

Coden: PSIRAA: 28(3) 147-220 (1985)

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 28, No. 3, June 1985

Physical Sciences. Pages 147-172
Biological Sciences. Pages 173-207
Technology. Pages 208-220



Published bimonthly by

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 28, No. 3, June 1985

THE BEHAVIOUR OF 5, 6-BENZO-4 (ρ -BROMO) BENZOYL-3, 4-DIHYDROCOUMARI TOWARDS NITROGEN NUCLEOPHILES

M.A.EL-Hashash, A.A.Afify, M. EL-Kady, and R, M. Saleh

*Chemistry Department, Faculty of Science, Ain Shams University
Abbassia, Cairo, Egypt*

(Received March 8, 1983; revised March 3, 1985)

5,6-benzo-4 (ρ -bromobenzoyl)-3, 4- hydrocoumarin (I) reacts with nitrogen nucleophiles yielding products (2-8) depending on the nature of the nitrogen nucleophiles and the reaction conditions.

Pakistan J. Sci. Ind. Res. Vol 28, No. 3, June 1985

SOME REACTIONS OF 2-(*p*-CHLOROPHENYL)-4H-1,3-BENZOXAZIN-4-ONE AND 2-(*p*-CHLOROPHENYL)-4H-1,3-BENZOTHIAZIN-4-THIONE COMPARED WITH THAT OF 4H-3,1-BENZOXAZIN-4-ONE AND 4H-3,1-BENZOTHIAZIN-4-THIONE

M.A. El Hashash, M.M. Mohamed, A.M. El-Gendy and R.M. Saleh

Faculty of Science, Ain Shams University, Egypt

(Received March 8, 1983; revised March 11, 1985)

The reaction of 1,3-benzoxazin-4-one (1) and 1,3-benzothiazin-4-thione (5) with alkyl, aralkyl and/or aralkyl magnesium halides has been described. P_2S_5 reacted with (1) and yielded the corresponding benzothiazin-4-one (5). Primary amines condensed with (1) and (5) giving the corresponding Schiff's bases (7 a-d) or (8a-d) respectively. Also 1 reacted with hydrazine hydrate and gave the triazole derivative (9). But (1) condensed with *p*-nitrophenyl hydrazine and hydroxyl amine and yielded the corresponding hydrazone and oxime derivatives (10a-b). On the other hand, compound (5) reacted with ammonia derivatives and gave the condensation products (11a-d).

ENVIRONMENTAL PROBLEMS OF PAKISTAN

Part I Composition of Solid Wastes of Karachi

M. Arshad Ali Beg, S. Naeem Mahmood, and Sitwat Naeem

PCSIR Laboratories, Karachi-39

(Received February 20, 1985)

The quality of the Karachi city garbage has been evaluated in terms of its ingredients and chemical analysis by collecting samples from twenty refuse dumps located in various areas of Karachi. The data so collected classifies the refuse into three types, viz. from opulent localities, middle class areas and slums.

The garbage samples have been examined with regard to their utilization as a composting material. The carbon: nitrogen ratio, which determines compostibility, ranges between 8 and 44 and on an average it is about 16 which is below the optimum value of 30. These values have been taken to suggest that the average city garbage may be supplemented with wastes containing higher amounts of organic matter, viz. vegetable market dumpings, slaughterhouse wastes, food processing wastes etc. for composting. Sludge from the city has also been analysed and the same is recommended for being utilized to raise the C:N ratio.

Pakistan J. Sci. Ind. Res., Vol. 28, No. 3, June 1985

MONOLAYER COMPUTED VALUES FOR THE ADSORPTION OF ORGANIC VAPOURS ON CHARCOAL USING JOYNER AND BET EQUATIONS

M. Afzal, J. Ahmed and P.K. Butt,

Department of Chemistry, Quaid-i-Azam University, Islamabad

(Received February 9, 1984; revised April 24, 1985)

The Joyner equation — a modified form of BET equation — has been used to compute monolayer values for the adsorption of organic vapours on coconut charcoal using the IBM-G44 Computer programme. BET and Joyner monolayer values have been compared at various temperatures together with n values between one and two.

SYNTHESIS AND SOME REACTIONS OF PHENYLENE-1, 4DI (1-PHENYL-1-PROPENONE)

Elsayed H. Eltamany*, Mohamed Orabi, Elsayed I. Ismail and Fakher A. Elshahed

Chemistry Department, Faculty of Science, Suez Canal University, Ismailia, Egypt

(Received February 17, 1985)

The condensation of acetophenone with terephthalic aldehyde (molar ratio 2:1) gave mono- and bis-chalcones I and II respectively, but when the molar ratio of ketone to the aldehyde increased (4:1) only II was obtained. The reaction of II with hydrogen peroxide, active methylene (under Michael condensation conditions) aromatic hydrocarbons (under Friedel-Crafts conditions), hydrazines, hydroxylamine hydrochloride and bromine have been studied. Also the reaction of tetrabromide VIII with hydrazines hydroxylamine hydrochloride and aromatic hydrocarbons (under Friedel-Crafts conditions) has been described.

Biological Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 28, No. 3, June 1985

CODLING MOTH: COMPARISON OF DISPERSAL ABILITY OF LABORATORY REARED AND NATIVE MALES*

Sana U.K. Khattak^{**}, L.D. White, J.F. Howell and R.B. Hutt,

Yakima Agricultural Research Laboratory, USDA-ARS, Yakima, WA 98902, USA

(Received June 21, 1984; revised March 13, 1985)

Recapture of released irradiated (25 krad) and unirradiated laboratory reared and native codling moths, *Cydia pomonella* L., showed that both treated and untreated males dispersed equally. The optimum dispersal distance was ca. 30 m. Untreated native (wild) males were equally dispersed at ca. 70 m. Laboratory reared male codling moths do not have the same vigour for dispersal as the native males.

HETEROSIS, GENE ACTION AND COMBINING ABILITY STUDY OF YIELD AND SOME OF THE YIELD COMPONENTS OF A FOUR-PARENT DIALLEL CROSS IN RICE

Akbar Ali Cheema and M.A. Awan

**Nuclear Institute for Agriculture and Biology, P.O. Box No. 128, Faisalabad, Pakistan*

(Received October 19, 1983; revised, April 3, 1985)

Heterosis, gene action, and combining ability of yield and some of the yield components in rice were studied using a four-parent diallel cross. The characters studied were the number of primary branches per panicle, number of secondary branches per panicle, panicle weight and yield per plant. Significant heterosis over mid-parent ranged from 15.64% for the number of primary branches/panicle (DM 16-5-1/DM 107-4), to 124.06% for grain yield/plant (Kashmir Basmati/DM 16-5-1). Most of the hybrids showed significant and positive heterosis over mid-parental values indicating dominant type of gene action for the four quantitative characters. Mean values of some hybrids for a number of primary and secondary branches/panicle and several hybrids for panicle weight and grain yield/plant exceeded significantly the better parent showing overdominance due to positive genes. However, some of the cross combinations showed non-significant deviation in either direction from mid-parental values suggesting the presence of additive gene action.

A narrow range of variation for all four characters with respect to general combining ability and specific combining ability was observed. Both dominant and additive genes were involved for number of primary and secondary branches/panicle, while non additive gene action controlled panicle weight and grain yield/plant.

SOLID SUBSTRATE FERMENTATION FOR PECTINASES BY *ASPERGILLUS FOETIDUS*

M.A. Qadeer, and J. Iqbal

PCSIR Laboratories, Lahore-16

S.K. Aziz, M. Hussain and H. Hassan,

Government College, College, Lahore

(Received December 20, 1984; revised April 2, 1985)

The biosynthesis of pectinases by *Aspergillus foetidus* was studied in litre conical flasks by the surface culture method using wheat bran as solid substrate. The parameters studied were the depth of the wheat bran, selection of diluents and methods for the extraction of the enzyme. Wheat bran was found to be an ideal substrate providing all nutrients essential for mould growth and enzyme formation. 0.1N HCl as diluent gave optimum results of both pectinesterase and polygalacturonase. The enzyme production reached maximum 48 hr. after incubating at 30°.

NEW SYNTHETIC UREIDES: EFFECTIVE MOSQUITO LARVICIDES*

Mobeen A. Khan, Shams Mohiuddin and Saleem A. Qureshi,

PCSIR Laboratories, Karachi

(Received 24 April 1984; revised, 24 April 1985)

The ovicidal effect of six ureides (A13-29054 (dimilin), A13-63223 (penfluron), A13-63218, A13-63220, A13-63308, and A13-63756 against 6.24 hrs. old eggs of yellow-fever mosquito, *Aedes aegypti* L. was very mild after exposure of 24 hr. These compounds are difluorobenzoyl analogues of dimilin. The hatchability of treated eggs ranged from 65-100% at 0.5-10 ppm doses. The susceptibility of various developmental stages of the test insect varied with test compounds. Pupae were less susceptible as compared to fourth instar larvae. Compound A13-63218 (3,4-dichlorophenyl analogue) proved least effective against pupae.

The substitution of halogen radicals, especially at the para-position of the phenyl ring or at its *para* and *meta* positions, increased the larvicidal potential of these compounds.

The test compounds proved very effective larvicides at concentrations ranging from 0.01 to 5 ppm. The anatomical distortions and the patterns of mortality observed indicate that these compounds mimic the action of various other compounds variably known as juvenoids, insect growth regulators (IGR's) insect growth inhibitors, juvenile hormone analogues JHa and morphogenetic agents.

**THE OCCURRENCE OF THE DIATOM *PSEUDOHIMANTHIDIUM PACIFICUM*
EPIZOOIC ON A COPEPOD FOUND IN THE COASTAL WATERS OF KARACHI**

Mohammad Moazzam*

Centre of Excellence in Marine Biology, University of Karachi, Karachi.

(Received, May 15, 1984; revised, April 15, 1985)

An epizooic diatom, *Pseudohimanthidium pacificum*, is reported from the coastal waters of Pakistan. The distribution of the host copepod *Corycaeus clausii* and the diatom has been studied. The copepod harbours this epizooite on its tail region only. Male copepods carry more diatoms than females. The probable role of copulatory and non-copulatory clasping in the transfer of diatoms from one copepod to other is also discussed.

DETECTION OF MASTITIS ORGANISMS IN UDDER SECRETIONS AND THEIR BEHAVIOUR TOWARDS VARIOUS ANTIBIOTICS

M.M. Rahman and M.A. Rahman

Department of Microbiology and Hygiene, Bangladesh Agricultural University Mymensingh, Bangladesh

(Received March 3, 1983; revised March 10, 1985)

860 samples of milk obtained from apparently healthy udder of cows belonging to organized farms and rural areas were examined by the Hotis-Miller, Card and Milk-ring tests. It is evident from the results that the Card test is the most suitable in the detection of sub-clinical form of mastitis. The percentage distribution of 350 bacterial isolates recovered from milk samples indicated that Staphylococci ranked the highest (42%), followed by Coliforms (22%), Gram-positive aerobic spore-formers (20%), Streptococci (12.57%), Corynebacterium (2%) and Pseudomonas (1.43%). The antibiotic sensitivity of the bacterial isolates revealed that Chloromycetin was most inhibitory.

MOTHER INFANT RELATIONSHIP IN FREE RANGING RHESUS MONKEY
(*MACACA MULATTA*)

S.S. Sahibzada, Q. A. Iqbal* and Abdul Rab*

*Pakistan Museum of Natural History (PSF),
Al-Markaz F-7/2, Islamabad*

(Received September 24, 1984; revised January 27, 1985)

Studies were carried out on the free-ranging rhesus monkeys (*Macaca mulatta*) in their natural habitat in Dunga Gali forests, Murree Hills, Pakistan. Kong group comprising 25 individuals was selected for the studies on mother-infant relationships.

The studies indicated that 3 month old infants behaved alike with respect to play and aggressive behaviour and that social rank hardly influenced infant behaviour. An overall analysis of the social-interaction based on two multivariate statistical techniques, namely, ordination and cluster-analysis, indicated that the development of social activities of rhesus infants are facilitated by the mother.

THE EFFECT OF DIFFERENT NPK FERTILIZERS ON THE GROWTH AND YIELD OF RICE VARIETY IRRI-6

Muhammad Ayub and Muhammad Siddique Sharar

Department of Agronomy, University of Agriculture, Faisalabad

(Received April 1984; revised May 1985)

Fertilizers as a source for N, P and K were applied to a crop of rice, IRRI-6, at the rate of 135-0-0, 135-66-0 and 135-66-66 kg/ha. on a sandy loam soil against control. The whole of P and K was applied at transplanting, whereas N was applied in two splits-66 kg/ha, the time of transplanting and the rest 55 days after transplanting. All fertilizer treatments increased significantly the grain yield over control due to their beneficial effects on panicle bearing tillers and the number of grains per panicle. Within N, P and K combinations comparable results were obtained. Addition of K along with N and P resulted in the maximum increase of 26 quintals of paddy per hectare over control. Addition of P at high levels of N did not bring about significant increase in yield over that of the application of nitrogen alone.

Technology Section

Pakistan J. Sci. Ind. Res, Vol. 28, No. 3, June 1985

LOW BIRTH WEIGHT: CRITICAL REVIEW OF A NEW DEFINITION

Naghma-e-Rehan

Public Health Research Unit, P.M.B. 2018, Katsina, Kaduna State, Nigeria

Sule Sani

Ministry of Health, Kaduna, Nigeria

(Received January 3, 1985)

Cumulative frequency curves were plotted for 9248 live-born Hausa children including 6873 full term singletons to test the validity of a new definition of low birth weight put forward by Rooth. The cumulative frequency for total live births as well as full term singletons showed two clearly defined populations, one a large population showing a Gaussian distribution and the other a smaller portion falling apart from normal distribution. The mean birth weight and proportion of children weighing 2.5 kg or below derived from cumulative frequency curves, were similar to those reported earlier. However by using Rooth's definition (Mean minus 2 Standard Deviations), there was a sharp decline in the number of low birth weight children ($P < 0.001$). This new cut-off point seems to corroborate the clinical observations better than the old international definition of 2.5 kg or below.

Pakistan J. Sci. Ind. Res., Vol. 28, No. 3, June 1985

UTILIZATION OF MAZRI LEAVES FOR FIBRE PRODUCTION*

M. Arshad Ali Beg and Tanzil H. Usmani

PCSIR Laboratories, Karachi – 39, Pakistan

(Received March 20, 1983)

Mazri leaves, abundantly available in the country as indigenous palm, have been evaluated as a source of fibre. A chemical-cum-mechanical method developed for the extraction of the fibre and a phytotonic liquor has been described. Physical and chemical characteristics including X-ray diffraction pattern have been compared with the commonly used vegetable fibres and it has been found that mazri fibre compares favourably with jute and sisal. The possibility of its application as long fibre substitute and by-products has been explored.

Pakistan J. Sci. Ind. Res., Vol. 28, No. 3, June 1985

DEVELOPMENT OF HIGH TEMPERATURE GRAPHITE CRUCIBLES

M. Latif, M. Yusaf, M.A. Baig and F.A. Faruqi

PCSIR Laboratories, Lahore

(Received December 1, 1984; revised, May 9, 1985)

This paper describes some of the studies made on the preparation of high-temperature graphite crucibles used for melting ferrous and non-ferrous metals. Ceylon graphite has been employed in the fabrication of these crucibles as the indigenous graphite possesses a low carbon content and a higher content of ash and other impurities which tend to accelerate the rate of oxidation of graphite crucibles.