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EXTRACTION OF SULPHUR FROM THE BATAL DEPOSIT OF KOH-I-SULTAN (BALOCHISTAN)

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

Flotation concentrates of Batal sulphur assaying over 75% sulphur was purified by melting in a stirred autoclave. Variables controlling the extraction showed that autoclaving minus 85 mesh flotation concentrate in a pulp (15 % solids) at 125° for 60 mins yielded a product assaying 99.8% sulphur at about 92.5% recovery. The residue contained about 19% sulphur which possibly could be recovered by recycling it in a flotation circuit.

Key words: Sulphur extraction, Batal deposit.

STUDIES ON SODA-SULPHUR PULPING

*Part- VI. Pulping of Multi-Bamboo (*Bambusa baccifera*) by Soda-Sulphur Process*

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(Received June 11, 1990; revised May 20, 1993)

Unbleached pulps from multi-bamboo were obtained by using optimum pulping conditions of 1.5% elemental sulphur in 22% NaOH solution in the rotary digester of 20L capacity at a temperature of 165° for 3 hrs with a material-liquor ratio of 1:4 at pressure 6.5 kg/cm². The unbleached yield was 46.09%. The unbleached pulp was then subjected to 3 and 5 stage bleaching systems. The paper properties and brightness of unbleached and bleached pulps were determined. The highest tear factors, most important one considered for paper-making, were obtained 160.83 and 150.07 respectively for 3 and 5 stage bleached pulps. The highest yield (42.87%) and higher brightness value (83.4%) were obtained in case of 3 stage bleached pulp. From the studies in details, it has been found that a stronger pulp with higher yield in less cooking time is obtained by use of soda-sulphur process on multi-bamboo for making good quality writing and printing paper.

Key words: Soda-sulphur, Multi-bamboo, Pulping.

Short Communication

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**Substituted N-Methyl-N-Phenylhydrazones
of Quinoline Carboxaldehydes. *Part-I***

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Biological Sciences Section

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PLANTING TECHNIQUES OF MAIZE ON THREE DIFFERENT SOIL FAMILIES

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(Received December 18, 1991; revised May 20, 1993)

Planting techniques for maize are presently recommended without taking into consideration soil characteristics and landscape positions. Secondly, there is no scientific base to transfer soil management practices from one place to another place. An experiment was conducted to find out most suitable planting technique for the soil families under test and a base for transfer of soil management technology. The soil families were: (i) Fine-silty, mixed, hyperthermic, udic Haplustalfs convex phase, (ii) Coarse-silty, mixed, hyperthermic, typic Ustochrepts sloping and terraced phase and (iii) Fine-loamy, mixed, hyperthermic, udic Haplustalfs sandy loam surface phase. The benchmark soil series were Guliana convex phase, Missa sloping and terraced phase and Balkassar sandy loam surface phase respectively. Suitable planting techniques for maize on the three benchmark soils of the three soil families were found to be different. Planting on: ridges for Guliana soil series, braodbeds for Missa soil series and flat parts of Balkasssar soil series were suitable. The planting techniques depended upon soil physical characteristics and attributes of landform. The site and planting technique interaction for a particular benchmark soil was non-significant which support the view that planting technique for a soil family can be transferred to the same family provided other production factors remain the same.

Key words: Planting techniques, Soil family, Maize.

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GENOTYPE X ENVIRONMENT INTERACTIONS IN OATS, AND THEIR IMPLICATION ON FORAGE OAT BREEDING PROGRAMMES IN PAKISTAN

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(Received September 3, 1992; revised June 19, 1993)

Thirteen oasts genotypes were evaluated for their forage yield potenital at 4 locations and for 4 years. Estimates of various types of genotype x environment interactions were obtained from forage oats performance tests. Genotype x locations and genotype x year interaction effects were significant, but thier variance components were small compared with the second order interaction indicated that oat genotypes responded quite differently to different environmental conditions. This response was not accounted for by either year or location suggesting that the three provinces under study should be divided into sub-areas on the basis of variation in rainfall, temperature, soil types, and soil fertility in order to minimize genotype x environments interaction for an efficient forage oat evaluation programme.

Key words: *Avena sativa*, Oat, Genotype, Environment, Breeding, Forage.

ISOTOPE-AIDED STUDIES ON THE NITROGEN UTILIZATION AND YIELD OF LENTIL AS INFLUENCED BY IRRIGATION REGIMES IN A SALT-AFFECTED SOIL

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(Received February 18, 1992; revised June 26, 1993)

Field experiments were conducted for two consecutive years to study the nitrogen utilization and yield of lentil as influenced by different irrigation regimes in the salt-affected soils of Bajoa series (Typic Haplaquept) in Satkhira, Bangladesh. The split-plot design experiments included two sources of irrigation water viz. (i) Stored lake water (LW) and (ii) Tube-well water (TW) in the main-plots and three irrigation regimes such as (i) W_0 - no irrigation, (ii) W_1 - one irrigation of 5 cm, and (iii) W_2 - two irrigations of 5 cm each in the sub-plots. Sources of irrigation water had no significant effect on the yield and nitrogen utilization by lentil although irrigation increased the lentil yield in the first year, but it was considerably lower compared to average national yield. During the second year, the yield, total N uptake and biological nitrogen fixation by lentil increased considerably due to the use of *Rhizobium* inoculated seeds. The extent of fertilizer N uptake and N utilization were, more or less similar in both the years. The A-value concept provided a unique opportunity to quantify the amount of nitrogen fixed by a legume crop under the adverse condition of salinity.

Key words: N^{15} isotope, Irrigation, N-fixation, Salt-affected soil.

BROAD-RANGE BACTERIOCINS OF INDIGENOUS PSEUDOMONADS: *IN VIVO* MANIPULATION AND MOLECULAR CHARACTERIZATION

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(Received December 31, 1990; revised February 15, 1993)

Indigenously isolated clinical *Pseudomonas aeruginosa* were screened for bacteriocin production against *E. coli* AB712, *Staphylococcus aureus* ATCC 25923, *Agrobacter tumefaciens*, *Erwinia* AC4075 and *Xanthomonas*. 44% of the isolates were found bacteriocinogenic against one or more indicator strains. The location (*viz.* chromosomal or extra-chromosomal) of the bacteriocin genes was determined by curing the representative producing cultures. 42% of the cured, producing pseudomonads lost bacteriocinogenic potential, thereby indicating non-chromosomal location. Plasmid mediated *in vivo* gene transfer (using *E. coli* AB712 and *E. coli* 40 as the recipient strains) studies gave stable exconjugants (10 out of 20 matings) which acquired the drug resistance marker; 5 of the stable exconjugants also acquired the bacteriocin genes against one or two indicator strains. One non-producing pseudomonas strain showed mitomycin C-mediated bacteriocin production. This protein was extracted and subjected to sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) and found to be of 50 ± 5 Kd molecular weight.

Key words: Pseudomonads, Bacteriocins, Broad-range plasmids, *In vivo* gene transfer, SDS-PAGE.

LABORATORY EVALUATION OF SOME VEGETABLE OILS AS PROTECTANTS OF STORED PRODUCTS

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(Received October 24, 1992; revised May 2, 1993)

Twelve vegetable oils were tested for their repellent activities against red flour beetle, *Tribolium castaneum* (Herbst) and their toxic effect against lesser grain borer, *Rhyzopertha dominica* (Fabricius) for a period of eight weeks. The best repellent activity (Class V) was found in the oil of neem, *Azadirachta indica* (Antoine de Jussieu). Methi dana, *Trigonella foenumgraecum* (Linnaeus) and nutmeg, *Myristica fragrans* (Maarten Houttuyn) showed Class IV repellency while oils of black pepper, *Piper nigrum* (Linnaeus), Kalongi, *Nigella sativa* (Linnaeus) and turmeric *Curcuma longa* (Linnaeus) showed Class III repellency. The oils of *M. fragrans* (calyx), *A. indica* and *P. nigrum* showed the maximum toxic effects at 0.25% w/w by surface treatment of wheat grains.

Key words : Antifeedants, Repellents, *R. dominica*, *T. castaneum*.

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CHARACTERISTICS AND CHEMICAL COMPOSITION OF *CITRULLUS COLOCYNTHIS* SEED OIL

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(Received December 7, 1992; revised July 25, 1993)

The seed oil from *Citrullus colocynthis* Schrad (N.O. Cucurbitaceae) was analysed for its physical characteristics and fatty acid composition. The data obtained for the iodine value, saponification value and fatty acid composition compare well with other edible oils. Gas-liquid chromatographic analysis revealed it to be a rich source of both oleic (24.1%) and linoleic acids (51.3%), besides palmitic (12.8%) and stearic acids (9.8%).

Key words: Fatty acids, Cucurbitaceae, *Citrullus colocynthis*, Oils.

Technology Section

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OIL SEED PROCESSING TECHNOLOGY IN PAKISTAN

Part -IX. Evaluation of Differently Designed Screw Assemblies in Small Expeller

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(Received January 2, 1992)

A number of screw configurations, with successive increasing compression ratio, were designed and tested to optimize for use in the newly developed expeller model-3. Experiments were conducted on designed screw configuration using rapeseed as a raw material. The experimental data, its analysis and the design features and the performance of screw configurations are discussed to determine the best performing screw configuration

Key words: Screw configuration, Helical grooves, Processing capacity gash space.

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EFFECT OF PRESERVATION METHODS ON THE QUALITY AND STORAGE STABILITY OF SQUASH PREPARED FROM IRRADIATED MANGOES

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(Received on February 28, 1991; revised April 17, 1993)

Chemical and organoleptic characteristics of squashes prepared from unirradiated and irradiated (0.25, 0.50, 1.00 kGy) Langra and Chonsa mangoes and preserved either by SO_2 (250 ppm) or heat (8° for 10 min.) were studied during storage at room conditions ($26-36^\circ$, 50-76% RH). Irradiation of mango fruit and heating of mango squash significantly ($P < 0.05$) decreased ascorbic acid content of squash. Being richer source, Langra mango squash retained more ascorbic acid (75.6%) than Chonsa squash (60.1%) after 12 weeks storage. Irradiation of mango fruit had no additive effect on the sensory quality of its squash. SO_2 preserved squashes were preferred over heat preserved ones for appearance, odour and taste. Heat preserved squash samples were spoiled after 4 weeks of storage. However, SO_2 preserved samples were in good condition after 12 weeks of storage and were given 68% overall acceptability scores. Langra and Chonsa mango squashes were comparable as for as sensory characteristics were concerned.

Key words : Mango squash, Irradiation, Heating, SO_2 , Ascorbic acid, Sensory quality.

THE IRRADIATION-INDUCED MICROSTRUCTURAL DEVELOPMENT IN Ni-Al ALLOYS

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(Received July 7, 1990; revised August 15, 1993)

The microstructural development for Ni-13.1 at % Al during irradiation was investigated. Different metallurgical conditions were obtained of this alloy, and γ' -precipitates were produced. Specimens were bombarded at 300° under proton irradiation from cyclotron. It was observed that the irradiation changed the precipitate structure and with increasing dose a splitting of the pre-existing precipitates into smaller fragments was observed. The irradiation induced growth of γ' -precipitates in quenched specimens by a displacement rate of $2 \cdot 10^{-6}$ dpa/sec. at 300° was comparable to the growth under thermal aging at 570°.

Key words: Irradiation, Microstructural development, Ni - Al alloy.