

ISSN 0030-9885

Coden: PSIRAA 38 (9-10) 333-398 (1995)



PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 38, Nos. 9-10, September-October 1995

Physical Sciences. Pages 333-347

Biological Sciences. Pages 348-374

Technology. Pages 375-390

Short Communications. Pages 391-397

Published monthly by

Scientific Information Centre

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pak. j. sci. ind. res., vol.38, nos.9-10, September-October, 1995

***p*-DIMETHYLAMINO BENZALDEHYDRAZONE DERIVATIVES AS INDICATORS**

SAMIR M. EL-MEDANI AND NABILA M. EL-MALLAH*

Department of Chemistry, Faculty of Science, Cairo University, El-Fayoum, Egypt

(Received March 17, 1994 ; revised January 22, 1995)

Two hydrazones were subjected to study. The first hydrazone was the *p*-dimethylaminobenzaldehyde-benzoylhydrazone (DMB). This hydrazone was used to determine Cu^{2+} by spectrophotometric method. This method depends on the extraction of Cu-DMB complex in chloroform. Maximum absorption was attained at 440 nm at pH 7-10. The second hydrazone, *p*-dimethylaminobenzaldehyde-*p*-nitrophenylhydrazone (DMN) was tested as an acid-base indicator. DMN compound was studied in UV and visible regions at different pH-values. DMN compound was found to have two pK_a values, 3.31 and 9.1. DMN was tested as acid-base indicator. It gave satisfied results for (1) strong acid-strong base system (2) strong acid-weak base system (3) weak acid-strong base system. The result was found to have maximum error 2% with maximum standard deviation 1.59.

Key words: Hydrazones, Cu^{2+} , Acid-base indicator.

POLYMETALLIC COMPLEXES

Part XLIV. Complexes of Cobalt (II), Nickel (II), Copper (II), Zinc (II), Cadmium (II) and Mercury II with Doubly-Bidentate O N Z N O Donor Chelating Azo Dye Ligands, 4,4'-Bis (2'-Hydroxy-1'-Naphthyl-Azo)-Diphenyl and 1,4-Bis (2'-Hydroxy-1'-Naphthyl-Azo)-Benzene

BIPIN B. MAHAPATRA, J. NANDA AND S.P. PRADHAN

P.G. Department of Chemistry, G.M. College, Sambalpur-768004, Orissa, India

(Received January 27, 1994; revised May 16, 1995)

The title doubly-bidentate bis-azo dye ligands form dimeric complexes of the type $[M_2L_2/L'_2(H_2O)_4]$, $[M'_2L_2/L'_2]$ where $M=Co(II)$, $Ni(II)$, $Cu(II)$, $M'=Zn(II)$, $Cd(II)$, $Hg(II)$. The complexes of the former category are found to be six coordinated, either octahedral or distorted octahedral and the complexes of the later type are four-coordinated with a tetrahedral geometry around the metal ions. The complexes have been characterized basing upon analytical, conductance, magnetic susceptibility, i.r., electronic, T.G.A., D.T.A., E.S.R. and N.M.R. data.

Key words: Polymetallic complexes, Chelating ligands.

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NEGATIVE ION FAB MASS SPECTROMETRY OF SOME RIBOSE ALKYLATED CYTIDINE 5'-MONOPHOSPHATE DERIVATIVES

KHURSHID ALAM KHAN, M. QUDRAT-E-KHUDA AND VIQAR UDDIN AHMAD*

PCSIR Laboratories Complex, Off University Road, Karachi- 75280, Pakistan

(Received September 21, 1991; revised June 14, 1995)

Characteristic fragment ions obtained in FAB mass spectrometry of ribose alkylated cytidine 5'-monophosphate (5'-CMP) derivatives in the negative mode are described. All the compounds examined exhibited either molecular ion M or quasimolecular ion M-H, the fragment ions can be used to characterise these nucleotides.

Key words: FAB mass spectrometry, Ribose alkylation, Cytidine-5'-monophosphate.

EFFECT OF ALKALI AND HIGH PRESSURE STEAM TREATMENTS OF RICE STRAW ON CHEMICAL COMPOSITION AND *IN SITU* DEGRADABILITY

ZIA-UR-REHMAN AND W.H. SHAH

PCSIR Laboratories Complex, Shahrah-e-Jalaluddin Roomi, Lahore, Pakistan.

(Received February 9, 1995; revised July 3, 1995)

The effect of sodium carbonate, sodium bicarbonate and high pressure steam treatment on chemical composition and *in situ* degradability of rice straw were studied. *In situ* organic matter degradability of untreated rice straw was 33.3% whereas it increased to 42.8% after steam/pressure treatment. However, organic matter degradability of rice straw on treatment with NaHCO_3 and Na_2CO_3 and steam under pressure increased degradability upto 66.1%. Improvement in the degradability of cellulose was also observed as a result of these treatments. Silica and lignin contents of rice straw were partially removed on treatment with both of these alkalies. The combined treatment of alkali and steam was found to be most effective in reducing silica and lignin contents of rice straw. After these treatments, three fold increase in reducing sugars was observed due to reduction in hemicellulose.

Key words: Rice straw, Physico-chemical methods, Chemical composition, *In situ* degradability.

Biological Sciences Section

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AGRONOMIC AND QUALITY TRAITS OF SOME ELITE RICE GENOTYPES

FIDA MUHAMMAD ABBASI, M. ASLAM SAGAR, M. AKRAM AND M. ASHRAF

National Agricultural Research Centre, Islamabad-45500, Pakistan

(Received September 1, 1994; revised May 14, 1995)

Four elite lines and a cultivar of rice (*Oryza sativa* L.) were evaluated for agronomic and some of the quality characteristics during 1992 at NARC, Islamabad. DR45 and DR48 out yielded the check variety, KS282 by producing 18% and 11% higher grain yield. The highest elongation ratio (after cooking) was exhibited by KS282 while the highest protein content (8.66%) was recorded for DR46. Productive tillers/hill showed the highest coefficient of variability (10.8%). Whereas flowering duration showed the lowest (0.61%). All the genotypes possessed similar grain quality. DR46 was ranked as inferior, in terms of paddy yield.

Key words: Rice varieties, Physico-chemical, Agronomic and quality characteristics.

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SPATIAL ADAPTATION AND DEVELOPMENTAL STRATEGY IN CARBON DIOXIDE ENRICHED MUSTARD PLANTS

M.A. HALIM KHAN* AND AXEL MADSEN

Department of Plant Physiology and Anatomy, The Royal Veterinary and Agricultural University, Copenhagen, Denmark

(Received October 24, 1992 ; revised June 7, 1995)

The morphological adaptation and developmental strategy of mustard plants, grown at 330 (atmospheric), 600 and 900 ppm CO₂ enriched atmosphere, are described. CO₂ enrichment evoked differential response pattern to the longitudinal and spatial adaptation. An increase in the atmospheric level of CO₂ resulted in increased plant height and greater number of branches. Development of assimilatory structures followed almost identical pattern corresponding to the plant height and branches. The absolute DM production was an increasing function of CO₂ concentration, but with no apparent set-back on the phasic development and pattern of DM distribution in different components indicating that increasing atmospheric CO₂ concentration also improved yield capacity through increased number of pods/plant and heavier seeds but with a consistent depression in harvest index.

Key words: CO₂ enrichment, Plant height, Area indices, DM accumulation, Harvest index.

ANTIMICROBIAL ACTIVITY OF ESSENTIAL OILS FROM *SCHINUS TEREBINTHI-FOLIUS*, *CYPRESS SEMPERVIRENS*, *CITRUS LIMON*, *FERULA ASSAFOETIDA*. Part I.

RAZIA RAFIQ SIDDIQUI, UZMA ZAFAR*, SULTAN SHAKOOR CHAUDHRY AND HAMID AHMAD

PCSIR Laboratories Complex, Shahrah-e-Jalaluddin Roómi, Lahore-54600 Pakistan

(Received July 12,1994; revised July 3,1995)

Antibacterial activity of essential oils was studied against *Escherichia coli*, *Shigella dysenteriae*, *Bacillus subtilis* and *Staphylococcus albus* by zone inhibition method. Determination of the approximate inhibition concentrations (AIC) of the essential oils demonstrated the antimicrobial activity of each essential oils against specific microbes tested. *Schinus* oil was most effective against all the test bacteria. The order of effectiveness of oils was: *Schinus* oil> Lemon oil> Ureka Lemon oil> *Cypress* oil> *Ferula* seed oil> *Ferula* gum oil.

Key words: Antibacterial activity, Essential oils, Zone inhibition method.

INTRODUCTION OF TOWER SYSTEM FOR THE CULTIVATION OF MUSHROOMS (*PLEUROTUS* SPP.)

TASNIM KAUSAR AND S.I. ZAFAR

PCSIR Laboratories Complex, Shahrah-e-Jalaluddin Roomi, Lahore-54600, Pakistan

(Received September 26, 1994 ; revised August 27, 1995)

Scaling up of the mushroom cultivation from 1.5 kg rice straw/tray to 18 kg/tower (120 cm long, 70 cm diameter) and double layer spawning method improved the yield of the crop by 4 - 5%. Tower system has two fold advantages as no wood is required for making the trays and shelves, thus reducing the cost. Secondly, the yield was more (5 %) than tray system as the system provides a long verticle sides all around the bed for fruitification.

Key words: Tower system, *Pleurotus* spp., Cultivation.

SCREENING OF VARIETAL RESISTANCE AND INSECTICIDES EFFICACY FOR CONTROL OF APHIDS IN WHEAT

ABDUL KHALIQ, TAHIR HASNAIN RAZA* AND LIAQATULLAH KHAN*

Department of Entomology, University College of Agriculture, Rawalakot, Azad Jammu & Kashmir

(Received January 19, 1995; revised August 27, 1995)

A test was conducted at NARC, Islamabad to evaluate 43 entries of wheat for resistance to oat-bird cherry aphid. Four of the entries, namely, Faisalabad-85, PARI-73, Rawal-87 and Punjab 81 were found to be resistant, 13 were moderately resistant and 26 were highly susceptible. An experiment was also conducted to test the efficacy of Pirimor, Dimlore and Neem oil for control of English grain aphid. Pirimor was tested at three rates (250, 400 and 500 gm/ha), Dimlore at two rates (400 and 500 ml/ha) and Neem oil at two rates (5 and 10 ha). In the Pirimor and Dimlore treated plots, 98% aphid mortality was observed after 24 hr, whereas in the plots treated with Neem oil it was 66 to 78%, compared to 35% natural mortality in the check. Three days after treatment, aphid mortality was 100% in the plots treated with Pirimor and Dimlore, 84% in plots treated with Neem oil and 47% in the check plots. The mortality percentage after one week declined to 79-90% probably due to rapid degradation of insecticides.

Key words: Cereal, Resistant, Aphids.

EFFECT OF CEMENT DUST POLLUTION ON THE GROWTH OF SOME TREE SPECIES

M. ZAFAR IQBAL AND MUHAMMAD SHAFIQ

Department of Botany, University of Karachi, Karachi -75270, Pakistan

(Received December 1, 1994; revised August 27, 1995)

Effect of cement dust on dry weight of *Albizia lebbeck*, *Leucennea leucocephala* and *Thespesia populneoides* was observed as compared to control (unpolluted) plants. Height, number of leaves, leaf area and biomass of *T. populneoides* was affected, while reduction in plant dry weight, cover and leaf area in *A. Lebbeck* and *L. Leucocephala* was comparatively less affected than the other species investigated.

Key words: Cement dust, Pollutants, Seedling growth, Trees.

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RESPONSE OF MAIZE (*ZEAMAYS* L.) TO ZINC AND PHOSPHORUS APPLICATION

S.M. ALAM, A. LATIF AND ZAFAR IQBAL

Soil Science Division, NIAB, P.O. Box 128, Jhang Road, Faisalabad, Pakistan

(Received January 30, 1993; revised August 31, 1995)

Pot and field experiments were conducted to assess the response of maize (*Zea mays* L.) to Zinc application and the effect of Phosphorus on Zinc distribution in plants. It was observed that maize responded significantly ($P < 0.01$) to Zn application and showed positive $P \times Zn$ interaction for growth as well as grain yield depending on soil Zn level and maize variety. Application of Zn increased Zn concentration in all plant parts including grain while application of P tended to decrease Zn concentration in plants. The results suggest that only small amount of Zn should be applied to soils containing marginal soil Zn in order to obtain better maize growth and yield.

Key words: Maize, Interaction, Phosphorus, Zinc.

Technology Section

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TECHNIQUES FOR INTER-CALIBRATION OF DEAD WEIGHT PRESSURE TESTERS

M. A. CHAUDHRI, KHALID ISLAM AND INAYATULLAH

PCSIR National Physical and Standards Laboratory, 16-H/9, Islamabad, Pakistan

(Received December 12, 1992; revised February 2, 1995)

A simple and reliable approach has been made to calibrate and certify Air, Oil or Gas-operated Dead Weight Pressure Tester (DWPT) against a Reference Dead Weight Pressure Tester. Periodic calibration data of dead weight pressure testers of different ranges and make has been collected against a reference DWPT traceable to the National Physical Laboratory, UK and NIST (NBS) USA. Using these techniques, the uncertainties of calibrated DWPTs have been found within their limits of error as specified by the manufacturer. The method has been found suitable for the certification of oil, gas, air-operated Dead Weight Pressure Testers using oil-operated DWPT as reference standard.

Key words.: Dead Weight Pressure Tester, Calibration, Certification.

IMPACT OF COPPER VAPOUR CONTAMINATION ON ARGON ARCS

SALIM AKBAR

Department of Avionics, College of Aeronautical Engineering, Risalpur Cantt, Pakistan

(Received August 2, 1993; revised June 23, 1994)

A fast, accurate and comprehensive emission spectroscopic set-up has been employed to study the impact of copper vapour on an Ar-Cu mixture plasma. Temperature profiles in the arc have been determined in the absence of Cu vapour and then in its presence, using the absolute line intensity method for an Ar spectral line; these profiles have been compared with temperature profiles derived from relative intensities of Cu I lines. Temperature profiles derived from relative intensity of Cu I lines have been used to calculate the radial density distribution of copper atoms in the arc. The following observations have been made from the resulting atomic number densities: (i) the copper vapour concentrates in the fringes of the arc, with atomic number densities up to $8.6 \times 10^{11} \text{ (cm}^{-3}\text{)}$; and (ii) Cu atomic number densities in the core of the arc are small.

Key words: Copper vapour contamination, Argon arcs, Emission spectroscopy.

ENGINEERING PROPERTIES OF SOIL LAYERS OF KARACHI

S.I. MOHSIN, GULRAIZ HAMID, EHTESHAM SIDDIQUI AND ARIF ZUBAIR

Department of Geology, University of Karachi, Karachi-75270, Pakistan

(Received October 16, 1994; revised August 4, 1995)

Karachi has been a fast growing city by any standards and planning could never keep the pace of construction. Engineering properties of the soils in various parts of the city have been studied to evaluate the foundation conditions. It is found that the soils of Karachi, in the northern part, are coarse grained, medium to coarse sand and sandy gravel, well graded and unimodal. The moisture content, bulk density and specific gravity are in the range where shallow foundations can safely be placed for medium sized civil projects. Shear strength of the soil has been tested in the field by an improvised penetration test and by pocket penetrometer at three feet depth. The results provide a useful guideline and it is believed that the standard test for penetration will incorporate with the obtained results. The foundations in the southern part of the city, particularly in Defence Housing Society, require caution. The soil is finer in size, very poorly graded and recently deposited in tidal flats, creeks and swamps. Drainage conditions are poor and the problem of salinity and water logging is encountered in the area. More high-rise buildings are being built in this part of the city and each site deserves to be carefully examined for the foundation conditions including the seismic risk.

Key words: Engineering properties, Foundation conditions, Soil, Seismic risk.

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Reduction In Post-Harvest Losses of Winter and Summer Crops of Guava

A WAHEED, W.H. SHAH AND F.H. SHAH

PCSIR Laboratories Complex, Lahore-54600, Pakistan

(Received December 29, 1993; reevised July 11, 1995)

Pak. j. sci. ind. res., vol. 38, nos. 9-10, September-October 1995

**Effect of additive level on potato sprout
suppression at high temperature by dust
formulations of tecnazene**

MATTHEW O. OLADIMEJI

(Received June 20, 1993; revised September 17, 1995)

*Department of Chemistry Federal University of
Technology, PMB 704 Akure, Ondo State, Nigeria*

(Received June 20, 1993; revised September 17, 1995)

Currently used post-harvest applied commercial formu-

Pak. j. sci. ind. res., vol. 38, nos. 9-10, September - October, 1995

Carrot and Citrus Juice Waste as Potential Source of Dietary Fiber

MUHAMMAD RAUF KHAN AND N.A. SUFI

*PCSIR Laboratories, Jamrud Road, P.O. Peshawar
University, Peshawar-25120, Pakistan*

(Received February 20, 1993; revised October 10, 1995)