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Physical Sciences

Biological Sciences

Review

Physical Sciences

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The Role of Rainfall Intensity and Soil in Determining Rates of Flow Through Cryoturbated Chalk

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Abstract. The effects of different water application rates (3, 10, 15 and 30 mm/h) and of topsoil removal on the rate of downward water movement through the cryoturbated chalk zone in southern England were investigated *in situ*. During and after each application of water, changes in water content and matric potential of the profile were monitored and percolate was collected in troughs. The measured water breakthrough time showed that water moved to 1.2 m depth quickly (in 8.2 h) even with application rate as low as 3 mm/h and that the time was only 3 h when water was applied at a rate of 15 mm/ h. These breakthrough times were about 150 and 422 fold shorter, respectively, than those expected if the water had been conducted by the matrix alone. Percolate was collected in troughs within 3.5 h at 1.2 m depth when water was applied at 30 mm/h and the quantity collected indicated that a significant amount of the surface applied water moved downward through inter-aggregate pores. The small increase in volumetric water content (about 3%) in excess of matrix water content resulted in a large increase in pore water velocities, from 0.20 to 5.3 m/d. The presence of soil layer had effect on the time taken for water to travel through the cryoturbated chalk layer and in the soil layer, water took about 1-2 h to pass thorough, depending on the intensity.

Keywords: breakthrough time, cryoturbated chalk; rainfall intensity; water flow

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Studies on Amylase Activity of Pancreatin Obtained from Bovine Pancreas

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Abstract. The main objective of this study was to prepare pancreatin in liquid and powder form and to determine its amylase activity in crude homogenate of animal tissue. Different conditions were optimized for estimation of maximal activity including pH, temperature and substrate concentration. The optimum pH was found to be 6.8. The enzyme was optimally active at 50 °C. The effect of substrate concentration on enzyme activity was also studied and Km was found to be 0.5%.

Keywords: pancreatin, bovine pancreas, amylase activity

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Metabolic Inhibitors as Stimulating Factors for Citric Acid Production

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Abstract. The effect of some metabolic inhibitors on citric acid (CA) production by *Aspergillus niger* in cane molasses medium was investigated. Addition of 0.01-0.1 mM iodoacetic acid and sodium arsenate, 0.05-1.0 mM sodium malonate, 0.01 mM sodium azide, 0.01-0.05 mM sodium fluoride, 0.1-1.0 mM EDTA stimulated CA production (5-49%). Higher concentrations (10 mM) of iodoacetic acid, sodium malonate and 0.5 mM sodium azide caused a complete inhibition of fungal growth. Iodoacetic acid, sodium arsenate and sodium fluoride (0.2 mM) caused a remarkable inhibition of CA production. The implications of those preliminary functions was discussed.

Keywords: citric acid, cane molasses, surface culture, metabolic inhibitor, *Aspergillus niger*

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Chemical Variability of Fatty Acid Composition of Seabuckthorn Berries Oil from Different Locations by GC-FID

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Abstract. For determining the chemical composition of seabuckthorn oil of different origins, samples of seabuckthorn berries (red and yellow varieties) were collected from different locations of northern areas of Pakistan. Among eight different fatty acids, palmitoleic acid (32.4%) and palmitic acid (36.52 %) were found to be the major fatty acids present along with other important fatty acids i.e., oleic acid (37.07%), linoleic acid (12.36%) and linolenic acid (0.73%). Quantities of unsaturated fatty acids were higher than that of saturated analogues.

Keywords: seabuckthorn berry oil, fatty acid composition, pharmacology

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Applications of Lac Dye Using Different Mordants on Leather

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Abstract. Lac dye aleuritic acid extracted from seed lac, when applied onto leather, using post-mordanting process showed good results. Among acetic acid, formic acid and alum, acetic acid at 0.1 M concentration proved to be the best mordant and gave excellent colour fastness to washing, light and rubbing and good tensile strength.

Keywords: lac dye, mordant, leather, aleuritic acid.

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Studies on Textile Sludge Treatment Options

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Abstract. Analysis of sludge samples of a textile processing factory revealed that the BOD and COD as well as the levels of total solids, nitrogen and phosphorus contents of sludge liquor were high needing treatment before disposal or reuse. Detention time of 60 days was established for aerobic treatment of the sludge. Optimum dosage for physico-chemical methods were established at 4 g/l, using alum and iron III chloride each and 15.5 g/l and 550 mg/l, for lime and polyelectrolyte each. Solids were reduced by 67%, through aerobic and 61% through anaerobic digestion, while the sludge treated by physicochemical method had higher solid content, recording the highest increase with lime.

Keywords: textile sludge treatment, pollution, aerobic sludge treatment, anaerobic sludge treatment

Biological Sciences

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Antifungal Activity of the Liquid Obtained by Oxidative Cracking of Waste Paper

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Abstract. The composition of the product formed by burning of paper under controlled conditions in an indigenously prepared reactor was determined by GC/MS, while its antifungal activity was assessed qualitatively and quantitatively by comparison with the standard and determination of the MIC. The product was found to be effective against six fungal strains. Amount of the product has been improved upto 25%.

Keywords: antifungal activity, oxidative cracking, waste paper

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Development of an Unconventional Method to Control the Ectoparasites in Backyard Poultry

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Abstract. Dust of *Nicotiana tabacum*, *Azadirachta indica* and *Polygonum hydropiper* when applied in the poultry sheds as bedding for control of six species of lice, one species of fly and two species of mites, highest efficacy (96.67%) was shown by tobacco at 15% concentration followed by neem at the same concentration (efficacy, 77.52%) and tobacco at 10% concentration. Tobacco at 15% concentration significantly ($p<0.05$) reduced the ectoparasitic burden within 12 days with maximum mean body weight gain by poultry, being 232.30 g.

Keywords: *Nicotiana tabacum*, *Azadirachta indica*, *Polygonum hydropiper*, ectoparasites, poultry parasites

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Surveillance of Drinking Water of Karachi City: Microbiological Quality

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Abstract. In the analysis of 329 treated (tap) water samples and 30 well water samples of Karachi city, 94 (28.5%) tap water samples were found contaminated with faecal coliforms and had high heterotrophic plate count (HPC), 153 (46.5%) had very high heterotrophic plate count and only 82 samples were fit for human consumption. Out of 30 well water samples only 2 samples were fit for human consumption; 23 (76%) had high faecal coliform count and HPC, whereas, 5 (16.67%) were rejected owing to extremely high bacterial count.

Keywords: faecal coliforms, heterotrophic plate count, drinking water quality, Karachi

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Respiration, Quantum Yield of Photosynthesis and Transpiration of Two Mungbean Genotypes Differing in Salt Tolerance

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Abstract. The mechanism of salt tolerance in relation to individual leaf growth, transpiration, dark respiration rate, and quantum yield was studied at 0, 50 and 100 mM NaCl solution. At high salt concentration the leaves of BM21 showed higher reduction in growth than those of BM 01. The relative reduction (% of control) of Tr and Dr were less in BM01 than in BM21. The dark respiration rates were less than 1 µmol $(CO_2)/m^2/s$ and accounted for 19 and 32% increase (% of control) at the highest PFD in BM01, while it was 31 and 44% in BM21, respectively at 50 and 100 mM NaCl. More reduced quantum yield in BM21 than BM01 reflects more maintenance costs of energy in repairing injured tissue, enzyme reactions and ion movement.

Keywords: salt tolerance, mungbean, respiration, quantum yield, transpiration

Review

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Pesticide Immunoassays: Experience and Future Perspective in Pakistan

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Abstract. An overview on the use of immunochemical technology for pesticide residue analysis has been described. Pioneering work on the development of pesticide immunoassays (IA) using ELISA technique in Pakistan has been carried out and described in detail. Dieldrin, atrazine and DDT IAs were performed using Enzyme-Linked Immunosorbent Assay (ELISA) kits to determine residual levels of these pesticides in soil and water. ELISA was found to be successful for dieldrin, atrazine and DDT residue analysis. A highly sensitive in-house ELISA has now been developed for atrazine residues determination. Polyclonal antibodies were raised in rabbits by immunization with an atrazine-BSA conjugate and optimized with atrazine-peroxidase (POD) conjugate. It showed middle of the test (50% B/Bo) at 90 ng/l and lowest detection limit (LDL) at 1ng/l in water. For environmental samples, 50% B/Bo was at 75 ng/l and LDL at 4 ng/l. No cross-reactivities were shown by terbutryn, ametryn, des-isopropylatrazine, de-ethylatrazine except terbuthylazine (17%) and hydroxyatrazine (30%). Data obtained by ELISA, significantly correlated with those obtained by HPLC ($r = 0.990$). It required no clean-up for water samples and less clean-up steps (than HPLC) in soil/coloured extracts, but showed matrix effect. Validation showed good accuracy and precision thereby suggesting that this test can be applied accurately for atrazine detection in water. This IA experience demands future IAs development in Pakistan for commonly used pesticides.

Keywords: pesticides, immunoassay, HPLC