Effect of Vesicular Arbuscular Mycorrhizal Species and Phosphorus Levels on growth and Yield of Papaya, cv. Sunset Solo

V.G. MANJUNATH 2000 MAJOR ADVISOR : P.B. PATIL

An investigation was carried out on papaya, cv. Sunset Solo to study the effect of three VAM fungal spceis, *viz*. *Glomus fasciculatum*, *Sclerocystis dussii* and *Acaulospora laevis* at three phosphorus levels (50, 75 and 100 per cent of RDP) on growth, flowering, yield and yield components, NPK content of the tissue and uptake of P from soil at the Department of Pomology, Kittur Rani Channamma College of Horticulture, Arabhavi during 1999-2000.

G. fasciculatum and *S. dussi* were effective in increasing vegetative growth parameters, *viz*., plant height, stem girth number of leaves and petiole length compared to the inoculation with *A. laevis* and unioculated control

Application of 75 per cent RDP was equally effective as that of 100 per cent of RDP application in inducing early flowering.

Inoculation of *G. fasciculatum* and *S. dussi* resulted in higher number of fruits and fruit yield compared to other treatment combinations. Yield components like mean fruit weight, length and circumference of fruit were found to be higher in plants inoculated with *G. fasciculatum*.

Mycorrhizal parameters like per cent root colonization and extramatrical spore count were found to be higher in plants inoculated with *G. fasciculatum* and *S. dussi*.

G. fasciculatum inoculated plants maximum NPK content in the petiole. Highest residual available phosphorus in soil was found in *G. fasciculatum* and *S. dussi* inoculated treatments.

Inoculation of *G. fasciculatum* coupled with 75 per cent of RDP application was found to be numerically higher when compared to application of 100 per cent of RDP alone in increasing yield and yield components.

The benefit : cost ratio of all the three VAM fungi at 75 per cent of RDP were higher compared to that of 100 per cent RDP alone threby saving 25 per cent of the RDP.

Micropropagation of Carnation (*Diathus caryophyllus* L.)

JAYASHREE C. HIREMATH 2000 MAJOR ADVISOR : Dr. ANAND N. MOKASHI

An investigation on micropropagation of carnation (*Dianthus caryophyllus* L.) was conducted during 1999-2000 in the Department of Horticulture, University of Agricultural Sciences, Dharwad. The study on decontamination revealed that explants pretreated with a fungicide (carbendezim, 0.1%) and bactericide (streptomycin, 0.1%) then with 0.1% $HgCl_2$ for 3 minutes, showed minimum contamination.

As regard suitability of explants, shoottip and nodes were the best for culture establishment, by producing more number of adventitious shoots in a shorter period of time i.e., emergence of primordia was early in both shottip and nodel explants.

In Vitro proliferated shoots were subcultured on MS medium with BAP and kinetin at different concentrations. The highest number of multiple shoots and fresh weight were observed on 20 µM BAP/1. But the shoots showed vatrification. The shoots proliferated on kinetin containing media were healthy and normal. Also when BAP and kinetin were combined with NAA at different concentrations the higher number of multiple shoots were observed on medium with 20 µM BAP + 1.0 µMNAA per litre. NAA at higher concentration showed vitrification and also reduced length of the shoots. Kinetin with NAA was less effective compared to BAP and NAA.

Rooting of microshoot was induced on half strength MS medium with different levels of auxins and rooting was observed even in auxin free medium. Maximum number of roots with better shoot and root characters were observed on medium with µM NAA/1. IBA was found not as effective as NAAS. NAA at higher concentration proved to be detrimental to root growth by suppressing its growth.

Soilrite (TC) medium gave the highest survival percentage at 15 and 30 days after transfer to hardening media and plantlets so hardened were also more vigorous compared to those on other two media.

Effect of Nutrition and GA_3 on Yield of Curry Leaf (*Murraya koenigii* Spreng.)

K. MAMATHA 2000 MAJOR ADVISOR : Dr. SATISH S. PATIL

An investigation was carried out to find out the optimum doses of fertilizers and the effect of gibberellic acid on twelve year old curry leaf plantation at the College of Agriculture, Dharwad during 1998-99.

The results revealed that the plants receiving fertilizer levels of 500 : 150 : 150 g NPK/plant/year recorded more number of new shoots, length of new shoots, number of leaves, fresh weight of shoots, fresh weight of leaves, dry weight of leaves and finally the yield. Gibberellic acid at the concentration of 150 ppm found to have more effect on increasing the growth and yield parameters. However, gibberellic acid at 125 ppm concentration was found to be on par with 150 ppm. The interaction effects revealed that fertilizers along with gibberellic acid treatment have profound effect on increasing the yield. The effect of gibberellic acid was found to be more when applied along with fertilizers.

It was observed that there was no significant differences with respect to number of leaflets per leaf and sucker poduction with an increase in the fertilizer levels as well as gibberellic acid concentrations. Fertilizers were found to have more effect on all the growth and yield parameters than gibberellic acid except for stem diameter which was greatly influenced by GA_3. Leaf NPK concentrations revealed that increased concentrations of gibberellic acid, increased NPK concentrations in leaf. It was found that among all the treatment combinations 500 : 150 : 150 g NPK/plant/year along with 100 ppm gibberellic acid gave highest benefit : cost ratio compared to all other treatment combinations which may be recommended to the farmers.

Weed Management and Vase Life Studies in Tuberose (*Polianthes tuberosa* Linn.) cv. Single

S.R.R.M. KUMAR 2000 MAJOR ADVISOR : Dr. V.S. PATIL

Experiment on weed management and vase life studies in tuberose (*Polianthes tuberosa* Linn.) cv. Single was conducted during 1999-2000 in the Floriculture Unit, Division of Horticulture, University of Agricultural Sciences, Dharwad. The treatments included were six herbicides and organic mulch for weed management studies and for vase life studies four chemicals were included. The experiment was laid all in randomized complete block design.

Oxyfluorfen 0.15 kg a.i. ha^{-1}, alachor 1.50 a.i. ha^{-1} caused slight toxicity at early stages of tuberose crop. Unweeded control had significantly higher weed count and higher dry matter of weeds at all the crop growth stages. In general the weed population and weed dry weight were reduced with the application of herbicides. Atrazine 1.00 kg a.i. ha^{-1} was very effective against dicot weeds. Oxyfluorfen 0.15 kg a.i. ha^{-1} and pendimethalin 1.00 kg a.i. ha^{-1} were very effective against controlling of weeds and recorded maximum plant growth parameters like number of leaves, plant height and higher cut flower yield.

The quality of flower spikes was not effected by different herbicide treatments. Water uptake, water loss and vase life was not affected by these treatments.

Different chemical solutions tested on vase life studies, the highest vase life was obtained from sugar 4 per cent + citric acid 100 ppm + aluminium sulphate 50 ppm treatment.

Economics of weed control, among herbicide treatments application of pendimehtalin at 1.00 a.i. ha^{-1} and oxyfluorfen 0.15 kg a.i. ha^{-1} resulted in higher marginal and net returns, lowest net returns and marginal returns were obtained in metolachlor 1.00 kg a.i. ha^{-1}. Highest profit per rupee spent on weed control was obtained in atrazine 1.00 kg/ a.i. ha^{-1}, whereas less profit per rupee invested was obtained in hand weeding treatment.

Investigation on Production of Winged Bean (*Psophocarpus tetragonolobus* L. DC)

MAHESH B. DANDANNAVAR 200 MAJOR ADVISOR : DR. M.B. MADALAGERI

A field experiment was conducted at Olericulture unit of Kittur Rani Channamma College of Horticulture, Arabhavi to study the growth and yield performance of winged bean genotypes in Ghataprabha Left Bank Command Area (GLBC) during kharif 1999. The experiment was laid out in randomised block design with two factors, *viz*., nine winged bean genotypes trained on two standards (dead and live).

The results of the investigation revealed that winged bean can be successfully cultivated in GLBC area.

The winged bean genotypes differed significantly in yield and quality of immature vegetable pods, seeds and root tubers. Among the tested genotypes, PTK-8 and PTK-5 were superior for vegetable pod yield (10.11 and 8.98 t/ha), seed yield (0.54 and 0.59 t/ha) and root tuber yield (1.75 and 1.89 t/ha). The quality of the vegetable pods and root tubers were also superior in these genotypes in terms of higher sugar and protein contents.

Between the two standards used, dead standard (wooden poles) was found superior in promoting all the growth and yield parametrs than the live standard (sweet corn). The plants trained on dead standard produced significantly higher green pod, seed and tuber yield (8.41, 0.72 and 1.31 t/ha, respectively) than those trained on live standard (6.50, 0.30 and 1.11 t/ha, respectively).

Among the different treatment combinations, the genotypes PTK-8 and PTK-5 trained on dead standard were found to be best for getting good quality and higher green pod, seed and tuber yield. However, despite the higher yield of PTK-5 and PTK-8 on dead standards, training these genotypes on live standard (sweet corn) had recorded higher net production values (3.53 and 3.29, respectively) and was found to be more profitable in view of low cost on standard and additional income from the sale of sweet corns.

In Vitro Rapid Multiplication of Potato

D. RENUKA 2000 MAJOR ADVISOR : Dr. N. BASAVARAJ

The present investigation on "*In vitro* rapid multiplication of potato" was carried out during 1999-2000 at the Tissue Culture Laboratory of Horticulture Department, College of Agriculture, University of Agriculture Sciences, Dharwad. In the present study, sub experiments were conducted by applying CRD design, in order to find out the best explant, media and the growth regulator combination and the best concentrations for rapid multiplication of potato. Further plantlets were assessed for their virus free condition through mechanical sap inoculation method and also plantlets were assessed for hardening under different growing conditions.

Three different explants and three basal media were used in the investigation. Among them, sprout tip explants on basal Murashige and Skoog media showed early initiation of culture, culture establishment, more number of shoots and more number of leaves compared to other explants.

Among the growth regulator combinations and concentrations assessed for standardization, MS basal medium containing 0.3 mg per litre of BAP gave more number of shoots and 0.3 mg per litre BAP + 0.3 mg per litre GA_3 gave maximum shoot length. Whereas addition of 0.32 mg per litre NAA to the basal MS medium resulted in better root length. However, the growth regulator combinations and increasing concentrations (from 0.1 to 0.3 mgl^{-1}) of BAP, GA_3 and NAA produced intense (++++) callus development and regeneration of potato plantlets.

Transferred potato plantlets established better under net house condition compared to direct exposure in the field. Mechanical sap inoculation on indicator plant like *Chinopodium amarantiacolor* showed no symptom of virus by any of the planlets of potato obtained under *in vitro* conditon.

Multiplication of potato under *in vitro* seems to be the best method for obtained more number of disease free propagules under transitional tract of Northern Karntaka.

Studies on Keeping Quality of Potato Cultivars

SALIL BHATTARAI 2000 MAJOR ADVISOR : K. RAMACHANDRA NAIK

An investigation was carried out in the Department of Horticulture, College of Agriculture, Dharwad during the year 1999-2000 to study the effect of storage conditions and chemical treatments on storability of potato cultivars.

Tubers stored under zero energy cool chamber (ZECC) recorded significantly lower values of PLW (8.54%) and total weight loss (12.83%) as compared to 14.0% and 27 38 respectively under ambient storage condition (ASC) after storage penod of four months. Sprout weight after four months of storage was higher (2.34%) in tubers stored under ZECC as compared to those under ASC (1.75%) Scores for sensory qualities of cooked potato was higher in tubers under ZECC. But the frying qualities were not affected by storage conditions.

Among the cultivars Kufri Chandramukhi recorded lower values of PLW and total weight loss (6.83 & 8.67% and 9 75 & 18.17%, respectively under ZECC and ASC) after storage period of four months. Sprout weight after four months of storage was also lower in Kufri Chandramukhi (1.81% and 1.16%, respectively under ZECC and ASC). Difference was observed in cooking and frying qualities among the cultivars after four months of storage under different storage conditions.

The total weight loss after storage period of four months in chemical treated tubers were statistically on par with untreated tubers under ZECC storage. Post harvest treatment of tubers with CIPC (1000 ppm) and preharvest foliar spray of MH (400 ppm) inhibited sprouting considerably and the reduction in sprout weight over control was 61.62 and 49.65 per cent respectively in tubers with CIPC and MH treatment under ZECC after four months of storage. Though score pertaining to overall acceptability of cooked tubers was reduced by chemical treatment, frying quality was not significant affected.

Effect of Spacing and Nutrition on Growth, Flowering and Corm Production in Gladiolus cv. American Beauty

MANJUNATH L. DODDAMANI 2000 MAJOR ADVISOR : Dr. P.R. DHARMATTI

The present investigation was carried out in the red sandy soil of the New Orchard of the Division of Horticulture, University of Agricultural Sciences, Dharwad, during kharif 1999. The main objectives of investigation were to find out the optimum planting density, to find out the optimum dose of fertilizer and to study the influence of spacing and fertilizer on growth and yield parameters of gladiolus. Three levels of spacing (S_1 30 x 10 cm, S_2 30 x 20cm, S_3 30 x 30 cm) and four levels of fertilizer doses (F_1 75:45:45 ; F_2 100:60:60 ; F_3 125:75:75 ; F_4 150:90:90 kg NPK/ha) were tried in this experiment under irrigated conditions.

Regarding the influence of spacing levels, it was found that wide spacing of 30 x 30 cm resulted in better flower qualities like (spike length, flower diameter, per cent marketable spikes) and they were on par with 30 x 30 cm spacing.

Among the various fertilizer levels tried, application of 150:90:90 kg NPK/ha resulted in maximum growth, highest yield (100% special grade marketable spikes/m^2) and better corm qualities.

The results of the present investigation revealed that higher monetary net return (Rs.12,61,600) and B:C ratio (2.71) was obtained with 30 x 20 cm spacing and 150:90:90 kg NPK/ha fertilizer level.

Effect of Nutrient Sources on Growth, Yield and Quality of Capsicum (Cv. California Wonder) Grown under Different Environments

JEEVANSAB 2000 MAJOR ADVISOR : Dr. N. BASAVARAJ

An experiment was conducted on medium deep black soil at Main Research Station, University of Agricultural Sciences, Dharwad during kharif 1999 to study the effect of nutrient sources on growth, yield and quality of capsicum (Cv. California wonder) grown under different environments. The treatments comprised of two growing environments (polyhouse and openfield conditons) and four levels of nutrient sources *viz* , vermicompost @ 2 t/ha^{-1} + RDF, *Azospirillum* + RDF, RDF (150:75:50 NPK kg/ha^{-1}) and 50% RDF. The experiment was laid out in split plot design with five replications

It is confirmed from the study that the mean air temperature of 25-28 °C, mean soil temperature of 27-30 °C, mean relative humidity 75-85% and 800-900 ft cd of mean light intensity were found to be better to obtain higher yield of capsicum under transitational tract of northern Karnataka (Zone-8).

The fruit field of capsicum differed significantly with the growing environments. The highest fresh fruit yield (30.5 t ha^{-1}) was obtained under polyhouse, which was 154 per cent more than the yield obtained in open field (12 t ha^{-1}). Similarly, capsicum fruits obtained from polyhouse had a higher ascorbic acid and total soluble solids (TSS) compared to capsicum grown under open field condition.

The fruit yield of capsicum differed significantly with the application of different nutrient sources. Application of vermicompost @ 2 t ha^{-1} along with RDF registered highest fruit yield (25.5 t ha^{-1}) followed by *azospirillum* + RDF (22.5 t ha^{-1}), RDF (20.5 t ha^{-1}) and 50% RDF (16.4 t ha^{-1}). Similarly, quality parameters *viz*., ascorbic acid and TSS also differed significantly with the application of different nutrient sources. Higher ascorbic acid and TSS content were recorded in vermicompost + RDF treated plants. The highest net returns (Rs.2,73,038) and gross returns (Rs.4,29,600) were obtained in the treatment combination of vermicompost + RDF under Polyhouse conditon.

Based on these results, it could be concluded that the application of vermicompost @ 2 tha^{-1} along with RDF under protected condition in beneficial in obtaining higher yield, quality fruits and higher net returns in capsicum production.

Heterosis and Combining Ability Studies in Brinjal (*Solanum melongena* L.)

SANJAY KUMAR BULGUNDI 2000 MAJOR ADVISOR : Dr. RAMANGOUDA V. PATIL

The study was under taken to assess the *per se* performance, magnitude of heterosis and combining ability in respect of yield and its components in brinjal. A line xtester set was obtained by crossing six lines with five testers. Thirty F_1's along with their parents and a commercial check (Sanju) were planted in randomised block design during the year 1999 at the College of Agriculture, Dharwad.

Hybrids showed significant differences for all the 23 traits. Significant *per se* performance and economic heterosis in desirable direction was recorded in several crosses. The crosses RL x TL, RL x W-8 and RL x R expressed heterosis to the extent of 59.96, 11.90 and 11.90 per cent, respectively over commercial check for yield per plant. Considering the consumer preference, these hybrids were also found suited to some parts of northern Karnataka namely parts of Belgaum, Bijapur and Bellary. Hence, these hybrids can be emphasized for commercial exploitation. The heterosis for high yield was found to be much regulated by the hybrid vigour, expressed by its component character - number of ruits per plant.

The estimated components of general and specific combining ability variance revealed that differences among lines, testers and line x tester was significant for all characters except days to first picking in lines and fruit density in line x tester. The dominance variance was higher

than additive variance in all traits indicating perdominance of non-additive gene effects, except for days to 50 per cent flowering, number of flowers per inflorescence, days to first picking, fruit length and fruit density. Hence, in such cases heterosis breeding or any other breeding programmes which utilizes combining ability information could be used. Further, for the expression of traits, contribution of the line was higher in five traits, testers in three and the line x tester in fifteen traits.

From, per cent gca score, it was observed that parent RL had highest positive pooled value among lines, while TL among testers indicating as best parents.

AGRICULTURAL ENGINEERING

Evaluation of Subsurface Drainage System in Islampur Pilot Project are under Upper Krishna Project Command

RAJASHEKHAR D. BARKER

MAJOR ADVISOR : Dr. P. BALAKRISHNAN

A study was conducted to evaluate the subsurface pipe drainage system that has been installed during 1991-96 at Islampur village, Gulbarga district in Upper Krishna Project Command area by the University of Agricultural Sciences, Dharwad with the funding by the UKP CADA (Command Area Development Authority). The subsurface drains were executed in 26 ha of black soil (Vertisol) area using the spacings of 20, 30, 40 and 60 m along with shallow open drains. The brief results of the present study undertaken during 1997-98 are presented below.

The weighted average discharge of the subsurface drainage system were 7.0 and 6.9 m/d during kharif and rabi/summer respectively. The overall weighted average discharge of project area was 6.9 m/d which was nearly 3.5 times that of the design drainage coefficient (DC). The spacing and the drainage materials had influence on drain discharge ; generally, the discharge was inversely related to the spacing and the PVC performated corrugated pipe with nylon filter combination was found to be best of the lot among the drainage materials. The PVC performated corrugated pipes without any filter also was found to work satisfactorily. However, this needs to be tried in few more areas for confirmation and large scale adoption. The average hydraulic conductivity by the auger hole method was 0.096 m/d whereas the areal hydraulic conductivity by the drain outflow method was 0.351 m/d which was eight times higher than that obtained by the earlier method. The EC and ESP decreased with soil depth for all the spacings before sowing and *vice-versa* after harvest of the crop. The ESP was directly related to the drain spacing as the values increased with spacing for both the cases of before sowing and after harvest of the crop. However, the ESP values were slightly higher at deeper layers after harvest of the crop. The leachate (drain water) salinity decreased gradually from July, 1997 to till March 1998 both in the laterals and the outlets of the main indicating that the salts accumulated in summer months were leached during the period. The quality of leachate was found to be good and fit for reuse as irrigation water without any salinity and sodicity hazards as SAR, EC, pH, RSC and SSP were below the critical limits. The irrigation to various crops was found to have local influence on drain discharge. Similarly, the results indicated the effect of rainfall on increase in drain discharge. The cropping intensity in the sutudy area increased (161.95%) and was more than 2 times that before the drainage system. There, was significant increase in the productivity of crops after the drainage installation over the pre-drainage yield levels. Though paddy is a banned crop, its area is increasing at alarming rate which needs to be checked to minimise the problems of waterlogging and salinity.

AGRICULTURAL ECONOMICS

Economic Analysis of Dairy Farming in Sameerwadi Sugar Factory Operational Area of Northern Karnataka

PRASHANTKUMAR R. WADEAR 2000 MAJOR ADVISOR : Dr. V.R. KIRESUR

The Dairy sub-sector in the agricultural economy of our country is not only an important source of income and employment in the rural sector, but also meets the equity objective through narrowing down the gap between the rich and the poor farmers. Karnataka is the eighth largest milk producing state in the country with an annual production of around 35 lakh tonnes at a growth rate of 5.5 per cent p.a.

With the financial support from the Sameerwadi Sugar Factory of Bagalkot district, Karnataka State, the present study was undertaken mainly to examine, the composition of dairy animals, feeding pattern, economic feasibilities of dairy farming and constraints faced by the dairy farmers therein.

The herd size of large ruminants increased with the increase in the size of land holding. Similar was the case with crossbred cows. This could be attributed to the high income level of large farmers and economies of scale. On the other hand, bullocks followed the reverse pattern owing to the effect of mechanisation/tractorisation by large farmers.

Among feed components, dry fodder accounted for the highest share (50 to 73%) in the animal's diet followed by green fodder (dry weight) (22 to 30%) and concentrates (4 to 25%). "Stall feeding" was superior to "stall feeding + grazing" in terms of higher milk yield, dung availability and lower usage of labour thus leading to higher net returns. In general, concentrates significantly and positively influenced the milk production. Due to inadequate and poor quality of fodder the full potential of crossbred cow could not be exploited.

Cost of feeds and green fodder constituted the lion's share in the variable cost. The net returns per animal per annum were highest in the case of small farmers followed by medium and large farmers across all types of milch animals. Most of the milk produced (99%) in the case of crossbred cow was sold as against 55 per cent in indigenous cow and 77 per cent in buffalo.

Among several production constraints faced by the farmers, low milk yield, non-availability of concentrates, high cost of concentrates and non-availability of pastures in the villages were the major ones. In marketing, sale on credit, lack of scientific storage facility and low price of milk were the major bottlenecks, whereas low local demand for processed products was the serious constraint in processing.

An Econometric Analysis of Indian Rice Exports

S. ANANTHI 2000 MAJOR ADVISOR : Dr. G.K. HIREMATH

With the unfolding of liberalized trade reforms, the export potential of Indian rice has increased. India holds a monopoly in basmati and non-basmati rice is also a major export item. The objectives were to estimate the growth rate of area, production, productivity and export of rice, instability in exports, the direction of trade and export competitiveness of rice. The techniques of Compound Growth Rate, Coefficient of Variation, Markov chain analysis and Constant Market Share model were employed.

The results revealed that for the period (1949-50 to 1997-98), the production registered the highest growth (2.7 per cent) followed by productivity (1.9 per cent) and area (1.0 per cent). The basmati and non-basmati rice exports registered a growth of 2.41 per cent and 25.32 per cent respectively.

The export value of basmati rice had a high a variation (82 per cent). The quantity and value of non-basmati rice exports showed a high variation of 183.58 per cent and 171.38 per cent.

The results of Markov Chain model showed that previous exports share retention for Indian rice was high for Saudi Arabia (87 per cent). Besides, Saudi Arbai gained

52 per cent of Kuwaiti market share and 69 per cent of U.S.A.'s share. Our non-basmati rice exports did not enjoy any strong preference in the global market except United Arab Emirates to a certain extent.

The study on export competitiveness revealed that prior to rupee devaluation, our exports were not competitive as judged from negative competitive effect (-34.17 per cent). After devaluation, the competitive effect was positive (61.21 per cent) reflecting the competitiveness of the product.

Appropriate export promotion strategies could be evolved to diversify the geographical concentration and to export the required quality of the needy market. In short, to capture the world market a Rice Export Promotion Council could be established.

Comperative Economics of Banana and Sugarcane Cultivation in Tungabhadra Command Area of Karnataka

G. KAMESHWARA RAO 2000 MAJOR ADVISOR :Dr. G.K. HIREMATH

The study was conducted in Tungabhadra command area of Karnataka, with an overall objective of comparing the economics of banana and sugarcane crops cultivation. Data were collected randomly from 120 farmers comprising sixty banana growers and sixty sugarcane growers from the two selected taluks. Tabular, compound growth rate and functional analysis were employed.

The results revealed that the growth rate in area of banana in Gangavati and Hospet taluks were higher (2.26 and 9.05 per cent, respectively) when compared to sugarcane crop (-3.50 and -2.49 per cent respectively). The per hectare total cost was higher in banana crop (Rs.71,513.04) than sugarcane crop (Rs.65,496.12). The per hectare gross income and net income generated in banana cultivation were also higher (Rs.1,13,377.57 and Rs.41,864.53, respectively) as compared to sugarcane crop (Rs.81,382.74 and Rs.15,886.62, respectively). The benefit-cost ratio with cost 'D' was lower in sugarcane cultivation (1.24) comparing the banana cultivation (1.59). Similar trend was observed with cost 'A', 'B' and 'C' also.

The results also revealed that the land was under utilised in banana and sugarcane to the extent of 25.35 and 80.37 per cent, respectively and irrigation was over used in sugarcane to the extent of 9.05 per cent above the optimum input level.

In banana marketing producer's share in consumer rupee was 56.69 per cent in Channel-I (Producer → Commission agent → Wholesaler → Retailer → Consumer) and 51.41 per cent in Channel-II (Producer → Village level trader → Wholesaler → Retailer → Consumer). Only one marketing channel was (Producer → Sugar factory) prevailed for sugarcane marketing.

The main reasons opined by sample farmer's preference for banana to sugarcane cultivation were delayed payments, high transportation costs, problem of disposal of sugracane to factories, low price fixation. Hence, sugar factories could ensure prompt payment, reasonable price fixation and provide transportation facilitites to increase the sugarcane area.

Economics of Soils and Water Consideration in Northern Dry Zone of Karnataka

MAHANTESH R. NAYAK 2000 MAJOR ADVISOR : Dr. V.R. KIRESUR

The major cause of land degradation has been the erosion of soil and water from the cultivated lands. Soil erosion is a serious problems in India which has to be controlled if the avowed aim of sustainable agriculture is to be achieved. Comprehensive research studies that focus on watershed programmes, particularlyon soil and water conservation are few and far between. Hence, the present study was undertaken with the main objectives of analysing the economics of soil and water conservation (SWC) technologies at farm level, financial feasibility thereof and examining the extent and pattern of adoption of recommended SWC practices and analysing the gaps and constraints therein.

The study was conducted in the two watersheds

projects of the Northern Dry Zone (Zone-3) of Karnataka, namely, Kanakanala watershed in Koppal District and Indwar-Hullalli watershed in Bagalkot District. The study was based on the primary data for the crop year 1999-2000 collected through personal interviews from 120 farmers, 60 from within the watershed area and 60 from outside. The data were analysed using various statistical techniques including financial feasibility analysis, logit model and tabular analysis.

The results indicate that the impact of adoption of SWC practices was positive in terms of additional net returns (Rs.685/ha to Rs.5297/ha during kharif and Rs.465/ha to 4240/ha during rabi/summer) in all the crops grown in the study area. Under the "constrained capital situation", vegetative bund involved the least investment per farmer followed by rubble checks, contour bund, contour + gully plugging, contour + waste weirs, contour + vegetative bund and farm pond, in that order. Adoption could be extended till the capital permitted.

Most of the constraints severely faced by the farmers thus leaving them to "non-adopter category" were related to financial factors, such as heavy investment, non-availability of credit, high interest rate and long gestation period, but not the technology related problems.

Value Addition to Cotton - An Economic Analysis

RAYANAGOUDA MUNDINMANI 2000 MAJOR ADVISOR : Dr. L.B. KUNNAL

This study was under taken to analyse the value addition to cotton in ginning, spinning and weaning process. The study was conducted in Gadag district. Two taluks (Gadag and Ron) having the highest area under cotton in the district were selected. From the selected taluks, three villages each were selected based on highest area under cotton. From each of the selected villages, 10 farmers were selected randomly for collection of data. Thus a total of 60 farmers formed the sample size for the study. For studying value addition two processing units in each stage (ginning, spinning and weaning) were selected.

Findings of the study reveled that, the total cost incurred for cotton cultivation was Rs.9,460.29/ha. Net returns were Rs.2,442.45/ha of cotton production. The average cost of processing of one quintal of Kapas to lint was Rs.1,840.61 and the gross returns obtained by ginning process were Rs.1,993.00. The net value addition to cotton by ginning process was Rs.152.39 per quintal of Kapas ginned. The total cost incurred in the processing of one quintal of lint to yarn was Rs.8,294.39 and gross returns obtained were Rs.9,951-27. The net value added in spinning process was Rs.1,656-88 per quintal of lint spinned. The total cost incurred in the processing of one quintal of yarn to cloth was Rs.17,213-60 and the gross returns per quintal of yarn woven were Rs.19,315.83. The net value added per quintal of yarn processed was Rs.2,102.23.

The total value addition to one quintal of cotton in the course of processing Kapas into cotton textile was Rs.1,356.45. The break up of the same at different levels of processing was, ginning Rs.152.39 (11.24%), spinning Rs.579.91 (42.75%) and weaving Rs.624.15 (46-01%). This, in other words amounted to enhancement of Kapas value by 184% in term of creation of form utility to commodity.

Economics of Gherkin Production and Trade in Haveri District, Karnataka

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Gherkin is mini cucumber of common man. It is native of Africa and has occupied a place of its own in the international market. The study was undertaken in Haveri district of Karnataka, to analyse the Economics of Gherkin production and trade. Three taluks *viz.*, Ranebennur, Hirekerur and Byadgi were selected from the district based on highest area under the Gherkin crop. Three village from each taluk were selected based on maximum area under the crop. Ten Gherkin growing farmers from each village were selected randomly. Hence, the total sample size was 90. The study

revealed that, the total per acre cost of Gherkin cultivation was Rs.30,627.42, out of which variable cost accounts 77 per cent and fixed cost accounts for 23 per cent. The per acre net returns obtained were Rs.11,374.33. Variation to the extent of 82 per cent in Gherkin production was explained by the seven independent variables included in the study employed the Cobb-Douglas production function. The regression co-efficient of bullock labour (0.2338) and FYM (0.4805) were found to be statistically significant indicating their crucial role in Gherkin production. The MVP to MFC ratio was more than one in cases of bullock labour, FYM, staking material and seeds. This indicated that there is an opportunity to maximise returns by using more of these resources. Markov chain model fitted to study the trade direction of Indian Gherkins in international market. Belgaum was found to be very loyal to import Gherkin from India, as it retained the trade to the extent of 79.37 per cent of market share of the previous years. Other major markets for Indian Gherkin exports were UK, Spain, Australia, France, USA and Canada. There were several problems in Gherkin production and trade in the country which can be well handled with proper policy interventions.

AGRICULTURAL MARKETING AND BUSINESS MANAGEMENT

Business Performance Analysis of Agro-Based Industry in Belgaum District of Karnataka - A Case of Starch Industry

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The maize starch industry in terms of volume and value of the final products is most important sector in the world. The turnover of the Indian starch industry is about Rs.5,000 million. Starch industry suffers from various management problems. Therefore to help existing manufactures and who wish to enter in the industry Belgaum district was selected in Karnataka with both established starch units. Further, they were categorized into two namely, small and large unit based on their installed capacity. The primary data was for the collected for the year 1998-99 by personal interview method with the help of pre-tested schedule. Similarly secondary data was collected from both the units and DIC, Belgaum for the year 1998-99.

The results revealed that, in Belgaum district 12,294 agro-based units were established, out of which 12,278 were small units. There was a direct relationship between the total capital investment and the size of the unit. The starch industry followed the line organization type of structure. Totally three patterns of procurement of maize were identified. The cost of carrying inventory per tonne of maize was higher (Rs.913.29) in large unit. The cost of production of starch per tonne of maize processed was small (Rs.8,374.37) in small unit. The value added as a result of processing activity was high (Rs.5,724.15) in large unit per tonne of maize processed. Maximum quantity of starch was marketed through traders and commission agents. The marketing cost per tonne of starch was high through channel III (commission agent). The units used 50 kg package for marketing of starch powder. The small unit adopted pricing at the market strategy and large unit adopted penetration pricing and loss leader pricing strategy. The business performance as observed through the financial ratios showed that the large processing units were more efficient than the small unit.

Management of Food Processing Units - A Case of Roller Flour Mills in Bijapur District, Karnataka

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India is one of the principal wheat producing and consuming country in the world, wheat forms and staple food to most of the population in the world. Wheat flour based products such as chapathi are part of the staple diet in most part of central and Northern India. Nearly 10.5 million tonnes of wheat is processed every year. The leading flour producing states are, Uttara Pradesh, Maharashtra, Karnataka, Tamil Nadu, Bihar, Andra Pradesh, West Bengal, Haryana and Punjab.

The overall objective of the study was to analyse the performance of roller flour mills in Bijapur district of