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Physical Sciences

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Soil Moisture Measurement by Soil Impedance Measuring Meter: Laboratory Calibration and Field Evaluation

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Soil impedance measuring meter is relatively a new device and utilises the principle of measuring the dielectric constant of the soil, and hence water content by soil electrical impedance method at 100 MHz. The probe is supplied with a general calibration by the manufacturer and very little has been published on the materials-specific calibration. Hence, the output (mV) of the probe was calibrated versus volumetric water content (θ_v) of silty clay loam soils, loamy very fine sand soil and chalky material. For θ_v <0.6 m^3m^{-3}, a third order polynomial relationship between θ_v and the probe's output was found suitable (r^2=0.99) for calibration. A good correlation was found between moisture content measured by this new probe and that with neutron probe under field condition, for silty clay loam soil (r=0.96) and for chalky material (r=0.97).

The probe is comparatively small and easy to install but its effective sampling volume is limited (42.4 cm^2). Therefore, it is most suitable for homogeneous soils and pot experiments. The sensitivity of the probe is greatly influenced by conditions close to the central rod and a 0.5 mm annular gap between this rod and the surrounding material resulted in 42% reduction in output.

Key words: Soil moisture, Theta probe, Calibration, Dielectric constant, Effective sampling volume.

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The Variation of Calcium, Magnesium, Sodium, Potassium and Bicarbonate Concentration, pH and Conductivity in Groundwater of Karachi Region

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Groundwater in Karachi is influenced mainly by the evaporation / crystallization process as expressed by the Na/(Na+Ca) weight concentration ratio. The high coefficient of determined between conductivity and total dissolved ions concentration in meq^{-1} revealed that major ions affect the conductivity of groundwater. It was also found that groundwater quality with respect to cations is not significantly influenced by geology, particularly in the Urban area of the city, where the 90% of the population resides. The relationship between conductivity and bicarbonate concentration shows that supersaturation of groundwater with carbon dioxide is responsible for general depression of pH.

Key words: Groundwater, Cations concentration, Evaporation/crystallization, Supersaturation.

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PLANT GROWTH STIMULATION BY LIGNITE HUMIC ACIDS. *PART-I.* EFFECT OF AMMONIUM HUMATE ON THE GROWTH OF WHEAT

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Humic acids were prepared by nitric acid oxidation of Lakhra coal. The product was alkali soluble polymeric material having an aromatic characteristic. Ammonium salt of the humic substances was prepared to find out its effects in the presence and absence of N-fertilizer on the yield of wheat, biological yield of whole plant and number of tillers associated with the plants. The addition of ammonia salt of humic acids increased the size of grain, plant and leaves. The small dose of 0.5 $kgha^{-1}$ alone and in combination with half dose of N-fertilizer (60 kg ha^{-1}) is the optimum dose of growth stimulation of wheat in Sindh. It suggests that the agricultural soil of experimental site is rich in humous material.

Key words: Oxidation, Humous material, Biological yield, N-fertilizer, Stimulation.

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METAL COMPLEXES OF NICKEL, PALLADIUM AND PLATINUM WITH PYRAZOLYL PYRIDINE

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The complexes of 2-(Pyrazol-1'-yl) pyridine with Ni (II), Pd(II) and Pt (II) are reported. Stability constants were carried out by Job's method of continuous variation. The complexes were characterized on the basis of analytical data for metal determination by atomic absorption, elemental analysis, spectroscopic evidence and qualitative analysis by x-ray diffraction. The ligand forms a 1:1 complex with these metals.

Key words: Metal complexes, Nickel, Palladium, Platinum, Pyrazolyl, Pyridine.

Pak J Sci Ind Res 2002 45 (3) 165-167

RENEWAL PROCESS OF pH-DISTRIBUTIONS WITH DUAL PROBLEM

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(Received 21 November 1998; accepted 16 August 2001)

In this paper it is considered to study the two pH-Renewal Process cases by Constructing the vector Markov process, because of the dense of Shi's formula in the set of non-negative random variables, the results are explicit and meaningful for the problems connected with the failure and replacement.

Key words: Markov process, Shi's formula, pH-distribution.

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SALT EFFECTS IN THE KINETICS OF REACTION BETWEEN IODIDE AND BROMATE IONS

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(Recieved 1 March 2000; accepted 1 September 2001)

A bimolecular reaction between potassium iodide and potassium bromate in presence of sodium nitrate was studied at various ionic strengths (μ) and temperatures. The results showed that the rate constants (k) increased with the increase in ionic strength of the medium. The values of energy of activation (E) and activation parameters such as change in enthalpy of activation ($\Delta H^{\#}$), change in entropy of activation ($\Delta S^{\#}$) and change in free energy of activation ($\Delta G^{\#}$) were evaluated as a function of ionic strength of the medium.

Key words: Salt effects, Kinetic reaction, Iodide, Bromate Ions.

Biological Sciences

Pak J Sci Ind Res 2002 45 (3) 174-177

STUDIES ON THE CULTIVATION AND INTRODUCTION OF SANDALWOOD (*SANTALUM ALBUM* L) AT KARACHI, PAKISTAN 24°59'N 68°56'E

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(Received 25 May 2000; accepted 22 May 2001)

Efforts were made to germinate the seeds of *Santalum album* L. (Sandalwood) for the first time in the Pakistan. The seeds germinated in about 8-16 days after the treatment of gibberellic acid to break the dormancy of the seeds. 500ppm gibberellic acid solution dose gave the optimum result and untreated seeds gave poor results. The paper encompasses the results related with the effect of irrigation on the germination of seeds and the seedling height plus the subsequent successful growth of this plant during the last 12 years. The optimum conditions for the growth of this plant are discussed.

Key words: *Santalum album*, Dormancy, Seed germination, Economics, Karachi.

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Influence of Multiple Taker-in System upon Tensile Parameters of Cotton Yarn

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(Received 11 August 1999; accepted 3 July 2001)

The study was aimed at comparing the effect of the conventional high production card with a modified card equipped with multiple taker-in system upon tensile parameters (viz., single yarn strength, elongation and rupture per kilometer) of 24^s cotton yarn. The quality of yarn was significantly improved by the modified system. Thus by modifying and updating the webfeed system, an older carding machine can be made to produce yarn of impressive quality.

Key words: Carding, Multiple taker-in system, Tensile parameters, Yarn.

Introduction

Whenever the question is raised of how to achieve high quality in spinning preparations, the cards will be the key machine. It is in this machine that the most important characteristic data of significance to quality in the subsequent spinning process is established. One of the most effective ways of increasing the productivity of a card machine is the enlargement of the pre-carding element. It is well known that an enlarged taker-in assembly extracts a large volume of waste, which is advantageous with regard to improving web and yarn quality (Ghaffar 1990; Irshad 1994). The performance of the cylinder flats assembly and in the final analysis, the quality of the card web depends on the efficiency of the taker-in separating the flocks into individual fibres and of eliminating extraneous matter and neps (Leifeld 1996).

The multiple taker-in system provides a vehicle for the out class effectiveness of the "flat-cylinder" system to the point of full development. In the carding zone, carding results are determined by clothing fineness and condition, by cylinder speed, and by the narrowness of the gap between the flat and cylinder clothing points (Schlichter and Leifeld 1996).

The main effect of the new precarding unit, comprising three opening and cleaning rollers instead of one taker-in roller is not as is generally assumed i.e. the additional cleaning effect, but the possibility of achieving better carding conditions at the cylinder through correctly staged opening. This study is targeted to compare the effect of an existing high production card with that of the modified card (equipped with multiple taker-in system) upon the tensile parameters of 24^s cotton yarn.

*Author for correspondence

This research work was conducted at the Department of Fibre Technology, University of Agriculture, Faisalabad and at the Aamer Cotton Mills (Ltd.), Jumberkhurd, Distt. Kasur, Pakistan, under the standard atmospheric conditions (i.e., 20±2°C temperature and 65±2 % relative humidity). Cotton variety MNH-93 having 27.06 millimeter length, 4.5 micronaire value, 27 gram/ten strength, 48.62 percent uniformity ratio and 82.55 percent maturity was selected for the study.

The material was fed through the chute feed system at the same rate to the following cards:

A_1 = Modified card, A_2 = Conventional card.

The modified card was equipped with multiple taker-in system (consisting of three additional rollers as shown in Fig 1).

The specifications of these additional rollers are as under:

	Ist roller	2nd roller	3rd roller
Diameter	172.5 mm	172.5 mm	172.5 mm
Wire angle	17°	20°	20°
Points per inch^2	36	162	205
Teeth length	5.0 mm	5.0 mm	8.0 mm
Speed	621-1373 rpm	800-1730 rpm	1066-2488 rpm

The following speeds of both carding machines were changed to study their effects.

a. Taker-in speeds (B)

B_1 = minimum speed of taker-in; B_2 = maximum speed of taker-in

b. Cylinder speeds (C)

C_1 = 450 rpm; C_2 = 500 rpm

c. Doffer speeds (D)

D_1 = 75 ypm (30 rpm); D_2 = 100 ypm (40 rpm); D_3 = 125 ypm (50 rpm); D_4 = 150 ypm (60 rpm)

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COMPARATIVE ECOLOGICAL STUDY OF PHYTOPLANKTON OF BAKAR AND PHOOSNA LAKES–PAKISTAN

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A comparative ecological study of phytoplankton of Lake Bakar, district Sanghar and Lake Phoosna, district Badin was carried out during August, 1993 to July, 1996. A total of 78 species belonging to 33 genera of 5 classes (Bacillariophyceae, Chrysophyceae, Dinophyceae, Xanthophyceae and Euglenophyceae) were recorded. 12 species were common in both Lakes. 58 species were present in Lake Bakar and 8 in Lake Phoosna. The study showed that the aquatic environment of Lake Bakar is qualitatively much better as compared to Lake Phoosna.

Key words: Phytoplankton, Bakar Lake, Phoosna Lake.

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THE QUARANTINE CONTROL AND THE METHODS OF DISINFECTION OF TOMATO AND CUCUMBER SEEDS IN DIFFERENT REGIONS OF RUSSIAN FEDERATION

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Quarantine phytopathogenic analysis of different sorts of tomato and cucumber seeds used in greenhouses in Russian Federation was studied. The common number of fungi and bacteria colonizing the outside and inside of seeds were determined. The characterization of micromycetes and bacteria complex disseminating the seeds was established. The phytotoxic infectious microorganisms were isolated. The negligible effect of some physical and chemical factors in seeds disinfectant was shown. The high antagonistic activity against phytopathogens as a new method of biocontrol with *Trichoderma harziamum* was proposed.

Key words: Quarantine control, Phytopathogens, Sorts, Tomato seeds, Cucumber seeds.

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STABILITY OF AFLATOXINS IN NATURALLY CONTAMINATED PISTACHIO NUTS INCORPORATED IN SOME LOCAL SWEET DISHES OF PAKISTAN

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The possible effects of conventional Pakistani cooking practices on the integrity and stability of naturally occurring aflatoxins in a complex food matrix of sweet dishes were observed. Three conventional local sweet dishes of pistachio nuts, naturally contaminated with different levels of aflatoxins were studied. Prior to cooking there was a decrease in recovery of aflatoxins from the various types of food matrices in all the three sweet dishes. Some variations were observed from the initial contents and the recovery from the precooked contents of naturally contaminated aflatoxins of two sweet dishes. Some variation in the recovery of aflatoxins in the milk based sweet dish was also observed.

Key words: Aflatoxins, Pistachio, Food, Pakistani cooking..

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PRELIMINARY EXPERIMENTS ON DEVELOPMENT OF A TECHNOLOGY FOR CITRUS WASTE UTILIZATION. *I.* POTENTIAL NUTRIENTS OF PAKISTANI SWEAT ORANGE PRODUCTS

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(Received 9 August 1999; accepted 6 June 2001)

Different sweat orange products like juice, peel, coarse peel, fines of peel, lime treated peel, molasses extracted peel, juice sacs, molasses and skin (peel without juice sacs) etc. were developed at laboratory scale and dried in an electric oven. Maximum crude protein (7.5%), crude fat (5.27%) and ash (5.53%) contents were recorded in dried juice sacs. Moisture content of different dried products ranged between 7.44-13.36%. Untreated peel contained highest amount of ascorbic acid (408.75 mg100g^{-1}) and beta-carotene (25.98 mg g^{-1}). All the products contained more than 1% pectin and its fractions showed some variation.

Key words: Waste utilization, Sweat orange, Nutritive value

Pak J Sci Ind Res 2002 45 (3) 206-211

APPLICATION OF BIOWASTE MATERIALS FOR THE SORPTION OF HEAVY METALS IN CONTAMINATED AQUEOUS MEDIUM

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(Received 30 October 2001; accepted 6 March 2002)

Biowaste materials were evaluated as metal ion adsorbents in aqueous medium. The biowastes used were black gram husk, wheat bran, *sheesham (Dalbergia sissoo)* sawdust, pea pod, rice husk and cotton and mustard seed cakes. All these biosorbents, except pea pod and rice husk, exhibited good adsorption potential for Cd, Pb, Cu, Zn and Ni. Black gram husk (bgh) was found to have the highest sorption capacity with 100, 99.4, 95.7, 98.2 and 93.1% removal of Cd, Pb, Cu, Zn and Ni, respectively. The metal ions adsorbed by bgh desorbed with 0.1 M HCl and the regenerated biosorbent was reused successfully for the sorption of metal ions in the next cycle. Concentration of the tested metals achieved at equilibrium in the contaminated aqueous medium was well below the maximum limits recommended by UNEP for sewage discharge. The study indicates the potential of bgh as a new, inexpensive and efficient biosorbent for the treatment of water contaminated with heavy metals.

Key words: Biosorption, Biowastes, Effluent treatment, Heavy metals, Black gram husk, *Cicer arientinum.*

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A Feasibility Study for the use of Molecular Markers (RAPDs) for Salinity Tolerance

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A feasibility study was carried out for the use of molecular markers (RAPDs) for salinity tolerance in maize. Polymorphism was sought in two salt tolerant accessions and a small sample of their F_2 progeny using a limited number of random primers. Whilst, a considerable level of polymorphism was found using only 4 primers, to make any conclusive remarks about the suitability of RAPD markers in the genetic analysis of salinity tolerance in maize based on the limited data perhaps would be inappropriate. The RAPD PCR amplifications were extremely sensitive and a single change in the concentration of reaction component and/or thermal cycling parameters appeared to be altering the RAPD patterns. Nevertheless, once optimised, the technique has the potential of providing an effective and convenient method to generate molecular markers, which could be utilised in mark aided selection of complex traits like salinity tolerance.

Key words: RAPD, Salinity, Maize, Molecular markers.

Short Communication

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INVESTIGATION OF INDUCED SECONDARY METABOLITES IN RESPONSE TO VARIOUS TREATMENT OF ELICITOR OBTAINED FROM *HYPNEA MUSCIFORMIS* (RED ALGAE)

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Time course and dose dependent activity of elicitors (poly

Short Communication

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MECHANISM OF MONOCARPIC SENESCENCE OF *TRICHOSANTHES DIOICA* ROXB (CUCURBITACEAE)

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