

## Abstract of Theses

### Crop Diversification Studies in Arecanut (*Areca catechu* L.) Plantation

N. K. HEGDE

1998

MAJOR ADVISOR : Dr. G. S. SULIKERI

Studies on crop diversification in arecanut plantation were carried out from 1993-94 to 1996-97 at Sirsi, Uttara Kannada district, Karnataka. Three experiments viz., intercropping in arecanut plantation, mixed cropping in arecanut plantation and variability studies in arecanut cultivar Sirsi local were conducted. Crop diversification either by intercropping or mixed cropping did not adversely affect the performance of arecanut. The highest Land Equivalent Ratio (LER) of 1.76 was recorded for intercropping system consisting of arecanut + ginger which also recorded the highest net returns per rupee spent (1:3.30). Among the seven intercrops, tapioca and sweet potato were not economically viable. Under reduced light (intercropping), interception efficiency of available Photosynthetically Active Radiation (PAR) was higher due to general reduction in canopy reflection (Reflection coefficient values) when compared to corresponding crop in open.

Growth and yield performance of banana, black pepper and cocoa did not show much variation as associated crop among different arecanut based mixed cropping systems. However, the poor performance of cardamom in arecanut + cocoa + cardamom mixed cropping system is attributed to intense reduction in the availability of PAR (0.015 ly/min., i.e. 1.2% of incoming PAR). The

highest value of crop intensity index was 2.62 (arecanut + pepper + cocoa) closely followed by 2.54 (arecanut + pepper + cardamom) when compared to the lowest value for arecanut + banana (1.15). In situations where, cocoa or banana are component crops in arecanut based mixed cropping systems the availability of PAR to underplanted arecanut seedlings is less (0.015 - 0.030 ly/min). The maximum PAR under sunfleck was recorded in sole crop of arecanut (80.3% of open PAR) and the minimum value (66.9% of open PAR) was observed in cropping system consisting of cocoa and cardamom.

Variability studies indicated maximum variation with regard to chili yield of arecanut (cv of 45.6% in Sirsi local arecanut cultivar). Yield structure of the population 498 palms indicated that, the proportion of very high yielding palms (>4 kg/palm) are much higher (18.3%) than very low (<1.0 kg/palm) yielding ones (6.6%). A significant negative correlation was observed for number of leaf scars upto 2 m height from the base of the palm with the growth and yield parameters gave an indication that, vigour in the initial years of establishment improves the performance during the economical life of the palm. Hence, management in the beginning of the plantation should receive adequate attention.

### Heterosis, Combining Ability and Disease Reaction Studies in Brinjal

RAMANAGOUDA V. PATIL

1998

MAJOR ADVISOR : Dr. B. B. MADALAGERI

Three experiments were conducted on brinjal from 1990 to 1993 at College of Agriculture, Dharwad on heterosis and combining ability, disease reaction to bacterial wilt and *Cercospora* leaf spot, and isolation of economic segregants suited to peri-urban areas of Dharwad.

Considerable magnitude of heterosis was expressed in  $F_2$ s for yield and yield influencing characters. Considering customized breeding programme for northern Karnataka, Raidurg Local x Composite 1 (64.67 t/ha), Kali Rawai x WCGR 112-8 (59.55 t/ha) and Kali Rawai x Composite 2 (57/11 t/ha) were the top three hybrids (at par), although there were other hybrids outweighing these in yield. These three preferred hybrids were purple fruited, resistant to bacterial wilt and moderately resistant to *Cercospora* leaf spot. Heterosis for yield was regulated by the hybrid vigour expressed by its component characters such as number of fruits per plant and/or average fruit weight.

ANOVA for combining ability indicates that both additivity and non-additivity effects as important with the preponderance of former in the inheritance of seven

characters and latter in ten. Plant height, plant spread and leaf area were controlled by additive gene action. The gca effects indicated that none of the parents was a good general combiner for all characters, suggesting use of separate parents for improvement of different traits.

Evaluations for resistance of 26 entries, 60  $F_1$  hybrids and a commercial check against pathogenic strain of *Ralstonia solanacearum* (Smith) Yabuuchi *et al.* indicated that SM-6, WCGR 112-8, Udupi Gulla, Composite 1 and Composite 2 and the respective hybrids involving these as the testers as resistant. Further, when the above entries were subjected to *Cercospora* leaf spot resistance, only 2 parents (Raidurg Local and Udupi Gulla) and 4  $F_1$ s (Kudachi Local x Udupi Gulla, Raidurg Local x Udupi Gulla, Raidurga Local X Muktakeshi and Raidurg Local x RPP) registered resistance.

Selection of transgressive segregants of economic value with recombinant bacterial wilt resistant gene suited to peri-urban areas of Dharwad points to RL x W-8/93/3/7 as the best segregant for consumers of Dharwad while, KR x W-8/93/7-6 for consumers of Kittur and Saundatti.

**Studies on the Effect of Horticultural Practices on Yield and Quality of Pomegranate (*Punica granatum* L.) Cv. Ganesh in Northern Dry Zone of Karnataka**

M. K. SHEIKH

1999

MAJOR ADVISOR: Dr. M. M. RAO

A field trial was conducted on 'Ganesh' Pomegranate with the objective to standardise practices of nutrition, pruning and fruit load, thinning, control of fruit cracking and rind colour development. There were five experiments viz., effect of split application of N and K on growth and fruiting, effect of growth regulators and hand thinning of flowers / fruits on size, effect of pruning and fruit load on yield and quality, and effect of chemicals on control of fruit cracking, fruit rind and aril colour on farmers field at Bijapur

The data revealed that four split application of fertilizer dose of 400:200:200 g NPK per cent (P applied as single dose) resulted higher yield with maximum average fruit weight, higher juice percentage, higher TSS, Sugars,

Ascorbic acid as compared to lower number of splits or single dose application.

Among the growth regulators used for thinning flowers/fruits, ethrel 250 ppm resulted in increase in fruit weight and yield. The severe pruning and retention of 30 fruit load in tree resulted in recording highest average fruit weight which amounted to 67 per cent rise as compared to unpruned trees.

Spraying 0.2 per cent boric acid significantly reduced cracking and also helped in marked increase in harvest of healthy fruits. Further, spraying potassium dihydrogen orthophosphate at 0.5 per cent or potassium nitrate at 1.0 per cent improved rind colour. The aril colour also was either reddish or pink by this treatment.

**Effect of Organic, Inorganic and *In situ* Vermiculture on Growth and Flower Yield of Jasmine**

SATEESH R. PATIL

1999

MAJOR ADVISOR: Dr. SATHYANARAYANA REDDY

A field experiment was carried out at the Floriculture Unit of Kittur Rani Channamma College of Horticulture, Arabhavi, University of Agricultural Sciences, Dharwad during 1996-97 and 1997-98, to study the effect of organic, inorganic and *in situ* vermiculture on growth and flower yield of jasmine. To achieve the objectives of the study, two separate experiments were carried out.

In the first experiment, all the growth components of *Jasminum sambac* Ait. were better in the plants supplied with 50 per cent RDF along with vermicompost (2 or 4 or 8 kg/plant) and RDF + RDFYM (120:240:240 g NPK + 20 kg FYM/plant).

The plants supplied with vermicompost along (2 or 4 or 8 kg/plant) or in combination with 50 per cent RDF were early to initiate flowering. Good quality flower buds

were produced by the plants which received 50 per cent RDF + vermicompost (2 or 4 or 8 kg/plant) and *in situ* vermiculture (50 or 100 worms/plant) and RDF + RDFYM. The flower yield was maximum in the plants which received RDF + RDFYM. The flower yield was maximum in the plants which received RDF + RDFYM and 50 per cent RDF + vermicompost (2, 4 or 8 kg per plant).

In the second experiment, the growth parameters which were influenced mostly by N were optimum in lower levels of N, but luxuriant in higher levels at the cost of flowering. The nutrient combination of 60:120:120 of per plant of NPK along with 20 kg FYM per plant was found optimum to achieve the optimum growth and flower yields in the first two years of planting in *Jasminum auriculatum* Vahl.

**PLANT PATHOLOGY**

**Epidemiology and Management of Leaf Rust of Wheat Caused by *Puccinia recondita* f. sp. *tritici* Rob. ex. Desm Through Host Plant Resistance**

S. N. HASABNIS

1998

MAJOR ADVISOR : Dr. SRIKANT KULKARNI

The investigations on leaf rust of wheat caused by *Puccinia recondita* f. sp. *tritici* Rob. ex Desm are presented here under. Two multiple regression models were developed for losses in grain yield and thousand grain weight using input variables as values of AUDPC of leaf and stem rusts.

Survey for leaf rust revealed, occurrence of boom and burst cycle in wheat genotype DWR 162 and matching pathotype 121R63-1 (77-5) during 1996-97. The uredospore load in the atmosphere showed fluctuation over a time period. The universal model was developed to predict and forecast the leaf rust severity of next fortnight, it was in the

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form of :

$$\frac{Y - \bar{Y}}{\sigma_Y} = 0.462 \frac{X_1 - \bar{X}_1}{\sigma_{X_1}} + 0.6148 \frac{X_2 - \bar{X}_2}{\sigma_{X_2}}$$

with,  $R^2 = 0.938$ . Wherein  $X_1$  and  $X_2$  are mean weekly uredospore load and maximum temperature, respectively.

Morphophysiological studies revealed that, leaf rust resistant wheat varieties had thicker leaf lamina and epidermis with leaf cuticle, lesser number of stomata  $\text{cm}^{-2}$  of leaf area. Accumulation of total free phenol and orthodihydroxy phenol content was significantly increased with the inoculation of pathogen in general and with incompatible interaction in particular. The activity of peroxidase and polyphenol oxidase isozymes was found

to be need based.

Leaf rust resistance gene *Lr 26* as singly or in combination with *Lr 10*, *Lr 13* and *Lr 23* were noticed at higher frequency. The genotypes viz., HD 2189, DWR 236, DWR 241 and NIAW 34 of bread wheat and MACS 2884 and DWR 137 durum wheat expressed slow leaf rusting mechanism. Epidemiological and host plant resistance studies revealed that, the resistance gene combination as *Lr 13 + Lr 23 + Lr 34* is most appropriate at strategic area.

The significance of additive and additive x additive gene effects in four wheat crosses indicated utility in the field resistance.

Integration of host plant resistance and agronomic manipulation could check the epidemic of leaf rust of wheat.

### Biology and Management of False Smut of Rice (*Oryza sativa* L.) Caused by *Claviceps oryzae sativae* Hashioka in Karnataka

YASHODA HEGDE

1998

MAJOR ADVISOR : Dr. K. H. ANAHOSUR

Systematic studies were carried out on false smut of rice with respect to its survival, perpetuation, cultural studies, life cycle and to develop integrated management strategies. Disease incidence was maximum (23.78%) in Udupi district. Crop sown beyond July 10th suffered least (0%). Weather parameters like lower maximum temperature ( $<31^\circ\text{C}$ ), minimum temperature ( $19^\circ\text{C}$ ) and higher relative humidity ( $>90\%$ ) during 50 per cent flowering were favourable for the disease development. False smut has significantly reduced the per cent seed germination (25.26%) and 1000 grain weight (48.06%) and increased the chaffiness (40.86%). Healthy seedlings recorded high amount of phenol and ortho-dihydroxy phenol than the seedlings emerged from infected panicles. Chlamydospores germinated by producing one to four conidia in a wide pH range of 4.5 to 8.5. Production of true sclerotia was observed for the first time in Karnataka. True sclerotia germinated on

autoclaved moist sand in 30 days at a temperature of  $27 \pm 2^\circ\text{C}$  by producing two to six stromatic heads. Fungus was identified as *Claviceps oryzae - sativae* and showed maximum radial growth in rice yeast dextrose agar. Chlamydospores and Pseudosclerotia retained their viability upto four and seven months, respectively under room temperature. Sclerotia and chlamydospores were the source of survival and perpetuation of the fungus and helped in the disease initiation and disease cycle. Among different methods of inoculation evaluated, spraying of chlamydospore suspension on the inflorescence during flowering was the best method. Carbendazim (0.1%) was the most effective fungicide both under laboratory and field condition. *Eucalyptus citriodora* leaf extract was effective in inhibiting chlamydospore germination. Out of 80 genotypes screened, Kavya, IESH 1, IR 30864 were from infection both under natural and artificial condition.

### Studies on Diseases of Cotton in Malnad (High rainfall) Tract of Karnataka with Special Reference to Boll Rot

S. T. NAIK

1998

MAJOR ADVISOR : Dr. R. V. HIREMATH

Survey for cotton diseases indicated angular leaf spot, *Alternaria* leaf spot, rust and boll rot are important and *Alternaria macrospora*, *Colletotrichum gossypii* and *Fusarium oxysporum* are virulent fungi causing boll rot. Rainfall positively influenced the intensity of foliar diseases. Among the genotypes tried, DCH-32 recorded the highest boll rot, while Virnar showed the lowest.

*Botryodiplodia theobromae*, *Rhizopus arrhizus* and *Aspergillus niger* produced discoloration of locules, lint,

softening of seeds and gave off smell. *Alternaria*, *Aspergillus*, *Colletotrichum*, *Curvularia*, *Dreschlera* and *Fusarium* produced symptoms without injury.

Aerobiological studies indicated that *Alternaria macrospora* and *Fusarium* spp., were highest spore producers and *Dreschlera carbonum* was the lowest. DHB-105 recorded highest germination and seedling survival and DCH-32 recorded the lowest. Using injection (Pin-Prick) method of inoculation, CPD-448, ICMF-10, CBBRH-3 and

TSH-289 were found as resistant lines. Gossypol and carpel thickness were positively related with resistance, while water content and stomatal index were negatively related. Fungicides viz., Carbendazim and captan in combination were effective under *in vitro* conditions. Plant extract viz., *Terminalia chebula* gave maximum inhibition of growth while maximum inhibition of spore germination was noticed in neem kernel extract. *Pseudomonas fluorescens* had positive influence on seedling emergence, seedling survival and height of seedlings in seeds inoculated with boll rot organisms.

Recommended insecticides upto harvest ( $T_2$ ) + Copper oxychloride @ 0.3 per cent and Streptomycin Sulphate @ 250 ppm ( $T_3$ ) + Mancozeb @ 0.2 per cent ( $T_4$ ) + Chlorothalonil @ 0.2 per cent ( $T_5$ ) + Carbendazim @ 0.1 per cent + Captan @ 0.2 per cent ( $T_6$ ) ( $T_6$ ) was the best treatment to control four diseases of cotton under study and also gave highest seed cotton yield. Cost : Benefit ratio (1:6.11) was highest in treatment with Carbendazim @ 0.1 per cent + Captan @ 0.2 per cent ( $T_6$ ). Sporelength, micronaire value and maturity coefficient were adversely affected by boll rot.

## SEED SCIENCE AND TECHNOLOGY

### Investigations on Seed Set, Seed Yield and Quality of Parental Lines and Hybrids of Sunflower (*Helianthus annuus* L.)

B. S. VYAKARANHAL

1998

MAJOR ADVISOR : Dr. M. SHEKHARGOUDA

Sunflower has its inherent problems like improper seed filling, low productivity and non-availability of quality parental seeds for hybrid production. To solve these production constraints, an investigation on seed set, seed yield and quality of parental lines and hybrids seed of sunflower was carried out by conducting four field experiments in two seasons (kharif 1997 and summer, 1998) and one laboratory experiment on storability of restorer lines at Main Research Station, University of Agricultural Sciences, Dharwad. Early planting (July) in kharif and summer (December) recorded 38.4 and 20.7 per cent higher processed seed yield, respectively and also higher yield attributes and seed quality parameters as compared to late plantings (August in kharif and January in summer). The seed parent of three way cross (TWC), (VRF, NDOL2) x EC 376240 gave higher seed yield of 30.5 and 39.5% over DSF 15A and CMS 234 A, respectively in kharif where as the same seed parent of TWC yielded 31.9 and 27.1% more compared to DSF 15A and CMS 234A respectively, during summer.

Foliar application of TIBA @ 25 or 50 ppm at ray floret stage increased the seed yield by 44.5 and 59.6% during kharif and by 49.3 and 59.2% during summer, respectively. Likewise, boron @ 0.1% spray at ray floret stage increased the processed seed yield by 49.0 and 43.4% during kharif and summer, respectively. These foliar

sprays also increased the capitulum diameter, number of filled seeds per capitulum, seed set percentage, seed weight per capitulum, 100 seed weight, germination percentage, seedling vigour index and seedling dry weight in both the seasons and also gave higher returns per rupee investment. Over the locations TWC hybrid, (VRF, NDOL2) x EC 376240 x RLC-4 gave the seed yield of 69.1 and 32.2% more over two single cross hybrids (CMS-234A x V-94; DSF 15 A x RIIA-857), respectively.

In restorer lines, continuous nipping of side branches 40 DAS onwards (at 7 days interval) over two seasons gave 229% and one time nipping of side branches at 50 DAS recorded 154% more seed yield as compared to without nipping. These two treatments recorded higher returns per rupee investment. Delay in nipping of side branches beyond 50 DAS decreased seed yield and its components drastically. Early planting of restorer lines gave 49.6 and 51.4% more seed yield over late planting during kharif and summer, respectively. Increase seed yield of restorer lines was came from significant increase in the yield components like capitulum diameter, number of filled seeds per capitulum, seed set per cent, 100 seed weight and seed quality parameters. The seeds of restorer lines (either branched or non-branched) can be treated with potassium iodide solution ( $10^{-3}$  M for 2-3 hours) or with calcium oxychloride @ 4 g/kg of seed or with pongamia leaf powder @ 40 g/kg of seeds apart from regular fungicide treatment to improve the storability.

### Studies on Seed Production Techniques and Storability of Karnataka Rice Hybrid-2

N. K. BIRADAR PATIL

1999

MAJOR ADVISOR: Dr. M. SHEKHARGOUDA

The field and laboratory experiments conducted at the University of Agricultural Sciences, Dharwad during 1995-96 on seed production and storability of Karnataka Rice Hybrid-2 revealed that spraying of gibberellic acid @ 75 g per ha, flag leaf clipping (FLC) + GA<sub>3</sub> 50 g per ha and

GA<sub>3</sub> 25 g per ha coupled with NAA or Arappu leaf extract increased the panicle exertion, seed set and seed yield by 47.4, 45.7, 44.3 and 34.8 per cent, respectively, over the control. The net returns were higher with GA<sub>3</sub> 25 g per ha + 100 ppm NAA and GA<sub>3</sub> 25 g per ha + 2.0 per cent urea. All

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chemicals, except boric acid produced better quality seed and improved the storability. Summer season produced higher seed yield with better quality.

The early sowing of the male parent by four and eight days resulted in better synchronisation, increased seed set and seed yield. The foliar spray at panicle initiation stage with of  $GA_3$  (100 ppm) and single super phosphate (1.0%) enhanced the 50 per cent flowering in male parent by 3.7 and 3.2 days, respectively, while additional application of N (25 kg/ha) to soil coupled with foliar spray of urea (2.0%) and MH @ 400 ppm to female parent delayed 50 per cent flowering by 4.7 and 3.5 days, respectively, over the control.

The seed yield and quality were higher with seed produced at Dharwad than Gangavati location.

The 50 per cent flowering was delayed with December sowing, but it was early with August sowing in all the parental lines. Transplanting of 30 days old seedlings of A, B and R lines gave higher seed yield and quality as compared to transplanting of younger or older seedlings. The seeds produced at Dharwad stored better than the ones produced at Sirsi. The seeds stored in polythene bag (700 gauge) were superior over cloth bag throughout the storage period for all the seed quality parameters. The untreated seeds lost their viability and vigour at a faster rate during storage compared to Thiram (2.0 g/kg) treated seeds.

## AGRICULTURAL ECONOMICS

### Production and Marketing Performance of Pulses in Karnataka - An Econometric Analysis

SHARANESH HANDIGANUR

1998

MAJOR ADVISOR : Dr. L. B. KUNNAL

The study was conducted in three major pulse growing districts of Karnataka with an overall objective of studying production and marketing performance of pulse during the year 1997-98. The pulse crops selected were pigeonpea, chickpea, greengram and blackgram. The secondary data pertaining to area, production, productivity, arrivals and prices were collected for a period of 20 years. The primary data were collected from 240 randomly selected farmers 210 market functionaries. The statistical techniques such as Compound Growth Rates, Decomposition, Principle Component, Orthogonal Polynomial Regression, Seasonal Indices, Correlation and Regression Analyses were employed to fulfill various objectives.

The results revealed the highest positive growth rates of area and production of total pulses in Dharwad (3.05 and 2.08%) and Bidar (1.90 and 3.5%) districts whereas, in case of yield, positive but non-significant growth rate (1.47%) was noticed only in Bidar district. The principal component analysis revealed that lagged price and yield of

the crop under consideration and the competing crops, gross cropped area irrigated, rainfall and area under the crop were the variables which influenced the most the production of the pulses. There was a dominance of few large traders who performed the triple functions of commission agents, wholesale traders and dal millers who controlled the major share of the pulse trade in the study markets.

The wide seasonal fluctuations in the arrivals had their consequential unfavourable impact on prices in some regulated markets over different months of the year. The trend pattern in prices exhibited a continuous upward swing for all the crops in the study area except Gadag market (for greengram). The producers share in the consumers rupee was more (90%) in Channel-III irrespective of crop and market. The study suggests the establishment of a Karnataka pulse growers federation and provision of credit to the farmers through co-operative societies by linking of credit with marketing.

### Performance of Sugar Industry in Karnataka - An Economics Analysis

VILAS ALIAS AVINASH

1998

MAJOR ADVISOR : Dr. L. B. KUNNAL

Sugar industry is an important agro-based industry in India. There were 408 sugar factories in the country during 1994-95, producing 146.43 lakh tonnes of sugar. Considering its importance in the development of rural led economy, the present study analysed the performance of the sugar industry in Karnataka. The data were collected from eight sugar factories over a period of time. The analysis of data included compound growth rate analysis, ratio analysis, principal component analysis, computation of cost of processing, break-even level of sugar production and

capacity utilization and SWOP (T) analysis. The results of the study revealed that, due to economies of large scale production, the above average sugar factories were better than their counterparts with respect to crushing activity and financial performance. All the sugar factories had a recovery percentage, above 10 per cent, which is satisfactory. The current ratio was greater than unity in all the sugar factories except in the case of Kampli sugar factory. Due to high exit rate of the stock and its management, the turnover ratios were found to be better in above average sugar factories.

The profitability ratio were found to be negative in cooperative sugar factories. However, the cooperative sugar factories had better network than public and private sector sugar factories due to creation of huge assets with less borrowings. The installed capacity was under utilised in all the sugar factories during 1995-96, except Ugarkhurd and Davangere sugar factories. The cane cost formed the prime share in the total cost (71.79%), followed by the other variable costs (16.60%). It was found from the study that,

to be a viable factory, a below average sugar factory with a crushing capacity of less than 2100 TCD has to produce 333,900 quintals of sugar and an above average sugar factory (5000 TCD) has to produce 1078,330 quintals of sugar. The results of principal component analysis revealed that, equity, owned funds, borrowings, liabilities, inventories, assets, total sales, sugar sales, total income, total purchases and total expenses highly influenced the performance of sugar factories.

#### **Farming Systems in Uttara Kannada District - An Econometric Analysis**

BALACHANDRA K. NAIK

1999

MAJOR ADVISOR : Dr. K. N. R. SASTRY

This study was conducted in Uttara Kannada district of Karnataka with an overall objective of identifying and analysing for optimality under different situations for different farming systems. The relevant data collected from both primary and secondary sources for the year 1995-96 were analysed through tabular, cluster and linear programming techniques. The analyses delineated the entire district into three agro climatic regions viz., Coastal, Malnad and Plains based on 30 different parameters. Research in agriculture could be more appropriate and extension recommendations would be much successful if one considers smaller administrative areas for delineating agro climatic regions. Three different linear programming models for optimization, viz., under existing resource base and technology, under recommended technology but existing resource level and under recommended technology employing enhanced resources were developed. The

analysis revealed that present net farm returns would range depending on size of farm, from Rs.17,000 to Rs.65,000, Rs.51,000 to Rs.75,000 and Rs.18,000 to Rs.58,000 on rainfed farms in Coastal, Malnad and Plains regions respectively, from Rs.56,000 to Rs.1,45,000, Rs.1,60,000 to Rs.2,03,000 and Rs.24,000 to Rs.76,000 on irrigated farms in the same situations. The farmers were operating closer to optimality under existing resource levels as increase in net farm returns were marginal. However, with introduction of new technology, the net farm returns would increase in the range of 25 to 150 per cent over existing plan across the situations. With availability of additional resources for inclusion of new technologies, the net farm returns were further enhanced (40 to 170 per cent). The problems for operationalization of recommended technologies are identified and suitable suggestions have been made.

#### **Economic Analysis of Farmers' Participatory Approach for Irrigation System in Karnataka - A Case Study of Chikkapadasalagi Barrage**

R. S. PODDAR

1999

MAJOR ADVISOR: Dr. G. K. HIREMATH

Chikkapadasalagi barrage, built across river Krishna in Bijapur district of Karnataka, is a unique project conceived, financed, constructed, managed and owned by the farmer-beneficiaries. This project costing only Rs.92.56 lakhs has a command area of more than 17,000 ha. It represents an alternative model to the state funded mega, multi-purpose river valley projects. The findings of the present study demonstrated the importance of self-reliance and success of farmers' participatory approach for irrigation systems management. Financial appraisal of the project revealed that while the pay back period of the project was only six years, BCR was positive and high at 1.84. NPV of investments was Rs.6,604 lakh and IRR 48.67 per cent for 25 years of the project life. The analysis for only 14 years, if the barrage were to submerge in the backwaters of UKP project, revealed that the pay back period was six years and BCR was 1.54. While NPV was Rs.3,401 lakh, IRR

was 33.95 per cent. Based on these values it was concluded that investments in the barrage project were financially feasible. Optimization of resource use showed that a few but more remunerative crop enterprises like sugarcane, mulberry, grapes and pulses and improved livestock breeds like Holstein Friesian could be taken up. The optimum plans indicated higher net returns per hectare over those in the existing plans. Results with regard to the secondary effects of irrigation from the barrage showed substantial gains in terms of development of infrastructure facilities, livestock enterprises, transport and communications facilities and socio-cultural scenario. However, a few negative effects like growing alcoholism, development of soil salinity and water logging were also evident. The project was found to be a genuine community effort in development of irrigation facility as opined by the respondents and hence, the model could be replicated elsewhere.

## AGRICULTURAL EXTENSION

### Technology Reach, Perception, Knowledge, Adoption and Attitude Towards Improved Agricultural Technologies by Small and Marginal Farmers in T.B.P. Area

S. K. METI

1998

MAJOR ADVISOR : Dr. B. SUNDARASWAMY

The study was undertaken in TBP area of Raichur district to know the extent of technology reach, perception, knowledge, adoption and attitude towards improved agricultural technologies by small and marginal farmers. A sample of 240 respondents were selected randomly from 12 villages of Sindhanoor, Manvi and Gangavathi talukas. The important findings of the study were : The majority of the small and marginal farmers were aware contour bunding (71.66%), paddy varieties (74.16%), changing of chemicals after every application (43.33%) and ridger (41.66%), whereas less majority of small and marginal farmers were aware about use of micronutrients to cotton (19.58%) and IPM practices like NPV (7.08%). The major source of awareness were, Agricultural Assistant, other farmers and input dealers.

Majority of small and marginal farmers correctly perceived the meaning of contour bunding (61.66%) and cultivation across the slope (61.66%), whereas a very less per cent of the respondents perceived correct meaning of about integrated pests management (18.75%). There was

difference in the perceived usefulness of improved agricultural practices by small and marginal farmers.

Majority of the small and marginal farmers belonged to medium knowledge, and medium adoption categories with respect to groundnut, cotton and paddy cultivation practices. There was significant difference in the mean yield obtained by small and marginal farmers with respect to groundnut, cotton and paddy practices.

The major reasons for partial or non adoption of groundnut, cotton and paddy practices were, lack of knowledge, high cost and non availability of inputs and unsuitability as expressed by majority of small and marginal farmers. Majority of small and marginal farmers had favourable attitude towards improved agricultural technologies.

There was no significant difference between small and marginal farmers with respect to knowledge level of groundnut, cotton and paddy crops, whereas significant difference was observed with respect to adoption of cultivation practices of groundnut, cotton and paddy crops.

### Perception of Development Programme and Benefits Derived by Women Beneficiaries of Ratnagiri District (M.S.)

D. P. HARDIKAR

1998

MAJOR ADVISOR : Dr. C. M. DUDHANI

A study on perception of development programme and benefits derived by women beneficiaries was conducted during 1995-96 involving 205 women beneficiaries from Ratnagiri tahsil of Ratnagiri district. Of them 108 were IRDP and 97 were DWCRA beneficiaries. Findings revealed that 59.26 per cent IRDP and 80.41 per cent DWCRA beneficiaries perceived the programme as 'useful'.

One half (49.08 per cent) IRDP beneficiaries had received assistance for 'fish marketing', while 42.27 per cent DWCRA beneficiaries had started 'readymade garments' trade. Majority (76.85 per cent) IRDP beneficiaries had received '76.00 per cent and above' beneficiaries.

Average additional employment generated for IRDP and DWCRA beneficiaries was 78 and 60 person days, respectively, while average additional income for them was Rs.2046/- and Rs.880/-, respectively.

Two groups differed significantly in respect of characteristics namely, education, family size, land holding, annual income, social participation, mass media exposure, cosmopoliteness, change proneness, achievement motivation, self confidence, employment

generation and income generation.

The characteristics namely education, annual income, change proneness, achievement motivation, self confidence, employment generation and income generation were found significantly influencing perception of beneficiaries. Selected fifteen characteristics explained 53.00 per cent variation in perception of beneficiaries, amongst which, contribution of education and income generation was maximum. The path analysis revealed maximum direct effect (0.3976) of income generation and maximum indirect effect (0.4478) of employment generation.

Almost equal number (57.00 per cent) of beneficiaries were not consulting any source of information and of the remaining, majority were consulting 'personal localite' source as per the need.

With regard to problems, 'lack of knowledge about other programmes' (27.80 per cent), 'no market facilities available' (16.10 per cent), and 'inadequate loan' (12.20 per cent) were the important problems. One third of the beneficiaries did not offer any suggestion, while one third of them suggested that 'knowledge about other programmes be provided'.

**Privatization of Extension Service Attitude and Preference of Farmers and Extension Personnel**

S. N. HANCHINAL

1999

MAJOR ADVISOR: Dr. B. SUNDARASWAMY

The study was conducted to know the attitude and preference of farmers and extension personnel towards privatization of extension service in 16 villages of Haveri District. Data was elicited from 240 farmer respondents and 60 extension personnel operating in the study area. The major findings were: Less than fifty per cent of farmers (42.08%) and extension personnel (35.00%) had favourable attitude towards privatization of extension service.

Majority of the farmer respondents (61.67%) preferred technical service by private agencies in the area of seed production followed by cultivation of fruits (53.33%), vegetables (52.92%) and flowers (52.92%). Eighty three per cent (82.92%) of the farmer respondents were willing to pay towards technical service rendered in the area of seed production followed by irrigation technology (55.67%), cultivation of flowers (56.67%), fruits (55.00%) and

vegetables (52.08%).

Majority of the extension personnel respondents (70.00%) preferred technical service by private agencies in the area of flower cultivation followed by vegetable cultivation (66.67%), seed production (63.33%) and fruits cultivation (61.67%). Seventy per cent of the extension personnel were of the opinion to collect fee for the technical service rendered in the area of seed production followed by irrigation technology (60.00%), post harvest technology (55.00%), dairy and poultry (55.00%), cultivation of fruits (53.33%), vegetables (51.67%) and land development (51.67%). The variables such as annual income (19.94%), cropping intensity (18.24%), attitude (14.17%) and development opportunity (13.24%) had greater contribution towards discriminating the seed producing farmers from that of farmers of non-seed producing category.

**An Experimental Study on the Effectiveness of Different Modes of Presentation of Information on Mushroom Cultivation Through Television**

P. A. SAVANT

1999

MAJOR ADVISOR: Dr. M. R. ANSARI

The experimental study was conducted to examine the effectiveness of two modes of presentation of information on mushroom cultivation through television. The two modes selected were, 'demonstration' and 'straight talk with visual aids'. Two sample groups, each of 50 respondents from two villages were exposed to selected two modes of presentation, separately. The 'before and after' experimental design was used in the study.

The findings were : Maximum gain in knowledge had occurred as a result of exposure to 'demonstration' mode of presentation (75.33 per cent), followed by 'straight talk with aids' mode (64.58 per cent).

Knowledge gained by the respondents was retained to the maximum extent after 15 days to 30 days of telecast (68.58 per cent and 63.79 per cent, respectively) in case of 'demonstration' mode, followed by 'straight talk with visual

aids' mode of presentation (56.71 per cent and 49.96 per cent, respectively). The personal and socio-economic characteristics namely, education, credit orientation and innovativeness exhibited positive and significant relationship with gain in knowledge as well as retention of knowledge after 15 days and 30 days of telecast in both the modes.

Majority of the respondents from 'demonstration' and 'straight talk with visual aids' mode, opined that the overall presentation of the mode to which they were exposed was 'excellent' (84.00 per cent and 78.00 per cent, respectively).

Majority of the respondents suggested 'use of demonstration mode' (75.00 per cent) as well as use of good quality (73.00 per cent) and relevant pictures/scenes (72.00 per cent) to the topic for improving the modes of presentation of farm telecast in general.

**FOOD AND NUTRITION**

**Development and Evaluation of Ready - to - eat (RTE) Foods for the Elderly**

L. A. UMA

1998

MAJOR ADVISOR : Dr. MEERA RAO

The research entitled "Development and Evaluation and Reday-To-Eat (RTE) Foods for the Elderly was

undertaken during 1995-1998 in Dharwad. Food preferences of 200 urban and rural aged including males and females



## Abstract of Theses

was obtained using questionnaire. Based on likes and dislikes of elderly, five different RTE foods were developed and analysed for chemical composition. Standardised recipes from RTE foods were studied for shelf life for three months. The acceptability of RTE foods given for home use among 20 urban elderly was tested.

The elderly in the present investigation followed traditional two meal pattern per day and had complaints of digestion chewing and gas formation with various foods. Elderly favoured savoury foods (55%) and fried foods (51%), frequently purchased bakery items (91%). Elderly opined proposed RTE foods to be home prepared, in vermicelli

from (51.56%) with sour taste (45.83%) and crispy texture (56.25%).

The developed five RTE foods viz., *samian*, soy and greengram porridge mixes, uppama mix and aralu mix had better nutrient profile. Recipes of *payasam*, porridges, uppama and *unde* had calorific values of 117 to 220 Kcals per serving size. All the RTE foods had better shelf life for two to three months.

Supplementation with RTE foods increased the nutrient intake among test subjects. *Aralin unde* followed by porridges were highly acceptable among the elderly. All the RTE foods were cost effective and thus can be included in the dietary regimen of elderly.

## HUMAN DEVELOPMENT

### Slow Learners : Instructional Strategies to Accelerate Mathematics Learning

T. ANNAPURNA

1998

MAJOR ADVISOR : Dr. V. GAONKAR

A study on "Slow Learners : Instructional Strategies to Accelerate Mathematics Learning" was carried out in Dharwad city during the year 1996-98. Population for the study comprised of first standard slow learning children of primary schools situated in Dharwad district of Karnataka state. Presentation convent and Yattinagudda school which were situated within the ten kilometers radius from Dharwad city and the class teachers extended willing co-operation were selected. Further, the students were identified as slow learners with the help of academic achievement, teacher's assessment, intelligence tests and achievement test. Finally 124 students were identified as slow learners and considered for the study. They were divided into six groups randomly. Among the six groups, five groups were treated as experimental groups and one group as control group. Control group slow learners were allowed to sit in the class room and learn through the traditional lecture method; while

the experimental groups studied the same portion with the help of picture book ( $E_1$ ), materials ( $E_2$ ), charts ( $E_3$ ), Peer tutoring ( $E_4$ ) and individualized instruction ( $E_5$ ). The experiment was conducted in four phases. In the first phase, a pre-test was administered for all the groups. In the second phase, all the experimental groups received one hour instruction for every alternative day for about three months using the different instructional strategies. At the end of the experimental period a post-test was administered for experimental and control group students. The same test was also administered for the normal students to compare their performance with experimental group students. In the fourth phase, after a lapse of three months the retention test was conducted to the same students. The analysis of variance and 't' test were used for analysing the data. The results reported that the experimental groups slow learners showed significant improvement in mathematics when they were taught through the different instructional strategies.

## MASTER OF SCIENCE

### AGRONOMY

#### Productivity of Chilli (*Capsicum annuum* L.) in Relation to Plant Population and Nutrient Levels

K. B. PATIL

1998

MAJOR ADVISOR : Dr. D. P. BIRADAR

An investigation was carried out to study the performance of chilli to plant population and nutrient levels on experimental field in Main Research Station, Dharwad during kharif season of 1997. Experiment was laid out in split plot design with plant population levels as main plot and levels of nutrients as sub plot in three replications.

Plant population of 55,555 plants  $ha^{-1}$  recorded significantly higher dry chilli yield (20.71 q  $ha^{-1}$ ) which was 11 per cent higher compared to recommended population of 37,037 plants  $ha^{-1}$ . The total dry matter production, number of fruits and fruit weight per plant were higher with 37,037 plants  $ha^{-1}$ . The higher yield in 55,555 plants  $ha^{-1}$  was mainly

due to 50 percent higher population than the recommended population.

The inclusion of vermicompost along with 100 per cent RDF (150:75:75 kg ha<sup>-1</sup>) + FYM resulted in additional dry chilli yield of 1.68 q ha<sup>-1</sup>. Higher fruit yield was recorded by application of 200 per cent RDF + FYM + VC (19.12 q ha<sup>-1</sup>) which was significantly superior to all other nutrient levels. This was due to increased total dry matter production and yield parameters by increased availability of nutrients.

Application of 200 per cent RDF + FYM + VC to a population of 55,555 plants ha<sup>-1</sup> recorded the highest net returns (Rs.48,663 ha<sup>-1</sup>) followed by application of 150 percent RDF+FYM + VC (Rs.46,438 ha<sup>-1</sup>) to the same level of plant population. These treatment combinations resulted in higher yield of 22.64 q ha<sup>-1</sup> and 21.41 q ha<sup>-1</sup> to account for better net returns, respectively. Thus, it was realised that maximum yield and net returns from chilli cultivation could be achieved with a population of 55,555 plants ha<sup>-1</sup> along with 200 per cent RDF + FYM + VC application.

#### Effect of Planting Methods and Intercrops on Growth and Yield of Sugarcane (*Saccharum officinarum* L.)

LACHAPPA L. ROODAGI

1998

MAJOR ADVISOR : Dr. C. J. ITNAL

A field experiment was conducted to study the effect of planting methods and intercrops on growth and yield of sugarcane in medium deep black soil at Karnataka Institute of Applied Agricultural Research, Samethwadi during 1997-98. The experiment consisted to two planting methods and seven intercrops compared with sole sugarcane. The experiment was laid out in split-plot design with planting methods at main plots and intercrops in the sub plots. The treatments were replicated four times.

The data revealed that planting methods did not influence the cane yield and sugar yield. However, paired row method of planting recorded higher cane yield (102.57 t/ha) and sugar yield (11.29 t/ha) than normal method of planting (101.15 t/ha and 11.23 t/ha, respectively). Similar response was observed with LAI, dry matter produced per plant throughout the crop growth and yield components at harvest.

Intercropping and incorporation of *in situ* green manure like sunnhemp recorded higher cane yield (111.09 t/ha) and sugar yield (12.49 t/ha) compared to rest of the treatments. Intercropping of sugarcane with maize recorded

significantly the lowest yield (70.82 t/ha) and sugar yield (7.60 t/ha). The yield attributes like internodal length and cane weight per plant recorded numerically higher values in sugarcane + sunnhemp intercropping system as compared to other treatments. The dry matter production, LAI, plant height, number of internodes and number of leaves were highest in sole sugarcane at 90, 150 and at 120 DAP compared to other treatments and later on differences were smothered out (i.e, 270, 300 DAP and at harvest).

Intercropping of sugarcane with soybean gave higher gross (Rs.99,2348/ha) and net income (Rs.68,336/ha) while, sugarcane intercropped with maize recorded the lowest gross income (Rs.68,142/ha) and net income (Rs./36,374/ha). Benefit: cost ratio was the highest when sugarcane was intercropped with soybean (3.21) while, cane intercropped with maize recorded lower benefit: cost ratio (2.15). Therefore, for getting higher net income, sugarcane may be intercropped with soybean under paired row method of planting.

#### Effect of Irrigation, Nitrogen and Sulphur Fertilization on Hybrid Sunflower (DSH-1)

N. M. HITTINAHALLI

1998

MAJOR ADVISOR : Dr. L. H. MALLIGAWAD

A field experiment, to study the effect of irrigation, nitrogen and sulphur fertilization on hybrid sunflower (DSH-1) was conducted on medium black soil during rabi/summer season of 1996-97 at Main Research Station, Dharwad with three irrigation schedules based on climatological approaches (0.8, 0.8 and 1.0 IW/CPE ratio), three nitrogen levels (60, 90 and 120 kg N ha<sup>-1</sup>) and two levels of sulphur (0 and 20 kg S ha<sup>-1</sup>). The experiment was laid out in split-plot design with three replications.

Scheduling the irrigation at 1.0 IW/CPE ratio recorded 15.65 and 36.78 per cent higher seed yield over 0.8 (1747 kg ha<sup>-1</sup>) and 0.6 (1490 kg ha<sup>-1</sup>) IW/CPE ratio, respectively. The yield components of sunflower viz., head

diameter, 1000 seed mass, number of filled seeds head<sup>-1</sup> and nutrient uptake by crop were highest at 1.0 IW/CPE ratio. Irrigation scheduled at 1.0 IW/CPE ratio recorded the highest oil content and oil yield over irrigation scheduled at 0.8 and 0.6 IW/CPE ratio. Consumptive use of water was linearly increased with irrigation levels which was higher in 1.0 IW/CPE ratio (314.50 mm). Water use efficiency was higher in 0.6 IW/CPE ratio (6.48 kg ha<sup>-1</sup> mm). Moisture depletion pattern was higher from 0-30 cm surface layer in 1.0 IW/CPE ratio.

Application of nitrogen @ 120 kg ha<sup>-1</sup> recorded 15.84 per cent higher seed yield over 60 kg N ha<sup>-1</sup> (1641 kg ha<sup>-1</sup>). Similarly sulphur fertilization @ 20 kg ha<sup>-1</sup> recorded