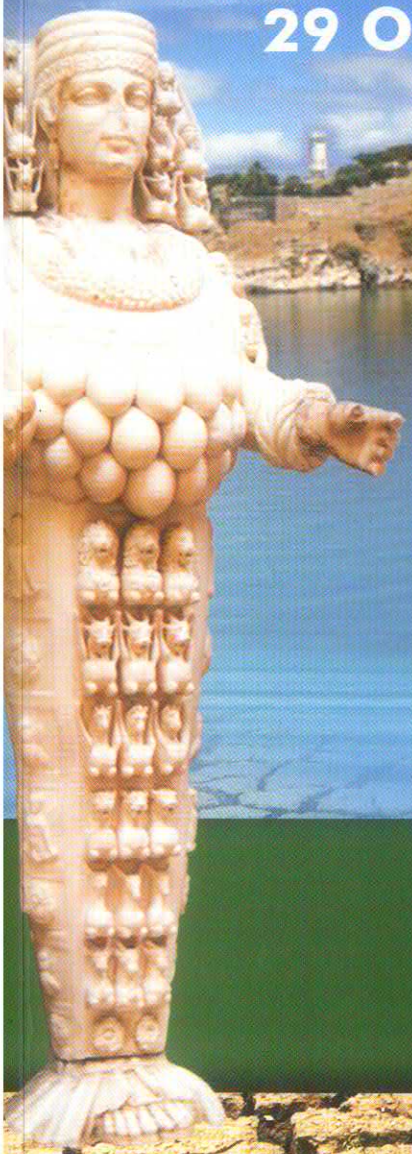
INTERNATIONAL MEETING ON SOIL FERTILITY LAND MANAGEMENT AND AGROCLIMATOLOGY

29 October - 1 November 2008

Kusadasi TURKEY



ABSTRACT BOOK

TÜBİTAK

Dear Colleagues,

We are proud to invite you to the conference entitled 'The International Meeting on Soil Fertility, Land Management and Agroclimatology' that we, at Adnan Menderes University, in collaboration with the Soil Science Society of Turkey, have organised with anticipation and great enthusiasm in Kusadasi-Aydin.
In this area graced with abundant natural beauty, we will discuss thoroughly the soil fertility, land management and the effects of climate change on soil and agriculture with the contributions of the esteemed scientists. Important studies conducted by eminent researchers will be shared in oral and written presentations during the conference.
In addition to the satisfactory scientific agenda, We will also offer social activities and tours for recreation and relationship-building among colleagues in the field.
In the midst of a beautiful Aegean autumn we look forward to sharing this wonderful event with you.

Affectionately and respectfully yours,

On behalf of the Organization Committee of the Meeting
Prof. Dr. Gönül Bilgehan AYDIN

AGROCLIMATOLOGY

DESERTIFICATION and LAND DEGREDATION

AGROCLIMATOLOGY

DESERTIFICATION and LAND DEGREDATION

SOIL QUALITY IMPROVEMENT

SOIL and WATER CONSERVATION

Land and water management

GIS and REMOTE SENSING

PEDOLOGY

CARBON CYCLE

PLANT NUTRITION and SOIL FERTILITY

PLANT PHYSIOLOGY in STRESS ENVIRONMENT

IRRIGATION and WATER QUALITY

CONSERVATION of BIODIVERSITY

SOIL MICROBIOLOGY and BIOCHEMISTRY

SOIL and WATER POLLUTION

DAY 1: WEDNESDAY, OCTOBER 29, 2008

TIME		
08.30-12.00	REGISTRATION	
12.00-13.30	LUNCH	
13.00-15.00	OPENING CEREMONY and INVITED SPEAKERS (Prof. Dr. Ural Dinc and Prof. Dr. Ahmet Mermut)	
15.00-15.30	COFFEE BREAK	
	HALL 1 AGROCLIMATOLOGY CARBON CYCLE SOIL AND WATER POLLUTION	
	CHAIRED BY: Dr. Cemil Cangir	
	SPEAKER	PRESENTATION TITLE
15.30-15.50*	T. J. Cutright, H. van Keulen, R. Wei	Laboratory assessment of *Helianthus annuus* for the phytoremediation of contaminated soil
15.50-16.10	J. Zeitz, A. Bauriegel and M. Zauft	Carbon storage in hydromorphic soils of the north-eastern part of Germany
16.10-16.30	F. Ellmer	Soil organic matter (SOM) of a sandy soil influenced by agronomy and climate
16.30-16.50	F. A. Akyuz, B. Mullins, R. Carcoana, D. Morlock	Agricultural applications of the North Dakota agricultural weather network
16.50-17.10	J. M. Cornejo, A. Faz Cano	Crop residues reuse to improve agricultural soil quality
17.10-18.00	POSTER PRESENTATIONS**	

*The oral presentations are normally 15 minutes with 5 minutes for discussion

** Posters are displayed duration of the meeting from October 29 to 31.

DAY 2: THURSDAY, OCTOBER 30, 2008

TIME	HALL 1 AGROCLIMATOLOGY DESERTIFICATION AND LAND DEGRADATION SOIL QUALITY IMPROVEMENT SOIL AND WATER CONSERVATION		HALL 2 LAND AND WATER MANAGEMENT GIS AND REMOTE SENSING PEDOLOGY CARBON CYCLE PLANT NUTRITION AND SOIL FERTILITY		HALL 3 PLANT PHYSIOLOGY IN STRESS ENVIRONMENT IRRIGATION AND WATER QUALITY CONSERVATION OF BIODIVERSITY SOIL MICROBIOLOGY AND BIOCHEMISTRY SOIL AND WATER POLLUTION	
	CHAIRED BY: Dr. Jutta Zeitz		CHAIRED BY: Dr. Frank Ellmer		CHAIRED BY: Dr. Teresa J. Cutright	
08.40-09.00	M. R. Sümer, J. Zeitz, F. Ellmer and G. Verch	Effects of different long-term soil management systems on selected	S. Shasavani, M. Rahimi	Sulphur uptake by wheat and its relationship to inorganic and organic	I. Yokas, A. L. Tuna, B. Bürün, B. Yagmur, H. Hakerlerler, R. Kilinç, S.	Research on pollution caused by thermal power plants in Muğla
09.00-09-20	D.M. Carmona, A. Faz Cano, J.M. Arocena	Increasing soil organic matter content in mine soil through pig manure	A. Tuli, J. B. Wei, B. D. Shaw, J. W. Hopmans	In situ monitoring of soil solution nitrate in saturated and unsaturated sandy	S. Köskeroglu, A. L. Tuna	The investigation on growth and some antioxidative enzymes of the
09.20-09.40	S. Deviren, P. Kaya, M. Özkan, G. Erpul, İ. Bayramin	Analyzing spatial and temporal trend of precipitation over Turkey	Ruediger Anlauf	Watershed modeling with ArcSWAT: calibration and validation for the	A. Karagöz, N. Cebel, K. Özbek, S. Madenoglu, İ. Ünver	Ni and Cd uptake of selected native species from the soils high in Ni and
09.40-10.00	M. Kuecke, D. H. Yoon	The suitability of passive capillary samplers as a tool for monitoring of	P. R. Warman, S. G. Shanmugam	Effect of organic amendments on half-highbush blueberry production	H. Abbasdokht	The study of Azotobacter-chroococum inoculation on yield and
10.00-10.30	R. A. Garcia, C. A. Rosolem	Cover crops and soybean root development in a compacted soil	M. E. Öztekin, S. Şenol, M. Dingil, İ. Solmaz, O. Dinç	cost of detailed soil surveys on the undulating landscape	M. R. Sadaghiani, M. Barin, F. Jalili	The effect of PGPR inoculation on the growth of wheat
10.30-11.00						
	HALL 1 CHAIRED BY: Dr. Ataç Tuli		HALL 2 CHAIRED BY: Dr. Suat Şenol		HALL 3 CHAIRED BY: Dr. İbrahim Ortaş	
11.00-11.20	A. Reshadsedghi, M. Loghavi and M. Zabolestani	Effective parameters on the disk harrow performance	H. Kaman, M. Çetin, C. Kırda	Soil salinity in a drip and furrow irrigated cotton field under influence of different deficit irrigation techniques	H. R. Asghari, M. R Amerian	Effects of soil salinity on arbuscular mycorrhizal colonization of halophytes
11.20-11.40	M. Gholipoor, S. Shahsavani	Simulation study of past climate change effect on chickpea	C. A. Grant	Agronomic and environmental benefits of a controlled release urea	M. Barin, A. Samadi, M. Rasouli Sadaghiani	Evaluation of arbuscular mycorrhizal fungi symbiosis of tomato in selected
11.40-12.00	İ. Oğuz, E. Karas, T. Susam, Ö. F. Noyan	Identifying soil degredation and determination catchment planning for sustainable farming in Tokat-	C. A. Grant, S. Malhi, D. Flaten, S. Sauvé	Fertilizer management and preceding crop influence accumulation of cadmium in durum	M. G. Nessim, M. A. Hussein and A. A. Moussa	The effects of irrigation water salinity, potassium nitrate fertilization, proline spraying and leaching fraction on the
12.00-12.20	Frank-M. Chmielewski, K. Bluemel, Y. Henniges, A. Mueller	Climate change and fruit growing in Germany	N. Yücekutlu, S. Terzioğlu, C. Saydam, I. Bildacı	Organic farming by using saharan soil	M. Anwar-ul-Haq, J. Akhtar, A. Haq, Z. A. Saqib	The ameliorative effect of saline or / sodic water on maize (Zea mays L.)
12.20-12.40	M. Kuecke, D. H. Yoon	Leaching of mineral and organic nitrogen and phosphorus in relation to	R. Koçyigit, S. Demirci	The changes in biological and physical C fractions after conversion	M. Anwar-ul-Haq, J. Akhtar, A. Haq, Z. A. Saqib	Improving the production of wheat crop in salt affected soils of Pakistan
12.45-13.45						
13.45-14.45						
	HALL 1 CHAIRED BY: Dr. Wolfgang Burghardt		HALL 2 CHAIRED BY: Dr. İbrahim Atalay		HALL 3 CHAIRED BY: Dr. İbrahim Yokaş	
14.50-15.10	S. Erşahin, H. Günal, K. Saltalı, T. Kutlu, B. Yetgin, F. Er, F. Sönmez, A. Korkmaz	Vertical transport of water and chemicals as affected by soil layering: a model study	I. Pugacheva, A. Shevyrnogov	Studying features of NDVI dynamics for vegetation monitoring of the South of Central Siberia	J. Akhtar, M. Anwar-ul-Haq, R. Farooq, Z. A. Saqib	Poor quality water and sustainability of wheat maize production on different textured soils
15.10-15.30	B. Turgut, T. Öztaş, E.L. Aksakal	Assessment of spatial distribution patterns of soil properties in the EAARI-	B. Panahi, M. Heidarian and A. Talaie	Effect of spraying of different mineral nutrients on generative buds in order	Ahmad Gholami, A.Biari and S.Nezarat	Effect of seed priming with growth promoting rhizobacteria at different
15.30-15.50	C. Göl, M. Sezgin, M. Dölarslan	Changes of soil properties and flora in natural forest and afforestation areas	M. Dingil, S. Şenol, M. E. Öztekin	Updating of the soil map of the Çukurova University campus area by	H. Monirifar	Tolerance of five Azerbaijan alfalfa ecotypes to salt
15.50-16.10	A. V. Bilgili, R. Akis, S. Aydemir	Geostatistical analysis of a water well field for determination of land	F. del Moral, J. A. Sánchez; M. Simón; S. de Haro and I. García	Soil alkaline phosphatase and phosphodiesterase activities in	F. Eraslan, A. Güneş, A. İnal, N. Çiçek, M. Alpaslan	Comparative physiological and growth responses of tomato and
16.10-16.30			C. A. Rosolem, R. Werle, T. Sgariboldi	Fertilization and texture affects K	Y. Kavdır, S. Camcı Çetin; D. Kili; R.	Potential use of olive oil solid waste in
16.30-17.00						
	HALL 1 CHAIRED BY: Dr. Sabit Erşahin		HALL 2 CHAIRED BY: Dr. İlhami Bayramin		HALL 3 CHAIRED BY: Dr. Alev Karagözler	
17.00-17.20	H. Ekinci, Y. Kavdır, O. Yüksel, Y. Yiğini, S. Camcı Çetin, H. Altay	Fire induced changes in soil characteristics in Kesan, Turkey	I. E. Boroujeni, M. H. Salehi, N. Toomanian, J. Mohammadi	Can location of sample area and expert idea affect the results of geopedological approach in soil mapping?	H. Ghorbani	Factors controlling the bioavailability of potentially harmful metals in wastewater treated soils
17.20-17.40	T. Kutlu, S. Erşahin	Calibration of van Genuchten unsaturated hydraulic conductivity parameters by regression technique	R. İlay, A. Sümer, Y. Kavdır	The effects of olive oil solid waste applications on the some physiological and morphological	E. Çelen, M. A. Kılıç	The molecular characterization of Azotobacter isolates from vegetations of meadows and farms of Antalya
17.40-18.00	M. (Baysal) Dölarslan, C. Göl	An investigation on the relationship between saline soil and halophytic	S.A. Materechera	Indigenous knowledge and approaches of soil fertility	N. Slyusar, N. S. Pechurkin, T. M. Zorkina	Studing of structure-functional features of halophytic vegetation in
18.00-18.20	D. Josic, M. Porobic, O.Stajkovic, D. Delic, N. Rasulic, D. Kuzmanovic, B.	Characterization of indigenous Bacillus isolates from stabilized sludge	K. Ajdary	of water distribution in different types of soils	F. De Cesare, S. Pantalei, E. Zampetti, A. Macagnano	Is Electronic Nose able to monitor phenanthrene biodegradation in soil?
18.20-18.40			M. Kuecke, K. Schiemenz, R. Reinhardt	Yield, quality and N dynamic in plants and soil after fluid fertilizer injection fertilization (CULTAN) in different cereal crops	İ. Ortaş, Ç. Akpınar	Indigenous mycorhiza potential in the plain of Çukurova

DAY 3: FRIDAY, OCTOBER 31, 2008

TIME	HALL 1		HALL 2	
	AGROCLIMATOLOGY		CARBON CYCLE	
	DESERTIFICATION AND LAND DEGRADATION		PLANT NUTRITION AND SOIL FERTILITY	
	SOIL QUALITY IMPROVEMENT		PLANT PHYSIOLOGY IN STRESS ENVIRONMENT	
	SOIL AND WATER CONSERVATION		IRRIGATION AND WATER QUALITY	
	LAND AND WATER MANAGEMENT		CONSERVATION OF BIODIVERSITY	
	GIS AND REMOTE SENSING		SOIL MICROBIOLOGY AND BIOCHEMISTRY	
	PEDOLOGY		SOIL AND WATER POLLUTION	
	CHAIRED BY: Dr. Bülent Okur		CHAIRED BY: Dr. Rafet Kıbnç	
08.40-09.00	R. Gündoğan, H. M. Beydemir	Updating soil maps by using geographical information systems and remote sensing techniques	B. Dilci, G. Rühl, J. M. Greef	Influence of soil applied bacterial strains as well as a liquid fertilization method on yield and quality of high oleic (HO) sunflowers (*Helianthus annuus* L.)
09.00-09-20	B. Yetgin Uz, S. Ersahin, E. Demiray, A. Ertas	Analyzing the soil texture effect on promoting water holding capacity by polyacrylamide	M. Çerçioğlu, B. Okur, S. Delibacak	Effect of tobacco waste and manure on soil properties and yield of lettuce
09.20-09.40	M. Gholipoor	Evaluating the effect of crop residue on water relations of rainfed chickpea in Maragheh, Iran, using simulation	N. Ziadi, J. Mac Leod, J. B. Sanderson, T. Forge	Anionic exchange membranes as a soil phosphorus index for potato produced in Eastern Canada
09.40-10.00	T. Tuncay, İ. Bayramin	The land evaluation of the Kırşehir-Çiçekdağ Farm State soils using Ilsen computer model	G. G. Gabinete, A. Z. Gabinete, M. I. Samson, R. L. Castillo, W. C. Cosico, R. J. Buresh.	On-farm verification and refinement of site-specific nutrient management (SSNM) for irrigated rice in Iloilo province
10.00-10.30 COFFEE BREAK				
	HALL 1		HALL 2	
	CHAIRED BY: Dr. Günay Erpul		CHAIRED BY: Dr. Habil Çolakoğlu	
10.30-10.50	M. Chernetsky, A. Shevyrnogov.	Mapping of inner water bodies in the Krasnoyarsk Territory based on the digital analysis of ground true and satellite data	M. Aydın, M. A. Kaptan, F. Özcan Sumer	A study on the differential response of malting barley genotypes to boron toxicity
10.50-11.10	A. H. Gorttapeh, M. E. Kordlar, B. P. Eslam, M. Roshdi, N. Akhondi, R. Amir	Evaluation of onion cultivation energy balance in East Azerbaijan province	T. Pekcan, H. S. Turan, H. Çolakoğlu	Effects of organomineral, mineral and farmyard manures on the yield and quality of olive trees (*Olea europaea*)
11.10-11.30	M. H. Salehi, R. Mohajer, H. Beigi	Developing soil cation exchange capacity pedotransfer functions using regression and neural networks and the effect of soil partitioning on the accuracy and precision of estimation	M. O. El-Mohtasem Bellah	Nitrate uptake and assimilation efficiency in excised leaves of C3 barley and C4 (Maize) plants I) Effetct of tempreture on Nitrate uptake and assimilation
11.30-12.30	CLOSING COMMENTS (HALL 1)			
12.30-13.30 LUNCH				
14.00-18.00 EXCURSION (EPHESUS and VIRGIN MARY HOUSE)				

POSTER PRESENTATION

Posters are open during the whole meeting from October 29 to 31.

Authors	Titles
AGROCLIMATOLOGY	
E. Akkuzu, G. Pamuk, H. B. Ünal	Evaluation of the effects of global climate change on agriculture and water sources in the Gediz River Basin
T. Pisman, I. Pugacheva, A. Shevyrnogov	Estimation of predictability of agrophytocenoses productivity on the basis of mathematical modeling, field experiments and satellite measurements
T. Pisman, N. Slyusar	Mathematical model of seasonal growth of halophytic plant community with account of environmental factors
SOIL QUALITY IMPROVEMENT	
A. Ebadi, A. H. Gorttapeh, F. Rejali and H. Salehzadeh	Effect of mycorrhizal fungi on the absorption of phosphorus and zinc by two alfalfa varieties in cadmium contaminated soils
H. Abbasdokht	The effect of plant residual on establishment of crops
H. Abbasdokht, E. Mamnoe	The effect of chemical controls of weed in alfalfa at different cutting
J.F. Herencia, C. Maqueda, P.A. García Galavís, R. Moreno, J.C. Ruiz	Physical and chemical properties in soils in conversion to organic management
R. Pivić, A. Stanojković, D. Delić, Z. Dželetović	Correlation of the water-physical properties in drainage pseudogley
SOIL and WATER CONSERVATION	
A. H. Gorttapeh, F. Faghenaby, R. Amirnia, M. Haji-Hasani	Evaluation of economy and compared energy efficiency on Grape in west Azerbaijan province
A. Reshadsedghi, A. Nasseri and A. Pakneznac	Influences of tillage methods on soil infiltration in a rapeseed farm
B. Turgut, E.I. Aksakal, T. Oztas	Defining partial effect coefficients of soil factors affecting on soil penetration resistance
H. Abbasdokht, E. Mamnoe	The effect of plant arrangement on yield and yield components of cucumber (Cucumis sativa) in Jiroft greenhouse conditions
M. Zabolestani, A.R. Sedghi, M. B. Khorshidi	Surface tillage possibility evaluation in irrigated wheat on the East Azerbaijan conditions
LAND AND WATER MANAGEMENT	
C. Gülser, S. Uç, F. Candemir, Z. Demir	Effects of rice husk application on mechanical properties and cultivation of a clay soil with and without planting
E. Yeşilirmak, S. Akçay, N. Dağdelen, F. Sezgin	Quality control and homogeneity of annual precipitation data in Büyük Menderes Basin, Turkey
G. Aydin, L. Atatanir, A. Yorulmaz	Some properties of saline-alkaline soils of Aydın-Söke Plain and activity of gypsum as amelioration material
H. Kaman, M. Çetin, C. Kırda, Ö. F. Karaca, S. Sesveren	Possibility of using EM38 device to determine the extent and severity of soil salinity: A case study in the Lower Seyhan Plain, Turkey
M. M. Bahoush, H. Abbasdokht, B. Rabie	Correlation coefficient analysis between grain yield and its components in corn (Zea mays L.) hybrids
M. M. Bahoush, H. Abbasdokht, B. Rabie	The study of phenotypic variation and cluster analysis for quantitative traits of corn (Zea mays L.)
M. M. Bahoush, H. Abbasdokht, B. Rabie	Principle component analysis for morphological traits in corn (Zea mays L.) hybrids
R. Meral, H. Değirmenci, C. Gençoğlan, A. Akyüz, S. Sesveren	Measuring water flow velocity and discharge with Acoustic Doppler velocimeter (ADV)
S. Emamgholizadeh	Neural networks for predicting flow discharge in the Balarood River (Iran)
GIS and REMOTE SENSING	
A. Larko, A. Shevyrnogov, M. Chernetskiy	Net primary production of boreal forests in the Krasnoyarsk Territory
A. Sarabchi, M.H. Salehi, M. A. Delavar, A. Golchin, M. Nader	Assessing the capability of satellite data for soil mapping
M. Kobets	GIS-modeling of agricultural land market in Ukraine
M. San, N. K. Sönmez, E. Aksoy, E. Tunç, S. Saydam	Integration of remote sensing data with geographic information technologies in agricultural land management: a case study of Kadriye-Antalya
Y. K. Koca, S. Şenol	Land use map of the Research and Implementation farm of the Agriculture Faculty of Çukurova University obtained by quickbird satellite data

PEDOLOGY	
A. Akay	Determination of the general properties of the soils in Sarayönü-Konya Turkey and their zinc sorption status
M. A. Delavar, S. A. Shoba, A. Sarabchi, A. Golchin	An investigation on reason of soil salinity and alkalinity on some part of Abyek Plain (Iran)
M. H. Salehi, F. Novruzi, H. Khademi, A. Davoudian	Clay mineralogy of selected semiarid soils as affected by parent materials in Central Zagros, Iran
M. H. Salehi, H. Afshar and J. Mohammadi	Spatial variability of wheat yield and soil properties in two land units of a quantitative suitability map, Central Iran
M. H. Salehi, I. Esfandiarpour and J. Mohammadi	The effect of landscape components on clay mineralogy of calcareous soils in Borujen area, Central Iran
O. Dengiz, N. Özdemir, T. Yakupoglu, E. Özturk	Basic soil properties and soil classification of hazelnut cultivation area in the Eastern Black Sea Region, case study; Unye-Tekkıraz district
PLANT NUTRITION and SOIL FERTILITY	
A. Gholami, S. Akhlaghi	Physiological response of winter wheat to various amounts of foliar application of nitrogen at different phonological stage
A.Ebadi, M. Davari, J. Razmjou, A. Hassanzadeh	Nitrate and nitrite accumulation in tomato and potato in Ardabil province, Iran
A.N. Cambouris, N. Ziadi, N. Tremblay, M. C. Nolin	Effect of texture and nitrogen fertilisation on quality and yield of corn and residual soil nitrate
A.N. Cambouris, N. Ziadi, N. Tremblay, M. C. Nolin	Wheat productivity and residual soil nitrate as affected by soil texture and nitrogen fertilization
B. Ertan, E. İrget, F. Çobanoglu, B. Şahin, E. Tutmuş, R. Konak, A. Belge	The effect of different nitrogen doses on the fig quality parameters and aflatoxin
B. Şahin, F. Çobanoglu, B. Ertan, R. Konak, E. Tutmuş, A. Belge, N. Okur, B. Çokuysal and H. Kayıkçıoğlu	The effect of using olive oil vegetation water on some physical and chemical characteristics of soil and nutrient element contents of fig (Ficus carica L. cv. Sarilop) leaves
D. Pageau, J. Lajeunesse and J. Lafond	Phosphorus and potassium fertilization of oilseed flax grown under a cool climate in the province of Quebec, Canada
E. A. Elkhatib, A. M. Mahdy	The disposal of biosolids and water treatment residuals on soils of arid regions: A glasshouse investigation
Ebru Karnez, Hayriye Ibrikci, M.Eren Oztekin, Mahmut Dingil, Mahmut Cetin, Sevilay Topcu, Hacer Oguz, Kürşat Korkmaz	Ammonium And Nitrate Status Of The First Crop Corn Fields At Cukurova Region
F. Sayyedi, J. M. Zadeh	Potato tuber yield as affected by various amount of N, P and K application
G. Saeidi	Effect of different fertilizers on seed yield and oil concentration of rapeseed(Brassica napus L.) in central region of Iran
H. A. Fallahi, A. Nasseri, A. Siadat	Nitrogen Fertilization Effects on Wheat Grain Yield Under Rainfed Condition
H. A. Gharaie	Effect of lemon waste on soil pH and availability of micronutrient in calcareous soils of Fars province, southern Iran
H. A. Norouzi, R. Kazerani	The effects of sulphur application and seed size on growth yield and yield components of three bread wheat genotypes (Triticum aestivum L.) under saline soil conditions
İ. Kavdır, Y. Kavdır	Determination of organic matter mineralization in compost amended soils using FT-NIR spectroscopy
J. Frat, S. Seferoğlu	Effects of olive oil waste water (mills) on macro nutrient contents of maize (Zea mays L.)
J. Lajeunesse, D. Pageau	Nitrogen fertilization and rhizobial inoculation effects on dry bean production in Northern Quebec, Canada
L. T. Büll, E. E. Freitag, J. C. Corrêa, D. M. Fernandes	Soybean yield and chemical attributes in soil after five-year surface application of slag, aqueous lime and sewage sludge
M. A. Demiral, M. Ay, F. Soral, M. Tekin	Effects of high nitrogen doses on growth and nitrate accumulation of leafy vegetables
M. G. Nessim, Y. H. Abdalla	Effect of cobalt on growth and cobalt uptake of barely in relation to cobalt availability in alkaline soils
M. R., Sadaghiani, M. Barin	The role of microbial activity on iron uptake of wheat genotype different in Fe-efficiency
M. S. Farahi, A. Faraji and H. A. Fallahi	Effect of nitrogen foliar application and different levels of irrigation on yield of canola
M. Secer, O. L. Elmaci, S. Ceylan, H. Akdemir	Residual effect of agroindustrial wastes on soil properties and maize nutrition

M. Ünal, T. Kutlu	Effects of drinking water treatment sludge on crop quality of Zea mays L.
N. Najafi, H. Towfighi	Changes in pH, EC and concentration of phosphorus in soil solution during submergence and rice growth period in some paddy soils of North of Iran
N. Tan, F. Çobanoğlu, H. Kocataş and S. Seferoğlu	Impacts of different natural fertilization techniques that was implemented on organic agriculture system on fruit quality criterions of (Ficus carica L. cv. Sarilop) dried fig cultivar
N. Yıldız	Diatomite: A new substrate for hydroponics
N. Yıldız, N. Bilgin	Determination of phosphorus and potassium status of Erzurum plain soils with Neubauer seedling technique
N. Ziadi, J. Fan, G. Bélanger, L. E. Parent, A. N. Cambouris and Z. Hu	Cadmium accumulation in potato tubers produced in Eastern Canada
N. Ziadi, N. Samson, C. Grant, L. E. Parent	Controlled release nitrogen in potato produced in eastern Canada
O. L. Elmaci, M. Seçer, S. Ceylan, H. Akdemir	Effects of some agro-industrial residues on soil fertility, yield and quality of potato
P. Sayyad-Amin, P. Ehsanzadeh	The effect of nitrogen on seed and oil yield of seven sesame (*Sesamum indicum* L.) genotypes in Isfahan
R. İlay, A. Sümer, Y. Kavdır	Determination of some micro and macro elements of bean (*Phaseolus vulgaris*) and sunflower (*Helianthus annuus*) plants after addition of olive oil solid waste to soil
S. B. Mosavi, A. A. Jafarzadeh, M. R. Nishabouri, Sh. Ostan and V. Feiziasl	Effects of rye green manure application in soil physical and chemical characteristics in Maragheh dryland condition zone
S. Ceylan, M. Seçer, Ö. L. Elmaci, H. Akdemir	Influence of tomato-paprika paste residues on soil properties and potato growth
S. Galeshi, E. Soltani, A. Hassanzadeh and A. Valdyani	The effect of seed aging on seedling growth, N and K uptake under salinity
S. Oustan, M. Asghari, M. R. Neyshabouri, A. Bybordi	Potassium fixation as affected by moisture conditions in some soils of Azerbaijan
S. Öztekın, A. R. Brohi, M. R. Karaman, S. İptaş	The effects of different level of nitrogenous and phosphorus doses on herbage yield and yield components of silage maize as the second crop under the ecological conditions of Tokat
S. Tabatabaei, S. Fathian, Z. Mehrabi, P. Ehsanzadeh	Impact of Pb pollution on three plant species
Ü. Harite, M. Aydın	Effect of boron applications on B concentrations in leaves, stem and roots of cotton cultivars

PLANT PHYSIOLOGY in STRESS ENVIRONMENT

A.Soltani, M. J. Robertson, Y. Mohammad-Nejad, A. Rahemi-Karizaki	Modeling leaf production and senescence in chickpea
A. Gholami, S. Asadollahi	The effects of water stress at different phonological stage on growth rate of wheat
F. Gşlser, F. Sönmez, S. Boysan	Effects of calcium nitrate and humic acid applications on growth and yield criteria of pepper seedling under salt stress
F. Nofouzi, V. Rashidi and A.R.Tarinejad	Path analysis of grain yield with its components in durum wheat under drought stres
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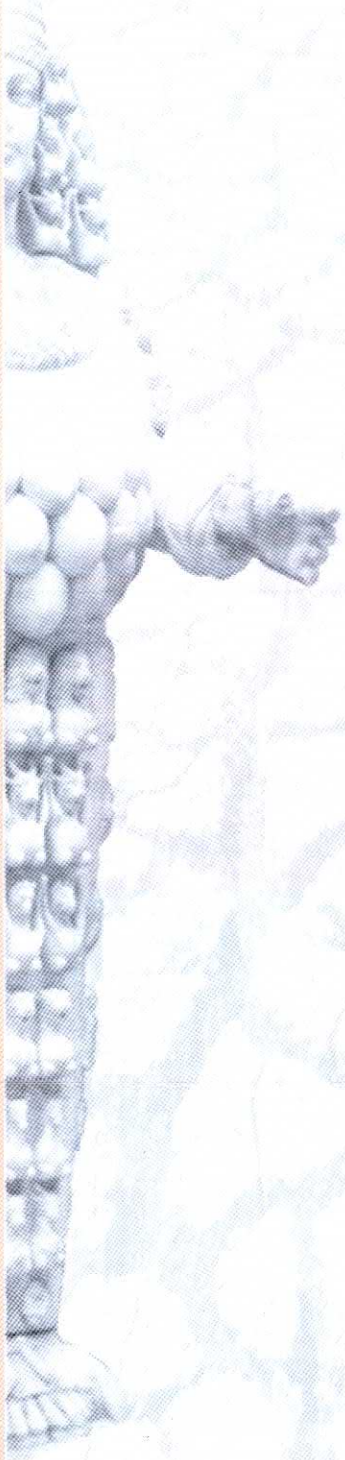

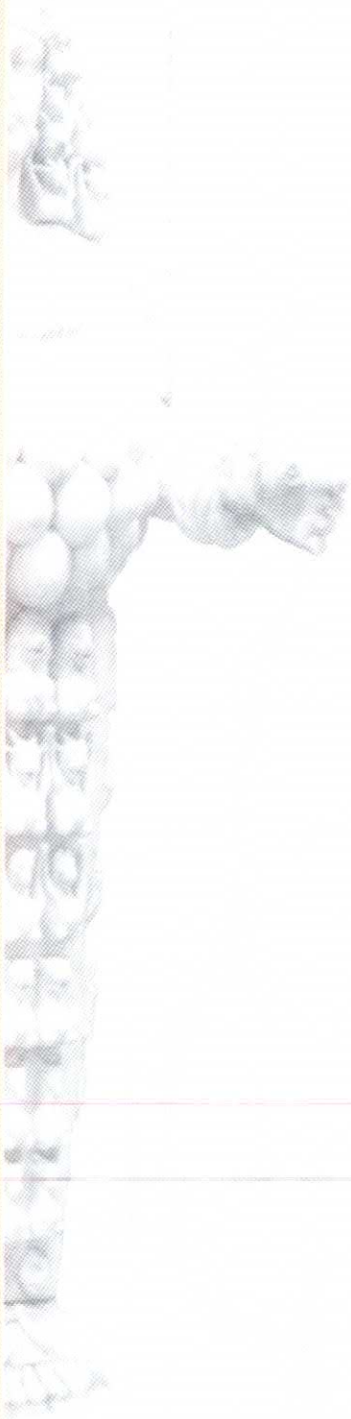

AGROCLIMATOLOGY

Soil Organic Matter (SOM) of a Sandy Soil Influenced by Agronomy and Climate

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Long term field experiments are carried out at Humboldt University of Berlin (Germany) to obtain information regarding sustainable management of arable land on sandy soils. In Thyrow, at a silty sand soil in the south of Berlin (85 % sand, 12 % silt, 3 % clay, 0.5 % Corg, pH 5.5) several experiments have been initiated since 1937. They include the agronomic factors crop rotation, organic fertilization, mineral fertilization and irrigation to study long-term effects on soil and crops. The results of annual Corg measurements enable to describe the influence of agronomic management and climate on the development of SOM. The following ranking of agronomic factors was observed from greatest to lowest influence: Organic fertilisation > crop rotation > mineral N-fertilisation > irrigation. Organic fertilisation with Farm Yard Manure (FYM) increases the content of Organic Carbon by 72 % compared with the control. A crop rotation consisting of cereals only leads to 34 % higher carbon contents than crop rotations including cereals and maize or potatoes respectively. Mineral nitrogen fertilisation increases the Corg content by 14 % but only a minor effect of + 4 % was detected at irrigation treatments. At the Nutrient Deficiency Experiment Thyrow contents of SOM are analysed since 1961. In general, the results show a decreasing tendency of SOM contents within all treatments of fertilisation. Since 1973 the Organic Carbon content lost 13 % meanwhile the average air temperature raised by 0.8 °C.

Keywords: organic matter, agronomy, climate, soil texture

Mathematical Model of Seasonal Growth of Halophytic Plant Community with Account of Environmental Factors

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A mathematical model has been constructed to describe the growth dynamics of different plant communities of halophytic meadows as dependent upon the air temperature and soil salinity level. Results of model studies show that there is a correlation between plant growth and the temperature of the air for plant communities growing on soils containing the lowest (0.1%) and medium (1.84%) salinity levels. It has been proven in model studies that for plant communities growing on high-salinity (3.58%) soils, not only the temperature of the air but also the salinity level of the soil should be taken into account.

Keywords: mathematical model, halophytes, plant communities, salinity level of the soil.

Agricultural Applications of the North Dakota Agricultural Weather Network

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The North Dakota Agricultural Weather Network (NDAWN) consists of 70 automated weather stations distributed among prime agricultural locations across North Dakota, the Red River Valley, and border regions of surrounding states. The NDAWN Center is a part of the Department of Soil Science, North Dakota State University. The NDAWN stations measure wind speed and direction, air temperature, rainfall, solar radiation, pressure (31 stations), atmospheric moisture and soil temperatures under bare and turf at 10 cm (4 inch) depth. The center provides daily summaries consisting of maximums and minimums as well as time of occurrence, and various totals or averages for all variables in English or metric units. Measured and calculated variables along with complete descriptions are available. The NDAWN Center web site: http://ndawn.ndsu.nodak.edu/ allows direct access to NDAWN data in various special and temporal scales. The voice modem accommodates those who do not have internet access. The NDAWN Center has assisted many North Dakotans in making weather critical decisions concerning their crops, livestock, and livelihood. One direct benefit of NDAWN data was helping to save the 1993-94 North Dakota potato crops. The stations provide weather data, which was instrumental in developing an agricultural model called the late blight model. This model predicts when leaf disease can occur in potato plants. Late blight doesn't occur in North Dakota every year and is prevalent during cool and moist periods of weather. In 1993-94, this model predicted that late blight would occur and growers were able to use fungicide applications to prevent the disease. Another direct benefit of NDAWN data is that it provides universities and the National Weather Service with an additional database for research and forecasting applications. Agriculture remains the number one industry in North Dakota and its success will always be dependent on the weather.

Keywords: Agricultural Weather, NDAWN Center, North Dakota Agricultural Weather Network

Simulation Study of Past Climate Change on Chickpea Phenology at Different Sowing Dates in Gorgan, Iran

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The evaluating of past climate change is needed for selecting appropriate adapting strategy for future. We evaluated change in some climatic variables and their effects on phenology of for chickpea cultivars (Jam, Hashem, Arman and Beauvanij) seeded at day of year 50, 70 and 90, during the 1961 to 2003 in Gorgan, Iran. Results revealed that the solar radiation has been decreased for month December. Although the value of maximum temperature appeared to be the same across years 1961 to 2003 for all months, that of minimum temperature tended to show increasing trend for May and August. The increase in number of days with temperature higher than 35 oC was considerable for April and October, but negligible for other months. The warming of night temperature was significant only for May and August. It found about 34 mm decrease in monthly rainfall for March. The rate of increase in number of days with rainfall was 0.0737 day year-1 for December. Nearly similar situation was also found for number of days with rainfall lower than 10 mm. The change in number of days with rainfall higher than 10 mm and lower and/or equal to 30 mm was in decreasing manner (March, October and December). The length of time from sowing to emergence appeared to be constant across past years. The advance in flowering (R1) was true only for cultivar Jam seeded at day of year 70. The length of period from R1 to pod initiation (R3) has been diminished for sowing at day of year 70 (Jam and Arman). Only cultivar Hashem seeded at day of year 90 tended to have decreasing trend for length of period between R3 and pod filling. It found one day (per 43 years) decreases from pod yellowing to maturity for cultivar Beauvanij seeded at day of year 70. Based on these findings, and on the fact that future climate change is predicted using past changes, it seems that the adaptation strategies for future, including agronomy and/or breeding programs, may be not the same for different sowing dates of chickpea.

Keywords: climate change, chickpea

Climate Change and Fruit Growing in Germany

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The vulnerability of economic sectors to climate change depends on both the expected regional climate change and the sectors' ability to adapt. In Germany, 80 % of the total area of land is used by the agriculture and forestry sectors and they belong to the most climate-sensitive branches. Climate change will have a significant impact on this sector. In comparison to crop production, where adaptation-strategies can be realised relatively fast through the implementation of a wide range of cultivars and species or by using short rotation periods in vegetation, the planting and rearrangement of orchards requires a consideration of the more long-term aspects of climate change impact. The adaptation of fruit plantation to climate change takes time and requires long-term investments. Returns are not realised before 3 to 6 years after the initial investments. Capital recovery can take as long as 25 years. Therefore, a detailed investigation on the impact of climate change on fruit growing is necessary. Earlier research has shown that the first impact of climate change on certain fruit species can already be observed. For example, since the end of the 1980's the blossoming of fruit trees in Germany has advanced by several days (Chmielewski et al. 2004). The general growing season in Europe and Germany has been extended by 10 days during the last decades (Chmielewski and Rötzer 2001, 2002). Because of the earlier blossoming of trees, in some regions of Europe the risk of late frost damages has increased (Sušnik und Žust 2001, Zinoni et al. 2002, Anconelli et al. 2004). Likewise, the number of pest populations in orchards has risen, e.g. the occurrence of the codling moth (Palm 2006). The overall objective of this project is to investigate the possible regional impacts of climate change on fruit-growing in Germany. The main fruit growing regions in Germany are likely to be impacted differently by climate change and therefore these regions will be vulnerable to the impact of climate change in a varying degree. The KliO project intends to develop application-relevant strategies for adaptation and evaluate the impact of these adaptation measures on the sectors profitability and productivity.

Keywords: Climate Change, Impact on Fruit growing, Phenology

Evaluation of the Effects of Global Climate Change on Agriculture and Water Sources in the Gediz River Basin

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Global climate change is very likely to have a major impact on the hydrological cycle and consequently on available water resources, flood and drought potentials, and agricultural productivity. As the largest user of water, the agricultural sector is expected to be affected by global climate change to an even greater extent than other sectors. Sufficiency of water resources is generally evaluated in terms of total water potential for total population. According to this evaluation, the beginning of water stress is accepted as 1700 m3 per capita per year. In Turkey, total water potential per capita per year was 2900 m3 in 2000, but this value is estimated to fall to 2200 m3 by 2025. Rapid population growth, industrialization, and rising standards of living will decrease the annual per capita renewable water potential in Turkey, and in general, Turkey's water resources are set to decrease to critical levels. We took as an example the Gediz Basin in western Turkey, which has a total area of some 17 310 ha, and supplies water for domestic and industrial purposes. The water resources in the basin support wildlife, and are used to produce energy. The objectives of this study are to examine the effects of global climate change on agriculture and water sources in the Gediz River Basin, to discuss the difficulties of management of the basin, and the measures which should be taken from today.

Keywords: Climate Change, water sources, irrigation, Gediz, Turkey

Estimation of Predictability of Agrophytocenoses Productivity on the Basis of Mathematical Modeling, Field Experiments and Satellite Measurements

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Estimation of predictability of agrophytocenoses productivity was made by comparing the results of investigation of a mathematical model, field experiments and satellite measurements. The mathematical model of the seasonal dynamics of agrophytocenoses productivity was built with account of air temperature. For model investigation the coefficients were used that were calculated on the basis of the results of field experiments conducted in the Republic of Khakassia. The objects of the research were agricultural crops (wheat, oats). The results of satellite measurements (NDVI dynamics), and theoretical and experimental results of the seasonal dynamics of plant total biomass proved to be quantitatively consistent

Keywords:mathematical model, NDVI dynamics, field experiments

DESERTIFICATION
and
LAND DEGREDATION

Identifying Soil Degredation and Determination Catchment Planning for Sustainable Farming in Tokat-Artova Celikli Catchment

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This research is carried-out between 2000-2005 in Tokat Celikli Basin which covers 10.412 km^2. In the research the grassland, agricultural and forestal areas were studied from soil degredation. Physical degredation was found according to the research findings. In addition to physical degredation chemical and biological degredation was also identified an correlation ratios are given with regression equations. Economical valuation was realised taking into considereation the agricultural areas in the basin. Required steps for basin improvement and sustainable agriculture were identified according to the research findings.

Keywords: Tokat-Celikli, soil degredation, desertification, basin, crop productivity, catchment menagement

Fire Induced Changes in Soil Characteristics in Kesan, Turkey

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This research was conducted in Kesan (Cinarlidere) area (1700 ha) of Thrace region, Turkey. The forest area was burned naturally in 2000. The aim of this research was to determine the effects of forest fire on some soil characteristics two year after the fire. Soil samples were collected from three locations as replicates from both burned and nearby unburnt sites. According to the study results, urease activity and soil organic carbon values ($P<0.001$), organic nitrogen and total porosity ($P<0.01$), aggregate stability, microbial biomass carbon values ($P<0.05$) were lower in burned soils than those of unburned soils. On the other hand, hydraulic conductivity and available phosphorus in unburned soil was not significantly higher than that of burned soils. This research showed negative effects of fire on some soil characteristics after two years.

Keywords: forest fire, soil characteristics,soil organic carbon, aggregate stability

Vertical Transport Of Water And Chemıcals As Affected By Soil Layering: A Model Study

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Transport of water and chemicals in soils is controlled by soil properties and processes. Advection, adsorption, diffusion, and dispersion of the chemical are the main processes controlling the extent of transport of a chemical. Soil porosity and pore size distribution are the key factors controlling the water and solute flow by advection and dispersion, soil adsorption phenomena are the main factors controlling the retention of the chemical in soils. All these processes are highly variable by depth due to differences in soil characteristics of different soil horizons. This study was conducted to analyze interactions between soil layering and vertical transport of solutes and water at 2-m wide, 4-m long, and 0.5-m deep lysimeters constructed as field plots. Zero, five, ten, fifteen, and twenty cm thick sand layers (as treatments) were placed over a level alkaline surface, then 30 cm thick non-alkaline soil layers were packed over the sand layers. To represent plant effect, alfalfa was grown at each plot since it has a dense canopy. Changes in pH, EC, and in concentrations of Na, K, HCO3, and B in topsoil were monitored, measuring these variables in water extracts collected by vacuum samplers following rainfall and/or irrigation events. Water content of both repacked topsoil and alkali subsoil were measured in October, 2004 when soil was dry. At the final sampling, a representative profile was open in each research plot and morphological observations were made in these profiles. Soil pH decreased and then increased sharply irrespective to sand layer thickness, and concentrations of HCO3 and B showed a similar behavior. The EC of repacked topsoil decreased continuously probably due to the leaching of salts by application of excess amount of irrigation water, and Na concentration of soil solution increased continuously, which was attributed to sodium transported by capillary rising water from the blow alkali soil. Greater values for water content occurred at final sampling in alkali soil below 5- and 0-cm sand layers, indicating that sand layer with 10 cm thickness obscured percolation of excess water from irrigation and precipitation as observed in layered soil profiles. Roots of alfalfa concentrated in the zone of sand layers, and almost no roots of alfalfa penetrated into the alkali zone in search of water and nutrients. As morphological observations revealed, channels of decayed roots in the alkali soil served as preferential pathways of water and chemical from upper layers.

Keywords: Soil layering, chemical transport, water flow, sand layer, alfalfa, vertical transport, transport of water in soil, transport of chemicals in soil

An Investigation on the Relationship between Salin Soil and Halophytic Plants Community in Semi Arid Region (Acicay Stream)

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An increase on world population and consumption has made providing new production areas necessary. Rehabiltation of salty and alkali soil which are foremost of problemeatic production areas and opening out for production are quite complicated and it changes according to the climate, soil and plant characteristics of the area. The soil affected by salt are approximately 1 billion hectare in the world and though there is not definite figures in Turkey, it is cited that it's about 2-2.5 million hectare (Munsuz et al. 2001). Acicay stream (96 km) arises from the lower slopes of Karakaya Mountain, gets through the Cankiri city center, Joins with Tatli Cay stream and then called Acisu Stream. Acisu stream joins with Terme stream which is close to Kizilirmak district and then mixes with the water of Kizilirmak. Right and left shores of Acicay stream are used for agriculture, pasture and afforestation practices. But stream water's and soil's being salty and gypsum affect growing environment factors negatively. The change in salinity and topography of right and left shores of Acicay stream affects flora directly. In order to determine interaction between soil-plant, salinity has been determined in the two different depths (0-20 cm and 20-40cm) from the plant-root area in the right and left shores of Acicay stream and floristic composition has been introduced in this area. In order to determine holophytic plant's ecology in the floristic composition, soil and plant sampling has been made along the stream by considering the type of the soil, topography and land usage. Salt (sodium chloride), electrical conductivity, pH and Na analysises have been made on the soil samples and Na analysises have been made on the plant samples. The characteristics that should be taken into account in the plantation and agricultural activities which will be done by investigating holophytic flora and salinity relationships have been determined.

Keywords: Salin Soil, Halophytic Plants, Acicay

Changes of Soil Properties and Flora in Natural Forest and Afforestation Areas (Çankiri-Eldivan Region)

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Turkey is one of the most important geographical regions in terms of richness of plant species by reason of its having different growing environments. This rich diversity of plant species must be recognized, conserved and managed in accordance with complicated relationships between climate-soil-plant. Forest areas, the most improved ecosystem, are important gene banks. In the world where ecological balance gradually spoils and forest areas rapidly decline, forestation practices should be attached importance while natural forest areas are being conserved. In this case, in order to make a success of forestation practices, primary aim should be to provide ecological balance. Plant and soil features in the area should be paid attention at the time of forestation practices. The aim should be to reach optimum plant diversity and soil features in natural forest formations. While the region which is chosen as an area of research had been covered with xerophytic steppe forests which are resistant to drought before, they changed today's anthropogene steppe as a result of over usage by humans. Ecological balance has been destroyed as a result of this ongoing damage and flora, fauna and soil features has changed. Ecosystem has been tried to reproduce together with forestation practices which have recently been applied. In this case, accurate description of ecosystem features is required. Fundamental information can be gained about growing environment through knowing well climate, soil and vegetation. Discovery of plant communities especially living in specific growing environment is important. The change of success in forestry practices which are not being applied in accordance with nature is lacking. In this context, in the research conducted in Eldivan where vegetation changes depending on highly water pressure and anthropogene effect by locating in arid and semi-arid region, the change in silvi-cultural, existent vegetation and soil features is investigated in the sample areas which were taken from natural and artificial forest areas that are similar in ecological and topographical qualities and surrounding area.

Keywords: Plantation, Silvi-culture, Soil, Flora, Çankiri

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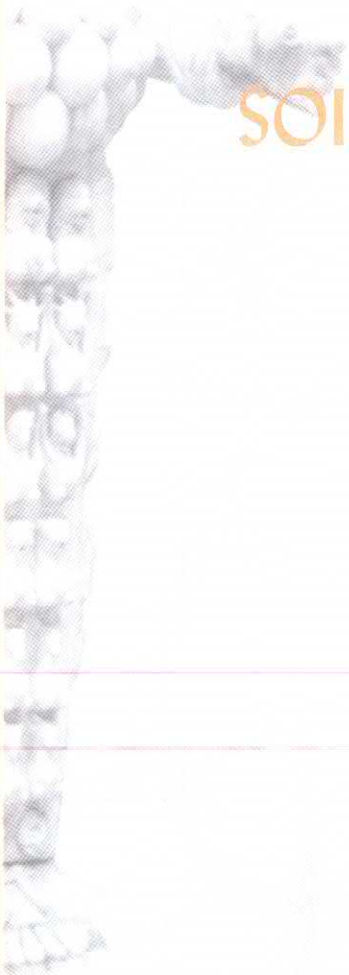

SOIL QUALITY IMPROVEMENT

Effects of Different Long-Term Soil Management Systems on Selected Physical and Chemical Properties and Crop Production in Sandy Soils in North-East Germany

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Soil management systems influence the agricultural system as they have in short- and long term period different effects on soil physical and chemical properties, therefore influencing the efficiency of production as well. An accurate directed choice of tillage equipments leads to a better soil protection and enables a higher fertility which is an important requirement for sustainable agriculture. The aim of this study is to investigate the effects of different soil management systems on some physical and chemical properties and the crop production of these sandy soils. This study demonstrates the first results obtained from the year 2006, performed on the long-term land use experiment with the effects of three different factors (deep and shallow tillage; 17 and 28 cm, lime application; +Ca and –Ca and farmyard manure; +FYM and –FYM) in Berlin-Dahlem (Germany), Humboldt University of Berlin and the ZALF experimental station at Dedelow (Centre for Agricultural Landscape Research) (Germany) in 5 different tillage systems (no-tillage, mulch; 10 cm, cultivator; 15 cm, plough; 15 cm and plough; 25 cm). The soil heterogeneity were determined and evaluated with the computer program "Surfer" depending on the different depths of the sand and loam layers. The penetration resistances of both experimental fields showed that the deep tillage systems caused a higher compacted zone in deeper soil layers. It was found that there are significant differences in the soil aggregate stability and pH values between the shallow and deep tillage systems in Berlin-Dahlem. The pH values were significantly higher in the deep tillage systems. The soil organic matter contents were found higher in the deep tillage systems but there were no significant differences. There were also no significant differences in grain yield between these two tillage systems in Berlin-Dahlem.

Keywords: Penetration resistance, soil compaction, pH, aggregate stability, soil organic matter, crop production

Effect of Mycorrhizal Fungi on the Absorption of Phosphorus and Zinc by Two Alfalfa Varieties in Cadmium Contaminated Soils

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Some agricultural and industrial practices such as mining activities, waste materials of industrial factories, other pollutants and the application of wastewater on farmlands contaminate the agricultural soils. Cadmium is one of the most common heavy metals which accumulates in agricultural soils as a result of the application of phosphorus fertilizers and can easily be absorbed by plants even at very low concentrations with detrimental effects on the living systems. Alfalfa requires high rates of phosphorus fertilizer and therefore the soils under alfalfa are more prone to contamination of cadmium. Arbescular Mycorrhizal fungi exist as obligate symbiotic organisms on roots of more than 80% of plant families and enhance the growth of the host plant by providing water and nutrients when the plant growth limited by environmental stresses. In order to evaluate the effect of Mycorrhiza symbiosis on nutrient absorption by alfalfa under the cadmium pollution, a factorial experiment base on completely randomized design conducted by using two alfalfa varieties (2122 and Hamadani cultivars); Glomus intraradices fungi; and four levels of cadmium (0, 5, 10 and 20 mg kg^{-1} soil) with four replications in green house on 2005. The plants cut at 50% bloom to determine root and shoot dry matter as well as mineral nutrient absorption by using standard laboratory procedures. The soil material rhyzosphere collected to determine colonization percent. Results showed that phosphorus and iron absorption of 2122 was superior under normal growing conditions. However, under cadmium stress Hamadani performed superior where it also proved none suitable as a host plant for symbiosis with Mycorrhiza. Fungi significantly increased the absorption of nitrogen, phosphorus and zinc by shoots and phosphorus even in the presence of cadmium adverse effects. Time of harvest also significantly improved the uptake of all the nutrients by the shoots as well as the dry matter production by shoots.

Keywords: Alfalfa, Arbuscular mycorrhiza, Cadmium, Symbiosis, Yield

Increasing Soil Organic Matter Content in Mine Soil Through Pig Manure Addition

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Mine soils in southeast Spain have scarce vegetation due to very poor properties such as extremely low soil organic matter (SOM) (< 0.6 g carbon kg^{-1} soil), low pH, high salinity and metal contents. Also in southeast Spain, there is an economically-important pig husbandry faced with challenges to manage the large volumes of industry-generated animal wastes. This study will present the results of a leaching experiment to assess the retention and release of nitrogen and carbon from pig manure added to undisturbed column of mine soil. We excavated three columns (15-cm diameter and 30-cm length) from a representative mined site. The columns were amended with single (7 % by mass) and double doses of pig manure, and leached weekly with distilled water for 10 weeks to simulate annual rainfall events in the study area. Leachates were collected and analyzed for pH, electrical conductivity, redox potential, and contents of selected anions and metals. However, we will limit this presentation to carbon and nitrogen to quantify the potential contribution of pig manure addition to the build up soil organic matter in mine soils. Results showed that after addition of pig manure in the soil surface, soil pH increased from 2.2 to 4.0 after 11 weeks (single dose) and to 5.2 at week 21(double doses). Significant increased were observed in total nitrogen contents in both single and double doses, 1.14 g kg-1 (1100%) and 1.33 g kg-1 (1000%), respectively. Total carbon contents improved to 18.6 g kg-1 (3200%) in single dose and to 16.4 g kg-1 (2800%) in double doses. Nitrogen and carbon in soils had weekly rate of increases of 0.1 and 2.0 g kg^{-1}, respectively. Moreover C/N ratio increased from 5 to 12 at the end of the experiment. Leachates had significantly higher weekly release of NO3- than total organic carbon (TOC) during the first 6 weeks of leaching. Weekly rate of releases (mg L^{-1}) were 127 ($NO3^-$) and 2.9 (TOC) in single dose, and 35 ($NO3^-$) and 1.0 (TOC) for double doses. Leachates contained NO3- less than the 50 mg L-1 threshold established by FAO. These results suggest that addition of pig manure may significantly accelerate the build up of SOM in mine soils without endangering the release of $NO3^-$ into sub-soil or groundwater in semiarid regions. Once there is sufficient SOM, mine soils will have an environment hospitable to various ecosystems including plant colonization and microbial community needed for its physical stability. Pig manure amendment of mine soils can be an ecologically-sound means of managing the large volume of wastes generated by the pig industry in southeast Spain.

Keywords: Column Leaching, nitrate, TOC mine soil

Physical and Chemical Properties in Soils in Conversion To Organic Management

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Interest in organic soil management has grown appreciably in recent years. The transition from conventional to organic farming is accompanied by changes in soil physical and chemical properties and processes that could affect soil fertility. Nevertheless, the organic systems is very complex and very few studies has been studied this process. Understanding of physical and chemical processes involved in the transition process is important for ameliorating the management of the organic farming systems. This work studies the effect of the transition conventional to organic farming on physical and chemical properties of a loam soil (Xerofluvent) located in the Guadalquivir River Valley, Sevilla, through a succession of five crops cycles over a three year period. Two mature composts (plant and animal compost) were used for the organic fertilization. Crop rotation and varieties were identical in the two systems. At the end of the study, the organic farming management resulted in a higher soil organic matter, N and P, K and Mg available. Electrical conductivity and pH are not significant differences between treatments. The use of organic farming resulted in higher available Fe, and Zn. The available Mn and fundamentally Cu do not show significant differences. The organic treatment also showed lower bulk density and higher available water content. This study demonstrated that the use of organic compost results in an increase of soil organic matter, storage of nutrients, and produce positively effect in physical soil properties than with conventional management, which can provide long-term fertility benefits.

Keywords: organic compost, EC, pH, Crop rotation, organic farming

Cover Crops And Soybean Root Development in a Compacted Soil

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Growing cover crops with vigorous and deep root systems can result in more soil biopores, improving soil conditions for root growth for the next crop. Root growth of cover crops and soybean cropped in a no-till rotation were evaluated in soil with high penetration resistance. The experiment was carried out in a Red Yellow Latosol with clay texture, in Botucatu, São Paulo, Brazil. Brachiaria ruziziensis, Sorghum bicolor and also a mix of these two crops were gown during Fall-Winter. Next, hybrid sorghum (CoverCrop®), Crotalaria juncea and Pennisetum americanum were grown in Spring, and soybean in Summer. In the second year of rotation, samples of cover crops roots were collected from the depths of 0-5, 5-10, 10-20, 20-40 and 40-60 cm. Soybean roots were sampled at R2. Root length and dry matter were determined. There was a significant difference in root growth among cover crops within the soil profile, showing their different abilities to explore soils with physical restrictions. There were more roots in the upper soil layers in plots with rotations using Sorghum bicolor mixed with Brachiaria ruziziensis, followed by Crotalaria juncea or Pennisetum americanum in Spring. CoverCrop® cropping after Sorghum bicolor and right before soybean resulted in the lower values of root length and dry matter. However, when CoverCrop® was grown after Brachiaria ruziziensis more roots were found in the deeper soil layers. Soybean root growth was affected by cover crop species, and there was a positive correlation between cover crops and soybean root growth, down to the depth of 10 cm. The use of cover crops with vigorous root systems in no-tillage rotations can increase soybean root development in a compacted soil.

Keywords: soil compaction, penetration resistance, no-till, root length

Effective Parameters On The Disk Harrow Performance

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This study was conducted to investigate the effect of three soil moisture content ranges of (12-14), (14-16) and (16-18) percent during primary tillage and three speed ranges of (3-5), (5-7) and (7-9) km/h on performance of an offset disk harrow in a silty clay loam soil. The experiment was a randomized complete block design with factorial experiment in three replications. The performance parameters measured were: total draft, drawbar power requirement, tractor drive wheel slip and degree of soil pulverization. Results indicated that, draft and drawbar power requirement of disk were increased significantly by increasing the travel speed. Tractor drive wheel slip was highly influenced by travel speed, soil moisture content and their interactions. Soil moisture content was primarily an important factor affecting the size and hardness of soil clods made by plowing and secondly, it played an important role in soil pulverization by disk harrow. Over all, the optimum soil moisture content for conducting primary tillage using a moldboard plow was 16 to 18%(dry weight basis), which corresponds to 0.91 lower plastic limit of the experimental field. Also, the optimum speed range for disk harrowing was determined to be 5 to 7 km/h.

Keywords: Tillage, Disk harrow, Soil moisture content, Travel speed, Draft, Soil pulverization

Correlation Of The Water-Physical Properties In Drainage Pseudogley

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On the experimental drainage field Varna near Šabac, owned by Institute of Soil Science, the influence of horizontal pipe drainage on the water-physical properties in pseudogley type of soil was investigated. The flexibile perforated PVC drainage pipes, spacing 25 m, were construcetd in 1979. Sampling and analysis of the data were done from the control variant with no drainage system and, also, from drained areas, three years after the horizontal pipe drainage has been constructed: in 1982, after 13 years (in 1992) and after 24 years (in 2003) of drainage function. The correlation between water permeability and content of clay, dust and air capacity, as well as between permanent wilting point and hygroscopicity, was determined. The obtained data show the highest correlation between water permeability and air capacity, and the lowest between water permeability and the content of dust. It was determined that the permanent wilting point is directly proportional to the hygroscopicity and that there is a very high correlation betwen them.

Keywords: Water-phisical properties, pseudogley, drainage, corelation

The Effect of Chemical Controls of Weed in Alfalfa at Different Cutting

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In order to study of The effect of chemical controls of weed in alfalfa (Medicago sativa) at different cutting an experiment was established as Randomized Complete Block Design with three replications. 9 treatments included herbicides and herbicides+ thinning and indicators (weed free and weed interference). Results showed that all of treatments significantly affected alfalfa fresh and dry weight at different cutting. 1 and 8 treatments produced maximum alfalfa fresh and dry weight and 5 and 6 treatments produced minimum. At the first cutting, 8 treatment produced maximum fresh and dry weight and 9 treatment produced minimum.

Keywords: alfalfa, herbicides, thining, cutting

The Effect of Plant Residual on Establishment of Crops

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In order to evaluation of plant residual on establishment of crops an experiment was conducted during 2006-2007 in Sharood Universiy of Technology in Iran. The experiment was as factorial in Completely Randomized Design with 4 replications. The residual of Triticum aestivum, Beta vulgaris, Zea mays and Brassica napus and distilled water as check were tested on themselves and other crops. The results showed residual of crops had different effect on growth of themselves and other crops. Germination percentage, speed of germination, root dry weight, stem dry eight, root length, stem length, root/shoot ratio and plant growth traits were significantly affected by residual of Beta vulgaris, Zea mays, Triticum aestivum and Brassica napus respectively

Keywords: Residual plants, growth

SOIL and WATER CONSERVATION

Surface Tillage Possibility Evaluation in Irrigated Wheat on the East Azarbijan Conditions

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In general, conventional tillage system (moldboard plow + disk harrow) is used for soil preparation, so drawbar power requirement is high and soil structure is destroyed. Wheat is one of the most important agricultural products of Iran. Every year the degradation of agricultural soils are increasing due to improper tillage operations. The study was conducted in three years with two treatments and four replications. Conventional tillage method was included: moldboard plowing at the depth of 20-25 cm, disk harrowing at the depth of 12 –15 cm, leveling, and following by chemical fertilizer spreading and planting by grain drill. Shallow tillage method was included: disk harrowing in the depth of 6-8 cm after removing plant residues, disk harrowing in the depth of 12 –15 cm in fall, spike tooth harrowing, following by chemical fertilizer spreading and planting with grain drill. The treatments were arranged in a combined analysis of variance. Treatments had no significant difference in yield and its components. The average wheat yield of conventional tillage was 79 kg more than shallow tillage. This difference might be due to higher plowing depth and better residual burying with moldboard plow. The grain yield in surface tillage was 97.5% of the yield in conventional tillage. Conventional tillage consumes more energy compared to shallow tillage, takes more times, causes more depreciation of the implements and therefore increases cost. This necessitates more study to obtain correct results. Considering that the time for cultivation is short, and also no significant differences in the yield by the two methods, the shallow tillage can be therefore recommended in irrigated wheat in Iran.

Keywords: Conventional tillage, Shallow, Grain yield, Irrigated wheat

Influences of Tillage Methods on Soil Infiltration in a Rapeseed Farm

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Tillage methods can affect soil infiltration. To investigate influences of tillage methods on infiltration an experiment was conducted in rapeseed farm at the Khosroshahr Research Station. Experiment treatments comprising primary and secondary tillage methods. The primary tillage comprised application of moldboard plowing at the depths of 15-20cm and 25-30 cm. The secondary tillage methods were application of rotivator and disk harrow both at the depth of 8-10 cm. Infiltration was measured by double-ring method and during 480 min for all experimental treatments. In the present study infiltration rate and cumulative infiltration function were developed. Results revealed that cumulative infiltration at the soils applying moldboard plow with two depths of 15-20 cm and 25-30 cm were nearly identical and equaled as 330mm. In addition, results showed that applying the secondary tillage with disk produced cumulative infiltration more that that rotivator and were respectively 365 and 296mm on the time of 480 min.

Keywords: Soil infiltration, tillage method.

The Suitability of Passive Capillary Samplers as a Tool for Monitoring of Nutrient Leaching

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To measure nutrient leaching under field conditions, 2 basics information are essentially needed: 1) the quantity of water percolating through the soil in a specific soil depth and 2) the concentrations of the chemical components (nitrate, phosphate, pesticides, etc.) in the percolate. Of similar interest is the possibility of short-term interval sampling to receive reliable information about the seasonal dynamics of the nutrient flux. Passive CAPillary Samplers, PCAPS suck the pore water from unsaturated soils by using the capillary potential of fiberglass wick, which act as a hanging water column and develops a suction of 0 to 50 cm H2O when it is wetted. PCAPS have essential advantages compared to the other leaching sampling techniques (soil coring, suction ceramic cups): They collect seepage water from undisturbed soil profiles of a defined area related to water flow dynamics (time and flux proportional) without any artificial suction, vacuum and electricity. Investigation with 56 PCAPS installed in 5 different experimental fields show that water amounts sampled by the PCAPS follows the water balance logically. The water sampling efficiency determined for 2 sites in relation to the climatic water balance is 37 % (arable land) and 76 % (grassland) and is related to precipitation intensity. Collection efficiency has been determined in relation to monolith lysimeter measurements. Pretreatment procedures for fibreglass wicks by which absorption of seepage water components shall be avoided will also be discussed.

Keywords: wick sampler, nutrient leaching, leaching monitoring, PCAPS

The Effect of Plant Arrangement on Yield and Yield Components of Cucumber (*Cucumis sativa*) in Jiroft Greenhouse Conditions

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In order to find out suitable plant arrangement for greenhouse cucumber Varieties a field experiment was conducted in Jiroft Agricaltural Reserch center. The experiment was as factorial in Randomized Complet Bolock Design with 3 replications. The first factor was width of plant strip with 15, 30, 45 Cm, The second factor was plant spacing with 25, 40, 55 Cm and the thired factor was Varieties naming Royal and Kalifornia. The results showed that the width of 30 Cm produced maximum fruit yield. On the other hand, when plant density was increased, fruit weight, fruit number per plant and single plant fruit yield were decreased significantly. But, number and fruit yield in area significantly increased. The plant density of 25 Cm produced maximum yield in area. Yield between varieties was not significantly different.

Keywords: Greenhouse, cucumber, yield, planting pattern

Leaching of Mineral and Organic Nitrogen and Phosphorus in Relation to Long-Term Cropping and Fertilization Intensity

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Between 2001 to 2004 the leaching of mineral an organic nitrogen and phosphorus was studied in different German field experiments in relation to soil types (sand, clay loam), soil cultivation (conventional tillage, minimum tillage), land-use (grassland, arable-land) and fertilization (organic and mineral fertilization). Passive capillary samplers were chosen to collect seepage water. The highest concentrations of mineral N (NO_3 and NH_4) were detected generally in the late winter, while mineral P concentrations were highest in late summer. Organic N and P concentration showed no seasonal trend. 22 % of the total nitrogen was found as organic N in the drainage from the clay loam, while it was only 7 % for the sand soil. The contribution of organic P in the total P content in the leachates was influenced by land use: On the sandy soil from 47 % (long-term mineral fertilization) and 15 % on permanent grassland; On the clay loam soil from 38 % in the minimum tillage plot to 15 % in the conventional tillage plot. A decrease of the nitrate concentrations in the drainage was usually accompanied by an increase of the PO_4 concentrations. In such situations, a higher contribution of macropore/preferential flow to leaching is assumed. The P/NO_3 ratio can be used as an indicator to explain the presence of macropore and/or preferential flow.

Keywords: nutrient leaching, macropore transport, nitrate, ammonium, phosphorus, organic nitrogen, organic phosphorus

Assessment of Spatial Distribution Patterns of Soil Properties in the EAARI-Experimental Station (Erzurum)

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Defining spatial distribution patterns of soil properties within a field or watershed is important for site-specific soil and plant management. The objective of this study was to determine spatial distribution patterns of particle size distribution, organic matter, lime content, pH and plant-available P contents of soils in the Experimental Station of the Eastern Anatolia Agricultural Research Institution (EAARI). The research area, about 100 ha, was gridded with 100 m intervals in the north to south and east to west directions, and 68 soils samples were collected from 0-20 cm dept at each intersection. An isotropic-spherical semivariogram was fit to explain spatial variability of organic matter, lime content, pH and plant available P. Clay and sand content showed anisotropic variation, and silt content produced pure nugget effect. Block kriging analysis was performed to prepare distribution maps. Distribution patterns of soils properties studied showed a great amount of similarities with each other, as the patterns of yield.

Keywords: geostatistics, spatial variabilty, soil properties

Defining Partial Effect Coefficients of Soil Factors Affecting on Soil Penetration Resistance

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Soil penetration resistance affects on plant root growth and water and air movements into soil. The objective of this study was to determine partial effect coefficients of soil properties affecting on soil penetration resistance by stepwise regression analysis. The research area is located at the Eastern Anatolia Agricultural Research Institute (EAARI)-Ilica Experimental field in which a severe soil compaction problem is exist in cereal production areas. 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 penetrologger. Soil samples from 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, aggregate size distribution, soil pH, $CaCO_3$ content, electrical conductivity and organic matter content of soil samples were determined. The stepwise regression analysis results indicated that the most important factors affecting on the mean soil penetration resistance through 80 cm soil depth profile were moisture contents of upper soil layer and moisture content, bulk density and organic matter content of lower soil layer. It was also determined that the moisture content of upper soil layer, aggregate stability and clay content were the most effective factors on the penetration resistance of the surface soil layer, but moisture content and bulk density for the compacted (lower) soil layer.

Keywords: soil penetration resistance, soil compaction, stepwise regression analysis

Calibration of Van Genuchten Unsaturated Hydraulic Conductivity Parameters by Regression Technique

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Unsaturated hydraulic conductivity is the mainstay, modulating water and chemical transport in the field. Measurements of parameters take place in the processes are difficult and require time, labor and finance. Thus, correct estimation of these parameters is very important to save valuable sources. The purposes of the study was to estimate van Genuchten unsaturated hydraulic conductivity parameters with RETC-ROSETTA program and calibrating the estimations by regression technique using easily measured soil physical properties, such as components of texture, bulk density and water holding capacity. Total, 168 soil and bulk density samples were collected from 0-30 cm soil depth in an alluvial area located over young river terraces of Yesilirmak near Tokat city. The soil samples were analysed for clay, silt, sand, and oganic matter, and saturated hydraulic conductivities of each sample was measured. Soil water content of each soil sample was determined for -10, -20, -33, -50, -75, -100, -300, -500, -700 and -1000 KPa soil water pressure. van and n, were determined inverselyαGenuchten's water retention curve parameters, ve nαusing water retention data with RETC program. Rosetta estimated parameters calibrated by regression technique using soil properties. Performance of calibration-model was judged by correlation of estimations with observed values.

Keywords: RETC, van Genuchten parameters, water retention curve, unsaturated hydraulic conductivity, estimation, modeling

Spatial and Temporal Analysis of Annual Precipitation Variations in Turkey

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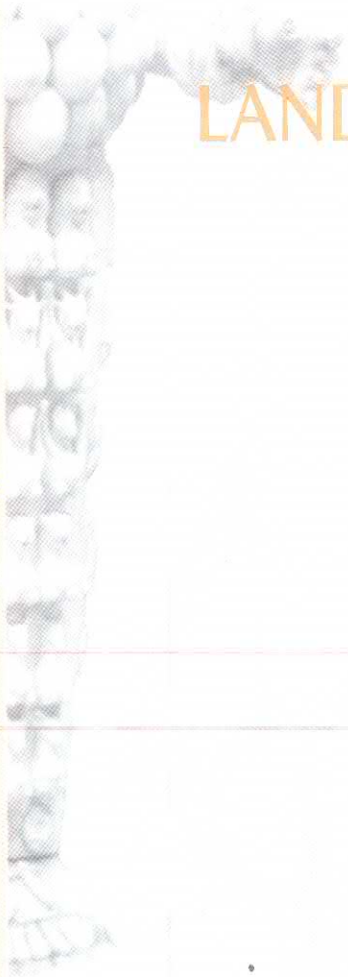
Variations in the spatial and temporal distribution of precipitation are one of the major impacts of global warming, and those have direct impacts on hydrology, water resources management, agricultural practices, and ecosystems in many regions around the world. Therefore, for management of water and related resources at a watershed scale or regional and national scales, it is important to understand how a given region would respond to climate change during a certain period of time and to be able to better predict how it may respond spatially and temporally in the future In this research, monthly rainfall values recorded yearwise from 1975 to 2004 at the 207 climate stations of Turkey by the Turkish State Meteorological Service (TSMS) were analyzed and long-term trend and fluctuations were determined for each station using the Mann-Kendall and Sen's T tests. Results showed that, increasing trends of the mean annual precipitation were observed at the 76 climate stations, and increases from 11 stations generally located in the northern and western Black Sea regions were statistically significant In contrast, 125 climate stations showed decreasing trends of the mean annual precipitation and decreasing trends at the 12 stations, located in the Central Anatolia, western Aegean and Trace regions, were statistically important. After December, January, with 66.9 mm mean annual precipitation, is found to be the second rainiest month in Turkey. The most important decreasing trends were also observed in the January precipitation values, and these decreases could have a vital importance for watershed management and water storage because of the higher contribution rates of January to the annual totals of the precipitation. Additionally, some decreasing precipitation trends were observed in October, June and May, and these were only important for small numbers of climate stations. On the other hand, increasing trends were observed especially in the August and September precipitation values, and these were statistically important at the 41 climate stations. However, due to the higher evapo-transpiration values in the months of August and September, these increases could not contribute water considerably for the accumulation and storage in the soils and reservoirs. Conclusively, the results of precipitation trend analysis for the 207 meteorological stations over Turkey revealed that increasing and decreasing trends were temporally and spatially different. More likely, it is expected from this study that the findings would contribute valuable information to drought, climate change and desertification studies in Turkey.

Keywords: annual rainfall totals, temporal and spatial variations, trend analysis



LAND and WATER MANAGEMENT

Some Properties of Saline-Alkaline Soils of Aydin-Söke Plain and Activity of Gypsum as Amelioration Material

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The study has been carried out in two different areas; a farmer area in Söke Plain and in experimental station of Adnan Menderes University. The aims of study, are to determine of some physical and chemical properties of the soils and to search of activity of gypsum (CaSO4) used in alkaline soils having high sodium. For this purpose, 50,100 and 150 kg/da gypsum were applied to the experimental soils besides control. These applications were made in autumn after harvest period and before the winter rains. In order to determine affects of gypsum on some physical and chemical properties of the soils such as texture, pH, soluble salt content, lime, EC, organic matter content, bor on, aggregate stability, dispersion ratio, suspension and dispersion percent. Disturbed and undisturbed soil samples were taken from 0-10,10-20,20-30, 30-40, 40-60, 60-90 cm depths in May after spring rain and in September when the soils are drier. The obteined data taken from the analyses were evaluated as statistically. The results showed that gypsum doses used as amelioration material are effective to lead Na into soil solution by leaving from soil colloids. However this phenomenon was not found sufficient in the soils of sesecond experimental area. Hence gypsum doses that will be used in soils having high alkalinity should be higher and the soils should be washed with high quality water after gypsum treatment because of unsufficient rains in the area.

Keywords: saline soils, alkaline soils, gypsum

In Situ Monitoring of Soil Solution Nitrate in Saturated and Unsaturated Soils

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A lack of in-situ instrumentation limits continuous monitoring of soil solution concentration to evaluate environmental (contaminants) and agricultural management (plant nutrients) practices. We developed a prototype soil solution monitoring technique, to measure long-term in-situ nitrate concentration, consisting of an in-situ stainless-steel porous cup, with real time concentration measurements using a UV fiber-optic sensor. The measurement technique does not require soil solution extraction, but is based on in-situ soil solution equilibration by diffusion between the porous cup and the surrounding medium. The technique is presented for nitrate solution with 2 different soil types using new designed of solution samplers. Analytical solutions are presented to evaluate solute diffusion coefficients, as controlled by a variety of soil water contents. The principles of operation are demonstrated for diffusion a saturated and unsaturated Oso Flaco Sand and Colombia Sandy loam soil, illustrating the potential application solution samplers in a soil environment.

Keywords: In situ soil solution sampler, Nitrate concentration in soil solution, Diffusion, UV adsorption spectrometer

Watershed Modeling with Arcswat: Calibration and Validation for the Prediction of Flow, Nitrate and Phosphorus Load

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The European Water Framework Directive requires that all surface waters and groundwaters within defined river basin districts must reach at least "good" status by 2015. Simulation models are essential tools to evaluate potential consequences of proposed strategies and to facilitate management decisions. One of the most commonly used river basin model is ArcSWAT, a combination of the simulation model SWAT with a GIS user interface. To test the application of ArcSWAT under German conditions, a relatively small watershed (52 km²) with sufficient data on soils, land use, climate, water flow and river water quality was selected. The watershed shows a wide variety of land uses (intensive farm land, extensive pasture, and forest), soils (light sandy soils and heavy loams), surface slopes and a few potential point sources of nutrients, like fish ponds, wastewater treatment plants and a public compost plant. The model was calibrated and validated for the prediction of flow, nitrate and phosphate concentration and load at the main basin outlet. Sensitive model parameters were determined and adjusted within feasible ranges to minimize model errors on monthly flow and quality data. The calibration resulted in good model predictions of the monthly flow and nutrient load, whereas the error in the prediction of the nutrient concentration was much larger. The water quality prediction could be improved by taking relevant point sources into account in the model. The model was used to evaluate some land use changes and changes of the agricultural practices on the river water quality. Results show, that land use as a non point pollution is the most important factor determining water quality. Changing part of the arable area from summer crops (corn) to winter crops (wheat and barley) could improve the water quality slightly. Higher improvement of the water quality could be achieved by changing arable land to pasture. This, however, is rather not feasible due to economic conditions of the farms.

Keywords: watershed modelling, water flow, nitrate, phosphorus

Principle Component Analysis for Morphological Traits in Corn (*Zea mays* L.) Hybrids

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In order to study the relationships between grain yield an experiment was carried out in randomized complete block design with four replications in Shahrood Agricultural Research Station during 2006-07. Results of factor analysis showed that five independent factors are the reason of the significant correlation cofficents between 16 measured traits. These factors explained 89/17% of total varation in the observed data.

Keywords: Factor analysis, Maize hybrid, Yield

Soil Salinity in a Drip and Furrow Irrigated Cotton Field Under Influence of Different Deficit Irrigation Techniques

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We investigated the influence of conventional deficit irrigation (CDI) and partial root zone irrigation (PRI) on soil salinity in a drip- and furrow-irrigated cotton field. Under PRI, one half of the rooting zone is wetted while the other half is maintained partially dry, and thus reduced amount of water is applied. The wetted half of the root zone is alternately changed either every or every other subsequent irrigations. Effects of time length during which one side of the root zone stays wet or partially dry on soil salinity were investigated for furrow irrigated cotton. We had compared proportional soil salinity developed under CDI and PRI under drip irrigation. Thus we had two field experiments consisting separately drip- and furrow-irrigated cotton. The treatments under furrow irrigated cotton were (1) FULL, control treatment where rooting zone soil water content was increased to field capacity at each irrigation; (2) 1PRI and (3) 2PRI, 50% deficit irrigation compared to FULL treatment was applied while interchanging wetted and partially dry sides every and every other irrigations, respectively. The drip-irrigated cotton had similarly three treatments: (1) FULL, the control treatment where full amount of irrigation water (100% Class-A pan evaporation) was applied to both sides of the plant rows; (2) 1PRI and (3) CDI, where the both treatments had 50% deficit irrigation compared to FULL treatment. Under CDI treatment, the deficit amount of water was uniformly applied to both sides of the cotton rows. Soil salinity was assessed utilizing root zone soil salinity profiles developed at planting and following harvest. Additionally we had iso-salinity maps constructed with grid soil sampling of plant root zone at harvest. The results showed that soil salinity increase was significant ($P<0.05$) only within soil surface layer of 0 20 cm. The highest increase in soil salinity was noted under the treatment of 2PRI with furrow irrigation. The drip irrigated cotton data showed that the salinity increase under PRI was in the same range as the FULL treatment whereas the increase under CDI was the highest. However, any likely soil salinity increase, resulting from deficit irrigation either with CDI or PRI practices, was at levels which could easily be leached with winter rains.

Keywords: Conventional deficit irrigation, partial root drying, root zone salinity, salinity map, cotton.

Correlation Coefficient Analysis between Grain Yield and Its Components in Corn (*Zea mays* L.) Hybrids

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In order to study of the correlation coefficient analysis between grain yield and its components in maize hybrids an experiment was carried out in randomized complete block design with four replications in Shahrood Agricultural Research Station during 2006-07. The result of correlation analysis between grain yield and other traits showed that number of grains per ear and 100 grain weights had high and positive direct effects and ear length had positive and moderate direct effect on yield. Futhermore, ear height had low and negative direct effect on grain yield.

Keywords: Correlation coefficient, Grain yield, Maize hybrid, Path analysis

Evaluation of Onion Cultivation Energy Balance in East Azerbaijan Province

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One of the estimating methods of agricultural development and production stability in agricultural locations is the use of energy flow method. In this consideration energy flow in agricultural ecosystems of onion in East Azerbaijan was calculated by the use of gathered information and data via questionnaire and statistics of related Province's agricultural Jihad organization and farms. The related data of inputs and outputs were altered to equal amounts of consumer and productive energy and then energy efficiency was calculated. Energy amounts of used factors and input in this type of cultivation was estimated 22307134 kcal/ha^{-1} and output (production) energy amount of onion yield was 18594060 kcal/ha^{-1}. Also energy efficiency value (output/input) was 0.833 percent. Data show that most of the consumer energy of onion cultivation of East Azerbaijan province are related to irrigation water use and chemical fertilizers and energy used in machinery. In such a condition it is suggested that through precise determining of the vegetable's water need, replacing modern irrigation methods in regard to current methods, preventing irregular use of inputs specially nitrogen fertilizers, applying proper managing methods in dry regions and using fertilizer on the base of soil test and production potential by increasing usage of function, energy could be optimum.

Keywords: Energy balans , Input , Output , Onion

Application of Hydrus-2D for Simulation of Water Distribution in Different Types of Soils

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Study of water distribution in the soil as a result of water application involves simulation of water movement in porous media. Water distribution in the soil depends on the hydraulic properties of the soil. In the present study, water distribution in the root zone depth of the green pepper was simulated at various emitter discharges under different fertigation strategies for various types of soils. A two-dimensional water and solute transport model Hydrus-2D was selected for the simulation. Experiments were conducted with the research farm of Bastam Agricultural Center, Shahrood, Iran to investigate the water distribution pattern under different types of soils. Investigation of water distribution in soil was done in seven types of soils. For simulation of water movement in soil, Hydrus-2D was calibrated and validated. Results of simulation indicated that for all the soils, water content was more in first layer of soil. Irrigation cycle was 48 hrs and adequate water content was available in the active root zone of the green pepper. Another result of this study showed that if the drip fertigation system designs properly, it will reduce drainage water below the crop root zone. Final result of simulation showed that in all types of soils amount of percolation from drainage boundary was less than one percent of applied water.

Keywords: simulation, Hydrus-2D, fertigation, soil type, water distribution, soil layers

Possibility of using EM38 device to determine the extent and severity of soil salinity: A case study in the Lower Seyhan Plain, Turkey

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Salinity is an increasing problem in irrigated areas which causes reductions in agricultural production. Distribution of soil salinity and its variability are required to set up measure-observation control in an irrigated area. The conventional methods to determine soil salinity in an irrigated area entail intensive laboratory analysis and land survey. However these take plenty of time and cost much. Instead of these conventional methods, lately, practical and simple techniques have become a current issue in salinity assessment. One of them is electromagnetic induction (EM38) technique that measures apparent soil salinity, ECa. EM38 is a technique which is designed to measure ECa horizontally and vertically, i.e., to a depth of 0-1 m and 0-2 m, respectively. In this research, we tried to investigate the effectiveness of EM38 device in identifying and mapping of soil salinity. The study was conducted in Yemisli Irrigation District (YID), covering an area of 7110 ha. YID is located in the Lower Seyhan Plain in the eastern part of the Mediterranean region, Adana, Turkey. The majority of farmers in YID use irrigation return flows of poor quality, diverted from main drainage canals. For this reason, the fields in YID are always under the risk of soil salinization. Therefore, soil salinity has to be monitored frequently in a quick and efficient way. Because of these characteristics, YID was chosen and 120 EM38 readings were done for salinity assessment. Concurrently, soil samples from 20 points, distributed randomly in the field, were taken from 2 m soil profile with 0.3 m intervals, summing up six totally. Extracts of soil saturation paste were obtained. Composite samples for 0-1 and 0-2 m depths were prepared by using extracts of each layer and salinities of composite samples were measured, ECe, to determine average ECe of 0-1 and 0-2 m depths. The remaining works are presently under the process of continuation. The relationship between ECe and ECa will be determined and the likely association to be determined will be used to convert apparent salinity, ECa, values to actual salinity, ECe, values. Then, ECe maps will be produced in GIS media, and salinity profile distributions, hypsometric salinity curves, etc. will be developed for the study area. The results will be interpreted by using both observed ECe map and converted ECe of ECa readings. The preliminary results showed that the electromagnetic induction meter (EM38) can be used very efficiently to determine soil salinity in areas prone to salinisation like in YID. Additionally, spatial and temporal changes in soil salinity can be derived from EM38 readings, provided that the deterministic association between ECa and ECe is determined.

Keywords: Soil salinity, salinity map, electromagnetic induction meter (EM38), hypsometric salinity curve, drainage water.

Analyzing the Soil Texture Effect on Promoting Water Holding Capacity by Polyacrylamide

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Polyacrylamide (PAM) has been frequently used to improve soil water holding capacity and control infiltration rate of the soils. However, limited studies have been conducted on the interactions between soil water holding capacity and PAM rates in different soil textures. This study targeted to analyze the relations between soil texture and water holding capacity as a response of increasing PAM applications rate. PAM rates of 0.03, 0.1, 0.13, 0.16, 0.23 and 0.33% by weight were applied to clay, sand, and loam. 0.033MPaθ 0.01 Mpa for sand and θ) at field capacity (θWater holding capacity (1.50 MPa) were measured with a pressureθfor clay and loam) and wilting point (plate apparatus. The values of water holding capacity were regressed as a function of PAM rate, and the slope and intercepts of regression lines for sand, clay, and loam were compared to decide the homogeneity of these functions. Increasing PAM rate has significantly increased the water holding capacity in all three soils ($P<0.05$). However, the regression lines obtained for sand, loam, and clay were all significantly different from one to another, revealing that soil texture has a significant effect on the function of PAM in promoting water holding capacity in these soils. Therefore, we concluded that soil texture should be considered in optimizing the results from PAM applications.

Keywords: PAM, water holding capacity, soil texture, field capacity, wilting point

The Study Of Phenotypic Variation And Cluster Analysis For Quantitative Traits Of Corn (*Zea mays* L.)

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In order to study the relationships between grain yield an experiment was carried out in randomized complete block design with four replications in Shahrood Agricultural Research Station during 2006-07. Cluster analysis with minimum ward variance metod grouped the hybrids in 4 groups. In order to proving the truth of the classification obtained from cluster analysis discriminant function analysis and multivariate analysis verified the accuracy of classification from cluster analysis and grouped the hybrids in 4 groups. Result of four methods of multivariate analysis of variance Wilk's lambda showed that there were significant differences between 4 groups resulted from the cluster analysis

Keywords: Cluster analysis, Discriminant function analysis and Multivariate analysis, Maize hybrid

Neural Networks for Predicting Flow Discharge in the Knodok River (Iran)

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The accurate estimation of the river discharge is the most important parameter in the water management studies and it would causes the studies will be more accurate and confidence. In some rivers, there is not hydrometry station and as a result, there is not measured discharge data, or sometimes there is not enough time series data in this station, therefore in such conditions, the studies would be encountered to problems. In such cases it can be used different methods such as using the relationship between the runoff and discharge. But in the recent years, the new approach which has attracted attention of the hydrologist engineers for such conditions is the using of neural network. In this study an artificial neural networks (ANNs) model, multi-layer perception using back-propagation algorithm (MLP/BP) was used for predicting flow discharge in the Knodok River which located in Khozestan province, Iran. The rain and temperature data as monthly collected at the five stations near the Kondok basin, and corresponding them the measured discharge at the Dokohe hydrometric station on the Kondok river were used to train and validate the model. The available field data were divided into training and testing scenarios, with the training file consisting of ten inputs and one output. A sensitivity analysis was performed by varying the network parameters to minimize the prediction error and determine the optimum network configuration. The best architecture for the MLP/BP model comprised of 10 neurons in the hidden layer and a learning rate of 0.01. Overall, the performance of the MLP/BP neural network was good in predicting the discharge of Kondok River. This information can be used for proper water management studies in that area.

Keywords: Water Management, Discharge Predicting, Artificial Neural Networks, Knodok River, Rain, Temperature

Geostatistical Analysis of a Water Well Field for Determination of Land Management Constraints

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Soil spatial variability and heterogeneity is a tough but very important matter in the field-scale description of soil properties, such as soil electrical conductivity, soil saturated hydraulic conductivity, and soil salinity. Geostatistics is a useful tool to study spatial distribution of soil properties and optimum sampling strategies in field. Estimating soil salinity, EC and Ks is a vital issue in soil fertility and management. Geostatistical methods, kriging and cokriging, were applied to estimate spatial distributions of the variables that were collected from a large size water well field for the surface soil, rather than entire bore-hole profile of the soil. The results suggested that estimation can be improved using cokriging , rather than kriging. Comparing to kriging results, cokriging reduced the mean squared error and improved the estimation of EC by 2-100% depending on cross-correlated variables. Using the cokriging prediction maps of the soil properties, the soil can be managed cell by cell with prescribed appropriate management strategies such as irrigation and manure application to mitigate soil salinity in the region.

Keywords: Kriging, Cokriging, Soil Salinity, Harran Plain, Turkey

Measuring Flow Velocity with an Acoustic Doppler Current Meter in River

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The measurement of daily flow velocity and discharge in river are important for management of water source, planning of water storage structure and flood studies. A wide variety of techniques have been used to measure flow velocity but single point current meters are widely used at river condition. Although this conventional method is easy to operate, it takes a long period of time to complete the velocity measurements of the whole cross-section. Due to difficulties of velocity measurements, the flow discharge values are obtained versus to flow depth and than flow rating curves are determined to continuously monitoring of flow with flow depth. But these curves should be checked at certain interval especially at unsteady flow condition. Recently, Acoustic flow measurement methods have made great progress due to the advances in remote sensing and data processing techniques. There are currently several manufacturers of commercial acoustic devices but the general principles of operation are based on the Doppler shift effect which is the change in frequency and wavelength of a wave for an observer moving relative to the source of the waves. The purpose of the present paper is to review and evaluate conventional current meter and acoustic Doppler current meters for measurements of flow velocity. In addition, the comparison of these methods was made with field measurements.

Keywords: Flow rating curve, flow velocity, acoustic, Doppler shift

Quality Control and Homogeneity of Annual Precipitation Data in Buyuk Menderes Basin, Turkey

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Precipitation is one of the most impotant climatic factors affecting agricultural production. Knowledge about spatial variability of precipitation amount over an agricultural area, its temporal change not only throughout a year but also over long-term span, start, end and length of rainy period, risk of wet and dry periods would be needed for appropriate agricultural planning and water management issues. However, analysis of long-term precipitation data for various purposes to be accurate, precipitation data must be homogeneous. It is defined that, as for other climatic time series, a homogeneous precipitation time series is to be affected by only natural weather and climatic conditions. Non-climatological factors such as changes in instrument, relocation of station, changes in observation practices make any climatic time series inhomogeneous. In this study, a quality control process involving outlier trimming and homogeneity checking were applied to 21 annual precipitation time series of various lenghts in Buyuk Menderes Basin, Turkey. Homogeneity analysis were performed using the Pettitt test, the Buishand range test and a R-based Toolkit RHtest.

Keywords: precipitation, Turkey, Buyuk Menderes Basin, quality control, homogeneity, outlier

Effects of Rice Husk Application on Mechanical Properties and Cultivation of a Clay Soil with and Without Planting

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In this study, effects of rice husk application on mechanical properties and cultivation of a clay textured soil were investigated with and without barley planting. A rate of 5% (w/w) rice husk as a dry weight base was added to clay textured soil by alone (RH) and with 5 kg N/da of ammonium sulphate (RHN) in order to increase the biological activity and the decomposition rate of rice husk in soil. Rice husk applied soils including control treatment were incubated at field capacity under greenhouse conditions for 4 months. After this period, barley was sown in a half number of the pots. All pots having barley planted and without planted were incubated together. Study was carried out in a factorial experimental design on barley planting and without planting pots in 3 treatments (control, RH and RHN) with 3 replications. At the end of the study, liquid limit (LL), plastic limit (PL), plasticity index (PI), consistency index (Ic), field capacity (FC), permanently wilting point (PWP) and organic matter (OM) contents of soils were determined. The highest values were determined for LL in RHN application with barley planting, for PL in RH application without planting and for PI in control application with barley planting. Barley planting increased LL and PI values of soil significantly. LL values of soils significantly correlated with PL (0.664**), PI (0.880**) and PWP (0.948**). PL values of soils significantly correlated with OM (0.699**) and PWP (0.821**). PI values of soils significantly correlated with FC (0.654**) and PWP (0.713**). Ic values of soils gave the significant correlations with PI (0.908**), OM (0.787**), FC (-0.611**) and PWP (0.615**). Ic values of soils in RH and RHN applications significantly increased according to control treatments. It was concluded that clay textured soil in control treatment can have deformation when it is cultivated at the field capacity without RH application; however clay soils can be cultivated without deformation after RH application.

Keywords: Clay, rice husk, atterberg limits, planting, soil cultivation

The Land Evaluation Of The Kirsehir-Çiçekdag Farm State Soils Using Ilsen Computer Model

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Land evaluation is concerned with its performance when to be planned a special land use type. The objective of this study was to evaluate land utilization types and their suitability using properties of the Kirsehir- Çiçekdag Farm State soils using ILSEN computer program. It was formed 1/ 5000 scale digital soil maps of the area and also described on hundred sixty-six land mapping unit along with their diagnostic characteristics such as texture, slope, erosion status, stoniness, depth, pH, drainage condition, exchangeable sodium ratio. A total of ten different land use types to be planned take into consideration local environment conditions were distinguished and their requirements were also determined. The requirements of the land use types were compared with the land characteristics and qualities of land mapping units. The light of the obtained results, it was determined the suitability of each land mapping unit for each relevant and use type. It was prepared use suitability class map for agricultural. Only 4.5 % of the study area soils were found to be employed in their best agricultural uses (1) according to agricultural use suitability map results. The distributions of the relatively good agricultural lands (2), problematic agricultural lands (3), restricted agricultural lands (4) and non-agricultural lands (5) were 9.45 %, 42.5%, 38.26 %, 5.59 %, respectively

Keywords: Land evaluation, land use type, land suitability classes

GIS and REMOTE SENSING

Assessing the Capability of Satellite Data for Soil Mapping

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The purpose of this research is to evaluate the potential of using landsat ETM+ data for soil mapping. The study area is located in center of Iran and covers about 1300 ha. The database of studied area was created by introducing topographic map (1:20,000 scale), soil map (1:25,000 scale) and reports and satellite data. After pre-possessing stage, selection of the best informative bands was carried out by using optimum index factor (OIF) calculation and principle component analysis (PCA). Results showed that TM1, TM4 and TM6-2 contain the highest information and the lowest redundancy. Besides the mentioned bands, TM5 and TM7 were considered for digital image classification. The images were classified using maximum likelihood classifier into seven mapping units. Separability of mapping units examined at 95% confidence level. Comparison of the prepared soil map from satellite data (PSMSD) and ground truth showed a relatively high accuracy of 80%. Also, comparison of PSMSD and detailed soil maps prepared using conventional methods (TDSM) showed imagery data could increase the classification and interpretative purity percentage up to 50% and 85%, respectively. Obtained results from calculating of relative variance and intraclass correlation for topsoil properties including depth of A horizon, percentage of sand, silt, clay, gravel and organic matter indicated that PSMSD could better explain the variability of soil surface properties. The results showed a high potential of imagery data for inventory and increasing the precision of existing soil maps. Therefore, incorporation of high-resolution satellite data for soil survey especially in arid and semi-arid regions is highly recommended.

Keywords: Landsat ETM+ data, Soil mapping, Purity, Intraclass correlation

Integration of Remote Sensing Data with Geographic Information Technologies in Agricultural Land Management: A Case Study of Kadriye-Antalya

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This study was conducted in Antalya-Kadriye municipality to preparing agricultural land management classification for 945 hectares. For this purpose, black white stereoscopic air photographs of 1:25.000 scale dated 1981, topographical maps of 1:25.000 and 1:5000 scales, and IKONOS Pan-Sharpened satellite images, which have 1.0 m land differentiation resolution, dated 2004 was used as remote sensing materials. Digital basic soil map, present land use map, land capability classifications, agricultural based land use map and agricultural based land management plans which take into principal of land protection and land use classifications were prepared as the scale of 1:25.000 by using varied remote sensing data and geographical information systems techniques and technologies. According to the prepared agricultural land management plan indicated that orchards lands (DT) were 10 ha, greenhouse lands (SE) were 86 ha, marginal agricultural land (TA) 78 ha, irrigated marginal agricultural (sTA) land 253 ha, organised greenhouse enterprises areas (OSI) 423 ha and nonagricultural land (TD) were 77 ha.

Keywords: Remote Sensing, GIS, Land Use Management, Agricultural Land Management

Mapping of Inner Water Bodies in the Krasnoyarsk Territory Based on the Digital Analysis of Ground True and Satellite Data

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Structuring and spatiotemporal connection of field investigations are known to be necessary for interpreting remote sensing data and for hydrobiological research. Modern geoinformation systems (GIS) are the most effective means of such connection. For this purpose, a digital geoinformation shell has been created, containing various data about the water body, the shore and a number of lakes in the south of the Krasnoyarsk Territory. The created shell allows one to store data of hydrobiological research and data obtained as a result of satellite information processing and analysis. The coordinates of the sampling stations are entered into the database as the main parameters. For each station such data as depth, transparency, phytoplankton concentration etc. are stored. The developed geoinformational shell allows one to analyze the water body area, water protection area; to analyze and add the ground true investigation data; to add new information layers, and, also to yield the results of information requests. One kind of the analysis is the classification of the Krasnoyarsk reservoir waters using satellite multyband information TERRA/MODIS. Such a kind of data processing provided an opportunity of mapping the reservoir areas during phytoplankton blooming. Another effective kind of data processing is applying the method of principal components which allowed determining seasonal and annual phytopigment dynamics. The developed electronic topographic map for the Krasnoyarsk reservoir has been tested in Siberian Federal University. It turns out to be a convenient software type for integrating various kinds of investigations of the selected objects in the Krasnoyarsk territory. The developed shell and approaches can also be used for other inner water bodies. Combining various data into an integrated software shell can provide an opportunity for the profound investigation of hydrobiological and hydrological peculiarities of inner water bodies.

Keywords: GIS, satellite monitoring, remote sensing, phytoplankton blooming, MODIS

Studying Features of NDVI Dynamics for Vegetation Monitoring of the South of Central Siberia

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Monitoring of vegetation state can be based on studying their dynamics features. Effective methods of satellite data interpretation using spectral feature distinctions should be applied for this purpose. Studying the time series of Normalized Difference Vegetation Index (NDVI) during growth period is one of such approaches. The analysis of NDVI temporal profile shape allows to identify vegetation objects on satellite image. The NDVI curve transformation regularities during growth period are studied in the process of study carried out. Growth rate in specific phenological phases (growth of vegetative organs; maturation and fruiting) and extreme NDVI values during total growth period are detected. Growth rate is calculated as a NDVI curve slope. The NDVI dynamics of different vegetation types (agricultural crops - wheat, oats, buckwheat; abandoned fields of different age, meadow steppe, stony steppe, feather-grass steppe, flood meadow etc.), located in the South of Central Siberia (Krasnoyarsk krai, Khakasia), has been derived and analyzed. Results of this study are as the basis for developed software, which produces the automatic identification of canopy using Terra Modis satellite measurement data.

Keywords: vegetation monitoring, NDVI dynamics, satellite data

New Approaches to Reduce Time and Cost of detailed Soil Surveys on the Undulating Landscape

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Soil survey studies are recognized as important sources of information for land use planning and management of a country. Generally soil survey of the hilly area needs more time and cost than plain area, because of changing slope and soil properties. Turkey has hilly land more than 90 %. The main objective of this research is to develop new methods to reduce time consumed in the field. The study area is located in the northern part of Adana which is covering 14.000 ha. The aerial photos and Quickbird images combination were used for the delineation of soil boundaries between soil series and its phases such as slope, soil depth, stoniness etc. After description and sampling of the soil series, 2 sample area were selected which is covering 4*5 km2. Later, detailed soil survey studies were completed by the conventional method. The contour maps were used for the preparation of slope map. Findings of sample areas are used to perform new methods for the detailed soil survey of hilly lands and tested remaining parts of research area.

Keywords: soil survey, GIS, quickbird

Updating of The Soil Map of the Cukurova University Campus Area by Using Geographic Information System (GIS)

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The aim of this study is to update the previous soil map of the Çukurova University campus which was completed in 1974. The widely distributed soil series were selected on previous soil map. Soil series are re-identified and re-sampled in the present study. Physical and chemical analyses were repeated on newly collected soil samples. Satellite image of Quickbird dated 17th of August 2004 were employed for the unsupervised classification. All classes were checked by field truth studies. Previous soil series borders were taken into account during field surveys. The ILSEN software is used to generate Suitability Class of Agricultural Applications (SCAA) and Potential Land Use (PLU). Land Use Capability map (LUC) was made by considering some characteristics which are limiting agricultural managements. Current Land Use map (CLU) is produced via field observations for each land use. Finally, we determined that there is no significant change between 1974 and updated maps for soil series. But there are some differentiations for soil phases since 1974. All maps of the study are produced at 1:5000 scales.

Keywords: Remote sensing, Soil survey, Soil classification, Land assessment, Actual soil map, GIS.

Land Use Map Of The Research And Implementation Farm O... The Agriculture Faculty Of Cukurova University Obtained By Quickbird Satellite Data

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In this study, current land use maps were created and the study that was made by a?r photography was updated for the Research and Implementation Farm of the Agriculture Faculty of Çukurova University. Digital QuickBird satellite data of 14 August 2004 which used for forming current land usage maps of the study area. The land use determine with visual interpretation, confirm with area control according to CORINE. The alterations of the type of land cover in the campus area since 1996 was created by this study. As a result of the study, ?t was put forward that more detailed and true as cartographic data can be obtained by the usage of high resolution satellite for land use studies.

Keywords: QuickBird, Çukurova University, Land Use, CORINE

Net Primary Production of Boreal Forests in the Krasnoyarsk Territory

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One of the most important characteristics used in the biosphere change control is net primary production(NPP) dynamics. NPP shows the amount of pure carbon fixed in plants for a definite time period, essentially, this indicator reflects the intensity of a carbon biochemical cycle. Being the main indicator of the ecosystem condition, NPP has great significance, since it is also an indicator of biosphere carbon flux intensity. Its use is important for ecological investigations, carbon cycle calculation and the distribution of natural recourses. Ground true ecosystems determine most of seasonal and annual changes in the atmospheric CO2 concentration. Satellite methods of investigation are known to be eectively used for the calculation of the global NPP distribution. In its turn, the study of boreal forest NPP dynamics is required to introduce clarity into global models and to understand their role in the carbon cycle. At present, there is a number of calculation models for obtaining NPP. In the given work, an estimate of NPP for boreal forests of the Krasnoyarsk Territory is made. For the calculation, the GloPEM model employing TERRA/MODIS and TOMS data has been used. The obtained data have been compared with satellite temperature and ground true climatic data and, also, with the forest vegetation maps. The maps contained data about the biomass amount and the forest species composition, which allowed one to obtain the results showing the nonuniformity of NP distribution depending on the climatic conditions, species composition and the latitude of th objects under study.

Keywords: net primary production, remote sensing, vegetation, boreal forests

Updating Soil Maps By Using Geographical Information Systems And Remote Sensing Tecniques

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Even thoughs soil maps provide very important information for agricultural production, environmental protection, and rural and urban based planning. However, it is hard to find high quality soil maps. In recent years, the improvements in Geographical Information System (GIS) and remote sensing technology have allowed rapid generation of high quality soil maps. The study area of approximately 15000 hectares located in southern of Kahramanmara? city. In this study, it is aimed to update current soil maps by using GIS techniques and remote sensing technology. In the study area, 15 different soil series were identified based on digital geology maps. These soils were classified as Entisol, Inceptisol Vertisol, and Mollisol according to soil taxonomy. Based on topographic maps and land use maps produced by using GIS techniques and remote sensing technology, mapping units were distinguished.

Keywords: Soil maps, GIS, Remote sensing, Kahramanmara?.

GIS-Modeling of Agricultural Land Market in Ukraine

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Problems of Agricultural Land Market (ALM) formation and functioning are the most debated and politicized issues of the agrarian policy in Ukraine. At present moratorium on Land Shares (LS) selling still exists and land lease relations at ALM dominate. However, the moratorium has provisional character and there is an urgent need to foresee what economic and social scenario is the most probable after its lifting. The basic ALM characteristics such as LS size, agricultural lands quality, number of potential players (sellers and buyers) are geographically determined and vary from region to region. Due to this fact the ALM undoubtedly is spatially heterogeneous and each region of Ukraine has its own specificity and peculiarities. Thus the task of present study was to simulate possible situation at the Ukrainian ALM by utilizing GIS as a powerful tool for spatial data analysis and presentation. It was developed a simplified ALM model that takes into account the only one type of LS transaction (purchase and sale) and LS leasing as well. The model utilizes State Land Cadastre data, official statistics on land reform progress and the results of FAO survey conducted in 2005. Land market simulation will allow the governmental and local authorities better understand possible consequences of moratorium lifting and avoid the tense situations. Results showed that potential supply/demand varies significantly as a function of LS availability, soil quality and number of market players. The study successfully demonstrated model applicability in forecast of prices for land at national and local levels taking spatial variability into account. Therefore, GIS-modeling of ALM is expected to give a new approach in order to provide state and local authorities, bank managers and ALM players with a information regarding the effect of moratorium lifting and regional peculiarities of agricultural land market prices formation based on supply/demand balance.

Keywords: agricultural land market, supply/demand analysis, GIS-modeling

PEDOLOGY

Determination of the General Properties of the Soils in Sarayonu-Konya Turkey and Their Zinc Sorption Status

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This study was made on 20 soil samples, which were taken randomly from 15 different villages in Van Province in southeastem Anatolia, Turkey. This research aimed to determine the zinc sorption capacities of the soils. Some physical and chemical characteristics of these soils (texture, pH, EC, organic matter,CaC03,CEC, available P, K, Zn, Cu, Mn and Fe and Zn sorption were also studied. Zn sorption capacities of the soils were determined by treating soil samples with zinc solutions (0-5-10-15-20-30-60-90-120 mg kg-1 Zn). About one-half of the soil samples is sandy loam and sandy day loam. The other half is loam and sandy loam in texture. The soil samples are slightly alkaline, medium in content of lime, poor in organic matter, and low in salt content.The available phosphorus and potassium content of the soils are average and sufficient, respectively. Cation exchange capacity is 24, 35 meq/l00 g soil. Zn sorption values of the soils confirmed the Langmuir and Freundlich adsorption isotherm and significant correlation was found among Clxlm sites. The important regression relations and r value were found between some physical and chemical properties on Zn adsorption of the soil samples.

Keywords: Zinc sorption, available zinc, Langmuir and Freundlich adsorption isotherm

An Investigation on Reason of Soil Salinity and Alkalinity on Some Part of Abyek Plain (Iran)

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Saline and sodic soils occupy an important part area in Abyek plain in Ghazvin province. The results showed that the parent material originating from gypsiferous and saliferous marls in southern parts, the rise of groundwater table and climate in probably as the main factors for soil salinization in this region. Wind and human influences are also considered as factors of soil salinization. Over irrigation with the saline and brackish water has probably intensified the salinity and alkalinity problem in these soils. Micromorphological studies showed that secondary salt, gypsum and calcium carbonate has accumulated in some pedons, forming salic, gypsic and calcic horizons respectively. Thenardite, bloedite, polyhalite and small amounts of eugstehte characterize the mineralogical composition of salic horizon. Salt efflorescence, macrocrystalline salts embedded in a clay matrix, and small saline aggregates filling voids in the structure, are characteristics of secondary enrichment in soluble salts in the salic horizon.

Keywords: Saline and Sodic Soils, Salinization, Gypsum, Thenardite,Bloedite,Eugstehte

Can Location of Sample Area and Expert Idea Affect the Results of Geopedological Approach in Soil Mapping?

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Geopedology is a systematic approach of geomorphic analysis for soil mapping that construct field operation upon work mainly in a sample area and generalization of the results obtained from sample area to similar landforms in the region. The objective of this study is to determine the effect of location of sample area and expert idea on credibility of generalization the results of geopedological approach for similar landforms in south-east of Borujen area, Iran. After preparation of primitive interpretation map of the study area on air photos (1:20,000 scale), considering different locations of Pi111 unit that encompasses the maximum space of the study area, the sample area was planed in three different locations. Then, a second-order soil survey was conducted and final soil map was prepared. Also, the idea of two different experts was considered to determine the amount of credibility of generalization the results of geopedological approach for the mentioned unit. Results showed that changing the location of sample area cause taxonomic and mapping unit differences for Pi111 unit. In spite of similarity the profiles selected by two experts, soil taxonomy of these profiles were different in comparison with representative pedons at soil family level and their accordance varied from 0 to 33%.

Keywords: Geopedology; Soil mapping; Sample area; Generalization; Second-order soil surveys

Developing Soil Cation Exchange Capacity Pedotransfer Functions Using Regression and Neural Networks and the Effect of Soil Partitioning on the Accuracy and Precision of Estimation

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Soil fertility measures such as cation exchange capacity (CEC) may be used in upgrading soil maps and improving their quality. Direct measurement of CEC is costly and laborious. Therefore, indirect estimation of CEC via pedotransfer functions may be appropriate and effective. Several delineations of two consociation map units consisting of two soil families (Shahrak series and Chaharmahal series), located in Shahrekord plain, Iran were identified. Soil samples were taken from two depths of 0-20 and 30-50 cm and were analyzed in lab for several physico-chemical properties. Clay and organic matter percentages as well as moisture content at -1500 kPa best correlated with CEC. Pedotransfer functions were successfully developed using regression and neural networks. Soil partitioning increased the accuracy and precision of functions. Compared to regression, neural network technique resulted in pedotransfer functions with higher R2 and lower RMSE.

Keywords: Cation exchange capacity (CEC), Pedotransfer, Regression, Neural network, Soil partitioning

The Effect of Landscape Components on Clay Mineralogy of Calcareous Soils in Borujen Area, Central Iran

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Clay minerals affect soil use and management considerably. Kind of clay minerals may depend upon landforms and their positions in the landscape. The main objective of this research was to study the relationship between clay minerals and landscape components in Borujen area, Chaharmahal-Va-Bakhtiari province, Iran. Mineralogy of silicate clays in soil surface and subsurface horizons of two different landscapes (hilland and piedmont) with different location and lithology were investigated using X-ray diffraction method (XRD). Results showed that illite, chlorite and smectite present in all the soils studied. Palygorskite was not observed in hilland whereas it identified in subsurface horizon of piedmont. Lack of existence of palygorskite in surface horizon of piedmont can be probably due to leaching and migration to subsurface horizon or its transformation to smectite by rainfall. Differences in lithology and age of two studied piedmonts showed the existence of palygorskite in younger one. This may also show transformation of palygorskite and it weathering in older piedmont. On the other hand, kaolinite presents in all the soils except surface horizons of both lower and higher parts of the hillands. This indicates that topographic position of this landform could not affect kind of clay minerals in the area. The co-existence of kaolinite and palygorskite in subsurface of piedmont indicates different conditions for their genesis. Results suggest that landscape components affect somewhat clay mineralogy in this area. For better understanding the origin of clay minerals and their genesis, studying the mineralogy of parent materials in these soils is recommended.

Keywords: Clay minerals, Landscape components, Lithology

Spatial Variability of Wheat Yield and Soil Properties in Two Land Units of a Quantitative Suitability Map, Central Iran

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The quality of soil maps and their attributes is heavily depends upon the variability of soils in the mapping units. Thus, the accuracy of the procedures used for crop recommendations is questionable. This study was performed to investigate the amount of soil and crop spatial variability in two land units of a semi-detailed suitability map (1:50000 scale) used for recommendation of irrigated wheat in Chaharmahal-Va-Bakhtiari province, central Iran. Eighty soil samples were collected in each land unit at 0-30 cm depth using grid sampling method to determine available P, K, total N, %O.M., %$CaCO_3$ equivalent, soil texture and particle size distribution, EC and pH. A 0.5×0.5 m^2 plot of wheat was harvested at each of 160 sites previously sampled to determine crop biomass, 1000 seeds weight and harvest index. Land units showed a significant difference for %CaCO3 equivalent, available potassium, particle size distribution and wheat characteristics. Also, the highest and the lowest CV were related to available potassium and pH, respectively. Harvest index and crop biomass were significantly higher in S2 unit in comparison with S3 unit. Analyze of variance and correlation coefficients suggest that high $CaCO_3$ equivalent and heavier texture in S3 unit are two restricted factors for wheat growth and its yield. Variography showed a considerable variation among measured parameters for both land units. Correlation between kriging maps of soil properties and wheat characteristics was significant. Results suggest that harvest index is a reliable factor to compare the capability of land units for wheat production in the area. It seems that wheat cultivar heavily affect crop biomass and wheat yield. However, high variability of soil properties as well as crop biomass crop, wheat yield and harvest index in two land units indicate that suitability maps have not enough credibility in precision agriculture.

Keywords: Spatial variability, Wheat yield, Suitability map, Soil properties, Precision agriculture

Clay Mineralogy of Selected Semiarid Soils as Affected by Parent Materials in Central Zagros, Iran

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Parent material is considered the most important soil forming factor in arid and semiarid regions. This study was carried out to determine the effect of seven different parent materials on the type of silicate clays in soils of central Zagros region, Iran. The soil moisture and temperature regimes of the area are xeric and mesic, respectively. Soil samples were taken from the genetic horizons of soils developed on different parent rocks including basalt, granite, shale, limestone, amphibolite, mica-schist and gneiss. They were treated with sodium acetate- acetic acid solution (pH=5), DCB and 30% hydrogen peroxide to remove carbonates, organic matters and free iron oxides, respectively. Clay fraction of treated samples was separated and slides were prepared for X-Ray diffraction analysis. Mineralogy of clays form different soils showed that kaolinite, illite, vermiculite and chlorite were present in all the surface and subsurface horizons (A, B and C) of the soils studied. Palygorskite could be identified only in surface horizon of soil derived from amphibolite. Besides, illite was not observed in soil developed on basalt whereas random interstratified mica-chlorite observed in this soil. The abundance of vermiculite and illite were considerably higher in soils developed on gneiss and shale rock, respectively. Results suggest that clay minerals mainly have inherited from parent materials. Despite the presence of different parent materials in the area, type of silicate clays are almost similar. Identification of clay minerals in parent rock samples is necessary for better understanding of soil development and origin of clay minerals.

Keywords: Clay minerals, Parent material, Zagros region

Basic Soil Properties and Soil Classification of Hazelnut Cultivation Area in the Eastern Black Sea Region, Case Study; Unye-Tekkiraz District

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The objective of this research was to investigate physical, chemical and morphological properties, classification and mapping of soils of hazelnut cultivation in Ünye-Tekkiraz district of The Eastern Black Sea Region. The study area is located between west of the Ordu and south of the Samsun provinces, at coordinates 4542495-4537485 N and 342549-347523 E and total area is approximately 31.5 km2. Average annual precipitation and temperature are 1162.4 mm and 14.2 oC, respectively. Elevation varies from 200 m to 550 m above sea level. According to soil taxonomy, the soil temperature regime and moisture regime were classified as mesic and ustic, respectively. Most of the study areas have been commonly used for hazelnut cultivation, whereas southern part of the study area generally cover small forest and pasture lands. In the study area, distribution of geological pattern is palaeocene and eocene rocks consisting of sandstone, siltstone and marl including widely distributed and altered eocene aged volcano-clastics which are composed of basalt and andesite. After examination of topographic, land use, geologic and geomorphologic maps and land observation, 15 profile places were excavated in the study area. The soil samples were taken from each profile based on genetic horizons and their analyses were done in the laboratory. According to the results of laboratory analyses by taking into consideration of soil taxonomy, 11 different soil series were classified and described. Two them were classified as Entisol due to their young age and five are Inceptisol, three are Alfisol, and one is Vertisol. Whereas Hatipler seri has the largest area (14.7 %), Yenicuma Dere soil seri has the smallest area in the study area (3.2 %).

Keywords: Soil survey and mapping, soil characteristics soil taxonomy

Notes :

CARBON CYCLE

Carbon Storage in Hydromorphic Soils of the North-Eastern Part of Germany

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Changing climatic conditions in Germany mainly concern hydromorphic soils formed by groundwater. They offer comparatively high carbon content and as the only soil type they accumulate C in the subsoil. The assessment of storage activity of these soils is essential to assign 'risk areas' according to national (German Soil Protection Low, 1998) and international (EU-Soil Protection Strategy, 2006) soil protection requirements. An appropriate water management enables preservation and protection of the soil organic matter in hydromorphic soils. Both aims, as a part of resource protection, need the assessment of the C storage activity and the transformation of punctual results to a regional level. Research contains of two steps: to make the first step, the carbon content of so-called substrate-horizon-combinations for profiles of the dominant soil of the soil mapping unit is determined. This method is based on the hypothesis, that comparable soil properties are formed by equal soil substrates and pedogenetic processes. To make the second step, the results are attached to the profiles of the dominant soil of the soil mapping unit and extended to spatial polygons of functional maps. Carbon storage activity of hydromorphic soils is determined for the federal state Brandenburg, located in the northeast of Germany. Brandenburg is characterized by a percentage of 40 % hydromorphic soils of the country's territory and features a high vulnerability according to studies concerning climate change. The authors offer a proposal for the assignment of 'risk areas' and management principles for hydromorpic soils.

Keywords: Carbon storage, hydromorpmic soils, water management

The Changes in Biological and Physical C Fractions after Conversion of Native Forest to Grassland and Cultivated Land in the Northern Turkey

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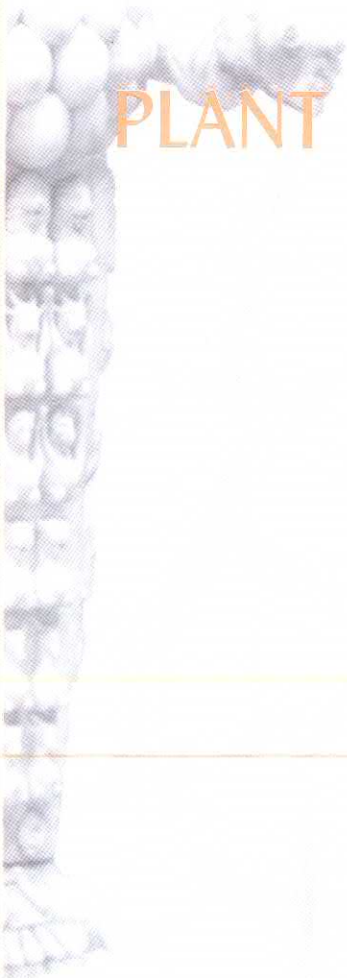
Soil management systems have greater effect on soil chemical, physical and biological properties. Conversion of forest to grassland and cultivated land can alter carbon and nitrogen dynamics. The objective of this study was to evaluate the changes in biological and physical carbon and nitrogen fractions after conversion of native forest to grassland and cultivated land in the northern Turkey. Some soil physical, chemical, and biological properties were measured. Soil texture ranged from sandy clay loam through clay loam. The highest bulk density was observed in the grassland (1.41 g cm-3) and the lowest one was in the cultivated land (1.14 g cm-3). Soil pH was the similar (pH = 7) in the three land uses. Microbial biomass C and total organic carbon were almost two times greater in the forest than forest cleared grassland and four times greater than cultivated land. The greater portion of organic carbon was stored in macro aggregates (>250 micron) in the three land uses. Physically unprotected organic carbon (light fraction) comprises smaller portion of soil organic carbon in the three land uses. Therefore, this study indicated that microbial biomass C, mineralizable C, and protected organic C decrease in forest cleared grassland and cultivated lands.

Keywords: Carbon Fractions, native forest, cultivation, microbial biomass, grassland.



PLANT NUTRITION and SOIL FERTILITY

The Effect of Different Nitrogen Doses on the Fig Quality Parameters and Aflatoxin

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Fertilization takes an important part among factors which have effected with quality and healthy fig growing. Investigating studies carried out on plant nutrition and fertilization on fig; it hasn't been seen any study using "only" fertilizer with nitrogen relating with impacts of different dosages on yield and quality. Nitrogen fertilization is quite important because of taking important role not only nitrogen metabolits concentration but also acymylat accumulation through increasing photosynthesis capacity of the tree. In that study, it would be aimed with impacts of different nitrogen dosages from the soil on yield and quality parameters, mineral nutrient substance contents of fruit and leaf and aflatoxin occurance on fig. Finally, it would be aimed to determine the most suitable dosage using one control and five different nitrogen dosages experiment designs on a fig orchard (slope land) which is complete yield period.

Keywords: Quality, nitrogen, fertilization, aflatoxin.

Sulphur Uptake by Wheat and Its Relationship to Inorganic and Organic Sulphur Level in Soil

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Sulphur (S) deficiency is becoming an important limiting factor to agricultural production in all over the world. The increasing frequency with which S-deficiency symptoms are now appearing in the cereal crops is considered to be due to largely reduction of S inputs. The aim of this research was to find out the relationship between the inorganic and organic form of sulphur in soil and sulphur uptake by wheat in north east of Iran. A survey of the S status of wheat was established during the 1998 spring season in Golestan Province. These surveys were based on sampling soils from two depths of irrigated and unirrigated fields. These surveys were based on 60 field samplings. Thirty samples were from irrigated and 30 from unirrigated fields. Samples of representative soil series were taken at 0-30 and 30-60 cm depths in early spring at the time of anthesis. Total S-uptake as well as total plant S-off-take and their relations with $CaCl_2$, water and $Ca(H_2PO_4)_2$ extractants showed strong relationship between grain S-uptake and sulphate extracted with CaCl2 in soils taken from both depths of irrigated fields at $p<0.01$ level. There was no relation between grain S-uptake and plant S-off-take with total-S and organic-S of the soils taken from 0-30 and 30-60 cm depth from irrigated fields. This means that $CaCl_2$ extraction method is a reliable extractant for evaluating sulphate-S in soils of the irrigated fields of Golesthan Province. The soils taken from 0-30 cm depth of unirrigated field had no significant relation with grain S-uptake but plant S-off-take had significant relation. There was significant relation between grain S-uptake with water and $Ca(H_2PO_4)_2$ extractants with soils taken from both depths of unirrigated fields, There were significant relation between total-S in soils taken from 0-30 and 30-60 cm depth with grain S-uptake and plant S off-take.

Keywords: sulphur uptake, wheat, organic sulphur, inorganic sulphur

Effect of Organic Amendments on Half-Highbush Blueberry Production and Soil Fertility

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Five different treatments were compared using two half-highbush blueberry cultivars (cv Chippewa and Polaris) transplanted and grown for their first three growing seasons at a site in Boutiliers Point, N.S., a Gibraltar brown sandy loam (Ferro-Humic Podzol). The five treatments were as follows: Alfalfa meal + rock P + wood ash; NPK fertilizer; Municipal Solid Waste (MSWC) compost; Ruminant compost; Yard waste, manure and food waste compost (YMFC). All amendments were weighed and applied in an amount equivalent to the total N of the recommended NPK fertilizer for blueberries, assuming 25 % N availability from each of the organic amendments. Soil extractable nutrients, leaf nutrients and fruit yields were measured and compared. The fertility treatments produced few effects on extractable levels of nutrients in the soil and leaf. "Chippewa" responded more than "Polaris" to the fertility treatments. The K fertilizing ability of the Ruminant compost was evident in all three growing seasons. "Chippewa" showed consistent soil and leaf P response to Ruminant compost throughout the growing season; however, it failed to produce a comparative increase in the fruit yield. The NPK fertilizer treatment reduced the soil pH compared to other soil amendments while the MSW treatment increased the soil pH each year. The yield results showed that there were no statistical differences between the treatments for either cultivar (one year of data). In conclusion, the composts provided equivalent amounts of plant essential nutrients without increasing the trace element concentration in soil and tissue.

Keywords: blueberry, compost, organic amendments, plant tissue, soil extracts

Changes in Ph, EC and Concentration of Phosphorus in Soil Solution during Submergence and Rice Growth Period in Some Paddy Soils of North of Iran

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Changes in pH, EC and concentration of phosphorus in soil solution during submergence and rice growth period were studied in three paddy soils of North of Iran (one acid and two alkaline-calcareous soils). Also, changes in pH, EC and concentration of phosphorus in soil solution of an alkaline-calcareous soil after addition of 40 mg P/ kg of soil during submergence and rice growth period were studied. The experiment was performed in a set of specially fabricated pots equipped with a perforated sampling tube installed in the root zone area. At different times, pH, EC and concentration of phosphorus in soil solution of cultivated and uncultivated treatments were measured. The results are as follows: 1- After submergence, water soluble P increased initially and then decreased in all three soils in both cultivated and uncultivated treatments. 2- Both pH and concentration of water soluble P in both treatments was not significantly different at early stage of growth, but they were significantly lower in cultivated treatment afterward. 3- After submergence, the pH of alkaline soils decreased, while the pH of acid soil increased significantly. 4- The EC of rhizosphere soil solution changed differently in different soils during the growth period. In acid soil, the EC of rhizosphere soil was significantly lower than the bulk soil solution, while in one of the alkaline-calcareous soils, it was significantly higher than the bulk soil solution. 5- After P addition, the pH of the rhizosphere soil solution did not change significantly, but the pH of the bulk soil solution increased significantly. 6- Generally, the chemistry of rice rhizosphere was essentially different from the bulk soil.

Keywords: Rice, pH, EC, phosphorus, soil solution, rhizosphere, submergence, paddy soils

Nitrate and Nitrite Accumulation in Tomato and Potato in Ardabil Province, Iran

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This research was conducted to determine the residual nitrite and nitrate on potatoes and tomatoes, two commercially important vegetables in Ardabil province, Iran. Samples of these plants were collected randomly from farms and wholesale markets in 10 day intervals at harvesting time in three sites (Ardabil, Parsabad and Meshkin Shahr) during 2004 and 2005. The samples analyzed for residual nitrate and nitrite using spectroscopic method. The results revealed that in 10% of potato samples nitrate concentration was more than acceptable level (465 – 519.3 mg/kg fresh weight). Nitrite residue in potato tubers ranged from 0.1 to 1.12 mg/kg. The nitrite and nitrate concentrations of 83.4% and 33% of tomato fruit samples were lower than detecting limit of the methods. The amount of nitrate in tomato samples of Meshkin shahr was 20 fold lower than Parsabad, s samples that probably resulted from higher nitrogen fertilizers application in later region.

Keywords: nitrite, accumulation, potato, tomato, Ardabil, Iran

The Effects Of Different Level Of Nitrogenous And Phosphorus Doses On Herbage Yield And Yield Components Of Silage Maize As The Second Crop Under The Ecological Conditions Of Tokat

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Nitrogen and phosphorus play a pivotal role in the crop growth and yield. This research was conducted to determine the effects of different nitrogenous (0, 60, 120, 180, 240 kg N ha-1) and phosphorus doses (0, 60, 120 kg P2O5 ha-1) on a plant length, leaf number, herbage yield, dry matter yield, harvest index, leaf nitrogen content, stalk nitrogen content, cob nitrogen content, leaf phosphorus content, stalk phosphorus content, cob phosphorus content, leaf crude protein content, stalk crude protein content, cob crude protein content in silage maize cultivar (MF-714 FAO 500) as the second crop in the experimental field of the Agricultural Faculty of Gaziosmanpa?a University in Tokat Conditions during the years of 2003-04. It was shown that nitrogen dose of 240 kg ha-1 and phosphorus dose of 120 kg ha-1 were a suitable combination for maximum herbage yield according to regression analysis.

Keywords: nitrogenous, phosphorus, silage maize

Agronomic and Environmental Benefits of a Controlled Release Urea Fertilizer Under Varying Environmental Conditions

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Controlled release urea can improve nitrogen use efficiency by synchronising N supply with crop N requirements. However, the effectiveness of controlled release urea will be affected by the environmental conditions in the field. Field studies were conducted for three years at sites across Canada, to evaluate the effective of controlled release urea on crop yield and N losses in a wide range of environments and cropping systems. Crop yield, N uptake, nitrous oxide emission and ammonia volatilization were evaluated under reduced and conventional tillage in plots receiving fall or spring banded controlled release and uncoated urea or split applications of urea. Both controlled release urea and split N applications improved crop yield and nitrogen use efficiency under wet conditions, but were less beneficial when conditions were dry. Wet conditions increase the potential for N losses by denitrification and leaching, increasing the benefit of controlled release and split applications. The controlled release urea also produced higher yields and lower N losses than the uncoated urea when applied as an in-soil band in the fall. Nitrous oxide emission throughout the season was low and periodic, occurring when high N availability combined with wet soil conditions. The effect of the controlled release urea on nitrous oxide emission varied, depending on the timing of release in relation to wet soil conditions. Ammonia losses were low, but were generally reduced with the controlled release as compared to the uncoated urea. The economic benefit from use of controlled release urea or split applications will depend on the environmental conditions, the potential for N losses, and the relationship between the fertilizer cost and the crop price received by the producer.

Keywords: enhanced efficiency fertilizer, NUE, urea

Effect of Spraying of Different Mineral Nutrients on Generative Buds in order to Determine the Quantitative and Qualitative Characteristics of Pistachio Fruits

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This research work was conducted to evaluate the effect of different mineral nutrients during swelling time on generative buds in order to determine the quantitative and qualitative characteristics of "Ohadi" pistachio fruits. The investigation was conducted in a randomized complete block design experiment with 5 treatments and 3 replicates on pistachio trees in Kerman Pistachio Research Station. The spraying was done on end of March 2007, when the generative buds swelled finely, on 75 trees of 30-year-old. Bud sampling was done 10 days after spraying and then the contents of N, P, K, Zn, Fe, Mn, B and Cu were determined. During growth and development of flowers, leaves and fruits; sampling were done to determine the number of fertilized flowers, dropped flowers, fruit set percentage, leaf area, dry weight of yield, percentage of blank nut and nut splitting. The means were compared with Duncan's test after statistical analysis of data. The results indicated that uptake of nutrients by swelled buds was done. Some of treatments caused increase in number of fertilized flowers, decline in number of dropped flowers increase in percentage of fruit set, increase in dry weight of yield, decrease in blank nut percentage and increase in nut splitting. These effects were caused significant changes, but the effect of treatments on leaf area was non-significant. This study revealed that uptake of N, Zn and Mn by swelled buds had affected on some of qualitative and quantitative characteristics of "Ohadi" pistachio fruits.

Keywords: Pistachio, Pistacia vera L., Bud, Mineral Nutrients, Fruit

Fertilizer Management and Preceding Crop Influence Accumulation of Cadmium in Durum Wheat

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Field studies were conducted since 2002 at seven locations across the Canadian prairies to evaluate the impact of application of monoammonium phosphate fertilizer varying in Cd concentration on Cd concentration in durum wheat (*Triticum turgidum* L.) and flax (*Linum usitatissimum* L.). Application of P fertilizer increased the Cd concentration in the seed of both crops even when the Cd concentration of the fertilizer was extremely low. Crop Cd concentration increased with Cd level in the P fertilizer, with the effect increasing with fertilizer rate. The impact of Cd concentration in the fertilizer became more apparent with repeated applications over time with the effect being proportional to the total Cd applied. Cadmium concentration in crops and the effect of fertilizer application varied with soil characteristics. Concentration and accumulation of Cd was higher and Zn lower in durum wheat grown after canola (*Brassica napus* L.) than after barley (*Hordeum vulgare* L.) or flax. Cadmium accumulation in crops may be reduced by selection of crop sequence that reduces the availability of Cd to the following crop. However, the risk of Cd accumulation in crops will increase with long-term application of Cd-containing fertilizers. Risk of Cd accumulation can be reduced by reducing the Cd concentration of fertilizer and by improving P use efficiency to minimize fertilizer application rates.

Keywords: crop rotation, trace element, crop sequence

Organic Farming by Using Saharan Soil

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It has been shown that Saharan soil may have the potential of producing bioavailable iron when illuminated with visible light and also it has some essential macro and micro nutrient elements. In this study the impact of various growth media on development of some bread wheat (*Triticum aestivum* L.) and durum wheat (*Triticum durum* L.) cultivars have been investigated. As a four different nutrient media, Hewitt nutrient solution, irradiated and non-irradiated Saharan desert soil solutions and distilled water have been utilized. Shoot length (cm.seedling^{-1}), leaf area (cm^2 seedling^{-1}) and photosynthetic pigments (chlorophyll a, chlorophyll b, total chlorophyll (a+ b) and carotenoids, mg.ml^{-1} g fw^{-1}) have been determined. The results of this study indicate that, wheat varieties fed by irradiated Saharan soil solution gave comparable results to Hewitt nutrient solution.

Keywords: Saharan desert soil, bread and durum wheat (Triticum L.), seedling, photosynthetic pigments.

The Role of Microbial Activity on Iron Uptake of Wheat Genotype Different in Fe-Efficiency

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Soils in many agricultural areas of Iran have high pH, resulting in low availability of Fe. Wheat grown on such soils suffers from most micronutrient defficiencies, in particular Fe deficiency. The objective of this investigation was to determine the potentials of indigenous fluorescent Pseudomondas for siderophore production and their effects on 59Fe acquisition. For this purpose, some strains of Pseudomonas putida, Pseudomonas fluorescens, and Pseudomonas aeruginosa were isolated from rhizosphere of wheat. The potentials of these strains for siderophore production were evaluated by chrome azorel-S assay (CAS blue agar). High siderophore producing Super-strains were selected for extraction of siderophores. Evaluation of Fe uptake and translocation were carried out with complexes of bacterial siderophores and 59Fe compared with standard siderophore "Desferrioxamine" in randomized complete block design with three replications. This experiment was conducted with two wheat genotypes different in Fe-efficiency at hydroponic condition. The results showed that among the three most effective siderophores producing strains considered, the P. putida produced a sidrophore complex that showed efficiency of 76 %, compared with the standard siderophore (DFOB) in the uptake of Fe. The effect of bacterial siderophores in the uptake of labeled 59Fe by wheat became significant, indicating the difference between chemical structures of the siderophore from different strains. The effects of wheat variety in 59Fe activity of shoots was also significant, where the efficient Tabasi genotype contained 46 % more Fe in shoots than the inefficient Yavarous genotype. It was concluded that the siderophore complex from P. putida was the most effective in translocating Fe to shoots, particularly in efficient Tabasi genotype.

Keywords: siderophore, 59Fe, wheat, Fluorescent Pseudomonads, iron-efficiency

On-Farm Verification and Refinement of Site-Specific Nutrient Management (SSNM) for Irrigated Rice in Iloilo Province

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Site-specific nutrient management (SSNM) is an approach that enables farmers to dynamically apply fertilizer to the rice crop as and when needed. On-farm field experiments were conducted in 22 farms in seven municipalities in Iloilo Province in 2007 to verify and refine the SSNM guidelines developed for direct wet-seeded rice in Iloilo in 2005. Seed rates of 120 and 80 kg ha^{-1} were used with the developed SSNM guidelines and compared with farmers' current fertilizer management practices and seed rates. Yield targets with SSNM were set at 5 and 6 t ha^{-1} for the different farmers' fields. Supplemental fertilization with zinc fertilizer in the early growth stage and with potassium fertilizer at panicle initiation were also evaluated to check for additional grain yield and economic benefits. The use of SSNM resulted in positive added net benefits on about 70% of the farms with a seed rate of 120 kg ha^{-1} and on about 60% of the farms with a seed rate of 80 kg ha^{-1}. Good crop management and assured availability of irrigation water helped to achieve targeted yield. Failure to achieve the target yield could result in overuse of fertilizer and less profits with SSNM. This on-farm research has resulted in refined SSNM guidelines that are now ready for wide-scale promotion and dissemination in Iloilo.

Keywords: site-specific nutrient management, SSNM, rice, Iloilo province, farmer's practice

The Effect of Using Olive Oil Vegetation Water on Some Physical and Chemical Characteristics of Soil and Nutrient Element Contents of Fig (*Ficus carica* L. Cv. Sarilop) Leaves

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In that project, it has been aimed to determine method of using that olive oil vegetation water as on organic manure in dried fig production and to obtain pozitive solution to for environmental pollution. Fig and olive are important agricultural products in Ayd?n province. It has been accepted that reducing of crop nutritient quantities in agricultural lands is caused negative effect on dried fig product quality and yield. The oil vegetation water which is occured in olive oil factory is caused very serious environment pollution.. That project will be carried out in 2006-2012 years. The study is conducted in a farmer orchard which has 80 Sarilop dried varieties, located in Isafakilar village, Incirliova, Turkey. This experiment was designed in respect of randomized blocks with four replications and each replication was consisted of two trees. Totally five applications are on the carpet, those olive oil vegetation water applications include control, 25, 50, 75, 100 kg/per tree, respectively. In addition, there are two groups that determined implementing olive oil vegetation waters in every year and every two years (implementing one year and no implementing one year). According to 2006-2007 periods results; it has been defined that olive oil vegetation water applications are composed some dissimilarities on some physical and chemical properties in the soil. However, similar variations weren't seen on leaf analysis. All phenological and pomological poroperties which are indicative of vegetatif growth and fruit quality parameters of the fig trees, have been measured and observed by properly in accordance with research calender. Finally, it would be explained that different olive oil vegetation water applications have increased microbial activities in the soil with respect to two years results.

Keywords: Olive Oil Vegetation Water, Yield, leaf analysis, fruit quality parameters

Phosphorus and Potassium Fertilization of Oilseed Flax Grown Under a Cool Climate in the Province of Quebec, Canada

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Oilseed flax (*Linum usitatissimum* L.) is a new crop in the province of Quebec (Canada) and there is presently no phosphorus (P) and potassium (K) fertilization recommendations. The objective of this study was to determine the effects of P and K fertilization on the productivity of oilseed flax in Eastern Canada (Normandin, province of Quebec). Five P (0, 20, 40, 60, and 80 kg ha^{-1}) and three K application rates (0, 50, and 100 kg ha^{-1}) were evaluated in two fields from 2005 to 2007. From 2005 to 2007, the soil of the first field had a P content of 21, 33 and 13 kg ha^{-1} and a K content of 147, 223 and 95 kg ha^{-1}, respectively. The soil of the second field had a P content of 184, 137 and 124 kg ha^{-1} and a K content of 413, 347 and 90 kg ha^{-1} in 2005, 2006 and 2007 respectively. The P x K interaction was not significant during the three years. In 2006, P application had no significant effect on grain yield. Phosphorus fertilization significantly increased grain yield at one site in 2005 and 2007 however those grain yield increments were low. Compared to the check (0 kg P ha^{-1}), the application of 80 kg P ha^{-1} increased grain yield by 100 kg ha^{-1} (field 2 in 2005) and by 80 kg ha^{-1} (field 1 in 2007). Potassium fertilization had no significant effect on grain yield in 2005 and 2007 but slightly reduced grain yield in 2006 in the field with the higher soil K content. Phosphorus and K fertilization had no significant effect on seed oil concentration. Our results suggest that there is no advantage to apply high rates of P and K fertilizers on flax grown under cool conditions.

Keywords: Potassium, phosphorus, fertilization, flax

Impacts on Fruit Quality Parameters of Sarilop Dried Fig Variety of Applied Different Natural Fertilization Technics on Organic Agriculture System

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Dried fig is second range (14,39%) as quantity and third range as value (15,89%) in Turkey total organic agricultural crops exports. Main aim of the project was determined that impacts on fruit quality parameters of Sarilop dried fig variety of applied different natural fertilization technics on organic agriculture system. That research was carried out in a farmer orchard which consisted of Sarilop dried fig variety, located in Isafakilar village, Incirliova, Aydin, during 2002-2005 years. This experiment was designed in respect of randomized blocks with four replications and each replication was comprised of one tree. Totally six applications are on the carpet; those are includes control, vetch, natural vegetation, 20, 40 and 60 kg farmyard manure applications, respectively. The data which were obtained from the study was evaluated to analysis of variance using SPSS packet program. The means were separated by LSD multiple comparison test at 0.01 and 0.05. In that research, rate of the worst quality dried fig fruit (%), split fruit rate (%), sunburn damage rate (%), average fruit weight (g), total soluble solids content (TSS) (%), ostiol width (mm), skin colour parameters were investigated, respectively. It has been determined that impacts of the applications on some important properties on fig involved split fruit and sunburn damage rate, average fruit weight, ostiol width.

Keywords: Fruit qulaity parameters, Natural Fertilization Techniques, organic agricultural system

Soil Alkaline Phosphatase and Phosphodiesterase Activities in Relation to Phosphorus Content in a Greenhouse Organic Tomato Crop in Almería (SE Spain)

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The aim of this work is to assess, in a greenhouse organic tomato crop, the effects of two soil organic amendments (T1:11.0 kg dry manure m^{-2}, and T2: 4.5 kg dry manure m^{-2} + 6.5 kg dry vermicompost m^{-2}) on levels of alkaline phosphatase and phosphodiesterase activities, in relation to available (Pa), soluble (Ps) and inorganic phosphorus content. Four plots were compared: P1 and P2 having loamy sandy soil (79 % of illite clay), and saturated hydraulic conductivity (Kfs) of 17.07 mm h^{-1}; P3 and P4 having sandy loam soil (45 % of smectite clay), and Kfs = 3.13 mm h^{-1}. Gravel mulch (5-10 mm) was added to plots P1 and P4, and sand mulch (0.05-2 mm) to P2 and P3 plots. Three replicates per plot of each organic treatment were sampled on a weekly basis during seventeen weeks. There were no statistical differences among treatments for inorganic phosphorus content and phosphodiesterase activity. Available and soluble phosphorus were greater in T2 (901.6 ± 343.27 mg Pa kg^{-1}; 10.18 ± 3.68 mg Ps kg^{-1}) than in T1 (312.2 ± 137.69 mg Pa kg^{-1}; 3.86 ± 1.84 mg Ps kg^{-1}), while alkaline phosphatase activity was greater in T1 (856.0 ± 406.4 mg PNP kg^{-1} h^{-1}) than in T2 (684.9 ± 324.5 mg PNP kg^{-1} h^{-1}). Mean values for all analyzed variables were significantly ($P<0.01$) higher in plots with gravel mulch (P1 and P4). There were positive and significant correlations ($P< 0.01$) between enzyme activities and forms of phosphorus, except for alkaline phosphatase and available phosphorus content where no correlation was detected, so no inhibition of enzyme activities by phosphorus availability was detected at plot scale. All values decrease with time in all plots, except in P4 which is the poorest drained.

Keywords: alkaline phosphatase, phosphodiesterase, phosphorus, soil, mulch, greenhouse, tomato.

Fertilization and Texture Affects K Dynamics in the Soil Profile

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The right potassium fertilization management, using adequate amounts of fertilizers, can minimize K losses, which is important economically and environmentally. Potassium dynamics in soil profile was studied in soils with different textures and exchangeable K levels resulting from previous soybean fertilizations. Soils with sand and clay textures, which had been fertilized with 0, 60, 120 and 180 kg ha^{-1} of K_2O for 6 years, were collected from two areas 1 km apart from each other. The experiment was carried out in greenhouse, in 40 cm high and 5 cm diameter PVC tubes, divided in the depths of 0-5, 5-10, 10-20 and 20-40 cm. On the columns' surface, 80 kg ha^{-1} of K_2O was applied as KCl. The equivalent of 100 mm of water was applied weekly, for 16 weeks. In each application, the drainage solution volume was determined, as well as the amount of K in leacheate. After the disassembly of the soil columns, exchangeable and non-exchangeable K contents were determined in each depth. Potassium leaching was higher in the clay soil, which had shown more available K due to a higher residual effect from the previous K fertilization. Leaching intensity was proportional to available K contents. As regarding the non-exchangeable K contents, there was proportionality between soil K and leaching just for the sandy soil. In this soil, initial leaching intensity was higher, decreasing with time, whereas in the clay soil losses were more constant. The residual effect of K fertilizer application during the years in soybean crop, increasing its availability, can result in exchangeable K intensive losses, irrespective of soil texture. Potassium transformation from non exchangeable to exchangeable K is very fast in sandy soils, which makes the replenishment of non-exchangeable K reserves very difficult due to leaching intensity.

Keywords: potassium fertilization, soybean crop, exchangeable and non-exchangeable K

Effect of Lemon Waste on Soil pH and Availability of Micronutrient in Calcareous Soils of Fars Province, Southern Iran

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Most of soils of Iran are calcareous in nature. The orchard trees are widespread in south of Fars province and cover more than 20000 ha. Sour lemon is one product of the area and is processed for lemon juice. The waste and its land fill is one of environmental problem. To evaluate the effect of lemon waste on soil pH and availability of micronutrients, composite soil samples were collected from 0-40 Cm of the area and analyzed for physico- chemical properties. Lemon waste was gathered from processing factory, dried at 70°C and crushed to 1-2 mm size. A statistical complete randomized design with 4 replicate and 30 treatments were used for evaluation of lemon waste on soil properties. The treatments were 0, 100, 200, 400, 800, and 1600 PPM of lemon waste which were added to pots containing 160 go soils and leaved in incubator for 0, 2, 4, 8, and 16 weeks at 27-30°C, pot moisture were kept at field capacity during the experiment. At dates of 0, 2, 4, 8, and 16 weeks after treatment the treated soils were sampled and physico-chemical properties were determined. According the results, the pH of treated soils with lemon waste decrease and organic mater increase slightly with increase in amount of lemon waste and time of incaution. The availability of Cu, Zn, Mn, Fe, and P in treated soils increased with increasing the amount of lemon waste and time of incubation. It is recommendable that the agricultural waste can be used as green sources of fertilizer for land and environment restoration.

Keywords: calcareous soil, agricultural waste, micronutrients

Soybean yield and chemical attributes in soil after five-year surface application of slag, aqueous lime and sewage sludge

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Soybean yield and chemical attributes in soil after five-year surface application of slag, aqueous lime and sewage sludge The agricultural use of industrial residues and sewage sludge in order to provide essential nutrients to a plant and soil liming, will be one of the most promising options of soil fertilization and liming management in a very near future, as far as these applications follow the prevailing technical norms to prevent eventual environmental contamination. The aim of this study was to evaluate the effect of slag, aqueous lime, sewage sludge and limestone, under surface application, on soil chemical attributes and soybean yield during a 5-year cultivation period. The experiment was carried out in dystrophic Clayey Rhodic Hapludox in no-till system from 2002 to 2007. The experiment had a 4x4+1 factorial random block design and 4 replications. The treatments consisted of sewage sludge (centrifuged and biodigestor), slag and aqueous lime doses of zero (control), 2, 4 and 8 ton ha^{-1} and one additional treatment of dolomitic limestone of 2 ton ha^{-1} . All treatments were applied on soil surface in 2002 and reapplied in 2005. There was increased soybean uptake of N, P and Ca in 2003, 2004 and 2005, and due to surface application of slag, sewage sludge, aqueous lime and limestone, there was a K uptake in 2003 and 2004. Soybean grain yield increased under superficial application of residues and limestone in no-till system in 2003, 2004 and 2005, and, after reapplication; the same results were observed in 2006. However, in 2007, it was observed that only the centrifuged sewage sludge treatment increased soybean yield. The application of centrifuged sewage sludge, slag and aqueous lime revealed pH increase and soil base saturation. Exchangeable heavy metals (Cd, Cr, Hg, Pb, As and V) available in soil were insignificant and that contributed to the bioavailability absence of these toxic elements in soybean plants during all experimental years.

Keywords: industrial residues, sewage sludge, soil acidity, heavy metals, soybean

Potato Tuber Yield as Affected by Various Amount Of N, P and K Application

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In order to assess the influence of nitrogen, phosphorus and potash on potato tuber yield an experiment was carried out at Agriculture Research Station of Araghi Muhaleh, Gorgan, Iran in 2001 for two years. The experiment was laid out in a Randomized Complete Block Design with three replications and it consisted of eight fertilizer treatments, which were as follows: 1 – N2P2K1 2 -N2P2K2 3- N2P2K3 4 – N1P2K2 5 – N3P2K2 6 – N2P1K2 7 – N2P3K2 8 – N0P0K0 Nitrogen, phosphorus and potash sources were urea, triple super phosphate and potassium sulfate, respectively. N2 was determined according to the soil test data, and N1 and N3 were 30 percent higher and lower than that of soil test based recommendation. The same procedure was adopted for P and K. Tubers of Marfona variety were sown in early April. Each plot consisted of four 5-meter long rows, 75 centimeters apart and within row distance of 25 centimeters. During the season, characters such as date of germination, tuber setting were recorded or determined. Leaf samples were taken at mid flowering. Two inner rows were harvested and they were used for yield determination. Mean tuber per plant, tuber weight and tuber yield were evaluated using analysis of variance. Fertilizers were not found to have a significant effect on any of the characters studied in the first year. Fertilizers had a significant effect on all characters but tuber weight. N2P2K2 and N0P0K0 produced the highest and the lowest tuber yield, respectively. There was a significant difference between fertilizer treatments for seed number per plant. The lowest numbers were produced by N0P0K0. The greatest numbers of tubers per plant were allocated to N2P2K2. There was not any significant difference between other treatments with the exception of the check with N2P2K2 for tuber per plants. Mean tuber weight was not affected by fertilizer treatments. The results suggests that the increase in yield by application if fertilizers might be attributed to greater number of tubers per plants. The lower yield of the check could be attributed to lower amount of nitrogen during the early growth season. We could possibly relate the lack of any significant difference between N1P2K2, N2P2K2 and N3P2K2 to decrease in shoot growth, number of tubers, and consequently decrease in tuber yield at lower amount of Nitrogen and higher shoot growth at higher Nitrogen levels. The interaction of three fertilizers might be the cause of higher tuber yield of N2P2K2.

Keywords: potato, tuber yied, nitrogen, phosphorus, potash, fertilizer

Determination of Some Micro and Macro Elements of Bean (*Phaseolus vulgaris*) and Sunflower (*Helianthus annuus*) Plants after Addition of Olive Oil Solid Waste to Soil

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In this study, effects of olive oil solid waste applications on bean and sunflower macro and micro element contents were investigated. Olive oil solid waste mixed with soil at the rates of 0, 3, 5 and 7 % by weight. Plants were grown in the pots under optimum conditions throughout 2,5 months. Plant carbon/nitrogen (C/N), some macro elements; nitrogen (N), phosphor (P), potassium (K), calcium (C), magnesium (Mg), and micro elements; boron (B), ferrous (Fe), manganese (Mn) contents were determined and their relations with the application of olive oil solid waste have been researched. As a result oil solid waste applications to soil increased most of the elements concentrations in both plants except for nitrogen (N).

Keywords: Olive Oil Solid Waste, Bean, Sunflower

The Effects of Olive Oil Solid Waste Applications on the Some Physiological and Morphological Features of Bean (*Phaseolus vulgaris*) and Sunflower (*Helianthus annuus*) Plants

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By considering the storage problems and the environmental harms caused by agricultural by-products and industrial wastes, researches on reusing these wastes are gaining great importance. In this study we investigated the olive oil solid waste applications on beans and sunflower growth. Olive oil solid waste mixed with soil at the rates of 0, 3, 5 and 7 % by weight. Some physiological and morphological parameters such as chlorophyll contents, plant height, plant thickness etc. have been examined. As a result, it is determined that direct applications of olive solid waste negatively affect bean and sunflower growths.

Keywords: Olive oil solid waste, bean and sunflower growths, physiological and morphological parameters

Nitrogen Fertilization Effects on Wheat Grain Yield Under Rainfed Condition

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To investigate nitrogen fertilization effect on wheat yield the field experiment was carried out during 2002-2003 at the Agricultural Research Station of Gonbad, Iran with a mean annual precipitation as 453mm. The field soil was classified as silt loam. Subtropical wheat variety of Kohdasht was sown on December in 2002 at seeding rate of 123 kg ha^{-1} on 12 rows 5 m long and 17 cm apart. There are four levels of nitrogen application rates as No- nitrogen fertilization (N0), Net nitrogen of 30 (N30), 60 (N60) and 90 (N90) kg ha^{-1} with four replications. Results revealed that the effect of nitrogen application on grain yield was significant ($P \leq 0.01$). The grain yield averaged as 4104, 4902, 5212, and 5292 kg ha^{-1} for levels of N0, N30, N60 and N90, respectively.

Keywords: Nitrogen application, Rainfed wheat, Wheat yield.

The Effect of Seed Aging on Seedling Growth, N and K Uptake under Salinity

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Early seedling growth Seedling emergence probably is the single most important phenological event that influences the success of an annual plant. Stress factors can compromise the emergence and early development of seedlings and this phase requires seeds of good quality. Different seed vigor of wheat may have different response to salinity; so far this aspect of seed aging has not been evaluated on wheat. Therefore, our objectives of this research were (1) to evaluate seedling growth of seed aged in salinity, (2) to determine the effect of seed aging and salinity on N and K uptake. Seeds (cv. 'Zagros') were kept at a high temperature (43°C) and high relative humidity (90-95%), to create different classes of seed aging, for 0, 48, 72, 96 and 144 h periods. Plants of seed aged were grown in a greenhouse in silty loam soil and treatments amended with NaCl and $CaCl_2$ (50:50) at 0.7, 7 and 14 dS m^{-1} electrical conductivity. Seed aging significantly declined seedling dry weight and leaf area at 59 days after planting (tillering stage). Results indicated N and K uptake decreased significantly and linearly during the aging period.

Keywords: Seed aging; salinity stress; seedling growth; N and K uptake.

Effect of Texture and Nitrogen Fertilisation on Quality and Yield of Corn and Residual Soil Nitrate

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In corn (*Zea mays* L.), adequate nitrogen (N) fertilization must be adjusted to optimize productivity (yield and quality) and economic return as well as to minimize environmental losses. Our objective was to evaluate the effect of soil texture and N fertilization on corn grain yield (CGY), protein content (PC), hectoliter weight (HLW), 1000-grain weight (1000W) and residual soil nitrate (RSN; soil layer 0-90 cm) in eastern Canada. A study was conducted at four sites over three years (2004-2006) representing different soil surface textures, i.e. 1) clay content > 30% referred to as fine texture (F), 2) 15-30% clay referred to as moderately fine texture (MF), 3) 7.5-15% clay referred to as moderately coarse texture (MC), and 4) clay content < 7.5% referred to as coarse texture (C). A randomized complete block design with six treatments and four replications was used at each site. Treatments consisted of six N rates (0, 50, 100, 150, 200, and 250 kg N/ha), of which 20 kg N/ha was banded at seeding and the remaining was banded at 6- to 8-leaf stage. Statistical analyses showed that PC increased linearly with N rates. Test weights (HLW and 1000W) were influenced by N rates with a significant interaction between soil texture and N rates. Actually, increasing N rates increased linearly 1000W in F, MF and MC textures and increased curvilinearly 1000W in C. However, increasing N rates increased curvilinearly HW in F, MF and MC texture and but the effect was pronounced in C. Corn grain yield and RSN varied significantly with soil surface texture. Depending on soil texture, increasing N rate increased linearly or curvilinearly GCY, and RSN. The N fertilizer rates for F, MF, MC and C sites to reach maximum grain yield (Nmax) were 192, 206, 212 and 189 kg N/ha, respectively, as estimated by a quadratic model. The N fertilizer rates for F, MF, MC and C sites to reach optimal economic yield (Nop) were respectively 179, 179, 190 and 162 kg N/ha while yields were reduced by less than 0.1 Mg/ha. Using the Nop instead of the Nmax for F, MF, MC and C sites reduced RSN by 0, 3, 2 and 11 kg N/ha, respectively. These results highlight the susceptibility of coarse textured soils to nitrate leaching. Based on corn productivity and RSN, our results suggest that soil surface texture provided useful information for guiding site specific N management in eastern Canada, particularly to reduce RSN.

Keywords: protein content, 1000-grain weight, hectolitre weight

Indigenous Knowledge and Approaches of Soil Fertility Management Among Small Scale Farmers in Semi-Arid Areas of South Africa

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In South Africa, decades of policy discrimination against the small-scale farming sector during the apartheid regime resulted in the sector being largely neglected at the expense of large scale commercial sector. The majority of the small-scale farmers reside in rural areas and agriculture is the principal economic sector upon which they depend for their livelihoods. As is the case with many other countries in sub-Saharan Africa, crop production among small-scale farmers, especially those in semi-arid regions of the country, is hampered by predominance of extreme climate (low, irregular & erratic rainfall), low inherent soil fertility and low use of mineral fertilizers. Depletion of soil fertility often results in low yields which threatens household food security. The intensification of agricultural production due increasing population pressure has further exacerbated the need for affordable strategies of soil fertility management. Consequently, tackling the problem of soil fertility depletion in these areas presents some critical challenge to the sustainability of small-scale food crop production systems. However, small-scale farmers have developed a range of indigenous knowledge and practices which have played a pivotal role in the management of soil fertility for sustaining crop productivity. Some of these indigenous include: (1) traditional fallows, (2) termite mound soil, (3) animal manure, (4) mixed cropping with legumes, (5) earthworm casts, (6) agroforestry, (7) ash and (8) crop residues. These locally adaptable and cost-effective strategies have been proven and used to restore soil fertility and improve productivity over long periods of time. Furthermore, the farmers have developed local knowledge systems of describing and classifying soils based on characteristics such as texture, organic matter, soil water capacity, presence of earthworms and nutrient deficiency that are used to make soil fertility management decisions. Most of these fertility inputs are applied in particular areas, times and crops. This paper discusses these strategies and concludes that it is important to recognize and build upon the many Indigenous knowledge and practices of soil fertility management used by small-scale farmers in these marginal environments.

Keywords: Indigenous knowledge; nutrient management; semi-arid; small-scale farmers; soil fertility

Yield, Quality And N Dynamic In Plants And Soil After Fluid Fertilizer Injection Fertilization (CULTAN) In Different Cereal Crops

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Injection of fluid fertilizers into the soil became known in Germany since the CULTAN method (Controlled Uptake Long-Term Ammonium Nutrition) has been proposed in the 60es. By special machinery (spoke wheel injectiors), fluid N fertilizers mainly based on ammonium and urea are injected about 8 cm deep into the soil. This fertilization strategy intends to aliment the crops predominantly with ammonium instead of nitrate. Ammonium nutrition has plant physiological and environmental advantages. The major fluid fertilizers used in Germany for injection are urea ammonium nitrate solution, urea ammonium solution and ammonium sulphate solution. In the USA and Canada, injection of liquid fertilizers is used since more than 20 years, and farm injection machinery is well developed. In Germany, only a few contractors offer injection fertilization for farmers, but the number is steadily increasing due to an increasing interest by the farmers. Field experimental data since 2000 show equivalent or higher yield reactions of cereals after liquid fertilizers injection compared to conventional surface application of fertilizers: Lower N losses by ammonia volatilization or surface runoff, a higher N availability and the advantages of ammonium nutrition compared to nitrate alimentation are assumed to be responsible for these effects. Due to decreasing pH value in the rhizosphere during ammonium uptake, higher micronutrient levels can be found in the plant tissue after ammonium injection. Experimental data will be presented that show that liquid ammonium injection fertilization is a favorable fertilization strategy especially in dry areas, dry seasons and in minimum soil cultivation systems.

Keywords: fluid fertilizers, injection fertilization, CULTAN, ammonium, spoke wheel injectiors

Influence of Soil Applied Bacterial Strains as well as a Liquid Fertilization Method on Yield and Quality of High Oleic (HO) Sunflowers (*Helianthus annuus* L.)

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Field trials with three different HO sunflower varieties were conducted as alternative agricultural approaches to ensure stable kernel and oil yield, as well as oil quality, and keep plants free of fungal attacks in the predominantly wet autumn. The bacterial mixture "Mikro-Vital" containing bacteria strains of Pseudomonas, Azotobacter, and Azospirillum was applied to the soil in order to supply the plants with nutrients and to suppress soil-borne fungal pathogens. Furthermore, three different solutions of ammonium based liquid fertilizers were injected into the soil, namely urea ammonium nitrate, urea ammonium nitrate including a nitrification inhibitor, and urea ammonium sulfate. These solutions were applied in three different nitrogen concentrations as alternative nitrogen nutrition method to test its potential to reduce soil borne fungal attacks. Mikro-Vital application showed only slight and insignificant decrease in total fungal diseases. However, it caused significant less stem infections in 2006. Additionally, it led to a slight increase in yield exclusively for the variety Olsavil in some experimental years. Only in warm and dry year 2003, oil content was increased but in general neither oil content nor its composition was changed. Ammonium based liquid fertilization in general did not reduce fungal infection rate. On the contrary, it significantly increased the infection rate in the wet and humid year 2002 but decreased it in 2006. Grain yield was slightly increased in the warm and dry year 2003, but in general was not significantly influenced. However, oil content was increased significantly by this alternative fertilization method, whereas oil composition was not changed.

Keywords: high oleic sunflowers, liquid fertilization, bacterial strains, soil-borne fungal pathogens, yield, oil quality.

Physiological response of winter wheat to various amounts of foliar application of nitrogen at different phonological stage

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Foliar application of nitrogen well known as the effective way to compensate the deficiency of nitrogen especially at the end of growing season. In this experiment that conducted as factorial experiment, 90 kg/ha urea used as soil application and the amounts of 25%,50%, 75% and 100% this amount were used as foliar application (equal to 22.5,45,67.5 and 90 kg/ha respectively.)at tillering, jointing, anthesis and grain filling stage. The highest dry weight was obtained from 90 kg/ha and the lowest dry weight was obtained from 22.5 kg/h N as foliar application. Also the highest and lowest value of crop growth rate(CGR) , leaf area index(LAI) and net assimilation rate (NAR) were obtained from 100% and 25% amount of residual N foliar application(90 and 22.5 kg/ha). Results of this study showed the highest and lowest total dry weight was obtained from N foliar application at tillering and grain filling stage.Also the highest and lowest value of crop growth rate(CGR) , leaf area index(LAI) and net assimilation rate (NAR) were obtained from residual N foliar application at tillering and grain filling stage respectively.

Keywords: foliar application,wheat,physiological response,phenology

Wheat Productivity and Residual Soil Nitrate as Affected by Soil Texture and Nitrogen Fertilization

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In spring milling wheat (*Triticum aestivum* L.) production, N management is important to optimize growth and quality and to minimize negative environmental impacts. Our objective was to evaluate the effect of soil surface texture, N rate and timing on grain yield (GY), protein content (PC), hectolitre weight (HW), 1000-grain weight (1000W) and residual soil nitrate (RSN; soil layer 0-90 cm) in eastern Canada. A study was conducted over three years (2004-2006) at four sites representing different soil surface textures, i.e. 1) clay content > 30% referred to as fine texture (F), 2) 15-30% clay referred to as moderately fine texture (MF), 3) 7.5-15% clay referred to as moderately coarse texture (MC), and 4) clay content < 7.5% referred to as coarse texture (C). A randomized complete block design with eight treatments and four replications was established at each site. Six treatments consisted of six mineral N rates (N0, N40, N80, N120, N160, and N200 kg N/ha) where 30 kg N/ha were broadcast at sowing and the remaining was applied at stem elongation. A reference treatment (N120t) based on local recommendation (120 kg N/ha: 50% at sowing + 50% at tillering stage) was also used. The last treatment (N120s) consisted of 120 kg N/ha all broadcast at sowing. Texture had a significant effect on protein content ($P < 0.07$). Grain yields and RSN were not significantly influenced by soil surface textures. Nitrogen fertilization (rate and timing), however, had a significant effect on GY, PC and RSN ($P < 0.0001$). Indeed, increasing N rates from N0 to N200 increased linearly GY from 1.6 to a maximum of 2.35 Mg/ha, reached with the N120 treatment. Applying 120 kg N/ha entirely at sowing or delaying a part of it until stem elongation, reduced the GY by 0.17 and 0.31 Mg/ha, respectively, as compared with the N120t treatment. Increasing N rates from N0 to N200, increased linearly PC, however, the PC was always higher than 13.5% except for N0. Delaying N application from sowing to stem elongation increased PC from 15.2 to 17.0%. Significant interaction between soil texture and treatment for the two test weights (1000W and HW) were observed ($P < 0.0001$). Actually, increasing N rates slightly increased linearly 1000W in the F, MF and MC textures and increased curvilinearly 1000W in C. In the other side, increasing N rates slightly decreased linearly HW in F, MF and MC texture and increased curvilinearly HW in C. Increasing N rates from N0 to N200, increased linearly or curvilinearly RSN from 23 to a maximum of 102 kg NO3-N/ha, reached with N200. Applying 120 kg N/ha entirely at planting or delaying a part of it until tillering or stem elongation, resulted in similar RSN values. Considering yield and quality of grain and RSN, our results suggest that N management in eastern Canada can not be adjusted to soil surface textures.

Keywords: N timing, protein content, 1000-grain weight, hectolitre weight

Determination of Phosphorus and Potassium Status of Erzurum Plain Soils with Neubauer Seedling Technique

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The purpose of this investigation was to determine phosphorus and potassium status of Erzurum plain soils .Representative 22 soils samples were collected from Erzurum plain. A greenhouse experiment was conducted using randomized block design each treatment replicated three times Rye (S.cerale tetraploid) was used as the test plant according to Neubauer seedling method Rye plants have been grown for 17 day duration. In a short time P and K in soil has been exploited by multiple branched roots, obtained from plants grown on 100 g soil. The plants harvested after 17 days growing period. P and K concentration in plants were determined quantitatively by using chemical analysis methods. As a result, soils, except 2 ,6 and 15 numbered samples were found adequate for P2O5 and except 6 and 10 numbered soils, all samples were found adequate in terms of K2O for Erzurum plain soils

Keywords: Soil, available, phosphorus, potassium, Neubauer seedling technique, rye

Nitrogen Fertilization and Rhizobial Inoculation Effects on Dry Bean Production in Northern Quebec, Canada

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In Northern Quebec (Canada) dry bean (*Phaseolus vulgaris* L.) is an uncommon crop. Dry bean is a legume capable of nitrogen fixation and up to 40 % of total nitrogen in the plant could come from fixation when the crop is inoculated with specific rhizobium bacteria. However, in Quebec, there is no recommendation for inoculation and the recommended nitrogen rate for dry bean production is 60 kg ha^{-1}. In 2006 and 2007, a trial was conducted in Normandin (Quebec, Canada) to evaluate the effect of rhizobial inoculation and nitrogen fertilization on dry bean production. Five nitrogen application rates (0, 30, 60, 90, and 120 kg ha^{-1}) and two rhizobial inoculation treatments (non-inoculated and inoculated with *Rhizobium leguminosarum* bv. phaseoli) were evaluated. Treatments were laid out in a factorial randomized block design with 4 replicates. In 2006 and 2007, grain yield increased linearly with nitrogen fertilization rate. Grain yields increased by 374 kg ha^{-1} and 441 kg ha^{-1} in 2006 and 2007 respectively when 120 kg of N ha^{-1} was applied compared to 0 kg of N ha^{-1}. In 2006, grain yields increased with rhizobial inoculation by 7 % when compared to the non-inoculated plots. Seed inoculation had no effect on grain yields in 2007. For both years, seed protein content increased linearly with the increment of nitrogen application rate. Moreover, in 2007, seed inoculated with *Rhizobium leguminosarum* bv. phaseoli had higher protein content (24.3%) compared to the non-inoculated plots (23.4%). Seed inoculation had no effect on grain protein content in 2006. There was no significant interaction between nitrogen fertilization rate and seed inoculation for both years.

Keywords: Dry bean, nitrogen, fertilzation

Effect of Cobalt on Growth and Cobalt Uptake of Barely in Relation To Cobalt Availability in Alkaline Soils

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A short term Neubauer experiment was conducted to evaluate the effect of cobalt on the growth as well as cobalt uptake of barely (Giza 126 variety) grown in three alkaline soils from the north west coast of Egypt in relation to AAAA-EDTA (Acetic Acid Ammonium Acetate-EDTA) extractable cobalt in the tested soils of the uncropped treatments. Treatments of five levels of cobalt (0, 5, 10, 20, 40, 80, and 100 mg/kg soil) were superimposed on the tested soils. The data indicated that the available cobalt concentration increased with increasing cobalt application rate. The concentration of cobalt extracted with AAAA-EDTA increased polynomialy in response to cobalt application for the three studied soils. The data showed also, that the effect of cobalt application on the growth of barely plants was significant on the clay soil (Soil A) and insignificant on the clay loam and sandy loam soils (Soils B and C). The higher dry matter yields were obtained with the application of cobalt to the soils at the rate of 20 mg Co/Kg soil. The tolerance index (Ti) for the addition of 5 to 80 mg Co/Kg soil (>1) shows a favourable effect for the growth of barley. Also, the tolerance index was varied with the soil characteristics. Cobalt concentration or uptake by barley was increased significantly with cobalt application and this was also evidenced by the increase in AAAA- EDTA extractable cobalt from the tested soils. The average uptake values of cobalt followed the sequence order: soil C (sandy loam) >soil B (clay loam)> soil A (clay). Also percentage utilization of added cobalt was highest in soil C followed by soil B and soil A. In conclusion the application of cobalt in a low level improved growth of barely and may be applied to the soil at the recommended rate in term of cobalt sulphate.

Keywords: Cobalt, alkaline soils, barely, growth, availability, uptake and tolerance index.

Diatomite: A New Substrate For Hydroponics

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Many different substrates are used for plant support in hydroponic culture, but one of the unique requirements for research is that the media be easily separated from the roots. Peat, perlite, and vermiculite are good substrates but roots and root hairs grow into these substrates, so they are unsuitable for studies of root size and morphology. Sand can easily be removed from roots, but roots grown in sand are shorter and thicker than hydroponic roots because the sand particles are so dense. Diatomite particules was the medium of choice for research hydroponics for many years because it can easily be removed from roots. Diatomite is a sedimentary rock primarily composed of the fossilized remains of unicellular fresh water plants known as Diatoms.This organic, natural product contains the fossilized skeletons of trillions of microscopic, single cell aquatic plants of fresh water origin. This lightweight, porous, non-toxic, non-hazardous mineral is a cost effective, highly efficient, horticultural growth promoting media. Diatomit is pH stable and the pH can be adjusted to suit various crops. Diatomite will absorb up to 150% of its own weight in fluids and slowly release the fluids 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 to filled cup and rinsing it in a few minutes time Its disadvantage is cost 3 TL/ 7 liter in Turkey. There are a lot of Natural Diatomite sources in Turkey.

Keywords: hydroponics, substrate, soilless culture

Anionic Exchange Membranes as a Soil Phosphorus Index for Potato Produced in Eastern Canada

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Anionic exchange membranes (AEMs) have been successfully used as an alternative to chemical extraction in several studies to estimate soil P availability to crops. This technique appeared to provide a better index of plant P availability than chemical extractions and may provide useful tools for monitoring in situ soil P availability/mineralization. However, few studies have assessed the utility of AEMs for in-situ monitoring of P availability under organic fertilizer such as compost. The objectives of our study were to: (i) assess the ability of AEMs as a P index during the growing season of potato (*Solanum tuberosum* L.), and (ii) evaluate soil P mineralization during winter after potato harvest. The study was conducted during three growing seasons (2005-2006-2007) in a long term experimental site established since 1992 in Prince Edward Island, Canada. The treatments in the long term experiment had a potato based compost applied at specific entry points in a three year barley/red clover/potato rotation. Treatments consisted of 5 rates of band applied fertilizer P ranging from 0 to 200 (kg P2O5 ha-1) in 50 kg increments. To measure in situ adsorption of P onto AEMs (PO4AEM), AEMs were buried in the surface horizon (0-15 cm) at different periods during each growing season from early spring until late on fall. The AEMs were incubated during eight, nine, and ten different 2-week periods in 2005, 2006, and 2007, respectively. After each contact period, AEMs were removed from the soils and analysed for adsorbed PO4. Other sets of AEMs were buried in the soil at four profiles (0-15, 15-30, 30-45, and 45-75–cm) in late fall of 2005, 2006 and 2007 to evaluate the release of P during winter. These AEMs were removed in early spring 2006, 2007 and 2008. Soil PO4AEM varied among P application rates and with time in the growing season. An increase of PO4AEM was observed early in summer (mid June) of each year, which we attribute to soil P mineralization. Subsequent decreases in a PO4AEMs from July until the beginning of September were observed each year, which we attribute to plant P uptake. Phosphorus addition had a significant effect on PO4 adsorbed onto AEMs during winters of 2006 and 2007. The relatively large amounts of PO4AEMs obtained in spring 2006 (7.29 µg cm-2), after a period of 185 days in soil (November, 1st 2005 –May, 4th 2006) suggested the possibility of soil P mineralization during winter. The PO4AEM also varied with the profiles where membranes were buried. In general, the highest amounts were obtained in the 0-15 cm layer in all treatments (P0 and P200). Obtained results indicated the ability of the AEMs to detect differences between organic P fertilizer treatments (With and without compost) and to predict the amount of soil P which is available to potato produced in eastern Canada.

Keywords: P availability, organic fertilizer, soil P test

Controlled Release Nitrogen in Potato Produced in Eastern Canada

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Potato (*Solanum tuberosum* L.) is highly responsive to N fertilization and tuber growth, development, quality, and yield are greatly affected by N fertilization. Applied N, however, is not totally used by the crop and consequently can contribute to negative environmental impacts such as surface and ground water contamination. Management practices involving the appropriate type of mineral N fertilizer need to evolve to improve N use efficiency (NUE). To reduce N losses and improve NUE, controlled release N (CRN) fertilizer can be used in agriculture as a management strategy fitted with environmental goals since it showed a high potential to increase NUE. A study was initiated in 2007 in potato with the Environmentally Smart Nitrogen (ESN; Polymer coated urea nitrogen, 44% N) as a CRN fertilizer. Experiments were conducted in the Quebec (Canada) region on a sandy soil in two sites with 15 plots (4 rows spaced by 0.91 cm for 7 m long) by site. Chieftain and Goldrush were the two varieties used. The experiment design was a RCBD with five treatments and 3 blocks. Thus, a control (N=0) and four N treatment (CAN / ESN) were applied as follow, 150 / 0, 100 / 50, 50 / 100 and 0 / 150 kg N ha^{-1}. All treatments were applied at planting and all experimental plots received P and K at recommended rates. Soil N availability was determined during the growing season using KCl (2M) extraction and anionic exchange membranes (AEMs). Fertilizer N significantly influenced marketable yield ($P < 0.001$), soil N availability, chlorophyll meter reading and residual soil nitrate (RSN). On average, N increased marketable yield from 32.3 Mg ha^{-1} without N to 41.3 Mg ha^{-1} with 150 kg N ha^{-1}. The highest marketable yield (42.5 Mg ha^{-1}) was obtained with the ESN applied at 150 kg N ha^{-1}. Soil N availability as measured by AEMs (NO3AEMs) varied greatly during the growing season. An increase of NO3AEMs was observed late on June and can be explained by soil N mineralization and N application. The decrease from July until the beginning of September is due to potato N uptake. At harvest, RSN was higher with N fertilization compared to the control; RSN was not affected by the type of mineral N applied as shown by the non significant contrast CAN vs. ESN. The results of the first year study suggest that the ESN could be an appropriate CRN in potato produced in Quebec. The study will be conducted for the next two growing seasons to conclude on the effectiveness of the ESN fertilizer.

Keywords: N use efficiency, N availability

The Effects of Sulphur Application and Seed Size on Growth Yield and Yield Components of Three Bread Wheat Genotypes (*Triticum aestivum* L.) under Saline Soil Conditions

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This research was carred out in "Anbar-e-olom Saline Reasearch Station" in 35 km north of Gorgan, Golestan province at the agronomy year of 1384-85.The experiment was arranged in Split-plot Factorial was in a form of Randomized Complete Blocks Design (RCBD) in 4 replications including the main and secondary factors, on soil Clay Loam, pH=8.2 and EC=9.2 (dSm-1). The main factor included amounts of Sulphur (0, 500 &1000 kg/he) and the secondary factors included the two seed size (Small and Large) and 3 genotypes of wheat (Zagros, Desconcido-7 and Kohdasht). Results showed that there was significant differences amounts the treatments and regarding (Sulphur, Seed size and Genotypes) such as, Grain yield, number of fertile stems per square meter, number of grains per spike, weight of kernel, Harvest Index (HI) of spike, HI of plant, weight of spike (gr/m^2), number of spikelets per spike. By comparing the characteristics mean it was proved that using 1000 kg/ha sulphur was significant difference in grain yield parameter. Although using of sulphur 500 kg per hectare had effected more than amount not using (without sulphur) but it was not significant difference. Using the two different amounts of seed size (Large and Small) were significant difference with each other. And using of Kohdasht genotype was significant difference in grain yield parameters and as the second, Zagros genotype and as third, Desconcido-7 were significant difference with each other. Also as the reciprocal effects, Sulphur 1000 kg/ha, Large seed size and Kohdasht genotype had the most amount of grain yield and effect.

Keywords: Genotype, Seed size, Salinity, Sulphur, Wheat.

Effects of Drinking Water treatment sludge on crop quality of *Zea mays* L.

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This research was conducted to evaluate effects of drinking water treatment sludge on crop quality. In this trial Zea mays (pioneer 32 w 86) was used, and the research was planned according to random blocks sampling design with three replicates. Increased amount of sludge, as of 0, 1, 2, 3, 4 t da^{-1}, was applied on blocks. Zea mays seeds were sewed between rows within a distance of 65 cm, and on rows within a distance of 25 cm. Blocks were irrigated to stimulate germination during dry conditions. When the leaves were 8 days old, 10 kg da^{-1} of N fertilizer was applied. Plant length, first corncob height, corncob length, corncob diameter and number of corncob were observed and measured using randomly selected 10 plants from each block. As a result, the highest plant length, 206.97 cm, was found on blocks with control. The lowest plant length 189.76 cm was found on blocks with 1 t ha^{-1}. The highest first corncob length, 85.62 cm, was found on blocks with 1 t da^{-1} sludge applied. The lowest first corncob length, 82.09 cm, was found on blocks with 4 t da^{-1} sludge applied. Average of the highest corncob number 1.23 was found on blocks with 4 t da^{-1} sludge applied. Average of the lowest corncob number 1.03 was found on blocks with 1 t da^{-1} sludge applied. The highest corncob length 22.08 cm was found on blocks with 2 t da-1 sludge applied. The lowest corncob length 19.94 cm was found on blocks with 3 t da^{-1} sludge applied. The highest corncob diameter 4.15 cm was found on blocks with 0 t da-1 sludge applied. The lowest corncob diameter 3.86 cm was found on blocks with 1 t da^{-1} sludge applied.

Keywords: Water Treatment Sludge, Zea mays, Soil

Effects of High Nitrogen Doses on Growth and Nitrate Accumulation of Leafy Vegetables

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The effects of high nitrogen doses on growth and nitrate accumulation of four different leafy vegetables species, patience (*Beta vulgaris* var. cicla), garden rocket (*Eruca sativa*), lettuce (*Lactuca sativa*) and spinach (*Spinacia oleracea*) were studied. The experiment was carried out in glasshouse. 15 days old seedlings of the species were planted on December 1, 2007, in 3-l buckets filled with coarse sand The experimental treatments consisted of 3 levels of nitrogen (110, 175 and 240 mg l^{-1} of nitrogen) in sand culture. Each treatment was in 4 replicates, 3 plants per pot, 12 plants per replicate. The plants were irrigated with half concentrated Hoagland's solution containing appropriate amounts of $NH4^+$ and $NO3^-$ for 45 days and then test plants were harvested and separated into roots and leaves. Total fresh weight of leaf and root, leaf number, leaf dry matter (%), plant height and root length of test plants were determined. Nitrate and total nitrogen analyses were performed in dried and ground leaf samples according to Cataldo et al., (1975) and Kacar (1972) respectively. The data obtained from the study were evaluated with the least significant difference (LSD 0.05) between treatments, derived from analysis of variance. Increasing nitrogen applications increased growth parameters of test plants significantly except total fresh leaf weight of lettuce, total fresh root weight of patience, leaf dry matters (%) of lettuce and spinach. Total nitrogen contents of the leaves increased significantly. However increasing nitrogen doses did not cause a regular nitrate accumulation in the leaves of experimental plants. Leaf nitrate accumulation of patience, garden rocket and lettuce paused in 175 mg l^{-1} and 240 mg l^{-1} nitrogen application. On the other hand increasing N applications has no affect on nitrate accumulation of Spinach leaves.

Keywords: Nitrate accumulation, growth, *Beta vulgaris* var. cicla, *Eruca sativa*, *Lactuca sativa*, *Spinacia oleracea*

Cadmium Accumulation in Potato Tubers Produced in Eastern Canada

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Cadmium (Cd) is a heavy metal present in soils from natural and anthropogenic sources and its accumulation in soil appears to be increasing over time. Crops, such as potato (*Solanum tuberosum* L.), can accumulate relatively high levels of Cd without negative effects on plant growth. Our objective was to study the effects of different soil phosphorus (P) contents on Cd accumulation in soil and potato tubers. The study was conducted using soil samples and potato tubers collected from five different experimental sites in Quebec (Canada) from 1999 to 2006. Phosphorus fertilizer, applied as triple super phosphate, varied with sites and ranged from 54 to 190 kg P_2O_5 ha^{-1}. Across sites, soil P content at harvest extracted by Mehlich-3 (0-20 cm), varied between 71 and 392 mg P kg^{-1}. Tuber Cd concentrations ranged from 0.039 to 0.200 mg kg^{-1} dry weight (DW), with a mean value of 0.107 mg kg^{-1} DW, and never exceeded the proposed tolerance for potato of 0.05 mg kg^{-1}fresh weight (about 0.25 mg kg^{-1} DW). The DTPA-extractable Cd in soils (0-20 cm) varied from 0.030 to 0.070 mg kg^{-1} with a mean value of 0.048 mg kg^{-1} and was positively correlated with soil organic matter content (R^2 = 0.94, P < 0.001), soil pH (R^2= 0.62, P<0.01) but not with soil P. Tuber Cd concentrations were not related to DTPA-extractable Cd in soils and were related to soil available P (R^2 = 0.41, P > 0.02) indicating a possible effect of soil P on Cd uptake by potato.

Keywords: Cadmium, potato, phosphorus

The Disposal Of Biosolids And Water Treatment Residuals On Soils Of Arid Regions: A Glasshouse Investigation

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Land co-application of biosolids and WTR is a new concept. Therefore, information on the effect of co-application of biosolids and WTR on plant growth and elements uptake are very limited especially in alkaline soils. : A glasshouse experiments was established to evaluate the effects of co-application of WTR and biosolids on agronomic performance of wheat crop grown in alkaline soils as well as P and Al plant concentration and uptake, and to improve management of industrial and toxic wastes and provides environmentally sound guidelines for their disposal. The results indicated that increases of 47, 359 and 55 % in total dry matter yield were achieved as a result of applying 40 gkg-1 WTR and 10 gkg-1 biosolids to clay, sandy and calcareous soils respectively. In all studied soils treated with a constant biosolid rate 10 gkg-1, application of 20 gkg-1 WTR significantly increased plant P concentration in the plant materials. Combined analyses of all soils ,all treatments of biosolid and WTR rates studied indicated clearly significant relationships between soil solution P concentration and P uptake (r = 0.37, p < 0.001). Application of WTR combined with biosolid showed significant increases in extractable Al in all the soils studied. However, application rates of WTR and biosolid did not increase extractable Al in amended soils beyond 6.06 mg Al kg-1.

Keywords: biosolids, water treatment residuals, phosphorus, aluminum, availability

Potassium Fixation as Affected by Moisture Conditions in Some Soils of Azerbaijan

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Potassium is the third macronutrient provided in a complete fertilizer. Exhaustive cropping of potassium-demanding crops like potato, sunflower and sugar beet leads to depletion of soil non-exchangeable potassium and subsequent fixation of added potassium. In this study the effects of different soil moisture conditions on potassium fixation were investigated in some potassium-depleted soils of Azerbaijan province. For this purpose 6 soil samples were selected from among 17 locations where the amounts of boiling nitric acid extractable-K were considerably lower in cultivated soils compared to the adjacent non-cultivated soils. The amount of potassium added to the soils (250 mg K kg^{-1}) was equivalent to the amount of depleted K. Results showed that the amounts of K fixation were significantly ($P<0.001$) increased (13.8%) after air-drying. There was a significant ($P<0.01$) positive relationship between the amount of K fixation and clay content. Three soil samples with different amounts of K fixation were chosen from among six soil samples for subsequent studies. Early air-drying of the soils was significantly ($P<0.01$) caused more K fixation comparing to middle and late air-drying. According to the results obtained the effect of soil matric potential (-30, -100, -500 kPa) on K fixation was significant ($P<0.001$).The highest amount of K fixation was found for -100 kPa. Furthermore, K fixation during two months incubation was significantly ($P<0.001$) elevated with the increase in the number of wetting-drying cycles (1, 5, 10 and 20 cycles). The amount of K fixation was increased by 23% with wetting-drying incubation (under 20 cycles) compared to constant field capacity incubation.

Keywords: potassium fixation, wetting-drying cycles, soil matric potential

Effect of Nitrogen Foliar Application and Different Levels of Irrigation on Yield of Canola

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In order to study the effects of irrigation and nitrogen treatments on rapeseed(option 500 variety) this experiment was conducted at agricultural research station of Gonbad during (2003-2005). The experiment was carried out as factorial form in RCBD in 3replications. 3 irrigation treatments 1-without irrigation, 2-irrigation in flowering stage and 3-irrigation at flowering stage and seed filling stage) and 3 nitrogen treatments (1-without applying of N, 2-applying of N in soil without foliar application and 3- applying of N in soil with foliar application were the experiment treatments. The foliar application of urea was applied in beginning of stem elongation and flowering stages with 2.5 % concentration. The result of first year of experiment showed that the effects of irrigation and nitrogen were significant on grain yield. The effect of irrigation of second year of experiment was not significant because of high rainfall. The two years analysis showed that the effect of year was significant on grain yield, the number of secondary branches and 1000 grain weight, that showed climatic conditions have varied in two years of experiment. Irrigation at flowering and seed filing stages and N in soil with foliar application treatment had highest yield (3426 kg/ha). Therefore we must irrigated canola in years that we have not enough rain in flowering and seed filling stages.

Keywords: Soil fertility, Canola, Nitrogen application

Determination of Organic Matter Mineralization in Compost Amended Soils Using FT-NIR Spectroscopy

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This study is aimed at developing a non-destructive method for determining organic matter mineralization using FT-NIR (Fourier Transform-Near Infrared) spectroscopy. Soils with two different textures were mixed with olive solid waste and olive solid waste composts. Samples have been incubated at 25°C for 9 months. After this period, some chemical and physical analyses were performed on the samples using standard methods. Also reflectance spectra of the same samples were acquired right after the standard measurements using FT-NIR spectroscopy. Calibration models between the standard measurements and the spectral measurements performed on samples will be established applying Partial Least Squares (PLS) method. NIR spectroscopy has the potential of sensing soil contents non-destructively. This study will provide results of the capability of NIR spectroscopy for sensing soil properties non-destructively.

Keywords: FT-NIR spectroscopy, organic matter mineralization, olive solid waste.

Effects of Rye Green Manure Application in Soil Physical and Chemical Characteristics in Maragheh Dryland Condition Zone

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In order to study of green manure application effects on soil physical and chemical characteristics in dryland condition, this project was carried out with 4 rye green manure treatments along with nitrogen factors included; 0, 26, 103 and 337 kg N.ha-1 from urea fertilizer plus check (without green manure) treatment in 3 rotation system (green manure-wheat) in RCBD desigin with 4 blocks at 1999-2007 in Maragheh Dryland Research Station. Results showed that, althrough treatment effects on dryland wheat grain yield was not significant, but maximum grain yield with 2484 kg.ha-1 obtained from application of rye green manure along with 26 kg N.ha-1. This grain yield was 442 kg.ha-1 (22 percentage) more than check (without green manure) treatment. Application of green manure without nitrogen factors increased soil pH, T.N.V.% and E.C (dS.m-1), but decreased O.C%, P (av.), Fe (av.), Cu (av.), Mn (av.), Zn (av.), saturation% and sand% in soil. With application of nitrogen factors along with green manure increased saturation%, clay%, E.C (dS.m-1) in soil, but decreased O.C%, P (av.), Cu (av.), Mn (av.), Zn (av.) sand% in soil. Soil moisture decreased 8% in green manure application treatment without nitrogen applicalion in 0-20 cm depth, but with nitrogen application along with rye green manure, soil moisture increased 6% compare to check. It can be concluded that, green manure application is useful in long term along with nitrogen fertilizer application. Green manure application in addition to increasing of soil moisture content, increase dryland wheat grain yield. Green manure application changes soil characteristics for example, increasing of soil T.N.V%. This problem is decreased of availability of some essential nutrient for dryland wheat, therefore in this condition dryland wheat fertilizer requirments must estimate via soil testing.

Keywords: Rye green manure, soil physical and chemical characteristics, dryland condition

The Effect of Nitrogen on Seed and Oil Yield of Seven Sesame Genotypes in Isfahan

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Nitrogen is a major part of plant nutrition in agricultural ecosystems. It greatly affects the yield of crops, specially "oilseed crops" such as sesame. In order to study the effect of nitrogen and genotype on the seed and oil yield of sesame; an experiment was laid out in split plots based on randomized complete block design with three replications and 35 plants m^{-2} at the Lavark Research Farm, Isfahan University of Technology, in 2006. Three nitrogen levels (50, 100 and 150 Kg N ha^{-1}) and seven sesame genotypes (Local Ardestan, Nonbracching Naz, Branching Naz, Yekta, Oltan, Darab 14 and Varamin 2822) were used in main and sub plots, respectively. With an enhancement in nitrogen application to at least 150 kg N ha^{-1}, despite a decrease in oil content, the seed and oil yield increased ($P \leq 0.01$) averaged over genotypes. Since, Yekta and Oltan outyielded the rest of others, therefore, the latter genotypes with application of at least 150 kg N ha^{-1} could be recommended for sesame production in Isfahan.

Keywords: *Sesamum indicum* L., yield, oil, nitrogen

Effects of Some Agro-industrial Residues on Soil Fertility, Yield and Quality of Potato

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In this study, the 9 combinations of production residues of some agro-industries, urban wastes and mineral fertilizers were applied potatoes (*Solanum tuberosum* L.) in a field experiment and the effect of these combinations on soil characteristics, yield and some quality parameters of tubers (size distribution, number, weight, dry matter, reduced sugar, starch, protein and L-ascorbic acids contents) were determined. The applications affected soil pH, $CaCO_3$ and organic matter % significantly. Total N, available P and K levels of soils indicated significant ($p<0.01$) differences between the applications. By wastes application more N than mineral N application and available P equal to mineral P application joined to soil. Available K content of "Wastes K+Mineral NP" plots was highest and found nearly two times higher than the amount of "Control". Sodium content increased in some quantities in almost all plots because of mainly used soapstock. Some wastes increased Cu content of soil slightly. The content of available Zn, Mn of soil differed significantly ($p<0.05$) among the applications. Generally Zn was found slightly high if soapstock, prina and blood were used alone or in combination. In leaves, sufficient levels were not obtained in respect to N, P and K content in all applications. Applications caused no statistical differences in leaf N level. Between P content of leaves of "Control" and other applications significant differences ($p<0.05$) were observed although no important difference was registered between "Mineral fertilizer" and "Wastes" applications. Potassium and Na contents of leaves showed significant ($p<0.05$) variances among the applications. Manganese was statistically higher in leaves of some combinations. Nitrogen, P and Mn contents of tubers differed significantly between the applications. Phosphorus, K, Mg and Cu levels were found sufficient, Fe, Zn and Mn low in tubers. Plant height differed significantly ($p<0.05$) between the combinations. The tallest plants were at combinations where wastes N and P were applied. Tuber yield was statistically highest ($p<0.01$) at "Wastes P +Mineral NK" combination. Reduced sugar and protein content of tuber were affected significantly ($p<0.01$, $p<0.05$) from the applications. Some significant correlations were found between soil, leaf and tubers. According to the results, it was concluded that particularly agro-industrial wastes could be used for plant growth on condition that prior their content is investigated.

Keywords: Agro-Industrial Residues, Soil Fertility, Yield, Quality, Potato

Influence of Tomato-Paprika Paste Residues on Soil Properties and Potato Growth

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The residues of tomato paste factories "green tomato", "cold processed tomato", "paprika wastes" and "ashes of milk processing" and "urban wastes" were used as soil amendment in a field experiment for potato (*Solanum tuberosum* L.) growth. These residues were combined with mineral fertilizer (N,P,K) and applicated as 7 different treatment including control. Different wastes applications didn't affect some physical and chemical properties, macro- and micronutrients of soils significantly before the vegetation and any pollution risk was observed in with wastes applicated soils. From the beginning to the end of the vegetation in all of the treatments K and B contents of soils decreased and Na increased. Nitrogen content of leaves was found under the normal, whereas P, K, Ca and Mg were at normal levels. Nitrogen, P and Mg contents of leaves were affected significantly from the applications. Iron contents of leaves was above sufficient, Cu and Mn were sufficient and Zn an B were below sufficient levels. Among the heavy metals of leaves only Cr content was slightly above the normal but quite under the critical value. Different applications caused significantly differences in only Cd content of leaves where N and K riched green tomato and paprika wastes had diminishing effect on Cd. In fresh weight basis of tubers with the exception of Fe, Mn, Cd and Pb all the other elements significantly differed between the treatments. In this respect "Wastes K+Mineral NP" was the most effective application. Paprika mark wastes as K and N sources with addition of mineral N and P in this treatment increased many elements in the tubers to the highest level. Iron, Zn, Cu, Mn, B, Cd and Cr contents of tubers were under the given normal values. In all the experimented tubers (including control) in dry weight basis, Co was found quite higher than the given normal values. All of investigated tubers (including control) indicated higher values then most of given Pb values. Tuber yield was affected significantly from the applications. Maximum yield was obtained in the "MinK+Wastes N,P" treatment. In all treatments, tubers with middle size has the highest percentage and statisticall difference was observed among the tubers with >55 mm diameter and "Only Wastes" was the most effective treatment. Tuber weight was positively correlated with starch content. Significant differences were observed between the treatments in respect of dry matter, reduced sugar and protein % of tubers. "Wastes K+Mineral N,P" has dominating effect on all of the quality parameters. Potassium and Ca contents of soil before vegetation have positively affected starch content of tubers. Nitrogen, K, B levels of tubers seem to be effective on L-ascorbic acid synthesis of tubers.

Keywords: Tomato-Paprika residues, Soil properties, Macro-Micronutrients, Heavy metals, Potato, Quality

Residual Effect of Agroindustrial Wastes on Soil Properties and Maize Nutrition

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In this study the residual effect of some agroindustrial wastes used previously for potato growth was investigated on some soil characteristics and mais nutrition. The experiment was consisted of 9 treatments in which agroindustrial wastes have been applied alone or in combination with chemical fertilizer. In all treatments pH value of soil increased whereas organic matter content decreased during the mais growth. Total N and available K were generally low in all treatments and statistically higher almost in wastes applicated soils. Phosphorus status of soils was good and maximum in "Only Wastes" and "Min.P+Wastes NK" treatments. In soil of "Only Wastes" treatment N, P, K and Ca contents decreased significantly as accompanied its organic matter during the mais growth. "Only wastes" in soil served as a source of nutrients and used for almost maximum mais growth parameter. Zinc and Mn were generally low in soils and no pollution risk arose in respect to heavy metals. Nitrogen, K, Zn and Mn concentrations of leaves were under the sufficient levels whereas P and Cu were sufficient. The ratio of P/Zn in leaves was 480 mg kg-1. From the heavy metals only Cr content of leaves was above the normal but under the critical value. Lead and Cr content in plant decreased with chelating effect of increasing organic matter. Except N, corn reacted poorly in respect to macro- micronutrients and some heavy metals among the treatments. Nitrogen and protein content in corn seems to be diluted in "Only Wastes" treatment. Phosphorus as wastes applicated treatments yielded significantly highest and P in corn was the macronutrient which had increasing effect on some yield determined parameter. As a consequence; N, K and Zn supplementations are recommended in case of use of this kind of agroindustrial wastes for accurate mais nutrition as a second crop if these elements are insufficient in soil.

Keywords: Agroindustrial Wastes, Residual Effect, Soil Fertility, Mais Nutrition, Quality

Crop Residues Reuse to Improve Agricultural Soil Quality

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From the 70´s the irrigated agricultural surface has increased in the province of Murcia, SE Spain, specially in the agricultural district ?Comarca del Campo de Cartagena?. As consequence, the amount of crop residues produced has considerably increased. At the present, harvest residues constitute a very serious environmental problem because in most cases are dehydraited on the land and burned lately with negative consequences for the environment. As result, it?s essential to find a suitable residue management which is able to recycle them, solving a very serious environmental problem in relation to its final disposal. This research is aimed to reuse crop residues as an organic fertilizer in order to recycle nutrients and improve soil properties. In this way, we will evaluate the influence of recycling plant residues on the quality of the soil-plant system. At the same time we will be able to reduce the use of chemical fertilizers. The plant waste comes from pepper crops because is representative -more than 90% of the surface occupied by greenhouses in this Agrarian District are of pepper-. In the experiment we are going to compare two methods of fertilization, on the one hand, conventional chemical fertilization used by farmers and, in the other hand, organic amendments with crop residues. For both cases the plots are divided in subplots of 5 x 5 meters in which we will test to different doses of nitrogen (triplicate), to establish the most indicated dose to reduce the nutrients leaching without affect the production. Soil samples will be taken at two depths in order to know the evolution of both physical and chemical parameters such us organic matter, nitrogen, phosphorus, available cations and metals, etc.; plant samples at the end of the cycle to measure productivity parameters, will be also collected.

Keywords: pepper residues, organic fertiliser, soil properties

Effect of Different Fertilizers on Seed Yield and Oil Concentration of Rapeseed(*Brassica napus* L.) in Central Region of Iran

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Rapeseed (*Brassica napus* L.) is one of the important oilseed crops and applying fertilizers may increase seed yield and seed oil concentration of the crop. An experiment was carried out at the Research Farm of Isfahan University of Technology in the central region of Iran to investigate the effect of N, P, K, Fe, Zn and Mn on seed yield and oil concentration of two rapeseed cultivars, Zarfam and Ocapi. The results showed that compared to the control treatment (with seed yield of 1725 kg/ha), application of N, NPK and NPK+Fe increased seed yield by 13, 7 and 43%, respectively. Application of N significantly increased seed oil concentration in both cultivars, but K and NP fertilizers significantly reduced seed oil concentration in Zarfam. Treatments of N, NPK and NPK+Fe had more effects than the others on both seed oil concentration and oil yield and the means of these traits for control, N, NPK and NPK+Fe was 39.7, 41.7, 39.4 and 39.8%, and 681, 816, 730 and 983 kg/ha, respectively. The significant interaction effects between fertilizer treatments and cultivars showed that application of K and NP significantly reduced seed oil concentration in Zarfam, but their effects on seed oil concentration of Ocapi were not significant. Application of Mn had no significant effect on seed yield and seed oil concentration; however applying Zn significantly reduced seed oil concentration only in Ocapi cultivar (8.3%). The results also showed that the variation of seed and oil yield was mainly due to the variation for number of pods per plant and seed yield, respectively. In conclusion, it seems that in soil and climatic conditions like this experiment, N and Fe fertilizers can increase oil yield in rapeseed.

Keywords: rapeseed, oil plant, fertilization

Impact of Pb Pollution on Three Plant Species

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Plumb (Pb) is considered as a pollutant of air, soil and water, which leaves adverse impacts on all forms of life, including plants. Some reports are indicative of high levels of the latter heavy metal in some crop and vegetable plants grown in the vicinity of Tehran and Isfahan, both major industrial cities in Iran. Therefore, an indoor experiment was conducted at the College of Agriculture, Isfahan University of Technology, aiming at studying the response of lettuce, cabbage and safflower plants to varying levels of $Pb(NO_3)_2$ in a hydroponic nutrient solution. In addition to growth characteristics of the plants, Pb content of their shoot and root were measured under varying levels of Pb pollution. Plant height, leaf area and chlorophyll content were not significantly affected by increased levels of $Pb(NO_3)_2$. Lead content of plant shoot and root increased significantly with increased levels of $Pb(NO_3)_2$. It was concluded that while Pb contamination may leave no detectable impacts on plant growth of the latter three species, it leads to a considerable accumulation of Pb at shoot and root, particularly in lettuce. Therefore, lettuce could, potentially, be employed for phytoremediation of Pb-contaminated soils.

Keywords: Pb pollution, plant growth, Pb accumulation

Effects of Olive Oil Waste Water (Mills) on Macro Nutrient Contents of Maize (*Zea mays* L.)

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In this study the impacts of various olive oil waste water (0, 5, 15, 20, 25, 30 g/kg) and calcium (0, 2.5 % and 5.0%) doses on the soil fertility and the development of corn were evaluated. The pioneer 31G98 type of maize was chosen as a plant produced in the region. Physical (pH, EC, organic matter, dry matter) and chemical (N, P, K, Ca, Mg, Na) analyses were carried out on the samples of leaves and soil taken after the experiments. In the study statistically significant relationships were obtained in terms of the doses of olive oil waste water, lime, and waste water+lime in the evaluation of the results of soil and plant analyses. After the treatment of waste water lime doses, the total salt %, and organic material % of the soils increased. The impact of both waste water and lime treatment on Ca levels were obtained at 15-20 g/kg dose, and 2.5 % lime dose. In terms of plant nutrients ingredients, increasing waste water doses increased the K level at 2.5 % lime dose, its highest level was observed at 5.0 %, 20 g/kg doses. In addition, application of 15-20 g kg-1 olive oil waste water caused positive effects on plant nutrient contents (N, P, K) of maize.

Keywords: vegetation water, olive waste, plant nutrition

A Study on the Differential Response of Malting Barley Genotypes to Boron Toxicity

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A field experiment was carried out to study the differential response of eight malting barley genotypes in Aydin, Turkey. Genotypes were grown with and without the application of 40 kg B ha-1. Total dry matter yield, grain yield, and boron concentration of roots, stems, leaves and ears were determined. Boron application resulted in toxicity symptoms at the peduncle leaves and reduced total dry matter and grain yield as 12.2% and 30.5%. Line 7 gave both the lowest yield reduction and toxicity reading score. Boron tolerance could be attributed to the lower toxicity symptoms score of leaf blade and lower root B concentration. In soils both with and without added boron, boron concentrations from the lowest to the highest were determined as ear, stem root and leaf, respectively. When boron was not added to the soils, boron concentration of root, stem, leaf and ear were found not to be significant differences. When boron was added to the soils, boron concentration of root, stem and leaf were found to be different from each

Keywords: Boron, malting barley, genotypes, tolerance

Effect of Boron Applications on B Concentrations in Leaves, Stem and Roots of Cotton Cultivars

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This research has been carried out at Adnan Menderes University the Faculty of Agriculture Application Greenhouse in 2006. The reactions of cotton varieties, grown in a mixture of sand and perlite medium, were investigated in point of boron (B) doses. The experiment was conducted with four boron doses (0.5, 7.5, 15, 22.5 mg B L-1) and eight cultivars (Barut 2005, Gossipolsüz Nazilli, Gürel Bey, Nazilli 143, Nazilli 342, Nazilli 39, Nazilli-503, STN 8A) in factorial experiment design. Number of damaged leaf from boron toxicity, root, stem and leaf boron concentrations increased by boron application doses while fresh weight, dry weight and leaf numbers per plant decreased. In point of yield relations on boron doses, Gürel Bey and Gossipolsüz Nazilli cultivars were the most tolerant and Nazilli 39 cultivar was the most sensitive against boron toxicity.

Keywords: *G. hirsutum* L, cultivars, leaf, stem, root, boron concentration

Effects of Organomineral, Mineral and Farmyard Manures on the Yield and Quality of Olive Trees (*Olea europaea*)

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The project was carried out in the trees of ?Domat? olive variety in full production period which was planted in Kemalpa?a Research and Production Station of Olive Research Institute. The trees which were used in the research were irrigated by drip irrigation method. In the research, the effects of the different doses (2 kg/tree and 3 kg/tree) of mineral fertilizer, mineral fertilizer + farmyard manure and organomineral fertilizer according to control plot (nonfertilizer) on yield, quality and the nutrition of olive trees were examined. The research was carried on for five years and years were effective on the yield of the parcels that received fertilizer according to control plot in the result of the obtained datas. In the fertilizer application, the highest yield was obtained by organomineral fertilizer application. The application of mineral fertilizer+farmyard manure increased the yield only compared to that of mineral fertilizer treatment. In the research, the relationships with the fertilization were determined by analyses of plant nutrients in soil, leaf and fruit samples

Keywords: Fertilizer, leonardite, plant nutrients, economic analysis.

Ammonium and Nitrate Status of the First Crop Corn Fields at Cukurova Region

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The nitrogen (N) compounds ammonium (NH4) and nitrate (NO3) are the available forms that plants need in large quantities. Their existence in the soil are limited, and concentrations are kept low due to the losses by leaching and microbial consumptions. Sustainability of plant available nitrogen forms in soil profile is important for plant growth and crop production. In this research, our main objective was to evaluate mineral nitrogen status of first crop corn soils and first crop corn plants in Akarsu Irrigation District of Cukurova Region in 2007. Soil samples prior to sowing and after harvest were taken from 0-30, 30-60 and 60-90 cm soil depths, and analyzed for ammonium and nitrate concentrations. Plant samples were also taken during harvest, and analyzed for N content for determination of N uptake. There was considerable amount of ammonium and nitrate in the soil profile during preplanting and postharvest. Since the soils were mostly heavy texture, there is tendency to have ammonium in the soil solution. However, ammonium concentration was far below the nitrate concentration thgroughout the profile. Plant nitrogen uptake was in the irrigation dictrict was very close to the amount that was applied by the local farmers. The results indicated that soil mineral nitrogen level is an important criteria for fertilization practices, especially the preplant values need to be considered to decrease the amount of N fertilizer that will be applied.

Notes :

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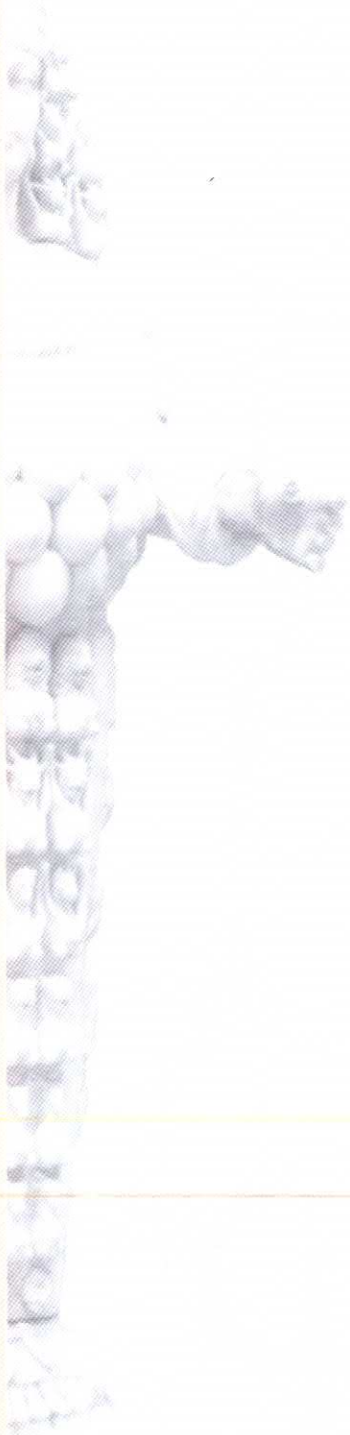

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STRESS ENVIRONMENT

Modeling Leaf Production and Senescence in Chickpea

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Quantitative information regarding leaf area development in chickpea (*Cicer arietinum* L.) is scarce. Data from four field experiments with a range of treatments including genotype, sowing date and plant density across 4 location-season combinations were analyzed to quantify main effects of temperature, photoperiod and plant population density on plant leaf area in chickpea. All experiments were conducted under well-watered conditions. Maximum rate of main stem node development was 0.72 nodes d^{-1}. Cardinal temperatures for node appearance were found as 6.0, 22.2 and 31.0 oC for base, optimum and ceiling temperatures, respectively. Plant density had no effect on cardinal temperatures for leaf appearance and phyllochron. Leaf senescence on the main stem started when the main stem had about 12 nodes and proceeded at a rate of 1.67% per each day increase in physiological day (a day with non-limiting temperature and photoperiod). Leaf production per plant versus main stem node number occurred in two phases; phase 1 when plant leaf number increased with a slower and density-independent rate (3 leaves per node), and phase 2 with a higher and density-dependent rate of leaf production (8-15 leaves per node). A close relationship was found between the fraction of senesced leaves per plant and the same fraction on the main stem. the average leaf size per plant increased from 4 cm^2 when there were 10 nodes on the main stem and stabilized at 10.8 cm^2 when there were 21 nodes on the main stem. Plant density and sowing date did not affect leaf size. Plant leaf area was also predictable directly from main stem node number. the relationships found in this study can be used in simulation models of chickpea.

Keywords: Leaf area development; Leaf senescence; Node appearance; Temperature; Model.

Allelopathic Effect of Different Part of Bigweed Extracts on Seed Germination and Plantlet Growth of Maize and Bean

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In field condition weeds attack is one of the most important yield loss. As weeds comprise solely 1 % of plant species, they cause very big loss in yield. Allelopathic interaction also can cause change in competition consequences and have majour role in influencing the agroecological productivity, so that in this survey also observed, Amaranthus rethroflexus water extracts have significant decreasing effect in traits surveyd. Analysis of variance of traits intreatment of maize seed with extracts showed significant effect on 1% level. Also these differences in 1% level were observed in seedling growth, but not plumule. Mean comparision also showedv differences between treatments, so that max germination percentage get in control by 55%, and 42% decreses of germination percentage in shoot extract of this weed in 7th day were obvios. In bean max germination in control obtained in control. Root and shoot extracts of bigweed caused 12% decreses in germination.

Keywords: Allelopathic, Germination, Maize, Bean.

The Ameliorative Effect of Saline or / Sodic Water on Maize (*Zea mays* L.) Production

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A pot experiment was conducted in green house to evaluate the performance of two maize genotypes using saline or / sodic water with and with out amendments. there were eight treatments T1 (control with EC 1.07 dS m-1, SAR 1.63, and RSC 0 me L^{-1}), T2 (EC 2.4 dS m^{-1}, SAR 16 (mmol L^{-1})1/2, and RSC 2.25 meL^{-1}), T3 (EC 3.6 dS m^{-1}, SAR 24 (mmol L^{-1})1/2, and RSC 4.5 meL^{-1}), T4 (T2+ Gypsum on irrigation water basis), T5 (T3+ Gypsum on irrigation water basis),T6 (T1+ FYM @ 20 Mg ha^{-1}),T7 (T2+FYM @ 20 Mg ha^{-1}),T8 (T3+ FYM @ 20 Mg ha^{-1}). Saline or/ sodic water were prepared with the help of quadratic equation and recommended doses of NPK fertilizers were used. Chlorophyll content was recorded after 40 days of sowing and fully expanded younger leaf were collected and stored in separate polypropylene tubes for sap extraction. the experimental results showed that chlorophyll content, Leaf area plant-1, plant height, fresh weight of plant, dry weight of plant of all genotypes decreased significantly with increasing levels of saline or /sodic water but this decrease was minimum when gypsum and FYM was applied. Na+ concentration of all genotypes increased significantly and decreased with gypsum and FYM application. Potassium and K+: Na+ ratio of all genotypes decreased significantly with increasing levels of saline or / sodic water but increased when gypsum and FYM was applied. ECe, SAR and pHs in soils after harvesting of crop increased also significantly. The application of FYM and gypsum proved to much helpful in improving soil quality and crop productivity.

Keywords: maize, amelioration, saline water, sodic water

Path Analysis of Grain Yield with its Components in Durum Wheat under Drought Stress

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Path analysis of grain yield with its components in durum wheat under drought stress Abstract This experiment was conducted in order to study the path analysis of grain yield with its components in durum wheat under potential and drought stress condition during 2005-2006 cropping season in Agriculture Research Station of Tabriz Islamic Azad University. 49 durum wheat line (6 line from Iran and 43line from other fount) was used for this purpose. Two separate simple lattic designs (7×7) with two replications were conducted. In one experiment, the plants were commonly irrigated until physiological but in another experiment drought stress imposed in four different stages including; tillering, stem elongation, anthesis and grain filling. Correlations among traits after combining two experiments were calculated by SPSS softword. Harvest index (r =0.849**), plant height (r =0.695**), and number of tiller (r =0.689**) had high correlation with grain yield. Back ward regressions was used for regressing grain yield on its components. Number of seeds per spike (0.405), number of tillers per plant (0.393) and peduncle length (0.337) had the highest direct positive effects on grain yield. Path analysis for 1000 seed weight, number of tillers per plant and number of seeds per spike showed that plant height (0.452), length of spike (0.857), days to flowering (0.345) were the most effective components of treaits, respectively. Therefore, traits such as number of seeds per spike, spike length and 1000 seed weight could be used as suitable indices in irrigatied and dry farming conditions for obtaing durum wheat genotypes with high yield.

Keywords: Correlation, Drought stress, Durum wheat, Path analysis.

Poor Quality Water and Sustainability of Wheat Maize Production on Different Textured Soils

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To evaluate the effect of brackish water with and with out gypsum and FYM, a lysimeter experiments was conducted for two years on maize-wheat crop rotation in three different textures i.e., sandy loam, clay loam and clay. Two wheat genotypes (SARC-1 and 8670) and two maize (S-2002 and Akbar) genotypes were selected from the solution culture screening experiment before planting them in lysimeter. the levels of brackish water were (T1=Control, T2= EC 10 dS m^{-1}, SAR 20, T3 =EC 10dS m^{-1}, SAR 20, RSC 5.4 me L^{-1}, T4 =T3+gypsum @ GRiw and T5 =T3 + FYM at 25 Mg ha^{-1}). The maximum reduction in plant biomass was observed at high at T3 (EC 10 dSm^{-1}, SAR 20, RSC 5.4 me L^{-1}) level while gypsum (according to gypsum water requirement) and FYM improved the growth and ionic composition. On the basis of growth parameters and ionic distribution in the leaves, it can be concluded that wheat genotype SARC-1 performed better than 8670 in wheat, while maize genotype S-2002 performed better than Akbar. The comparison of textures indicated that sandy loam was effected less by the application of brackish water compared to clay and clay loam. The soil analysis (EC and SAR) indicated that the accumulation of salts was much faster in clay and clay loam texture compare to the sandy loam. On the basis of these findings, regression lines and equations were developed to assess the probable duration of brackish water application with the known concentration of salts in irrigation water for maize -wheat crops on different textures.

Keywords: wheat, poor quality water, soil texture

Improving the Production of Wheat Crop in Salt Affected Soils of Pakistan By Using Biosaline Approaches

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Salinity is much hazardous to plant growth and soil quality; there is drastic increase in the saline areas in the world. To overcome these situations, there is dire need to develop salt tolerant genotypes through rapid techniques. In view of theses objectives, a comprehensive study was planned to identify the salt tolerant genotypes through green house as well as field trials. Firstly a solution culture experiment was conducted in Hoagland solution with two levels of salinity (100 mol $m^{-3}$and 200 mol m^{-3}) for mass screening of available wheat germplasms for salt affected areas. The salt tolerance of the genotypes was evaluated on the basis of shoot /root fresh weights and their ionic contents (Na, K, K: Na) in leaf samples. Five genotypes were selected from this screening and were tested in three soils having salinity EC 4-8 dS m^{-1}, EC 8-15 dS m^{-1} and EC >15 dSm^{-1} for two successive years. At the maturity crop was harvested, growth parameters and grain yield was recorded. The results indicated that at low saline conditions, the grain yield of Inqulab was relatively better than the SARC genotypes but as the salinity increases, the SARC-1 and SARC-5 produced the more grain yield in moderately to highly saline conditions.

Keywords: wheat, salt affected soils, biosaline agriculture

The Effects of Water Stress at Different Phonological Stage on Growth Rate of Wheat

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In order to study the effects of water stress on growth parameter of wheat at different phonological stages, this experiment was conducted as split plot design with four replications. Main plot were include: jointing stage, anthesis and seed filling period. Sub plot were: Irrigation at field capacity, 75% field capacity, 50% field capacity, 25% field capacity. The results showed the time of water regime application on grain yield was significant. Also with Increase in water stress the amount of grain yield decreased. The greatest and lower CGR obtained from stress condition at jointing stage and grain filling stage respectively. The results also showed that the value of RGR decreased through the growing season.

Keywords: water stress, phenology, wheat, growth rate

Tolerance of Five Azarbaijan Alfalfa Ecotypes to Salt

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A major limitation to crop production throughout much of the world is soil salinity, which is increased by irrigation and fertilization. One way to better utilize saline soils is to grow salt tolerant crops. Five cultivars of alfalfa were subjected to evaluate phenotypic variation for salt tolerance. A completely randomized design (CRD) with 5*4 factorial arrangements and three replications were used. The first factor was five alfalfa cultivars (Syah-Roud, Gara-Yonjeh, Hasht-Roud, Khor-Khor and Bash-Kand) and second was three levels of salt and a control. Salt levels were 3.07, 10, 20 and 30 mm mohs (Ec), which were achieved by adding 0, 1.062, 2.431 and 5.07 g/kg NaCl to pots soil. Data analysis indicated that the response was significantly different among cultivars as well as NaCl levels. Bash-Kand had the highest; Syah-Roud and Gara-Yonjeh cultivars had the lowest yield reduction percentage, respectively. In general, Syah-Roud and Gara-Yonjeh had the highest tolerant to salinity.

Keywords: Alfalfa, Salinity, Tolerance, Variation

Comparative Physiological And Growth Responses Of Tomato And Pepper Plants To Fertilizer Induced Salinity And Salt Stress Under Greenhouse Conditions

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Fertilizer induced salinity adversely affects plant growth through its ionic and osmotic effects as in ordinary salinity caused by toxic ions (Na, Cl, etc.). In this study, to determine the ionic and osmotic effects of fertilizer induced salinity and NaCl salinity on growth, ascorbic acid, proline and hydrogen peroxide (H2O2) accumulation and stomatal resistance (SR), relative water content (RWC), malondialdehyde (MDA) contents of tomato and pepper plants subjected to different treatments (i.e. control, 40 mM NaCl salinity and excess fertilizer salinity) were investigated under greenhouse condition. The results of this study indicated that similar to NaCl salinity, fertilizer induced salinity significantly reduced the fresh and dry weights of tomato and pepper plants. Relative water content of the plants was decreased by NaCl salinity. Both NaCl and fertilizer induced salinity caused significant increases in proline, MDA, ascorbic acid and H_2O_2 accumulation, and stomatal resistance of the plants. Salinity achieved by NaCl and fertilizer altered plant growth and plant physiological processes ionically and osmotically in a similar manner.

Keywords: ascorbic acid, malondialdehyde, proline, relative water content, H_2O_2, stomatal resistance

Uptake and Translocation of Phosphorus in Salt-Stressed Olive Plants

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Two olive (*Olea europaea* L.) cultivars (Barnea and Leccino) were grown in sand culture to study the effect of NaCl-induced salinity on uptake and translocation of P in olive plant. the plants were subjected to 3 levels of salinity as electrical conductivity of 4.0, 8.0 and 12 dS m^{-1}. the salinity levels were obtained by the addition of appropriate amounts of NaCl into the half-strength Hoagland's solution. The final solution contained 15.5 mg l^{-1} P. Tap water served as the nonsaline control. After plant sampling Na^+, Cl^- and P content of different plant parts were determined. Salinity inhibited P uptake by roots more than P transport from roots to leaves. Cultivars having different response to salinity showed no any distinction in terms of P uptake and translocation. Basically, the plants accumulated P in thin roots. However test plants translocated sufficient P to leaves.

Keywords: *Olea europaea*, salinity, phosphorus, sodium, chloride

Response of Cotton (*Gossypium hirsutum* L.) Genotypes To Salt Stress

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The response of 15 cotton (*Gossypium hirsutum* L.) genotypes to salt stress was studied in this research in terms of their biomass production and reduction ratios under salt stress. The cotton varieties were grown at different salt concentrations (0, 125 and 250 mM NaCl) in completely randomized split-plot design with ten replications. Plant height (PH), stem diameter (SD), shoot fresh weight (SFW), shoot dry weight (SDW), leaf area (LA), and total dry weight (TDW) were determined to compare their relative performance at salinity. Significant genotypic variation occurred among 15 cotton genotypes for all investigated traits with increasing salt level in growing condition. The positive and significant correlation of SDW and TDW at both salt levels with SFW, SDW, and TDW values in non-stressed indicated that cotton genotypes with good vegetative growth without salt stress had also good vegetative growth under salt stress. Based on biomass production and reduction ratios of cotton genotypes in salt stress, it is concluded that Delta Opal, Golden West, and Deltapine 50 are salt sensitive, and Sahin-2000, Nazilli M 503, and TAM94L-25 are salt tolerant, and rest of the cotton genotypes are considered a moderately salt tolerant.

Keywords: Cotton (*Gossypium hirsutum* L.), salt stress, biomass production.

Effects of Calcium Nitrate and Humic Acid Applications on Growth and Yield Criteria of Pepper Seedling under Salt Stress

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This study was carried out in order to determine effects of calcium nitrate and humic acid applications on growth and yield criteria of pepper seedling under salt stress in a plant growth room of Horticultural Department in Yüzüncü Yil University. 1:1 ratio of garden soil:sand mixture was used as a plant growing media including 1.17 % NaCl, 90 ppm P_2O_5, 180 ppm K_2O and 180 ppm N. Experiment was conducted with four different treatments of humic acid (0, 1000, 2000 and 4000 ppm) and calcium nitrate (0, 50, 100 and 150 ppm) in a factorial design with tree replications. Applications of humic acid and calcium nitrate significantly affected yield criteria of pepper seedling at 1% level. 1000 and 2000 ppm humic acid and 50 and 100 ppm calcium nitrate applications increased fresh leaf weight, dry leaf weight, fresh root weight, dry root weight, steem diameter, root length and shoot length. The highest rate of both humic acid (4000 ppm) and calcium nitrate (150 ppm) decreased these yield criteria.

Keywords: Pepper seedling, salt stress, humic acid, calcium nitrate, yield criteria

Status of Some Chemical and Biochemical Parameters of *Salvia halophila hedge* (Lamiaceae)

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In arid and semiarid regions fresh water is a major limitation in agriculture. Crop production suffers from a steady increase in salinity in these areas. In order to maintain agricultural activity halophytic plants may be an economic alternative for conventional crops that are irrigated with fresh water. These plants can be used as cash crop (forage, fodder, fuel, madicine, chemicals, ornamentals etc.). Salvia (Lamiaceae) represents one of the most diverse genera of plants in Turkey with 88 species of which 51% are endemic. Salvia halophila is one of the important endemic halophytic members of Lamiaceae family and spreads normally on Central Anatolia especially around the Tuz (Salt) Lake. In this study it was aimed to determine growth, plant nutrient contens and status of some biochemical parameters of S. halophila grown under unstressed conditions. For this purpose, seeds of the test plant were collected from the nature (around Tuz Lake, Konya) and germinated in laboratory. The seedlings were grown in a controlled growth chamber using half strenght Hoagland solution under the following growth conditions for four months up to flowering stage: 16-h photoperiod; 65-75% relative humidity; day and night temperature of 25°C. After harvest, plant height, fresh and dry (%) weight, leaf number were determined. For nutrient analyses, plant organs were dried in a forced-air oven at 70oC for 72 hours and were ground in a stainless steel Wiley mill. Nitrogen, P, K, Ca, Mg, Na, Cl, Fe, Zn, Mn, total phenols, free radical scavenging activity on DPPH (2,2-diphenyl-1-picrylhydrazyl) and reducing power analyses (by the TCA method) were performed in the samples. According to the findings plant fresh weight values varied between 57.12 and 87.96 g, plant dry matter (%) between 8.80 and 10.80, leaf number between 23 and 37 per plant. Test plants accumulated 2.82 % N, 0.25 % P, 3.03 % K, 1.28 % Ca, 4.79 % Mg, 0.13 % Na, 1.19 % Cl, 222 mg kg-1 Fe, 59.6 mg kg-1 Zn and 40.5 mg kg-1 Mn in their leaves. Total phenols, free radical scavenging activity, reducing power were determined as 6.70 mg g-1 & 4.95 mg g-1, 45 % & 37 % and 44.6 % & 36.9 % for methanol and water extraction, respectively.

Keywords: *Salvia halophila*, growth, plant nutrient status, total phenolic components, DPPH, reducing activity

Effect of Planting Method, Sowing Time and Plant Density on Weed Dry Weight in Wheat (*Triticum aestivum*)

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In order to study of the effect of planting method, sowing time and plant density on weed dry weight in wheat, an experiment was conducted at agricultural research station and natural resource in Semnan. The experimental design was split plot factorial in Randomized Compelete Block Design (RCBD) with four replications. Results showed that weed dry weight is significantly affected by planting method, sowing time and plant density of wheat (Triticum aestivum). When sowing time delayed, weed dry weight was increased and when plant density was increased, weed dry weight decreased

Keywords: wheat, sowing time, plant density, weed dry weight

Study on Relations between Relative Water Content, Cell Membrane Stability and Duration of Growth Period with Grain Yield of Lentil Genotypes under Drought Stress and Non-Stress Condition

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Drought is one of the most important abiotic stresses that limit crop production in arid and semi-arid regions of the world. Lentil (*Lens culinaris* L.), a valuable legume crop, is produced mainly rain-fed in Iran. An experiment was conducted to study thy relationships between relative water content (RWC), cell membrane stability (CMS) and duration of growth period with grain yield of 11 advanced genotypes, varieties and a local genotype in the Ardabil Agriculture and Natural Resources research Station. Experimental design was a randomized complete block (RCB) three replicated under both drought stress and non-stressed conditions. Combined ANOVA showed significant differences among all the traits evaluated. Significant differences between characters reveal that there are high variations between the traits studied. Means for characters under study showed that grain yield, RWC, CMS and duration of growth period decreased in rain-fed condition but cell membrane leakage (electric conductivity) increased. Correlation coefficients showed strongly positive relation between grain yield with RWC ($r+=0.98^{**}$), strongly negative and non significant CMS ($r-=0.32^{ns}$) and strongly negative relation between grain yield and the days to maturity ($r-=0.78^{**}$). The results of experiment also revealed that there weren't a strong relation between yield and calculated attributes for tolerance to drought except RWC. Therefore, this character could be effective in evaluation of drought tolerance and identification of high yielding genotypes (ILL 6031, ILL 9893 and ILL 8095).

Keywords: relative water content, cell membrane stability, drought stress, grain yield, lentil

Evaluating the Effect of Crop Residue on Water Relations of Rainfed Chickpea in Maragheh, Iran, Using Simulation

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In no-till management, the crop residue is left on the soil surface. the effect of residue on water relations of soil, and subsequently that of plant are highly dependent on weather conditions. This study was aimed to evaluate the effect of maize residue on water relations of rainfed chickpea, using model CYRUS. Firstly, this model was recoded in Qbasic programming; then a simple sub-routine was added to include the effect of crop residue; finally, it was run for long-term daily weather data (1961-2004) of Maragheh (winter-dominant rainfall), Iran. It was revealed that, as compared to control, the residue treatment results in that the value of fraction transpiration soil water [FTSW: ranges from 0 (wilting point) to 1 (field capacity)] to be 2.72% higher during emergence (E) to flowering (R1), 10.02% higher for period R1 to pod initiation (R3), 7.59% higher for R3 to pod initiation (R5), 1.82% higher during R5 to pod yellowing (R7) and 1.32% more for R7 to maturity (R8). the probability of occurring FTSW lower than the threshold value (0.4) for residue (and for non-residue conditions) was 11% (21%) at E-R1, 53% (73%) at R1-R3, 62% (75%) at R3-R5, 86% (94%) at R5-R7, and 100% (100%) at R7-R8, respectively. During all developmental stages, the difference between residue and non-residue treatments appeared to be negligible for value of evapotranspiration, but considerable for the ratio of transpiration water to evaporative water [the ratio for residue (and for non-residue) was 1.16 (1.03), 8.15 (6.15), 8.74 (5.24), 7.39 (2.52), and 4.52 (1.54), at E-R1, R1-R3, R3-R5, R5-R7, and R7-R8, respectively].

Keywords: Crop residue; water relation; chickpea; simulation

Evaluation the Genetic Diversity of Advanced Lentil Genotypes under the Drought Stress and Non-Stress Conditions

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To evaluate genetic diversity of advanced lentil lines, screening quantitative indices of drought resistance, and identifying drought resistant lines, 11 varieties, one advanced lentil line and one selected genotype from Ardabil local mass in a randomized complete block design (RCBD) with 3 replications under both stress (rain-fed) and non-stress (irrigated) conditions in the Station of Agricultural and Natural Research of Ardabil. Based on yields obtained under irrigation (YP) and rain-fed (YS) conditions, several quantitative drought tolerance indices, like mean productivity (MP), tolerance index (TOL), geometric mean productivity (GMP), harmonic mean (HARM), stress susceptibility index (SSI) and stress tolerance index (STI) were used to evaluate the drought responses of these genotypes. Evaluation of quantitative indices of drought resistance of drought resistance and considering the means quantities and correlation coefficients between such indices, based on grain yield and under both rain-fedand and irrigated conditions indicated that indices (MP), (HARM), (GMP) and (STI) are considered as the best indices of Lentil genotypes response with stress intensity of (SI = 0.29) under drought stress. in 3-D graph, it has been showed that with consideriy these indices and grain yield and under rain-fedand and irrigated conditions, genotypes ILL 6031, ILL 9893 and ILL 8095 will be as the produced highest seed yields and drought resistant lines in groupe A. Multivariate biplot graph indicated that genotypes ILL 6031, ILL 9893 and ILL 8095 were located next to the vectors of drought resistantce indices, as: MP, HARM, GMP and STI. Distribution of the genotypes in the biplot space indicated the presence of genetic diversity among the lines for drought stress. Diagrams obtained from cluster analysis based on above indices showed that the farthest genetic distance in related to drought resistant lines with highest seed yields (ILL 6031, ILL 9893 and ILL 8095) and drought suscetible lines and lowest seed yields (ILL 8173 ، ILL 9832, ILL 1878 and ILL 8146).

Keywords: Lentil (Lens culinaris L.), Seed yield, Drought sensitivity and tolerance indices, Biplot, Cluster analysis.

Notes :

IRRIGATION and WATER QUALITY

Automated Irrigation Scheduling Application Of The North Dakota Agricultural Weather Network

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Irrigation water management has commonly been referred to as 50 percent science and 50 percent art. During the last 30 years, the development of agricultural weather networks and other technologies have made scientific irrigation scheduling much easier to apply and use. However, at the present time the most frequent complaints by irrigators about scientific irrigation scheduling is that it has a steep learning curve, takes too much time to gather all the bits of information and they just don't have the time during the growing season. To address these concerns a site-specific irrigation scheduling program, accessible through the North Dakota Agricultural Weather Network (NDAWN) website, was developed. The user selects their field from aerial photos using a GIS interface and then field specific soil parameters are accessed from the NRCS's digitized soil survey database. The user then selects the crop, planting date, emergence date and year. The user can then select one of the three nearest weather stations to be used to calculate crop water use estimates. The program automatically creates a soil water accounting sheet for each of the three major soils in the field (based on area). The site is fully operational and ready to use for the 2008 growing season. User acceptance will be measured in various ways such as email feedback, online surveys and analysis of web access statistics.

Keywords: irrigation scheduling, weather data, site specific, NDAWN, soil properties

Water Quality Assessment of the Kopal River (IRAN)

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The Kopal River in the Khozestan province, IRAN, the most important river on the plain and water capability for agriculture in this plain were provided from this river. It is planning to construct a reservoir on the river in the Haftgel area in order to supply the agriculture and drinking consumptions in that region. Therefore, the study on the water quality of this river is very important role in take any decision. In this paper the water quality parameters such as HCO_3^-، SO_4^{-2}، CL^-، K^+، Na^+، Mg^{+2}، Ca^{+2} and SO_4^{-2} are evaluated base on the sampled data which taken in the Hygrometry station of NUMBER3 from 1981-2006. In general, 162 series data are used. For assessment of the water the Vikoks diagram are used. Base on this criterion, the water of Kopal River has high harness and it is not suitable for dinking uses. Also the water is classified as C_4S_2، C_4S_3 and C_4S_4; therefore it is not suitable for the irrigation consumptions.

Keywords: water quality, irrigation, Kopal River

The Effects of Irrigation Water Salinity, Potassium Nitrate Fertilization, Proline Spraying and Leaching Fraction on the Growth and Chemical Composition of Corn Grown in Calcareous Soil

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Two pot experiments were conducted to study the effect of irrigation with saline water in relation to KNO_3 fertilization, proline spraying and leaching fraction application on the growth and Na+, K^+, Cl^-, NO_3^- and proline contents of corn (*Zea mays* L) plants grown on a nonsaline calcareous soil. The treatments included irrigation waters with different salinity levels (0.54, 3.36, 5.88 or 7.95 dS/m), three rates of KNO_3 (0, 4 and 8 g/pot) fertilizer and foliar application with three rates of proline (0, 100 and 200 mg/L). The first experiment was irrigated with the water to the field capacity with leaching fraction and the second without leaching fraction. The experimental design was a split plot with three replications. Also, the effect of these parameters on salt accumulation in soil was discussed. The results obtained showed that the dry weight of shoots was decreased as salinity of irrigation water increased. The highest decreases were attained with waters of 5.88 and 7.95 dS/m as compared with dry weight due to irrigation with 0.54 or 3.36 dS/m water salinity. The adverse effect of water salinity was reduced by KNO_3 fertilization, proline spraying and leaching fraction application. High salinity of water increased the shoot contents of Na^+, Cl^-, proline and decreased NO_3^- contents in plant with or without leaching fraction, but the values without leaching fraction were higher than those of without leaching fraction. Also, increasing the salinity of irrigation water decreased K content in shoot which was higher with leaching than without leaching. On the other hand, KNO_3 fertilization or proline spraying decreased Na^+, Cl^- contents and increased K^+ or NO_3^- contents in plant shoot and their values without leaching were higher than those with leaching. The EC values of soil were increased with both increasing salinity of irrigation water and with increasing KNO_3 fertilization. The decreased plant growth due to water salinity was partially offset by KNO_3 fertilization, proline spraying and leaching fraction application. Also, KNO3 Fertilization was more effective than proline for reducing the adverse effect of water salinity.

Keywords: irrigation, water salinity, potassium nitrate fertilization, proline spraying, leaching, calcareous soils, EC

Performance Benchmarking in Irrigation and Drainage Systems

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Due to the rapid growth in world population, increasing numbers of people especially those who are living in arid and semi-arid regions are suffering from shortage of water and food, and this is the driving force for improving irrigation and drainage systems' efficiency. As irrigated agriculture is a consumer for over 75% of world fresh water supplies, using the water allocated to the agricultural sector more efficient and then releasing the surplus of water for other sectors' use seems to be the only solution for coping with water scarcity. Irrigation and drainage infrastructure is the indispensable element of irrigated agriculture. The level of irrigation and drainage services maintained in the irrigation area is directly affecting the quantity of crop production. Improving irrigation system efficiency / performance in aspects of Management - Operation - Maintenance (MOM) tasks has become a major concern for stakeholders and system managers, but monitoring and evaluating the performance of irrigation systems by using performance indicators have been a major concern for the researchers in this area. The term "Irrigation system performance evaluation" refers to what extent the targets and objectives have been achieved. Benchmarking implies comparison either internally with previous performance and desired future targets, or externally against similar organizations, or organizations performing similar functions. The overall aim of benchmarking is to improve the performance of an organization as measured against its mission and objectives. This paper emphasizes on the concept of benchmarking and its applications in irrigation and drainage systems.

Keywords: Benchmarking, performance evaluation, irrigation and drainage systems

Effect of Different Water Stress on the Yield and Yield Components of Second Crop Corn in Semiarid Climate

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The response of second crop corn (*Zea mays* L.) to different irrigation treatments in a semi arid climate was carried out in the field during the 2003 and 2004 growing season. Water stress was created at different development stages: early vegetative, vegetative, before tasseling, after tasseling, milk stage and after milk in order to determine the effect of irrigation treatments on vegetative growth, grain yield and yield components of corn. The effect of water stress at any stage of development on plant height, dry matter accumulation, kernel weight, kernel number per ear, ear length and ear diameter were studied. A rainfed (non-irrigated) treatment and 9 deficit irrigation treatments were applied to the Pioneer 3394 corn hybrid on a loam soil with 3 replications. Water stress significantly affected the corn grain yield and yield components. The grain yield increased with irrigation water amount, and the highest average grain yield (11160 kg ha^{-1}) was obtained from the well irrigated treatment (K1). Seasonal evapotranspiration increased with increased amounts of irrigation water applied. The highest seasonal ET (average of 650 mm) was determined at the (K1) treatment. Water stress occurring during vegetative and tasselling stages reduced plant height. Total dry matter (DM) accumulation was accelerated after each irrigation application. Yield response factor (ky) value of 1.02 were determined based on averages of two years. Significant linear relations were found for grain yield and seasonal evapotranspiration (ET). It is concluded that well irrigated treatment (K1) could be used for the semiarid climatic conditions under no water shortage. In the case of more restricted irrigation, the limitation of irrigation water at the vegetative and tasselling stages should be avoided to maintain satisfactory growth.

Keywords: corn, water stress, growth stages, yield response factor (ky), Aegean region.

Determination of Crop Water Stress Index (CWSI) Of Second Crop Corn in a Semiarid Climate

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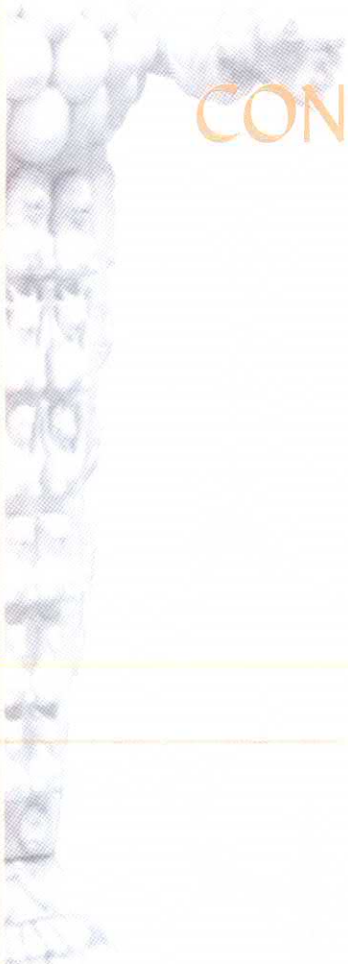
This study was carried out to determine the relationship between the canopy-air temperature differential and vapor pressure deficit (VPD), which can be used to quantify the crop water stress index (CWSI) under fully irrigated (100 %) and maximum water stress (0 %) conditions of furrow irrigated corn. The effects of five different irrigation levels (100, 70, 50, 30 and 0 % replenishment of soil water depleted from the 0.90 m soil profile depth) on corn yields and the resulting CWSI were investigated in the field during the 2003 and 2004 growing season. The highest yield and total water use were obtained under fully irrigated corn plots (100 % replenishment of soil water depleted). The trends in CWSI values were consistent with the soil water content induced by deficit irrigation. CWSI increased with increased soil water deficit. An average CWSI of 0.22 before irrigation time provided highest grain corn yield. The yield was directly correlated with seasonal mean CWSI values and the second order polynomial equation "Y = 59258CWSI2 -72051CWSI +24060"can be used to predict the yield potential of second crop corn under the semiarid climate.

Keywords: crop water stress index (CWSI), canopy temperature, lower baseline, corn

Notes :



CONSERVATION of BIODIVERSITY

Studying Of Structure-Functional Features of Halophytic Vegetation in Depend on Degree of Soil Salinity (The South Part of Central Siberia, Khakasia)

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Salinity problems are caused from the accumulation of soluble salts in the root zone. These excess salts reduce plant growth and vigor by altering water uptake and causing ion-specific toxicities or imbalances. Salinity plant communities play important role for agricultural practice of Khakasia. They are mainly used as feed lands, which change structure-functional properties due to human activity. The lake Kurinka locates in Altaiskii area of Khakasia. Type of salinity is sulfate-sodic. Common mineralization is in the range 72 - 108 g/l. Five plant communities Festuca – Elytrigia (P.1.), Artimisia – Puccinellia (P.2.), Suaeda (P.3.), Carex – herbs (P.4.), herbs – Phragmites (P.5.) were investigated (2004-2007) on the north-west coast in depend on degree of salinity soil. Each plant community locates on soils of different types with different degree of salinity, resulting in changing in structure. P.1. growth on medium loam meadow soil with low salinity level of 0.25%, pH varies from 7.7 to 8.9 along profile soil. Vertical stratification of this plant community had three layers. Artimisia – Puccinelia plant community was located also on meadow sandy loam saline soil with degree salinity changing from 0.6 to 1.8%. The increase of sulfate-ions up to 0.24% and appearance of chloride was indicated (the pH values changing from 8.3 to 8.5 along profile soil). Plant community structure also varies. P.2. has three layers such as P.1., but first layer is presented by dominant Puccinellia tenuissima. Subdominant Artemisia nitrosa occupies the second layer. P.3. has boundary status. It had specific second-layers structure due to enhance degree of salinity up to 3.58%. Soil type is medium meadow loam. The value of pH has maximum in near-surface zone (0 – 5 cm) and composes 9.2%. The first layer has height 25 cm and was presented by dominant species Suaeda linifolia and subdominant Suaeda corniculata. Carex – herbs (P.4.) and herbs – Phragmites (F.5.) plant communities was located near to coast and had great species diversity including mesohalophyte, halomesophyte and also swamp species. However, P.4. had two-layers vertical stratification and was associated with heavy loam meadow-swamp saline soil with degree of salinity 1.29%, pH values increases with depth from 8.2 to 8.7. Results of investigation can be used for diagnostics soil salinity at early stages.

Keywords: soil salinity, halophytic plant community, bioindication of salynity soil

Ni and Cd Uptake of Selected Native Species from the Soils High in Ni and Cd Contents

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Some soils are naturally inconvenient for growing of many plant species because of their high heavy metal content. Those toxic materials may originate from either parent material, or neighboring mining etc activities, or dumping of polluted wastes. For example, recently accelerating mining activities pose severe and irreversible damages on the environment. Turkey is located at a significant position from the viewpoint of plant genetic resources and genetic diversity which is the key for meeting various demands of worlds growing population. It is scientifically agreed that two of the Centers of Diversity and Centers of Origin; the Near Eastern and the Mediterranean overlap at Turkey. Turkey is the meeting ground of three phytogeographical regions; Euro-Siberian, Mediterranean and Irano-Turanian. Due to its great variety in geomorphology, topography and climate, Turkey has large diversity of habitats so it is very rich in plant species and endemism. Human impact on some areas has been much higher than the tolerable level by natural dynamics: Great amount of money is spent each year in attempts to remediate such polluted sites. Engineering methods for the remediation of contaminated sites include excavation, transport, soil washing, extraction, pumping and treating of contaminated water, addition of oxidants and so on. Another common clean up method, phytoremediation, involves use of plants to clean up contaminated sites. Huge genetic diversity of Turkey offers a variety of opportunities for plant based environmental cleaning. Several plant species, especially the ones that belong to Brassicaceae family and some others are known to be promising metal accumulators. The aim of this study was to identify the most promising plant species with high Ni and Cd uptake capacity. Another objective was to test those plant species around the areas that are high in Ni and Cd for remediation of the polluted soils. Initially, 19 mining sites, serpentine soils and their surroundings were surveyed for sampling the vegetation and soil. Plants and soil samples were analyzed for their Ni and Cd contents. Analyses results guided for collecting seeds of the plant species with potentially hyperaccumulator. Initial results of the study suggest that Cd contents of the samples were lower than the threshold for hyperaccumulation of Cd uptake (100 ppm)limit. Sinapis alba (10,05 ppm), Raphanus raphanistrum (8,27 ppm) and Cardaria draba subsp. draba (9,65 ppm) were the highest Cd accumulating species. Promising results were obtained for Ni uptake capacity. Following plant species were found to have potential for remediation of polluted soils with Cd and Ni: Alyssum masmeneanum (1.894-13.485 ppm), Alyssum caricum (5.647-13.778 ppm), Isatis pinnatiloba (1.441 ppm) and Thlaspi oxyceras (7.550 ppm) which are all significantly higher than the threshold (1.000 ppm). Those seeds will be planted again in highly polluted soils under controlled conditions and then the plants will be analyzed once again for their metal uptake capacities.

Keywords: Ni, Cd, soil pollution, phytoremediation

Soil, Vegetation and Vicunas in Apolobamba (Bolivia): Conservation of the Biodiversity

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High-grasslands in the Andes Mountain Range are the natural habitat of many species such as vicuna (*Vicugna vicugna*), endangered specie recognized by The World Conservation Union. These ecosystems are especially weak and suffer, in many cases, over-exploitation processes due to the cattle raising. The National Area of Apolobamba Integrated Management (ANMIN-A) is located to the northwest of Bolivia and there, government and indigenous people carry out a vicuna sustainable management programme in the aim of the conservation of this specie and its natural habitat. The objectives of this work were to study different zones with diverse vicuna and other domestic camelid populations in Apolobamba in order to evaluate: (i) soil conservation degree through the analysis of physical and chemical properties, (ii) the vegetation characterisation and (iii) the relationship soil-plant system. Some soil and plant samples were taken in different sampling plots according to vicuna and domestic camelid population densities. Moreover, it was taking to account geo-morphological and landscape kinds. Results showed differences between soil characterization and fertility qualities, both plant covert, vegetation species identification and palatability. The result discussion exhibited that the studied zones had unlike degradation processes, mainly, due to the vegetation modification. In conclusion, in Apolobamba there were differences in study zones with diverse vicuna and domestic camelid population densities, related to soil and vegetation conservation degree. On the other hand, some zones needed specially protection measures associated to the cattle raising impacts and the soil-plant system degradation.

Keywords: soil, vegetations, biodiversity

Effect of Seed Priming with Growth Promoting Rhizobacteria at Different Rhizosphere Condition on Growth Parameter of Maize

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In this experiment the effects of three rhizobacteria named Azotobacter and Azospirillum and pseudomonas at different rhizosphere condition on growth parameter were evaluated as a factorial experiment. Factors include:10 levels of rhizobacteria (include p1= *P. putida* strain R-168 p2=*P. flurescens* strain R-93 , P3= fluoresces strain 50090, P4= P.putida dsm291, p5= Azotobacter sp.Strain5, p6= *Azotobacter chroococcum* ,p7: Azospirillum sp.Strain21 ,p8= *Azospirillum lipoferum* and p9= *Azospirillum brasilense* and p10 = no inoculation. Other factor include soil condition(S1=natural soil condition and S2= sterile soil).The results showed the interaction of two factors on stem and total fresh weight also on total dry weight and leaf area were significant. The most effective PGPR strain in this study were *Azospirillum lipoferum* and *Azospirillum brasilense* .In this study observed that soil natural condition had the higher effects on growth parameter than soil sterile condition.

Keywords: PGPR, maize, growth parameter

The Study Of Chemical And İntegrated Weed Management On Dry Weight İn Sesame (Sesamum İndicum)

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In order to identify and study of chemical and integrated weed management on dry weight in *Sesamum indicum* an experiment was established as Randomized Complete Block Design with three replications. 11 treatments included herbicides and herbicides+ thinning and indicators (weed free and weed interference). Results showed that all of treatments decreased weed dry weight. Thinning decreased weed dry weight compeletly. Herbicides + thinning controlled weeds better than herbicides lonely. Alachlor and pendymethalin controlled weeds (monocotyledon and dicotyledon) dry weight better than other herbicides.

Keywords: weed, thinning, herbicides, sesame

Evaluations On Erzurum Province Wetlands For Biodiversity And Soil-Water Conservation

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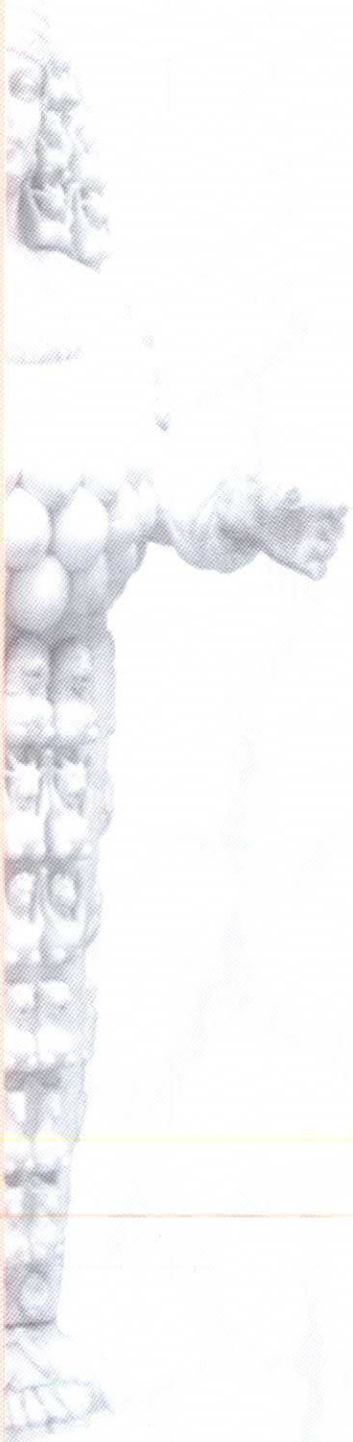
Wetlands have great importance for biodiversity and soil and water protection. These areas are expected and commonly accepted to help for solving problems related to climatical changes and water deficiency in global scale. The objective of this study was to define physical characteristics of Erzurum province wetlands. Using the ArcGIS-ArcMAP program, wetlands in Erzurum province were located on hydrographic map, and streams, rivers, temporary wetlands, lakes, dam lakes and all types of water surfaces in the study area were evaluated for biodiversity and soil-water conservation purposes.

Keywords: wetland, biodiversity, soil-water conservation

Notes :



SOIL MICROBIOLOGY and BIOCHEMISTRY

Natural Occurrence and Distribution of Soil Borne Entomopathogenic Fungi in Shahrood Region, Northeast of Iran

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Natural occurrence and distribution of soil borne entomopathogenic fungi in Shahrood region, northeast of Iran The study investigated the occurrence of soil borne entomopathogenic fungi (EPF) in potato, wheat, sugar beet, alfalfa fields and orchards. A total of 150 soil samples were collected and EPF were isolated using Galleria method. Soil pH was rages from 6.8 to 8.1 and soil texture was sandy, loam, sandy- loam, clay and sandy-loam-clay. Soil borne EPF occurred at 78% of soil samples from which 40% Beauveria bassiana, 27% Metarhizium anisopliae and 17% had both species. Occurrence and distribution of EPF was not significantly affected by pH and texture of soil samples. Although Shahrood region is located at dry climate but this study showed that its soil is rich of EPF. Fungal pathogens collected from this soil survey will serve as a source of potential biological control agents of soil borne pests.

Keywords: Entomopathogenic fungi, soil borne, Beauveria bassiana, Metarhizium anisopliae

The Effect of Soil Management Systems on Microbial Activity

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Soil microbial activity is an important indicator of soil fertility, quality and environmental factors. The changes in the environment factor will affect soil microbial activity in a short period of time. The objective of this study was to determine the variation in microbial activity under different management systems in two adjacent fields (native pasture and long-term cultivated wheat field) at Kazova, Tokat. In this study, some soil physical, chemical, and biological properties were measured. Soils in the both ecosystems have clay loam texture through the profile. Soil pH ranged from 7.7 to 8.3 and the cultivated land generally had greater soil pH than native pasture. Microbial activity was determined from March through October. Microbial activity varied through the growing season in the both ecosystems and the greater microbial activity was observed in October at the both ecosystems. Microbial activity slightly decreased at the deeper deeps. The relationship between soil water content and microbial activity was weak in the both ecosystems. This indicated that soil water content is not only a significant factor controlling microbial activity in native pasture and cultivated lands.

Keywords: microbial activity, Soil use, pasture, Long-term cultivation, Soil water

The Study of Azotobacter-Chroococum Inoculation on Yield and Post Harvest Quality of Wheat (*Triticum aestivum*)

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In order to evaluation of the effect of Azotobacter-chroococum on two varieties of wheat grown under field conditions, an experiment was carried out in Agricultural Research Station of Shahrood University of Technology during 2004-2006. Results showed that wheat yield was affected when cultivars inoculated. Inoculation resulted in improving post harvest seed germination and nitrogen content of the seed.

Keywords: Inoculation, wheat, yield, germination

The Effect of PGPR Inoculation on the Growth of Wheat

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The potentials of non-symbiotic plant growth-promoting rhizbacteria (pgpr) for stimulating plant growth have been extensively used during recent decades. This experiment was carried out in growth chamber to evaluate the effects of siderophore-producing Pseudomonads on the growth as well as Fe and Zn uptake of wheat. A randomized complete block design experiments was conducted using with Alborz genotype treated with either 7NSK2 strain as a siderophore positive (sid+) or with MPFM1 mutant strain of the same isolate as a siderophore negative (sid -) treatments with three replications. The potentials of these strains for auxin production and phosphate solubilizing activity were evaluated by standard methods. The results showed that inoculation with sid+ strain increased shoot dry weight as compared with the control (sterile condition) or with sid - strain. Likewise, the concentration of chlorophyll a in leaves of sid+ and sid - treatments were 1.27 and 0.41µg mg^{-1} of fresh weight, respectively and the concentration of chlorophyll b were measured to be 1.09 and 0.35 µg mg^{-1} of fresh weight respectively, indicating significantly more chlorophyll formation due to inoculation with sid+ as compared with sid -. The uptake of Fe by roots and its rate of translocation to the shoots were greater for the sid+ treated plants as compared with the sid - treated ones. The effect of microbial inoculation on shoot Zn was not significant, but increased the concentration of Zn on roots compared with control. The results suggested that the siderophores of Pseudomonads may involve on increasing bioavailability of iron and zinc for wheat.

Keywords: Plant Growth Promoting Rhizobacteria (PGPR), Wheat, Siderophore, Fluorescent Pseudomonads, Iron, Zinc

Effects of Soil Salinity on Arbuscular Mycorrhizal Colonization of Halophytes

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Arbuscular mycorrhizal (AM) fungi have been shown to increase plant salinity tolerance in many plant families. High levels of soil salinity can limit AM fungi colonization and its beneficial effects in saline conditions. In order to determine the effects of soil salinity on AM fungi colonization in halophytes, plants of semi-arid region of North-Eastern Iran were examined for their colonization in soils with different salinity levels. Roots of several halophytes were colonized and showed typical structure of AM fungi with different levels of colonization. *Haloxylon aphyllum, Kochia stellaris, Halocnemum strobilaceum, Seidlitzia rosmarinus and Salsola sp* of the Chenopodiaceae and Zygophyllum eurypterum and Peganum harmala of the Zygophyllaceae were found to be colonized by AM fungi. For some species the mycorrhizal status is reported for the first time. The results of this study showed that AM fungi colonization in halophytes in soil with high salinity level (16 dSm-1), but fungi colonization were inhibited by very high salinity (45 dSm-1). The lack of AM fungi colonization in halophytes in very high soil salinity conditions may was due to inability of AM fungi to survive such salinity conditions, which may limit the beneficial effects of AM fungi in halophytes.

Keywords: *Arbuscular mycorrhizal* fungi, salt tolerance, Turan Biosphere Reserve

The Effects of Sugar Factory Sludge on Plant Growth and *Vesicular arbuscular* (VA) Mycorrhizal Colonization in Chickpea (*Cicer arietinum*) And Barley (*Hordeum vulgare*)

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Sludge from sugar beet factory may be used in production of compound fertilizers as a calcium source, but because of very high pH value is known as a pollutant material in soil. The possible use of sugar beet factory sludge for agricultural purpose was investigated with chickpea (*Cicer arietinum*) and barley (*Hordeum vulgare*) in two greenhouse experiments. The sludge was air dried and sieved through a 2 mm mesh before application to a soil. Afterwards, the sludge was mixed with soil at a rate 0, 5, 10, 15 and 20 percent base on soil weight (W/W). After a growing period of three-months the plants were harvested, and growth and vesicular arbuscular (VA) mycorrhizal colonization were determined. The results of these experiments showed that plant growth significantly decreased with increasing the amount of carbonate sludge in both plants, where chickpea showed higher decrease than barley. Application of carbonate sludge (w/w) more than 10% to soil decreased plant growth. Totally the sludge decreased percentage of (VA) mycorrhizal colonization in both plant roots. The highest and the lowest levels of colonization were found at 0 and 20% of sludge in soil, respectively. Adding 20% of the sludge to soil decreased 52% of mycorrhizal colonization in barley, where the same amount of sludge decreased 45% of colonization in chickpea. Overall the results showed that application of more than 10% of sugar beet factory sludge to the soil decrease plant growth and VA fungi colonization, but different plants affected differently.

Keywords: Sugar factory sludge, *Vesicular arbuscular* fungi, *Cicer arietinum, Hordeum vulgare*

Evaluation of *Arbuscular mycorrhizal* Fungi Symbiosis of Tomato in Selected Soil Calcareous of North-West of Iran

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THE abundance and distribution of arbuscular mycorrhizal fungi (AMF) and their relations with soil properties were evaluated. At the flowering stage of tomato, forthy rhizosphere soil samples along with roots belonging to thirteen soil series were collected from Western Azarbaijan province located in north-west of Iran. The root samples and rhizosphere soil were analysed for the percentage of root length colonization (PRC) of AMF, spore number, certain physical and chemical properties of soil including soil texture, EC, pH, CaCO3, O.C, available K, P and Fe content. The results showed that the most spore number (552 per 10g dry soil) and the least spore number (60 per 10g dry soil) related to soil series of Chobtrash and Sarajogh, respectively. While the PRC of all samples was the less of 15 percent, the most it's value occurred in Chobtrash series. It can probably be due to high available P, clay content, EC or low potential of native fungi for root colonization. Cluster analysis of correlation coefficient matrice indicated that, the percentage of root colonization, soil pH, clay content, soil available P and percentage CaCO3 rather than soil salinity, K content and organic mater were closely related with spore number.

Keywords: arbuscular mycorrhiza; tomato; symbiosis; distribution

Effects Of Some Heavy Metals On Rhizobial Growth

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This study was made to investigate the effects of some heavy metals on rhizobial growing under the laboratory conditions. For this aim, heavy metals were additioned growing medium which is the yeast mannitol agar (YMA) solution. Fe, Ni, B, Mn, Zn, Co, Cd, Mo, Pb and Cu were used as heavy metal. Heavy metals were applied with normal and half concentration doses of Fe=10000; Ni=50; B=80; Mn=3000; Zn=80; Co=5; Cd=O.5; Mo=5; Pb=200, Cu=40 µgml-1 and half concentration. Rhizobium inoculation was made petri dish scattering in preparation of the yeast mannitol agar (YMA) solution and than was abandoned at 28°C for seven day incubation in the incubator. The end of incubation colony and cell number was counted using the direct number method. Its showed that; Fe, B, Zn, Co, Cd, Mo, Pb, and Cu had enhanced the growing colony of Rhizobium however, growing medium additioned Ni and Mn had restricted the growing colony of Rhizobium.

Keywords: Rhizobium, heavy metals, growth, metal tolerance

Effects Of Different Application Doses Of Sewage Sludge On Microbial Biomass And CO2 Production Of Soil And Earthworm Lumbricus Terrestris Cast

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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, CO_2 production, organic C and total N of soil and earthworm *Lumbricus terrestris* casts. Experimental design was randomized plot design with three replications. The moisture content in soil was maintained around 60 % of maximum water holding capacity by weighing the pots everyday. Changes in the microbiological properties and total C and N were determined in the soil and earthworm casts 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 microbial biomass C, CO_2 production, total organic C, and total N levels than the surrounding soils at all incubation periods and sewage sludge applications significantly ($P<0,001$). Increases in application doses of swage sludge caused increases in microbial biomass C and CO_2 production, significantly ($P<0,001$). It was determined that the microbial parameters of soil and earthworm casts were not significantly changed after the 45th and 60th days of the experiment.

Keywords: Sewage sludge, soil, earthworm cast, microbial biomass C, CO_2 production

Comparative Analysis Of Pseudomonas Population In Oil-Contaminated Soils In Serbia And Plant-Pathogen

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Pseudomonas are remarkable for their capacities to colonize almost all terrestrial and aquatic ecological niches. This genus includes species with functions of ecological, economic and health-related importance. Altought they are globally active in aerobic decomposition and biodegradation, Pseudomonas include species pathogenic for humans, domestic animals and cultivated plants. The aim of this study was identification of the members of the Pseudomonas species from oil-polluted soil, investigate their diversity and compare it to same phytopatpgenic strains isolated from host-plant niar marked site.. Isolates were described phenotypically according carbon assimilation, fluorescence on King B medium and susceptibility patterns against 6 different heavy metals. In addition, they were characterized genotypically using plasmid profile and fingerprints obtained with the (GTG) 5 primer. The high heterogeneity was observed within the collected Pseudomonas strains from oil- contaminated soils. Phenotyping and (GTG)5 pattern showed 4 major groups, and low similarity in comparation with plant-pathogens .

Keywords: Pseudomonas, polluted soil, plant pathogen, GTG fingerprinting

Indigenous Mycorhiza Potential in the Plan of Cukurova

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Mycorrhiza are commonly called vesicular arbuscular mycorrhizal (VAM) fungi form symbiotic associations with feeder roots of most flowering plants. The selected twenty four soil series' from different location, rhizosphere and non rhizosphere soil samples were collected from a depth of 0-25 cm top soils. Samples were selected with a divers agricultural management. Soil properties are not presented in hear. Soil sample were taken under the surface well cover vegetation area. Root colonization were determined on washed roots of rhizosphere soils were collected from field. Twenty four soil samples taken from widely distributed soil series in several area in Turkey, were examined. Major crops of the area are lentil andcereals (wheat, barley) together with natural vegetation Results obtained in the present experiment show that several soil series have diverse mycorrhizapopulations. Number of spores in these soils have been counted to ranged from 8 to 1080 spores/10 g dry soil. More spores were found under natural plant communities Whereas less was counted under bare soil. The Balcali soil under natural vegetation, has 1080 spore/10g soil. But in Begendik soil under bare soil conditions there was 8 spore/10 g soil. Since spores collected directly from a field, they have no clear taxonomical characteristics for identification. There is a strong link between plant species and number of spores. More spores were counted under natural vegetation, garlic and lentil stubble plantation.

Keywords: mycorhiza, rhizosphere,

Effect of Tilemsi Phosphate Rock-Solubilizing Microorganisms on Phosphorus Uptake and Yield of Field-Grown Wheat (*Triticum aestivum* L.) in Mali

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With the broad aim of biologically improving P uptake by wheat fertilized with Tilemsi phosphate rock (TPR), we investigated the effect of inoculation with TPR-solubilizing microorganisms isolated from Malian soils and with a commercial isolate of the arbuscular mycorrhizal (AM) fungus Glomus intraradices (Gi). AM root length colonization, and growth yield and P concentration of the cultivar Tetra of wheat were measured under field conditions in Mali. Experimental plots were established in Koygour (Diré) during the 2001-2002 cropping season. Inoculation treatments included two fungal isolates, Aspergillus awamori (C1) and Penicillium chrysogenum (C13), and an isolate of Pseudomonas sp. (BR2), used alone or in fungus-bacterium combinations in the presence or absence of the AM fungus Gi. In fertilized treatments, 0 or 30 kg P ha^{-1} was applied as TPR or diammonium phosphate (DAP). In 45-day-old wheat plants, the highest root length AM colonization (62%) was observed with TPR fertilized wheat inoculated with Gi and BR2. Our results suggest that BR2 is a mycorrhizal-helper bacteria and a good plant growth-promoting rhizobacteria. In fact, inoculation of wheat Tetra fertilized with TPR with a combination of Gi, BR2 and C1 produced the best grain yield with the highest P concentration. This work shows that by inoculating seeds with TPR-solubilizing microorganisms and AM fungi under field conditions in Mali it is possible to obtain wheat grain yields comparable to those produced by using the expensive DAP fertilizer.

Keywords: *Aspergillus awamori*, *Glomus intraradices*, Plant growth promotion, Pseudomonas sp, *Triticum aestivum*

Four New Species of *Arbuscular mycorrhizal* Fungi In Legume Rhizosphere Of Iran

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During periods of 2005-2007, total of 180 and 120 soil samples were collected from alfalfa as well as soybean rhizosphers in cultivated regions of Iran, respectively. Trap cultures established in order to obtaining healthy and nonparasitic spores. Spores were isolated using wet sieving as well as centrifugation with sucrose solution (50%) method. Two species of Gigaspora including G. albida and G. coralloidea were identified in both alfalfa and soybean rhizosphers. Also, two species of Acaulospora including A. dilatata and A. mellea found but only in soybean rhizosphere. The species frequencies were also different based on fungal species as well as host plant type. Species of Gigaspora had more frequencies in alfalfa fields compare with soybean fields (6% and 1% rather than 0.65% and 0.35%). In other hand, frequencies of Acaulospora species in soybean rhizosphere were equal (0.25%). All four species are new for mycoflora of Iran.

Keywords: *Arbuscular Mycorrhizal* Fungi, Legumes, Taxonomy, Rhizosphere

Molecular Detection Of Arbuscular Mycorrhizal Fungus Glomus Mosseae Using Specific Primer

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Rapid Molecular detection of arbuscular mycorrhizal fungus *Glomus mosseae* using a specific primer was studied. We used of different fungal structures such as sporocarps, fungal hyphae as well as colonized roots. For this purpose, trap cultures with purified isolate of fungus and *Lotus japonicus* as host plant were established. Sporocarps isolated from trap cultures, washed thoroughly 3-4 times with distilled water, sonicated 3-4 times each 2 minutes and then surface sterilized and kept in special tubes. Also, fungal hyphae were isolated under stereomicroscope and kept in PCR buffer 1X. DNA extracted from fungal structures as well as mycorrhizal roots. We used a primer set NDL22-5.21 for PCR reaction. Products were studied using Agarose gel electrophoresis. This primer could amplified a fragment with 367 bp length in all samples including fungal structures as well as mycorrhizal roots and positive control (G. mosseae BEG12) but this band could not be observed in negative control (non mycorrhizal roots). This indicates that the primer set is specific for fungus and could not amplified host plant DNA. The bands were so clear and strong with fungal structure samples in comparison with mycorrhizal roots.

Keywords: Arbuscular Mycorrhizal Fungi, *Glomus mosseae*, Molecular identification, PCR

The Effect of Mycorrhiza on Forest Tree Species in the East Mediterranean Region of Turkey

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Mycorrhizae are symbiotic associations that form between the roots of most plant species and fungi. These symbioses are characterized by bi-directional movement of nutrients where carbon flows to the fungus and inorganic nutrients move to the plant, thereby providing a critical linkage between the plant root and soil. In infertile soils, nutrients taken up by the mycorrhizal fungi can lead to improved plant growth and reproduction. As a result, mycorrhizal plants are often more competitive and better able to tolerate environmental stresses than are nonmycorrhizal plants. The mycorrhiza, rhizosphere and soil quality research group in Turkey who are studying mycorrhizae for high plant root. Mainly we are interested with producing mycorrhizal inoculated agro forestry seedling production. Turkey has more than 21 million ha forest area that has been covered the 27.2 % of Turkish land. All over the Turkey, there are 110 forest nurseries and every year nearly 425 million seedlings are produced. Several forestry species were studied for ecto and endo mycorrhizae. These species are; *Acer negundo, Nerium oleander, Eucalyptus grandis, Laurus nobilis, Eleagnus angustifolia, Ceratonia siliqua* and *Rosmarinus officinalis.* Mycorrhizal infections on the roots were determined in these seedlings. In the seedlings the order of effectiveness of species was as follows: *Nerium oleander* (89 %), *Rosmarinus officinalis* (64 %), *Acer negundo* (45 %), *Laurus nobilis* (37 %), *Eucalyptus grandis* (35%), *Eleagnus angustifolia* (17 %), *Ceratonia siliqua* (7 %). In our previous studies were determined that vascular plants have shown high mycorrhizal root infection. Also agro forestry plant roots were worked. Root and shoot ratio were calculated. Non mycorrhizal plant have high ratio of root: shoot ratio. Mycorrhizal dependent plant has fewer ratios. We are planning to work in future how mycorrhizal inoculation effect root growth and relation with plant growth

Keywords: Mycorrhiza, East Mediterranean Region

Notes

SOIL and WATER POLLUTION

Laboratory Assessment of *Helianthus annuus* for the Phytoremediation of Contaminated Soil

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Phytoremediation is a promising means for the treatment contamination arising from heavy metal spills. Although several species have been identified as hyperaccumulators, most of the studies were conducted with only one heavy metal. In this study, the interconnected factors of soil type, plant source, metal type and concentration were studied to evaluate the efficiency *Helianthus annuus* for phytoremeidation. Experiments were conducted with three different strains of *H. annuus* exposed to different combinations of metal contamination (30 mg/kg Cd, Cr, Ni, Pb, As, and/or Fe). Cultivar efficiency was based on total metal uptake, as well as the translocation, and selectivity of each metal. The results for each cultivar were also compared after 0.1 g/kg or 0.3 g/kg EDTA was added to enhance metal bioavailability. For instance, with *H. annuus* the selectivity and total metal content obtained was Cd>Cr>>Ni and 0.73 mg and Cr>Cd>>Ni and 0.32 for 0.1 and 0.3 g/kg EDTA, respectively. Results with *H. annuus* will also be compared to the model hypercaccumulator *Thlaspi caerulescens*.

Keywords: phytoremediation, heavy metals, Helianthus annuus

Modeling Phytoextraction of Heavy Metals at Multiply Contaminated Soils with Hyperaccumulator Plants

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Soils and waters contaminated with heavy metals pose a major environmental and human health problem that needs an effective and affordable technological solution. Phytoextraction offers a reasonable technology which uses plants to extract the heavy metals from soils. However, the effectiveness of this new method needs to be demonstrated by means of mathematical modeling. The phytoextraction models also are needed to manage the contaminated soils. A thorough literature review indicates that very few models have yet been developed for phytoextraction due to complexities involved within the soil-water-chemicals-plant system, even for a single metal contamination in the laboratory scale. Furthermore, the complexity increases in the field scale problems where the soils are multi-contaminated and also are with high heterogeneity involved in soil physico-chemical properties. On the other hand, in the case of hyperaccumulator plants there are a great deal of data spread worldwide because of the attentions that have been made to test the phytoextration technology in the last years. Consequently, analysis of the existing database of measured phytoextraction data for hyperaccumulators may result in simple models. The objective of this study was to develop a simple model for phytoextraction of heavy metals at multi-contaminated soils. The more preferable input parameters to derive the phytoextraction models were selected by reviewing the literature. Using the published data of Cd and Zn phytoextraction with Thlaspi caerulescens, some reasonable models were derived. The model calculations suggest that phytoextraction using T. caerulescens is not feasible even when the soil is only moderately contaminated with both Cd and Zn.

Keywords: Heavy Metal, Hyperaccumulator, Modeling, Multi-Contaminated Soils, Phytoextraction

Research On Pollution Caused By Thermal Power Plants İn Mugla

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Potential of heavy metal pollution originated from Gökova (210 MWx3), Yeniköy (210 MWx2) and Yatagan (210 MWx3) thermal power plants in Mu?la province was investigated. For this purpose, in olive plantations and it's soils, heavy metal levels had been determined for four seasons. The lowest mean of heavy metal levels was found in Yatagan, whereas the highest value was determined in Yeniköy thermal power plant. It was observed that heavy metal levels of soil samples were generally higher in autumn, but heavy metal levels of leaf sample were higher in winter. Pollution has continued to constitute a potential danger in region as a result of using low calorie lignite in thermal power plants, having high fly ash and SO2 content, and especially being outdated for Yatagan thermal power plant.

Keywords: Pollution, heavy metals, thermal power plants, Mugla

Continuous Monitoring Of Suspended Sediment İn Rivers By Use Of New Methods

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Traditional sampling methods are restrictive for spatial and temporal monitoring of suspended sediment in river. Application of these methods is simple but labour intensive to collect and process. For this reason, the use of new technological methods has recently gained importance. These methods are commonly based on the scattering of sound or light in water. Acoustic methods involve propagating sound at around the Megahertz frequency range through the water column. Short bursts of high frequency sound are transmitted from a transducer and directed towards the measurement water sample. Sediment in suspension will scatter a part of this sound back to the transducer. Another method, laser scattering, directs a laser beam through the sample of water where particles in suspension will scatter, absorb and reflect the beam. The scattered laser beam is received by a ring detector that allows measurement of the scattering angle of the beam. Particle size and volumetric concentration can be calculated from knowledge of this angle. In addition to these methods, optical turbidimeters supply an estimate for suspended sediment concentration through measuring either the backscatter of the light or the attenuation of a light beam passing through a water sample. In this paper, these methods were presented and advantages and limitations of each were given for comparison.

Keywords: Suspended sediment, Acoustic, Optical sensor, Laser diffraction

Identification of *Helianthus annuus* Proteins that are Upregulated when Exposed to Heavy Metals

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Plants have evolved the ability to extract, transport and use micronutrients from the soil. Many plants utilize this mechanism to accumulate toxic metals from the soil without incurring toxic effects. As a result, phytoremediation is gaining interest as a remediation technology. The study of model plants has shown that plants use a large amount of its genome to deal with stress, including heavy metal uptake and protection from the toxic effects. Although many genes have been identified, knowledge of the basic mechanisms of remediation is limited. Hydroponic and soil based experiments were conducted with two different dwarf sunflowers to identify what proteins were up-regulated as a response to heavy metal exposure. Two-dimensional gels of Helianthus annuus have isolated four proteins that were upregulated when the plants were exposed to arsenic or lead. This paper will discuss total metal uptake and translocation of arsenic and lead as well as the proteins that were upregulated as a result of metal sequestration.

Keywords: phytoremediation, arsenic, lead, Helianthus annuus, proteins

Laboratory Assessment of Natural Product Antifoulants for Preventing Freshwater Bacteria Attachmenton Model Silicone Coatings

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Biofouling is the settlement and growth of micro- and macro-organisms on structures immersed in water. The first stage of fouling consists of the attachment and formation of a bacterial biofilm, which is later colonized by higher organisms. Previously metal based paints were used to prevent fouling. Due to the toxicity posed this approach has been banned and one alternative is to replace metal based compounds with natural product antifoulants (NPAs). In order to be effective NPAs need to prevent bacteria attachment during the early biofilm formation. This paper will report the results of three NPAs (zosteric acid, capsaicin and tannic acid) in conjunction with two model siliconces (Sylgard 184 and RTV11) for preventing freshwater bacteria attachment. NPA performance was based on the decrease in microbial attachment, low toxicity, and minimum alteration of the coatings properties. Among the three NPAs tested, zosteric acid exhibits the lowest toxicity and least alteration to the coating properties, followed by tannic acid. Capsaicin was found to be in-compatible for blending in the two silicone coatings. Both zosteric acid and tannic acid incorporated silicone coatings were found to reduce bacteria attachment.

Keywords: biofouling, NPAs, zosteric acid, capsaicin

Potential Use of Olive Oil Solid Waste in Agriculture

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Olive (olea europea) orchards are dominant crops in Mediterranean countries. The main use of olive fruits is the extraction of olive oil. The remaining Olive oil solid waste (OSW) can be a good and available source for soil organic matter in Turkey. One method to use OSW in agricultural practices can be making compost. OSW and OSW compost were evaluated for agricultural use. Olive solid wastes were mixed with soil at the rates of 0, 3, 5 and 7% with and without additional nitrogen and phosphorous sources. Sunflower and corn plants were grown in the pots for two months. Additionally changes in soil physical and chemical properties were observed. Results showed that OSW compost can be used as and organic source for plant growth. This research was supported by TUBITAK TOVAG project number 106O371

Keywords: olive oil solid waste, compost, sunflower, corn, nitrogen, soil

Factors Controlling the Bioavailability Of Potentially Harmful Metals in Wastewater Treated Soils

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Sewage sludge contains significant proportions of nitrogen, phosphorus and organic matter. It therefore has a similar fertiliser value to animal manures and slurries. Typical applications can provide a significant contribution to the nitrogen and phosphate requirements of arable and grassland crops. In addition, sludge can contain potentially harmful substances, including pathogens, persistent organic pollutants and toxic metals. It is therefore necessary to control the use of sewage sludge in order to protect human and animal health and to maintain soil fertility and crop yields. The bioavailability of heavy metals can be affected by several factors. Some of these factors are related to soil and some others may be related to plant characteristics. Soil pH, organic mater content, redox status, carbonate content, chloride content, moisture, source and form of metals and plant genotype may be the most important. However, investigation of any factors which may reduce or enhance the availability of heavy metals in soil and uptake by plants would be crucial. Such knowledge and information on these factors could be used and would help the authorities to manage and control the environmental problems which are concerned with sludge application to agricultural land and could threaten the human health. This paper is going to describe the factors and circumstances of which the bioavailability of potentially harmful metals would reduce or enhance in soil.

Keywords: Heavy Metals, Bioavailability, Soil, Sewage sludge

Geophagia, a Soil - Environmental Related Disease

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Geophagia or geophagy is a habit for an uncontrollable urge to eat earth that commonly is occur in poverty-stricken populations and particularly there are in children under 3 years of age and pregnant women. The custom of involuntary or deliberate eating of soil, especially clayey soil, has a long history and is amazingly widespread. Some researchers have described an anomalous clay layer at a prehistoric site at the Kalambo Falls in Zambia indicating that clay might have been eaten by hominids. Von Humboidt reported from his travels in South America in early 18th century that clay was eaten to some extent at all times by the tribe in Peru. In the mid 19 century it was customary for certain people in the north of Sweden to mix earth with flour in making bread whether the clay effected an improvement in taste. In Iran, geophagia has seen in some of children and pregnant which that is solved with eating starch daily. For example, some reports are shown that there has been geophagia disease in some parts of Fars province, around Shiraz city which have been made different health as well as environmental complications. Clay with a large cation exchange capacity that is also fairly well saturated can release and supplement some macronutrients and micronutrients such as Cu, Fe, Mn and Zn. Deficiency of these elements led to dwarfism, hypogonadism, anemia, hepatosplenomegaly and skin problems. Almost all of these health complication evidences are seen in most of people who has been suffered from geophagy in Iran. However, geophagia has a history of 2000 years and the effects of soil and environmental chemistry on human health have been studied for hundreds years ago in China. In this review it has tried to introduce the geophagia as a nutritional and environmental complication in Iran as well as in the world which could be a serious health risk for human.

Keywords: Geophagia, Soil, Iron, Zinc, Anemia, Environment

RAPD Fingerprinting of Indigenous *Lysinibacillus fusiformis* Isolates from Stabilized Sludge and Oil-Polluted Soil

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The Lysinibacillus group is bacilli with positive Gram, oval or spherical spores, mobiles, oxidase and catalase positive, not grouped in strict chains, with strictly oxydative metabolism and very similar to *Bacillus sphericus* group. Indigenous isolates of *Lysinibacillus fusiformis* from oil-polluted soil near gas station and stabilized sludge from petrochemical plant in Serbia (FOV – HIP "Petrohemija", Pancevo) was tested on IAR and HMT and showed high sensitivity to neomycin, cephalexin and bacitracin, since were resistant to trimetoprim. Isolates were tolerant to 100µg/ml of Zn and Co, 10µg/ml of Hg and Mo, but they showed differences in tolerance to 20µg/ml of Cd. Isolate from stabilized sludge showed very strong emulsification ability of xylol (E24 65,8) and mineral oil (E24 75,6). Isolate from oil-polluted soil showed very strong emulsification ability of xylol (E24 87,2) and mineral oil (E24 72,7). RAPD fingerprinting exhibit clear differences between two *Lysinibacillus fusiformis* isolates.

Keywords: *Lysinibacillus fusiformis*, RAPD fingerprinting, emulsification ability, IAR, HMT

The Effects of Natural Zeolite on Ions Adsorption and Reducing Solution Electrical Conductivity, I) Na and K Solutions

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Natural zeolites are crystalline alominosilicate minerals with three dimensions. In general, three important factors, structure, texture, chemical composition as well as economic value of natural and synthetic zeolites have made them as valuable materials. Zeolites as catalysts in oil and petrochemical industries, fire distinguishing industries and agricultural industries are just some of their applications. Zeolites are also valuable as soil fertilizer, soil moisture holder, municipals as well as industrials wastewater treatment, harmful and toxic chemicals eliminator, metals and gases adsorptive. Zeolites are very effective minerals to decrease the risk of toxic cations as well as anions. In a series of experiments different mixtures of soil with zeolite were prepared using 0, 0.5, 1, 5, 10 and 100 percent of zeolite by weight. The constant amounts of mixtures were treated with constant volumes of solutions containing NaCl, NaNO3, KCl and KNO3. The electrical conductivity of each solution was 0, 5, 10, 15 and 20 dS/m. All samples were replicated two times and each batch of experiment was containing 60 samples with total number of 240 samples for the whole experiment. Mixtures of soil with zeolite were treated with different salt solutions and were shake for two hours prior to analysis. All suspensions were filtered and their electrical conductivity was measured at constant temperature. The results showed that electrical conductivity of filtered solutions was lower in mixtures containing zeolite compared to soil. Also the electrical conductivity of the filtered solutions was considerably lower in K solutions compared to Na. It concluded that zeolite could probably reduce the electrical conductivity of soil solutions by adsorption of ions from the primary solutions and it seems that zeolite would tend to adsorb more K ions compared to Na ions from the solutions resulting lower electrical conductivity of K containing compared to Na containing solutions.

Keywords: Zeolite, Cations, Soil, Electrical conductivity, Adsorption

The Effects of Natural Zeolite on Ions Adsorption and Reducing Solution Electrical Conductivity, II) Cl and NO_3 Solutions

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Zeolites can change soil solution compositions due to having high capacity of adsorption as well as water holding capacity. Zeolite are able to decrease fertilizer losses and their leaching from the soil and also able to adsorb the environmental pollutants such as heavy metals and toxic elements from the wastewaters. Some soil solutions are rich of different metals as well as anions which may potentially be harmful for the organisms and the environment. Natural zeolites such as clinoptilolite, analcime, laumomtite, phillipsite, mordenite are crystalline alominosilicate minerals and are effective minerals to decrease the risk of toxic cations as well as anions. In a series of experiments different mixtures of soil with zeolite were prepared using 0, 0.5, 1, 5, 10 and 100 percent of zeolite by weight. The constant amounts of mixtures were treated with constant volumes of solutions containing NaCl, $NaNO_3$, KCl and KNO_3. The electrical conductivity of each solution was 0, 5, 10, 15 and 20 dS/m. All samples were replicated two times and each batch of experiment was containing 60 samples with total number of 240 samples for the whole experiment. Mixtures of soil with zeolite were treated with different salt solutions and were shaking for two hours prior to analysis. All suspensions were filtered and their electrical conductivity was measured at constant temperature. The results showed that electrical conductivity of filtered solutions was lower in mixtures containing zeolite compared to soil. Also the electrical conductivity of the filtered solutions was considerably lower in NO3 solutions compared to Cl. It concluded that zeolite could probably reduce the electrical conductivity of soil solutions by adsorption of ions from the primary solutions and it seems that zeolite would tend to adsorb more NO_3 ions compared to Cl ions from the solutions resulting lower electrical conductivity of NO_3 containing compared to Cl containing solutions.

Keywords: Zeolite, Anions, Soil, Adsorption, Electrical conductivity.

Characterization of Indigenous Bacillus Isolates from Stabilized Sludge in Petrochemical Industry

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Bacillus species are rod-shaped, endospore-forming aerobic or facultatively anaerobic, Gram-positive bacteria; in some species cultures may turn Gram-negative with age. The many species of the genus exhibit a wide range of physiologic abilities that allow them to live in every natural environment. The spores are resistant to heat, cold, radiation, desiccation, and disinfectants. Bacillus species are used in many medical, pharmaceutical, agricultural, and industrial processes that take advantage of their wide range of physiologic characteristics and their ability to produce a host of enzymes, antibiotics, and other metabolites. Certain Bacillus species are important in the natural or artificial degradation of waste products. Three of 15 isolates showed very strong emulsification ability of xylol (E24 from 95 to 100). Six isolates showed strong emulsification of mineral oil (E24 from 78 to 100). All isolates were tolerant to 100μg/ml of Zn and Co, 10μg/ml of Hg and Mo, since eleven isolates showed tolerance to 10μg/ml of Cd and six isolates to 100μg/ml Hg. Only one isolate was sensitive to trimethoprime (5 μg), all isolates were sensitive to bacitracine (40U), cephalexine (30 μg), clindamycine (2 μg) and neomycin (120μg), since five isolates were resistant to novobiocin (5μg) and two to bacitracine (40U). Based on PCR analysis, we estimated genetic similarity of investigated Bacillus isolates. We isolated 15 indigenous Bacillus isolates from stabilized sludge in petrochemical plant in Serbia (FOV – HIP "Petrohemija", Pancevo) and investigated morphological and biochemical characteristics, emulsification activity and sensitivity to antibiotics and heavy metals. In addition, we estimated the genetic diversity of isolates by RAPD and rep-PCR.

Keywords: Bacillus, emulsification activity, RAPD, rep-PCR

Is Electronic Nose Able to Monitor Phenanthrene Biodegradation in Soil?

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Abstract Policyclic aromatic hydrocarbons (PAHs) are a family of ubiquitous pollutants in the environment with potential or conclaimed toxicity and/or carcinogenicity and phenenathrene is a member of this class of chemicals. Due to their high hydrophobicity, PAHs in soil are mainly associated to the organic matter (SOM), with bonds that evolves in time towards more stable interactions (aging) that prevent or limit the access of soil microorganisms to these substrates (bioavailability). In order to solubilize these pollutants into the water phase and improve their degradation some microorganisms excrete biosurfactants. Artificial olfactive systems named electronic noses (ENs), which tend to reproduce that of mammalians, have been recently developed in order to perceive volatile substances in a good deal of contexts and environments by using several mechanisms [1, 2]. Neverthless, no studies concerning the application of ENs to soil metabolism were yet reported in literature while these experiments had been carried out. The aim of this work was to verify the ability of an EN to monitor the possible degradation of phenanthrene by microorganisms in an artificially contaminated soil in the presence or absence of a surfactant to increase pollutant solubilisation and bioavailability. An additional N source was also supplied to soil to improve microbial degradation. Results of phenanthrene degradation observed by EN were compared with those obtained by solid phase microextraction (SPME). This is another technique recently developed to analyse volatile compounds [3], which was also used in studies on degradation in soil of PAHs and other volatile or semivolatile compounds [4]. A 30 day-incubation was used in the present experiments. After this period, the results obtained by SPME showed a reduction of phenanthrene concentration by soil microrganisms up to 92%. Different treatments with the surfactant Brij 30, NaNO3, and a combination of the two additives stimulated phenanthrene degradation up to 97%, 95% and 92%, respectively. The analysis by EN demonstrated a specific classification of soil samples on the base of the incubation time and discriminated between phenanthrene contaminated soils and uncontaminated controls. Phenanthrene soil samples, in fact, were classified by PCA (Principal Component Analysis) plots as delayed in a temporal scale with respect to controls. However, EN did not succeeded in distinguishing any difference observable by SPME in soil samples treated with different additives. Neverthless, the integration of results obtained by the both techniques suggested a list of substances, which might be responsible for the chemical images (odours) obtained by EN. Therefore, this work points out that EN is a useful technique for studying microbial metabolism, e.g. pollutant biodegradation, and that EN and SPME are not alternative but complementarity techniques in these studies. References 1. Gopel W., "Chemical imaging: I. concepts and visions for electronic and bioelectronic sensors", Sensor Actuat. B: Chem. Vol. 52 (1998), pp. 125-142 2. D'Amico A., Di Natale C., Paolesse R., Macagnano A., Mantini A., "Metalloporphyrins as basic material for volatile sensitive sensors", Sensor Actuat. B: Chem., Vol. 65 (2000), pp. 209-215 3. Pawliszyn J. Solid Phase Microextraction: Theory and Practice, Wiley (New York, 1997). 4. Eriksson M., Dalhammar G., Borg-Karlson A.-K. "Biological degradation of selected hydrocarbons in an old PAH/creosote contaminated soil from a gas work sites", Appl. Microbiol. Biotechnol., Vol. 53 (2000), pp. 619-626

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