Monitoring of Concentration of Heavy Metals in *Conocarpus erectus* in Industrial City of Abadan

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Abstract

This research was conducted in order to investigate the capability of *Conocarpus erectus* for accumulation of metal contaminants from overloaded low traffic areas and also areas near the refinery in the city of Abadan (Khouzestan, Iran) in 2016 and 2017. Samples were collected from 9 stations in hot season (spring and summer) and cold season (winter). The concentrations of copper, lead, chromium, cobalt, cadmium and zinc were measured in the leaves of conocarpus tree. The results of the study showed that the concentration of heavy metals in the plants of industrial area was higher than non-industrial areas with a high and low traffic density. Statistical analysis showed that the difference in measured values in industrial areas with traffic and residential areas was significant for copper (p = 0.0001), lead (p = 0.01), cobalt (p = 0.01), cadmium (P = 0.0002) and zinc (p = 0.0003), and only chromium did not show any significant difference (p = 0.1). Analysis of results for time effect also showed that only lead concentration was influenced by season (p = 0.009). Considering the results of the research, it can be concluded that in the industrial areas, heavy metal pollution is in a relatively high level and Conocarpus is a dependable biomonitor for air pollution investigations.

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Seasonal Changes of Glycerol Contents in Insect Larvae (Case Study: Zayandehrud River)

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Abstract

In recent years, global climate change and water resources drought have been the most important environmental issues in aquatic life in order to tolerate changes in temperature and humidity. Diapause and anhydrobiosis are the adaptation mechanisms of organisms to survive these changes. The accumulation of sugars and polyol are the common physiological mechanisms among anhydrobiotic organisms. In this study, the change of glycerol contents was investigated. The samples were collected seasonally from two stations and for one year from autumn 2015 to summer 2016. The amount of glycerol was 18.31, 7.65, 17.63 and 23.21 µg/mg wet weight for Simuliidae and 8.19, 7.36, 30.35 and 8.97 µg/mg wet weight for Tipulidae; and 44.43, 17.85, 38.07 and 11.13 µg/mg wet weight for Baetidae during spring, summer, autumn and winter, respectively. In Simuliidae the glycerol contents did not show any significant differences between summer and autumn (P > 0.05) while it showed significant differences (P < 0.05) in other seasons. In Tipulidae the glycerol had not significant differences in spring and summer (P > 0.05) and also showed no significant differences in spring and winter (P > 0.05) while there were significant differences (P < 0.05) between autumn and other seasons. In the Baetidae the glycerol contents showed significant differences among different seasons (P < 0.05). The increasing polyols with low molecular weight associated with diapause and anhydrobiosis in early autumn, when the insect larvae exposed to cold shock and increase the cryoprotectant components and consume them as antifreezing agent in winter. In addition, the insect larvae increase these compounds during spring, which prepare them to survive in high temperature and desiccation during summer. This study illustrated that the insect larvae responses to environment ecological conditions by glycerol content, especially during freezing and desiccation.

Keywords: Baetidae, Simuliidae, Tipulidae, Insect larvae, Glycerol, Seasonal changes.

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Studying the Feasibility of Environment Valuation Model in Iran (Case study Ben City in the Province of Chahar Mahal and Bakhtiari)

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Abstract

Population growth and the spread of science and technology have led to destruction of natural resources and threatening the environment. The natural resources of each country are of the major infrastructures of its economic development, and this is especially important in developing countries. Sustainable management of natural and semi-natural ecosystems requires adequate information of the economic value of ecosystem services. Economic valuation of ecosystem services is aimed at preventing the destruction and unnecessary utilization of natural resources and modifying the national computing system. The purpose of this study was to estimate the value of environmental capital of Ben in 2016. In this study, in order to calculate the relative value of environmental capital markets, alternative methods of cost-effective engineering and cost of opportunity was applied. In order to estimate the economic value of non-market capitalization of the environment, the conditional valuation method, utilizing the approach of the proposed preferences and the model Logit were used. Data needed in this study include statistics and information recorded in the provincial departments, as well as completion of 554 two-dimensional double-choice questionnaires in Ben in 2016. The non-market values of this city were divided into two sections: conservational and recreational areas. The results of the study showed that recreation and conservation value of the region estimated as 37727.96 and 30420.02 million Rials, and the market value of 3307107.16 million Rials, respectively. The total value of the environmental capital of the city was 3375255.14 million Rials in 2016, which represents the minimum value of the investment of politicians in the region.

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Cranial Morphometric Variations of Persian Leopard (*Panthera pardus saxicolor*) from the Zagros Mountains and Northern and Northeastern Mountainous Areas based on Geometric Morphometric Analysis

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Abstract

Persian leopard is considered as the largest feline in Iran, which has the wide distribution along the Alborz and the Zagros mountains. Considering the differences in climate, vegetation types, dietary habits, as well as the substantial fragmentation in their habitats in the two mountainous areas, morphological variation of the species in the two areas looks probable. A landmark-based geometric morphometric analysis was performed using high quality 2D pictures from the dorsal, lateral, and ventral views of 42 Persian leopard's skulls. Procrust Analysis was used to remove the effect of none-shape parameters in landmark points and Discriminant Analysis was conducted to verify the differences between skulls in the two study areas. Our results revealed that the skulls of the two ranges of mountains are different in their overall shape, as we found the significant differences in zygomatic arch, occipital bone and nasal suture of frontal bone between the two dataset. This could be resulted from different allometric growth pattern, habitat characteristics and environmental parameters, and genetic variation among the populations of the species in these two geographic ranges.

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Chromosomal Study of Yellow Sweet-Clover (*Melilotus officinalis* (L.) Lam.) under Heavy Metal Pollution of Lead and Zinc Mine of Zeh Abad, Qazvin

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Abstract

Melilotus officinalis (L.) Lam. belonging to Fabaceae growing in the vicinity of zinc and lead mine around Zeh abad village, Qazvin province, Iran. The aim of this study was determination of level of zinc and lead pollution in soil and water and investigating the meiotic behavior of pollen mother cells (PMCs) and pollen fertility of *M. officinalis* exposed to long-term exposure to the pollutants. The chemical analysis of soil and water samples by using the ICP-MS indicated concentrations of lead and zinc much higher than the standard. The results revealed that polluted soil and water with heavy metals had a significant impeding effect on the division of PMCs in *M. officinalis* as noticed by the increase in meiosis abnormality percentage, decrease in meiotic index (MI) and pollen fertility compared to the control and can lead to genotoxicity in under study plant. The present data indicate that this species is not meiotically stable. In general, the pollen mother cells of specimen grown in polluted soil exhibited an increased incidence of chromosome stickiness, B-chromosomes, chromosome bridges, laggard chromosomes, micronuclei, cytomixis and formation of tripolar cells.

Key words: Chromosomal study, Lead, Yellow sweet-clover, Zinc.

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Assessment of Contamination and Mobility Potential of Potentially Toxic Elements in the Zayanderud Sediments, Isfahan Metropolis

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Abstract

Sediment has a special importance in the ecosystem, because it acts as a sink for the potentially toxic elements in water/sediment environment. The aim of this study was to assess the concentration and contamination potential of potentially toxic elements in the Zayaderoud sediments with a special emphasis on the role of the Isfahan metropolis. For this purpose, 23 sediment samples were collected from the Zayanderud River within the boundary of the Isfahan city. The single extraction method was applied to the samples using 0.43M acid acetic and 0.05M EDTA leaching solutions. After preparation process, the total concentration of target elements was measured by using an ICP-OES. Evaluation of the total concentration results using environmental pollution indices showed that the concentrations of Ag, As, Cu, Pb, Zn, and S were higher than the natural background values suggesting an anthropogenic source. The contamination potential was increased from upstream to the downstream, especially after discharges from the treatment plant located in south of Isfahan. According to the PCA multivariate statistical method, elements with the same sources fall into the same groups, so that the elements with the anthropogenic source showed the same group with high correlation. Determination of the soluble fraction using single extraction method showed that 50 percent of statistical population of Cu and S has mobility factor higher than 30 percent corresponded potential with a high risk. Also, 50 percent of statistical population of Pb, Mn, and Zn showed mobility factor between 10 to 30 percent, corresponded with the medium risk of these elements.

Key words: Sediment, Zayanderud, Toxic elements, Mobility potential.

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Investigating the Effects of Chemical Fertilizers on Population Variations of Different Species of Earthworms

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Abstract

Earthworms have been used for many toxicity assays and environmental assessments because of the remarkable role they play in biological, chemical and physical processes of the soil. The purpose of this study was to investigate the impact of chemical fertilizers on the density of earthworms in the soil of an orchard. One square meter area was considered as experimental plot. Seven different types of fertilizers including urea, ammonium sulfate, diammonium phosphate, solupotas, NPK (15-5-25), NPK and organic manure were studied as experimental treatments, based on soil test. Abundances of worms were evaluated in two different times and in 2 depths of 0-20 and 20-40 cm of soil. In the first stage, 20 days after the addition of fertilizers, and in the second stage, 60 days after fertilization, earthworms were sampled and their number changes were determined. Treatments were applied in three replications and the data were analyzed using one-way ANOVA (using the GLM process) by SPSS software. The results of the means comparison showed that in the 20th day, at 0-20 cm soil depth, *E. fetida* species abundance was decreased significantly in ammonium sulfate and urea treatments compared to the control plot ($p<0.05$). From epigeic group, *D. hortensis* species showed more compatibility and its population in ammonium sulfate treatment was more than that of urea treatment. Results also showed that the anecic *L. terrestris*, had a greater tolerance to chemical fertilizers compared to the *A. Longa* species.

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Prediction Model of Citizens' Satisfaction in Urban Parks using Artificial Neural Network

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Abstract

Parks and green spaces are of the most important elements of cities. The design and function of urban parks should be in line with the requirements of urban life and in response to the needs of citizens, as this can be used to create a healthy urban environment. The purpose of this research was to model the satisfaction of urban parks visitors using the artificial neural network. In this study, a multi-layer perceptron network was used to process the data with the intelligent neural network tool. First, 103 urban parks were selected in Karaj and Tehran, and information about regional, service and aesthetic variables was collected in all parks. Then, the collected data was considered as network input and the results of satisfaction level assessment as network output. The value of determination coefficient (R^2) in this study was 0.72 which indicates the suitability of artificial neural network for satisfaction modeling in urban parks. The results of sensitivity analysis showed that variables of landscape quality, number of sports fields, food centers, and barbeque had the highest impact on satisfaction of urban parks. Therefore, in planning and managing public places such as urban green spaces, consideration of users' perceptions of the environment should be highlighted.

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Air Pollution Tolerant Species in City Green Area

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Abstract

The negative effects of air pollution impress plants to develop different morphological and anatomical changes. In the other hand, plants (especially trees) in large cities contribute in improving the quality of air. Therefore, the plants which balance internal structure and polluted environment, can deeply affect the quality of air in the cities. This study try to determine the suitable indexes to select tolerance of species which are widely planted in Tehran. Seven study areas were selected in Tehran. Seven morphological (leaf area, dry and wet weight, thickness, specific leaf area, water content percentage) and 20 anatomical parameters were measured and calculated for *Robinia pseudoacacia*, *Fraxinus rotundifolia*, and *Platanus orientalis*. Sorkhe-Hesar and Azadi were introduced as areas that affect air pollution and climate and soil parameters were similar in both areas. Significant changes in some vegetation characteristics were observed in all the study species. Leaf thickness (Sorkhehesar= 0.12, Azadi= 0.14 and P<0.01), upper cuticul thickness (Sorkhehesar= 1.9, Azadi= 3.5 and P<0.05), Rp/Rs (sorkhehesar= 1.2, Azadi= 1.9 and P<0.05) and abaxial stomata density (Sorkhehesar= 347, Azadi= 444 and P< 0.05) showed significant increases in black locust. Significant relation with indicator of air pollution tolerance is the highest in black locust and the least in plane. This study indicated *R. pseudoacacia* as suitable species to air pollution than the other plants (plane and ash).

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Improvement of Habitat Simulation Method using River2D Hydrodynamic Model to Determine Regime Ecological of River

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Abstract

Water resources management in the basin area is increasingly related to the allocation of environmental flows as a tool for improving the quality of ecosystem habitats in river conservation and restoration projects. In order to facilitate the estimation of the environmental flow of the Gharasoo River in Golestan province, based on the research framework: after the hydrological analysis and field studies and observations, the Habitat Suitability model of the *C. Capoeta gracilis* species was developed. In the next step hydrodynamic modeling of the hydraulic parameters was performed, and finally habitat simulation and modeling was conducted with the integration of ecological and hydrodynamic studies of the flow and the ecological flow regime was extracted. Based on the results of this study, *C. Capoeta gracilis* species has shown a response to changes in hydraulic parameters (depth and velocity) and flow rate in various stages of its life. For conservation of the ecosystem of the Gharasoo river for this species minimum and maximum environmental flows are proposed to be 0.47 m^3/s for September and 3.03 m^3/s for May, using River2D model and variables of habitat physics and habitat suitability index of based Weighted Usable Area. Results of this study showed the use of a two-dimensional hydrodynamic model for modeling the habitat desirability of the target species can be recommended as a tool for improving the performance of modeling in habitat simulation and implementation of the ecological river regime in river engineering projects conservation and restoration.

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