



ISSN 0030-9885

Coden: PSIRAA 36 (8) 295-346 (1993)

# PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

**Vol. 36, No. 8, August 1993**

**Physical Sciences. Pages 295-301**

**Biological Sciences. Pages 302-342**

**Technology. Pages 343-346**

Published monthly by

Scientific Information Centre

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH  
KARACHI

# Physical Sciences Section

Pak. j. sci. ind. res., vol. 36, no. 8; August 1993

## FLOTATION STUDIES OF SULPHUR ORE FROM BATAL DEPOSITS, KOH-I-SULTAN BALOCHISTAN

M.A. QAZI, SAQIB AHMAD, MEHDI HASSAN, I.H. KHAN AND SHAFIQ ANWAR  
*PCSIR Quetta Laboratories, Quetta, Pakistan*

(Received March 1, 1992; revised July 21, 1993)

Elemental sulphur occurs in the volcanic deposits of Batal area in Koh-i-Sultan. The sulphur content in the ore varies from 17 to over 50%. Sulphur particles upto 80 $\mu$ , could be liberated from the associated gangue at 44-60 mesh (B.S.S.). The composite ore sample averaging 32.2% sulphur was crushed, ground and floated. Flotation tests on the composite Batal sulphur ore ground to about 44 mesh size showed a significant response to kerosine as collector and polyglycol and MIBC as frothers. Effect of different variables such as particle size, pulp density, pH, reagents, conditioning time and impeller speed was studied on the flotation of sulphur. Final concentrate containing about 80% sulphur at 75.9% recovery was obtained after three cleaning stages. The flotation conditions found optimum were particle size 60 mesh (80% passing), at pH 2.5 and impeller speed 1000-1200 rpm. The reagent used were 0.3 kg/t kerosine, 0.2 kg/t MIBC and 2.0 kg/t sodium pyrophosphate.

**Key words:** Flotation, Batal sulphur deposits.

## MASS SPECTRAL STUDIES ON MIXED LIGAND QUADRUPLY BONDED MOLYBDENUM COMPLEXES COMPARISON WITH THE HOMOLIGAND PARENT COMPOUNDS

M. QUAMRUL ISLAM

*Department of Chemistry, University of Rajshahi, Rajshahi, Bangladesh*

(Received November 18, 1992; revised June 28, 1993)

The EI mass spectrum of the mixed ligand quadruply bonded molybdenum complexes  $\text{Mo}_2(\text{O}_2\text{CCF}_3)_2(\text{S}_2\text{PF}_2)_2$  and  $\text{Mo}_2(\text{O}_2\text{CCH}_3)_2(\text{S}_2\text{PF}_2)_2$  show fragments which are observed in the mass spectrum of the parent homoligand compounds. The fragmentation of  $\text{Mo}_2(\text{O}_2\text{CCF}_3)_2(\text{S}_2\text{PF}_2)_2$  is similar to that of the parent compound  $\text{Mo}_2(\text{O}_2\text{CCF}_3)_4$ .  $\text{Mo}_2(\text{O}_2\text{CCH}_3)_2(\text{S}_2\text{PF}_2)_2$  on the other hand show fragment that is not observed in the mass spectrum of the parent compound,  $\text{Mo}_2(\text{O}_2\text{CCH}_3)_4$ . The acetato bridged mixed ligand complex show fragments containing one molybdenum atom resulting from the cleavage of the metal-metal bond, a process not observed in the mass spectrum of the parent compound,  $\text{Mo}_2(\text{O}_2\text{CCH}_3)_4$ .

**Key words:** Mass spectrum, Molybdenum complex, Dithio-phosphinate acetate ligands.

# Biological Sciences Section

Pak. j. sci. ind. res., vol. 36, no. 8, August 1993

## DERMATOLOGICAL EFFECT AND TOXICOLOGICAL EVALUATION OF HUMIC ACIDS FOR TROPICAL USE IN SKIN WOUND HEALING AND SKIN DISEASES

NISAR AHMAD, SURRIAYA MIR AND NASIM MUQTADAR QADRI

*PCSIR Fuel Research Centre, Karachi-75280, Pakistan*

(Received June 29, 1991; revised July 15, 1993)

Humic acids are produced for the first time from low rank coals of Pakistan. Humic acids and its salts are used as therapeutic agents especially in veterinary medicine. Humic acids is a very economical product due to its production from indigenous raw material. The evaluation of humic acids in dermatological applications for skin affection is carried out to find about its feasibility of utilization in pharmaceuticals related to dermatology.

**Key words:** Lignites, Humic acids, Dermatology.

## TISSUE CULTURE VARIABILITY IN WHEAT GERM-PLASM: CALLUS INITIATION AND LONG-TERM PLANT REGENERATION AND MAINTENANCE

AKBAR S. MOHAMAND

*Tissue Culture Lab, National Agricultural Research Centre, P.O. N.I.H., Park Road, Islamabad, Pakistan*

(Received February 20, 1991; revised May 24, 1993)

Twenty genotypes of spring and winter wheat were studied for their potential use in tissue culture. Calli were initiated from mature embryos on Linsmaier and Skoog's [LS] basal medium containing 4.0 mg/l 2,4-dichlorophenoxyacetic acid [2,4-D], 2% sucrose and 1% agar. Cultures were maintained on the same LS medium with 2,4-D reduced to 2.0 mg/l. Shoots were initiated from embryogenic callus [*E. callus*] by reducing 2,4-D to 0.1 mg/l and adding 0.1 and 0.5 mg/l indoleacetic acid [IAA] and benzylaminopurine [BAP] respectively. Complete plants were regenerated by transferring the calli to 2,4-D-free medium. Significant genotypic variation was observed for callus induction frequency, *E. callus* formation and the potential for plant regeneration. Cultures of ten genotypes remained morphogenic for 210 to 270 days. Three genotypes gave *E. callus* upto 455 days. For the first time wheat genotypes have been identified which were still able to regenerate plants after 900 days in culture (PI-410626, PI-299828, PI-478016). Of the 20 genotypes, PI-478022 and Dayak yielded the highest amount of *E. callus*, while PI-478022 and PI-478016 gave the highest number of regenerants. A total of 597 plants were regenerated and seeds were obtained. The genotypic effect on callus induction, long-term maintenance and plant regeneration in wheat germplasm is discussed.

**Key words:** Germplasm, Mature embryo, Long-term, Regeneration, Maintenance.

## INFLUENCE OF CULTIVAR, SOWING DEPTH AND SEED SIZE ON THE EARLY SEEDLING GROWTH OF GROUNDNUT

A.H.M. RAZZAQUE AND S.N. AZAM ALI\*

*Agronomy Division, Bangladesh Institute of Nuclear Agriculture, Mymensingh-2200, Bangladesh*

(Received December 12, 1992)

Growth chamber experiments were carried out to determine the influence of cultivar, sowing depth and seed size on the early seedling growth of groundnut (*Arachis hypogaea* L.) There were four cultivars: Kadiri-3, Kadiri 71-1, Gangapuri and TMV-2; four sowing depths: 2, 4, 6, 8 cm and three seed size: Large, medium and small. Experiments were conducted in a controlled environment growth room at 28° and with a 12h day length. Results showed that the differences between cultivars in early seedling growth were variable. However, Kadiri-3 produced more vigorous seedlings compared with the other cultivars. Sowing depth had a profound effect on seedling growth. Seeds sown at 4 and 6 cm depths produced more vigorous seedlings. Seed size had a significant influence on the early growth of seedlings. For each cultivar, large seeds produced the most vigorous seedlings at any particular sowing depth.

**Key words:** Groundnut, Cultivar, Growth, Seed size, Sowing depth.

## EFFECT OF PLANTING DATE ON DEVELOPMENTAL PHASES IN DETERMINATE AND INDETERMINATE SOYBEAN CULTIVARS

M. HATAM AND G.H. JAMRO\*

*NWFP Agricultural University, Peshawar, Pakistan*

(Received February 14, 1990; revised January 1, 1993)

Determinate and indeterminate soybean types (*Glycine max* (L.) Merr.) have different growth habits. The present investigations determined the behaviour of two determinate (Lee, MG VI and Essex MG V) and one indeterminate (Williams MG III) cultivars at latitude of 34.1 N at NWFP Agricultural University Peshawar, when planted from April to July at 15 days intervals. Number of days to vegetative and reproductive stages were reduced with late planting in determinates. In indeterminate number of days to reproductive stages were not affected by planting dates. In Williams reproductive phase initiated earlier than Lee and Essex. The number of days to maturity declined with each successive planting date for all cultivars. The maturity date of Williams was affected more by planting date than those of Lee and Essex.

**Key words:** *Glycine max* (L.) Merr., Planting date, Developmental phase.

**OMEGA-3 POLYUNSATURATED FATTY ACIDS CONTENT OF POMFRETS  
(*STROMATEUS* SP, *PARASTROMATEUS* SP) AND MACKEREL (*SCOMBEROMORUS* SP)  
FROM KARACHI COASTAL WATERS**

RIAZ FATIMA, R. B. QADRI, VIQARUDDIN AHMED\* AND KANIZ FIZZA\*

*PCSIR Laboratories Complex , Off University Road, Karachi-75280, Pakistan*

(Received December 5, 1992; revised August 17, 1993)

Three commercially important fish were analyzed for fatty acid profile with particular reference to n-3 PUFAs, the EPA (20:5n-3) and DHA (22:6n-3) in their muscle lipid. The data revealed that black pomfret and mackerel were rich sources of n-3 PUFAS while white pomfret was not. The data also showed that temperature of coastal waters has profound effect on the percentage composition of saturates and unsaturates.

**Key words:** Lipid, Omega-3 polyunsaturated fatty acids, Pomfrets, Mackerels.

## OVIPOSITION AND DEVELOPMENT OF THE MEALYBUG PARASITOID *ANAGYRUS PSEUDOCOCCI* (GIRAULT) AT DIFFERENT CONSTANT TEMPERATURES

KHANDAKAR SHARIFUL ISLAM AND MAHBUBA JAHAN\*

MCR, Wye College, University of London Wye, Ashford, Kent TN25 5AH U.K.

(Received October 25, 1992; revised August 11, 1993)

Oviposition and rate of development of the parasitoid, *Anagyrus pseudococci*, were determined at constant temperature of 18, 21, 24, 27, 30 and 33° in the laboratory. Most progeny were produced at 27° and 30°. The developmental rate for both the sexes showed good fit to linear regression model over a wide range of temperatures. Males developed faster than females at all temperatures. The lower developmental threshold was estimated to be 13.06° and 12.57° for males and females respectively. The estimated thermal requirement for development was 195.50 degree-days for males and 219.59 degree-days for females.

**Key words:** Developmental rate, Progeny production, *A. pseudococci*, Mealybug, *Planococcus citri*.

Pak. j. sci. ind. res., vol. 36, no. 8, August 1993

## DETECTION AND ESTIMATION OF ESSENTIAL TRACE ELEMENTS IN TEA (*THEA SINENSIS*) BY ICPAES AND FAAS METHODS

AZIHAR M. SYED AND M. QADIRUDDIN

*PCSIR Laboratories Complex, Karachi-75280, Pakistan*

(Received July 15, 1992; revised July 7, 1993)

Seven essential trace elements have been detected and estimated, including cobalt and chromium in six samples of tea. The use of inductively coupled plasma atomic emission spectroscopy (ICPAES) and flame atomic absorption spectrophotometry (FAAS) has been made. Hot water extraction limits for these elements have also been estimated. The standardization of the methods was carried out by using Orchard Leaves NBS-1571.

**Key words:** Essential, Trace elements, Tea.

## PHYSIO-GENETIC BASIS FOR DROUGHT TOLERANCE IN SPRING WHEAT

MUHAMMAD ASLAM CHOWDHRY, RASHID HUSSAIN, IHSAN KHALIQ AND NAEEM MAHMOOD

*Department of Plant Breeding & Genetics, University of Agriculture, Faisalabad, Pakistan*

(Received November 12, 1992; revised May 2, 1993)

Nine wheat genotypes (6 females and 3 males) were crossed in the crop season 1989-90. Data on some drought related and yield characters were recorded and subjected to combining ability studies. Cross LU26S x HABA 3 indicated positive GCA effects for osmotic pressure, stomatal size and yield characters. While the crosses HABA 3 x LU26S, HABA 4 x Pak.81 and LABA 3 x LU26S showed positive SCA effects for grain yield. These crosses may prove useful in future breeding.

**Key words:** Wheat genotype, Combining ability, Drought.

Pak. j. sci. ind. res., vol. 36, no. 8, August 1993

## TRACE HEAVY METAL DISTRIBUTION IN THE FISH, *ILLISHA AFRICANA* ORGANS AND TISSUE II: CHROMIUM, ZINC, COPPER, IRON AND COBALT

E.I. ADEYEYE

*Department of Chemistry, Federal University of Technology, P.M.B. 704, Akure, Nigeria*

(Received March 20, 1993; revised August 8, 1993)

This work provides information on the levels of 5 essential trace metals found in the muscle tissue, internal organs, head and gills of the fish, *Illisha africana* commonly harvested from fresh-water ponds in Nigeria. The fishes were caught from 3 neighbouring man-made ponds and were analysed for their contents of Cr, Zn, Cu, Fe and Co by atomic absorption spectrophotometer. All determinations were made on dry weight basis. Cr was not detected in any samples. Both the coefficients of variation of the elements and their concentration factors were determined in the fish parts. Every part of the fish in the 3 ponds showed a sign of some degree of bioaccumulation.

**Key words:** Essential trace metals, Coefficient of variation, Concentration factor, *Illisha africana*.

***Short Communication***

Pak. j. sci. ind. res., vol. 36, no. 8, August 1993

**Studies on the Preparation and Quality  
Evaluation of Kinnow (*Citrus reticulata* L.)  
Comminuted Squashes**

MAQBOOL AHMAD\* AND M.A. CHAUDRY

*Nuclear Institute for Food and Agriculture (NIFA),  
Peshawar*

(Received July 11, 1991; revised August 5, 1993)

*Short Communication*

Pak. j. sci. ind. res., vol. 36, no. 8, August 1993

**Influence of Inter and Intra Row Spacings  
on the Growth, Seed Yields, Oil and Protein  
Content in Linseed (*Linum Usitatissimum* L.)**

NASIR RAZA KHAN AND S. SHAHID HUSAIN

*PCSIR Laboratories Complex, Karachi - 75280*

(Received May 6, 1990; revised June 17, 1993)

## Technology Section

Pak. j. sci. ind. res., vol. 36, no. 8, August 1993

### BENEFICIATION STUDIES OF DAU DAM (DISTRICT DADU, SINDH) SAND ON PILOT PLANT SCALE FOR MAKING COLOURLESS GLASS

M. ASLAM CHAUDHRY AND (LATE) AHMAD DIN

*PCSIR Laboratories Complex, Lahore-54600, Pakistan*

(Received August 8, 1992; revised May 13, 1993)

Six low grade glass sands of Dau Dam, district Dadu, have been beneficiated on laboratory as well as on pilot plant scale. Laboratory studies showed that none of the sand in its original form was suitable for melting colourless glass. However, three sands SQ<sub>4</sub>, SQ<sub>5</sub>, and SQ<sub>6</sub> after simple water washing were found suitable to be processed on sand washing plant. Sand SQ<sub>4</sub> and SQ<sub>6</sub> showed an iron content of 0.045 and 0.04% respectively after pilot plant washing treatment. These two sands can be utilized for the manufacture of colourless glass with the proper use of decolourizer mixture of selenium and cobalt. However, SQ<sub>1</sub>, SQ<sub>2</sub>, SQ<sub>3</sub> and SQ<sub>5</sub> sands after simple water washing can be used for making thin walled chimneys, electric shells, sheet glass and coloured glasses.

**Key words:** Beneficiation, Glass sand, Sand for making colourless glass.