ISSN 0030-9885
Coden: PSIRAA 32(9) 579-648(1989)

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 32, No. 9, September 1989

Published monthly by

Scientific Information Centre
PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pak. j. sci. ind. res., vol. 32, no. 9, September 1989

STUDIES ON CYCLODIPHOSPHAZANES: SOME REACTIONS OF CYCLODIPHOSPHAZANES WITH MALONIC ACID AND ITS DERIVATIVES

I.M. ABD-ELLAH, A.A. SALMAN, R.S. FARAG AND Z.H. ABD EL-WAHAB
Chemistry Department, Faculty of Science, Al-Azhar University, Nasr City, Cairo, Egypt

(Received November 23, 1988; revised August 30, 1989)

Interaction of chlorocyclodiphosphazanes (I) with bifunctional reagents containing active methylene groups such as malonic acid, diethylmalonate and disodium malonate furnished geminal, non-geminal and ansa-cyclodiphosphazane derivatives of type (II-V). The structure of the isolated products were proposed on the basis of microanalytical data, infrared, ultraviolet and H nmr spectroscopic analysis.

Key words: Cyclodiphosphazanes, Malonic acid.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

EFFECT OF CHLORIDES OF COBALT, NICKEL AND COPPER ON NITRIFICATION IN PEAT

R. MANDAL* AND J. W. PARSONS
Department of Soil Science, University of Aberdeen, AB9 2UE, Scotland, U.K.

(Received April 3, 1989; revised September 27, 1989)

Mineralization of N in the presence of 0 to 2000 mg kg^{-1} each of Co, Ni and Cu as chlorides in peat was studied. These salts of metals did not produce any significant change in the process of nitrification and ammonification up to 40 and 50 days respectively. However, thereafter the general trend was for NH_4-N to decrease up to 110 days as (NO_2+NO_3)-N accumulated. Nitrification was increasingly suppressed as the Co, Ni and Cu were increased, especially with the highest level of Cu where NH_4-N remained high and (NO_2+NO_3)-N remained at about the initial level suggesting that nitrification was virtually prevented. Between 110 and 130 days of incubation ammonification increased slightly in all treatments but nitrification showed an unexplained flush at the highest level of applied Cu.

Key words: Peat, Nitrification, Heavy metals.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

EFFECT OF LIMING, PHOSPHORUS AND AMMONIUM SULPHATE ON AMMONIFICATION AND NITRIFICATION IN PEAT

R. MANDAL AND J.W. PARSONS
Department of Soil Science, University of Aberdeen, AB9 2UE, Scotland, U.K.

(Received April 3, 1989)

Mineralization of native N in an extremely acid peat following liming and addition of P and $(NH_4)_2SO_4$ was investigated. All the treatments increased NH_4-N upto 20 days incubation followed by a rapid decrease to a minimum at 35 days. The trend, thereafter, mainly followed a slow increase at 45 days. Released of NH_4-N increased significantly with pH and added $(NH_4)_2SO_4$ specially where lime and N were applied together.

The (NO_2+NO_3)-N level dropped in the first 5 days and remained near zero upto 25 days of incubation in all the treatments. A subsequent small flush occurred at 35 days. Nitrification was limited althrough. Neither lime nor $(NH_4)_2SO_4$ was effective in stimulating (NO_2+NO_3)-N production. Added P did not promote ammonification and nitrification significantly. Interactions of lime, P and $(NH_4)_2SO_4$ were nonsignificant in both processes except ammonification of N x pH in peat.

Key words: Ammonification, Nitrification, Peat.

Pak. j. sci. ind. res., vol 32, no.9, September, 1989

IMPACT OF DESERT ENVIRONMENT ON THE PROPERTIES OF TRANSFORMER OIL UNDER SERVICE LOAD IN SAUDI ARABIA

ABDULAZIZ A. EL-SULAIMAN, ABOBAKR S. AHMED, M. IQBAL QURESHI AND KHALID A. ALRASHOOD*
College of Engineering, King Saud University, Riyadh, Saudi Arabia

(Received April 21, 1989; revised September 21, 1989)

This paper presents and discusses the experimental results of the effect of temperature variation on transformer oil aged under service load and installed in the arid region of Saudi Arabia. The oil properties investigated are the i-V characteristics under non-uniform fields and High Performance Liquid Chromatography (HPLC) spectroscopy. An important consequence of desert environment is the strong dependence of the i-V characteristics on temperature. The current changes by several orders of magnitude with a relative change of temperature $\Delta T/T$ of the order of less than 15%. Moreover the i-V characteristics show a departure from Nikuradse behaviour at higher temperature. The variation of the i-V characteristics with temperature are modelled. It is believed that the conduction mechanism is complicated at higher voltage and temperature, and the model is not a simple exponential. HPLC spectroscopic analysis indicates change in the molecular structure of oil due to aging under service conditions.

Key words: Conduction, Transformer oil, Spectroscopy.

Pak. J. Sci. Ind. Res., Vol.32, no. 9, September 1989

Short Communication

NMR STUDIES OF CLATHRATE DEUTERATES OF PIPERAZINE AND HEXAMETHYLENETETRAMINE

A. W. K. KHANZADA*

Department of Chemistry, The University of British Columbia, Vancouver B.C., Canada V6T 1W5

(Received July 5, 1988; revised September 14, 1989)

Biological Sciences Section

Pak. j. sci. ind. res., vol. 32, no. 9, September 1989

ANTIMICROBIAL ACTIVITY OF *SALVIA SPLENDENS*

I.H. QURESHI, SHAHNAZ AHMED AND ZULEKHA KAPADIA
PCSIR Laboratories Complex, Karachi-39

(Received January 30, 1989; revised September 9, 1989)

The antimicrobial activity of the aqueous, ethanolic and acetone extracts of the aerial parts, flowers and roots of *Salvia splendens* (Labiateae family) has been studied against Gram positive and Gram negative bacteria and compared with nitrofurazone. Aqueous extracts exhibited very little activity while alcoholic and acetone fractions exhibited promising activity. Root fractions, however, exhibited maximum activity in all solvents.

Key words: *Salvia splendens* Ker.-Gawl., Labiateae family, Antimicrobial activity.

Biological Sciences Section

Pak. j. sci. ind. res., vol. 32, no. 9, September 1989

ANTIMICROBIAL ACTIVITY OF *SALVIA SPLENDENS*

I.H. QURESHI, SHAHNAZ AHMED AND ZULEKHA KAPADIA
PCSIR Laboratories Complex, Karachi-39

(Received January 30, 1989; revised September 9, 1989)

The antimicrobial activity of the aqueous, ethanolic and acetone extracts of the aerial parts, flowers and roots of *Salvia splendens* (Labiateae family) has been studied against Gram positive and Gram negative bacteria and compared with nitrofurazone. Aqueous extracts exhibited very little activity while alcoholic and acetone fractions exhibited promising activity. Root fractions, however, exhibited maximum activity in all solvents.

Key words: *Salvia splendens* Ker.-Gawl., Labiateae family, Antimicrobial activity.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

NEMATICIDAL PROPERTIES OF CRUDE EXTRACTS OF SOME INDIGENOUS PLANTS. *Part I*

F. QAMAR, M. SAEED, Z. KAPADIA, N. SEEMA AND Y. BADAR
PCSIR Laboratories Complex , Karachi-75280

(Received April 18, 1989; revised August 28, 1989)

1% crude extracts of thirty plants were assayed for their nematicidal properties using *Cephalobus litoralis* as test nematode. After 96 hours the number of active nematodes was reduced by 100%, in *Nicotiana tabacum* 95%, in *Trachyspermum capticum* 90%, in *Ricinus communis* and in *Azadirachta indica* 56%. Initial number of nematodes was 100. *Cephalobus litoralis* is considered a good test nematode because it is inexpensive to maintenance and easy in culturing.

Key words: Nematode *Cephalobus litoralis,* Plant extracts.

Pak. j. sci. ind. res., vol. 32, no. 9, September 1989

NEMATODES ASSOCIATED WITH NURSERIES IN KARACHI
Part II. Croton *(Codiaeum variegatum* (L) A.H.L. Juss

S.A. KHAN, H.A. KHAN, M. SAEED AND M.A. SHAKIR
PCSIR Laboratories Complex, Karachi-75280

(Received April 20, 1989; revised September 19, 1989)

One hundred plant nurseries situated in Karachi were surveyed for nematode infestation in Croton (*Codiaeum variegatum*). *Pratylenchus coffeae, P. pratensis, Tylenchorhynchus martini, T. annulatus, T. trilineatus, Hoplolaimus galeatus, H. californicus, Helicotylenchus multicinctus, H. exallus, Rotylenchulus reniformis, Basirolaimus indicus, Xiphinema americanum, Cephalobus persignis, Eudorylaimus* sp., *Aporcelaimellus obscurus* and *Mesodorylaimus bastiani* were found associated with Croton. Lesion nematodes (*Pratylenchus coffeae, P. pratensis* and *Tylenchorhynchus martini, T. annulatus*), and spiral nematodes (*Helicotylenchus exallus*) were found in higher frequency. *Helicotylenchus californicus, H. multicinctus* and *Xiphinema americanum* are first time reported from Pakistan.

Key words: Croton, Lesion nematodes, Spiral nematodes, Nurseries.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

STUDIES ON ANTIFUNGAL PROPERTIES OF INDIGENOUS PLANTS FROM THE KARACHI REGION. *Part II*

YEZDANA M. RIZKI, KANEEZ FATIMA, IFTIKHAR AHMED AND YASMIN BADAR
PCSIR Laboratories Complex, Karachi-39

(Received December 10, 1988; revised August 2, 1989)

The antifungal properties of 58 extracts from 32 plants belonging to 14 families from the Karachi region have been studied. The plant families include: *Aristolochiaceae, Amaryllidaceae, Capparidaceae, Compositae, Euphorbiaceae, Leguminosae, Lilliaceae, Meliaceae, Myrlaceae, Rutaceae, Solanaceae, Umbellifereae, Verbenaceae,* and *Zingeberaceae*. The test organisms used were *Aspergillus niger, A. flavus* and *Penicillium citrinum*. Eleven of the plant extracts tested showed antifungal activity. Besides inhibitory activities some of the extracts indicated strong stimulatory effects with the test organisms.

Key words: Antifungal, Antibacterial, Plant extracts.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

A TAXONOMIC KEY TO THE WATER MITES (HYDRACARINA) OF PAKISTAN

SANJEEDA KHATOON AND S. RASHID ALI*
Pakistan Museum of Natural History, Al-Markaz F-7/2, Islamabad

(Received January 2, 1989; revised August 15, 1989)

Taxonomic studies are carried out on the aquatic mites collected from various localities of Pakistan. The collection belong to 12 families 13 genera and 15 species. A key to the genera and description of species is given.

Key words: Fresh water, Mites, Pakistan.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

CANABIS SATIVA L. IS ALLELOPATHIC

BUSHRA INAM, *FARRUKH HUSSAIN AND FARHAT BANO

Botany Division, Pakistan Museum of Natural History, Islamabad

(Received June 14, 1988; revised September 27, 1989)

Aqueous extracts from various parts; litter and rain-leachates and volatiles from shoots of *Canabis sativa* L. significantly retarded either germination, radicle growth, fresh and dry biomass or moisture contents of *Sorghum bicolor, Trigonella foenum-graeceum, Vigna mungo, Trifolium resupinatum and Brassica compestris* in various bioassays. Caffeic, ferulic, p-OH-benzoic, benzoic and coumaric acids were identified as the phytotoxins.

Key words: *Canabis sativa L.*, Weed, Allelopathy, Inhibitors.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

SOIL SUITABLE FOR THE GROWTH OF LEGUMINOUS CROPS

MUHAMMAD NAZIR AND FARRUKH HASSAN SHAH
PCSIR Laboratories Complex, Lahore-16

(Received July 20, 1988; revised September 19, 1989)

The profile of the soil sample indicated that the surface horizon was dark brown, messive, silty clay loam, under lain by non-saline/sodic, distinctly mottled and weakly structured silty clay to 240 cm. depth. The soil was classified as Aquic ustochrepts. Chemical analysis of the soil showed that it contained adequate amounts of essential metal ions. Two forage legumes *Trifollium resupinatum and Trifolium alexandrium* (Persian and Egyptian clovers) grew well when irrigated. The yield of these fodder crops, without application of fertilizer was 86.5 and 94.1 tonne/ha/season, respectively. The protein content of the crops on a dry matter basis was calculated as 25 and 30% respectively. The soil classified as above is regarded as suitable for growing leguminous crops.

Key words: Soil, Clovers, Growth.

Pak. j. sci. ind. res., vol. 32, no. 9, September 1989

STUDIES ON GROWTH OF *PLEUROTUS OSTREATUS* (JACQ. EX. FR) KUMMER, ON DIFFERENT SUBSTRATE

SH. MOHAMMAD IQBAL* AND ABDUL HALEEM ASGHAR
National Physical and Standards Laboratory, Islamabad

(Received January 8, 1989; revised September 16, 1989)

Pleurotus ostreatus was grown on 4 different substrate (i.e. mixed wild grass, wheat bhoosa, wheat straw and cotton waste) in mushroom growth room. Cotton waste proved to be the best growth substratum for the fungus and gave a significantly higher yield than wheat straw. While it gave a non-significantly different yield than mixed wild grass and wheat bhoosa and wheat straw. However, it is medium as a source of micronutrients. Uptake of micronutrients by the fungus was noted to be better in case of mixed wild grass. As the yield is non-significantly related to cotton waste as substrate; it can be recommended that on the whole mixed wild grass is a suitable medium for the fungus.

Key words: *Pleurotus ostreatus*, Substrate, Micronutrient.

Pak. j. sci. ind. res., vol. 32, no. 9, September 1989

EFFECT OF GAMMA IRRADIATION ON THE POSTHARVEST QUALITY OF BLOOD RED ORANGES

AMER ABDUL MAJEED MOHAMED*, MAQBOOL AHMAD, MOHAMMED ASHRAF CHAUDRY AND HAFIZ INAYATULLAH*
Nuclear Institute for Food and Agriculture (NIFA), Peshawar

(Received October 6, 1986; revised September 12, 1989)

Different irradiation doses (5, 10, 25, 50, 100, 200, 300 krad) did not alter the weight loss pattern of oranges during postharvest storage (7-20°, 54-88% RH). Ascorbic acid, reducing, nonreducing and total sugars content and sugar/acid ratio of oranges were not significantly changed by irradiation doses applied, however, total acid content decreased as an effect of irradiation. Irradiation doses at 100 krad and above caused skin injury in the form of scald and pitting, hence external appearance scores were lowered. Flavour scores of unirradiated control oranges and those irradiated at different doses were comparable after 5 weeks of storage at room conditions.

Key words: Oranges, Irradiation, Postharvest quality.

Pak. j. sci. ind. res. ,vol. 32, no. 9, September 1989

MANIFESTATION OF HETEROSIS AND COMBINING ABILITY IN UPLAND COTTON

ASIF ALI KHAN, MUKHTAR MUHAMMAD ALI, ABID MAHMOOD* AND M. AMIN KHAN

University of Agriculture, Faisalabad.

(Received March 11, 1989; revised September 7, 1989)

Estimates of heterosis and combining ability were made using 30 hybrid and 6 parental combination grown under field conditions. The hybrids were produced by crossing in diallel six cotton (*G. hirsutum L.*) varieties having exotic and local backgrounds.

Estimates of gca, sca and reciprocals were highly significant for all the characters under study except the insignificance of sca and reciprocal effects for seed and lint indices respectively. Gca effects were higher than those of sca and reciprocals, for lint percentage, lint index and staple length, indicating a preponderance of additive gene effects. The reverse was true for seed index, where non-additive gene effects were found. Several of the crosses showed considerable heterosis when compared with mid and better parental means.

Key words: Heterosis, Heterobeltiosis, Combining ability.

Pak. j. sci. ind. res. ,vol 32, No. 9, September 1989

STUDIES ON THE CULTIVATION OF SIND LAC INSECT
Part IV. Two Important Consideration in Cultivating the Sind Lac-Insect

S. MAHDIHASSAN

SD-34, Block A, North Nazimabad, Karachi-33

(Received January 24, 1989)

Soil moisture reaching the host plant of lac-insects enables the latter to grow well but as mother-insects, constituting brood-lac, they deliver a progeny in which the sex-ratio is not favourable to the female and these alone form the main lac encrustation. Thus there is a paradox between "vegetative growth" and " female sex determination". For improved cultivation of lac, area reserved for cultivation should be subdivided, so that where soil moisture is poor it should be reserved for always supplying brood-lac. The main crop naturally would first he exploited as brood-lac, whatever be its quality, and then disposed as the harvest crop.

The quality of brood-lac used can be judged by the sex-ratio determination of the larvae that have swarmed from it. The earliest convenient time of determining sex-ratio would be when the larvae are half grown in the first stage. This can be done by using a pocket lens with the magnification of ten. The next and better time would be when the larvae are in the early second stage. Two articles with illustrations showing differences between the cells of male and female larvae have been offered before.

Key words: Lac, Insect, Cultivation.

Technology Section

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

SUITABILITY OF KALLAR GRASS (*LEPTOCHLOA FUSCA*) AS A PULPING MATERIAL

NAYEEMUDDIN, TAMOOR WAHAB AHMED, TANZIL H. USMANI AND MOHAMMAD ADIL
PCSIR Laboratories Complex, Karachi-39

(Received May, 21, 1989; revised September 28, 1989)

Studies have been carried out to explore the suitability of kallar grass *(Leptochloa Fusca)* as an alternate and cheap pulping source in comparison with other conventional pulping materials *viz.* bagasse, wheat straw and kahi grass. It has been concluded that kallar grass an agricultural waste grown on saline lands to arrest salinity being low in lignin-is easily digestible material and has breaking length and burst factor comparable to that of kahi grass but lesser tear factor and screened yield. Further it has 25% higher ratio of long fiber and lower ratio of short fiber when compared to kahi grass. It may particularly be a feasible proposition for mills of smaller capacity to prepare writing paper after blending it with certain proportions of long fiber pulp.

Key words: Kallar grass, Pulping material, Fiber dimensions.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

SIMULTANEOUS DETERMINATION OF Cd, Pb, Cu AND Zn IN DIFFERENT MATERIALS USING DIFFERENTIAL PULSE ANODIC STRIPPING VOLTAMMETRY

RIAZ AHMED AND VIQAR-UN-NISA

Nuclear Chemistry Division, Pakistan Institute of Nuclear Science and Technology (PINSTECH), Islamabad

(Received January 14, 1989; revised June 7, 1989)

A simple digestion method with subsequent simultaneous analysis of Pb, Cd, Cu and Zn by differential pulse anodicc stripping voltammetry (DPASV) in different types of materials has been developed for environmental pollution control studies. The applicability of the procedure was proved by analysing different types of samples. The accuracy of the method was verified by analysing standard reference materials from NBS. Using this method different environmental samples were analysed and results are reported.

Key words: Trace analysis of Pb, Cd, Cu, Zn, Voltammetry, Environmental pollution.

Pak.j. sci, ind. res., vol. 32, no.9, September 1989

THE FATTY ACIDS OF INDIGENOUS RESOURCES FOR POSSIBLE INDUSTRIAL APPLICATIONS

Part XVIII. The Fatty Acid Composition of the Fixed Oils of *Leucaena leucocephala and Cassia holosericea*

SHAMIMA KHALID, GHAZALA SHAHID, NIGHAT AFZA, S. SHAHID HUSSAIN, YASMEEN BADAR, ABDUL SATTAR* AND SHAFIQ AHMAD KHAN*
PCSIR Laboratories Complex, Karachi

(Received May 30, 1989; revised August 26, 1989)

The fixed oils (w/w of *Leucaena leucocephala* (6.93%) and *Cassia holosericea* (5.6%) seeds (N.O. Leguminoseae) have been investigated for their physico-chemical properties and chemical composition. The fatty acid composition of the seed oils of *L. leucocephala and C. holosericea,* as determined by GLC, are lauric (0.118, 0.135%) myristic (0.104, 0.324%), palmitic (14.741, 15.22%), palmitoleic (0.180, 0.008%), steric (6.170, 6.69%), oleic (20.77, 19.064%), linoleic (53.101, 57.323%), linolenic (1.640, 0.10%), arachidic (1.287, 0.560%) and behenic (1.769, 0.011%) acids respectively.

Key woords: Fatty acids, *Leucaena leucocephala, Cassia holosericea,* Saponification.

Pak. j. sci. ind. res. vol. 32, no. 9, September 1989

NUTRIENT COMPOSITION OF SOME COMMERCIAL BAKERY PRODUCTS

AURANGZEB, MAQBOOL AHMAD, NIZAKAT BIBI, AMAL BADSHAH, MOHAMMAD ASHRAF CHAUDRY AND ISMAIL KHAN

Nuclear Institute for Food and Agriculture (NIFA), Peshawar

(Received March 18, 1989; revised August 6, 1989)

Different bakery products including seventeen types of biscuits, eight types of pastries, three types of cakes, two types of crackers and one type each of bread, bund, patty and jalaiby were purchased from open market of Peshawar and analysed for proximate and important mineral composition. Except bread (5.8%), bund (9.8%) and cracker (10.7%), fat content in bakery products ranged from 18-40%. Protein content varied from 5-10% with an average of 6.9%. Other chemical constituents determined were moisture, ash, total carbohydrate, iron, total phosphorus and phytate-phosphorus. Except fat, most of the nutrients studied were low in different bakery products. In general, with the exception of fat, the nutrient contribution of the products tested was small..

Key words: Bakery products, Nutrients, Phytic acid.