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Physical Sciences Section

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FAST DETECTION, LOCATION AND TRAJECTORY TRACING OF MOVING TARGETS

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(Received June 26, 1988; revised April 1, 1989)

This paper describes a new time efficient technique for the analysis of time-varying images taken by a stationary camera. The proposed alogrithm consists of three stages, motion detection, object location, and trajectory tracing. These stages locate a local window containing the moving object in respective frames in both fast and slow motion cases. The described method has been tested on the real world complex images of moving objects. Experiments produced satisfactory results.

Key words: Motion analysis, Time-varying image, Trajectory tracing.

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EFFECT OF DODECYL MERCAPTAN ON THE BENZOYL PEROXIDE INITIATED POLYMERIZATION OF VINYL ACETATE

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(Received March 2, 1988; revised March 27, 1989)

The solution polymerisation of vinyl acetate in the presence of dodecyl mercaptan has been carried out at 100° using benzoyl peroxide as initiator and ethyl acetate as diluent. Dodecyl mercaptan decreases the polymerization of vinyl acetate and at low concentration shows no induction period. It acts as chain transfer agent. The value of chain transfer constant for DDM is determined as 4.2×10^{-2}. DDM may be used as molecular weight regulator.

Key words: Polymerization, Dodecyl mercaptan, Vinyl acetate, Chain transfer agent.

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ORGANIC CORROSION INHIBITORS FOR TIN IN HYDROCHLORIC ACID

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(Received November 20, 1988; revised April 2, 1989)

The inhibitive effect of benzaldehyde, salicylaldehyde, *p*-anisaldehyde, cinnamicaldehyde and cyclohexanol on the corrosion of tin in 6.0 M hydrochloric acid was studied by weight-loss and galvanostatic methods. It has been found that all the aldehydes give high performance while cyclohexanol appears to be the worst one. Cinnamicaldehyde is the excellent inhibitor even at low concentration (2 mM). All the inhibitors used are found to retard the corrosion by predominantly acting on local cathodes. The effect of time and temperature on inhibitor efficiency has been also studied. The values of activation energy in the absence and presence of inhibitors were evaluated.

Key words: Tin, Inhibitors, Corrosion.

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REACTION WITH HETEROCYCLIC DIAZONIUM SALTS: SYNTHESIS OF PYRAZOLYLHYDRAZONE AND PYRAZOLO [1,5-C] AS-TRIAZINE DERIVATIVES

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(Received December 16, 1987; revised April 17, 1989)

3-Amino-4-arylazopyrazol-5-yl diazonium chlorides (2 a,b) were coupled with different active methylene reagents such as benzenesulfonyl-acetophenone (i), *p*-toluenesulfonylacetophenone (ii), benzenesulfonylacetone (iii), dibenzolmethane and acetoacetanilide in sodium acetate/ethanol solution to give the corresponding pyrazole [1,5-c] as-triazine derivatives(5 a-d) and (6 a,b) respectively. Formation of pyrazole [1,5-c] as-triazines is assumed to be a dipolar cycloaddition reaction of diazobetaiene [3] and the enol form of the active methylene compounds. On the other hand, diazonium chlorides (2 a,b) were coupled with cyanoacetanilide, cyanoacetamide, β-naphthol, 3-methylpyrazol-5-one, 3-methyl-1-phenylpyrazol-5-one and (4-hydroxythiazol-2-yl)-acetonitrile [12] to give the corresponding hydrazones (7 a-c), (9 a,b), (11 a-c), and (13 a,b) respectively. The formation of hydrazones is assumed to occur by the normal coupling of diazonium chlorides (2 a,b) and active hydrogen reagents. Some of the acyclic hydrazones such as pyrazolylhydrazones (7 a-c), (9 a,b) and (13 a,b) could be cyclized by refluxing acetic acid to give pyrazole[1,5-c] as-triazine derivatives (8 a-c), (10 a,b) and (15 a,b) respectively. All structures suggested are based on elemental analysis and spectral data.

Key words: Heterocyclic, Salts, Pyrazoles.

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COPPER-LOADED DEALUMINATED HY ZEOLITE CATALYSTS

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(Received October 10, 1988; revised April 18, 1989)

Copper was incorporated into NaY and HY zeolites by impregnation and by ion-exchange methods. Zeolites with copper incorporated by impregnation have high catalytic activity. The influence of dealumination on the behaviour of these catalysts was also studied. The results demonstrate the catalytic activity can be attributed to small copper agglomerates in the zeolite pores and to larger copper crystallites outside the pores. The decomposition of hydrogen peroxide was used to measure the catalytic activity of the zeolites.

Key words: Zeolites, Cu-loaded catalysts, Dealumination.

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EXPLORATION OF ESTIMATING KINETIC RESIDUE FOR PULVERISED MINERAL COAL USING RATE METHOD

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(Received June 9, 1988; revised April 8, 1989)

The kinetic residue (R_{KR}) for pulverised mineral coal was estimated by rate method on Ro-Tap electrical sieving machine. The value of kinetic residue for this type of coal has been computed as 12.90% which gives a linear decay rate on semilog paper after 40 minutes of sieving time. It has been established that when the logarithmic decay describes the rate of sieving is obtained then the size distribution function of coal powder passing the sieve remains constant.

Key words: Kinetic residue, Pulverised mineral coal, Automatic sieving.

Short Communication

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CHARACTERIZATION OF SOME LIPID COMPONENTS OF *COCCULUS HIRSUTUS* BY MASS SPECTROMETRY

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Biological Sciences Section

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ANTIMICROBIAL ACTIVITY OF THE ESSENTIAL OILS OF UMBELLIFERAE FAMILY

Part VIII. Seseli libanotis, Ligusticum Stewartii and *Pycnocycla aucheriana* Oils

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(Received July 12, 1988)

The essential oils of the seeds of *Seseli libanotis, Ligusticum stewartii* and *Pycnocycla aucheriana* have been tested against the pathogenic bacteria of *Staphyococcus aureus, Escherichia coli, Shigella dysentry,* and *Vibrio cholera.* The tests were carried on in emulsified broth using spectrophotometric method. Of the oils tested, *Sesali libanotis* is most effective, especially against *Staph. aureus.* While at higher doses, the oil of *P. aucheriana* was also effective against pathogen like *S. typhi.*

Key words: *Seseli libanotis, Ligusticum stewartii,* and *Pycnocycla aucheriana.*

INTRODUCTION

Preparation of media and inoculum. The media and

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PRELIMINARY STUDIES ON EMBRYOGENESIS OF *CEPHALOBUS LITORALIS* (NEMATODA: CEPHALOBIDAE)

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(Received March 15, 1989; revised April 16, 1989)

Cephalobus litoralis (Akhtar, 1962) Andrassy, 1984 completes its embryogenic development in about 18.5 hr and deposites 20-25 eggs in 10 hr. Usually the first cleavage division occurs within the uterus. Development of the embryo is fast and early cleavage divisions are similar to *A. complexus*. Gastrula stage is reached within 8-11 hr from egg deposition. Lima bean stage is followed by comma stage within 11-16 hr. Tadpole stage transforms to plum stage within 12.5-18.5 hr. The first larval stage develops within 14-20.5 hr of deposition and emerges out of the egg within 14.5-22.5 hr.

Key words: Cephalobus litoralis, Embryogenesis, Egg deposition, Nematode model.

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LIPID METABOLISM IN GERMINATION SEEDS OF *CASSIA*

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(Received October 15, 1986; revised April 18, 1989)

The seeds of *Cassia absus*, *Cassia fistula* and *Cassia occidentalis* were germinated in the dark at 30° and the variations in the lipid class and fatty acid composition in the cotyledons and primary root were determined. Along with losses in dry matter in both the cotyledons and the primary root, the lipid content increased in the cotyledons but were reduced in the root during germination. Lipid content was found to be least in the region of the primary root close to the cotyledons. During germination the relative amounts of the neutral lipids, which were mainly triglycerides, decreased but those of the polar lipids, mainly phosphoglycerides, increased. Similar but more significant changes in the lipid class composition of the primary root were observed, which indicated that the neutral glycerides have a function as a source of reserve energy while the phosphoglycerides and glycolipids play a role as component of the membrane systems in the growing root. Analysis for lipid class pattern in the various regions of the primary root showed that the apical portions had slightly higher proportions of neutral lipids as compared to the other parts. Changes in the distribution of fatty acids were measured during germination in cotyledons and primary roots which did not show any significant variations as compared to the resting seeds. In the primary root, however, relative proportion of saturated fatty acids, mainly $C_{16:0}$ and $C_{18:0}$ increased manifold, while percentage of $C_{18:2}$, the major unsaturated fatty acid, was reduced to about 1/3rd. Percentage of the unsaturated fatty acids was highest in the tip whereas the relative amount of the saturated fatty acids was highest in the regions of the root close to the cotyledons. Metabolic patterns of the Classes and the fatty acids in the cotyledons and the primary root of Cassia have been discussed.

Key words: Lipids, Germination, *Cassia* seeds.

composition was determined at the various stages of the

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HETEROSIS AND HETEROBELTIOSIS STUDIES FOR QUALITY CHARACTERS IN INTRASPECIFIC CROSSES OF *GOSSYPIUM HIRSUTUM* L.

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(Received August 16, 1988; revised April 8, 1989)

Heterosis and heterobeltiosis was studied in seven hybrids of *Gossypium hirsutum* L. derived from eight local and exotic varieties in respect of six quality characters. Heterotic response varied from 2.46 to 24.63%, 0.23 to 52.70%, 0.72 to 13.44%, 2.93 to 6.85%, 5.23 to 19.14% and 1.32 to 9.43% for seed index, lint index, ginning cutturn, staple length, fibre fineness and fibre strength characters respectively. Likewise positive heterobeltiosis ranging from 9.45 to 17.00%, 10.17 to 48.68%, 3.39 to 11.24%, 1.41 to 5.04%, 9.44 to 14.35% and 0.77 to 6.19% for respective characters was also observed.

Key words: Gossypium hirsutum L., Heterosis, Heterobeltiosis, Quality characters.

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DIRECT AND RESIDUAL EFFECTS OF PHOSPHORUS ON RICE AND WHEAT CROP IN LONG TERM TRIAL UNDER IRRIGATED CONDITIONS OF SARGODHA (PUNJAB)

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(Received December 5, 1988; revised March 22, 1989)

Three year trial on direct and residual effects of phosphorus on rice-wheat crop sequence was carried out during 1984-88 under irrigated condition at Adaptive Research Farm, Sargodha. Five levels of P (0, 15, 30, 45, 60 kg P/ha) were applied only to rice crop in 1984-85 growing season and subsequent crops were raised on residual phosphorus. The results indicated that significant crop response to applied phosphorus could be obtained only when initial status of phosphorus in available form is not very high. The grain yields of first three crops (rice-wheat-rice) during 1984-85 and 1985-86 season harvested from direct and residual fertilization were not statistically significant when soil contained more than 7.19 ppm available phosphorus. The grain yields of successive crops i.e. wheat (1985-86), rice and wheat (1986-87) and rice (1987-88) differed significantly, when soil phosphorus dropped below 7.19 ppm and ranged between 4.15-7.19 ppm.

Key words: Residual phosphorus, *Triticum aestivum, Oryza sativa.*

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GROWTH AND YIELD OF FIVE WHEAT GENOTYPES AS INFLUENCED BY DIFFERENT IRRIGATION FREQUENCIES

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(Received January 22, 1987; revised April 15, 1989)

The growth and yield of five newly developed wheat genotypes as influenced by different irrigation frequencies, was determined on a medium loam soil with a water table at a depth of 210 cm from the soil surface. The growth characteristics like tillering, plant height and thousand grain weight were affected significantly by the genotypes. Wheat genotypes 79100, 79143, 79353 and LU-26 produced statistically the same grain yield but yielded significantly more than K-342. The irrigation frequencies did not affect the total as well as fertile tillers and grain yield per hectare. The plant height, number of grains per spike and 1000-grain weight were affected significantly by the irrigation frequencies. Two irrigations, first at tillering and second at grain development, proved to be sufficient for obtaining the optimum yield of 44.20 quintals per hectare.

Key words: Wheat, Genotypes, Irrigation frequencies.

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STUDIES OF SIND-LAC HELPFUL IN ITS CULTIVATION

Part II. Sex Ratio Determination in Early Second Stage Larvae of Sind Lac-Insect

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(Received January 3, 1989; revised April 19, 1989)

Lac production depends upon a colony of lac insects in which the females are in a favourable percentage. It is then possible to predict an expected crop of lac early enough by determining the sex ratio soon after the larvae have settled on the host plant. During early first larval stage a magnification of x 30 may be necessary. But when the first stage larvae are full grown, or a little later, when the first exdysis has occured sex-ratio can be determined with a pocket magnifying lens giving the magnification of x 10. Pictures of lac larvae have been offered showing fully formed first stage cells and also fully formed second stage cells in which the sex-ratio can be determined.

Key words: Lac, Insect, Cultivation.

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STUDIES OF SIND-LAC HELPFUL IN ITS CULTIVATION

Part III. Sex Identification in Full Grown First Stage Larval Cells of Sind Lac Insect

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(Received January 3, 1989; revised April 19, 1989)

The crawling larva of the lac insect as male has a narrow "V" shaped posterior part. The corresponding portion in the female larva is broader and "U" shaped. While settling on its host plant it secretes from its dorsal surface a shield of hard transparent wax which is a replica of the body segments which produced it. This wax shield shows 11 segments corresponding to body segments which produced it. This wax shield can also identify the sex of the larva to which it belongs. The larva of the male insect grows lengthwise with the result that the segments of the dorsal shield are disrupted. Segments 1 and 2 remain in the anterior portion while segments 3 to 7, as the middle portion, remain far behind the anterior portion. At the same time the posterior portion comprizing of segments 8 to 11 are pushed for towards the end. Thus there are two places where the wax shield shows marked separation. One in the anterior, with segments 1 and 2, the other in posterior region, with segments 8 to 11. It speaks of lengthwise growth of the male cell. The female grows vertically so that the wax shield is not disrupted to such an extent. In this case very often the anterior segments, 1 and 2, remain close enough to the segments in the middle, numbered 3 to 7. Then the anterior portion may show a broad head in the case of female larva while it is much narrower in that of the male. The posterior region in the male alone is pointed or "V" shaped.

Key words: Lac, Insect, Cultivation

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TOXICITY OF AFLATOXIN B_1 TO CHICK EMBRYO

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(Received September 26, 1988; revised March 21, 1989)

Effects of Aflatoxin B_1 on mortality and hatchability of chick embryo were studied. Three different doses 26,81, and 216 ng/egg of aflatoxin B_1 were employed. Aflatoxin B_1 purified from contaminated groundnut meal was used for the first two concentrations and standard aflatoxin B_1 for the third. The lethal dose of 216 ng/egg caused 93 % mortality by the 4th day of incubation period.

Key words: Chick embryo, Aflatoxin B_1, Bioassay.

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EFFECT OF PRE- AND POST-EMERGENCE APPLICATION OF HERBICIDES ON WEED GROWTH AND SEED COTTON YIELD OF AMERICAN COTTON (*GOSSYPIUM HIRSUTUM* L). CV. B557

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(Received October 27, 1988; revised April 15, 1989)

The efficiency of two herbicides namely stomp 330E (pre-emergence) + Dowpon-M (post-emergence) as against the cultural weed control method was studied. The result revealed that pre-emergence application of Stomp 330E @ 3.70 litre ha^{-1} and Dowpon-M post-emergence @ 12.35 kg ha^{-1} appeared to be the most effective treatment in controlling the annual weeds especially the broad and Kharif weeds of cotton. The highest yield of 13.59 quintal ha^{-1} was obtained by the pre-emergence application of Stamp 330E @ 3.70 litre ha^{-1} + Dowpon-M post-emergence @ 12.35 kg ha^{-1} as against the 10.20 and 11.10 quintal ha^{-1} in case of post-emergence application of Dowpon-M alone @ 12.35 kg ha^{-1} and hand-weeding respectively. The data further revealed that application of Stomp 330E @ 3.70 litre ha^{-1} pre-emergence + Dowpon-M @ 12.35 kg ha^{-1} post-emergence increased seed cotton yield by 69 per cent over the control.

Key wo

Technology Section

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MANUFACTURING OF INDIGENOUS CHEESE USING STARTER CULTURE AND DIRECT ACIDIFICATION PROCESS

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(Received July 28, 1988; revised March 22, 1989)

Direct acidification process (DAP) starter culture process (SCP) were used to manufacture indigenous cheese. The trials were carried out with seven replicates using cow, buffalo and *buffalo toned milk. The results indicated that there was no significant difference among the constituents of cheese and whey obtained by DAP and SCP in all three types of milk. Organoleptic tests showed that cheese prepared by DAP was more acceptable as compared to SCP.

Key words: Indigenous, Cheese, Acidification.

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GOAT AND SHEEP SKIN PRESERVATIVES - I

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Five different chemicals, were used as each, as well as in mixtures of varying combinations for testing the relative efficacies as preservative on twenty different sheep and goat skin pieces. Each sample of skin was taken from 24 hours' soaked, well washed, free of salt piece of salted stock. This was incubated at 37° for a week, to activate the microbial flora, checking the effectivity of the applied preservatives. Results were calculated on the basis of % weight loss of the skin.

Key words: Skin preservatives, Raw skin preservative, Curing agent.

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STUDIES ON THE FIXED OIL OF THE SEEDS OF *ALBIZIA LEBBEK* BENTH *Part II.*

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(Received December 21, 1988; revised April 1, 1989)

A fixed oil to the textent of 4.8% has been extracted from the seeds of *Albizia lebbek* Benth, which belongs to the family Leguminosae. Its physical properties, fatty acid composition and vitamin A and D contents have been studied. The oil is found to contain myristic (0.11%), pelmitic (16.17%), stearic (2.71%), arachidic (2.01%), behenic (4.57%), oleic (18.23%), linoleic (54.06%), and linolenic (0.16%) acids. The vitamin A is found to be 24.1.0. while vitamin D 2. I.U.

Key words: Fatty acids, Esterification, Saponification.