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Physical Sciences Section

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CYANOTHIOACETAMIDE AND ITS DERIVATIVES AS SYNTHONS: SYNTHESIS OF SEVERAL NEW PYRIDINE AND PYRIDO [2, 1-b]-[1,3] THIAZINE DERIVATIVES

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Several pyridothiazine and pyridine derivatives were synthesised via the reactions 5-cyano-2, 4- dioxotetrahydropyridine-6-thione with different reagents.

Key words: Cyanothioacetamide, Pyridines, Pyrido [2,1-b] [1,3] thiazines, Diethylmalonate, Acrylonitriles.

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THE ODD COMPONENTS OF NEGATIVE MAGNETORESISTANCE OF n-TYPE GERMANIUM CRYSTAL AT THREE DIFFERENT TEMPERATURES

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The transverse magnetoresistance (TMR) was measured versus the magnetic field, B, at three different temperatures (80, 100 and 130 K) for n-type germanium crystals with carrier concentration of 1.8×10^{14} cm^{-3}. These measurements were done in the case of deviating the current vector from the (100) axis of symmetry by different angles (φ), i.e. ($\varphi_{(100)} = 22.5°$, and $\varphi_{(100)} = 32.5°$. Many types of anomalous negative TMR were observed. The degree of variation of anomalous behaviours of negative TMR was controlled by the values of φ, T, and intravalley scattering (μB). These results show that the asymmetry variations of quantitative and qualitative effects of negative TMR are strongly dependent on the anisotropic scattering of charge carriers in k-space, due to the noncompensating relations among (φ, T), (φ, μB) and (T, μB). Also the anomalous terms $\Delta\rho/\rho_0(\mu B)$ and the normal components $\Delta\rho/\rho_0(\mu B)^2$ of TMR were calculated at different T and φ. The experimental data are illustrated and the results are discussed.

Key words.: Magnetoresistance, n-Type germanium crystal, Different temperature.

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BIOCHEMICAL ALTERATION FOLLOWING SINGLE ORAL DOSES OF PHOSPHAMIDON IN *BUBALUS BUBALIS*

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(Received May 12, 1991; revised June 10, 1992)

The single oral administration of phosphamidon in doses of 20, 40 and 80 gm/kg body wt. caused 0,50 and 100% mortality, respectively and significantly inhibited serum cholinesterase activity to the extent of 47-81 % in male buffalo calves. On the other hand, all the 3 doses of phosphamidon significantly elevated serum levels of aspartate aminotransferase (32-109%), alanine aminotransferase (79-240%), acid phosphatase (80-309%) and alkaline phosphatase (44-148%) in male buffalo calves. Inactivation of serum cholinesterase following 40 mg/kg body wt did not return to control level even on day 28 of insecticide dosing indicating that inhibition of cholinesterase activity produced by phosphamidon is almost irreversible and long-lasting in buffalo calves. Whereas, the altered values of other parameters in surviving animals returned to their normal values within 7-14 days of insecticide exposure in indicating that the damage to the tissues if any, was not of permanent nature.

Key words: Phosphamidon, Aminotransferases, Phosphatases.

Biological Sciences Section

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COMPARATIVE ANATOMICAL AND HISTOLOGICAL STUDY OF THE HEART OF FOUR SYRPHID SPECIES DIPTERA (SYRPHIDAE) IN IRAQ

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(Received December 12, 1990; revised June 6, 1992)

The paper deals with the anatomical and histological studies of the heart in larvae and adults of four syrphid species namely, *Lasiophthicus pyrastri* L., *Sphaerophoria scripat* L., *Syrphus corollae* F. and *Xanthogramma* sp. Structural differences of the dorsal vessel, particularly the heart chambers, ostia together with inner valves and the flap pads of the heart lumen have been described.

Key words: Syrphid, Taxonomy, Histology.

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INTRA AND INTER-SPECIFIC COMPLEMENTATION BETWEEN *TRITICUM AESTIVUM* L. AND *VICIA FABA* L.

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(Received February 24, 1990; revised May 17, 1992)

Mixtures and monocultures of wheat and broad beans were compared using indices such as substitution rates and relative resource totals. The substitution rates indicated a greater competitive effect of broad beans in mixture. However, the product of the substitution rates suggested that the component species were not competing exactly for the same resource pool. The relative resource totals, being more than 1, showed better capture and efficient utilization of available resources by component species in mixture than in monoculture. R^2 values exhibited a good fit to yield-density relationship in both the component species.

Key words: Competition, Resource use, Substitution rates, Relative resource totals.

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IMMIGRATION OF *METAPENAEUS STEBBINGI, M. AFFINIS* AND *M. MONOCEROS* JUVENILES IN THE CREEKS AND BACKWATERS NEAR KARACHI

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(Received Jaunary 9, 1989; revised June 7, 1992)

Immigration of *Metapenaeus* juveniles were studied in Korangi Creek, Bhambore, Sandspit and Hab Delta near Karachi for one year during 1979. Peak abundances in the three species *M. affinis, M. stebbingi* and *M. monoceros* were recorded in the second half of the year, which indicate spawning in spring and early summer. The juveniles were caught at 3-17 mm C. L. and abundant at 5-10 mm. Larger >8 mm were frequent during winter and smaller <8 mm during spring and summer. *M. stebbingi* appeared to dominate at the four localities, where salinities remain high for most part of the year with a decrease during July-September due to rain and flooding. The juveniles enter the localities at 3 mm minimum C. L., stay for 3-4 months and grow, then migrate to deeper shelf at 12-17 mm C. L. for further growth maturation and spawning.

Key words: Immigration, Migrate, Cohort, Spawn, Recruitment.

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ALLEVIATION OF SALT EFFECTS ON FLOODED RICE (*ORYZA SATIVA* L.) BY NITROGEN FERTILIZATION

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(Received August 31, 1991; revised April 25, 1992)

Rice (*Oryza sativa* L. var. IR-6) was grown in pots treated with varying levels of salts and ammonium nitrogen (N). Salinization of soil caused a significant decrease in different yield components of rice while N application alleviated adverse effects of salts to a greater extent. All yield components showed a significant improvement due to applied N. The root biomass showed a close correlation with the above ground plant components indicating a direct bearing of root biomass on the overall plant performance.

Key words: Rice, Salinity, Root Biomass, N use efficiency.

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GENETIC ANALYSIS FOR OIL PERCENTAGE, PROTEIN PERCENTAGE AND SEED YIELD IN SUNFLOWER (*HELIANTHUS ANNUUS* L.)

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(Received August 3,1991; revised May 31, 1992)

A 4 x 4 diallel cross was made to generate information on type of gene action and to evolve superior genotypes carrying desirable characteristics. Oil percentage indicated additive type of gene action with partial dominance. Genotype Romania had maximum dominant genes due to its closest position at array points and sunflower genotype KNI had maximum recessive genes for this character. Protein percentage and seed yield per plant showed overdominance type of gene action. Romania and Suncom 90 got maximum dominant genes while Suncom 110 and Romania appeared to have maximum recessive genes for protein percentage and seed yield per plant respectively. Among actual diallel values, arry mean of Suncom 90 were high for oil percentage, protein percentage and seed yield per plant which appeared to be the best general combiner. The cross combinations of Suncom 110, KN1 and Romania with Suncom 90 showed the best specific combining ability with that array for oil percentage, protein percentage and seed yield per plant respectively.

Key words: *Helianthus annuus*, Combining ability, Diallel crosses.

Technology Section

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MANUFACTURE OF EXTERIOR GRADE PLYWOOD FROM LIGNIN BASED PHENOLIC RESIN

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(Received April 5, 1990; revised June 7, 1992)

A lignin based phenolic resin has been developed for the exterior grade plywood. In this resin lignosulfonate (LS) was isolated from sodium based spent sulfite liquor (SSL), a waste product of the paper mills in Pakistan, where different grasses (bagasse, kaigrass, rice straws) are being used as raw material for pulping. A series of resins were formulated in which up to 70% of phenol was replaced by LS, when condensed with formaldehyde under reflux. Plywood made with these resins was tested both in the dry and wet states {cold water resistance (CWR), warm water resistance (WWR), boiling water resistance (BWR) and mycological}. The glue shear load of the plywood, in all the states met the requirements imposed by Pak. Std. 871, 1970. Wood failure of the plywood was compared with commercial standard (CS) 35 - 45 and the results found were equally good.

Key words: Grassy pulp material, Phenol formaldehyde-lignosulfonate resin, Plywood.

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UTILISATION OF SPENT SULFITE LIQUOR FROM GRASSY PULP MATERIALS AS A BINDER FOR PARTICLEBOARD

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(Received April 5, 1990; revised June 15, 1992)

Spent sulfite liquor (SSL), obtained from the paper industry based on the grassy pulp material was concentrated to 50% total solids and polymerised with conc. H_2SO_4 at pH 2 and 3. The modified SSL was used as a binder for exterior grade particleboard. Medium density (0.7gm/cm^3) poplar boards (1.27 cm) were manufactured from 6-12% SSL based on the ovendry (O.D) weight of board material. Boards of highest strength were obtained at SSL concentration of 8-10% with pH 3, while high water resistant properties were observed in the board at pH 2. SSL bonded poplar and bagasse boards were also prepared at different press times. Boards prepared during this study met the requirements of American Standard CS 236 for urea formaldehyde (UF) bonded particle boards, even at a press time of 8 mins. The results were also compared with UF bonded poplar and bagasse boards, prepared during the present investigations. It has been noted that the strength property of the SSL bonded poplar board is comparable to the UF based poplar board, but its water resistance is comparable only at a press time of 20 mins. Strength property of the SSL bonded bagasse boards is not comparable to that of UF bonded bagasse boards but its water absorption is comparable even at a press time of 12 mins. The properties of the boards were also compared with the UF bonded commercial poplar and bagasse boards and were found to be equally good.

Key words: Grassy pulp materials, SSL, Particleboard.

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SPENT SULFITE LIQUOR-UREA FORMALDEHYDE RESIN: A POTENTIAL BINDER FOR PARTICLEBOARD

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Spent sulfite liquor (SSL), obtained from the paper industry based on the grassy pulp material was concentrated to 50% total solids and condensed with sulfuric acid at pH 3. The modified SSL was copolymerized with different amounts of urea formaldehyde (UF) and used as a binder for exterior grade particle board. Various types of poplar boards were prepared i.e. (i) by using different composition of SSL: UF. (ii) at different press time and (iii) at different press temperatures. The properties of these boards meet the requirement imposed for international standards.

Key words: Grassy pulp materials, SSL-UF resin, Particleboard.