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Microbial Polycyclic Aromatic Hydrocarbons Degradation in Soil

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As Polycyclic Aromatic Hydrocarbons (PAHs) are biological hazards in the environment, the aim of the present investigation is to review their sources, biological and chemical properties and their biodegradation by microorganisms in the soil. The complete degradation of PAHs that originate from various sources require a community of microorganisms. When PAHs are taken by microorganisms, they will be activated in aerobic metabolism by insertion of two oxygen atoms by bacteria and green algae to produce either cis-dihydrodiols or phenols. PAHs may also be activated by cytochrome P₄₅₀ of many fungi and bacteria to produce arene oxides. The activation may also be performed by lignin degrading enzymes to produce quinines. After complete degradation of PAHs in soil, it was found that about 56-77% of the carbon of PAHs is converted to CO₂, 16-35% to microbial biomass and small portion accumulates as intermediate metabolites. It can be concluded that the microbial decontamination of PAHs contaminated soil is an efficient, economic and a good alternative to physiochemical treatments if suitable conditions for the microorganisms are prevailing. (*Research Journal of Environmental Toxicology* 3 (1): 1-8, 2009; *doi: 10.3923/rjet.2009.1.8*)

Impact of Water Pollution on Histopathological and Electrophoretic Characters of *Oreochromis niloticus* Fish

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The present study suggested in order to explore the capability of two environmental pollutants namely copper sulfate (CuSO₄) and lead acetate (CH₃COO)₂Pb to induce histopathological changes and changes in the electrophoretic pattern of serum proteins in aquatic organisms. To achieve such a purpose, *Oreochromis niloticus* were chosen as a test material for the study. After determination of LC₅₀ of both pollutants, fish were treated with 1/5, 1/10 and 1/20 of LC₅₀ of either CuSO₄ or (CH₃COO)₂Pb for a periods of 2, 4 and 6 weeks. The histopathological studies revealed that both chemicals under study are capable of inducing changes in different fish organs (gills, liver, kidneys and spleen) after 2 and 6 weeks of treatment and at three different concentrations. These histopathological changes were positively correlated in its effects with the increase of pollutants concentration and time of exposure. Concerning the electrophoretic patterns. The

control samples exhibited 12 bands with different densities and intensities. The total number of bands were 11, 16 and 5-13 bands after exposure to 1st, 2nd and 3rd concentrations of copper sulfate, respectively. The total number of bands were ranged from 8-17, from 9-13 and from 9-12 bands after exposure to 1st, 2nd and 3rd concentrations of lead acetate respectively. (*Research Journal of Environmental Toxicology* 3 (1): 9-23, 2009; **doi**: 10.3923/rjet.2009.9.23)

Histological Alterations Induced by Lead in the Testes of the Quail *Coturnix coturnix*

M.I. Almansour

Adult males of the quail *Coturnix coturnix* were exposed to lead acetate trihydrate in drinking water (0.1, 0.25, 0.5 and 1% for 1 to 6 months) to investigate testicular histological alterations induced by lead intoxication. Chronic exposure to subtoxic concentrations of lead caused vascular, interstitial and tubular histological alterations that included interstitial arterial congestion, endothelial cell hyperplasia, interstitial fibrocyte hyperplasia, Leydig cell degeneration, intertubular edema, thickening of the seminiferous tubular basement membrane, spermatocyte degeneration, pyknosis and desquamation. Tubular atrophy and arrest of spermatogenesis were also observed. Taken together, the histological findings of this study indicate that chronic exposure to lead produces significant histological alterations in the testes, which may eventually lead to complete arrest of spermatogenesis. (*Research Journal of Environmental Toxicology* 3 (1): 24-30, 2009; **doi**: 10.3923/rjet.2009.24.30)

Analysis of Organic Matter, Iron and Manganese in Soil of Arsenic Affected Singair Area, Bangladesh

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This study evaluated the mutual relationship among arsenic, iron, manganese, total nitrogen and total organic carbon in the soil of arsenic affected area, Singair, Bangladesh and the results were compared with the other arsenic contaminated area in Bangladesh. The present investigation revealed that high concentration of iron (9138-22071 mg kg⁻¹) and manganese (22-80 mg kg⁻¹) were accompanied by the high concentration of arsenic (44-60 mg kg⁻¹) in arsenic polluted Singair area. In addition, the study showed that the soil of Singair (15-20 m) contained very high concentrations of total organic carbon

ranged from 23100-42900 mg kg⁻¹ and the content of total nitrogen was also very significant in some soil samples, where the concentration of arsenic was high. Therefore, the research study can conclude that presence of total organic carbon, total nitrogen, iron and manganese has significant relationship with arsenic contamination in the soil of Bangladesh. However, the study found no significant relationship with arsenic and carbon nitrogen ratio in the soil of Singair. (*Research Journal of Environmental Toxicology* 3 (1): 31-35, 2009; doi: 10.3923/rjet.2009.31.35)

Aflatoxins Effect on Fungal Populations of Soil, Root and Leaf Surface of Peanut Plants in the Field with Special Reference to Aflatoxins Biodegradation

O.M.O. El-Maghraby, M.S. Youssef and Y.M. Ibrahim

The research aimed to study the role of aflatoxins contaminated peanut seeds (4, 8, 16 and 32 µg g⁻¹ seeds) on fungal populations of soil, rhizosphere, rhizoplane, phyllosphere and phylloplane of cultivated peanut plants for 15, 30, 60 and 120 days in the field, with special reference to aflatoxins biodegradation in soil. Mycological survey revealed that the total fungal count of soil (692.9 colonies mg⁻¹ dry soil) was high compared with that of rhizosphere (602.9 colonies mg⁻¹ fresh root system) and phyllosphere (103.12 colonies mg⁻¹ fresh shoot system) based on dilution-plate method. As well as, phylloplane total fungal count (472 colonies/10 shoot segments) was rich than that of rhizoplane (288 colonies/10 root segments) based on plating-method. A total of 67 species in addition to two varieties belonging to 26 fungal genera were isolated and identified from soil (28 species of 12 genera), rhizosphere (43+1 variety of 16), phyllosphere (49+1 variety of 18), rhizoplane (15 of 10) and phylloplane (29 of 14) of peanut plants investigated (control and treated samples) on dextrose-Czapek's agar medium at 28±2°C. Treatment of peanut seeds with different doses of aflatoxin before planting resulted in a clear effect on total fungal count of both of rhizosphere and soil, while there was no clear effect on total fungal count of rhizoplane, phyllosphere and phylloplane after different cultivation periods. The rate of aflatoxin biodegradation was dose and time dependent, that after 3 days was 40, 70, 81.9 and 89.5% at (4, 8, 16 and 32 µg g⁻¹ seeds), while after 7 days was 70, 81.3, 85.6 and 92.5%, respectively, whereas, after 15 days, no mycotoxin could be detected in the lowest dose (4 µg g⁻¹) and traces in the other remaining doses. After 30 days, completely disappearance of toxin was recorded at the different treatment doses. (*Research Journal of Environmental Toxicology* 3 (1): 36-49, 2009; doi: 10.3923/rjet.2009.36.49)

Anabolic Steroid Exposure of Athletes of Qom, Iran, Through Performance Enhancing Drugs Use

Mansour Ebrahimi

The aim of study was to determine the extent of Anabolic Steroids (AS) exposure of athletes of Qom, Iran in sport clubs. AS are a group of synthetic steroid hormones which have the potential to alter the normal functioning of the endocrine system in wildlives and humans and sharp increase of some diseases have been shown to have direct relation with increase to their exposure. Many athletes use Performance-Enhancing Drugs (PEDs) in training and even competitions. It has been shown that some PEDs have capacity to disturb normal endocrine system and increases of some disorders in athletes have been related to continuous exposure to AS. Here, the amounts of athletes' exposure to AS in Qom sport clubs have been studied. The results showed that nearly in all sport clubs different types of supplementary diets, were used up to 750 days and it were more common in athletes of fitness and aerobic fields which mainly recommended by couches. More than 15.6% of 62 PEDs used in Qom sport clubs had been confirmed and registered as AS, mainly they were steroid hormones derivatives such as testosterone, prohormones, anabolic steroids, vinstrol, sevestanol, oxymetolone, nanderlone, anadrol (oxybolone) and oxandelone and they were common between athletes of aerobic and fitness fields. Significant differences ($p < 0.05$) were found between the numbers, types and duration of PEDs usage, field of sport activity and PEDs advisors while highly significant ($p < 0.001$) difference found between male and female sexes. By considering the finding of this study and the extent of AS usage by athletes, it would be possible to see a sharp surge in hormone dependent disease in Qom so urgent action should be taken. (*Research Journal of Environmental Toxicology* 3 (1): 50-55, 2009; doi: 10.3923/rjet.2009.50.55)

Effects of Oil Pollution on Body Size and Weight of the Sand Lizard *Acanthodactylus scutellatus* at the Greater Al-Burgan Oil Field in Kuwait

M. Al-Hashem and P.F. Brain

This study investigated the impact of oil pollution on morphological measurements in adult male and female sand lizards captured in locations with apparently different pollution levels. The results of this study confirmed that there is sexual dimorphism in body size, with males being generally larger than females at all the study sites. Adult male (but not female) lizards were generally bigger at the Tar mat and soot than the clear and control sites. The increase in body size and weight suggests that

there is a greater availability of food for these somewhat territorial reptiles in both the Tar mat and soot sites. An alternative explanation is that the food resource is affected by oil pollution such that lizards consuming prey with high levels of fat accumulate more adipose tissue in their bodies. (*Research Journal of Environmental Toxicology* 3 (1): 56-59, 2009; *doi*: 10.3923/rjet.2009.56.59)

Effect of Residual and Accumulative Sewage Sludge on Heavy Metals Bioaccumulation: Gene Action and Some Yield Parameters of *Vicia faba*

A.W. Amin, F.K. Sherif, H. El-Atar and H. Ez-Eldin

Field experiments were conducted to evaluate the effect of using sewage sludge as organic fertilizer on different cytological and yield parameters of *Vicia faba*. Sewage sludge treatment rates were 0, 10, 20, 30 and 40 T/F and applied to the soil in three successive additions during 1999-2001. Different rates of residual and repeated application of sewage sludge increased heavy metals concentrations in the soil before sowing and after harvesting of *Vicia faba*. Sludge treatments did not affect some yield parameters, but mature plant height and number of tillers/plant were increased or decreased at different treatments of sludge. The seed index and fresh and dry weights of shoots and roots were increased. The number of seeds/pot recorded the highest value by 10 T/F of the one residual addition, while the lowest value was obtained at 20 T/F two additions. Also, sludge treatments increased mature plant height, seed index, seed density, the number of nodules/plant and fresh and dry weights of nodules except at the highest treatments of two and three additions. Generally, it decreased nodules efficiency percentage. The root tolerance index was increased by sludge treatments. The sludge treatments increased the mean mitotic index and those of three cumulative additions were higher than that of one residual addition treatment. Sludge treatments included a number of abnormalities in all mitotic phases and non dividing cells. The percentage of abnormal cells was increased by three cumulative additions treatments than the one residual addition. (*Research Journal of Environmental Toxicology* 3 (2): 60-75, 2009; *doi*: 10.3923/rjet.2009.60.75)

Effect of Fertilizers (Activators) in Enhancing the Microbial Degradation of Endosulfan in Soil

O.E.G. Elsaid, A.O. Abdelbagi and E.A.E. Elsheikh

The effect of fertilizers activators on microbial growth and capability in degrading α and β -endosulfan was studied by incubating two groups of microorganism in the

presence and absence of four fertilizers (urea, triple super phosphate, urea + triple super phosphate and cow manure) for 45 days with sample drawn every 15 days. Drawn sample were examined for microbial growth, concentration of starting material remained and a mount of sulphate generated. Results indicated that all activators caused significant increase in microbial counts especially the triple super phosphate followed by urea + triple super phosphate, cow manure and urea. Significant reduction in half lives of α and β -endosulfan accompanied with various level of sulphate generation was noticed. Since, the microorganism studied have shown great potential in degrading endosulfan therefore any enhancement in their numbers and activity (caused by activator) will no doubt promote their capability in degrading endosulfan in soil. (*Research Journal of Environmental Toxicology* 3 (2): 76-85, 2009; **doi**: 10.3923/rjet.2009.76.85)

Residual Effect of Sewage Sludge on Soil and Several Yield Parameters of *Zea mays*

A.W. Amin, F.K. Sherif, H. El-Atar and H. Ez-Eldin

A field experiment was conducted to evaluate the effect of using sewage sludge as an organic fertilizer on different yield parameters of maize. Generally, different rates of residual applications of sewage sludge increased heavy metal concentrations in the soil before sowing and after harvesting of *Zea mays*. Leaf and grain contents of heavy metals were affected by sludge addition except for Cd. In general, the residual one addition of sludge decreased heavy metals contents except Pb. While, the residual two additions increased the concentrations of heavy metals except Cu. Sludge treatments did not affect some plant yield parameters. Increased germination percentage and number of ears per treatment were recorded. The dry weight of leaves increased except at 10 and 40 T/F for one residual addition and 20 and 30 T/F for two residual additions. Mature plant height, number of tillers/plant and dry weights of leaves either increased or decreased for different treatments of sludge. The kernel index decreased in all sludge treatments. Sludge treatments affected the M₂ kernel characters of maize, such as inducing yellow kernels, different colored patches in aleurone layer and non-pitted and shrunken kernels. Therefore, the use of sewage sludge as biofertilizer must be applied after pre-treatment to reduce heavy metals in order to decrease the rate of point mutations affecting kernel germination, color and shape and some yield products. (*Research Journal of Environmental Toxicology* 3 (2): 86-93, 2009; **doi**: 10.3923/rjet.2009.86.93)

Effects of Gamma Irradiation on Fungal Growth and Associated Pathogens

M.S. Shathele

Microorganisms from chlorine treated sewage water samples from Al-Ahsa municipal sewage plant were irradiated with gamma rays at doses of 10.0, 15.0, 20.0 and 25.0 kGy. The microorganisms identified were the filamentous fungi, *Aspergillus fumigatus* and *Absedia* spp. and the yeast *Candida silvicola* (*Hansenula holstii*), *Cryptococcus laurentii* and *Candida sake*. Microbial counts were made immediately after irradiation. Although, the damage to microorganisms increased with an increase in irradiation dose but even the highest dose did not completely sterilize the water. The microbiological results revealed that irradiation above 25.0 kGy completely inhibited the growth of all the microorganisms. However, a high dose of irradiation of 25.0 kGy did not show the inhibitory effect on the growth of *Candida sake*. Whereas *Cryptococcus laurentii*, *Aspergillus fumigates* and *Absedia* sp. were killed by 10.0 kGy. The results obtained highlighted the potential of this technology for wastewater treatment. (*Research Journal of Environmental Toxicology* 3 (2): 94-100, 2009; doi: 10.3923/rjet.2009.94.100)

Persistent Organic Chemicals in Malaysian Waters: A Review

N. Somchit, M.N. Somchit, S. Azizan Hadi and M.P. Zakaria

A critical review of the levels of persistence organic chemicals in Malaysian waters from 1980 to 2002. This review concentrated on the detection several toxic substances by groups of scientists in the marine environment, evaluated their quantities and provides estimates of their potential danger for the health of both marine life and humans. The compounds include polycyclic aromatic hydrocarbons, tributyl-tin and pesticides. In summary, the levels of some persistent organic chemicals is lower compared with other Southeast Asia countries and the levels in this region still at the medium level compared with more urbanized and industrialized regions in the West. Nevertheless, continuous monitoring and investigations on the level of the persistent organic chemicals are needed in Malaysia. Transboundary pollution potential should be taken as an important consideration in any development project especially in Southeast Asia. (*Research Journal of Environmental Toxicology* 3 (2): 101-112, 2009; doi: 10.3923/rjet.2009.101.112)

The Role of Human Capital on the Development and Progress of Various Sectors in Iran Economy

M. Ebrahimi and M. Noonejad

We investigated the factors affecting the whole of value added of Iranian economy as well as agricultural and industrial sectors. As, educated labor can affect value added more than uneducated labor, labor was divided to two groups and their effects on value added were investigated separately. Also, selected economical indices were compared pre and post Islamic revolution by using time series data from 1962-2002. Ordinary Least Squares, autoregressive distributed lag model, Johanson cointegrated vectors and vector error correction model were used to investigate the long and short run effects of variables on value added. Student Test (t) was used to compare selected indices pre and post the revolution. The results showed elasticities of economy value added with respect to investment, educated and uneducated labor force are 1.46, 0.059 and -2.32%, respectively. Elasticities of industrial value added with respect to the above-mentioned variables are 0.268, 0.895 and -1.3, respectively, while elasticities of agricultural value added with respect to investment, educated and uneducated labor force are 0.321, 0.369 and 6.94, respectively shows the most important factor in this sector of economy is uneducated labor force. Comparing the average growth rate of variables pre- and post-revolution indicated growth rates of economy value added, the economy investment, industrial and agricultural educated labor force and the economy uneducated labor force are different significantly. Other variables such as growth rate of value added of agricultural and industrial sectors and investment in these two sectors did not have significant differences. (*Research Journal of Environmental Toxicology* 3 (3): 113-123, 2009; doi: 10.3923/rjet.2009.113.123)

Acute Toxic Effects of Endosulfan 35 EC (Endocel) upon Oral Gavage and Dietary Admixture in Japanese Quails

P.J. Prakash, G. Rajashekhar, H. Krishnappa, S.M. Sulaiman and K. Venugopala Rao

A study was conducted to determine the acute toxic effects of Endosulfan 35 EC (Endocel) in Japanese quails by oral gavage and through dietary admixture. The acute oral LD₅₀ value of Endosulfan 35 EC (Endocel) by gavage was determined to be 141 mg kg⁻¹ b.wt. (equivalent to 46 mg kg⁻¹ b.wt. of Endosulfan active

ingredient) with fiducial limits of 56 and 171. The Acute Dietary LC_{50} value of Endosulfan 35 EC (Endocel) was 3590 mg kg^{-1} (which is equivalent to 1197 mg kg^{-1} b.wt. of Endosulfan active ingredient) with fiducial limits of 2563-6925. Endosulfan was relatively more toxic ($LD_{50} 41 \text{ mg kg}^{-1}$) by the oral gavage administration when compared to the dietary route ($LC_{50} 3569 \text{ mg kg}^{-1}$). (*Research Journal of Environmental Toxicology* 3 (3): 124-131, 2009; **doi:** 10.3923/rjet.2009.124.131)

Statistical Analysis of Environmental Elements in Manuchihris Poems

M. Fooladi and M. Ebrahimi

This study takes a step in this direction through the analysis of the poetic works of Manuchihris Damghani, one of the great naturalist poets of the Khorasani style; behaviors that protect the environment and ensure natural sustainability. Ten main categories and their subsets characterized according to their environmental importance. All poems from Manuchihris collection that had at least one of these environmental elements were statistically analyzed. In nearly all of Manuchihris verses there was at least one of the environmental elements, showing his particular attention towards nature and the environment. The most significant environmental elements found were minerals, which shows his familiarity with flowers and trees. The importance of rain and water as the main elements of growth and freshness in nature were clearly presented, showing the role of these environmentally vital elements in the formation of this poets thoughts. Manuchihris particular focus on flowers and their parts and his knowledge about various types of flowers have created a wonderful picture of nature in his collection. Significant differences ($p < 0.05$) between the ten main natural categories and between the subsets of any given category were found. (*Research Journal of Environmental Toxicology* 3 (3): 132-139, 2009; **doi:** 10.3923/rjet.2009.132.139)

Effect of Endosulfan 35% Ec on the Egg Laying and Egg Shell Thickness in Japanese Quails

P.J. Prakash, Geetha Rajashekhar, H. Krishnappa, S.M. Sulaiman and K. Venugopala Rao

A study was conducted to determine the effect of endosulfan 35% EC on the egg laying and egg shell thickness in Japanese quails. The birds were fed a diet

containing the test article at concentrations of 100, 400 and 1000 ppm in diet for a period of 20 weeks. The egg production, cracked eggs and egg shell thickness were measured and then compared with corresponding parameters in the naïve controls. The feed fortified with 100 and 1000 ppm of Endosulfan 35 EC was stable for a period of 7 days with a loss of 8.2 and 8.0%, respectively. The results of the study indicated that Endosulfan 35% EC at the concentration of 100-1000 (ppm) mg kg^{-1} feed did not affect egg production and egg quality and thereby there appears to be no adverse effects on reproduction in birds. (*Research Journal of Environmental Toxicology* 3 (3): 140-146, 2009; *doi*: 10.3923/rjet.2009.140.146)

Degradation of Organchlorine Pesticides in Carbonate Sediments from the Aqaba Gulf, Red Sea

M.G. Al Masri, M. Rasheed and M. Alawi

In order to show the role of sediment in buffering pesticide contamination in seawater, degradation of DDT, Antar and Herphosate in carbonate sediments were investigated. Degradation rates of organochlorine pesticides were calculated from oxygen consumption rate and ammonium production rate that were estimated by incubation of natural carbonate chambers with pesticides. The degradation rates of Antar under oxic and anoxic conditions were 90.7 ± 9.9 and 110.2 ± 17.0 $\text{mgC/m}^2/\text{day}^1$, respectively, which were twofold higher than the rates of Herphosate under both conditions. Degradation of DDT in the sediment was almost zero indicating its higher stability. Statistical analysis shows no significant differences between the degradation under oxic and anoxic conditions. The highly permeable carbonate sediments which are composed mainly of unconsolidated fragments may play an important role in the mineralization of pesticides in marine environments. (*Research Journal of Environmental Toxicology* 3 (4): 147-158, 2009; *doi*: 10.3923/rjet.2009.147.158)

Evaluation of *Alcaligenes faecalis* Degradation of Chrysene and Diesel Oil with Concomitant Production of Biosurfactant

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Alcaligenes faecalis was evaluated for its potential to degrade varying concentrations of chrysene and diesel oil with concomitant biosurfactant production. Biodegradation was set up for 7 days utilizing the substrates as sole

carbon and energy sources. Residual chrysene obtained after degradation of 30, 50 and 100 mg L⁻¹, respectively was 17.4±1.5, 27.2±1.2 and 28.7±1.4 mg L⁻¹ while total petroleum hydrocarbon remaining after degradation of 3, 5, 15 and 30% (v/v) diesel oil respectively was 2.58±0.5, 3.09±1.2, 21.65±5.4 and 63.92±8.1%. Microbial cells of *A. faecalis* and sterilized cell-free extract from diesel oil media showed emulsifying activities against kerosene, diesel oil, engine oil, hexadecane, dodecane, xylene and hexane whereas no emulsifying activity was observed of microbial cells and sterilized cell-free extract from chrysene media. *Alcaligenes faecalis* cells harvested from diesel oil media also showed haemolytic activity unlike the microbial cells from chrysene media. Growth of the isolate in chrysene and diesel oil media induced secretion of protein and carbohydrate into the media which were statistically significantly ($p < 0.05$) different compared to controls. This study portrays the potential of *Alcaligenes faecalis* to degrade and grow on chrysene and diesel oil and induce extracellular protein and carbohydrate with concomitant production of biosurfactant for industrial purposes and in hydrocarbon bioremediation. (*Research Journal of Environmental Toxicology* 3 (4): 159-169, 2009; **doi**: 10.3923/rjet.2009.159.169)

The Presence of Microcystins in Aquatic Ecosystems in Northern Nigeria: Zaria as a Case Study

A.M. Chia, D.S. Abolude, Z. Ladan, O. Akanbi and A. Kalaboms

Evidence from research in most countries of the world has shown that Cyanobacteria blooms could exhibit acute and chronic toxicity to man and animals alike. Despite the availability of records from other countries of the world, there is no information on the occurrence of these toxins in Northern Nigeria. This study reports the findings of a survey for the occurrence of microcystins in aquatic ecosystems in Zaria Northern Nigeria, using Enzyme Linked Immunosorbent Assay (ELISA) based methods. Five out of the 15 aquatic systems surveyed had microcystins concentrations higher than the acceptable limits (1 µg L⁻¹) for portable drinking water. A total of eight Cyanobacteria species were recorded in this survey namely: *Anabaena* sp., *Microcystis* sp., *Spirulina* sp., *Merismopedium* sp., *Gloetrichia* sp., *Cylindrospermopsis* sp. and *Anabaenopsis* sp. In all the water bodies surveyed *Anabaena* sp. and *Microcystis* sp. had the highest frequency of occurrence and biomass (No. of cells per litre of water). (*Research Journal of Environmental Toxicology* 3 (4): 170-178, 2009; **doi**: 10.3923/rjet.2009.170.178)

Hematological and Biochemical Alterations in Occupationally Pesticides-Exposed Workers of Riyadh Municipality, Kingdom of Saudi Arabia

A.S. Al-Sarar, Y. Abo Bakr, G.S. Al-Erimah, H.I. Hussein and A.E. Bayoumi

To assess the adverse health effects of pesticides on occupationally exposed workers, a cohort of pesticide sprayers, employed in Riyadh municipality, were interviewed and examined for changes in hematological profile, blood AChE activity, serum enzymes reflecting hepatotoxicity (AST, ALT and ALP) and markers of nephrotoxicity (urea and creatinine). There was a significant decrease in AChE activity ($p < 0.001$) in pesticide workers ($n = 43$) relative to the control group ($n = 10$). No significant differences were detected in hematological parameters, except for WBC count which was significantly higher ($p < 0.01$) in pesticides workers compared to the control group. Slight increases were observed in liver and kidney functions in the exposed group. The results indicated the need for official regulations and interventions enforced to reduce workers overexposure to pesticides throughout the Kingdom of Saudi Arabia. (*Research Journal of Environmental Toxicology* 3 (4): 179-185, 2009; doi: 10.3923/rjet.2009.179.185)

Land Use Planning and the Yangtze Ecosystem (Wuhan Section): Implications for Sustainability

D. Chibamba, J. Li and L. Zhang

This study explores the effects of land use planning on the Yangtze ecosystem and suggests a framework for incorporating ecological information into land use planning in order to achieve sustainability. The discussion is based on the insights and experiences from the Wuhan city section of the Yangtze River Basin. In China, unprecedented industrialisation and urbanisation have made the Yangtze one of the world's top 10 rivers at risk, its major threat being pollution. Incidences of pollution are ongoing and in many cases increasing. The momentum of the country's population growth, together with the imperative of further economic development, implies that pollution in the Yangtze will worsen before it gets better. Thus, linking ecological information to the planning process is imperative to achieve sustainable development. (*Journal of Environmental Science and Technology* 2 (1): 1-11, 2009; doi: 10.3923/jest.2009.1.11)

A Microcosm Study of Endosulfan Degradation and its Short-Term Effect on pH and Biological Parameters of Cotton Zones Soils of Burkina Faso

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We studied under microcosm conditions the degradation of endosulfan and its effect on soil microbial respiration, soil microbial population and pH evolution in three major soil types of Burkina Faso. Results indicated that the recommended treatment dose of endosulfan ($3 \mu\text{g g}^{-1}$) did not affect soil pH. But when the dose was $6 \mu\text{g g}^{-1}$, a stimulation of the respiratory activity of the soils during the first five days and a disturbance of the pH were observed. There were no significant impact of endosulfan at 3 and $6 \mu\text{g g}^{-1}$ of soil in the total bacterial number. After 5 days of incubation the degradation rate of endosulfan with initial concentration of $3 \mu\text{g g}^{-1}$ were 50, 56.5 and 83.5% in the soil from Boni, Farakoba and Kaibo, respectively. But when the initial concentration of endosulfan was $6 \mu\text{g g}^{-1}$, the figures were 94.6, 79.6 and 20.4%, respectively. Endosulfan degradation in these three soils led to a production of endosulfan-sulphate. (*Journal of Environmental Science and Technology* 2 (1): 12-21, 2009; **doi:** 10.3923/jest.2009.12.21)

Water Adsorption and Surface Acidity of Nano-Ball Allophane as Affected by Heat Treatment

Hamayoon Khan, Rozina Khan, Naoto Matsue and Teruo Henmi

Effect of heat treatment on the water adsorption and surface acidity of two nano-ball allophane samples with varying Si/Al ratio under different relative humidities (RHs) was studied. The water vapor adsorption of two allophane samples under various relative humidities, decreased with preheating treatment up to 400°C for 2 h. The decrease in water adsorption at monolayer level ($\text{RH} \leq 0.45$) was greater for KnP sample than for KyP sample, whereas the decrease in water adsorption due to capillary condensation between allophane unit particles ($\text{RH} \geq 0.6$) was greater for KyP sample. These indicate that allophane hollow spherical particles in KyP sample were directly connected each other with the preheating, but those in KnP sample were not. Heat treatment caused the enhancement in the surface acidity of nano-ball allophane samples. The enhancement in the surface acidity after heat treatment is attributed to the inductive effect on the Si-OH groups present at the pore region of the hollow sphere. The

results showed that surface acidity of the allophane with higher Si/Al ratio (KnP) was stronger than the (KyP) sample having lower Si/Al ratio. This trend was observed under RH between 0 and 75%; then the acid strength for the two samples was the same at RH of 98%. After the heat treatment at lower level of RH, the surface acidity of KnP was higher than KyP. The presence of polymerized silicate tails exposed outside of hollow spherical allophane particles (KnP), causes the enhancement of the Brønsted acidity and also prevent direct connection between the particles after heating. (*Journal of Environmental Science and Technology* 2 (1): 22-30, 2009; **doi:** 10.3923/jest.2009.22.30)

TiO₂-MoO₃ as Photocatalyst for Azo and Triphenylmethane Dyes Decolouration

J.B. Tchatchueng, B.B. Loura, J. Atchana and R. Kamga

TiO₂-MoO₃ was first used as catalyst to oxidize propylene to acetone. The by-products of this reaction were acetic acid, acetaldehyde and carbon dioxide. The decolouration performances of TiO₂ and TiO₂-MoO₃ for the oxidation of azobenzene in aqueous suspensions irradiated with UV light at 365 nm were studied at pH 3 and 10. At pH 3 complete decolouration of azobenzene dye was obtained after 30 min of irradiation in the presence of TiO₂-MoO₃ whereas in the presence of TiO₂ the time of complete decolouration was 55 min. Subsequent study using TiO₂-MoO₃ as photocatalyst was the study of the kinetic rate constants of azo and triphenylmethane dyes decolouration. The results were as followed: 0.4535, 0.6832, 0.8512 and 0.9946 m for methyl green, fast green, crystal violet, malachite green respectively at the same concentration of 0.05 mM. The kinetic rate constants for azo dyes were: azobenzene 0.2909 m (C₀ = 0.032 mM), methyl orange 0.5497 min⁻¹ (C₀ = 0.04 mM) and p-methyl 0.8168 m (C₀ = 0.1 mM). These results showed that using TiO₂-MoO₃ as photocatalyst the decolouration was rapid and total after irradiation time of 30 min whatever the azo or triphenylmethane dyes. (*Journal of Environmental Science and Technology* 2 (1): 31-39, 2009; **doi:** 10.3923/jest.2009.31.39)

Soil Behavior Prediction under Footings Regard to the Elasto-Plastic Models (Shahkarami Model)

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Experiences and studies were shown that the modeling of geotechnical material behavior was very difficult by using of mathematical equations. For this reason, the

calibration of models and establishment of parameters may be available for some stress-path. Presently all stress-paths are not analyzable by any of behavior models. Therefore in engineering designs, we must be studied a large domain as a model. The stress-path and calibration must be coordination. Models and parameters for small footings had a shearing behavior and for large footing had an isotope compression. In the shearing behavior by increasing the load and deformation after yielding the behavior of soil would be softening but the behavior of soil under the large footing would be hardening. Therefore the behavior of soil under the footing was related to the dimension of footing. In this study, we will consider the different types of analytical models for large and small footing on the hard earth. In this investigation are used the finite element methods by ANSYS software for analyzing. (*Journal of Environmental Science and Technology* 2 (1): 40-47, 2009; **doi:** 10.3923/jest.2009.40.47)

Calculation of Concrete Minarets Frequency by Neural Network

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Determination of natural angular frequency of concrete minarets by artificial neural network with various supporting conditions is general goal of this research. For the subject of neural network, training or learning algorithms are applied. The most famous of network structure which is back propagation algorithm is applied in this study. This algorithm is a systematic method for training multi layer artificial neural network. Back propagation algorithm is based on gradient descant which means that it moves downward on the error declination and regulates the weights for the minimum error. In this research, the real frequency of concrete minarets is calculated first using SAP2000 program and is defined as a goal function for neural network, so that all outputs of the network can be compared to this function and the corresponding error can be calculated and so the best function will selected. Then, a set of inputs including dimensions or specifications of arches are made using MATLAB program. After the determination of algorithm and quantification of the network, the phases of training and testing of the results are carried out and the output of the network is created. It is concluded that the performance of the neural network is optimum and the errors are less than 8%, so, the network trains in different manner. Furthermore the time of frequency calculations in neural network is less than real analysis time that calculated by SAP2000 software and its precision is acceptable (less than 12%). (*Journal of Environmental Science and Technology* 2 (1): 48-55, 2009; **doi:** 10.3923/jest.2009.48.55)

Pedo-Landscape and Development of *Lippia multiflora* in the Southern Côte D'Ivoire

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A study on geological, geomorphological, pedological, hydrological and botanical prospection was undertaken. The main focus was to identify the types of rocks, relief, soils, river and flora which characterize a suitable landscape for the growth of *Lippia multiflora*. The results obtained from this first investigation indicate that *Lippia multiflora* needs a savannah type environmental ecosystem with sandy soils derived from silico-aluminous rocks preferably developed in medium or base of hill topographical positions. (*Journal of Environmental Science and Technology* 2 (1): 56-62, 2009; **doi:** 10.3923/jest.2009.56.62)

Analysis the Plant Nutrients and Organic Matter in Textile Sludge in Gazipur, Bangladesh

M.M. Islam, M.A. Halim, M. Saiful Islam, M. Safiqul Islam and C.K. Biswas

The present research was carried out to determine the content of essential macro nutrients (N, P, K and S) as well as Fe, total organic carbon and total organic matter in textile sludge of Apex Weaving and Finishing Mills Ltd., Gazipur, Bangladesh and assess its possibility to use as a soil conditioner or fertilizer in agricultural land. The results revealed that plant macro nutrients Nitrogen (N), Phosphorous (P), Potassium (K) and Sulphur (S) were found in significant amount compared to some commonly used organic manures. The range of various macro nutrients was 1.53-2.37, 0.09-0.14, 0.11-0.17 and 2.69-3.42% for N, P, K and S, respectively. The concentration of iron (19.52%) was also very high in the sludge than that of in soil. Moreover, total organic carbon (19.89%) and total organic matter (34.67%) were abundantly available in sludge. In addition, thermal study explores that after 400°C the sludge was thermally stable and it was also confirmed by IR study that dried sludge samples showed significant presence of water at room temperature while the samples heated up to 400°C, the presence of water was barely indicated. (*Journal of Environmental Science and Technology* 2 (1): 63-67, 2009; **doi:** 10.3923/jest.2009.63.67)

Influence of Cadmium and Lead Concentrations of Irrigation Water on Dry Matter Yield of Vegetables

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The aim of the study was to find out the extent that cadmium and lead concentrations in irrigation water affect yield of vegetables like cabbage, lettuce and carrots negatively or positively. Experimental plots were established to produce cabbage, carrots and lettuce. The crops were irrigated with irrigation water of 0.05 and 0.1 mg L⁻¹ Cd and 30 and 50 mg L⁻¹ Pb concentrations. Results of analyzed crops samples showed that generally, there was a reduction of dry matter yield of crops produced. Dry matter yield of cabbage and lettuce treated with 0.05 mg L⁻¹ Cd concentration of irrigation water reduced by 56.10 and 10.65%, respectively. At 0.1 mg L⁻¹ Cd irrigation water concentration the reduction of cabbage and lettuce dry matter yield were 61.17 and 16.57%, respectively, compared with values of controlled crops. However, in the case of carrots there were increases in dry matter yield of 268 and 187%, respectively irrigating with water with Cd concentrations of 0.05 and 0.1 mg L⁻¹. With Pb irrigated vegetables, dry matter yield for all the three crops reduced at all Pb irrigation water concentrations. Dry matter yield of Pb treated cabbage reduced by 56.6, 13.54% for lettuce and 35.83% for carrots at 30 mg L⁻¹ Pb irrigation water concentration. At 50 mg L⁻¹ Pb irrigation water concentration, dry matter contents of cabbage, lettuce and carrots reduced by 72.85, 43.23 and 24.57%, respectively, compared with values from controlled plots. (*Journal of Environmental Science and Technology* 2 (1): 68-72, 2009; doi: 10.3923/jest.2009.68.72)

Heavy Metals Contents on Beach Sediments North and South of Sohar Industrial Area, Oman

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A total of 63 surface sediment samples from three sites: Harmul north of Sohar industrial area, Majees south of Sohar industrial area and Zafaran nine kilometers south of Majees were collected in November 2005. They were analyzed for 11 heavy metals including: Vanadium (V), chromium (Cr), manganese (Mn), nickel (Ni), copper (Cu), selenium (Se), mercury (Hg), cadmium (Cd), lead (Pb), zinc (Zn) and arsenic (As) using microwave digestion followed by Inductively Coupled

Plasma-Mass Spectrometry (ICP-MS). The concentrations of chromium, manganese and vanadium were higher in Harmul than Majees and Zafaran. Arsenic concentration was generally low except in some stations. The results revealed that heavy metals concentrations in these sites are not alarming. (*Journal of Environmental Science and Technology* 2 (2): 73-79, 2009; **doi:** 10.3923/jest.2009.73.79)

Determination of Land Data of Ergene Basin (Turkey) by Planning Geographic Information Systems

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Geographic Information Systems (GIS) provide to gather environmental, legal and positional whole data pertaining to land. GIS is used to make future plans with the maps formed by digitizing informations gathered from land data. In the study, positional data pertaining to Ergene Basin where is chosen as the area of study are first processed into GIS medium and then thematic maps of the region are formed. It is aimed with the maps prepared within the context of the study to form a base in making further plans for basins. (*Journal of Environmental Science and Technology* 2 (2): 80-87, 2009; **doi:** 10.3923/jest.2009.80.87)

Detection of Some Heavy Metals Due to Sewage Water Diffusion into Planted Land

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The concentrations and transfer factor of some heavy metals including copper (Cu), zinc (Zn), silver (Ag), lead (Pb), mercury (Hg) and cadmium (Cd) in some fruit and leaves of plants grown in the polluted soil of Um Al Nasser village were determined using atomic absorption spectroscopy. The study showed a significant pollution of plants with some of the studied metals which exceeded in some cases the allowed values approved by WHO and FAO. The concentrations of copper, zinc, silver, lead and mercury were in the range: 0-14.5, 5.9-115.4, 0-1.8, 0- 68.0 and 7.3-29.6 $\mu\text{g g}^{-1}$, respectively. No significant amount of cadmium was detected. Transfer factor was varied amongst the plants and also amongst the species of the metals. (*Journal of Environmental Science and Technology* 2 (2): 88-94, 2009; **doi:** 10.3923/jest.2009.88.94)

Extraction of Eleven Polycyclic Aromatic Hydrocarbons in Water Samples

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Eleven polycyclic aromatic hydrocarbons namely; naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[b]fluoranthene, benzo[a]pyrene and benzo[ghi]perylene were extracted simultaneously by solid phase and analysis by gas chromatograph. The LC-18 solid phase showed good recoveries for extraction of 11 PAHs by using 3 mL of the mixture of (1:1:1) dichloromethane: cyclohexane: hexane as eluent, the percentage recoveries were in the ranges of 84.31-97.38 with the standard deviation of 1.56-5.36. The detection limits for solid phase extraction were in the ranges of 0.06-0.55 ppm. Application for analysis of water samples were done by this technique. The concentration of PAHs in water samples were found slightly varied from the location. The advantages of solid phase are solvent consumption, reuse in several times and pre-concentration. (*Journal of Environmental Science and Technology* 2 (2): 95-99, 2009; **doi**: 10.3923/jest.2009.95.99)

Evaluation of Road Pavement Density Using Ground Penetrating Radar

RSA Raja Abdullah, H. Zulhaidi M. Shafri, R. Mardeni, Sabira Khatun and R. Muniandy

This study describes an analysis of Ground Penetrating Radar (GPR) measurements at frequency range of 1.7-2.6 GHz to get a relationship between attenuation and density for nine road pavements slabs with different densities. There are about four different frequencies had been tested. The method is simple, fast, non-destructive and accurate way to determine the density of road pavement. Density is a one of the important parameter in order to determine the compressive strength of road pavement for road user safety. In laboratory, the measurement system consists of a signal generator (250 kHz-3 GHz) as a source, spectrum analyzer (100 Hz-8 GHz), directional coupler with adapter and horn antenna. The first part of the measurement system setup is to determine the amplitude of transmitted wave (received signal strength). A few of received signal strength and attenuation for nine road pavement slab samples were taken at four different frequencies. An instantaneous method for measuring the density of road pavement was developed by using microwave reflection technique and free space method.

The MATLAB software is used to analyze the measurement data and also for the graphs comparisons. At the end of this study, it is found that density plays an important factor in causing a major in the recorded signal strength as well as the differences of attenuation of the GPR signal. (*Journal of Environmental Science and Technology* 2 (2): 100-111, 2009; **doi:** 10.3923/jest.2009.100.111)

Combined Processes for Phosphorus Removal from a Dairy Plant Wastewater: Conditions Influencing the Chemical Process

O. Balamane-Zizi and H. Ait-Amar

The aim of this study is to assess the efficiency of a possible combination of the chemical and biological processes to enhance the phosphorus removal from a dairy plant wastewater which contains important amounts of phosphates and organic matter (PO_4^{3-} -P in range of 9-45 mg L^{-1} and COD in range of 200-5000 mg L^{-1}). In a first time, batch tests conducted in jar test were used to determine the pH and the molar ratios Fe:P and Al:P in order to optimise the chemical process. In this case, pH = 7, molar ratio Al: P = 3 and pH = 4 ; molar ratio Fe: P = 3 were obtained, respectively for aluminium sulphate and ferric chloride used as precipitants. In a second time, kinetics of biological phosphorus removal were studied by batch tests at three temperatures (13, 23 and 33°C) in order to show the importance of temperature in biological processes. These tests were conducted with the mixture of supernatant obtained after the precipitation of phosphates at optimum conditions (by ferric chloride and aluminium sulphate) and activated sludge originate from wastewater treatment plant of Staoueli at east of Algiers. The results obtained indicated that biological phosphorus removal could indeed be feasible to enhance the remove of phosphates from dairy processing wastewaters. The effect of temperature had also been studied in order to show the importance of temperature in biological processes. The results obtained showed that an increase of temperature accelerates the process. (*Journal of Environmental Science and Technology* 2 (2): 112-119, 2009; **doi:** 10.3923/jest.2009.112.119)

A Review on the Environmental Issues in Jeddah, Saudi Arabia with Special Focus on Water Pollution

Saleh Faraj Magram

This study seeks to compile data on environmental issues in Jeddah, which is the most significant commercial city in Saudi Arabia, through a comprehensive review

of the available studies. The growth of the city of Jeddah over the last fifty years and particularly in the last thirty has been rapid and diverse. Due to lack of proper care, unfortunately the development activities were accompanied by environmental degradation. Today there are many integrated management issues that relate not only to water, but also the air, land and the marine resources of Jeddah. This study systematically compiled data on environmental issues in Jeddah. Special focus was given on the water issues. It became evident through the review of the available past studies and recommendations that a significant problem in solving the environmental issues is related to the issues of integrated environmental management. Some actions that should be considered in order to resolve the high priority issues were proposed. (*Journal of Environmental Science and Technology* 2 (3): 120-132, 2009; **doi:** 10.3923/jest.2009.120.132)

Evaluation of a New Egyptian Probiotic by African Catfish Fingerlings

A.M. Abdelhamid, A.I. Mehrim, M.I. El-Barbary, S.M. Ibrahim and A.I. Abd El-Wahab

A preliminary study (120 days) was conducted on African catfish (initial body weight 90 g) to evaluate the beneficial effects of a new patent local probiotic (T-Protophyt 2000) when added to their diet (25% crude protein) at graded levels (0, 1, 2 and 3 g kg⁻¹ diet). The diet containing 1 g kg⁻¹ (T₂) reflected the best growth and feed utilization parameters. Increasing the probiotic level increased fish carcass protein, fat and energy contents, as well as RBCs, WBCs, platelets and A/G ratio but decreased blood proteins. Also, T₂ treatment led to improvement of most histometric characteristics of the dorsal muscles of African catfish compared with the control (T₁) and other treatments (T₃ and T₄). The bacterial activity of this probiotic was tested *in vitro* against nine of pathogenic strains of Gram-negative bacteria (*Aeromonas hydrophilla*, *Pseudomonas aeruginosa*, *Pseudomonas fluorescent*, *Vibrio* sp., *Klebsiella* sp., *Shigella* sp., *Salmonella* sp., *Proteus* sp. and *Escherichia coli*) at two concentrations (120 and 240 µg) compared with oxytetracycline (OTC 30 and 60 µg). The results showed positive effect of the probiotic at the two concentrations against all the tested bacteria. (*Journal of Environmental Science and Technology* 2 (3): 133-145, 2009; **doi:** 10.3923/jest.2009.133.145)

Impact of Combined Industrial Effluent on Metal Accumulation, Nitrate Reductase Activity and Yield of Two Cultivars of *Vigna unguiculata* (L.) Walp

C.E. Umebese, O.E. Ade-Ademilua and B.O. Olonisakin

Combined industrial effluent from Ikeja Central Treatment Plant, Lagos, was used to irrigate *Vigna unguiculata* L. Walp (cowpea), cultivars IT89KD-349 (white) and IT84E-124 (red). The effluent was alkaline (pH 9.8) and had a significantly higher concentration of Ca (11.53 mg L^{-1}), NO_3 (83.20 mg L^{-1}), SO_4 (22.73 mg L^{-1}), Cl (15.45 mg L^{-1}) and Cd (2.16 mg L^{-1}) than the experimental soil. Nitrate reductase activity was enhanced almost throughout the period of growth of both treated cultivars but for the peak at 35 DAP shown by control white. There was a corresponding increase in the net assimilation rate and a significant increase ($p \leq 0.05$) in the biomass of leaves and pods of treated red cowpea but only the pods of treated white cowpea. Heavy metal uptake by seeds of treated plants was negligible and this may be attributed to the high accumulation of Ca by these seeds. Undiluted combined industrial effluent has good agro potential in the cultivation of red cowpea. (*Journal of Environmental Science and Technology* 2 (3): 146-152, 2009; doi: 10.3923/jest.2009.146.152)

Synthetic Textile Effluent Removal by Skin Almonds Waste

F. Atmani, A. Bensmaili and N.Y. Mezenner

In the present study, natural and treated skin almonds were used as adsorbents for adsorption kinetics of methyl orange (acid dye) and crystal violet (basic dye). Skin almonds were treated by three different types of chemical treatments: acidic treatment (H_2SO_4), alkaline treatment (NaOH) and salt treatment (MgCl_2). The maximum adsorption capacities of crystal violet onto skin almond and methyl orange onto natural and treated skin almond with H_2SO_4 were 85.47, 15 and 31.94 mg g^{-1} , respectively, at 23°C . Untreated skin almonds might be a good adsorbent for the removal of basic dye from water solution. The fitness of both Langmuir and Freundlich adsorption model on describing the equilibrium isotherms of Crystal Violet (CV) and Methyl Orange (MO) were examined. The experimental data fitted very well the pseudo second order kinetic model and also followed by intraparticle diffusion model. The results show that the sorption capacity decreases with an increase in solution temperature from 23 to 50°C . The thermodynamics parameters were evaluated. The negative value of enthalpy (ΔH°) indicated that the adsorption of both dye onto skin almonds were exothermic,

which result was supported by the decreasing adsorption of dye with temperature. (*Journal of Environmental Science and Technology* 2 (4): 153-169, 2009; **doi:** 10.3923/jest.2009.153.169)

Socio-Economic Aspects of Wastewater Reuse in the Gaza Strip

Abdelmajid R. Nassar, H. Al-Najar and Jamal Y. Al-Dadah

The main concern of the current research is to investigate the socio-economical aspects of reuse which rarely discussed in Gaza Strip. Questionnaire to farmers in three areas in Gaza Strip have been conducted and analysis and two sites irrigated with treated effluent was monitored. The study indicates an economical improvement for farmers switching from groundwater to effluent irrigation, even though full yield potential of citrus and olive. (*Journal of Environmental Science and Technology* 2 (4): 170-178, 2009; **doi:** 10.3923/jest.2009.170.178)

Environmental Assessment due to Air Pollution near Iron Smelting Industry

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The present investigation was on iron smelting industry which was located in Papankulam-Madavarvilagam Village, Tamilnadu, India and polluting the environment in the forms of fumes. The pollutant seems to affect the various plants and human beings residing at the vicinity of industry. In this industry, for a month 40-50 tones of ferric sulphate was produced using sulphuric acid, nitric acid and iron which were considered major environmental contaminant. Ditch, well, bore-well waters, plant samples like coconut tender water, *Cassia auriculata* and *Opuntia elatior* extracts were captivated from pollutant and unpollutant sites and the concentration of iron content in the captivated water samples and plant extracts were monitored and also the effect of iron on the physiology of plants was studied. On the basis of results, we concluded the exhaust from the iron smelting industry had a telling effects on the near by ecosystem. Accordingly, continuous monitoring of this polluted study site can be helped to solve this air pollution. (*Journal of Environmental Science and Technology* 2 (4): 179-186, 2009; **doi:** 10.3923/jest.2009.179.186)