

**Epidemiology and Management of Leaf Blight of Wheat Caused by *Exserohilum hawaiiensis*  
(Bugnicourt) Subram. and Jain. Ex. M.B. Ellis**

VASANT S. PATIL

2000

MAJOR ADVISOR : Dr. SRIKANT KULKARNI

The leaf blight of wheat caused by *Exserohilum hawaiiensis* is one of important diseases of wheat. The survey revealed maximum disease incidence in Raibag, Gokak, Athani and Dharwad taluks in Karnataka and Mahabaleshwar, Pune, Karad, Niphad taluks in Maharashtra. The loss assessment study indicated reduction in thousand grain weight (18.12%), grain yield (31.30%) height of plants (7.05%) and biomass (19.17%). Crop loss model using input variable PDI was of the form  $y = -32.33 + 1.16 (PDI)$ .

The pathogen survived only for few weeks in soil, as it was highly aerobic. The pathogen survived under laboratory conditions for 21 months, 15 months under natural conditions, 27 months under refrigerated conditions and remained viable in seed for 28 months.

The pathogen could infect *Chloris barbata*, *Dectyloctenium aegypticum*, *Eleusine coracana*, *Oryza sativa*, *Sorghum bicolor* and *Zea mays*. The perfect state of the pathogen could not be detected. The spore load of *E. hawaiiensis* showed fluctuations over time from 2.38 to

8.08 per cent microscopic field per day. Eight isolates obtained from field of different localities. The variability among hyphal tip isolates was assessed on the basis of morphological, cultural physiological, nutritional and pathogenicity characters. The isolates were classified into four groups such as Group-I : E, F, G, Group-II: B and C, Group-III: D and H, Group-IV: A based on their cultural characters.

On the basis of pathogenicity, isolates were classified into three group as highly virulent (Mahabaleshwar and Ugar Khurd), Moderately virulent (Arabhavi, Dharwad and Sangankeri) and least virulent (Kannur, Digraj and Pune). Seed treatment with captan or mancozeb or combination of either of them with *Trichoderma viride* recorded cent per cent control of primary seed borne inoculum. Among the fungicides, propiconazole was found effective. The plant extracts viz., *Eucalyptus globus*, *Lantana camara*, *Flacourtia ramontchi*, *Acacia concina*, *Mimosa pudica* and *Mangifera indica* were found effective against *E. hawaiiensis*.

**SEED SCIENCE AND TECHNOLOGY**

**Influence of Seed Production Techniques on Seed Yield, Quality and Storability  
in Okra (*Abelmoschus esculentus* (L.) Moench)**

ASHOK S. SAJJAN

2000

MAJOR ADVISOR : Dr. M. SHEKHARGOUDA

Okra is an essentially tropical vegetable and cultivated throughout India mainly as a kharif crop. The non-availability of quality seeds of improved varieties is one of the major production constraints in India. To tackle the various production constraints, four field experiments were carried out at Agricultural Research Station, Bagalkot and one laboratory study was initiated in the Dept. of Seed Science and Technology, College of Agriculture, Bijapur during kharif 1998 and rabi 1998-99.

The data revealed that, sowing in month of July 15<sup>th</sup> coupled with spacing of 60 x 30 cm and 150 kg N per ha higher processed seed yield (1139.7 kg/ha) during kharif while in rabi, the number 15<sup>th</sup> sowing the same treatment combination recorded higher seed yield (745.3 kg/ha) with better seed quality parameters. The July 15<sup>th</sup> sowing coupled

with 60 x 30 cm spacing and 125 kg N per ha, followed by same sowing date spacing and at 125 kg N per ha produced higher seedling vigour in okra.

Apical pinching at 20 DAS and picking of two early formed green fruits for vegetable purpose recorded higher processed seed yield (1078.0 and 884.5 kg/ha) during kharif and rabi, respectively. The harvesting of fruits at 40 DAA gave significantly higher seed diameter, seed weight per fruit and 100 seed weight. The seeds extracted from the fruits harvested at 15 DAA failed to germinate in both the seasons. Extraction of seeds from the dried fruits found to be better in seed quality parameters compared to the seed extracted from the fruits immediately after harvest.

Among the bio-regulators and  $KH_2PO_4$ , the higher processed seed yield was obtained with spraying of CCC

## Abstract of Theses

200 ppm (37.8 and 26.7%) followed by  $\text{KH}_2\text{PO}_4$  and TIBA over control (without spray) during kharif and rabi season. The  $\text{KH}_2\text{PO}_4$  5000 ppm had significantly increased seed germination, root length, shoot length, seedling vigour, field emergence and reduced electrical conductivity values.

The seed storage studies indicated that captan

(2 g/kg of seed) treated seeds recorded higher germination (85.3%) followed by sweet flag (84.8%), pongamia (83.2%) and neem oil (83.2%). Storing of seeds either in cloth bag or polythene bags (700 gauge) did not show significant difference in germination upto 12 months under ambient condition and maintained germination above the minimum seed certification standards (>80%) for 12 months at Bijapur.

## AGRICULTURAL ECONOMICS

### Economic Dimensions of Soil Salinity and Water Logging in Tungabhadra Project Command Area

K. C. GUMMAGOLMATH

2000

MAJOR ADVISOR : Dr. H. BASAVARAJA

The indiscriminate use of irrigation has resulted in adverse effects like land degradation in the form of salinity. This has resulted in decline in crop production, farm income and mono cropping. The study attempts to assess the impact of land degradation in the Tungabhadra Project Command.

Two major canal commands recording the maximum proportion of salinity were selected at the first stage. In the second stage, a sample of 270 farmers comprising 135 normal and 135 problematic farms were randomly selected for the study. Tabular, functional and financial analyses were carried out to analyse the data.

The study revealed that paddy, cotton, maize and sunflower were the major crops grown on the sample farms. About 44 per cent of the total land of sample farms was degraded. The cost of cultivation was less by 10 per cent to 56 per cent on problematic soils compared to that

of normal farms due to reduced input use. Consequently the drop in productivity was highest in cotton followed by paddy, sunflower and maize. The net returns were negative for paddy and cotton and marginally positive for other crops on problematic soils.

Decomposition analysis revealed that the decline in productivity due to soil degradation in paddy, maize and sunflower was 65 per cent, 44 per cent and 36 per cent respectively. In the case of cotton the shortfall in inputs use was responsible for yield reduction by 84 per cent.

The analysis revealed that farmers on normal soils had achieved higher technical efficiency level compared to those on degraded soils. Investment on sub-surface drainage for salinity control was financially feasible. However, farmers faced several constraints in taking up sub-surface drainage. Hence, there is a need to take up sub-surface drainage on community basis.

### Performance of Primary Co-operative Agriculture and Rural Development Banks In Dharwad District - Karnataka

S. M. PATIL

2000

MAJOR ADVISOR : Dr. S. B. HOSAMANI

In the present ever-changing economic environment the role of co-operative institutions in meeting the necessities of the weaker sections has been increasingly recognised. An effective research in the field co-operatives can help to identify strength and weaknesses in their working and performance. Hence, an Economic Analysis of Primary Co-operative Agricultural and Rural Development Banks (PCARDBs) was undertaken.

Dharwad, Navalgund and Kalaghatgi PCARDBs

representing different agro-climatic zones were selected for the study. Time series data for 33 years on various performance indicators were collected, besides, information from 270 borrowers, 60 willful and non-willful defaulters and 15 each Officials and Policy makers. The techniques like Tabular, Cluster, Principal component and Discriminant function analyses were used for the analysis of data.

Findings of the study revealed that, the growth in physical and the financial indicators, except recovery per

cent of selected PCARDBs were positive and significant. The current ratio was more than unity and acid-test ratio was less than unity while, net-worth and profitability ratios were negative for all the banks in all the periods, except for Dharwad PCARDB.

The principal component analysis revealed that 11 variables each in Dharwad and Navalgund banks and 12 variables in Kalaghatgi bank were found in first component indicating that these variables were closely associated with the performance of the banks.

The Kendall's Coefficient of concordance was found to be significant only in the case of Dharwad bank indicating that there was a definite pattern of flow of credit to different

sectors. Overdue analysis of the willful and non-willful defaulters using discriminant function analysis revealed that only 11 per cent of borrowers were miss-classified by the banks. The bank finance had positive impact on income and employment of borrowers.

The opinion of the Officials and Policy makers regarding performance of the PCARDBs revealed that out of 12 variables, 10 variables were found in high aggregate cluster. About 80 per cent of the borrowers expressed delay in sanctioning of the loan. The study suggested venturing in to the scheduled banking activity, reduction in the miscellaneous expenses and extensive training to the officials and policy makers for better performance of PCARDBs.

## **FOODS AND NUTRITION**

### **Impact of Diet Modification, Education and Counselling Interventions on Management of Diabetes Mellitus**

USHA MALAGI

2000

MAJOR ADVISOR : Dr. RAMA K. NAIK

Impact of diet and educational interventions on management of Diabetes mellitus was studied for a period of six months.

Fifty Type-2 diabetics, above 50 years of age from Hubli-Dharwad diabetes clinics were interviewed for general information, diabetic knowledge and practices by using, pretested questionnaire. The nutritional status was assessed by dietary, anthropometric and clinic methods.

Out of this, 26 diabetics were given interventions in form of diet modification alone (I) for individual subjects, education alone (II) in form of individual, group, family and spouse education, combination of diet modification and education (III) with 6-7 subjects in each group for a period of six months. Control group was not given any interventions (IV).

More than half the subjects had three meals and a snack every day. Foods rich in fats and sugar were restricted, vegetables, citrus and *jumbu* fruit and fenugreek seeds were specially included, half the subjects exercised and walking being the most common form. Obesity and

hypertension were common complications. Females had higher morbidity and age related problems compared to males. The mean adequacy for energy nutrients was higher than RDA in both the genders. Higher percentage of females were abdominally obese (62.07%) compared to males (38.10%).

Positive improvements in diet scores was observed in intervention groups and diet modification group had made maximum desirable changes (83.33%) followed by III. The adequacy of fuel nutrients decreased during the intervention period. More number of diabetics lost weight in I followed by III. There was a significant decrease in blood sugar, lipids and increase in HDL-C, and most of the diabetes complications were under control, 45 per cent of non exercising subjects exercised after the intervention.

Diet modification for six months was most effective in terms of glycaemic control, reduction in lipids, increase in HDL-C, weight reduction, improvement in diabetes practices and control of complications, followed by II and III.

## MASTER OF SCIENCE

### AGRONOMY

#### **Response of Chickpea (*Cicer aristinum* L.) Genotypes to Irrigation Schedules and Naa Spray in Vertisols of Northern Karnataka**

D. U. PRAKASH

2000

MAJOR ADVISOR : Dr. A. D. JANAWADE

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad on medium black soil to study the Response of chickpea genotypes to irrigation schedules and Naa spray in vertisols of Northern Karnataka during rabi 1999. The experiment was laid out in split plot design with three replications. There were 18 treatment combinations consisting of 3 irrigation schedules (0.4, 0.6 and 0.8 IW/CPE ratios) as main plots and 2 genotypes (*desi* variety Annigeri-1 and *kabuli* variety ICCV-2) and 3 NAA spray treatments (no spray, 20 ppm spray and 30 ppm spray) as sub plots.

Irrigation scheduling at 0.6 IW/CPE ratio recorded significantly higher seed yield (7.9 and 17.6%) over 0.8 and 0.4 IW/CPE ratio, respectively. Among the genotypes, *desi*

variety - Annigeri-1 out yielded *kabuli* variety - ICCV-2 by 27 per cent. The spray of NAA @ 20 ppm increased the seed yield of chickpea significantly over 30 ppm spray and no spray. This was the consequent effect of significantly improved growth and yield parameters. Irrigation scheduling at 0.6 IW/CPE ratio, *desi* variety - Annigeri-1 and 20 ppm NAA spray recorded higher water use efficiency.

Irrigation scheduling at 0.6 IW / CPE ratio with 20 ppm NAA spray to *desi* variety recorded higher net returns and B:C ratio. Based on the result it could be concluded that scheduling of irrigation at 0.6 IW/CPE ratio to *desi* variety - Annigeri-1 with 20 ppm NAA spray was economically feasible for realising higher seed yield and net returns in chickpea in vertisols of Northern Karnataka

#### **Influence of *in situ* Moisture Conservation Practices in Sunnhemp Green Manuring and Levels of Nitrogen on Rabi Sorghum**

BASAGONDAPPA S. HEBBI

2000

MAJOR ADVISOR : Dr. S. M. HIREMATH

An investigation was carried out to study the influence of *in situ* moisture conservation practices in sunnhemp green manuring and levels of nitrogen on rabi sorghum at Regional Research Station, Bijapur during kharif and rabi seasons of 1996-97. Experiment was laid out in split-plot design with different *in situ* moisture conservation practices in sunnhemp green manuring as main plot and various levels of nitrogen (0, 25 and 50 kg/ha) to rabi sorghum as sub plot with three replications.

The results indicated that adoption of tied ridges and compartment bunding of *in situ* moisture conservation practices were found beneficial in conserving higher soil moisture, which helped in getting higher biomass (7.02 and 6.62 t/ha) and N accumulation (101.79 and 92.68 kg/ha) in kharif sunnhemp. Sorghum grain yields were also significantly higher in tied ridges (22.10 q/ha) and compartment bunding (21.24 q/ha) than in flat bed (14.05

q/ha). The yield increase over flat bed was 57.30 and 51.17 per cent, respectively.

Application of 25 kg N/ha to rabi sorghum along with sunnhemp incorporation recorded grain yield of 19.48 q/ha which was on par with sunnhemp incorporation along with recommended dose of 50 kg N/ha (21.05 q/ha). This clearly indicates a saving of 50 per cent recommended dose of N to succeeding rabi sorghum besides improving soil fertility. Total dry matter production / plant, LAI, ear length and girth, grain weight / plant and test weight also followed the trend of grain yield of sorghum.

Economics of the cropping system revealed that application of 25 kg N/ha to rabi sorghum along with sunnhemp incorporation recorded a net returns of Rs. 8274/ha with B:C ratio of 1.28 which was comparable with 50 kg N/ha along with sunnhemp incorporation (Rs. 9333/ha and 1.40).

**Phosphorus Management in Groundnut (*Arachis hypogaea* L.) Using Sludge in Vertisols of Northern Transitional Tract of Karnataka**

GANGANNA

2000

MAJOR ADVISOR : Dr. Y. B. PALLED

A field experiment was conducted on black soils at Main Research Station, University of Agricultural Sciences, Dharwad, during kharif 1999-2000 to study the effect of phosphorus management practices in groundnut using sludge. The treatments consisted of two sources of phosphorus (sludge and SSP). FYM and phosphorus solubilizer (*Pseudomonas striata*). The experiment was laid out in randomised block design with three replications.

The pod yield of groundnut differed significantly with different treatments. The maximum pod yield (45.9 q/ha) was recorded in treatment that received 50% phosphorus through sludge plus 50% phosphorus through SSP along with FYM and phosphorus solubilizer and was on par with 100% phosphorus through SSP alone.

The kernel yield and oil yield per ha also differed significantly by different treatments. The highest kernel yield (33.33 q/ha) and oil yield (15.33 q/ha) were obtained in treatment receiving 50% phosphorus through sludge plus

50% phosphorus through SSP along with FYM and phosphorus solubilizer.

The values of growth components (Plant height, number of branches per plant, leaf area plant, LAI and dry matter production and its distribution in different parts) and yield components (number of pods per plant, pod weight per plant and 100 pod weight) were also higher with the application of sludge and SSP in the ratio 1:1 and 3:1 along with FYM and phosphorus solubilizer.

Maximum net income (Rs. 46,012/ha) was realised in treatment receiving sludge and SSP in the ratio of 1:1 along with FYM and phosphorus solubilizer. Higher B:C ratio was recorded in treatment which received sludge and SSP in the ratio of 3:1 along with phosphorus solubilizer. Significantly lower fluoride content in groundnut kernel (3.02 ppm) was found in control treatment which received 100% SSP alone compared to other treatments.

**Effect of Plant Geometry on Growth and Yield of Pigeonpea Genotypes in Vertisols of Northern Transitional Tract of Karnataka**

MANJUNATHA B ANTRAVALLI

2000

MAJOR ADVISOR : Dr. S. I. HALIKATTI

A field experiment was conducted during kharif 1999 at Main Research Station, Dharwad with two pigeonpea genotypes and seven planting geometrics (Population).

The genotypes, Maruti (1469 kg/ha) and PET-3-19 (1445 kg/ha) recorded on par grain yield, yield attributes viz., number of pods per plant, number of seeds per pod, pod weight per plant, seed yield per plant, 100 seed weight, harvest index and seed protein content. While, few growth characters viz., total number of branches, dry matter accumulation in leaves, total dry matter production, plant spread per plant and light transmission ratio were found significant only at certain stages of growth. But, there was significant difference in plant height, days to flower initiation, 50 per cent flowering and physiological maturity, the highest being with PET-3-19.

The geometry had significant effect on all the growth

and yield attributes. A geometry of 120 cm x 30 cm with a population of 27,777 plants per ha recorded the highest yield (1544 kg/ha) and yield attributes viz., number of pods per plant (155.7), number of seeds per pod (3.2), pod weight per plant (99.03 g), seed yield per plant (53.90 g), 100 seed weight (9.130 g) and harvest index (27.62%). It also recorded the highest per plant number of primary, secondary and total branches, dry matter accumulation in leaves, stem and reproductive parts, plant spread and LTR. But, the plant height, LAI, LAD and flower drop were highest with a population of 83,333 plants per ha with the geometry of 120 cm x 10 cm and 60 cm x 20 cm.

Thus, it can be concluded that the genotype Maruti in a geometry of 120 cm x 30 cm with a population of 27,777 plants per ha is optimum to get higher yield and net return in vertisols of Northern Transitional Zone of Karnataka.



## Abstract of Theses

### Response of Kharif Pop Sorghum [*Sorghum bicolor* (L.) Moench] Genotypes to Farm Yard Manure and Mineral Fertilizers in Black Soil Under Rainfed Conditions

RAJEEVKUMAR B. NEGLUR

2000

MAJOR ADVISOR : Dr. M. D. KACHAPUR

A field experiment was conducted to response of kharif pop sorghum genotypes to farm yard manure and mineral fertilizers in black soil under rainfed conditions at Main Research Station, University of Agricultural Sciences, Dharwad, during rainy season of 2000. The experiment was laid out in randomized block design with 15 treatments.

Application of RDF (80: 40 kg N :  $P_2O_5$  :  $K_2O$  ha<sup>-1</sup>) + FYM (5 t ha<sup>-1</sup>) to the genotype Inamhongal-1 has recorded higher leaf area and LAI at 120 DAS (48.60 dm<sup>2</sup>/plant and 5.40, respectively). Higher total dry matter (TDM) production (184.65 g/plant) was recorded at harvest with RDF + FYM application. Higher dry matter accumulation in leaves (42.10 g/plant), stem (88.86 g/plant) and ear (69.1 g/plant) was recorded at 120 DAS with the RDF + FYM treatment. Highest peduncle length was noticed with the Inamhongal-1 both at 120 DAS and at harvest (21.8 and 31.5 cm, respectively).

Inamhongal-1 has recorded higher ear head length and girth (27.7 and 12.4 cm, respectively). Grain number

per ear head was higher with application of RDF + FYM to Inamhongal-1 genotype (1432.3). Grain weight per plant, test weight and number of raches per ear head were higher with the genotype Inamhongal-1. Grain yield was higher (1356 kg/ha) with Inamhongal-1 and was lower with Uppnabetageri-1 (910 kg/ha). Stover yield was also higher with Inamhongal-1 (24.5 t/ha) but was lower with Gadag-1 (9.5 t/ha). Gadag-1 genotype has recorded higher HI (0.107), maximum protein per cent in grains (7.55) and higher uptake of N, P and K (116.2, 25.1 and 154.3 kg/ha, respectively). Combined application of RDF + FYM recorded higher available N,  $P_2O_5$ ,  $K_2O$  and organic carbon at harvest (156.62, 26.27, 265.65 and 0.617, respectively) in the soil.

Application of 50% RDF + FYM recorded higher popping percentage, expansion volume of pop and flake size (78.00, 17.89 ml/g and 0.44 ml/l, respectively). Protein per cent in pop was higher with Inamhongal-1 (7.40). Net returns were higher with Inamhongal-1 both in case of grains and pops (Rs.21063/ha and Rs.30463/ha, respectively) with the application of RDF + FYM.

### Evaluation of Sulfosulfuron as Pre and Post Emergence Herbicide in Wheat Under Irrigated Black Soil

SATISH S. MUGANAVAR

2000

MAJOR ADVISOR : Dr. B. N. PATIL

A field experiment was conducted to Evaluate of sulfosulfuron as pre and post emergence herbicide in wheat under irrigated black soil at All India Coordinated Wheat Improvement Project, Main Research Station, University of Agricultural Sciences, Dharwad, during rabi 1999-2000. The experiment was laid out in adopting randomized block design with 18 treatments and 3 replications.

The predominant weeds observed in experimental site include, *Commelina benghalensis*, *Cynodon dactylon*, *Cyperus rotundus*, *Dinebra retroflexa* and *Echinochloa colonum* among the monocots and among dicots, *Altemanthera sessilis*, *Amaranthus* sp., *Bidens pilosa*, *Lactuca runcinata*, *Lagasca mollis*, *Parthenium hysterophorus*, *Phyllanthus nruri* and *Portulaca oleracea*.

Sulfosulfuron @ 50 g ha<sup>-1</sup> irrespective of its application timings, recorded significantly lower population and dry matter of both grassy and broad leaved weeds. However sulfosulfuron @ 50g ha<sup>-1</sup> applied as pre emergence herbicide recorded lowest weed population and dry weight and was on par with other pre emergence treatments.

Highest weed control efficiency was noticed with the application of sulfosulfuron @ 50 g ha<sup>-1</sup> applied as pre emergence at all the stages of crop growth as compared to 2, 4-D Na salt @ 2500 g ha<sup>-1</sup> applied at 30 DAS. Among post emergence treatments, sulfosulfuron @ 50 g ha<sup>-1</sup> applied at 20 and 30 DAS and sulfosulfuron and 2, 4-D EE @ 20 and 450 g ha<sup>-1</sup> applied as pre emergence and at 30 DAS recorded higher weed control efficiency at all the crop growth stages.

Sulfosulfuron @ 50 g ha<sup>-1</sup> applied as pre emergence herbicide recorded maximum grain yield. The increase in yield due to application of sulfosulfuron @ 50 g ha<sup>-1</sup> as pre emergence and at 20 DAS was to an extent of 23.88 and 18.00 per cent, respectively over unweeded control.

Sulfosulfuron @ 15 to 25 g ha<sup>-1</sup> applied as pre emergence herbicide was found most effective in control of both monocot and diocot weeds and recorded higher grain yields vis-a-vis higher benefit : cost ratio. Sulfosulfuron did not exhibit any phytotoxic effect on crop growth upto 50 g ha<sup>-1</sup> either as pre or post emergence application.

**Sequential Application of Herbicides for Control of *Cyperus rotundus* L. and *Cynodon dactylon* L. Pers in Hybrid Cotton**

M. SHIVASHENKARAMURTHY

2000

MAJOR ADVISOR : Dr. S. M. HIREMATH

A field experiment was conducted to study the sequential application of herbicides for control of *Cyperus rotundus* L. and *Cynodon dactylon* L. Pers in hybrid cotton on black soil at Main Research Station, University of Agricultural Sciences, Dharwad, during 1999-2000. The experiment was laid out in randomized block design with 3 replications. There were fifteen treatments comprising four levels of glyphosate (1 to 4 kg ha<sup>-1</sup>), each level was followed by inter-cultivation (IC) and sequential application of glyphosate and glufosinate ammonium (GA). Standard checks viz., weed free, farmers practice and weedy check were also included for comparison. *Cyperus* and *Cynodon* infested field was selected and these weeds were allowed to grow in the site before imposing the herbicidal treatments.

The lowest total density of *Cyperus* and *Cynodon* was recorded in weed free check (2.53 m<sup>2</sup>) and glyphosate 4 kg ha<sup>-1</sup> followed by either (GA1 kg ha<sup>-1</sup>) (3.35 m<sup>2</sup>) or IC (4.01 m<sup>2</sup>) or glyphosate 1 kg ha<sup>-1</sup> (4.17 m<sup>2</sup>). Weedy check recorded the highest density. Dry weight of weeds, weed

control efficiency, regeneration percentage of weeds and tuber / rhizome control efficiency followed the trend of weed density.

Higher kapas yield of cotton was obtained in the weed free check (1201 kg ha<sup>-1</sup>). Application of glyphosate 4 kg ha<sup>-1</sup> followed by either GA 1 kg ha<sup>-1</sup> (1130 kg ha<sup>-1</sup>) or IC (1027 kg ha<sup>-1</sup>) or glyphosate 1 kg ha<sup>-1</sup> (1021 kg ha<sup>-1</sup>) were next best treatments. Weedy check recorded lowest kapas yield (135 kg ha<sup>-1</sup>). Higher yield in these treatments was due to increased growth and yield attributing characters viz., total dry matter production, LAI, boll weight and number of harvested bolls per plant. The higher nutrient (NPK) uptake by cotton and lower nutrient uptake by weeds was also recorded in the same treatments.

The economics of weed management practices indicated that application of glyphosate 4 kg ha<sup>-1</sup> followed by GA 1 kg ha<sup>-1</sup> resulted in higher net return (Rs. 13287 ha<sup>-1</sup>) and B:C ratio (0.89).

**Bio-efficacy of Herbicides in Maize + Soybean Intercropping systems in Vertisols**

RAJENDRA A. NANDAGAVI

2000

MAJOR ADVISOR : Dr. B. M. CHITTAPUR

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad, during 1999 to study the bio-efficacy of herbicides in maize + soybean intercropping systems in *Vertisols*. The experiment consisted fifteen treatments comprising of five pre-emergent herbicides viz., alachlor (1.5 and 2 kg ha<sup>-1</sup>), metolachlor (1.0 and 1.5 kg ha<sup>-1</sup>), pendamethalin (1.5 and 2.0 kg ha<sup>-1</sup>), oxyfluorfen (0.1 and 0.15 kg ha<sup>-1</sup>), isoproturon (0.50 and 1.0 kg ha<sup>-1</sup>) and butachlor (1.0 and 1.5 kg ha<sup>-1</sup>), a weed free check, farmers' practice and weedy check. The treatments were laid out in Randomised complete block design with three replications.

Among the five herbicides, pendimethalin (2 and 1.5 kg ha<sup>-1</sup>) and oxyfluorfen (0.10 and 0.15 kg ha<sup>-1</sup>) were found to effect germination and initial seedling growth of maize and soybean. Application of butachlor 1.5 and 1.0 kg ha<sup>-1</sup> and alachlor 2 kg ha<sup>-1</sup> recorded significantly lower population and dry weight of weeds and higher weed control efficiency at all the growth stages. Pendimethalin and isoproturon were less effective on weeds.

Significantly higher maize, soybean and maize equivalent yields were recorded with butachlor 1.5 and 1.0 kg ha<sup>-1</sup> and alachlor 2 kg ha<sup>-1</sup>. Growth and yield attributing characters of both the crops were also improved with weed control treatments. All weed control treatments favoured the nutrient uptake by both the crops. None of the herbicides used in the experiment had any adverse effect on the growth and proliferation of soil inhabiting microorganisms such as bacteria, fungi, actinomycetes, P-solubilizers and N-fixers.

Significantly higher net returns and B:C ratio were obtained with pre-emergence application of butachlor 1.5 and 1.0 kg ha<sup>-1</sup> and alachlor 2 kg ha<sup>-1</sup>. Based on the results it could be concluded that butachlor 1.5 and 1.0 kg ha<sup>-1</sup> or alachlor 2 kg ha<sup>-1</sup> are environmentally safe and economically feasible for effective weed control in maize + soybean intercropping system in *Vertisols* of northern transitional tract of Karnataka.

## Abstract of Theses

### Effect of Seed Proportion Mixtures on Yield and Quality of Forage Maize-Legume Mixed Cropping System

SUNILKUMAR S. NYAMAGONDA

2000

MAJOR ADVISOR : Dr. S. S. ANGADI

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad, during kharif 1999 to study the effect of seed proportion mixtures on yield and quality of forage maize-legume mixed cropping system. The experiment consisted 16 treatments combinations, comprising sole crops of maize, cowpea, horsegram, field bean and their mixtures in different seed proportions (100 : 25, 100:50, 100:75 and 100:100) were laidout in randomised complete block design with three replications.

In the present investigation, the compatibility between maize and legumes was obtained at 100:50 seed proportion mixtures, which was noticed by considerable improvement in leaf area, leaf to stem ratio and light transmission ratio.

The green forage yield of mixture was higher in 100:50 proportions of maize and legume mixtures over other combinations. Mixing of maize with fieldbean in 100: 50

seed proportion mixture increased the mixture yield (73.43 t/ha) to an extent of 16.61 per cent over sole maize (61.25 t/ha) with the net returns (Rs.19450/ha) and B:C ratio of 2.33. The treatments next in order were maize mixed with cowpea (72.85 t/ha) and horsegram (72.24 t/ha) at 100:50 seed proportion mixtures. Similar trend was noticed with respect to the dry matter yield.

Total crude protein yield of maize and fieldbean mixture (1336 kg/ha) was higher in 100:50 proportions with superior palatability (96.23%). Similarly total yield of crude fibre, ether extract, total ash and nitrogen free extract were higher in 100:50 seed proportion mixtures of maize and legumes over sole crops and other proportions.

From this investigation it is concluded that, growing of maize and fieldbean in 100:50 proportion was found ideal. It has yielded 73.43 t/ha with superior palatability of 96.23% with higher quality parameters under rainfed condition.

### SOIL AND SCIENCE AND AGRICULTURAL CHEMISTRY

#### Effect of Solid Wastes and Fertilizer Levels on Growth, Yield of Okra [*Abelmoschus esculentus* (L.) Moench] and Soil Properties

H. NAGARAJA

2000

MAJOR ADVISOR : Dr. N. A. YELEDHALLI

Flyash, the principle residue of thermal power station, resulting from combustion of pulverized coal. It is an amorphous ferro alumino silicate with large proportion of silt sized particles. Similarly sewage sludge is the solid waste product of domestic and industrial waste water treatment plants, contains considerable amount of nutrient elements. Field experiments conducted on the effect of solid wastes (flyash and sewage sludge) and fertilizer levels on okra (Bhendi) indicated that application of flyash and sewage sludge @ 52 tonnes per hectare either individually or in 50 : 50 proportion increased the pod yield of okra by 18.48, 61.68 and 64.00 per cent over no solid waste control. The effect was further accentuated due to application of 100% RDF. The increase in pod yield of okra was attributed to elevated concentration of both macro and micronutrient elements in different parts of okra. It was maximum at 45

DAS but decrease marginally both at 60 DAS and harvest stage. As a result increased uptake of macro and micronutrients by okra biomass, which inturn increased the total dry matter yield of okra was observed due to application of flyash / sewage sludge / solid waste mixture in 50:50 proportion along with 100% RDF. Application of flyash and sewage sludge in different proportion along with varied levels of RDF, significantly increased the organic carbon content, nutrient availability and decreased the bulk density of soil. However, did not influence the pH and EC of soil significantly after harvest of okra crop. The results clearly suggested that flyash and sludge which are inexpensive and largely available waste considering their opportunity cost as zero can be safely, economically and ecologically used on agricultural lands to abate environmental pollution and to increase crop yields and soil productivity.



**Effect of Pretreated Copper Ore Tailings (COT) on Cauliflower (*Brassica oleracea* var. *botrytis* L.) in Alfisols**

S.C. ANILKUMAR

2000

MAJOR ADVISOR : Dr. H. M. MANJUNATHIAH

Laboratory incubation and field experiments were conducted separately during kharif 1998-99. The main objectives of the experiments were to know the effect of treating COT with SSP, PM, FYM and VC on release of available Zn, Cu, Fe and Mn from COT and to know the effect of pretreated COT with SSP, PM, FYM and VC on growth, yield and nutrient uptake by cauliflower. In reduced the pH and EC of COT. The pH and EC of COT treated with SSP (75% of COT) varied to 6.00 from 7.95 and to 2.33 from 3.4 dSm<sup>-1</sup> respectively at 30 DAT. The maximum release of available Zn (15.24 ppm), Cu (21.54 ppm), Fe (34.42 ppm) and Mn (23.84 ppm) was noticed in COT treated with VC (75% of COT) at 30 DAT.

Field experiment was conducted on red sandy loam soil in farmers field at Garag village. The maximum dry matter production at 50 DAT (66.54 g/plant) and at harvest by cauliflower curd (61.0 g/plant) and highest cauliflower curd diameter of 16.33 cm and maximum ascorbic acid content of 80.67 mg was observed in COT treated with 1.125 t ha<sup>-1</sup> of VC whereas, the maximum cauliflower curd yield was noticed in COT treated with 1.125 t ha<sup>-1</sup> of FYM (26.23 t/ha). Application of pretreated COT favourably affected the concentration and uptake of N, P, K, S, Ca, Mg, Zn, Cu, Fe and Mn by cauliflower crop all stages of crop growth. The residual micronutrient status of soil after the harvest of crop was greatly enhanced by application of pretreated COT.

**Integrated Nitrogen Management in Knolkhol (*Brassica oleracea* var. *gongyiodes* L.)**

BHANU SHALINI S.

2000

MAJOR ADVISOR : Dr. H. T. CHANNAL

A field experiments were conducted at the Olericulture Section of the Division of Horticulture, Dharwad during rabi season of 1999, on red sandy clay soil to study the effect of two organic sources of nutrients along with inorganic N fertilizers with and without *Azospirillum* on growth, yield and quality of knolkhol. The treatments consisted of two levels of N (50 and 75% recommended dose of N) combined with organic manures (FYM and VC) with and without *Azospirillum*.

The experiment was laid out in a randomised block design with ten treatments replicated thrice. Among the various treatments, maximum plant height (16.42 cm), number of leaves (19.42) and tuber yield (37.21 t/ha) was obtained in the treatment receiving 50 per cent N (Urea) + 50 per cent N (VC) + *Azospirillum*. However, the results obtained was on par with the treatments receiving 50 per cent N (Urea) + 50 per cent N (FYM) + *Azospirillum* and 50 per cent N (Urea) + 50 per cent N (VC).

Higher protein content (2.28%), ascorbic acid (58.41

mg/100 g), TSS (8.13%) and ash (8.34%) was obtained in the treatments receiving 50 per cent N (Urea) + 50 per cent N (VC) + *Azospirillum* and was on par with treatments receiving 50 per cent N (Urea) + 50 per cent N (FYM) + *Azospirillum* and 50 per cent N (Urea) + 50 per cent N (VC).

Economic analysis indicated that application of both the organic manures increased the cost of cultivation and treatment receiving 50 per cent N (Urea) + 50 per cent N (VC) + *Azospirillum* recorded the highest cost of cultivation. The highest net profit was obtained in the treatment 75 per cent N (Urea) + 25 per cent N (VC) + *Azospirillum* while the highest benefit cost ratio was recorded in the treatment supplied with 75 per cent N (Urea) + *Azospirillum*.

In post harvest soil, maximum available N and P content was obtained in the treatment 50 per cent N (Urea) + 50 per cent N (VC) + *Azospirillum* while the highest available K was recorded in the treatment 50 per cent N (Urea) + 50 per cent N (FYM).

**Solution Chemistry and Availability of Iron to Groundnut Crop (*Arachis hypogaea* L.) in Calcareous Soils**

RESHMA SARKAR

2000

MAJOR ADVISOR : Dr. B. BASAVARAJ

Distribution of different forms of iron and calcium in presence of bicarbonate ion in calcareous soils of Dharwad, Hebballi and Hebsur was studied. A pot culture experiment (imposing three moisture and five CaCO<sub>3</sub> levels) was conducted at MRS, Dharwad to know the uptake of iron

and calcium by groundnut crop in calcareous soils.

Free calcium carbonate was more in soils of Hebsur while exchangeable Ca was found more in Hebballi. Amorphous iron oxide- occluded iron and free iron oxides

## Abstract of Theses

increased with increase in depth. No definite pattern was followed in distribution of water soluble iron, whereas, high water soluble calcium was noticed in soils of Dharwad. The concentration of bicarbonate ions in surface soils was found least in Dharwad and did not follow any trend in profiles. DTPA-Fe was found high in Dharwad.

After harvest of the crop, both forms of iron oxides in soil was found to decrease significantly with increased level of  $\text{CaCO}_3$  and moisture. Water soluble Ca and  $\text{HCO}_3$  increased significantly with increase in both  $\text{CaCO}_3$  and moisture level. With increasing level of  $\text{CaCO}_3$ ,

concentration of water soluble Fe decreased. Decrease in concentration of exchangeable Ca and DTPA-Fe was observed with increasing level of  $\text{CaCO}_3$  and with increasing level of both the factors respectively.

Uptake and concentration of Fe and Ca in plant samples (haulm and kernel) increased significantly with increasing level of moisture and  $\text{CaCO}_3$ . Balanced uptake of Fe and Ca resulted in maximum yield of pod in treatment with moisture of 150 per cent of F.C. + 7 per cent  $\text{CaCO}_3$ .

### Effect of Nitrogen and Potassium on Yield and Quality Parameters of Byadagi Chilli (*Capsicum annuum* L.)

V. V. SURSH

2000

MAJOR ADVISOR : Dr. P. A. SARANGAMATH

A field experiment was conducted in black soil at Main Research Station, Dharwad during kharif 1999 to study the effect of nitrogen and potassium on yield and quality parameters of byadagi chilli. The design was RBD with twelve treatments and three replications.

The treatment 150 : 50 : 75 kg NPK + FYM @ 25 t ha<sup>-1</sup> produced the tallest plants, maximum number of primary and secondary branches and highest plant dry matter. Maximum yield of dry chilli fruit per hectare was obtained in the same treatment. The dry fruit yield per plant and number of fruits per plant also followed the same trend. However, fruit length was not influenced by various treatments.

Application of 150 kg N ha<sup>-1</sup> significantly increased the ascorbic acid content of green fruits when compared with the application of 100 kg N ha<sup>-1</sup>. Potassium application failed to produce significant influence on ascorbic acid content of chilli fruits. The treatment of 150 : 50 : 75 kg

NPK + FYM @ 25 t ha<sup>-1</sup> recorded maximum capsaicin content and total extractable colour in dry chilli fruits which were significantly higher than all other treatments. Highest crude protein content of dry chilli fruits were obtained in the treatment 150 : 50 : 75 kg NPK + FYM @ 25 t ha<sup>-1</sup>.

Maximum concentration of nitrogen, phosphorus and potassium in the shoot and fruit portions of chilli were noticed in the treatment 150 : 50 : 75 kg NPK + FYM @ 25 t ha<sup>-1</sup>. Uptake of the major nutrients also followed the same trend. The highest available nitrogen and available phosphorus content of the soil was obtained with the application of highest level of nitrogen (150 kg ha<sup>-1</sup>). However, available potassium status of the soil was not affected by different treatments. The population of bacteria, fungi and actinomycetes in the rhizosphere of chilli were increased with increase in the level of nitrogen application irrespective of potassium levels.

### Effect of Underground Irrigation Water on Properties of Vertisols

H. P. LOKESH

2000

MAJOR ADVISOR : Dr. V. S. DODDAMANI

Profile soil samples from six villages of Dharwad district viz., Kavalageri, Govanakoppa, Marewad, Annigeri, Kondikoppa and Alagawadi were collected from irrigated and near by unirrigated sites to study the impact of underground irrigation water on physico-chemical properties of vertisols during 1999-2000. The study revealed that irrigated soils have slightly higher BD and maximum WHC when compared to unirrigated soils, while the reverse trend was observed in pore space.

Irrigated soils have higher pH, EC, Exchangeable

cations, CEC, ESP, soluble cations and anions when compared to unirrigated soils. Increase in chemical and physical characters of irrigated soils compared to unirrigated soils of near by places attributed to the quality of underground irrigation waters belong to  $\text{C}_3\text{S}_1$  to  $\text{C}_3\text{S}_2$  classes.

Among the irrigated soils studied the salt content, pH, exchangeable sodium, ESP and CEC were highest in Kondikoppa soil followed by Alagawadi except in pH. This is due to highest EC, SAR, sodium content of underground