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Physical Sciences Section

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THE ARNDT-EISTERT REACTION OF δ -OXO-(13-17)-PENTANORALABDAN-12, 19-DIOIC ACID-19-METHYL ESTER

Misbah-ul-Hasan

Fuel Research Centre, PCSIR, Karachi

(Received July 5, 1987; revised January 27, 1988)

The keto acid (III) has been synthesized from podocarpic acid. Ozonolysis of methyl podocarpate and subsequent catalytic hydrogenation of resulting product provided the keto-acid (II). The Arndt-Eistert reaction was successfully used to extend the side chain by one carbon atom to obtain the keto acid (III).

Key words: Arndt-Eistert reaction, δ -oxo-(13-17) pentanorlabdan-12.

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THE CHEMICAL COMPOSITION OF VARIOUS EUPHORBIA SPECIES FOR INDUSTRIAL APPLICATIONS

Part-II. Neutral Lipids of *Euphorbia cauducifolia*

Waqar Ahmad, Muhammad Nazir and Shafiq Ahmad Khan

PCSIR Laboratories, Lahore-16

(Received December 15, 1987)

Euphorbia cauducifolia gave ethyl acetate - extractable material (10.4%) which was resolved into free fatty acids (0.207%), free alcohols (4.015%), hydrocarbons (0.36%), esters (0.812%), sterols (0.028%) and highly polar components (4.863%). The composition of various classes of compounds was determined by gas liquid chromatography of the individual fractions or derivatized fractions. The acids, both free and combined, ranged from lauric acid ($C_{12:0}$) to behenic acid ($C_{22:0}$) with palmitic acid ($C_{16:0}$) as the highest contributor in all fractions. The alcohols ranged from pentacosanol ($C_{25:0}$) to dotriacontanol ($C_{32:0}$) with the highest percentage of octacosanol ($C_{28:0}$). The hydrocarbons ranged from tetradecane ($C_{14:0}$) to pentatriacontane ($C_{35:0}$) with maxima at octadecane ($C_{18:0}$) and tritriacontane ($C_{33:0}$).

Key words: Euphorbiaceae, *Euphorbia cauducifolia*, Fatty acids, Fatty alcohols, Hydrocarbons.

THE ROLE OF CHEMICAL STRUCTURE AND THE MEDIUM IN THE REDUCIBILITY OF SOME AROMATIC ALDEHYDES

Hesham Mansour, Mahmoud A. Ghandour, Moustafa H.M. Abu-El-Wafa and Mortga M. Moustafa

Chemistry Department, Faculty of Science at Qena, Qena, Egypt

(Received December 7, 1986)

The electrochemical reduction of benzaldehyde, salicylaldehyde and anisaldehyde were investigated at metallurgical copper and electrolytic cadmium cathodes in aqueous ethanol (1:1) containing 0.25 M H_2SO_4 . It was found that the reducibility of the studied aldehydes can be arranged in the following order: anisaldehyde > salicylaldehyde > benzaldehyde.

The influence of the medium (acidic, basic and neutral) on the reduction process has been investigated. All the studied aldehydes possess the highest reducibility in acidic medium and the lowest one in basic medium. The work was also extended to investigate the effect of the concentration of both acid and base on the reduction process. The potential measurements were carried out using galvanostatic technique. The Tafel's slope and the order of the overall electrode process in acidic medium were evaluated.

Key words: Medium effect, Aromatic aldehydes, Electrochemical reduction.

SEASONAL CHANGES IN BIOCHEMICAL COMPOSITION OF SEAWEEDS FROM KARACHI COAST

Rashida Qari

Centre of Excellence in Marine Biology, University of Karachi, Karachi-32

(Received September 13, 1987; revised January 24, 1988)

An attempt has been made in this paper to investigate seasonal variation in the biochemical composition of *Caulerpa racemosa*, *C. scalpelliformis*, *C. taxifolia*, *Codium elongatum*, *Ulva fasciata*, *Cystoseira* spp., *Padina pavonica*, *Sargassum boveanum*, *Gracilaria corticata* and *Hypnea musciformis*. The results indicate that the total protein, carbohydrate, crude fibre, lipid and ash contents varied seasonally. Calorific values show little variation but *Codium elongatum* (Buleji), *Caulerpa taxifolia* and *Gracilaria corticata* showed high calorific values in January, February and June to August respectively, whereas in *Padina pavonica* (Buleji) and *Ulva fasciata* they were low in January and September respectively. Many species studied had high protein, lipid and ash values in winter months (November - February) and high carbohydrate values in the spring and presummer months (March - June).

Key words: Biochemical composition, Seaweed, Karachi coast.

LEACHING OF CHLORIDE IN SOIL COLUMNS*

A. Hamid**

MacDonald College of McGill University, Canada

(Received July 23, 1987; revised February 4, 1988)

Leaching of Cl^- was studied in Chicot sandy loam soil in columns under laboratory conditions. The leaching patterns were influenced by the initial moisture content in the soil. In initially saturated column Cl^- band tended to spread and it appeared in the effluent when only 0.66 pore volume water was eluted and the leaching pattern resembled normal distribution curve which was due to Cl^- exclusion and presence of large fast conducting pores. Theoretical values calculated using Day and Forsythe equation were higher than those observed experimentally until 1.5 pore volume water was eluted. Thereafter tailing was much pronounced in the experimental values which was the manifestation of soil-solute interaction. The soil-solute interaction should be taken into account while applying this equation in specific problems.

Key words: Chloride leaching, Dispersion index, Hydrodynamic dispersion.

Short Communication

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PREPARATION OF SOME LONG CHAIN ALKYL NAPHTHYL ETHERS

Rashid Iqbal, Awad El-Hossadi and A. Hamid

Department of Chemistry, Garyounis University, Benghazi, Libya

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Short Communication

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THERMODYNAMICS OF IONIZATION PROCESS OF SOME WEAK ACIDS IN AQUEOUS SOLUTIONS

Mohi M. Bahr, Hassan A. Shehata, Mohamed S. El Samad and Mostafa M. Emara

Department of Chemistry, Al-Azhar University, Nasr City, Cairo, Egypt

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Biological Sciences Section

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EFFECT OF MATURITY ON LIPID CLASSES AND FATTY ACID COMPOSITION OF CASSIA SEEDS

Shahina Zaka, M. Waheed Akhtar* and Shafiq Ahmad Khan

PCSIR Laboratories, Lahore-16

(Received May 18, 1986)

The major lipid classes and their constituent fatty acids in maturing seeds of *Cassia absus*, *Cassia fistula* and *Cassia occidentalis* have been analysed. Generally in all the three seed oils a continuous increase in the contents of triacylglycerol was observed whereas the contents of all other neutral lipids decreased with maturity. The contents of polar lipids on the whole decreased with maturity. The major fatty acids in all the three species were palmitic, oleic and linoleic. Fatty acid composition of non-polar and polar lipids changed as the seeds matured, but the fatty acids of polar lipids were more saturated than those of the non-polar lipids throughout the sampling periods, 12 weeks for *C. absus* and *C. occidentalis* and 24 weeks for *C. fistula*.

Key words: Maturity, Lipid, *Cassia*.

IN VITRO STUDIES ON *RAUWOLFIA* FOR MASS PROPAGATION AND ALKALOID SYNTHESIS

Ihsan Ilahi, Mahmood Akram* and Lj. Kraus**

Department of Botany, University of Peshawar, Peshawar

(Received December 8, 1987; revised February 21, 1988)

Rauwolfia serpentina is a tropical plant of woody nature (family Apocynaceae). The plant is of great medicinal importance because of its alkaloid used for the treatment of high blood pressure and as a tranquillizer. Propagation of *Rauwolfia* by seed is not satisfactory due to highly variable germination percentage (10-75 %). The plant can be propagated vegetatively.

For this purpose various organs such as root, leaf and stem were used to induce *callus* formation and then organogenesis. Plantlet regeneration has been achieved in root and stem calli by a combination of different growth hormones. For this different media viz. White, Murashige and Skoog, Abou-Mandour were utilized. Hormonal requirement differed with the explant source. A large number of plantlets can now be produced *in vitro* for further establishment under the natural conditions. Root, stem and leaf calli were analysed for *Rauwolfia* alkaloids. Ajmaline was the major alkaloid produced by cultures. Alkaloids in such plants were higher in leaf and stem cultures than the parent plant.

Key words: *Rauwolfia*, Micropropagation, Ajmaline.

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FODDER YIELD AND QUALITY OF PEARL MILLET (*PENNISETUM AMERICANUM*) AS INFLUENCED BY DIFFERENT NITROGEN RATES

M. S. Sharar, M. Ayub and M. Hussain

Department of Agronomy, University of Agriculture, Faisalabad

(Received February 15, 1987; revised January 28, 1988)

Investigations to ascertain the effect of different nitrogen rates on the fodder yield and quality of pearl millet, were carried out at the Agronomic Research Area, University of Agriculture, Faisalabad. The nitrogen rates were 0, 75, 100 and 125 kg per hectare. All nitrogen levels produced significantly more plant height, leaf area and green weight per tiller, final plant stand, green fodder as well as dry matter than the control. However, the plant height, final plant stand and green fodder yield was not increased significantly by the application of nitrogen beyond the level of 100 kg per hectare. There was consistent increase in protein content of the fodder with successive increase in the nitrogen rate.

Key words: Pennisetum americanum L. Nitrogen rates, Growth and yield.

CORRELATION AND PATH COEFFICIENT ANALYSIS OF PLANT HEIGHT AND ITS COMPONENTS IN BASMATI RICE

M. Siddique Sajjad and Javed Iqbal

Nuclear Institute for Agriculture and Biology, Faisalabad

(Received November 25, 1987; revised February 10, 1988)

Different inevitable phenotypic and genotypic correlations were observed between plant height and its components. The path coefficient analysis indicated the maximum positive direct effect of third internodal length on plant height, followed by peduncle length and fourth internodal length. The traits of peduncle length, first, second, fourth and fifth internodal lengths had substantial positive indirect effect on plant height through third internodal length. Third and fourth internodal and peduncle length may be a good selection criteria for semidwarf plant posture in Basmati rice.

Key words: *Oryza sativa*, Correlation path analysis, Semidwarfism.

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THE EFFECT OF *ALEUROGLYPHUS OVATUS* ON STORED WHEAT BRAN

Galila A. Yacout and Samia M. Saleh*

Biochemistry Department, Alexandria University, Alex. Egypt

(Received September 27, 1987; revised January 1, 1988)

Studies on sound and *Aleuroglyphus ovatus* infested wheat bran showed considerable changes in total proteins, lipids, carbohydrate, crude fibre and free amino acids as well as fatty acids besides the remarkable changes in the moisture, ash, and mineral elements content.

Key words: Wheat bran, *Aleuroglyphus ovatus*, Elements, Fatty acids.

PROTECTION OF STORED FOOD GRAINS IN VILLAGES
Suitability of Different Grain Receptacles for Phosphine Fumigation

Mohammad Qasim Chaudhry and Mohammad Anwar

Pakistan Agricultural Research Council, Malir Halt, Karachi-27

(Received May 20, 1986; revised November 16, 1987)

Retention of phosphine gas in five different storage receptacles, commonly used in villages, was studied to assess their suitability for phosphine fumigation. Mud structures i.e. mud-bins, kuccha and pucca kothies did not retain phosphine gas for more than 24 hr. Metallic bins and plastic drums retained effective concentrations of phosphine over a period of 6 and more than 8 days respectively. The mud bins could be made gastight by applying an inner lining of polyethylene sheet.

Key words: Storage, Fumigation, Protection, Foodgrains, Receptacles.

Technology Section

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DETOXIFICATION OF MUSTARD SEED CAKE

Elimination of Toxic and Antinutritive Factors from Mustard Seed Cake

A.H.K. Niazi, M. Waheed Akhtar* and F.H. Shah

PCSIR Laboratories, Lahore-16

(Received July 15, 1987; revised February 9, 1988)

Optimum conditions for elimination of toxic antinutritive factors, i.e., allylisothiocyanate and phytic acid, from mustard seed cake have been investigated. Enzymatic detoxification followed by steeping in 4 % NaCl solution at pH 5 reduced allylisothiocyanate content to traces and eliminated 83.64 % of phytic acid respectively. Maximum nitrogen solubility profile in water, 10 % NaCl and 0.2 % NaOH was about 39.36 % and in vivo, digestibility (86.06 %) of dry matter of low phytate detoxified meal was observed at pH 5.

Key words: Glucosinolates, Phytic acid, Protein.

FOAM-MAT DRYING OF SOME LIQUID FOODS

Mohammad Jamil, Nazar Mohammad, Mohammad Anwar and A.F. Md. Ehteshamuddin

PCSIR Laboratories, Lahore-16

(Received January 9, 1988)

Conditions that were successful in foam-mat drying of various liquid foods have been described. Dilute juices had to be concentrated prior to foam formation. The foams were produced using a foaming machine developed locally. Various permissible additives were tested for production and stabilisation of foams for the purpose of dehydration. Optimum conditions with respect to foam thickness, drying temperature and drying time have been indicated. The products, in general, were organoleptically acceptable.

Key words: Drying, Dehydration, Food powder.

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FATTY ACIDS OF INDIGENOUS RESOURCES FOR POSSIBLE INDUSTRIAL APPLICATIONS

Part XV. Fatty acid composition of the seed oils of *Withania coagulans* and *Withania somnifera*

Abdul Sattar, Muhammad Yusaf Ghanai* and Shafiq Ahmad Khan

PCSIR Laboratories Lahore-16

(Received January 28, 1988)

Seed oils from *Withania coagulans* (10.45) and *Withania somnifera* (23.6%) (N.O. Solanaceae) have been evaluated for their physico-chemical properties and fatty acid composition. The fatty acid composition, as determined by gas chromatography, revealed the presence of C_{12:0} (0.07%), C_{14:0} (0.09%, 0.14%), C_{16:0} (17.06%, 17.45%), C_{18:0} (1.10%, 3.71%), C_{18:1} (19.56%, 20.18%) and C_{18:2} (61.19%, 58.52%) fatty acids in *W. coagulans* and *W. somnifera* seed oils respectively.

Key words: *Withania coagulans*, *Withania somnifera*, Linoleic acid, Saponification.

EFFECT OF WAX-COATINGS ON THE PHYSIOLOGICAL AND BIO-CHEMICAL ASPECTS OF 'KINNOW' FRUIT*

Wasim A. Farooqi, M. Salih Ahmad and Zain-ul-Abdin**

Nuclear Institute for Agriculture and Biology, Faisalabad

(Received July 29, 1987; revised January 13, 1988)

The effect of wax-coatings using two commercial wax emulsions, viz. Britex-561 and SB-65 (USA) on the storage behaviour of the Kinnow fruit was studied. Data on physical, physiological, biochemical and organoleptic parameters have revealed that waxing not only improves the external appearance of the fruit but also reduces weight loss, slows down the respiratory activity and ethylene production, thus extending shelf-life. The taste and flavour of waxed fruit were impaired and negative co-relation between external appearance and flavour was observed.

Key words: Waxing, Physiology, Shelflife.

REPLACEMENT OF PORTLAND CEMENT WITH POZZOLANA

M. Ayub, M. Yusaf, M. Iqbal and M.A. Baig

PCSIR Laboratories, Lahore

(Received November 13, 1986; revised June 17, 1987)

Pozzolanas prepared from kaolinitic clays of the Mianwali area have been studied for their effect on cement mortars and concretes. Portland cement was replaced by pozzolana upto 40 % in concrete compositions and portland cement was added to mortar compositions comprising pozzolana and the effect on compressive strength and other properties were studied.

Key words: Pozzolana, Portland cement, Kaolinitic clays.

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STUDIES ON PULPING OF KOROI (*ALBIZZIA PROCERA*) BENTH BY SODA PROCESS

Md. Sirajul Karim and Ajit Kumar Sarker

Bangladesh Agricultural University Mymensingh, Bangladesh

(Received October 22, 1987)

Studies on pulping of Koroi (*Albizzia procera*) Benth were made by soda process. Optimum pulping conditions were established. The physical properties of unbleached handsheets and bleached ones were determined. The results are within international specification for making writing and printing papers from 3- and 5-stage bleached soda pulp of koroi.

Key words: Soda, Pulping, Koroi.

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STUDIES ON SODA-SULPHUR PULPING

Part I. Pulping of Rice-straw (*Oryza sativa*) by Soda-sulphur Process

Md. Sirajul Karim

Bangladesh Agricultural University, Mymensingh, Bangladesh

(Received November 8, 1987)

A stronger pulp with higher yield is obtained by use of soda-sulphur process on rice-straw (*Oryza sativa*). The pulp thus produced can be used for production of good quality writing and printing paper.

Key words: Soda-sulphur, Pulping, Rice-straw.