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Physical Sciences Section

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KINETICS AND MECHANISM OF ACID HYDROLYSIS OF NITROBENZALDEHYDE 2, 4-DINITROPHENYLHYDRAZONES

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Kinetics and activation parameters for the acid catalysed hydrolysis of 2-, 3- and 4-nitrobenzaldehyde 2,4-dinitrophenyl- hydrazones were investigated in 50% (v/v) aqueous acetone. The observed hydrolysis rates were first order with respect to substrate. The first order rate coefficients increase with the increase in acid concentrations in a non-linear fashion. The substituents on the aldehyde moiety decelerate the rate of hydrolysis reactions. A high negative value of Hammett reaction constant ($\rho = -1.1 \pm 0.1$) was found for the series. A mechanism compatible with the observed results is proposed.

Key words : Kinetics, Hydrolysis, Hydrazines.

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PHYSICO CHEMICAL STUDIES OF *SOLANUM* SPECIES OF PAKISTAN

Part II. Fatty Acid Composition of the Total Lipids and Lipid Classes and Trace Elements of *Solanum khasianum* Clarke Seeds

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(Received April 1, 1989; revised August 29, 1990)

Solanum khasianum Clarke seed total lipids (9.26%) were examined to find out its fatty acids composition. The total lipids were fractionated into lipid classes by thin layer chromatography. Neutral lipids were found to be 78.43% and the polar lipids 21.57% by weight of the total lipids. The neutral lipids were composed of hydrocarbons (2.77%), wax esters (0.74%), triglycerides (44.22%), free fatty acids (5.31%), fatty alcohols (10.75%), 1:3-diglycerides (5.16%), 1:2- diglycerides (3.92%) and monoglycerides (5.56%). The predominant fatty acids in the total lipids and all its fractions were palmitic, stearic, oleic and linoleic acids. The mineral contents of the seed meal were also identified.

Key words : *Solanum khasianum,* Lipid composition, Trace elements.

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STUDIES ON PHYSICAL AND CHEMICAL CHARACTERISTICS AND UTILIZATION OF MAIZE (*ZEA MAYS*) STEMS

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(Received March 1, 1989; revised February 22, 1990)

Studies on the physico-chemical characteristics of maize stems have been carried out. The average weight of whole and clean stems were 56.94 and 30.38 g. and the average value for length were 2.25 and 1.94 meter respectively. Average number of nodes per stem was 12, and weight per meter was 21.4 g. Density of ground stems was 0.102 and compressability of about 74.6% under a pressure of 135 kg/cm^2.

The average value of ash content, solvent soluble matter, holocellulose, α-cellulose, α-hydrolysis, β-hydrolysis and acid purification were 2.90, 2.01, 79.86, 61.0, 8.37, 11.62 , and 5.0% respectively. Chemical characteristics have been compared with other crop residues and vegetable raw materials. In view of the physico-chemical characteristics the utilization of maize stems has also been discussed.

Key words : Maize stems, Physico chemical characteristics.

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ANALYSIS PURIFICATION AND UTILIZATION OF WASTE FROM THE PAKISTAN-AMERICAN FERTILIZER INDUSTRY AT DAUD KHEL

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(Received April 4, 1989; revised April 7, 1990)

The utilization of solid industrial wastes greatly helps in reducing energy consumption which is to be required in shifting the waste to some disposable sites, in saving land and controlling pollution. Studies have been carried out to assess the chemical composition and into methods for the purification of the waste from the Pakistan-American Fertilizer (PAF) Industry. Results of chemical, sieve, thermogravimetric and differential thermal analysis have been presented and discussed for the upgradation of the PAF waste. Recommendations have been made for the utilization of the waste as a substitute for limestone to be used for the neutralization of spent acid, in fluidized bed combustion and for the manufacture of chalk-sticks.

Key words: Analysis, Purification, Utilization, Industrial waste.

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COMPARATIVE EVALUATION OF LATERITE DEPOSITS OF PAKISTAN

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(Received November 25, 1989; revised June 20, 1990)

Studies on various samples of laterites from Cherat, Attock, Abbotabad, Sargodha and Ziarat areas of Pakistan were carried out by chemical, x-ray powder diffraction and thermal analysis for comparative evaluation. The minerals identified in these laterites are vermiculite, goethite, calcite, limonite, hematite, quartz, kaolinite, diaspore, boehmite and illite.

Key words: Comparison, Laterites, Pakistan.

Introduction

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PHARMACOLOGICAL EVALUATION OF THE ANTIEMETIC ACTION OF *EMBLICA OFFICINALIS* – GAERTN

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(Received October 17, 1989; revised July 8, 1990)

Emblica officinalis-Gaertn was evaluated for its antiemetic activity. The crude aqueous extract of the dry fruits administered orally was found effective in controlling centrally induced emesis by apomorphine in dogs.

Key words: *Emblica officinalis*-Gaertn, Emesis, Apomorphine.

Biological Sciences Section

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IN VITRO REGENERATION AND FIELD TRANSFER OF *RAUWOLFIA* PLANTS

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(Received February 10, 1988; revised January 24, 1990)

Root callus of *Rauwolfia serpentina* was induced to differentiate buds with 0.8 mg/l NAA and 2 mg/l BAP. Buds were rooted with 24 hr treatment of IAA + IBA (both 3 mg/l). Rooted buds differentiated into autotrophic plantlets. The plants on transfer to soil thrived well and matured successfully to produce flowers and fruits. Karyotype analysis of flower buds showed pollen mother cells as having 22 chromosomes (2n), as in cultivated *Rauwolfia* plants.

Key words: Root tissue, Plant regeneration, Field growth.

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STUDIES ON THE COMPOSITION OF THE CHERRY FRUITS

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(Received February 22, 1989; revised July 28, 1990)

Cherry fruits (*Prunus cerasus* L) have been analyzed for its nutritional constituents such as sugar, ascorbic acid, amino acids and minerals like sodium and potassium as well as total anthocyanin pigments. Nutritionally the quality of the fruit was found comparable to the ones produced elsewhere in the world except that no sucrose was identified. The quality and the shelf life of the preserved cherry juice has also been found satisfactory. In view of its low sodium and high potassium content the fruit juice particularly suites certain catagories of consumers like those suffering from high-pertension etc.

Key words: Cherry fruit; *Prunus cerasus* L, Cherry juice, Cold storage, Minerals.

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CONTENTS OF SELECTED MACRONUTRIENTS IN VARIOUS LOCAL FRESH WATER FISH

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(Received November 19, 1989; revised July 4, 1990)

The muscle of seventeen commonly consumed freshwater fish species collected from local lakes and fish hatcheries was estimated for calcium, sodium, potassium and magnesium by the atomic absorption technique. The fish species included in the study were: *Chela cachius, Ompok bimacultus, Puntiusticto, Mastacembelus armatus, Mystus seenghala, Tor putitora, Cyprinus carpio, Rita rita, Wallago attu, Catla catla, Heteropneustes fossilis, Tilapia nilotice, Carassius auratus, Cirrhinus mrigala, Labeo rohita, Ophiocephalus punctatus.* The macronutrient contents of these fish were studied from the viewpoint of nutritional quality and the recommended dietary standard (EDI) laid down internationally for the safe consumption of fish. The observed calcium, potassium, magnesium and sodium contents ranged respectively from 62 to 591mg/g, 692 to 3045mg/g, 162 to 524mg/g and 209 to 1215mg. The levels of the macronutrients were examined from the viewpoint of relationship to weight/age of the relevant fish and their species specificaly. The farm and hatcheries fish were found to contain elevated levels of the macronutrients as compared with those in lake fish. Almost all fish species were found to be potentially good source of the macronutrients.

Key words: Macronutrient analysis; Freshwater fish analysis.

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STUDIES ON THE PERFORMANCE OF AWASSI SHEEP IN PAKISTAN
Part I. Some Productive Traits

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(Received January 1, 1990; revised July 28, 1990)

Data on 1011 lambs of Awassi sheep reared at the Livestock Production Research Institute, Bahadurnagar (Okara) during 1965-1984 were analysed to study the influence of some biological factors on productive traits.

The overall mean birth weight was 4.08 + 0.02 kg. The single born lambs were heavier than the twin born lambs. The male lambs were aso heavier than the female lambs.

The average weaning weight and age were 27.94 + 0.22 kg and 118.36 + 0.062 days, respectively. The correction factors based on the prediction equation were developed for each birth type and sex separately. The factors were used to bring all the records of weaning weight to 120 days comparable basis. These adjusted weaning weights also differed significantly due to sex, birth type and year of lambing.

The daily growth rate also varied significantly in the two birth types, sexes and year of lambing. The average daily growth rate upto weaning was 0.204 + 0.002 kg/day. The overall average wool yield was 3.02 + 0.04 kg and was higher amongst single born ewes (3.04 + 0.03 kg) than twin born ewes (2.94 + 0.06 kg).

Key words: Productive traits, Awassi sheep, Birth weight.

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BIO-ECONOMIC RELATIONSHIP OF COMPONENT CROPS IN SOYBEAN-MASH INTERCROPPING SYSTEMS

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(Received March 4, 1989; revised May 22, 1990)

A field study pertaining to intercrop relationships in different soybean-mash intercropping systems was conducted on a sandy clay loam soil. The treatments comprised soybean alone, mash alone, soybean + one row of mash, soybean + two rows of mash, soybean + three rows of mash and soybean + four rows of mash. The results revealed that intercropping of mash in patterns of one, two, three and four rows between the soybean strips reduced the soybean yield by 3.55, 8.36, 20.04 and 23.48 %, respectively over soybean alone. By contrast at the cost of this much reduction in soybean yield an additional harvest of 2.72, 3.16, 3.51 and 3.72 q/ha of mash was obtained from the respective intercropped treatments which compensated more than the losses in soybean production. The highest land equivalent ratio (LER) of 1.31 was recorded for an intercropping system comprising soybean + two rows of mash which indicated 31 % yield advantage over sole cropping.

Key words: Intercropping, Land equivalent ratio, Economic analysis, *Vigna mungo*, *Glycine max*.

Introduction

intercropping systems in different combinations under the

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MICROBIOLOGICAL, CHEMICAL AND SENSORY ASSESSMENT OF POND REARED TILAPIA *OREOCHROMIS MOSSAMBICUS* STORED IN ICE

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(Received January 6, 1990; revised July 25, 1990)

Chemical, sensory and microbiological analyses were carried out on pond reared Tilapia during 21 days of storage in ice (0^0C). At the time of harvest average bacterial count of the pond reared fish was 2.6 x 10^2/g, while pond water contained 6 x 10^3/ml. *Pseudomonas* and *Flavobacterium* were dominant organisms throughout the experiment. The total bacterial count of fish during the first 6 days reached upto 5.85 x 10^3/g, after which there was a constant increase in total bacterial load and at the end of the experiment it reached upto 5.3 x 10^7/g.

Thiobarbituric acid, Trimethyle amine-nitrogen, total volatile nitrogen and pH values during this period increased with the increase in total bacterial count. Proximate analyses of chemical contents were carried out on representative samples of the fish. Sensory results indicated that tilapia used in this trial had a shelf life of 6 days.

Key words: Tilapia, Ice storage, Post-harvest deterioration.

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EFFECT OF SALINITY STRESS ON GROWTH AND NUTRIENT CONTENT OF RICE PLANTS (*ORYZA SATIVA* L. VAR. POKKALI)

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(Received February 16, 1989; revised July 24, 1990)

Effect of sodium chloride and sodium sulphate on the growth and content of some nutrients in rice plants were studied using the salinity levels of 0, 0.2 0.4, 0.6, and 0.8% of 1:1 NaCl and Na_2So_4. Both types of salinity have inhibitory effects on the growth parameters of rice, except 0.2% Na_2So_4 where growth was increased. Water content in plants leaves was increased with increasing salinity levels. The content of N, P, Ca, Na, Fe and Mn increased, while that of K decreased with both types of salinity.

Key words: Salinity stress, Rice, Nutrient composition.

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VARIATIONS IN THE BIOCHEMICAL COMPOSITION OF *GOBIOIDES RUBICUNDUS* HAM-BUCH AT DIFFERENT STAGES OF MATURITY

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(Received September 2, 1989; revised July 28, 1990)

The highest percentages of protein and moisture were observed in the gravid and spent individuals of *Gobioides rubicundus* respectively while the highest percentages of fat, ash and carbohydrate were observed in the maturing fish. Significant negative correlations between fat and moisture were found in all the three main stages of maturity viz. maturing, gravid and spent. However no relation was observed between protein and moisture of the fish. Of the three essential elements viz. Ca, Fe and P, the percentage of Fe (275.9 mg/100 g) was notably higher than that of any other commercial fish of the subcontinent.

Key words: Fish analysis, Fat-moisture relationship, Nutrition evaluation.

Technology Section

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PARAFFIN WAX DEPOSITION FROM WAXY OIL STOCKS

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(Received September 29, 1988; revised February 25, 1989)

The parameters controlling the deposition of paraffin wax from waxy oil stock on to the pipe surface are investigated. It is noticed that the wax deposited, is a function of residence time, wax concentration, type of flow and the temperature of the waxy oils.

Key words: Paraffin wax, Waxy oil.

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PROTEIN CONCENTRATES FROM POULTRY BY-PRODUCTS
Part II. Intestines, Legs, Skin, Skin-Cum Feathers

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(Received January 19, 1989; revised July 24, 1990)

Protein concentrates produced by autoclaving separately poultry intestines, legs, skin or skin-cum-feathers contained 68.25, 60.00, 58.70 and 70.10% protein respectively alongwith a considerable amount of fat, Ca and P. Enzyme digestibilities of the respective protein concentrates were 70.00, 73.00, 86.00 and 82.00%. Additionally, protein concentrates from skin- cum-feathers were prepared also on semi-pilot plant scale.

Key words : Poultry by-products, Protein concentrates, Digestibility and autoclaving.