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## **Phytoplankton Primary Production and Distribution in a South Caspian Sea Basin Case Study in Tajan River Estuary**

M. Shapoori, A. Javanshir, S. Jamili, M. Fallahi and R. Changizi

The phytoplankton community composition, abundance and size-fractionated biomass (chlorophyll a) along with various physical and chemical parameters were assessed in Tajan estuary, in South Caspian Sea Basin. Monthly sampling was conducted at 6 stations. Based on results, the mouth or formed estuary could be categorized in three different classes. Category 1: station essentially related to river input and low net production (vary between 13.8 and 46.4 mg m<sup>-3</sup> year<sup>-1</sup>). Category 2: consists of high net production (between 277.9 and 330.4 mg m<sup>-3</sup> year<sup>-1</sup>) and mild consumption of (8.4 to 32.5 mg m<sup>-3</sup> year<sup>-1</sup>). The 3rd category is considered to be in the middle of two above values from productivity point of view with (236.7 to 240.2 mg m<sup>-3</sup> year<sup>-1</sup>) and relatively mild consumptions of (20.9 to 92.4 mg m<sup>-3</sup> year<sup>-1</sup>). It seems that importance of such areas is much more in their nutrient inlet of the river from upper mouth. Net primary productions were high in the center of estuary with values near to 277 mg m<sup>-3</sup> year<sup>-1</sup>. Selected station in lower mouth situated in the adjacent area inlet also showed high concentrations of 330 mg m<sup>-3</sup> year<sup>-1</sup>, which suggests the existence of a nutrient front where fresh waters originated from rivers (rich in nutrient and phytoplankton decomposition materials) joint salt waters of the sea. In these stations phytoplankton has not enough time to be consumed because of soft sediments instability and inevitably is added to south Caspian basin production. Also primary production among months and seasons shows fluctuations, perhaps related to water inlet availability and residence time. There suggests a correlation between primary production and river discharge in different selected stations. (*Research Journal of Environmental Sciences 3 (1): 1-15, 2009; doi: 10.3923/rjes.2009.1.15*)

## **Future Climate Impacts on Chickpea in Iran and ICARDA**

M. Gholipour and A. Soltani

Study the effects of climate change, i.e., increasing temperature (T) and CO<sub>2</sub> concentration (C) and changing rainfall (R), on crop systems could help to develop needed adaptation strategies. Subsequently, these strategies can promote and stabilize crop yield. The effects of two future climate scenarios on chickpea was investigated in a full factorial combination of 4 factors (6 locations×3C×7T×3R). The scenarios were reduction of 10% historic R (rainfed conditions) +525 ppm

C + 2°C warmer T (year 2050) and declining of 20% historic R (rainfed conditions) +700 ppm C+4°C warmer T (year 2100). This study was performed for ICARDA (from Syria) and five locations of Iran using CYRUS model. The results indicated that for both scenarios, the differential grain yield of rainfed chickpea will be positive in all locations. Since the differential Harvest Index (HI) tended to be mainly negative, the increase in grain yield was not proportional to increase in biomass. By year 2050, it is expected that the stability of yield to be increased for most locations; however, that of yield would be less stable for Tabriz, Mashhad and ICARDA, but more stable for other locations at year 2100. In irrigated conditions, different scenarios had different effects on biomass, HI and yield stability in all locations. The differential grain yield appeared to be negative [0 (ICARDA) to 18%] for year 2050; this was also true for year 2100 (6.3 to 17.1%). Both the results of factorial combination of factors and of probability of occurring temperatures higher than ceiling temperature suggested that to avoid future yield loss in irrigated conditions, chickpea improvement for heat tolerance is inevitable. (*Research Journal of Environmental Sciences 3 (1): 16-28, 2009; doi: 10.3923/rjes.2009.16.28*)

## **Investigation on the Current Status and the Potential of Urban Parks with GIS**

S. Teimoori, J. Fegghi, Y. Erfanifard and M. Sharifi

The aim of this study performed in a part of Tehran city (capital of Iran) with 538 ha surface area, was locating the parks and determining the needs of the area to find suitable recreational spaces using GIS. The Ikonos imagery and 1:2000 topographic maps were applied to detect the parks in the regions. Classifying the parks in four categories of regional, zonal, local and neighboring levels, the influence rate of each park was determined using the standards and the areas without parks were identified in the region. Also the number of people using the parks was measured by overlaying the maps of park boundaries and people distribution. Then the map of gaps and their spatial pattern were prepared as the greatest potential of green space increase and they were ranked due to the necessity of park establishment and gap suitability. The gaps' surface area was 49.5 ha that have had no buildings. Regarding to the lack of parks in local and neighboring levels and overlaying the maps of gaps on park establishment necessities and needs, it was concluded that the area doesn't have the potential for park establishment at local level but about 1.8 ha of the gaps can be allocated to parks at neighboring level. (*Research Journal of Environmental Sciences 3 (1): 29-40, 2009; doi: 10.3923/rjes.2009.29.40*)

## **Mass Change Calculations During Hydrothermal Alteration/Mineralization in the Porphyry Copper Deposit of Darrehzar, Iran**

R. Derakhshani and M. Abdolzadeh

Quantitatively evaluating of mass changes of major and minor elements that accompanied alteration in granodioritic rocks of Darrehzar porphyry copper deposit based on elements that were immobile during alteration is the aim of study that is done for the first time. Darrehzar porphyry copper deposit has four distinct types of hypogene alterations: Potassic, Phyllic, Argillic and Propylitic. Mineralogic study of these ore bodies distinguished an upper oxidation zone, an intermediate enriched zone and a primary sulfide zone. Copper mineralization was accompanied by both potassic and phyllic alterations. Supergene alteration was minor and restricted to a thin blanket of Cu sulfides under an argillic cap. Isocon plots illustrate that Al, Ti and Ga were relatively immobile during alteration and the mass was essentially conserved during alteration. At all stages in the evolution of the hydrothermal system,  $\text{TiO}_2$  and  $\text{Al}_2\text{O}_3$  which are immobile and have a high correlation coefficient are used in the calculations. In the potassic alteration zone there is an obvious enrichment in K and depletion in Na, Ca, Mn and Fe. These changes were due to replacement of plagioclase and amphibole by K-feldspar and biotite, respectively. Potassic alteration was associated with a large increase in Cu represented by disseminated chalcopyrite and bornite in this zone. Phyllic alteration was accompanied by the depletion of Na, K, Fe and Ba and the enrichment of Si and Cu. The loss of Na, K and Fe reflects the sericitization of alkali feldspar and the destruction of ferromagnesian minerals. The addition of Si is consistent with widespread silicification which is a major feature of phyllic alteration and the addition Cu, mobilized from the potassic zone which is depleted in this element. (*Research Journal of Environmental Sciences* 3 (1): 41-51, 2009; doi: 10.3923/rjes.2009.41.51)

## **Population Structure and its Influence on Self-Thinning of *Melastoma malabathricum* L.**

M. Faravani and B.B. Baki

The effects of density on the growth rate and survival of individual plants as well as changes in population structure and self-thinning were experimentally evaluated in *Melastoma malabathricum* at five densities (19098, 76394, 152788, 229183 and 458365 seeds  $\text{m}^{-2}$ ). The biomass (dry weight) of root, stem and leaf was

measured for seven times after drying from the 18 to 162th days after planting. It was applied at 20 day intervals. The relationship between the total dry matter weights per plant and plant densities of survivors for populations of *Melastoma malabathricum* showed that each population will start to thin along a line of slope from -3.7 to -1.2 until it reaches the maximum standing crop. Mortality during the phase of self-thinning is largely among individuals suppressed by the ensuing growth of neighbours, resulting in increased shading within the canopies of neighbouring plants. The total dry matter ( $m^{-2}$ ) was constant over a wide range of densities because individual plant displayed density-dependent reduction in growth rate and hence in individual plant size, in particular, because the reductions in mean plant weight compensated exactly for increase in density. (*Research Journal of Environmental Sciences* 3 (1): 52-61, 2009; doi: 10.3923/rjes.2009.52.61)

### **A Comparison of Parametric and Nonparametric Density Functions for Estimating Annual Precipitation in Iran**

P. Haghghat Jou, A.M. Akhoond-Ali, A. Behnia and R. Chinipardaz

The main purpose of this study is to compare parametric density functions with nonparametric Fourier series to estimate annual precipitation for five old rain gauge stations (Bushehr, Isfahan, Meshed, Tehran and Jask) in Iran. The parametric density functions include normal, two and three parameters log-normal, two parameter gamma, Pearson and log-Pearson type 3 and Gumbel extreme value type 1. The nonparametric approach is Fourier series method. Annual precipitation data from the mentioned stations were fitted to all density functions including Fourier series. Results showed that the Fourier series predict annual precipitation much better than other parametric methods. Thus, the Fourier series can be used as a better alternative approach for precipitation frequency analysis. (*Research Journal of Environmental Sciences* 3 (1): 62-70, 2009; doi: 10.3923/rjes.2009.62.70)

### **Fall Velocity of Cohesive Sediments in Dez Dam Reservoir**

A. Arman, M. Fathi-Moghadam, H. Samadi and S. Emamgholizadeh

In order to characterize the settling properties of natural cohesive sediment adjacent to the Dez Dam wall (as a symbol of a large dam reservoir in arid and semi-arid zones), falling velocity of particles have been measured using a 2.50 m height and 0.30 m diameter column. In contrast to the traditional particle size based methods, an approach relying on time and depth variation of sediment

concentration was employed to estimate the mean value of fall velocity at any depth and time. Particles in deeper depth, particularly for the samples with higher rate of sediment concentration accelerated faster and stayed at higher velocities for longer duration as a result of higher rate of flocculation. This confirms the greater effect of particle flocculation than their settling competition. The particles in all depths reached their maximum falling velocity same time around 15 min after the beginning of the tests. The low concentration samples reached higher maximum velocity as a result of lower rate of particle compaction but for a much lower duration in comparison to the higher concentrated samples. (*Research Journal of Environmental Sciences 3 (1): 71-79, 2009; doi: 10.3923/rjes.2009.71.79*)

### **Photomorphic Units Map Derived from Processing Satellite Images as a Model in Providing Erosion Types Maps**

A. Mohammadi Torkasvand

In this study, the possibility using ETM<sup>+</sup> satellite images for providing erosion types maps was investigated. With regards to the lack of visual distinction of surface, rill and small gully erosions on the satellite image after processing, photomorphic units with attention to color, tone, texture, drainage pattern and other image characteristics, were differentiated on color composite by the screen digitizing methods. Photomorphic units map as a model was crossed by ground truth maps of surface, rill and gully erosion; and erosion features map. Results indicated that the greatest accuracy and precision of model is related to providing gully erosion map, although it also is suitable in providing surface and rill erosion maps. (*Research Journal of Environmental Sciences 3 (1): 80-87, 2009; doi: 10.3923/rjes.2009.80.87*)

### **Investigation of Tuber Size and Nitrogen Fertilizer on Nitrogen Use Efficiency and Yield of Potato Tuber, Cultivar Agria**

M. Saeidi, A. Tobeh, Y. Raei, M. Hassanzadeh, Sh. Jamaati-e-Somarin and A. Rohi

This study was done as factorial based on Randomized complete block design with three replications in 2006 in research field of Mohaghegh Ardabili University, Ardabil, Iran. First factor was nitrogen level (0, 80, 160 and 200 kg ha<sup>-1</sup> net nitrogen) and second was tuber size (<40, 40-80 and >80 g). Results showed that tuber size increase and nitrogen usage reduced Agronomical Nitrogen Use Efficiency (ANUE) and increased Physiological Efficiency (PE), Apparent Recovery Efficiency (ARE) and Nitrogen Use Efficiency (NUE). The most tuber yield, total plant dry matter, number of tuber per plant, mean tuber weight and

tuber dry weight were achieved in medium tuber size. Also, the most tuber yield, mean tuber weight and tuber dry weight were gained at 160 kg ha<sup>-1</sup> net nitrogen. Utmost nitrogen uptake by plant and total plant dry matter was observed at 160 kg ha<sup>-1</sup> nitrogen. So, utilization of 160 kg ha<sup>-1</sup> nitrogen with medium tuber size in order to achieving most yields, planting and eating usages is recommended. (*Research Journal of Environmental Sciences 3 (1): 88-95, 2009; doi: 10.3923/rjes.2009.88.95*)

### **Heavy Metal Levels and Their Potential Toxic Effect on Coral *Galaxea fascicularis* from Java Sea, Indonesia**

A. Sabdono

Specific aims of the study were to quantify heavy metal concentration in the coral tissue and to determine the toxic effect of metal on coral *Galaxea fascicularis*. The concentration of heavy metals in the coral tissues were assessed using Atomic Absorption Spectrophotometer (AAS) technique. Various oceanographic parameters were also measured on sampling sites. Controlled tolerance experiment testing copper were performed on coral organism. Series of exposures at different range concentrations (0.025, 0.050, 0.075 and 0.100 mg L<sup>-1</sup> Cu) were conducted for 96 h LC<sub>50</sub>. Results indicated that low variation existed among some oceanographic parameter in depth. Higher concentrations of Pb and Fe were detected in coral tissues. Short duration (24 h) laboratory assay demonstrated dramatic effects ( tissue bleaching and death) on coral at copper concentrations (0.1 mg L<sup>-1</sup> Cu). The LC<sub>50-96</sub> was determined to be 0.032 mg L<sup>-1</sup> Cu (II). The present experimental results demonstrated that heavy metals can have deleterious effect on coral animal, at relatively low concentrations and for brief exposures. (*Research Journal of Environmental Sciences 3 (1): 96-102, 2009; doi: 10.3923/rjes.2009.96.102*)

### **Evaluation of Water Stress and Nitrogen Fertilizer Effects on Relative Water Content, Membrane Stability Index, Chlorophyll and Some Other Traits of Lentils (*Lens culinaris* L.) Under Hydroponics Conditions**

M. Salehpour, A. Ebadi, M. Izadi and Sh. Jamaati-e-Somarin

In order to investigate the response of Lentil cultivar Gachsaran to nitrogen and water stress under hydroponics conditions, a factorial experiment based on randomized complete block design was conducted with three replications using Hoagland nutrient solution without nitrogen, at the growth chamber in 2007, Ardebil, Iran. Factors were four water stress levels (0, -0.6, -0.9 and -1.2 MPa)

prepared with polyethylene glycol (PEG) and three nitrogen levels (0, 0.5 and 1.0 Mmol). Results showed that all traits were decreased with increasing stress. Both treatments had significant effects on Relative Water Content (RWC), Leaf Chlorophyll Content (LCC), Leaf Area (LA), length, height and dry weight of stem and Total Biomass (TB) and their interaction effects on LCC (before and after stress), LA ( $p < 0.05$ ) and on length and dry weight of stem ( $p < 0.01$ ). The most values of RWC, LCC, LA, length and dry weight of stem and total biomass were obtained using 0.5 Mmol nitrogen is sufficient and higher values is not recommended because of its preventive effect on nitrogen fixation in plant. (*Research Journal of Environmental Sciences 3 (1): 103-109, 2009; doi: 10.3923/rjes.2009.103.109*)

### **Isolation and Characterization of Arsenic Resistant Bacteria from Different Environment in South-West Region of Bangladesh**

M.A. Salam, M.S. Hossain M.E. Ali, M.A. Asad and M.H. Ali

The experiment was carried out to determine the presence and numbers of arsenic resistant bacteria population. In this study, soil samples were collected from different contaminated sites of Khulna shipyard, Rupsha, Baghmara and Ramnagor in Khulna district of Bangladesh. Twenty arsenic resistant bacterial strains were isolated from the soil samples. They were isolated by growing them on Nutrient Broth (NB) medium impregnated with high concentration of arsenic. From them, six strains *Bacillus lichneformis* (1/10), *Listeria murrayi* (2/9), *Bacillus polymyxa* (3/6), *Moraxella urethralis* (4/9) and *Planococcus citreus* (5/8) and *Pseudomonas fluorescens* (6/8) were finally selected and studied their morphological and biochemical characters in details. All six strains were able to tolerate very high concentration ( $> 100$  ppm). The optimum pH and temperature for the growth of all six strains were 8.5 and 37°C, respectively. It was concluded that bacteria living in arsenic free environment must possess a mechanism necessary to resist other toxic levels of arsenic. (*Research Journal of Environmental Sciences 3 (1): 110-115, 2009; doi: 10.3923/rjes.2009.110.115*)

### **Effects of Water Deficit on Drought Tolerance Indices of Sesame (*Sesamum indicum* L.) Genotypes in Moghan Region**

M. Hassanzadeh, A. Asghari, Sh. Jamaati-e-Somarin, M. Saeidi, R. Zabihi-e-Mahmoodabad and S. Hokmalipour

In order to investigation of water deficit on drought tolerance indices of 27 sesame genotypes, a factorial experiment based on randomized complete block design



was carried out in Moghan region in 2006 cropping year with three replications. Factors were: 27 sesame genotype (Karaj 1, Yekta, Oltan, Moghan 17, Naz takshakheh, Naz chandshakheh, Borazjan 2, Borazjan 5, Darab 14, Varamin 37, Varamin 237, Varamin 2822, Zoodrass IS, Hendi, Chini, Yellow white, 5089, Panama, DO-1, TF-3, TKG-21, J-1, RT-54, Hendi 9, Hendi 12, Hendi 14 and Jiroft) and irrigation (complete irrigation and irrigation until beginning of flowering). Results showed that Varamin 2822 genotype and Hendi 12 genotype in stress conditions had the highest yield stability about tolerance (TOL) and Mean Productivity (MP) indices, respectively. Regarding to Geometric Mean Productivity (GMP), Karaj 1, Oltan and Naz takshakheh were at highest level. Based on Stress Susceptibility Index (SSI), Varamin 237, Naz takshakheh, Naz chandshakheh, Oltan, Hendi 12, J-1, Panama genotypes and Jiroft line, were among mid-resistant and Zoodrass IS genotype was as sensitive one. Based on Stress Tolerance Index (STI), Varamin 2822, arranged as mid-resistant genotype. So, Karaj 1, Naz takshakheh, Varamin 237 and Varamin 2822 had highest rates (about mentioned indices) and are suitable for cropping under drought stress conditions. (*Research Journal of Environmental Sciences 3 (1): 116-121, 2009; doi: 10.3923/rjes.2009.116.121*)

### **Effects of Plant Density and Nitrogen Fertilizer on Nitrogen Uptake from Soil and Nitrate Pollution in Potato Tuber**

Sh. Jamaati-e-Somarin, A. Tobeh, M. Hassanzadeh, S. Hokmalipour and R. Zabihi-e-Mahmoodabad

In order to investigate plant density and nitrogen fertilizer on nitrogen uptake from soil and nitrate pollution in potato tuber cu. Agria, a factorial experiment based on randomized complete block design with three replications was carried out in Ardabil, Iran, in 2006. Factors were nitrogen levels (0, 80, 160 and 200 kg ha<sup>-1</sup> net nitrogen) and plant densities (5.5, 7.5 and 11 plant m<sup>-2</sup>). Results showed that the most nitrogen uptake by plant aerial parts and the most nitrate concentration in dry and fresh tuber weight were observed at 200 kg ha<sup>-1</sup> nitrogen, 11 plant m<sup>-2</sup> and 200 kg ha<sup>-1</sup> nitrogen, 5.5 plant m<sup>-2</sup>, respectively. At 160 kg ha<sup>-1</sup> nitrogen (as equal to 80 kg ha<sup>-1</sup> nitrogen) and 11 plant m<sup>-2</sup>, the most tuber and yield of tuber were gained. With increasing nitrogen application up to 160 kg ha<sup>-1</sup>, nitrogen uptake by tuber, number of tuber, tuber dry weight and mean tuber weight was increased. 160 and 80 kg ha<sup>-1</sup> nitrogen jointly with density of 5.5 plant m<sup>-2</sup>, caused the most mean tuber weight per plant. So, utilization of 80 kg ha<sup>-1</sup> nitrogen to reach highest yield and less nitrate pollution, density of 11 plant m<sup>-2</sup> to gain seed tuber (because of reduction in tuber weight and size) and density of 7.5 plant m<sup>-2</sup>

for eating usages, are recommended. (*Research Journal of Environmental Sciences* 3 (1): 122-126, 2009; doi: 10.3923/rjes.2009.122.126)

### **Importance of Malacological Factors in the Transmission of *Schistosoma haematobium* in Two Dams in the Province of Oubritenga (Burkina Faso)**

D. Zongo, B.G. Kabre, D. Dianou, B. Savadogo and J.N. Poda

A study on malacological factors in the transmission of *Schistosoma haematobium* took place in December 2007 at the villages of Daguilma and Tanguiga in Burkina Faso in order to combat schistosomiasis is diversified both in humans than in the intermediate host. A malacological investigation was followed by a parasitological study in order to give a progress report on the dynamics of urinary schistosomiasis and also, that of the mollusc intermediary host in the study area. Malacological Investigations at the dams of the two villages indicated *Bulinus truncatus* mollusk as host responsible for the transmission of urinary schistosomiasis. The natural infestation tests underscored that only *Bulinus truncatus* was responsible for the transmission of urinary schistosomiasis. The parasitological results obtained showed an overall prevalence rate of *Schistosoma haematobium* from 11.2 to 15.6% and Daguilma to Tanguiga. The study by sex showed that Daguilma, the difference in prevalence was not significant ( $p = 0.2311$ ) among men (16.6) and females (06.4%). In contrast to Tanguiga, this difference in prevalence between men (23.4) and women (03.3%) showed a slight significance ( $p = 0.0407$ ). The results concerning parasite *Schistosoma haematobium* and malacological and in the villages of Daguilma and Tanguiga has helped to highlight the expansion of urinary schistosomiasis; the importance of the behaviour of the local population and the presence of *Bulinus truncatus* in the dam of Daguilma village. (*Research Journal of Environmental Sciences* 3 (1): 127-133, 2009; doi: 10.3923/rjes.2009.127.133)

### **Sedimentological and Mineralogical Investigation of Beach Sediments of a Fast Prograding Cuspate Foreland (Point Calimere), Southeast Coast of India**

M. Sundararajan, Usha Natesan, N. Babu and P. Seralathan

Beach sediments from the Point Calimere coast are studied for composition and for deciphering their origin and mode of deposition. The sediments are medium to fine sand. Heavy mineral suits are pyroxenes, amphiboles, muscovite, staurolite, ilmenite, sillimanite, zircon and garnet. The presence of pyrite under XRD indicates

chemical precipitation under anoxic conditions. Quartz, orthoclase and oligoclase are lighter minerals identified under XRD. SEM micro-morphological features of quartz grains show both high wave and low energy conditions chemical actions. The conchoidal features, breakage blocks are inherited from the source itself before its deposition at Point Calimere while vast majority of chemical features like etch vs, precipitation features etc originate after deposition. (*Research Journal of Environmental Sciences* 3 (2): 134-148, 2009; doi: 10.3923/rjes.2009.134.148)

### **The Planktonic Community Structure and Fluxes Nutrients in the Sefid-Rood River Estuary (South Caspian Sea)**

M.R. Rahimibashar, A. Esmaeili-Sary, S.A. Nezami, A. Javanshir, S.M. Reza Fatemi and S. Jamili

The aim of this study was to examine spatial and temporal variability in phytoplankton and zooplankton abundance and diversity in Sefid-Rood River Estuary (SRE). Variability of Chlorophyll a and inorganic nutrient concentration were determined during a year (November 2005- October 2006) in five sampling stations. Total chlorophyll a concentration during the investigation ranged between zero to  $22.8 \mu\text{g L}^{-1}$  and the highest levels were consistently recorded during Summer and the lowest during winter with a annual mean concentration  $4.48 \mu\text{g L}^{-1}$ . Nutrient concentration was seasonally related to river flow with annual mean concentration:  $\text{NO}_2$   $0.05 \pm 0.2$ ,  $\text{NO}_3^-$   $1.13 \pm 0.57$  and  $\text{NH}_4^+$   $0.51 \pm 0.66 \text{ mg L}^{-1}$ , total phosphate  $0.13 \pm 0.1$  and  $\text{SiO}_2$   $5.68 \pm 1.91 \text{ mg L}^{-1}$ . *Bacillariophytes*, *Cyanophytes*, *Chlorophytes*, *Pyrophytes* and *Euglenophytes* were the dominant phytoplankton groups in this shallow and turbid estuary. The diversity and abundance of phytoplankton had a seasonal pattern while *Diatomas* and *Chrysophytes* were dominant throughout the year but *Cyanophytes* observed only during the Summer. Zooplankton community structure was dominated by copepods which 68% of the total Zooplankton. In the winter and summer seasons two increased in the number of zooplankton community and usually toward the sea had occurred. Zooplankton also showed a significant spatial and temporal variation. The high turbidity and temperature prime characteristics of SRE seem to be determining factors acting directly on Phytoplankton and Zooplankton temporal variability and nutrient fluctuations. Everywhere in this estuary nutrients appeared to be in excess of algal requirement and did not influence an phytoplankton and zooplankton composition. Also there was a positive correlation between chlorophyll a and temperature and a negative one with DIN and TP. (*Research Journal of Environmental Sciences* 3 (2): 149-162, 2009; doi: 10.3923/rjes.2009.149.162)

## **The Trend of HATS Nitrate Uptake in Response to Nitrate and Glutamine in *Nicotiana plumbaginifolia* Plant**

P. Zoufan and M. Shariati

Present study was conducted to investigate and characterize the effect of nitrate and Gln (glutamine) on the trend and rate of nitrate uptake by HATS (High-affinity transport system) in *Nicotiana plumbaginifolia* plant under hydroponic system using ion depletion technique. The plants were grown at 16 h light/8h dark at 24/20°C, 70% humidity, 150  $\mu\text{mol m}^{-2} \text{sec}^{-1}$  light intensity and on the commercial soil with NPK fertilizer. About 28-day plants were transferred to hydroponic media containing complete nutrition solution with 0.5 mM  $\text{NO}_3^-$  at the same growth conditions for 1 week. To better understanding of time-course of HATS induction, starved plants of nitrogen for 7 days were supplied with 5 different concentrations including 10, 50, 75, 100 and 150  $\mu\text{M NO}_3^-$ . Monitoring of trend of  $\text{NO}_3^-$  absorption showed that at least 2 h is adequate to induce HATS activity at 150  $\mu\text{M NO}_3^-$ . A surprising finding was that transfer N-starved plants to media containing high concentration of  $\text{NO}_3^-$  (10 mM) for 48 h resulted in increasing the rate of  $\text{NO}_3^-$  uptake by HATS. Amino acid Gln applied to N-deprived plants either as pretreatment or with  $\text{NO}_3^-$  significantly inhibited nitrate uptake by HATS compared to control conditions. The results collectively indicate that high-affinity nitrate transport is regulated by nitrate itself and the metabolites of its assimilation such as amino acids. (*Research Journal of Environmental Sciences* 3 (2): 163-173, 2009; doi: 10.3923/rjes.2009.163.173)

## **Possible Controlling Effects of Cover Crops on Weeds in Subsequent Cultivation (Corn) under Different Tillage Methods**

A. Tobeh, Sh. Jamaati-e-Somarin, M. Panahyan-e-Kivi and M. Shiri

In order to investigation of possible controlling effects of cover crops on weeds in subsequent cultivation (Corn) under Different Tillage Methods, two factorial experiment based on randomized complete block design were carried out in Karaj, Iran, in 2006, in two separate parts of a farmland considering great variations in growth and diversity of weeds. The main factor was cover crops including control (without crop cover), hairy vetch, Persian clover and rye and the second factor was planting date of cover crops under surface or disk tillage and common or moldboard tillage. One experiment was done before corn cultivation according to initial plot plan under disk tillage and another one was carried out under moldboard tillage with cultivation of corn SCK108. Results showed that

inhibition potential of these two crops is higher due to higher N content of their aerial and root system (residue) that lead to increase in mean mineral and organic N content under disk tillage. It is possible that released inhibitors with higher remained N in soil had toxicity effects on weed germination, so that weed plant number and density decreased with the increase in N content of vetch and clover residue. The plant number of these weeds significantly decreased through planting vetch, Persian clover or rye as cover crop under surface tillage compared to control. Their TDW in the presence of vetch and Persian clover was significantly lower than that in the rye and control treatments under same tillage method. Similarly, soil mineral N content in the depth of 20-40 cm aggregately in three planting date under disk tillage in vetch and clover treatments was significantly higher than that in rye treatment that corresponds to the status of weeds. The amount of mineral N content was highest in rye treatment among all treatments under moldboard tillage. Among two kinds of tillage, surface or disk tillage had better results compared to common or moldboard tillage. It seems that nowadays surface tillage by different implements was extensively used in the cultivation of different crops under different conditions. (*Research Journal of Environmental Sciences* 3 (2): 174-183, 2009; doi: 10.3923/rjes.2009.174.183)

### **The Effect of Seed Aging on the Seedling Growth as Affected by Environmental Factors in Wheat**

E. Soltani, S. Galeshi, B. Kamkar and F. Akramghaderi

The present study was conducted to evaluate the effect of seed aging (seed quality) on germination, emergence and seedling growth of wheat under optimum (control) and stressful conditions including salinity (2 levels), drought (2 levels) and deep sowing depth (physical stress). Seeds (cv. Zagros) were kept at a high temperature (43°C) and high relative humidity (90-95%) to create different classes of seed aging. Factorial combinations of 5 seed aging treatments (0, 48, 72, 96 and 144 h accelerated aging periods) and 6 levels of environmental factor were treatments of the experiment. Maximum and rate of emergence reduced significantly with increase in the duration of accelerated aging. The ranking of the stress factors from most to least harmful for maximum emergence were: severe drought, severe salinity and sowing depth of 7 cm, medium drought and medium salinity. Seed aging significantly decreased leaf area and seedling dry weight at the first harvest, but reduction in these characteristics was not significant at the second harvest. The ranking of the importance of stress conditions in terms of harmful effects on the leaf area and seedling dry weight were severe drought, medium drought, severe salinity and sowing depth of 7 cm and medium salinity. Seed aging

had no a pronounced effect on the number of leaf at the first or second harvests. (*Research Journal of Environmental Sciences* 3 (2): 184-192, 2009; doi: 10.3923/rjes.2009.184.192)

### **Determination of Runoff Threshold Using Rainfall Simulator in the Southern Alborz Range Foothill-Iran**

J. Vahabi and M. Ghafouri

In this research, the effects of slope, vegetal cover percentages, clay, sand, silt and moisture percentages on runoff generation threshold have been investigated using an outdoor rainfall simulator in an Iranian watershed. Two rainfall intensities of 24.5 and 32 mm h<sup>-1</sup> were tested over 145 experimental plots in Taleghan watershed and runoff thresholds were recorded. Visual interpretation of the scatter diagrams of both dependent and independent variables supported by the correlation matrix indicates the effective variables in runoff generation for 24.5 mm h<sup>-1</sup> as vegetal cover percentage, soil moisture, clay, sand, silt and slope, respectively. The orders of the effective variables for intensity of 32 mm h<sup>-1</sup> are vegetal cover, sand, soil moisture, silt, slope percentages and clay. Regression equations are developed and evaluated for runoff threshold prediction in different conditions of independent variables variations. (*Research Journal of Environmental Sciences* 3 (2): 193-201, 2009; doi: 10.3923/rjes.2009.193.201)

### **Investigation of Some Models Derived from Data Layers Integration in Geographic Information System with Slope Layer for Providing Water-Soil Erosion Types Maps**

A. Mohammadi Torkashvand and Naghi Haghighat

The aim of this study is to investigate some models of data layers integration and slope layer (GIS) for providing erosion types maps in Roodbar sub-basin, downstream Sefidrood dam. From topographic layer, DEM was provided and then from that, four slope layers with different categories of slope were prepared. Nine working units' maps were provided from the integration of the land use, rocks erodibility, land unit and different slope layers. In basin, 652 ground control points were investigated with the view of erosion features (surface, rill and gully erosions) and the point's position were recorded by GPS. Homogenous points percent with the view of the surface erosion, rill erosion, gully erosion and erosion features were computed to derive the accuracy of working units. Mean accuracy of these working units has been considered as the accuracy of working units maps.

Results indicated in providing erosion features, using slope layer is led to the high numbers of small area working units that in addition to increase in field controls expenses and executive limitations, it is also accompanied with cartographic limitations. Overall accuracy and precision of the model derived from the integration of land use, land units and rocks erodibility layers was investigated as compared with truth maps of surface, rill and gully erosions and erosion features map. Results indicated that this model can be used in providing erosion types maps with accepting error, but without forest land use, it is not proposed. (*Research Journal of Environmental Sciences 3 (2): 202-209, 2009; doi: 10.3923/rjes.2009.202.209*)

### **Abundance and Distribution of Benthic Foraminifera in the Northern Oman Sea (Iranian Side) Continental Shelf Sediments**

B. Moghaddasi, S.M.B. Nabavi, G. Vosoughi, S.M.R. Fatemi and S. Jamili

Abundance and distribution of benthic Foraminifera, in the Northern Oman Sea (Iranian side) continental shelf sediments was studied. Sediment samples were gathered in Winter 2006, from eight stations ranging in depth from 30 to 103 m. Environmental conditions including water depth, temperature, dissolved oxygen, salinity, pH, grain size, total organic matter and calcium carbonate concentration were measured and their relationship with the distribution of benthic foraminifera was discussed. Forams were the most abundant meiobenthic group in nearby all the stations. The suborder ROTALIINA was dominant in the northern region while LAGENINA, MILIOLINA and TEXTULARIINA, were being abundant in the northwest region too. LAGENINA were being very abundant in the stations with higher depth. From the total 40 species belonging to 24 genera, *Ammonia beccarii* was common in the whole research region. Water depth, salinity and substrate seemed to be the most important environmental factors controlling the distribution of benthic foraminifera. None or rare structural abnormal and oil polluted individuals, in nearby all stations, leading to the clean benthic environment of the Oman Sea benthic zone. (*Research Journal of Environmental Sciences 3 (2): 210-217, 2009; doi: 10.3923/rjes.2009.210.217*)

### **Morphological and Structural Characteristics of the Hemocytes of the *Anodonta cygnea***

S. Jamili, L. Salimi, A. Motalebi and M. Rostami-Beshman

The Anodont (*Anodonta cygnea*) constitutes one of the most important bivalves along of Anzali Lagoon. In last decade, Anodont have suffered a high degree of

mortality. Introduce of the morphological characterization of hemocytes is a prerequisite to further exploring the causes of death in bivalves, therefore in this study, the circulating hemocytes of the *Anodonta cygnea* in Anzali Lagoon were identified. At first, two types of hemocytes were recognized, granulocytes and agranulocytes, were identified based on the existence of cytoplasmic granules under light microscopy. The hemocytes were then stained and the granulocytes subclassified into eosinophilic and basophilic granulocytes and an intermix. The eosinophilic granulocytes were distinctive small and large granules. Agranulocytes could be subdivided into hyalinocytes and blast-like cells and another cell type, vesicular cells, was observed as unclassified cells. Results were compared with similar researches about other bivalves observations. (*Research Journal of Environmental Sciences* 3 (2): 218-224, 2009; doi: 10.3923/rjes.2009.218.224)

### **Protein Profiles in Response to Salt Stress in Seeds of *Brassica napus***

H. Mahmoodzadeh

Canola plants, salt tolerant cv. (Okapi) and salt sensitive cv. (Symbol) were grown in greenhouse conditions in presence or absence of different concentrations of NaCl. Inhibition of plant growth and modification of plant morphology are the most sensitive responses of canola plant to salt stress. The ratio of fresh weight to dry weight of plants after stress application of NaCl was strongly increased in comparison to their corresponding control. Electerophoretic analysis of total soluble protein (SDS-PAGE) profiles were carried out in order to evaluate the response of canola cultivars to salt stress. SDS-PAGE analysis has revealed that plant grown under NaCl showed induction in the synthesis of few polypeptide in seeds. Increasing of these proteins was greater in tolerant cv. than the sensitive. This differences reflected the biochemical adjustment of the plant to cope with the saline conditions. These results can be translated into efforts aimed to develop salt tolerant cultivars and maximize the use of saline soils. (*Research Journal of Environmental Sciences* 3 (2): 225-231, 2009; doi: 10.3923/rjes.2009.225.231)

### **Study the Gap Wind in the Sepeed-Rood Valley of Iran Using a Hydraulic Model**

A. Sedaghatkarder, S. Sehatkashani, A.A. Bidokhti and A.A. Majborian

The aim of this study was to apply a hydraulic model for the gap flow in the Sepeed Rood valley to assess the roles of factors such as sea breeze affecting the



flow in the gap. The valley is considered as a narrow passage in Alborz mountain range in which the remarkable air flow causes intensive winds in its route cities such as Rood Bar and Manjil. Since the gap winds are considered as the condensed air flow in low levels which are horizontally limited by the channel rims and vertically by temperature inversion, it is similar to the flow in a channel and the hydraulic model can be applied for it. The application of scale analysis indicates the strength of  $F_0$  term related to the contribution of heat forcing circulation such as sea breeze which plays a role for creating the winds with the average daily velocity much bigger than the night most especially in summer days. Moreover it indicates the validity of Bernoulli equation application in winter most especially when the regional circulations are weak and synoptic forcing is the dominant factor in the gap wind, while in summer the effects of regional circulations such as sea breeze are more noticeable. (*Research Journal of Environmental Sciences* 3 (2): 232-238, 2009; doi: 10.3923/rjes.2009.232.238)

### **Investigation of Water Stress on Yield and Yield Components of Sesame (*Sesamum indicum* L.) in Moghan Region**

M. Hassanzadeh, A. Ebadi, M. Panahyan-e-Kivi, Sh. Jamaati-e-Somarin, M. Saeidi and A. Gholipouri

In order to investigate the effects of water stress on yield and yield components of 27 sesame genotypes, a factorial experiment based on randomized complete block design with three replications was conducted in 2006 in Moghan region, Iran. Factors were, 27 sesame genotypes (Karaj 1, Yekta, Oltan, Moghan 17, Naz takshakheh, Naz chandshakheh, Borazjan 2, Borazjan 5, Darab 14, Varamin 37, Varamin 237, Varamin 2822, Zoodrass IS, Hendi, Chini, Yellow white, 5089, Panama, Do-1, TF-3, TKG-21, J-I, RT-54, Hendi 9, Hendi 12, Hendi 14 and Jiroft) and second factor was irrigation levels (complete irrigation and irrigation until flowering). Results showed that the highest yield belonged to Karaj1, Oltan, Naz takshakheh and Varamin 237 of 861.87, 863.47 and 859.73 kg ha<sup>-1</sup>. Naz takshakheh had the highest 1000-seed weight of 3.771 g. The highest seed No. per capsule and No. of capsule per plant was related to Chini and Naz chandshakheh genotypes of 107.250 and 99.13, respectively. So, Karaj 1, Oltan, Naz takshakheh and Varamin 237 genotypes in order to planting under drought stress conditions are recommended. (*Research Journal of Environmental Sciences* 3 (2): 239-244, 2009; doi: 10.3923/rjes.2009.239.244)

## **Isolation and Characterization of Microcystins (Heptapeptides Hepatotoxins) from *Microcystis aeruginosa* Bloom in a Homestead Pond, Dhaka, Bangladesh**

Md. Sagir Ahmed

A bloom of *Microcystis aeruginosa* occurred in a homestead pond in Rupgoanj, Dhaka. Bloom sample was collected and filtered through a glass fiber filter. Methanol-water extract of filtered cells were analyzed by High Performance Liquid Chromatography (HPLC) with UV, MS and MS-MS detection, detected three types of microcystins viz., Microcystin-RR, Microcystin-YR and Microcystin-LR and those were confirmed by HPLC-MS. The amount of MC-LR was the highest ( $34.8 \mu\text{g L}^{-1}$ ) followed by MC-RR ( $16.8 \mu\text{g L}^{-1}$ ) and MC-YR ( $10.9 \mu\text{g L}^{-1}$ ). The concentration of microcystins was well above the WHO provisional guideline value of  $1 \mu\text{g L}^{-1}$  MC-LR. Further investigations need to characterize other types of microcystins from bloom forming cyanobacteria and their effect on human health and cultured fish in Bangladesh. (*Research Journal of Environmental Sciences* 3 (2): 245-250, 2009; doi: 10.3923/rjes.2009.245.250)

## **Production of Mannan-Degrading Enzymes from *Aspergillus niger* and *Sclerotium rolfsii* Using Palm Kernel Cake as Carbon Source**

S. Abd-Aziz, N.A. Ab-Razak, M.H. Musa and M.A. Hassan

The aim of this study is to produce and profile the mannan-degrading enzymes from local fungal isolates by submerged fermentation and saccharification of PKC. Results showed that *Aspergillus niger* and *Sclerotium rolfsii* can produce mannan-degrading enzymes. The fungi were grown in submerged fermentation of PKC to produce mannan-degrading enzymes. The highest alpha-galactosidase was obtained on day 13 of fermentation ( $0.128 \text{ U mL}^{-1}$ ) when using *A. niger* and on day 18 ( $0.126 \text{ U mL}^{-1}$ ) when using *S. rolfsii*. Analysis also showed that enzyme activities for beta-mannanase using *S. rolfsii* were the highest at day 17 ( $3.166 \text{ U mL}^{-1}$ ) and for *A. niger* ( $2.482 \text{ U mL}^{-1}$ ) at day 8. Meanwhile the highest beta-mannosidase were obtained at day 16 for *A. niger* ( $0.128 \text{ U mL}^{-1}$ ) and for *S. rolfsii* at day 16 ( $0.116 \text{ U mL}^{-1}$ ). (*Research Journal of Environmental Sciences* 3 (2): 251-256, 2009; doi: 10.3923/rjes.2009.251.256)

## **Morphology and Nutrient of Leaf in *Quercus castaneifolia* Seedling as Affected by Blackberry (*Rubus fruticosus* L.)**

J. Karami and M. Tabari

Morphology and nutrient of leaf in *Quercus castaneifolia* (C.A.Meyer) seedlings in competition with blackberry (*Rubus fruticosus* L.) was investigated in an intervened lowland forest of Noor city, north of Iran. The research was conducted as factorial experiment in three replications. For this purpose, seedlings of small (3 mm) and large (4 mm) in collar diameter (CD) were sown in two treatments (i) covered with *Rubus* and (ii) moved from *Rubus* in 0.5 m radius around the *Quercus* seedling, replicated three times. In the end of the first growing season, leaf samples were randomly taken from 9 seedlings in each treatment in order to determine leaf number, leaf dry matter, leaf area, growth flush number, apical shoot growth and concentrations of leaf nutrient (N, P, Mg and Ca). Leaf dry matter did not differ among the treatments. Leaf number and leaf area were greatest with large CD seedlings growing in moved *Rubus* area. The greatest apical shoot growth was observed with large CD seedlings growing in full *Rubus* area. The same as growth flush number, concentration of P, N and Mg was greatest with small CD seedlings in moved *Rubus* area. From this research it can be deduced that the seedlings growing in moved *Rubus* area produce greater plant biomass and mineral nutrient matter. (*Research Journal of Environmental Sciences* 3 (2): 257-261, 2009; doi: 10.3923/rjes.2009.257.261)

## **Radiation Dose Survey of Refuse Dumpsites in Abeokuta in Ogun State in the Southwestern Zone of Nigeria**

R.K. Odunaike, S.K. Alausa, O.O. Fasunwon, B.A. Orunsolu and G.C. Ijeoma

This study aimed at employing radiation detection method to examine the total radiation intensity of 20 identified dumpsites in Abeokuta, the capital of Ogun state in the Southwestern part of Nigeria. The result which is comparable to those reported for environs in Nigeria and the World showed the absorbed dose rate from the dumpsites ranged from 12.3 to 49.1  $\mu\text{Sv year}^{-1}$  and the mean annual absorbed dose rate of 36.0  $\mu\text{Sv year}^{-1}$ . The results indicated that the observed radiation dose is minimal when compared to Nigeria's average and the world average but no matter how low; all levels of radiation still constitute a hazard. However, it is recommended that these dumpsites be managed or the wastes be converted to useful raw materials through employment generation. (*Research Journal of Environmental Sciences* 3 (2): 262-266, 2009; doi: 10.3923/rjes.2009.262.266)

## **Membrane Bioreactor for Wastewater Reclamation-Pilot Plant Study in Jeddah, Saudi Arabia**

Turki M. Alaboud

This study conducted investigations at a pilot scale MBR plant, located in Al Khomra, Jeddah for a period of three months. The plant received wastewater from a residential area and adjoining workshops. Irrespective of the applied Mixed Liquor Suspended Solids (MLSS) concentrations (10, 15 and 20 g L<sup>-1</sup>) and hydraulic retention times, HRT (8, 6 and 3 h), the MBR units realized excellent organics, nutrients and pathogen removal performances. In the course of the investigation, the influent Biochemical Oxygen Demand (BOD) (198-253 mg L<sup>-1</sup>), Chemical Oxygen Demand (COD) (445-575 mg L<sup>-1</sup>), Total Kjeldhal Nitrogen (TKN) (18-26 mg L<sup>-1</sup>) and Total Phosphorous (TP) (8.6-13.6 mg L<sup>-1</sup>) were removed with efficiencies varying within the ranges of 95-98, 90-95, 98.64-100 and 40-50%, respectively. A 2.1-3.1 log removal of fecal coliforms and a 5-6 log removal of total Coliforms were also accomplished. The best quality effluent achieved during this investigation convincingly satisfied the quality requirements for reuse for irrigation purpose in the country. Furthermore, severe membrane fouling, requiring chemical cleaning, was not encountered during the operation period. (*Research Journal of Environmental Sciences 3 (2): 267-277, 2009; doi: 10.3923/rjes.2009.267.277*)

## **Evaluation of Tuber Size and Nitrogen Fertilizer on Nitrogen Uptake and Nitrate Accumulation in Potato Tuber**

M. Saeidi, A. Tobeh, Y. Raei, A. Roohi, Sh. Jamaati-e-Somarin and M. Hassanzadeh

In order to investigate tuber size and nitrogen fertilizer on nitrogen uptake and nitrate accumulation in potato tuber cultivar Agria, a factorial experiment based on randomized complete block design with three replications was carried out in Ardabil, Iran, in 2006. Factors were nitrogen fertilizer level (0, 80, 160 and 200 kg ha<sup>-1</sup> net nitrogen) and tuber size (<40 = small, 40-80 = medium and >80 = large, g). Results showed that the most tuber yield, No. of tuber per plant, mean tuber weight and tuber dry weight were resulted at medium tuber size. Also, the most tuber yield, mean tuber weight, tuber dry weight and tuber nitrogen percent were observed at 160 kg ha<sup>-1</sup> nitrogen. The most nitrogen taken up in tuber and aerial parts and nitrate accumulation in fresh and dry weight was gained at 200 kg ha<sup>-1</sup> nitrogen and medium size. The most important result from this study

was that nitrogen application over the favorite values, resulted in reduction of crop production along with increasing nitrate accumulation in tubers. So, nitrogen value of 160 kg ha<sup>-1</sup> and medium tuber size to get the highest yield and suitable planting and eating usages are recommended, respectively. (*Research Journal of Environmental Sciences* 3 (3): 278-284, 2009; doi: 10.3923/rjes.2009.278.284)

### **Influence of Nitrogen, Phosphorus and Potassium Fertilizer on Biochemical Contents of *Asparagus racemosus* (Willd.) Root Tubers**

N. Vijay, A. Kumar and A. Bhoite

This research attempts to investigate the influence of N, P and K on chlorophyll, carbohydrate, proteins and saponin contents of *Asparagus racemosus* (Willd.). The treatment consisted different concentrations of nitrogen (N 20, N 40, N 80 and N 160 mg kg<sup>-1</sup>), phosphorus (P 20, P 40, P 80 and P 160 mg kg<sup>-1</sup>) and potassium (K 40, K 80 and K 160 mg kg<sup>-1</sup>) in the form of Urea (46%, H<sub>2</sub>NCONH<sub>2</sub>), superphosphate (16%, P<sub>2</sub>O<sub>5</sub>) and muriate of potash (60% K<sub>2</sub>O), respectively. A significant increase in the chlorophyll content was recorded with all the applications of N, P and K. Root protein and carbohydrate contents were found linearly increase with K treatment while a slight decline was found with the higher dosage of N. Root saponin content was 1.66, 1.87 and 1.75 folds higher than the control with N, P and K, respectively. Application of Phosphorus was found to be best for growth and biochemical contents of root tuber. (*Research Journal of Environmental Sciences* 3 (3): 285-291, 2009; doi: 10.3923/rjes.2009.285.291)

### **Heavy Metal (Cu, Zn, Pb) Contamination of Vegetables in Urban City: A Case Study in Lagos**

K.A. Yusuf and S.O. Oluwole

Five leafy vegetable species (*Talinum triangulare*, *Celosia argentea*, *Amaranthus viridis*, *Cucurbita maxima* and *Corchorus olitorius*) sold in Lagos markets were investigated for Cu, Pb and Zn content by atomic absorption spectrophotometry. Both unwashed and washed leaves showed the highest amounts of heavy metals in the urban area. Unwashed leaves showed greater difference between urban and remote areas and among the urban sites than washed leaves for heavy metal concentrations. Water-washing resulted in a significant (p<0.001) decrease in vegetable concentrations of Cu, Zn and

Pb. However, the levels of Cu and Zn did not indicate excessive contamination that could be considered a serious health hazard to the consumers. (*Research Journal of Environmental Sciences* 3 (3): 292-298, 2009; doi: 10.3923/rjes.2009.292.298)

### **Past Runoff Trend for Declivitous Farms of Iran**

M. Gholipoor

The regionally determination of direction of runoff changes is a challenging task. This simulation study was aimed to evaluate the past changes in runoff for sloped farms of five locations in Iran (Isfahan, Shiraz, Kermanshah, Tabriz and Mashhad) in 2006-2007. The soil water balance sub-model of CYRUS model with some modifications was used to calculate the value of runoff over monthly and yearly periods and over growing period of chickpea. The model was run for the daily weather data set from 1961 (or 1966) to 2004. Linear regression analyses were used to determine the trends (slopes) in value of runoff. The results indicated that in Isfahan, the value of runoff has increased for January, March and yearly period; on the other hand, it has had a downwardly change for April; runoff has shown statistically steady state for the rest months of the year. It appeared to have upwardly trend just for December in Shiraz. In Kermanshah, it was found the increasing trend in runoff for December, but decreasing trend for February and May. The months February and November have experienced the increasing risk of runoff in Tabriz and Mashhad, respectively. Over growing period of chickpea, this risk has been diminishing for Isfahan and Kermanshah; while it found to be constant for other locations. There is a consensus for inversed relation between recommendable slopes of land for planting the crops, including chickpea and risk of runoff; hence, it can be said that the recommendable slopes for planting the chickpea (*Cicer arietinum*) in declivitous farms of Isfahan and Kermanshah is steeper in 2000s as compared to those in 1960s. (*Research Journal of Environmental Sciences* 3 (3): 299-310, 2009; doi: 10.3923/rjes.2009.299.310)

### **Heavy Metal (Pb, Cd, Zn, Cu, Cr, Fe and Mn) Content in Textile Sludge in Gazipur, Bangladesh**

M.M. Islam, M.A. Halim, S. Safiullah, S.A.M. Waliul Hoque and M. Saiful Islam

The present research was carried out with eight specimens of sludge from Apex Weaving and Finishing Mills Ltd. Gazipur, Bangladesh, to determine the concentration of heavy metals (Pb, Cd, Zn, Cu, Cr, Fe and Mn) in the sludge

samples and an assessment was made with the heavy metal content in agricultural soil. Atomic Absorption Spectrometry (AAS) method was employed for the analysis of Pb, Cd, Cr, Zn, Cu and UV-Spectrophotometric method was used for Fe and Mn, respectively. The mean concentration of lead (Pb), cadmium (Cd), chromium (Cr) was 79.13, 6.27, 4.35 mg kg<sup>-1</sup> and for zinc (Zn), copper (Cu), iron (Fe) and manganese (Mn) it was 7.90, 1.34, 195.2 and 3.97 g kg<sup>-1</sup>, respectively. All the heavy metal concentrations except chromium in the sludge samples were higher than that of in agricultural soil. In addition, the study concluded that pre-treatment process for reducing the amount of heavy metal is mandatory before the sludge can be used as a soil conditioner or fertilizer in the agricultural soil. (*Research Journal of Environmental Sciences 3 (3): 311-315, 2009; doi: 10.3923/rjes.2009.311.315*)

### **The Effect of Oil-Spillage on the Soil of Eleme in Rivers State of the Niger-Delta Area of Nigeria**

T.A. Abii and P.C. Nwosu

Two oil-spill affected areas (Ogali and Agbonchia) were identified as the study areas while a geographically similar but unaffected area (Aletto) served as control. Sampling site was delimited at each area by the grid technique and soil samples were collected at top surface 0-15 cm and sub-surface 130 cm depth. Some physiochemical properties that reflect soil nutrient content and fertility status (K, Ca, Mg, C, P, pH, Cation Exchange Capacity (CEC) and structure) were determined using standard methods and results from the three areas were compared. There was a significant decrease in the Ca K, P (CEC), as well as a significant increase in the sand fraction and Na content of the oil-spill affected soils of (Ogali and Agbonichia) when compared with the non-affected soil of (Aletto). The acidic nature of the soils could not be attributed entirely to the oil spill since the control soil of Aletto was equally acidic. The results indicate that oil-spill has adversely affected the nutrient level and fertility status of Eleme soil, necessitating the inclusion of Eleme in the ongoing remediation technique for soil cleaning in Rivers State. (*Research Journal of Environmental Sciences 3 (3): 316-320, 2009; doi: 10.3923/rjes.2009.316.320*)

### **Evaluation and Slope Instability Hazard Zonation in Part of Tajan Basin, Sari, Iran, by Anbalagan Method**

K. Solaimani, S. Mashari and S.R. Moosavi

The aim of this study is an experimental investigation on landslide hazards in Tajan Basin and its increasing due to land use changing, deforesting, road and other

construction. The main strategy for restricting the damage caused by the activity of landslides is to avoid these regions. To accomplish this, landslide zonation hazard map of the area is required. There are different methods for zoning of different regions in term of susceptibility to landslide. Because of geological conditions of the study area, Anbalagan method purposed to gain the results. For landslide hazards zonation map the required maps of slope, aspect, land use, lithology, structural lithology, ground water, landform and facet map prepared using GIS software of Arc view and Arc map related to Anbalagan method. For the accuracy evaluation of the used method landslide distribution map provided for the study area which has compared with the landslide zonation map. The results showed that the most of landslides are occurred in VHH zone (28%) and HH zone (55.5%) and the rest of them are occurred in MH zone, which have predicted by the mentioned method. The results of fieldwork performed in summer 2008 with the method of Anbalagan were used to assess slope failure. (*Research Journal of Environmental Sciences* 3 (3): 321-331, 2009; doi: 10.3923/rjes.2009.321.331)

### **Effects of Mineral Nitrogen on Water Use Efficiency of Chickpea (*Cicer arietinum* L.) under Water Deficit Condition**

Nayer Bahavar, Ali Ebadi, Ahmad Tobeh and Shahzad Jamaati-E-Somarin

This experiment was conducted to determine water use efficiency of chickpea (cv. Arman) under water deficit condition and different mineral N application. The experiment was arranged in growth chamber of Mohaghegh Ardabili University, Ardabil, Iran, in 2007, with three nitrogen levels (25, 50 and 75 kg N ha<sup>-1</sup> as urea) and five irrigation regimes (soil water content of 25, 45, 65, 85 and 100% field capacity). The experiment was laid out in randomized complete block design (factorial) experiment with three replications. Results showed that water stress affect Water Use Efficiency (WUE), Relative Water Content (RWC), Leaf Area (LA), leaf number after stress induction, biomass (above ground tissues) and root/shoot ratio (R/S) traits. Application of Mineral nitrogen increased water use efficiency, RWC, leaf area and biomass. Maximum amount of WUE, RWC, biomass and LA obtained from 75 kg N ha<sup>-1</sup> under water deficit condition. This experiment revealed that nitrogen fertilizer could reduce many detrimental effects of water stress. These results also suggest that using of nitrogen fertilizer in water deficit conditions (such as dry land farming areas) increase tolerance of plants to stress. (*Research Journal of Environmental Sciences* 3 (3): 332-338, 2009; doi: 10.3923/rjes.2009.332.338)



## **Determination of Pb, Ni, Hg, Cr, Cd in Edible Vegetables in the West South of Tehran Province with Atomic Absorption**

Eftekhar Shirvani Mahdavi

In this research, edible vegetables from Babasalman and Eslamshahr regions were sampled in summer 2007 from farms for which well water was used. The samples were then prepared and concentration of the trace elements were determined by using atomic absorption spectrometry in Iranian Atomic Energy Agency. According to the analysis the minimum and maximum concentration of Pb  $0.0050 \pm 0.0001$  ppm in mint (stem) of Babasalman and  $0.0645 \pm 0.0010$  ppm in radish (leaf) of Eslamshahr, Ni  $0.0004 \pm 0.0001$  ppm in radish (root) of Babasalman and  $0.0175 \pm 0.0001$  ppm in bulbil (root) of Eslamshahr, Cr  $0.0903 \pm 0.0006$  ppm in radish (root) of Babasalman and  $0.8801 \pm 0.0036$  ppm in mint (leaf) of Eslamshahr, respectively. Minimum of Cd concentration was lower than detection limit of spectrometer and maximum was  $0.0816 \pm 0.0002$  ppm in radish (leaf) of Babasalman and concentration of Hg was lower than detection limit of spectrometer in all of the samples and only was  $0.1399 \pm 0.0002$  ppm in cress of Babasalman. (*Research Journal of Environmental Sciences* 3 (3): 339-344, 2009; doi: 10.3923/rjes.2009.339.344)

## **Evaluation of Drought Stress on Relative Water Content and Chlorophyll Content of Sesame (*Sesamum indicum* L.) Genotypes at Early Flowering Stage**

M. Hassanzadeh, A. Ebadi, M. Panahyan-e-Kivi, A.G. Eshghi, Sh. Jamaati-e-Somarin, M. Saeidi and R. Zabihi-e-Mahmoodabad

In order to evaluate drought stress on relative water content (RWC) and chlorophyll content of 27 Sesame genotypes, a factorial experiment based on randomized complete block design with three replications was conducted in 2006 in Moghan region, Iran. Factors were 27 Sesame genotypes (Karaj 1, Yekta, Oltan, Moghan 17, Naz takshakheh, Naz chandshakheh, Borazjan 2, Borazjan 5, Darab 14, Varamin 37, Varamin 237, Varamin 2822, Zoodrass IS, Hendi, Chini, Yellow white, 5089, Panama, Do-1, TF-3, TKG-21, J-I, RT-54, Hendi 9, Hendi 12, Hendi 14 and Jiroft) and irrigation levels (full irrigation and irrigation until flowering stage). Results showed that Varamin 2822 and Varamin 237 genotypes had the highest RWC of 84.100 and 81.217%, respectively. The most chlorophyll a content was observed in Hendi 9 genotype of 106.237, the most chlorophyll b in Karaj 1 genotype of 84.665 and the most chlorophyll total in Hendi genotype of 182.395 mg g<sup>-1</sup> leaf fresh weight. It seems that Varamin 2822 genotype having

the highest RWC and Hendi 9 and Hendi genotypes having the most chlorophyll a and chlorophyll total, respectively, are recommended for planting in arid and semi-arid conditions. (*Research Journal of Environmental Sciences 3 (3): 345-350, 2009; doi: 10.3923/rjes.2009.345.350*)

### **Effects of Water Deficit and Potassium Humate on Tuber Yield and Yield Component of Potato Cultivars in Ardabil Region, Iran**

Davoud Hassanpanah

This experiment carried out on three potato cultivar [Agria (susceptible), Satina (semi-tolerant) and Ceaser (tolerant to water deficit)] and four irrigation regimes (after 30 mm evaporation from basin class A; after 30 mm evaporation from basin class A with spraying by potassium humate; after 60 mm evaporation with spraying by potassium humate and after 60 mm evaporation from basin class A) for three locations of Ardabil (Alarog, Hassanbarog and Khoshkeroud) in Northwestern Iran, for two years (2007-2008). Experimental design was split plot with three replications. Potassium humate sprayed ( $250 \text{ mL ha}^{-1}$ ) in the three stage of emergence, before tuberization and during tuberization period. The highest total and marketable tuber yield, plant height, tuber number and weight per plant had the lowest amount under stress conditions and the highest under normal and normal with spraying by potassium humate conditions. Use of potassium humate in water deficit condition increased tuber yield more than  $0.93$  and  $9.63 \text{ t ha}^{-1}$  under normal and stress conditions, respectively. Caesar cultivar had the highest total and marketable tuber yield, plant height, tuber weight per plant and dry matter percent under normal with spraying by potassium humate, stress with spraying by potassium humate and stress conditions and Agria cultivar under normal condition. Khoshkeroud and Alarog locations were produced the highest total and marketable tuber yield, plant height, tuber number and weight per plant. (*Research Journal of Environmental Sciences 3 (3): 351-356, 2009; doi: 10.3923/rjes.2009.351.356*)

### **Evaluation of Support Materials for Immobilization of *Pycnoporus sanguineus* Mycelia for Laccase Production and Biodegradation of Polycyclic Aromatic Hydrocarbons**

Jaime Y.S. Low, Noorlidah Abdullah and S. Vikineswary

The ability of white rot fungus *Pycnoporus sanguineus* to colonize support materials and subsequently produce laccase and degradation of Polycyclic

Aromatic Hydrocarbons (PAHs) was compared with free mycelia culture. Natural support, Ecomat, was found to be the best support material for *P. sanguineus* for mycelial colonization and laccase activity with maximum activity of 39 nkat mL<sup>-1</sup> on day nine of incubation. Coconut husk and grey scouring sponge produces maximum laccase activity of 9.17 and 6.67 nkat mL<sup>-1</sup>, respectively on day 15. *Pycnoporus sanguineus* immobilized culture exhibited higher PAHs degradation efficiency compared to the free mycelia culture during the 20 days of incubation. The immobilized mycelia culture degraded 88% of phenanthrene, 93% of anthracene and 85% of pyrene within 20 days. The good correlation between the amount of PAHs degraded and laccase activity produced in the immobilization medium indicated that laccase was solely responsible for degradation of the three PAHs tested. In comparison, free mycelia culture rapidly degraded 42% of phenanthrene, 92% of anthracene and 87% of pyrene at the cessation of incubation. However, poor correlation between the amount of PAHs degraded and laccase activity measured in the free cell culture was obtained. This suggested that intracellular enzymes could be involved in PAHs degradation in the free cell culture. (*Research Journal of Environmental Sciences 3 (3): 357-366, 2009; doi: 10.3923/rjes.2009.357.366*)

### **Investigation of Lineaments Related to Ground Water Occurrence in a Karstic Area: A Case Study in Lar Catchment, Iran**

R. Kazemi, J. Porhemmat and M. Kheirkhah

The aim of this research was to demonstrate the spatial correlation between hydro geomorphologic features identified as lineament and fracture traces located in a karst geological catchments of the study area and subsurface ground water parameters. In this research emphasis was given to investigate whether structural and topographic factors mapped using remote sensing, aerial photo interpretation and derived from the geologic map, can be correlated with hydrologic phenomena. With this assumption, Land sat TM7 spectral bands were analyzed. Springs geographic locations were surveyed with a high precision GPS unit. Black and white 1/20000 aerial photos, geology and topography maps were used to create different thematic layers. These data sets were later displayed on a GIS environment to investigate their geospatial correlation. Owing to the good correlation between the above mentioned factors and hydrologic phenomena, it was concluded that tectonic elements have a positive influence on the groundwater occurrence and they act as transmission routs in the limestone bodies. The importance of structural geological elements such as lineaments and faults in

explaining the patterns of springs was demonstrated. (*Research Journal of Environmental Sciences* 3 (3): 367-375, 2009; doi: 10.3923/rjes.2009.367.375)

### **Seasonal Variations of Fatty Acid Contents of *Saccostrea cucullata* at Intertidal Zone of Chabahar Bay**

N. Sajjadi, P. Eghtesadi-Araghi, A. Mashinchian, S. Jamili, S. Farzadnia and M.S. Hashtroudi

Seasonal variations of fatty acids were studied in the lipid fractions of the bivalve mollusk, *Saccostrea cucullata*, at the intertidal zone of Chabahar bay in the northern part of Oman Sea (Iran). Samples were collected in rocky shores between two stations. The analysis were carried by GC/MS chromatography. Thirteen fatty acids were identified, of which, the most important saturated fatty acids (SFA) were 14:0, 4, 8, 12 tri Me- 13:0, 16:0 and 18:0, the mono unsaturated fatty acids (MUFA) included 16:1n-9, 18:1n-9 and 20:1n-11, the polyunsaturated fatty acids (PUFA) were linoleic acid 9,12 18:2, eicosapentaenoic acid EPA 20:5n-3 and arachidonic acid 20:4n-6. Variability of the fatty acid components were studied in four seasons. Maximum percentage level in *Saccostrea cucullata* for 14:0, 4, 8, 12 tri Me 13:0, 16:0 and 15:0 as saturated fatty acids was observed in summer, while for 18:1n-9, 20:1n-11 and 20:5n-3 (as unsaturated fatty acids) maximum concentration was observed in winter. The environmental factors were monitored monthly and their effects on seasonal variations of the fatty acids were studied by applying pearson coefficient correlation. The results showed the significant dependency of 20:1n-11 fatty acid concentration to ambient temperature and 9,12 18:2 fatty acid to silicate as environmental factors. Also, principal component analysis was done to establish the fatty acid groups. After Varimax rotation, three factors were extracted, of which first and second factors contributed to 86% of the data matrix. These were mainly dependent on the seasonal variations of the fatty acids. (*Research Journal of Environmental Sciences* 3 (3): 376-383, 2009; doi: 10.3923/rjes.2009.376.383)

### **Demolition Agent Selection for Rock Breaking in Mountain Region of Hyrcanian Forests**

Aidin Parsakhoo and Majid Lotfalian

In this study, the AHP and Expert choice software were used for data analysis. The criteria to be used for selecting agents were determined and then scorings

were done with authorized engineers. Results indicated that the priorities of the various demolition agents in the case of laminated schist stone was hydraulic hammer>expansive chemicals>dynamite>CARDOX>rock cracker and for dry sandstone, limestone, marl was rock cracker>CARDOX>expansive chemicals>dynamite>hydraulic hammer. Also, the alternatives were arranged as rock cracker>CARDOX>dynamite>hydraulic hammer>expansive chemicals for moist sandstone, limestone and marl. To conclude, this study reveals that decision-making methods can be used in the process of selecting demolition agent for the rock breaking. (*Research Journal of Environmental Sciences* 3 (3): 384-391, 2009; *doi*: 10.3923/rjes.2009.384.391)

### **Geochemistry of Urban Soils in the Masjed-i-Soleiman (MIS) City, Khuzestan Province, Iran: Environmental Marks**

M.H. Moosavi and A. Zarasvandi

The aim of this study was to assess and evaluation of the amount and severity of heavy metal contamination of residential areas soils of the Masjed-i-Soleiman (MIS) City, which located on a wide oil field (Masjed-i-Soleiman (MIS) oil field) with abundant springs. The present degree and spatial distribution of heavy metal concentrations in 25 topsoil samples in the Masjed-i-Soleiman (MIS) were examined. Analytical determinations were performed by XRF. Six metals, namely Co, Cr, Cu, Ni, Pb and Zn were considered. The abundance of heavy metals measured in these soils decreases as follows: Ni>Zn>Cr>Cu>Pb>Co. The major sources for Pb, Cu, Zn and Cr contamination in Masjed-i-Soleiman (MIS) City are most possibly emissions from vehicles and air conditioning coolants and Ni contamination is hydrocarbon seepage. Total concentrations of Cr, Cu, Ni and Zn in some soils exceed the background values. Direct ingestion of soil by children and inhalation of contaminated windblown dust may contribute largely to the accumulation of heavy metal in human. (*Research Journal of Environmental Sciences* 3 (3): 392-399, 2009; *doi*: 10.3923/rjes.2009.392.399)

### **Annual Rainfall Forecasting by Using Mamdani Fuzzy Inference System**

Gholam Abbas Fallah-Ghalhary, Mohammad Mousavi-Baygi and Majid Habibi Nokhandan

This research aims to study the relationship between climatic large-scale synoptic patterns and rainfall in Khorasan region. Fuzzy Inference System (FIS) was used in this study to predict rainfall in the period between December to May in the

region. Soft computing is an innovative approach to construct computationally intelligent systems that are supposed to possess humanlike expertise within a specific domain, adapt themselves and learn to do better in changing environments and explain how they make decisions. Unlike conventional artificial intelligence techniques the guiding principle of soft computing is to exploit tolerance for imprecision, uncertainty, robustness, partial truth to achieve tractability and better rapport with reality. In this study, 33 years of rainfall data analyzed in khorasan region, situated at the northeastern part of Iran. This research attempted to train Fuzzy Inference System (FIS) based prediction models with 33 years of rainfall data. For performance evaluation, the model predicted outputs were compared with the actual rainfall data. Simulation results reveal that soft computing techniques are promising and efficient. The Root Mean Square Error by using Fuzzy Inference System model was obtained 52 millimeter. (*Research Journal of Environmental Sciences* 3 (4): 400-413, 2009; *doi*: 10.3923/rjes.2009.400.413)

### **Optimum Design of a Photovoltaic Reverse-Osmosis System for Persian Gulf Water Solar Desalination**

A. Ataei, Alireza Haji-Mola-Ali Kani, R. Parand and M. Raoufinia

The present study describes the designing of an economically optimum PV-RO (photovoltaic reverse-osmosis) solar powered seawater desalinating unit which is capable for desalination of Persian Gulf water with the TDS of 40,000 ppm and produces potable water which complies with international standards. This unit has the capacity of producing 1424 m<sup>3</sup> of potable water per annum. In order to run continuously, desalinating units are equipped with lead-acid batteries, but these batteries are causing some problems and are costly. In this system, instead of storing electricity in batteries, potable water is stored in storage tanks to maintain constant flow rate of potable water. In this design, the number of photovoltaic cells to provide needed energy for the RO system is determined with the assumption that it should function with a minimum reception of solar energy. Economic assessment is also carried out to draw comparison between this system and conventional systems in terms of costs. (*Research Journal of Environmental Sciences* 3 (4): 414-426, 2009; *doi*: 10.3923/rjes.2009.414.426)

### **Effects of Intra-Plant Competition on the Ensuing Spatial Branching Patterns of Straits Rhododendron**

M. Faravani, B.B. Baki, Shogo Kato, K. Shimizu and C.H. Sim

The ensuing plant branching patterns were studied at three planting densities 1, 2 and 3 plants per wooden box, raised until maturity. Circular statistics were used

to represent the evolving spatial distributions of branches along density gradients of the translation with certain assumptions. The position of each branch was characterized by three parameters: horizontal rotation ( $\varphi$ ), vertical rotation ( $\theta$ ) and translation. The values of  $\varphi$  were measured within  $45^\circ$  angle using a circular protractor, divided into 8 angular sectors oriented clockwise, while  $\varphi$  was measured from the geographical north direction ( $0^\circ$ ). The translation was registered from 1 to 5 categories. The distribution  $\varphi$  was uniform, but the distribution  $\theta$  was non uniform. The former was distributed symmetrically in plants at densities 1, 2 and 3 with respective mean direction values of  $52.3^\circ$ ,  $47.8^\circ$  and  $41.8^\circ$ . The mean direction of the angle  $\theta$  was different between plants at different densities and translations, whereby branches became progressively more erect with increasing density regimes from 1 to 3 and from the base to the top of the canopy. The registered mean direction of each translation from 1 up to 5 from the base were  $60.2^\circ$ ,  $49.7^\circ$ ,  $40.1^\circ$ ,  $30.5^\circ$  and  $22.5^\circ$ , respectively. (*Research Journal of Environmental Sciences 3 (4): 427-438, 2009; doi: 10.3923/rjes.2009.427.438*)

### **Estimation of Daily Reference Evapotranspiration Using Support Vector Machines and Artificial Neural Networks in Greenhouse**

S.S. Eslamian, J. Abedi-Koupai, M.J. Amiri and S.A. Gohari

In the present study, the meteorological variables including air temperature, solar radiation, wind speed and relative humidity were considered daily. The  $R^2$  of ANNs and SVMs models were obtained 0.92 and 0.96, respectively; whereas the efficiency of ANNs and SVMs models were 0.83 and 0.91, respectively. Both ANNs and SVMs approaches work well for the data set used in greenhouse condition, but the SVMs model works better in comparison with the ANNs model. (*Research Journal of Environmental Sciences 3 (4): 439-447, 2009; doi: 10.3923/rjes.2009.439.447*)

### **Effects of Nitrogen Application on Growth of Irrigated Chickpea (*Cicer arietinum* L.) under Drought Stress in Hydroponics Condition**

N. Bahavar, A. Ebadi, A. Tobeh and Sh. Jamaati-e-Somarin

To study the effects of N application on growth and biomass of a local variety (cv. Kabouli) of chickpea under water deficit, a study was carried out hydroponically

in growth chamber using three concentrations of N (0.25, 0.5 and 1 Mm) and four levels of drought stress (0, -0.3, -0.6 and -0.9 MPa) in three replications in the form of a completely random block design in 2007, Ardebil, under the Iran conditions. Water deficit stress were evaluated for leaf water content, leaf water potential, membrane stability index, chlorophyll content, leaf area, root area, root/shoot ratio, nodule water content, nodule number and biomass. According to observed data, N application was increased the leaf water content, membrane stability, chlorophyll, leaf water potential, leaf area, nodule water content, nodule number and biomass. The experiment showed that N fertilizer application (with a concentration of 1 Mm) can increase leaf and nodule Relative Water Content (RWC), leaf water potential, membrane stability index, leaf chlorophyll content, leaf area and biomass under water deficit condition. Therefore, it seems that mineral nitrogen application can mitigate the adverse effects of water deficit stress and improve growth and biomass in chickpea. Consequently, nitrogen application after moisture stress decrease negative effects drought. (*Research Journal of Environmental Sciences* 3 (4): 448-455, 2009; doi: 10.3923/rjes.2009.448.455)

### **Evaluation of Yield and Yield Components of Lentil Genotypes under Drought Stress**

M. Panahyan-e-Kivi, A. Ebadi, Ahmad Tobeh and Sh. Jamaati-e-Somarin

To evaluate the yield and yield components of lentil genotypes under drought stress conditions, an experiment was conducted in Ardabil Agricultural Research Station during 2005 in a split-plot experimental design based on Completely Randomized Block Design (CRBD) with four replications. The treatments included four irrigation levels [(I<sub>1</sub>) irrigation on the basis of 60 mm evaporation, (I<sub>2</sub>) irrigation on the basis of 80 mm evaporation, (I<sub>3</sub>) irrigation after 100 mm evaporation from basin class A, and (I<sub>4</sub>) no irrigation] as the major factor and three lentil genotypes (Ardabil local variety, ILL4400 and ILL6212) as the minor factor. The results showed that irrigation water deficit during lentil flowering led to the decrease in pod number, grain number per plant, grain weight, grain yield and harvest index, so that I<sub>2</sub> level of genotype ILL4400 had the highest yield followed by ILL 6212 and Ardabil local variety and I<sub>4</sub> had the lowest yield. I<sub>3</sub> level of ILL6212 had the highest harvest index and genotypes ILL4400 and ILL6212 had the highest grain number per plant. (*Research Journal of Environmental Sciences* 3 (4): 456-460, 2009; doi: 10.3923/rjes.2009.456.460)



## **Vessel Element Length Related to the Physiological Traits of Leaves in *Fagus crenata* Seedlings Originated from Different Provenances**

V. Bayramzadeh, P. Attarod, A. Shirvany, S.M. Heshmatol Vaezin, M. Roonnia and A. Tajdini

The study was achieved to understand the relationships between vessel element length and physiological traits of the leaves in *Fagus crenata* seedlings originated from different provenances and grown in the Chichibu Research Forest of Tokyo University. The results underlined that the variations in the vessel elements length were related to variations of the transpiration rate and stomatal conductance in response to the provenance variation. (*Research Journal of Environmental Sciences* 3 (4): 461-465, 2009; doi: 10.3923/rjes.2009.461.465)

## **The Study on Shadow Price of Greenhouse Gases Emission in Iran: Case of Dairy Farms**

M. Ghorbani and M. Motallebi

The aim of this study was estimation of environmental costs of agricultural greenhouse gases emissions in dairy farms. The sample was 85 dairy farms which were selected by simple random sampling method in 2006. The methodology was output distance function to derive estimates of greenhouse gases' shadow prices. In this study dairy farms' share in environmental costs in Mashhad and Iran was estimated 10688 and 67910300 million rials, respectively. Thus, it is recommended that policy makers use some methods like environmental taxes, improving management and carbon sequestration to reduce these kinds of costs. Results can help policy makers to decide more appropriate with considering the externality costs. (*Research Journal of Environmental Sciences* 3 (4): 466-475, 2009; doi: 10.3923/rjes.2009.466.475)

## **Effects of Water Stress on Water Demand, Growth and Tuber Grade of Potato (*Solanum tuberosum* L.) Crop**

M. Shiri-e-Janagard, A. Tobeh, A. Abbasi, Sh. Jamaati-e-Somarin, M. Hassanzadeh and R. Zabihi-e-Mahmoodabad

In order to study water demand, vegetative growth and tuber grade of potato crop under water stress and different cultivation patterns in different drip irrigation regimes, a split plot experiment based on the randomized complete block design with three replications carried out at the Allarog Research Station, Ardebil, Iran,

in 2004. Estimation of crop evapotranspiration was conducted by CROPWAT computer program based on the relationship between crop coefficient ( $K_c$ ) and crop evapotranspiration. Different drip irrigation levels were 100, 80 and 60% of potato crop evapotranspiration. Different levels of cultivation patterns were: 1 row 75 cm on bed 75 cm (furrow to furrow), 2 rows 35 cm on bed 150 cm (furrow to furrow) and 2 rows 45 cm on bed 150 cm and sampling times were the third factor with 6 levels. It was found that yield and growth of aerial parts was significantly affected by water stress and sampling times. Cultivation patterns had only significant effect on above ground biomass. The maximum and the minimum values of most traits studied were observed at 100 and 60% crop evapotranspiration levels, respectively. Number of tubers with 28-50 mm and larger than 50 mm diameter in size were higher at 80 and 100% of full irrigation, respectively. Estimating of amount of water irrigation during irrigation period for 100, 80 and 60% of water irrigation were 558.7, 445.96 and 335.22 mm, respectively. (*Research Journal of Environmental Sciences 3 (4): 476-485, 2009; doi: 10.3923/rjes.2009.476.485*)

### **Prediction of Earth Fissures Development in Sirjan**

A. Ziaie, K. Kumarci, A.R. Ghanizadeh and A. Mahmudinejad

In this study, the relationship between the decrease of the water level of an aquifer, the sinking of the land surface (subsidence) and the generation of earth fissures is investigated. Comparing with the real field data for Sirjan land, the obtained results are confirmed. A decrease in ground water level will causes an increase in effective stresses at clay layers which results the consolidation of lower soil layers. Modeling of this behavior is possible using finite element technique and it baneful to predict the future settlement and the location of potential fissures. It is possible to approximate the model by assuming elastic time dependent behavior due to decrease in water table level. Also a finite element model is established and related to classical soil mechanics consolidation parameters in this study. To finding the water level of an aquifer, WTAQ computer program is used in this study. (*Research Journal of Environmental Sciences 3 (4): 486-496, 2009; doi: 10.3923/rjes.2009.486.496*)

### **The Effects of Different Water Qualities and Irrigation Methods on Soil Chemical Properties**

M.A. Ebrahimizadeh, M.J. Amiri, S.S. Eslamian, J. Abedi-Koupai and M. Khozaei

In this study, the effects of irrigation methods (surface drip and subsurface drip) and water qualities (municipal treated effluent and fresh water) with irrigation

scheduling based on soil moisture and root depth monitoring were evaluated on the chemical properties of the soil. A split plot experiment with two main treatments (irrigation methods) and two sub-main treatments (irrigation water qualities) with four replications were designed and executed in Koshkak research centre (Southern Iran). Soil samples were collected from depths of 0-20, 20-40 and 40-60 cm and were analyzed for electrical conductivity (EC), soluble sodium (Na) and chloride (Cl) concentrations, total nitrogen (TN) and phosphorus (P). Results showed that the soil EC, Na and Cl of the second and third layers of soil were significantly greater with surface irrigation than with subsurface irrigation. The EC, Na and Cl of second and third soil layers irrigated with wastewater were higher as compared with groundwater. The soil EC, Na and Cl content increased with increasing the depth of the soil layer. The fluctuations in nitrogen concentration were opposite to the fluctuations in Cl concentration as the nitrogen content of the soil decreased with increasing the soil depth. The best water saving and water productivity was obtained with sub-surface drip irrigation. (*Research Journal of Environmental Sciences* 3 (4): 497-503, 2009; doi: 10.3923/rjes.2009.497.503)

## **Water Quality and Phytoplankton Communities in Lake Al-Asfar, Al-Hassa, Saudi Arabia**

A.A. Fathi, M.A. Al-Fredan and A.M. Youssef

Some characteristics of Lake Al-Asfar, Al-Hassa, Saudi Arabia were monitored over a period of one year. Seasonal differences in the quantitative and qualitative composition of the phytoplankton communities in Lake Al-Asfar were marked. The maximum crop density was recorded in spring, whereas lowest values occurred in winter. The total crop densities were mainly a reflection of the trends in counts of Chlorophyceae. Four algal groups were recorded during the investigation: Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae. Thirty nine species were identified allover the period of the investigation. Out of these, 14 species belong to Chlorophyceae, 15 belong to Bacillariophyceae, 7 to Cyanophyceae and 3 to Euglenophyceae. *Chlorella* sp., *Chlorococcus humicola*, *Monoraphidium contortum*, *Oedogonium* sp., *Cyclotella meneghiniana*, *Gyrosigma* sp., *Fragilaria capucina*, *Navicula lanceolata*, *Surirella obonga*, *Synedra acus*, *Tabellaria* sp. and *Oscillatoria* sp. were observed in a high rank of occurrence. Seven algal species were moderately common and 3 species were frequently recovered, most of them belong to Bacillariophyceae. The remaining recorded species were rarely recovered. Generally, the species data suggests that the water of Lake Al-Asfar

can be considered as eutrophic. (*Research Journal of Environmental Sciences* 3 (5): 504-513, 2009; doi: 10.3923/rjes.2009.504.513)

### **A normal Micro- and Megagametophyte Development in *Brassica napus* Induced by High Salinity**

H. Mahmoodzadeh and M. Kabiri

A major factor impairing worldwide agricultural productivity is salinity, which is believed to affect nearly one-fifth of the world's irrigated land and causes 10<sup>7</sup> irrigated hectares to be abandoned each year. In canola, the effect of salt stress on reproduction was examined using plants grown in greenhouse. Structural and functional abnormalities in reproductive organs were observed when plants treated with NaCl solution (EC = 12 dS m<sup>-1</sup>). Floral primordia, number of flowers, siliques, seeds per siliques and weight of 1000-seed were reduced in stressed plants. SEM studies showed that anthers filled with pollen corpses. During ovule abortion, gametophyte cells became more vacuolated. The resources conserved by reducing plant fertility, thereby, can be shunted into processes that permit plants to acclimate to stressful environmental conditions. (*Research Journal of Environmental Sciences* 3 (5): 514-521, 2009; doi: 10.3923/rjes.2009.514.521)

### **Assessing Cd, Pb Accumulation in the Tissues of *Chalcalburnus chalcoides* in Anzali Port**

E. Shirvani and S. Jamili

This study was performed in spring 2008 in order to determine of Cd and Pb accumulation in gills, kidney, skin tissues and muscles of *Chalcalburnus chalcoides* in Anzali Port in the South west of Caspian Sea within 10 km<sup>2</sup> zone. The samples were collected from 12 stations, biometric measurements had been taken, thereafter, tissues were separated and digested chemically and then it were analyzed by Flame Atomic Absorption Spectrophotometer. Pearson correlation of metal's concentration in studied tissues with the weight and forked length of fish showed non significant relationship between weight and length ( $p \geq 0.05$ ) and results showed that smaller fish have higher concentration of Cd and Pb than larger ones. Maximum concentrations of Cd and Pb were recorded in gills (0.94 and 8.33 ppm) while minimum concentrations were recorded in muscles (0.02 and 0.12 ppm). Results show that Cd and Pb were accumulated in descending order in gills>skin>kidney>muscles. The level of metals was compared with (WHO,

1993) standard and it was resulted that Cd in gills and Pb in all tissues were significant difference at ( $p < 0.05$ ) levels. (*Research Journal of Environmental Sciences* 3 (5): 522-529, 2009; doi: 10.3923/rjes.2009.522.529)

### **Analysis of Summer Temperature Anomalies in Egypt during the 20th Century**

Eman Shafik Elmallah and Sherif Gamal Elsharkawy

Summer surface air temperature anomalies over Egypt have been studied using data obtained from 13 different monitoring stations during different periods of time starting from 1870's till 2007. Three groups are constructed. The groups are; North Group (NG), South Group (SG), Desert Group (DG), in addition to Cairo station. Two phase analysis are applied to all monitoring stations. One deals with each station separately and the other with stations groups. Trend analysis is performed using both data segmentation as well as whole record concept. Our results show that, the temperature at North of Egypt is raised with a value of  $1.05^{\circ}\text{C}$  during summer season in the last century. Meanwhile, at South a nonsignificant, very low warming trend is observed during the same period. Cross-correlation analysis is applied between sunspot number and temperature anomalies for each group. Negative correlations are found and the effect of 11 year cycle appears in all correlation panels. Power spectral analysis is performed to the anomalies. This analysis declares short and long period oscillations as well as Gleissberg period. (*Research Journal of Environmental Sciences* 3 (5): 530-542, 2009; doi: 10.3923/rjes.2009.530.542)

### **The Use of Surface Runoff to Improve Degraded Rangelands by Creating Shrub Pastures**

A. Rangavar, V.A. Rojkov, M.G. Nurberdiev and M. Azizi

Field experiments were conducted at Sanganeh Research Station at North-east of Iran to determining runoff production, soil accumulated moisture and develop semiempirical model to determine the best plant row spacing for reclamation and optimum production of degraded rangelands under natural precipitation. Runoff production and soil accumulated moisture were determined in 80 experimental plot on different combination of soil type, vegetation cover and slop gradient, during autumn, winter and spring precipitations during 1996-2005. Results from 90 precipitation events with various magnitude and intensity indicated that, soil accumulated moisture was not considerable in September to November period

and the amount of evapotranspiration was more than precipitation up to 6 fold. The average of soil accumulated moisture, evapotranspiration and surface runoff in winter were calculated around 64, 33 and 3% of precipitation, respectively. In spring, the average of evapotranspiration, infiltration and runoff were 62, 36 and 2% of the rainfalls, respectively. The resulted values for moisture accumulation in the soil and surface runoff on the experimental plots make it possible to estimate the potential deficit of moisture and assess the water supply of the plant. Experimental data was used to develop a semiempirical model for determining the best plant row spacing for optimum production and water requirement of pastures. Generally we concluded that there is a strong possibility for reclamation of eroded rangelands using surface runoff in arid and semi arid regions. (*Research Journal of Environmental Sciences* 3 (5): 543-551, 2009; doi: 10.3923/rjes.2009.543.551)

### **Semi-Continuous and Continuous Anaerobic Treatment of Palm Oil Mill Effluent for the Production of Organic Acids and Polyhydroxyalkanoates**

S.K. Hong, Y. Shirai, A.R. Nor Aini and M.A. Hassan

The aim of this study was to improve organic acids production in semi and continuous anaerobic treatment of Palm Oil Mill Effluent (POME) using a locally fabricated 50 L Continuously Stirred Tank Reactor (CSTR). The organic acids obtained were then used for polyhydroxyalkanoate (PHA) production by *Ralstonia eutropha* ATCC 17699 in a 2 L bioreactor. The conditions used in the anaerobic treatment were controlled pH 6.5, sludge to POME ratio at 1:1 and Hydraulic Retention Time (HRT) of 4 days. The organic acids obtained were about 15 g L<sup>-1</sup> at steady state for both treatments and the organic acids yield (based on BOD) was 58.3%. The selected organic acids obtained were acetic (51.5%), propionic (27%) and butyric (21.5%) acid. The recovery of the clarified and concentrated organic acids from the treated POME was made using a two-steps evaporation process. The clarified organic acids (distillate) obtained were comprising of 44.6, 20.1 and 22.5 g L<sup>-1</sup> acetic, propionic and butyric acids, respectively with a recovery of 76%. The organic acids collected were then used for polyhydroxyalkanoates accumulation by *Ralstonia eutropha* ATCC 17699 using pH stat fed-batch fermentation under nitrogen limitation of C/N 40 in a 2 L fermenter. The highest PHA concentration of 11.4 g L<sup>-1</sup> (>90% w/w) was achieved in this process. (*Research Journal of Environmental Sciences* 3 (5): 552-559, 2009; doi: 10.3923/rjes.2009.552.559)

## **Three-Dimensional Numerical Modeling Study of the Coastal Upwelling in the Persian Gulf**

Masoud Sadrinasab

A numerical study is made of the dynamics of the circulation that arises from forcing by a steady, uniform longshore wind in the Persian Gulf. The three-dimensional hydrodynamic model (COHERENS) has been employed to drive upwelling in the Northern part of the Persian Gulf. Atmospheric forces as well as tidal force have been employed in this model. Total simulation times, run in a fully prognostic mode are 11 years, which is sufficient to develop a steady state seasonal cycle of circulation and water mass properties in the Persian Gulf. Findings of the model suggested that a seasonal thermocline is evident with a surface to bottom temperature difference of around 12°C in summer. Simulated results show that when the direction of upwelling-favorable wind is parallel to the coast in the Northern part of the Gulf with a speed of greater than 9 m sec<sup>-1</sup>, upwelling occurs. A minimum of 4 days continual wind parallel to the coast is required to cause upwelling in this region. It is also found that the coastal sea surface temperature is a very good indicator of upwelling at the study area. The model predictions of coastal circulation and vertical temperature structure are compared with the limited available observations. (*Research Journal of Environmental Sciences* 3 (5): 560-566, 2009; doi: 10.3923/rjes.2009.560.566)

## **Cane Molasses: An Ammonia Suppressant in the Composting Manure and Municipal Wastes**

A. Mohammadi Torkashvrad, D. Hashemabadi, B. Kaviani and Sh. Sedaghat Hoor

The aim of this study is to evaluate effect of cane molasses on total nitrogen and C/N ratio of municipal wastes compost and cattle manure. Treatments included different amounts of molasses with municipal decomposable wastes and cattle manure that were added to organic wastes in 2 and 4 weeks after composting start (first and second stages). Each of treatments with 20 kg fresh organic wastes (decomposable municipal wastes and manure) in three replicates as a completely randomized design was done. After 50 days, a 100 g sample of every treatment was taken to measure total nitrogen, organic carbon, C/N ratio, EC and pH in 1:6 dry organic matter/water. Results indicated that the molasses held nitrogen in compost caused to reduce C/N ratio. The effect of molasses on total nitrogen of

manure treatments is more than municipal wastes. Total nitrogen of 4% molasses-manure treatment at the second stage increased 4.6 times than its control; while this was only 1.43 times for 4% molasses-municipal wastes treatment at the same stage than municipal wastes-control treatment. (*Research Journal of Environmental Sciences* 3 (5): 567-573, 2009; doi: 10.3923/rjes.2009.567.573)

### **Investigation of the Lar Lake Fluctuations Using Remote Sensing Data**

K. Solaimani, M. Miryaqobzadeh and S. Lotfi

In this study, the change detection techniques were applied by using maximum likelihood supervised classification and post-classification on the Landsat images acquired 1997 and 2000 for the Lar Dam water level changes in Northern part of Iran. Three different classification of minimum distance, parallel piped and maximum likelihood were carried out on two different date of images individually with the aid of ground truth data. Ground truth as control points were collected during four field trips conducted between 2003 and 2007 (the Lar Dam office has helped to provide some ground truth data) which have supported with the recent recorded discharges. Using ancillary data, visual interpretation and expert knowledge of the Lar Dam basin through field further refined the classification results. Calculation of the accuracy was used to produce change image through cross-tabulation. The results revealed that the reservoir level changed about 6 km<sup>2</sup> due to the seepage development in karsts formation during the study period. (*Research Journal of Environmental Sciences* 3 (5): 574-580, 2009; doi: 10.3923/rjes.2009.574.580)

### **Translocation and Bioaccumulation of Trace Metals in Desert Plants of Kuwait Governorates**

Abdul H. Bu-Olayan and Bivin V. Thomas

Recent industrialization showed possible trace metals pollution impact in the Kuwait arid ecosystem. Desert plants that were distributed in the six Kuwait Governorate areas representing the residential, industrial and recreational sites (GI-VI) were assessed for trace metals. Observation showed high trace metal concentrations in the sequence of leaves > soil > shoot > root irrespective of the species and areas, respectively. *Chrozophora tinctoria* showed higher trace metals concentration than the other species. Samples in GII showed high trace metals levels among the six Governorates indicating the significance of pollution



due to the recent urban development and rise in population. Metal-wise analysis revealed high metals levels in the sequence of Al ( $14.16 \mu\text{g g}^{-1}$ ) > Cu ( $10.71 \mu\text{g g}^{-1}$ ) > Ni ( $4.83 \mu\text{g g}^{-1}$ ) > Fe ( $4.60 \mu\text{g g}^{-1}$ ) > Pb ( $2.89 \mu\text{g g}^{-1}$ ) > V ( $2.52 \mu\text{g g}^{-1}$ ). Trace metals Translocation Factor (TF) and Bioaccumulation factor (BAF) in all the plants were >1 thus labeling these plants as trace metals accumulators. Pearson's correlation coefficient on species-wise and metal-wise analysis revealed significance between TF and BAF, respectively. Thus, trace metals sequestration from the soil to these plants characterized them as trace metals pollution indicators. (*Research Journal of Environmental Sciences* 3 (5): 581-587, 2009; doi: 10.3923/rjes.2009.581.587)

## **The Supportive Policies and Dimensions of Environmental Security in Agriculture of Iran**

Ahmad Reza Ommani

The purpose of this study was to identify and prioritize the supportive policies and dimensions of environmental security in agriculture of Iran, within the ten months period. The population consisted of all extension experts in the Khuzestan Province of Iran (N =110). All of experts were interviewed. A mailed questionnaire was used to collect the data. Consequently 86 questionnaires were analyzed. Ranking indicated that the 4 most important supportive policies regarding environmental security in agriculture were: encouraging farmers for using sustainable methods, increasing knowledge of farmers regarding environmental security, dissemination of organic farming and considering financial credit for regarding environmental security. As the results indicated the 4 most important dimensions of environmental security in agriculture. Namely, they are (1) conservation of basic resources, (2) dissemination of new methods, (3) equality in distribution of resources and finally and (4) reduce chemical material in agriculture. So, provide new information for consumer and farmers, support information system to link research, extension and farmers and support for farmers training are very vital key toward sustainability. (*Research Journal of Environmental Sciences* 3 (5): 588-593, 2009; doi: 10.3923/rjes.2009.588.593)

## **Analysis of the Training Needs of Agricultural Extension Experts Associated with Environmental Security in Agriculture**

A.R. Ommani and M. Chizari

The aim of this study was to identify the training needs of extension experts related to Environmental Security in Agriculture (ESA) in Khuzestan Province, Iran. The

sustainable use of environment for agriculture has become a global priority of vital importance, requiring urgent solutions in view of intensifying competition. Based on multiple researches training is a key input and requirement, of sustainable resources management in agriculture. The population consisted of all extension experts in the province (N = 96). By census method all of experts were interviewed. Consequently 89 questionnaires were analyzed. Ranking indicated that the six most important training needs related to ESA were: (1) new irrigation systems, (2) water productivity and efficiency in agriculture, (3) food safety and pesticide residues, (4) biological systems, (5) economics of sustainable agriculture and (6) water quality with respect to agrichemicals. As revealed that level of education, perception of experts regarding ESA, social participation and level of job satisfaction may well account for 61% of changes in knowledge of experts regarding ESA. (*Research Journal of Environmental Sciences* 3 (5): 594-598, 2009; doi: 10.3923/rjes.2009.594.598)

### **Benthic Fauna and Water Quality in Southern Caspian Sea Estuary: A Case Study on Gorganrood River**

N. Zorriasatein, B. Dehzad, G. Vossoughi, M. Shapoori and S. Jamili

The present research is a study on water quality and benthic macro invertebrate in Gorganrood River, a South Eastern Caspian Sea. The research was carried out at six sampling sites and the abundance and diversity of benthos were monitored along the length of river from 2007 to 2008. Fourteen families included under different groups such as Annelida, Mollusca and Insecta were recorded in the present investigation. The greatest number of species were recorded at 1st station and the least number was at 6th station. Low macro invertebrate abundance was observed during spring as a result of heavy rainfall and flood and generally in all lowest section because of high value of nitrogen and other nutrients. Water physicochemical parameters such as Phosphate, Nitrate, TPS and others were measured and water quality were studied through different indices such as saprobic system, Helsinhoff (FBI), BMWP and the results were compared and evaluated by physical and chemical parameters. The result indicated that the water quality in the up stream and the middle were good to fair, but the down stream qualities were poor at all sites. (*Research Journal of Environmental Sciences* 3 (5): 599-603, 2009; doi: 10.3923/rjes.2009.599.603)

## **Simultaneous Energy and Water Minimization-Approach for Systems with Optimum Regeneration of Wastewater**

A. Ataei, M.H. Panjeshahi and S. Karbassian

In this study, a new systematic design methodology has been developed for the simultaneous management of energy and water systems that also feature optimum regeneration of wastewater. In addition to allowing regeneration of wastewater, issues about heat losses inside unit operations have also been incorporated in the simultaneous management of water and energy. To implement such a design, two new design aspects are introduced; new method for non-isothermal mixing points identification and new separate system generation. The first aspect involves non-isothermal mixing, which enables direct heat recovery between water streams and therefore allows the reduction of the number of heat transfer units. An NLP model is formulated to identify feasible non-isothermal mixing points in the network regarding minimum operation cost, which satisfy minimum freshwater and utility requirements. The other aspect is the generation of separate system in heat exchanger network design. The flexibility of mixing and splitting of water streams allows separate systems to be created as a cost-efficient series of heat exchanger units between freshwater and wastewater streams. The new design aspects have been illustrated with a case study. The results demonstrated 56% of fresh water, 62% of hot utility, 100% of cold utility, 67% of number of heat transfer units and 60% of total cost saving relevant to the conventional design method. (*Research Journal of Environmental Sciences 3 (6): 604-618, 2009; doi: 10.3923/rjes.2009.604.618*)

## **Modification of Co-Generation Plant in a Sugar Cane Factory for Reduction of Power Deficit**

Abtin Ataei

This study outlines work on the modification of co-generation plant in a sugar cane factory for reduction of power deficit. These modifications, which tested though a sample 6000 TCD sugar cane factory, contain minimization of process steam demand and also high-pressure steam production, using high-pressure boilers which coupled with condensing-extraction steam turbines as option 1 and biomass integrated gasification as option 2. By these modifications, the additional revenue for sugar industry by generating surplus power and supplying to national grid could be possible. Applying the suggested modifications on the sample factory achieved 4 and 22.4 million USD monetary benefits for options 1 and 2, respectively.

Because of the required investment for options 1 was 16 million USD and for option 2 was 179 million USD, the investment had an attractive simple payback period of 4 years for option 1 and 8 years for option 2. Thanks to the increased amount of agricultural residues available for power production, the higher efficiencies in conversion and to a lesser extent, the avoided emissions as a result of less sugar cane burning, the emissions of CO<sub>2</sub>, greenhouse gases and particulates would be significantly reduced. (*Research Journal of Environmental Sciences* 3 (6): 619-630, 2009; doi: 10.3923/rjes.2009.619.630)

### **Forest Damage Caused by Earth Working Operations in Uneven Aged Deciduous Stands**

A. Parsakhoo and S.A. Hosseini

In this study the regeneration and trees damages caused by bulldozer earth working operations were examined for a road construction project in the Lolet Forest, Mazandaran Province, Iran. Damages were assessed within the 10000 m<sup>2</sup> plot along 400 m roads in each of slope classes 30-40, 40-50, 50-60 and 60-70%. Damaged regeneration were classified into stem wounds, broken stems, leaning and interment and uprooted. Damaged trees were classified into crown injury; stem wounds, felled and uprooted trees. The wounds areas were also classified into 0-300, 300-600 and more than 600 cm<sup>2</sup>. Results showed that the most common type of damage to regeneration was leaning and the majority of this damage occurred in diameter classes of 0-2.5 and 2.5-7.5 cm. In higher slope classes a greater number of regeneration and trees were damaged. Totally, 87% of regenerations were damaged by bulldozer earth working. Fifty percent of trees were damaged in each of slope classes: 7% were wounded (bark removed), 13% were crown injured and 30% were felled or uprooted. The wounded trees percentage in class 0-300 cm<sup>2</sup> was more than other wound classes. Minimizing regeneration and trees damages during earth working appears to allow a more rapid recovery of vegetation on bulldozed soil. (*Research Journal of Environmental Sciences* 3 (6): 631-639, 2009; doi: 10.3923/rjes.2009.631.639)

### **Impact of Alder (*Alnus subcordata*) in Fertility of Forest Soil**

S.A.R. Taleshi, K.N. Dhumal, A. Alipour, K. Espahbodi and O. Ghasemi

This research was carried out in natural Alder (*Alnus subcordata* C. A. Meyer) stands for evaluation effects of Alder trees on restoration of forest soil in North

forest of Iran. The soil samples and different parts of Alder such as leaves, barks, roots and nodules were collected from three altitudes zone in Alder and birch stands. Mineral amount of plant and soil sample were analyzed in laboratory by standard methods. Results of mineral analysis in deferent parts of Alder revealed that the amount of nitrogen and phosphorus in leaves significantly more than bark and root. Generally the fallen leaves of Alder remained in the soil as a source of nitrogen. Amount of nitrogen in nodules was significant higher than roots. Nitrogen analysis of soil profiles in two Alder and birch stands also showed that mean amount of nitrogen in Alder stand was significantly more than birch stand. Overall, the results indicated the positive role of Alder trees in restoration of soil fertility by nitrogen fixation. (*Research Journal of Environmental Sciences* 3 (6): 640-644, 2009; doi: 10.3923/rjes.2009.640.644)

### **Estimates of Nitrate Leaching from Wheat Fields in Gorgan, of Iran**

E. Zeinali, A. Soltani, S. Galeshi and S.A.R. Movahedi Naeeni

There is no estimation on the nitrate leaching from arable lands of Iran. Therefore, the CERES-wheat of DSSAT model was used to estimate the nitrate leaching from wheat fields of Gorgan. The experiment was conducted in Gorgan Northeast of Iran, during 2005-2007 years. Input data were 3 nitrogen use scenarios (N-S), 3 soil profiles (SLPs) and two Cropping Systems (CS) including rainfed (RFD) and irrigated (IRR) as well as daily weather data of this area. The amounts of fertilizer-N used in N-S-1, N-S-2 and N-S-3 were 165, 122 and 96 kg N ha<sup>-1</sup>, respectively. Three SLPs were defined on the basis of the analysis of hundreds soil samples. Soil samples were taken from arable lands to a 120 cm depth. The simulations were performed for a 45 years time period from 1961-2006. The average of N-leached in scenarios during 45 years estimated to be 23.6 kg N/ha/year. Cropping system and SLP had significant effects ( $p = 0.01$ ) on the nitrate leaching, but the effects of N-Ss and interactions between 3 factors were not significant, statistically. The results of simulations indicated that in RFD and IRRCS about 16 and 31 kg N/ha/year have been leached, respectively. The N-leached rates from SLP I, II and III were 39, 19 and 13 kg N ha/year, indicating significant differences between SLPs. It can be concluded that considerable amounts of nitrate-N are leached from wheat fields in Gorgan, annually that can have important economic and environmental impacts. (*Research Journal of Environmental Sciences* 3 (6): 645-655, 2009; doi: 10.3923/rjes.2009.645.655)

## **Ameliorative Effects of Zinc on Pistachio (*Pistacia vera* L.) Growth under Salt-Affected Soil Conditions**

V. Tavallali, M. Rahemi and B. Kholdebarin

A greenhouse study was conducted to evaluate the ameliorative effects of Zn (0, 5, 10 and 20 mg Zn kg<sup>-1</sup> soil) under saline (800, 1600, 2400 and 3200 mg NaCl kg<sup>-1</sup> soil) and normal conditions on pistachio seedlings (*Pistacia vera* L. cv. Badami) growth and performance. Zinc improved plant growth under salt-affected soil conditions. Plants biomass was strongly decreased by salinity level of 3200 mg kg<sup>-1</sup> and the soil adverse effects were accentuated with increasing level of salinity. Increasing salinity in soil under Zn deficient conditions, generally decreased leaf, shoot and root fresh and dry weight and other growth parameters. However, these adverse effects of salinity diminished with the increase in Zn levels up to 10 mg kg<sup>-1</sup>. Increasing Zn supply from 5 to 10 mg kg<sup>-1</sup> soil improved net assimilation rate, relative growth rate, leaf area ratio and specific leaf area under salinity conditions. Zn also had significant effect on increasing total leaf area, shoot height, stem diameter and number of leaves under salinity stress. The result of the present study emphasized the importance of Zn nutritional status of plants in improving salt stress tolerance. Adequate Zn nutrition is, therefore, important for the maintenance of good pistachio tree growth and yield under saline conditions. Zn fertilization markedly increases pistachio biomass, shoot height, leaf number, stem diameter, net assimilation rate, relative growth rate, leaf area ratio and specific leaf area at all salinity levels. These growth indices are markedly reduced when the amount of Zn in media is below optimum levels under salinity conditions. (*Research Journal of Environmental Sciences* 3 (6): 656-666, 2009; doi: 10.3923/rjes.2009.656.666)

## **Using Morphology and Micromorphology Characters for Identification of *Silene* L. Species in North-East of Iran**

A. Jafari, Z. Fathi and M. Bemani

*Silene* L. from Caryophyllaceae, comprises about 92 species in Iran which 16 species have been recorded from North-East of Iran. In present research, seven *Silene* species and four subspecies from four sections from Khorassan Razavi Province in North-East of Iran identified using floral segments morphology e.g. shape of calyx's denth, margin of calyx's denth, paracorolla shape and micromorphological characters like seed coat and pollen ornamentation. The results demonstrated using above mentioned characters are very useful for exact

identification of *Silene* species. (*Research Journal of Environmental Sciences* 3 (6): 667-676, 2009; doi: 10.3923/rjes.2009.667.676)

### **Anthracene-Induced Enzymatic Changes as Stress Indicators in African Catfish, *Heterobranchus bidorsalis* Geoffroy Saint Hilaire, 1809**

Taofik O. Sunmonu, Olufemi D. Owolabi and Oyelola B. Oloyede

The impact of short term exposure to waterborne anthracene on the activities of Gamma Glutamyl Transferase (GGT), Alanine aminotransferase (ALT) and Alkaline aminotransferase (ALP) in the liver and stomach mucosa of juvenile African catfish, *Heterobranchus bidorsalis* Geoffroy Saint Hilaire, 1809 was investigated. Fish specimens weighing  $73.00 \pm 2.50$  g ( $n = 72$ ) were grouped into six of twelve fishes each in 30 L aquarium. Each group was exposed to different concentrations (0 (control), 0.25, 0.50, 0.75, 1.00 and  $1.25 \text{ g L}^{-1}$ ) of anthracene for 54 h. The results showed that there was a significant ( $p < 0.05$ ) inhibition of all the enzymes' (GGT, ALT, ALP) activities in both the liver and stomach of *H. bidorsalis* in relation to the control. Inhibition of each enzyme increased with increase in concentration of anthracene, with the highest inhibition of 79.96% (GGT), 89.74% (ALT) and 46.26% (ALP) and lowest inhibition of 13.98% (GGT), 22.80% (ALT) and 31.44% (ALP) recorded at the concentration of 1.25 and  $0.25 \text{ g L}^{-1}$ , respectively. The decrease in the activities of the enzymes could be due to their possible leakage into general blood circulation or could be as a result of organ dysfunction, thus indicating that anthracene could induce oxidative stress on *H. bidorsalis*. Percentage mortality ranged between 0 and 44.44%, with the highest mortality recorded at the highest tested concentration of anthracene. The results suggest that GGT, ALT and ALP can be used as potential environmental biomarkers for anthracene-induced hepatotoxicity and gastrotoxicity in *H. bidorsalis*. (*Research Journal of Environmental Sciences* 3 (6): 677-686, 2009; doi: 10.3923/rjes.2009.677.686)

### **Surfactants in Street Dust and their Deposition on Glass Surfaces**

N.M. Hanif, M.T. Latif and M.R. Othman

In this study, the dust (total) at exterior surfaces of windows and street dust ( $< 63 \mu\text{m}$ ) in the vicinity of both busy and quiet streets were sampled in order to determine the concentration of anionic and cationic surfactants, as well as anions (sulfate, nitrate and chloride) to indicate its possible sources. The sampling

locations were Bandar Baru Bangi, Bandar Kajang and Seremban, which were selected due to the traffic density in those areas. Samples obtained were analyzed by calorimetric methods using Methylene Blue Active Substances (MBAS) for anionic surfactants and Disulphine Blue Active Substances (DBAS) for cationic surfactants. The results obtained indicate that the concentration of surfactants was higher in busy areas for both windows and street dust in comparison to quiet areas; although, the difference noted was insignificant ( $p > 0.05$ ). Such that, it is suggested that combustion in car engines is mostly likely to be the source of surfactants in both areas. Additionally, the positive correlation recorded between surfactant and nitrate concentration ( $R^2_{\text{nitrate}} = 0.51$ ) added further support to surfactants mainly being produced as a result of vehicular emissions. On the other hand, the insignificant correlation between both surfactants in street dust and on windows in busy areas suggests that the presence of surfactants originated from different sources. (*Research Journal of Environmental Sciences* 3 (6): 687-696, 2009; **doi**: 10.3923/rjes.2009.687.696)

### **Developing Pedo Transfer Functions to Predict Infiltration Rate in Flood Spreading Stations of Iran**

M.H. Mahdian, R.S. Oskoe, K. Kamali, H. Angoshtari and M.A. Kadkhodapoor

Since, measuring infiltration rate directly is time consuming and expensive, the Pedo Transfer Functions (PTFs) were developed to estimate soil infiltration rate using soil physical data of the flood spreading stations in Iran. Infiltration rate was measured in the flooded areas by double ring method. Selected soil physical properties used as input variables were sand, silts, clay percentage, bulk density, field capacity and wilting point. Soils studied were classified as Entisols. All stations were classified into three groups using Principal Component Analysis (PCA). Linear and nonlinear PTFs were developed to estimate infiltration rate. For one variable linear regression, the PTFs at 0.95 confidence interval were obtained. Nonlinear regression developed as PTFs using gravel, sand, silt and clay percent. There were also developed the multi variable functions based on the gravel, sand, silt and clay percent, so it is possible that developing the related functions to estimate infiltration rate by easily measured soil parameters. Most of the developed functions were cubic. Changes in PTFs have wide variation and developed PTFs vary based on the number of parameters formed them. (*Research Journal of Environmental Sciences* 3 (6): 697-704, 2009; **doi**: 10.3923/rjes.2009.697.704)