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Physical Sciences Section

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REACTION WITH HETEROCYCLIC DIAZONIUM SALTS : SYNTHESIS OF SOME AZOLYLHYDRAZONE AND FUSED AZOLES DERIVATIVES

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(Received April 8, 1986; revised October 17, 1987)

4-Bromo-3-phenylpyrazol-5-yl diazonium chloride (1) was coupled with different active methylene reagents such as 3-methylpyrazol-5-one, cyanoacetanilide, acetoacetanilide, rhodanine, 2-substituted thiazolin-4-one derivative (11) and 2-oxazolin-5-one derivative (21) in ethanol solution to give the corresponding coupling products (4), (6), (10), (12) and (22). Also aminoantipyrine was diazotized to diazonium chloride (2) and then coupled with the 2-substituted thiazolin-4-one derivative (11) to give the corresponding hydrazone derivative (16). Similarly 3-amino-4-phenylazopyrazol-5-yl diazonium chloride (3) was coupled with ethyl 1,1,1-trifluoroacetoacetate to give the corresponding hydrazone (18). Some of the acyclic hydrazones could be cyclized via reflux in acetic acid, such as hydrazones (6) and (12) to give pyrazolo [1,5-c] as-triazine derivatives (7) and (14) respectively. Also hydrazone (18) was treated with hydrazine hydrate and phenylhydrazine to give the corresponding pyrazolyl pyrazole derivatives (19) and (20) respectively. On the other hand, pyrazol-5-ylazo-oxazolin-5-one derivative (22) was converted into pyrazolo [1,5-c] as-triazine (23) via treatment with ammonia solution. All structures suggested are based on elemental analysis and spectral data.

Key words: Heterocyclic, salts, derivatives.

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ORGANIC MERCURY DETERMINATION IN DRINKING WATERS BY COLD VAPOUR ATOMIC ABSORPTION

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(Received September 2, 1985; revised November 15, 1987)

Using tin(II) chloride as a reductant in a basic medium, a method of general utility is proposed for the estimation of organic mercury in drinking waters by the cold vapour atomic absorption technique. The estimation of mercury is quantitatively studied as a function of eluent (air) flow rate, sample volume, reduction-vessel volume and mercury content of various drinking water samples. A low-cost absorption cell fabricated from locally available materials is used for recording the absorption of mercury vapour. For a 50.0 ml aliquot of water sample in a total volume of 100.0 ml in the reduction vessel a lower detection limit of 10 ng/l with ± 0.50 ng/l as the standard deviation at 2S confidence level is achieved. The method does not involve any blank adjustments.

Key words: Organic mercury; Cold vapour analysis of mercury; Organic mercury in natural waters.

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Key words: Organic mercury; Cold vapour analysis of mercury; Organic mercury in natural waters.

SOLVENT INFLUENCE ON THE OXIDATION OF IRON (II) CITRATE COMPLEX BY MOLECULAR OXYGEN

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(Received October 1, 1987)

The oxidation of iron (II) citrate complex by molecular oxygen was investigated in aqueous acidic solutions of alcohols, e.g. methanol, ethanol and isopropanol. The reaction was first order in iron (II). It was found that the rate constant increases with the addition of alcohols to the aqueous solutions in the order: isopropanol > ethanol > methanol. The rate constant also increases with the increase of the percentage of alcohol. These effects are probably as a result of structural changes in the inner sphere of Fe (II). Activation parameters for all systems are reported.

Key words: Iron (II), Oxidation, Solvent.

CHANGES IN CAROTENOIDS AND TOCOPHEROLS DURING MATURATION OF CASSIA SEEDS

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(Received April 8, 1986)

Changes in the oil, carotenoid and total tocopherol contents of *Cassia absus*, *Cassia fistula* and *Cassia occidentalis* seed oils were studied during maturation between the 2nd and 12th week after the flowering of *C. absus* and *C. occidentalis* and between 4th and 24th week after the flowering of *C. fistula* seed oils. The carotenoid concentration declined from 0.68 % to 0.05 % in *C. absus*; 0.74 %–0.15 % in *C. fistula* and 0.82 %–0.11 % in *C. occidentalis* seed oils. Tocopherols, obtained after saponification of the seed oils, increased from 0.09 % to 0.475 % in *C. absus*, 0.12 %–60 % in *C. fistula* and 0.19 %–61 % in *C. occidentalis* seed oils. The oil contents increased from 0.7 % in *C. absus*; 0.48 %–4.0 % in *C. fistula* and 0.6 %–3.5 % in *C. occidentalis* seed oils. Changes in the oil, carotenoid and tocopherol contents of the three seed oils indicated that the decrease in carotenoid concentration and increase in tocopherol content was associated with increased bio-synthesis of oil and decrease in moisture content as the seeds matured.

Key words: *Cassia* Carotenoids, Tocopherols, Maturity.

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PHASE SEPARATION OF METHANOL/GASOLINE BLEND. Part II

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(Received May 18, 1986; revised May 26, 1987)

In this study, the possible use of methanol as a blending component in motor gasoline has been examined. The effect of various alcohol additives on the phase separation of 20/80 v/v methanol/unleaded gasoline has been investigated. It has been observed that the water that could be tolerated without causing phase separation increased with increasing hydrocarbon chain of the alcohol activities.

Key words: Alcohol-gasoline blends.

Short Communication

Pakistan J. Sci. Ind. Res., Vol. 30, No. 11, November 1987

**PHYSICO-CHEMICAL CHARACTERISTICS AND FATTY ACID COMPOSITION OF YELLOW
NUTSEDGE OIL (*CYPERUS ESCULENTUS*)**

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(Received June 21, 1987)

Biological Sciences Section

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PRESENCE OF NEW TYPE II SPECIFICITY RESTRICTION ENZYMES IN LOCAL BACTERIA

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(Received September 1, 1987; revised November 23, 1987)

Eight bacterial strains isolated from local environments have been screened for the presence of new Type II restriction enzymes by analyzing lambda(λ) DNA fragments resulting from protein DNA interactions. Partially purified protein extracts of two of these strains, namely *Pseudomonas aeruginosa* A and *Citrobacter freundii* A₄ contain endonuclease activities which have been highly purified by a combination of gel filtration, ion exchange and affinity chromatography. The identity of the new enzymes, designated as PaeAI and CfrA₄I, have been confirmed by analyses of incised λ , ϕ x 174RFI, pBR322, adeno-2 and M13 mp 19RF1 DNA substrates as truly Type II restriction enzymes. The isolated enzymes, by analogy with known enzymes, seem to recognize CCGCGG and CTGCAG base sequences respectively.

Key words: Local bacterial isolates, Restriction enzymes, Isoschezomers.

Pakistan J. Sci. Ind. Res., Vol. 30, No. 11, November 1987

EFFECT OF DIETARY PROTEIN SOURCE ON LIPID METABOLISM IN CHICKS

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(Received July 5, 1987; revised October 22, 1987)

The effect of dietary protein source (soybean, egg-yolk, whole egg and casien) on the lipid profile of plasma and liver and excretion of fecal sterols in female Fayumi chicks was studied. Soy-protein had a general hypo effect on blood and liver lipids and significantly increased fecal sterol excretion. Egg-yolk and whole-egg proteins were found generally associated with high blood and liver lipids and low fecal sterols. The mechanism of lipid lowering effect of plant proteins is discussed.

Key words: Cholesterol, triglycerides, phospholipids.

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EFFECT OF ZINC FERTILIZATION ON THE YIELD AND CHEMICAL COMPOSITION OF MAIZE (CV. CHANGEZ) CROP IN PESHAWAR SOIL SERIES

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(Received April 4, 1986; revised July 19, 1987)

A field trial in the Peshawar soil series was conducted to study the effect of zinc on the yield and chemical composition of maize leaf and grain. The effect of zinc on total dry matter, stalk, ear, and cob was nonsignificant but the yield of grain was significantly increased. Extractable zinc (0.1 N HCl) in soil and zinc content of leaf were also significantly increased. The relationship between grain yield and zinc content in leaf showed 14 ppm as the critical level for leaf while the optimum dose was 5 kg Zn/ha for crop. These results could be applied equally to other semi-arid areas, having calcareous, fine-textured soil, and low organic matter content.

Key words: Critical level, maize, optimum yield, zinc.

PROPERTIES OF *MORINGA OLEIFERA* SEED LIPASE

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(Received May 20, 1985; revised November 1, 1987)

A thermolabile lipase present in *Moringa oleifera* seed was studied using olive oil emulsion stabilized with 10% gum acacia as a substrate. At pH 5.0 and a temperature 40° lipase activity was found optimum. Manganese chloride stimulated the enzyme activity. Calcium salt had no significant effect on lipolysis whereas mercury, copper, E.D.T.A., sodium deoxycholate, triton X-100, acetone, alcohol and toluene were found inhibitory. The lipase was inactivated completely when it was preincubated at 80° for ten.

Key words: *Moringa oleifera*, Seed, Lipase

EVALUATION OF PARENT VARIETIES IN THE HYBRID COTTON PRODUCTION PROGRAMME IN PAKISTAN

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(Received April 26, 1987; revised November 16, 1987)

An experiment was conducted to evaluate the genetic potential of some varieties of cotton (*Gossypium hirsutum* L.) for the production of productive hybrids. Highly significant, general combining ability effects were observed for all characters studied, whereas specific combining ability effects were highly significant for boll weight and lint percentage, significant for staple length and non-significant for number of bolls and yield of seed cotton. No reciprocal effects were noted. A considerable degree of heterosis and heterobeltiosis also was observed in various plant characters.

Key words: Heterosis, Combining ability, Hybrid cotton.

EFFECT OF DIFFERENT COMBINATIONS OF N AND P ON SOME AGRONOMIC CHARACTERS OF WHEAT MUTANTS

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(Received July 26, 1987; revised November 19, 1987)

The performance of five newly evolved promising wheat (*Triticum aestivum* L.) mutants of variety Lu-26, i.e. WM-89-1, WM-56-1-2, WM-6-17, WM-81-2 and WM-120-3 along with the standard commercial cultivar (Pak-81), was studied under combined levels of 0-0, 95-35, 115-45, 135-55, 155-65, 175-75 and 195-85 kg ha⁻¹ of N - P, during 1984-85. Days to heading, plant height, lodging and grain yield of all the mutants significantly increased ($P < 0.05$) with increasing levels of N and P. However, high doses of fertilizer had no significant effect on spike length and spike-lets per spike. The highest grain yield was recorded in almost all mutants by the combined application of N (135 kg ha⁻¹) and P (55 kg ha⁻¹) as P₂O₅. Mutant WM-89-1 outyielded all mutants and the standard variety at 5032 kg ha⁻¹) was followed by the mutant WM-81-2, which also showed a high level of resistance to lodging under all levels of N and P fertilization.

Key words: Combined effect, Fertilizer (N and P), Wheat mutants.

ZINC AVAILABILITY TO WHEAT AT VARIOUS ZINC AND SOIL MOISTURE LEVELS

S. Mahmood Shah, Wisal Mohammad, Naseer H. Khan and M. Mohsin Iqbal

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(Received April 12, 1987; revised October 17, 1987)

The water regime of a soil exercises great influence on the availability of nutrient elements to plants. The availability of zinc applied to wheat, at three rates, was studied at different soil moisture levels representing high, low and optimum moisture contents maintained during the entire growth periods in a pot experiment. The results showed that maximum grain yield and uptake of zinc in wheat occurred at optimum (1.0 field capacity) moisture level. The moisture contents above or below this level caused a reduction in yield. The reduction was greater at above-optimum than at sub-optimum moisture levels. Zinc fertilization had a corrective effect on yield under saturated or waterlogged conditions. The influence of zinc rates was different at different moisture levels. The above-optimum moisture levels favoured more vegetative growth whereas optimum or slightly-stressed conditions favoured the production of more grain.

Key words: Zinc uptake; Waterlogging; Moisture stress.

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Key words: Zinc uptake; Waterlogging; Moisture stress.

NUTRITIONAL DISORDERS OF POTASSIUM DEFICIENCY IN SORGHUM USING STILL CULTURE TECHNIQUE

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(Received July 3, 1987; revised October 25, 1987)

To produce, describe and record by colour photography the symptoms of nutritional disorders of potassium deficiency in sorghum, an experiment was designed and carried out in the glasshouse of the Department of Agriculture, University of Queensland using the still culture technique. Five nutrient levels of potassium were evaluated (1,10,90,850 and 8000 μM K). The first potassium deficiency symptom recorded was reduction in plant growth and dwarfing of plant size. The dark green colour of leaves changed to light green these symptoms were first recorded on old leaves. Marginal discoloration continued from the tips to the base of leaves. Eventually tissues of the leaf tips and edges died, leaving small areas at the bases and mid ribs green (popularly known as leaf scorch or tip burn). Except in 8000 μM K external solution, all other treatments showed K deficiency symptoms which suggests that 8000 μM K may be the external K requirement of the sorghum plant. However this needs further experimentation, Potassium efficiency was found to reduce the growth of plant tops more than the roots.

Key words: Potassium deficiency, root/shoot ratio, sorghum.

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SOYA, A SUBSTITUTE INGREDIENT FOR CASEIN IN THE CODLING MOTH LARVAL REARING MEDIUM

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(Received October 19, 1986; revised September 9, 1987)

In the wheat germ — casein larval diet of the codling moth, *Cydia pomonella* (L.), casein was replaced with soya using 0, 50, 100 and 200 g soya per treatment formulation. The results evaluated on the basis of larval survival, pupal recovery, pupal size and duration, adult emergence, oviposition and egg hatch showed that 100 g soya was the best combination. These results suggest that soya could be a good substitute for casein.

Key words: Codling moth, soya, larval diet, casein, larval survival, pupal recovery, adult emergence.

Technology Section

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EFFECT OF ADDITIVES ON THE POLYMERIZATION OF N-VINYLCARBAZOLE INITIATED BY MERCURIC CHLORIDE IN CHLOROBENZENE SOLUTION

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(Received March 13, 1986; revised October 10, 1987)

The effect of different additives on the rate of polymerization of *N*-vinylcarbazole initiated by mercuric chloride in chlorobenzene and on the molecular weight of the polymers was studied. The chain-transfer coefficients with monomer, water and phenylacetate were found to be much higher than those with quinone and anthracene.

By spectroscopic analysis showed no formation of a complex between monomer and catalyst. The oligomers obtained in the presence of esters and water and chain-transfer agents showed the absorptions of carbonyl and hydroxyl groups respectively, indicating incorporation of the chain-transfer agent. All mechanisms put forward were in agreement with the experimental results.

Key words: Polymerization, Mercuric Chloride, Solution.

STUDIES ON VARIOUS ASPECTS OF PROCESSING AND STORAGE AFFECTING THE QUALITY OF DEHYDRATED GARLIC

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(Received December 23, 1986; revised August 16, 1987)

Dehydration of garlic on large scale has been described. Effect of storage of crop on the quality of the product has been studied. The dehydration ratio and pungency of the product made from the stored commodity was better compared to the product from freshly harvested crop. The effect of particle size on the quality of the dehydrated garlic during storage has also been investigated. It was found that the keeping quality of the product in the form of clove bits was superior to that in the powder form. The sorption isotherms of clove bits and powders of 20 and 30 mesh have been discussed.

Key words: Garlic, Dehydration, Vegetable.

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STUDIES ON MAKING PAPER PULP FROM RICE STRAW (*ORYZA SATIVA*) BY THE SODA METHOD

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Rice straw, an agricultural waste, contains a substantial amount of alpha-cellulose from where a better quality writing and printing paper may be made by the soda- method through a low consumption of chemicals.

Key words: Rice-straw, Soda, Paper-pulp.

IMPROVEMENT IN THE NUTRITIVE VALUE OF MUSTARD AND RAPE SEED CAKES

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(Received September 4, 1987; revised November 18, 1987)

Protein, ash, crude fibre and allylisothiocyanate (AIT) contents of mustard and rape seed meals (defatted oilseed cake) varied from 40.9 to 45.1%, 7.0 to 9.1%, 10.7 to 13.5% and 0.78 to 1.22% respectively. Detoxification of the meals reduced the AIT content to traces. The detoxified meals showed a nitrogen solubility profile of 24.9 to 36.9% in water, 10% NaCl and 0.2% NaOH and a satisfactory growth promoting capacity for rats at the level of 10% dietary protein. NPU and PER increased from 45.8 to 65.8% and 0.83 to 2.12% respectively.

Key words: Glucosinolate, NPU, PER