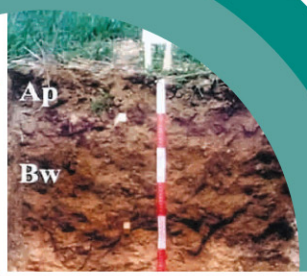


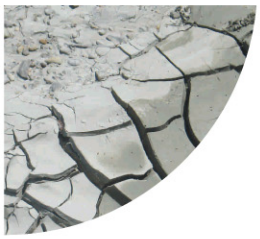

# ABSTRACT BOOK

## INTERNATIONAL SOIL SCIENCE CONGRESS on "MANAGEMENT of NATURAL RESOURCES to SUSTAIN SOIL HEALTH and QUALITY"

Ondokuz Mayıs University
Samsun -Turkey
May 26 - 28, 2010

Editors
Dr. R. Kızılkaya - Dr. C. Gülser - Dr. O.Dengiz

Organized by

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**International Soil Science Congress**
**on**
**"Management of Natural Resources to Sustain Soil Health and Quality"**


**Ondokuz Mayis University**
**Samsun -Turkey**

# BOOK OF ABSTRACTS

http://www.soil2010.omu.edu.tr

This Abstract book has been prepared from different abstracts sent to the congress secretary only by making some changes in the format. Scientific committee regret for any language and/or aim-scope.

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**PREFACE I**

This book contains the abstracts of papers that were selected for presentation at the International Soil Science Congress (ISSC) on "Management of Natural Resources to Sustain Soil Health and Quality" Samsun-Turkey, May 26-28, 2010. Except for the abstracts of 5 invited presentations included in the beginning of the book, all were voluntary submissions for oral or poster sessions. In preparation for the congress, the response vastly exceeded our expectations: we received more than 325 voluntary submissions from 37 different countries of the world. The abstracts were sent to the respective ISSC scientific committee members for their scrutiny and decision on their acceptability for oral or poster presentations. The final selected abstracts were then edited for uniformity in length (maximum 400 words), presentation format, and language.

The abstracts in this book cover fundamental aspects, technical approaches and the related areas of soil science. This book contains the following topic categories:

I. Soil Physics and Chemistry
II. Soil Ecology, Biology and Biochemistry
III. Soil Pedology, Classification and Mapping
IV. Soil Fertility and Plant Nutrition
V. Land Degradation, Management and Conservation
VI. Soil, Water Pollution and Remediation
VII. Soil Health and Quality
VIII. Sustainable use of Natural Resources in Agricultural Ecosystem

This book of abstracts will remain the only source of reference. Some selected presentations by the scientific committee will be developed as full-length journal articles for the special issues of Anadolu Journal of Agricultural Sciences. But, for the majority of the full-length articles that may not be published in this journal, will be published in a proceedings book after the congress. The proceedings book will also be made available to congress participants as a CD, and the full-length articles will be posted on the congress web-site (http://www.soil2010.omu.edu.tr), and retained for several months after the congress. This book of abstracts represents the collective endeavor of hundreds of researchers, students and others interested in soil science and natural resources around the world. We trust that it will be useful as a source for the state of knowledge and practice of soil science.

Compiling the congress involved the efforts and hard working of a number of individuals. We wish to express our sincere appreciation to Prof. Dr. Hüseyin AKAN, president of Ondokuz Mayıs University, Turkish Soil Science Society, Samsun Metropolitan Municipality, Soil and Water Resources Research Institute in Samsun, Samsun Province Private Administration, and the other sponsors for the congress. Finally, we sincerely thank all the invited speakers, scientific committee members, authors and participants without their cooperation and timely inputs this congress would not have been possible.

Rıdvan Kızılkaya, Ph.D
(Congress Secretary)

Coşkun Gülser, Ph.D
(Congress Secretary)

Orhan Dengiz, Ph.D
(Congress Secretary)

**PREFACE II**

Civilization is often influenced by the soil quality and the kinds and quality of plants and animals grown on them. As one of the most important natural resources, soils have almost leaded great civilizations. While soil destruction or mismanagement was associated with the downfall of some civilizations, good soils had helped to build them.

The Soil Science Society of Turkey (SSST) was founded by the leadership of Prof.Dr. Kerim Ömer Çağlar in 1964. The objectives of the SSST are to bring people together to share and support their knowledge, experiences in the soil science. The SSST as a member of the International Union of Soil Science has more than 750 members and organized 19 scientific meetings, national and international levels biennially. The International Symposium series was started with the first meeting "M. Şefik Yeşilsoy Interational Symposium on Arid Region Soil" organized by SSST in 1998. Since then, the SSST has been struggling with national and worldwide problems faced by the producers and researchers through 6 international scientific meetings organized in every two years. The goal of these symposiums stimulates international scientific interactions in soil science. 20th International Symposium "Management of Natural Resources to Sustain Soil Health and Quality" is gong to be held in Ondokuz Mayis University in Samsun, Turkey, May 26 – 28, 2010.

SSST Board believes that the oral and poster presentations, discussions and recommendations given during this congress will support valuable information to soil scientists for their future activities. We would like to give special thanks to Organizing and Scientific committee for their excellent efforts to develop this Congress and Governer and Mayor of Samsun City, President of Ondokuz Mayıs University, for hosting the Congress and for the immense facilities they have.

Prof.Dr.Ayten Karaca
President, Soil Science Society of Turkey

Up to now, all these international meetings organized by SSST are given with date and locations as follows;

**19th International Meeting on Soil Fertility and Agroclimatology**
29 October-1 November, 2008
Kuşadası, Aydın, Turkey

**18th International Soil Meeting (ISM) on Soil Sustaining Life on Earth, Managing Soil and Technology**
May 22-26, 2006
Şanlıurfa, Turkey


**17th International Soil Congress (ISC) on Natural Research Management for Sustainable Devolopment**
June 7-10, 2004
Erzurum, Turkey


**16th International Conference on Sustainable Land Use and Management**
10-13 June 2002
Çanakkale, Turkey

**15th International Symposium on Desertification,** June 13-17, 2000, Konya, Turkey
**14th M. Şefik Yeşilsoy International Symposium on Arid Region Soil**
September 21-24, 1998, İzmir,Turkey

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# LOCATION

Samsun, located between the Kızılırmak and the Yeşilırmak Rivers, is a modern industrial city that has served as a major port in the middle of Black Sea coastline of Turkey for centuries. Although Samsun was founded as the colony Amisos by settlers from Miletus in the 7th century BC, the first human traces were found in the cave-castle settlements of Tekkeköy dating back to the Palaeolithic Age. The Kızılırmak basin shelters many pre-historic assets in its unique environment. Asar Castle, thought to be dated to around 1000s B.C., and Paphlagonia Rock Tombs are just the two such examples. During the excavations carried out around Samsun and the work continuing in the Baruthane Tumulus, many artifacts were brought to light which are exhibited in the Samsun Museum of Archaeology and Ethnography. Invaluable findings unearthed at the excavations of the ancient city of Amisos in 1995 are also among the unique items on display in the museum. Samsun found itself at the center of Turkish War of Independence on May 19, 1919 when Atatürk landed here to organize the defense of Anatolia. Samsun has many natural riches. These include its vibrant green forests and plateaus, a long coastline with unique sand, and the Kızılırmak and Yeşilırmak Rivers. It has thermal waters, especially the Havza Thermal Springs, and the Kızılırmak basin which shelters approximately 320 bird species, and the Ladik District offering many tourism activities. Thanks to its landscape, Samsun also provides great opportunities for sporting activities such as paragliding, water sports and trekking. If you want to take a deep breathe of our history and to appreciate the myriad hues of green and blue which its unique landscape offers, visit Samsun, the gateway to the Black Sea Region. More infos at:http://www.samsunkulturturizm.gov.tr

The International Soil Sciences Congress will take place at the Ondokuz Mayis University in Samsun, Turkey. Ondokuz Mayıs University is a modern regional state university with faculties and schools spread across Samsun and 8 countries established in 1975. Ondokuz Mayıs University is located in Samsun, the largest city on the Black Sea coast in the North of Turkey, with a population of approximately 1.2 million. Samsun is a major commercial port, an industrial and agricultural city.

The University is situated in a land of 8,500 acres with a view of the Black Sea on the one side and a view of the Kocadağ Mountain on the other side. It is comprised of 10 faculties, 2 schools, 9 vocational schools, 4 graduate schools and 12 study and research centers and one conservatoire. Ondokuz Mayis University has 151 different departments and programs with about 21000 undergraduate and 2000 graduate students in the above mentioned schools. The university provides educational services in 10 faculties, which consists of Faculty of Medicine, Faculty of Engineering, Faculty of Dentistry, Faculty of Arts and Sciences, Faculty of Agriculture, Faculty of Theology, Faculty of Education, Faculty of Economics and Administrative Sciences, Faculty of Veterinary Sciences and Faculty of Law. The graduate schools are Social Sciences, Natural Sciences, Health Sciences and Fine Arts. More infos at: http://www.omu.edu.tr

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**Prof.Dr.Hüseyin Akan**
President, Ondokuz Mayıs University

## WELCOME SPEECH

I would like to welcome you to the International Soil Science Congress on “Management of Natural Resources to Sustain Soil Health and Quality”. I would like to welcome you also in Turkish, “Hoşgeldiniz”. It is a great honor and pleasure for me to be with you here in Ondokuz Mayis University, Samsun at the heart of Black Sea Region.

Coming from a medical background, it is interesting for me to learn that soil also needs health. It is nice to know that some of us are working to preserve and care about the health of soil, especially nowadays in which everyday human being finds new ways to damage and pollute the environment. It seems that a clean and healthy soil is a must for agricultural production. Indeed from a consumer point of view it may have also importance for “from farm to fork” concept.

I would like now to give brief information about my University. Ondokuz Mayis University was established in 1975 and has 10 faculties including Faculty of Agriculture, 3 schools, 9 vocational schools, 5 graduate schools and 12 study and research centers and one conservatoire. We have around 24 000 undergraduate students and 2000 academic staff. Our university is within the top ten state universities of Turkey. Ondokuz Mayis University contributes not only to the educational progresses but also to the social and cultural life of Samsun. We have recently established a new technopark to increase collaborations between industry and university to solve problems of industry. We believe that such activities of our academic staff will increase their contribution also to the global science.

I hope this congress will provide a great chance for every one of you to have discussions and exchange of views with each other on this important topic of Management of Natural Resources to Sustain Soil Health and Quality.

Finally I would like to thank the Organizing Committee, wish you fruitful discussions.

# WELCOME SPEECH

**Prof.Dr.Mehmet Kuran**
Dean of Faculty of Agriculture,
Ondokuz Mayıs University

I would like to welcome you to the International Soil Science Congress on "Management of Natural Resources to Sustain Soil Health and Quality". We are very happy to host you here in Ondokuz Mayis University. As the Dean of the Faculty of Agriculture I would like to give you brief information about our faculty and also agricultural production in Turkey. Our faculty was established in 1976 and one of the 3 founder faculties of OMU. It has 9 different departments within the faculty ranging from animal science to plant protection including Soil Science department. We have around 115 Academic staff, 850 undergraduate students and 130 graduate students.

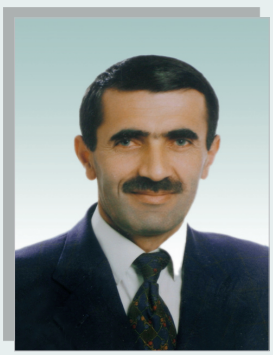
Members of faculty carry out researches on the regional agricultural matters. As you may already know Turkey is within the top ten of the world in terms of the most of main agricultural products. For example Turkey produces around 70% of world hazelnut production. Of this, approximately 80% is produced in Black Sea Region. These values indicate that in terms of production level, performance of Turkish farmers is quite adequate. However we know that still we are far from perfection in terms of so many steps of production starting from preserving soil quality, product quality and providing the desired needs of markets. Therefore I believe your experimental results and exchanging views are very important for us and also for other developing parts of the world. Only with this kind of activities, scientific community can help to sustainable development of the countries.

All we are aware of the fact that natural resource management has vital importance to preserve natural resources including soil, biodiversity and environment for the use of our grand-sons and -daughters, our next generations. For developing countries across the world, as for Turkey, natural resources are the main driving force for the economic growth and development. Therefore your studies and discussions are important to find ways to reduce the pressure on natural resources and maintain soil health and quality. Without these there would be no survival on the earth. So, this Soil Science Congress, I hope, will provide every attendee an opportunity to share knowledge and experience, to share new ideas and also to transfer technologies in sustainable use of natural resources.

I know that more than 320 contributors from 37 different countries have submitted their research results to this great congress and it is a great honor for us to have more than 350 attendances for this congress. I hope this congress will provide a great chance for every one of you to have discussions and exchange of views with each other on this important topic of Management of Natural Resources to Sustain Soil Health and Quality.

During the congress please feel free to ask any member of the organizing committee for us to make your stay comfortable. I hope that you will enjoy your stay in Turkey and have a memorable time here.

Finally I would like to thank Organizing Committee for their efforts to realize this Congress and wish you success and very fruitful discussions during the congress.



**Prof.Dr.Nutullah Özdemir**
Chairman of the Congress

## OPENING SPEECH

Dear Governor and Mayor of the City, President and Deans of the University, Distinguished Scientists, and the Member of Media.

It is great honor and pleasure for me to be here with you. I am very pleased to welcome you to the International Soil Science Congress on "Management of Natural Resources to Sustain Soil Health and Quality".

Soil is the interface between aquatic, atmospheric and terrestrial ecosystems and a basic medium for production of food for the rapidly expanding human population.

Human activities have mostly un-restorable reshaped natural resources in the world. Intensive and improper use of natural resources has resulted in the soil pollution, erosion and degradation. Soil degradation is aggravated with intensive use of farm machinery and chemical inputs, such as chemical fertilizers and pesticides in the agriculture. Management of soil quality and health is the key to development of sustainable agriculture. Soil quality is a function of various soil physical, chemical and biological components, and influence plant growth, regulation of water and nutrient availability and element fluxes, air and water composition.

This is a multi-disciplinary congress and covers a broad range of topics on soil and environmental sciences. The international soil science congress has received considerable international attention from around the world. The total number of abstracts received was more than 325 from 37 different countries. We hope that the oral and poster presentations, discussions and recommendations done during the meetings will give valuable information for soil and environmental scientists.

On behalf of the organizing committee, I would like to thank all participants from all over the world. I also thank to Governor and Mayor of the Samsun City, President of Ondokuz Mayis University for hosting the congress and the facilities.

# Abstracts of Congress

# Abstracts

## IV. SOIL FERTILITY AND PLANT NUTRITION

## VI. SOIL, WATER POLLUTION AND REMEDIATION


**Ondokuz Mayis University**
**Samsun -Turkey**

# Keynotes

Keynotes

International Soil Science Congress on
"Management of Natural Resources to Sustain Soil Health and Quality"

Ondokuz Mayis University / Samsun - Turkey / May 26 - 28, 2010

# Soil Quality: What do we measure and how do we use the information?

**S. Nortcliff**

**Secretary General , International Union of Soil Sciences,**
**University of Reading, Department of Soil Science, Reading, RG6 6DW, United Kingdom**

## Abstract

The notion of soil quality has been in the soil science literature for many years and in the last decade it has also become part of many of the national and supra-national policies addressing environmental regulation and protection. There is considerable appeal, particularly to the non-soil scientist, in particular environmental policy makers and regulators in being able to summarise the nature of a soil with reference to an index and on this basis compare with other soils. Whilst this sort of comparison has always been possible using soil survey units, the notion of a soil quality index has much wider appeal because it is perceived that it requires less knowledge and interpretation to use it. This assumption of 'simplicity' has often resulted in inappropriate use of these indices. A necessary question is 'are the soil quality indices fit for purpose?'. This paper will briefly review the development of indices of soil quality, the underlying principles guiding their development and consider how they have been used, particularly focusing on environmental regulatory contexts. The paper will then review where knowledge of soil quality may be useful and consider what are the soil information requirements to meet these uses? Are we perhaps expecting too much information to be provided by our indices of soil quality? Is it possible to have a single Soil Quality Index or do we need to develop suites of indices appropriate for particular purposes. If multiple indices is the approach how do we synthesis this information to provide a multi-purpose comparison?

**Key words :** soil quality; environmental policy; environmental regulation

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International Soil Science Congress on
"Management of Natural Resources to Sustain Soil Health and Quality"
Ondokuz Mayis University / Samsun - Turkey / May 26 - 28, 2010

# Organic natural nanoparticles versus manufactured nanoparticles in soil pollution and remediation

**N. Senesi**

**European Confederation of Soil Science Societies, President**
**University of Bari, Department of Agroforestal and Environmental Biology and Chemistry, Bari, Italy**

## Abstract

Humic substances (HS) are recognized to be the most widespread and ubiquitous components of natural nonliving organic matter (NOM) in the global environment. The estimated level of soil organic carbon (SOC) on the earth surface occurring as HS is 30 x $10^{14}$ Kg. In particular, approximately 60-70 % of the total SOC has been estimated to occur in HS. These substances consist of a physically and chemically heterogeneous mixture of relatively high-molecular weight, yellow to black organic compounds of mixed aliphatic and aromatic nature, formed by secondary synthesis reactions (humification) of products of the microbial and chemical decay and transformations of biomolecules released from organisms into the surrounding environment both during life and after death. The HS are universally recognized as the most relevant and chemically, biologically and physically active components of NOM thanks to their typical composition, macromolecular structure, polyfunctionality, surface properties, presence of multiple reactive sites, variable sizes and shapes, and intrinsic porosity. Further, several studies have demonstrated that HS are able to interact efficiently with various organic pollutants (OPs) in soil through various mechanisms and processes, among which the most important is adsorption, and that this action is increased markedly upon addition to soil of organic amendments rich in HS, such as composts. Nowadays, manufactured (or synthetic) nanoscale materials (nanoparticles, NP) are increasingly used, or proposed to be used, for soil decontamination by adsorption/trapping of various OPs. This, thanks to their appropriate average dimensions (ranging from 1 to 100 nm), high porosity and hydrophobic surfaces. However, the ascertained toxicity to organisms of these engineered NPs is posing increasing serious concerns for human and environmental exposure. Based on the intrinsic chemical and physical properties of HS, including the average size (from about 1 nm to 1000 nm) and the typical cross-linked spatial networks containing highly-branched polymer chains exhibiting fractal features, HS can be qualified as natural NPs in the environment. In the first part of this presentation specific properties of HS which support their NP nature will be highlighted. In the second part, some comparative results will be discussed on the adsorption efficiency for selected OPs of various types of

soils added with either a compost rich in HS or with a selected NP. Four different soils with various content of SOC and different chemical properties have been considered, and adsorption of the polycyclic aromatic hydrocarbons (PAHs) pyrene and fenantrene, two very common OPs, has been measured comparatively on each original soil, and on the soil added with either 1% of a compost rich in HS or 5% of the NP fullerene. Results show that: (a) in any case, the adsorption data best fit into a Langmuir-type isotherm, which means that a maximum of adsorption, i.e., saturation, is reached by filling all available vacant sites; (b) as expected, the adsorption capacity for the two PAHs of the three soils, either in the absence or the presence of compost or fullerene, is a function of their original content in SOC; (c) for any soil, the values of adsorption distribution coefficients for pyrene and fenantrene, which are an indication of the adsorption capacity of the substrate for the PAHs, increase in the order: original soil<soil+fullerene<soil+compost. These results indicate that the content of native SOC is the most important factor influencing the adsorption capacity of soil for PAHs, even if additional powerful sorbents, such as compost or fullerene, are added. However, the addition of either a source of HS, such as compost, or an engineered NP, such as fullerene, is able to enhance at various extent the adsorption capacity of soil for PAHs. More important, the HS-rich compost appears more efficient than fullerene in enhancing the adsorption capacity of soil for pyrene. Thus, the compost amendment practice could be preferred to the application of engineered NPs to soil for OP remediation purposes.

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# A computer program for E-DiGOR model

**M. Aydın [1], V. Polat [2]**

[1] **Mustafa Kemal University, Faculty of Agriculture, Department of Soil Science, Hatay, Turkey**
[2] **Çukurova University, Vocational School of Adana, Adana, Turkey**

## Abstract

A computer program has been developed for E-DiGOR [Evaporation and Drainage investigations at Ground of Ordinary Rainfed-areas] model described by Aydin, M. [Ecological Modelling 217: 148-156, 2008].
The E-DiGOR model adequately represents the physical processes important in estimating actual evaporation and drainage losses from bare soils as well as water amount in the soil profile. The model is useful for quantifying these components of soil water balance with a few parameters, and for the descriptions and predictions of the past, present and future dynamics if climate data are available. Although physical credibility of the model is quite high, a consistent set of values suitable for the calculations are required. The input variables of the model are climate data (sunshine duration, air-temperature, relative humidity, wind speed and rainfall) and soil properties (albedo, tortuosity, average diffusivity for drying soil, volumetric water content at field capacity, profile depth, initial water content of the profile) to account for specific soil–climate combinations.
The computer program developed is a useful tool for a fast and precise simulation since the volume of involved calculations is considerably high, thus giving rise to a versatile and functional implementation of the E-DiGOR model. From this stage, the model can be simultaneously employed for the simulation of water balance and commonly used in rainfed-areas at the worldwide. The outputs of the model will not only improve our understanding of the physical processes controlling soil water losses but also provide valuable information of risk assessment and management for soil and water resources. These results may set the basis for prevention of water losses through evaporation and drainage from bare soils and adoption of an effective management strategy for soil water, particularly, under fallow conditions. The computer program has been developed as a Delphi application, written in Object Pascal. The program can be obtained on request.
**Key words :** computer program, E-DiGOR model, soil water balance

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# Eco-function of rhizospheric microorganisms

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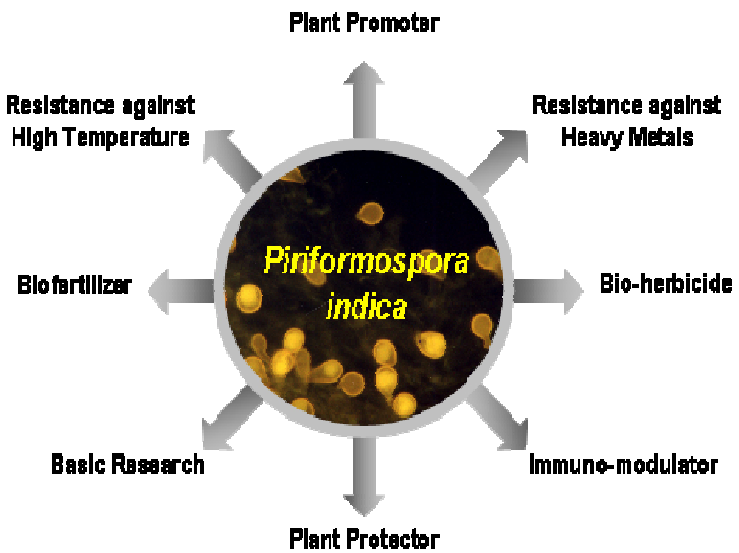
## Abstract

An axenically culturable mycorrhiza-like-fungus has been recently described by Varma (JNU, New Delhi) and his collaborators. It was originally found along with arbuscular mycorrhizal spores from the rhizosphere soil samples of spineless cacti and *Cenchrus* sp (desert grass) growing in North-West Rajasthan. The fungus was named *Piriformospora indica* based on its characteristic pear-shaped chlamydospores. According to the analysis of 18S rDNA and the ultrastructure of the septal pore, its phylogenetic relationship within the Hymenomycetes (Basidiomycota). A symbiotic fungus-*Piriformospora indica* is a potential candidate to serve as biofertilizer, bioprotector, bioregulator, bioherbicide/weedicide, combats environmental stresses (chemical and physical) and an excellent source for the hardening of the tissue-culture raised crops/plants. *P. indica* tremendously improves the growth, overall biomass production of a large number of plants with economic importance. Pronounced growth promotional effect was also seen with terrestrial orchids. The fungus promises to be a potential orchid mycorrhizal fungus. The functions of the fungus are illustrated in the following stylized diagram.

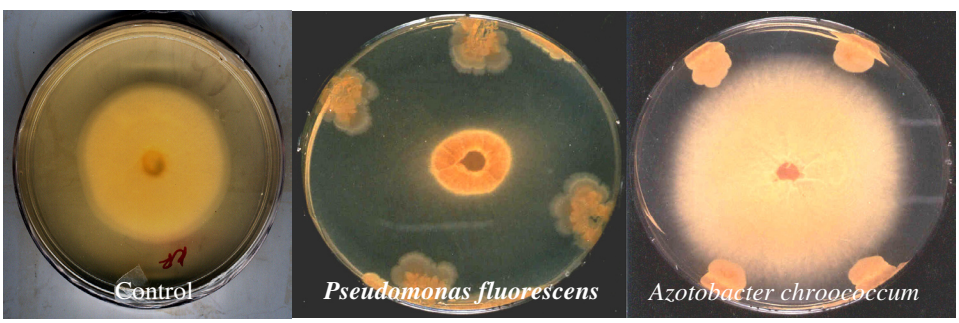



The properties of the fungus, *Piriformospora indica*, have been patented (Varma A and

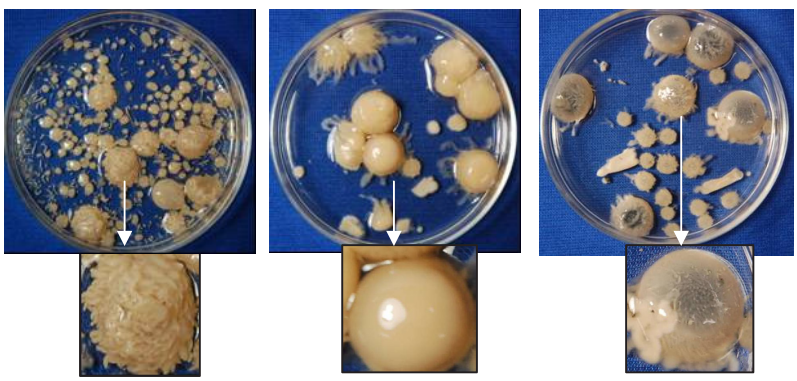
Franken P, 1997, European Patent Office, Muenchen, Germany. Patent No. 97121440.8-2105, Nov. 1998) and the 18s rDNA fragment has been deposited in GenBank, Bethesda, USA. The culture has been deposited at Braunsweich, Germany (DMS No.11827) and National Bureau of Agriculturally Important Microorganisms (NBAIM), Mau, Uttar Pradesh.

*In vitro* studies were made between *P. indica* and PGPRs on defined solidified medium. All the species of *Pseudomonas* tested inhibited the growth and development of *P. indica* while other PGPRs like *Azospirillum* spp, *Azotobacter chrococcum, Bradyrhizobium* spp. showed no inhibition of the fungus. The studies clearly demonstrated that there is intense communication at molecular level between the rhizobacteria and fungus.

*In vitro* studies have indicated that *Ps. fluorescence* inhibited the growth of *P. indica*, whereas *Azotobacter chroococcum* promoted the overall growth of the fungus The inhibitory mechanisms carried out *Ps. fluorescence* could be due to: production of ammonia, siderophore, HCN, antibiotic (s), antifungal metabolites, cell wall degrading enzymes viz., cellulase, hemicellulase, pectinase, chitinase etc. The inhibitory effect may be severely affected morphology of fungal hyphae and the sporulation. It may be of hyphae lysis and restricted growth also. In contrast, *Az. chroococcum* enhanced the overall growth of *P. indica* while incubating on solid agar or broth media. The promotional effects are highlighted by tremendous enhancement in the size, shape and width of hyphae and spores. It is possible that *Az. chroococcum* produces phytohormone (s), which resulted in such significant enhancement.




The growth of the fungus can be considerably enhanced while interacting with nanoparticles like Carbon Nanotubes and Titanium oxide. This has relevance towards commercialization of the fungus for practical applications.



Control Titanium oxide Carbon Nanotubes

In general, the rhizospheric microorganisms promote and counteract the inhibitory effects of some rhizobacteria and render a positive help to terrestrial plants. *P. indica* serves a model organism for exploring the mechanisms involve the interaction between the plant and microorganisms. The physiology, biochemistry and molecular basis of the interaction need a critical appraisal.

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# Combating desertification through management of water in drylands

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## Abstract

A fundamental factor for managing and maintaining the susceptibility of drylands is the efficient use of available water. Because of land degradation and pressure on the water resources of the drylands, practical tools and techniques are needed for a more efficient use of the rainwater. For this purpose the soil water storage can be increased; small hydraulic structures can be installed to collect the runoff water; or the runoff water can be collected behind groundwater recharge structures, with recharge wells enhancing the runoff water to infiltrate directly to the groundwater table. Those techniques are illustrated for drylands in different parts of the world.

In Tunisia, the indigenous 'jessour' terraces and groundwater recharge systems were installed. It was found that the *CCR* (*Catchment to Cropping area Ratio)* should be larger than 7.4 in order to provide sufficient amounts of runoff water to enter the terrace for the cultivation of olive trees and this for an 'average' annual precipitation of 235 mm.

For the replenishment of the Zeus-Koutine aquifer, several recharge wells, consisting of two concentric tubes with a gravel filter in between, were drilled.

Runoff water is also collected and stored in stone-faced underground cisterns, of various sizes, called *majel* and *feskia.*

In China a field experiment was set up in the semi-arid region of the loess plateau to evaluate different tillage practices (no-till, reduced tillage, conventional tillage and subsoiling) on their effect on increasing the water storage in the soil. Subsoiling (with stubble mulch) resulted in the highest increase in water storage during the fallow period so that more water was made available to the winter wheat during its growing stage

On the Cape Verde Islands, with low annual rainfall (100-500 mm) three land use systems were compared. Two catchments without soil and water conservation systems, one with traditional agriculture (maize and beans), the other with natural vegetation, were compared with a catchment afforested with tree species where runoff absorption bench terraces and micro catchments were installed.

In the semi-arid region of Northern Chile rainfall simulations were carried out on slopes of 6

different locations allowing estimating the dimensions and spacing between infiltration trenches.

**Key words :** Cape Verde, catchment, Chile, China, cistern, drylands, infiltration trench, jessr, terrace, Tunisia, water harvesting, water storage

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Soil Physics and Chemistry

# Soil Physics and Chemistry

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# Effects of chemical fertilizer and different organic manures applications on soil pH, EC and soil organic matter content

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## Abstract

The experiment was carried out in order to examine the effects of chemical fertilizer and 3 different organic manures including farmyard manure (FM), chicken manure (CM) and blood meal (BM) on soil pH, EC and soil organic matter (SOM) during three successive cabbage growing seasons, called autumn 1, spring and autumn 2 as well. All applications showed different responses on soil pH, EC and SOM and some of which were found to be statistically significant in the each season. Chemical fertilizer, blood meal (BM) and chicken manure (CM) application gave rise to a decrease in soil pH, whereas farmyard manure (FM) caused soil pH to increase. Soil EC were influenced by the applications to some extent and chemical fertilizer brought about the highest soil EC level in the each season. Farmyard manure (FM) application had positive effects on SOM more than the others. As a result, each application reacted differently depending on the seasonal conditions and the treatments containing farmyard manure (FM) and chicken manure (CM) was found more effective, but blood meal (BM) application was recommended being used within a mixture and also small quantities because of having some undesired features such as having bad smell and also application difficulty.

**Key words :** organic manure, chemical fertilizer, seasons, soil properties

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# The effect of rye green manure application with Nitrogen fertilizer on soil available water capacity in Maragheh dry land condition

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## Abstract

Soil moisture limits crop production potential in semiarid regions thus it's important that improve soil water retention capacity. for this reason Under dryland condition with the aim of investigating the effects of rye green manure application in dryland wheat rotation with 4 levels of nitrogen fertilization (0, 26, 103 and 337 kg N $ha^{-1}$) on soil moisture indexes, this study was carried out in 6 years (2000-2006). Nitrogen fertilizer application with green manure in order to decreasing of C/N ratio for best activation of soil microorganism accelerated these effects. Relationships between C/N ratio and soil moisture indexes were evaluated with regression model. Results showed that the effects of green manure application were significant on the soil bulk density and soil moisture indexes such Filed Capacity and Permanent Wilting Point. Highly Available Water Capacity and lowest soil bulk density obtained in C/N=20 ratio treatment. There are significant relationships with highly correlation coefficient between the levels of C/N ratio and soil moisture indexes that explains the nitrogen application effects with rye green manure on the soil available water capacity.
**Key words :** rye green manure, nitrogen fertilizer, available water capacity, dryland condition

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# Comparative dielectric behaviour of Sai River Soil : Pre Monsoon Verses Post Monsoon

**R. Bajpai, V.S. Chandel**

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## Abstract

The present paper discusses the complex impedance data for 16 samples (8 pre monsoon and 8 post monsoon) collected from four different places of river Sai (A subsidiary to Gomti river) between the frequency range of 1 kHz to 40 M Hz and temperature range from room temperature to 50°C. In the paper dielectric data have been compared for the pre monsoon and post monsoon samples. In addition to this penetration depth and emissivity of the soils have also been discussed.
**Key words :** Complex impedance, penetration depth, emissivity

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# Soil thermal properties determination by inverse modeling

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## Abstract

Soil temperature is a significant factor which affects the retention and movement of water in the soil, surface soil moisture, soil aggregation, soil aeration, chemical reactions that occur in the soil, the availability of the plant nutrition elements in the soil, germination of the seeds, plant root development and microbiological activity, etc. Knowledge of the soil thermal properties is a major requirement in soil science, agriculture, micro-meteorology and in various areas of agricultural engineering. The aim of the present research is to determine the thermal properties of the soils in the Çumra Plain of Konya by means of a mathematical model using the inverse modeling method. The inverse modeling is a general method to determine the unknown properties on the basis of investigations of their effects. The method of inverse modeling is applied for investigation soil thermal properties: soil thermal diffusivity and soil thermal conductivity. The data of the soil temperature dynamic along the profile depth are used as input data for thermal properties determination. The new mathematical model and computer program are developed for calculating soil thermal properties for different soil horizons and its dependence from soil moisture content. It is found that a reasonable soil thermal properties is important for an accurate predication and assessment of soil thermal regime.

**Key words :** soil, thermal properties, thermal diffusivity, inverse modeling

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# The effect of rye green manure application with nitrogen fertilizer on soil aggregate stability and water infiltration rate to soil in Maragheh dry land condition

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[2] Dryland Agricultural Research Institute (DARI), Maragheh, Iran

## Abstract

Aggregation affects erosion, movement of water and plant root growth. Desirable aggregates are stable against rainfall and water movement. thus an experiment was conducted under rainfed dryland condition to determine the effects of rye green manure application along with different levels of nitrogen fertilization in rotation with wheat production, on the soil aggregate stability and soil water infiltration rate. This study was carried out with or without rye green manure along with 4 nitrogen fertilization levels (0, 26, 103 and 337 kg N $ha^{-1}$) in 3 rotation system (green manure-wheat) between 1999-2007 years. Results showed that the green manure application effects were significant on the soil aggregate stability among the 1-2 mm diameter aggregates. Study on the soil aggregate distribution and abundance with different size 0.25 – 8mm diameter showed that green manure had a significant effect on the distribution of 0.375mm diameter particle respect to other investigated particle. This particle abundance decreased with increasing the C/N ratio. Our results also showed that green manure application had significant effect on soil water infiltration rate in dry land condition. Higher and lower infiltration rate was belong to C/N=36 and C/N=20 treatments respectively at 30 min, among the soil water infiltration predictable model, adjusted Kostiakov model was determined as a best model for it's higher R squire ($R^2$ = 0.90) and lower standard error (SE=0.30). that could predict about 90 % of variation in soil water infiltration rate in all of the treatments in this study.

**Key words :** rye green manure, aggregate stability, water infiltration rate and dry land condition

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# Effects of aggregate size on compressive behaviour of soil

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## Abstract

Soil compaction is the most significant mechanisms of land degradation. Soil compressibility and the soil bulk density are affected by aggregate size distribution of soil. The objective of this study was to determine effects of aggregate size on compressive behaviour of soils with different textures. The study was conducted in two surface soil samples (0-20 cm); one was coarse textured (Sandy loam-SL) and the other was fine textured (Silt loam-SiL). We discuss the influence of the sizes of aggregates on soil compaction. Aggregates were separated into three different aggregate size groups (4.0-2.0 mm; 2.0-0.84 mm and <0.84 mm) by dry sieving. Soil compaction characteristics were determined for each aggregate size group. The dry bulk density values of the SL and SiL soils for each aggregate size group were determined at three different soil water contents (SWC) and compaction efforts. The saturated hydraulic conductivity of the SL and SiL soils for each aggregate size group was also determined under three different compaction efforts for saturated condition of soil water content. The maximum dry bulk density values of aggregate size groups of the SL soil were significantly higher than those of the SiL soil, but the optimum water content values of the SiL soil were significantly higher than those of the SL soil. The dry bulk density and saturated hydraulic conductivity values of the SL soil were significantly higher than those of the SiL soil.

**Key words :** soil aggregate size; soil compaction; dry bulk density; saturated hydraulic conductivity

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# Physical properties of soddy- podzolic soils under long-term field experiment

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## Abstract

The fundamental physical properties of sod-podzolic soils under long-term field experiment were studied. The results showed that these properties have not changed significantly under the influence of nearly 100 years of liming, chemical and organic fertilization. The significant differences of approximation parameters of dependence penetration resistance from soil moisture content indicated that the application of manure increased interparticle contacts within the studied moisture range. This approximation parameters allow to affirm the significant increase interparticle forces by decreasing moisture content in the control and lime treatments compared with the others ones that resulted from the sand fractions increasing in granulometric composition of control treatment soils and aggregation of particles due to the influence of lime (lime treatment).

**Key words :** soil physical properties, sod-podzolic soils, long-term field experiment, aggregate strength, penetration resistance

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# Effects of leonardite on of Pb and Zn sorption/ desorption in soils with different parent materials

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## Abstract

Adsorption and desorption of heavy metals is one of conseqential processes in soil chemistry. Clay minerals, iron and manganese oxides and soil organic compounds have considerable effect on these processes. The aim of this study was comparison of leonardite effect on adsorption/desorption reactions of heavy metals in three soils different in parent materials. Surface soil samples were collected from different soil parent materials including Calcite, Siyenite and Gabro derived in Akpınar-Kırşehir province located in the central of Anatolia Turkey. Soil physical and chemical properties were determined through standard methods, clay mineralogy characteristic identified by X-ray diffraction method (XRD). Adsorption/desorption reactions of Lead (Pb) and Zinc (Zn) were done in three leonardite levels including 0%, 2% and 5%. Adsorption data was prepared using Pb $(NO_3)_2$ and Zn $(NO_3)_2$ with concentration between 100-1200 $mgl^{-1}$ and 25-400 $mgl^{-1}$, respectively. Also desorption studies were carried out using Ca $(NO_3)_2$ 0.01M solution on the same samples. Maximum Adsorption (Qmax), bonding coefficient (b) and adsorption capacity (Kf) were calculated from fitted linear Langmuir and Frundlich equations. X-ray diffraction results showed that smectite (3.55%), illite (24.6%), kaolinite (21.2%) and smectite (48.4%) and vermiculite (41.3%) and montmorilonite (86%) were dominant clay minerals in Siyenite, Calcite and Gabro samples, respectively. Clay percent and type with CEC values were positively related. Adsorption data were fitted well with Langmuir and Freundlich equation models with high correlation. The results showed different behavior of leonardite in adsorption and desorption of soil Pb and Zn which were completely related to clay mineralogy and soil physicochemical properties. Maximum adsorption of Zn calculated as 33.3, 33.3 and 1.43 mg g-1 in Gabro, Calcite and Siyenite-derived soils, respectively. Maximum adsorption for Pb was 20, 12.5 and 10 mg g-1 in Gabro, Calcite and Siyenite-dreived soil, respectively. These differences can be attributed to clay mineralogy and soil pH changes which was decreased with adding leonardite and increased trough lime solubization in siyenite and calcite derived soil, respectively. Furthermore, at high levels of leonardite, desorption of Zn and Pb was varied in different soils. Thus application of leonardite in contaminated soils for different purpose such as mobility or immobilization of heavy metals must be done owing to soil characteristics.

**Key words:** adsorption, desorption, clay minerals, leonardite, lead, zinc

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# Assesment of neuropack software package for deriving pedotransfer functions based on Iranian soils informations

**A. Haghverdii, B. Ghahraman**

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## Abstract

Modeling water flow and solute transport in unsaturated zone requires knowledge of soil hydraulic properties such as water retention curve. Indirect determination of these functions from basic soil properties using pedotransfer functions (PTFs) has attracted the attention of researchers in a variety of fields. Using of ANNs models for PTFs deriving is very usual. In this study efficiency of ANNs models with using Neouropack software package for 122 soil sample of north and north east of Iran was tested. Also the new functions that named so-called parametric PTFs in this research was tested. Result of parametric functions is better than point functions. The average of r and RMSE indicators in parametric functions are 0.93 and 0.032 and in point functions are 0.76 and 0.034. On the other hand so-called parametric functions improved the results of point functions with using the same informations for training. The average of r and RMSE indicators in so-called parametric functions are 0.95 and 0.026. It seems that increasing of samples in training phase and select the matric potentials as input are the most important factors in so-called parametric functions success.
**Key words :** pedotransfer functions, neuropack software package, water retention curve, North and North-East of Iran

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# Estimation and validation of soil hydrological parameters with SOILPAR 2.00 software

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## Abstract

Soil hydrological parameters are very important inputs in simulation models in water and soil science. But using direct measurement techniques for estimation these characteristics are time consuming and expensive. One of the exist important solutions to solve this problem is create a mathematical relationship between some of easily collected soil parameters, such as soil texture, bulk density and organic matter content., and the less readily soil hydraulic properties. This relationships call pedotransfer functions (PTFs). SOILPAR 2 is a software for estimating soil hydraulic parameters that provides 15 procedures (11 point PTFs and 4 parametric PTFs) to estimate soil hydrulic parameters such as soil water content at predefined soil matrix tensions And the parameters of well-known soil water retention functions Brooks-Corey, Hutson-Cass, van Genuchten, and Campbell. In this research we use SOILPAR 2 for estimation different soil hydraulic parameters in 122 soil samples of north and north-east of iran. Results showed that majority of procedures had a good and reasonable estimation of water content in different tensions. Also evaluation criteria of showed point PTFs had good performance in water content simulations in lower potentioal but parametric PTFs have reverse trend. In addition SOILPAR 2.00 is the good choise for soil hydraulic estiomation because it has many kind of famous PTFs and easy usage.

**Key words :** pedotransfer functions, SOILPAR 2.00, soil hydrological characteristics, North and North-East of Iran

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# Managing soil properties using a new composite polymineral

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## Abstract

On the basis of bentonite clays obtained a new, environmentally friendly, multipurpose soil improve poly-mineral composite and designed and implemented the technology of its manufacture. Composite is a powder varying dispersion (depending on destination) and has the following properties: (i) In contact with water swells, accumulating water to 100 times its volume; (ii) The process of accumulation and impact of water (swelling-drying) is accompanied by a transition from solid to gel-like state through an intermediate form. The number of cycles of swelling is practically unlimited; (iii) A full impact water takes the original solid state, does not lose properties after swelling, freezing, thawing and drying in the temperature range from - 40 .. $+100^0$C; (iv) Non-toxic, chemically resistant, does not dissolve in water, non-flammable; (v) Resistant to radiation, microbiological and climatic influences; (vi) Impact of water is osmotic way, i.e. by which plants extract water from the soil; (vii) Can contain dosed amount of trace elements, nutrients and fertilizers, which are paid together with the accumulated water; (viii) Can accumulate dissolved substances.

In order to establish areas of application KAVELASTA out comprehensive studies on the influence of additives on the properties of the composite soil and disperse inert materials, the mechanism of these mixtures, their efficiency, durability, etc. Even small amounts of KAVELASTA (up to 5% of exchange) significantly increase water storage and water-holding capacity of the mixtures with soil and inert material, increase the content of the productive moisture and prolongs the onset of moisture knitting, reduce permeability, increase adhesion, plasticity erosion control and stability that provides optimum water-air mode in the root thickness at the lowest cost of irrigation water and improving melioration properties. After making a composite of sand and sandy loam soils on its water-physical characteristics are identical to light and medium loams and even exceed their ability to accumulate water. Further increase in doses transforms primers and other dispersed materials in a completely watertight system on which you can get new and innovative high-performance waterproofing materials. These materials represent various compositional mixtures consisting of any local soils (gravel, sand, sandy loam, light loam, etc.), disperse inert materials and waste, and an appropriate quantity of the composite.

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# Partial effects of soil properties affecting on soil penetration resistance

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## Abstract

Soil penetration resistance affects on plant root growth and water and air movements into soil. The objective of this study was to determine direct and indirect effects of soil properties affecting on soil penetration resistance by the path analysis. The research area is located at the Eastern Anatolia Agricultural Research Institute (EAARI)-Ilıca Experimental fields. The experimental field was gridded with 80 m intervals in the E-W and N-S directions, and soil penetration resistance was measured at 72 intersections using a digital penetrologger. Soil samples from the upper and lower soil layers were also taken at the same points for determining physical and chemical soil properties. Soil moisture contents at the time of penetration measurements, sand, silt and clay contents, bulk density, aggregate stability, and aggregate size distribution, $CaCO_3$ content and organic matter content of soil samples were determined. The results of study indicated that the highest direct effect on the upper soil layer penetration resistance was aggregate stability (77.5%) and the lowest was soil organic matter (12.7%). But, the highest direct effect to subsoil layer compaction was bulk density (%76.8).

**Key words:** path analysis, soil compaction, penetration resistance

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# Defining spatial variability patterns of soil properties affecting on soil penetration resistance using geostatistical methods

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## Abstract

Soil compaction, an important soil degradation problem of cultivated lands, may cause severe yield losses as a result of limiting soil root growth. Site specific management practices are needed to reduce yield losses due to soil compaction. Therefore, it is very important to determine spatial distribution patterns of soil properties affecting on soil compaction. The objective of this study was to determine spatial characteristics and distribution patterns of soil properties affecting on soil compaction. The study site was the cereal production area of the Eastern Anatolia Agricultural Research Institute (EAARE)-Ilıca Experimental Station. The experimental field with a size of 44 ha was gridded with 80 m intervals in the E-W and N-S directions, and soil penetration resistance was measured at 72 intersections using a digital penetrologger. Soil samples from the compacted soil layer were taken at the same points for determining physical and chemical soil properties. Stepwise regression analysis was performed to determine soil properties affecting on soil compaction. Semivariogram and kriging analyses were used to define spatial characteristics and distribution patterns of the soil properties related to the soil compaction level. The distribution patterns of soil compaction and the spatial variability maps of soil properties were overlapped and the similarities were evaluated. Soil moisture content at the time of penetration measurements, bulk density, silt content and organic matter content of soil layer showed significant relationships with the compaction patterns.

**Key words:** soil compaction, penetration resistance, geostatistics, spatial variability

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# Similarity combinations in the spatial distribution patterns of soil properties

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## Abstract

Many soil properties show strong dependence to each other. The objective of this study was to determine the similarity combination percentages for the spatial distribution patterns of soil properties by overlapping the distribution maps using ArcGIS. The study site consists of 100 ha cultivated land, and it is located at the Eastern Anatolia Agricultural Research Institute (EAARE) - Pasinler Experimental Station. The research area was gridded with 100 m intervals in the E-W and N-S directions, and 68 soil samples from 0-20 cm surface layer were collected at the intersections of the grid system. Distribution patterns of the measured soil properties were obtained by the kriging analysis and overlapped to each other using the ArcGIS software. The results indicated that the highest values of soil organic matter and plant available phosphorus mostly matched with the areas low in sand but high in clay contents. Soil reaction (pH) was higher in clay-riched areas than sand or silt-riched areas.
**Key words:** spatial variability, distribution maps, soil properties, ArcGIS

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# Rapid prediction of available K content in soil using near-infrared spectroscopy

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## Abstract

Soil NPK testing has been widely used for fertilizer recommendation of annual crops. Soil analyses of available K content by chemical methods are sufficiently accurate, but they are expensive, time consuming and labour intensive. Recently, fertilization recommendation to the farmers is based on reduced number of soil samples due to high price of analyses. For this reason a rapid and cost-effective soil analysis is needed for soil quality assessment. Near infrared spectroscopy (NIRS) could provide a possible alternative. The objective of this study was to investigate the possibilities of NIRS for prediction of available potassium content in different soil units. A total 191 samples from four soil type- Chernozems, Vertisols, Luvisols and Fluvisols were analyzed for available K by conventional chemical method. NIR spectra of all samples were obtained by using an InfraAlayzer 450 spectrophotometer within the range 1445-2348 nm and portable FQA-NIRGun scanning spectrophotometer in shortwave NIR range from 600 to 1100 nm. SIMCA- soft independent modeling of class analogy was performed to classify samples, according to soil type. MLR and PLS regression were used for calibration models development for available K determination. The best model was obtained for samples of Chernozems with correlation coefficient R=0,94, standard error of calibration SEC=2,30 mg/100g, and the ratio of the standard variation of the reference data to the SEC, indicating the performance of the calibration RPD=3,1. Accuracy of determination of K content for models for separated soil units, developed by spectral data in short-wave NIR region, was better to accuracy of models, based on filter-type instrument in classical NIR region. Correlation coefficients for the global calibrations containing the samples of all soil units' decrease and SEC or SEP increase compared to calibrations for separate soil units. The values of R were between 0,76 and 0,79 and RPD were between 1,5-1,7 for the both calibration and test set. Calibration models for each soil type increase accuracy of determination of available potassium content.

**Key words :** near infrared spectroscopy, available potassium, quantitative determination

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# Comparison of Arya-Paris model and pedotransfer functions for prediction of soil water retention curve

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## Abstract

Soil water retention curve (SWRC) is an important property of soil and it is necessary for the study of plant available water, infilteration, modeling of water and solute transport in unsaturated soils. Due to difficulties and labor costs when measuring SWRC, it has become necessary to develop methods to describe the function utilizing readily available data, such as soil particle size distribution, soil texture, bulk density and organic matter content. Many empirical models and mathematical relationships have been developed to describe the soil water retention curve. The Arya-Paris (AP) physico-empirical model and regression pedotransfer functions (PTFs) are two methods which can reduce time and cost spending for direct measurement of soil hydraulic properties by estimating difficult soil properties from readily available data. The objective of this study was to compare the Arya-Paris model (based on particle size distribution) and pedotransfer functions for predicting soil water retention curve. For this purpose, 35 soil samples with different textures were collected from the eastern and the western regions of Guilan province in Iran. In estimating soil water retention curve by particle size distribution, scaling parameter (α) perform main role. In this study, α parameter was estimated by different methods in AP model. Accuracy of the predictions was evaluated by the coefficient of determination ($R^2$), the root mean square error (RMSE) and mean error (ME) between the measured and predicted parameter values. The results showed that linear α with minimum error was the best scale parameter for using AP model for predicting soil water retention, which shown a good agreement between predicted and measured soil water retention curves. PTFs were developed using the laboratory measurements made on soil moisture at FC and PWP, particle size distribution, bulk density, pH and organic matter content. Independent variables were separated in six groups to develop pedotransfer functions and the most optimum combinations of independent variables were selected by multiple linear regression to predict soil water retention curve. Evaluation statistics of pedotransfer functions were compared with evaluation statistics of the AP model (linear α) to determine the best method for prediction of soil water retention curve. Results showed that pedotransfer functions were better than AP model (linear α) for predicting soil water retention curve.

**Key words :** Arya and Paris (AP) model, bulk density, particle size distribution, pedotransfer function, scaling parameter, soil water retention curve

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# Effect of elemental S and compost on pH, electrical conductivity, and phosphorus availability of one clay soil

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## Abstract

Suitable plant nutrition is one of the most important factors in the quantity and quality of crops yield. In plant nutrition, each nutrient should be in adequate level. The most important role of pH is control of nutrients solubility in soil. Nutrient availability usually decreases with increasing pH. Experimental soil sample was collected from 0-30 cm depth from Niar village around the Ardabil city. The soil samples were mixed with solid acidifying material including elemental sulphur (S) in three levels (0.25, 0.5 and 1.0 g/kg soil), farm yard manure compost in three levels (2.5, 5 and 10 g/kg soil) and elemental sulphur (S)* organic matter in three levels (the same amounts of S With 5gr/kg cattle manure) and filled in 4 liter pots. Soil water content was held close to field capacity and green house temperature was kept to 25± 5 $^{o}$C. Before experiment, the physicochemical properties of soil and chemical compost properties were measured. In 8, 16 and 32 weeks of incubation compound soil samples were collected from pots and their pH, electrical conductivity (EC) and phosphorus were measured. Results showed that the effect of elemental S were obtained in early period of incubation (28 days), but after that only the 3$^{rd}$ level of S had significantly effect on pH reduction. Compost * S treatment had minor effect on pH reduction in the early stages of incubation but markedly decreased the pH after 56 days. The effect of Compost * S treatment on pH of soil was shorter than S treatment and after 16 weeks the pH of soil was increased. The effect of different compost levels on pH reduction was not significant at 8 , and 16 weeks compare to control but these treatment increased the ph of soil at 32 weeks.. All rates of compost * S treatments caused to significantly increase of soil pH at 32 weeks, but S treatment has not significant difference whit control. S and S * compost treatments significantly increased the EC of soil during experimental period but effect of compost on elevation of EC obtained after 32 weeks. Available P of soil was improved in all treatment and reached to maximum level at 8 weeks and then decreased.

**Key words :** sulphur, compost, soil, ph, electrical conductivity, phosphorus

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# Effects of polymers (PVA&PAM) and humic acid on aggregate stability of soils under freezing-thawing cycles

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## Abstract

Freezing and thawing cycles have great importance among the factors affecting on soil physical and hydrological properties. The objective of this study was to determine effects of polyvinylalcohol (PVA), polyacrylamide (PAM) and humic acid (HA) on aggregate stability of four soil great groups commonly distributed in Erzurum. Soil samples treated with 0,05% PVA, 0,01% HA and 0,001% PAM on weight to weight basis, left to freezing-thawing processes (3, 6 and 9 times) at different moisture levels (air dry, field capacity and 90% of saturation) and freezing temperatures (-4°C and -18°C). The PVA, PAM and HA applications significantly increased the stability of soil aggregates at different size groups (< 0.42, 0.42-0.84, 0.84-2, 2-6.4, 6.4-12.7 and >12.7 mm) as well as the aggregate stability of standard aggregate size group (1-2 mm). The highest increasing rate (213%) was obtained for the aggregates smaller than <0,42 mm. The number of freezing-thawing cycles, the moisture content at the time of freezing and the freezing temperature had significantly negative effects on soil aggregate stability. The most effective treatments on disruption of soil aggregates were the 9 times freezing-thawing cycles, 90% of saturation moisture content and -18 $^{0}$C freezing temperature. Although the aggregate stability of soils treated with PVA, PAM and HA also negatively affected with freezing-thawing processes, the final aggregate stability of soils at the end of the experiment was still significantly higher than that of the initial aggregate stability of soils not treated with freezing and thawing processes. The results of this study clearly indicated that all three soil stabilizer agents increased aggregate stability and reduced the negative effects of freezing-thawing on aggregate stability of soils. The most effective treatment was PVA and followed by PAM and HA.

**Key words:** polyvinylalcohol (PVA), polyacrylamide (PAM), humic acid (HA), freezing-thawing processes, aggregate stability

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# Preferential water flows in technogenic soils

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## Abstract

A technogenic soil (technozem) was created on the surface of the former sludge pond of the iron-ore quarry in the course of land rehabilitation. The upper chernozemic layer in the technozem was underlain by the sandy or loamy layers. The water regime of these soils differed from the water regime of background automorphic natural soils and was characterized by the periods of water stagnation at the boundary between the two layers. In 20 years this type of water regime resulted in the development of a columnar structure in the lower part of the chernozemic layer. The coatings on the ped faces in this part of the profile had an increased content of Fe and Ca ions. There was no differentiation of the carbon of organic substances and carbonates in the soil profile. Field studies of water flows in this soil with the use of starch label and laboratory experiments on infiltration of salt solutions though the soil columns with determination of breakthrough curves demonstrated the existence of preferential water flows in technozem. Rapid infiltration of water through preferential water paths in chernozemic layer after abundant rainfalls and during the snowmelt season leads to the development of perched water above the textural boundary.

**Key words :** technogenic soil, preferential flow, soil structure

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# The effect of soil organic matter on the difference between particle-size distribution data obtained by the sedimentometric and laser diffraction methods

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## Abstract

Particle-size distribution in dispersed sediments, soils, atmospheric dust, and other natural objects is their fundamental characteristic. The methods of sedimentometry (the pipette method) and laser diffraction have been applied to study particle-size distribution in a typical chernozem of Kursk region from the Alekhin Central Chernozemic Reserve. The content of the clay fraction as determined by the method of laser diffraction is three to five times lower than the clay content determined by the traditional pipette method. One of the reasons for such a great difference in the results obtained by two different methods is related to the low density of the solid phase of the particles of soil organic matter that have the size corresponding to the fine and medium silt fractions. Owing to this, they fall into the category of the clay fraction during the traditional sedimentometric analysis. The initially water-stable aggregates of 0.25–0.5 mm are subjected to several stages of their breakdown under the impact of ultrasonic dispersion with the detachment of small particles from their surface layers. The remaining aggregates have different resistance to ultrasonic treatment. After the long-term ultrasonic dispersion, the most stable microaggregates still exist in the soil mass. These microaggregates may only be decomposed to elementary soil particles after the addition of sodium pyrophosphate.

**Key words :** particle-size distribution, laser diffraction, water-stable aggregates

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# Water-stable chernozem structure as a result relation between hydrophobic and hydrophilic components of humus substances

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## Abstract

Waterstability and mechanical strength of chernozem soils are well known. But the modern process of aggregate structure degradation accompanied by decrease of soil organic matter (SOM) content brings up the problem of physical mechanisms of these processes. The aim of this work was to investigate SOM content and transformation of its hydrophilic and hydrophobic components, in connection with structure evolution. It is offered the concept according to which humification products of organic material are considered as a system natural hydrophobic and hydrophilic compounds that have spatial and structurally functional organization and in many respects determine morphological, chemical and physical properties of soils. The spatial differentiation of components of humus substances in the unit consists in localization of hydrophilic humification products of allochthonous genesis on a surface of mineral particles, and hydrophobic humus substances autochthonous genesis - in structure of organic elementary soil particles stochastically distributed in pore space of the unit. The structurally functional organization of components of humus substances in the unit provides formation of hydrophobic properties on surface of pore space of the unit. The total effect of intra-unit hydrophobic zones consists of counteraction to fast water inflow in the unit and rise of disjoining pressure. In case of deficiency of fresh organic substance there is a mineralization of humus substances located on the surface of mineral particles, their hydrophilic surface opens, the efficiency of hydrophobic interactions inside the unit falls and the unit is dispersed with water.

**Key words :** humic substances, water-stable aggregates, hydrophobic interaction chromatography

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# Aggregate size distribution and geometric mean diameter affected by polymers (PVA&PAM) and humic acid applications under wetting-drying processes

**E.L. Aksakal, T. Öztaş, B. Turgut**

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## Abstract

Wetting/drying (WD) processes affect on soil structural and hydraulic properties. The objective of this study was to determine effects of organic polymers (polyvinylalcohol-PVA and polyacrylamide-PAM) and humic acid (HA) on aggregate size distribution (ASD) and geometric mean diameter (GMD) of soils under wetting/drying processes. Soil samples were collected from four commonly distributed soil great groups; Typic Ustert, Fluvaquent, Argiustoll and Calciorthid in Erzurum. Soil samples passed through 4.76 mm sieve were treated with 0,05% PVA, 0,01% HA and 0,001% PAM on weight to weight basis and left to WD processes (3, 6 and 9 times) at different moisture levels (air dry, field capacity and 90% of saturation). Significant differences were obtained in ASD of treated and non-treated soil samples. In the control sample, the highest proportion (37.3%) of soil aggregate size group had a size of smaller than 0.42 mm, and the lowest proportion (12.9%) had the size of 0.42-0.84 mm. The GMD of soil aggregates in the control changed between 1.46 mm and 1.68 mm. On the average, the proportions of the aggregate size groups of <0.42, 0.42-0,84 and 0,84-2 mm decreased with the rates of 73.0, 32.3 and 2.0%, respectively in the samples treated with PVA, PAM and HA, but , the proportions of the aggregate size group of 2-6,4 mm increased with a rate of 24.3%. Significant amounts of new aggregates greater than 6.4 mm also formed with PVA, PAM and HA applications. Humic acid application was the most effective treatment in increasing of the GMD. The WD cycles decreased the proportions of the aggregate size groups of <0,42, 0,42-0,84, 0,84-2 and 2-6,4 mm, but increased 6,4-12,7 and >12,7 mm aggregate proportions in all the moisture levels. The GMD significantly increased after WD processes. Changes in the proportions of aggregate size groups following WD cycles was the lowest in PVA treated samples as compared to the PAM and HA applied samples. This result suggests that PVA is more effective in stabilizing soil aggregates and on reducing negative effects of WD processes on the stability of small size soil aggregates.

**Key words:** polyvinylalcohol (PVA), polyacrylamide (PAM), humic acid (HA), wetting/drying processes, aggregate size distribution, geometric mean diameter

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# A study on useability of mercury displacement technique for measuring the bulk volume of soil clods

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## Abstract

Bulk density of the soil is an important site characterization parameter. It is the ratio of the mass of dry solids to the bulk volume of the soil occupied by those dry solids. Although different methods are used for measuring the volume of soil clods, the paraffin methods is the most commonly used standard method. The objective of this study was to evaluate the mercury displacement technique for measuring the bulk volume of soil clods over the paraffin method. Fifty-five clods from soils with different characteristics were collected and their bulk density values were measured using the paraffin method and the mercury displacement method. The soil clods were introduced into the cap filled with mercury, and the volume of mercury displaced with the clod was recorded. Bulk density of soil samples varied between 0.99 g $cm^{-3}$and 1.79 g $cm^{-3}$. The results indicated that in almost all samples mercury displacement technique produced slightly higher values than the paraffin method. There was a very strong and a significant ($r^2$=0.976, n:55) relationship between the data produced by the two methods.

**Key words:** bulk density, clod method, paraffin, mercury displacement

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# Incubation studies to evaluate some phosphate rocks for direct application in some soils of North of Iran

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## Abstract

There are various methods to evaluate Phosphate Rocks (PRs) for direct application. One of these methods is incubation study in soil. In this study, local PRs of Iran (two samples of a sedimentary PR and two samples of igneous PR) along with one sample PR of Gafsa (Tunisia) were collected for the experiment. These PRs and 100 mg P/kg from triple superphosphate were incubated with 20 soil samples in 25□c in 3 replications. Also, all of the soil samples incubated without adding P (check treatment). Available phosphorous (Olsen method) were determined after 2 months. The relative effectiveness of these PRs (RE = [(Olsen P of PR)-(Olsen P of check)]/[(Olsen P of TSP)-(Olsen P of check)] x 100) was compared with standard fertilizer (triple superphosphate). Results showed that the relative effectiveness of local PRs were low and had significant difference ($p<0.01$) with reference Gafsa PR. None of soil characteristics had significant effect on the dissolution of local PRs, but pH had a significant effect ($p<0.01$) on the dissolution and relative effectiveness of Gafsa PR.

**Key words :** phosphate rock, direct application, incubation, relative effectiveness

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# Spatial distribution patterns of physical and chemical properties of soil formed on alluvial parent material

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## Abstract

Defining variability in soil properties within a field or an agricultural watershed is important for developing effective management strategies. The objective of this study was to determine spatial distribution patterns of physical and chemical properties of soils formed on alluvial parent material. The research field, 45 da, located in the Eastern Anatolia Agricultural Research Institute-Ilıca Experimental Station were gridded with 25 m intervals in the east to west and north to south direction. Surface soil samples (0-20 cm) were collected at the intersectional points of the grid system and analyzed for physical and chemical properties. Spatial variability characteristics and distribution patterns of soil properties including soil texture, field capacity, aggregate stability, pH, organic matter content, plant-available phosphorus, exchangeable cations and electrical conductivity were determined and mapped using geostatistical analyses. Isotropic-exponential semivariograms were fitted to explain spatial variability of clay and silt content and pH, isotropic linear model for plant available P, and isotropic-spherical semivariograms for sand content and exchangeable cations ($Ca^{++}$, $Mg^{++}$, $Na^{+}$ and $K^{+}$). Organic matter content, electricity conductivity, field capacity and aggregate stability produced pure nugget effects. Soil properties showed great changes and varied within short distances within the study field. The most homogeneous soil property was soil pH based on the range of influence (289 m); the other measured properties produced ranges changed between 34.5 and 72.2 m.

**Key words: s**oil properties, spatial variability, geostatistics

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# Effect of study scale on estimation precession of organic carbon content and bulk density in paddy soils

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## Abstract

The precision of soil properties data at any region depends largely on the nature of their variation which often is described by studying of their spatial variability. More than 80 percent of data used by scientists are related to the spatial position (Geography). The position should be consider when analyzing such data, because changing of soil depends on many process that act in space and time scale, therefore potentially depends on a scale. New progresses in statistical theory help us to quantify special relations between data and use it to predict the ensamples point. This research was carried out to study the effect of scale on estimation precession of organic carbon and bulk density in paddy soils. Three different scales of study were selected in the field of the Iranian Institute of Rice Research in Rasht. In the first scale, 172 soil samples were taken from the center of 200×50 meter plots. In the second and third scales, 357 and 72 samples were taken from the center of 100×50 m and 3×4 plots, respectively. The measured soil properties were organic carbon content and bulk density. All data had abnormal distribution, but bulk density in the third scale. Organic carbon in the second scale and bulk density in the third scale had the maximum and minimum of coefficient of variation, respectively. The results show that organic carbon in the second and third scale and bulk density in the third scale are anisotropic. A spherical model was fitted to the varigrams of organic carbon in all scales, which indicated that a single main factor affects organic carbon variations. In the other hands for bulk density, a linear model was fitted to the variograms of first second scale an spherical model was fitted for the third scale. Three estimation methods of global, inverse distance, and kriging were compared for predicting of studied properties. Three statistics of mean error (ME), root mean square error (RMSE), and reduced variance (RV) were used to compare the methods. Results show that kriging is the best method for estimating of organic carbon, but there was no any significant difference for estimating of bulk density in the first and second scales. The effect of scale was analyzed using similar media and spatial variance concepts. Results showed that, the first scale with the sampling distance of 200 m is the best scale for studying of organic carbon, and the second scale of 100 m distance is the best for bulk density.

**Key words :** scale, regionalized variables, spatial statistics, kriging

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# The different amendments and range stability of aggregates

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## Abstract

Aggregates is one of media used to study the different properties which has a similarity with soil that is formed and part of it in smaller and smaller to very fine crumbs of fragile. The fracture property of different shapes behave as affective single unit. Therefore, and (2.8 – 5 mm) aggregate of two soil has been used and mixed with organic and inorganic amendments in formed of salted and unsalted aggregate in different ways. One Kg of aggregates were incubated with seven treatments adding the amendments in first experiments and pass of sodium chloride in aggregate and then mixed with amendments. The range of variation of physical prosperities measured through reducing the hydraulic conductivity of salted and unsalted water.

The results explained that the continuity flow of water reduces the hydraulic conductivity and the amendments created the aggregate stability in all treatments in compared with control. Moreover, the results explained that the amendments before and after leaching prevent the slaking little bit that reflected on aggregate stability too, but the interaction between organic and inorganic amendments were better to stop slaking of aggregate in a level and the gradual leaching with thin amendments with electrolyte concentration prevent degradation and slaking for better aggregate stability.

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# Influence is soil - physical factors on thermophysical descriptions of soils

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## Abstract

Thermophysical indexes of soil, such as a by volume and specific heat capacity, warmly and diffusivity, it is depended difficult appearance on a number of soil - of physical factors: temperatures, closenesses of addition of soil type, degrees of moistening of genetic horizon, grain-size distribution, maintenance in them of organic matter. The purpose of this work is to rotin possibility of application of coefficient of diffusivity ( $K$ ) at determination of properties of soils, accountable for its fertility depending on humidity ($W$), specific surface ($S_0$), by volume weight ($\rho$), grain-size distribution et cetera. Experimental a way it is got, that curves as dependence on humidity and by volume mass were shown in an analytical form

$$10^4 K = \left[A - B(W - W_{kr})^2\right]\rho$$

where $K$ - coefficient of diffusivity ( см$^2$/sek) ; $W$ -humidity of soil, %; $\rho$ - by volume mass, gr/см$^3$; $A$ and $B$ coefficients, depending on property of soils. $W_{kr}$ - humidity at which $K$ arrives at a maximal value. The selected formula for determination as compared to experimental $K$ information gives an error no more 3-5%, that close to the error of measurings.

Dependence $K$ is certain on the specific surface of soils, presented by direct dependence, the angle of slope of which is related to humidity, by volume mass and temperature. It is noticed that with an increase $S_0$ decreases arcwise $K$. The got results are subject to mathematical treatment. Empiric formulas, relating the studied parameters from soil, $S_0$ are shown out. The coefficients of thermophysical parameters are related to $S_0$ next appearance.

$$10^4 K = -S_0 a + b$$

where $K$ - coefficient of diffusivity; $S_0$ - specific surface; $a, b$ - permanent sizes, determined on results an experiment. It should be noted that at equal terms $(W, \rho)$ with the increase of specific surface on 10 gr/m $^2$ $K$ increased on 0,8-1,0·10$^{-4}$ cm$^2$/sec. The got results allow, in principle to decide and at reverse tasks, i.e. on a size to define its specific surface.

**Key words:** temperatures, closeness, genetically horizon, diffusivity, specific surface

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# Defining and evaluating the spectral characteristics of soil's organic matter by radiometer

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## Abstract

Physical and chemical properties of soil play very important roles in defining its spectral characterization. Soil reflectance is produced by the inherent scattering and absorption properties of its components. The objective of this study was to evaluate soil spectral reflectance as a function of soil organic matter content. Forty two soil samples under different management systems were randomly collected from Erzurum and its surroundings. Organic matter content of soils varied satisfactorily for characterizing spectral reflectance. Spectral data were obtained under laboratory conditions using an LI-1800–10 CEP559 (320-1100 nm) model spectroradiometer. The results of spectral analysis showed that the reflectance decreased with increases in soil organic matter content in 400-595 nm wavelengths. The reflectance of soil organic matter between 595-1200 nm was not stabile.

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# Soil moisture and water tension modeling under conjunctive use of saline water for irrigation

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## Abstract

Modeling of water flow in the soil has been interest of many academics for the past 30 years ago. In this research, a dual-porosity model, MACRO, was evaluated for simulation of surface layer moisture though the profiles of six lysimeters in unstructured clay soil. Thus, tow conjunction irrigation schemes using fresh (1 dS/m) and saline (14 dS/m) water were employed namely: blending and one-alternate. The experiment did in a completely randomized design on the tow mentioned treatments with three replications in six lysimeters. The parameters of van Genuchten (1980) equation were estimated by non-linear least-square fitting with the RETC code. The results showed that MACRO predicted tension of surface layered, well. After parameter optimization using SUFI code (effective diffusion path-length and boundary hydraulic conductivity), MACRO Predictions were improved. The correlation coefficient and CRM for blending and one- alternate were 0.80 and 0.77, 0.60 and 0.04 and 0.03 respectively, after optimization. Thus, MACRO 5.0 predicted moisture of surface layered, well.

**Key words :** soil moisture, saline water strategy, MACRO 5.0 model

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# Influence of organic matter on the estimation of saturated hydraulic conductivity of paddy soil

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## Abstract

Water percolation loss beyond the root zone in the soil is one of the important parameters for determine of rice water requirement. The saturated hydraulic conductivity is an important soil physical property for determining deep percolation. Pedotransfer functions (PTFs) provide an alternative by estimating soil hydraulic properties from more readily available soil data. Some of the PTFs were used Organic Matter (OM) as one of the input variables to estimation of $K_s$. Several authors have shown an increase in $K_s$ with increasing OM content, a soil property that presumably improves soil structure but other authors have shown significant inverse relationship between OM and $K_s$. Hence the objective of this study was to consider relationship between OM and $K_s$ in paddy soil and to develop regression PTFs for estimation of $K_s$ using hierarchy method to select input variables. 70 soil samples were randomly collected from paddy fields in Guilan province, North of Iran. Saturated hydraulic conductivity values of soil samples were determined using falling head permeability method. Measured soil variables included texture, organic carbon (determined Using Walkely and Black rapid titration), water percentage at field capacity (determined using a pressure plate apparatus) and bulk density (determined using cylinder). Results showed that Using more input variables increase the $R^2_{adj}$ values of predicted models. The addition of bulk density and especially moisture content of field capacity contributed to the predictability of models. Moreover, the result of this study showed that between OM and $K_s$ significantly exists inverse relationship.

**Key words:** hydraulic property, organic matter, paddy soil, pedotransfer function

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# Distribution of some soil properties and relationships between these properties in Amik Plain (Turkey)

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## Abstract

In this research, the distribution of soluble and exchangeable cations (Na, K, Ca and Mg), pH, cation exchange capacitiy (CEC), total salt content (TSC), total dissolved solid (TDS) and electrical conductivity in saturation extract ($EC_e$) and saturated soil paste ($EC_s$) were determined in 29 soil series of the Amik Plain. In addition, total cation concentration (TCC), exchangeable sodium ratio (ESR), exchangeable sodium percentage (ESP) and sodium adsorption ratio (SAR) values were calculated from soluble and exchangeable cations. For this purpose, a total of 131 soil samples were collected from profiles of 29 different soil series on the horizon based.

Soil samples taken from horizons were divided into two subgroups as topsoil (n= 69) and subsoil (n = 62). The subgroups covered aproximately the range of 0-60 cm for the topsoil and 60-120 cm for the subsoil. Then, a correlation analysis between soil properties was made. Afterwards, relationships between soil properties which have high correlation coefficcients (R) values were examined by linear regression analyses.

The range of TSC, $EC_e$, pH, TCC, CEC, ESP, TDS were 0.02 - 0.78%, 0.37 - 19.7 dS $m^{-1}$, 7.21 - 8.42, 3.8 - 268.5 me $L^{-1}$, 10.9 - 68.4, 0.73 - 7.72, 322.3 - 16255.8 mg $L^{-1}$, respectively.

In all the horizons (n=131), topsoil (n=69) and subsoil (n=62), it was determined that there were very high correlations between $EC_e$ and $EC_s$,TCC, TSC and soluble Na, Mg and K contents; TCC and TSC and $EC_s$; TDS and TCC, $EC_e$, $EC_s$ and TSC and between ESR and SAR values. In addition, Coefficients of all regression equations which were determined between the above mentioned soil properties were found to be significant at 0.01 level for all the horizons, topsoil and subsoil.

**Key words:** Amik Plain, soil properties, correlation, regression

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# Comparison of aggregate stability between forest and pasture`s soils in Guilan province

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## Abstract

The stability of aggregates in the surface soil is crucial to soil erosion and runoff generation. Thus, to understand the stability as well as comparison of aggregate stability between different soils, for example forest and pasture`s soils .140 soil samples from forest and pasture`s soils of Guilan province were collected and geometric mean diameter (GMD), %silt (Si), %clay (Cl), %sand (Sa), bulk density (BD), equivalent carbonate calcium ($CaCO_3$), particle density (PD), soil mechanical resistance (Load), pH, electrical conductivity (EC) and %organic matter (OM) values were determined. The independent-samples t test performed with equal independent variables and number unequal independent variables for forest and pasture soil samples with used of software SPSS14. We found that significant difference in average of geometric mean diameter, %silt, %clay, %sand, bulk density, equivalent carbonate calcium, soil mechanical resistance, pH, electrical conductivity and %organic matter between forest and pasture soils. Pasture soils had higher average of GMD, soil mechanical resistance, %clay, porosity and lower average of bulk density and %sand than forest soils. With increased soil aggregate stability, soil mechanical resistance increased, too. With increased clay and porosity and decreased %sand and bulk density, soil aggregate stability increased. Hence, aggregates in pasture soils had higher stability than forest soils.

**Key words:** soil aggregate stability, soil properties, pasture, forest, Guilan

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# Estimation of soil retention curve using pointed pedo-transfer functions and RETC computer program

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## Abstract

Description of soil water retention curve and hydraulic conductivity are crucial to study water movement and solute transport in the unsaturated soils. Because the direct measurements of these properties are time consuming and costly, alternative methods are suitable for their determining. One of these methods is Pedo-transfer functions (PTFs) that estimate missing soil characteristics from easily measurable soil properties. The objective of this study was to predict soil retention curve by using of RETC computer Program and pointed Pedo-transfer functions in calcareous soils of Karaj. For this purpose 54 soil samples were collected randomly from Karaj plain. Particle size distribution, bulk density, calcium carbonate, organic matter and soil retention curve were measured. The parameters of Van Genuchten equation were determined by using of some variables such as particle size distribution and bulk density in RETC software. Then according to Van Genuchten equation, water content in any suction was calculated. In addition, some functions for predicting soil retention curve were derived using particle size distribution, bulk density, organic matter, and calcium carbonate variables with stepwise regression method. The results showed that the pedo-transfer functions could predict water contents as well as RETC computer Program. However exception of saturation point, RETC computer Program has a better prediction of retention curve. There was a significant correlation between measured and predicted water contents with RETC computer Program in 0 Kpa and other suctions at 5% and 1%, respectively. Also there was a significant correlation between measured and predicted water contents with Pedo-transfer functions in all suctions (p=0.01).

**Key words:** soil retention curve, pedo-transfer functions, RETC computer Program, and Van Genuchten equation

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# Spatial variation of some physical and chemical properties of the sand dunes in Kavak delta (NW Turkey)

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## Abstract

The coastal sand dunes in Kavak Delta (Saros Gulf) were chosen as study area. The Kavak Delta has approximately 21 $km^2$. Coastal sand dunes was classified as fore dunes (embryo dunes), stable (grey) dunes and semi-stable dunes which between fore dunes and grey dunes. In view of sand dunes topography and vegetation sand samples were taken from 37 different points. The samples took two different depths (0-20, 20-40 cm) from each point. pH, electrical conductivity ( µS/cm), organic matter (%), $CaCO_3$ (%), gradation (sieve analysis) (%) and texture (%) were analyzed in these samples. These results by evaluating the physical and chemical properties of dunes changes occurring in spatial variation were determined.

**Key words:** Kavak Delta, spatial variation, sand dunes

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# Estimation of soil moisture curve from particle-size distribution and bulk density using fractal approach

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## Abstract

Soil, as a component of the Soil-Plant-Atmosphere Continuum (SPAC), is an important element in agricultural crop production cycle. On the other hand, knowledge of soil hydraulic properties is indispensable to solve soil and water management problems related to agricultural, ecological, and environmental issues. In this study, we evaluated different fractal approaches in estimation of soil moisture curve from particle-size distribution and bulk density. For this purpose, a Finnish database including 108 soil samples was used. In order to estimate soil moisture curve using Tyler and Wheatcraft (1990) model, the fractal dimension of soil moisture curve was determined from particle-size distribution using different methods such as, Kravchenko and Zhang (1998), Bird et al. (2000) and Huang and Zhang (2005); Soil porosity was calculated from bulk density; and air entry value was estimated from soil texture using class pedotransfer functions developed by Rawls et al. (1982). The calculated statistical parameters such as mean of residuals (MR), root mean square error (RMSE) and Akaike's criterion index (AIC) were used to compare the estimated soil moisture curve with measured one. The results showed that the methods of Kravchenko and Zhang (1998), and Huang and Zhang (2005) estimated fractal dimension and soil moisture curve better than the other methods, respectively.

**Key words:** bulk density, fractal dimension, particle-size distribution, soil moisture curve

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# Effects of treated waste water on some physical properties of soil and yield and nutrient content of corn plant

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## Abstract

This work is aimed to study the effects of waste water which is treated at İzmir-Menderes-Tekeli sewage treatment facility on some physical properties of a clay soil. Corn (Zea mays L.) had been choosen as experiment plant and irrigated with the treated waste water. Physical properties of the soil and the yield and macro and micro nutrients content of the corn plant irrigated with the treated waste water is compared with that of soil irrigated with fresh water (control parcel) .

According to the results of this research; irrigation with treated waste water did not significantly change the physical properties of soils. Also, yield and content of macro and micro elements of corn plant were not significantly changed by treated waste water. This treated waste water is used for irrigation in Tekeli location in summer months. Our results showed that this treated waste water did not cause any damage on the physical properties of soils and plant growth, for now.

**Key words:** treated waste water, corn plant, physical properties of soil, yield, macro and micro elements

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# Behaviour of magnesium in saline soils. 1 - It's effect on clay dispersion

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## Abstract

A study was conducted on salt-affected soils collected from northern part of Iraq (Ninavah Province) to study the effect of magnesium on clay dispersion. Dispersion experiment was carried out on surface soil samples to evaluate the dispersive effect of Mg on clay in comparison with Ca and Na. Six electrolyte concentrations (1,5, 15, 20, 50, and 100 $mmol_c l^{-1}$) were prepared using chloride Salts (i.e, Nacl,$CaCl_2$ $2H_20$ and $MgCl_2.6H_20$). Dispersed particles were determined by measuring optical density at 641nm.

The results showed that Mg represents an intermediate stage between Na and Ca. The dispersive effect of Mg and Na increased once the concentration Exceed 100 $mmol_c l^{-1}$ unlike Ca. The difference between Magnesium and Calcium in relation to dispersion may be due to the differences in the hydration layers of these two cations and a reflection of the level of Mg saturation which increases substantially as the equivalent fraction Mg increased in solution.

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# Effect of elemental S and compost on pH, electrical conductivity, and phosphorus availability of one clay soil

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## Abstract

Suitable plant nutrition is one of the most important factors in the quantity and quality of crops yield. In plant nutrition, each nutrient should be in adequate level. The most important role of pH is control of nutrients solubility in soil. Nutrient availability usually decreases with increasing pH. Experimental soil sample was collected from 0-30 cm depth from Niar village around the Ardabil city. The soil samples were mixed with solid acidifying material including elemental sulphur (S) in three levels (0.25, 0.5 and 1.0 g/kg soil), farm yard manure compost in three levels (2.5, 5 and 10 g/kg soil) and elemental sulphur (S)* organic matter in three levels (the same amounts of S With 5gr/kg cattle manure) and filled in 4 liter pots. Soil water content was held close to field capacity and green house temperature was kept to 25± 5 $^{\circ}$C. Before experiment, the physicochemical properties of soil and chemical compost properties were measured. In 8, 16 and 32 weeks of incubation compound soil samples were collected from pots and their pH, electrical conductivity (EC) and phosphorus were measured. Results showed that the effect of elemental S were obtained in early period of incubation (28 days), but after that only the 3$^{rd}$ level of S had significantly effect on pH reduction. Compost * S treatment had minor effect on pH reduction in the early stages of incubation but markedly decreased the pH after 56 days. The effect of Compost * S treatment on pH of soil was shorter than S treatment and after 16 weeks the pH of soil was increased. The effect of different compost levels on pH reduction was not significant at 8 , and 16 weeks compare to control but these treatment increased the ph of soil at 32 weeks.. All rates of compost * S treatments caused to significantly increase of soil pH at 32 weeks, but S treatment has not significant difference whit control. S and S * compost treatments significantly increased the EC of soil during experimental period but effect of compost on elevation of EC obtained after 32 weeks. Available P of soil was improved in all treatment and reached to maximum level at 8 weeks and then decreased.

**Key words:** sulphur, compost, soil, pH, electrical conductivity, phosphorus

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# The effect of poldasht flood spreading scheme on the soil physico-chemical properties

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## Abstract

Presently, flood-spreading schemes are under construction or use as aquifer management projects in the country. In these projects, by spreading a large volume of floods containing salts and suspension load on the spreading network, it may lead to some differences in soil physical and chemical properties. So it is necessary to study the amount and the trend of these differences in time to produce the suitable method in order to increase the utility of such designs. This research has been done with the aim of study and determining the effect of flood spreading on the trend of soil physical and chemical properties differences on the Poldasht station located in West Azarbaijan evaluated by comparison with control during 5 years. This was done by measuring soil physical and chemical properties such as pH, EC, SP, soil texture, cations and anions among spreading channels of three lines of flooded, 6 sample from each line and 3 depth of soil 0-20, 20-40 and 40-60 cm gathered with sediment soil and control points. The data obtained were analyzed by t-student method if their statistical distributions are normal otherwise non-parametric methods were used. Results showed some physical chemical factors were differed significantly during 5 years. Among the lines and soil profile depth the SAR, $Hco_3$, $CaSO_4$, $SO_4$, Mg, Na and Pb were differed significantly. Some factors like pH, Na and Mg are also were differed in the sediments. Soil EC between lines and sediment EC during time showed significantly differences. Finally, soil clay and silt percent increased.

**Key words:** flood spreading, soil physical chemical properties, sediment, , poldasht aquifer

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# Effect of heating on some physical, chemical and mineralogical aspects of soil and plant development

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## Abstract

The objective of this research was to determine the effects of heating at different temperatures on physical, chemical and mineralogical aspects of two different soils taken from Gallipoli Historical National Park and plant development. Soil samples were kept in a muffle furnace at different temperatures (25, 100, 200, 300, 400 ve 500 °C). Soil heating lowered clay and silt contents and at some temperatures partially decreased the contents of pH, lime, total N, exchangeable Ca, Mg, Na, and cation exchange capacity. It, however, caused on increase in sand, aggregate stability, electrical conductivity and a partial increase in exchangeable K, available P and loss on ignition at some temperatures. Heating had different effects on soil color value and chroma while changing minerological components considerably. Heating the soil did not significantly influence plant development of barley.
**Key words:** controlled heating, soil properties, wildfire, plant development, barley

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# The determination of zinc adsorption in Sarayönü soils of Konya Region-Turkey

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## Abstract

In this study, the general physical and chemical characteristics of soils in Sarayönü and its vicinity, which are the areas of Konya-Turkey with a high crop cultivation rate, were primarily investigated. Of the soil samples taken from the research area, ones that had different textures and different lime contents were selected, clay type analysis were performed and zinc adsorption properties of these soils were determined. As the result of the study, it was found that Mica/Illite, Kaolinite, Smectite, Chlorite type clays were generally dominant in the soils. It was found that the zinc adsorption properties of soils conformed to the Langmuir and Freundlich isotherms and according to the variance analysis performed on the data, $R^2$ values were generally found to be $P<0.001$.

As the results of the regression analyses performed on the data, statistically significant relationships were found at ($p<0.001$) level between the k value calculated in the Langmuir model, and CEC and the percent clay content. In Freundlich isotherms, however, statistically significant relationships were found between the calculated k value and the percent clay content in different soils ($P<0.05$) ve ($P<0.001$). As the result of the study, it was determined that the pH, clay content ,CEC of soils and the plant-available zinc content significantly affected the zinc adsorption by the soil. Regression analyses were performed on each of the values obtained for the Langmuir and Freundlich isotherms (respectively b–k values and n-k values) in order to investigate the soil characteristics. As the result of the analyses, 95-99.1 % significance was found for the Langmuir model and 91.3-98.9 % significance was found for the Freundlich model, and it was determined that both of the models could be used for these soils.

**Key words:** zinc in soil, Zn adsorption, clay type, adsorption isoterms, langmuir and freundlich isotherms

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# Various forms of iron trends in a river terrace chronosequence

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## Abstract

This investigation was done from the youngest to oldest terrace in northern of Iran river chronosequence. The value for citrate-bicarbonate-dithionite soluble Fe and pedogenic Fe oxides (Fed) and their crystallinity increased with soil age to a maximum, then decreased with further time. The oxalate-soluble (Feo) show no consistent trends with soil age and amounts of Fe extractable with acid ammonium oxalate gives a estimate of amorphous Fe oxides. The Feo/Fed (oxalate/dithionate extractable Fe) concentration ratio decreases with soil age. This concentration ratio to be a useful property to characterize the stage of transformation from ferrihydrite to goethite or hematite. The data obtaind from this study, therefore, suggest progressive transformation of ferrihydrite to crystalline forms of Fe oxides with age.

**Key words:** Fed, Feo, Chronosequence

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# Using relationships between particle-size distribution and scaling parameter to predict soil moisture characteristic curve

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## Abstract

The Arya and Paris model is a commonly accepted method to translate a particle-size distribution curve into a corresponding soil moisture characteristic curve using scaling parameter ($\alpha$). The scaling parameter, in original model of Arya and Paris (1981), was assumed constant ($\alpha$ = 1.38) for all soil texture classes. In recent years, several studies has shown that $\alpha$ is not constant and its quantity depends on soil particle size distribution. In this study, $\alpha$, is considered as a function of scaled number of spherical particle to estimate the pore length in a natural soil. Results confirmed that $\alpha$ was not constant for any given texture but decreased with increasing particle size specially for the coarse fractions. For determination the scaling parameter a regression equation was obtained to estimate scaling parameter. The predictive ability of equation and scaling parameter were compared on 48 samples from Karaj region. Prediction of soil water characteristic for a range soil texture with varying bulk densities showed a reasonable to excellent agreement with measured data, whereas using constant $\alpha$ in Arya-Paris model (1982) led to deficiencies in prediction.

**Key words:** scaling parameter, particle-size distribution, soil texture, Arya-Paris model, soil moisture characteristic curve

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# Effects of aplied pressure and moisture content on strength indices of loamy soils of Kwara State Nigeria

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## Abstract

Laboratory investigations were carried out to study strength characteristics of three loamy soils- silty loam, loam, and clay loam under uniaxial compression tests. The main objective of this research was to study the effects of applied pressure and moisture content on bulk density, penetration resistance and shear strength of the three loamy soils and to develop relationships between the strength indices for predictive purposes and more. The compression was carried out at different moisture contents determined according to the consistency limits of the soils. The applied pressure range was from 75 to 700 kPa. Values of bulk density, penetration resistance and shear strength increased with increase in moisture content up to peak values after which the values decreased with further increase in moisture content (silty loam). For the other soils (loam and clay loam), the values increased again tending to reach another peak. Penetration resistance (or cone index) had positive correlation with shear strength at different applied pressures with good coefficient of determination (0.5432 to 0.9492) for all the soils, however the correlation was best in silty loam and least in clay loam. Bulk density had negative correlation with moisture content with coefficient of determination ranging from 0.8966 to 0.9624. Regression models were used to describe the trends in the results. Results from this study show that bulk density and soil strength (which are normally regarded as indicators of soil quality) are affected by moisture content and applied pressure and that these properties can be predicted using the models generated in this study. The maximum strength of the soil depended on the applied pressure for the compression of the soil.

**Key words:** loamy soils, applied pressure, bulk density, penetration resistance, moisture content, shear strength, Nigeria

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# Hydraulic conductivity at and near saturation of an Orthic Luvisol after 15 years of different soil management practices

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## Abstract

Soil tillage is one of the key soil management practices in agricultural land use. The farming concepts are based on understanding of soil physical and hydrological characteristics under different tillage treatments. Hydraulic conductivity of the surface layer determines water infiltration into the soil profile and possible runoff formation. The treatment of the surface layer affects the soil pore system (distribution and connectivity of macroscopic cracks, voids, holes, etc.). The aim of this study was to evaluate the changes in hydraulic conductivity at and near saturation under the field conditions for soil with different tillage treatments (reduced tillage – RT, no tillage – NT, and conventional tillage – CT). The field experiments were carried out in four phases (June 2008, September 2008, April 2009, and July 2009) in order to characterise also the seasonal changes in hydraulic conductivity of the soil. Pressure ring infiltrometer (Matula and Kozáková, 1997) was employed to carry out the infiltration tests to determine hydraulic conductivity at saturation, $K_s$. The infiltration time was allowed long enough to obtain steady state infiltration data, which were analysed based on the equations formulated by Philip (1985) and Reynolds and Elrick (1990). To determine hydraulic conductivity near saturation *K(h)*, Mini Disk infiltrometer (Decagon Devices, Inc.) was used. The transient infiltration data obtained from Mini Disk infiltrometer were analysed by HYDRUS 2D software (Šimůnek et al., 2006). Analysis of variance identified significantly lower $K_s$ values for NT plots, while CT and RT plots did not differ from each other. When comparing the *K(h)* values measured at three consecutive water pressure heads (-5, -3, and -1 cm) the statistically significant differences were found between all three treatments (CT > RT > NT). The seasonal changes in hydraulic conductivity were reflecting the changes in structure of the surface layer (caused for example by tillage operation, winter frost, and wetting and drying circles). In contrast to some published studies, this study showed no improvement in soil structure of soil under NT after certain time period, resulting in significantly lower values of hydraulic conductivity during each of the experimental phase.

**Key words:** hydraulic conductivity, tillage treatment, pressure ring infiltrometer, mini disk infiltrometer

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# Iron fractions in the soil of Harran plain, Şanlıurfa

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## Abstract

The aim of this study is to determine the contents of $Fe_T$, $Fe_D$, $Fe_{DTPA}$, $Fe_O$, $Fe_P$ in Harran Plain soils and evaulate the relations between Fe and pH, calcite, salt, organic content, CEC, and soil texture.

Soil samples were prepared from 16 different profiles in various horizons in Harran Plain. In each soil profile, pH, organic contents, calcite, CEC (Cation Exchange Capactiy), salt and soil texture were analaysed. As results of analyses, high pH (7.0 - 8.52); low organic matter contents (%0.03 – 2.76); various salt contents in horizons (0.19 – 15.62 $dsm^{-1}$); high calcite content (%14.03 -58.46); and also various CEC recordings (22.40 – 49.22 cmol $kg^{-1}$) were evaluated. From the point of soil texture, the soils of Harran Plain was determined to be mainly clay.

In analysis of Fe, $Fe_T$ content (1.17 – 47.71 g $kg^{-1}$); $Fe_D$ content (0.18 – 17.85 g $kg^{-1}$); $Fe_O$ content (0.02 – 0.31 g $kg^{-1}$); $Fe_{DTPA}$ content (0.002 – 0.17 g $kg^{-1}$) and $Fe_P$ content (0.0005 – 0.022 g $kg^{-1}$) were found.

As a result of analysis, the relations between Fe contents and soil textures were investigated. Harran Plain soils have got various $Fe_T$ contents in various horizons. This was found sufficient, however, $Fe_D$, $Fe_{DTPA}$, $Fe_O$, $Fe_P$ contents were found low due to insolubility of Fe, high pH and calcite, low organic contents and clay texture properties.

**Key words:** soil, Harran plain, iron, Şanlıurfa, agriculture

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# Impact of continuous cropping on phosphorus adsorption characteristics in calcareous soils of north-west of Iran

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## Abstract

Phosphorus (P) sorption in soils is a key process governing its availability to crops. P sorption characteristics and their relationship to soil properties were determined in twenty-one paired surface soil samples (21 cultivated and 21 adjacent virgin soils) belonging to five soil types: Typic Calcixerepts, Typic Haploxerepts, Typic Endoaquepts, Vertic Endoaquepts, and Vertic Calcixerepts from sugar beet growing areas located in the north-west of Iran. The soils are alkaline and calcareous. The K-bearing mineral illite is the dominant clay mineral in Typic Calcixerepts, Typic Haploxerepts, Typic Endoaquepts whereas in Vertic Calcixerepts and Vertic Endoquepts, the clay mineralogy is dominated by smectite. Total $CaCO_3$ contents ranged from 8.2 to 29% for cultivated soils and from 8.5 to 29% for adjacent virgin soils. Active $CaCO_3$ contents ranged from 2.5 to 11% for cultivated soils and form 2.7 to 14% for adjacent virgin soils. Significant positive relationships were found between total $CaCO_3$ and active $CaCO_3$ contents for cultivated soils ($R^2$ = 0.77, $P$<0.001) and adjacent virgin soils ($R^2$ = 0.63, $P$<0.001). The amount P sorbed by the soils differed among soil types. The results showed that in all soils types except Typic Haploxerepts, equilibrium solution P concentration (EPC) was almost low in comparison with the requirement for most crops (<0.4 mg/L). The amount of P adsorbed by the soils at 0.4 mg/L EPC ranged from 36 to 75 mg/kg for cultivated soils and from 21 to 52 mg/kg for adjacent virgin soils. While Langmuir equation explained well the P sorption data ($R^2$ =0.82), Freundlich model provided a best description of P adsorption isothems ($R^2$ =0.97) in both cultivated and adjacent virgin soils. Langmuir maximum P adsorption (b) ranged from 152 to 230 mg /kg for cultivated soils and from 171 to 220 mg /kg for adjacent virgin soils. Paired t-test revealed that continuous sugar beet cultivation increased maximum P adsorption in all soil types except Typic Endoaquepts as a result of intensive cultivation. It can be concluded that long-term continuous cropping influenced some soil properties and in particular P adsorption parameters.

**Key words:** Phosphorus (P) adsorption isotherms, continuous cropping, Langmuir, Freundlich

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# The effect of using organic matter and sulfur on decreasing chemical fertilizer application according to sustainable agriculture

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## Abstract

Calcareous soils result in several problems for plants in availability of elements such as P, Fe and Zn due to high pH level as well as bicarbonates. Biological activities especially sulfur(S) oxidizing bacteria is one of the stable and effective strategies in this manner. S oxidation by soil borne microorganisms such as heteroteroph and autotroph bacteria result in acid production, decreasing of pH and subsequently uptake of Fe, Zn and P by plants. In this study, an apple orchard (15 years old) selected during 3 years for treatment by S (300g/tree) and organic matters (5Kg/tree). In control soil, S and organic matters were not used. After 3 years, sampling was done from this orchard (treated as well as control soils) and some of physico-chemical as well as biological indices were estimated. Data were analyzed by statistical software (MSTATC). Results showed that in treated sample with S and organic matters, there is a significant decrease in calcium carbonate but some other indices such as EC, CEC, available potassium, available phosphorus as well as organic matters were significantly ($p<5\%$) more than non-treated ones. Amount of nitrate form of nitrogen ($N-NO_3$) decreased in S and organic matters treated samples that may be due to high population of microorganisms in these treatments. Microbial activity were also more significantly rather than control ones. In addition, microbial population was also more than non-treated samples. Using organic matters with S results in increasing heterotrophic S oxidizing microorganisms activity which causes increasing of S oxidation rate, pH decreasing, increasing lime solubility as well as some nutrient elements in soil.

**Key words:** sulfur oxidation, heterotroph bacteria, nutritional elements availability, organic matter

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# Spectrophotometric methods of soil analysis

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## Abstract

The utilization of the last achievement of science and engineering is one of the urgent problems in studying of soils in detail. The methods which exist today for using the soils of rationality do not meet contemporary demands of the day. Last time spectrophotometric methods are widely used in studying of soils from a distance. The 400-750 nm of the wave lengths have been used in the sphere of the visibility of spectrophotometer for preventing of these shortages. The spectral reflecting of soil ability changes depending on different reasons. At the same time the spectral reflecting ability changes depending on separate characters of the soil. For example here we have presented the research result of Garabagh plain soils by using of SF-18 spectrophotometer. To study of spectrophotometric parameters soils of research object the fair quantity of the main and subsidiary cuts have been used. The results of some physical and chemical analyses from the main cut have been given order to characterize soils of the research object. According to the soil classification system there are grey-brown, grey, grey-meadow, boggy, saline soils and their different kinds in the Garabagh plain. For studying of spectrophotometric parameters of research zone soils more than 1000 subsidiary cuts have been used. It is shown that the differ soils of test object have differences of such properties as the humus, carbonate, mineralogy and other contents, granulometric composition etcetera. All of this soil properties influence on colorimetric indices. Humus reduces, and carbonates on the contrary increase size of factor of reflection, the Fe however here it is important to establish their action not separately, and their joint action, i.e. action of their parities {ratio}. It concerns to all influencing on reflective ability почв to components. It is established that the reflection coefficient depends on type of soil, in particularly on its compositions, condition of humidity, density etc. All of this dependence research in different size of electromagnetic wave length. The received data suggest to use for research of different properties of soils such as fertility, humidity, density, salinity etc. as on suti and distances methods.

**Key words:** spectrophotometer, soil reflectance, electromagnetic waves

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# Effects of zeolite application on ammonia nitrogen losses from an alkaline reaction soil

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## Abstract

In this study; the effects of zeolite on nitrogen losses in the form of ammonia gas ($NH_3$) from an alkaline reaction soil were investigated. The experiment were carried out using a clay loam texture soil in a closed system set under laboratory conditions. 1 kg of soil based on oven dry weight, four different concentrations of zeolite (0,3-0,6-0,9-1,2 g) and ammonium sulphate fertilizer (4,8 g) were applied to each unit. The prepared samples were left to incubation for 24 hours after being arranged to field capacity moisture content and then daily and total nitrogen losses as $NH_3$ were measured by vacuuming with certain intervals. At the end of experiment zeolite applications decreased the nitrogen losses in gas form as 14%, 23%, 24% and 35% respectively in the first eight days and as 28%, 49%, 63% ve 75% respectively in the second eight days when compared to contol treatment.
**Key words:** zeolite, nitrogen losses, ammonia

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# Phosphorus forms in calcareous soils as affected by irrigation water salinity

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## Abstract

The study was carried out on five calcareous soils of Egypt characterized by different content (%) of Calcium carbonate ($CaCO_3$) and other physical and chemical properties to study their content of different forms of Phosphorus and it's affected by soil properties and irrigation water salinity. The tested calcareous soils were used in a greenhouse experiment, where these soils were planted by barley and irrigated by tap water and four sources of artificial saline water. The artificial saline water were prepared at 1000 and 2500 mg TSS\l (A1 and A2), each level of TSS have one values of Sodium adsorption ratio (SAR) of 6.31 and 23.26 for A1 and 9.97 and 33.26 for A2. Plants were harvested at harvesting stage. The dry matter yield of the harvested plants was measured and also its content of P was determined. Different forms of P (i.e. total, available, organic, inorganic, calcium, aluminum and iron phosphate {T-P, O-P, I-P, Ca-P, Al-P and Fe-P}) were determined in the soils before and after planting under different treatments of this study. Generally the studied calcareous soils characterized by low content of P. Most of this content was found in I-P form (>90% of T-P). The major fraction of I-P was Ca-P followed by Al-P. The content of different P-forms was related with the studied soil properties. Irrigation water Salinity and sodicity have a clear effect on calcareous soils content of P-forms especially O-P, Al-P and Ca-P. Barley plants content of P was varied widely according to irrigation water salinity and sodicity and its effect on both soil properties and their content of different P-forms. The conclusion of this study is: under similar conditions some sources of saline water may be used in irrigation especially at the short-term of the earlier periods of calcareous soils reclamation.

**Key words:** calcareous soils, irrigation water salinity and sodicity, barley, phosphorus forms

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# Sorption and desorption of Zn, Mn, Fe, and Cu in acidic and calcareous soils

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## Abstract

Reaction of heavy metal with soil is very important in metals fate in soil environments. Mobility and availability of metals depends on adsorption/desorption processes, soil holding capacity for special element and soil properties including pH, redox potential, clay minerals, organic matter, iron and manganese oxides, and calcite content. Adsorption /desorption reactions are main processes in behavior of heavy metals, therefore affect their availability and potential toxicity. In order to study adsorption isotherm in two acidic and calcareous soils, solutions with concentrations 0 to 3750 mg Fe $kg^{-1}$ soil and 0 to 30 mg $kg^{-1}$Zn, Cu and Mn were used in 50 ml plastic tubes. After 24h shaking, the tubes centrifuged and extracted. For investigation of desorption behavior, 25 ml of background solution (0.01 M $CaCl_2$) was added to tubes. Element concentrations determined through AAS in both adsorption and desorption samples. Data fitted to different adsorption/desorption isotherms model including Langmuir (*Cs= kbCe/ 1+kCe*) and Frundlich (*Cs=kCe1/n*) and appropriate model developed for quantitative behavior of element adsorption/desorption. The results showed that in calcareous soil, Cu and Zn adsorption data fitted well with Langmuir ($R^2$=0.98) and in acidic soil, data for Cu an Zn were fitted with Frundlich ($R^2$=0.99) and Langmuir respectively. Evaluation of desorption data indicated immobilization of Cu and Fe in both soils was higher than 90 percent, and in case of Mn more than 70 and 60 percent were immobilized in both soils. Immobilization of Zn was higher in acidic soil compared with calcareous soil. In low concentration, the amount of desorption was lower and increased at high concentrations. In acidic soil, owing to low clay content, high organic carbon, and relative high concentration of these elements, immobilization of Fe, Cu, Zn and Mn was lower in that soils in comparison with calcareous soil.

**Key words:** sorption, desorption, organic acids, iron, zinc, copper, manganese

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# Estimation of spatial changes in carbon and nitrogen contents in soil aggregate by FT-NIR spectroscopy

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## Abstract

The aim of this research was to investigate the spatial changes in carbon and nitrogen contents of individual soil aggregates after additions of olive oil solid waste (OSW) and OSW compost (OSWC). OSW and OSWC were mixed with Clay loam soils at the rates of 0, 3, 5 and 7% w/w. Samples were incubated for three months at 25 $C^{o}$ and water stability of soil aggregates were determined. Additionally fifteen aggregates were selected between 4.0-6,3 mm size from each treatment. Soil aggregate erosion chambers (SAE) were used to separate aggregate layers into three concentric layers. Carbon and nitrogen contents of each layer was determined. Reflectance spectra of the soil aggregate layers were acquired right after the standard measurements using FT-NIR spectroscopy. FTNIR spectrometer were succesfull to determine aggregate N and C contents nondetructively.

**Key words:** olive soil waste; olive waste compost; soil aggregate; aggregate layers; FTNIR; aggregate stability; organic carbon

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# Spatial distribution of soil pH in Wildlife Refugee of Karkhe in Southwestern Iran

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## Abstract

Soil properties vary spatially and temporally from a field to a larger region scale. The heterogeneity and variation of soil properties should be monitored and quantified for a better understanding of the influence of such factors as management and pollution, and finally for leading to more efficient management. A key feature of soil information is that each observation relates to a particular location in space and time. Important information may be lost if locations of observations are not considered. Geostatistics provide descriptive tools such as variogram to characterize the spatial pattern of continuous and categorical soil attributes. This method allows assessment of consistency of spatial patterns as well as the scale at which they are expressed. The objective of this study was to characterize the spatial variability of soil pH at the regional scale. The study was carried out in Wildlife Refugee of Karkhe in riparian forests of Karkhe river southwestern Iran (32$^{o}$ 10' N and 48$^{o}$ 15' E). The soil was sampled in 2009 using 200 sampling point along parallel transects (perpendicular to the river). The distance between transects were 0.5 km. The sampling procedure was hierarchically, we considered maximum distance between samples as 0.5 km, but the samples was taken at 250m, 100m, 50m, 10m and 5m at different location of sampling. At each transect point, three 50 cm×50 cm×25 cm samples will take for analyses at each sampling campaign. Soil pH was analyzed using geostatistics (variogram) in order to describe and quantify the spatial continuity. Mean of soil acidity was 8.07 with a standard deviation of 0.26. Coefficient of variation was 3.2**%**. The variogram of soil pH was exponential and revealed the presence of spatial autocorrelation. It was moderately spatially dependent. The range of influence is considered as the distance beyond which observations are not spatially dependent. This distance was 1800 m. The variogram reported here featured a somewhat high ratio of nugget variance to sill (48**%**). This result showed that there was the small-scale variability and important proportion of unexplained variance. Because of the similar conditions of climate, parent material, and land use in the study area, probably difference of vegetation cover and leaching process of soil nutrient are the main factor of the variability of soil pH.

**Key words:** soil pH, spatial pattern, variogram, geostatistics, Wildlife Refugee of Karkhe

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# Water stress in native shrubs, Northeastern Mexico

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## Abstract

Native shrubs that grow in the semiarid regions of northeastern Mexico are important feed resources for range ruminants and white-tiled deer. They also provide high quality fuelwood and timber for fencing and construction. Since water stress is the most limiting factor in this region, the present work was focused to study how seasonal leaf water potentials (Ψ) of native shrubs such as *Foresteria angustifolia* (Oleaceae), *Celtis pallida* (Ulmaceae) *Zanthoxylum fagara* (Rutaceae) and *Eysenhardtia texana* (Fabaceae) and how are related to soil water availability and evaporative demand components. Determinations of Ψ were carried out at 10 days intervals between July 10 and September 30, 2008 by using a Scholander pressure bomb. Ψ was monitored in five different plants per species at 06:00 h (predawn, Ψpd) and 14:00 h (midday, Ψmd). Air temperature, relative humidity, vapor pressure deficit, precipitation and soil water content were registered throughout. Ψ data were subjected to one-way ANOVA and correlation analysis. During the wettest period (Jul-10), Ψpd ranged from -0.29 (*C. pallida* and *E. texana*) to -0.37 MPa (*F. angustifolia* and *Z. fagara*), in contrast, during the driest period (Aug-10), Ψpd varied from -3.28 (*F. angustifolia*) to -4.50 MPa (*Z. fagara*). With respect to Ψmd data, *E. texana* achieved the highest (-1.14 MPa) and lowest (-4.20 MPa) values during the wettest (Sep-10) and driest (Aug-20) sampling dates, respectively. Diurnal Ψ values were negatively correlated with air temperature (r = -0.590 to -0.680; $P<0.001$) and vapor pressure deficit (r = -0.577 to -0.702; $P<0.001$), in contrast, a positive relationship was found with relative humidity (r = 0.560 to 0.684; $P<0.001$). The ability of shrub species to cope with drought stress depends on the pattern of water uptake and the extent to control water loss through the transpirational flux.

**Key words:** water stress, drought adaptation, water potential, native shrubs, evaporative demand components.

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# Spatial variation of some physical and chemical properties of soils in Serik plain

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## Abstract

Spatial variation of soil is important in fertilizer use, irrigation, and soil tillage. In this study, spatial variation of physical and chemical soil properties was evaluated in a large plain (26.000 ha) in Serik region of Antalya, Southern Turkey. The study area was sampled, taking 250 geo-referenced soil samples from 0-0,3 m depth by a random sampling scheme. The soil samples were analyzed for sand, silt, clay, organic matter (OM), pH, electrical conductivity (EC), cation exchange capacity (CEC), water content at field capacity ($\theta_{fc}$), and water content at sampling. The data for each variable were evaluated by techniques of classical statistics and geostatistics. Greatest variation occurred for sand content and lowest for pH. Greatest geostatistical range (2710 m) occurred for silt content and smallest range (550 m) for SOM and EC. Highest nugget effect occurred for silt content and lowest for sand content. All soil properties showed a strong spatial dependency. Sills of semivariograms calculated for soil properties were generally smaller than their general variance, indicating that no global trend occurred for these soil properties. However, kriged maps of soil properties showed considerable local trends and discontinuities, suggesting that local semivarograms should be used in kriging estimations of soil properties in the study area.

**Key words:** Serik plain, global trend, local trend, local semivariogram, krigiged map, geostatistical range

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# Modeling convective water flow in repacked sand columns by breakthrough curves of chloride

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## Abstract

Miscible displacement tests are commonly used to characterize physical properties of porous media. The shape and position of the resultant breakthrough curves have been analyzed extensively to characterize the transport of water and chemicals in various porous media. Therefore, this study develops a concept and methodology for approximating the hydraulic conductivity of a porous medium as a cumulative function of individual capillaries. Water flow in each capillary was approximated by utilizing the breakthrough curve. Miscible displacement tests of chloride were conducted using 30 cm long and 8 cm wide repacked sand columns, prepared using washed sand with particle size of 2-1, 1-0.5, 0.5-0.25, and <0.25 mm in diameter. The reason for use of different particle-sized materials was to evaluate the response of model to media with different pore and flow characteristics. The resultant BTCs of chloride were utilized to estimate the hydraulic conductivity of capillary bundles in the sand column. The water flow rate $q_w$ was described as a function of the mobile water content held in corresponding capillary bundles ($\theta_m$). The estimated discrete values of $q_w(\theta_m)$ were summed to acquire $q_w$ as a continuous function of cumulative of mobile water content $\theta_{mc}$. Finally, laboratory measured and modeled values of $q_w$ were compared to validate the methods developed. The correlation analysis conducted between measured and approximated values of $q_w(\theta_{mc})$ at saturation resulted in a correlation coefficient of r= 0.90 with a P<0.01, indicating that the procedure developed was successful in the utilizing the data in BTCs to quantify pore water velocity variation in studied porous systems.

**Key words:** water flow, miscible displacement tests, mobile water, sand columns, porous media

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# Potassium status in soil and its components in predominant soil series of Golestan province

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## Abstract

K is an essential macronutrient for plants. According to the conceptual approach soil potassium (K) can be classified into four forms: soil solution K, exchangeable K, non-exchangeable (fixed) K and structural K. In this research, various potassium forms were studied in 12 loessial and loess like drived soil series of Golestan province in order to determine the contribution of each constituent of soil (clay and silt) in supplying K need of plants and to manage fertilizers in soils. All of the different K forms in clay fraction were more than that of silt fraction and soil. Total K content mean in clay and silt particles were 1.95 and 1.09 percents, respectively. Non-exchangeable K content average in clay fraction was about two times of its content in silt fraction. Solution K-content in soil samples varied from 15 to 32 mg/kg. Average of K content extracted by NH4oAc, boiling nitric acid and fluoric acid in soil samples were 261.8, 859.5 and 14400 mg/kg, respectively. In the clay fraction, the means of exchangeable, non-exchangeable and total K contents were 160.6, 1155.1 and 19100 mg/kg, respectively. In all soils, non-exchangeable K content in the silt fraction was half of the non-exchangeable K content in the clay fraction. According to this study, approximately, 48 percent of Golestan soils were classified in the range of medium to very low potassium level.

**Key words:** potassium status, potassium forms, soil components

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# Fractionation and sorption of phosphorus in Greek inceptisols

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## Abstract

Phosphorus fractionation and sorption, both individually and jointly, were studied in two cultivated Inceptisols in Northern Greece. Chemical sequential extraction (resin, $NaHCO_3$, NaOH, dilute HCl, concentrated HCl, $H_2SO_4/H_2O_2$) was used to divide soil phosphorus (P) into inorganic Pi (geochemical) and organic Po (biological) fractions. Direct extractable P by Olsen (Olsen-P), by Mehlich III (M3-P), by distillated water (WP) and by ammonium oxalate (Pox) were also determined. Phosphorus sorption was carried out with 1:10 soil/solution ratio and sorption parameters were derived from the Langmuir model to the experimental data. Total phosphorus (the sum of P fractions-Pt) ranged from 336 to 657 mg $kg^{-1}$, with a strong accumulation at the soil surface, where the value is almost two times higher than C horizon. Most of the total P occurred in inorganic P forms (74% of Pt), while organic P comprised only 26 % of the Pt. Among the various inorganic P forms relatively large amount of residual P (118 mg $kg^{-1}$) was observed, while occluded P in calcium phosphate minerals (d.HCl-Pi) and in Fe,Al-oxides (c.HCl-Pi) existed in almost equal amounts (95 and 87 mg $kg^{-1}$ respectively).These results indicate the redistribution of P in the various stable - occluded P forms, probably due to the moderate degree of weathering of the studied soils. The following soil test on the average, extracted P in this order: Pox (50mg $kg^{-1}$), M3-P (19 mg $kg^{-1}$) and Olsen (7 mg $kg^{-1}$). Positive correlations were observed between soil P test (except Pox) and total available P (Resin+$NaHCO_3$-P). Contrarily, Pox was highly correlated with d.HCl-Pi demonstrating that ammonium oxalate primarily extracts stable Ca-phosphates. The phosphorus sorption parameters showed positive relationships with clay, cation exchange capacity and sum of exchangeable calcium, magnesium. Overall, this study indicated that Ca and Mg compounds strongly influence the P chemistry in moderately weathered soils, with relatively high concentration of primary P minerals.

**Key words:** phosphorus fractionation, sorption, Langmuir, Inceptisols, soil test P

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# Aqua regia and DTPA metal fractions in top soils of the Thriasian plain, Attica, Greece

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## Abstract

As a part of a project designed to monitor heavy metal distributions in urban and rural soils of the Thriasian plain, a heavily industrialized area, the preliminary results for the soils of Eleusina, one of the major towns located in the area, are presented. Attempting to avoid site specific pollution sources (i.e. industries, oil refineries, highways and avenues) grid sampling was chosen. A total of 40 top soil samples (0-5 cm depth) were collected, equally representing urban and rural soils of the town. The total and the bio-available Pb, Zn, Cu, Cr and Ni concentrations were determined by aqua regia and DTPA extraction respectively. The total metal concentrations are not extremely high but in most cases were found above the Dutch reference A values as they adjusted for the clay and organic matter of the soil samples (target value). The calculated mean target values for Pb, Cu, Zn, Ni and Cr in urban and rural soils are 74, 30, 119, 31, 92 and 73 29, 112, 29, 87 mg $kg^{-1}$ respectively. For Pb even the minimum or the $10^{th}$ percentile concentrations are above these values indicating serious enrichment of Eleusina top soils with this metal. For Cu median concentrations are close to the mean target values hence half of the tested soils exhibit increased Cu concentration. As indicated by the $10^{th}$ percentile values the soils are enriched by Zn, while in all soil samples Ni concentration is above the mean target value and that of Cr below. Significant correlations between the total metal concentrations were found, suggesting common origin and similar metal transportation and redistribution in the studied area. A clear but not significant trend for increased metal loadings in the rural soils was observed. The DTPA extracted fraction was in cases above the permissible limits. Except Cu, the availability ratio (A.R.) values (calculated as DTPA fraction/aqua regia fraction %) were comparable to the A.R. values of Athenian soils. The performed cluster analysis on aqua regia extracted fraction and A.R.s showed that total Pb, Cu, Zn and Cr in urban soils primarily associate to soil carbonates and Ni to clay content, while in rural soils metals associate to organic matter content and that the availability of Zn in both urban and rural soils is controlled by the organic matter content of the soils.

**Key words:** heavy metal, urban soils, rural soils, aqua regia, DTPA

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# Spatial variability of soil physical properties in adjacent alluvial and colluvial soils

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## Abstract

Soils vary spatially due to differences in topography, soil management, and soil formation. This study was carried out to identify and compare the spatial variability of some soil physical properties in adjacent alluvial and colluvial soils derived from alluvial and colluvial parent materials in ustic moisture regime at Gökhöyük State Farm (1750 ha), located in North of Çekerek River, Amasya, Turkey. Seventy four soil samples were collected on a regular grid (500x500 m) and 224 data were collected from 28 500-m fine-transects, randomly superimposed between the nodes of transects. Samplings, on each fine-transect were arranged as 5, 15, 35, 65,105, 215, 295, 395 m. The semivariograms and the kriging maps for soil texture, soil organic matter (SOM) and bulk density (BD) were prepared. Statistical analyses were conducted separately for both the colluvial, alluvial areas, and whole of the farm. All variables, except SOM, showed strong spatial dependency. The sill and the range of soil textural components increased from the colluvial to the alluvial area. Data obtained for SOM and BD differred in parent material. The variation in land use, crop production, and soil texture inside the alluvial area resulted in variation in the SOM content that masked the spatial effect on SOM. Bulk density was highly spatially dependent in alluvial area (1018 m) in contrast to in kolluvial area (414 m). Local trends were determined for sand and BD in alluvial area and for silt in the colluvial area. Kriging maps indicated a dependence of soil physical properties on topography and slope.

**Key words:** spatial variability, colluvial and alluvial area, soil physical properties, soil texture, bulk density, soil organic matter

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# The possibility of mathematical model application in evaluation of underground water's nourishment via infiltration

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## Abstract

The soil temperature is considered to have an important effect in nourishment of underground water along with factors, such as physical, chemical and biological properties of soil, development of plant roots, rain, evaporation, irrigation waters and etc. In this study, variance of soil temperature depending on depth has been analyzed by taking initial and different (linear, frequency jumping, sinusoidal) boundary conditions of "heat transmissibility equation" into account. The obtained solution provides an opportunity of estimating "nourishment level of underground water via infiltration" by using the values of soil's heat storage capacity ( $\rho C$ ) and calculated heat transmissibility ( $\lambda$ ).

**Key words:** heat transmissibility equation, soil, underground water, infiltration, soil temperature

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# Distribution of various magnesium forms in eastern littoral soils of Caspian Sea

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## Abstract

Mg content is high in arid and semiarid soils. Most of Mg in this area is in the form of Non exchangeable. The eastern littoral soils of Caspian Sea locate on northern and southern of Gorgan river of Golestan province (Turkmensahra) in semiarid region. There is no comprehensive study on the amount and various forms of Mg in this area. 25 soil samples were collected from 0-30 Cm depth of wheat and barley farms in eastern littoral of Caspian Sea. Various Mg forms including solution, exchangeable, non-exchangeable and total Mg were measured. Results showed that Mg solution, exchangeable and non-exchangeable varied from 1 to 13.4, from 6.4 to 62.8 and from 31.6 to 72.5 meq/l, respectively. It was also concluded that the non-exchangeable form is the predominant forms of soil Mg.
**Key words:** magnesium forms, littoral soils, Caspian Sea

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# Importance of soil organic matter (SOM) in availability of potassium and its effect on releasing of non-exchangeable potassium (NEK) in loessial soils of Golestan province

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## Abstract

Soils responses are affected by the type and quantity of organic matter (OM). The rate of NEK release and its mechanism are controlled by the nature and amount of clay minerals and organic acids present in soil environment. Organic acid are produced in soils during the decomposition of plant and animal residues, humic substances, microbial metabolism and rhizosphere activities. Use of organic acids to extract NEK from soil is believed to be synonymous to root extraction of soil K during cropping. Decomposition of SOM is the most important factor in the production of acids in soil, which cause weathering of clay minerals (main resource of NEK) and releasing NEK. Besides the NEK quantity, the rate of potassium release and its availability in plant growth period are significantly important. Therefore laboratory experiment was conducted on the role of soil organic matter (SOM), on availability of potassium and its effect on releasing non-exchangeable potassium (NEK) in loessial soils of Golestan province. The SOM was removed through two ways; then OM percent was re-determined by Walkly and Black method. The results of oxidation showed that NaOCl removed more OM than $H_2O_2$. This means that $H_2O_2$ has less ability in the removal of OM. The rate of NEK release was determined in soils with and without OM. Kinetic experiments results indicated that total quantity of NEK from the soils in all treatments was maximum in Aliabad series at the end of extraction. The rates of NEK release were minimum at blank in Kordkoy series and at the both of OM removed treatments in Daland series. More K was released in all soils at $H_2O_2$ removed treatment; where as less K was released at NaOCl treatment. K release was faster in earlier periods in all soils followed with a lower release rate. The Elovich and Parabolic diffusion equations described well the NEK release kinetics by Organic acid. Consequently, OM has direct and indirect effects on chemical forms quantity of K and on its kinetic release.

**Key words:** potassium, OM, organic acids, kinetic release

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# Multivariate geostatistical methods for mapping soil salinity

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## Abstract

Degredation of the lands by salinity under arid climate and poor drainage conditions can be inevitable. In the Harran plain total salt affected areas covers 10 % of total irrigated areas which are mainly located in the low lying parts of the plain where elevation ranges from 350 to 400 m. Soil salinity shows high spatial variability which requires intensive sampling and laboratory analyses. Geostatistical techniques such as simple or ordinary kriging can be used in explaining this spatial variability and estimating soil salinity parameters at unvisited locations. On the other hand, new approaches such as hybrid interpolation methods which incorporate secondary variables into primary variables can help improve the estimation. Estimating soil salinity is a vital issue in soil fertility and management. This study evaluated multivariate geostatistical methods such as cokriging (COK), regression kriging (RK) and kriging with external drift (KED) and compared them with traditional geostatistical methods (ordinary and simple kriging) for the estimation of soil salinity parameters. Topographical parameters (i.e elevation, slope and topo wetness index (ln (A/tanα)), soil types, and groundwater data were used as auxiliary variables.

**Key words:** soil salinity, mapping, regression kriging, topography

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# Effect of geochemical factor and chemical environment on spesific surface area of carbonate minerals

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## Abstract

Three different kinds of calcareous rocks, the first consist calcite (C), the second of dolomite, and the third was composed of a mixture of both calcite and dolomite (CD). Very fine powder of these rocks were treated with different concentration (0.05 and 0.02 M) of $MgCl_2$ (added to C samples), $CaCl_2$ (Sample D), and mixture of both salts (sample CD). Other samples were treated with 20ug $Fe^{-1}$ of rocks added as mineral iron ($FeSO_4$. $7H_2O$ or chelating iron (Fe- EDDHA). Other samples were treated with organic acid added in 3% level as humic and fluvic All samples were subjected to wetting and drying cycles for a period of 60 days under saturated $CO_2$ atmosphere. In the end of incubation period, measurements of specific surface area (SSA), particle size distribution of carbonate minerals (PSD), and mean diameter of carbonate particles (M. D) were conducted using liser technology .

Incubation of C samples has a tremendous effect in increasing the percent distribution of particles < 5 u and those > 50 u. these changes in the PSD were differ with indifferent treatment. In case of < 2u, the change in the PSD was ranged from 22.5 to 31.0 fold for mineral iron and distilled water treatment. The remarkable increase in the fine fraction of C particles has obvious effect on SSA which its value want up to 14437 $cm^2$, $cm^{-3}$ in distilled water treatment which increased by 8028 $cm^2$ $cm^{-3}$ over its level in control treatment. D sample was behave in different ways compared with calcite. Incubation of dolomite samples reduced the SSA for distilled water and Fe- EDDHA treatment down to 7668 and 7637 $cm^2$ $cm^{-3}$ respectively compared with the value 7803 $cm^2$ $cm^{-3}$ for control treatment. The drop in SSA was coincidence with growth of mineral crystals through incubation. Consequently, the M. D 9.33u for control treatment was increased up to 25.9u and 24.0u in distilled water and Fe- EDDHA treatment respectively. In the Other hand, the SSA was remarkably increased up to 13364 $cm^2$ $cm^{-3}$ in $FeSO_4$. $7H_2O$ treatment which attributed to the reduction in M.D down to 6.9 u compared with other treatment. Coexistence of both minerals in CD samples effects the equilibrium behavior in these samples compared with manners of C and D samples through incubation period Measurements of SSA indicated a reduction in its values compared with control treatment for all treatment except that for $FeSO_4.7H_2O$ treatment. The lower and highest value for SSA and PSD respectively were recorded in 0.05M mixed salts treatment. Data recorded for SSA and M.D for mixed salts control treatments were 3743 $cm^2$ $cm^{-3}$ and 58.8u and 8908 $cm^2$ $cm^{-3}$ and 8.16u respectively.

**Key words:** geochemical, soil minerals, specific surface area, particle size distribution of carbonate minerals, and mean diameter of carbonate particles

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# The use of cutting stone-slurry-wast in engineering practice

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## Abstract

The paper studies the use of cutting stones water slurry waste in engineering applications. Three types of selected clayey soils with different plasticity index and clay fraction were used. The initial physical properties of the clayey soils such as Atterberg's limits, maximum dry density, optimum water content, specific gravity, and clay fraction were evaluated in accordance with American Standard for Testing and Materials (ASTM) standard specification. Cohesion, angle of internal friction and unconfined compressive strength were evaluated from samples remolded at 95% relative compaction and optimum water content. Two sets of soil samples were prepared for testing purpose in this investigation. The first set is prepared with fresh water at different initial water content and dry densities and without any admixture. The second set is identical to the first set but the water content is replaced with the same percentage of stones slurry waste (SSW). The two sets of samples were tested for the unconfined compressive strength at two different percentages of water content (first set) and cutting stones slurry (second set) and at three different initial dry densities. Additionally, the effect of mixing the soils with cutting stone water slurry on the plastic index, dry densities and optimum water contents were studied. Results indicated that mixing the clay soil with cutting stone slurry waste increased the max dry density, and decreased the optimum water content percent and the plasticity index. Also, both unconfined and the modulus of elasticity of the soil was improved significantly due to the addition of stone slurry waste to the tested soil.

**Key words:** modulus of elasticity, plasticity index, shear strength, clay, slurry waste

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# Changes in pH, EC and $NO_3$-N along a clay soil profile due to surface application of hazelnut husk and manure

**F.Candemir, C. Gülser, S. İç, Z. Demir**

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## Abstract

Changes in pH, electrical conductivity (EC) and $NO_3$-N along a clay soil (Vertic Haplustoll) profile due to surface application of hazelnut husk (HH) and manure (M) were investigated in the experimental field of Agricultural Faculty in Ondokuz Mayis University. Two different organic waste treatments (M and HH) were incorporated into the top 15 cm of soil profile as a randomized plot design with four doses (0, 33, 67 and 100 Mg $ha^{-1}$), each in three replicates. After 20 months of M and HH applications, soil samples were taken from four different depths (0-20, 20-40, 40-60 and 60-80 cm) of soil profile, and pH, EC and $NO_3$-N in soil samples were analyzed. The third dose of manure and HH treatments significantly increased soil pH, EC and $NO_3$-N values within 40 cm soil depth according to the control. Increases in EC and $NO_3$-N values along the clay soil profile were generally determined in the following order: control < HH < M treatment. While the nitrate nitrogen in control treatment were 55.98 ppm in 0-20 cm and 35.65 ppm in 20-40 cm depth, nitrate nitrogen in these depths significantly increased by the third dose application of organic wastes to 189.16 and 108.77 ppm with M, and 111.93 and 71.74 ppm with HH, respectively. The most increases in the soil properties along the soil profile were obtained with M treatment.

**Key words :** manure, hazelnut husk, clay soil profile, pH, EC, $NO_3$-N

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# Effects of plant growth on some physical properties of different textured soils

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## Abstract

This study was carried out to determine the effects of plant growth on some physical properties on three different textured (clay, loam and sandy) soils. Study was carried out growing and without growing of barley in 3 soils (clay, loam and sand) with 3 replications. After barley was sown in a half number of the pots, all soils were incubated together for 6 months under greenhouse conditions without fertilization. Moisture content in the pots was kept around field capacity with adding distilled water after weighing the pots in every 2 days. At the end of the study, bulk density (Db), mean weight diameter (MVD), aggregate stability (AS), field capacity (FC), permanently wilting point (PWP) and available water capacity (AWC) were determined in all treatments. Plant growth increased AS, MVD, FC and PWP in all soils according to the control. On the other hand, bulk density decreased in clay and loam, and increased in sandy soil. Available water capacity, except clay soil, generally increased in the other soils. The most increases among the soil physical properties were determined in AS and MWD with plant growth. AS and MWD increased 51.53% and 13.67% in clay, 34.34% and 17.54% in loam and 14.99% and 26.45% in sandy soil, respectively. These results indicate that plant root development in soils has an important positive effect on soil physical properties, especially structural development and stability.

**Key words :** plant growth, soil texture, soil physical properties, water holding capacity

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# Changes in exchangeable cations in a clay loam soil depth due to surface application of organic wastes

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## Abstract

Changes in exchangeable cations in a clay loam soil depth due to application of hazelnut husk (HH), tea (TEW) and tobacco wastes (TOW) within the first 10 cm of soil surface were determined under greenhouse conditions. At the end of 80 days of incubation, organic carbon (OC) and exch. cations (Ca, Mg, K and Na) were determined in 10, 20, 30, 40 and 50 cm depth of soil columns. OC in 0 to 50 cm depth increased with organic waste treatments according to the control as follows: control (C) < TOW < HH < TEW applications. Exch. Ca contents decreased through soil depth with the waste applications and the most decrease was obtained with TEW application. Exch. Mg content, except HH, generally increased in all soil layers of TEW and TOW applications. Exch. Na content in the first 10 cm soil depth decreased with the waste applications. Exch. Na between 30 and 50 cm depth increased with TOW and decreased with HH application. Exch. K contents within 20 cm soil depth increased with all treatments. According to the control treatment, the most increases in exch. cations within the first 10 cm soil depth were determined as 10.0% in Mg with TOW and 301.1% in K with HH applications, while the most decreases in exch. cations within the same depth were 8.4% in Ca with TEW and 27.0% in Na with TOW applications.

**Key words :** exchangeable cations, hazelnut husk, tea waste, tobacco waste, soil depth

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# Study of various methods of acidification of phosphate rock in order to fertilize the soil

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## Abstract

The dissolution of phosphates (apatite) in acidic solutions is considered a heterogeneous non-catalytic reaction. It occurs mainly on the surface of the solid particle. It is well known that phosphates can not be used directly as fertilizer due to their insolubility. To make them assimilable by plants, the phosphates are dissolved by mineral acids. These acids, which are used in industrial production of compound fertilizers, mainly nitric acid, hydrochloric acid, sulphuric acid.

The reaction of phosphate with these acids depends on several factors. Among them we can mention:

- The chemical and mineralogical composition of rock phosphate,
- Its size distribution,
- Specific surface,
- The temperature of the reaction,
- The acidity of the liquid phase,
- The ratio of acid-rock
- The speed of agitation during the reaction,

acidulation time, and the products formed during the attack.

In this present work, we present the best method of attack phosphates rock to make them assimilated into the soil. We also present the advantages and disadvantages of different methods of acidification.

**Key words:** phosphate rock, NPK fertilizer, acidulation, solubility

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Soil Ecology, Biology and Biochemistry

# Soil Ecology, Biology and Biochemistry

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# Enzymatic activity as a biodiagnostic indicator of the technogenic-polluted grey-brown soils

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## Abstract

Studying of enzymatic activity was spent on an example of the tehnogenic-polluted grey-brown soil of Apsheron which are in sphere of influence cement (Garadag area) and superphosphate (Sumgait area) factories, and as located on a route of an oil pipeline of Baku-Tbilisi-Dzhejhan. The definitions of enzymatic activity of soils of Garadag and Sumgait spent by us have revealed characteristic distinctions between them. Activity of an oxidising enzyme of catalase on natural solonetzic soil (0-30 cm a layer) the Sumgait area was insignificant and has made only 2,3-4,0 $cm^3$ of $0_2$. $g^{-1}$ of soil. Its activity increases almost in 1,5 times under grain crops increasing in the top 0-10 cm and arable layers of 20-30 cm to 2,8-5,0 $cm^3 0_2$. $g^{-1}$ soils.

Invertase as a hidrolitic enzyme, takes part in hydrolysis of carbon connections in the soil, serving by power resources for microorganisms, invertebrates, plants and other representatives of soil biota. The obtained data testifies to constant decrease activity of invertase from virgin soil of 6,0-12,2 ml gluc. $g^{-1}$ soils to soil of agrocenosis grain 6,8-8,4 ml gluc. $g^{-1}$ of soils. Urease participates in transformation of connections of nitrogen into soil, translating them in easy-to-assimilate forms of nutritious connections. On a virgin soil its indicators on separate layers (0-10, 20-30 cm) change between 0,7-1,9 ml $NH_3$. $g^{-1}$ of soil, and under crops grain its insignificant reduction to 0,6-1,5 ml $NH_3$. $g^{-1}$ of the soil, connected with intensive mineralization of the vegetative rests is marked even. Enzymatic reactions in soils of the Garadag area had absolutely other character. If activity of catalase on virgin variants changed on soil layers between 1,2-3,1 $cm^3 0_2$ and 1,3-3,6 $cm^3$ of $0_2$. $g^{-1}$ of soil in soil of a garden it increases to 2,2-5,6 $cm^3$ of $0_2$. $g^{-1}$ of soil, the same tendency are found out and in activity of other enzymes. In comparison with the virgin salted soils where activity of invertase and urease change from 2,5-7,0 to 2,9-8,5 ml. $g^{-1}$ of soil and from 0,20-0,7 to 0,2-1,1 ml $NH_3$. $g^{-1}$ of soil in soil of agrocenosis of a garden. These indicators essentially increase accordingly to 6,0-14 ml. $g^{-1}$ of soils and 0,5-2,5 ml $NH_3$. $g^{-1}$ of soil. Thus, long-term processing of soil has positively affected activity of separate enzymes. Analyzing the received results on some biochemical indicators, it was possible to find out that enzymatic reactions are in close interrelation as with the general zoo-microbiological processes, degree tame soils, and with soil pollution by a tehnogenic waste of the various chemical nature.

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# Decomposition Rates of Intercropped Green Manure Crops in Oaxaca, Mexico

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## Abstract

In the Central Valleys of Oaxaca, México, crop production is seriously limited by soil moisture and fertility, as well as by land scarcity. To try to alleviate these constraints, an experiment to evaluate the feasibility of producing green manure crops intercropped with maize (*Zea mays*), residue decomposition rates and nitrogen content at full bloom was conducted. The mung beans (*Vigna radiata*) and dolichos beans (*Dolichus lablab*), planted as single crops, out yielded widely the other species evaluated, but decreased significantly their dry matter production when intercropped with maize, particularly mung beans. Maize production was also affected by the intercrops, especially crop grain yields when grew associated with crotalaria (*Crotalaria juncea*). On average, biomass production of intercropped legumes decreased 31.3 %, with extreme values of 22.1 % for crotalaria and of 37.4 % for mung beans. Using the methodology of burying residues contained in mesh bags, it was found that mung and dolichos beans showed the highest decomposition rates (8.8 and 9.1 g $ha^{-1}$ per day, respectively), while crotalaria and common beans reached values of 4.1 and 5.7 g $ha^{-1}$ per day, respectively. Decomposition rates were significantly related to soil temperature and water content, as well as to C/N ratios of the residues. Given its characteristics of high drought tolerance and rate of height increase when intercropped, crotalaria is a species suitable for intercropping with maize in more marginal areas. Because of its growth habit and long life cycle, which minimizes competence with maize during its critical stages, dolichos bean has a good potential to grow well in association with maize in deep soils under rain-fed conditions.

**Key words :** Crotalaria, Dolichus, Vigna, Phaseolus, drought, poor soils, peasant agriculture

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# The relative contribution of chemoautotrophic and chemo-heterotrophic bacteria to sulfur oxidation in calcareous soils

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## Abstract

Lab experiments were conducted to study the relative contribution of each of the chemoautotrophic and chemoheterotrophic bacteria to sulfur oxidation in three calcareous soils. Soil (1) have a texture of loamy clay classified as calciorthid, soil (2) have a texture of silty clay loam, classified as typic calciorthid, while the texture of the third soil was sandy loam and classified as torriflurent . The following experiments were included :

**Experiment 1;** Oxidation of agricultural sulfur by the original microflora of the soils : A 500 gm – aliquot of each of the three soils were treated with different levels of agricultural sulfur (0, 1% and 2%), moistened up to 90 % of the field capacity and then incubated for 60 days at 28 C during wich the amounts of sulfate and the changes in the pH of each soil were measured at a 15 day intervals. A CRD Experiment was used with three replicates.

**Experiment 2;** Oxidation of agricultural sulfur by chemoautotrophic bacteria : The interaction between the added sulfur (0, 1% , and 2%) and organic fertilizer (chicken manure) added as (0 and 1 %) on the oxidation of sulfur were studied in each of the three soils under sterile conditions , using a CRD Experiment with three replicates. Each of the treated sterile soil was inoculated with a 5-day old chemoautotrophic bacteria ($6.8\times10^{7}$ cells $.ml^{-1}$) , then incubated for 45 days at 28 C during wich , the amounts of sulfate and the changes in the soil pH were measured at a 15 day intervals.

**Experiment 3;** Oxidation of agricultural sulfur by chemoautotrophic bacteria: The design of this experiment was the same as experiment 2 in term of treatments and replications with one exception, that is to inoculate the treated sterile soils of each dish with 10 ml inoculum of 7-day culture of chemoautotrophic bacteria.

Results indicated that: (1) Chemoautotrophic bacteria contributed about 70 % of the total sulfur oxidized while chemoautotrophic bacteria contributed just 30 %. (2) Maximum decreases in pH after 45 days of incubation was 1.2 unit , obtained in soil taken from Kaiara region, when treated with 1 % sulfur. (3) Addition of organic manure caused a little effect on the oxidation of the added sulfur, and in some time had an inhibitory effect specially on chemoautotrophic bacteria. (4) Generally the percentages of the oxidation of the added sulfur after 45 days of incubation was not that much , around 7 % of that added .

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# $N_2O$ and $CH_4$ fluxes from *Acacia mangium* plantation soils in response to nitrogen application and FH layer removal

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## Abstract

We measured $N_2O$ fluxes and $CH_4$ uptake rates following $NH_4Cl$ and $KNO_3$ (100kg N $ha^{-1}$) application with and without FH layer during a relatively dry season in an *Acacia mangium* plantation stand in Sumatra, Indonesia. High $N_2O$ fluxes at control (no treatment) with FH (0.46 – 0.53 mg N $m^{-2}$ $d^{-1}$) suggested that *A. mangium* soils function as a larger source of $N_2O$ than natural forest soils. In the relatively dry season, FH layers in the *A. mangium* plantation were not a direct source of $N_2O$, but appear to contribute to nitrogen cycling and the following $N_2O$ production in mineral soils as a supplier of available carbon and nitrogen. Application of $NO_3^-$ fertilizers significantly increased $N_2O$ fluxes irrespective of the FH removal treatment, suggesting that increased $NO_3^-$ availability enhanced $N_2O$ emissions through the denitrification process and that anaerobic microsites can exist even in the relatively dry soils in the *A. mangium* plantation. $CH_4$ uptake rates at control with FH layer ranged between 0.70 – 0.84 mg C $m^{-2}$ $d^{-1}$, which is consistent with other natural tropical forest soils. *A. mangium* soils supplied with N rich litter do not appear to decrease the function as a sink for atmospheric $CH_4$ at least in a relatively dry season, though $NH_4^+$ addition significantly reduced $CH_4$ uptake rates.

**Key words :** *Acacia mangium*, fast wood plantation, nitrous oxide, methane, denitrification, nitrogen application, litter, Indonesia

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# Selective isolation and identification of *Streptomyces* from legume rhizosphere based on molecular techniques

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## Abstract

In this research, *Streptomyces violaceusniger* 16S rRNA gene clade members, which is known to have antogonistic effect on root infecting fungi, were isolated from rhizosphere soils from different legumes, using starc-casein agar suplemented cycloheximide, nystatine and rifampicin, incubated at 28°C for 14 days, using dilution plates technique. The test organisms which were characterised according to cultural, morphological and pigmentation features on different agars and cell wall diaminopimelic (DAP) and fatty acids were determined to have antimicrobial activities against 17 patogen organisms like Gram (–) and (+) bacteria, fungi and yeast. The test organisms which were selected as a member of the clade on the isolation plates according to morphological and pigmentation features were tested with *Streptomyces violaceusniger* 16S rRNA gene clade specific S-S-Svio-66-A-S-18 and A-S-Svio-1274-A-A-20 primers. Spore chain morphology and spore surface ornamentation of representative strains were examined by scanning electron microscope. According to the results of these studies, although all of the members of the *S. violaceusniger* clade isolates had characteristic rugose ornamented spores in spiral chains. 16S rRNA nucleotid base sequences of *Streptomyces* type strains obtained from databanks such as NCBI, RDP-II RDP, DDBJ and EMBL and base sequences of isolates were aligned comparatively by using the PHYDIT program. Phylogenetic dendograms of 16S rRNA sequence analysis were made using the least-squares, maximum-parsimony and neighbour-joining algorithms. DNA-DNA relatedness of chosen test isolates among themselves and their nearest phylogenetic neighbour type strain *S. malaysiensis* were established based on the thermal denaturation temperature by a flourometric method. The MLST studies were carried out through sequence analysis of the location of *rpo*B, *rec*A and *tuf*A genes with related forward and reverse primers with PCR amplification. It can be concluded from the results that phylogenetic analysis based on multilocus sequences is more accurate and robust for species delineation within member of the *S. violaceusniger* gene clade. Good corelation was found between *rpo*B, *rec*A and *tuf*A genes and 16S rRNA gene sequences results.

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# Study of the efficiency of some fungal genera isolated from rhizosphere on rock phosphate solubilization

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## Abstract

Several laboratory experiments were conducted to select the most efficient fungal isolates in rock phosphate solubilization. Also to study the effect of inoculation with these isolates on phosphorus availability in soil in the presence or absence of rock phosphate under different levels of organic matter (0%, 1%. 2%) and in sterile and non-sterile soil. Results can be summarized as follows:

1. Fungal isolates also showed a different efficiency in their ability to solubilize rock phosphate in liquid medium. The genus Aspergillus and Alternia were the best as compared with the other isolates tested (14 isolates).
2. The available phosphates values were increased significantly in the soil containing 1% rock phosphate as compared with the control treatment (0% rock phosphate), in about 31.4% .
3. The available phosphorus values were increased significantly in the soil amended with both levels of the organic manure as compared with the control treatment (0% organic manure). Increasing the organic matter level from 1% to 2% increased the available phosphorus significantly (10-12%) .
4. The available phosphorus values were greater in the non-sterilized soil than the sterilized soil in about 23-47%..

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# Effect of temperature on carbon mineralization and nitrous oxide emission from forest floors of Solling forest-Germany

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## Abstract

The measurement of $CO_2$ and $N_2O$ efflux from forest soils has become of great importance in evaluating the role of forests as sequestering agents of atmospheric $CO_2$ and nitrogen. To quantify the effect of temperature on net C-mineralization and $N_2O$-N emissions from different forest floors three adjacent forest floors under beech, Norway spruce and mixed species stands were investigated at Solling forest, Germany by an incubation experiment for three months. The investigated net C-mineralization and $N_2O$-N emissions from all forest floors exhibited an exponential increase with respect to temperature elevation. The temperature coefficient function ($Q_{10}$ value), was fitted to flux rates to describe the temperature sensitivity of forest floors on temperature in the range of 1–20 ºC. Comparing the fitted curves for temperature sensitivity of the forest floors in relation to net carbon mineralization and nitrous oxide emission rates revealed a strong positive correlation across all sites. For the whole data set of all stands, a $Q_{10}$ value of 1.73–2.10 for net C-mineralization and 2.81–3.58 for $N_2O$-N emissions per measured unit was found to describe the temperature dependency of net C-mineralization and $N_2O$-N efflux at experimental site. The absence of clear differences between beech and spruce in mono and mixed species cultures on temperature dependencies of net C-mineralization and $N_2O$-N emission rates indicated that the flux rates were not affected by species-specific differences of litter quality.
**Key words:** beech, spruce, net C-mineralization, Nitrous oxide emission, Temperature, Temperature sensitivity index ($Q_{10}$)

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# The effect of forest type on organic horizon thickness and decomposition rate of forest floor of a northern hardwood forest in Iran

**S. M. Waez Mousavi, M. Zoghi**

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## Abstract

In this study the effect of forest type on forest floor thickness was investigated by comparing the thickness of different forest floor horizons such as L, F and H in 12 different forest stands which belong to 3 different forest types inclusive Fagetum-hyrcanum, Fagetum-carpinetum and Fagetum-aceretum (4 stands for each forest type) in northern hardwood forest of Iran. 12 rectangle plots with a size of 2500 $m^2$ were considered for measuring the thickness of soil organic horizons (one 2500 $m^2$ rectangular plot in each stand) and in each rectangle plot 25 humus profiles with the area of 625 $cm^2$ (25×25 cm) were considered to measure the thickness of organic horizons. Results indicated that there was a significant effect from forest types on humus thickness ($p > 0.05$). Humus thickness in fagetum-hyrcanum (pure fagus orientalis stand) was thicker than two other stands which is justifiable due to lower pH of its humus and unsuitable conditions for decomposer microorganisms. Fagetum- aceretum has significantly thinner humus horizon ($p > 0.05$) and hence faster decomposition which is due to existence of *Carpinus betulus* litter that makes humus, pH and nutrient properties more suitable for decomposer microorganisms. Fagetum-carpinetum has intermediate conditions.
**Key words:** forest type, organic horizon thickness, forest floor, northern Hardwood

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# Isolation of Nocardia asteroids from soil samples and its effect on the levels of some biochemical parameters of experimentaly infected animals

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## Abstract

The study includes the isolation and identification of N.asteroides from soil samples after inoculation on selective media includinglowenstein-jensen, carbon free broth, blood agar and brain heart infusion agar. Microbiological and cultural characteristics for the growing colonies as gram stain and modified ziehl neelsen as well as the biochemical tests confirmed its isolation at arate of 4% and all the isolates belonged to N.asteroides. The effect of experimental infection by N.asteroides on enzymes GOT, GPT, Cholinesterase and tissue Glutathion were studied, the results showed an increase in the levels of GOT and GPT and adecrease in the level cholinesterase and tissue glutathione which indicates its effect on the liver and heart.

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# Effects of phosphate-solubilizing bacterial inoculations on yield, quality and chemical composition of winter wheat (*Triticum aestivum l.*)

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## Abstract

This study was conducted to investigate the effects of seed to inoculation with a strain of P–solubilizing bacteria (*Bacillus* M-13) on yield, quality and chemical composition of winter wheat. Strain of P–solubilizing bacteria (M-13) was studied in relation to five level (0, 23, 35,47, 70 kg $ha^{-1}$) with inoculation and without inoculation and P applications under field conditions in Central Anatolia, Turkey, in 2004-2005 growing seasons. The grain yield,1000 kernel weight, hectoliter weight, protein content and N, P, K, Fe, Cu, Zn, Mn concentration of grain were measured. Inoculation with strain of P–solubilizing bacteria significantly affected yield, and quality. The highest grain yield was obtained from seed uninoculation + T4 (23 kg $ha^{-1}$ P fertilizer) and seed (M-13) inoculation + T3 (35 kg $ha^{-1}$ P fertilizer) in dry conditions. Bacterial inoculation gave an increase in grain yield over control application. The similar results were derived from 1000 kernel weight, hectoliter weight, protein %. Results of this research suggest that the both bacterial inoculation and phosphate fertilizers together should be applied in arable in order to obtain high grain yield and to cut down over fertilizers usage. The significant differentiation ($p< 0.05$) was found on Fe, Zn, Cu, Mn concentration of wheat grain and on N, P, K content both *Bacillus* inoculation and P fertilizer.

**Key words:** chemical composition, inoculation, phosphate, P–solubilizing bacteria, *Bacillus* sp., quality, yield, wheat

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# The effect of *Azotobacter chrococoum* and *Azospirillum lipoferum* on releasing soil potassium

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## Abstract

K is an essential macronutrient for plants. Various micro organisms including some bacteria, fungi, yeasts, algae and also mosses are able to decompose silicate minerals of soil and to dissolve nutrients such as P, Fe, Zn and Si, among them bacteria are more important. This study is to investigate the effect of two bacteria *(Azospirillum lipoferum* and *Azotobacter chrococoum)* on releasing soil potassium. The experiment was conducted as a factorial in completely randomized design including two factors with three replications. The first factor includes two geniuses of bacteria and the second factor contains various extracting times after bacterial inoculation. To do so, four treatments including B1, B2, B1B2 and without bacterial treatment were inoculated into soil and the K was extracted by $NH_4OAc$ during four different times (0, 10, 20 and 30 days). Results indicated that the most amount of K was released by soil inoculation with *Azotobacter chrococoum* and K content increased through passing of time. In all treatments, the most amount of K was released 30 days after inoculation.

**Key words:** potassium, bacteria, silicate minerals

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# The effects of different compost material, mycorrhizal species and different growth medium on clover and onion growth, nutrient uptake and mycorriza colonization

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## Abstract

It is well known that the intensive use of chemicals in agricultural production systems causes important environmental problems in both soil quality and human health. Therefore, recently use of organic fertilizer is so popular for sustainable agriculture. Very recently several pot experiments were set up to search the effect of compost material on seedling quality and mycorrhizal development.

The aim of this research is to use two different mycorrizae (*Glomus intradices*, *Glomus clarium),* two different growth media to investigate the effects of various compost applications on clover and onion plant's growth, nutrient uptake and mycorriza infection. The study was carried out under greenhouse conditions, at the department of Agriculture Faculty, Çukurova University. In this experiment, clover and onion were used as host plants. Ten different compost materials were prepared. Two different growth media were used. As regard with the growth environment; Medium A; andezitic tuff: soil (andezitik Tuff +Soil (2:1 v/v) treated with %4 of compost. Medium B; andezitic tuff: soil (andezitik Tuff +Soil (2:1 v/v) treated with %8 of compost. After 10th week following the sowing, the plants were harvested and shoot and root dry weight, root infection, P and Zn content were determined. Composted chicken manure was determined to be the most efficient mediums affecting the plant growth and development at the highest rate. Among the growth media the most efficient compost medium of growth was determined to be andezitik tuff + Soil with 4 % compost medium. It was also observed that compost made from leguminous plants is the second effective medium. The research outcomes show that *G. intradices* is the most effective mycorrhizal species.

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# Occurrence of arbuscular mycorrhizal fungal species in rhizosphere of some desert plants of Semnan Province in Iran

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## Abstract

In this study, occurrence as well as abundance of arbuscular mycorrhizal fungal species in rhizospheres of some desert plants including, *Haloxylon* sp., *Zygophyllum* sp. and *Ephedra* sp. were studies in Semnan province in central parts of Iran. Totally, 84 soil samples were collected. Fungal spore populations were recorded from soil samples. Trap cultures was also established using maize as host plant for species identification. Host roots were also stained for observation of fungal structures. Results showed that mycorrhizal fungal spores were observed in all soil samples but with different frequencies. These spore numbers were 115-2450 spores in *Haloxylon* sp. rhizosphere whereas 245-2280 spores in *Zygophyllum* sp. and 249-1254 spores in *Ephedra* sp. rhizospheres. Average numbers of spore in Haloxylon, Zygophyllum and Ephedra rhizospheres were 642.82, 704.55 and 593.3 spores per 500g soil sample, respectively. In all plant roots, fungal structures such as extraradical mycelia, intraradical mycelia, spores, vesicles and arbuscules could be observed but the most apparent structures were mycelia, vesicles and spores. 12 different fungal species identified in host plant rhizospheres. These fungi belonged to 3 genera, *Glomus*, *Acaulospora*, *Pacispora* from two orders Glomerales and Diversisporales, of Glomeraceae, Acaulosporaceae and Pacisporaceae. Occurrence and frequency of fungal species in different host plant rhizospheres were different. The most abundant species in *Haloxylon* and *Ephedra* rhizospheres was *Glomus fasciculatum*, while in *Zygophyllum* rhizosphere was *G. intraradices*. Also, some species were not observed in some host plant rhizospheres.

**Key words:** arbuscular mycorrhizal fungi, *Haloxylon*, *Zygophyllum*, *Ephedra*, identification

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# Terrestrial isopods diversity related to irrigation and agricultural practices in North-East of Tunisia

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## Abstract

Environmental factors and land-use affect soil biological communities and their functions as woodlice. These terrestrial isopods are detritivorous and reliable bio indicators of habitat quality and soil capacity production. In order to evaluate the effect of different irrigation practices and type of cultivation, woodlice richness (S), diversity indice (H'), equitability (J') and their relative abundance (A) were studied according to 3 types of irrigation (drip, surface mode and sprinkler) in 16 plots and in 9 different types of cultivation: market gardening (artichoke, tomato and melon); vegetable crop (alfalfa, sorghum and maize) and fruit-trees (apple, pear and olive) in the Majerda low plain (North-East Tunisia).
Pitfalls were used to collect woodlice during 3 weeks (from 22 August to 09 September 2008). Physico-chemical analyses were performed from soil sampled in each plot. According to type of cultivation, 7 species of terrestrial isopods were listed. S varied from 3 species in tomato, melon and artichoke to 5 species in alfalfa cultivation. *Porcellio laevis* was very abundant in pear tree fields (A=89%), alfalfa (A=83%) and in apple tree fields (A=78%). *Porcellio variabilis* was abundant in the olive (A=84%) and in maize cultivation (A=82%). *Armadillidium sulcatum*, the less abundant species, was present in alfalfa. Species diversity was maximum in tomato cultivate (H'=1.9 and J'=0.95) and minimum in pear-tree (H'=0.68 and J'=0.29). According to the type of irrigation system, *P. laevis* was the most abundant species in the drip and surface mode, (A=48% and A=69% respectively), *P. variabilis* (A=49%) in sprinkler irrigation. Moreover, a relationship between the soil features and each terrestrial isopod was tested.

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# Molecular ecology of nitrifying and denitrifying microbial communities

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## Abstract

Microorganisms are the key players in the nitrogen cycle of various ecosystems. Utilization of new techniques and tools in environmental studies revealed that the diversity of microorganisms responsible for transformation of nitrogen is far greater than previously thought. According to recent reports, not only Bacteria but also Archaea and Eukarya are involved in nitrification and denitrification processes and denitrification can also occur in the presence of oxygen. In addition, a biological process called "anammox" in which ammonium is anaerobically oxidized has been discovered. Even though bacteria responsible for anammox reaction have not been isolated in pure culture, studies utilizing molecular techniques indicated that they belong to a phylum whose members are widespread and occur in diverse environments including soils. Advances in molecular biology provide the opportunity to study microbial communities responsible for nitrogen transformation through "culture-independent" techniques that circumvent isolation and cultivation of organisms. These techniques proved to be powerful tools for that purpose. Scientists have been investigating these microbial communities via universal or group-specific 16S rDNA primers, and primers targeting functional genes encoding enzymes involved in nitrification and denitrification. During the last decade, considerable amount of information has been accumulated on nitrogen transforming organisms. The aim of this paper is to summarize the recent progress on molecular ecology of nitrifying and denitrifying communities in the environment, particularly in soil.

**Key words:** molecular ecology, nitrification, denitrification, microbial community

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# Change numbers of microorganisms of good vegetable of irrigated soils subtropical zone of Azerbaijan

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## Abstract

The activity of microorganisms in soils is related to the formation and mineralization of soil humus and inactivation of substances released from plants and inhibiting substances entering the soils with applied chemicals. The analysis of the soil microflora includes the determination of the total number of microorganisms in the soil and the populations of particular physiological groups. Object of researches are Irrigated gray-brown (Irragric Gypsic Calcisols in the WRB) and meadow-sierozemic soils (Irragric Calcisols in the WRB) of arid subtropical, meadow-forest alluvial soils of semiarid subtropical (Irragric Mollic Luvisols in the WRB) and Irrigated zheltozem-gley soils (Irragric Gleyic Luvisols in the WRB) of humid subtropical zones. In the irrigated gray-brown soils used in rotation systems with different crops, the numbers of microorganisms in the upper 50 cm of the soil profiles varies within the following values: 736-2016 thousand CFU/g of dry soil for bacteria, 111-197 thousand CFU/g of dry soil for spore-forming bacteria, 262-594 thousand CFU/g of dry soil for actinomycetes, and 1.4-3.8 thousand CFU/g of dry soil for microscopic fungi. The corresponding values for meadow-sierozemic soils are 1027-1300, 302-396,478-621, and 3.9-4.9 thousand CFU/g of dry soil, respectively; for meadow-forest alluvial soils, 2199-3171, 81-100, 394-459, and 26-62 thousand CFU/g of dry soil, respectively; and for zheltozem-gley soils, 1643-2101, 248-300, 511-547, and 23-52 thousand CFU/g of dry soil, respectively. Among the growing cultures the highest number of microorganisms was observed under lucerne, haricots, the least - under onions and garlics. In the investigated soils the share of bacteria and actinomytes surpassed, the quantity of microscopic mushrooms was the least. In total of bacteria the quantity of sporoforming bacteria in irrigated meadow-forest alluvial soils is much lower than in other investigated soils. Gray-brown soils in comparison with meadow-forest alluvial soils are rich in inhabitant of actinomytes, and meadow-sierozemic soils - bacillus forms. Among the investigated soils the highest number of actinomytes was observed in meadow-sierozemic and zheltozem-gley soils. In gray-brown soils under growing cultures the intensity of processes of mineralization vibrates within the limits of 0.26-0.38, at permanent - 0.33-0.45, in meadow-sierozemic soils - 0.41-0.57 and 0.67-0.82 accordingly, in meadow-forest alluvial soils - 0.11-0.20 and 0.21-0.28, in zheltozem-gley soils - 0.25-0.29 and 0.28-0.32. The least intensity of process of mineralization was marked in meadow-forest alluvial soils and in zheltozem-gley soils. Under permanent cultures the coefficient of mineralization was higher, than in a crop rotation.

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# Mycorrhizae inoculated vegetable seedling production and use for field experiments for ecological farming

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## Abstract

Under semi arid soil conditions, since soils are poor in availability of nutrients because of its high clay and lime content and high pH, mycorrhizal inoculation is seem to be a good strategy for sustainable agriculture. Since it is still very difficult to produce large quantity of mycorrhizal inoculum for large area, it is sound to produce mycorrhizal inoculated seedling and then transplanting to the field.

Green pepper, bell pepper, eggplant, tomato, cucumber, honeymeleon, watermelon, marrow seedling were produced in different growth medium which are made from different composting material with several mycorrhizal species. Seedlings were produced with different techniques. Mycorrhiza inoculated and non inoculated seedlings were used under field conditions with different inoculation techniques. The experiments revealed that under field conditions, mycorrhiza inoculated seedlings are effectively established and given high response to plant growth and yield. The results showed that, mycorrhizal inoculated plants have high P and Zn content than not inoculated one.

It has been concluded that seedling quality is much more dependent on growth medium and mycorrhizal spore effectiveness. Also it is important to indicate that using mycorrhiza inoculated seedling it is a good strategy for horticultural production.

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# Symbiotic potential effect of arbuscular mycorrhizal fungi on growth and nutrient uptake in basil plants

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## Abstract

In order to evaluation of mycorrhizal fungi effects on growth parameters as well as nutrients uptake in basil (*Ocimum basilicum*), this study was conducted in complete randomized design with 4 treatments and 4 replications. Fungi inoculation treatments consisted: $M_f$ *(Glomus fasciculatum)*, $M_e$ *(Glomus etonicatum)*, $M_i$ *(Glomus intraradices*), and $M_b$ (no-inoculation). The results showed mycorrhizal plants significantly had higher shoot and root dry weight, leaf area, plant height, numbers of lateral branches, numbers of leaves, as well as N, P, K, Ca, Fe, Zn, Cu and Mn concentration compared with non-inoculated plants. Furthermore, mean comparisons showed in most measured growth properties, mycorrhizal plants significantly had higher levels with respect to control plants. Among studied fungus species, inoculation of basil with $M_f$ resulted in significant different in growth indices and nutrition status in comparison with other studied species. Colonization percent of basil roots with *G. fasiculatum* was higher than other species, which may indicate effective symbiotic potential of this strain with basil roots.

**Key words:** arbuscular mycorrhizal, basil, root colonization, yield

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# Soil microarthropods communities (soil mesofauna) as tool to assess soil quality. A case study from Makwanpur district of Central Nepal

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## Abstract

Microarthropods are the most abundant and diverse faunal group among terrestrial ecosystem. A preliminary ecological study was conducted in Makwanpur district (central region, Nepal), the objective of the study was to determine the abundance, diversity and specie composition of soil microarthropods under different land use system and elevation gradient. Further to evaluate the relationship between soil biological indicators (microarthropods) and Physico-chemical indicators. Soils were sampled from forest and agriculture land, soil sample collection and microarthropods extraction was performed according to the standard methodology applied in soil biology: soil core samples (10 × 10 × 5 cm) and extraction by using the modified Berlese–Tullgren funnel. The population density and diversity of soil microarthropods were compared in two land use type and three different elevations. Microarthropods densities differed significantly with the land use and elevation. Pearson's correlation indicated that microarthropods density was significantly positively correlated with the soil organic carbon and soil moisture content and negatively with the pH and bulk density. Among the soil microarthropods groups Collembolans were the most abundant group followed by Acarina. Both groups of arthropods significantly vary with elevation and were strongly correlated with soil moisture and soil organic carbon. Our results indicate that soil moisture content and soil organic carbon will have an impact on soil ecosystem. Soil moisture and SOC appeared to be stronger indicator of soil quality determine the abundance and diversity of soil micro arthropods. However further research is required to evaluate the impact of agricultural practices (Tillage, pesticide, herbicide, intensification) on soil micro arthropods abundance and diversity for sustainable management of agro ecosystem in Nepal. Further, bioassesment could be an effective and relatively inexpensive tool for soil quality assessment, however further work need to be done to develop an index suitable for Nepal. Bio indices are likely to eco-region.

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# Effects of different application doses of sewage sludge on microbial biomass C and basal respiration in soil and in earthworm *L. terrestris* L. cast

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## Abstract

This study was carried out in order to determine the effects different application doses of sewage sludge (0, 2, 4, 6, 8 and 10 %) on microbial biomass C ($C_{mic}$), basal respiration (BSR), organic C ($C_{org}$) and total N ($N_{total}$) in soil and in earthworm *Lumbricus terrestris* casts. Experimental design was randomized plot design with three replications. The moisture contents in the amended soils were adjusted to 60% water holding capacity (WHC) and the and the containers were incubated at 20 ± 0,5 $^0$C for 90 days in the dark. The soil moisture was kept at the same level (60% WHC) by adding distilled water at regular intervals throughout the incubation period. Changes in the $C_{mic}$, BSR, $C_{org}$ and $N_{total}$ were determined in the soil and in earthworm cast samples taken in 15, 30, 45, 60, 75 and 90 days after the experiment was conducted.

At the end of the experiment, earthworm casts had higher $C_{mic}$, BSR, $C_{org}$ and $N_{total}$ levels than the surrounding soils at all incubation periods and sewage sludge applications significantly ($P$<0,001). Increases in application doses of sewage sludge caused increases in $C_{mic}$ and BSR, significantly (P<0,001). It was determined that the microbial parameters of soil and earthworm casts were not significantly changed after the 45$^{th}$ and 60$^{th}$ days of the experiment.

**Key words:** sewage sludge, soil, earthworm cast, microbial biomass C, basal respiration

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# Effect of compost application on soil chemical and biological properties under potato crop in the Mantaro Valley - Peru

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## Abstract

The fertilization of potato (*Solanum tuberosum* L.) crop in the Andean region of Peru is strongly dependant on local sources of organic matter. A field experiment was set up to evaluate the effect of the application of six composts on some chemical properties and microbial population of an alluvial soil cultivated with potato in the farm community of Sincos (Junin-Peru). Two crop residues: wheat straw, residue of *Vicia* sp, and a mixture of both residues in proportion 1:1; were composted with and without the addition of wood ash at 0.41% w/w using a mixed farmyard manure. A control without organic matter application was included. Composts were applied at seeding time on plant furrows at a dose of 16.7 t $ha^{-1}$. The contents of total organic C, labile C, extractable P, total N, $NH_4^+$-N, $NO_3^-$-N, populations of total bacteria, actinomycetes and fungi and microbial activity were evaluated in the soil at harvest time using a complete randomized blocks design. All compost applied significantly increased the contents of organic C, extractable P and total N in the soil compared to control. Labile organic C was significantly increased but all treatments except by composted mixed residues without ash. For the content of N-$NO_3^-$; only the compost of mixed residues + ash was similar to control. All composts increased also soil basal respiration and microbial biomass carbon. Composted wheat straw + ash significantly increased soil bacterial population and produced the highest basal respiration rate, followed by compost of the mixture of residues with and without ash. Soil microbial biomass carbon was the highest after application of composted *Vicia* residue + ash.

**Key words:** compost, crop residues, soil microbial population, soil microbial biomass

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# Influence of wood vermicompost on some soil and plant properties of coal mine tailings (Tertiary sand) in Lusatian lignite region (Eastern Germany)

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## Abstract

One of the most negative site effects of open mining in eastern Germany are large areas of post-coal mining dump deposits which have to be reclaimed and restored to the previous use. This study was carried out to evaluate the effect of different application rates of wood vermicompost on soil physiochemical properties and some growth parameters of a *RSM* grass (45% *Festuca ovina duriuscula*, 10% *Festuca rubra commutata*, 15% *Festuca rubra rubra*, 15% *Festuca rubra trichophylla* and 15% *Lolium perenne*,) in tertiary sand substrates. The experiment was carried out as a plastic pot in greenhouse for 42 days. Soil samples were collected from different places at depth (0-30 cm) and then mixed well to make a representative sample of the site. The representative soil sample was mixed in completely randomize design with the wood vermicompost at mixed ratios of 0.0, 3.0, 12.5 and 25.0 % (w/w) and then sowed with *RSM* grass seeds. At the end of experiment the obtained data show that, the physical properties such as water holding capacity (WHC, %), bulk density (BD, g $cm^{-3}$), and total porosity (TP, %) in soil amended with vermicompost were improved. Most soil chemical properties were increased significantly with the increase of vermicompost application rates particularly soil reaction (pH), electrical conductivity (EC, $msd^{-1}$), organic matter content (OM, %), total nitrogen (TN, %), soil buffering capacity and soil available macro-micro nutrients content (N, P, K, Ca, Mg, Cu, Zn, and Mn), except Fe. The soils treated with vermicompost had significantly more potential and effective cation exchange capacity (PCEC, ECEC, cmol $kg^{-1}$) and base saturation (BS, %) in comparison to unamended soil. On the contrary, total exchangeable acidity (TEA) was decreased with the increase of vermicompost rates. Compared with the control treatment, the treated soil with vermicompost had significant increase in grass biomass (fresh and dry matter yield) and macro-micro-nutrients uptake. The positive impact of vermicompost on soil and plant properties could be related to the high quality of vermicompost chemical characteristics like OM, CEC and its ability to increase soil buffering capacity which effect on soil nutrients availability.

**Key words:** open-cast lignite mining, lusatian tertiary sand, soil amelioration, reclamation, recultivation, vermicompost of wood.

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# Effects of 3 different *Streptomyces* spp. isolates on tomato plant growth and root knot nematode (*Meloidogyne arenaria*) (Heteroderidae: Tylenchida: Nematoda)

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## Abstract

Root knot nematodes are commonly founding pests for agricultural areas all over the world. This genus cause approximately 11-60 % reduction in agricultural products for just only Mediterranean countries. Because of this yield loss, management of root knot nematodes has been searched for a long time focusing prevent important yield loss and quality in crops and to keep nematode populations small. Biological control have been advised after having side effects of nematicides on human, animals, nature and ozone layer. With the restrictions on use of MBr and other broad-spectrum nematicides and the absence of resistant cultivars, the industries are in need of economically, biologically and ecologically sustainable alternatives. This study was conducted to determine the relative efficacy of bioagents *Streptomyces* isolates on *M.arenaria* greenhouse population from Samsun. *Streptomyces* were isolated from Nigerian soil on starch-casein agar supplemented cycloheximide (50µgml$^{-1}$), nystatin (50 µg ml$^{-1}$) and rifampicin (0.5 µg ml$^{-1}$), incubated at 28$^{o}$C for 14 days. After purification of the test organisms were identified using poliphasic taxonomic procedures. In a greenhouse experiment, tomato (cv. Falcon) seedlings were inoculated with 0 or 3000 eggs and exposed to *Streptomyces* spore suspensions (0 or 10 ml per plant) in pots containing 300 ml sterilized soils that was sandy clay loam textural structure (62.4 %, 24 %, 13.3 %) in a factorial design. Oxamyl was used for control plots. Six weeks after nematode inoculations, experiments were terminated and roots were washed free of soil then shoot heights, fresh root weights, fresh and dry shoot weighs were determined and root knot index 0 to 5 were rated. Isolate number N1103 was found as phytotoxic (50%) following 37.5% for N2212 and 25% for N2202 under applying soil and rates. For all growth parameters, nematisid applied plants were the highest and followed by non-nematode inoculated plants. Among isolates, N2202 was the most effective on the growth parameters, but all isolates shared same statistical groups. So 3 isolates did not any statistically important positive effects on the plant growth and nematode reproduction as well under these conditions. Different rates and soil types may be emphasis for future aspects.

**Kew words:** Root knot nematodes, *Streptomyces* spp., tomatoes, biological control

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# The knowledge of vegetables farmers protection agriculture that is using techniques in soil sterilization and it's importance in increase production

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## Abstract

The research was amide, cognitive the level of Vegetables farmers knowledge protected agricultural in soil sterilization area and determining the relation between the level of knowledge of vegetables farmers protection agricultural and each of independent factors, age – Agricultural experience, briefing of information sources, participation in agricultural cycles, number of green houses. In addition on diagnosis the Important soil sterilization for vegetables crop. Protected agricultural in increasing production . The middle provinces were chosen to conduct this research, the ratio of %50 was taken from the following provinces (Baghdad, Babylon, Dayla, Karbala and Nf) stratified proportion random sample was chosen from each province with %11 from Vegetable farmers; the sample value reach (65) farmers. The measurement included (21) items to measure the level knowledge of vegetables farmers.

The test included three areas, soil sun sterilization, soil evaporation sterilization, and soil sterilization camycal; the research show of that was low knowledge level for Vegetables farmers in soil sterilization area and that was relation between knowledge level of farmers with all Independent variables , there search recommended that it is very important to increase the knowledge of Vegetables farmers during participation in Extension training specialist in soil sterilization area in addition to using Extension activities that relation in soil sterilization area.

**Key words:** vegetable, soil sterilization, production, agricultural production

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# Effects of long-term organic amendments and mycorrhiza application on nitrate leaching in a clay-loamy soil

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## Abstract

A long-term (1996-2008) field experiment was performed to investigate effect the role of mycorrhizal inoculation and organic fertilizers on nitrate ($NO_3$-N) leaching and porosity in clay-loamy soils of Cukurova Region, located in Eastern Mediterranean. The study consisted of control, mineral fertilizing (300-60-150 kg N-P-K $ha^{-1}$), animal manure (25 ton $ha^{-1}$), compost (25 ton $ha^{-1}$) and mycorrhiza-inoculated compost (10 ton $ha^{-1}$) with three replicates. The effects of long-term mycorrhiza-use, organic and mineral fertilizing on nitrate leaching were statistically significant ($P<0.05$). The effect of manure and compost applications at 0–30 cm on total porosity was similar to each other, and the increase in total porosity was 40% and 42% greater than that of mineral fertilizing and control, respectively. However, soil porosity was not signicantly changed with mineral fertilizer treatment. Mycorrhiza-inoculated compost also increased total porosity by 27% and 29% compared with mineral fertilizing and control, respectively. The results revealed that compost, manure and compost+mycorrhiza applications significantly decreased $NO_3$-N leaching as compared to mineral fertilizing. However, the highest $NO_3$-N leaching among the organic applications occurred in manure application.

**Key words:** organic fertilization, compost, manure, mycorrhizae, nitrate leaching

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# Effect of canopy composition on soil $CO_2$ emission in a mixed spruce-beech forest

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## Abstract

It was hypothesized that respiration of forest soil may be affected by canopy composition. Hence, admixture of trees as a common forest management practice may cause significant change in the carbon cycling. This study was conducted in a mixed spruce-beech stand at Solling forest in central Germany. The canopy cover of the stand was classified in four major canopy classes (pure beech, pure spruce, mixed and gap). To investigate the effect of canopy composition on soil respiration, the area under each canopy class was identified as a sub-plot. Soil respiration in each sub-plot (*n=4*) was measured monthly from Jun 2005 to July 2006. The average rates of soil respiration ranged from 14.8- 97.5 mg $C/m^2/h$. Our results showed significant differences in annual soil respiration between the beech (359 g $C/m^2/year$) and gap (211 g $C/m^2/year$) sub-plots. The estimation of the total below-ground carbon allocation (TBCA) based on a model given by Raich and Nadelhofer (1989) revealed considerably higher root $CO_2$ production in the beech sub-plot (231 g $C/m^2/year$) compare to the gap sub-plot (51 g $C/m^2/year$). The contribution of the root respiration to the total soil respiration was higher in the soil under the beech canopy (59%) compared with the soil in the gap (29%). The findings suggested that the condition under the beech canopy may cause more desirable micro-site for autotrophic respiration and consequently higher $CO_2$ release into the atmosphere.

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# Influence of seed inoculation with *Bradyrhizobium* on yield and growth indices of soybean

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## Abstract

Legume such as soybean could fix ($N_2$) with symbiosis and cooperation with *Rhizobium* bacteria, this natural ability is important for high yield production. In modern agriculture N deficiency is the most limit factor of growing. This trial was an experimental in Qarakheil agricultural research station innorth of Iran in (RCBD) with 3 replication in farm. The treatments consist of N0: control, N1: seed inculcation with *Bradyrhizobium* and N2: 150 Kg/ha Nitrogen (from urea). Urea applied three times before flowering that 1/3 of urea applied before cultivation. There was dimension of any plot concern 5×2 m and 4 soybean's row in per plot. For measuring rates of nutrients in plant's leaves, we carried out sampling in flowering and end of growing time them record the yield. Results showed N2 had significant difference with other treatments in leaf Nitrogen, protein percentage and yield. Highest seed yield was obtained from the application of nitrogen fertilizer (2598 $Kg.ha^{-1}$). The application of nitrogen and sulfur increased number of pot per plant and 1000 seeds weight. The nitrogen treatments increased oil and protein yields of soybean compared to control. Number of seed per pot and oil content of seed were not affected by the nitrogen. the application of nitrogen fertilizer and seed inoculation decreased the concentration of P, Fe, Zn, Mn and Cu in leaf compared to control.

**Key words:** nitrogen, soybean, yield, protein, *bradyrhizobium*

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# Restoration of soil function requires plants, arbuscular mycorrhizal fungi and organic matter

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## Abstract

Lack of soil remediation often limits attempts at restoring degraded ecosystems. Soil aggregate cohesion determines plant root growth, water and mineral uptake as well as overall soil resilience. Soil aggregation is often described as a hierarchy where aggregation is a consequence of the interaction of fine roots, hyphae of mycorrhizal fungi and microbial mucilages that interact with the physical and chemical properties of soil. The model has long-lived and widespread acceptance and is normally experimentally tested by disrupting and dispersing aggregates and characterising the constituents of these end products. Massive soil is the more common starting point when attempting soil remediation for a highly degraded ecosystem. A resilience approach, whereby the ability of soil constituents to create an aggregated porous system from a massive soil is not normally characterised. In the experiments that follow, compost (0, 5, 10 or 20% organic matter) was added to coal mine overburden (spoil) and placed in elongated pots which could be opened lengthwise to allow harvest of an intact core. Plants and arbuscular mycorrhizal (AM) fungi were then added to the amended mine spoil. After 6 months, soil water characteristics, soil aggregate stability by wet sieving and distribution of organic carbon in soil fractions were determined. Soil water characteristic curves were plotted from soil saturation to -60MPa for each of the treatments. Increasing organic matter alone decreased the bulk density the soil and increased the capacity to store water. Addition of plants alone to compost amended spoil slightly increased the capacity of the amended spoil to store water. The presence of AM fungi further increased the volume of pore space. Interpretation of aggregate formation data was complex. Presence of plants alone decreased mean weight diameter (MWD) compared to the controls, whereas presence of plants with their associated AM fungi increased MWD. We hypothesise that the decrease in MWD in the plant without AM treatments may be indicative of increased breakdown of organic matter in the plant root rhizosphere. The absence of hyphae of AM fungi in the plant only treatment may be limiting aggregate formation owing to the lack of enmeshment or the possible production of a mucilage by the fungi. Maximisation of functional complexity of spoil required approximately 3% organic carbon, plants and the presence of AM fungi. Successful remediation of soil requires consideration of the complexity of the plant/AM fungus/soil organic matter interaction for each soil type and climate.

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# Effect of zinc contamination with and without sewage sludge on soil dehydrogenase activity

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## Abstract

Heavy metal contamination of soil has been recognized as a major factor impeding soil microbial process. From this perspective, monitoring soil quality by means of biological indices can be of help for the management and sustainability of soils that received metal contamination. In this study, changes produced in dehydrogenase activity (DHA) of a loam textured soil (Typic Udifluvent) by the addition of zinc as $ZnSO_4.7H_2O$ with and without sewage sludge (pH 6.65, C/N 13, 647 mg Zn $kg^{-1}$) at different doses (0, 75, 150, 300, 600 and 1200 mg $kg^{-1}$), were evaluated during a year under field conditions in Bafra region, Samsun. Throughout the experiments carried out for a period of a year using a randomized block design, changes in the DHA in soil samples were collected each month from plots receiving single Zn treated without sewage sludge (SS) plots and Zn treated with SS plots.

The results showed that considerable variations in DHA were found for different doses of Zn and SS treatment at different sampling dates. Statistically significant variations were found in DHA at successive doses of Zn application (with and without SS) and sampling dates ($P<0,01$). The DHA level in Zn added with SS treatment in plots were higher than in Zn added without SS treatment in plots at all sampling dates and application doses of Zn. In successive Zn added plots without SS, Zn doses $\geq$ 300 mg $kg^{-1}$ decreased DHA level in soils, while the reverse was the case at a level of 75 and 150 mg $kg^{-1}$ compared to the control plots. In contrast SS successive Zn added with, DHA levels in soils was lower than the control treatment. The DHA in soils were also affected by sampling dates. The analysis of variance of the results obtained in our experiment on the periodic sampling dates showed that all factors (SS, Zn application doses and their interaction) significantly influenced DHA. The highest DHA levels in soils were determined in August.

**Key words:** sewage sludge, zinc, pollution, soil, dehydrogenase activity

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# Litterfall deposition and nutrient return through leaves litter along an altitudinal gradient, Northeastern Mexico

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## Abstract

Litterfall and litter decomposition are key fundamental processes in nutrient cycling of forest ecosystems. In northeastern Mexico, however, few studies have addressed the spatial and temporal patterns of litterfall and nutrient deposition. Thus, the aim of this study was to determine the litterfall production and macronutrients (Ca, K, Mg, N, and P) deposition through leaves litter along an altitudinal gradient in northeastern Mexico. Litter constituents (leaves, reproductive structures (flowers, fruits and seeds), twigs, and miscellaneous (unidentified residues, fine plant material such as bark, insect bodies and feces, among others) were measured at 15-day intervals between December 21, 2006 and December 20, 2007 in four experimental sites: one site was located in a pine (*Pinus pseudostrobus* Lindl.) forest (Bosque Escuela at 1600 m of altitude), second in the ecotone of a *Quercus* spp. forest and the Tamaulipan thornscrub (Crucitas at 550 m), third and fourth sites were in the Tamaulipan thornscrub (Campus at 350 m and Cascajoso at 300 m). Each site had a plot (50 m x 50 m) in which ten litter traps (1.0 $m^2$ each) were used for collections. Since for most sampling dates and litter constituents data had not equality of variances, even when data was logarithmically transformed, thus, the Kruskal-Wallis non parametric test was employed to detect significant differences among sites at each sampling date. Total annual litterfall deposition was 4407, 7397, 6304 and 6527 kg $ha^{-2}$ $y^{-1}$ for Bosque Escuela, Crucitas, Campus and Cascajoso, respectively. Of total annual litter production, leaves were higher varying from 74% (Bosque Escuela) to 86% (Cascajoso) followed by twigs from 4% (Cascajoso) to 14% (Crucitas), reproductive structures from 6% (Bosque Escuela) to 10% (Crucitas), and miscellaneous liiterfall from <1% (Campus) to 12% (Bosque Escuela). The Ca annual deposition was significantly higher in Cascajoso (232.7 kg $ha^{-2}$ $y^{-1}$) followed by Campus (182.3), Crucitas (130.5) and Bosque Escuela (30.3); the K (37.5, 32.5, 24.8, 7.2, respectively); Mg (22.6, 17.7, 13.7, 4.5, respectively) followed the same pattern as Ca. However, N was higher in Campus (85.8) followed by Crucitas (85.1), Cascajoso (68.3) and Bosque Escuela (18.3). The P was higher in Campus and Crucitas (4.0) followed by Cascajoso (3.4) and Bosque Escuela (1.4). Ca, K, Mg, N, and P nutrient-use efficiency values in leaf litter were higher in Bosque Escuela, while lower figures were acquired in Cascajoso and Crucitas sites.

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# Symbiotic potential effect of arbuscular mycorrhizal fungi on growth and nutrient uptake in basil plants

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## Abstract

In order to evaluation of mycorrhizal fungi effects on growth parameters as well as nutrients uptake in basil (*Ocimum basilicum*), this study was conducted in complete randomized design with 4 treatments and 4 replications. Fungi inoculation treatments consisted: $M_f$ *(Glomus fasciculatum)*, $M_e$ *(Glomus etonicatum)*, $M_i$ *(Glomus intraradices*), and $M_b$ (no-inoculation). The results showed mycorrhizal plants significantly had higher shoot and root dry weight, leaf area, plant height, numbers of lateral branches, numbers of leaves, as well as N, P, K, Ca, Fe, Zn, Cu and Mn concentration compared with non-inoculated plants. Furthermore, mean comparisons showed in most measured growth properties, mycorrhizal plants significantly had higher levels with respect to control plants. Among studied fungus species, inoculation of basil with $M_f$ resulted in significant different in growth indices and nutrition status in comparison with other studied species. Colonization percent of basil roots with *G. fasiculatum* was higher than other species, which may indicate effective symbiotic potential of this strain with basil roots.

**Key words:** arbuscular mycorrhizal, basil, root colonization, yield

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# Determination of the hydrocarbon-degrading metabolic capabilities of bacterial isolates from Turkey

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## Abstract

Aim of this study is to evaluate different bioremediation approaches against to soil pollution due to crude oil contaminations. Three main treatments including, bioaugmentation, biostimulation and combined treatment were tested in a laboratory condition using crude oil contaminated soil.

In the case of bioaugmentation, 33 bacterial strains isolated from oil contaminated soil obtained from Adana, Batman and Adıyaman were preselected in biodegradation studies and then inoculated to oil polluted agricultural soils. 6 bacteria *(Pseudomons- aeruginosa, Pseudomonas putida biotype A, Citrobacter-amalonaticus-GC subgroup A, Acinetobacter-genomospecies)* were selected according to their improvement capacity in crude oil contaminated environment and high capability of crude oil degradation. Under the biostimulation treatments, forms of a humic substance were applied to the oil polluted soil while in the combined treatments organic substance and bacterial mixture were transversely applied to polluted soil. In all cases, the bioremediation efficiency of the treatments was evaluated by quantitative hydrocarbon analysis in a 120 days incubation period.

The results showed that the highest oil degradation (56%) has occurred in bioaugmented soils. Amendment of different organic matter info oil polluted soils and biological inoculation resulted in 18% petrol degradation. Compared to individual bioremediation treatments, the combined treatments exhibited lower degradation performance as 30 %.

In the light of these results, it has been concluded that well documented bioaugmentation approach provided the best performances. Further study under exsitu conditions may be necessary to determine true biodegradation potential of bacterial mixture tested in this study.

**Key words:** soil, crude oil, soil pollution, bacteria, bioremediation

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# The effect of microbial sulfur fertilizer on nutrient uptake and yield of soybeans in a calcareous soil

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## Abstract

There are many problems in yield production in calcic soil. Main problem in these soils is high concentration of $Ca^{+2}$ and high pH. There is a direct relationship among phosphorus absorption and micronutrients and also to high pH. Usually in soils micro nutrients will be fixed and unavailable for plants absorption. Sulfur oxidation in soil produce sulfur acid and decrease soil pH and also cause more absorption of other nutrients indirectly. Trial has carried out an experimental in Qarakheil agricultural research station in (RCBD) with calcic soil with 3 levels of sulfur in 3 replications in a farm. Elemental sulfur in three levels (S0, S1.5, and S3) as zero, 1.5 and 3 t/ha a long with *Thiobacillus* inoculation. There was dimension of any plot concern 5×2 m and 4 soybean's row in per plot. For measuring rates of nutrients in plant's leaves, we carried out sampling in flowering. Results showed consumption of sulfur had difference on yield and concentration of P in leaf significantly. The most amount of yield (2429 $Kg.ha^{-1}$) and concentration of P (0.58 %) were from 3 t/ha sulfur. The sulfur treatments increased oil and protein yields of soybean compared to control. Applying sulfur to soil increased the concentrations of K, P, Fe, Zn, Mn and Cu in leaf significantly The concentration of Fe, Mn, Zn and electrical conductivity of soil increased but pH concentration of soil decreased when sulfur was applied to soil.

**Key words:** sulfur, soybean, *Thiobacillus*, concentration, Fe, Zn, Cu

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# Phosphorus effects on $N_2O$ and NO emissions from *Acacia mangium* soil

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## Abstract

An incubation experiment was conducted to examine the effects of phosphorus (P) application on $N_2O$ and NO emissions from soils of an *Acacia mangium* plantation in Indonesia. The soils were incubated for 30 d with and without adding P ($Ca(H_2PO_4)_2$; 2 mg P g· $soil^{-1}$) after adjusting water-filled pore space (WFPS) to 75% or 100%. $N_2O$/NO ratio in both 75% and 100% WFPS in control soils were higher than 1, suggesting that $N_2O$ and NO were emitted mainly from denitrifying bacteria. P addition increased $N_2O$ emission under both WFPS conditions and NO emission under 75% WFPS, which was attributed to two reasons. Firstly, the stimulation of $O_2$ consumption by general heterotrophic activity, which was suggested by significant increase in $CO_2$ production in P treated soils, promoted developing stronger anaerobic conditions required for denitrification. Secondly, P addition could also have relieved the P shortage for denitrifying bacteria, producing $N_2O$ and NO. Our results suggest the application of P fertilizer has a potential to stimulate $N_2O$ and NO emissions from *Acacia mangium* plantation at least when soils are under relatively wet conditions. The results also suggest that P limitation in tropical soils might be suppressing the emissions of $N_2O$ and NO, because it limits the activity of nitrification and/or denitrification.

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# Effects of municipal waste treatment sludge and nitrogen applications on some soil enzyme activities

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## Abstract

The study was carried out in Sincan-Ankara under dry field conditions growing barley for two years to assess the effect of municipal waste treatment sludge and nitrogenous fertilizer on soil enzyme activities (catalase, acid phosphatase, alkaline phosphatase, β-glucosidase activity) for two different times (spring-fall) during two years. Six doses of sludge (0, 300, 600, 1200, 2400 ve 4800 kg $da^{-1}$ dry matter) and 4 doses of fertilizer (0, 3, 6 ve 9 kg $da^{-1}$ active ingredient) were used to the study.

The activities of Catalase enzyme showed significant differences ($p<0,01$). The interaction between catalase enyzme and sludge were found significant, while the interaction with the different levels of nitrogen applications not significant. The interactions between years, stages in years, levels of nitrogen and levels of sludge were not significant for β-glucosidase activity. The interactions between years and stages in years were significant for acid phosphatase and also the interaction between years and levels of sludge was important for alkaline phosphatase enzyme.

**Key words:** waste treatment sludge, nitrogenous fertilizer, calcareous soil, barley, soil enzymes

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# Plant growth-promoting microorganisms effect on Cd Uptake by *Zea Mays* in a contaminated soil

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## Abstract

Heavy metal contaminations are very dangerous for environment and human health. One of management strategies is using microorganism potential in particular plant-growth promoting rhizobacteria (pgpr) and mycorrhizal fungi in phytoremediation processes. An experiment was done as factorial design with four Cd levels (mg $kg^{-1}$) $Cd_0$, $Cd_{10}$, $Cd_{20}$ and $Cd_{30}$ and four microbial inoculation including C (no inoculation), B (pgpr), M (mycorrhiza) and BF (pgpr+ Mycorrhiza). Corn plants (*Zea mays*) were cultivated in pots at greenhouse condition. Pgpr and mycorrhiza inoculants were mixtures of fluorescent *Pseudomonas* species and *Glomus mosseae*, respectively. After 3 months plants were harvested, shoots and roots separately weighed and dried. Growth parameters and Cd concentration was determined in different parts of plants. Analysis of variances showed the different Cd levels and microbial inoculations significantly affected determined indices. High concentration of Cd decreased shoot dry weight (12.9%) and plant height (19.4%). Furthermore, microbial inoculation increased shoot dry weight (212 %) and plant height (83%) compared to sterile condition. Among microbial treatments, pgpr inoculation had highest effect on those indices. Microbial inoculation resulted in increasing Cd uptake and accumulation with comparison to sterile pots. High accumulation of Cd in corn plants were seen in pgpr inoculation. It is concluded that in plant-microorganism system for co-remediation of Cd, pgpr was effective than mycorrhizal fungi.

**Key words:** pgpr, mycorrhiza, cadmium, corn, phytoremediation

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# Saprotrophic fungi aggregate soil

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## Abstract

Aggregation contributes important functions to soil. Fungi contribute to the development of aggregates, but the precise role of each major group of fungi is unclear. Soil aggregation is often described as a hierarchy where aggregation is a consequence of the interaction of fine roots, hyphae of mycorrhizal fungi and microbial mucilage that interact with the physical and chemical properties of soil. The possible contribution of saprotrophic fungi, which gain their nutrition from the breakdown of organic matter, remains poorly understood. Saprotrophic fungi may contribute mucilage to the polymer pool and / or enmesh small soil particles and aggregates via their hyphae. 87 isolates of Trichocomaceae (*Penicillium* spp. & *Aspergillus* spp.) were isolated from soil. The isolates were grown on coal mine overburden amended with nutrients for 28 days to quantify their ability to create water stable aggregates (WSA). Changes in aggregation were determined after wet sieving by changes in mean weight diameter (MWD). The ability to enmesh soil via their hyphae varied both within and across species. Hyphal growth on agar was unrelated to enmeshment. A subsequent experiment examined the longevity of aggregation when individual fungi were grown on compost. The data clearly indicate that a few saprotrophic fungi potentially aggregate spoil through enmeshment of soil by their hyphae and that this aggregation is long-lived. A second experiment quantified the ability of the isolates to create WSA through production of mucilage alone. The results again were isolate specific: only one isolate significantly increasing WSA. Importantly, saprotrophic fungi vary considerably both within and across species in their enmeshing and mucilage production capabilities in soil. This property appears to be much rarer than previously thought.

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# Changes of soil microbial biomass C and basal soil respiration in different land use and land cover

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## Abstract

Soil microbial biomass (Cmic) and basal soil respiration (BSR) are being increasingly recognized as a sensitive indicator of soil quality. Theirs knowledge are fundamental for sustainable environmental management. This study aimed to determine the impact of different land uses (forest, pasture, and agricultural lands) on Cmic and BSR. In this study, the changes in the properties of four different pedons classified as Lithic Xerorthent, Typic Dystroxerept and Typic Haploxerept located on three adjacent land use types which are native forest, pasture and cultivated fields include some physico-chemical properties (texture, pH, EC, lime content and organic matter), Cmic and BSR. It was determined that Cmic and BSR of the soils varied from 29 – 786 mg C $kg^{-1}$and 67 - 2198 µg $CO_2$-C $g^{-1}$, respectively. In addition, it was found that changes of land use and land cover associated with organic matter content can alter the Cmic and BSR within the soil profile.It was concluded that Cmic and BSR decreased through profile depth, and Cmic and BSR were shown to be significantly correlated to the physico-chemical properties of the soil. Present study clearly shows that land use has a significant effect Cmic and BSR in soil by altering natural soil characteristics under the same ecological conditions.

**Key words:** land use, microbial biomass, basal soil respiration, profile, organic matter

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# Investigation of morphological characteristics under effect of mycorrhizal fungus different strains in barely (*Hordeum vulgar*e L.)

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## Abstract

Arbuscular mycorrhizal (AM) fungi are commonly occurring soil microbes whose association with roots can have wide-ranging effects on growth of the host plant. In a pot experiment five treatments mycorrhizal strains [*Glomus mosseae*, *G. etanicatum*, *G. intraradices*, combination of some strains (*G. mosseae*, *Gigaspora hartiga*, *G. fasciculatum*) and control] with four replications in a complete randomized design were investigated. All strains were produced by pot culture method before main trial. A sample of collected loamy, were used for experiment. Each pot soil inoculated with strains. After seedling emergence five plants were remained in pot. Morphological characteristics such as, plant height, stem diameter, tiller and spike number per plant, length, width and flag leaf area, plant leaf area and spike length were measured. The results of analysis of variance showed that mycorrhizal strains had no significant effect on plant height, tiller number per plant, length, width, flag leaf area and spike length. Duncan's test showed that *G. mosseae* strain produced the highest amount of plant leaf area (699.2 $cm^2$) and spike number ($\alpha$=0.05). There is a lot of documents that show mycorrhizae can alter root morphology and structure of inoculated plants, but there isn't clear reports about morphological traits. Effect of mycorrhizae on enhancement of dry matter accumulation maybe arise higher leaf area.

**Key words :** mycorrhizae, morphological characteristics, barely

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# Vermicompost promotes plant growth in cucumber seedlings

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## Abstract

Along with the increasing concern on environmental problems caused by intensive use of agro-chemicals, application of organic soil amendments such as compost products derived from conventional aerobic composting (thermopillic) or vermicomposting (mezophillic) techniques have received tremendous attention as alternative organic fertilizers and biological control agents. Vermicomposting, a sound environmentally friendly organic waste management technique, provides a valuable end product called vermicast (vermicompost) consisting of readily available plant nutrients at very high levels. In the present study, potential plant growth promoting effect of vermicompost, produced from agricultural wastes consisting of cattle manure, tree bark (Salix spp.), potato culls, and apples was assayed on cucumber (*Cucumis sativus* cv. Cevher) seedlings with respect to *Trichoderma harzianum*. Growth promoting effect was assessed at the rates of 10, 20 and 30% (v/v) vermicompost either blended with *T. harzianum* Rifai (KRL-AG2) or not, amended with growth media consisting of sand and garden soil (1:1, v/v). Two bioassays were carried out with this growth media and controls. Some physical, chemical, and biological properties of vermicompost were also analyzed. Growth promoting effect was evaluated eight weeks after cucumber seedling transplantation using the growth parameters as fresh and dry weights and lengths of the seedlings. The data were analyzed by ANOVA then the relationship between vermicompost amendment rates and growth parameters were also evaluated by regression technique. Vermicompost not blended with *T. harzianum* improved plant growth better than that blended with *T. harzianum*. While pot amendment rate of 10% promoted root growth but the shoot, the amendment rate of 20% significantly improved both root and shoot development. Growth promoting effect was increased in proportion to the growth media amendment rate of vermicompost up to 30%. Pot amendment rate of 30% expressed a few slight growth retardation symptoms. These symptoms were attributed to salt stress derived from high electrical conductivity of the vermicompost.

**Key words :** growth effect, organic based-amendments, vermicomposting, vermicast, container media, compost, plant, soil

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# Impact of soil quality on the distribution of terrestrial isopod in some Tunisian wetlands

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## Abstract

No studies in Tunisia have focusing on an analysis of oniscidean diversity in wetlands. To improve our knowledge on the species occupying this type of habitat, field work was conducted during spring 2008 in 18 wetlands (3 dams, 4 hill reservoirs, 7 lagoons, 2 sebkhas and 2 rivers) located in the north of the Tunisian dorsal.
Isopods were collected by hand each time with respect to the same sampling effort.
At the laboratory, Isopods are identified, counted and sexed. Physico-chemical analyses were performed from soil sampled in each site.
The results reveal the presence of 19 terrestrial isopods species belonging to 10 families. *Chaetophiloscia cellaria* and *Porcellio laevis* are the most abundant species; their relative abundance is respectively equal to 29.5 and 23.4 %. The species richness varied from 8 in both lagoons of Ghar El Meleh and Bizerte to 1 in some hill reservoirs. *Chaetophiloscia cellaria, Leptotrichus panzeri, Porcellio variabilis* and *Porcellio laevis* tolerate changes in salinity up to 35.4 g/kg, whereas others, such as *Armadillidium sulcatum* and *Armadillo officinalis*, were collected in stations where soil salinity does not exceed 8.5 g/kg.
Among environmontal factors, this study shows the effect of soil salinity on the distribution of terrestrial isopods. Other factors, such as relative humidity, conductivity and calcium content of the soil, will be discussed in order to define the preferendum of each species.
**Key words:** distribution, terrestrial isopod, wetland, soil salinity

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# Enzyme and earthworm activities during vermicomposting in sewage sludge

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## Abstract

The aim of this study was to evaluate the enzyme activities such as urease, phosphatase and arylsulphatase during vermicomposting of sewage sludge (SS) with hazelnut husk (HH) and cow manure (CM) by earthworm *Eisenia fetida*. The growth and reproduction of *E. fetida* were monitored in a range of different feed mixtures for 90 days in the laboratory under controlled experimental conditions at 25 ± 0.5 $^0$C. In the study two investigated approaches were: (1) growth and reproduction of *E. fetida* up to 90 days in different feed mixtures and; (2) evaluation of vermicomposting of SS, HH and CM mixtures after 90 days in terms of enzyme activities of the products. The maximum earthworm biomass was recorded in 20% SS +40% HH + 40% CM feed mixtures. The results indicated that extracelular enzyme activities significantly increased with increasing vermicomposting time. Our trials demonstrated vermicomposting as an alternative technology for the recycling and environmentally safe disposal/management of SS using an epigeic earthworm *E. fetida* if mixed with HH and CM

**Key words:** vermicompost, *Eisenia fetida*, sewage sludge, enzyme activity, earthworm growth and reproduction

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# Effect of different enriched vermicompost with iron and zinc on dry weight and germination percentage of corn

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## Abstract

Due to high pH and calcium carbonate content of soils, lack of sufficient organic matter, presence of bicarbonate and carbonate ions in irrigation water and application of huge amounts of nitrogen and phosphorus fertilizer, deficiency of microelements is very common in soils of Iran.
Different methods have been suggested to correct deficiency of micronutrients. Foliar application of microelements, increase in organic matter content of soils, and soil application of enriched vermicompost have been suggested as effective methods in this respect. To study the effect of different vermicomposts, enriched with Zinc and Iron, on biomass dry weight and seed germination of corn, a pot experiment with ten treatments was conducted using a complete block design and tree replications. In this experiment, nine different vermicomposts including vermicomposted rice hull chicken manure, rice hull cow manure and cow manure and zinc and iron enriched forms of these three vermicomposts were used. The nitrogen content of all vermicomposts equalized by addition of urea and control also received the same amount of nitrogen that had other treatments. The results of analysis of variance showed that there are significant differences between treatments with respect to biomass dry weight of corn. The highest dry weight for corn biomass was measured in treatment with vermicomposted rice hull chicken manure enriched with zinc. In contrast, the lowest dry weight for corn biomass was observed in control. Different vermoicomposts had significant effects on seed germination of corn. Application of vermicomposts improved seed germination of corn and all treatments had higher seed germination percentages than the control. The highest seed germination percentage was observed in the treatment with vermicomposted rice hull cow manure enriched with iron.
**Key words:** vermicompost, enriched, yield, germination percentage, dry weight plant

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# Soil carbon sequestration and biodiversity reconstruction in rehabilitated coal mine spoil in a dry tropical region, India: A case study

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## Abstract

Accumulation of significant C stock in redeveloping soils of mine spoil depends upon the quality and rapidity of biodiversity reconstruction and establishing young native woody plant species that could be able to develop a reliable forest. Evidences from a number of researches conducted on the same or similar habitats in the tropics reported that developing forest on any particular degraded ecosystems play a significant role in mitigating the effect of global climate change by carbon sequestration. However, restructuring of vegetation on such degraded ecosystems is not an easy task. It needs careful scientific consideration prior applying restoration principles. Present study was conducted on a degraded ecosystem (coal mine spoil) in a dry tropical region of India where mining is one of the serious problem, degrading precious forests with unprecedented rates. Mining operation not only degrade the forest cover even degrade the soil composition. Thus, degraded soils have no ability to sequester essential nutrients (C, N and P) for vegetation development because soil-plant relationships and nutrient circuit in the soil medium has been damaged. Hence, soil restoration is a really challenging ecological problem; moreover, their recovery into previous version by natural succession is very slow. Therefore, biological soil restoration by establishing desirable plant species is cost-effective and more stable technique than physical and chemical rehabilitation procedure. We selected four woody species which were indigenous and hard in nature; of which two of them (*Albizia lebbeck* and *Albizia procera*) were leguminous tree and short stature in size, while remaining (*Tectona grandis* and *Dendrocalamus strictus*) species were non-leguminous in nature. *T. grandis* is a versatile tree species possessing high economic importance in terms of quality product wood, whereas *D. strictus* is a fast growing woody grass species also possessing socio-economic values. The objective of the present study was to quantify biodiversity recruitment under plantation plots, and to estimate biomass, net primary production (NPP) and carbon cycling, stock in planted species and their sequestration in redeveloping soils of mine spoil followed by time. Results indicated that influence of these plantations on soil redevelopment in terms of accumulation of soil organic C and their sequestration in redeveloping soil was more pronounced. Recruitment of plant biodiversity among planted plots was significantly related with soil carbon sequestration with plantation age confirming accretion of carbon and positive direction of soil redevelopment. Furthermore, redevelopment of soil biological fertility on mine spoil was strongly integrated with biodiversity development and carbon sequestration in soil strongly supports that vegetation development is a strong conduit of carbon sequestration even in damaged ecosystems.

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# Microbial sulfur oxidation effect on micronutrients availability of municipal compost in wheat

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## Abstract

Joint application of municipal solid waste compost and sulfur may reduce rhizosphere pH and increase availability of phosphorous and some micronutrients in soil. This study was aimed to investigate the impact of supplemented compost with sulfur on phosphorous, Iron, Zinc, Manganese, and Copper availability in soil. A factorial completely randomized design with wheat (*Triticum aestivum* L. CV. Alvand) was established in the greenhouse, having two main factors including compost and elemental sulfur with four replicates. The compost treatments were consisted of 0, 50 and 100 ton/ha denoted as $C_o$, $C_l$ and $C_2$, respectively. The elemental sulfur including 0, 500, 1000 and 2000 kg/ha applications represented as So, $S_l$, $S_2$ and $S_3$, respectively. loamy sand soil samples collected from the depth of 0-30 cm, powdered compost and powdered sulfur were air dried and passed through the 4-mm, 1-mm and 100 µm sieves respectively. Compost and sulfur contents were mixed with soil filled in plastic pots. wheat seeds were sown in pots and after 75 days of the growth period crops were harvested and Zn, Fe, Cu and Mn concentrations in crop extracts were measured by atomic absorption system of Perkin-Elmer 3110 model. In addition, P was measured by chlorimetric method as Olsen P. The results indicated that the shoot and root growth as well as nutrients uptake are increased by increasing compost content. However, in most cases there was not a significant difference between $C_1$ and $C_2$. The increasing of sulfur content up to 1000Kg/ha, caused a significant increase in wheat root and shoot growth as well as nutrient uptake. But they were reduced by increasing sulfur level from $S_2$ to $S_3$. It can be concluded that application of 50 ton/ha compost and 1000 kg/ha of elemental sulfur can improve wheat growth and nutrients uptake from municipal compost.

**Key words:** microbial sulfur oxidation, municipal compost, micronutrients, phosphorous, wheat

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# Effect of MSW compost on microbiological and biochemical saline Sebkha soil quality indicators

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## Abstract

A laboratory incubation study was conducted to evaluate the effect of municipal solid waste compost (MSWC) as a soil amendment on soil quality indicators, such as microbial biomass, and their activities. MSWC was applied to saline sebkha soil at the rates of 0, 18 and 36 ml 100 g.Kg-1 soil (corresponding to a field rate of 0, 40, 80 and 120t.ha$^{-1}$. Microbial biomass-C (MBC), carbohydrates, TOC total organic carbon, urease, alkaline phosphatase, and β-glycosidase activities in soil were analyzed following 14, 30 and 50 days of incubation. The parameters studied were significantly temporary and permanent changes in several biochemical soil properties occurred following MSWC application, thus being these properties varied in sensitivity to the applied disturbance. A sudden increase of total organic C and microbial biomass carbon (at 14 day incubation) of MSWC amended soils occurred. In comparison with control oxidoreductase enzymes, such dehydrogenase and catalase in sebkha soil was significantly enhanced by the added MSW compost at doses C40, C80 and C120 for the first period T1 by (116, 124, and 128%) and (113, 133 and 102%) respectively (no amendment) the values of both activity catalase and dehydrogenase were always greater in the soils amended with compost than control indicating an increase in the microbial metabolism in the soil as a result of the mineralization of biodegradable C fractions contained in the amendment. Whereas phosphatase activity did not show significant differences at three times of incubation between doses MSWC treated soils. C40 and C80 increased significantly (0.05) soil β-glycosidase at all time of incubation, in contrast C120 had the lowest values of this activity. Overall, our results have shown that the addition of MSWC to sebkha soil can improve soil quality, increasing the organic matter content of degraded soils and improving soil biochemical and biologic properties. However, the wide variety of substances such heavy metals and other potential pollutants in MSWC limits the use of these residues in compost. Consequently, there must be a quality control of uses of these organic amendments.

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# Isolation, characterisation and identification of native *Azotobacter* spp. strains

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## Abstract

In this research, 50 soil samples were collected from ecologically different provinces in 9 country in Turkey, for isolation of the indigenous *Azotobacter chroococcum* strains. Fifty-five like *A. chroococcum* strains were isolated on Ashby agar after incubated for 3 days at 30 ºC. The isolated strains were maintained on Ashby agar slopes and mycelial fragment in glycerol (25% v/v) at -25 ºC.

The isolated 55 indigenous *A.chroococcum* strains were tested for nitrogen fixation capability into Ashby broth after 72 h at 30 ºC and three soil samples with different texture after 8 weeks. The highest N fixed 10 isolates and the type strain of the *A. chroococcum* Beijerinck 1901 were examined on the field and greenhouse conditions for determine efect of the plantal productivies. The selected indigenous *A. chroococcum* and the related type strains were also tested for ability to use sole carbon sources for energy and growth.

The isolate strains identified based on 16S rRNA gene sequencing. Phylogenetic dendograms of 16S rRNA sequence analysis were made using the least-squares, maximum-parsimony and neighbour-joining algorithms.

**Key words :** *A.chroococcum*, N fixation, identification, soil

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# Assessment of earthworm biomass during vermicomposting process of various organic materials

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## Abstract

To evaluate the production biomass earthworm in two different periods in bed during the "worm composting organic materials being tested in a randomized complete block design with 8 treatments and three replications was carried out. Treatments include use of organic matter including manure + rice shell, cotton, cow manure and rice crust were any amount of organic matter above 2 kg wooden box and put each of the same amount of organic matter in earthworm approximately 5 g weight was added. Analysis of variance showed that increasing the "worm composting period to two months in the making of" worm composting cotton, rice crust and the crust of rice + earth mite manure weight and their average weight increased significantly after But it dropped the "worm compost manure to three months after making" worm compost earth mite total weight in each treatment was significantly increased. But the average earthworm weight increased to two months and after three months fell. Vermicompost among various "worm compost manure and cow manure + rice crust highest total weight of earthworm were having. Lowest total worm weight "worm compost produced in skin was rice. Between "worm composting various" worms composting cotton highest average weight earthworm had and groom "worm composting crust rice the lowest average weight earthworm ranked. Maximum and minimum total weight earthworm produced compost manure "worm" worm compost quarterly rice crust was two and three-month average highest and lowest weight earthworm treatment "worm compost and" worm composting cotton quarter two and three-month rice crust was observed.

**Key words:** organic matter, vermicomposting, earthworm, total weight, average weight

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# Isolation and characterization of metal tolerant BRB from serpentine and mine soils in Turkey

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## Abstract

The function of hyperaccumulation is relevant not only to the plant, but also to the interactions between plant roots and beneficial rhizosphere bacteria (BRB) that play a significant role on plant growth in serpentine soils by various mechanisms. Hence, isolation of the indigenous and stress-adapted BRB from serpentine soils has a great potential serving as a potential biotechnological tool for inoculation of plants for the successful restoration of metal contaminated ecosystems. To the best of our knowledge, despite the number of studies describing metal hyperaccumulating plants and their associated bacteria, there is no information on BRB potential of Turkish serpentine soils in the literature. Therefore, in the present study, we isolated rhizosphere bacteria from serpentine soils and mining areas that are naturally polluted with high levels of heavy metals including Ni, Cd, Pb and Zn. Our aim is to highlight the diversity of BRB and their metal tolerance-resistance-mobilization characteristics that may have significant potential in phytoremediation of anthropogenically metal-contaminated soils in the future. Field surveys were performed on serpentine soils of Anatolia, characterized by high contents of heavy metals and low levels of essential nutrients. 243 locations were visited to collect soil and plant samples in the Central, Marmara, Mediterranean and Aegean Regions of Anatolia from the flowering stage in Spring to early Summer of 2007 and analyzed for their natural Ni-Cd contents. In order to obtain available rhizosphere conditions for BRB isolation, the plants with highest Ni (*Alyssum caricum, Alyssum peltarioides, Alyssum pateri* and *Isatis pinnatiloba*) and Cd (*Alyssum filiforme*, *Thlaspi oxyceras* and *Silene aegyptiaca)* levels were grown in two groups of three different soils with different Ni (Ni1; 143,35ppm, N2; 105,40ppm and Ni3; 75,68 ) and Cd contents (Cd1; 38,88 Cd2; 14,49 Cd3; 14,11) in a 6 months greenhouse-pot experiment. We isolated over 320 bacteria from rhizosphere soil samples collected in the initial, middle and end stages. Microbial identification was performed by BIOLOG and MIDI Systems. To discriminate BRB characteristic, 40 of the isolates, which were able to be isolated for all sampling stages and identified with a similarity index value over 50%, was taken to metal resistance test. The resistance of each isolate to Ni, Cd and additionally Pb and Zn was measured as minimal inhibitory concentrations (MIC) over plate and tube dilution methods in a concentration range between 50-2000ppm. The results showed that majority of the isolates were able to survive in higher concentrations of Ni-Cd-Pb-Zn. Four isolates from serpentine and five isolates from mine soils were resistant even at a level of 2000ppm Ni and Cd. More interestingly two isolates identified from N1 were able to tolerate 2000ppm of all heavy metals tested.

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# Effect of compost application on soil chemical and biological properties under potato crop in the Mantaro Valley - Peru

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## Abstract

The fertilization of potato (*Solanum tuberosum* L.) crop in the Andean region of Peru is strongly dependant on local sources of organic matter. A field experiment was set up to evaluate the effect of the application of six composts on some chemical properties and microbial population of an alluvial soil cultivated with potato in the farm community of Sincos (Junin-Peru). Two crop residues: wheat straw, residue of *Vicia* sp, and a mixture of both residues in proportion 1:1; were composted with and without the addition of wood ash at 0.41% w/w using a mixed farmyard manure. A control without organic matter application was included. Composts were applied at seeding time on plant furrows at a dose of 16.7 t $ha^{-1}$. The contents of total organic C, labile C, extractable P, total N, $NH_4^+$-N, $NO_3^-$-N, populations of total bacteria, actinomycetes and fungi and microbial activity were evaluated in the soil at harvest time using a complete randomized blocks design. All compost applied significantly increased the contents of organic C, extractable P and total N in the soil compared to control. Labile organic C was significantly increased but all treatments except by composted mixed residues without ash. For the content of N-$NO_3^-$; only the compost of mixed residues + ash was similar to control. All composts increased also soil basal respiration and microbial biomass carbon. Composted wheat straw + ash significantly increased soil bacterial population and produced the highest basal respiration rate, followed by compost of the mixture of residues with and without ash. Soil microbial biomass carbon was the highest after application of composted *Vicia* residue + ash.

**Key words:** compost, crop residues, soil microbial population, soil microbial biomass.

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# Emissions of Nitrous oxide from arable soils: effects of tillage reduced N input and climate change

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## Abstract

Nitrous oxide ($N_2O$) flux measurements from an Irish spring barley field managed under conventional and reduced tillage and different N fertilizer rates at the Teagasc Oak Park Research Centre were made for two consecutive seasons. The aims were to investigate the efficacy of reduced tillage, reduced N fertilizer and climate change on $N_2O$ fluxes and emission factors and to study the relationship between crop yield and N-induced fluxes of $N_2O$. The soil is a sandy loam with a pH of 7.4 and organic carbon and nitrogen content at 15 cm of 19 and 1.9 g $kg^{-1}$ dry soil, respectively. Three climate scenarios, a baseline of measured climatic data and a high and low temperature sensitive scenarios predicted by the Hadley Global Climate Model were investigated. Reduced tillage had no significant effect on $N_2O$ fluxes from soils or crop grain yield. Soil moisture and interaction between soil moisture and soil nitrate are the main significant factors affecting $N_2O$ flux. The derived emission factor was 0.6% of the applied N fertilizer. By reducing the applied nitrogen fertilizer by 50 % compared to the normal field rate, $N_2O$ emissions could be reduced by 57% with no significant decrease on grain yield or quality. DeNitrification– DeComposition model (DNDC) was found suitable to estimate $N_2O$ flux es from Irish arable soils however, underestimated the flux by 24%. Under climate change, using the high temperature increase scenario, DNDC predicted an increase in $N_2O$ emissions from both conventional and reduced tillage, ranging from 58 to 88% depending upon N application rate. In contrast annual fluxes of $N_2O$ either decreased or increased slightly in the low temperature increase scenario relative to N application (-26 to +16%). Outputs from the model indicate that elevated temperature and precipitation increase N mineralisation and total denitrification leading to greater fluxes of $N_2O$.

**Key words:** Nitrous oxide, Conventional tillage, Reduced tillage, Spring barley, N application

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# The isolation of *Streptomyces* from *Alhagi pseudoalhagi* and *Colutea arborescens* legumens rhizosphere and characterization with polyphasic methods

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## Abstract

The members of the genus *Streptomyces* have been isolated from rhizosfer soil collected from *Alhagi pseudoalhagi* and *Colutea arborescens* on starch casein agar supplemented cycloheximide (50 µg/ml), rifampisin (0.5 µg/ml), and nystatin (50 µg/ml) incubated at 28 °C for 14 days. The isolate strains were examined for their ability to grow in the presence of various NaCl concentrations and antimicrobial activities against the gram positive and gram negative bacteria, yeast and pathogen fungi. The cultural and morphological characteristics of the isolates were determined on several medium. The isolates were also tested for total 48 unit characters including biochemical, degradation and nutritional for phenotypic properties.

All isolates on which PCR amplifications were carried out using the universal primer M13f in term of RAPD-PCR fragments – differentiated from one another according to phylogenetic and phenotypic analysis. 16S rDNA genes were amplified by PCR and RFLP analysis of the 16S rDNA was performed with *EcoR* I, *Sau3* AI and *Pst* I. *Pst* I produce RFLP patterns that differentiated most of the test organisms but *EcoR* I and *Sau3* AI produced same RFLP patterns.

**Key words:** *Streptomyces,* 16S rDNA, identification

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# Relations among Beet soilborne virus, soil properties and plant root weight in sugar beet fields

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## Abstract

*Beet soilborne virus* (BSBV) is one of the important and widespread virus diseases in most sugar beet (*Beta vulgaris* L.) growing areas in the world. A total number of 102 soil samples used in this study were taken from sugar beet fields in Samsun, Amasya, Tokat, Çorum, Çankırı and Yozgat in 2004. Sugar beet plants (cv. Arosa), susceptible to rhizomania, were grown in these soils as a bait plant for six weeks. Incidence of BSBV by ELISA and its vector *Polymyxa betae* by root staining method were determined in bait plants. Also, texture, pH, organic matter, cation exchange capacity (CEC), electrical conductivity, lime ($CaCO_3$) and exchangeable K, Mg, and Ca contents in these soil samples were determined. According to correlation analysis results, BSBV infection had the significant positive correlations with *P. betae* (r = 0.206*) and sand (r=0.219*) content, and siginificant negative correlations with CEC (r = 0.239*), EC (r = 0.273**) and Ca (r = 0.215*). While $CaCO_3$ content had the highest direct effect (47.41%) on BSBV, the highest indirect effects of the other soil properties on BSBV were generally obtained through the clay content. Plant root weight (PRW) had the significant positive correlations with EC (r = 0.297**), K (r = 0.210*) and CaCO3 (r= 0.219*), and siginificant negative correlation with BSBV (r = 0.205*). While $CaCO_3$ content had the highest direct effect (48.37%) on PRW, higher indirect effects of the other soil properties on PRW were generally obtained through the sand content and EC. It was determined that increasing nutrient content in soils increased the resistance of plant roots to diseases.

**Key words:** BSBV, *P. betae*, bait plant test, soil properties, plant root weight.

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# Soil Pedology, Classification and Mapping

Soil Pedology, Classification and Mapping

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# Effects of physiographic factors and some hydro-physical soil properties on river follow in Ovacikyayla river catchment

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## Abstract

This research was carried out in Ovacıkyayla River catchment located in Çankırı- Yapraklı district of the Central Anatolia. The objective of this study was to investigate physiographic parameters, some hydro-physical soil properties and land use on river follow in Ovacıkdere River Catchment. Some physiographic factors and land use-land cover were determined and evaluated by using RS&GIS program. Catchment is 2474 ha. Georeferanced Landsat Thematic Mapper data were classified to identify land cover and land uses of the study area. Research area is established between 1210m-1825m heights Mean sea level altitude of the catchment is 1000.5 m. The study area consists of various topographic features (flat, hilly, rolling etc.). Mountains, hilly and rolling physiographic units are particularly common in the study area. 14.5% of the study area has less than 20% slope (gentle and moderate) and 85.5% has more than 20% slope (steep and very steep). Soil series were classified as Entisolls due to their young age, three are Mollisol and one is Inceptisol. While, Humic Dystroxerept soil has the largest area (28.5%), Typic Haploxeroll has the smallest area in the study area (3.5%). Average annual precipitation and temperature are 530.8 mm and 9.1 $^{o}$C, respectively. Research area is situated in İran-Turan flora district which is one of the three biggest flora districts in our country. On the basis of Davis karelian system it is located in A4 square. In the light of data derived from management plan in the related district Scotch pine (*Pinus sylevestris* L.), Black pine (*Pinus nigra var. Pallasiana* L.) and Uludağ fir (*Abies bornmülleriana* Mattf) forests are dominant species.

**Key words:** catchment characteristic, land use, flow, Çankırı

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# Land use effects on some soil properties in a semi-arid ecosystem (Middle North Anatolia)

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## Abstract

Inappropriate land use is one of the main reasons for land degradation. Afforestration plays an important role in many semiarid regions all over the world as a permanent plant cover in terms of preventing erosion, sustainable use of land and water resources, defense against desertification and settling population in rural areas. In this paper, in Dikilitaş River Catchment have been applied to determine and compare the effects of land use types such as forest lands, grasslands, cultivated area on soil properties (especially hydro-physical properties). In order to determine these effects; some physical, chemical and hydro physical analysis were done on 28 soil samples taken from 0-30 cm soil depth. Soil samples were crumbled and then sieved at 2 mm. sieve. Texture, hydraulic permeability, bulk density, field capacity, permanent wilding point, maximum water capacity, pH, EC, salinity, lime, organic matter and total nitrogen analysis were done at soil samples. Some statistical analysis as variance analysis, Duncan test and correlation analysis were done at soil samples taken from surface soils. Results showed that, hydraulic permeability, bulk density, maximum water capacity, organic matter and total nitrogen change with land use types significantly.

**Key words:** land use, hydro-physical properties, catchment, Çankırı

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# Prediction of carbonate minerals dissolution by using solubility diagram in some calcareous soils Northern Iraq

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## Abstract

Carbonate minerals play an important role in some chemical characteristics depending on their solubility which affects the nutrients availability to plants in calcareous soils. Therefore, four locations were chosen from North Iraq having different soils order classified at series level namely, (Zawaita, Mollisols, 563CCE) (Batail, Vertisols, 452CCW) (Ninevah forest, Inceptisols, 432CCF) (Tel-Afer, Aridisols, 453CCW) in order to study the mineral that control the carbonate dissolution through the parameter $P_{Ca}$ which reflects the solubility diagram with soil pH. Results showed that the calcite mineral controlled the carbonate dissolution indicating by the points which falls under calcite line represented the state under saturation with respect to this mineral, calcite was the dominated mineral then dolomite as shown by the X-ray diffraction analysis. Results also stated that the soil under study are non saline characterized by low ionic strength ranged from 1-2.1mol.$L^{-1}$.

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# Accumulations of secondary calcium carbonate in some arid and semi arid lands in west of Urmia Lake (IRAN)

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## Abstract

Accumulation of carbonatic components in arid and semiarid regions is one of the most significant parameters in evaluating the degrees of soil development, soil age, soil classification and subsequently land use. Although the distinction of carbonatic features is usually simple in noncalcareous parent material, but as a consequence of calcareous parent material in many arid and semiarid soils, the distinction between primary and secondary carbonates in these soils is not always an easy task. Therefore, to make sure the origin and probably the mechanism of the formation of these features, usually the use of more detailed laboratory techniques is necessary. The present study is one of the first investigations about micromorphological properties of carbonates and their probable mechanism of formation in arid and semiarid soils around Urmia Lake with calcareous and noncalcareous parent material. Based on micromorphological properties, pedogenic carbonate accumulations were placed into five categories: 1) Needle fiber calcite that are present in large pores and as coatings on skeleton grains and aggregates. These needles are accumulated as MA type. The MA type needles are long and smooth, composed of calcite fibers. 2) Micritic calcium carbonate coatings (Calcans) on peds and around skeleton grains with different thickness are subdivided into 2 types. The first type is recognized as Carbonate rinds, uniformly covers entire skeleton grains and are composed of single layer. The second type is also coatings on skeleton grains but with more than one layer. 3) The third form of calcium carbonate accumulations are nodules, composed of micritic and microspritic and in some cases sparitic carbonates. The observed nodules are subdivided into 3types, Typic nodules, Nucleic nodules and Geodic nodules. 4) The forth form of calcium carbonate accumulations are carbonatic pendants that have formed as stalactite-like masses on bottoms of calcium carbonate coats or directly on bottoms of coarse fragments. 5) Finally the last form of calcium carbonate accumulations is carbonatic hypocoatings. These features have formed by impregnation of soil matrix in edges of voids with micritic calcite. In addition to these five categories, carbonate depleted zones were also observed in thin sections, in relation with other features.

**Key words :** arid, micrite, micromorphology, carbonate, semi arid, sparite, Urmia

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# Characterization and classification of soils along toposequence in Rashakan Region of Urmia -Iran

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## Abstract

In this study soil development and physicochemical properties of soils along a toposequence in different geomorphic surfaces in western side of Urmia Lake (IRAN) between Urmia and Mohammadyar cities were investigated. Four soil profiles on carbonatic parent material, in four land types including mountains, hills, plateaus and piedmont plains were studied. Mean annual soil temperature and rainfall of this area are 10.83 degree centigrade and 345.37 mm respectively. Calculated soil moisture and temperature regimes of this region are *Xeric* and *Mesic* respectively. The soils of this transect were classified in three subgroups, including *Typic Haploxerepts* in mountain, *Typic Calcixerepts* in hills and *Fluventic Haploxerepts* in plateaus. The soil depth deceased from 238 cm in lowest part of transect (piedmont plain, profile 1) to 68 cm in highest part of transect (mountain, profile 4). Maximum depth to Calcic horizons and thickness of Calcic horizons showed such a trend. In high elevations, variations in soil organic carbon are regular but its variation in low elevations is irregular. Despite this, mean organic carbon content of these pedons was increased with elevation. The cation exchange capacity of these soils is relatively high and shows variation with clay and organic carbon content of soils.

**Key words :** arid, calcic horizon, land type, toposequence, transect, Urmia

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# Some morphological, physical and chemical properties, classification and mapping of soils formed on a similar physical geography under different land use types

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## Abstract

Differences in land use type influence the process of soil formation. The objective of this study was to map and evaluate some morphological, physical and chemical properties of soils formed on similar topography and climatic conditions but under different land use types (forest, meadow, pasture and cultivation). The forest soil formed on colufluvial volcanic material was classified as Argiustoll. It has the slope gradient of 12-20%, no erosion problem, moderately deep soil profile with A, $B_{2t}$, $BC_1$ and $2C_2$ horizons. Soils in the meadow, pasture and cultivated sites formed on volcanic originated colluvial material and classified as Ustorthents. The soil under meadow adjacent forest cover has moderately deep soil profile with A, $AC_1$, $2C_2$ and $3C_3$ horizons and having coarse skeletal material. The forest-pasture site soil has shallow soil profile with A and C horizons and under low erosion risk. The soil in the cultivated site has the slope gradient of 6-12%, loam textured in Ap and clay textured in lower horizons. In general, the soils in the study area are medium-textured with medium or slightly acidic soil reaction, low in lime and plant-available phosphorus, no salt problem and containing low or medium organic matter, except the forest site.

**Key words:** soil classification, soil mapping, land use type

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# Comparison fuzzy logic and boolean methods in mapping on nitrogen and phosphorus nutritional status of paddy soils of Rasht Rice Research Institute

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## Abstract

One of the approaches for increase of yield and reduction of rice production costs is precision agriculture. Complete and correct determination of nutrition status of paddy soils is necessary for using of this new technology. To comparison of fuzzy and Boolean methods, mapping of nutrition status of nitrogen and phosphorus, 370 compound samples were collected from 306 hectare of paddy soils of Rice Research Institute in Rasht County from plots with the dimension of 50 × 100 meter. Total nitrogen and available phosphorus contents were measured. Results showed that interpolation and mapping by fuzzy logic was more accurate and correct in comparison with Boolean method and had greater distinguished power to indicate deficiency of nutrients. Evaluation of dependency of paddy soils using of fuzzy function and Boolean method, showed that the southwest of study area have nitrogen and phosphorus deficiency and the other parts have minor limitation for these elements.

**Key words :** precision agriculture, mapping, fuzzy logic, nutrients

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# Determining the effects of farmers' habits on alternative production by using CBS tecniques: the sample of Sinop/Boyabat

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## Abstract

Agricultural activities are mandatory in continuity of human nutrition. Producers conducting these activities began to grow same plant species on same planting area continuously due to some factors.

Growing the same plant species on same production area continuously lead to consumption of water and nutrients within certain soil deepness. Excessive use of synthetic fertilizers to compensate for nutrient deficiency leads to pollution of water sources and soils as well as negative effects on life chain and decreases in yield per acre. To cause the producers to succeed in getting desirable income levels, it is essential to encourage them for raising alternative products. A method based on geographical information systems (GIS) was developed in order to determine the most appropriate planting (raising) area for each plant.

**Key words:** geographical information systems (GIS), alternative production, analyis of geographical.

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# Application Remote Sensing Techniques in Study Rangelands Degradation in Mosul / Iraq

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## Abstract

The study aimed at exploring the applicability of data obtained from remote sensing in determining the deterioration in rangelands utilizing the digital camera in calculating soil reflection through color properties and some other auxiliary properties to analyze satellite images which helps in specifying regions. Hatra region was chosen for this study because it is considered as a typical area for studying soil degradation in rangelands and for determination of the degree of this degradation. Hatra city contains some reservations (like Hatra rangeland reservation) which can be utilized to distinguish between the condition of the reserved and unreserved rangelands. Farm investigations and evaluation of degradation in the study region was done according to the criteria described by Dregene. "Dregene Criteria" were considered by the FAO and UNEP as a reference in plotting the desertification and soil degradation map. Soil samples representing reserved and unreserved regions were also obtained for laboratory investigation. Digital camera type (Mercury 3.1 mega pixels) was used to picture soil surface in the rangelands in a vertical manner at a constant distance using a tripod stand. Five light filters were used with the following wavelengths: (440, 505, 525, 580, 595, 840 ) nm . Soil color in both the dry and wet conditions was appraised using "Munsell soil color chart". Estimation of the percent of organic materials, calcium carbonate , gypsum and certain other soil properties was also done in laboratory. Milted soil samples were also pictured in laboratory. Reflection values of soil were calculated in the field, in laboratory and from satellite images using the following equation : the square root of the sum of values obtained from computer. Two methods were used to read the samples: the " manual method " in which 5 test points are read and the result was obtained using the calculator. The second method is by reading 25-75 test points and then calculating the result by a specially designed program named "Band". Integrated Software for Multispectral Image Classification (ISMIC) and Unsupervised Classification Systems were also used. The results indicated the possibility of determining the reserved regions from the satellite images , and calculating the reflection values for the region by the mathematical method mentioned above. It is also possible to draw soil reflection curves for the reserved and unreserved regions in different locations and for samples representing soil surface in the field and for milted soil samples in laboratory using digital camera pictures through filters. More than one method were used to calculate soil reflection for the purpose of precision and for comparing soil reflection values with laboratory analysis for some soil properties. Results were verified using unsupervised classification system. It was clear that more filters are required to draw more accurate soil reflection curves and that there is a significant relationship between soil reflection measured from digital camera pictures and the "value" obtained from Munsell Soil Color Charts.

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# Morphology, physico-chemical characteristics and classification of two vertisols in Bafra and Çarşamba delta plains

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## Abstract

The name of Vertisol is derived from Latin "vertere" meaning to invert, thus limiting the development of classical soil horizons. These soils have the capacity to swell and shrink, inducing cracks in the upper parts of the soil and distinctive soil structure throughout the soil. The formation of these specific features are caused by a heavy texture, a dominance of swelling clay in the fine fraction and marked changes in moisture content. The swell-shrink behavior is attributed to the wetting and drying of the soil mass.

In this study, morphology, physico-chemical characteristics and classification of two vertisols that were formed on alluvial delta plains, were investigated. The first one has been formed on the Bafra Plain found in the Kızılırmak Delta and located in the central Black Sea region of Turkey. The soil is very deep, color ranges from dark olive brown to very dark grayish brown (in dry and wet conditions) and clay content is between 53-63 % within the one meter. The second pedon has been formed on the Çarşamba Plain found in the Yeşilırmak Delta and located in the central Black Sea region of Turkey. This pedon has also more than one meter depth, clay content changes between 53-56 %. However, this pedon has lighter color than other one. Slickensides, clay cutans and crack of 3-5 cm wide extends beyond one meter were observed in both pedons. According to Soil Taxonomy and FAO-Unesco Soil Map of the World Legend classification systems, the pedon formed on Bafra delta plain was classified as Chromic Endoaquert sub group and Chromic Vertisol soil unit while, the other pedon formed on Çarşmaba delta plain was classified as Typic Haplustert sub groups and as Eutric Vertisol soil unit, respectively.

**Key words:** vertisol, soil morphology, soil classification, Bafra and Çarşamba delta plains

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# Surveying the mechanism and model of peaty formation in the costal territories of sorth Caspian (Nowshahr and Chalus)

**M. Nazeri, I. Mataji**

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## Abstract

Coastal region of nowshahr-Chalus which is characterized by specific features of climate geology and vegetation is from among regions where accumulation of organic sources and formation of peaty soils during the quarterner is possible. The world's organic soils rankas one of the 12 major order of soils, which are named histosoil soils, are placed in 4 sub class, 23 groups and 123 sub groups. High level of static and motion less ness of water because of the crossing of fresh water and salty water, being away from the activity of fluvial and alluvial rivers, depression resulted from karstic processes ,caspian fault performance, high vegetation cover of marsh plants and hydrophil trees such as ainus pave the way for the formation of peaty soils in this region. The results obtained from the laboratory data and examination ofgeomorphologic situation is suggestive of low land mode) for these factors.the axaminations carried out in the study area suggest that about 6 percent of the coastal territories of Nowshahr and CKalus is covered with peaty soils, with 2 meters thick and the highest thickness of the peat soils, of the region is about 5.50 meters. This research has been carried out aimed at identifying the physical and chemical features of peaty soils and estimation of their volume and surface. More and effective identification of these soils enhanced their applications in various knowladge of gardening and mushroom growing in the country and region and this help to eliminate the need to import peaty soils.

**Key words :** peat , soil, low land model, noshahr, chalus

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# Study Soil origin in Central Alborz (Case Study: plain Lashk Noshahr)

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## Abstract

The samples of plain soil with samples of exploratory divinings excavation and load bar in Chomer darreh river, Koshkak and Aroush has studied exactly according to sedimentology and petrology in order to locate sourec of sedimentary deposits of Lashak plain and distinguish the rate involve each formations in providing of plain sediments. Mineralogy experiments on Lashak watershed rocks and plain sediments showed that the high correlations among mineral and existing elements with silt and shale units are shemshak group. Although the concentration of elements like Ag, Cu, Mo, Ni and V in comparison with standard samples are high, the amount of elements such as Sr, Sb and As are low. Among of main elements also MnO, CaO and MgO oxides are low in comparison with standard rate but amount of TiO is higher, the study of existing clay mineral showed that the plenty of minerals such as mica, illite, kaolinite and chlorite minerals like montmorillonite, ploygurskite and nantronite exist in minor froms in some sample. One of the most important factors to form polygurskite mineral is Alkaline pH. This factor is the result of high amount of carbonate.

**Key words :** Soil origin; Central Alborz, plain Lashk

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# Aggregate stability and related properties of soils developed on volcanic materials in central part of Turkey

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## Abstract

Aggregate stability (AS) values can be used as indicators of soil structural quality. Change of land use from forest to grassland or cultivated soils reduces the quality of the topsoil by decreasing the amount of organic carbon and stabile aggregate content. This is a widespread problem in semi-arid areas and may lead to a decline in soil productivity.., The objective of this study was to determine the influences of land use types on aggregate stability of soil developed on volcanic materials and assess the effects of some chemical properties on structure stability of soils by evaluating changes in aggregate stability due to changes of land use. Fort his reason bulk density (BD), Acid oxalate extractable Al ($Al_o$), pyrophosphate extractable Al ($Al_p$) and ditiyonit –citrat extractable Al ($Al_d$) and Fe ($Fe_d$), pH $_{(H2O)}$ and $pH_{(NaF)}$, total base content (TBC) and aggregate stability (AS ) of the A-horizon were determined in undisturbed samples at field moisture, at two different volcanic area.

The results indicated that the percentage of aggregates between 2 and 0.25 mm was significantly higher under forest soils (47,35%) than under grassland soils (21,89%). Multiple regression analysis showed that AS was positively related to organic matter (r =0,757), $Al_o$ (r=0,679), $Fe_d$ (r = 0,702), $Al_d$ (r = 0,576) and TBC (r = 0,751) content and negatively related to soil reaction (r=-0,647). Other results of importance were formation of stable soil aggregates to be significantly correlated with Al linked with non- or poorly crystalline forms, organic matter content, free Fe oxide, soil reaction., and total base content, and those factors can perhaps be used as edaphic indicators of aggregate stability in soils developed on volcanic materials in semi arid region of Turkey.

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# Agroecological estimation of turf-brown soils on different agricultural land at Middle Preduralye

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## Abstract

Turf-brown soils are widespread in a soil-cover of Perm region. These soils take one of the first places at this territory. Turf-brown clay soils of different kinds (e. g. forest, fields) have similar morphological properties. According to the mechanical analysis of soil the result of agricultural use, carrying out of oozy particles from a 0-40cm layer is becoming more often, that may lead to the podzolization of a profile afterwards. Virgin turf-brown soils possess good agrophysical properties. It's necessary to apply a deep loosening and taking of organic fertilizers into the soil for the improvement of agrophysical properties of arable soils. These methods improve the structure of soil and reduce soil density as a result of agricultural use. It's established, that the stocks of humus, the degree of saturation of soils with bases are being reduced, acidity of a soil rises in arable turf-brown soils because of cultivation in comparison with the virgin ones. Agroecological estimation has shown, that turf-brown clay soils which are under flat woods, are stable and turf-brown soils of arable soils are of relative stability owing to a high-buffer action of their parent breed – that is the eluvium of Perm clay.

**Key words:** soil, a virgin soil, an arable soils, properties, agroecological estimation

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# Land use capability class data with land forms using GIS case study; Samsun-Bafra district

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## Abstract

Land use capability class (LUCC) is of great importance in guiding on land uses in terms of their potential and conserving natural resources for next generations. The concept of land capability is useful in this respect because it is a composite assessment of land and soil, which incorporates the key physical characteristics that limit sustainable land management. Such an approach is simple and logical in approach, is widely known and accepted in the rural community and has been applied widely. LUCC system the range of suited crops decreased from class 1 to 8 and the management inputs required to produce suited crops increases from class 1 to class 8. However, the combination of soils, climate and types of agriculture in a particular area or region may make certain lower capability lands valuable for agriculture. Join analysis of LUCC with topography offers a precious tool to agricultural practices and land use planners revealing the most suitable land for agricultural aims both from LUCC and physiyography point of view.

The main objective of this study was to determine relationship LUCC and land forms using GIS in Bafra Plain found in the Kızılırmak Delta and located in the central Black Sea region of Turkey. The study area covers about 77796.1 ha. In this study, LUCC information derived from soil database prepared by the Rural Affairs General Directory and topographic maps scaled 1:25.000 to generate digital elevation model (DEM) were used. According to LUCC distribution of the study area, suitable land for agricultural application ranged from class 1 to class 4 is 53244.4 ha whereas, 24551.7 ha of the total area is non suitable (from class 5 to 8) for tillage. Land slope, aspect, hill shade, drainage network, creation of a three dimensional network structure of earth surface are among application of DEM. In finally, LUCC map painted in various colors was combined by the hill-shade image to generate three dimensional view image.

**Key words:** land use capability class, land form, Bafra plain

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# Study of soil salinity on the basis of processing of sputnik images

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## Abstract

Kur-Araks lowland is turned out by the quarter deposits. In the lowland the products of breed of tertiary period dominate. Here the products of Absheron layer are mainly met, partially upper, middle and low pliocene. In pliocene, on the territory of little Caucasus went falling precipitations of gypsum, hallite, mirabilite, tenardite and other salts.The north, west and south frontier areas of the lowland are foothill, inclined, having delluvial and alluvial, proluvial deposits.The central and east parts of the lowland represent plane plain,covering by alluvial deposits of the rivers of Kur and Araks, the part is occupied by new Caspian deposits. Almost all the alluvial plains of Kur and Araks are situated in low level of the ocean. In the formation of geomorphology of Kur-Araks lowland the level of the Caspian sea and periodic change of regress and transgress played a great role, that's why the condition of deposits and the following soil formation are strongly chan-ged.The zones of saline soils are fully studied. Efficiency of the recognition of cosmic images depends on choice of optimal technological decisions and studied methods. On the maps, creating over materials of cosmic images, borders of the investigated areas are established on definite criteria: on optic peculiarities of the natural objects; on landscape indicators; on field investigations; with attraction of specialists. of visual qualities of images (colour contrast, underlined borders). In Kur-Araks lowland the serozem type of soil formation is formed as a main zonal soil type.Among the sero-zem soils of the lowland: meadow-serozem, meadowy, meadow-marshy are formed. Among these soils solonchak has a large spreading. The reason of the large salinity is both primary salinity of soil grounds and ground waters and their second salinity as a result of evaporation, close situated to surface, high mineralized ground waters under the influence of insignificant quantity of atmospheric precipitations. In this lowland continental-delta salt accumulation has a large spreading. The area in different degree of saline soils with the matters in the metric salt layer more than 0,25% over the dense residue forms about 85 %. In dependence of soil ground conditions and meliorative situation here it is offered to apply deep collectors and drainage of the different intensity. Thus on the basis of the composed map of agricultural lands we defined unsalinized,little salinized, strong salinized and solonchak on the investigated territory.We should note, that in the middle of irrigated grounds of average salinized soils can see (on pasture) both average salinized and strong salinized, and also solonchak soils.In connection with it was organized short-term expedition for soil researches and was taken soil samples for defining of average salinized fields.Then these studied fields were marked on the map of soil salinization. So, the map was composed.According to above mentioned methods we compiled a map of saline soil of Mugan-Salyan massive within Kur-Araks lowland. The map was compiled on the basis of space images processing with help GIS technologies.

**Key words:** solonchak, collector drainage, salinization, GIS, antropogen factor

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# Determination of salt loading to soil profile and groundwater by GIS-based trace element transfer model

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## Abstract

Soil and water degradation is regarded as one of the most important nation's environmental quality concerns. Agriculture is acknowledged as the primary contributor of nonpoint source (NPS) pollutants (e.g., salts, pesticides, fertilizers, trace elements) responsible for soil and groundwater degradation. The ability to assess the environmental impact of NPS pollutants is a key element in agriculture sustainability. Because of the spatial complexity and heterogeneity of soils, the modeling of NPS pollutants in the vadose zone is well suited to the integration of a one-dimensional, deterministic model of solute transport and a geographic information system (GIS). The functional model TETrans was used to predict salt loading to soil profile and groundwater in a 1475-hectare study area located on Ankara Kesikkopru Basin of Central Anatolia region in Turkey. Visualisations displaying the simulated temporal and spatial changes in the loading of salts to soil profile and ground water were presented for the study period 2000-2004. The order of crops grown in the rotation was winter wheat, dry bean and fallow. A comparison of the predicted and measured salt loads in soil profile for 20 cm increments and groundwater salinity level from observation wells in water district at the end of the 4-year study period showed close agreement. An evaluation of the results indicates that validation of the TETrans model at field to watershed scales and the practicality and utility of applying a one-dimensional GIS-based solute transport model of the vadose zone to predict and visually display salt loading over hundreds or thousands of hectares. The display maps provide a visual tool for assessing the potential impact of salinity on soil profile and groundwater, thereby providing information to make management decisions for the purpose of minimizing environmental impacts without compromising future agricultural productivity.

**Key words :** TETransGeo, soil salinity, boron, ground water pollution, GIS, Kesikköprü, computer model

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# GIS and HEC-RAS model application in flood area impounding

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## Abstract

In recent decades in part of countries northern province specially mazandaran east and golestan province we have been observing advent various floods and accuring the pecuniary and casualitis the village and countryside improvement and extention ,agriculture arable land and also industrial and uarbanal centers adjucent to rivers has caused to many of sensitive and inhabitated canters prone to flooding hazardous area. So that at 1387, the heavy damege and casualities imposed upon darabcala village by considering thats, we used GIS technique to charactrictis flooding area with diffrent return periods and we used from TIN irregular triangular as hydrolic model input of stream channel. Cross section is in river routin in village area which are the most principal hydraulic parameter ,adduced by using the appendix function of HEC geo RAS. Finally, we gained map for returns periods of 2, 5, 25, 50, 100 years which indicates flooding hazardous area at this village. Hence for reducing casualities due to flooding, residential part extension and agricultural land improvment and sensitive center at this region must carry out with more investigation and out of flooding area.

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# Pedological development on four different parent materials

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## Abstract

The influence of parent materials on soil properties has long been recognized. Early pedologists and soil geographers based their concepts of soils largely on its presumed parent material. Later, parent material was viewed simply as a factor that influences soil development-an influence that diminishes in importance with time. The main objective of this study is to research the influence of four different soil parent materials on some soil physical, chemical, mineralogical and morphological properties of the study area located in the Southeast Anatolia Region of Turkey. Four soil profiles were investigated. Soil samples were analyzed using standard procedures. The results show that basalt and lime stone-marn derived soils have relatively deeper profiles, lower bulk density, higher clay content, organic matter, exchangeable bases, micronutrients and weatherable minerals. They are also higher in their CEC and base saturation percentage while available water capacity, hydraulic conductivity and natural water content are more adequate in them. The parent materials of around soils are basalt, lime stone-marn, sand stone materials and alluvium materials. It was observed that soil pedons formed on lime stone-marn and basalt parent materials were well developed while; pedons formed on sand stone and alluvial deposit have weak pedogenesis process. Development of B horizons (Bw and Bk) and carbonate accumulation were main pedogenic processes in subsurface and veric and ochric epipedon developed on top surfce soil. The most abundant clay mineral was smectite, followed by and illite and kaolinite. Four soil pedons were classified as Entisol, Vertisol and Aridisol according to Soil Taxonomy.

**Key words :** soil parent materials, soil properties, soil classification

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# Degradation of soils of Kazakhstan and prevention measures

**A.S.Saparov, G.A. Tokseitova**

**U.U.Uspanov Kazakh Research Institute of Soil Science and Agrochemistry, Almaty, Kazakhstan,**

## Abstract

Long use of the lands used for agricultural purposes without considerartion of the agroecological potential of the territory and the scientifically-grounded systems of land cultivation has led to degradation and desertification, decrease in soil fertility and deterioration of soil-reclamation and environmental condition. At present period about 75 % of the territory of Kazakhstan is subjected to the high risk of desertification and 14 % of pastures have reached extreme degree of degradation. In Kazakhstan in Aral area the intensive processes of desertification, salinization and deflation of soil surface take place. Salt-dust streams extend to 500 km, the area of sedimentation of dust is about 25 mln. ha. Intensive development of erosion and secondary salinization of irrigated lands which area increases every year is observed. Pollution of soils by oil and oil products is observed on the area more than 1,5 million in ha, most part of which is located in Atyrau region– 59 %, Aktyubinsk region-19 %, West Kazakhstan region-13 % and Mangystau region – 9 %. During the development of virgin and waste lands 1/3 part of humus was lost from its initial content and in irrigation conditions - to 57 %. Annual losses of humus in agriculture of Kazakhstan is 0,5-1,4 t/ha. In the regions with large-scale industry the centers of technogenic infringement, pollution of soils by heavy metals, radio-nucleides and the areas of pollution with products of combustion of rocket fuel - about 9,6 mln.ha, are observed. There are various ways of solution of the problem. In each certain region the special scientifically-justified approach is needed which takes into account the natural-environmental conditions. For stopping and decreasing the process of desertification and improvement of environmental situation and also sustainable management of land resources and pastures it is necessary to develop a complex of organizational-economic, agritechnical, forest reclamation, hydraulic engineering and other measures.

**Key words:** soil surface, degradation, desertification, soils transformation, fertility, humus, pollution, salinization, ecology, heavy metals, oil products

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# Geolojical and mineralojical properties of a soil formed on the Augite-Bazalt Rocks in Ordu conditions

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## Abstract

Basalts are the major rock groups of the geological formations in Ordu. Study area is located 50 km south of the Black Sea cost, at altidute of 1225m at the Mesudiye District of Ordu Province. Soil profile, formed on the Augite-Basalt rock,was opened and each horizon were sampled. Morphologycal, physical, chemical, mineralogical and geochemical properties of each samples were determined. The soil was described as Typic Haploxererts. Smectite was the dominant clay minerals according to X-RAY analysis, illite and kaolinite were also determined. Big crystaline solid plagioclase, as well as obsidian, crystobalite, microlite and as a mafic minerals pyroxene were described at the thin section of the Augite-Basalt rock using the polarized microscobe. Mineral composition of the Augite-Basalt rock were determined with XRF analyses, and percentages of the minerals were found as follows; 3.06 $NaO_2$, 0.45 MgO, 18.97 $Al_2O_3$, 53.94 $SiO_2$, 0,565 $P_2O_5$, 3.601 $K_2O$, 8.142 CaO, 0,2168 MnO, 5.962 $Fe_2O_3$.

**Key words :** basalt, smectite, minerals, X-ray

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# Detailed land capability classification, Case study; Turnasuyu-Ordu

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## Abstract

In this research, detailed land capability classification was carried out for the area covering Akçatepe, Kayabaşı, Yukarıtepe and Turnasuyu villages in Ordu. Eight soil profiles were opened and based on horizon soil samples were taken. Following field and office studies and laboratory analysis, soil taxonomic classification was done and 4 orders were determined as of Entisol, Inceptisol, Mollisol and Alfisol. Then based on available data, field surveys and Klingeibel and Monthgomery (1966), detailed land capability classification was performed and 6 main classes as of IIs, IIIs, IIIw, IVws, VIs, VIse, VIIse and VIII and 9 sub-classes were determined and land capability classification map for the area were prepared.

**Key words :** capability classification, soil profile, Ordu

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Soil Fertility and Plant Nutrition

# Soil Fertility and Plant Nutrition

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# Effect of nitrogen and water on nitrogen use efficiency of rice in north of Iran

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## Abstract

In order to investigate the best nitrogen level and irrigation regime an experiment was conducted in split plot based on completely randomized block design with 3 replications at the rice research institute of Iran in 2008.Four levels of nitrogen (N1=0, N2= 90, N3= 120 and N4= 150 kg/ha) were splited on 4 different irrigation managements (I1=continuous submergence (CS), I2= 5, I3= 8 and I4= 11 days interval). Nitrogen fertilizer splited in three important growth stages according to transplanting (50%), tillering (25%) and booting (25%). The results clearly indicate that nitrogen levels and irrigation management in most of studied characteristics such as grain yield (GY), total nitrogen (TN), grain nitrogen (GN), nitrogen harvest index (NHI) and apparent nitrogen recovery efficiency (ANRE) had very significant differences. Grain yield were 5303, 6628, 7399 and 7419 kg/ha in N1 to N4 respectively. Total nitrogen (TN), grain nitrogen (GN) and apparent nitrogen recovery efficiency (ANRE) were increased significantly with the increment of the amount of nitrogen. (GY), (TN), (GN) and (NHI) were statistically the same under CS and interval irrigation of 5 and 8 days. The consumption of 120 and 150 kg/ha nitrogen fertilizer produced same grain yield. Since obtaining a higher grain yield is important goal in each experiment thus, suggested that Irrigation water input in 8 days interval and consumption of 120 kgN/ha are basic model for future experiment of rice.

**Key words :** nitrogen use efficiency, irrigation, rice, yield

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# The effects of planting density on the trend of grain filling; yield and yield components of three chickpea (*cicer arietinum* L.) varieties in Kermanshah

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## Abstract

A field experiment was conducted to evaluate effects of planting density and variety on the trend of grain filling; yield and yield component of chick pea. The present research was conducted at experimental farm of mahydasht (KerManshah). The factorial experiment was designed based on complete randomized block design with four replication. In this experiment; the variety in three level (Jam;ILC-482 and 12-60-31) and the planting density in three level 19; 28 and 57 plant.m$^{-2}$) were considered. The trend of grain filling; yield ;yield component and agronomic characteristics; as some biomass yield; harvest index; number of pods per plant; number of grain per plant; number of node per main stem; plant height; number of branch per plant; weight of 100 grain ;distance between 1$^{st}$ pod to soil; distance between 1$^{st}$ branch to soil and phonological stages the chick pea varieties based on photo growing degree day (PHOTO GDD) were calculated. The result achieved showed that the maximum speed of grain filling related to density of 28 plant.m$^{-2}$ and ILC-482 variety. Grain yield; number of pods per plant; number of grain per plant; weight of 100 grain; plant height; distance between 1$^{st}$ pod to soil and distance between 1$^{st}$ branch to soil were significantly affected by variety and density but number of branch per plant was affected by density and number of node per main stem and harvest index were affected by variety. The maximum photo growing degree day Related to 12-60-31 variety and the maximum grain yield related to density of 28 plant.m$^{-2.}$

**Key words :** chick pea, variety, planting density, grain filling, yield, yield component

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# Foliar and soil boron application in kiwifruit plants

**C. Tarakçıoğlu, T. Aşkın, O. Sarıçiçek, M. Şahin**

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## Abstract

A study was conducted to determine the effect of boron fertilization on the yield, mean fruit weight and N, P, K, and B contents of leaves of kiwifruit vines. Boron treatments with macro (MACF) and micro (MICF) crystalline forms (sodium penta borate; containing of 18 B %, 10.5 $Na_2O$ %) were applied into soil and, only MICF was sprayed on leaves of Hayward Kiwifruit vines in Ordu province in 2007 and 2008 growing seasons. For this purpose four doses of boron at the amount of 0, 3, 6, 9 g B $vine^{-1}$ as a soil application and four doses of boron at the amount of 0, 100, 200, 300 mg B $L^{-1}$ as a foliar applications. Boron sprays applied a week before blooming and after fruit set. The experimental design was a completely randomized design with three replications. According to the results, boron applications increased fruit yield over controls in both seasons. The highest fruit yield were obtained by the dose of 9 g B per vines of MICF application in the first year and that of 6 g B per vines of MICF application in the second year and as average of two years. For MACF application, the highest yield were 6 g B $vine^{-1}$ in 2007 and 9 g B $vine^{-1}$ in 2008 and as average of the years. Fruit yields in both season were generally increased with foliar applications, and treatments of 300 mg B $L^{-1}$ per vines were the highest yield. The highest yields were 87.4 kg.$vine^{-1}$ at the first year and 94.4 kg $vine^{-1}$ at the second year and 89.3 kg $vine^{-1}$ as average of years with foliar application (300 mg B $L^{-1}$) and MACF application (9 g B $vine^{-1}$) and foliar applications (300 mg B $L^{-1}$), respectively. Mean fruit weight changed in each experiment season. The experiment with the highest mean fruit weight noted in 2007 (3 g B $vine^{-1}$, MACF) and in 2008 and as average of the years (3 g B $vine^{-1}$, MICF). While nitrogen, phosphorus and potassium contents of leaf were changed from increasing with boron applications, these nutrient concentrations were generally adequately at all treatment. Leaf B concentrations increased with the increasing B applications and were highly correlated with fertilizer levels. Kiwifruit appear to be very sensitive to excess boron extreme care should be taken when applying fertilizers since there is no reliable information yet for kiwifruit on the quantities of boron required to safely correct a deficiency. Consequently, if boron is applied to correct what may appear to be an early season deficiency, there is a distinct danger that toxicity will results.

**Key words :** boron, fertilization, kiwifruit, nutrition

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# Calibration of nitrogen soil tests with yield of corn by using uv (205 and 220 nm) absorbans

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## Abstract

The objective of this study was to calibrate of nitrogen soil tests using UV (205 and 220 nm) absorbance values in determination of soil's nitrogen statues by growing corn plant (Zea mays L.) in field experiments and determine to nitrogen fertilizer doses to corn plant using these analysis results. Eleven field experiments at different locations, 4 locations in 1997, 3 in 2000 and 4 in 2001 were conducted to determine nitrogen fertilizer requirement of corn plant in randomized plot design in Bafra and Çarşamba Plains of Samsun. Application doses of nitrogen fertilizers were 0, 5, 10, 15, 20 and 25 kg N $da^{-1}$. Between UV absorbance values at 205 nm and 220 nm of the soils and grain yield of corn plant grown in control soils, and relative grain yield values were obtained statistically significant positive correlations, however these UV absorbance values showed significant negative correlation with the response values at percent to the nitrogen fertilizer of corn plant. In order to determine application amount of fertilizer depending on nitrogen values of the soils determined by the chemical methods, parabolic multiple regression equations among the relative grain yield (y), nitrogen contents of the soils by the chemical methods which are 205 and 220 nm absorbance ($x_1$) and applied the nitrogen-fertilizer doses ($x_2$) were calculated as $y=-26,1+69,2x_1+5,03x_2-9,57x_1^2-0.059x_2^2-1,27x_1.x_2$ ($R^2=0.469^{**}$) with 205 nm absorbance and $y=11,7+53,2x_1+3,98x_2-8,11x_1^2-0,059x_2^2-1,01x_1.x_2$ ($R^2=0.494^{**}$) with 220 nm absorbance. The UV values at 205 nm and 220 nm in these correlations concluded that it was a suitable test in the determined of the nitrogen status and needing nitrogen fertilizer of the soils. Then, by getting the derivatives ($\delta y/\delta x_2$) according to $x_2$ of these calibration equations was calculated to the N fertilizer doses needed for corn plant and determined the nitrogen categories. Afterwards, the nitrogen-fertilizer needs calculating by means of the equations obtaining from calibration of UV absorbance values at 220 nm of the test soils showed that paralleled with the nitrogen-fertilizer needs determined by trials. By making use of the equations obtained from calibration of these UV values were found that needed to be given of the nitrogen-fertilizer 30-43 and 30-34 kg $da^{-1}$ because of containing very poor nitrogen of the soils which were equal and under to 1.179 and 0.436 of the UV values, 41.91 and 33.36 % of adequateness percents, for UV values at 205 and 220 nm respectively. As a result of critical UV values for nitrogen status of the soils were obtained as 3.960 at 205 nm and 3.941 at 220 nm, and N fertilizer application was recommended to soils including less than these critical values.

**Key words :** calibration, UV 205 and 220 nm absorbance, N fertilizer requirement, N categories

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# Effect of wheat and barley residues in germination and growth of two weeds (*Silgbum marianus* L. and *Doucus caruta* L.)

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## Abstract

The study includes Green house experiments to show the allelopathic effects of wheat and baraly residues that added to the soil at three concentration (0.25, 0.5, and 1%) w:w in germination and growth of two varieties of weed. The results showed a difference in allelopathic effects of wheat and baraly residues the wheat residue was more than baraly residue in effected the most of character studied. The results also showed a difference between the weeds in*/ it's sensitivity to the effect of treatments wild carrot gave the highest effect compared with kalgan in germination and growth.

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# Effect of pot diameter, organic fertilizer and pinching on growth and flowering of Cineraria *Pericallis X hybrida*

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## Abstract

This experiment was carried out in the college of Agriculture, Duhok University / Sumail, to study the effect of two Pot diameter: 15 and 20 cm, Organic fertilizer of Rock Dove manure: 0, 5 and 10 gm/ pot/ week add as solution, and pinching inflorescence bud on growth and flowering of *Pericallis X hybrida*. From results of the experiment, the following conclusions may be draw:

- Potting plants in 20 cm diameter pots gave significantly best results for leaves number 9.01 leaf/ plant, amount of chlorophyll content 69.47 mg/ gm fresh weight, inflorescence height 18.49 cm and inflorescence number 41.00 inflorescence/ plant.
- Plants manured with 10 gm/ pot/ week Rock Dove manure as solution gave significantly better character for leaves number 9.09 leaf/plant, amount of chlorophyll 70.28 mg/gm fresh weight, dry weight of vegetative growth 3.26 gm/plant, inflorescence height 18.11 cm, seed production 0.151 gm/plant, and leaf content of NPK. But these treatments caused significantly decreasing in flowering duration.
- The results showed that flower bud pinching caused decreasing in plant height, but increased inflorescence number per cluster and seed production per plant.
- In conclusion, using 20 cm pot with addition of 10 gm/ pot/ week Rock Dove manure without pinching gave the best results for almost all characters studied.

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# Some characteristics of agricultural lands in Konya-Karaman and their plant available micronutrients contents

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## Abstract

1028 soil samples were collected and analyzed in order to determine some characteristics of soils in Konya and Karaman provinces. The data obtained from analysis was classified based on limit values of analysis. After classification, the area was idebtified as heavy in structure, rich in calcium and poor in organic material. Results of analysis showed 49.7 % of the soil samples was deficient for Fe (>2.5 ppm), and 65.8 % of those for Zn (>0.5 ppm). It seemed that Cu and Mn deficiencies did not limit yield in these areas. The relationship among Fe, Zn, Cu ve Mn contents with soil structure, salt content, pH, calcium and organic matter contents were determined by regression analysis.

**Key words :** Konya-Karaman soil characteristics, micronutrients contents

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# Influence of local resources and organic ferrilizer on yield and quality of cucumber in condition hothouse of Azerbaijan

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## Abstract

In the greenhouse vegetable growing in Azerbaijan widely spreader of cucumber with its high harvestless and its earlier bringing crop in the connection of what they are more in need of nutrient conditions. The vegetable plant reaction for the nutrient elements depend on quantity of giving mineral and organic fertilizers, agrochemical malice's of substrate and the harvest size too. The actual problems are working out of reception of rational use of compost from domestic wastes (TBO) and dry remains in town sewerages (SOK), which accordingly contain in its compost organic matter 40-26%, the total $K_20$ 1,2-2,0%. The experience was got in Zabrat greenhouse in Absheron region of Azerbaijan. They grew cucumber hybrid TSCHA-211. The grey-brown soils in Absheron serve by substrate in the experiments, to contents of nutritious matters (%) in these soils low humus 1,43-1,53 % quantity of common nitrogen, phosphorus and potassium vibrates according to following limits: 0,10-0,16; 0,11-0,15; 2,4-2,7, light hydrolyze N 175-143,6 mg/kg, sum of mineral N 27,61-22,59; exchanging potassium of 365,5-342,3mg/kg soils. That's why for receipt of vegetable plant high harvest in greenhouse soil is necessary to provide with nutritious elements. In the experiments of industrial phone (100 t/ha manure,+ $N_{120}P_{120}K_{60}$) according to experience graphic in soil gave 10-20t/ha TBO and SOK. In all cases in versions of TBO and SOK application was marked their favorable influence, The importance of receipt for experimental versions surpassed controls. From reception of composts TBO and SOK and in dependence of their cloze correlation of cucumber harvest growth compared with industrial phone to 3-5kg/$m^2$. Except it they don't show the negative in influence on the environment and their reception of eco logical profitable and usefulness. The compost application promotes not only the growth of crop capacity and positively influence on qualitative cucumber indices which depend on its growth sot and condition. As known, the main qualitative indices of vegetable plants are dry matter, vitamin C, common sugar and others. In studying the influence of fertilizers and composts on qualitative indices of cucumber the sort of TSCHA-211 fruits for analysis were choose in the period of fruit-format ion mass and they defined dry matter, vitamin C, quantity of common sugar, nitrate in them. In studying of dry matters the taking fruit time for analysis is the least in early harvest. In the compost application TBO and SOK from the calculation of 20 t/ha to 0,35; 0,60% as compared with industrial phone (4,90%). One of the quantitative indices of vegetable plants is vitamin is vitamin C content, which synthesize only implants and some animals. The deficiency of vitamin C in the organism influences on the exchange of matters. For the provision of the human organism by vitamin C plays a direct part of vegetable plants, including the cucumber. In order to get available norm of vitamin C, it is necessary to lat 250 g cucumber every day. In our experience the application of composts promoted the growth of the contents in fruits vitamin C. The best version is industrial background 20 t/ha COK, so here the content of vitamin C increased to 0,35 mg% industrial background. This version is characterized by the most amount of common sugar (2,25%). In studying of qualitative indices the domination of nitrate content of the highest amount of which displayed in them forming 52, 8 mg/kg presents aggregate interest at present. On toxic form for human organism its size didn't increase PDK. There was more effective doze of carrying dry rests of take sewerage from the calculation of sot/ha in the experience.

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# Effects of different levels of salinity on germination of four components of lentil cultivars

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## Abstract

Combat salinity and the major issues that several thousand years of human struggle with it ever has been. Way, that this stress can be causes of reduced agricultural production capability of land outlined. To evaluate the effects of different levels of salinity on germination of four components of lentil cultivars include: Kabralyaaynta, Philip 97-1L, ILL6199 and Gachsaran, a factorial experiment in completely randomized design with 3 replications in the laboratory seed physiology State University of Bojnourd Branch was. Five levels of salinity treatments (0, 3, 6, 9 and 12 ds / m) with the use of sodium chloride salt was applied. Seed planted within plastic containers with dimensions 5×8×11 cm was performed. These results showed that the percent germination of all cultivars with increasing salinity, decreasing to find. Other parameters measured included length of root and stem the increase of salt concentration in solution, eased. If the dry weight of cotyledons in low salinity levels (from zero to 6 ds/m) decreased and increased in level. Among the cultivars studied, Gachsaran figure compared with other figures in terms of most parameters than were affected by salinity.

**Key words :** salinity, percentage of germination, lentil, length of root and stem

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# Spatial variability of soil physical properties in adjacent alluvial and colluvial soils

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## Abstract

The purpose of this project to determine the content of plants nutrients and potantial toxic elements of agricultural area affected different contaminent resouce.In this project, soil samples (317 number) were analyzed determing coordinates of area by CPS from intensive farming area arround drainage and main discharge canal. According to result of this study parts of soils analyzed have mostly clay-loamy or clay textures. This result shows in that soil texture was anailable for agriculture. Soil salinity generaly was not a level restrictive for crop yield. Also the part of soil analyzed have high calsium content. For that reason soil pH values effecting negative the productivity of soil was very high.The half of research area soil has insufficient the quarter of that area has moderate and ancher condition quarter area has well conditions in that phosphorus.When the half of research area soil have ferrum and zinc deficiency. Cupper and mangan deficiency have not heavy metals (which one Pb, Cd, Cr, Cu, and Zn) content were limited values below standart value, but Ni content has raised on 37 soil samples 367 above standart values.

**Key words:** Konya, soil, potential toxic

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# Effects of increasing level of copper and sulphur applications on soil pH and nutrient contents of soil

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## Abstract

It is determined that the copper contents are high level in plant and in some soil samples due to intensive use of Cu-containing fertilizers and fungicides in Mediterranean Region where greenhouse production is intensive. Cu toxicity is difficult to determine since its symtoms are quite similar to Fe deficiency symtoms. At the same time, elemental S is commonly applied to reduce soil pH without any soil analyses. The aim of the present study was to investigate the effects of Cu and S applications to soil on pH and nutrient contents of soil. For this purpose, Cu was applied to soil as $CuSO_4.5H_2O$ in five different levels (0, 250, 500, 1000 and 2000 ppm Cu) and elemental S in two different levels (0 and 750 ppm S). Pot experiments were carried out according to the completely randomized design with 4 replicates. Soil samples were taken at the end of the experiment and soil pH, total N, available P, exchangeable K, Ca and Mg, available Fe, Mn, Zn and Cu were analyzed. According to the analysis results; soil pH decreased with increasing level of Cu and S applications. Without S application, increasing level of Cu applications did not result in significant differences in total N content of soil samples. However, with S application, total N content of soil samples were initially decreased and later increased by increasing level of Cu applications. Available P content of soil samples were initially decreased and later increased by increasing level of Cu applications without S application while increasing level of Cu applications along with S application initially caused an increase and later a decrease in available P content of soil samples. Increasing level of Cu applications resulted in an increase in exchangeable K content while causing a decline in exchangeable Mg content. Exchangeable Ca and available Mn contents were not changed by any treatment. With and without S application, increasing level of Cu applications decreased available Fe content, and increased available Cu content. S application resulted in an increase in available Fe content and a decrease in available Cu content. S application alone caused an increase available Zn. As a result; Cu applications, aiming to control plant diseases, and S applications, aiming to reduce soil pH, showed different effects on the nutrient contents of soil samples. Therefore, it is clear that soil analyses before Cu and S applications are necessary for a conscious application and a accurate fertilization.

**Key words :** $CuSO_4.5H_2O$, sulphur, soil pH, nutrients

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# Effect of compost application on growth and yield of potato in a farm community in the central Andes of Peru

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## Abstract

Potato (*Solanum tuberosum* L.) is the most important crop in the Andean region of Peru. It is cultivated by small farmers with limited access to external resources thus fertilization mostly depends on locally available sources of organic matter. A field experiment was set up to evaluate the effects of application of three organic amendments (wheat straw compost, vicia residue compost and farmyard manure) at rates of 10 and 20 t $ha^{-1}$ on growth, yield, carbon assimilation and nitrogen uptake of potato cv Yungay in the farm community of Aramachay (Junin-Peru, 3750 masl). Inorganic NPK fertilization was uniformly applied at a low dose (87 – 145 – 87) and treatments were distributed in a completely randomized blocks design. All organic amendments increased plant size and the dry weight of shoots compared to the control, although both application rates were similar. The three organic amendments at 20 t $ha^{-1}$ and wheat straw compost at 10 t $ha^{-1}$ increased the leaf area of potato plants. The treatments did not affect the number of tubers but the use of wheat straw compost and farmyard manure at 20 t $ha^{-1}$ significantly increased total tuber yield. Carbon assimilation and nitrogen uptake in shoots were significantly increased by the application of organic amendments but those in potato tubers were not affected. Results indicate that adequate doses of organic matter can provide a complementary source of nutrients for potato production by small farmers in the Andes of Peru.

**Key words:** *Solanum tuberosum* L., fertilization, organic matter, compost, nutrient uptake.

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# Effects of sheep manure on some properties of soybean root under leaching and non-leaching conditions

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## Abstract

Deficiency of organic matter is one of the most important problems in the arid and semi arid regions. About two-third of Iran is arid or semi arid and Soil organic matter content because of some natural factors for example, low rainfall, high temperature, High oxidation and management factors including non-using of organic matter fertilizers, is low in the most cultivated soils. Addition of organic wastes may improve soil physical, chemical and biological properties. One of the problems in using of manure and compost is high salinity and its effects on plant growth. For decreasing the harmful effects of using manures, leaching is recommended. The objective of this research was to study the effects of manure leaching on soybean root properties. Measured parameters in soils consisted of Soil Texture, Soil Organic Matter, N, P, K, EC, pH and micronutrients including Fe, Mn, Zn and Cu. the classification of soils was Fine, mixed, mesic, Fluventic Haploxerepts. The amount of Cu, Pb, Cd, Fe, pH, Total N, P, K and Ec, were measured in both leached and non-leached sheep manures. Treatments consisted of a factorial arrangement of sheep manure in four levels (0, 1, 2 and 4 % on dry weight basis) and two leaching levels (leached or not leached) in a completely randomized design with three replicates. Results indicated that manure increased nitrogen, Fe, Zn, Cu and Mn concentrations. Leaching of sheep manure reduced salinity effects of 2% treatment. The effect of leaching on the root nutrients concentration was not consistent. It can be concluded that better results can obtain with fewer leaching ratios.

**Key words :** sheep manure, leaching, soybean root

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# Zinc, iron and manganese interactions in soil and various organs of wheat

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## Abstract

Nutrients balance in plant tissues has been considered an important aspect of modern plant nutrition science. Interactions among nutrients can greatly influence their balance in plant tissues. In this study Zn, Fe and Mn interaction and its effect on concentration of these nutrients in various organs of wheat was investigated. A greenhouse factorial experiment, using completely randomized design, was carried out with four replications in this study. Treatments consisted of three Zn levels (0, 40 and 80 mg $kg^{-1}$ soil) in the form of $ZnSO_4.7H_2O$, three levels of Fe (0, 15 and 30 mg $kg^{-1}$ soil) in the form of Fe-EDDHA and three levels of Mn (0, 15 and 30 mg $kg^{-1}$) in the form of $MnSO_4.7H_2O$. Results showed that Zn treatments had a significant effect on concentration of these elements in wheat organs. Application of Zn increased Fe concentration significantly in stems (85.2 to 99.5 mg mg $kg^{-1}$) and decreased iron in roots (171.4 to159.7 mg $kg^{-1}$) and clusters (56.0 to 52.6 mg $kg^{-1}$) of wheat. Zinc application also decreased Mn concentration in roots (75.2 to 72.7 mg $kg^{-1}$) and stems (24.4 to 20.4 mg $kg^{-1}$) and increased it in clusters (16.2 to 28.6 mg $kg^{-1}$). Application of Fe to soil resulted in reduction of Zn (46.6 to 43.3 mg $kg^{-1}$) and Mn (44.2 to 33.8 mg $kg^{-1}$) concentrations in clusters and stems (34.4 to 24.4 mg $kg^{-1}$ for Zn and 26.0 to 20.4 mg $kg^{-1}$ for Mn) and increased their concentration in roots significantly. Mn application to soil had a significant effect on Mn concentration in clusters and roots of wheat. Mn application also resulted in an increase in Zn concentration in roots (57.4 to 59.2 mg $kg^{-1}$) and stems (29.0 to 31.3 mg $kg^{-1}$), Fe concentration increase in stems (142.2 to 163.9 mg $kg^{-1}$) and clusters (52.0 to 55.2 mg $kg^{-1}$) and reduction of Fe concentration in roots of wheat. In integrated use of these three elements, Zn movement rate to clusters was higher than Fe and Mn. Considering the higher demands in plants for Fe and Mn than Zn, higher translocation of Zn to cluster, might disturb nutrient balance in plants tissues.

**Key words :** interaction, zinc, iron, manganese, soil, root, stem, cluster, wheat

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# Effect of different levels of nitrogen and herbicide on wheat (*Triticum aestivum*) competition ability against wild mustard (*Sinapis arvensis*) and wild oat (*Avena fatua*) in Ahwaz, Iran

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## Abstract

In order to evaluate wheat competition ability against wild mustard and wild oat, two experiments were carried out in Ramin Agriculture and Natural Resources University, in 2007-2008. Two split plot designs in basis of Randomized Complete Block Design (RCBD) were used for this study. Four nitrogen levels (0, 60, 120 and 180 Kg/ha) and four herbicide doses (in mustard experiment: 0, 15, 20 and 25 g granstar/ha, in oat experiment: 0, 0.8, 1.0 and 1.2 lit topic/ha) were investigated. The results showed that the interaction effect between nitrogen and herbicide levels on grain yield (GY) and dry matter of wheat, and dry matter (DM) of wild mustard and wild oat was significant. With increase of nitrogen, while herbicide levels were low or no herbicide was be done, the yield of wheat and DM of wild mustard decreased and increased, respectively. It was showed that in high nitrogen levels, more herbicide would be required for weed management. In low levels of nitrogen, differences between herbicide levels were little and DM of wild mustard and wild oat decreased significantly. Generally, increase of nitrogen caused to decrease of wheat competition ability against wild mustard and also caused to requirement to high herbicide doses. Highest DM of wild mustard and wild oat was observed with 180 kg N/ha without weed control. In the other hand, highest GY and DM of wheat was produced by 180 kg N/ha and 20 g granstar/ha in wild mustard experiment, and 180 kg N/ha and 1.2 lit topic/ha in wild oat experiment.

**Key words :** competition, herbicide, nitrogen, wheat, wild mustard, wild oat

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# Effect of compost application on growth and yield of potato in a farm community in the central Andes of Peru

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## Abstract

Potato (*Solanum tuberosum* L.) is the most important crop in the Andean region of Peru. It is cultivated by small farmers with limited access to external resources thus fertilization mostly depends on locally available sources of organic matter. A field experiment was set up to evaluate the effects of application of three organic amendments (wheat straw compost, vicia residue compost and farmyard manure) at rates of 10 and 20 t $ha^{-1}$ on growth, yield, carbon assimilation and nitrogen uptake of potato cv Yungay in the farm community of Aramachay (Junin-Peru, 3750 masl). Inorganic NPK fertilization was uniformly applied at a low dose (87 – 145 – 87) and treatments were distributed in a completely randomized blocks design. All organic amendments increased plant size and the dry weight of shoots compared to the control, although both application rates were similar. The three organic amendments at 20 t $ha^{-1}$ and wheat straw compost at 10 t $ha^{-1}$ increased the leaf area of potato plants. The treatments did not affect the number of tubers but the use of wheat straw compost and farmyard manure at 20 t $ha^{-1}$ significantly increased total tuber yield. Carbon assimilation and nitrogen uptake in shoots were significantly increased by the application of organic amendments but those in potato tubers were not affected. Results indicate that adequate doses of organic matter can provide a complementary source of nutrients for potato production by small farmers in the Andes of Peru.

**Key words:** *Solanum tuberosum* L., fertilization, organic matter, compost, nutrient uptake.

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# The effect of zinc application on wheat yield and zinc content

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## Abstract

The research was implemented in a test station on account of determining the effects of different zinc doses on leaves on the yield of two different types of bread wheat. For this reason, 0, 0.1, 0.2, 0.3 % Zn doses applied on leaves were applied on two different types of bread wheat and the yield, the weight of a thousand grains and zinc content were determined. According to the data, Zinc application has a great effect on the yield, a thousand grains and zinc content. It has been determined that when you increase the zinc application on leaves, the yield, a thousand grains and zinc application increase as well.
**Key words :** wheat, Zn, yield, foliar fertilization

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# Effects of long-term continuous cropping of sunflower on K forms in calcareous soils of Western Azerbaijan Province, Iran

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## Abstract

Potassium forms and clay mineral composition of soils under sunflower cropping were compared to those adjacent virgin soils. For this purpose, twenty paired surface soil samples belonging to 10 soil series in Western Azerbaijan province, Iran were selected to determine the changes in K forms and K adsorption behavior of the cultivated soils after long-term cropping. The samples were analyzed for soil physical and chemical properties, mineralogy of clay fraction, different forms of K, and K adsorption characteristics. The soils studied were alkaline and calcareous. Illite, illite-smectite and chlorite- kaolinite were the dominant clay minerals in Typic Xerocrepts, Typic Xerofluvents and Fluventic Xerocrepts, respectively. No changes in K-bearing minerals (illite) were detected due to cropping and K depletion. Soil solution K (So-K) constituted 1.65 % of exchangeable K (Ex-K) and 4.35 % of non-exchangeable (NEx-K) for the cultivated soils and 2.54 % of Ex-K and 4.35 % of NEx-K for the adjacent virgin land. Significant declines in Ex-K content from 464 to 241 mg $kg^{-1}$ (48 % , on average), from 488 to 264 mg $Kg^{-1}$ (46% ,on average), from 0.75 to 0.28 mmol $L^{-1}$ (62 %, on average), and from 1.28 to 0.28 mmol $L^{-1}$ (79%, on average) were observed for Fluventic Xerocrepts, Typic Xerofluvents ($P \leq 0.01$) Fluventic Xerocrepts and Typic Xerofluvents ($P \leq 0.01$) soil series, respectively. No changes in the NEx-K content were observed after longe-therm cropping of sunflower in all of the soils. A highly significant positive relationship ($r^2 = 0.70$, $P \leq 0.01$) was observed between NEx-K and illite contents, indicating that this form of K is mainly released from the frayed edges of illite. Paired t-test revealed that in Fluventic Xerocrepts and Typic xerofluvents, K adsorption significantly was increased ($P \leq 0.01$) and exchangeable K was decreased as a result of exhausting cropping of sunflower.

**Key words:** sunflower, K forms, K sorption, clay mineralogy, continuous cropping

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# Manganese - iron relationships in grain and straw of wheat

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## Abstract

The availability of manganese (Mn) to crops also could be limited in high pH soils. The negative effect of Mn application was attributed to the interference of Fe with Mn nutrition. This study was conducted to determine under field condition the influence of manganese (Mn) on iron (Fe) accumulation in grain and straw of wheat cultivars. The experiment was carried in Eskisehir in 2007/08 year. The soil of experiment area was alkaline and calcareous with low organic matter contents and Mn concentration was low. Two levels as $MnSO_4.4H_2O$ (0 and 300 g $ha^{-1}$) sprayed on leaves of durum wheat (Kızıltan-91 and Çeşit 1252) and bread wheat cultivars (Gün-91 and İkizce 96) at booting stage. The experiment was designed in a split-plot with four replicates. Main plots consisted of two levels of Mn applications and subplots consisted of wheat cultivars. Results showed that application of 300 g Mn $ha^{-1}$ increased grain and straw Mn concentrations 50 or 100 percentages whereas, Fe concentrations of wheat decreased when Mn was applied. The effect of Mn application was significant and Fe concentration of grain and straw differed significantly. It is concluded that the inhibition of Fe translocation from root to shoot by Mn may be the main reason for application of Mn may cause an antagonistic effect on the content of Fe and there may be a negative effect of Mn on Fe.

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# Humus content and humus fractions after long-term systemic mineral and organic-mineral fertilization on Mollic fluvisols

**N. Simeonova, S. Todorova**

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## Abstract

The present work studies, the effect of long-term systemic mineral and organic-mineral fertilization on the humus amount, humus type and humus fractions on Mollic fluvisols in Plovdiv region. Fertilizer norms are 1. $N_{75}P_{30}K_{20}$; 2. $N_{25}P_{15}K_{0}$ + organic; 3. $N_{50}P_{0}K_{20}$ and 4. Standart. It was found that long-term systemic mineral and organic-mineral fertilization (forty-seven years) has a stabilized effect on humus content in studied soils. The systemic fertilization lead to a slight decrease of soil humus amount, although the fertilization was excluded since three years. The humus type–was not influenced from the long-term fertilization.

**Key words :** humus, humic acids, fulvic acids, humus type, fertilization

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# Root growth, Zn, Fe and Cu uptake by *Trifolium alexandrinum* L. as affected by organic matter and soil compation

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## Abstract

Effects of soil compaction and organic matter on root growth and P, Zn, Fe, Cu uptake by Egyptian clover plant (*Trifolium alexandrinum* L.) were studied in a factorial experiment with a randomized complete block design including three soil compaction levels (bulk densities of 1.40, 1.65 and 1.80 Mg $m^{-3}$) and three rates of organic material manure (0, 4.5, and 9.0 g $kg^{-1}$ soil) with three replications. The results of this study indicated that soil compaction, due to increase in soil mechanical resistance, significantly decreased both root length and root dry weight of clover plant. However, addition of organic matter increased root growth at each corresponding soil compaction levels. Total P uptake (P content) by impeded clover root in compacted soil significantly decreased. A similar trend to that of P observed for total uptake of Zn, Fe and Cu. However, organic matter application due to increase root length and root dry weight improved uptake of less mobile of P, Zn, Fe and Cu. Soil compaction differently affect root concentration of P, Zn, Fe and Cu. Soil compaction decreased root P and Fe concentrations, but had no significant effect on root Zn and Cu concentrations. In conclusion, soil compaction decreased plant root growth and this resulted in a significant decline in P, Zn, Cu and Fe accumulation. However, at each soil compaction levels, organic matter compensated, in part, for the adverse effect of soil compaction and significantly improved root growth and plant nutrition, particularly P and Zn nutrition.

**Key words :** Soil compaction, Zn, P, Fe, Cu, Clover, Organic matter

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# The effects of chemical combination of nutrient solution in foliar application on yield and concentration of nutrient elements in cucumber in greenhouse culture

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## Abstract

The most soils of Iran are calcareous and in which availability of microelements are low and their amounts are not enough for sufficient growth, specially for plants that are quickly grow up same cucumber. Availability of microelements influence under some factors include alkaline reactions of soils, high level of lime, high level of bicarbonate in irrigation water, low level of organic matter and drought stress. Foliar application of microelements same Fe, Zn, Cu and mn can to eliminate deficiency of this elements in plant. Therefore, usage of this elements by foliar application have more efficiency than fertigation method. Important factors in foliar application are determination of sufficient concentration and kind of combination of nutrient elements. Objects of this research were to study on effects of combination and concentration of nutrient solution that are used by spraying on yield of cucumber. This research is done in greenhouse site of Azad university in Esfahan. Pots with 37 cm in height and 30cm in diameter are used. The texture of soil was sandy clay loam. Cucumber seed include *Cucumis sativ.L* with khasib cultivar is used. In every pots set one plant of cucumber. Amount of irrigation water, humidity and temperature was similar for all treatments. Macronutrients include N, P and K are fertigated for every treatments base to FAO recommendation and micronutrients did not any usage in fertigation. The experiment was conducted in completely randomized design with 6 treatments and 12 replications. The treatments were six kind of nutrient solution for spraying that 2 kind of them had only microelements and others had different ratios of micro and macro elements. Twelve pots are used as control. The plants are sprayed with treatments once every week. The sampling of leaf and fruit are done in three stages. LSD method for comparison of means is used. The plants sprayed only with micronutrients had highest amount of fruit and had significant difference at %5 level as compared with control. In treatments with more concentration of micronutrient, the concentration of Mg, Ca, K, P, Fe, Zn, Cu and Mn in leaves were higher as compared with other treatments. Highest amount of N in leaves was in treatments only with micronutrients. Therefore poor quality of water and soils in this area and their effects on micronutrients uptake can eliminate with usage of foliar application.

**Key words :** nutrient solution, foliar application, greenhouse cucumber, fertigation

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# Determination of maximum allowable depletion (MAD) in greenhouse cucumber cultivation

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## Abstract

The measurement and control of soil moisture is an essential factor in irrigation management, facilitating the application of the best management practice for reducing water consumption and improving product quality. Soil moisture is an important factor in greenhouses, where it is directly related to the total amount of water consumed by irrigation. Since cucumbers are considered the main, most widespread summer crop in Iran, and are extremely sensitive to adverse conditions, particularly water stress, the determination of water requirement is vital when growing this fruit. To this end, the Maximum Allowable Depletion (MAD) for cucumbers should be determined. This test was conducted in the research greenhouse of Islamic Azad University in Khorasgan, Isfahan, over a 5-month period. The project was implemented within the framework of three 40, 60 and 80 cm bar water suction treatments, with three replications, using a tensiometer. Prior to the treatment application, the soil moisture was determined by weight. The MAD in the 40, 60 and 80 cm bar treatments was 22%, 32 and 50%, respectively. The statistical results and mean comparison demonstrate that a MAD of 21.5% and 32% has led to a significant yield increase ($p<0.001$), while a MAD of 50% provides the lowest yield. The results reveal that there is a significant difference between a MAD of 22% and one of 32% in increasing the Leaf Area Index (LAI) ($p<0.001$). On the other hand, no significant difference is found between a MAD of 22% and one of 32%.

**Key words :** maximum allowable depletion (MAD), greenhouse cucumber, tensiometer, leaf area index

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# The effect of cocopeat, perlite and peat moss on some greenhouse cucumber's growth indices in soilless culture

**N. Alifar, A.G. Mohammadi, N. Honarjoo, Y. Ghobadi**

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## Abstract

Soilless culture is a technique for crop production using no soil which is one form of hydroponic. Plants' growing in substrates is developing due to the large number of their advantages such as plant's nutrition, maximum yield, healthy and uniform crop production, reducing incidence of disease and pests and increasing production quantity and quality in substrate than soil culture. Properties of different materials used as a substrate effects plants growth and crop yield. So the most important factor in soilless culture is selecting a suitable substrate. The objective of this study was to examine the effect of some growing media on growth indices of greenhouse cucumber. This study was carried out in a research greenhouse of Azad University-Khorasgan branch, using a completely randomized design with 5 treatments, 4 replications and 10 plant in each replication. Irrigation period, environment temperature and saturation humidity were kept the same for all treatment. Five different growing media including pure cocopeat, perlite-cocopeat(50-50 v/v), perlite-cocopeat-peatmoss (50-20-30 v/v and 50-30-20) and perlite-peatmoss were investigated. Growth indices such as yield, fruit's number, stem diameter, leaf area index and biomass as well as physical and chemical properties of growing media were examined. The highest yield, the largest stem diameter and the highest biomass were obtained from cocopeat and perlite-cocopeat. The significant difference (in 5% level) observed in some growing indices such as fruit's number and biomass. However the yield, stem diameter and leaf area index did not indicate any significant difference. Generally, the best growth was found in cocopeat substrate which can be used as an appropriate cucumber's growing media in soilless culture.

**Key words:** hydroponic, soilless culture, cocopeat, perlite, peat moss, growing media, greenhouse cucumber

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# Effect of organic matter, zinc and copper on the concentration of some micronutrients in soil and wheat plant

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## Abstract

Among different factors affecting nutrient availability, influence of and interaction between organic matter and micronutrients are considered important on the bioavailability of micronutrients to plants. A greenhouse experiment was conducted to study the effects of zinc (Zn), copper (Cu), and organic matter (OM) and also their interactions on the concentration of zinc, copper, iron (Fe) and manganese (Mn) in soil and wheat plant. Treatments consisted of three zinc levels (0, 10, and 20 mg $kg^{-1}$ soil) as $ZnSO_4.7H_2O$, three levels of copper (0, 2.5, and 5 mg $kg^{-1}$ soil) as $CuSO_4.5H_2O$, and two levels of organic matter (0 and 2% w/w) in the form of cow manure. The experiment was designed with three replications in the frame of completely randomized factorial design. Plants were cut for analysis 45 days after planting. Results indicated that applied zinc increased soil DTPA-extractable Zn and its concentration in shoots. Zinc also had significant effects on Mn in shoots. Copper application increased soil DTPA-extractable Cu but decreased root dry matter weight. Organic matter significantly increased all the measured parameters in this study except Cu concentration in shoot. Organic matter application caused a decrease in transfer factor of Fe and Mn (except for Zn) from soil to plant. However, transfer factor of Cu did not change significantly. Organic matter application had a synergistic effect on the concentrations of elements in the interactive treatments than their individual applications. Generally, combined application of the elements showed the concentration of one of them decreased in presence of another.

**Key words:** copper, organic matter, soil, wheat, zinc

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# The effect of zinc sulfate fertilizer on some agronomic traits of safflower in semi-arid conditions

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## Abstract

This research was conducted in the Experimental Fields of Eskisehir Osmangazi University in Eskisehir, Turkey during 2003 and 2005 for two growing seasons. The experimental design was a Randomized Complete Block with four replications. Two safflower varieties (Dinçer and Yenice) were sown in April both experimental year without any irrigation treatments. In this sudy the effect of Zinc fertilizer (3 kg/da $ZnSO_4.7H_2O$) and control dose (no zinc application) for plant height, number of branches per plant, head number per plant, 1000 seed weight, seed width and seed yield were investigated. It is concluded that Zinc fertilizer applied to soil and ecological conditions influenced yield and some agronomic traits of safflower.

**Key words :** safflower, zinc, soil application

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# Effect of boron levels on growth and yield of cabbage in calcareous soils

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## Abstract

The experiment was carried out to investigate the effect of B levels on growth and yield components of cabbage during October 2004 to January 2005 in calcareous soils of Bangladesh. The genotype of cabbage was "KS Cross $F_1$ hybrid", which is suitable for pot experiment. The soil was medium fertile with low content of available B, pH was 8.4 and silty clay loam in texture. There were eight levels of B (0, 1, 2, 3, 4, 5, 6, 7 kg B/ha) as boric acid in the treatments. The equal amounts of 50cm×50cm spacing/plant was considered, so the actual treatments i.e. $B_0$ (control), $B_1$ (0.15g), $B_2$ (0.30g), $B_3$ (0.45g), $B_4$ (0.60g), $B_5$ (0.75g), $B_6$ (0.90g) and $B_7$ (1.05g) boric acid per pot. The experiment was laid out in RCBD with 3 replications. The RCBD design was selected because of pot arrangement. The doses of (50cm×50cm equal amount) N:P:K:S:Mg:Zn = 120:50:75:20:10:3 as urea (6.52g), TSP (5.95g), MP (3.75g), gypsum (2.78g), magnesium oxide (0.417g), zinc oxide (0.097g), respectively and vermicompost at 10t/ha equivalent amount (0.25kg/pot) also added in all pots. Urea was used 50% as basal and 50% at 35 days after transplanting (DAT) and also boric acid treatments used at pot soil preparation and at 30 DAT. Irrigation were done very carefully by measuring cylinder and a special protection also taken against rainfall. Data were recorded at 15, 30, 45, 60, 75, 90, 118 DAT (at harvest) i.e. plant spread, number of loose leaves/plant, largest leaf length and breadth but other parameters also recorded after harvest of the crop. Growth, yield and other yield contributing characters of cabbage significantly affected by boron levels. The head weight and other growth and yield contributing parameters of cabbage increased up to 4.0 kg B/ha ($B_4$) and decreased gradually with the increases of B level (>4.0 kg B/ha). The highest head weight (811.33g) was obtained with $B_4$ followed by $B_3$ (748.67g) but both are statistically similar. The lowest head weight (384.33g) was found in $B_0$ but $B_7$ (406.0g) is statistically similar with $B_0$. The head weight of cabbage was strongly correlated with head diameter (r = 0.967**) and leaf breadth (r = 0.965**). The maximum cabbage head yield increase of 116.82% by $B_4$ and 94.97% by $B_3$ treatment. The results suggested that 3-4 kg B/ha (0.45-0.60g boric acid/pot) is suitable in cabbage or any upland vegetable crop production for better growth and yield in calcareous soils, but above 4.0kg B/ha it may be harmful for crop growth and yield. The results also indicated that cabbage can be grown successfully in pot-soil for commercial production in green house with proper fertilization specially boron.

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# Response of vermicompost, macro and micro-nutrients on growth and yield of broccoli under calcareous soil environment

**M. N. Alam**

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## Abstract

The experiment was conducted to evaluate the response of vermicompost and N, P, K, S, Mg, Zn & B on growth and yield of broccoli in calcareous soils of Bangladesh. There were 15 treatments *viz*. $T_1$ = Control, $T_2$ = Vermicompost (VC) (5 t/ha), $T_3$ = VC (10 t/ha), $T_4$ = N, $T_5$ =NP, $T_6$ = NPK, $T_7$ = NPKS, $T_8$=NPKS+Mg, $T_9$= NPKS+Zn, $T_{10}$ = NPKS+B, $T_{11}$ = NPKSMgZnB (= F), $T_{12}$ = F + VC (5 t/ha), $T_{13}$ = F + VC (10 t/ha), $T_{14}$ = 1/2 F + VC (5 t/ha) and $T_{15}$ = 1/2 F + VC (10 t/ha). The experimental soil was low in fertile having pH 8.5. The experiment was laid out in RCBD with 3 replications. The doses of N, P, K, S, Mg, Zn and B were 120, 50, 75, 20, 10, 3 and 2 kg/ha respectively. The N, P, K, S, Mg, Zn and B were applied through urea, TSP, MP, gypsum, magnesium oxide, zinc oxide and boric acid, respectively. Application of vermicompost and N, P, K, S, Mg, Zn and B significantly influenced the vegetative growth and yield of broccoli. The gross and curd yield was highly increased when B was added to the treatments. The highest curd yield was found in treatment $T_{13}$ (17.66 t/ha) followed by $T_{12}$ (17.23 t/ha), $T_{11}$ (16.46 t/ha) and $T_{10}$ (15.80 t/ha) but $T_{13}$, $T_{12}$ and $T_{11}$ are statistically similar. The lowest yield and yield contributing parameters were found in control ($T_1$). The response of chemical fertilizers (specially B) were more dominant than vermicompost and combined effect was also more favourable. Application of N, P and K more or less increased in all characters of broccoli and S had no or negative effects, but Mg and Zn had little or no effects in respect of all parameters. It appears stated that the response of B in calcareous soils is more efficient to increase the vegetative growth and curd yield of broccoli. The results also suggested that 5 t/ha of vermicompost with optimum doses of NPK+ZnB is required for maximum production of broccoli and B fertilization is more important for any upland vegetables in calcareous soils. The efficiency of different elements on curd yield of broccoli in calcareous soils can be expressed the following orders: N>P>K>B>Mg>Zn>S.

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# Comparison Fuzzy logic and Boolean methods in mapping on nitrogen and phosphorus nutritional status of paddy soils of Rasht Rice Research Institute

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## Abstract

One of the approaches for increase of yield and reduction of rice production costs is precision agriculture. Complete and correct determination of nutrition status of paddy soils is necessary for using of this new technology. To comparison of fuzzy and Boolean methods, mapping of nutrition status of nitrogen and phosphorus, 370 compound samples were collected from 306 hectare of paddy soils of Rice Research Institute in Rasht County from plots with the dimension of 50 × 100 meter. Total nitrogen and available phosphorus contents were measured. Results showed that interpolation and mapping by fuzzy logic was more accurate and correct in comparison with Boolean method and had greater distinguished power to indicate deficiency of nutrients. Evaluation of dependency of paddy soils using of fuzzy function and Boolean method, showed that the southwest of study area have nitrogen and phosphorus deficiency and the other parts have minor limitation for these elements.

**Key words:** precision agriculture, mapping, fuzzy logic, nutrients

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# Effects of organic waste application on nitrogen and phosphorus contents of tomato plant grown in eroded soils

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## Abstract

This study was carried out to determine effects of bio-solid (BS), tea waste (TW) and tobacco production waste (TBW) applied to eroded soils in different levels (slight, moderate and severe) on nitrogen (N) and phosphorus (P) contents of tomato plant. Soil samples used in this study were taken from arable soil (0-20 cm depth) in Samsun. The soils have fine texture, low organic matter content and slight alkaline reaction. The experiment was arranged in a split block design with four different levels of BS, TW and TBW (0, 2, 4 and 6 %) and three replications under greenhouse condition. After four weeks incubation period, tomato plant was grown in all pots. As a result, BS and TBW treatment increased N and P contents of tomato plants and TW treatment increased just P contents of plants in comparison to control treatment. Effectiveness of the treatments varied depending on kind of waste ($P$<0.001), treatment dose ($P$<0.001) and soil erodibility level ($P$<0.001) for each element. Influence of applied organic wastes on total N contents and available P contents for tomato plants grown eroded area were found in order of BS > TBW >TW and TBW > BS > TW, respectively.

**Key words:** organic wastes, soil erodibility, nitrogen, phosphorus, tomato

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# Potassium effect on the efficiency of Zinc utilization by barley varieties

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## Abstract

Glasshouse experiment was carred out to screen four barley varieties for Zinc utilization efficiency under the effect of potassium. Plants were grown in Zinc deficient silty clay soil which characterized by high PH, high level of bicarbonate and low organic matter. Zn deficiency and zero K application produced low grain yield as compared with the yield produced under the application of both Zn and K. Addition of K to the Zn deficient soil does compensate for the amount of Zinc applied and generally increased both the Zn utilization efficiency and Zinc utilization index of barley varieties. The highest plasticity in adapting to Zn deficiency was found with El-Khair barley variety.

**Key words :** efficiency, Zinc utilization, grain yield, deficiency, summery

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# The effects of copper and zinc on growth of beta vulgaris and vicia faba and its content of some heavy metals

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## Abstract

The growth of vicia faba and Beta vulgaris plants and the concentration of Cu and Zn in the different plant part before and after flowering stage increased with increasing the amount of Cu and Zn applied to soil, while the concentrations of Cd, Ni and Pb in all parts of both plant reduced except while the concentrations of Cd in the root increased with increasing Zn application. The concentrations of Cu in the edible parts of both plant were lower than that in the root.

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# Investigations on the possibilities of ecological kiwifruit production in the Marmara region

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## Abstract

This study was conducted by the Ataturk Central Horticultural Research Institute between 2002-2006 years. In the experiment, different organic fertilizers and some soil amendments on the yield and quality characteristics of kiwi and cultivated in organic farming conditions was investigated.

Applications materials used in fertigation program has been given to the plant. Split plot experiment in randomized complete block design according to the study conducted in 4 replications in each plot was located 10 kiwifruit. Trial process control and certification of the parcel which was made at the Institute's work was conducted within the organic plots.

Different applications were searched on yield and quality properties of organic kiwifruit as a result of this study was;

-Yield increase on-composted farmyard manure + $K_2O$ (potassium-weighted fertilizer allowed in organic agriculture) application gave the best results.

-Fruit weight gave best results in the same practice.

-Fruit width and height on the differences between applications were not close to the value of organic practices had given control.

-Fruit quality between 1 and 2 standardization categories increased rates were observed in 2006.

-Applications were significantly increased soil-water holding capacity and organic matter content compared with baseline.

**Key words:** organic kiwifuit, organic plant nutrition, soil amendments

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# Impact of continuous cropping on K quantity-intensity parameters in relation to clay mineralogy compositions in calcareous soils of North-west of Iran

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## Abstract

The potassium (K) supplying power of cultivated and adjacent virgin soils was compared. One hundred eighteen surface soil samples (59 samples from cultivated areas and 59 samples from virgin soils) belonging to 24 soil series from the major sugar beet growing areas in Western Azarbaijan province, north-west of Iran were studied to ascertain if K quantity-intensity (Q/I) parameters of the soils are being changed by long-term cropping. The Q/I plots were developed and used to derive the typical Q/I parameters including equilibrium activity ratio for K ($AR_e^K$), easily exchangeable K ($\Delta K_0$), potential buffering capacity ($PBC^K$), free energy of exchange ($-\Delta G$), and Gapon selectivity coefficient ($K_G$). Long-term cultivation resulted in a significant decline in the $AR_e^K$ values from 0.012 to 0.0047 $(moles/L)^{1/2}$ (a drop of 61%) and from 0.013 to 0.008 (a drop of 38%) in Typic calcixerpts and Typic endoaquepts, respectively. Significant changes in the $\Delta K_0$ values from -0.69 to -0.28 $cmol_c/kg$ (a rise of 59 %) were detected in the Typic calcixerepts. A significant increase ($P \leq 0.01$) in the $K_G$ values from 3.3 to 3.8 (an increase of 15%) was detected in Typic haploxeropts. The highest values for $PBC^K$ were associated with the soil types which had the greatest clay contents and smectite clay minerals. A highly significant positive relationship was observed between the values of $PBC^K$ and the percentage of smectite clay minerals ($R^2$ = 0.69, $P \leq 0.001$). Paired t-test revealed that continuous sugar beet cultivation led to changes in the free energy of exchange. A significant decline in the $\Delta G$ values from -14 to -18 kJ/mol (a drop of 29%) was detected in Typic calcixerepts. Results suggest that continuous sugar beet cropping caused a great decline in K supplying power of the soils and emphasize the need for balanced use of K to build up soil levels into the optimum range and to sustain a steady supply of K to successive crops.

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# Phosphorus efficiency of two wheat cultivars (*Triticum aestivum*) and white lupin (*Lupinus albus*) in different sources of P

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## Abstract

Phosphorus (P) is a critical component of soil fertility for sustainable crop production. Dwindling of high-grade P ore and rising fuel and therefore fertilizers costs necessitate finding an alternative to P fertilizers and/or developing crop genotypes that acquire and utilize P efficiently. A factorial experiment was carried out to characterize varying capacity of two wheat (*Triticum aestivum* L.) cultivars (Brookton and Krichauff) and white lupin (*Lupinus albus* L.) to acquire and utilize P from different P resources. We compared control ($P_0$) with rock phosphate, composted rock phosphate, phytate (organic P) and soluble P fertilizer (mono-calcium phosphate) at 200 mg P $kg^{-1}$ soil. In all three species shoot P concentration and content were highest in the phytate treatment and lowest in $P_0$. The root-to-shoot ratio of wheat cultivars ranged from 0.15 (Krichauff in the phytate treatment) to 0.49 (Brookton in $P_0$). This ratio was around 0.2 for lupin in all treatments, except phytate (0.09). Phosphorus utilization efficiency (PUTE) (the amount of shoot dry weight produced per unit of P accumulated in shoots) was highest in $P_0$ and lowest in the phytate treatment for all three plant species. Phosphorus acquisition efficiency (PACE) (shoot P content in a P treatment as a proportion of that in the soluble P fertilizer treatment) ranged from 1 (Brookton in $P_0$) to 355% (Brookton supplied with phytate). Phosphorus efficiency (relative shoot yield in a P treatment compared with the soluble P fertilizer treatment) of white lupin was greater than for both wheat cultivars in all P treatments, except phytate. Irrespective of plant species, shoot dry weight and P content were not significantly different between rock phosphate with and without microbe and organic compound supplementation. In conclusion, the availability of P in rock phosphate was not influenced by microbe and organic compound supplementation and wheat cultivars were not as efficient as lupin in using P from sparingly soluble P sources due to lower organic acids exudation from roots in comparison with white lup.

**Key words:** phosphorus efficiency, root exudation, rock phosphate, phytate, eraphos

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# Mineral fertilizers influence on the dynamics of the nutrious matters subject to the methods of their application in Azerbaijan condition

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## Abstract

One of the main reception of harvest increasing of the soil is the rational application macro- and micro-fertilizer, affectivity which directly relates with their ecological safety. Maintenance of the optimal parameters of the effective harvest decreases expenditure related with fertilizer application and creates then gives advantageous condition for their payback of the agricultural plants harvest. In the grey - brown and meadow - forest soils of Azerbaijan in the field condition during 3 years, studying carried out on the investigation of effectiveness of the mineral application and also P fertilizer under vegetable cultures. Grey - brown sprinkled soil of Absheron has the following agrochemical indexes in the в ploughing layer: pH-8,0; general humus-1,1-1,4%; $N/NH_4$ exchanging - 10,8-16,2; $N/NO_3$-2,4-5,1 mg/kg soil. Amount of mobile $P_2O_5$ (on Machigin) 8,2-15,2; exchanging $K_2O$ (on Protasov) 201,2-250,2 mg/kg soil. In the irrigated grey-brown soils of Kuba-Khachmaz zone in Azerbaijan ploughing layer of the soil before filling the experience was alkalescent ($pHH_2O$=7,8), with the low content (in infusion on Machigin) mobile form of P ($P_2O_5$ - 15,7 mg/kg) and medium content of K ($K_2O$-230 mg/kg). content of humus in the topsoil consisted of 3,28%, $N/NH_4$-16,6 mg/kg, $N/NO_3$-6,22 mg/kg soil. Experiments were located in four в fourfold replication, carried out studying in the grey – brown soil was realized in 9 variants, tomato sort «Volgogradskiy-5/95» was used, and in the grey-brown soils tomato sort «Sevimli» in 10 variants. The field of the allotment is $30m^2$, field of one plant nourishment is 70x30 cm. All agrotechnical measurements, beside application of fertilizer was carried out on widely-used agro rules for the region: Naa,Pcr,Kkc were applied. In addition in the experiments carried out в meadow–forest soils microfertilizer were used by leaf-feeding spraying of manganese sulphate. In Absheron zone in grey-brown soil fertilizer is given separately and local. During local fertilizer dose application decreased to 24- and 50%. For observing the dynamics of the nutritive matters of soil samples were taken from two depths (0-20, 20-40 cm) at phase of the development of the plant in three terms: before seed plantation, at the phase of mass blossoming and at the end harvest collection. Results of the analysis of soil samples in Kuba-Khachmaz zone showed that during two years absorbed ammonia in the horizon 0-20 sm at all term significantly quantitatively changes. If in the mass blossoming in the variant $N_{120}P_{120}K_{100}$+$MnSO_4$ 0,05% it consisted of 28,27 mgr/kg soil, at the end of harvest collection it decreased to 15,12 mgr/kg soil. In comparison with control variants of these indexes were in 12,64 mg/kg and 6,33 mgr/kg soil higher. Analysis of the soil samples show that mobile P contains more in the period of mass blossoming, at this phase their amount varies on the upper layer soil from 14,70 to 39,85 mg/kg soil. In-phase of mass blossoming at combined application of macro–and microfertilizer of the contain of exchanging K in ploughing layer nutates from 234,7-282,45 mg/kg soil. Thus, NPK application together with $MnSO_4$ usage at different doses by the way leaf-feeding spraying forwarded growth of the main nutritive elements in the ploughing layer of the soil.

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# Soil productivity of tea production areas in Rize and Artvin provinces

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## Abstract

In this study, it was aimed to show the soil of tea production areas which have some distinctions compared to the other areas. In relation tothe aim, 220 soil samples were taken and analyzed. Soils in the tea production areas of Rize and Artvin were clay-loamy and clay. Some 90 percent of the soil have pH values which are below the recommended values for tea production. These soils were found to be nonlime and contained high amounts of organic material and available P and K. The results of this study indicated that the producers should take some precautions in order to maintain and enhance the productivities of the tea soils.

**Key words:** Rize, Artvin, soil productivity, tea

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# Significance of phosphorus, zinc supply and zinc-enriched seeds for protein percent of wheat

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## Abstract

Wheat is one of the strategic crops for Iran and bread is the staple food of the peoples of Middle East countries including Iran ,where 70% protein and 40% calories are supplied by bread alone and it should be considered as the main target for enrichment with micronutrient specially zinc. Zinc deficiency is the most widespread micronutrient deficiency in the calcareous soil and plant.Various factors result in low rates of Zinc absorption specially due to antagonistic effects that Zinc-Phosphorus antagonism is the most important in plant nutrition. The present researched was carried out on Karaj Area Soil in green-house in 2007-08 to investigate the main and interactive effect of phosphorus, Zinc and Zn-enriched seeds on protein percent of wheat. In this research, study was made on: Three phosphorus levels(Zero, 75, 100 mg per Kg) from Dehydrogenate ammonium Phosphate source; Two zinc levels (Zero and 7.5 mg per Kg.) from Zinc Sulfate and two types of seeds(normal and enriched) in three replication, in the form of factorial with randomized complete block design (RCBD) on autumnal wheat-shiraz cultivar.Result revealed that zinc application brought about an increase of 7.3 % in protein percent of seed but different level of phosphorus had no effect on it .There was significant positive correlation at 5% level between enriched seeds and normal seed, Protein percent in zinc-enriched seeds was raised in proportion to normal seeds. interactive effect between zinc and phosphorus decreased protein percent that because of zinc-phosphorus antagonism. interactive effects between zinc, phosphorus and enriched seeds couldn't decrease protein level in seeds that indicate the positive effect of Zn-enriched seeds and the combined effect of enriched seed and Zn1(7.5 mg/kg)2 resulted in an increase of 8% in protein content of seed, meaning positive interaction between Zn-enriched seed and Zn application, in other word, enrichment of seeds caused an improved reaction of the plants to the applied Zn.

**Key words:** phosphorus, protein, wheat, zinc, zn-enriched seed

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# Significance of phosphorus, zinc supply and Zn-enriched seeds for Zn concentration of wheat grain

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## Abstract

Zinc is an essential micronutrient for human, animal and plant. Zinc deficiency is the main problem in most of the farms in the world, including Iran and Turkey, where bread is the main staple food of the people. Various factors result in low rates of zinc absorption especially due to antagonistic effects. The interaction of phosphorus and zinc is the most important antagonisms in plant nutrition so for achieving the best yield with proper quality we should consider this matter. The present researched was carried out on Karaj Area Soil in green-house in 2007-08. In this research, study was made on: Three phosphorus levels (Zero, 75, 100 mg per Kg) from Dehydrogenate ammonium Phosphate source; Two zinc levels (Zero and 7.5 mg per Kg.) from Zinc Sulfate and two types of seeds (normal and enriched) in three replication, in the form of factorial with randomized complete block design (RCBD) on autumnal wheat-shiraz cultivar. Result showed that zinc application on concentration of Zn in grain became significant at 1% level and zinc brought about an increase of 7.3% in the zinc concentration. interactive effects between phosphorus and Zinc-enriched seeds had no effect on zinc concentration of grain that indicate positive effect of zn-enriched seed that in high levels of phosphorus (100mg/kg) the rate of zinc concentration didn't decrease. There was significant correlation at 1% level between different levels of phosphorus showing that raising the level of phosphorus fertilizer decreased zn concentration in grain. interactive effects of zinc and phosphorus on zinc concentration of grain became significant at 5% level , zinc concentration of P0Zn1 treatment was 33.89 mg/kg, for P1Zn1 treatment was 31.05 mg/kg(8.4% decrease) and for P2Zn1 treatment was 30.24. The interactive effects between Zn-enriched seeds and Zinc (7.5 mg per kg) on concentration of Zn in the grain became significant at 1% level and increased Zn concentration in grain.

**Key words:** micronutrient, phosphorus ,wheat, zinc, zinc-enriched seeds

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# Effects of potassium, salicylic acid and humic acid applications on Fusarium wilt (*Fusarium oxysporum* f.sp.lycopersici) and nutrition of tomato seedlings (*Lycorpersicum esculentum*)

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## Abstract

In this study, effects of potassium, salicylic and humic acid applications on macro and micro nutrient contents of seedling and fusarium wilt (*Fusarium oxysporum* f.sp.lycopersici) in tomato seedlings (Lycorpersicum esculentum) were investigated under a controlled growth room. After 10 % *Fusarium oxysporum* f.sp.lycopersici isolate reproduced in sand media was inoculated in each pot having 500 g growing media. To compare fusarium inoculated control treatment, sterile control (C) was also conducted with three replications. Interactions of potassium (200 ppm K), salicylic acid (0.1 mmol SA) and humic acid (2000 ppm HA) were applied into fusarium inoculated pots in a randomized plots design with three replications. Disease severity in tomato seedlings grown in SA and HA treatments decreased as 39% and 30% compared with fusarium inoculated control (CF), respectively. The highest Ca, Mg and Fe contents of the tomato seedlings obtained in the sterile control showed that fusarium wilt in the seedlings decreased these nutrient uptakes by the plants. Nutrient contents in the seedlings generally increased with the applications of K, SA, HA and combination of them compared with the fusarium inoculated control. The highest increases in some nutrient uptakes by the seedlings in fusarium inoculated treatments were determined as Ca in SA, Mg in KHA, K in K, Fe and Cu in HASA, Zn in KSA and Mn in KHASA treatment. Generally, HA and SA treatments decreased the disease severity and increased the nutrient uptake by the seedlings..

**Key words :** Fusarium, tomato seedling, potassium, salicylic acid, humic acid, macro-micro nutrients

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# Effect of biofertilizer and rock phosphate on iron availability in soil and the iron content of lentil

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## Abstract

Field experiment was conducted in (Calciorthid) to study the effect of biofertilizer (*R. leguminosarum* mixture of the three rhizobial strains Le719, Le726 and Le735) and phosphate fertilizers as rock phosphate to determine the content of Iron in the Lentil (Lens culinaris) and its availability in the soil. Which is the first study in these region.

The experiment was conducted using (RCBD) that involved three levels of phosphorus (0, 40, and 80 kg P/H) as rock phosphate besides two levels of inoculation (inoculated with rhizobial bacteria and not inoculated). K was added to all treatments at a rate of 10 kg K/H with three replicates. Samples of soil and plant were taken at three interval times 75, 105, and 137days after seeding for determining iron.

Results showed an ability of strains under-study to increase the availability of Iron in the soil and the Lentil content of iron al so application of rock phosphate increase iron in the soil and plant. This study indicated that ability of using the rock phosphate instead of P fertilizer.

**Key words :** Rhizobia, Lentil , rock phosphate, N, and P fertilizers

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# Nutrient accumulation in street greenery of Riga (Latvia) in increased salinity conditions, 2005 and 2007

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## Abstract

One of the most widespread tree species of street greenery in Central, Northern and Eastern Europe, int. al. in Riga (Latvia) located in the boreo-nem oral zone, is lime tree *Tilia x vulgaris* H. A topical problem in the boreo-nemoral zone is using of de-icing material in winter to prevent ice formation on roads and salt accumulation in greenery. The aim of the research was to find out the macronutrient status in the street greenery of Riga to reveal the effect of de-icing salt accumulation on the element supply and the vitality of *T. x vulgaris*. The concentrations of K, Ca, Mg and Na, $Cl^-$ were estimated in lime leaf and soil samples collected from 27 study sites (5 streets or 8 objects) in Riga from March 2005 to August 2007, but the concentrations of N, P and S in samples from June and August 2007. Additional three sites in a park area were chosen for the background level. A bioindication research on the vitality of the street greenery carried out in August of 2005 and 2007 revealed mainly damaged status of lime trees. The damages to the deciduous trees typically appeared as leaf necrosis and dead branches. Ordination with principal component analysis (PCA) of results showed a high heterogeneity of the soil and lime leaf chemical composition. A negative medium close correlation was found between the concentration of Na and K in the leaf samples in July and August 2005 and August 2007, as well as between Na and Mg in June 2005. Our research did not reveal a statistically significant correlation between the content of $Cl^-$ and its antagonists (N, S, P) concentrations in lime leaf and soil samples, as exception – there was a negative medium close correlation between the $Cl^-$ and Ca in lime leaves of August 2007. The main problems of the mineral nutrition of the street greenery in Riga during 2005 and 2007 were elevated concentration of Ca, Mg and P, decreased concentration of N, S and, especially, K in soil, which could be promoted by Na and $Cl^-$ regular accumulation in soil, as well as other factors. Whereas insufficient amount of K and S, in several sites Mg and P, was stated in lime leaves in 2005 and 2007. Probably, it could be facilitated by $Na^+$ and $Cl^-$ antagonism in the street greenery of Riga.

**Key words :** elements, de-icing salt; street trees, soil, lime leaves

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# Renovation of extracted high bogs in Latvia: mineral nutrition and ecological aspects of American cranberry cultivation

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## Abstract

Latvia is a country with abundant peat resources and intensive peat production. Therefore restoration of more than 17,000 ha abandoned and excavated high bogs are an important issue. Scientific researches are necessary to choose the best way for renovation of peatlands after peat cutting. Along with sufficient freshwater supply this specific nutrient-poor and acid growing environment provides the possibilities for commercial cultivation of American cranberry (*Vaccinium macrocarpon*) which was successfully started during last 15 years. Today with more than 100 ha of plantings Latvia is fourth major cranberries producing country. In contrast with North America little is known regarding the fertilizing systems of cranberries planted on bare sphagnum peat. Being a native wetland plant, cranberries are nutrients low requiring culture; however, balanced mineral nutrition is vitally essential in producing high and qualitative yield. On the other hand, excessive or inadequate fertilization is potentially detrimental to the environmentally sensitive cranberry growing medium. Investigations were done to find out the actual status and main tendencies in mineral nutrition of American cranberries in Latvia during 2001–2009. Peat samples from 60 different cranberry producing sites established on extracted high bogs were collected over two periods: 2001–2004 and 2005–2009. Additional 20 samples from cutover and natural bogs were analyzed for background level to assess the changes in peat nutrient content during cranberry cultivation. Soil (peat) testing was used to evaluate the cranberry supply with nutrients (N, P, K, Ca, Mg, S, Fe, Mn, Zn, Cu, Mo, B). Peat analysis revealed serious disbalance in cranberry providing with essential mineral elements. Deficiency of N,P,S,Zn, Cu,Mo,and B were stated in the majority of samples. Corresponding to low level of nutrients, peat samples pointed out insufficient electrical conductivity. Positive tendencies in nutrient status of cranberry peat were found from 2001-2004 to 2005-2007. Mean concentrations increased for P, K, Ca, Fe, Cu, B, and become more corresponding to soil standards. Our results revealed significantly higher mean concentrations of P, K, Ca, Fe, and Mn in cultivated cranberry peat to compare with background level, although only P and Ca contents exceeded maximal levels of these nutrients stated in cutover peatlands. Lack of seriously increased nutrient concentrations in peat samples (only 3% of indices in high levels) approves cranberry fertilization practices in Latvia as environmentally friendly. The present investigation forms the basis for development of on scientific knowledge based cranberry fertilization guidelines in Latvia.

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# The effect of poldasht flood spreading scheme on the soil fertility

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## Abstract

In arid and semi arid regions, the control of floods is recognized as a way to degraded rangelands. But by spreading a large volume of floods containing salts and suspension load on the spreading network may lead to some differences in soil fertility, so it is necessary to study the amount and the trend of these differences in time to produce the suitable method in order to increase of such designs. This research has been done with the aim of study and determining the effect of flood spreading on the trend of soil fertility differences on the Poldasht flood and spreading station located in West Azerbaijan evaluated by comparison with control during 5 years. This was done by measuring soil fertility factors of Organic Carbon, Nitrogen, Phosphors and Potassium among spreading channels of three lines of flooded, 6 sample from each line and 3 depth of soil 0-20, 20-40 and 40-60 cm gathered with sediment soil and control points. The data obtained were analyzed by T-student method if their statistical distributions are normal otherwise non- parametric methods were used. Results showed the fertility factors have decreased significantly during 5 years. Among the lines, these factors also were decreased along up to low lines. But the amount of potassium were not differs significantly. The amount of the fertility factors by soil depth was decreased. The fertility factors of sediments like Organic Carbon and Nitrogen were not differed significantly.

**Key words:** flood spreading, soil fertility, sediment, W. Azerbaijan

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# Distribution inorganic phosphorous forms in sugar beet growing calcareous soils and adjacent virgin lands in north-west of Iran

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## Abstract

Studying soil phosphorus fractions is useful in understanding soil pedogenesis as well as soil fertility. To obtain such information, forms, amount and distribution of phosphorus (P) in different fractions of 15 paired soil samples (15 cultivated and 15 virgin soils) from the major sugarbeet-growing soils and adjacent virgin soils in western Azarbaijan province, Iran were determined by sequential extraction methods. The values of TP (total P) ranged from 1000 to 1630 mg/kg with a mean of 1309 mg/kg for cultivated soil and from 1011 to 1674 mg/kg with a mean of 1266 mg/kg adjacent for adjacent virgin soils. In general, the distribution of $P_i$ fraction for cultivated soils was $Ca_2$-P=12, $Ca_8$-P=109, Al-P= 90, Fe-P=47, $Ca_{10}$-P=512.4 mg P/kg accounting for 1.6%, 14%, 12%, 6.1%, and 66% of total $P_i$, respectively. The distribution of $P_i$ fraction for adjacent virgin soils was $Ca_2$-P=7.9, $Ca_8$-P=95.6, Al-P=73.7, Fe-P=46.5, $Ca_{10}$-P=533 mg P/kg accounting for 1%, 13%, 10%, 6.1% and 71 % of total $P_i$, respectively. The pattern of distribution of the $P_i$ fractions , however, differed between virgin and cultivated soils. For virgin soils, the average relative abundance of $P_i$ in the secondary Ca-P [($Ca_2$-P) + ($Ca_8$-P)], nonoccluded Fe- and Al-P [(Al-P) + (Fe-P)] and acid extractable P (primary Ca phosphate ($Ca_{10}$-P) was 1.0:1.1:5.1 and in cultivated soils was 1.0:1.1:4.2 respectively. Simple correlation coefficients showed that olsen-P had a significant correlation with $Ca_2$-P, $Ca_8$-P, Al-P, and Ca10-P in caltivated soils and with $Ca_2$-P, $Ca_8$-P, Al-P, $Ca_{10}$-P, and Fe-P in virgin soils. Significant correlations were also observed between P forms themselves, which is presumably a reflection of the existence of a dynamic relation between the chemical forms of an element in soil.

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# Assessing foliar application of micronutrients in rice production in the North of Iran

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## Abstract

Rice is the staple in the diet for much of the world. It runs a close second to wheat in its importance as a food cereal in the human diet. In Iran, the total area under rice is more than 600000 ha and rice is grown in 15 provinces. However, more than 80 percent of rice area is distributed in the two northern provinces of Mazandaran and Guilan. It is estimated that 230000 ha in Guilan are under rice cultivation. Rapid population growth along with higher crop production per unit area has resulted in greater depletion of soil phytoavailable micronutrients. Most farmers follow the recommended rates and methods of application of macronutrient to achieve top yields, but they may not consider that one or more micronutrients also may be limiting their yields. The objective of this study was to investigate the influence foliar application of micronutrient (liquid fertilizer containing elements zinc 1.5%, boron 0.1%, copper 0.3% and silicon 0.1%) in increasing rice production. This research was performed in agricultural lands of Guilan province, in the north of Iran. The results showed that foliar application of liquid fertilizers increased rice grain yield and quality, specially when applied in combination with the soil application of complete fertilizer. Foliar application of micronutrient fertilizer at 3-4 L/400 liter of water per hectar 25-30 days after cultivation in main field and once at flower initiation stage have the more effect on grain weight and reduced the number of unfilled grains. The index of the weight of a thousand seeds and succulence of leaves increased, too. Positive effect on stem resistance to pests and disease was observed and the use of chemical pesticides was decreased. In regard to the positive effects of micronutrients in crop production, it's necessary more attention to fundamental role of micronutrients in increasing and sustaining future agricultural production. Balance consumption of traditional NPK fertilizer and more regard to micronutrients application in crop production lead to "Macro-benefits from Micronutrients". Effectiveness of various agricultural measures in increasing micronutrient density depends on soil type, crop, cultivar, rotation, and environmental and other factors. Appropriate recommendations for the use of micronutrient fertilizer should be based on local conditions and additional interaction is needed to bridge the gap between crop production and nutrition security.

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# The response of registered some different chickpea varieties to zinc and iron applications

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## Abstract

Chickpea (Cicer arietinum L.) is an important pulse crop due to its protein content and wide adaptability as a food grain. Besides being an important source of human and animal food, chickpea also plays an important role in the maintenance of soil fertility, particularly in the dry areas. In Turkey, chickpea rotates with cereals. Chickpea varieties differ in their response to nutrient element uptake under water stress.

The aim of this study was to determine the effect of increasing levels of iron (0-10-50 mg Fe /kg) and zinc (0-5 mg Zn /kg) applications on plant physical characteristics and iron, zinc, active $Fe^{+2}$, phosphorus, boron content and chlorophyll contents of different chickpea varieties ( Gokce, Uzunlu, Sarı-98, Kusmen, ILC-195, Eser-87, Damla, Akcin-91, Canıtez-87 and Er-99 ) under greenhouse conditions.

According to variance analysis, there was a statistically significant differences between zinc and iron application on chlorophyll a, chlorophyll b, total chlorophyll, iron, active iron, zinc, phosphorus and boron content; and leaf length, plant petiole density, plant height, plant fresh and dry weight, root dry weight. Plant iron content was 507,62 mg/kg; plant active iron content was 42,64 mg/kg and plant phosphorus content was 2634 mg/kg . The best response to iron and zinc application were obtained on Sarı-98, Damla and Uzunlu varieties. We recommended that for all of the chickpea varieties can be fertilized with 5 mg Zn /kg.

**Key words:** chickpea (*Cicer arietinum L.* ), chlorophyll contents, active iron, iron, zinc.

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# Effects of cadmium in different peat ratios on plant growth and nutrient contents in pepper seedlings

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## Abstract

This study was carried out in order to determine effects of cadmium applications in different peat ratios on plant growth and nutrient contents of pepper seedlings in a controlled plant growth room of Soil Science Department in Yüzüncü Yıl University, Van-Türkiye. Three mixtures of garden soil:peat (soil:no peat, soil:%10 peat and soil:%20 peat) were used as plant growing media including 90 mg/kg $P_2O_5$, 180 mg/kg $K_2O$ and 250 mg/kg N. This study was conducted with three different levels of Cd (0, 2.5, 5.0 mg/kg) and three different ratios of peat in the growing media in a factorial design with three replications. Including peat into growing media significantly affected Ca, Mg, K, Zn, Mn, Cu, P, ($P<0.01$) and Cd ($P<0.05$) contents, and some criteria of pepper seedlings such as; plant fresh weight, plant dry weight, root fresh weight, root dry weight, leaf number, shoot length, root length ($P< 0.01$). Levels of Cd significantly affected Ca, K, Zn, Mn, Cu, Cd ($P<0.01$) and Fe, P ($P< 0.05$) contents. Interactions of peat and cadmium significantly affected plant dry weight, root fresh weight, root dry weight, root length ($P<0.05$). Cd contents in the pepper seedlings usually decreased in the plant growing media including % 20 of peat.

**Key words :** pepper seedling, peat, cadmium, plant growth, nutrients

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# Nutrient retranslocation of eight tree plantations in Southwestern of Iran

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## Abstract

*Populus euphratica* forests in Dez river floodplains in southwestern Iran are degraded heavily. Tree plantation is one method by which the restoration of these degraded sites would be possible. The capability of each plant to utilize available resources is species specific therefor this factor should be considered. This study was conducted in a randomized block design with three blocks constitute of *Populus euphratica*, *Eucalptus camaldulensis*, *E. microthca*, *Acacia farnesiana*, *A. salicina*, *A. saligna*, *A. stenophlla* and *Dalbergia sissoo* monoculture plantations that were established in 1992. The aim of this study is to distinguish the differences in the degree of internal cycling of nutrient (retranclocation) among these species. Leaf samples were collected from the stands in September 2006. Leaf litter fall was collected from the beginning of November 2006 and extended to November 2007 at bi-weekly intervals. The retranslocation efficiency of Nitrogen, Phosphorus and Potassium were significantly differed between the tree plantations. The Nitrogen retranslocation efficiency of *P.euphratica* and *A. saligna* were significantly higher than the other species. This index in the case of Phosphorus was highest in *A. saligna*, *P.euphratica* and *D.sissoo* and lowest in *A.salicina*, *E.camaldulensis* and *E.microtheca*. The Potassium retranslocation efficiency of *P.euphratica*, *D.sissoo*, *A.farnesiana* and *A. saligna* were the highest. Therefore *A. saligna* and *P.euphratica* have more internal nutrient recycle and in contrast *A.salicina* has less. Consequently we might see that the two first species influence soil negatively and the latest positively. Finally it should be implied that nutrient retranslocation is an important factor for species selection.

**Key words:** plantation, nutrient retranslocation, floodplain, Iran

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# The productivity of cherry tree depending on nutritious condition

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## Abstract

Cherry is the main plant among the popular fruit trees. İt is evaluted according to its highfood value,technological pecularities and quick growing capabilities. Its contents 18% dry material, 15% sugar, 1,4-2,4% acid, 75-83% water, 0,9% tanning ajents 25mg% vitamin C, as well as vitamin C,$B_1$, $B_2$, $B_9$ and so on. Cherry is used either as fresh or as dry or as frosen etc.form. The most important task of the Industrial Orchardinq is to increase the production of high qualified harvest. In connection with this matter quickly grwing, rich harvest cherry's planting is of great importance. According to vitamin C (15-30 mg%), P vitamin complex and cumarin contents cherry follews red currant. Black raspberryand pomgranade. Cherry fruit contains 1,2 mg% of iron, as well as vitamin $B_9$ folic acid and $B_2$ riboflavin acid in an effective dosage. These contents prevents from shortage of blood. From this point of view fruits and their production in Azerbaijanof great importance. As well as seed plants have already spread all over Azerbaijan. Photometric characteristics and main mineral nutritious pecularities allow os to get the following conclusion according to biological and planting forming systems and hardness of soil. The mutual dependance of the intensive planting project items such as the plantingscheme of at tree and ombrella formatting system were learant weaken in Azerbaijan. This concerns to newlysettled and prospective sorts. Productive soil, enough warmness sunshines high-level agricultural engineering give us opportunity to tell that there's necessity of getting the following optimum parameters of planting tress ahd umbrella formation in order to increase their productivity.

**Key words:** fertilizers, fertility of plants, local resources, quality

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# Effect of amount and application methods of iron fertilizers on iron absorption and yield of soybean

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## Abstract

Plants require a continuous supply of iron (Fe) to maintain proper growth. Low rates of iron chelates applied to reduce iron deficiency in soybean [Glycine max (L.) Merr.] Probably do not satisfy this requirement. In calcic soils observe lack of Fe sorption. However for investigation effect of iron absorption for soybean designed an experimental in (RCBD) with 4 treatment Fe0: control, Fe1: soil application of 10 kg/ha FeEDDHA and Fe2: foliar spray of $SO_4Fe$ (10g/liter) and Fe3: foliar spray of FeEDTA (2g/liter) in farm in Qarakheil agriculture research station in north of Iran. Iron fertilizer applied before flowering. There was dimension of any plot concern 5×2 m and 4 soybean's row in per plot. Sampling for yield measuring and concentration nutrients in seed and leaf has been done from tow row of plot's text. Results showed in soil with high T.N.V and low iron in soil iron fertilization increased the yield of soybean but the increase in yield was not significant compared to control. Number of seed per pot and oil content of seed were not affected iron treatments. The iron treatments increased number of pot per plant compared to control. Iron fertilization decreased the contractions of P, Mn, Zn and Cu in leaf and soil application of FeEDDHA was more effective in this respect. However, iron fertilization increased the iron contents of leaf and seed and foliar spray was more effective than soil application.

**Key words:** iron, deficiency, foliar spray, soybean, plant nutrition, yield

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# Enrichment of different vermicomposts with beet vinasse and its effects on growth and chemical composition of corn

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## Abstract

In the present days, modern world a massive of organic wastes is dumped into environment. The burying of these wastes not only pollutes environment but also underground water and inflicts irreparable economical losses upon society. Innovation of new methods, to make better use of these wastes helps to return them to production cycle and in addition to beneficial using of their potential, reduce pollution. One of these effective methods to recycle them to agriculture is the production of compost and vermicompost. To study the effect of vermicomposts enriched with beet vinasse on growth and chemical composition of corn, a pot experiment with seven treatments was conducted using a complete block design with three replications.

Six different vermicomposts including, vermicomposted cotton residues, cow manure and azolla residues and their pairs enriched with beet vinasse were used. The nitrogen content of all vermicomposts and control equalized by addition of urea. The results showed that application of vermicomposted cow manure with beet vinasse resulted in highest biomass dry weight for corn where as the least of this trail was measured for control. Different vermicomposts had significant effects on chemical composition of corn. The highest concentrations of leaf N, P, K, Cu and Fe were measured for corn in the treatment with beet vinasse and corn in the control had the lowest leaf concentration of these elements. The highest leaf concentrations of K and Mn for corn were observed respectively in the treatments with cotton and azolla residues vermicomposted with beet vinasse.

**Key words:** vermicompost, enriched, beet vinasse, iron, zinc, yield, chemical concentration of plant, corn

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# *Pinus radiata* (D. Don) growth and B uptake response to boron fertilizer application in green house study

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## Abstract

A pot trial was conducted at Palmerston North, New Zealand under greenhouse conditions by applying five levels of Boron viz: 0, 4, 8 , 16 and 32 kg B/ha as ulexite to one year old radiata pine grown in Pumice soil pot container. Green house temperature was maintained at 17.5 ± 1 °C (night) and 22.5± 1°C (day), pot were irrigated regularly to maintain soil moisture at 80 % of field capacity. Boron application at the rate of 8 kg/ha resulted in maximum plant height which could not appeared by further increase up to 16 and or 32 kg/ha. Maximum plant diameter was obtained by B application at the rate of 4 kg/ha however increase rate reduced stem diameter though higher than obtained at control with no B application. Both low and high B application resulted decrease in needle net photosynthetic rate (Np) as compare to Np rate at B rates of 4 and 8 kg/ha ascribed to good plant growth. Soil dehydrogenase activity, an index of soil microbial metabolic activity, was significantly reduced at the B rates greater than 8 kg/ha. This implies that high rates of B fertiliser could be toxic to some soil microorganisms sensitive to added chemicals. Boron application increased B concentration in all three age needle B concentrations significantly having a greater increase in needle B concentration found at B rates up to 16 kg/ha with a little or no effect for further B rate increase. The B concentration in currently mature needles for the control treatment was 12 mg/kg. Toxicity of foliar B at high fertilisation rate may explain the observed declining plant growth and photosynthetic capacity. Increased B uptake was observed with B fertilisers in current year stem as compared to 1-year old stem. The $CaCl_2$ extracted soil B also increased with increasing rates of B fertiliser. The much greater availability of soil B at 32 kg/ha caused a toxic accumulation of B in the needles at this treatment. Greater root to needle ratio was found in the control (no B) and highest B rate (32 kg/ha) when compared with optimum B application rates. Analysis of B distribution among different plant parts indicated that translocation of B from root to the aboveground parts (e.g. needles) could be restricted under stress conditions caused by both low and high B levels. In this study we evaluated increasing soil B levels on growth of *P. radiata* Optimum B rates have had positive effect on plant height, diameter and dry weight up to an optimal level of soil B. However, B in excess of the optimal concentration affected by decrease in photosynthetic activity. Microbial activity in term of soil dehydrogenase activities did not respond to B application in this study.

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# Effect of splitting and rate of phosphorus fertilization on calcareous soil on growth and yield of wheat (*Triticum aestivum)*

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## Abstract

A field experiment in calcareous soil (35.6 % $CaCO_3$) was conducted in the 2007/08 growing season at the college of Agriculture and Forestry in Mosul University to evaluate the effect of splitting and rates of phosphorus fertilization on the growth and yield of wheat *Triticum aestivum* variety- Abugareeb-3. A randomized complete block design was used with three replications and ten treatment combinations. Super phosphate (20% $P_2O_5$ was applied at three rates viz. 80,160 & 240 $kgha^{-1}$ plus a control of 0 kgP $ha^{-1}$ . Three split P treatments were also applied for each rate viz. D1: All P applied with seeding; D2: Half P applied with seeding and half ten weeks after seeding; D3: Half ten weeks after seeding and half 14 weeks after seeding. A basal dressing of 120 $kgNha^{-1}$was applied to all treatments (at seeding?). All treatment plots were sampled to determine dry matter; P uptake in plant and P available in soil, at 10 weeks, 14 weeks and 18 weeks post- seeding, and after harvesting (23 weeks).. The results showed there was a significant increasing of grain yield, and its components as the fertilizer increase ,While there was no significant difference for the splitting treatments for the yield of seeds and most components. The critical value of P which removal by plants was 1.67 kg.ton-1 of seeds to produce 95% of the relative yield. Soil analyses results at all sampling stages showed an increase of available P (Residual) after harvest with increasing of P rates while there was decreasing of available P vs. time. The effect of splitting at each P rate individually 4th (after harvest) stage arranged as follow: (D1) < (D2) < (D3). The critical value of P in the soil using a Modified Olsen Method was 16.5 ppm to produce 95% of the relative yield.

**Key words:** phosphorous, fertilizer, yield, components, wheat

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# Evaluation of flor levels in irrigated plants with water supply of Eskisehir-Beylikova-Kızılcaören pond

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## Abstract

Farmers have been irrigating with water of Pinarbasi Creek for more than 40 years. This study determined Fluoride content levels for commonly grown plants irrigated with pond waters. This study was focused on whether fluoride and fluoride accumulation levels harmful for plant and soil. According to former researches, in plant tissue under normal conditions (except for some fodder crops) the fluoride has been reported to be between 0.1-10 ppm. According to some literature, this value is 3-30 ppm. Levels of Fluoride in the crops were smaller than 0.1 ppm. It can be said that this level of fluoride in irrigation water and plants does not have a risk. In the studies it has been found that if the fluoride accumulation in the soil is high it can pass to the plant limited degree. Even if the fluoride accumulation is too high in the soil, the fluoride content in the plant roots less and the least content in the fruit may has been found.

**Key words :** crop, fluorine (F), pollution, Eskişehir-Kızılcaören

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# The comparison of some phosphorous extractants and the effect of P Fertilizer on yield in some calcareous soils

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## Abstract

In order to assess available phosphorous different methods have proposed in the last decades by soil scientists. Although application of this methods in soils with similar physical and chemical properties cause to reliable results, but their results in soils with various pH, calcium carbonate, organic matter, Al and Fe oxides and hydroxides especially in calcareous soils is different. The objective of this research was to determine the best extractant for phosphorous and critical level of phosphorous in some calcareous soils. 20 soil samples of wheat cultivated farms were selected based on some soil properties such as pH, calcium carbonate, and labile phosphorous. Soil phosphorous was measured with 0.5 M Sodium Bicarbonate at pH = 8.5 ($NaHCO_3$), Ammonium Bicarbonate – DTPA ($NH_4HCO_3$-DTPA), Sodium Bicarbonate - DTPA ($NaHCO_3$-DTPA), and 0.005 M calcium chloride ($CaCl_2$). Also wheat plant was cultivated in a greenhouse experiment with three replications in soil samples. The treatments of these experiment were 0 ($T_1$), 50 ($T_2$), and 100 ($T_3$) Kg/ha P fertilizer from $KH_2PO_4$ (0, 11.11, and 22.22 mg/pot). 100 Kg/ha N fertilizer from urea was applied to all treatments twice too. After two months the plants were harvested and dry matter and Uptake phosphorous in shoots were measured. The results showed that $CaCl_2$ and $NaHCO_3$ extracted minimum and maximum soil P, respectively and the order of extractants in extracting of soil P were $NaHCO_3$ > $NaHCO_3$-DTPA > $NH_4HCO_3$-DTPA > $CaCl_2$. The regression models and the relationships between P extracted with different extractants showed that there was a significant correlation between them. And $R^2$ of P-$NaHCO_3$ and P-$NaHCO_3$-DTPA, P-$NaHCO_3$ and P-$NH_4HCO_3$-DTPA, and P-$NaHCO_3$-DTPA and P-$NH_4HCO_3$-DTPA were $0.91^{**}$, $0.85^{**}$, and $0.82^{**}$ respectively. In addition, the comparison of results with Duncan test at $P < 0.05$ showed that wheat dry matter in $T_3$ increased significantly in relation to $T_1$ and $T_2$ only in 4 samples, which their P- $NaHCO_3$ were less than 18 ppm. Also P-uptake in shoots of wheat in $T_3$ was more than $T_1$ and $T_2$ significantly and average P-uptake increased 191% in $T_2$ in relation to $T_1$ and 80% in $T_3$ in relation to $T_2$.

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# The effect of Ca/B ratios on the yield and nutrients uptake of wheat

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## Abstract

There are a few studies on the effect of Ca/B ratios on nutrient uptake particularly by wheat which is extensively cultivated in Golestan province, Iran. This study explores the effect of various Ca/B ratios on yield and nutrients uptake of wheat. The study was carried out in a completely randomized design with 6 treatment and four replications, in greenhouse. The Ca/B ratios in the culture were 2000/1, 1000/1, 500/1, 250/1, 125/1 and 25/1. Every pot included 20 wheat seeds in the sand and perlite culture. Nutrients were supplied by Hogland solution. Results showed that dry matter increased with the decrease of Ca/B ratios. Increase of Calcium content reduced adverse effect of boron. Therefore, there is a reverse relationship among Ca/B ratios and other nutrients. P, K, Mg, Boron and Na contents in plant tissues increased with decrease of Ca/B ratios.

**Key words:** Ca/B ratio, wheat, nutrient uptake

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# The role of some lichen species on phosphorus fertilizer use efficiency and growth parameters of corn (*Zea mays* L.) plants

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## Abstract

The aims of this study were to test if lichen species can increase fertilizer use efficiency and improve soil fertility without affecting the quality of soils and plants. A greenhouse experiment was conducted in 2009 to investigate the effects of lichen species on macro and micro nutrient content of soil, yield and mineral contents of maize (*Zea mays* L.) plants grown on Aridisol eastern Anatolia, Erzurum province, Turkey. Pot experiments were conducted using a randomized complete block design with four P fertilizer doses (0, 100, 200 and 300 kg $P_2O_5$ $ha^{-1}$), four lichen species (*Rhizoplaca melonophthalum*, *Rhizoploca crysoleuca*, *Peltigera rupescens*, and *Peltigera proetexfota*), three lichen doses (0, 5, and 10 g $kg^{-1}$) and three replicates. The studies were done with an aridisol sampled to a depth of 0-15 cm from agricultural fields in Erzurum province (39° 55' N, 41º 61' E) in Turkey. Plant was harvested 90 d after planting. Phosphorus fertilizer and lichen species affected significantly plant growth and soil chemical properties especially in rhizosphere soil and plant P nutrient contents after one growing season. Dry-matter yield of shoot and total yield were significantly and quadratically increased with P fertilization. Concentrations (content per unit dry-weight leaves) of nitrogen (N), P, potassium (K) and magnesium (Mg) were significantly increased in a quadratic fashion with the increasing P rates. However, concentrations of, calcium (Ca), zinc (Zn), copper (Cu), and iron (Fe) were not influenced significantly with P fertilization, Phosphorus use efficiencies (agronomic, physiological, agrophysiological, recovery, and utilization) were decreased with increasing P rates. However, lichen application increase the efficiency parameter varied from efficiency to efficiency.

**Key words :** Ardisol, P use efficiency, lichen, macro and micro nutrient

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# Effects of boron fertilizer and application methods on yield and chemical composition of roka (*Eruca Sativa*)

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## Abstract

Boron (B) deficiency is widespread in the Anatolia region of Turkey. This could impact production and quality of Roka (*Eruca Sativa*). Greenhouse experiment was conducted to study yield and quality response of Roka to B addition (0, 1, 3 and 9 kg B $ha^{-1}$) using 4 application methods (seed coating, soil application, seeds were soaked in the B suspension, and foliar fertilizer). B application method affected the plant yield. The optimum economic B rate (OEBR) ranged from 2.0 to 3.2 kg B $ha^{-1}$ resulting in soil B levels of 0.90-1.50 mg $kg^{-1}$. Independent of application method, B application affected tissue macro-and micro element content and increased tissue P, K, Fe, and Zn content but decreased tissue N, Ca and Mg for each of the cultivars. We conclude a seed coating application method addition was most effective application method to increase the yield and elevate soil B levels to non-deficient levels. Similar studies with different soils and initial soil test B levels are needed to conclude if these B application rates and critical soil test values can be applied across the region.

**Key words :** Ardisol, boron, fertilizer application method, macro and micro nutrient, optimum economic yield

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# The role of NEK release in availability of potassium for plant

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## Abstract

Non exchangeable potassium (NEK) constitutes a slowly available reserve that may significantly influence K fertility of soils. Greenhouse experiments were conducted to characterize the K supply and NEK release in 12 dominant soil series. Water-soluble K and Kex are the major sources used by plant initially, but as they become depleted, plants increasingly rely on K from NEK sources. Samples of soils were therefore leached to remove soluble and exchangeable K so that in the subsequent greenhouse pot trial the plants would use more K from the NEK pool. The experiment thus involved two treatments, unleached (UL) and leached (L) soils, with four replicates. The plants were harvested four times. Total K uptake by corn grown in the greenhouse was used to measure plant-available K. Greenhouse study results showed there was a significant difference with dry matter and potassium uptake in leached and unleached soils (pr<0/01). Yield and potassium uptake was higher in unleached soil. Mean comparison results showed that there was significant difference between released exchangeable potassium and NEK at the Preplanting and after the fourth harvest. It was indicated that the rate of exchangeable potassium released from soils in the unleached treatment was higher than the leached one, but the reverse results were observed for NEK.

**Key words:** potassium forms, release, availability

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# Effects of organic versus conventional management on soil and leaf micronutrients in Greek apple orchards

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## Abstract

Organic farming has expanded rapidly in Europe over the last decade due to environmental, economic and social concerns. A comparative study of organic and conventional apple orchard management systems was conducted in order to compares Fe, Mn, Cu and Zn availability in soil as well as to evaluate the concentration of micronutrients in the leaves of apple trees. The soil in both orchards was characterized as a clay loam – clay soil and was very uniform in morphological and physical properties suggesting that any differences in the measured soil parameters may be attributed to the management system and not to soil heterogeneity. The soil of the organically cultivated orchard exhibited significantly lower Cu and Zn concentrations than that of the conventional one. The application of various agrochemicals like pesticides and synthetic fertilizers in the conventionally managed soils seems to increase the content of these metals. In addition the results of this study indicated that the type as well as the application rate of inputs of organic matter in the organically management orchard are insufficient in order to increase the availability of metals in soil. All leaf nutrients were within the sufficiency range in both management systems. The orchard management system had a significant effect on the concentration of Cu and Zn in apple leaves while time of sampling had a significant effect on almost all measured nutrients, except from Mn. Copper concentration was significantly higher in leaves of the organically cultivated orchard, especially during the last two sampling events probably to the extent use of many copper-containing fungicides in organic orchards in Greece.

**Key words:** available metals in soil, agricultural management, organic farming, leaf micronutrients, apple orchard

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# Comparative interaction of Cs and K in the shoots of *Trifolium Pratense* plants

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## Abstract

Under greenhouse condition a pot experiment was carried out to investigate the comparative interaction of Cs and K in the shoots of plants, so as to interpret the way that $K^+$ ions related with $Cs^+$ in soil-plant systems. Also the soil properties that affects Cs uptake by *Trifolium pratense* plants were determined. The plants grown on four different soil types, contaminating with 40 mg $kg^{-1}$ of Cs, and sown at 60, 240 and 420 days after contamination (treatments). During each treatment two cuts of the shoots were performed. According to the results significantly variations on Cs uptake by *Trifolium pratense* plants observed among different cuts, soil types and treatments. Regardless to soil type or treatment, it was found that as the concentration of Cs decreased, the K content increased in shoots in both cuts of the plants. Such relationship, confirms the occurrence of a direct competition between Cs and K ions during the process of accumulation through the plant tissues, suggesting that the two elements could have a common accumulation mechanism and that Cs uptake by plants can be suppressed by the competition of Cs and K ions in the plant tissues. Due to the competitive interactions that occurred between Cs and K ions, the discrimination factor (DF), which is often used to evaluate a plant's efficiency in absorbing nutrients from soil, was additionally estimated. In all treatments DF values were below unity, suggesting a preferential uptake of K over Cs. Thus, K appears to be one of the main factors influence plant mobility of Cs and behaves not only as a competitor via Cs ions, but also as an effective inhibitor of Cs uptake by plants. Among the soil properties it was observed that the particle size fractions as well as the K content in soils play a predominant role on Cs availability to plants. Thus, Cs uptake by plants is a result of reactions both in the soil and in the plant, implying that Cs transport from soil to plant controlled by a complex mechanism. Therefore the utilization of the K-status of plant tissues simultaneously with the soil properties is essential to monitor and estimate soil to plant Cs mobility.

**Key words:** cesium, potassium, soil, *Trifolium pratense* plants, discrimination factor

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# Preliminary data on iron critical level for peach orchards in Golestan province

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## Abstract

Iron is an essential micronutrient for plant growth. Iron chlorosis is common nutritional problem. Soils mainly contain enough total iron; however, due to soil factors, iron is not available for plants. High macro and low micronutrient fertilizers application, particularly in calcareous soils resulted in iron deficiency. Iron shortage can be a limiting factor of maximum plant production. Therefore, it is important to determine iron critical level for fertilizer recommendation. This study was carried out in 19 peach orchards of Golestan province with two fertilizer treatments ($Fe_1$ = 10, $Fe_2$ = 20 kg/ha) which were applied from iron sequestrine-138 (Fe-EDDHA) source, and a blank treatment in four replication. The other nutrients were applied in a same amount. Soil iron was extracted by DTPA and total iron in plant tissues were analyzed by dry ashing procedure and were read out by atomic absorption spectrometry. The scattered diagram of iron concentration in plant tissue was drawn versus soil data. Then critical level of iron was determined by graphical Cate-Nelson method. The critical level of iron was calculated 4.8 mg/kg. Besides, sufficiency level of iron in peach leaves was determined 80 mg/kg.

**Key words:** iron nutrition, critical level, peach

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# Effect of sewage sludge application as organic fertilizer on growth and mineral composition of cor

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## Abstract

A pot experiment was conducted to evaluate the effect of application of sewage sludge ( 0, 15, 30, 60 and 120 t/h ) on dry matter yield and mineral composition of corn plant (Zea mays L. ) using asilty clayloam soil from Abu – ghrab, Baghdad. The results showed that dray matter yied increased noticeably with the application of sewage sludge . The effect of 60 and 120 t/h sludge inputs over passed the mineral fertilizer (200 kg N and 180 kg $P_2O_5$ /h) input. shoot N and Mg contents reflected sludge inputs, where as there no treatments effect on shoot P, K, Na, Fe, Mn and Cd contents. Shoot Zn, Cu and Pb contents increased clearly with the addition of sewage sludge. In any case, shoot heavy metals contents were within the normal ranges.

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# The effect on dry matter yield of corn plant applied diatomite to different pH soils

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## Abstract

The minerali, called diatomite, (diatomaceous earth, kieselguhr) is a sedimentary rock primarily composed of the fossilized remains of unicellular fresh water plants known as Diatoms. Many different substrates (peat, perlite, and vermiculite, sand etc.) are used for plant support in hydroponic culture. This lightweight, porous, non-toxic, non-hazardous, neutral or light alkaline pH mineral is a cost effective, highly efficient, horticultural growth promoting media. Diatomite is pH stable, and the pH can be adjusted to suit various crops. Diatomite will absorb water up to 150% of its own weight and slowly release it as required by the plant. Diatomite is available in particle sizes from 1 to 10-mm diameter. Our tests indicate that diatomite is chemically inert and has good water holding characteristics. The plant roots muffled with the media particles during the harvest were easily separated from each other by submerging roots in the filled cup and rinsing it in a few minutes. Its cost is 20 TL/ 100 liter in Turkey. There are a lot of Natural Diatomite sources in Turkey.

The purpose of this study was to determine the effects of diatomite applications on plant growth (dry matter yield) in zea mays plants. For this purpose, diatomite samples were collected from Erzurum-Pasinler region. A greenhouse experiment was conducted using randomized block designs with three replications. Corn (Zea mays.L.var.*Karadeniz Yıldızı*) was used as the experimental plant material. Diatomite was applied (10%diatomit+90%V soil) to the pot plants, which were harvested 8 weeks after germination.

The results showed that the application of diatomite significantly ($p < 0.001$) increased the plant growth (fresh and dry matter content).

**Key words :** diatomite, corn, natural mineral, soil pH

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# The impacts of surfactans on the growing and yield of wheat, tomato and soybean

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## Abstract

The negative impacts of surfactants (detergents) that reach to water resources from various supplies are widely known. In this study, it was aimed to determine the impacts of anionic, cationic and nonionic surfactants on agricultural production. In these experiments, clay loam, non saline, low organic matter and phosphorus and high calcium carbonate and potassium content soil, was used under greenhouse conditions. Treatments were conducted separately for every surfactant with different dosages. The dosages of surfactant were applied to the pots before sowing at once. The necessary fertilizer and irrigation amounts were applied to the pots.

After these applications tomato seedlings were planted and wheat and soybean seeds were sown to the pots. Until harvest time, phenological observation were made, the plants, then, harvested by cutting from the stem above soil surface, and immediately taken to the laboratory and plant samples were dried at $65^0$C. The dried plants were weighed and the values were evaluated as dry weight yield.

According to results of the experiments, the anionic surfactant application with increasing doses has dramatically decreased the dry weight of wheat, tomato and soybean yields. Cationic surfactant application, on the other hand, has only decreased the dry weight of wheat yield at a statictically important level, and the decreases in dry weight of soybean and tomato yields were found as not statistically important. Nonionic surfactant application has decreased the dry weight of soybean yield, but decreases dry weight recorded for the other plants yield were not found important.

**Key words :** Surfactant, anionic, cationic, nonionic, wheat, tomato, soybean

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# Effects of olive solid waste and olive solid waste compost application on plant growth

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## Abstract

Olive solid waste (OSW) is one of the agricultural waste which has been produced in Mediterranean countries. Turkey also has important economic potential of olive and olive oil in the world. OSW has been used as a plant nutrition and/or soil conditioner. In this study, a pot experiment was conducted applying 0, 4, 8, 10 % of OSW and olive mill waste compost (OSWC) on sandy and loamy soil with tree replications for each treatment.To investigate of OSW and OSWC effects on plant growth parameters such as seed germination, leaf chlorophyll content, plant and root biomass, root development were determined. Application of 4% OSWC had most positive significant effects ($p < 0.05$) on tomato plant growth and root development in loamy soil. Plant parameters have not been changed by increasing OSWC. Direct application of OSW has no positive effects on plant growth and root development.

**Key words :** olive mill waste, olive mill waste compost, tomato plant

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Land Degradation, Management and Conservation

# Land Degradation, Management and Conservation

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# Problem and probable remediation of soil erosion in uttarakhand himalayas, India

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## Abstract

In Uttarakhand, the northern most state of India, comprising sub and lesser Himalayan region, natural as well as human induced hazards casts a wide shadow over human life. Every year valuable top soil cover erodes and washes away, several places experience massive landslides and debris flow, which results in damage to human life as well as to property. In recent years the intensity of natural hazards has increased surprisingly. From last 15 years all over the hilly region of Uttarakhand, extensive and widespread damages occurred due to several massive landslides / slips and flashflood resulting into massive downward side debris flow due to gravity blocking the Alaknanda river flow which is a major lifeline for the Uttarakhand region (after reaching the plain area it is called as Ganga river), blocking the connecting roads in the hilly region and damaging the human, their property as well as the livestock. It is difficult to stop the debris flow due to natural hazards like earthquake and landslides or weather related or by man made activities like dam and road construction, which are quite common in the area but their intensity can be mitigated by taking appropriate steps, as some of the human activities had an impact on increasing instability of slopes, making them susceptible to potential degradation by natural runoff through floods, sheet erosion, slides etc. However, It is also not possible to maintain absolute conservation in the Himalayas, where the people are dependent on the forests for their basic requirements of water, fuel and fodder. Moreover, vast areas of land have been cleared for cultivation of agricultural crops resulting in accelerated soil erosion and consequently leading to desertification. Another factor of urbanization - productive areas are fast depleting due to developmental activities such as road construction ; construction of one kilometer of road in the mountainous region of Himalaya creates nearly 40,000 to 80,000 $m^3$ of debris. The deforestation, shifting cultivation and the commercial water logging have aggravated the problem and are far serious offended in making the land wasteful, unproductive, unsustainable and are causing maximum soil / land degradation in India in comparison to others. Almost half of the country's total landmass needs conservation measures to check soil erosion. Satellite imagery now enables both the monitoring and measuring of soil erosion. But the soil erosion and landslides can be effectively controlled by putting ban on deforestation.

**Key words :** land degradation, soil erosion, shifting cultivation, landslides, debris flow

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# Effects of immethodical agriculture on accumulation of salinity factors in soil (Case study: Boushehr Province, Iran)

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## Abstract

There are large areas in arid regions having low rainfall affected by land degradation caused due to change in environmental condition and anthropogenic activities (e.g. agricultural and mis-use of the land). Consequently these fertile lands were changed in to degraded and bare lands. The goal of this study is the comparison of EC and SAR changes in agricultural and range lands. In many parts of arid and semi-arid regions of Iran agricultural activities such as unwise management of the land as well as inappropriate irrigation systems has seriously led to salinity and soil degradation. Then wise management of soil and water resources is inevitable to avoid consequence degradation. For this purpose different agricultural treatments were selected to compare SAR, EC with rangelands of Boushehr province in two depths (0-30 cm) and (30-60cm). The results showed that there is significant difference between the measured factors both in top and sub soil. Comparison of means using Duncan test indicated that the highest amount of EC and SAR in both layers occurs in wheat cultivated lands; therefore this crop has resulted the highest degradation .Also the most favorable treatment in the study region is vegetable cultivation.

**Key words :** Iran, Boushehr province, sodium absorption ratio (SAR), electrical conductivity (EC), agricultural lands, range lands.

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# Have geostatistical techniques useful tools for soil erodibility studies as related to landscape position?

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## Abstract

Knowledge of some soil parameters about determining structural stability and erodibility of soils is very important for soil conservation. These parameters can be evaluated as statistically due to application of geostatistical methods on soil science recently. Semivariogram analysis is used in order to determine spatial variability of soil properties while Kriging analysis is used to determine predicted values of these parameters in unsampled locations. The objective of this study was to determine spatial variability of some soil erodibility parameters such as: structural stability index, dispersion ratio, erosion ratio, and soil erodibility factor (K factor in USLE). Soil erodibility at the same line of three different landscape (summit, backslope and terrace) positions in 1.35 ha pasture field of Samsun-Karakoy State Farm was determined using some soil properties. The effect of landscape positions on erodibility was investigated and spatial variability of selected erodibility parameters were evaluated by geostatistical techniques (semivariogram and Kriging analyses). Also these parameters obtained from this field were mapped. Seventy seven surfaced soil samples (0-20 cm) were collected in the study and the indices of those soil samples were obtained from laboratory analysis. Comparison of the coefficients of variation of each soil property revealed that soil bulk density was the least variable property while the lime contents were the most variable. The properties on the summit and backslope positions were the most variable while those on the terrace position were the least variable. Comparison of the coefficients of variation of erodibility index revealed that structural stabilityindex was the least variable property while the dispersion ratio and erosion ratio were the most variable. The erodibility parameters, on the summit and backslope positions were the most variable while those on the terrace position were the least variable. The results of this study indicated that almost all investigated soils, based on structural stability and erodibility indices, were "non susceptible" to erosion. Semivariograms for structural stability and erodibility indices revealed that exhibited spatial dependence with a average range of influence approximately 124 m.

**Key words :** soil erodibility, spatial variability, site specific management, landscape position

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# Soil carbohydrates and particulate organic carbon contents changes due to conversion of overgrazed pastures to agriculture in clay soils of west central Iran

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## Abstract

A vast area in west central Iran is intensively grazed native pastures with no proper management practices. The conversion of overgrazed pastures to croplands may have a major influence on soil organic matter, especially on particulate organic carbon (POC) and carbohydrate fractions. The objective of this study was to determine the impact conversion of overgrazed pastures to croplands on selected soil organic matter components in Javanmardi plain, west central, Iran. Soil organic matter components including; organic carbon (OC), total nitrogen ($N_t$), dilute acid-soluble carbohydrates ($CH_{da}$), hot water-soluble carbohydrates ($CH_{hw}$), cold water-soluble carbohydrates ($CH_{cw}$), particulate organic carbon exist in macro-aggregate ($POC_{mac}$) and micro-aggregate ($POC_{mic}$) were evaluated in two land use systems including permanent pastures overgrazed by sheep and permanent pastures converted to wheat fields for more than 23 years. Soil samples were randomly taken (with twelve replicates) from the 0-5 and 5-15 cm depths in each land use systems. The results showed that carbohydrates and POC represent 3.6-6.5 % and 22-30 % of the OC in soils, respectively. The carbohydrate concentrations at each sampling period varied in the order of $CH_{hw} > CH_{da} > CH_{cw}$. Cultivation resulted in significant ($p < 0.05$) increases in OC, $N_t$, $CH_{da}$, $CH_{hw}$, $POC_{mac}$ and $POC_{mic}$ contents in both depths. The lower soil organic matter components in overgrazed pastures compared to wheat fields may partly be attributed to: 1) reduced C inputs to the soil because a large fraction of aboveground biomass is annually removed as animal feed, 2) irrigation and application of mineral N fertilizers in wheat fields that increase the level of crop residue returned to the soil, leading to enhanced soil organic matter contents and 3) the high clay percent (> 57 % clay) in soils that led to protect organic matter against microbial decomposition and oxidation (specially in wheat fields). Furthermore, the POC/OC ratio was higher in cropland soils than in the pastures, reflecting the coarser nature of organic inputs under cultivation. Generally, in overgrazed pastures of arid ecosystems, where soils are generally poor in initial soil organic matter and nutrients, the conversion of overgrazed pastures to cropland could be a potential practice for C sequestration in soil, and thus lowering $CO_2$ concentrations in the atmosphere.

**Key words :** cultivation, overgrazed pastures, wheat fields, carbohydrate fractions, particulate organic carbon

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# A new approach applied in erosion mapping of Ankara-Haymana Soğulca catchment

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## Abstract

The prevention of erosion threatening soil resources and conservation of soils with an effective struggle is only possible by determining the severity and the causes of erosion and taking appropriate management measures. UNEP (United Nations Environment Program), within the framework of Mediterranean Action Plan (MAP) has transferred its "SOIL CONSERVATION" related studies to PAP (Priority Actions Programme)/RAC (Regional Activity Centre) of which headquarters being in Split. With the cooperation of DGCONA (General Directorate of Natural Resources Conservation of Spain) and FAO (Food and Agricultural Organization), a new methodology for soil erosion measurement and mapping, that could be used by all Mediterranean countries, has been developed.With this methodology, the potential and actual erosion risks (causes, type, severity levels, density and trends) can be determined in a catchment and necessary measures to solve erosion problem can be taken. Ankara-Haymana Soğulca catchment has a drainage area of about 50 $km^2$. As a result of applying DGCONA Methodology for the catchment, it has been determined that 2.06 %, 7.37 %, and 90.67 % of the catchment area had low and very low, moderate, and high and very high severity levels of erosion respectively.In addition, with the help of FAO Methodology, the description and causes of erosion and their spatial distribution for the catchment have been stated precisely. According to FAO Methodology, 6.89 % and 91.31 % of the catchment have been defined as stabile and unstabile lands respectively. Moreover, types of erosion and their spatial distribution were determined to give information on erosion status in the catchment.

**Key words :** erosion, erosion mapping, soğulca catchment**,** UNEP, DGCONA-FAO, PAP/RAC

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# Assessment of EPM and MPSIAC models efficiency on estimate of soil erosion and sediment yield in Baghmalek watershed and providing erosion maps by using remote sensing and GIS techniques

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## Abstract

Soil is accounted as survival basis and most important and most valuable natural resources in each country. Each country and society that has rich and fertile soil Sources and exploit from that in the best and most suitable way, their constancy Power, welfare and security is guaranteed. Soil erosion is one of the huge and Recognized economical, social and environment and has been performed great Effort in most country for its struggle and inspection and has been spent Exorbitant sums. In this study with the aim of inspection of efficiency of two EPM and MPSIAC models in estimating of erosion and sediment in Abdullah Baghmalek watershed with areas about 105 $Km^2$, with annual precipitation about 700-800 mm, sensitive constructor and high gradient were selected. Some Data collected by desert studies and some of another data have been collected by watershed studies. Existing models after making numerical and then all Necessary layers have been entered to GIS surrounding. By use of region Numerical models, Digital Elevation Model (DEM) was prepared. According to DEM, gradient model of the watershed was prepared too, and it used for some morphometric parameters. Six parcels was extracting From DEM map which was chosen as an efficient unit. By the use of GIS and its abilities and structure of each model, related calculations to each model was performed. PSIAC model has been chosen as a target due to lack of sediment testing station. By use of SPSS software statistical comparison has been preformed too. Results show that MPSIAC together with GIS&RS techniques more solidarity with sediment rate and EPM model just does a brief consideration from erosion and sediment measure in area. According to the results model, in MPSIAC and PSIAC models, parcel No.1 showed minimum and parcel No.5 maximum sediment yields and in EPM model parcel No.1 showed minimum and parcel No.6 maximum sediment yield rate in area level. The average of sediment yield in EPM model, 44182 tons/ha and in MPSIAC model, 24041 tons/ha was assessed.

**Key words:** erosion and sediment, watershed, EPM, MPSIAC, GIS, SPSS

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# Effect of the ground water quality on land degradation in Al - Muhalabia and Sinjar Region

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## Abstract

The study of ground water is very important to determine the quality and validity of water for different uses as one of the important sources, because the need to use ground water for different purposes are increasing dramatically at the last time, these uses are required appropriate water type due to the variation of water kinds. The quality of ground water is different from one area to another depending on the combination of factors, such as chemical and physical composition of rocks, water movement, in addition to different environmental and weather conditions, as well as vegetation cover type and human influences. The ground water are pure and free of sediments and organic materials but it is often containing dissolved materials and metal compounds stored for long periods in aquifers of different rock types and chemical composition, many researchers pointed out that most of dissolved salts in the ground water exists on form of ionized salts, some of them are negatively charge ($Cl^-$, $SO_4^{-2}$, $CO_3^-$, and $HCO_3^-$) and others with a positive charge ($Cl^-$, $K^+$, $Ca^{+2}$, $Mg^{+2}$). Research includes study of water wells in various locations in Al-Muhalabia and Sinjar regions, west of Mosul, at a distance of 40 - 110 Km respectively; these areas suffer from lack of its water sources, so the population relies on water wells as a major source in their daily life, which have many risks on public health in those regions. Research aims to determine the quality of water wells in these regions, and to define their suitability in daily use, as well as in irrigation, where orchards and the most adjacent lands to the wells that depend on water wells. Recently, noted a distinct deterioration in soil and crop production, so these regions are suffering now severe desertification. Thirty wells has been selected from these regions, laboratory tests were done to determine the quality of water, included estimation of $SO_4^{-2}$ and $Ca^{+2}$, $Mg^{+2}$ and $Cl^-$, $P^{+4}$ in addition to measuring The pH and electrical conductivity (EC). The values of dissolved substances for all studied wells are overstepped the accepted limits for drinking as Kamensky water classification and specifications of the World Health Organization WHO. The results of the study pointed out that the high concentration of magnesium and gypsum in the water gives unpalatable taste and lead to an increase of diarrhea when use this water for drinking, also it is observed that the studied samples contain magnesium concentration higher than 125 mg / liter, where as the most studied samples are unsuitable for drinking as well as the ninety per cent of the samples which studied are unsuitable for domestic use as classified in Kamensky.

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# The spatial variation in wind-blown sediment transport in small scales in the Karapinar – Turkey

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## Abstract

The wind erosion in the great Konya basin, which is in the Central Anatolian Plateau, is one of significant land degradation factors. The rampant grazing and agriculture with no soil conservation measures in the Karapinar region accelerated the wind erosion process. Therefore, the measurement of the wind erosion in the region is very essential. This research was conducted in the Karapinar region to assess the spatial variation in wind-blown sediment transport. Two measurement plots were chosen: One of them is located at the agricultural area and the other is placed at the protected steppe. 25 MWAC (Modified Wilson and Cooke) traps were positioned for every measurement plot of 60 x 60 $m^2$ area. A full meteorological station was installed to collect climatologic data necessary for modeling the wind erosion. During the experiment, a total of 5 erosive wind events were observed in March 2009. The maximum wind speed was recorded as 17.56 $ms^{-1}$ on the 6$^{th}$ of March 2009. Comparison-wise, the results showed that while the mass transport amount in the agricultural area is high (maximum amount was 621 $Kgm^{-1}$), there was no considerable sediment collected/eroded at the plot of the protected steppe. Therefore, analyses for the spatial distribution were restricted to the plot of agricultural area. It is also determined that the most erosive winds come from the S, SSW and SSE. In conclusion, the results indicated that the land use is the most important factor that affects the amount of wind- blown sediment. The research thus recommends that the land use policy in the region should take into account the high erodibility of the Karapinar soils and the high speed wind in the region. In the agricultural area the results showed that the distribution of mass transport over the measurement plot had a high heterogeneity. That can be related to the boundary effects, soil surface characters and to the dispersed vegetation cover on the measurement plot.

**Key words:** wind erosion, mass transport, spatial variation

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# Gully erosion mapping: The proposing an accurate model by GIS and RS

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## Abstract

Erosion types mapping is one of the most important and basic methods in erosion and sediment yield studies to determine suitable soil conservation programs. The possibility to use the aerial photographs for soil mapping has been known for a long time. Commonly they were used to support conventional geomorphological methods, and also for direct identification of sheet, rill and gully erosion. The extension of the use of modern spatial information technologies, such as geographical information systems (GIS), digital elevation modeling (DEM) and remote sensing, have created new possibilities for research as a key for erosion mapping that is economical due to low costs as well as quickness. In this study, some methodologies were compared in providing gully erosion map, in research which took place in the Roodbar basin, Guilan province, Iran. Nine working units maps were provided from the integration of land use, rocks erodibility, land unit and different slope layers. Taking into consideration gully erosion intensity in 652 ground control points, the accuracy of each working units map in producing gully erosion map were computed. Regarding the quality of results (accuracy) and economic and practical concerns, integration of land use, rocks sensitivity to erosion and land units as a method with other two methods including the integration of land units and rocks erodibility layers; and photomorphic units models as working units maps applied for preparing of gully erosion map in two methods including 1. Land use layer with considering forest land use and 2. Land use layer without considering forest land use. Photomorphic unit map was produced from processed satellite images ($ETM^+$). Comparison of ground truth maps of gully erosion and working unit maps indicated that the satellite image photomorphic units map provide the best method in producing gully erosion map in both methods. The accuracy decreased without considering forest land use, but variation trend is the same with considering forest land use. Without forest land use, the precision severely reduced that decreasing precision is very greater in the integration of data layers compared with photomorphic units.

**Key words:** land units, land use, photomorphic units, rocks erodibility, roodbar basin

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# Developed characters of degradation of the irrigative soils in arid and subtropics zone of Azerbaijan

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## Abstract

The soil cover which is the main structural part of the ecosystem losses its fertility and productivity by exposing to strong changes on the condition of the contemporary anthropogen tension. It was determined by the long-term investigations that it developed intensively in the irrigative soils as Irragi Haplic Calsisols, Irragri Haplic Gypsols, Irragri Fulvic Gleysols, Irragri Accumulic Anthric Calcilols on the condition of semi-desert and dry field subtropics climate of Azerbaijan. The degradation development goes in different directions in soils during irrigation. The inculcation of 45 irrigative soils is higher than 0.005. As a result of surface irrigation in such soils fertile soil mass of 5-18 tons from hectares of the area during one vegetation period. As a result of the development of irrigation erosion because of washing of the thin particles on the upper part of the irrigative. Area a quantity of humus and biogenic elements reduces sharply and 250-500 kg nitrogen, 120-180 kg phosphorus are washed as a result three zones which are distinguished by their diagnostic characters: (1) Upper erozion zone; (2) Stable transportation zones; (3) Accumulative zone. Erosion zone is distinguished by humus and nourishment elements decrease, hardening, water- stability, a quantity of structural aggregates and decrease of density (1.15-1.20 g/cm$^3$) and 45-50% of the porosity. As a result the productivity reduces till 25-30%. Stable transportation zone is distinguished by exposing to degradation very little. Here changeability isn't fell in physical, water-physical and chemical characters of the soils. Accumulative zone is covered with the thinnest particles by washing out from the upper part. It hardens after irrigation in connection with superiority of the thinnest of the growing plants. So, the soils are explode to degradation in the same areas. In the soils where the inculcation of the irrigation is less than 0.002 and because of weak flow irrigation water rises level of subsoil water. So the collector-drainage net has becomes old, filled and a flow regime has been disturbed for last 15-20 years and as a result the subsoil waters have increased sharply. While the mineralized subsoil waters evaporate in the summer months the salts remain in salts. The repeat (anthropogen) salinization happens and degradation begins. At present more than 50% of the soils of Kur-Araz valley salinizing repeatedly in a different degree.

**Key words :** soils, degradation, irrigation, accumulative

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# Temporal changes in soil aggregate stability after forest wildfire in Çanakkale-İntepe

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## Abstract

This study was carried out in Çanakkale-Intepe region soils (1514 ha) which was burned in August 2008. Eight burned soil sampling points were determined after fire in the study region. Burned soil samples were taken from 0-5cm depths in five different times during the year. Soil aggregate stabilities of 1-2, 2-4, 4-6mm aggregates were determined by wet sieving method.

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# An Quantitive investigation on the gully erosion on the kalgan Chay watershed (south west of the Tabriz Province) Iran

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## Abstract

The kalgan Chay watershed with an area of 235/5 km$^2$, 310 mm annually precipitation and with average gradient of ٪12.92 is located on the south east of the Tabriz. The results of the derange morphometric data, some coefficients and some climatic indices (such as Hydrothermal coefficient (HTK) and soil wetness fluctuation (Ws) and sediment yield formula, are showed study basin is very prone to rill and gully genesis or runoff erosions. According to the high gradient slops active tectonic, impacts (more than 18 villages in the basin) and thunder storms rainfalls, has important role in fertilizer soil erosion. The average rainfall and altitude of basin respectively is 300 mm and 2615m, and due to the many interrelated factors, high soil erosion occurred. The average annually sediment yield of the basin is evaluated 310.46 ton/ha/y and total of them 1435427333 ton/ha/y. Due to high slope gradient, tectonically uplifting with Vf= 1.4 and Bs=1.61 indices, indicated Neo-tectonically uplifting and derange system vividly caused to distraction and transported unresistant materials from watersheds.. There are negative significance with %95 confident and %45 correlation coefficient. Thus, with increase of high, steepness become intense and diameter of destructed and soil materials decreased so depth and large gully in compared with low steep surfaces, less formed. in an other hand the exist of reverse significant with %40 correlation coefficient for gradient and depth verifying the above subject, (average deep of gullies at the plains, about 2.2m and in mountain area 1.62m). According to the results of this cause study, gully erosion are the one of the important factors to instability and destruction of superficial formation on the slopes and some Points of plain area.

**Key words:** Gully erosion, sediment yield, Kalgan Chay watershed, watershed

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# Temporal changes in soil nitrogen, carbon and carbon/nitrogen ratio after forest wildfire in Çanakkale-İntepe

**R. İlay, A. Sungur, Y. Yiğini, Y. Kavdir , H. Ekinci**

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## Abstract

This study was carried out in Çanakkale-Intepe region soils (1514 ha) which was burned in August 2008. Eight burned soil sampling points were determined after fire in the study region. Burned soil samples were taken from 0-5cm depths in five different times during the year. Total nitrogen, carbon and carbon/nitrogen ratios of burned and unburned soils were determined . Temporal changes of measured parameters were evaluated.

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# Quantitative analysis of soil erosion and sediment yield of Alaki Chay (Harzand chay) basin

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## Abstract

The Alaki Chay basin with an area of 205.5 $km^2$ is located on the northwest of Tabriz city. Tectonically uplifting, vast extension of potentially sensitive formation to erosion, intensive human activities, and runoffs leads to intensive soil erosion and transporting especially topsoil to the plain area and out of the basin. As a result of mophometric drainage system, basin coefficient shape and evaluation of sediment yield with Arnold, Arnoldus, Sepaskah, Fournier indicated the rate of soil erosion is high in the basin. Annually sediment yield of basin is 41474010 ton/ha/year and average sediment yield of basin in hectare evaluated 201.82 ton/ha/y and indicated intensive soil erosion via runoffs. The high gradient streams and river beds (high mountains 3000 and 3100 meter) from marl and inresistant soil formation, also human activities prepared background for intensive soil erosion and turbulence floods occurrence. The results of some climatic indices (such as Hydrothermal coefficient (HTK) and soil wetness fluctuation (Ws), showed the basin very prone to rill and gully genesis or runoff erosion. In the warm seasons especially in summer stormy rainfall leads to occurrence of flash drastic flood and often destroys villages and agricultural lands with reasonable damage. According to the climatic, geomorphology, tectonic condition, erosion systems, some suitable methods and techniques suggested management and decrease of soil erosion via runoff in Alaki Chay river basin.

**Key words:** unresistant formation, slope instability, soil erosion, basin management

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# Spatial variation of soil erodibility and some soil properties on Ali Dağı Volcano Cone of Erciyes Mountain (Turkey)

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## Abstract

In this study, spatial variations on soil erodibility factor (*K*) and some soil properties of Ali Dağı Volcano Cone (organic matter, clay, silt and sand) were investigated. The erodibility factor (*K*) was estimated using Equation of Torri. The variables were modeled by using spherical modeling and all variables showed different spatial correlation (1200, 1700, 600, 3000, and 1380 m for K, Sand, Silt, Clay and OM, respectively). Variance analysis and DUNCAN test indicated that elevation, aspect, and slope degree had significant effect on soil properties ($p<0.05$). On hillslope elevation differences affected on erodibilty and OM content. Although, the higher areas had lower erodibility and higher OM content, lower areas had higher erodibility and lower OM content. Nevertheless, north and south part of the study area had lower erodibility risk. The lower erodobility risk of these areas could be related to higher sand content which was very clear observed on kriging map of sandy surface. As a result; topographic features had a great effect on soil erodibility by effecting soil formation.

**Key words:** soil erodibility, spatial analysis, Ali Dağı, volcano cone

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# To the question of soil degradation in southern caucasus

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## Abstract

The dry subtropic soils map of Southern Caucasus is made and shown the main problems, that needs to solution in first time. On the basis of the made map the various actions directed on restoration of the broken lands are offered. By the form and degree of degradation of the soils are offered carrying out of the concrete actions, intended on restoration of the degraded lands. For protection and reconstruction of the natural resources of soils it is necessary to examine them in the evolutionary order, to analyze their contemporary situation, to prognosticate changes and methods of their removal to lead by these processes. The problem of soil degradation and soil exhaustion of Southern Caucasus dry subtropics zone extremely acquires alarm scale. The physical degradation of soil as the result of the influence of the heavy agricultural technique, leading to structural violation, the concentrating of soil layer under tillage, decreasing of its porosity in some occasions to the loss of upper layers, occupies the area till 0,5 mln ha. The mountainous territories of the arid zone are characterized by the appreciable amplitudes of the height and strong relief crossing. The chemical polluted soils is contents in mainly the following substances -the remnants of pesticide, herbicide, radioactive elements, heavy metals etc. To different kind of the soil degradation concerns the losses of the fertile soils which have been taken away under building of megacities and their communications too. The complex maps occupying different kinds of degradation (erosion, salting and others) are composed. For the fight with the process of degradation use the grounded technologies promoting over the optimization of the natural environment situation, stable management by the process of degraded soils restoration are elaborated. For the creation of these technologies it is necessary to account traditional methods by the controlled time and acceptable for the conditions of regions use. With the use of the vegetative remnants, silt of river water, zeolite, turf, waste of fish wine-making industry, silk science and etc. The meliorative measures must be directed to non-assumption second salted, using in crop rotation of salt-stable plants, sowing of the sorts, which are stable to extremely situations of environment.

**Key words:** degradation, reclamation, disturbed, soil

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# Numerical analysis of hydro-geomorphologic and environmental potentials of touristy Ormieh lake basin and shorelines

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## Abstract

Orumieh lake causeway has an important role that can be attributed to its effect in connecting West and East Azerbaijan, but its ecological effect could not be ignored. This lake basin area is 52700 $km^2$ with 102 islands, familiar national park, with 186 species of birds, and animals. Due to economic, tourism, agricultural activities has a special role in the northwest of Iran. Where this lake is the biggest cachemet in the western Asia, and due to Rio conference published Declaration in 1994, the Ormieh lake ecosystem and national park of them as known as one of the protect area among the 9 protected area. Also the National park of Ormieh lake, among the 14 national park in the world utilized from spatial limitations. The water of lake are very salty (240 gr in winter and 260 gr in summer) and fluctuation of lake water level threaded 500$km^2$ of banks or shorelines lands. Water level rising in intensive rainfall years caused damage for ports instruments in shoreline and agricultures lands. This tectonically Ormieh lake, surrounded by agricultural plains and consists of 10.5 % of basin area and has 34000 million $m^3$ water resource. The average depths of lake is 6 m and in the about 5.2 % of basin area (in marginal and mountainous area), erosion rate is very high. The result of drainage morphometric showed low density (49.8 m/$km^2$), basin form factor and coefficient such as Gravelius 1.49 indicated little along form but basin has high adoption with Rotundity and triangle ratio. The ratio of salt in soils is from %1 an Ec 8 mmhose to %3 and Ec more than 40 in around lake expanded in vast area. For control satiation preceding and rehabilitation marginal soils due to environmental potential, some techniques suggested for land using of shoreline.

**Key words:** Orumieh lake ecological changing, soil erosion, environmental management

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# Slope effects on soil erosion in changed forest lands, challenges and solutions. Case study; North-West of Iran, arasbaran forest, mardanaghomchay watershed

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## Abstract

This study was carried out in North-Wet of Iran, Arasbaran forest to investigation Slope effects on soil erosion in changed forest lands t farming. In the region rural people formerly with clear cutting changed a section of forest and prepare it to the agricultural activities, that now occurred rarely. But these part of forest changed to the pasture and in some of change to unutilized lands. According to the research, in the most farming lands reducing soil fertility and decreasing agriculture crops respectively. In this study relation between land degradation rate and its slope degrees was recorded. Results showed that areas with more than 40 percent slope, confront more to the damaging than low slopes. The results indicated slope significantly affects the area rate erosion. Changing forest lands in different slope percent areas, have various consequences. Precipitation and water erosion in changed area decreasing fertility and according to the different slope classes, occurred different results. In the higher slope area most of time, land soil depth lessened under 1-2cm with poor coverage of annual plants (5-10 percent of plot) and rest of plot appearance stone surface. In the Low slope area pasture plants coverage settlement include herbal and shrubby can be find. These changed area in the region should be managed. In the management programs with consideration to the slope percent and soil depth and fertility, cultivation of light demander annual and perennial pastural plant species and prepare land to entrance the native forest species in some of plots such as *Quercus macranthera, Carpinus betulus, Lonicera caucasica* and etc is necessary.

**Key words:** clear cutting, soil fertility, rate erosion, higher slope, low slope

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# Creating potential erosion risk map of the Çeşme-Karaburun peninsula by geographical information system and remote sensing technique

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## Abstract

With this study, it is aimed to draw a potential erosion risk map needed to be used for planning the precautions against erosion, which is one of the biggest problems of our country, by using advanced techniques. An area of 1126 km$^2$ including Çeşme Karaburun peninsula, which is located on the west coast of Turkey, has been selected as study area. RUSLE soil loss factors have been used in the study. Each factor used for detecting the soil loss has been determined geographically from different sources and recorded as layer in database according to Geographic information system. In the study, for determining C factor 15-m spatial resolution ASTER image, for determining "L" and "S" factors numerical counter lines, for determining "R" factor weather observation results, for determining "K" factor soil order maps have been used. Afterwards, layers are united by using spatial intersection and new polygons containing all attributes have been created. After the database was created, RUSLE model has been applied and as a result soil loss has been determined for each polygon. At the end of the study, it has been determined that Çeşme-Karaburun peninsula, selected as study area, has 11.36 ton/ha/year.

**Key words :** erosion, RUSLE, GIS, remote sensing, Karaburun peninsula

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# Estimation of sediment yield using MPSIAC model in GIS environment (A case study, Jam and Riz Watershed, Asaloyeh)

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## Abstract

The results of sediment estimation in Iran has shown that the MPSIAC model can be one of the most common empirical models in comparison to the other models on ungauged watersheds. In this study, both the erosion and sediment rates were estimated by MPSIAC model using GIS in the Jam and Riz watershed of Iran. The results of this study indicate that the amount of sediment yield in the study area is about 149011.8 ton/y. Considering the amount of the observed sediment yield of the watershed, which is about 72545.9 ton/y, the amount of estimated sediment yield is significantly differs by 76465.9 ton/y. It seems that there must be a rational reason(s) for difference between the observed and estimated amount of sediment yield. The results of evaluation on the observed data shown that it should has the root in structure of the model as well as its related tables for rating and weighting of the factors included in the model. It can be concluded that in order to accept or reject the result of the sediment yield estimation using the MPSIAC model with high confidence, the model first should be calibrated based on the existing conditions of the study area.

**Key words:** sediment, watershed, MPSIAC, GIS, Iran

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# Relations between some erosion parameters and physico-chemical properties of Bafra Plain soils

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## Abstract

This study was carried out to determine relations among structural stability (dispersion ratio, DR), water transmission parameters (erosion ratio, ER) and some physic-chemical properties of Bafra Plain surface soils. For this purpose, 30 surface soil samples (0-20 cm) were taken from arable lands of Bafra Plain. In the soil samples, particle size distribution, field capacity and wilting point, Atterberg limits, particle density, pH, electricity conductivity, organic matter and $CaCO_3$ content, exchangeable Ca, Mg, Na, K contents and cation exchange capacity were determined. Significant correlations were found between soil physico-chemical properties and each erosion indices. Some equations derived from these correlations and mentioned indices were calculated by using these equations. Therefore, structural stability and erodibility of plain soils can be estimated as an initial approach value.
**Key words:** soil erodibility, physico-chemical properties, Bafra Plain

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# The simulation on environmental geological of desertification phenomena in Libya

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## Abstract

Since 400 million years ago, the Libya had witnessed geological activities resulted in formation of the physical landscapes of the Libya and formation of the oil and groundwater basins. After the preliminary development of the system of the Tectonic processes during the development stage of karmi & Permian Tish sea water revolved to cover huge areas of the Libyan territory until got to Tibisti mountains, then revolved back until in the Pleistocene epoch a climate change caused rain shortage formation of a Rock layers, hills and huge sand dunes thus creating more desert situation then causing sand dunes extending to huge areas thought the Libyan areas (1,700.000) $km^{2.}$ it is believed that the forth geological epoch had formed most of the Libya Landscape. Libya is situated within the sub dry climate is characterized with rarity of rain fall, which in then caused a wide spread of desertification where huge fertilized hands became dry areas, lacks plantation and animals, therefore resulting in a very poor environmental. The phenomena of deser-tification is due to far always climate condition as a result of drop in rain fall, in addition to the situation as a result of the area within a sub-desert climate, causing a rise in evapo-ration rate transpiration a drop in soil moisture high rise in CA+HCO3 and bi-HCO3 thus causing the spread of swamps and therefore rarity of plant cover in particular in the western rang. Also the intensive irrigation process caused increase in soil salt to become a salt soil not fit for agriculture or for constructions cutting trees in addition to improper pastry. The climate conditions have played a vital role in water shortage which is one of the main problems causing an increase in desertification process. In this study we propose for desertification eradication to use silica formation 90% of rocks metals of the earth sphere such process come as a result of fusion. This metal is common in all earth rocks and is characterized with the ability to absorb water molecules in order to be able to form of water and provide the same to plant roots, then again compensate whatever quantity of water which may be lost by absorption of air moisture containing water. The square meter needs 25-50kg of silica further we may attempt to fix the sand dunes and stop their marsh by planting pine trees ,oak construction of a water hole to reserve rain water in and outside of the cities and villages in order to benefit from it in crops irrigation .also eructation of five purification plants along the Libyan coast to process rain water and sanitary drainage. This water must be used in soil fixing besides preservation of the Great Man made river which must be used for drinking purposes only. In addition to be above one may use remote sensing to be control soil marching and finding an economic plan of plantation in and outside of cities and villages via frees distribution of trees on citizens establishment of prairies within cities contraction of wind buffers around them so to prevent march .

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# Determination of sediment yield and soil conservation measures by estimating potential soil loss in Ankara-Yenimahalle-Guvenc basin

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## Abstract

USLE model was used to estimate potential soil loss, sediment yield and to prepare land use plan of Yenimahalle-Guvenc, a rural basin in central Anatolia. In this study, the basin of the soil, topography, land use and rainfall data were used. In this study, basin sediment yield was estimated by multiplying potential soil loss values with sediment delivery ratio. Results obtained in 2007 were compared with predicted sediment yield values for Guvenc pond basin. According to the results of the study, according to data from the years 1987-2007 in Guvenc basin, potential soil loss of the basin based on USLE method are 16.30 t /ha annually. The average sediment delivery ratio of the basin was found as 28.23%. According to the results measured sediment yield is 3190 t/ha in the basin. For sustainable management of the basin, soil conservation measures were prepared.

**Key words :** potential soil loss, sediment yield, land use management, USLE

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# Study of Desertification Base on Wind Erosion (Case Study: Sistan Region, Iran)

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## Abstract

Sistan plain is effected by desertification so that this phenomenon has encountered the relative paths and people economic-social activities of this region with serious problems. The main purpose of this study is estimating the current and potential desertification intensity of Niatak-Sistan region, based on MICD method (MICD: Modified Iranian Classification of Desertification). That, through it the unit works of this region were prepared as the base plan for evaluating to considered factors and indices by geomorphology method. Also, in order to prepare the desertification intensity plan for both current and potential case of this region, the desertification intensity of various applications was determined and relative plants to current and potential desertification cases of each application were drowned after evaluating to wind erosion indexes and accumulating their scores for each unit work based on source tables. Results showed that in this region the desertification Potential is include of medium (III), intensive(IV) and very intensive (V) classes, wile Current desertification condition is include of low (II), medium (III) and intensive (IV) classes of desertification intensity respectively. These changes was happen by wind erosion control activates, during recent years.

**Key words:** desertification, wind erosion, current, potential, unit works, sistan, MICD method

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# Ammonia volatilization pollution from organic fertilizers added to calcareous soil under different environmental conditions from Northern Iraq

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## Abstract

Ammonia volatilization is an important issue in agricultural production and environmental protection, in order to predict ammonia ($NH_3$) volatilization from field applied urea by estimate the rate and amount of the volatilization under different environmental condition. A Group of experiments were conducted in the field of the department of soil and water science/college of Agriculture and Forestry, University of Mosul; during the year of 2004-2005 to quantify. The rate and amounts of volatilization from surface application of 320 kg/h urea fertilizer during four different 8 seasons in calciorhtids soil. Ammonia volatilized were collected under closed system in boric acid 2% under field condition daily for 2-3 weeks. The data were described mathematically by using five different kinetic equations (zero order) first order, second order, parabolic diffusion, Elvoich and multiorder equation. The results showed that the highest amount of $NH_3$ volatilization was obtained in summer season, and there are a significant relationship between ammonia volatilization and each of temperate and the time of volatilization. The best fitted mathematical model for ammonia volatilization was the diffusion parabolic equation.

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# Effects of different pasture amelioration methods on some soil properties in Minoz creek basin

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## Abstract

In this study, effects of five different pasture amelioration methods and polyacrylamide (PAM) as a synthetic soil conditioner on bulk density (BD), aggregate stability (AS) and organic matter (OM) content of pasture soil in Minöz Creek Basin were monitored between 2006 and 2009. Experiment in a natural pasture soil was conducted with seven treatments; control under uncontrolled grazing (C), control under controlled grazing (CG) and the treatments of fertilizing (F), PAM, spread seeding (SS), cultivation or aeration (A), and spread seeding + fertilizing + aeration (SSFA) under controlled grazing in seven plots. Soil samples were taken two times a year in spring (May) and fall (October) seasons of each year. According to the C and CG treatments, the other treatments generally increased aggregate stabilities, organic matter contents and decreased bulk densities of the plots. These changes in the soil properties varied among the seasons. The lower bulk densities generally determined in A and SSFA treatment plots. The highest decrease in bulk density was obtained as 1.14 g $cm^{-3}$ with SSFA treatment in October 2009. Aggregate stabilities of the treatments were usually higher in spring (May) sampling than in fall (October) sampling. The highest increases in AS and OM contents were determined as 79.15% and 6.31% with PAM treatment in May 2009, respectively. SS, PAM and SSFA treatments usually increased AS and OM contents of the pasture soil during the study.

**Key words :** pasture soil, controlled grazing, spread seeding, fertilizing, PAM, aeration

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# Study of type and intensity effective factors in desertification Sistan region, Iran

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## Abstract

Desertification is a distractive process in arid and semi arid region. This reduces land potential capability. In order to mapping desertification several models are recommended. ICD (Iranian Classification of Desertification) model was presented by Ekhtesasi and his colleagues (1995).This considers biome condition of Iran specially this region. It is a comprehensive and step by step model, and has for stages. In the first step define the type of desert environment which result in eight units. In the second step we conducted field surveys and by scoring six factors of desertification weighted and assessed. in the third step we evaluated the intensity based on erosion intensity and sediments delivery and also possibility of flexibility in ecosystem was categorized in for levels finally sum of total scours gives the intensity five classes. Subsequently desertification map was drown using the indicators results show that desertification intensity moderate, high and very high in this region. The major factor is environmental (drought) factors.

**Key words:** desertification, anthropogenic induced and environmental factors, drought, ICD model, Sistan region

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# A comparison between the effect of sprinckler irrigation and surface irrigation on some soil physical properties and yield of corn for spring and automn seasons

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## Abstract

The experiment was conducted during spring season of year 2007, to compare the effect of sprinkler irrigation systems and surface irrigation on some soil physical properties including soil water storage, bulk density and soil resistance penetration, and plant properties including root weight , plant height and yield of corn Zea Mays L., at the experimental station of Al-Rabei Agricultural Research Center, Ministry of Agriculture at, Al-Zafaraniyah, Baghdad, Iraq. Three treatments including sprinkler irrigation systems with three levels including evaporate 50%,75% and 100% based on
American evaporation pan class (A), represented as level one, two and three respectively with surface irrigation treatment. Randomized complete block design with three replications and LSD (0.05) was used to compare the means of treatments at 0.05 level.The results were showed as follows:-
1- Sprinkler irrigation level three (evaporate 100%) showed asignificant increase in soil water storage and decrease soil resistance penetration for the two seasons hence improve plant growth and increase corn yield comparing with other treatment for spring season.
2- Sprinkler irrigation level three (evaporate 100%) and Sprinkler irrigation level three (evaporate 75%) increase corn yield comparing with other treatment for automn season.
**Key words:** sprinkler irrigation, surface irrigation, soil physical properties, corn yield

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# Some mechanical properties and workability of Asagi Aksu basin soils

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## Abstract

Atterberg limits, consistency index (Ic), and optimum moisture contents for workability of soil series in Asagı Aksu Basin were investigated. While the highest liquid limit (LL, 65.05%) and plastic limit (PL, 37.28%) values were determined in Yukarı Aksu series soils, the lowest LL (58.11%) and PL (32.01%) values were in Kayadibi series soils. PI values in the soil series increased as follows: Tatardede Tepe < Gölet < Kamaz Deresi < Kayadibi < Asagi Aksu < Yukari Aksu, and varied between 24.27% and 27.77%. According to LL and plasticity index values, soils in all series of Asagi Aksu Basin were classified within kaolin type clays and inorganic silts of high compressibility group and highly plastic. Activities of clays in the soil series, ranged between 0.42 and 0.46, were lower than 0.75 and classified as inactive clays with only little swelling-shrinking activity. Suggested upper and lower moisture limits for optimum tillage of the soil series were 40.99 and 30.44% in Asagi Aksu, 40.40 and 30.61% in Gölet, 42.78 and 32.58% in Kamaz Deresi, 38.54 and 28.10% in Kayadibi, 41.67 and 31.96% Tatardede Tepe, and 44.22 and 33.11% in Yukari Aksu series. Soils in Asagi Aksu, Kamaz Deresi and Kayadibi series have a risk of being muddy when they were cultivated at field capacity moisture content. On the other hand, soils in Gölet, Tatardede Tepe and Yukari Aksu series can be cultivated without structural deformation at their field capacity.

**Key words :** atterberg limits, consistency index, soil workability, field capacity

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# Droughts in Sistan region, Iran; Could we struggle with desertification?

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## Abstract

Sistan is an over-populated region that located in southeastern Iran with annual mean temperature of 22° Celsius and annual mean rainfall of 50 mm. evaporation rate is very high (5000 mm) so that in De Marten classification, it belongs to hyper arid class. In recent decade especially from year 1999, a severe drought occurred, limiting the life of flora and fauna of its ecosystem. It has been said that such drought was unique in past 600 years.
In this study we tried to in one hand discuss and explain the consequences of the recent drought such as agricultural lands deterioration, drying out of Hamun Lake, sand dune encroachment to residential and agricultural areas, devastation of economic and social infrastructures, fill up the water bodies and channels and other damages to husbandry, aquaculture and human health and its environmental hazards. In the other hand, we evaluated the conservative initiatives that implemented to combat desertification in Sistan with emphasis on their advantages and deficiencies.
**Key words:** drought, Sistan plain, land degradation, environmental hazards, reclamation

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# Determination of soil degradation and catchment planning for sustainable farming in Tokat – Artova Çelikli basin

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## Abstract

This research was carried out between 2000-2005 in Tokat Çelikli Basin which covers 10.412 km$^2$. In the research the grassland, agricultural and forest areas were studied from soil degradation. Physical degradation was found according to the research findings. In addition to physical degradation chemical and biological degradation was also identified. Required steps for basin improvement and sustainable agriculture were identified according to the research findings.

**Key words :** Tokat-Çelikli, soil degradation, desertification, basin, crop productivity, catchment management

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# RS-based assessment of recent drought effect on vegetative cover of Sistan, Iran and its social consequences

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## Abstract

Several droughts in recent decades have died many humans, have led to many economical losses and washed out countless opportunities especially in the arid and semi-arid regions and have intensified the desertification processes. During last century a number of droughts occurred in Sistan region, south-eastern Iran and the last drought (1999-2006) was the cruelest one which is matchless in the past six centuries according to new reports and have had catastrophic effects on environment, economy and society. In this study with using of TM imagery of 1998 which refers to pre-drought conditions and either ETM+ images of year 2002 which belongs to drought year, the changes in vegetation cover of Sistan were investigated through vegetation index of WDVI and classified in three classes: restored, deteriorated and unchanged . According to change detection map it was observed that vegetation cover of the study area decreased from 91159 hectares in 1998 to 25830 hectares in 2002 and that the main contributor of the changes was abandoned agricultural lands and deterioration of reed beds due to drying up of Hamoun Lakes. The population that depended on reed beds for feeding their livestock and the farmers that their main income was agriculture now lost their sources of income and seeking new jobs, irrelevant to their experiences. More important, illicit activities and smugglers start to increase due to its good income and adjacency to Afghanistan.

**Key words:** drought, Sistan, WDVI, plant cover, TM, ETM+

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# Assessment of geo-systems degradation based on soil deflation in coastal areas of Azerbaijan

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## Abstract

The work is devoted to research on identifying and assessing the degree of deflation of meadow-gray desert soils and sands by types of agricultural land and geo-systems degradation assessment under the influence of wind erosion. Correlation between the type of agricultural land and intensity of wind erosion processes is established and definitions of the degree of soil and sand deflation in the region are given. The paper gives reliable quantitative data on the removal of fertile fine-grained particles from the soil surface by wind erosion. From the agricultural lands specific to the region the winter pastures are prone to be strongly deflated (weak- and semi-bound sands with plant cover, respectively, 15-20 and 25-35%), with loss of particles varying between 321-610 tonnes/ha; moderate-strong deflation is characteristic to the winter pastures (saline, with a projected cover of 10%) with removal of silt at 170-320 tonnes/ha; medium deflated are plough lands where loss of soil particles depends on the type of tillage - average is around 50-70 tonnes/ha; weak and slightly deflated areas are fallow lands (village pastures and fallows with a projective cover, respectively, 10-20 and 50%) where removal of particles reaches 6-50 and 5 tonnes/ha. Close correlation established between exposure to wind erosion and a soil degradation of geo-systems (fertility decline, worsening conditions for the development of vegetation and reduction of yield). This correlation can be determined taking into account the extent of deflation. Evaluation system with the quality definition of geo-systems degradation influenced by wind erosion has been established: slight deflation - very little stress; weak - weak stress; average – average stress; moderate - moderately strong; moderately strong - intense and strong – critical. Reliable data on the loss of fertile fine-grained particles from the soil surface and determination of correlation with the natural properties of soil can serve as the scientific basis for degradation assessment of geo-systems affected by wind erosions.

**Key words:** wind erosion, deflation, assessment, geo-system

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# Global environmental degradation

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## Abstract

Climate changes characterized as global warming are leading to large-scale irreversible effects at continental and global scales. The likelihood and magnitude of the effects are observed and predicted to be increasing and accelerating. The effects of global warming are of concern both for the environment and human life. Research by NOAA indicate that the effects of global warming are already irreversible. The IPCC reports attribute many specific natural phenomena to human causes. The expected long range effects of recent climate change may already be observed. Rising sea levels, glacier retreat, Arctic shrinkage, and altered patterns of agriculture are cited as direct consequences of human activities. Predictions for secondary and regional effects include extreme weather events, an expansion of tropical diseases, changes in the timing of seasonal patterns in ecosystems, and drastic economic impact. All these problems of global environmental pollution needs global solution called Kyoto Protocol. In this context, the goal of this study is to analyse climate change as global environmental degradation together with Kyoto protocol in the meaning of global land degradation with urbanization and global biodiversity.

**Key words :** global warming, climate change, Kyoto protocol, environment, land degredation, urbanization, biodiversity

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# Relationship between organic carbon content and fraction size class under different land uses in a semi-arid catchment

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## Abstract

Soil aggregate stability is affected by many factors, and organic carbon (OC) content as widely defined in the literature that it is the most important agent for soil aggregate stability. This study aims to evaluate the OC contents of the soil aggregate size classes (8 different levels) for the soils developed under four different land uses. Selected aggregate size classes were 8-5, 5-4, 4-2 2-1, 1-0.5, 0.5-0.25, 0.25-0.125 and 0.125-0.063 mm. Soil samples were taken from colluvial and alluvial agricultural lands under conventional soil tillage (CAL and AAL, respectively) grassland (GL) and forest (FL) areas. Moreover, five different treatments for aggregate stability of soil samples were performed in this study, too. Natural distribution of soil aggregates, defined as mean diameter weight (MWD, mm), was determined by dry sieving. MWD values of the land uses were 7.37 (CAL), 3.99 (AAL), 2.82 (GL) and 5.74 (FL). Results further showed that interactions between treatments and land uses in terms of aggregate stability defined by an index or MWD were statistically significant ($p<0.01$). Wet sieving with different sieve sizes led to the highest discrepancy among land uses ($p<0.05$). Irrespective of the size classes, the mean OC contents were 1.98, 1.25, 2.53 and 9.40 % for the land uses of CAL, AAL, GL and FL, respectively. The interactions between aggregate sizes and land uses in terms of the OC contents were statistically significant ($p<0.01$) as well. With respect to the selected aggregate sizes, although there was no statistically significant difference between OCs of CAL and AAL, those of GL and FL differed significantly. Especially, of land uses, FL had the highest OCs in all aggregate size classes. Given the OC of every aggregate size class, it was remarkable that the contents of disturbed lands (CAL and AAL) were similar and those of undisturbed lands (GL and FL) were significantly different. This implied that the OC contents were aggregate size-sensitive for undisturbed soils. It is also observed that the performance of the various aggregate analyses in differentiating the distributions was much clearer in undisturbed soils than in disturbed soils.

**Key words :** organic carbon content, aggregate stability, fraction sizes, land uses

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# Using of waste water, way to contrast drought

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## Abstract

Water deficit is the most important limited factor of plants growth in arid and semi arid zones. Drought is happen once every year and makes economic, society, cultural and biological problems. Water deficient and enhance of population has increased waste water. It is one of the best way to contrast to drought is used of this huge water. In most zones waste water has been infiltration into ground that increases ground water population. By filtering of waste water and use of it on agriculture, range management and natural resource can solve drought problems, Irrigation with waste water make some natural problems, Such as disease, parasites, salinity, soil destruction and plant quality changes. It can be pointed to filtering of waste water, fixation of physicochemical elements in soil, controlling of salinity, usage of resistance plants, design of desertification control, introduction of oil and industrial plants that be used indirect by human. In this study, it has explained the effect of waste water in plant growth and yield, increase of effect of drought, problems of using waste water in Iran.

**Key words:** waste water, drought, irrigation

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# The estimation of soil erosion risk areas by using GIS analysis of land use and soil map: an Estonian case study

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## Abstract

The land use in areas potentially prone to erosion process, is one of the most important parameters for evaluating the risk of water and wind erosion. Therefore the estimation of the share and location of arable land and permanent (incl. natural) grasslands in erosion sensible areas by land use databases, soil map and orthophotos was the goal of the current research. In Estonian digital soil map (accuracy 1:10 000) for estimating the wind erosion, fields with sandy texture over 3 ha and peat soils 0.5 ha size in areas with higher speed of wind (mainly in coastal counties) were picked up. The water eroded soils in soil map are already determined by erosion degree into three subgroups. According to the GIS analyses and queries of soil map and ARIB (Agricultural Registers and Information Board) land use the water eroded soils embraced from ARIB registered agricultural land 40 thousand ha from which 16 thousand was under the arable land. It means that the greater risk for soil water erosion can occur averagely in 40% of agricultural land located on eroded soils but the share of arable land varies in different counties remarkably. The use of eroded soils for arable land is bigger in counties where the erosion degree and share of eroded soils is relatively smaller, varying from 27 to 54%. The GIS analysis by using USLE model showed that even though the average soil loss by water erosion in Estonia is very low (~0.11 t $ha^{-1}$ $y^{-1}$), there are slopes where the estimated soil loss can reach up to 4000 t $ha^{-1}$ $y^{-1}$. By estimating the wind erosion the GIS queries in wind erosion sensible soils and areas resulted in more than 100 thousand ha of agricultural land and the arable fields comprised 34 thousand ha (~34% have potentially higher risk for wind erosion). The area is bigger than under the risk of water erosion but during the field works we found out that the damage caused by wind erosion is not so important than it is by water erosion. The area under the arable land in erosion sensible areas is located in field level as well as parish level enabling to implement the methods (like using minimal tillage, direct sowing, winter crop cover, establishing permanent grasslands) to prevent or slow down the erosion and also to subsidize those farmers who are willing to take the measures for preventing soil loss.

**Key words:** water erosion, wind erosion, GIS land use

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# Effects of Conventional and Reduced Tillage on the Photosynthetic Performance and Carbon Budget of Cropland

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## Abstract

At the present time total annual emissions of Green House Gases (GHG) are increasing in the Earth's atmosphere. In Ireland agriculture is the single largest contributor to GHG emissions, comprising ~28% of the total national emissions. In order to reduce these, various mitigation strategies are being investigated in cropland ecosystems, including the use of reduced-tillage and associated management modifications. In this work an assessment is being made of the impact of conventional (CT) and reduced-tillage (RT), as well as residue incorporation (RI), natural regeneration (NR) and cover cropping (CC) on the carbon budget of an arable ecosystem with barley as the main crop. Measurements of Net Ecosystem $CO_2$ Exchange (NEE) using eddy covariance (EC) techniques shows that NEE of a spring barley crop under reduced tillage with residue incorporation and mustard as a fallow season cover crop represents a stronger carbon sink (RT+RI+CC ~3.44 t C $ha^{-1}$) when compared to conventional tillage management with residue incorporation (CT+RI ~1.85 t C $ha^{-1}$). In addition, the photosynthetic performance of both the barley and mustard plants has been assessed at the leaf level in order to characterize gross primary productivity (GPP). After the first spring-growing season, statistical analyses showed that there were no significant differences ($P>0.05$) in leaf-level photosynthesis between the CT and RT treatments nor between CC, RI and NR treatments. Also leaf respiration did not differ significantly between treatments. The leaf level data suggest that the different management practices have no significant impact on the carbon exchange of the plants in the short term. However the EC data suggest that cover cropping may increase the carbon sink strength of these arable ecosystems. We will continue to collect EC, leaf level photosynthesis, soil $CO_2$ flux, meteorological and biomass data to assess the longer-term impacts of the different management systems. In addition, the one possible model, PIXGRO, will be used to scale the carbon budgets for these cropland ecosystems from leaf level to the ecosystem scale. We expect that multiannual measurements will clarify both the trends shown during the first growing season and the accuracy of modeled carbon budgets.

**Key words:** Net ecosystem C exchange, arable ecosystem C budget, ecosystem C modelling

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Soil, Water Pollution and Remediation

# Soil, Water Pollution and Remediation

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# Influence of mineral fertilizers on biochemical parameters stability turf-brown soils polluted by lead

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## Abstract

Parameters of biological activity of soils can be used with a view of early diagnostics of negative changes of properties of soils. It is established, that biochemical parameters of stability of turf-brown soils of Middle Preduralye being polluted with lead, can be arranged into the following number: the number of actinomyces>$Q_r$>substratum-sympathetic respiration >background respiration>the activity of catalase. Long use of turf-brown soils in system of agrocoenosis has led to the change of structure and number of ecological-trophic groups of microorganisms that was in turn reflected in decrease in a level of issue of carbonic gas, microbic metabolic factor, fermentative activity. These changes shows, that turf-brown soil in agrocoenosis possesses low stability to agro- and technogenic loadings. Applying of mineral fertilizes improves the ratio of groups of microorganisms in soils as they remove the inhibirizing action of the acetic lead to the development of useful microflora. Besides, applying fertilizes reduces the negative action of lead to the background respiration; rises the fermentative activity of the soils, that leads to the increasing stability of microbocoenosis at pollution, which in turn raises the stability of arable turf-brown soils.

**Key words:** soil, microbocoenosis, stability, mineral fertilizes

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# Spatial distribution patterns of ground water levels and salinity in Igdır plain

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## Abstract

Establishing optimal conditions between irrigation and drainage systems are required for obtaining maximum yield in plant production. In conditions with lack of equilibrium between irrigation and drainage, groundwater level raises which results in salinity and alkalinity problems in soil, and therefore crop production is limited. Various systems have been used to drain the excess water both on the surface and between the soil horizons in order to keep the water table certain level. These systems are known as 'Surface Drainage Systems' and 'Undersurface Drainage Systems'. One of the most secure ways to control a drainage system is to monitor the water table level in a year and to observe the groundwater quality changes by years in regular intervals. Groundwater maps are drawn to monitor the changes in groundwater level and groundwater quality. The objective of this study was to define ground water levels and salinity of Igdir plain using geostatistical analyses. The study are covers 61900 ha area which gradually drained and allowed for irrigation by the State Hydraulic Works since 1969. The irrigation rate of the study area is 51% for 2008 and the quality of the irrigation water is C2S1 and C3S1. The dominant plant patterns in the study area are cereals, legume crops, rangelands, sugar-beet, and some fruits and vegetables. In the study area, groundwater levels and groundwater salinity were measured in 255 water table survey wells during a 12 months period between October 2007 and September 2008. Semivariogram and punctual kriging analyses were used to define spatial dependence and producing distribution maps of groundwater levels and salinity. Distribution maps were compared and evaluated based upon irrigation water quality, soil salinity and crop patterns.

**Key words :** groundwater level, salinity, geoistatistic, spatial variability, Iğdır Plain

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# Palygorskite formation under the influence of groundwater in Central Iranian Soils

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## Abstract

Palygorskite is a dominant clay mineral in most soils and sediments in Central Iran. Few studies investigated the formation of palygorskite under the influence of groundwater in central Iran. This study aims to identify the effects of groundwater on the formation of palygorskite and associated clay minerals. Four soil profiles along a calcareous catena with different depths of groundwater were sampled and analyzed using X-ray diffraction (XRD), transmission electron microscopy (TEM), scanning electron microscopy (SEM) and inductively coupled plasma mass spectroscopy (ICP-MS). Chemical composition of groundwater and those of soil samples were also determined. The XRD results showed the presence of palygorskite, smectite, mica, chlorite, quartz and feldspars in soils studied. The highest amount of palygorskite was found in horizons with permanent occurrence of groundwater. Palygorskite was not detectable using XRD in surface horizons. However, TEM studies confirmed presence of palygorskite in surface horizons. Smectite showed an inverse trend when compared with palygorskite. Stability diagrams for smectite-palygorskite system in studied profiles showed that geochemical conditions were conducive for the formation of palygorskite from smectite. Growth of palygorskite fibers on gypsum and calcite crystals, as revealed by SEM observations, clearly indicates the in situ formation of palygorskite. Chemical composition of groundwater in study area showed high concentrations of soluble $Mg^{2+}$ and silica which are necessary for the formation of palygorskite from solution. In conclusion, it seems that the two likely sources of palygorskite in the study area include the transformation from smectite and precipitation from solution.

**Key words :** palygorskite, smectite, soil solution, central Iran

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# Heavy metals concentrations in soils and plant accumulation in contaminated areas surrounding the zinc industrial estate in Zanjan province-Iran

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## Abstract

Due to their high level of durability and harmfulness to living organisms, heavy metals are said to be among the most dangerous substances in the environment. Due to presence of valuable reserves of Lead and Zinc in Zanjan province, located in northwest of Iran, many related industries have emerged in the area and their progress has led to increased emission of pollutants into ecosystems. Distribution and mobility of heavy metals (Zn, Pb, Cu, Mn, Fe, and Cd) in the surrounding soils of the estate and their transfer to wild flora is the main concern of this research. Thus, soils and plants were sampled from the studied area and laboratory-based aqua regia acid digestion of the samples collected, was followed by the atomic absorption spectrophotometry (AAS). The results of the analysis were used to determine major sources and magnitude of heavy metals pollution. Soils affected by industrial activities present a total Zn, Cd, and Cu concentrations above toxic thresholds. Plants tended to have a higher Cd accumulation (as reflected by Biological Accumulation Coefficient) from soil. Excessive accumulation of heavy metals in agricultural soils and elevated heavy metal uptake by crops in comparison to native plants in some samples may come from other anthropogenic sources notably agrochemicals used in the farms.

**Key words:** heavy metals, anthropogenic contamination, spatial variability, soil–plant transfer, Zanjan- Iran.

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# Use of brewery wastewater and its effects on soil physical and chemical properties under greenhouse conditions

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## Abstract

Brewing industry in Peru has increased markedly during the last eight years, subsequently increasing the production of solid and liquid organic wastes. Due to its organic nature, most of those wastes can be used in agriculture as sources of organic matter for soil. A pot experiment was set up to evaluate the effect of fractionated application of brewery wastewater (BW) at increasing levels (0.125, 0.25, 0.5 and 1.0 L $kg^{-1}$) on physical and chemical properties of two different-textured soils: Sandy Loam and Fine Sand, collected from the central coast of Peru. Pots were irrigated with BW was applied twice a week during eight weeks and then soils were incubated for two months. Soil pH, electrical conductivity, bulk density, water holding capacity and the contents of total and labile organic carbon, total nitrogen and lead were evaluated. Bulk density was not affected by BW application in any soil but water holding capacity was increased both in Sandy Loam and Fine Sand. Soil pH gradually decreased as the rate of application of BW increased but the electrical conductivity was not affected by application rate. Total organic carbon and total nitrogen contents in the Sandy Loam soil were significantly increased by the application of 0.5 and 1.0 L $kg^{-1}$ while labile organic carbon was increased by 1.0 L $kg^{-1}$. In the Fine Sand the content of total organic carbon was significantly increased by the application of 0.5 and 1.0 L $kg^{-1}$. Total nitrogen and labile organic carbon contents were increased by all rates higher than 0.125 L $kg^{-1}$. The relative increase in total carbon was higher for the Fine Sand than for the Sandy Loam. The application of BW did not affect Pb content on the soils. Our results showed that the use of brewery wastewater as organic source can be suitable for arid soils of the Peruvian coast.

**Key words:** brewery wastewater, soil organic carbon, soil properties

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# Assessment of heavy metal pollution in surficial soils surrounding zinc industrial complex in Zanjan-Iran

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## Abstract

Valuable reserves of lead and Zinc are available in Angoran area in Zanjan province located in northwest of Iran. Mining, processing and transportation of these heavy metals are the main sources of pollution in the province. In this study the Zinc Industrial Complex located near the city of Zanjan was selected for detailed study. Here the possibilities of spreading pollution to the nearby areas, especially along the direction of the prevailing winds, through dust blow-offs poses a potential threat for the local communities. In order to map heavy metals (Pb, Zn, and Cd) contamination in the soils of the region surrounding the Industrial Complex, 32 topsoil samples were collected on a stratified random sampling grid. The region was stratified into regularized grid cells of 0.5 *0.5 km, within each a sampling location was chosen randomly. Laboratory analysis utilized a concentrated HCl and $HNO_3$ extraction procedure, followed by inductively coupled plasma optical emission spectroscopy.

Elevated concentration levels reflected metal loadings from anthropogenic sources located in the vicinity of sampled sites. Except for the samples collected along the direction of prevailing winds, the general trend observed was a decrease in metal toxicity measured with increasing distance from the industrial complex. Relatively higher concentration of heavy metals was observed in samples collected from the centre of the industrial complex and near waste disposal sites.

**Key words:** heavy metal contamination, Zanjan province, discriminant analysis, Iran.

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# Determination of heavy metal (Fe, Cu, Zn, Mn, Cd, Pb and Ni) contaminatıon status in crossroad sides plant *(Pinus sylvestris*) and soil in Erzurum Centrum, Turkey

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## Abstract

In this research, heavy metal contamination of soil and plant samples were collected from 11 sampling points (rectorship, University roadcross, 100. yıl park, between University Junction and cemal gürsel stadium, between University roadcross and havuzbaşı, havuzbaşı, tebrizkapı, migros, gez, yenişehir and kayakyolu) where there are always traffic jam and air pollution collected soil samples in august and two periods, (January and August). Plant samples were taken, which were carried into laboratory, were dried until they reached constant weight without cleaning then their heavy metal contents analyzied. Heavy metal contens of Plant and soil samples were compared with standard critical values, then a decision were made whether they are at critical level or at toxical level in order to make some assumption for these questions.

As a result, heavy metal contents of plant and soil which collected from sampling points, differed importantly ($p<0.001$) from each other in terms of period and sampling point. Plant available Fe, Cu, and Zn, contents of soil samples which were collected from 100. yıl park were found at toxic level however all of plant available heavy metal contents of other soil samples which were collected from the other sampling points, were found under the toxic level. Fe content of plant were found at high-level in january, whereas Cu, Mn, Zn were determined at high-level in august. On the other hand, Pb, Cd except, Ni contents of plant were found at toxic-level in January.

**Key words :** heavy metal, traffic, roadcross, soil, plant, contamination

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# Effect of using magnetic technique on hydrogenous number ($P^H$) and electric conductivity ($E_C$) of water and soil

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## Abstract

Human nature doesn't accept any unknown issues; furthermore, the human may takes opposite situation against that. In antiquity the magnetism was linked with devilry jobs always, but with growth of human knowledges, the magnetism starts to impose itself on our daily life as a facet of energy facets and its employs become multitude in all scopes, and all advanced States are still save their magnetism knowledges as a secret and don't declare about that only a little.

The current research studied the using of the magnetic techniques in irrigation scope and soil modification, so that to clarify the effect of magnetic irrigation water and soil on improvement of some qualities for them, and in the relevant issue of hydrogenous number ($P^H$) and electric conductivity ($E_c$).

Seven samples were chosen (five of them were from different regions from Nineveh (Iraq) and the others were created by adding two different concentrations of salt), and the test of $P^H$ and $E_c$ were taken before subduing the samples to the magnetic field.

Each sample were divided into three parts, the 1st one were subdued for an hour to the magnetic field, the 2nd for two hours and the 3rd for three hours. Then the readings of $P^H$ and $E_c$ were taken directly after the end of subduing period to the magnetic field.

Results showed that big change have happened for the samples especially in $E_c$ where the water quality have been changed after the magnetic field cross it and become more throughputs and more liveness.

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# A macroscopic model to assess potential for phytoextraction of metals

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## Abstract

Soils and waters contaminated with heavy metals pose major environmental and human health problems. Cadmium due to its high solubility is one of the most hazardous heavy metals in the environment. Therefore, Cd contaminated soils need an effective technique for remediation. The objectives of this study were to assess the capability of Land Cress and Spinach for Cd phytoextraction from contaminated soils and to propose a new macroscopic phytoextraction model. Also, a comparison of obtained results is presented with the published results of Cd remediation with the Cd-hyperaccumulator, *Thlaspi caerulescens*. Consequently, Land Cress and Spinach seeds were germinated in the contaminated soils. Some regression analysis were performed to obtain the optimal models for predicting plant relative yield and relative plant Cd concentration in Land Cress and Spinach. Combining plant yield model with those of plant Cd-concentration, a model was derived to predict the total Cd uptake by both plants. Using the derived models, then the potential for Cd phytoextraction of land cress and spinach was assessed by calculating the number of crops needed to remediate the Cd below the remediation targets at a Cd-contaminated soil for an initial concentration of soil Cd of 50, 20, 10, and 5 mg $kg^{-1}$. The results indicated the reasonability of general forms of root water uptake reduction functions to apply to phytoextraction. The model simulations revealed that the phytoremediation of moderately-contaminated soils (below 10 mg Cd $kg^{-1}$ soil) with spinach is more feasible than that of land cress. The model simulations also revealed that although the phytoremediation of heavily-contaminated soils with land cress is more feasible than that of spinach, none of them seems to be suitable to remediate the soil in this case. Comparing the obtained results with those of *T. caerulescens* for the same initial concentrations of soil Cd revealed that in low-contaminated soils, it may take less crops of spinach to remediate the soil Cd below remediation targets. However, in high-contaminated soils, land cress and *T. caerulescens* provided almost a same potential for Cd phytoremediation (≈40 crops) and had the preference over spinach (≈80 crops).

**Key words :** Cd, land cress, phytoextraction, spinach

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# Soil contamination by leachate from Kicukiro Nyanza landfill

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## Abstract

This study was conducted at Kicukiro Nyanza landfill located in Kigali City. The site covers a surface area of 8.6 ha. Leachate from the waste piles is usually overflowing on the soil surface. Many researchers have demonstrated that leachates percolated through municipal waste piles include heavy metals which might contaminate the soil. Properties of soils neighboring the landfill and the leachates were investigated in laboratory. The results showed that values of Soil organic Carbon, pH, Cation exchange capacity and six heavy metals decreased with the distance from the landfill. Values of Total Basic cations, pH and Heavy metals were markedly high in the Leachate and septic tanks solution. The SOC in soils ranged from 2.01 to 4.38 %. All soil samples collected neighboring the Landfill had a high pH except cultivated area. The pH-KCl varied from 6.5 to 8.1 in the non cultivated soils while it was around 4 in the cultivated soils. The pH of leachate was relatively high ranging from 7.42 to 8.26. According to NYSDEC guidelines and the standards proposed by Pendias in 1984, the results showed trends of elevated levels of Pb, Cd and Cr and they were expected to be originated from the landfill leachates.

**Key words :** landfill, leachate, heavy metals

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# Influence of paper board mill sludge on soil properties

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## Abstract

The effect of paper mill sludges (PMS) with and without nitrogen fertilizer (urea) addition, on soil some physical (aggregate stability-AS), chemical (pH, EC, lime, total nitrogen-N, soil organic carbon-SOC) and biochemical properties (urease and β-glucosidase enzyme activities) was assessed in a 112-day soil incubation experiment.

The BPS amendment substantially increased the SOC both with and without urea addition ($P$<0.05). This effect continued to the end of the incubation. The PMS treatments also resulted in a significantly greater SOC than the controls during the incubation period ($P$<0.05). The soil AS was significantly greater with the addition of PMS than control. The organic matter added in the form of BPS therefore had a direct effect on the AS, providing a nutrient source capable of supporting a greater bacterial population and soil structure. The PMS amendment substantially increased the β-glukosidase and urease enzyme activities, and N both with and without urea addition ($P$<0.05). This effect continued to the end of the incubation. However, in the PMS+Urea treatment urease activity and N were significantly greater than in the PMS alone treatment. Greater β-glukosidase and urease activity in PMS amended soil indicates affirmative effect of PMS application on soil biochemical quality determined by soil enzyme activities.

**Key words:** board paper mill sludge, enzyme activity, aggregate stability, soil

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# Applying soil sorption kinetics to model phytoextraction of Cd and Pb from soils

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## Abstract

Large areas worldwide are polluted by cadmium (Cd) and lead (Pb). The effectiveness of phytoextraction as a reasonable technology to remove the pollutants from soils can be better evaluated by means of mathematical modeling. The objective of this study was to develop and verify a simple model for phytoextraction of Cd and Pb. Consequently, a new formulation was established based on soil and plant responses to Cd and Pb pollutants. Polluted sandy loam soils (0-1000 mg $kg^{-1}$ for Pb and 0-100 mg $kg^{-1}$ for Cd) were packed into the designated pots. Land cress (*Barbarea verna*, (Miller) Ascherson) and spinach (*Spinacia oleracea L.*) seeds were then germinated in the pots. Results showed the more Pb and Cd-tolerance of land cress compared to spinach. Furthermore, land cress dry matter production was up to 50 times more than that of spinach at the same contaminations. There was a relatively linear trend between land cress and soil Pb concentration, with maximum shoot Pb concentration of 66 mg $kg^{-1}$ at the final harvest. Whereas, in the case of spinach there was a threshold soil Pb concentration (600 mg $kg^{-1}$), beyond which the plant is more efficient to uptake Pb. The maximum shoot Pb concentration is 90 mg $kg^{-1}$ for spinach. Land cress was more inclined to Cd-uptake than spinach. Calculated remediation times, on the basis of plant yield and plant metal concentration, were up to 2500 and 30000 years for Pb and 1000 and 125 years for Cd remediation by land cress and spinach, respectively. The results indicated that the proposed model can reasonably predict the time needed for remediation of soil Pb contamination (*ME*=-17, *RMSE*=14, *d*=0.99 for land cress and *ME*=83, *RMSE*=72, *d*=0.99 for spinach), while the sorption isotherm is linear. However, the model does not work in the case of Cd (*ME*=55, *RMSE*=49, *d*=0.93 for land cress and *ME*=5, *RMSE*=7, *d*=0.93 for spinach). These results suggest the incorporation of other curvilinear isotherm models within the model.

**Key words :** cadmium (Cd), lead (Pb), modeling, phytoextraction, soil pollution

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# Effect of water washing on metal contents in aboveground plant tissue

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## Abstract

The ability to distinguish airborne and soil borne contamination is assessing by washing the leaves, and using distilled water for this reason is effective, cost efficient and safe in many cases. This study was proposed to assess suitability of washing technique to distinguish between airborne and soil borne several metal contaminants in an industrial area. For this reason, six plant species contain three tree species (*Pinus eldarica*, *Quercus brantii* and *Elaeagnus angustifolia*) and three shrub species (*Cercis siliquastrum*, *Nerium oleander* and *Thuja orientalis*) which growing under Mobarakeh Steel Company emission were selected. Al, Fe, Ni, Mn, Zn, Cu and Pb concentrations determined by ICP-AES in washed and unwashed leaves of plants. Water washing reduced Al, Fe and Ni concentrations significantly ($p<0.05$ and 0.01) in the most cases. The highest reduction percentage of three metals was observed in *N. oleander* which was 76%, 84% and 69% for Al, Fe and Ni respectively. Washing had no significant effect for removing Mn, Zn and Cu from leaf surface most species. Influence of washing procedure on Pb concentrations was different. Washing effect varied with various physico-chemical characters of contaminants, plant species, primary level of contaminants and washing time. There were a significant positive correlation between Al, Fe, Ni and Zn which have anthropogenic source.

**Key words :** contaminants, airborne, soil borne, washing, leaves, heavy metals

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# The application of biomonitors for the evaluation of industrial contamination

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## Abstract

Biomonitoring is the one of the cost-effective and simple ways for investigation of environmental quality and refers to process which in that using living organisms or part of them can obtain quantitative information on environmental quality. This study was proposed to assess plant and soil potential for monitoring heavy metal contaminations in an industrial area. For this reason two plant species (*Thuja orientalis* and *Photinia serrulata*) which growing under Mobarakeh Steel Company emission were selected. Concentrations of Aluminium, Iron, Nickel and Lead have been estimated in soil (A-horizon), leaves and bark samples of these plant species by ICP-AES. Element concentrations in contaminated site were compared with samples of the same species from the background site. The results indicated that total concentration of nearly all heavy metals in studied site were higher than the background site. In studied site, Pb concentration was low in both plants. Heavy metal concentrations in bark were higher than the leaves in the most cases. Al and Fe concentrations in bark of both species were higher than the leaves significantly ($p<0.05$). Comparison of plant species also indicated that both plants were suitable bioindicator for Fe, but *Thuja orientalis* was better. There was significant difference between two plants in leaves Fe concentrations ($p<0.05$). In contaminated site except for Pb in *Photinia serrulata*, leaves to bark ratio < 1 in both species confirmed barks of these plants uptake more contaminant. Total concentrations of Al, Fe and Ni in soils were high but due to calcareous soil with pH>8, plant available concentrations of these elements were low and for this reason transfer factor from soil to plant values were very small. Therefore high concentration of Al and Fe (especially Fe) in leaves and bark of both species arise from the atmosphere. So the results obtained highlight the fact that studied plants since are tolerant to these contaminants have a potential use as biomonitor for determination of some metal contamination in this industrial area without requirement to expensive way application.

**Key words :** biomonitoring, bark, leaves, heavy metal, heavy metal atmospheric contamination, transfer factor

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# Bioavailable cadmium contents of the Western Anatolian zinc mine soils and the adapted plant species

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## Abstract

Soils rich in cadmium (Cd) content are common around zinc mining and smelting areas since natural availability and chemical properties of cadmium and zinc are similar. The objective was to determine DTPA extractable Cd contents of the related soils in Western Anatolia with their noteworthy vegetation. Foliage of 57 herbaceous plants and nearby surface soil samples were collected from 52 zinc mining and smelting areas. Contaminated areas by human activities ie dump sites; arable lands etc were discarded as not resembling the typical soil properties and rare possibility of growing genotypes well adapted. At the mine areas, vegetation was extremely scarce. High elevation, toxic effect of any other heavy metals at the mine soil and surroundings, too short time for development of mature soil may be possible causes. DTPA extractable cadmium was at tracing levels in 25 of 52 soils studied surrounding zinc lead mines. Six soils were found to be containing 10-20 ppm and one sample containing more than 30 ppm DTPA extractable Cd. DTPA extractable Cd content range was 11.6-16.2% of the total. *Thlaspi praecox* known as a Cd hyperaccumulator could not be successfully introduced to the Cd rich mining soils. *Dactylis glomerata* and *Galium tenuissimum* subsp. *tenuissimum* were found to be accumulating Cd at dangerous levels in grazing lands with 23.51 mg $kg^{-1}$ and 22.25 mg $kg^{-1}$ dry matter, respectively. Volunteer species under controlled conditions included *Poa bulbosa* and *Plantago lanceolata* which were both likely Cd hyperaccumulator candidates. *Silene aegyptiaca* and *Silene vulgaris* were other species commonly found around zinc mines and cultivated without facing much difficulties. However, Cd concentrations at the above ground tissues of the species mentioned were not over 100 mg $kg^{-1}$ dry matter of threshold value for hyperaccumulating cadmium. Particular attention should be paid on *Micromeria myrtifolia* because of its natural growth around zinc mining and smelting areas, Cd accumulation characteristics and common consumption as aromatic herbal tea by local people.

**Key words :** bioavailable cadmium, DTPA extraction, zinc mining soils, *Dactylis glomerata*, *Poa bulbosa*

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# Ammonia volatilization pollution from organic fertilizers added to calcareous soil under different environmental conditions from Northern Iraq

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## Abstract

Ammonia volatilization is an important issue in agricultural production and environmental protection, in order to predict ammonia ($NH_3$) volatilization from field applied urea by estimate the rate and amount of the volatilization under different environmental condition. A Group of experiments were conducted in the field of the department of soil and water science/college of Agriculture and Forestry, University of Mosul; during the year of 2004-2005 to quantify. The rate and amounts of volatilization from surface application of 320Kg.$h^{-1}$ urea fertilizer during four different 8 seasons in calciorhtids soil. Ammonia volatilized were collected under closed system in boric acid 2% under field condition daily for 2-3 weeks. The data were described mathematically by using five different kinetic equations (zero order) first order, second order, parabolic diffusion, Elvoich and multiorder equation. The results showed that the highest amount of $NH_3$ volatilization was obtained in summer season, and there are a significant relationship between ammonia volatilization and each of temperate and the time of volatilization. The best fitted mathematical model for ammonia volatilization was the diffusion parabolic equation.

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# Effect of irrigation systems and methods with garbage leachate on soil contamination

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## Abstract

Where there is little sources of water with proper quality, water with marginal quality will consider for using in agriculture. Garbage leachate is one source of water with marginal quality in arid and semiarid regions. About 800 tons of garbage is processed in Isfahan Organic Fertilizer Factory and changed to compost daily. This process produces about 40000 liters of leachate. Insanitary application of leachate in soils can cause environmental problems. In this study, garbage leachate of Isfahan Organic Fertilizer Factory with two different dilutions was used for irrigation of soils. The experiment was performed at the field of Azad University of Khorasgan in 2008. Six different irrigation treatments were designed in a completely randomized design as split plot with three replications. The treatments were: T1, surface drip irrigation with well water (control); T2, subsurface drip irrigation with well water in depth of 30 cm (control); T3, surface drip irrigation with interval of garbage leachate and well water; T4, subsurface drip irrigation with interval of garbage leachate and well water in depth of 30 cm ; T5, surface drip irrigation with blending garbage leachate and well water; T6, subsurface drip irrigation with blending garbage leachate and well water in depth of 30 cm. Some characteristics of soil (Pb, Ni, Cr, Cd, coliform and fecal coliform) were analyzed. The results showed that complex and interval treatments were significantly differert in above parameters in comparison with controls. Also complex water was significantly more effective than interval treatment ($p<0.01$). It means that the garbage leachate increased available and total heavy metals (Pb, Ni, Cr, Cd), coliform and fecal coliform in the soils. In other hand, surface drip irrigation was more effective in contaminating of soils than subsurface drip irrigation ($p<0.01$). The interaction effects indicated that T4 treatments could control soil contamination and was less effective in contamination of the soils in comparison with complex water and surface irrigation.

**Key words:** garbage leachate, subsurface drip irrigation, surface drip irrigation, soil contamination, heavy metals

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# The effect of cocopeat, perlite and peat moss on some greenhouse cucumber's growth indices in soilless culture

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## Abstract

Soilless culture is a technique for crop production using no soil which is one form of hydroponic. Plants' growing in substrates is developing due to the large number of their advantages such as plant's nutrition, maximum yield, healthy and uniform crop production, reducing incidence of disease and pests and increasing production quantity and quality in substrate than soil culture. Properties of different materials used as a substrate effects plants growth and crop yield. So the most important factor in soilless culture is selecting a suitable substrate. The objective of this study was to examine the effect of some growing media on growth indices of greenhouse cucumber. This study was carried out in a research greenhouse of Azad University-Khorasgan branch, using a completely randomized design with 5 treatments, 4 replications and 10 plant in each replication. Irrigation period, environment temperature and saturation humidity were kept the same for all treatment. Five different growing media including pure cocopeat, perlite-cocopeat(50-50 v/v), perlite-cocopeat-peatmoss (50-20-30 v/v and 50-30-20) and perlite-peatmoss were investigated. Growth indices such as yield, fruit's number, stem diameter, leaf area index and biomass as well as physical and chemical properties of growing media were examined. The highest yield, the largest stem diameter and the highest biomass were obtained from cocopeat and perlite-cocopeat. The significant difference (in 5% level) observed in some growing indices such as fruit's number and biomass. However the yield, stem diameter and leaf area index did not indicate any significant difference. Generally, the best growth was found in cocopeat substrate which can be used as an appropriate cucumber's growing media in soilless culture.

**Key words:** hydroponic, soilless culture, cocopeat, perlite, peat moss, growing media, greenhouse cucumber

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# Bioremediation of oil contaminated soils by bacteria indigenous to oil-rich areas and the impact of environmental parameters

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## Abstract

Iran is oil-rich country and encounters with oil pollution of soil and water. Bioremediation of these pollutants is an appropriate solution compared to the physical and chemical remediation methods. Meanwhile, there are some factors that increase the rate of biodegradation. Therefore, the aim of this study was to increase bioremediation rate of two indigenous bacteria isolates (isolated from oil contaminated soils in south of Tehran oil refinery) in the beds containing sawdust. Due to increased production and consumption rate of gasoil in Iran and many countries, this section of oil was selected as the main pollutants. Results indicate that in optimal environmental conditions (temperature, 2 ± 27 ° C, humidity 60% WHC and daily aeration), bacterial isolates have been able to degrade, about 78.87% and 93.53% of gasoil in soil and soil-sawdust mixture beds, respectively during the period of 45 days. These results imply sawdust role in improving aeration, water holding capacity and ultimately increasing bioavailability of gasoil to bacteria.

**Key words :** bioremediation, oil contaminated soil, hydrocarbon compounds, biodegradation

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# Agroecological estimation of turf-brown soils on different agricultural land at Middle Preduralye

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## Abstract

Turf-brown soils are widespread in a soil-cover of Perm region. These soils take one of the first places at this territory. Turf-brown clay soils of different kinds (e. g. forest, fields) have similar morphological properties. According to the mechanical analysis of soil the result of agricultural use, carrying out of oozy particles from a 0-40cm layer is becoming more often, that may lead to the podzolization of a profile afterwards. Virgin turf-brown soils possess good agrophysical properties. It's necessary to apply a deep loosening and taking of organic fertilizers into the soil for the improvement of agrophysical properties of arable soils. These methods improve the structure of soil and reduce soil density as a result of agricultural use. It's established, that the stocks of humus, the degree of saturation of soils with bases are being reduced, acidity of a soil rises in arable turf-brown soils because of cultivation in comparison with the virgin ones. Agroecological estimation has shown, that turf-brown clay soils which are under flat woods, are stable and turf-brown soils of arable soils are of relative stability owing to a high-buffer action of their parent breed – that is the eluvium of Perm clay.

**Key words:** soil, a virgin soil, an arable soils, properties, agroecological estimation

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# Bioremediation of sewage sludge for land application as a fertilizer using bioleaching

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## Abstract

Huge amount of sewage sludge is generated worldwide that needs a proper discharge strategy, which retains both future sustainability and present needs. Land application of sewage sludge can be a good solution, whereas it is cost-effective disposal method for treatment plants and also can provide a favorable fertilizer for farm lands. It provides an economical alternative for the final disposal of the sewage sludge, but heavy metals in sewage sludge is always an issue restricting its general use. Therefore, removal of heavy metals prior to land application is likely to be a possible and practical means for reducing metal content in sewage sludge. Bioleaching appear to be a promising technology in removing heavy metals from contaminated sewage sludge. The effect of bioleaching on heavy metals solubilization and also their DTPA-extractable form changes was investigated in this work. The samples of activated sludge were collected from three of most important sewage sludge treatment plant of Tehran. Total metal concentration and DTPA-Extractable (Diethylene Triamine Pentaacetic Acid) metal content of samples were determined. Bioleaching using Acidithiobacillus ferrooxidans was carried out in two experiments to study solubilization rate and changes in DTPA-Extractable Fe, Cu, Ni and Pb. Results showed that bioleaching could affect metal DTPA-Extractable form significantly but, there was no definite behavior for each metal and each metal in different samples. However, bioleaching can efficiently remove mentioned metals from sewage sludge solid phase. Bioleaching can remove approximately 24.73 % of Fe, 83.96 % of Cu, 81.46% of Ni and 38.96 % of Pb from sewage sludge samples. In fact, bioleaching is more efficient and economic than chemical leaching. Indeed Acidithiobacillus ferrooxidans is a powerful bacterium in metals removal and environmental remediation programs.

**Key words:** bioleaching; heavy metal; sewage sludge bioremediation; acidithiobacillus ferrooxidans; DTPA-extractable

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# Monitoring of nitrate concentration of well waters in the Kumluca district of Antalya in Turkey

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## Abstract

This study was carried out to determine the nitrate ($NO_3$) concentration of irrigation waters obtained from wells in greenhouses located in Antalya-Kumluca region. For this purpose, water samples were taken from 20 wells in the region in 1996 and 2008. In water samples, EC and $NO_3$ concentrations were analyzed. The results obtained showed that $NO_3$ concentration of the well waters in the region ranged from 2.46 to 164.91 mg $L^{-1}$ in 1996, and from 0.15 to 66.04 mg $L^{-1}$ in 2008. EC values ranged from 548 dS $cm^{-1}$ to 1643 dS $cm^{-1}$ in 1996 and from 509 dS $cm^{-1}$ to 1385 dS $cm^{-1}$ in 2008. The average nitrate concentration and EC values in well waters were found to be 52.15 mg $L^{-1}$ and 1041 dS $cm^{-1}$, respectively, in 1996, and 19.37 mg $L^{-1}$ and 956 dS $cm^{-1}$, respectively, in 2008. This indicates that a decrease in both nitrate concentration and EC occurred in 2008 compared to the average values in 1996. The positive correlation was observed between EC values and $NO_3$ concentrations of the well waters. According to these findings, it is clear that the $NO_3$ pollution of the ground waters decreases in the region. It is thought that this situation is a result of applications of agricultural methods and techniques in recent years that do not disturb ecological balance. As a result, it is concluded that more controlled applications of nitrogen fertilizers are conducted in the region.

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# Determination of radioactive pollution in groundwater samples in Nineveh Province in North-West of Iraq by using liquid scintillation technique

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## Abstract

The aim of this study was to determine the level of natural radioactivity Pollution and the calculation of effectiveness of quality in an environment of Nineveh province in almost groundwater water resources including hot springs of the Nineveh province and whether this radiation causes any danger to health. The activity concentrations of $^{222}$Rn and $^{226}$Ra and $^{238}$U in drinking water were determined in water samples from 50 drilled wells in Nineveh governorate in north-west of Iraq republic. Samples of raw and treated water from bored wells have been collected from all parts of Nineveh and analyzed for radium-226 and radon-222 content . where The analysis included chemical separation technique and detection occur by using liquid scintillation system and gamma-ray spectroscopy system type (DSA 2000) with high-purity germanium detector (HPGe) with 50% efficiency and the ability of the analysis (2.2 keV) for energy 1332 keV to the source $^{60}$Co.

The Radon, a naturally occurring radioactive noble gas, is the main source of the natural radiation that is received by the population. It derives from the traces of radium in rocks and can diffuse directly or as solution in water to the earth's surface. Where Measurements of radium and radon concentration in a total of 50 different well waters sampled at about 50-350 m depth in the Nineveh area of Iraq have been made. It was found that the concentration ranged from 860 - 39000 Bq/m$^3$ for radon and from 12 to 165 Bq/m$^3$ for radium. and 2800 – 4900 Bq/m$^3$ for $^{238}$U . The reason for variations of Radium and Radon concentration is the diverse geological structures in Nineveh province.The hot springs were found to have high level of activities and some water drilled wells in Adaya , ham'am alalil village and singar city had the highest activities among other cities in Nineveh province.

**Key words:** liquid scintillation counting , groundwater, radium , radon , uranium

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# Comparison of cluster dry biomass and humidity percentage of barley in petroleum contaminated soil and clean soil

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## Abstract

Most problems of soil in large cities are due to of modern industries development in these areas. Petroleum refineries contaminate surrounded soil, water and air of themself. Like other people, residetns of such regions, need to cultivate to subsist. Undoubtedly this pollution affects on plant growth in those soils. According to last researches and tolerance of some plants to petroleum contamination, in this study we chose barley and compared the cluster dry biomass and it's humidity percentage of barley in petroleum contaminated soil and clean soil to know that if cultivation in polluted soils would have economical justification. Soil analysis experiments is performed with standard methods to know that both contaminated and clean soil have similar properties, and don't have different effect on plant growth. Barley (*Hordeum vulgare*) in three accumulation levels I, II and III that became more, respectively (10-15-20 seeds in each pot) were planted in contaminated and clean soil with loam texture. The results showed that cluster dry biomass of barley was lower in contaminated soil than clean soil, generally. So, the yield of cultivation in polluted soils is lower than clean soils. The remarkable point of this study is that cluster humidity percentage were generally higher in contaminated soil than clean one. Also accumulation levels didn't have particular effect on evaluated factors.

**Key words:** barley, biomass, cluster, humidity percentage, soil

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# Effects of some potential toxic elements with organic origin on the pollution of agricultural areas and growth of bean

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## Abstract

Remainder effects of potential toxic elements with the origin of industrial sewage sludge in soil, in the case of their use in the agriculture their amounts passing into plant and their effects on plant growth were investigated in this study realized in the land of Rural Services Research Institute of Konya in 1999. Bean was grown in the treatments of control, optimum NP and 3 and 6 tons sewage sludge (dw)/da in the experiment with the randomized blocks treatment design. According to the results, the sewage sludge increased EC, organic matter, available P, K and DTPA-extractable Fe, Zn, Mn, Cu, Cd, Pb and Ni amounts in the soil before sowing. The contents of DTPA-extractable metal also generally decreased in the soil analysis in after harvest, with the comparing to before sowing. Sewage sludge treatment significantly increased the contents of Zn (R = 0.604*), Mn (R = 0.649*) and Cd (R = 0.766**) in the bean leaf, also Zn (R = 0.899**) in the grain. There was no significant effect of the other metals in the leaf and grain.

**Key words:** sewage sludge, heavy metal, bean

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# Delibration of mutual effect of barley, vetch and bean germination and soil petroleum hydrocarbon contamination

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## Abstract

Ignoring the results of usage and remediation of petroleum in Iran for about one century had caused a lot of damages to a large part of soil and water resources. So, taking a useful national strategy in order to solve this problem and achievement to stable development is vital. Undoubtedly this strategy should be based on knowing the equipment and should have the minimum risk on making the dangerous environmental problems as possible. Achieving this goal, we introduced the most convenient and the least dangerous remediation method. To decrease soil petroleum hydrocarbon contamination, three plants, barley (*Hordeum vulgare*), vetch (*Vicia Sativa*) and bean (*Phaseolus Vulgaris*) in three accumulation levels I, П and Ш that became more, respectively; (Barley 10-15-20, Vetch 10-15-20 and Bean 5-10-15 seeds in each pot) were planted in style of Randomized Complete Block Design (RCBD) and factorial experiment. Total Petroleum Hydrocarbons (TPHs) had been measured with the standard method of the U.S. Environmental Protection Agency. The results showed that the amount of soil remediation has a direct relation with increasing accumulation level. The maximum remediation was belong to barley that in the maximum level of accumulation it reduced the amount of contamination from 27.666 to 18.33 g/kg soil (33.78%). Vetch decreased the contamination until the germinate step at maximum level of accumulation from 27.666 to 19.666 g/kg of soil (28.91%). Because of death of many Bean plants, sampling for more than one time in each accumulation was not possible and results just show reduction of contamination and statistical analysis was not possible. We also deliberate effects of contamination on plants germination. The most important effect of contamination on plant germination was death of many bean germinates and prevention from plants growth.

**Key words:** barley, bean, contamination, soil, vetch

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# Effects of water management practices on reducing arsenic toxicity in rice

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## Abstract

The digging of tube-wells for drinking water supply and shallow tube-wells for irrigating crop fields into aquifers with elevated arsenic in Bangladesh has been described as the greatest mass poisoning issue in the human history. Human beings are exposed to As by ingestion of As contaminated water and food and by inhalation of As containing dust. Practical measures are needed to mitigate the problem of excessive As accumulation in paddy rice. We carried out a pot experiment at the net house of Bangladesh Agricultural University, Mymensingh during January – May 2009 using calcareous soil elevated with arsenic (22.5 ppm) due to long term application of arsenic contaminated irrigation for paddy cultivation to find out an option of water management that will reduce the arsenic toxicity to rice plants. The rice variety tested was the BRRI dhan29.Three levels of arsenic was added @ 0, 10 and 20 mg As $kg^{-1}$ from $Na_2HAsO_4.7H_2O$ to the soil with three water management options i.e. Continuous 5 cm standing water, alternate-wetting-drying (AWD) and continuous saturation level. Each pot had received 100 mg $kg^{-1}$ N, 40 mg $kg^{-1}$ K and 25 mg $kg^{-1}$ S from urea, MoP and gypsum, respectively. Arsenic contamination reduced plant height, tillering, panicle length, seeds/panicle, 100-seed weight, grain and straw yields of rice. The grain yield of rice was reduced by 40 % for 10 mg $kg^{-1}$ As treatment and 82% due to 20 mg $kg^{-1}$ As. Such reductions for straw yield were 35% and 58 % with these two As treatments, respectively. Alternate wetting and drying irrigation treatment significantly increased plant height, panicle length and grains/panicle which ultimately increased grain and straw yields of rice over two other water management methods. The toxicity of arsenic contamination to rice was greatly reduced due to AWD water management compared to other water management options. Arsenic concentration in both grain and straw significantly increased due to arsenic application. AWD technique of water management reduced the grain arsenic level compared to other water management options. This study demonstrated that growing rice with AWD technique may be further explored under field condition to reduce arsenic content in rice grain.

**Key words:** arsenic, rice, water management options

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# Effects of soil petroleum hydrocarbons contamination on *Medicago sativa* and *Trifolium repens* plants

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## Abstract

Phytoremediation process is a new technique to remove contaminants from the environment. It may be difinned as used of plants to remove or sequester hazardous substances from contaminated soil or surface and ground water. Difference in the ability of various crops to growin contaminated soils should be better explored to choose the most appropriate plant species in the development of any phytoremediation process. In this study in order to evaluate the effects of petroleum hydrocarbons at the end of growth on two plants, (*Medicago sativa* and *Trifolium Repens)* in two planting density levels in factorial experiment with complete randomized design (CRD) with three replications was used. Results showed that presence of petroleum hydrocarbons in contaminated soil, at the end of plants growth caused decrease in stem height of *Trifolium repens* plant in contaminated soil in comparision with uncontaminated soil. But *Medicago sativa* plant had not noticeable decrease in stem height between contaminated soil and uncontaminated one. In measurement of root height not only no significant decrease in root height of cultivated plants in contaminated soil had been seen, but also an increase in root height of both cultivated plants in contaminated soil than uncontaminated soil had been seen. Peresence of petroleum pollutants caused decreas in wet weight of shoot and root of *Medicago sativa* plant to 50% and *Trifolium repens* plant to 40% and 20%, respectively. In this study a noticeable decrease in dry weight of shoot and root of both cultivated plants in contaminated soil than uncontaminated soil had been seen.

**Key words:** contamination, hydrocarbons, petroleum, phytoremediaton, Trifolium repens

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# Ecomeliorative estimation of soils of Nakhichevan AR

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## Abstract

Soils of foothill and along Araks of Nakhichevan AR are formed in the condition of complex geological structure, arid climate. Here the development of agriculture meets water problem. In ancient times and nowadays the kahriz systems are used for problem solution. From 1960 years in Nakhichevan the volume of 1,35 mlrd.$m^3$ Araz water storehouse, Arpachay (150 mln.$m^3$), Haydar Aliyev (100), Bananiyar (19), Sirab (12), Uzunoba (8), and 400 subartesians and pump stations have been used. The ecological and meliorative condition has changed in soils of the regions where occurred bogging and repeat saltinity. For occurring purposes of processes and conducting fight methods against them we have come into the following conclusions.

In clause dynamics salting soil grounds on a background of a drainage is investigated. The mineralization of earth and drainage waters is simultaneously investigated. Is revealed, that high speed of factor of a filtration soil grounds enables fresh watering salted grounds with the help watering with the increased norm of submission of waters. On water areas of water basins Araz and Sirab, Nehrem where the drainage is absent goes overcastting and salting. The offers and recommendations about the factors effecting on aggravation of ecomoliarative condition occuring in soils of foothill and along Araks and preventing them.

**Key words:** Nakhichevan, ecomeliorative, kahriz, geological structure, repeat salinity

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# Study of some plants effects on remediation of soil petroleum hydrocarbons contamination by germination process

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## Abstract

During the past years, leakage and development of petroleum contaminants is became serious and their natural properties caused them very difficult to degrade and remediate from soil. So various methods including physical, chemical, and biological methods have been suggested to remediate this pollutant. In recent years cleaning of contaminated soils by phytoremediation has been considered and used more than past and it's purpose is feasibility, identification and introduction of plant species that are capable to grow in polluted soils and degradate soils contamination corresponding to environmental considerations. In this study in order to evaluate the possibility of cleaning contaminated soil around Tehran petroleum refinery, phytoremediaton process with three plants, (*Medicago sativa*, *Lolium perenne* and *Trifolium repens* ) in three planting density levels in factorial experiment with complete randomized design (CRD) was used with three replications. Purpose of this study was to observe the changes in the rate of petroleum hydrocarbons concentration in the soil under cultivation of these plants by germination process. The results showed that plants growth in degradation of total petroleum hydrocarbons (TPHs) was effective and amount of remediation in soil has direct relationship with planting density level. It means that although *Lolium perenne* plant in minimum density level had higher remedition than *Medicago sativa* and *Trifolium repens* with increasing of density level of *Medicago sativa* plant, higher yield had been observed. So *Medicago sativa* plant had highest yield in remediation of soil hydrocarbon contamination that reduced the contamination from 14.8 g/kg of soil to 8.53 g/kg of soil (42.36%). *Lolium perenne* and *Trifolium repens* plants in the highest density level degradate contaminants from 14.8g/kg of soil to 10.2 g/kg of soil (31.08%). Whereas these changes in noncultivated soil were so little (about 7.27%), that it might be related to some effective processes for example biological activities, leaching, evaporation and sublimation.

**Key words:** contamination, lolium perenne, medicago sativa. phytoremediation,

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# Contamination of spring waters in Mid-Black Sea Region by organochlorine pesticides and their transport in soil

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## Abstract

Organochlorine pesticides are ubiquitous and persistent organic pollutants used widely throughout the world. Due to the extensive use in agriculture, organic environmental contaminants such as HCH, DDT along with other organochlorine pesticides are distributed globally by transport through air and water. It may move downward in the soil and either adhere to soil particles or dissolve in soil water. Pesticides may be leached out of the root zone by rain or irrigation water or wash off the surface of the land. The main aim of present study is to determine contamination levels of organochlorine pesticides in the spring water of Mid-Black Sea Region. Water samples have been collected three seasonally from six spring water for a period of one year. A rapid, sensitive, convenient, and highly quality-assured method is presented for determination of sixteen organochlorine pesticides in the spring water. Solid-phase extraction (SPE) followed by gas chromatographic techniques with electron capture detection (ECD) was used for determination of the compounds. SPE using prepacked reversed phase octadecyl (C-18 bonded silica) contained in cartridges was used for sample preparation. In all samples pesticide residues were analyzed by GC (Fisions Mega II Series) with $Ni^{63}$ ECD. The most commonly encouraged organochlorine pesticides in spring waters were the isomers of hexachlorocyclohexane (HCH), aldrin and heptachlor epoxide. Most pesticide detections were at concentrations less than 0.1 µg/l. The occurrence of these compounds in spring waters can be attributed to intense agricultural activity as well as to transboundary pollution.

**Key words:** organochlorine pesticides, spring waters, solid-phase extraction, soil permeability

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# Distribution of soil heavy metal contamination in Hashtgerd, Iran

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## Abstract

Concentrations of elements (Cr, As, Co, Cu, Ni, Mo, Pb, and Zn) are studied in the 149 soil samples of the Hashtgerd area. The average abundance order of heavy metals content is: Zn>Ni>Cu>Cr>Pb>Co>As>Mo. The maximum enrichment factor(EF) for Zn is 2.20, which means moderate enrichment, while Pb, Ni, Co, As, Cr, Mo and Cu with EF <2, indicate deficiency to minimal enrichment. The principal component analysis (PCA) is used to assess the main factors responsible to concentration of heavy metals. The strong association of elements such as to Co, Fe, Ni, Sc, and Cu suggests a common source. Also, high loading of these heavy metals with Fe agrees with the measured correlation coefficients and indicate that Fe hydroxides play a significant role in the distribution and sorption of heavy metals in soil samples of the study area. The results of PCA for Zn, and Pb indicate that these metals are influenced by anthropogenic activities. Also, indicate that organic carbon content and S play a significant role in the distribution and sorption of these heavy metals in the soils. Mo (PC3) and As and Cr on PC4 do not show high loading with other heavy metals. The variable behavior of Mo, As and Cr probably reflect various sources of these elements.

**Key words:** soil contamination, enrichment factor, principal component analysis

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# Evaluation some of tree species for biomonitoring of heavy metals and air pollution tolerance index in Isfahan

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## Abstract

Studies were carried out to determine the physiological response tree species Cupressus sempervirens, Morus alba, Fraxinus excesior and ligustrum ovalifolium during 2009. By determining some physiological parameters, which included total chlorophyll, ascorbic acid, pH and relative water content , APTI was recorded in the leaf samples and content of heavy metals (Cu, Fe, Mn, Cd, Pb, Zn), impact of automobile exhaust on these species was assessed. Results showed that the sites and plant species in 5 percent level of Fe, Cu, Zn content significant. The species of Cupressus sempervirens, Morus alba, Fraxinus excesior and ligustrum ovalifolium can be used as biomonitoring of airborne heavy metals in dry areas. Traffic emissions were found to be the main source of heavy metal pollution in the atmosphere of Isfahan .The ANOVA analysis showed that there are no significant differences between four sites and four species in content of ascorbic acid, total chlorophyll, pH, relative water content and air pollution tolerance index. tree species and sites have studied, in PH and RWC are significant in 1 percent level . The results showed that air pollution tolerance index is order to Morua alba> ligustreum lucidu > Cupressus sempervirens > Fraxinus excesior.

**Key words:** roadside pollution, automobiles, heavy metal, APTI

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# Identification of nitrate leaching hot spots in a large area with contrasting crop and soil texture

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## Abstract

Leaching of $NO_3$-N from agricultural lands often occurs in well-defined hot spot areas, the areas that often appear with $NO_3$-N concentrations in shallow underlying aquifers. Once identified, the hot spots can be further analyzed for evaluating and ranking appropriate alternative management techniques to reduce impact of $NO_3$-N on groundwater. This study was conducted to evaluate nitrate leaching hot spots in an approximately 26.000 ha area in Serik plain of Antalya in southern Turkey. Geo-referenced groundwater samples were taken form 210 wells and the soils around the wells in October of 2009. The water and soil samples were transported to a laboratory in refrigerated cases and analyzed for nitrate with a spectrophotometer. Data were analyzed by classical statistics and geostatistics. Both soil and groundwater nitrate concentrations showed a considerably high variation. Mean was 10.23 $mgL^{-1}$ for Groundwater $NO_3$-N and 2.16 mg L for groundwater $NO_3$-N concentration. Surface maps for groundwater and soil nitrate concentrations showed that some localities occurred with nitrate concentrations grater than 10 Mg $L^{-1}$ of critical NO3-N concentration specified by World Health Organization. Geostatistical range and nugget effect calculated for variables indicated that nitrate leaching was spatially dependent in the study area. Furthermore, sills of semivariogram calculated for both variables were not greater than their general variance, indicating that no global trend exists for $NO_3$-N leaching in the study area. However, krigged surface maps of $NO_3$-N showed considerable local highs (hot spots) for soil and graoundwater nitrate concentrations. These hot spots should be considered in managing nitrate fertilizer and irrigation water. Modeling nitrate leaching for mitigating movement of $NO_3$-N beyond the root zone in this region is under study.

**Key words:** groundwater, hot spot, nitrate leaching, Serik plain, spatial variation

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# Study of water pollution factors in Sistan region, problems and solutions

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## Abstract

Today, natural environment is being to destroy and pollution rapidly. The development of pollution is a new tragedy and huge calamity. In future, water pollution will be one of the most problems at agriculture in Sistan. Most important of factors that polluted water in Sistan are concluded present of hardpan in soil, topography, evaporation and transpiration that is more than 4500 mm/year, oil contraband, sophisticated of underground water, lake sediments, enhance of produce wastewater, industrialized, water deficit and using of weapon in adjure countries and so on. The result of compare between before and after water deficit showed that salinity, electrical conductivity and salinity density of soil were been enhanced. In some region water can not be used for drinking and agriculture. Microbes, bacteria and disease factors enhanced among 35%. More than 12000 ha of agricultural field, 19000 ha of natural resources land and 75000 ha of Hamoon were be destroyed. Some solution to decrease water pollution is development of water transport systems, irrigation method in farms, control of using of chemical fertilizers and pesticides, economy in water using, filtration of wastewater, applying waste water in agriculture, control of spates. Thus it is essential to protect Sistan region for sustain and establishment.

**Key words:** water pollution, Sistan, problems, solutions

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# Soil usage and remediation of heavy metal polluted soils

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## Abstract

Heavy metal pollution is a growing environmental problem, which requires immediate attention. With current commercial remediation reagents failing to provide the needed requirements as safe and effective metal chelators, the need for new technology is critical. Chemical treatment technology has greatly improved over the years for wastewater that contains suspended solids, oil, metal and metal ions, including disposing of rancid metal removal fluid. The question is how to get rid of the spent metal removal fluid in a manner that is both economically and environmentally responsible? The Environmental Protection Agency (EPA) had declared that unless certain standards are met for metal, oil and grease, suspended solids and other contaminants, wastewater/metal removal fluid cannot be discharged to sewer or surface water.

Microbial capacity for heavy metal concentrate has known during the two last decades that microorganisms are being used as a potential alternative for heavy metal removal. Biosorption is a process which solids of the natural origin e.g. microorganisms, alive or dead, or their derivates, are employed for sequestration of heavy metals from environment. The transfer of metal ions from aqueous to solid bisorbent phase can be due to passive, facilitated or active transport. The mechanism of uptake can be due to physical sorption, chemical complexation with microbial cell surface groups or bioaccumulation.

**Key words:** pollution, heavy metal extraction, degradation, filtration, stabilisation, phyto-remediation

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# Nutrient accumulation in street greenery of Riga (Latvia) in increased salinity conditions, 2005 and 2007

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## Abstract

One of the most widespread tree species of street greenery in Central, Northern and Eastern Europe, int. al. in Riga (Latvia) located in the boreo-nemoral zone, is lime tree *Tilia x vulgaris* H. A topical problem in the boreo-nemoral zone is using of de-icing material in winter to prevent ice formation on roads and salt accumulation in greenery. The aim of the research was to find out the macronutrient status in the street greenery of Riga to reveal the effect of de-icing salt accumulation on the element supply and the vitality of *T. x vulgaris*. The concentrations of K, Ca, Mg and Na, $Cl^-$ were estimated in lime leaf and soil samples collected from 27 study sites (5 streets or 8 objects) in Riga from March 2005 to August 2007, but the concentrations of N, P and S in samples from June and August 2007. Additional three sites in a park area were chosen for the background level. A bioindication research on the vitality of the street greenery carried out in August of 2005 and 2007 revealed mainly damaged status of lime trees. The damages to the deciduous trees typically appeared as leaf necrosis and dead branches. Ordination with principal component analysis (PCA) of results showed a high heterogeneity of the soil and lime leaf chemical composition. A negative medium close correlation was found between the concentration of Na and K in the leaf samples in July and August 2005 and August 2007, as well as between Na and Mg in June 2005. Our research did not reveal a statistically significant correlation between the content of $Cl^-$ and its antagonists (N, S, P) concentrations in lime leaf and soil samples, as exception – there was a negative medium close correlation between the $Cl^-$ and Ca in lime leaves of August 2007. The main problems of the mineral nutrition of the street greenery in Riga during 2005 and 2007 were elevated concentration of Ca, Mg and P, decreased concentration of N, S and, especially, K in soil, which could be promoted by Na and $Cl^-$ regular accumulation in soil, as well as other factors. Whereas insufficient amount of K and S, in several sites Mg and P, was stated in lime leaves in 2005 and 2007. Probably, it could be facilitated by $Na^+$ and $Cl^-$ antagonism in the street greenery of Riga.

**Key words :** elements, de-icing salt; street trees, soil, lime leaves

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# Groundwater nitrate pollution in Sahahriyar region, south-western of Tehran, Iran

**A. Imani Jeyhounabadi [1], M. Nezami [1], A. Yousefzade [2], M. Mozafariyan [1]**

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## Abstract

In recent decades, use of nitrogen fertilizer has been increased irrespectively of the effects on soil properties, agricultural products and especially environmental pollution. Nitrate is the main form of the nitrogen element and it can cause of groundwater contamination. In most arid and semiarid regions, groundwater resources are the main source of water for several applications, because these resources have good and constant quality and use of them is very easy. High nitrate concentration in water resources is hazardous for human, animals and plants. The objective of this study was to determine temporal and spatial nitrate pollution in groundwater of agricultural, industrial and urban districts of Shahriyar region. Sahahriyar region is located in arid and semiarid region of Iran and due to drought crisis in recent years, so use of groundwater resources in this region has been increased. We divided this region to smaller regions including: Shahriyar, Quds and Malard and we also divided this region to agricultural, industrial and urban districts for purposes of land usage, to fulfill this study. In general 30wells were selected and monthly groundwater samples were collected during May-September 2008. Samples were analyzed to nitrate, nitrite, pH, electrical conductivity and total dissolved solids in each sampling round. About 60 percent of wells had nitrate concentration upper than standard level (45 mg/lit) and during this study average of nitrate concentration in different wells ranged from 2.9 to 66.2 mg/lit. The average of nitrate concentration in groundwater in Shahriyar, Quds and Malard regions was 29.8, 35.7 and 54.1 mg/lit and 53.5, 50 and 85.7 percent of total wells in these regions had nitrate concentration more than standard level, respectively. Certainly abundance of nitrate concentration was different in various regions. Maximum nitrate concentration in groundwater was in agricultural lands in west of Malard region (68.2 mg/lit). Maximum contamination of nitrate in most of sampling areas related to agricultural activities, and urban and industrial activities had less influence than agricultural activities in this contamination. Agricultural activities were the most effective factor in nitrate pollution in groundwater resources and distribution of nitrate pollution was related to these activities. Nitrate contamination in groundwater resources in most of regions had increasing trend with time and maximum of nitrate concentration was in July 2008.

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# Determination of Cd, Cu, Pb, Zn in soil samples taken from the Middle Black Sea region

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## Abstract

The heavy metal content of soil in urban and industrial areas has received increased attention with regard to the increased number of polluted sites in existence. Elevated heavy metal concentrations were not only found in both soil and plant samples from historical mining and smelting operations, but other sites used for deposition of municipal and industrial wastes. The contamination of agricultural soils surrounding industrial activities has also been reported to occur due to atmospheric deposition of dust and aerosol particles. The use of commercial fertilizers and pesticides (copper containing fungicides etc.) and application of compost and sludge to soil are among the main sources of pollution. Within this study composite soil samples from Samsun, Sinop, Merzifon, Kastamonu-Ilgaz were taken, air-dried and analysed for their properties according to standard procedures. Grain size analysis was performed as outlined in ASTM D 422-63 (1999). The organic content of soil was determined as described in the method TS 8336 (1990) of Turkish Standards Institute (TSE), which is based on the Walkley-Black Method. The cation exchange capacity (CEC) was measured according to the method of Rump and Krist (1992). Soil pH was analysed as outlined in ASTM D4972-95a (1995). The total concentration of heavy metals in soil was determined after sample preparation for about 8 h with a pressure digestion system. Analyses of cadmium, copper, lead and zinc were performed by flame-AAS. The results were related to the possible sources of heavy metals like nature, motorway, agricultural and industrial activities. Accordingly, soil samples taken from rural areas represented lower heavy metal contents than soils close to motorways, waste dumping sites, other industrial activities like metallurgical operations, smelter processes and metal production. Some of the polluted cites mostly located in industrial areas revealed higher heavy metal concentrations than specified in the Soil Pollution Control Regulation.

**Key words:** heavy metals, sources, soil contamination, spatial variations

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# Groundwater nitrate pollution in Sahahriyar region, south-western of Tehran, Iran

**A. Imani Jeyhounabadi [1], M. Nezami [1], A. Yousefzade [2], M. Mozafariyan [1]**

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## Abstract

In recent decades, use of nitrogen fertilizer has been increased irrespectively of the effects on soil properties, agricultural products and especially environmental pollution. Nitrate is the main form of the nitrogen element and it can cause of groundwater contamination. In most arid and semiarid regions, groundwater resources are the main source of water for several applications, because these resources have good and constant quality and use of them is very easy. High nitrate concentration in water resources is hazardous for human, animals and plants. The objective of this study was to determine temporal and spatial nitrate pollution in groundwater of agricultural, industrial and urban districts of Shahriyar region. Sahahriyar region is located in arid and semiarid region of Iran and due to drought crisis in recent years, so use of groundwater resources in this region has been increased. We divided this region to smaller regions including: Shahriyar, Quds and Malard and we also divided this region to agricultural, industrial and urban districts for purposes of land usage, to fulfill this study. In general 30wells were selected and monthly groundwater samples were collected during May-September 2008. Samples were analyzed to nitrate, nitrite, pH, electrical conductivity and total dissolved solids in each sampling round. About 60 percent of wells had nitrate concentration upper than standard level (45 mg/lit) and during this study average of nitrate concentration in different wells ranged from 2.9 to 66.2 mg/lit. The average of nitrate concentration in groundwater in Shahriyar, Quds and Malard regions was 29.8, 35.7 and 54.1 mg/lit and 53.5, 50 and 85.7 percent of total wells in these regions had nitrate concentration more than standard level, respectively. Certainly abundance of nitrate concentration was different in various regions. Maximum nitrate concentration in groundwater was in agricultural lands in west of Malard region (68.2 mg/lit). Maximum contamination of nitrate in most of sampling areas related to agricultural activities, and urban and industrial activities had less influence than agricultural activities in this contamination. Agricultural activities were the most effective factor in nitrate pollution in groundwater resources and distribution of nitrate pollution was related to these activities. Nitrate contamination in groundwater resources in most of regions had increasing trend with time and maximum of nitrate concentration was in July 2008.

**Key words:** nitrate, groundwater, pollution, Iran

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# Phytoextraction of heavy metals from mine soils using hyperaccumulator plants

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## Abstract

Phytoextraction is an environmental-friendly and cost-effective technology that uses metal hyperaccumulator plants to remove heavy metals from soils. The metals are absorbed by the roots, transported and accumulated in the aerial parts of the plants, which can be harvested and eliminated. The aim of this work was to study some hyperaccumulator species that could be useful to decontaminate mine soils and also to investigate the bioavailability and uptake of these metals by plants with the addition of organic amendments. Pot experiments were performed with soil samples collected from two mining areas in the north of Madrid, where there was an intense mining activity more than 50 years ago. Two species (*Thlaspi arvense* and *Brassica juncea*) were sown under controlled conditions in pots filled with contaminated soils mixed with 0 Mg, 30 Mg and 60 Mg per hectare of two different organic amendments: a commercial compost made of pine bark, peat and wood fiber and other made of horse and sheep manure and wood fiber. Plants were harvested at the end of their crop cycle and were digested in order to measure metal concentration (Zn, Cu and Cd) in roots and shoots. Highest plant metal concentration was observed in pots treated with pine bark amendment and with pure soil due to an increase in metal bioavailability with decreasing pH. Also in those treatments the total plant biomass was lower, even some plants could not germinate. On the contrary, there was a lower metal concentration in plant tissues of pots with manure because its higher pH whereas plant growth was significantly larger so there was an incresing amount of metals removed from soil by plants. Comparing both species results indicate a higher metal concentration and uptake in *B. juncea* than *T. arvense*. In conclusion, results show that pH affects metal bioavailability and uptake by hyperaccumulator plants. Addition of organic amendments could be a succesful technique for stabilization of metals in contaminated soils.

**Key words:** hyperaccumulator, phytoextraction, mine soil, Zn, Cu, organic amendment, *Thlaspi arvense, Brassica juncea*

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# Effect of soil microbial activity in phytoremediation of Zn

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## Abstract

Improving microbial activity in rhizosphere soil of contaminated area for increasing metal accumulation by plants is useful and inexpensive management. An experiment was done as factorial design with different Zn levels (mg $kg^{-1}$) $Zn_0$, $Zn_{100}$, $Zn_{200}$ and $Zn_{300}$ and four microbial inoculation including C (no inoculation), B (pgpr), M (mycorrhiza) and BF (pgpr+ Mycorrhiza). Corn plants (*Zea mays*) were cultivated in plastic pots at greenhouse condition. Pgpr and mycorrhiza inoculants were mixtures of fluorescent *Pseudomonas* species and *Glomus mosseae*, respectively. After 3 months plants were harvested, shoots and roots separately weighed and dried. Growth parameters and Zn concentration was determined in different parts of plants. The results indicated a significant relationship between determined parameters and different Zn levels. High concentration of Zn decreased shoot dry weight (13.6%) and plant height (8.7%). Microbial inoculation significantly increased shoot dry weight and plant height compared to sterile condition. Microbial inoculation resulted in increasing Cd uptake and accumulation with comparison to sterile pots. Among microbial treatments, pgpr inoculation had highest effect on Zn accumulation by corn plant. It is concluded that in phytoremediation of Zn by corn plants in contaminated soils, pgpr was effective than mycorrhizal fungi.

**Key words:** pgpr, mycorrhiza, zinc, corn, phytoremediation

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# Plant growth-promoting microorganisms effect on Cd Uptake by *Zea Mays* in a contaminated soil

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## Abstract

Heavy metal contaminations are very dangerous for environment and human health. One of management strategies is using microorganism potential in particular plant-growth promoting rhizobacteria (pgpr) and mycorrhizal fungi in phytoremediation processes. An experiment was done as factorial design with four Cd levels (mg $kg^{-1}$) $Cd_0$, $Cd_{10}$, $Cd_{20}$ and $Cd_{30}$ and four microbial inoculation including C (no inoculation), B (pgpr), M (mycorrhiza) and BF (pgpr+ Mycorrhiza). Corn plants (*Zea mays*) were cultivated in pots at greenhouse condition. Pgpr and mycorrhiza inoculants were mixtures of fluorescent *Pseudomonas* species and *Glomus mosseae*, respectively. After 3 months plants were harvested, shoots and roots separately weighed and dried. Growth parameters and Cd concentration was determined in different parts of plants. Analysis of variances showed the different Cd levels and microbial inoculations significantly affected determined indices. High concentration of Cd decreased shoot dry weight (12.9%) and plant height (19.4%). Furthermore, microbial inoculation increased shoot dry weight (212 %) and plant height (83%) compared to sterile condition. Among microbial treatments, pgpr inoculation had highest effect on those indices. Microbial inoculation resulted in increasing Cd uptake and accumulation with comparison to sterile pots. High accumulation of Cd in corn plants were seen in pgpr inoculation. It is concluded that in plant-microorganism system for co-remediation of Cd, pgpr was effective than mycorrhizal fungi.

**Key words:** pgpr, mycorrhiza, cadmium, corn, phytoremediation

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# Degradation of pesticide residues from soil by bioremediation techniques

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## Abstract

Pesticides are hazardous chemical compounds which are not easily decomposed in nature. Their residues can be detected many years after they were applied and in addition to this, they can be converted into more dangerous chemicals. Pesticides' toxicological effects might cause different types of cancers, nervous disorders and sometimes death. The number of people who got poisoned has been three million all over the world and two thousand of them die each year. Pesticide sector has a global market and the organic phosphorus pesticides have the largest portion in there with %34. The reasons why organic phosphorus insecticides are preferred are their high degradation rate and the small amount of residues after degradation. However, it is shown that they are more persistent than once believed. The pesticides are drained by rains and rivers from the soil surfaces to the oceans and groundwater reservoirs. Also they accumulate in the food webs while getting more toxic to the top levels, their soil residues are not analyzed consistently. They affect not only target organisms but also non-target organisms such as the microbial fauna, the main resource to degrade the pesticides. According to the latest data of the Agricultural Administrative Units in Turkey, the most preferred pesticide is chlorpyrifos-ethyl. Malathion, DDVP, azinphos-methyl, parathion are the other common ones but their sales and imports have been forbidden since August 2008 by the Agriculture Municipality. Our project aims to increase their degradation rate by using microorganisms in soil which degrade the target chemicals into their monomers. Furthermore, the previous studies showed that chlorpyrifos-ethyl has a secondary metabolite, 3,5,6-trichloro-2-pyridinol (TCP), which is more dangerous than itself. TCP is also more persistent and decreased the decomposition rate of chlorpyrifos–ethyl by affecting the soil microbiota negatively. There are many studies about chlorpyrifos bioremediation by microorganisms but only recently some adaptive microorganisms with the ability to degrade both chlorpyrifos and TCP have been isolated. One part of our project is to isolate some specific strains from the native soils of Turkey which can degrade this hazardous insecticide. Additionally, we aim to analyze the degradability of other pesticides which have similar chemical structures to chlorpyrifos.

**Key words :** soil bioremediation, organic phosphorous pesticides, Chlorpyrifos-ethyl

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# Soil Health and Quality

Soil Health and Quality

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# Long-term tillage, straw and N rate effects on quantity and quality of organic C and N in a gray Luvisol soil

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## Abstract

A field experiment with barley (*Hordeum vulgare* L.)-wheat (*Triticum aestivum* L.)-canola (*Brassica napus* L) rotation was conducted to determine the effect of 19 or 27 years (from 1980 to 1998 or 2006 growing seasons) of tillage (zero tillage [ZT] and conventional tillage [CT]), straw management (straw removed [NS] and straw retained [S]) and N fertilizer rate (0, 50 and 100 kg N $ha^{-1}$ in straw retained, and 0 kg N $ha^{-1}$ in straw removal plots) on total organic C (TOC) and N (TON), light fraction organic C (LFOC) and N (LFON), mineralizable C and N, microbial biomass C (MB-C), macro organic matter C (MOM-C) and N (MOM-N), pH, extractable P, ammonium-N ($NH_4$-N) and nitrate-N ($NO_3$-N) in a Gray Luvisol (Typic Cryoboralf) soil at Breton, Alberta, Canada. Zero tillage, straw retained and N fertilizer plots usually had higher mass of TOC, TON, LFOC, LFON, MOM-N, and mineralizable C and N in soil compared to the corresponding CT, straw removed and zero-N control plots, especially in the surface layers. Soil pH in 0-15 cm depth was depressed slightly with N application. Extractable P in 0-15 cm soil was higher with straw retained than straw removed and also higher under ZT than CT, but it was significantly decreased with N application. Nitrate-N (though quite low) in the top 15 cm soil layer was increased with N addition. There was usually no significant effect of treatments on any soil parameters in the 15-30 cm or deeper layers. Comparisons of TOC concentrations in 0-15 cm depth in 1979, 1990, 1998 and 2007 indicated a loss of TOC in soil in the CTNS0 treatment in 1998, and in the CTNS0, CTS0 and ZTNS0 treatments in 2007 compared to 1979, due to tillage and/or dry weather conditions prevailed in several years during this period. In conclusion, elimination of tillage, straw retention and N application all improved organic C and N in soil, and generally differences were more pronounced between the most polar treatments (CTNS0 vs. ZTS100) for each dynamic organic fraction. This may be better for long-term sustainability of soil quality, fertility, and subsequently productivity.

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# Relationships between soil salinity and halophytes species in Kavak Delta

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## Abstract

Kavak Delta is located in the northwest of Gallipoli Peninsula, in the northeast of the Aegeaen Sea and in the eastern coast of the Saros Gulf. Distance of this delta is 80 km from the Çanakkale city center and covers an area of 2136 ha. The soils in the area formed on the sediment carried by Kavak River. The physiographic units in the area are river terrace, delta, hydromorphic alluvial and saline soil. The vegetation includes culture plants (sunflower, rice, wheat) and halophytic plants.

The main purpose of this study is to determine the relationship between soil salinity and halophyte species. Based on aerial photograph and satellite images (quickbird) totally 81 soil samples at the depth of 0-10cm have been taken. Electrical conductivities (EC) of soils have been analyzed. The relation between soil EC values and halophytes species has been investigated. The result showed that the most tolerant halophyte in the area was *Halocnemum strobilaceum* and the most sensitive was *Salicornia fragilis*.

**Key words:** Kavak Delta, soil salinity, halophyte species

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# Soil quality indicator changes due to continuous cultivation of a saline soils in arid region of Central Iran

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## Abstract

The conversion of natural ecosystems into cropland may do a major change to soil quality. Yet, the effects of these changes on soil quality are not well understood, particularly in saline soils of arid regions. The saline soils in aridic central Iran are characterized by low rainfall, lack of fertilizer application, high evaporation and salinity. The aim of this study was to determine the response of soil quality indicators to cultivating saline soils occurring in Abarkooh plain, Central Iran. Soil quality indicators were evaluated in three land use systems including virgin saline soils, wheat and alfalfa fields. Composite soil samples from each of the three land use systems were sampled at three depths (0-10, 10-20 and 20-30 cm) and analyzed for wet aggregate stability (MWD), soil organic carbon (SOC), total nitrogen ($N_t$), dilute acid-hydrolysable carbohydrates ($CH_{da}$), particulate organic carbon exist in macro-aggregate ($POC_{mac}$) and micro-aggregate ($POC_{mic}$) and carbon mineralization. At all depths, the cultivation of saline soils caused a significant decrease in electrical conductivity (EC) and increased the amount of OC, $N_t$, $CH_{da}$, $POC_{mac}$, $POC_{mic}$, MWD and C mineralization. The lower soil quality indicators in saline soils may partly be attributed to reduced C inputs to the soil because low moisture and fertility and high salinity of soil. Therefore the promotion of soil quality indicators in cultivated fields were mainly related to higher C inputs from plant residues incorporated in the surface soil during land irrigating and fertilizing. However higher soil quality indicators were far greater in alfalfa compared to the wheat fields. With the exception of 20-30 depth, the amounts of $POC_{mac}$ in the alfalfa fields were higher than that in the wheat fields. However, the $POC_{mic}$ contents for alfalfa and wheat fields were not statistically different at the all depths. Since $POC_{mac}$ is younger and more labile than $POC_{mic}$, consequently the soil organic matter in alfalfa fields is more labile than organic matter in the wheat fields. Greater inputs of labile C from alfalfa residue, and consequently the availability of easily-utilizable C sources, could also be accounted for the higher microbial C mineralization in alfalfa fields relative to the wheat fields. Whereas the biological production in croplands is very important, transcend of all component of organic matter in cultivated soils (especially with alfalfa) signifying the higher of biological production and consequently improvement in soil quality.

**Key words :** soil quality, saline soils, cultivated soils, soil organic matter

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# Short term effects of cover crops on soil properties related to organic matter and soil stability under Mediterranean climate

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## Abstract

Soil degradation is a problem affecting every day more and more agricultural soils, resulting in important quality and fertility losses. Introduction of cover crops during the non cropping period is a good solution to avoid soil degradation; since besides decreasing erosion, cover crops increase organic carbon content and other soil quality variables. Furthermore, it has been found a better growth of micorrhizal fungi, which are the responsible of glomalin production. Glomalin is an insoluble glicoprotein reported to be related with soil stability, but contradictory results have been found in soils poor in organic matter and rich in calcium carbonate. The aims of this study were to analyse in short-term the effect of different cover crops on soil quality, particularly in variables linked with organic matter and soil structure, as well as to determine the relation between glomalin-related soil protein content and soil aggregates stability. The study area was located at central Spain under mild Mediterranean climate. The top horizon of an Haplic Calcisol with a medium organic matter content and a high calcium carbonate content (20%) was sampled at 0-5 and 5-20 cm depth. Soil organic carbon (SOC), particulate organic carbon (POC), aggregate stability (WSA) and Bradford-reactive soil proteins (BRSP) were measured. After only two years of cover crops introduction, we found significant increases in SOC, POC and WSA under barley (Hordeum vulgare L.) cover crop compared to vetch (*Vicia sativa* L.) or bare soil. Therefore barley treatment seems to be the most effective cover crop improving soil quality in the short term under our conditions. In addition, a strong relation between the BRSP and WSA was found. Bradford-reactive soil proteins showed higher content in stable than in unstable aggregates, confirming the role of these soil proteins in soil stability even in soils with low organic matter content and rich in calcium carbonates.

**Key words:** cover crops, glomalin, organic carbon, aggregate stability, Mediterranean climate

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# Changes in soil quality properties following olive oil solid waste and compost applications

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## Abstract

The main objective of this study is investigation of possible usage of olive oil solid waste (OSW) and OSW compost to improve soil quality. Soil carbon (C) and nitrogen (N) dynamics were monitored after application of OSW and compost to the soil. Increased rate of OSW application also increased soil organic carbon content. Application of 7% OSW to clay loam soil increased soil aggregate stability (AS) 8 times compared to control. On the other hand, 10% OSW application increased AS by 44 times and 140 times for loam and sand soil respectively. In both soil compost application increased cation exchange capacity more than OSW application.

**Key words:** olive oil solid waste, compost, aggregate stability, organic carbon, nitrogen, soil

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# Study the relationship between some soil physical quality indices

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## Abstract

Land using and management practices affect the soil ability to bear internal and external forces without compacted mechanical. Soil resistance is the most dynamic mechanical properties and its knowledge is important for plowing, root growth, and biological activities. More resistance of soil limits root growth. The object of this study was to study the relationship between penetration resistance and soil physical properties. 70 soil samples according to variety of physicochemical properties were collected from Iranian soils. Then their penetration resistance (PR) was measured by cone penetrometer (EL 29-3739 model) with 6.29 $cm^2$ basin area at soil surface (0-5 cm) and some physical and chemical properties were measured too. Simultaneously the water content was measured. In addition, the slope of soil retention curve at inflection point (Si) according to retention curve data and parameters of Van Genouchten model and least limiting water range (LLWR) as physical quality indices were determined. The results showed that there was a negative significant correlation between Si and PR ($p=0.01$). Also the positive correlation between LLWR and available water (AW) with Si was significant at $p > 0.01$, but the reverse relationship between PR with AW and LLWR was observed ($p > 0.01$). In addition, the correlation between Soil moisture content, clay percent, Sodium Adsorption Ratio (SAR), and organic matter content (OM) with Si Index was significant at 1% level, but the correlation between Si index with soil bulk density and Electrical Conductivity (EC) was significant at 5% level. The relationship between Si index and clay percent, bulk density, SAR, and EC, was negative and with OM was positive.

**Key words:** penetration resistance, slope of retention curve, least limiting water range

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# Impact of soil quality on the distribution of terrestrial isopod in some Tunisian wetlands

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## Abstract

No studies in Tunisia have focusing on an analysis of oniscidean diversity in wetlands. To improve our knowledge on the species occupying this type of habitat, field work was conducted during spring 2008 in 18 wetlands (3 dams, 4 hill reservoirs, 7 lagoons, 2 sebkhas and 2 rivers) located in the north of the Tunisian dorsal.
Isopods were collected by hand each time with respect to the same sampling effort.
At the laboratory, Isopods are identified, counted and sexed. Physico-chemical analyses were performed from soil sampled in each site.
The results reveal the presence of 19 terrestrial isopods species belonging to 10 families. *Chaetophiloscia cellaria* and *Porcellio laevis* are the most abundant species; their relative abundance is respectively equal to 29.5 and 23.4 %. The species richness varied from 8 in both lagoons of Ghar El Meleh and Bizerte to 1 in some hill reservoirs. *Chaetophiloscia cellaria, Leptotrichus panzeri, Porcellio variabilis* and *Porcellio laevis* tolerate changes in salinity up to 35.4 g/kg, whereas others, such as *Armadillidium sulcatum* and *Armadillo officinalis*, were collected in stations where soil salinity does not exceed 8.5 g/kg.
Among environmontal factors, this study shows the effect of soil salinity on the distribution of terrestrial isopods. Other factors, such as relative humidity, conductivity and calcium content of the soil, will be discussed in order to define the preferendum of each species.
**Key words:** distribution, terrestrial isopod, wetland, soil salinity

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# Evaluating soil quality parameters of Şanlıurfa Bozova plain soils: A case study of Buğdayhöyük region

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## Abstract

Evaluation of soil quality parameters and soil quality scores within specific time periods may help sustainable and productive use of agricultural soils. The objectives of this study were to examine soil quality parameters of soils of Buğdayhöyük region located in the Bozova Plain with an area of 4.930 ha that will be irrigated for crop pruduction in near future, and to provide information for effective soil-water management practices. Quality Score for the soils in the study area was determined by evaluating some physical and chemical soil properties and land characteristics. It was concluded that the soils of study area had 2-3-grade soil source with degraded pH, organic matter, fundamental plant nutrients and shallow soil depths. Soils in the study area need to be rehabilitated for top soil depth, erosion, nutrient deficiency, especially N and P and water holding capacity before starting complete irrigation with any other intense agricultural practices. Overall, the study area was in a quite good condition with respect to soil texture, structure and mostly the quality of irrigation water. In the study area, it is important to define the process, factors and causes of soil degradation, and to assess the quality of soil that indicates the capacity of soil to sustain especially agricultural productivity and promote plant and animal health for sustainable resource management.

**Key words:** Şanlıurfa-Bozova, soil quality, sustainable agriculture

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# Nutrient return through litter secondary components in different vegetation communities, northeastern Mexico

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## Abstract

The amount of litter produced by a plant community is the sum of thin air plant debris to the soil for a period of time, among which include leaves, branches, reproductive structures (flowers, fruits and seeds) bark, insect bodies and feces. The amount of bioelements content in the litter is the main source of nutrients added to the soil in natural ecosystems, once litter decomposes. Thus, the objective of the present study was to determine the macro (Ca, K, Mg, and P) and micronutrients (Cu, Fe, Mn and Zn) deposition through secondary litter components in different vegetation communities in northeastern Mexico. Litter secondary constituents (such as: branches, reproductive structures (flowers, fruits and seeds), bark, insect bodies and feces and miscellaneous (unidentified residues) were measured at 15-day intervals between December 21, 2006 and December 20, 2007 in four experimental sites: one site was located in a pine (*Pinus pseudostrobus* Lindl.) forest (Bosque Escuela at 1600 m of altitude), second in the ecotone of a *Quercus* spp. forest and the Tamaulipan thornscrub (Crucitas at 550 m), third and fourth sites were in the Tamaulipan thornscrub (Campus at 350 m and Cascajoso at 300 m). Each site had a plot (50 m x 50 m) in which ten litter traps (1.0 $m^2$ each) were used for collections. In this study litter leaves nutrient deposition from a previous study are compared with nutrient deposition of litter secondary components. Leaves represented the main source of macronutrients deposition: 52% in Bosque Escuela and Crucitas, while in Cascajoso and Campus represented 78 and 70%, respectively of the total annual deposition. In contrast, micronutrients deposition by litter secondary components represented 93-99% of the total annual deposition, thus this secondary constituents of litter represented the main source of micronutrient return in all investigated communities. In general, Ca (138.8 kg $ha^{-1}$ $y^{-1}$) and Fe (372.7 g $ha^{-1}$ $y^{-1}$) were the major elements deposited by litter secondary components, likewise the macronutrients deposition order was as follows: Ca>Mg>K>P, while the micronutrients deposition was: Fe > Mn > Zn > Cu. On the other hand, Ca, K and P were returned mainly by reproductive structures in all experimental sites, except in Bosque Escuela where P was returned equally by all secondary components while Mg was deposited principally by branches and reproductive structures (Campus and Cascajoso). In relation to micronutrients Cu, Fe, Mn and Zn were returned in Cascajoso y Campus by reproductive structures, in Crucitas by branches and in Bosque Escuela by the component bark. Of all litter secondary component studied, reproductive structures were the most important component in the macro and micronutrients return in all vegetation communities.

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Sustainable Use of Natural Resources

# Sustainable Use of Natural Resources

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# The evaluation of soil properties and plant composition in semiarid forest grassland: Sample of Çankırı-Yapraklı-Büyükyayla

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## Abstract

In this study, the relations between the soil properties and plant composition were determined in Büyükyayla forest grassland in Yapraklı, Cankırı Province. For this reason, 24 surface samples were collected from natural grassland to determine soil properties. Soil physical properties (soil texture, bulk density, hydraulic conductivity, aggregate stability, saturation percentages, water retention characteristics,) and chemical properties (pH, EC, organic matter, carbonate content, cation exchange capacity, exchangeable cations) were determined in the soil samples. Soil properties showed important differences regarding to their use and their directions. Slope direction significantly affected to water resistant aggregate stability, plant available water, and bulk density content of the soil samples. The plant composition of the study area consists of plants which were collected between 2007 and 2008 years during the period of vegetation. The collected plants were suitably transformed to herbarium materials according to the modern systematic techniques. Plant samples were carefully collected at least two pairs which have the parts of flower and fruit on their surface. The result of evaluation process of collected plant samples were identified 26 families and 77 species and subspecies taxa belong to 53 genera. According to the taxa numbers *Asteraceae* (12), *Fabaceae* (11), *Lamiaceae* (6) ve *Poaceae* (6) are the largest families. In the climate analysis were used Thorntwaite and Emberger methods. The climate of the study area according to the Thornthwaite method are represented with the BC' $rw_2$ symbols. These symbols refer to "moisture, microthermal, during the year no water surplus or least whole terrestrial.

**Key words :** grassland, soil properties, botanic composition, Çankırı, Turkey

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# Statistical modeling to predicting productivity of wheat for rural land use

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## Abstract

Thirty-nine soils under cultivation in a representative reference zone of 8000ha in an area located in the east Azerbaijan Province of Iran were studied. The characteristics of this zone are those typical of the semi-arid climate closed to xeric and mesic soil moisture and temperature regimes, respectively. The soils were classified into the following main great groups: Haploxerepts, Haploxeralfs, Calcixerepts, and Xerorthents, in accord with the Soil Taxonomy classification system. The information on productivity of the wheat analyzed was obtained by means of previous investigations. The control section for measuring certain characteristics was established between 0.0 and 50cm which were calculated using soil database software (SDBm plus). Independent variables were coarse fragment (P1), clay content (P2), available moisture (P3), carbonate content (P4), Salinity (P5), sodium saturation (P6), and cation exchange capacity (P7). The prediction of productivity (Y) is analyzed as a polynomial function. The calibration of this polynomial model can be treated statistically as a particular case of multiple regressions. The regression coefficient ($R^2$) facilitated by this analysis represents an inductive validation index of the model corresponding to the accounted for the percentage of the observed variation. The results taken by created model for the studied area were examined with another previously established one named Albero model and real farm data. According to the obtained results, soils with vertic properties such as Vertic Haploxerepts and Vertic Haploxeralfs compared to another ones have high productivity while it exceeds 5 to 5.5 T/ha. On contrary, Typic Xerorthents are estimated as weak soils for wheat production which in this case it was up to 3 T/ha. Testing analysis showed that the results in real situation are closed to model predicted. Therefore, statistical systems are powerful methods for predicting land suitability on the basis of selected land characteristics.

**Key words :** land characteristics, polynomial function, productivity, statistical modeling

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# Comparison of sugar beet suitability with wheat and alfalfa through economic evaluation in the south of Uromieh plain

**N.Hamzehpour, R.S. Oskoi , N. Ghaemian , S. Ayoubi**

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## Abstract

An agricultural system is sustainable while the land, use to be based on its capability, otherwise the land will cross-accelerated degradation. Sugar beet is the main source crop to produce Sugar and important to human feed. Benefits of capitalization for Sugar industries are related to maintenance and increasing of Sugar beet yield that can be done by several ways. Land suitability evaluation is one of the land management approaches to planning yield increasing, optimum and sustainable use of land for future. So, this research was done by the aim of land suitability evaluation for Sugar beet in comparison with wheat and alfalfa by FAO method in Uromieh plain. Results of economic evaluation showed that benefits obtained from sugar beet plantation in the region was higher than other two plants, although it has higher variable costs. However, wrong policies of sugar beet factory, which is the main purchaser of the yield in the in the area, has reduced the tendency of the farmers to continue to plant sugar beet. Results also showed that the region has low or no suitability for alfalfa. Short growth period, low temperature and high labor costs are resulted in low economic suitability for this product. But the reason why farmers are continuing to plant it is due to the way they live, which is the integration of farming and stock holding. Most of the land map units had medium to low suitability for wheat plantation, except for units 3.1, 4.1 and 5.1 which have a high suitability for wheat.

**Key words :** land suitability, economic evaluation, sugar beet, wheat, alfalfa, Uromieh

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# Greenways for protection of water resources

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## Abstract

Water is one of the most vital factors affecting the life as a renewable natural resource, yet limited. Uses of water include agricultural, industrial, household, recreational and environmental activities. Negative effects of growing population and urbanization is possibble to see most on water resources. Greenways are linear connectors linking natural corridors such as riverfronts, ridgelines or valleys, or canals, scenic roads along a railroad right-of way converted to recreational use or parks, nature reserves, cultural features, or historic sites with each other and with populated areas. Greenways networks of land that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable land use. Greenways have many functions. One of these functions is a water resources related: relating to the protection, restoration and management of water resources including floodplains, stream corridors, groundwater recharge/discharge areas, and wetlands. The purpose of this paper is to study importance of greenways for protection of water resources and to present some of the successful case studies of made for this purpose, additionally to suggest recommendations for water resources in Turkey.
**Key words:** greenways, water pollution, water resources, protection

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# The agrophysical features of natural and anthropogenic soils of Mardakan Arboratum

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## Abstract

Mardakan Arbaretum's territory is located of in the north east of the Absheron peninsula, which chosen as model for investigation object. Arising of primary relief connected with centuries-old activity of the Caspian Sea. The purpose of the scientific work, land's efficient usage, restoration of soil fertility and of regulation agrophysical features and from its regime consists. The purpose of the scientific work consists, from the land's efficient usage, restoration of soil fertility, of regulation agrophisical features and its regimes. With this purpose, in various natural ecological condition of Apsheron is chosen stationary experimental area.Experimental investigations have been carried in the 2008-2009 y in conditions in the field, kameral and laboratory. At learning changes agrophyisical features and regimes is investigated soil have been using methods accepted Institute of Soil Science of the name V.V.Dokuchayev. Irrigating gray-brown soil on morphological structure,physical and chemical feature and biochemical activity sharply differ from the row ground,puted to rest and recently irrigated gray- brown soil.Cultural soil formation process happen in optimal temperature dampness and biological activities is comparative higher. Very dry regime of dampness characteristic for semi-desert zona rezult of increase artificial dampness is observed process formation of a meadow. In this connection irrigated gray-brown soil possess peculiar morphogenetic profile. These soil differ thick cultivated planting layer (45-55 cm) and 20-40 sm with thickness agroirrigation (A1) a layer. Agroirrigation layer in last 150-200 year formed as a result of use of local organic and mineral fertilizers. Color cultivated layer brightly gray-brown structure weak and dusty mechanical structure heavy clay passage of the layer periodical. Illiuvation carbonate a layer (B) it feebly marked and sometimes absolutely disappears. The layer humus gradually sometimes in sharp form passes in a layer of following morphogenetic profiel: In dry subtropical and semi desert to a zone weak in relation by anthropogenic and natural factors irrigated gray-brown soil have been studied change agrophysical features soil and is shown their distinctions. In the first time in selective stationary experiment areas Mardakan arboretum NAS of Azerbaijan agrophyzical indices regime of the irrigated anthropogenic soil are learnt depending on a complex of a soil cover. In selective stationary experimental areas from the basic physical indices of soil the special limit measure in one meter on the average from 2,65 -2,74 g/cm$^3$ its density changes within the limits of 1,24-1,44 g/cm$^3$. Irrigated is gray-brown soil of territoties by quantity of waterproof aggregates it is possible to estimate on weak and average. In that way comform experimental areas on a degree fertility parameters waterproof aggregates are determined 42-44%, 36-40%, 32-38%, 42-48%.

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# Management of wastewater irrigation in farmlands

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## Abstract

Rapid population growth, industrialisation, uncontrolled and unplanned urbanisation put heavy pressure on available water resources. At present many countries in the world face the challenge of water scarcity. If the supply of water demand should continue by depletion without exploring new sources, there would be a higher water deficiency. A reliable way to secure the required water for irrigation is by collecting and reclaiming each drop of water used in the cities to be reused. Agricultural use of wastewater is not limited to arid and semi-arid areas like Iran, Humid regions also make efficient use of it so, the role of wastewater in agriculture has become increasingly important. This paper discusses about management of wastewater irrigation in farmlands and comparison of different methods of irrigation systems in lands that are irrigated by wastewater. The results showed that drip irrigation with wastewater, compared with other methods (traditional irrigation methods, surface application of sewage, sprinkler and leakage irrigation systems) are more usefull in terms of maximum production and observing health issues for workers and consumers. The treatment of wastewater in compatibility with final use and crop type, mixing of wastewater with other sources of water, leaching, drainage, deep plowing and land leveling are considered as other adopted methods that are used to alleviate harmfull influence of wastewater application on health and enviroment. The increasing agricultural reuse of wastewater serves goals such as promoting sustainable agriculture, preserving scarce water resources, and maintaining enviromental quality. Also, irrigating with wastewater may reduce purification levels and fertilization costs, because soil and crop serve as bio-filters, and wastewater contain nutrients. Therefore reusing of wastewater is important not only in terms of ensuring hydrolic cycle and management of water resources, but also in enviromental protection and sustainable agriculture.

**Key words:** wastewater, irrigation, water demand

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# Work-flow and activity planning in land consolidation activities

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## Abstract

Meeting the nutritional requirement which is a result of the rapid population growth can only be possible through the growth in agricultural productin. Since the lands that are subject to agricultural production are limited, the growth of the agricultural production can only be possible through rising the efficiency provided by the unit area. In order to rise the efficiency provided by the unit area, modern agriculture elements like good seed, fertilizer and pesticide shall be used for production and additionally, agricultural lands shall be subject to structural regulations. These structural regulations can be provided by land consolidation which is an interdisciplinary study. Within the frame of land consolidation activities, the main target is the growth of production. In an attempt to carry this target out, the lands that are divided into several pieces as small blocks and spread to various regions or that are formed in an inadequate way are combined, formed, regulated in accordance with the principles of modern agricultural management and culture technique services are brought as a whole. These proceedings are carried out in lands where agricultural production is in progress. Different occupational groups join the consolidation activities by working in the land with different purposes. The proceedings have a priority and receny relationship with one another. These priority and receny relationships should be organized in such a way to complete the Land Consolidation activities in the shortest term and manage them. With this study, it is aimed to provide the efficiency growth in production by planning the work-flow that can be used in the activities of Land Consolidation and to make the various disciplines do various activities within parallel times.

**Key words:** land consolidation, work-flow

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# Mathematical model as a tool for ground water management in Siun Village N-W of Iraq

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## Abstract

Sinu village and the surrounding area is the most productive agricultural area in the sinjar district, west of Msoul city of about 90 km, north Iraq .which ground water is vital and sole resources in most of the studied region. It has a significant role in agriculture . In the last two decades, the agricultural activities have grown continuously with an associated increase in irrigation using pumped groundwater. Although the Fatha aquifer have formed an important aquifer/water resource, excessive pumping in the last years due to in shortage in rainfall , mainly for irritation, has created a significant depletion of the reservoir. To avoid the depletion and for optimal management of ground water, Mathematical model (MODFLOW) which is a three-dimensional finite difference model was used to simulate drawdown in ground water level in Al-Fatha aquifer in sinu village and the surrounding area, to predict the behavior of ground water level impact by different abstraction levels. The study area was divided into (48) grid distributed in six columns and eight rows each grid covering (4) $km^2$ to represent the natural condition of ground water system. Calibration and its validity was done to get agreement between observed and calculated drawdown, the model then is used to predict the drawdown for the period from (2003 to 2012) under different pumping schemes scenarios. Model results found that by increasing the yield of the wells five time from now will discharge (88) l/sec up to (440) l/sec by drilling new wells (assuming the same climate condition) a slight depression of water level in all grids except (4,2) (4,3) and (5,2) in the north and grid (3,7) in the south in which its water table drops (22.7)m , which is about (2.5) m/yr .This lowering belongs to the effect of subsurface faults , therefore the study area has a plenty of ground water which can be used for agriculture and other usages .

**Key words :** ground water management, aquifer, Mathematical model, Iraq

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# Ecotourism: Alternative tourism for global environment & land degradation

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## Abstract

Globalization has become a driving force to many industries in today's world. Tourism being one of the fastest growing industries has benefited from it. Tourism was the forerunner of the globalization system. It is with tourism that people were brought together from distinct parts of the world and it is thanks to tourism that the exchange of cultures, economics, and information has been created. There exists a paradox within a destination that relies on tourism as a main industry for the country's economy: a tourist destroys what he is searching for, while he discovers it. The main challenge that the tourism industry faces is to sustain economic growth while ensuring the long-term protection of the social and natural environment. Ecotourism is a solution to this challenge. It allows for tourist activities to take place, while keeping in mind ways to overcome the negative impacts of mass tourism. Ecotourism is defined as "responsible travel to natural areas which conserves the environment and improves the welfare of local people." This paper examines the current phenomenon of rapidly increasing ecotourism in Turkey and also global world with the discussion takes place within alternative meaning for environment and land degradation.

**Key words :** ecotourism, globalization, economy, nature, environment, land degradation Turkey

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# Organic production methods and comparison of organic and traditional agriculture

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## Abstract

Organic farming is the form of agriculture that relies on crop rotation, green manure, compost, biological pest control, and mechanical cultivation to maintain soil productivity and control pests, exclusing or stictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. Soil as a living system, the main axis is defined and with strengthening of it, beneficial microorganisms activities is strengthen, too. Organic production has been practiced in the United States since the late 1940s. From that time, the industry has grown from experimental garden plots to large farms with surplus products sold under a special organic lable. Food manufactures have developed organic processed products and many retail marketing chains specialize in the sale of "organic" products. This growth simulated a need for verification the products are indeed produced according to certain standards. Thus, the organic certification industry also evolved. The goal of organic farming is development of a production system that sustain the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic farming methods combine scientific knowledge of ecology and modern technology with traditional farming practices based on naturally occuring biological processes. There are several organic farming systems such as: Biodynamic farming, "Do Nothing Farming" farming, French intensive and Biointensive and No-till farming. The purpose of this study is introduction of different methods of organic farming and comparison of organic and traditional agriculture. Application of traditional agriculture lead to soil erosion, bulding destruction and enviromental pollution, toxicity of food and low quality of crops. Organic farming needs less input and it is regarded as one way to minimize soil erosion. Studies has found that manure applications in organic farming are better at bulding up the soil so, if part of the research is focused on the development of organic agriculture techniqes, can be expected that organic systems in the future, have more efficiency and soil health and quality can be reserved, too.

**Key words:** organic agriculture, inputs, biodiversity, agricultural systems

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# Natural factors which can influence on oil-pipe line of Baku-Tbilisi-Jeyhan

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## Abstract

In the zone ( the width is 100 m ) of oil-pipe Baki-Tbilisi-Ceyhan passinq over the territory of the Azerbaijan Republic the soil investiqations have been carried out and in the soils spreadinq here the water-physical qualities, salinity,salt structure,saline type, absor-dinq bases, percentage of sodium ion from the sum of absorbinq bases, pH, the level of bed and mineralization of qround waters have been investiqated.The analysis of the accu-mulatinq material allowed to determine the factors of the neqatively influencinq on oil-pipe. This – the degree of the soil salinity, mineralization of qround waters and flow waters forminq at floods causinq plentiful precipitations.

The soil salinity and mineralization of qround waters can promote over the acceleration of corrosion process of oil-pipe,but flow waters promote over its direct destruction. Cor-rosion process of oil-pipe can be accelerated in those places where the salt-endurance in the soil is 2,0%,but mineralization of qround waters forms, more than 30,0q/l. The destruction of oil-pipe can happen in the sprinq period, when on the mountains coverinq with snow falls two-month norm of precipitations for a intermediate time (for an hour or two hours).

With the purpose of oil-pipe protection from corrosion it is necessary to carry out complex measures allowinq to reduce soil salinity and mineralization of qround waters, but for prevention of oil-pipe from flow waters (in the places of stoppinq it by the river-beds) must be carried out additional strenqtheninq works.

**Key words:** oil pipe line, saliity, mineralization, corrosion

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# Ecological restoration following landslide; a case study from Artvin-Borçka

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## Abstract

Landslide is the ground movement of natural rocks, debris material and/or artificial filling material through slope length by the forces affecting on slope stability such as gravity, geology and hydrological factors. It is one of the most important natural disasters causing life and economical losses in addition to destroying effect of the environment. Landslide does not happen within a short period. There are many pre-signs of this geological phenomenon. large scale landslides occur following small scale landslips. Therefore ecological restoration is very important for these areas for protecting the area from severe landslide effects. In Turkey, many lives were lost due to landslide in recent years. One of these disasters occurred in September 29, 2009 in Borçka-Artvin. Five people died and its destroying effect will stay in people's mind for log times. This study discusses and simulates the landslide problem in Borçka-Artvin under some ecological restoration studies.

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# Using simple limitation method for evaluation of land suitability for the landfill of Tabriz

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## Abstract

Agriculture has a vital role in country's national economy. The utilized portion of water in agriculture usage is 93% which 61% of this portion is provided from subterranean sources of water. So preventing the pollution of water sources, especially subterranean sources, in Iran, that is situated in the dry and semidry zone of earth, is very important. Landfills (places for dispose the waste) are one of the factors that can cause the pollution and if they are selected without any scrutiny and survey, they can cause the pollution of water sources and decrease the safety of the products that are irrigated with that water. Hence, in this study we try to collect the requirements of applying the site as a landfill, and design a table for determining the degree of land suitability in order to be used for the sanitary landfill. So the data that relate to the quality of the site of Tabriz's landfill are collected and after putting these data in the mentioned table, the degree of suitability is specified. Therefore in this study with recognition of the qualities of the utilized site as the landfill of Tabriz, and comparison of these cases with the necessary criteria for being sanitary (table 1), the degree of suitability of the landfill of Tabriz is stated as $S_3$ , and as this degree of suitability is a low degree, we give some suggestions for preventing the pollution of surface and subterranean water sources that are used for irrigation in the agricultural part.

**Key words:** land suitability, sanitary landfill, groundwater pollution, Tabriz, Iran

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# Using operations research technics in land consolidation project

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## Abstract

Rapidly growing population and supplying necessity of them is one of the most important problem of humankind. Main point of this problem is limited agricultural area and increasing population. Various measures should be taken to supply the increasing needs, from the same amount of agricultural area. Land consolidation, which increase the productivity by regulating the use of agricultural areas, is in the most important place of these measures. The location of parcels and the area of them required to change by land consolidation applications.

Operation research technics should be utilized in land consolidation projects, to solve routine process quickly in the application phase of project and also to minimize the total expenditures of transportation, productive power and time, after starting the agricultural activities.

Transport model, which is the special form of lineer programming in operation research technics can be used in organization of agricultural area. By the application of transport model in land consolidation, parcellation, which is the most difficult stage of consolidation ,can be completed quickly according to the scientific principles and the application can be implemented. In this study, an application, which uses the lineer programming in parcellation stage, was done and the results were discussed.

**Key words:** land consolidation, operation researchs

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# Global benefit or global hazard

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## Abstract

Applications of modern biotechnology becominhg widespread rapidly and the productions and applications of modern biotechnology became widespread in world market especially in agricultural sector. It is clear that, modern biotechnology will not be limited with the applications and productions which are used today, and it is expected that the kind and the number of applications and productions will increase in the following years. Although the advantages of modern biotechnology applications cannot be denied, potential risks over human health and biological diversity and its effects on legal, commercial and social structure cannot be ignored. Therefore discussions about these topics and determination of national strategies are needed. Discussions about this subject are focused on living modified organisms (transgenic) rather than modern biotechnology and its uses. Besides, the risks coming form these products can be reduced and even it can be disappearned in certain cases. In This study it is argued that; there is a need for organizing a systematic structure and establishing modern biotechnology industry in order to develop modern biotechnology agreeable with the purpase of protection of environment and human health with sustained progress to have a decision abaut GMO with the role of global benefit or global hazard.
**Key words :** GMO, biotechnology, biosecurity, biodiversity, globalization

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# Integrating current land use and farmers' knowledge to modify land suitability evaluation

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## Abstract

Land suitability analysis is very important to assess and propose the most suitable land use alternatives. The reliability of land suitability evaluation results is controlled by choosing the most limiting land characteristics and their ratings for the proposed land utilization types. The current land use and the farmers' knowledge form a starting point to suggest and/or modify land evaluation criteria. This study aims at examining the possibility of using the current land use and the farmers' knowledge to improve the land suitability evaluation process. The potential suitability of land for five land utilization types (open range; improved range; rainfed barley; drip-irrigated vegetables; drip-irrigated trees) was evaluated. This evaluation indicated that soil constraints and water shortage are the major limiting factors for agricultural production. Only 1% of the study area was highly suitable for drip irrigation, while most of the area is moderately or marginally suitable for other uses. The ratings for different land characteristics were modified based on the comparison with the current land use and by referring to the farmers' adopted management practices to overcome some limitations. A revised land evaluation was produced for different levels of management. At the medium level of management (original criteria), 0% of study area is highly suitable for drip-irrigated vegetables and 1% is highly suitable for drip-irrigated trees. At the high level of management (modified criteria), the suitable area for drip-irrigated vegetables increased to 18% and the suitable area for drip-irrigated trees increased to 25%. The results emphasized the indispensable role of the farmers' indigenous knowledge in the land evaluation process, which aims at sustaining the use and management of land resources.

**Key words:** soil survey, land use, GIS, map overlay, indigenous knowledge, remote sensing, GPS

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# The crop water stress index (CWSI) estimation using adaptive neuro-fuzzy inference systems of green bean

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## Abstract

The potential of the adaptive neuro-fuzzy inference system (ANFIS) is investigated for modeling of crop water stress index (CWSI) green bean. For this purpose, The experiments were carried out under Ankara climatic condition consist of six different irrigation water applications. By means of fully irrigated and rainfed crops basic graphic of CWSI were developed and CWSI of green bean growth at each irrigation treatment were calculated. The first step in designing the CWSI by using ANFIS was to identify the fuzzy input and output variables. Two inputs selected were: difference of canopy and air temperature (*T*c−*T*a) and vapor pressure deficit (VPD). The crop water stress index (CWSI) was defined as a single fuzzy output variable. Second, the range (universe of discourse) of the inputs and output variables was selected by examining data. The universe of discourse for (*T*c−*T*a), (VPD), and (CWSI) were (−10.9 to 6°C), (1.5 – 6 kPa), and (0–1), respectively. In this study, the membership functions were selected as trapezoidal. The ANFIS system is applied to modeling CWSI of green bean. The results indicated that ANFIS can be successfully applied for CWSI modeling.

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# Determination functionally of drainage pipes by using GPR

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## Abstract

In agricultural lands, buried drainage pipes cause common problems including clogging, breaking, insufficient discharge slope etc. After for a long time of functioning subsurface drainage systems, old drain lines often need to be relocated i.e. reducing drain line spacing. The aim of this study is to check whether ground penetrating radar (GPR) could be used in detecting buried subsurface drainage pipes. GPR is a high resolution electromagnetic technique that is designed to investigate anomalies at the shallow subsurface of the earth. An experimental work was designed at the Department of Geophysics Engineering of Ankara University garden. Three plastic drainage pipes with different diameters (5 and 15 cm) and one steel pipe (5 cm diameter) were buried in the 1.5 m deep trench. Above the pipes were filled with approximately 15-30 cm backfill material. GPR system was tested to fix the presence and situation of drainage pipes. GPR data was collected with 250 MHz and 500 MHz GPR antennas along the whole profile for 12 profiles of which the length was about 9 meter. In GPR images, some anomalies were defined. Velocity analysis gave different hyperbola attenuation. This was attributed to different pipe materials as different signals were monitored from PVC and steel pipes. Pipe hyperbola anomalies were also different from each other. Location and depth of the PVC and iron drainage pipes for different diameters were defined after processing GPR data for 250 MHz and 500 MHz antennas frequencies. Diameters of the pipes could not be determined likely due to high clay content of the soils and relatively small dimensions. GPR data was displayed with 2D and 3D images. The results suggested that, GPR, a near surface geophysical method, has potential to situate agricultural drainage pipes.

**Key words :** ground penetrating radar, agricultural drainage pipe, velocity analysis

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# Evaluation of land units suitability for sanitary landfills in order to prevent from pollution of natural sources

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## Abstract

The role of nature and natural resources in human's economical and social life and it's very important value in relation with agriculture and environment is an undeniable subject. Renewable natural recourses -water, soil, forest and pasture- have an important role in animates' life, and undoubtedly without these God's gifts human can't continue his life; hence, safekeeping of them is very important. One of the effective factors in the pollution of natural resources is rural and urban sites of disposing waste, that if they are selected without any study they will be harmful for their surrounding environment. Therefore, in order to preventing or reducing these problems, before selecting the site of landfill, it is necessary to evaluate nominated sites. In this study we try to have a little part in preventing natural resources- these national treasures- from pollution , with presenting a table for grading land suitability in order to locating the site of sanitary landfill for rural and urban waste by using the simple limitation method in the light of FAO laws. Therefore in the presented table the kinds of the usage of land units' requirements, for using as urban and rural landfill, are compared with the qualities and features of each unit of land, and they classified into 5 groups of $S_1$ (very suitable), $S_2$(normal suitability), $S_3$(low suitability), $N_1$(non suitable in the present time), and $N_2$(permanent non suitable). After specification of the levels of each requirements and qualities of the studied land, using the simple limitation method , we determine the ultimate degree of each unit . Then we select the unit or units which have the maximum degree of suitability among the studied units as the site for landfill.

**Key words:** land suitability, sanitary landfill, pollution, natural resources, Iran

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# Application of GIS model in physical land evaluation suitability for rice cultivation

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## Abstract

The objective of this study was to establish spatial model in land evaluation for rice cultivation using GIS in Bafra Plain found in the Kızılırmak Delta and located in the central Black Sea region of Turkey. The study area covers about 4823.7 ha. A land unit resulted from the overlay process of the selected theme layers has unique information of land qualities for which the suitability is based on. The selected theme layers of rice include topographic factor (slope), soil physical factors (soil depth, soil texture, drainage, stoniness, hydraulic conductivity) and soil chemical factors (pH, electrical conductivity, $CaCO_3$ and soil fertility). These theme layers were collected from existing information. Spatial information of soil physical and soil chemical factors were formulated using soil map database. Slope layer of the study area was prepared from DEM. Each land characteristics is also considered as a thematic layer in the GIS. In addition, each of land quality layers with associated attribute data is digitally encoded in a GIS database. After combination of these layers, a resultant map was produced. Land suitability rating model applied to the resultant polygonal layer provided the suitability classes for field crops. Results showed that 79% of the study area is highly and moderately suitable for field crops, whereas 21% of the study area is low and non suitable for rice cultivation due to soil and land conditions. The resultant suitability classes were also checked with field experiment study. 12 rice species were used in experiments. ANOVA was done for grain yield and $LSD_{0.05}$ test was implemented for comparison of mean values in the TARIST statistics package. According to ANOVA results, it was found significantly positive relationship between land suitability classes and grain yield values. The grain yield values were affected at level of $P<0.001$ by land suitability class. In general, the highest grain yield was obtained from rice plots located in S1 class, S2 and S3 classes followed it as well. As for $LSD_{0.05}$ test results, the highest yield values were determined Halil Bey ($789.9^{a}$), Osmancık-97 ($760.5^{ab}$) and Durağan ($751.0^{b}$) in 12 rice species for S1 class while, the highest yield values were found Osmancık-97 ($696.1^{a}$), Şumnu ($688.8^{ab}$) and Neğiş ($654.1^{bc}$) in 12 rice species for S3 class.

**Key words:** land suitability, soil map, GIS, rice cultivation

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# Some chemical compositions of *G. lucidum* (Fr.) Karst. Spent substrates to evaluate as a soil conditioner

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## Abstract

Spent mushroom substrate is one of the most promising renewable agricultural resources and used as a soil conditioner or an organic fertilizer. After the commercial cultivation of *Ganoderma lucidum,* that is becoming increasingly popular because of its valuable medicinal effects, a large amount of *Ganoderma* spent substrate (GSS) remains as a residual material. It is important to identify differences in the chemical compositions among GSS products to indicate their suitability as a soil conditioner. This study was carried out to characterize and evaluate of the some chemical contents such as; pH, EC, ash, organic carbon (OC), total nitrogen (N), macro and micro elements and C:N ratios of 10 GSS prepared by the mixtures of hornbeam and oak sawdust non-supplemented and supplemented with tea manufacture waste in different ratios (10, 15, 20 and 25%). They were determined before mycelium inoculation and at the end of *G. lucidum* cultivation process. EC values and C content of GSS varied between 1.13 and 2.33 dS $m^{-1}$, and 41.94 and 47.46%, respectively. pH, C and C:N decreased in GSS while ash, N, P, K, Mg, Ca, Fe, Mn and Zn contents increased. GSS was found rich in all investigated mineral nutrients. More detail studies should be done with applications of GSS into soils as an organic conditioner.

**Key words:** *Ganoderma lucidum*, spent substrate, chemical constituents

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# Use of effective microorganism for rapid composting of hazelnut husk and tea refuse

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## Abstract

Composting of fibrous residues take up fairly long time. Microbial activators are used for rapid composting. This study was carried out to supply rapid composting of hazelnut husk (HH) and tea refuse (TF) with the use microbial activator (bio-compost). Thirty-six piles were prepared using HH and TF. The piles were applied different doses bio-compost (control, 100cc/t, 200cc/t, 300cc/ and 400cc/t). Increased bio-compost doses were rapidly decomposed and these materials composted two and a half months. 400cc/t treatment supplied more rapid composting compared to the other doses. C:N ratio of HH and TF decreased from 35:1 to 18:1 and from 25:1 to 15:1, respectively.

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# Monitoring temporal degradation of natural resources in Bursa-Turkey

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## Abstract

The main objective was to investigate multi-temporal changes of the natural resources using by remote sensing and geographic information system techniques. Landsat full frame images for 16 june 1984 and 12 june 2001 were used in this study.

For this aim, three sub-scenes covering the Bursa city built-up area, Uluabat Lake and Uludağ and ıt's surroundings were extracted from the images. Geometric correction, image enhancement were made for the comparison time series remote sensing data, exact image-on-map overlay and better visual interpretation. Boundary of the Bursa City built-up area and Uluabat Lake was produced from visually interpreted image by using both screen and tablet digitizing. Biomass changes of the Uludağ and ıts surroundings, were gathered from normalized vegetation index classification.

Finally, revealed results show that the Bursa City built up areas have been expanded at a rate of 86,6 % from 5089 hectare (in 1984) to 9500 hectare (in 2001). Expansions in the built-up areas have been mainly occurred in valuable agricultural lands. In addition the coverage area of the Uluabat Lake decreased at a rate of 12 % from 133.1 $km^2$( in 1984) to 117.1 (in 2001) $km^2$ due to sediments transported by the surface water of surrounding irrigated agricultural lands, tributary streams and mainly M.Kemalpaşa River. Moreover, in seventeen years period was found that vegetative cover of Uludag and It's surrounding have dramatically been degradated.

**Key words:** Natural resources, monitoring, temporal changes, degradation, remote sensing, GIS

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# Using natural resources in Kızılırmak delta plain and causative effects

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## Abstract

Kızılırmak delta is a productive plain which layouts through coastline of 19 Mayis, Bafra, Alaçam provinces in Black Sea, including sand, morass, bog, wetland, agricultural and forestry lands with a total of 57.000 ha. Main employs in this area is agriculture including field and horticultural productions. The natural resources of the area are morass, goga harvesting, fishing, sand, silis and balast. Besides, snowflake and arum plants have been harvested from natural populations, some animals such as frog, snail and blood sucker are used for economic purposes. Results from current studies on the area revealed that water sources are used unconsciously, as a result the water-retailed fertilizer and pesticides poses a great risk for the natural live in the wet land. Besides, uncontrolled morass harvesting destroys nestle, illegal sand/aggregate collecting are harmful to all water-derived life forms, especially the fishes. Similarly uncontrolled plant harvesting from natural area such as summer snowflake also destroys the natural flora.

Low income and uneducated local people in Kızılırmak delta, a total of 25000 individuals have increased the press on the natural resources. In this study, Kızılırmak delta was researched in terms of agricultural and social points of view and suggestions for solving of the aforesaid problems were developed.

**Key words:** Kızılırmak delta, using natural resources, natural flora

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# The effect of different sources of organic materials application on soil bulk density in sandy loam textured soil

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## Abstract

In this experiment, the effects of different sources of organic materials application on bulk density (BD) of sandy loam textured soil were investigated. Organic materials, such as Sugar Beet Pulp (SBP), Apple Pomace (AP) and Cotton Gin Waste (CGW) was applied to soil as a fresh material, (dry weight basis 1000, 2000 and 4000 kg/da), and pot experiments were carried out according to the completely randomized design with 5 replicates in greenhouse conditions. This study is consisted of two different stages. The first stage which is consists of 6 months incubation period (1st sample period). Second stage which is consists of other 6 months plus 8 weeks bean (*Phaseolus vulgaris L.*) vegetation period (2nd sample period). In the experiment, the effect of different sources of organic materials on BD was variable for different stages. The effect of SBP on BD was significant ($P < 0.001$) and ($P < 0.05$) in 1st and 2nd stages, respectively. While the effect of AP on BD was not significant in 1st stage, was significant ($P < 0.05$) in 2nd stage. Similarly, while the effect of CGW on BD was not significant in 1st stage, was significant ($P< 0.001$) 2nd stage. In the effect of applications on soil bulk density, the effect of SBP on BD was decreased in both stages but the effects of AP and CGW decreased in 2nd stage. At the end of experiment, it is determined that bulk density of soil was improved by the three organic amendments.

**Key words :** cotton gin waste, organic material, soil, physical property

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# The effect of rhizosphere soil, and mycorrhizal inoculation on wheat and onion growth under methyl bromide fumigated and non-fumigated field condition

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## Abstract

The potential effect of rhizosphere soil were compared with selected mycorhizae on wheat growth were investigated under field conditions for two successive years. Experiment was carried out on Menzilat soil series, which is located in Research Farm of Çukurova University/Turkey (Eastern Mediterranean region). 1000 spore per plant for selected mycorrhizae inoculum and mycorrhizae spore reach rhizosphere soil were placed 30 mm under the seeds. Wheat seed was sown in fumigated and non-fumigated plots with and without mycorrhizae, rhizosphere soil and phosphorus treatments. Experiment was carried out in two successive years.

In generally plant growth and yield were not well in fumigated plots than non-fumigated one. The yield of plants grown in non-fumigated soils was higher than fumigated one. There were no significant differences between rhizosphere soil inoculation and mycorrhizal inoculation. The differences in nutrient uptake in non-fumigated plot was considered to be related to indigenous mycorrhizal infection. The results revealed that soil indigenous mycorrhizae is persisting to contribute to the plant growth.

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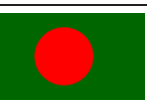
| Nurul Alam | Rajshahi University,<br>Department of Crop Science and Technology, Rajshahi, Bangladesh | Tel : +8801199174547<br>Fax:<br>E-mail: nalam_ru@yahoo.com |  |

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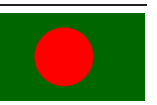
| Rafiqul Islam | Bangladesh Agricultural University,<br>Department of Soil Science,<br>Mymensingh, Bangladesh | Tel :<br>Fax:<br>E-mail: mrislam58@yahoo.com |  |
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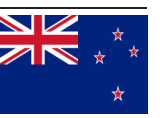
| Raza Khan | Massey University, Institute of Natural Resources, Soil and Earth Sciences, Palmerston North,<br>New Zealand | Tel : +063569099<br>Fax:<br>E-mail: razaullahshah@yahoo.com |  |
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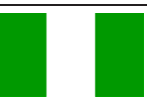
| Seth Manuwa | The Federal University of Technology, Department of Agricultural Engineering, Akure, Nigeria | Tel : +2348034152976<br>Fax:<br>E-mail: sethimanuwa@yahoo.com |  |
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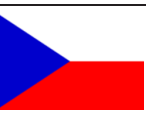
| Svatopluk Matula | Czech University of Life Sciences Prague, Faculty of Agrobiology, Food and Natural Resources, Department of Water Resources, Czech Republic | Tel : +420224384636<br>Fax: +420234381835<br>E-mail: matula@af.czu.cz |  |
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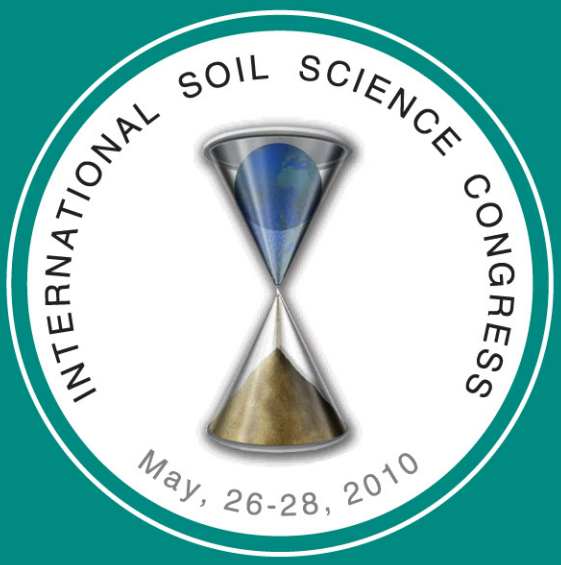


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