

Abstracts of Theses Accepted for the Award of Post-Graduate Degrees in the University of Agricultural Sciences, Dharwad

DOCTOR OF PHILOSOPHY

AGRONOMY

Performance of wheat (*Triticum aestivum*) as Influenced by Bund Planted Multi Purpose Tree Species

R. H. PATIL

1999

MAJOR ADVISOR: Dr. C. J. ITNAL

The field experiments to study the effect of bund planted eucalyptus, casuarina and teak tree rows on wheat crop was carried out for two years (1997-98 and 1998-99 rabi). Effect of three Agroforestry systems was studied by taking six distances from tree row i.e. 1-18 m at an interval of 3 m. Cement rings of 90 cm deep and 60 cm wide were inserted in to the soil at all the distance intervals (six) hence making 12 treatments and were replicated thrice. Results were analysed through two factor randomised complete block design.

Grain yield of wheat varied with distance and between out side and within rings indicating the effect of tree on crop. Reduction in grain yield was noticed to a distance of 12 m eucalyptus and 9 cm from teak and casuarina tree rows respectively. The maximum adverse effect of tree row was observed with eucalyptus followed

by teak and casuarina. Lower grain yield of wheat nearer to tree row was due to poor expression of growth and yield parameters and competition for growth resources (moisture, nutrients and light) between trees and crop.

Soil moisture was significantly low nearer to the tree row under all the AFS while, nutrient status was quite opposite indicating the nutrients added through continuous leaf fall over the years which was quite large at all the locations. This leaf fall must have released allelochemicals in to the soil to cause adverse effect on wheat crops. To study this, poly bag and bioassay studies were carried out which indicated the possibility of interference of allelochemicals on initial germination and establishment of wheat crop. Allelopathic effect was more severe with eucalyptus leaves followed by teak and the least was with casuarina needles.

CROP PHYSIOLOGY

Salt Tolerance Studies in Cotton (*Gossypium* spp.)

RAJGOPAL

1999

MAJOR ADVISOR : Dr. B. C. PATIL

Investigation on salt tolerance in cotton was made with nine genotypes, belonging to *Gossypium arboreum* (AK 235, CIMA 302 and AKH 4) *G. herbaceum* (Jayadhar and Dhumad) and *G. hirsutum* (JK-276-10-5, JK 345-3-3, LRA 5166 and AK 84635), under five salinity levels in pot and field conditions. The objective was to study the changes in physiological, biochemical parameters, yield potential and their relationship under varying salinity levels and finally to find out the mechanism of salt tolerance in cotton.

The results showed that germination, shoot and root vigour index, leaf area and total dry matter (30 and 60 DAS) decreased with increase in salinity level. The relative decrease was lower in AK 235 and LRA 5166 as compared to other genotype.

Stomatal density increased while stomatal conductance, stomatal size, transpiration rate, photosynthetic rate and osmotic potential decreased with increase in salinity level. The genotype AK 235 showed

lower reduction in these characters whereas maximum reduction was observed in AKH 4. Sodium content in stem and leaf increased with increase in salinity, while potassium and calcium content decreased. At higher salinity levels K/Na ratio was maintained in genotypes AK 235, AK 84635 and LRA 5166 by restricting Na⁺ uptake and increased K⁺ uptake in to the shoot indicating salt tolerance.

In general, chlorophyll a, chlorophyll b, total chlorophyll content, soluble protein and catalase activity decreased with increase in salinity whereas, free proline, peroxidase activity and sugar content increased in all the genotypes. Seed cotton yield, total dry matter and leaf area at different stages of crop growth reduced with increase in salinity. The higher mean salinity index, tolerance index and lower slope of regression for seed cotton yield and total dry matter at harvest in AK 235, LRA 5166, AK 84635 and Jayadhar indicated their suitability to salt stress conditions.

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Based on the study the genotypes AK 235, LRA 5166 and AK 84635 were found to be tolerant to salinity stress. Lesser reduction in germination, shoot and root vigour indices, photosynthetic rate, stomatal conductance,

leaf area, total dry matter and chlorophyll content, maintenance of higher K/Na ratio and higher catalase and peroxidase activity at higher salinity levels can serve as selection criteria for identification of salinity tolerance at early stages of crop growth in cotton.

SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

Phosphorus Chemistry in Paddy Growing Soils of Karnataka

A. V. GADDI

1999

MAJOR ADVISOR : Dr. P. A. SARANGAMATH

Eighteen soil profiles from major rice growing areas representing all ten agroclimatic zones of Karnataka were collected to study the forms of P and their distribution phosphate adsorption and desorption phosphate potential and Q/p parameters.

The soils used in the study varied widely in their characteristics. The soils were low to medium in available P status and highest available P was noticed in surface layers. Black soils and mixed red and black soil of Yadgir were dominated by Ca-P fraction. While in rest of the red and lateritic soils the Red-P was dominant among inorganic P fractions. Soloid P was lowest of all the fractions irrespective of the zones and ranged from undetectable level to 8.94 ppm. The highest (471.92 ppm) Organic P as a profile mean was observed in Bidar soil owing to higher organic carbon content.

The available P was more with Trough method, followed by Bray's and Olsen's methods. However, the

Bray's and Olsen's methods were considered as better for extracting the available P owing to their highly significant and positive relations with the Al-P, Fe-P and Ca-P fractions.

The data on P adsorption was found to confirm the Langmuir adsorption isotherms, particularly at lower equilibration solution P concentration. The P adsorption maxima varied widely with the type of soils and ranged from 93.33 to 615.38 $\mu\text{g g}^{-1}$ and was in the order of Inceptisols > Vertisols > Alfisols. The P adsorption was highest in Vertisols while the lowest, was in Inceptisols.

The phosphate potential of soils ranged from 6.899 to 7.770 and in general, it was higher in Vertisols than in Inceptisols and Alfisols. The Vertisols exhibited higher PBC followed by Inceptisols and Alfisols. Black soils and mixed red and black soils contained hydroxyapatite and octocalcium phosphate minerals and laterite soils contained variscite and strengite forms of P bearing minerals.

AGRICULTURAL ENTOMOLOGY

Studies on the Management of Pod borer, *Helicoverpa armigera* (Hubner) in Pigeonpea Ecosystem

YELSHETTY SUHAS

1999

MAJOR ADVISOR: Dr. B. V. PATIL

Studies undertaken at Agricultural Research Station Gulbarga during 1997-98 and 1998-99 seasons indicated that house sparrow, *Passar domesticus* (Linnaeus), the Common myna, *Acridotheres tristis* Latham, black drongo, *Dicrurus adsimilis* (Bechstein), small green bee eater, *Merops orientalis* Latham are the important predacious insectivorous birds on the pigeonpea pod borer, *Helicoverpa armigera* (Hubner). The predatory distance of birds from perching place revealed that upto two metres these birds could pick the larvae effectively. The gut analysis indicated black drongo to be the most efficient predator followed by house sparrow and common myna. The small green bee eater preferred dipterans, hymenopterans and odonatens that are more beneficial thus causing reduction in natural enemy population.

HaNPV @ 250LE ha^{-1} along with 0.5 per cent sugar

and any of the UV protectants like activated charcoal, boric acid and blue at 0.1 per cent was found to record significantly lower pod damage and higher grain yield irrespective of application time as compared to HANPV alone. Among the adjuvants, activated charcoal proved in most effective recording at par higher grain yield irrespective of application time compared to other adjuvants.

Though methomyl 12.5 L @ 500g and profenofos 50 EC @ 1500g a.i. ha^{-1} recorded highest egg occlusion both in freshly laid and older eggs the lowest dosage of methomyl (125g a.i. ha^{-1}) was equal to highest dosage (1500 g a.i. ha^{-1}) of profenofos 50EC in terms of egg occlusion irrespective of the age of the egg.

Five peak moth catches were noticed in light and pheromone traps, the longest peak- was observed from 43

standard week to 52 standard week which coincided with peak reproductive stage of the crop. The multiple regression analysis indicated maximum and minimum temperature with afternoon relative humidity to influence the light and pheromone trap catches.

Evaluation of different IPM modules indicated the adaptive module consisting of ovicidal application of

profenofos 50EC at 1000g a.i.ha⁻¹, NSKE (5.00%), HaNPV 250 LE per ha followed by alphamethrin IOEC at 50g a.i. ha⁻¹ and bio-intensive module consisting of application of HaNPV 250 LE ha⁻¹, hand collection, *Bacillus thuringiensis* 1.0 kg ha⁻¹, NSKE 5 per cent followed by HaNPV 250 LE ha⁻¹ were found cost effective. However, the adaptability of bio-intensive IPM module depends to the larger extent on their availability.

PLANT PATHOLOGY

Studies on Some Aspects of Soybean Rust Caused by *Phakopsora pachyrhizi* Syd.

APPASAB R. HUNDEKAR

1999

MAJOR ADVISOR: Dr. P. C. HIREMATH

Studies on soybean rust revealed that disease was wide spread in severe form (64.99%) on soybean in Northern Karnataka and parts of Maharashtra during kharif 1996, 1997 and 1998. Onset and more severity were recorded in villages situated on Krishna River Bank and are considered as hot spots of disease.

Deposition of uredospores on slide kept in a microscope commenced 6 to 9 days before onset of disease. Fluctuations in uredospore deposition were observed. More uredospores were trapped between 75 to 90 DAS and rust severity was maximum at this stage. Autoregression model of seventh order was found to be accurate for prediction of uredospores load in atmosphere. Logistic model and linear environmental model were appropriate for predicting rust epidemics.

Uredospores survived for 12 to 15 days in infected host debris. Disease prevailed on soybean throughout the year with difference in severity. Cowpea, pea, greengram, horsegram, redgram and frenchbean were found to be

collateral hosts.

Onset of rust was delayed on early sown crop and severity increased with delayed sowing in kharif. Drastic reduction in yield and seed weight was recorded with delayed sowing. Among the varieties PK- 1029 recorded the least severity with all the sowing periods. Among germplasms S-22, WC-12 and 92-10 performed better in yield with resistant reaction. Among varieties PK- 1 162, PK- 1029, JS-80-21 and PK- 1024 showed moderately resistant reaction with good yield.

Three and two sprays of hexaconazole (0.1%) were required to manage rust on a susceptible (JS-335) and a moderately resistant (PK1029) varieties respectively. Yield loss of 81.94 and 65.73 per cent due to rust was observed with JS-335 and PK-1029, respectively. Yield loss model could be developed by using AUDPC as input variable. Severity at 75 and 85 DAS was highly significant and positively correlated with yield loss in JS-335 and PK-1029 respectively.

HORTICULTURE

Studies on Mechanisms of Resistance to Rust and Genetics of Quantitative Characters in Snap bean (*Phaseolus vulgaris* L.)

T. S. AGHORA

1999

MAJOR ADVISOR: Dr. M. B. MADALAGERI

Epidemiological components of partial resistance to rust, nature of pathogenesis, physiological, biochemical and genetic basis of rust resistance in snap bean (*Phaseolus vulgaris* L.) were investigated. Association and inter-relationship between rust resistance and quantitative characters, the components of genetic variation and gene action for various quantitative characters were worked out. Among the 60 genotypes evaluated for rust resistance under artificial epiphytotic condition, 37 genotypes were resistant, five lines viz., IIHR-12, 13, 45, 121 and 161 were slow rusters and 18 were susceptible. Slow rusters showed less

AUDPC, low PDI, extended latent period, fewer pustules, small pustule size and low sporulation capacity. Negative association of AUDPC and PDI with latent period and positive and significant correlation with all other components of partial resistance was observed.

Histopathological studies revealed that the entry of the pathogen into the host tissue was through stomata. The structural features of the stomata like small stomatal pore size, narrow stoma and fewer stomata imparted the resistance to rust. Among the biochemical components of

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resistance, high chlorophyll, high phenol and low sugar were associated with resistance. A pair of dominant genes controlled the rust resistance in IIHR-220 and KPV-1. The crosses Contender x KPV-1, Arka Komal x IIHR-220, their reciprocal crosses and Arka Komal x KPV-1 were high yielding with resistance to rust. The association of quantitative characters with disease severity was negative and significant for all the traits except days to first flowering and days to pod maturity. The magnitude of negative correlation of PDI with pod yield per plant, total pod number, total flowers per plant, seeds per pod and flowering branches were high.

Duplicate type of epistasis for plant height, and flowering branches and complementary gene action for flowers per plant, pods per plant and pod weight were noticed. Heterobeltiosis was high and significant but the genetic advance was low for majority of the quantitative characters indicated the limited possibility of improving these characters through selection. Hence, it is suggested to go for biparental mating of selected parents followed by pedigree method of selection. Studies indicated that the selection should be based on high chlorophyll, high phenol, low sugar, small and fewer stomata, long latent periods, small and fewer pustules, low PDI, low AUDPC and low sporulation capacity for improving rust resistance.

Studies on Evaluation of Genotypes and Standardisation of Production Technology of *Coleus forskohlii* Briq.

SHANKARGOUDA PATIL

2000

MAJOR ADVISOR : Dr. N. C. HULAMANI

Studies were conducted to evaluate the genotypes for growth yield and suitability for pickling and to standardise the production techniques like planting densities, types of planting materials in *C. forskohlii* during the years 1998 and 1999.

Among the accessions evaluated, accession C2 excelled in morphological characters like plant spread(NS) upto 120 days, plant spread (EW) upto 90 days, number of branches per plant at 150 days(111.05 branches), number of leaves per plant at 60 days (258.54), lamina length at all the crop growth stages and stem diameter upto 90 days compared to other accessions. Among the yield parameters evaluated, accession C2 had the highest length of tubers (15.44 cm), diameter of tubers (1.68 cm), number of tubers per plant (41.37) and fresh weight of tubers per plant (534.75 g), volume of tubers (487.04 cc), harvest index (45.94%) and dry weight of tubers per plant (66.64 g). However, accession C1 produced the highest total dry weight per plant (237.46 g). Variations were observed among the accessions of *C. forskohlii* for abundance and distribution of starch grains in the leaf mesophyll tissues. Variations among the accessions were also observed with reference to the accumulation of secondary metabolites in

the cortex cells of roots. Accession C2 was found to be most suitable for pickling.

Studies on the effect of plant densities on morphological parameters revealed that at the highest plant density of 1, 11, 111 plants per ha, there was increase in the plant height, reduction in plant spread, number of leaves per plant and stem diameter at all the crop growth stages observed. The yield and yield attributes were also significantly influenced by different plant densities. At the highest plant density of 1, 11, 111 plants per ha there was reduction in the length of tubers, diameter of tubers, total number of tubers per plant total fresh weight of tubers per plant, number of marketable tubers per plant fresh weight of marketable tubers per plant, volume of tubers compared to the lower plant densities. Studies on the effects of types of planting material on root and shoot induction in *C. forskohlii* revealed that, tip cuttings were superior with reference to root and shoot induction compared to middle and basal cuttings. The field performance of tip, middle and basal cuttings on the morphological parameters revealed superiority of tip cuttings over middle and basal cuttings at all the crop stages. There were no significant differences in the yield of tubers among the plants grown from different types of planting materials.

FOODS AND NUTRITION

Iodine Deficiency Disorders In Children of Sirsi Taluk - Karnataka

SAROJANI J. KARKANNAVAR

1999

MAJOR ADVISOR: Dr. RAMA K. NAIK

The study was conducted to assess iodine deficiency disorders (IDD) and its causes in Sirsi taluk of Uttara Kannada district. School children (N = 3009) in the age group of 6 - 12 years were selected by two stage cluster survey from thirty clusters for goitre assessment by

palpation method. Subjects were graded as grade 0, 1 and 2. Urinary iodine excretion, dietary pattern, iodine in salt, water, consumption of iodine rich foods and goitrogens was studied in subsample (N = 301). It was found that 78.83, 19.64 and 1.53 per cent of subjects were grade 0 (normal)

grade 1 and grade 2, respectively. The total goitre rate (TGR) in Sirsi taluk was 21.17 per cent indicating the severity to be moderate. The TGR was significantly higher in rural area (25.17%), 10 - 12 years (23.31%), female subjects (23.73%) when compared to urban area (13.84%), 6 - 9 years group (18.19%) and male subjects (18.49%), respectively. There was a positive and significant correlation between goitrogen consumption and goitre prevalence. The mean cyanide and thiocyanate intake among children was 8.05 and 5.27 mg per consumption unit. Consumption of goitrogenic foods was high. Cyanide intake and quality of diet were responsible for goitre. The consumption of iodine

rich foods was satisfactory. The mean iodine content of water was low viz., 6.29 µg/L. About 78.07 per cent of subjects consumed salt which contained more than 15 ppm iodine. The salt storage revealed, no loss of iodine in Tata crystal, Falguni crystal, Tata powder and captain cook after one year storage. Highest percentage of subjects belonged to normal category followed by wasted, stunted and then by stunted and wasted. The median value of urinary iodine excretion was 24 µg/dL indicating satisfactory iodine intake. Highest percentage of mothers of subjects were classified into medium score category based on knowledge and awareness of IDD.

MASTER OF SCIENCE

AGRONOMY

Studies on the Intercropping of Legumes on Yield and Quality of Forage Sweet

Sorghum (Sorghum bicolor (L.) Moench.)

THIPPESWAMY

1999

MAJOR ADVISOR : S.C. ALAGUNDAGI

A field experiment was conducted during the kharif season of 1998 under rainfed conditions at Main Research Station, University of Agricultural Sciences Dharwad in Northern Transitional zone of Karnataka to study the effect of intercropping of forage legumes viz., cowpea, field bean, and horsegram with forage sweet sorghum in four row proportions viz., 1: 1, 2:1, 3: 1 and 3:2, on green forage yield, quality, and monetary returns. Experiment consisted of 16 treatments of sole and intercropping combinations and was laid out in randomised complete block design with three replications.

Significantly higher green forage yield was recorded in component crop sorghum when it was intercropped with field bean at 2:1 row proportion (52.64 t/ha) compared to sole sorghum (46.11 t/ha). Among the sole and intercropped legumes, significantly higher green forage yield was produced when horsegram was grown alone (20.56 t/ha).

These yield advantages are due to better growth and yield attributes.

Sorghum + field bean intercropping system at 2:1 row proportion recorded significantly higher mixed green forage yield (59.50 t/ha), dry matter yield (11.35 t/ha), land equivalent ratio (1.54) and yields of forage quality parameters viz., crude protein (812 kg/ha), crude fibre (3820 kg/ha), ether extract (259 kg/ha), total ash (804 kg/ha), nitrogen free extract (5665 kg/ha), total carbohydrates (9473 h/ha) and organic matter (10545 t/ha) with net profit of Rs. 13571 /ha and B:C ratio of 1.64. The next best intercropping system was sorghum + cowpea at 2:1 row ratio compared to sole and other intercropping combinations. Palatability was higher in intercropping systems followed by sole sorghum. While it was lower in sole legume crops.

Response of Hybrid Maize (*Zea mays* L.) to Row Application of Organics and Nitrogen in Transitional Tract of Northern Karnataka

VENKATESH R.

1999

MAJOR ADVISOR : Dr. Y. B. PALLED

A field experiment was conducted to study the 'Response of hybrid maize to row application of organics and nitrogen in Transitional Tract of Northern Karnataka' at Main Research Station, Dharwad on medium black soil during kharif, 1997. Treatment combinations consisted of three organic sources (FYM @ 1 t/ha, poultry manure @ 1 t/ha and vermicompost @ 1 t/ha) and three nitrogen levels (100 kg N/ha, 150 kg N/ha and 200 kg N/ha).

Grain and stover yield of maize were significantly higher at 200 kg N/ha (52.01 q/ha and 8.16 t/ha, respectively) over other nitrogen levels. Among the organic sources, row application of poultry manure recorded significantly higher grain and stover yield (53.53 q/ha and 8.24 t/ha). The combination of row application of poultry manure @ 1 t/ha and 200 kg N/ha recorded significantly higher grain yield (57.57 q/ha) over other combinations.

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The increase in grain yield of maize at row application of poultry manure with 200 kg N/ha was to an extent of 28.59 per cent over no organics

Application of 200 kg N/ha with row application of poultry manure recorded significantly higher N uptake

(284.27 kg/ha) by maize crop and available nitrogen in soil after harvest (187.57 kg/ha). Maximum net returns (17679 Rs/ha) were realized by 200 kg N/ha with row application of poultry manure. Maximum B:C ratio (2.45) was noticed in 150 kg N/ha with row application of poultry manure.

GENETICS AND PLANT BREEDING

Evaluation of Sunflower Hybrids for Confectionery Characters

PRABHAKAR, C. J

1999

MAJOR ADVISOR : I. SHANKER GOUD

The study was undertaken to elicit information on the combining ability, nature of gene action and heterosis for 12 different characters by using diallel mating design. Forty-five hybrids (excluding reciprocals) was obtained by crossing ten lines (eight inbreds and two populations) of confectionery grade of sunflower (*Helianthus annuus* L.). All the F₁'s along with the standard check were planted in a randomised block design during *Kharif* 1998-99 at RRS, Raichur.

The analysis of variances for hybrids revealed highly significant differences for all the characters except stem girth. Significant *per se* performance and standard heterosis in desirable direction recorded in several crosses. Out of 45 hybrids, four hybrids CF₃ X CF₄, CF₃ X CF₇, CF₄ X CF₇, CF₆ X CF₈, were found to be out standing for majority of the confectionery seed characters and out yielded the check hybrid MSFH-17 (CF₁₁). The maximum value of standard heterosis for seed Yield per plant was observed

in CF₄ X CF₇ (76.00) and CF₃ X CF₄ (63.81).

The combining ability studies indicated the higher ratio of SCA and GCA variances for all the characters studied indicating predominance of non additive gene action. Among female parents CF₃, CF₄ and CF₆ and among male parents CF₇, CF₈ and CF₄ are the good general combiners for majority of the traits studied. The study of sea effects revealed that the performance of hybrids for majority of the characters were higher than the parents having High X Low gca effects except for oil content and hull content where Low X Low combinations of gca effects of parents were observed. The specific combining ability showed that the hybrids CF₃ X CF₇ (Acc. No. 1258-1-1 X Acc. No. 1168-1-3), CF₆ X CF₈ (Acc. No. 1174-1-1 X Acc. No. 1502-2-1) and CF₃ X CF₄ (Acc. No. 1258-1-1 X Acc. No. 1184-1-6) proved to be the best specific combiners for majority of the confectionery traits.

PLANT BIOTECHNOLOGY

Intra and Inter-Cultivar Molecular Polymorphism in Native Chilli (*Capsicum annuum* L.)

KASHINATH PAWAR

2000

MAJOR ADVISOR : Dr. V. V. SHENOY

An investigation was undertaken to assess the genetic diversity within and among the three native chilli cultivars, viz., Byadgi Dabbi, Byadgi Kaddi and Sankeshwar, both at the morphological and molecular levels. At the morphological level, fruit length as well as fruit colour were assessed. The three cultivars differed significantly for these traits. The molecular polymorphism was assessed employing the RAPD analysis, wherein, five random decamer primers were used. The primers generated 187 RAPD loci, of which 97 were polymorphic. The level of polymorphism generated was 48.5 per cent.

The level of polymorphism brought out by individual primers varied. OPJ-10 amplified largest number of polymorphic bands, hence could be more useful in further studies. The cultivar Sankeshwar showed maximum polymorphism followed by Byadgi Dabbi and Byadgi kaddi. However, this did not coincide with the morphological polymorphism observed for the fruit characters. Further work is necessary employing larger number of primers to identify greater polymorphism among cultivars with contrasting phenotypes for desired characters like fruit length, fruit colour and pungency.

SEED SCIENCE AND TECHNOLOGY

Influence of Stages of Harvesting on Seed Yield, Quality And Incidence of *Aspergillus flavus* in Confectionery Groundnut Varieties

MANOHAR THIMMANNAVAR

2000

MAJOR ADVISOR: P. N. UMAPATHY

In an attempt to find out the influence of stages of harvesting on seed yield, quality and incidence of *Aspergillus flavus* in confectionery groundnut varieties, a field experiment was conducted during kharif 1998 at College of Agriculture Farm, University of Agricultural Sciences, Dharwad. The experiment consisted of 18 treatment combinations comprising six varieties (TKG-1 9A, ICGV 86564, BAU-1 3, Somanath, JL-24 & Dh-3-30) and three harvesting stages viz., one week early, normal and one week late stage in randomized block design with factorial concept. The results indicated that in yield and its attributing characters, JL-24 recorded higher number of pods per plant, pod and seed yield per plant, pod and seed yield per hectare. Among the harvesting stages, the normal harvesting stage resulted in higher values in these parameters followed by later and early harvesting stages. The seed quality parameters like sound mature kernels, shelling percentage, vigour index, field emergence, germination percentage, shoot and root length and oil

content were highest in JL-24 with minimum electrical conductivity, moisture content and less incidence of *Aspergillus flavus*. The variety BAU-1 3 resulted in higher incidence of *Aspergillus flavus*, electrical conductivity and moisture content. Whereas, ICGV 86564 recorded highest 100 seed weight. Among the harvesting stages, the normal stage recorded higher values with lesser incidence of *Aspergillus flavus* and electrical conductivity followed by late and early harvesting stages. The variety BAU-1 3 recorded highest per cent recovery of bold seeds with less recovery of medium and small seeds. The recovery of bold and medium seeds was higher with lower recovery of small seeds in normal harvesting stage. Among the confectionery varieties ICGV 86564 was found to be superior for various quality parameters ultimately resulting in higher returns of Rs.43,353/ha. Hence, it is concluded that this variety can be grown under Dharwad condition for confectionery purpose.

Effect of Accelerated Ageing and Seed Treatment on Storability of Groundnut (*Arachis hypogaea* L.) Varieties

R.K. SARWAD

1999

MAJOR ADVISOR : Dr. V.K. DESHPANDE

The study was comprised of two laboratory experiments to predict the storability of three groundnut varieties through accelerated ageing (AA) test and to evaluate the effect of seed treatment on storability of groundnut kernels in comparison with pods under ambient conditions of Dharwad from December 1997 to October 1998 in the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad.

The pods of three groundnut varieties harvested from Kharif were divided into two sets. One set was subjected to accelerated ageing ($42 \pm 1^\circ\text{C}$ and 95% RH) periodically for 9 days and another set was stored under ambient condition in cloth bag. Experimental results indicated that JL - 24 maintained germinability above certification standards (70%) throughout the storage period whereas, R-8808 and ICGS-1 1 retained the certification

standards for only eight and seven months respectively. It could be predicated that 5 days of AA was equated to nine months and eight months of storability in JL-24 and R-8808 respectively. The poor storer ICGS-1 1 which retained its germinability for seven months was equated to four days of AA.

In another storage experiment conducted upto nine months, the halogenated groundnut kernels with bleaching powder (Calcium hypochloride) maintained higher germinability upto six months followed by seeds coated with ash+captan (five months) and seeds coated with captan + malathion (five months) when compared to control (3 months). Other seed quality attributes and seedling vigour were maximum with halogenation treatment throughout the storage period indicating the feasibility of kernel storage for a period of six months under the scarcity of space.

SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

Efficient Utilization of Rock Phosphate Through Integrated Nutrient Management Approach in Upland Paddy

SUNIL D. TAMGALE

1999

MAJOR ADVISOR : Dr. P. A. SARANGAMATH

An investigation was carried out in the laboratory to study the dissolution of rockphosphate with P-sources and a field experiment at ARS Mugad, UAS, Dharwad, in upland paddy soils, during kharif season of 1998. The experiment was laidout in a randomized block design with 14 treatments and three replications. The phosphate sources used were DAP, Mussoorie rockphosphate (MRP) and Binaga factory sludge, while the organic manures used were biogas slurry, farm yard manure and verimicompost. A phosphate solubilizing bacteria (PSB) *Pseudomonas striata* and pyrite were used as P-solubilizers.

The results of the phosphate dissolution revealed that application of MRP in combination with pyrite and PSB proved to be significantly superior to sole application of MRP with respect to dissolution by 0.5M NaOH and 0.25M BaCl₂ TEA as extractants. Bray's extractant at different intervals of incubation, DAP+FYM was found to be significantly superior to MRP which shows the higher P-availability.

Among P-sources, DAP+FYM gave maximum grain yield which was 11.4 per cent higher when compared to MRP. Drymatter production, thousand seed weight, P-uptake by crop and available P in soil at all the stages of crop growth followed the same trend. When organic manures were applied along with MRP and PSB there was an increase in grain yield, when compared to the use of MRP alone. Among them BGS recorded 31.33 q/ha grain yield.

The use of MRP along with pyrite and PSB recorded 32.05 q/ha grain yield which was on par with MRP amended with organic manures irrespective of P-solubilizers but were superior over control and MRP applied alone. Binaga factory sludge which is the waste of orthosphoric acid industry and used as P-source recorded again yield of 31.05 q/ha which was on par with MRP amended with organic manures but significantly superior over control and MRP applied alone.

Characterisation of Hubli - Dharwad Urban Sewage and Its Impact on Soil Properties

RENUKAPRASANNA, M.

1999

MAJOR ADVISOR : Dr. H. T. CHANNAL

In the present study, the sewage water samples of Hubli and Dharwad cities were analysed for different parameters such as pH, EC, BOD, suspended solids, cations, anions and heavy metals at monthly intervals for a period of one year and at every kilometre from the sewage outlet upto ten kms. Three profiles in farmers' field irrigated with sewage such as near the sewage outlet, 5 km and 10 km along the sewage drain and two profiles wherein sewage irrigation was not practiced were taken to study the effect of sewage water irrigation on different soil properties.

The study revealed that except HCO₃ content, remaining parameters of Hubli sewage were higher than the Dharwad sewage. Lowest concentration of different parameters were recorded during rainy season, while higher concentration was recorded during summer. A decrease in the concentration of the said parameters were recorded as the distance from the sewage outlet increased. The pH, EC, BOD, suspended solids and SAR of both Hubli and Dharwad sewage were within the permissible limits, chloride

and manganese concentration was more than the permissible limits for irrigation purpose. Heavy metals such as Cd and Cr were present in below detectable limits and the concentration of Pb was within the permissible limits.

Sewage irrigated profiles had very low infiltration rate, lower BD, increased volume of expansion and MWHC than sewage unirrigated profiles. Higher pH, EC, CEC and content of exchangeable cations, organic carbon were recorded in the sewage irrigated profiles. An ESP > 15 was registered at lower depths in the soil profile irrigated with sewage near the outlet both in Hubli and Dharwad.

Sewage irrigated profiles had higher nutrient status than unirrigated profiles and it decreased as the distance from the outlet increased. Higher content of micronutrients in sewage irrigated profiles was also recorded. The content of heavy metals in sewage irrigated profiles were within the permissible limits.

AGRICULTURAL ENTOMOLOGY

Bio-Ecology of Stem Borer, *Chilo partellus* (Swinhoe) and Impact of Its Damage on Juice Quality of Sweet Sorghum

K. N. MARULASIIDDESHA

1999

MAJOR ADVISOR : Dr. I. G. HIREMATH

Investigations on the sorghum stem borer, *Chilo partellus* (Swinhoe) with reference to its biology, population dynamics, varietal interaction and its damage impact on juice quality and quantity parameters of sweet sorghum were made during 1998-99 at Main Research Station, Dharwad.

The incubation period ranged from four to seven days on both SSV-74 and CSH-14. Larva passed through six instars on both sweet sorghum and grain sorghum. The total larval period ranged from 19 to 47 (32.08 days) and 21 to 49 days (34.84 days) on sweet sorghum and grain sorghum, respectively. The total life cycle occupied 30 to 65 days (45.16 days) on sweet sorghum and 31 to 69 days (48.39 days) on grain sorghum.

The pest entered the larval diapause in dry stalks from October and continued upto the end of March. Maximum moth emergence (35.2%) was noticed in the month of June. More number of egg masses, larvae and

pupae were noticed during September, October and November, respectively during *kharif*. In rabi-summer they were more in January, February and March, respectively.

Cotesia flavipes (Cameron) was found very active during *kharif* and maximum parasitization (28.78%) of larvae was noticed in November. In contrast, the activity of *Sturmiopsis inference* (Townsend) was only in rabi-summer with maximum parasitization (28.50%) in February.

Among the 23 genotypes screened for stem borer reactions SSV-7073, HES-4 and SSV-53 were found promising. The genotype SSV-7073 registered minimum loss in fresh cane weight (5.05 %) and sugar yield (10.67 %) as compared to SSV-74 (30.80% and 62.73%, respectively). Similar trend was noticed with respect to other parameters viz., brix, sucrose content, purity, pol per cent, CCS per cent, reducing sugar, cane yield and sugar yield.

Biology and Management of *Caryedon serratus* (Oliver) in Groundnut

DHANARAJ HALLE

1999

MAJOR ADVISOR : Dr. J. S. AWAKNAVAR

Investigations on the biology of *Caryedon serratus* (Oliver) in groundnut and other alternative hosts, field carryover of *C. serratus*, bioefficacy of insecticides and botanicals and distributions of *C. serratus* in Gadag, Haveri and Dharwad districts was undertaken during 1998-99.

Studies on biology of the pest on nine alternative hosts revealed that *Tamarindus indica* L. was most preferred (70.51 days) followed by groundnut (79.35 days), whereas, it failed to complete its biology on *Albizia lebbek* Benth, *Pongamia pinnata* L. and *Cassia tora* L. Detailed biology on groundnut revealed that incubation period occupied 9-14 days. First, second, third and fourth instar occupied 8.74, 10.96, 9.36 and 6.47 days, respectively. The average pupal period lasted for 26.33 days. Pre-oviposition period and oviposition period lasted for 4.17 and 8.7 days, respectively. Adult males lived for 12.9 days while females lived for 13.43 days. Survey of pest on alternative hosts revealed that only eggs were found on *T. indica* and *Acacia*

farnesiana L. where as on other alternative hosts eggs were not recorded.

The bioefficacy of insecticides and plant products against *C. serratus* revealed that surface treatment of gunny bags with deltamethrin 0.025% was most effective followed by carbaryl (1 %) and malathion (1 %). Among different admixtures malathion and fenvalerate alone were found most effective followed by *Acorus calamus* Linn. The combinations of insecticides as surface treatment of gunny bag and plant products as admixtures with pods showed that deltamethrin in combination with all plant products found to be significantly superior over other treatments. Distribution of *C. serratus* in Dharwad, Gadag and Haveri districts revealed that maximum cocoons and adults were observed in the month of October. Higher incidence of *C. serratus* observed in Gadag district, while lower incidence was recorded in Dharwad district.

PLANT PATHOLOGY

Studies on Leaf Blight of Garlic (*Allium sativum* L.) Caused By *Alternaria porri* (Ellis) Cif.

SHRIKANT B. PATIL

2000

MAJOR ADVISOR : Dr. M. S. KULKARNI

Garlic (*Allium sativum* L.) is one of the important bulb crops in the world and ranks second next to onion. Among foliar diseases, *Alternaria* leaf blight caused by *Alternaria porri* inflicts more damage and causes considerable loss in yield.

Survey carried out during kharif and rabi 1998-99 in parts of Karnataka revealed that, the highest per cent disease index (83.23%) of *Alternaria* leaf blight was recorded in Dharwad taluk during kharif and in Gokak taluk (77.15%) during rabi. On the basis of morphological and cultural characters, the pathogen was identified as *Alternaria porri* (Ellis) Cif.

Among the solid media tested, the highest radial growth was observed on Czapeck's medium (89.67 mm). Good sporulation was observed in glucose asparagine medium. Among different liquid media tested, Richard's broth supported the maximum growth of the fungus (436.78 mg) followed by potato dextrose broth (375.34 mg), Czapeck's (327.74 mg) and Sabouraud's broth (295.66 mg).

The highest spore germination after six hours was observed in one per cent sucrose solution (92.18%) followed by one per cent glucose and Richard's solution.

Out of twenty seven hosts tried, only *Allium cepa* showed severe symptoms. Cross inoculation studies between onion and garlic proved that, onion was the collateral host of *Alternaria porri*. Early sown (July) crop recorded the highest disease intensity (70.72%) and least disease intensity was observed in crop sown in October (23.93%). Of the twenty two local garlic cultivars screened, Athani-B, Teradal, Halyal, Bailhongal and Hidakai local showed moderately resistant reaction to the disease.

Out of the six fungicides tested in vitro against *A. porri*, Difenoconazole (Score) at 0.1 per cent and Mancozeb (Indofil M-45) at 0.3 per cent were found to be the best in inhibiting the growth of the fungus. These fungicides recorded the highest yield and lowest disease intensity when tested in field conditions.

Studies on Foliar Diseases of Sesame

SHEKHARAPPA G.

1999

MAJOR ADVISOR : Dr. P. V. PATIL

Among several foliar diseases affecting sesame crop, *Alternaria* leaf spot caused by *Alternaria sesami* and white spot caused by *Cercophora sesami* has become a major constraint in sesame cultivation. Therefore, these foliar diseases have been studied in detail with different objectives with an ultimate aim of the control of these diseases.

Survey revealed that maximum disease severity of *Alternaria* leaf spot was recorded from Dharwad taluk of Dharwad district and Basavakalyan taluk of Bidar district. Among the 172 sesame genotypes including three wild species screened against foliar diseases under field conditions, three wild species viz, *Sesamum malabaricum*, *S. occidentalis* and *S. radiatum* were found resistant and 12 genotypes (Kalika, DORS-2 DS-9, 10, 28, 57, Bijapur local (brown), Tanikeri local, BSG-26, Kudalagi local,

Madhavi and AVT-13) showed moderately resistant reaction to *Alternaria* leaf spot.

In case of *in vitro* evaluation of nine fungicides, mancozeb and Azadirectin @ 0.3%, difenconazole and propiconazole @ 0.1% against *Alternaria sesami* and carbendazim @ 0.1 % and mancozeb @ 0.3% against were found most effective. Copper oxychloride and Azadiractin (Nimbidine) at all the concentrations tested were found least effective in inhibition of mycelial growth of both the fungi.

In field evaluation of ten chemicals, 3 sprays of mancozeb (0.3%) + streptocycline (0.25%) combination and mancozeb (0.3%) alone have significantly reduced the severity of foliar diseases and increased the seed yield and oil content.

AGRICULTURAL MICROBIOLOGY

Effect of Long Term Integrated Nutrient Management of Sorghum (*Sorghum bicolor* (L.) Moench] Based Cropping Systems on Dynamics of Soil Microflora and Soil Enzymes

Y R GOVEKAR

1999

MAJOR ADVISOR : Dr. V. S. EMMIMATH

The dynamics of soil microflora and soil enzymes were studied in a long term integrated nutrient management experiment in a fixed site during the year 1998-1999. A field experiment was initiated by AICRP on Sorghum at Main Research, Station - Dharwad (1991-92) which included two cropping systems as a main plots and five combination of organic and inorganic sources as a sub-plots. Cropping systems had significant influence on soil microflora (Bacteria, fungi, actinomycetes, nitrogen fixing bacteria and P-solubilizing bacteria) and soil enzymes (urease and dehydrogenase). Groundnut-sorghum cropping system recorded maximum microbial population and enzyme activities as compared to the sorghum - safflower cropping system. Cropping systems had no significant influence on chemical properties of the soil. However, groundnut -

sorghum cropping system recorded higher level of organic carbon, available nitrogen and available phosphorus as compared to the sorghum - safflower cropping system. Organic carbon, available nitrogen, available phosphorus, soil microflora and enzyme activities of the soil were significantly increased, with the combined application of organic and inorganic fertilizers as compared to RDF and control (without any application). There was positive correlation between soil microflora, soil enzymes and nutrient availability. Application of crop residues + 50% RDF recorded the highest sorghum and groundnut yield during kharif when compared with other treatments. Whereas during rabi application of FYM + 50% RDF registered the higher safflower yield. However, 50% RDF + crop residues recorded the highest sorghum yield during rabi season.

AGRICULTURAL ECONOMICS

Economics of Crop and Livestock Enterprises Under Rainfed Condition of Gadag District

BASAVARAJ C. RAJUR

1999

MAJOR ADVISOR : Dr. H. BASAVARAJ

The present study was undertaken to examine the economics of crop and livestock enterprises under rainfed condition of Gadag district. The cost A in different crops varied between Rs.3674.00 in jowar and Rs.7608.00 in bengalgram. The cost B was highest in bengalgram and lowest in greengram. Similar trend was noticed, with respect to cost C. The returns were highest in bengalgram and lowest in greengram. The cost of production per litre of milk worked out to Rs.4.19 in cows that Rs.5.46 in buffaloes. The net returns realised from cows was highest. The net return was almost identical in Groundnut, Wheat and bengalgram where the ratio was hovering around 1 : 13.

The total cost per unit of 100 birds worked out to Rs. 11,513.56 for layers and Rs. 11,200.74 for broilers. The benefit per rupee spent in egg production was 2.23 in

layers and 2.32 in broiler. All increasing return to scale was evident in the case of sunflower, while a decreasing return to scale was noticed in cultivation of Groundnut. A high proportion (80%) of variation in gross returns from buffaloes was explained by the variation in four variables included in the production function, whereas in the case of cows these variables explained 77 per cent of variation in gross returns. A very high proportion (99%) of variation in the gross returns from layers farm and broiler farm was explained by the variation in the resources included in the production functions. A low proportion of farmers were operating in high efficiency level which was around 11 per cent in the case of cows and only 8 per cent in the case of buffaloes. The average technical efficiency in broiler farms was 75 per cent while it was 76 per cent in layer farms.

Economics of Processing and Marketing of Rice in Tungabhadra Project Area, Karnataka

ANILKUMAR P. KOUJALAGI

1999

MAJOR ADVISOR : Dr. L. B. HUGAR

In general, the performance of large size rice mills was better than medium and small size rice mills, in terms of procurement costs, output, power consumption and

returns, indicating economics of scale and their viability.

The pattern of procurement of paddy indicated that rice mills procured highest quantity of paddy from farmers

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through commission agents (61.75%). The disposal pattern of rice revealed that small (44.72%) and medium (42.51%) size rice mills sold their major quantity of output to the markets located within the state while large size rice mills (60.00%) resorted to the markets outside the state and country through brokers. Therefore, the association of rice millers for export of rice may give better dividend than depending on brokers. The processing cost was found to be higher in larger size mills (Rs.701.26/q), compared to medium (Rs.608.54/q) and small (Rs.558.60/q) size rice mills. Of the total processing cost, variable cost formed major component (96.56%) in all the categories of rice mills. The net returns per quintal output obtained were higher large size rice mills (Rs. 121.33), compared to other categories of rice mills. Further, business ratio analysis showed that large size rice mills earned higher profit than small and medium size rice mills. However, the capacity utilization in all the categories of mills was poor (53.49%)

mainly due to irregular power supply and inadequate supply of raw material. The power consumption decreased with the increase in the size of the mill. As the rate of outturn of head rice increased with the size of the mill small and medium size ricemills may, by processing more quantity, improve their recovery percentage. The actual production of out put in all the categories of mills was more than the break even volume of output.

As per the perceptions of rice millers, the present levy system is not beneficial either to the Government or to the millers. So, there is a need to rationalize the existing levy system as well as lifting of trade barriers which would reduce corruption and malpractices and thereby provide favourable environment for rice trading. To improve the transportation facility and to reduce cost of transportation, establishment of co-operative transport service societies can be thought of.

An Economic Analysis of Selected Agricultural Systems in Tungabhadra Project Area, Karnataka

YERRISWAMY, J

1999

MAJOR ADVISOR : Dr. L. B. HUGAR

The study was undertaken (1997-98) in Tungabhadra Project (TBP) area to assess the selected agricultural systems which were identified on the basis of adequacy of irrigation water and period of practice of irrigated agriculture namely (i) Ancient Irrigated Agricultural System (AIAS) which is under irrigation from the period of Vijaynagara empire (last 3-4 centuries) with assured supply of water (ii) Highly Intensive Agricultural System (HIAS) under irrigation for the last 4 decades with assured supply of water and (iii) Semi-Intensive Agricultural System (SIAS) under irrigation for the last 2-3 decades with inadequate water supply. The cropping pattern was found to be highly diversified in SIAS and AIAS whereas monoculture of paddy was noticed in HIAS. The cropping intensity as well as cultivable land use index were also higher in AIAS over HIAS indicating higher land use efficiency in AIAS. The input use pattern in paddy clearly revealed that the cost on plant protection chemicals and chemical fertilizers formed the major components of total cost in HIAS and SIAS while the cost on labour in AIAS. The net returns of *kharif* paddy was found to be higher in AIAS (Rs. 20,002/ha), compared to HIAS (Rs. 17,408/ha) and SIAS (Rs. 14,402/ha) mainly due to higher cost on plant protection chemicals and fertilizers in HIAS. The resource use efficiency of fertilizers and plant protection chemicals indicated their excess use

in paddy cultivation under HIAS and SIAS.

It is worth noting that the intensity of all selected indicators namely, cropping intensity, irrigation intensity, plant protection chemicals use intensity, fertilizer use intensity, high yielding variety seeds use intensity, machine power use intensity, commercial crops intensity and labour use intensity were found to be higher in HIAS except organic manure use intensity which was found to be higher in AIAS. Intensity of other resources found to be moderate in AIAS. Intensity of all indicators were lower in SIAS in view of risk of irregular and inadequate supply of canal irrigation water. The Composite Efficiency Index (CEI) as well as Composite Yield Index (CYI) of AIAS was found to be high indicating its efficiency as compared to other systems. The position of socioeconomic status of sample farmers in both HIAS and AIAS appears to be better than those in SIAS.

The practice of agriculture in AIAS with higher use of organic manures, appropriate crop rotations and less use of plant protection chemicals appears to be sustained over years in terms of higher composite yield index. Hence, farmers under HIAS and SIAS needs to be educated with such practices of sustainable agricultural system as well as to improve their socio-economic status.

AGRICULTURAL EXTENSION EDUCATION

A Study on Knowledge, Adoption and Marketing Pattern of Pomegranate Growers in Bagalkot District, Karnataka State

SIDDAPPA C. ANGADI

1999

MAJOR ADVISOR : Dr. J.G. ANGADI

The study on knowledge, adoption and marketing pattern of pomegranate growers in Bagalkot district, Karnataka state was carried out during 1998-99. By following proportionate random sampling 160 farmers were selected and data were collected by personal interview method.

The important findings of the study were, a majority of the growers (63.75%) had medium level of knowledge about pomegranate cultivation. The findings on adoption of recommended cultivation practices by the pomegranate growers revealed that cent per cent of the pomegranate growers adopted Ganesh variety. Recommended spacing was followed by 61.25 per cent of the pomegranate growers.

- More than half - the number of pomegranate, growers (53.75%) groundnut as an intercrop. Nearly 62 per cent of the pomegranate growers had applied nitrogen in the range of 450-690 g/plant, whereas 86.88 per cent had applied phosphorus in the range of 400-570 g/plant. In case of application of potashic fertilizer fifty per cent of the pomegranate growers applied in the range of 180-375 g/plant. Basin method of irrigation was followed by 57.50 per cent of the pomegranate growers. A majority of the growers

(78.60%) were literate. Maximum number of growers (62.50%) possessed medium land holding of 10-30 acres. Extension participation and social participation of the pomegranate growers were low. Half the number of growers (50.63%) had medium level of economic motivation. The average maintenance cost incurred on one acre of orchard ranged from Rs. 5,500 to Rs. 8,500. A positive and significant relationship was observed between knowledge, education, land holding, annual income, extension contact, mass media participation, material possession and economic motivation. Age was found to be negatively significant with the knowledge level of the respondents.

A majority of the growers (74.77%) sold, pomegranate through auction in different market places. Nearly fifty per cent of the growers received market information from farmers who visited market. The major constraints faced by pomegranate growers in cultivation and marketing of produce were, irregular supply of electricity (83.75%), costliness of packing material (79.38%) and expensive nature of fertilizer and plant protection chemicals (53.12 and 52.50%).

FOREST BIOLOGY AND TREE IMPROVEMENT

Management of Root Rot of *Casuarina equisetifolia* Linn.

PATIL SANTOSH

1999

MAJOR ADVISOR : Dr. S. T. NAIK

Casuarina equisetifolia is a fast growing, tree species extensively, grown in the coastal regions of South India because of its multifarious uses. Among various biotic factors which limit the successful establishment and production of the crop, root rot caused by *Macrophomina phaseolina* (Tassi) Goid. is one of the important diseases. Survey conducted for root rot indicated that disease incidence was moderate in, nurseries where as the plantations of less than six years recorded the highest incidence (46.55 per cent). Less annual rainfall coupled with lesser number of rainy days favoured the disease development.

Based on the morphological characters of the pathogen and the typical symptoms produced the causal organism was identified as *Macrophomina phaseolina*. Analyses of physical and chemical properties of the soil collected from different plantations indicated that plantations

with higher sand content (83.72 per cent) and C: N ratio manifested higher disease incidence (7.01).

Antagonistic organisms tried under *in vitro* conditions revealed that *Trichoderma viride*, and *T. harzianum* completely inhibited the growth and development of *M. phaseolina*. Experiment conducted to test the efficacy of antagonists under nursery conditions indicated that the treatment with *M. phaseolina* (T_2) showed lowest per cent seedling emergence (35.75 per cent) compared to that of control. However, addition of antagonistic organisms such as *T. viride* either through soil application or seed pelleting restored the seedling emergence to the level of control.

Per cent survival of the seedlings at regular interval of six weeks indicated that the treatment (T_2) with pathogen showed lowest survival, while the treatment (T_3) with *T.*

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viride (through soil application) recorded the highest survival. Survival of seedlings in T_3 was higher by 6.33, 31.81 and 60.5 per cent over T_2 after six, twelve and eighteen weeks, respectively. Seedling parameters such as height, shoot length and root biomass were greatly influenced by the application of antagonists.

Population estimation after eighteen weeks of incorporation of the treatment revealed that the population of *M. phaseolina* increased by 120 folds, while the population of *Trichoderma* Spp. and *Pseudomonas fluorescens* increased by six to seven and eight to thirteen folds, respectively.

SILVICULTURE AND AGROFORESTRY

Collection and Evaluation of *Solanum viarum* Dunal. Germplasm from Central Western Ghats of Karnataka

BALIRAM G. NAYAK

2000

MAJOR ADVISOR : Dr. S. K. PATIL

Solanum viarum is a rich source of solasodine, an important substitute for diosgenin and a precious steroidal alkaloid in pharmaceutical industry for synthesis of contraceptives, corticosteroids and sex-hormones. Seven collections from different places of Uttara Kannada district of Karnataka, and one standard variety (Arka Sanjeevini) of Bangalore, were evaluated to screen and identify the best genoplasm for solasodine yield. Out of these Arka Sanjeevini and Bhatkal collection emerged as most promising ones with high dry weight of berries per plant and per unit area, solasodine content, solasodine yield per plant and per unit area, number of berries per plant, flowering period, days to blooming and number of leaves per plant. All these traits also shown high genotypic variances,

genotypic coefficient of variability, heritability coupled with high genetic gains. Positive and higher genotypic correlation coefficients and appreciable direct and indirect effects of character combinations involving above said parameters and their intricate impact on solasodine content suggested that these traits are of paramount importance for making selection and further improvement in this crop. Residual value of 32.50 per cent indicates that most of the solasodine content attributing traits have been accounted in the present investigation. It is better to harvest berries in matured coloured stage as they contain maximum solasodine content in that stage, consequently, high yield per plant.

Variability and Site Interaction Studies in *Dendrocayamus strictus* Nees.

MAJID IQBAL

2000

MAJOR ADVISOR : K. V. DEVAR

Dendrocayamus strictus, is one of the most economically important and widely distributed bamboo species of India showing considerable morphological variations. Phenotypic selection of superior individuals within a species forms the basic part of the most tree improvement programs. Mere selection of best genotype can give substantial gain in terms of production of biomass per hectare per year and economic returns. Survey was done in ten different Forest Ranges belonging to three different Forest Circles for variability study. Totally eighty six candidate clumps were selected. Clump characters showed higher variation than the culm characters. Among the Forest Ranges, Barchi Forest Range showed higher variation for all phenotypic characters.

The correlation worked out showed that among the seven different characters the culm diameter, number of culms/clump, node length and crown diameter were important independent characters associated positively and significantly with culm volume. For site interaction study, plantations of two age groups (6 to 7 and 12 to 14 years) were selected from Haliyal, Sirsi and Yellapur Forest Divisions. For both the age groups, performance was found to be better on sites having red loam to red lateritic soils with pH of 6.0 on mild slopes with North-West exposure, and altitude ranging from 480 m to 550m MSL. Best growth was recorded on sites receiving an annual rainfall of 1200 mm. There was linear increase in most of the growth parameters as there was increase in values of nitrogen, phosphorous, potassium, calcium and magnesium.

HORTICULTURE

Standardization of Production Practice in China Aster (*Callistephus chinensis* Ness.)

PRASANNA, M.P.

1999

MAJOR ADVISOR : Dr. P. NARAYANA REDDY

Investigation on standardization of production practices in china aster (*Callistephus chinensis* Ness.) was conducted at Regional Research Station, Raichur during

kharif season of 1998. Results indicated that performance of three varieties of aster viz., Kamini, Aster Purple and Aster white was better under second week of August and

September month planting with more number of branches, more number of flowers per plant and maximum weight of hundred flowers, which reflected in higher yield of flowers per unit area. Among the three varieties Kamini performed better with lesser variation in yields under varied dates of planting compared to other two varieties. Pinching and growth retardant (CCC) spray helped in increasing the yield and quality flowers in Kamini cultivar of aster. Treatments

T₅ (CCC 2000 ppm spray at nursery, 25 DAS, and pinching at planting) and T₇ (CCC spray 2000 ppm both at nursery and main field) were found to be better for increasing the yield. Among different preservatives used to increase the vase life of cut flowers sugar solution at one percent was found to be better preservative for china aster.

FAMILY RESOURCE MANAGEMENT

Adequacy of Artificial Lighting in Living Room and Study Area of Urban Residential Homes in Dharwad City, Karnataka

SHILPA NANDI

1999

MAJOR ADVISOR : SUSHEELA SAWKAR

The study was under taken during 1998-99. The objectives were to determine the existing intensity of artificial lighting and compare with the recommended standards and to know the awareness with regard to adequacy of artificial lighting. Data were collected from the different socio-economic groups as classified by HUDCO (1998) as low income (Rs.2100-4500 per month), middle income (Rs.4500-7500 per month) and high income (more than Rs.7500 per month). Thirty households from each income group were selected by stratified random sampling method. The questionnaire-cum-interview method was used to collect data from the head of the households and the respondents. The intensity of artificial light in living room and study area were measured by using Digital Luxmeter (TES 1332) between 7 to 9 p.m. The living room was divided into 20 equal parts and study area into 4 equal parts. Luxmeter was kept horizontally at the centre of each part and mean intensity of artificial light was calculated.

The salient findings were that majority of the

households used fluorescent tubes in living room compare to incandescent bulbs. Irrespective of the income groups, all the households used general lighting arrangement, in living room and study area. Mean intensity of artificial lighting in living room and study area was 69.28 and 72.04 lux, which was highly inadequate, compared to the recommended standards of 300 lux for living room and 1.50 lux for study area. The intensity of artificial light in living room and study area was slightly higher in high income group i.e. 72.56 and 74.13 lux compared to middle income, 68.22 and 68.88 lux and low income group, 68.47 and 68.04 lux respectively.

Hence the adequacy, type and proper arrangement of artificial lighting in home needs to be improved for the health, comfort and well being of family members which presently families are unaware. The usage of fluorescent tubes and adequate task lighting were suggested which lasts longer and also conserve valuable energy.

VETERINARY SURVEY AND RADIOLOGY

Study on Incidence of Eye Disorders and Use of Orbital Prosthesis After Extirpation in Experimental and Clinical Cases of Ruminants

ASHOK S. GHONASGI

1999

MAJOR ADVISOR: Dr. SHIVSLINKAR M. USTURGE

The incidence of eye disorders in ruminants was studied in six different veterinary hospitals of Bidar district between the year 1994 to 1998 during all the seasons. Methylmethacrylate implants was evaluated in twelve experimental buffalo calves by two techniques viz., open method of orbital prosthesis (6 animals) and by closed method of orbital prosthesis (6 animals). The implants were evaluated post operatively for two months on all the animals by clinical, physiological, haematological, biochemical, radiological and histological observations. Subsequently, the material was tested in five clinical cases of large animals suffering from irreparable eye disorders.

The incidence of eye disorders constitute an

alarming number (0.67%) in ruminants when compared to other ailments. The bovines (0.63%) were more commonly affected than caprines (0.04%). The season location and years had no significant bearing on the incidence of eye disorders. The closed technique of methylmethacrylate implant was found to be superior when compared to the open method of orbital implant. The study also revealed that methylmethacrylate is suitable implant in eye extirpated animals. The methylmethacrylate was found to be inert materials suggested by the minimal changes in physiological, haematological, biochemical, radiological and histological studies. The changes in these parameters were similar to normal surgical stress.

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