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SECTION OF AGRICULTURAL SCIENCES

President : DR. S. Y. PADMANABHAN

Abstracts

1. Heterotic response in rice (*Oryza sativa* L.) in environmental stress condition

D. K. MUKHERJI, D. MITRA and A. K. MITRA, West Bengal

An attempt was made to study the extent of heterotic response in rice in F_1 under dry seeded rainfed upland condition from a series of 12 cross-combinations.

For each cross combination, heterosis for yield, its five components and two subcomponents and also for four different growth attributes have been elucidated by three different genetic parameters. Dominance values of the character under study have been computed. Correlation studies involving percent high parent heterosis values have also been represented.

F_1 hybrids, derived from Dular and Satika percentage, having better performance and adaptation under stress environment can economically be exploited.

2. Phenotypic stability of green peas (*Pisum sativum*, L.) and its fodder in rainfed conditions of Hissar

NARESH MEHROTRA, KANWAR SINGH and PREM. P. JAIN, Hissar

Nine promising varieties of peas were grown at Research Farm during *rabi*, 1974-75 in four environments created by the combinations of two row spacings (30 and 40 cms) with no fertiliser and, 20 kg N and 50 kg P_2O_5/ha basal application. It was seen that 6115, 479-B and 172M in favourable environment and 6113, 450-B and T.163 in adverse environment were stable for green pod production. Similarly strains 6115, T163, 172M and 353-2B were suitable for fodder in good environment. No variety showed promise for fodder production in adverse conditions.

3. Heterosis in cigar filler tobacco

R. S. DUBEY, West Bengal

Twenty one F_1's involving seven promising cigar filler tobacco

(*N. tabacum*) varieties were studied to find out the extent and nature of heterosis. The crosses exhibited a wide range of heterosis varying from 4%-36% over better parent and 5%-44% over the mid-parent, for cured leaf yield. Analysis of the expression of yield heterosis in relation to heterosis for yield components revealed that for laminar length heterosis varied from 73%-8% over better parent and 76%-6% over mid-parent. Similarly for laminar width also heterosis varied from 65%-2% over better parent and 69%-2% over mid parent. About 11%-4% heterrosis over better parent was recorded for the number of curable leaves.

4. Intermutant hybridization in jute—Ornamental and Dwarf

S. C. RAKSHIT and S. K. ROY, Kalyani

The mutants, Ornamental and Dwarf, differed by two genes, and the leaf and the plant-height characters were independent of each other. Segregation of total node-number indicated monogenic control. The F_1 phenotype revealed complementary action of the mutant genotypes. The F_1s also showed heterosis in plant-height, and internode length. Node-number and internode-length characters separately showed significant positive correlation with plant-height. Further, transgressive segregation, exceeding both the parents and the cultivar JRO 632, in all the three characters, plant-height, node-number and internode-length, indicate the posibility of isolation of improved plant types.

5. Heterosis in cigar wrapper tobacco

R. S. DUBEY and R. V. S. RAO, Dinhata

Eight varieties of cigar wrapper tobacco (*Nicotiana tabacum* L.) and the 28 possible hybrids between them, were evaluated for the number of curable leaves, laminar length, width and area, cured leaf yield, seed yield and days to flowering. Three hybrids namely—Magnolia × Dixie shade, Rg × Dixie shade, and S.A. 40-31 × Dixie shade yielded significantly more leaf surface than the highest yielding parent, Dixie shade. The manifestation of heterosis in F_1 hybrids over better parent was present to the extent of 23% for laminar width, 123.3% for laminar area, 64.7% for cured leaf yield, 47.6% for seed yield and 13.9% for earliness. These large amounts of heterosis supported the programmes for hyrid seed productions in cigar wrapper tobacco for raising the plant productivity.

6. Evolution of high ylelding rice cultures resistant to blast from a cross CRK.30

S. C. MATHUR and R. K. MISRA, Cuttack

Twenty cultures resistant to blast were developed from the cross *CRK.30*

(*TR.8* resistant x *Sigadis* susceptible) with the seeds of F_2 selections initially received from Karjat (Maharashtra) during 1969. Uniform Blast Nursery technique was adopted for screening the segregating population in F_1—F_6 and selections were made. When subjected to artificial inoculation with races, IC.1, IC.17 and ID.1 of *Pyricularia oryzae*, the cultures proved resistant to all of them. In *kharif* 1974 yeild trial, three of these cultures yielded significantly higher than *IR.8* viz., 6.6, 6.2 and 5.2 tonnes/ha as compared to 3.8 tonnes/ha of *IR.8*.

7. Inheritance of resistance to bactiral leaf blight *Xanthomonas oryzae* (Uyeda et Ishiyama) Dowson in rice. Heritability of resistance to bacterial leaf blight.

V. V. S. MURTY, New York, G. S. KHUSH, Ahmednagar and N. F. JENSEN, Phillippines

Six crosses between rice varieties resistant and susceptible to bacterial leaf blight *Xanthomonas oryzae* (Uyeda et Ishiyama) were studied for heritability values in the broad sense and narrow sense.

Estimates of broad sense heritability were obtained on the basis of F_2 and F_3 variances while narrow sense heritability estimates were obtained based on regression of F_3 progeny means on F_2 parental scores.

Broad sense heritability based on F_2 variances ranged from 75 to 93% while it ranged from 83% to 94% based on F_3 variance. Narrow sense heritability by regression of F_3 Progeny means on F_2+Parent ranged from 36% to 70%. Since the heritability values are high, it is concluded that resistance to bacterial leaf blight could be fixed in the early segregating generations.

8. Possibility of exploitation of transgressive segregation in rice (*Oryza sativa* L.).

D. MITRA, A. K. MITRA and D. K. MUKHERJEE, West Bengal

Transgressive segregation in F_2 exceeding the parental limit was seen in a cross (NC 1281 x Ratna). In F_3 even, transgression resulted early segregants which were earlier than earlier parent Ratna. Occurrence of these rare transgressive variants in F_2 and subsequent generation which might be due to genotypic difference between *aman* and high yielding variety used as parents sugessted polygenic control of duration (sowing to fifty percent flowering).

Replicated progeny row trial of some selected transgressed cultures revealed earliness and higher yield potentiality during *boro* season. Promising cultures are now in multilocation adaptive trial.

9. Preliminary studies on the effect of specific gravity on the post harvest ripening of mango (*Mangifera indica* L) in the cultivar Dashehari

SUSANTA K. ROY and R. M. PANDEY, New Delhi

Mango clutivar Dashehari was harvested when a few ripe mangoes dropped naturally from the tree and were divided into four different cateagories of specific gravity such as gr.I below 1.00, gr.II between 1 to 1.02, gr.III 1.02 to 1.04 and gr.IV above 1.04. It was observed that group II and III provided maximum number of mangoes from the total hasvest followed by group I and IV. Not much initial difference, either in physical and chemical character was noticed among the groups mentioned above excepting group IV which was slightly under ripe, having low fruit pressure, high brix, low acidity, high carotenoid pigments compared to other groups. During storage at 30°C ripening took place as follows: gr.I took 7-8 days, gr.II 5-6 days, gr.III 4-5 days and gr.IV—2days. At the optimum stage of ripening the physico-chemical constituents of the fruits were found to be more or less same. However, it was noticed that fruits having sp. gravity less than one were slightly shrivelled and showed lesser acceptability. It was further observed that the acceptability of the fruit increased with increase in sp. gravity of the fruit at the time of harvest.

10. Analysis of quantitative characters in rice mutants induced by X-Rays, 32P and 35S.

B. MAJUMDER, Calcutta

Dry seeds of rice varieties namely Chinsura Bore I and Chinsura Boro II were irradiated with X-Rays and with B-rays from radioactive phosphorus and sulphur.

At the 10th generation forty one such micromutant lines with their parents were grown in a replicated plots to study the induced variation in quantitative characters. A shifting of mean values in the flowering time both in the plus and in the minus directions, changed variances and changed skewness of the flowering time were recorded. The mutants when compared with their parent for different agronomic characters also showed significant changes in the plant height, number of panicles, grain yield and straw yield.

11. Colchicine induced tetraploidy in cucumber (*Cucumis* spp.)

K. B. WANJARI, Akola

Sprouted seed treatments with 0.1 and 0.2% colchicine for 6 hours were found to be effective for inducing tetraploidy in a local variety of cucumber viz. *Sakarkakri* having diploid chromosome number 2n=24. Gigasness in the size of leaves, stomata, flowers and pollen grains of tetraploids was observed.

Flowering was delayed. Very few unproductive female flowers were borne by the tetraploids after a long period from sowing. Pollen grains of tetraploid were highly sterile. Some of the pollengrains produced polysiphonous and bifurcated pollen tubes. Meiosis was irregular with average chromosome association—3.74I+ 11.72II+ 1.32III+ 4.16IV+ 0.04V during metaphase I. Flowering behaviour, meiosis and sterility in the tetraploids have been discussed.

12. Studies on the gamma irradiation on *Sorghum vulgare*

K. MURALIDHARAN and MADHURI SHARON, Poona

The early effects of irradiation on jowar have been studied at 1,3,5,10,15 and 20Kr doses. At certain doses, often a stimulatory effect on growth and development has been observed. Lower doses, particularly, 3 and 5Kr, increased the percentage germination while no apparent change was noticed on the root and shoot length. The number of leaf primordia at these doses were six times more than the control. However, the number of root lateral primordia increased to only one and half times. Irradiation at higher doses had inhibitory effect on the germination and also resulted in pollen sterility. Estimations on the content of growth hormones, free amino acids, proteins, total nitrogen and sugars were also made till the 25th day. All the evidences suggest a general stimulatory effect on jowar seedlings, irradiated at 3 and 5kr.

13. Study of morphological and cytological behaviour in an autotriploid rice

P. SEN and R. N. MISRA, Cuttack

Autotriploid rice is one of the best sources for obtaining trisomic lines which can be used for the preparation of cytological linkage maps and assignment of genes to specific linkage groups corresponding to individual chromosomes. Although, the twelve primary trisomics have been identified in *japonica* rice (Iwata, et al. 1970) such information in *indica* sub-species is so far not known completely. Attempts have been made, however, in India to isolate trisomics from the progeny of spontaneous autotriploid, obtained from a late photosensitive rice variety T.1242. The results obtained so far are limitted to the identification of few chromosomes. Therefore, it was necessary to produce trisomics from another triploid source, which could be photo-insensitive so that it could be grown in both the seasons for comparatively easy isolation of trisomics from its progeny.

The morphological characteristics and meiotic behaviour of such an autotriploid obtained from the M_2 population of a medium duration photosensitive rice variety "Sona" (ILT. 1991) treated with 0.2% aqueous solution of Ethyl methane sulphonate (EMS) were studied.

Association of chromosomes in first metaphase was regular autotriploid material. In anaphase I, lagging chromosomes occurred most frequently and they were often seen splitting precociously. The amount of lagging chromosomes being more or less proportional to the average number of univalents

at M_I. The distribution of chromosomes at Anaphase 1 was normal. In the second meiotic division also the lagging chromosomes were observed which were seen as micronuclei at the tetrad stage.

14. Cytogenetic investigations in two Eastern Himalayan cultivated cucurbits

RITA SEN and KALYAN B. DATTA, Kalyani

Cytological stidies on two Eastern Himalayan species *Cyclanthera pedata* Schrad. ('Burma Karela') and *Sechium edule* Swart. ('Squash') showed that *C. pedata* had 2n=32, n=16 and *S. edule* has 2n = 24, n = 12 chromosomes. Comparatively long chromosomes (2.89-5.80μ) characterized the karyotype of *C. pedata*, while short to medium sized chromosomes (1.35-3.19μ) constituted the genome of *S. edule*. Regular bivalent formation and normal disjoining have been noted in *S. edule*. High irregularity in the meiotic behaviour of chromosomes was noticed in *C. pedata* such meiotic anomalies suggest that in addition to plolyploidy, structural alterations of chromosomes have also played a significant role in evolution and speciation of the genus *Cyclanthera*.

15. Studies on canning qualities of tomato

M. RAMA RAO and B. CHOUDHURY, New Delhi

Six cultivars of tomato, Pusa Ruby, Chico Grande, Ace, Sugar Gimar, Italian Red Pear and Roma were selected out of number of cultivars for evaluation of their fruit quality attributes and processing performance. Crosses were also made to study the *inheritance* of canning qualities. Composite fruit samples collected from the progenies were processed as canned tomatoes and subjective to normal cut-out analysis and objective and subjective evaluation. The data showed that the fruits of the cultivar Pusa Ruby were medium sized, many loculed thin fleshed, flat to round shaped and soft textured with an attractive skin and juice colour. While the cultivars, Roma, Chico Grande and Sugar Gimar were also medium sized but few loculed, thick fleshed with less attractive skin and juice colour. Cut-out analyses and evaluation of canned tomatoes revealed that the cultivar Roma, F_1 and back cross generations of Pusa Ruby and Chico Grande and the F_1 of cross Pusa Ruby and Italian Red Pear were suitable for whole fruit canning among the parents and their combinations tried.

16. Studies on the algal aeroflora of Poona

M. S. BALAKRISHNAN and V. R. GUNALE, Poona

The relevance of fungal spores and pollen aeroflora to plant disease and allergy is well known but no attention has been paid to algae in the aeroflora,

Preliminary investigations of the algal aeroflora in and around Poona revealed the presence of no less than 20 genera belonging to Cyanophyceae, 13 genera belonging to Chlorophyceae and some diatoms in the aeroflora as determined by spore traps and impactions on agar plates at various levels. Such a large number of Cyanophyceae was unexpected and what was even more interesting was the presence of several genera of known nitrogen fixers, thus pointing to possible aerial dispersal of these algae with obvious implications in soil fertility. The presence of diatoms was also of interest from the allergenic point of view.

17. Physiological studies on submerged rice. 1. Effect of submergence on germination, growth, dry matter accumulation and carbohydrate and nitrogen metabolism in rice seedlings

S. K. PAL, M. K. SADHU and T. M. DAS, Calcutta

The Physiological basis of higher growth rate of lowland rice cultivars was investigated. Two rice cultivars viz. CB—1 (upland rice) and DW—3 (lowland rice) were used. Under water the germination was not affected and coleoptile growth was stimulated, but root and shoot growth of seedlings were appreciably retarded. However, the growth of DW-3 was less adversely affected. The dry weight of endosperms of submerged seedlings was higher Accumulation of sugar was greater in the submerged shoot. Hydrolysis of endospermic protein and its subsequent translocation to the growing shoot and root was more under normal than under submerged state.

18. Adaptability of the recently evolved high yielding early rice cultures for kharif season

G. SAHU and K. S. MURTY, Cuttack

To find out productive early rice cultures for the monsoon season, 16 hybrids derived from *Dee-Geo-Woo-Gen* gene source and *Japonica* parents were grown under 50 and 100 kg N/ha for two seasons. The *Indica* × *Japonica* (*I* x *J*) hybrids, e.g. *Jikkoku* x *Kolamba*-351-34-278, *J* x *Seraupkechil*-52-102 and *Waikoku* x *CR*.1014-162 invariably gave higher yeild (4.5 to 4.9 t/ha) than other cultures even at 50 kg N/ha indicating their better adaptability to *kharif* season. These cultures were characterised by high dry matter and LAI at flowering, thin leaves, high harvest index, slow senescence, optimum yield with fine grain even under low fertilizer input (50 kg N) and tolerance to major pests and diseases when compared with the existing cultures derived from *Dg Wg* gene souree.

19. Variability in the harvest index of the late duration high yielding rice cultures

K. S. MURTY and G. SAHU, Cuttack

Harvest index (HI) which is expressed as the percentage of grain weight to total dry weight of a crop is a useful physiological trait associated with yield. Studies with 21 late duration rice cultures grown under 50 and 100 kg N/ha indicated lower HI under high N rate. Considerable variation (23% to 50%) in HI amongst the cultures was noticed. Mtu. 9908 exhibited highest HI (50%) followed by *Mahsuri, Pankaj, Jagannath* and *Mtu.* 8089 (37%-43%) with high grain yield (3.7 to 4.2 t/ha). The results indicated the possibility of identifying cultivars with high dry matter yield and HI for further improvement in rice production during *kharif* season.

20. Efficacy of foliar spray of urea on morpho-physiological responses of Barley with respect to normal and subnormal basal supply of nitrogen

AHMED JAMAL and ABDUL KHALIQUE, Aligarh

The effect of foliar application of urea on morpho-physiological response of *Hordeum vulgare* L. under normal and subnormal basal supply of nitrogen was studied. There were no beneficial influence by foliar spray, either in the morphological characterss or in N content of the host supplied with normal basal dose. However foliar spray was found to be beneficial under subnormal basal dose of N.

21. Effect of plant growth regulators on the total number of lowest nodes bearing female and male flowers in cucumber plant (*Cucumis sativus* L.)

SUMAN CH. MALLIK, Kalyani

The efficacy of different concentrations of NAA, MH & 2, 4-D sprays on cucumber plant was studied. These chemicals induced the production of first female flower from a lower node, which is a fair measure of fruit bearing capacity of the vine. The lowest nodes under NAA, MH and control were 8.38, 8.0 and 12.75 respectively.

Higher placement of node was observed with the increase in concentrations of growth regulators. The lowest node for male flower was 3.5 and 7 in control, 50 ppm NAA respectively. The total nodes per plant were the highest in control (32) and lowest in 15 ppm 2, 4-D (18.5).

22. Effect of IAA spray on the nodes producing first male and female flower in bitter gourd plant (*Momordica charantia* L.)

S. CH. MALLIK, Kalyani

The effect of 100 ppm IAA spray, at 4 to 12 days intervals, for a period

of 48 days was studied. The production of first female flower from the lower node was higher in sprays at 4-8 days intervals are superior over intervals of 12 days and the control The 6 days interval of spray recorded the first female flowers at 3.63th node, against II.33th node in control and 4 days interval of spray recorded the highest placement of male flower at 9.68th node. There was a regular decrease in the node position with the increase in intervals of spray. Control showed the lowest number of (4.25th) of node for male flower.

23. Micro nutrient and growth substance on bringal (*Solanum melongena*)

R. C. DAS, Bhubaneswar

The effect of foliar spray of boron (35, 70 and 105 ppm), molybdenum (108, 217 and 325 ppm), calcium (7, 14 and 21 ppm), Planofix (0, 200 and 400 ppm) was studied on bringal. All the treatments showed significant effect on fruit size. Boron at 105 ppm produced the largest fruit followed by Planofix, molybdenum and calcium. The ascorbic acid content was also maximum in boron 105 ppm treatment followed by Mo, Ca and Planofix. However, these chemicals reduced the moisture content of the fruits. All the treatments increased the nitrogen, phosphorus and potash contents in leaf and fruit as compared to the control.

24. Response of soybean to pre-sowing chemical treatment

M. P. SRIVASTAVA, Ballia (U.P.)

The effect of pre-sowing (seed soaking) treament with indoleacetic acid (100 & 250 ppm), gibberellic acid (10 & 100 ppm) and calcium nitrate (1 & 2 M) was studied on Soybean.

Seed treatment with the above chemicals increased the total carbohydrates, crude protein and oil contents in seed. GA on 100 ppm was more effective than the other treatments.

25. Effect of photoperiods on growth, development and essential oil content of *Cymopogon flexuosus* Stapf.

M. L. GHOSH and S. K. CHATTERJEE, West Bengal

Cymbopogon flexuosus Stapf. exhibited characteristics of short day (16 D + 8 L) plant. SD treatments enhanced the extension growth, hastened flowring and increased the growth of inflorescence axis except 30 PIC treated plants that failed to flower. Inhibition of flowering was clear in long day (16 L + 8 D) treated plants except 10 PIC.

Formation of tillers and leaves was inhibited in SD treatment whereas LD treated plants exhibited more tillers and leaves.

Formation of essential oil increased upto 20 PIC in LD, but in SD such increase also clear in 10 PIC. Light intensity increased the essential oil formation by promoting foliar growth and accumulation of dry matter. A regulatory control of reproductive growth on terpene synthesis in this plant was postulated.

26. Effect of foliar application of hormones, NAA, IAA and AA on boll shedding and yield of cotton (*Gossypium hirsutum* L.)

W. M. DABRE and A. P. GHUGAL, Akola

Effect of foliar spray of NAA, IAA and AA (0, 40, 80 and 120 ppm) was studied on boll shedding and yield of cotton Var. DHY-286. The spraying of hormones at flowering stage in concentrations of 40, 80 and 120 ppm were found to be beneficial as these treatments reduced the boll shedding percentage. However, among the three hormones used the NAA 120 ppm showed lowest percentage of boll shedding.

Treatment with NAA (80 ppm) produced highest yield per plant (15.99 gms) followed by treatment with NAA 120 ppm (15.47 gms).

27. Effect of spraying ascorbic acid and naphthalene acetic acid singly and in combination on bud/boll production/shedding and yield in cotton (*Gossypium hirsutum* L.)

S. K. VARMA, Hissar

The effect of spraying ascorbic acid (AA) and Naphthalene acetic acid (NAA) at post-bloom and pre-bloom + bloom stages of growth on flower bud/boll production/shedding and yield were investigated on *hirsutum* cotton (C.V.H.-14) in the field. AA and NAA applied singly or in combination at pre-bloom + bloom reduced bud/boll shedding. AA applied singly or in combination with NAA at pre-bloom + bloom or at post-bloom alone increased the number of buds produced, bolls retained and the yield of seed cotton per plant. The effect of AA and NAA was found to be related with the regulator dose and the stage of treatment.

28. Studies on the abscission process of *Gossypium* leaves with reference to uptake and incorporation of P^{32} in nucleic acids of abscission zones

SAMIR CHATTERJEE, West Bengal

Studies were conducted on the abscission process of *Gossypium* leaves.

Abscission rate was faster in older leaves than in younger leaves. A gradual loss of both RNA and DNA from the distal region of the abscission zones was seen with a concommitant rise in proximal tissue of both younger and older leaves with progress of abscission.

Uptake and incorporation of radioactive phosphorus ^{32}P in the nucleic acid fractions (RNA and DNA) was higher in younger to older leaves. Furthermore ^{32}P incorporation was higher in the nucleic acid fractions of distal region that of proximal region. With the progress of abscission ^{32}P activity in nucleic acid fractions decreased in the distal region especially in older leaves. In the proximal region, however, ^{32}P activity in nucleic acid fractions (in both DNA and RNA) increased with the progress of abscission.

29. Effect of presowing treatment of sugarcane setts with certain amino acids on germination and early growth of sprouts

B. P. SINGH and V. B. BHATNAGAR, Varanasi

The response of various consecutively numbered single noded setts obtained from a single cane (excepting the top immature portion) to treatments of glycine and DL-methionine 50 ppm was studied in pots.

Rapid germination was noticed in sett number 4 treated with DL-Methionine and followed by glycine. DL-Methionine was more effective in germination of different setts.

DL-Methionine was also more effective in increasing the length of the shoot. However, the number of leaves and nodal roots was not affected by the treatments. The effect was persistent and influenced the subsequent growth of plants.

30. Improvement in root formation in *Punica granatum* and some varieties of *Ixora* by the application of growth substances

S. N. MITRA, D. P. MUKHOPADHYAY and DOLLY PAN, Howrah

Effect of growth substances in cuttings of *Junica granatum* Linn., *Ixora singapprensis* Hort. and *Ixora coccinea* Linn cv. 'Hybrida' and 'Stellata' have been studied. Cuttings of *Punica granatum* were treated with 3,000 and 6000 ppm of IAA, IBA and NAA in quick dip for 5 seconds. Cuttings of *Ixora* were soaked in 10 and 100 ppm solutions of the chemicals for 24 hours. Seradix-B_3 was used in the customary method.

Application of NAA and IAA at 3,000 ppm markedly improved rooting in *Punica granatum*. Use of chemicals at 100 ppm was highly effective in *Ixora singaporensis* and performance of 100 ppm NAA was best. IAA in 100 ppm proved to be effective in *Ixora coccinea* cv. 'Hybrida' whereas NAA in 100 ppm promoted root initiation in the variety 'Stellata'.

31. Root initiation in *Bougainvillea* var. *'Roosevelts Delight'* and *'Lady Mary Baring'* by using growth substances

S. N. MITRA, D. P. MUKHOPADHYAY and
A. P. BHATTACHARYYA, Howrah

Hard wood cuttings of two varieties of Bougainvillea—*'Roosevelts Delight'* and *'Lady Mary Baring'* were treated with 10 and 100 ppm solutions of IAA, IBA and NAA for 24 hours and also with Seradix B_3 in talc form before planting in pots containing pure sand as rooting medium.

NAA (100 ppm) and Seradix B_3 indueed better rooting in both the varieties of Bougainvillea. Application of 100 ppm IBA and 10 ppm NAA was also found to be highly effective in root initiative in *'Lady Mary Baring'*.

32. Photoperiodic behaviour of some herbaceous ornamentals

S. K. BHATTACHARJEE, Howrah

Three photoperiodic treatment (6, $11\frac{3}{4}$, 16 hr)* were employed to nineteen species of herbaceous ornamentals belonging to nine families and eighteen genera. Additional illuminations accelerated plant height and stimulated early flowering in most of the species. The plant species which grow in rosette form at early stage, showed late flowering or complete suppression of flower bud emergence due to short photoperiod and exhibited marked elongation of shoots with appearance of flower buds. Significant improvement in production of flowers were also observed with *Althea, Arctotis, Coreopsis, Gypsophila, Helichrysum, Papaver, Portulaca* and *Zinnia linearis* under long days, but eleven other species produced maximum flowers in normal days.

33. Dwarfing of ornamentals by using ethrel

T. K. BOSE, TAPAN BOSE and
A. K. CHATTERJEE, Calcutta

Bougainvillea, Jasminum sambac, J. auriculatum and *Castrum nocturnum* were sprayed with ethrel at 100, 250 and 500 and *Hibiscus rosa sinensis* at 250, 500 and 1000 ppm concentrations.

Treatment with ethrel caused significant retardation in plant height of *Bougainvillea* vars.—'Mary Palmer' and 'Mahara'. The treated plants developed smaller number of flowers and bracts than control plants. Higher concentrations of the chemical markedly suppressed the height of *Jasminum sambac* without causing any adverse effect on flowering whereas in in *J. auriculatum* the shoot length was promoted and the flowering was delayed. At 500 ppm the plant height was reduced and the number of flowers increased in *Cestrum nocturnum*. The height of both the varieties of *Hibiscus rosasinensis* was retarded at 100 ppm and without any adverse effect on flowering.

34. Certain biochemical changes in foliar tissues of egg plant under the influence of plant bug, *Urentius sentis* D.

AHMAD JAMAL and AQUL AHMAD, Aligarh

Phytophagous bugs release secretions in or on plants while feeding on them. Present study revealed certain biochemical changes in foliar tissues of *Solanum melongena* L. under the influence of plant bug, *Urentius sentis* D. An increase in soluble proteins and carbohydrates of bug-infected tissues was noted, the increase in the latter being more significant. On the other hand, insoluble fractions of the above biopolymers showed a deep decline in their levels. DNA and RNA were found at a significant high level under bug-infected condition, which may be stipulated due to the disturbed metabolism or to some other factors.

35. Significance of boron nutrition in relation to pollen vitality in rice (*Oryza sativa* L. var. Jaya)

O. K. GARG, Varanasi

The rice plants were grown in sand cultures in two sets of treatments—(a) plants supplied with complete nutrients solution including boron at 1, 2.5 and 5 ppm concentrations and (b) plants supplied with nutrient solution without any trace of boron.

In general, supply of boron improved the pollen vitality in rice flowers. It was found to be stimulating upto 2.5 ppm beyond which (i.e., 5 ppm) inhibitory effects appeared. Stimulating effects of boron may be linked with greater availability of sugars, increased enzymatic activity and respiration and better growth of pollen and pollen tubes. Inhibitory effects of stronger concentration of boron (5 ppm) may be linked with a depression in all the above processes and injury to protoplasm itself.

36. A convenient procedure for the detection of insecticidal residues in harvested products

P. C. BOSE and N. ADITYACHAUDHURY, Kalyani

In the present investigation column chromatography coupled with thinlayer chromatography were employed for the detection of micro amounts of insecticidal residues present in harvested products after spraying with different intervals of time.

It has been revealed from several trials that chromogenic reagents such as iodine, silver nitrate, sodium hydroxide etc. can detect the presence of microquantities of insecticides upto a certain limit. Thus ethyl parathion, methyl parathion, endrin, BHC, lindane, phosphamidon, malathion etc. can be detected within the range of 10 to 20 ppm using UV light after spraying with the above chromogenic reagents.

Column chromatography has been found to be an effective clean up procedure for the detection of microamount of insecticidal residues occuring in the extracts of harvested products.

37. Bioassay of relative toxicity of three organophosphorus insecticides and their mixtures against the adults of *Sitophilus oryzae* Linn. (Curculionidae; Coleoptera)

P. ROY and B. B. MAITY, Kalyani

Bioassay of relative toxicity of three organophosphorus insecticides and their mixtures against the adults of *Sitophilus oryzae* Linn. was studied by dry film method. Methyl parathion, ethyl parathion were found to be 3.90 and 2.26 times as toxic as labaycid. Mixtures of ethyl parathion-lebaycid, methyl parathion-lebaycid and ethyl parathion-methyl parathion were 6.78, 5.37 and 1.46 times as toxic as lebaycid alone. Mixture of ethyl parathion-lebaycid and methyl parathion-lebaycid exhibited strong synergistic action having co toxicity coefficients 415.3 and 214.6 respectively. On the other hand mixture of ethyl parathion and its methyl homologue showed antagonistic action having co-toxicity coefficient 47.4.

38. Role of chelated boron and zinc in host-plant resistance of rice to yellow rice borer, *Tryporyza incertulas* Walker

N. PANDA, Bhubaneswar

A borer susceptible rice variety 'Hema' was treated with chelated boron and zinc with or without antibiotics such as oxytetracycline and erythromycin and a penetrant, dimethyl sulfoxide (DMSO) in order to ascertain the degree of antibiosis for the borer pest. The rice plants were artificially infested with just-hatched larvae. It was observed that boron-zinc-oxytetracycline complex (0.5 ppm) with DMSO (0.01%) applied as seed + on foliar was the most effective treatment in checking the dead hearts (7.5%), and white ear heads (20%). The untreated check had the highest percentage (75%) of dead hearts and white ear heads (70%). The same treatment was significantly superior in retarding the larval development. The higher ratio of total ash/silica in treated rice plants seemed to be a determinant factor in operating the mechanism of antibiosis against yellow rice borers.

39. Cytomorphic and cytochemical changes in the pars intercerebralis cells of *Periplaneta americana* following administration of 0-isopropoxyphenyl methyl carbamate

U. PAHARI, West Bengal

Single intra-abdominal injection of 0.08 ml. of 2% 0-isopropoxyphenyl

methyl carbamate to adult *Periplaneta* of both sexes after 30-60 minutes, produced considerable loss of CAH-stained NSM together with PAS-reactive substances and bound lipids in the pars intercerebralis neuroglandular components of brain-showing a release of the neurohormone caused by the action of the insecticide. Moreover, severe structural impairments involving karyopycnosis, chromatin clumping etc. were observed in many of the pars intercerebralis cells of the treated insects probably due to the toxic action of the insecticide.

40. Control of earthworm, *Pheretima posthuma* Valliant in tobacco nurseries with recent insecticides in Bihar State

R. S. N. RAO (Jr.), Bihar

Earthworms have been observed to cause extensive damage to germinating seed and tender seedlings in the tobacco nurseries, Burley Ky-58, Natu and chewing types of tobacco. Carbaryl 5% D and Methomyl 90 DP gave superior-most control of pre-emergence and post-emergence damage of earthworms followed by plant products, soap-nut extract and *Pongamia* cake; Endosulfan 35% ES and 4% D though superior to, Diazinon 20% EC were much less effective than the plant products and Carbamates and Diazinon were found to be least effective.

41. Record of a new species of *Rhizomys* (Rodentia : Rhizomidae); a pest of crops in Kashmir

N. D. RISHI, Srinagar

Of the four species and subspecies of Bamboo rats genus *Rhizomys, viz. R. pannosus, R. sinensis* reported from Asia, a new species *Rhizomys chotta* is being reported for the first time from Kashmir (India). The rodent resembles in morphological features *Rhizomys* but in behaviour and habitat it is similar to European Pocket Gopher genus *Geomys*. The rodent is blunt-headed, stout bodied, having short tail and legs; body is 3.5 and tail 1.1 inches long. Body is covered with dark grey silky fur with tips white. Two pair of incisors are exposed, chisel shaped and orange coloured. Eyes are small, oval and ears rounded. Foreclaws long while; hind toes bear short claws. Its habits and habitat damage done and control methods have been discussed.

42. Seasonal activity of mustard aphid, *Lipaphis erysimi* (Kaltenbach) in West Bengal

PRANAB ROY, Kalyani

Seasonal activity of mustard aphid, *Lipaphis erysimi* (Kaltenbach) was

studied with the help of Moericke's yellow pan traps for two years. Statistical analysis of data indicates that weather factors such as maximum temperature, minimum temperature and relative humidity do not have any influence on the activity of this insect. It seems that variation in catch reflects the population change of this aphid.

43. Feasibility of controlling some of the serious pests of paddy through the use of some unconventional method

S. M. CHATTERJI and N. MAJUMDAR, Cuttack

In order to overcome the possible adverse effects of the chemical control measures, such as, environmental pollution, development of resistance, deleterious effects on beneficial organisms and the residue problem, new avenues like autocidal methods of population suppression, use of sex pheromone and other attractants and repellents, use of juvenile hormone (JH) analogues and interlacing of all possible control practices together with the existing mortality components of the agro-ecosystem, are being explored.

Preliminary studies on the evidence for a sex pheromone in yellow stem borer, *Tryporyza incertulas*, revealed that the females of this species produced odoriferous substance which triggered sexual excitment in males. Use of this physiologically potent chemical might work as a dependable supplement in an integrated control programme.

44. Integrated control of rice gall midge *Pachydiplosis oryzae* (W.M.)

J. P. KULSHRESHTHA, S. RAJAMANI and
S. M. CHATTERJI, Cuttack

The rice gall midge *Pachydiplosis oryzae* W.M. is a serious pest of rice in several states. Most of the high yielding varieties are susceptible to this pest. The granular insecticides, are effective against this pest but are rendered ineffective by frequent heavy rains and standing or overflowing rain water in kharif season. Some gall midge resistant varieties were tested in integrated pest control schedules in replicated field experiments during *kharif* seasons. The insecticides tested included diazinon (1.25 kg), mephosfolan and phorate @ 1 kg a.i/ha as granules one application with seedling root dip in chlorpyriphos 0.02 per cent solution.

The data showed that gall midge resistant varieties (Shakti, CR. 94-MR-1550, CR. 60-29) did not require any insecticidal protection against gall midge and their yields were only marginally increased with insecticidal treatment. The grain yields of gall midge susceptible varieties, Vijaya and Jaya were increased by 53 to 100 per cent with only one application of granular insecticide viz, diazinon or mephosfolan at 30 to 35 days after planting.

45. Effects of nematods co-parasitism on root-knot development in *Solanam melongena* L.

C. MISRA and S. N. DAS, Bhubaneswar

Three ectoparasitic nematodes, *Criconemoides ornatus*, *Hopololaimus indicus*, and *Tylenchorhynchus nudus* associated with the root-knot nematode, *Meloidogyne incognita*, either singly or in mixed infestations (@ 1000/species), produced no apparent effect on dry weight of shoot but the root-knot nematode alone and with other combinations greatly reduced root dry weight. Recovery of ring nematodes appreciably declined when co-inoculated with other nematodes, particularly lance and stunt nematodes which were only adversely affected in the presence of root-knot or when all the nematodes were present.

Root-knot disease was considerably suppressed when the lance nematodes were present, followed by stunt and ring nematodes.

46. Residual effect of some granular nematodes on root-knot of tomato and other soil nematodes

M. S. PANWAR and S. N. DAS, Bhubaneswar

Granular formulations of Temik, Dasanit, Furadan, Phorate and Diazinon broadcast into soil at their approximate recommended doses, were highly effective in reducing the soil population of root-knot nematodes upto 60 days. Phorate was best followed by Diazinon, Furadan, Dasanit and Temik. There was no significant change in the populations of *Hoplolaimus indicus*, *Criconemoides ornatus* and *Longidorus* sp. but *Helicotylenchus indicus* decreased appreciably. Free-living Dorylaims were slightly reduced, whereas, other saprophyts (Rhabditids and Cephalobes) greatly declined.

Tomato seedlings planted at 15 days interval after chemical application of soil contained much less of juvenile *Meloidogyne incognita* in Furadan, Diazinon and Dasanit treated plots, at least upto 30 days.

47. Effect of spraying of fungicides in combination with urea on the control of helminthosporiose of rice

S. K. MOHANTY and N. K. CHAKRABARTI, Cuttack

Field experiments were conducted during *Rabi*, 1974 and 1975 using local tall *indica* cultivar *Benibhog* to find out the compatibility of urea and fungicide when mixed together for use as spray to control helminthosporiose of rice. Results obtained showed that all fungicides tested viz., Hinosan (Organophosphate), Dithane M-45 (Dithiocarbamate) and Aureofungin Sol (antibiotic) either in combination with urea (3%) or alone brought down the foliar infection due to Helminthosporiose, with corresponding increase in yield over

the unsprayed control. Urea alone did not bring down the infection but there was an increase in yielded which was less than the yield obtained with fungicide + urea.

48. Studies on the effects of nitrogen, phosphorus and potassium on stem rot disease of rice

S. S. JAIN, Cuttack

A study was undertaken with rice variety *Jhone*-349 in pots on the effects of sixtyfour NPK combinations on the incidence of stem rot under artificial infection.

The results indicated that there was a significant increase in the incidence of stem rot with increase in the level of N upto 160 ppm and with that of P upto 60 ppm. The ameliorative effect of K in combination with N became increasingly evident with an increase in the level of its application upto 120 ppm.

The data obtained are of practical importance because much of the damage from stem rot in endemic areas can be avoided by application of judicious level of N in combination with K.

49. Longevity of spores of *Ephelis oryzae*, the incitant of Udbatta disease of rice

N. N. MOHANTY, Bhubaneswar

Udbatta disease of rice caused by *Ephelis oryzae* Syd. is assuming serious proportions in yield in certain endemic areas of Karnataka (Mysore), Tamil-Nadu, Andhra Pradesh, Madhya Pradesh, Maharashtra, Kerala, Bihar and Orissa. In order to gain knowledge in the perpetuation of the disease in nature, studies were undertaken to find out the effect of different storage conditions of the diseased panicles, on the longevity of the spores of the pathogen. Out of the five different storage conditions tried, the spores of the fungus of air dried diseased panicles, stored at 10°C in the refrigerator and in the desiccator at room temperature of 23-35°C could retain their viability up to the extent of 23% and 6%, respectively even after 225 days of storage, while, the spores of the fungus stored at room temperature of 24-29°C, in low temperature incubator at a temperature of 26-27°C and at out side the laboratory (under eaves) lost their viability only after a period of 75, 60 and 60 days of storage, respectively.

50. Systemic fungicides to control blast disease of rice

K. V. S. R. KAMESWAR ROW and SK. AHAMED ALI, Cuttack

Results obtained in a field experiment with four systemic fungicides

applied as seedling dip, foliar spray and soil application to control blast showed that Benomyl at 1000 and 2000 ppm as spray application and at 1.25 gms. per sq. metre as soil application was found effective in reducing significantly forliar and neck infection of blast in susceptible variety Co. 13. Seedling did not control neck blast. Benomyl at 1000 ppm was also found to be at par with non-systemic fungicides 0-ethyl-s-s diphenyl dithiophosphate (EDIP) EC 50% and 0-0-diethyl-s-benzyl thiophosphate (DBP) EC 48%.

51. Effect of pesticides on the rate of spread of rice blast disease

P. NAYAK, K. V. S. R. KAMESWAR ROW and
SK. AHAMED ALI, Cuttack

Two antibiotics and twelve fungicides were evaluated for the control of blast disease of rice on a highly susceptible cultivar Co. 13 on the basis lowering the infection and arresting the rate of spread of the disease. 0-(4-bromo-2, 5-dichlorophenyl) 0-methyl Phenyl phosphothioate (Leptophos) EC 34% was effective in bringing down foliar infection as well as the rate of spread of the disease with significant increase in yield.

52. Occurance of sunflower diseases in West Bengal

D. C. KHATUA and S. MAITI, Kalyani

Sunflower, the newly introduced oil seed crop found to suffer from three diseases—Leaf spot and Leaf blight (*Alternaria sp.*)—disease appears as small dark brown necrotic spots surrounded by a yellow zone, usually on the lower leaves. These spots enlarge into a irregular patches and coalesece to form a large blighted area. Blighting is more common at the marginal areas, and spread to the upper leaves being favoured by weather conditions. Black spots and irregular patches also develope on the stem, petioe, calyx and flower head.

Foot rot (*Sclerotium rolfsii*)—causes sudden wilting of the plants, wilting is due to the rotting of the tisseus at collar regions which remain covered with mycelial mat and fungal sclerotia.

Charcol rot (*Macrophominia Phaseoli*)—the plants become weak mature earlier and when dry exibit a black ashy discolaration of the stem.

53. Investigation on blight of sunflower

P. P. MEHTA, R. K. PRASAD and
A. B. MANANDHAR, Bihar

The symptoms produced by *Alternaria alternata* (Fr.) Keissler pathogenic on sunflower (variety E.C. 68414 from Russia) have been described. The pathogen could infect *Chrysanthemum* and *Zinnia* also. Studies were

carried out on morphology of the pathogen and also on spore germination, using various culture media.

Alternaria, Fusarium and *Cercospora* either spores of species of single or in combination were found causing deterioration of seeds of sunflower.

Dithane Z-78, Dithane M-45 and Brestan were found to be effective in inhibiting the spore germination and checking the radial colony growth at 0.1% concentration, whereas Dithane S-31, Ceresan and Fytolan inhibited spore germination at 0.1% and radial growth was checked at 0.5% concentration.

54. Fungal diseases of bhindi (*Abelmoschus esculentus* L.)

D. C. KHATUA and S. MAITI, Kalyani

A brief report lists seven diseases of Bhindi (*Abelmoschus esculentus* L.) recorded in Nadia District of West Bengal during last four years survey. The following descriptions indicate the disease, causal organism and its brief symptoms.

1. Damping off caused by (*Pythium aphanidermatum* & *Rhizoctonia solani*) Decaying of tissue at collar region followed by death of the seedlings.

2. Foot rot a) caused by (*Pythium apanidermatum*)—decaying of bark tissues above and below the soil level; b) caused by *Sclerotium rolfsii*—rotting of host tissues above the soil level rotted tissue covered with mycelial mat and fungal sclerotia; death of the plant in all cases.

3. Stem rot caused by (*Macrophomina phaseoli*)—brown necrotic patches (2-8 cm.) on stem and black minute pycnidia on such patches.

4. Leaf spot caused by (*Cercopora malayensis*)—scatter spots (2-8 mm.) with grayish centre and purpel brown margin.

5. Shooty spot caused by (*Cercospora abelmoschi*)—angular olvaceous patches usually on the lower leaf surface which later covered with shooty fungal growth; in sever case shooty fungal growth on the upper surface also.

6. Anthracnose and die back caused by (*Colletotrichum* sp.)—anthracnose on fruits and die back starts from the tip to dowenwards upto a few inches.

7. Leaf blight (*Phoma* sp.)—caused by blighting started from margin, proceeding inwards; covering with whole marginal area; drying up of the blighted areas and black minute pycnidia on such areas.

55. Pathogenicity and host specific toxin-toxicity potentials of *Alternaria mali* isolates and their toxins

I. D. KHAN, Japan

Spore pathogenicity, toxin-toxity and mycelial mat pathogenicity co-relations, at least in case of Nijisseiki cultivar of Japanese pear in addition to Indo cultivar of apple, were obtained with (0-110) *Alternaria mali* Roberts

(producing at least 6 host specific toxins in culture). *A. kikuchiana* Tanaka (isolate N—1) was highly specific to Nijisseiki cultivar only. Infection ability of *A. mali* (isolate 0-75) was expressed not only on Indo, Nijisseiki and Chojuro cultivars of pear. By the use of pooled neutral toxins and pooled Acidic toxins of *A. mali*, the toxicity range was extended to Jonathan (resistant apple), Nijisseiki (susceptible pear) and Chojuro (resistant pear) in addition to the specific suscept, Indo. Highly purified toxins displayed a similar cytotoxicity pattern and their dilution and points were 0.000,001 ppm (Indo), 1.95 ppm (Jonathan), 0.48 ppm (Nijisseiki) and 1000 ppm (Chojuro). Implications of these findings are discussed.

56. Effect of different molar concentration of some carbohydrates on germination and change in volume of spores of six smuts

S. K. SAXENA, Aligarh

Studies were made to determine the effect of different molar concentrations of carbohydrates on the germination of spores of *Ustilago hordei, U. scitaminea, U. cynodontis, Sphacelotheca sorghi, S. cruenta* and *Tolyposporium penicilariae*. No one source of carbohydrate supported the germination of spores of all the fungi except glucose. The optimum germination of spores took place at the concentration ranging from 0.01 M to 0.04 M of different carbohydrates. The volume of spores increased with the increase in the molar concentration of the carbohydrate upto the level optimal for germination of the spores, but at higher molar concentrations the volume of of the spores decreased.

57. Influence of amino acids and vitamins on the *in-vitro* and *in-vivo* cellulase production by *Alternaria brassicae* (Berk.) Sacc.

K. M. ARUN NEHEMIAH and K. B. DESHPANDE, Aurangabad

With the exception of glycine, growth of *Alternaria brassicae* had increased in all the amino acids, the maximum being in DL-tryptophan; the *in-vitro* cellulase production was inhibited, the maximum being from glycine and L-lysine monohydrochloride. Development of rot reduced, as also the *in-vivo* cellulase yield, while pH decreased. Likewise, all the vitamins stimulated growth of the fungus but inhibited the *in-vitro* cellulase production, maximum being from nicotinic and folic acids. However, folic and nicotinic acids were observed to be most inhibitory for the development of rot of *Solanum tuberosum* L., as also the *in-vivo* cellulase production, while pH drifted towards neutrality.

58. Control of some plant diseases by *Vinca rosea* extracts

AVDHESH NARAIN and N. PANDA, Bhubaneswar

Studies pertaining to the antifungal potential of *Vinca rosea* revealed

entry points provided by the breaking of the hairs, favourable microclimate and inoculum holding capacity of the hairy leaf.

61. Variation in aggressiveness of *X. translucens f. sp. eryzicola* the incitant of bacterial leaf streak of rice

C. SESHAGIRI RAO and S. DEVADATH, Cuttack

The infectivity of 20 isolates of the causal bacterium on resistant, and susceptible rice varieties showed wide variation in their aggressiveness though the data failed to indicate the existence of physiologic races in this pathogen. There was no correlation between the incubation period and aggressiveness of the bacterial isolates. A relationship between the aggressiveness of the isolates with the exudate production was however, observed. More aggressive isolates were associated with more exudate production than the intermediate and less aggressive isolates. The lesion colour was found to be associated with the degree of resistance or susceptibility of the variety rather than the aggressiveness of the isolates.

62. A new modified technique of purification of plant viruses for electron microscopy

K. V. KESHAVA MURTHY and H. C. GOVINDU, Bangalore

A simple technique of purificataion of plant viruses for electron microscopy without the involvement of elaborate sofisticated equipments has been developed. Purification steps involves initial clarification of crude sap with organic solvents and precipitation of virus with ammonium sulphate. By this method with the use of a low speed centrifuge only a relatively high concentration of the virus has been obtained. Electron microscopy of purified preparations shadowed with chromium showed a high concentration of the virus with very little host material.

63. Mosaic disease of spinach—a new record for India

S. QAMAR A. NAQVI and K. MAHMOOD, Aligarh

The virus affecting spinach (*Spinacia oleracea*) could be transmitted readily by sap inoculation and by the aphid *Myzus persicae* Sulz. and not by *Brevicoryne brassicae* L. Eleven species of plants in 3 families viz., *Achyranthes aspera* L., *Amaranthus caudatus* L., *A. leucocarpus* S. Wat., *Benincasa*

hispida Cogn., *Lagenaria leucantha* (Duch.) *Rusby., Datura stramonium* L., *Lycopersicon glandulosum* Muller., *Nicotiana glutinosa* L., *N. rustica* L., *N. tabacum* L. and *Petunia hybrida* Vilm. were infected systemically by the virus. *Chenopodium amaranticolor* Coste & Reyn., *C. murale* L. and *Cucumis sativus* L. were found to be good local lesion hosts of the virus. *Beta vulgaris saccharifera* L. var Katari-6 and *Physalis peruviana* L. were found to be symptomless carriers of the virus. The virus was found to withstand a dilution of upto 10^{-4}, heating upto 70°C and retained infectivity at 10°C for 72 hr and at room temp. for 48 hr.

64. Efficiency of nitrogen under different forms, methods and time of application in transplanted rice crops

S. K. MUKHOPADHYAY, Visva-Bharati

The yield data revealed that 30 kg N as urea in form of mud ball showed highest yield (4733 kg/ha). It was also noted that wherever mudball basal application of fertilizer was included either fully mudball basal or mudball basal plus top dressing, there was considerably higher yield of the crop. There was not much difference in between incorporated basal application and band placement basal application in any of the form of urea, sulphur coated urea and ammonium sulphate considering 30, 60 and 80 kg. N doses except that 60 kg N in the form of urea in band placement showed considerably higher yield. Regarding the split application treatments of urea fertilizer it was found that split application of 30 kg. N showed considerably higher yield than all the other split application treatments. Single top dressing application at any stage or dose showed considerably poor yield as compared to other treatments.

65. Identification of critical phases in semi-dwarf varieties of rice to varying depths of flooding

B. C. GHOSH, B. N. MITTRA and
H. K. PANDE, Kharagpur

Field experiments were conducted with rice varieties Jaya and IIT 60 to find out some measures against flood damage. The crop growth phases—seedling establishment to maximum tillering, maximum tillering to flowering and flowering to maturity were subjected to flooding amounting to 25, 50 and 75 per cent of plant height. Among the growth phases seedling establishment to maximum tillering was found to be most critical at 75 percent level of flooding. The subsequent phases were less susceptible. Hence, draining the flood water and keeping the submergence to 25 percent of the plant height throughout a period of 10 to 55 days after transplanting, cause minimum damage.

66. Performance of malt barley varieties to levels of nitrogen and seed rates

P. K. JANA, Kalyani

A field experiment was conducted to see the performance of different varieties of 6-row (Jyoti, Ratna and Rs 6) and 2-row (Clipper, HBL 102, DL 102 and DL 150 barley under different levels of nitrogen (0, 20 and 40 kg N per ha) and seed rates (50 and 75 kg per ha) during rabi 1973-74 and 1974-75 in the University Farm of Bidhan Chandra Krishi Viswa Vidyalaya, Kalyani. Among the varieties tested, one 2-row (DL 150) and all 6-row (Jyoti, Ratna and Rs 6) barley varieties were found good for this locality. DL 150 produced grain yield comparable to those of 6-row barley varieties. The application of nitrogen significantly increased the yield attributes as well as the yields of straw and grain. The application of 20 kg N per ha produced more grains (17.25 kg) per kg of nitrogen applied than the application of 40 kg N per ha (13.00 kg). A seed rate of 75 kg per ha produced significantly higher number of panicles per unit area, more number of grains per panicle and consequently higher yields of grain over 50 kg seed rate.

67. Effects of thinning stage and plant specing on grain yield and water-use efficiency of two sorghum varieties

B. MURALIMOHAN REDDY and
E. RAVINDRANATH, Kharagpur

Field experiments were conducted to determine the effects of thinning stage and plant spacing on two sorghum varieties viz. Swarna and M35-1. In Swarna, the grain yield and water-use efficiency were increased significantly for each 15 cm decrease in inter row spacing whereas M35-1 performed better with intermediate spacing. Thinning after two and three weeks significantly increased grain yield and water-use efficiency of Swarna while M35-1 did not whom any response to thinning.

68. Influence of soil moisture tension and nitrogen levels on the growth dynamics of jute crop (Var. Jro. 632)

S. N. SAHU and D. K. DUTTA, Kalyani

Studies on growth dynamics of jute crop (variety JRO-632) under different soil moisture tensions 1.2, 0.8, 0.4, 0.2 atmospheres and nitrogenous fertilizer 0, 45, 60 kilograms Nitrogen per hectare showed that T_3 (0.4) atmospheric moisture tension and N_2(60) kilograms Nitrogen per hectare produced maximum growth attributes whereas T_3N_1 combination treatment was recommendable from the considerations of economy and significance and the optimum irrigation requirement was found to be 90 mm upto 45 days of growth period. The relationship between days (D) after energence and height (H), diameter (Di), leaf area index (LAI) was two degree polynomical whereas

that of with number of leaves (L) and number of nodes (N), it gave straight line relationship for both the different soil moisture tensions and nitrogenous fertilizer levels.

69. Nutrient absorption under soil moisture stress and applied nitrogen and phosphorus in some cereal and leguminous crops

S. K. VARMA, Hissar

Effect of three soil moisture regimes (irrigation given at 75, 50 and 25% depletion of available soil moisture from 0-30 cm layer of soil), two nitrogen levels (i.e. 75, and 150 kg N/ha), and three phosphorus levels (30, 60 and 90 kg P_2O_5/ha) and their interaction on nitrogen, phosphorus and potassium absorption in two cereal crops (wheat and barley) and three leguminous crops (peas, mung and cowpeas) was studied in the field on a soil low in available nitrogen medium in available phosphorus and high in potassium. Wetter irrigation regimes increased nitrogen content in legumes but decreased it in cereals, but these did not affect much the phosphorus and the potassium content total nitrogen, phosphorus and potassium uptake increased with increase in soil moisture supply. Nitrogen doses tried did increased nitrogen content and its uptake but did not affect in any way the phosphorus and potassium content as well as their uptake high phosphorus doses increased nitrogen content and its total uptake but were without effect on phosphorus and potassium content/uptake. The data on the interaction of soil moisture regimes and the phosphorus/nitrogen doses indicated an absence of competition between nitrogen, phosphorus and potassium uptake.

70. Studies on the effect of phosphorus and zinc sulphate and their combinations on moong (*Phaselous aureus*)

R. C. SAMUI, Kalyani

To study the effects of phosphorus applied at 0, 60, 120 and 180 kg P_2O_5/ha as single super phosphate and zinc sulphate at 0, 30, 60 and 90 kg/ha and their combinations on moong (B_1) (*Phaseolus aureus*), an experiment was conducted in 30 cm deep, 60 cm × 60 cm cement pots at Haringhata, West Bengal. The basal dose of N and K_2O was 40 kg N and 40 kg K_2O/ha respectively. The crop was sown on August and harvested on October.

The application of P_2O_5 beyond 60 kg/ha has been found to depress the seed yield significantly. However, the straw yield was significantly more at 180 kg P_2O_5/ha over control. The seed yield was significantly more due to zinc sulphate application over control during 1972. There was no significant difference in seed yield among zinc sulphate levels in pooled analysis. The application of P_2O_5 at 180 kg/ha significantly depressed seed yield at all level of zinc sulphate application. 60 kg P_2O_5/ha and 60 kg zinc sulphate/ha might be the optimum combination for moong. 1000 seed weight was increased by

the application of 180 kg P_2O_5/ha over control. The application of 60 kg zinc sulphate also increased the 1000 seed weight over control. The application of P_2O_5 above 60 kg/ha is not beneficial for moong to soils testing high in available phosphorus.

71. Studies on the effect of micronutrients on berseem seed production

R. C. SAMUI, Kalyani

A field experiment involving different micronutrients along with NPK on berseem (*Trifolium alexandrinum*) was conducted in a Randomized Block Design with a replications at the University Teaching Farm, Haringhata during 1971-72. The treatments consisted of (1) NPK (25 kg N, 75 kg P_2O_5 and 50 kg K_2O/ha) (2) NPK + Zn (3) NPK + B (4) NPK + Mo (5) NPK + Zn + B (6) NPK + Zn + Mo (7) NPK + B + Mo (8) NPK + Zn + B + Mo. Zinc sulphate, Borax and sodium molybdate as source of mioronutrients were used @ 40 kg/na, 20 kg/ha and 3 kg/ha respectively. Berseem (T_{15}) was sown on November end and harvested on end of April. The dry forage yield was increased by the application of micronutrients. The highest increase (28.8% over NPK) was recorded with borax. The micronutrients in general have a negetive effect on seed yield excepting borax which increased the seed yield by 28.1% over NPK. The highest decrease was recorded with Zn + Mo (38.0% over NPK).

72. Manurial efficiency of juteleaf under multiple cropping system
I. Effect on crop production

N. R. DAS and R. K. ROY, Kalyani

A field experiment was conducted in the University Teaching-cum-Research Farm, Kalyani, West Bengal, to evaluate the manurial efficiency of nitrogen both from green jute leaf and ammonium sulphate increased the grain and straw yields of transplanted rice. Addition of phosphorus also increased the grain yield of wheat. Forty and 80 kg nitrogen/ha were as good as 50 and 100 q. of green jute leaf/ha respectively. Nitrogen from green jute leaf and ammonium sulphate applied to rice showed the residual effect on the succeeding late sown dwarf wheat. Dwarf wheat with yield of (35.0-44.0 q/ha) could be grown in *aman* paddy land, late in the season after the harvest of *aman* paddy. Rate of residual effect of jute leaf while applying more, is more than nitrogen from ammonium sulphate, in wheat grain yield. It is also possible to grow giant *mung* with moderate yield (179 q/ha) as a short duration crop during the lean month of the forage production just after harvest of dwarf wheat. Levels of nitrogen from jute leaf or ammonium sulphate have not any cumulative effect on giant *mung*.

73. Studies in the uptake of nutrients by banana plants (*M. cavendishii*, Lamb.) at different stages of growth-II, 19th leaf stage

T. K. CHATTOPADHYAY and P. C. MALLIK, Kalyani

The effect of dose and frequency of irrigation was only noticeable when plant organs were analysed for chemical constituents. Most of the elements was taken up in higher quantity under irrigation of 5 cm per fortnight or 10 cm per month. The dry matter content of the plant organs was also favourably influenced by the doses and frequencies of irrigation. Inorganic constituents like N, P, K and Ca in various plant organs as well as whole plant increased with their soil application in higher quantity. Consequently, it is inferred that plants at 19th leaf stage respond in a better way to double dose of NPK application and 10 cm of irrigation per month or 5 cm per fortnight for increasing growth and uptake of inorganic plant constituents and dry matter content.

74. A new compound fertiliser from steel-plants' waste

B. S. GUPTA, Khatauli

Increase of soil fertility and productivity which are the aim of all modern scientific and practical researches, related to the nature of applied fertiliser. Basic slag—a bye-product of steel industries can be converted into a new compound fertiliser after treating with Rockphosphate, Nitric Acid and Ammonia. This fertiliser contains 12% Phosphorus, 12% Nitrogen, 20% Calcium along with numerous micro nutrients. 'Steel plants' waste can be used in place of lime in the manufacture of calcium ammonium nitrate which is marketed by the Nagal Unit of the Fertiliser Corporation of India. Author proposed a tentative plan for manufacturing the said compound fertiliser.

75. Distribution of trace-elements in the soils developed on schistose rocks in the district of Santhal Parganas

S. SAHAY, Bihar

The soils of the district Santhal Parganas in Bihar have been surveyed on a two-mile-grid pattern and a more than a hundred soil profiles, developed on schistose rock, have been studied for the morphological characters. They were grouped into two soil series, the samples of which have been taken for subsequent studies. The study of trace-elements in the soils reveals that there is variable concentration of the elements (V, Zr, Cr, Ga, Co, Ni, Cu, Sn and Ba) at different soil depths. The distribution pattern is more or less similar in both the soil profiles but soils between 13-29 inches is rich in trace-elements.

76. Selectivity of some new herbicides for direct seeded rice

A. N. DUBEY, G. B. MANNA and M. V. RAO, Cuttack

Experiments conducted at the Central Rice Research Institute, Cuttack for five seasons (from *rabi*, 1973 to *rabi*, 1975) reveal that weed control through chemicals were comparable to hand weeding. Under direct seeded rice in dry bed maximum weed control and good yields were noted with C-288 @ 2.0 kg a.i./ha, nitrofen @ 3.0 kg a.i./ha, USB 3584, USB 3153 and AC 92553 @ 2.0 kg a.i./ha while for rice seeded on puddle, chemicals like butachlor @ 1.0 kg a.i./ha, propanil followed by 2, 4-D @ 3.0/1.0 kg a..i/ha, C-288 @ 0.5 kg a.i./ha, C-19490 @ 1.0 kg a.i./ha benthiocarb @ 1.5 kg a.i./ha, M-3432 @ 2.0 kg a.i.i/ha, benthiocarb/2, 4-D IPE @ 1.0/05 kg a.i./ha, sirmate @ 2.0 kg a.i./ha and C-19490+2, 4-D IPE @ 0.75 kg/0.5 kg a.i./ha were found to be promising for effective weed control and increased yields.

77. Simultaneous foliar nutrition and weed control through herbicide-fertilizer mixtures in rice (*Oryza sativa*, L.)

G. K. PATRO and G. C. TOSH, Bhubaneswar

The combined use of herbicide and fertilizer was studied in up-land rice with the variety 'IR 8' and were compared with other cultural methods. Three hand weedings supplemented with foliar application of nitrogen (2% urea) recorded the maximum grain yield and this was closely followed by the treatment of propanil + urea (2% solution). Both the above treatments were found to be significantly superior over all the other treatments except three hand weedings treatment which received soil application of fertilizer. All the herbicide-fertilizer mixtures (Propanil + urea, 2, 4-D+urea and MCPA+urea) recorded higher yields than their respective herbicide applications alone.

78. Aquatic weed problems in Andhra Pradesh and their control measures

D. J. CHANDRA SINGH and
K. NARAYANA RAO, Baptla

The importance of distribution and the losses caused by aquatic weeds such as water hyacinth and *Salvinia* are discussed. In Andhra Pradesh the dominant aquatic weeds are (1) *Eichhornia crassipes* (Kater hyacinth), (2) *Ipomoea reptans* (3) *Ipomoea carnea* and (4) *Typha* spp. These weeds are major obstacles for flow of irrigation water, drainage and also for navigation. *Typha* is posing a problem in the Nagarjuna Sagar Project area.

(a) *Water hyacinth*: Spray 80% sodium salt of 2, 4-D @ 11.20 kg/ha dissolved in 1125 litres of water on the actively growing foliage.

(b) *Ipomoea reptans* and *Ipomoea carnea*: Spray 80% sodium salt of 2, 4-D @ 8.96 kg/ha dissolved in 1125 litres of water.

(c) *Typha*: A combination of tafapon @ 37.5 kg and fernoxone @ 37.5 kg/ha dissolved in 1125 litres of water can effectively control when sprayed at the actively growing stage.

The need for additional research on the control of aquatic vegetation both at Central and States level is stressed and immediate implementation is suggested.

79. Control of nut grass by herbicides and residual studies

D. J. CHANDRA SINGH and K. MAHADEVA GUPTA, Baptla

Nut grass is a pestiferous weed and considered to be the number one weed among worst weeds. Its pestiferous nature is mainly due to its quick multiplication and its underground storage in rhizomes at different depths in soil.

Two field trials for control of nut grass and one field trial for studying the residual effects were conducted by the weed control division of Agricultural College, Baptla during 73-74. The results indicate that sinbar applied @ 2.47 kg/ha was the best treatment followed by CP 44939 and lasso @ 18.9 1/ha. Glyphosate was found very effective in controlling nut grass as post emergence spray @ 11.5 1/ha. Most susceptible crops as okra, cotton and brinjal can be grown even after 3 days interval after spraying with this herbicide. In residual studies when radish is grown three months after spraying, it was observed that highest yield of radish was obtained in plots sprayed with lasso @ 18.9 1/ha followed by CP 44939, and other chemicals.

60. Evaluation of existing irrigation practices and cropping patterns in Delhi State

N. M. NIMGADE and BABU RAM, New Delhi

Delhi State has about 1,47,500 hectares total geographical area. The study shows that about 50 percent of this area is under crops. More than 80 percent of this cropped area is sown with high yielding varieties. The major cereal crops grown in this area during *kharif* and *rabi* season are, Bajra and Wheat. Besides, some vegetable crops are grown in good proportion to fulfill the demand of local population and fodders are grown for animal consumption. About 80 percent of the cropped area is irrigated and the rest is rainfed. The major sources of irrigation are tube wells, canals and open wells with Persian wheels. Nearly 56 percent of this irrigated area is covered by tube wells.

Out of 210 ground water samples collected, 11% have EC between 0.250 to 0.75 mmhos/cm. This range is safe for crops. The EC between 0.750 to 2.00 has 52% samples and tolerant crops are grown with this quality of water. The water more than 2 mmhos/cm EC is hazardous for crops. This range occupies 37% of samples.

81. Effect of moisture stress on growth and yield of composite maize

D. LENKA and P. K. MOHAPATRA, Bhubaneswar

Studies on susceptibility of maize var 'Jawahar' in sandy loam soil to intermittent or continuous stress as compared with irrigation at 0.6 to 0.7 bar and irrigation as per 0.8 perevealed that stress at grand growth period reduced the height and delayed tasseling and silking. Severe stress at grand growth tasseling and silking or at milk and dough stage and from tasseling to milk stage reduced the grain yield by 50, and 65% respectively. Intermittent stress reduced the grain yield by 35%. Stover yield was reduced by 45-50% due to stress from tasseling to milk stage.

82. Model of the soil moisture characteristic

R. K. GHOSH, Kalyani

A procedure is proposed by which the soil-moisture charactertitic of sandy soils can reasonably be established as $\psi = \psi_0 (\theta/\theta_0)^{-\beta}$, where ψ_0 is the capillary suction in bar at θ_0 i.e, at satauration, β is an empirically determined constant and θ is the volumetric moisture content of the soil. Only a single measurement of ψ at some θ is needed. And the value of β can be estimated as $\beta = 26.5\ (\lambda_2/\lambda_1)^{1.756}$ where λ_1 and λ_2 are the percentage sand and silt of the soil. The procedure is useful when a reliable curve is not available. Statistical test of the β-model established from the experimental observation of twelve samples of soil mixtures indicates its validity.

83. Influence of antecedent moisture on infiltration of water into soil 'in situ'

R. K. GHOSH and S. P. MAITY, Kalyani

Experiments were conducted at six different sites with soils varying from sandy loam to clay loam to study the influence of antecedent moisture in infiltration. Empirical models for estimating S and A of Philip's two-term infiltration equation: $I = St^{1/2} + At$, using initial moisture deficit data of heterogeneous field soils 'in situ' have been proposed. These models have been verified for known boundary conditions. Statistical tests adequately support the reliability of these models.

84. Studies on seepage loss in field channels and its control

S. SEN and D. K. DUTTA, Kalyani

Seepage through unlined channels can amount to 60-70% of the volume of water supplied. This loss, if prevented could bring vast amount of areas under irrigation. In this study attempts were made to study seepage loss

through unlined field channels as well as through lined field channels, lined with polythene, sand-cement, soil-cement, bitumen and bitumen over sand-cement mortar. It was revealed that seepage decreased with the increase in channel slope. The lining materials controlled seepage in different degrees on depending on their permeability. Seepage rate was reduced and the percentage control was increased with the increase in cost of lining.

85. Effect of drainage or water regime on the quality and quantity of heavy minerals of alluvial soils developed on similar parent materials

S. SAHAY, A. K. SINGH and P. P. JHA, Bihar

Two old alluvial soil profiles, one from moderately to somewhat poorly drained and other from a poorly drained locations from South Bhagalpur were studied for their morphology, physiography and heavy mineral content. The effect of water regime on the quality and quantity of heavy minerals present in two soils was apparent. The identity of heavy minerals refer to the similarity of the source of their origin and depositional agency of their alluvium and the degree of wtathering is more under high water regime. The readily weatherable primary minerals like Hornblende Chlorite and Augite weathered more in a situatation in better water regime and has not been influenced much by a relatively slight change in the reactions of weathering medium. But the released iron has been influenced more in the slightly to moderately alkaline soil as compared to slightly acidic to neutral soils.

86. Assessment of optimum use of ground water in modernising agriculture

S. K. MAITY and P. C. ACHARYA, Calcutta

In the repspestive of the existing field situation of groundwater use, land use, crop intensity and agricultural labour utilisation vis-a-vis cost benefit ratio the potential increase on these counts has been assessed in 41 villages of the Kalyani-Haringhata complex of Nadia district in West Bengal. It has been found that in every village there has been under-utilization of ground water. If, the use of ground water is optimised, other conditions remaining constant, the crop intensity and agricultural profit accuring therefrom as also the income of agricultural labour will go up substantially. The cost-benefit ratio will increase by 1.7499 times.

87. Crop water use efficiency under semiarid conditions

E. RAVINDRANATH and B. N. RAO, Kharagpur

Water use efficiency of irrigated crops under arid and semiarid conditions for wheat (*Triticum aestivum*) and sorghum (*Sorghum vulgare*) should

that though water use efficiency increased with decreasing soil water depletions, under oxygen stress conditions, increased available water in rootzone could hamper crop growth and could reduce water use efficiency. Under limited water available resources conditions, application of straw mulch as an agronomic technique increased water use efficiency by 66 percent. Grain filling phase found to be the most critical stage for water use in wheat and sorghum crops.

88. Studies on depth and quality of water on soil salinization in sandy and clay soils in Malaprabha irrigation project Karnataka State

H. M. MANJUNATHAIAH, A. S. HADIMANI and N. VASUKI, Dharwar

Behaviour of chloride, sulphate, bicarbonate, sodium, potassium, calcium plus magnesium, pH and electrical conductivity in soil columns of sandy and clay soils with reference to the position of water table at 70 cm depth was studied. The ground water contained 10 me/l of each of sodium chloride, sodium sulphate and sodium bicarbonate. The soil columns were sectioned after 105 days and soil water suspension (1 : 2.5) was analysed for different anions, cations, pH and EC. During the period of study the capillary water moved to the top in case of clay soil and to only 50 cm height in sandy soil. The results of analyses revealed that in both sandy and clay soils pH decreased towards the surface layer, whereas EC, chloride, sulphate sodium, potassium, calcium plus magnesium increased. However, in sandy soils, the relative proportin of calcium plus magnesium in soil water suspension was more compared to that in clay soil. The reverse was true with sodium.

89. Influence of different water management practices on yield of paddy under varying atmospheric evaporative demand

M. K. SARKAR and S. P. MAITY, Kalyani

The experiment was conducted at Kalyani for three *boro* and two *aman* seasons during 1971-72, 1972-73 and 1973-74 in sixty brick masonary lysimeter (each lysimeter being one metre long, one metre wide and 75 cm deep) to study the influence of different water management pracices on yield of paddy under varying atmospheric evaporative demand.

While there was no significant difference in yield under either continuous submergence of 2-4 cm water or under continuous saturation during *aman* seasons due to low evaporative demand of the atmosphere, during *boro* seasons, significantly lower yield was recorded under continuous saturation due to prevailing high atmospheric evaporative demand causing significant reduction in 1000 grain weight and filled grains/panicle.

90. Effect of erosion on the fertility of upland soils of Tripura

PIJUSH KANTI PAUL, Tripura

Effect of soil erosion on the fertility of upland soils of Tripura was studied. Erosion is the severe problem for the fallow land and it is less in presence of cover crops of which groundnut is the best, paddy is moderate and seasamum is least effective as cover crop. The fertility of upland soils is very much less in comparison to the low land soils and the soil texture of the low land soil is much heavier than the upland soils. With high rainfall prevailing in the state the cause of heavier texture and better fertility of the low land soils may be the deposition of eroded finer soil particles and fertility from the nearby surrounding highlands which are undulating.

91. Utilization of dry leaves in reclamation of alkali soils

R. P. AGRAWAL, Hissar

A laboratory investigation was carried out to study the efficacy of leaf powder a mixiture of neem (*Azairachta indica*) and Jamun (*Syzygium cumini*) leaves and sugar-cane trash in equal proportions in combination with and without $CaCO_3$, nitrogen and phosphorus under aerobic and anaerobic conditions in reclamation of saline-alkali soils. Addition of leaf powder @0.2 percent without $CaCO_3$, but with P_2O_5 and N both under aerobic and anaerobic condition was found effective in reclamation of calcareous Pusa and Katol soil as judged by the increase in available calcium+magnesium and calcium, reduction in the degree of dispersion, exchangeable sodium and to a lesser extent in pH. In other soils, (Sultanpur, Anantpur, Mandya, and Dindi) the addition of leaf powder did not seem to cause an all round improvement in the alkali conditions.

92. Influence of basal dose on nitrogen and rhizobial inoculation on yield and nitrogen turn over in black gram (*Phaseolus mungo Roxb*).

P. R. REDDY and ZAHEDA AFTAB AHMED, Hyderabad

The effect of artificial inoculation of rhizobium with or without basal dose of nitrogen on yield and nitrogen assimilation in black gram *Phaseolus mungo* Roxb was studied. 15 or 30Kg N/ha was applied as a basal dose 3 days before the inoculation of peat based rhizobial culture in soil. Root nodules, weight of pods, dry weight of plants, weight of grain and husk, 1000 seed weight, percentage of nitrogen in grain and husk were recorded.

15Kg N/ha though improved growth and yield over control, but in combination with rhizobial inoculation increased number of nodules, grain yields and assimilation of N both in vegetative parts and grain significantly.

93. Evaluation of agricultural problems by West Bengal farmers

S. K. SANTRA, and J. BASU RAY CHOWDHURY, Calcutta

The presnt investigation has been carried out among the randomly selected 311 farmers of Dakshin Barasat, a rural region of West Bengal. They have enumerated twelve agricultural problems which according to them hinder the progress of agricultural development. These problems differ in intensity and the most important problem is with use and availability of chemical fertilizer followed respectively by problems relating to plant protection chemicals, irrigation, HYV of seed, credit, hiring implements, servicing implements, warehouse, owning implements, technical know how, marketing and drainage.

94. Some observations on the estimation of traces of lead in foods

S. N. MITRA, Calcutta

Importance of estimation of traces of lead in food has been emphasised. Some salient points in the estimation of lead by dry ashing of food material, extraction of lead by dithizone and subsequent estimation of lead as lead sulphide colorimetrically, have been discussed. Sufficient amount of material, which may be upto 100g or more depending on the lead content, has to be taken for ashing to get sizeable amount of lead for proper final colour-matching. Properly carried out, the method gives good recovery and reproducible results.

95. Comparative growth studies in Haryana and Cross-bred calves

R. S. POONIA and A. R. RAO, Hissar

Ten male calves of Haryana and Holstein-Friesian Haryana breeds of about 8 5 months of age were fed *ad libitum* for 5 months a high protein (11.31% D.C.P.) high energy (68.99% T.D.N.) ration to promote maximal growth. Daily feed consumption and growth data were collected and a digestibility trial conducted.

Body weight, daily weight gain, relative growth rate and body dimensions were higher for the coossbreds. Crossbred calves ate more feed but their feed consumption per unit body weight was not significantly more. Both breeds had similar feed efficiency and their costs per unit gain in body weight were similar. Growth in body measurements (heart girth, body length, height at withers and width between hip points) similar in both breeds. Highly significant correlations were found between body weight and body size measurements as also among most of the body dimensions. Heart girth was the best measure to predict body weight.

Digestibility of the proximate principles was similar in the two breeds, except that of nitrogen free extractives which was better in the Haryana

calves. In both breeds, the digestibility of all the nutrients, except that of protein, were low. In both the breeds the total digestible nutrients of the ration were lower than expected, but the proteins were digested normally.

These studies indicate that both the breeds may be able to utilize higher allowances of protein than are normally recommended.

96. Whitening properties of tea whiteners and the role of chemical and physical factors

R. P. ANEJA, Anand

The whitening and coloring powers of various coffee creamers were quantitatively studied by employing reflectance spectrophotometery. Lightness and color parameters were studied on the Hunter Scale. Commercial samples of coffee creamers exhibited a uniform relationship between the whiteness produced by fat as approximately two times the whiteness produced by S.N.F. Concentrated skim milk with 30% S.N.F. has the same whitening effect as that of Creamilk containing 10% fat and 8% S.N.F. Homogenization can more than double the whitening power of coffee creamers. This is attributed to the increase in the light reflecting surface areas. Boiling the whiteners before use, denatures the water soluble milk proteins, resulting into a marginal increase in the whitening power.

97. *In vitro* regeneration of plants from tobacco tissue and organ cultures

S. K. RAWAL and A. R. MEHTA, Baroda

Undifferentiated callus derived from the floral buds of tobacco has been used for studies on organogenesis and compared with the organogenetic potentials of root, stem and leaf explants.

The morphogenetic responses varied with the hormonal levels in the basal medium. NAA or 2,4-D alone or in combination with KN did not invoke any response from the callus tissues. Depending on its concentration IAA induced root or shoot formation. However, GA_3 promoted roots from callus tissues. At appropriate IAA-Kn cncentrations the floral bud callus as well as the root, stem and leaf explants produced shoot buds.

Culture of organ explants and undifferentiated tissues provide experimental system to elucidate the mechanism of hormonal effects on organogenesis

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