

**Ph.D.**

**Agricultural Extension**

**Need Satisfaction of Rural Women of Dharwad District, Karnataka**

**ANASUYA CHANDARGI**

**1994**

**Major Advisor : B. SUNDARA SWAMY**

A scale to measure the need satisfaction level of rural women was developed considering the need hierarchy developed by Maslow. The needs, viz. food, clothing, housing, health, security, love and belongingness, sociability, esteem, selfactualization were included in the study. Three hundred and eighty four randomly selected women of Dharwad taluk were contacted and their responses were obtained. The results of the study were that majority of rural women (63.54%) were fairly satisfied with their needs in general. Twenty six per cent of the rural women satisfied with their needs. More number (56) of women of farming family were satisfied with their needs than women (46) of nonfarming family. Nearly 10 per cent of the women

of nonfarming family were least satisfied with their needs. Multiple regression analysis that the variables education, family size, land holding, material possession, self concept, self reliance, work value significantly influenced the level of need satisfaction. The results of discriminant function analysis revealed that the greater contribution of the variables material possession (35.61%), land holding (11.73%) and self reliance (11.72%) for discrimination of women of fairly satisfied group from the women of satisfied group. Problems such as off seasonal employment (64.29%), lack of educational facilities in the villages (64.22%) and restrictions from the elders of the family (49.05%) were major problems in meeting their needs as cited by them.

**National Agricultural Extension Project (NAEP) as Perceived by Farmers and Extension Personnel of Department of Agriculture, Karnataka**

**S. L. PATIL**

**1994**

**Major Advisor : B. SUNDAR SWAMY**

The study on NAEP as perceived by farmers and extension personnel was conducted during 1992-93 in the purposively selected Dharwad district of Karnataka State. Multistage random sampling procedure was followed to select 180 farmers and 227 extension personnel working under T and V system as the respondents for the study. The dependent variable perception of usefulness of NAEP by farmers and extension personnel was measured with the help of scales developed for

this purpose. The independent variables were quantified by the scoring procedures/scales developed by earlier researchers. The important findings of the study were that majority of farmers (71.11 %) and extension personnel (68.72 %) perceived NAEP as 'useful' in scattering the needs of farmers. Multiple regression analysis revealed that 'education', 'source credibility', 'change proneness' and 'management orientation' in case of farmers and 'organisational climate', 'organisational commitment',

'job autonomy', 'achievement motivation', 'job perception', 'guidance and supervision', 'facilities and resources', 'people participation', 'job satisfaction', 'self confidence' and 'communication' in case of extension personnel emerged as the most crucial variables in influencing the level of perception of usefulness of NAEP. The variables 'land holding' and 'annual income' in case of farmers, organisational commitment and people participation in case of extension personnel substantially contributed for the discrimination of farmers and extension personnel

belonging to 'more useful' perception category from those belonging to 'less useful' perception category. 'Make Agriculture Assistants to stay in villages compulsorily', 'remunerative prices for farm produce', and 'make available quality farm inputs in time' were the important suggestions made by farmers. 'Measures for timely supply of quality farm inputs', 'promotion opportunities' and 'conveyance to field extension workers', were the important suggestion made by extension personnel for effective functioning of NAEP.

## **Soil Science**

### **Studies on Pedogenesis of Lateritic and Associated Soils of North Karnataka**

**P. L. PATIL**

**1994**

**Major Advisor : G. S. DASOG**

Properties of six lateritic pedons on midland and two associated lowland pedons from Uttara Kannada and Belgaum districts were selected to study their pedogenesis and to classify according to revisions in Soil Taxonomy. The rainfall varied from 1792 mm at Khanapur to 3854 mm, at Murdeshwar. All the pedons were very deep. Morphological, physical and chemical properties of all the midland pedons followed the characteristic features of lateritic pedons. Iron oxide concretions were distributed throughout the pedons in Kumta and Murdeshwar and in the lower solum of the other pedons. The properties of lowland pedons departed markedly from midlands due to hydromorphic condition. CEC of clays indicated the dominance of low activity clays in lateritic pedons. Amorphous ferri-aluminosilicates (AFAS) were present in significant quantity. Kaolinite (39.4 to 68.8%) was the dominant mineral in the clay fraction of all the pedons. The Fe substitution for Al was ranged from 0.07 to 0.4 atoms per unit cell in kaolinite. Chlorite and vermiculite was detected in XRD. A small amount of smectite was also estimated by

chemical method though XRD peaks were not detected. Mica was trictahedral type undergoing weathering. Feldspar was in small quantity and quartz content was high in lowlands. Kaolinite peak in XRD of fine sand fraction indicated formation of pseudo-aggregates of sand size. Climate has played an important role in the formation of these soils with topography and drainage as secondary factors. Kaolinization and laterization are the important pedogenic processes operating along with illuviation of clays and iron oxides. Neosynthesis was dominant kaolinization process. Murdeshwar, Kumta and Londa pedons have undergone higher degree of laterization than the other pedons. Gibbsification was more pronounced in Murdeshwar and Kumta than in other pedons. Resilicification was noticed in lowlands. Murdeshwar, Kumta and Londa pedons were classified as Plinthic kandistox, Sirsi midland pedons as Typic kandistult, Siddapur midland pedon as Plinthic paleustult, as Khanapur pedons as Typic paleustalf, Sirsi lowland pedon as Typic endoaqualf and Siddapur lowland pedon as Typic endoaquent.

**Performance of Tree Species Under Saline and Waterlogged Soils of Tungabhadra Command Area**

VITTAL KULIGOD

1995

Major Advisor : V. S. DODDAMANI

A field experiment was conducted on saline and waterlogged soils of ARS, Gangavati. Soil salinity of the experimental area was ranging from 1.30 to 42.90 dSm<sup>-1</sup> due to fluctuating water table from 61.40 to 79.10 cm during November and from 87.50 to 99.10 cm during July. The tree species evaluated were *Hardwickia binata*, *Sesbania grandiflora*, *Acacia nilotica*, *Dalbergia sissoo*, *Casuarina equisetifolia* and *Azadirachta indica*. Effect of soil salinity and water table on establishment, height, number of branches, diameter of stem at stump (DSH) and breast (DBH), crown width and pruned biomass of tree species were studied. Establishment of tree species was reduced by the increasing soil salinity. The reduction was lower in species such as *A. nilotica*, *H. binata* and *C. equisetifolia*. However, the reduction was higher in case of *D. sissoo* and *A. indica* under saline soil conditions (> 15 dSm<sup>-1</sup>). Shallow water table reduced growth of tree species but *A. nilotica*, *C.*

*equisetifolia* and *S. grandiflora* exhibited lower reductions while, *A. indica*, *D. sissoo* and *H. binata* registered higher decrease. All the growth parameters of trees strongly correlated with combined stresses of soil salinity and waterlogging (SEWN) than with salinity or waterlogging alone suggesting its usefulness in evaluating the performance of trees. Growth and establishment of *A. nilotica*, *C. equisetifolia* were little affected by SEWN, in contrast to the significant reduction observed in case of *D. sissoo*, *A. indica* and *H. binata*. Accumulation of sodium, magnesium, chlorine and sulphur in leaf tissue was higher in *C. equisetifolia*, *A. indica* and *D. sissoo* compared to *A. nilotica* under saline and waterlogged conditions (SEWN > 500). After two years of tree growth, soil salinity and sodium adsorption ratios were reduced and organic carbon content increased. Reduction in salinity and increase in organic carbon content of soil was higher under *A. nilotica* and *S. grandiflora*.

**Crop Physiology**

**Effect of Herbicides, Growth Conditions and Carriers on Physiological, Biochemical and Anatomical Changes in Eupatorium (*Chromolaena odorata* K & R)**

UMESH V. MUMMIGATTI

1994

Major Advisor : Y. C. PANCHAL

Field and pot experiments were conducted during 1989-91 on naturally grown Eupatorium (*Chromolaena odorata* K & R) to find out the effect of herbicides, growth conditions and carriers on its control. It was also intended to find out the critical time of application of herbicides. The application of herbicides during August was found most effective in controlling Eupatorium at Yellapur while, the spray of herbicides during September was effective

at Prabhunagar. Among the herbicides, 2, 4-D (2500 ppm) and glyphosate (5000 ppm) were more effective in controlling weed growth. Spraying of paraquat (4000 ppm) at flower bud stage was most effective in controlling viable seed production than at full bloom stage. Effect of herbicides on biochemical parameters indicated a reduction in chlorophylls, total soluble sugars, crude protein content and free amino acid pool of the treated

plants. The extent of reduction was more in paraquat followed by glyphosate and 2, 4-D. The activity of peroxidase, phenylalanine ammonia lyase (PAL) and tyrosine ammonia lyase (TAL) increased with an increase in the concentration of herbicides. Transpiration rate (TR), stomatal conductance (SC) were found to be more in open light than under shaded condition and decreased with an increase in the concentration of herbicides. Electrical conductivity (EC) and optical density (OD at 525 nm) of leaf leachates were found to increase with an increase in the concentration of herbicides indicating the alterations in membrane integrity. Among the different herbicides and carriers

combinations, glyphosate with ammonium sulphate, paraquat with potassium nitrate and 2, 4-D with urea were found to be effective in increasing herbicide efficacy and the effect was more in open light as compared to shaded condition. Growth conditions significantly altered leaf thickness, petiole diameter, epidermal thickness, pubescence, mesophyll thickness and number of mesophyll cells under open light as compared to shaded conditions. Significant reduction in leaf and petiole thickness was noticed in herbicide treatments and the extent of reduction was more in glyphosate over other herbicides.

## **Genetics and Plant Breeding**

### **Investigations on *In Vitro* Morphogenesis and Somaclonal Variation in Sugarcane (*Saccharum* spp. hybrid)**

**K. L. DOBARIYA**

**1995 Major Advisor : M. S. KURUVINASHETTI**

Five sugarcane (*Saccharum* spp. hybrid) cultivars were investigated for induction of callus, its maintenance, morphogenic pathways and plant regeneration from long – term callus cultures. Somaclonal variation for different characters was studied in two cultivars, viz. CoC 671 and Co 740. Frequency of callus induction from leaf and leaf sheath explants was high (> 85%) in all the cultivars on modified MS medium with 3 mg l<sup>-1</sup> 2, 4-D. Morphogenic calli of the cultivars differed in colour, hardness and organization. Lower levels of 2, 4-D (0.5 to 1 mg l<sup>-1</sup>) along with selective subculture of organized sectors was found effective for long – term maintenance of totipotent callus. In long term cultures, mean regeneration frequency was the highest in Co 740 followed by CoC 671, Co 85002, Co 8014 and Co 7219. Albino and sectored plants were observed in all the cultures. Regeneration potential declined with the age of callus. Histological studies revealed that plant regeneration occurred via both somatic embryogenesis and organogenesis, the former being predominant in all the cultivars.

Large number of somaclones of CoC 671 (405) and Co 740 (777) were produced from established calli. Profuse rooting occurred on MS medium with 60 g l<sup>-1</sup> sucrose and 1 g l<sup>-1</sup> charcoal. Field evaluation of vegetative progenies of somaclones, along with donors showed widespread variation for many morphological, yield and juice parameters. The somaclones of CoC 671 showed variability for a greater number of morphological characters, with higher frequency, than those of Co 740. For quantitative characters the frequency of variant somaclones ranged from 9.85 (cane weight/clump) to 48.64 (leaf length) per cent in CoC 671 and from 2.96 (number of millable canes/clump) to 32.82 (leaf length) per cent in case of Co 740, indicating marked genotypic differences. The involvement of transposable element (s) in CoC 671 was suspected. The kind and frequency of variants produced for most quantitative characters depended upon the selection history of the character. Many somaclones with higher cane weight and pol than the controls were selected for further evaluation.

## **M.Sc.**

### ***Agricultural Economics***

#### **Economics of Processing Paddy Into Rice, Poha, Murmura and Popped Rice**

**AMRUTHA C. P.**

**1995**

**Major Advisor : G. K. HIREMATH**

There are four principal paddy products, viz. rice, poha, Murmura and popped rice. The objectives were to study the socio economic features, investment patterns and economic aspects of processing units which were analysed employing the techniques of tabular analysis and business ratios. The results showed that the capital investments in rice mills, poha mills, murmura units and popped rice units were Rs. 17,92,250, Rs. 5,33,225, Rs. 16,740 and Rs. 20,786 respectively. The per quintal processing costs were Rs. 100 and Rs. 123 for rice and poha respectively, whereas the per bag (120 litres) processing costs for murmura and popped rice were Rs. 23 and Rs. 17 respectively. The net returns per quintal for rice and poha were Rs. 110 and Rs. 36 respectively. In case of murmura and popped rice units the net returns per bag of

output were Rs. 8 and Rs. 9 respectively. The business ratio analysis showed that the large size units of poha, murmura and popped rice were more efficient than small size units. Break-even analysis revealed that all the paddy processing units were operating on profits. The net returns per annum for the processing units were Rs. 67,19,000 for Rice, Rs. 4,74,000 for poha, Rs. 69,000 for Murmura and Rs. 26,000 for popped rice. The opinion survey revealed that all the paddy processing units were facing problems of electricity, fuel and non-availability of paddy. The study concluded that the modernization of processing units and adoption of improved processing techniques can significantly reduce per unit cost of processing. There is a need to build a colony of paddy processors on the line similar to that of industrial estates.

#### **Economics of Production and Processing of Grape in Bijapur District, Karnataka**

**SHARANESH S. HANDIGANUR**

**1994**

**Major Advisor : K. N. R. SASTRY**

The study was conducted in Bijapur district of Karnataka with an overall objective of examining economics of production and processing of grape. Data were collected from 80 grape growers from 13 villages of Bijapur district. Tabular, financial and growth rate analyses were employed. Financial feasibility measures namely, NPV, BCR, IRR and PBP were calculated with sensitivity analysis. The results revealed that the per hectare cost of establishment for the gestation period was Rs. 1,79,475.14 in spacing-I (6' x 4'), Rs. 1,50,634.49 in spacing-II (6' x 6') under pandal system and Rs.

1,08,660 in spacing-I (9' x 5'), Rs. 1,02,112.52 in spacing-II (9' x 6') under telephone trellis system. The total cost of production of grape was highest in spacing-I (Rs. 1,57,519.80) followed by spacing-II (Rs. 1,35,508.07) in pandal system, Spacing-I (Rs. 1,11,529.44) and spacing-II (Rs. 99,519.85) in telephone trellis system. The study further revealed that at 15 per cent discount rate, the spacing-I adopted vineya rolls under pandal system has maximum NPV (Rs. 10,96,393.13), BCR (2.03), IRR (55.09%) and minimum PBP (2.8 years) as compared to spacing-II (Rs. 8,95,842.10, 1.82,

49.26 and 3.2) in pandal system, spacing-I (5,84,859.12, 1.78, 48.44 and 3.1) and spacing II (5,08,597.60, 1.76, 46.22 and 3.2) in telephone trellis system. The per hectare cost of production of raisin of grape was higher in dipping oil method (Rs. 42,102.37 in spacing-I and Rs. 41,006.61 in spacing-II) followed by sulphur fumigation method (Rs. 39,594.19 in spacing-I and Rs. 34,915.41 in spacing-II) and hot dipping method (Rs. 24,616.06). The net returns from raisin was higher in dipping

oil method (Rs. 3,33,336.26 in spacing-I and Rs. 3,12,680.91 in spacing-II) followed by hot dipping method (Rs. 2,43,415.98) and sulphur fumigation method (Rs. 2,37,480.74 in spacing-I and Rs. 1,87,112.92 in spacing-II). The local market was less favourable than markets in Maharashtra. There is need to strengthen and streamline the activities of the Bijapur district grape growers society in the production, processing and marketing of grapes/raisins.

### **Economics of Hybrid Cotton with Special Reference to Pest Management**

**SHRIPAD P. VISHWESHWAR**

**1994**

**Major Advisor : G. K. HIREMATH**

Cotton crop is attacked by 1326 species of insects and mites, of which 166 species damage extensively cotton crop in India resulting in 66-77 per cent decrease in yield. The present study was undertaken to suggest best management technique in cotton. For the study, Naragund, Navalgund and Saundatti talukas in Malaprabha Command area were selected based on the highest area under cotton in these taluks. The growth rate of area under cotton in Navalgund and Naragund taluks ranged between 21.33 and 32.59 per cent, while it declined in Saundatti taluk. The growth rate of productivity of cotton showed decreasing trend in all the taluks. The growth rate of production of the crop in Nargund and Navalgund taluks increased at the rate of 18.06 and 15.54 per cent respectively due to increase in area. The conventional farmers incurred about 45 per cent

more cost on pesticides (Rs. 3742.30) as compared to IPM farmers (Rs. 2579.34). The total cost of production for conventional farmers was Rs. 14274.25 and that for IPM farmers realized about 20 per cent more yield (8.75 qtls) as compared to that of conventional farmers (7.30 qtls). The net returns per hectare earned by IPM farmers (3644.40) was more than four times that earned by conventional farmers (Rs. 700.00). Most of the IPM farmers (70 percent) have got favourable opinion about IPM technology because of low cost and high yield. Among conventional farmers most of them were unaware of IPM technology. In short, IPM technology was found to be technically efficient and cost effective. Hence the government policy must aim at encouraging and educating farmers in adopting IPM technology on mass scale. This will also reduce the environmental hazards.

### **Production and Marketing of Dry Chillies in Karnataka – An Economic Analysis**

**A. P. HIREMATH**

**1995 Major Advisor : H.G.SHANKARA MURTHY**

The present study was undertaken with overall objectives of analysing the economics of production and marketing of dry chillies in the

transitional zone of Karnataka. Since Dharwad district was the leading district with respect to area and production of chilli, it was selected purposively

for the study. Data were collected from 120 farmers of three taluks, viz. Kundgol, Savanur and Haveri in Dharwad district adopting multi-stage random sampling. Byadagi and Hubli markets were selected for studying the chilli marketing. Tabular, financial and functional analysis were employed to analyse the data. The results revealed that the per hectre total cost of cultivation of chilli on small farms was Rs. 5516.5 and that of large farms was Rs. 5852.75. In both the farms share of human labour was the highest (51.20 % in small and 50.10% in large). Net income (profit at cost-C) per acre was found to be negative in both the categories of farms. Benefit-Cost Ratio was also less than one. The results of functional analysis-yield of chilli as dependent variable and land, labour, FYM, seed, fertilizer and PPC as independent variables included in the function explained about 62 and 72 per cent of total variation in chilli yield of small and large farms respectively. It was observed seed and land contributed significantly in small and large farms respectively. The marketing channels identified were :

Channel - I : Producer → Local traders → Commission agent → Wholesaler → Retailer → Consumer  
Channel - II : Producer → Commission agent → Wholesaler → Retailer → Consumer  
Channel - III : Producer → Commission agent → Wholesaler-cum- Processor of chilli powder → Wholesale purchaser of chilli powder → Retailer → Consumer

The producer's share in consumer's rupee was 55.36 per cent in Channel - I (common to both the markets). In Channel - II it was 60.66 per cent in Hubli and 62.66 per cent in Byadagi market. The same was 43.56 per cent and 45.23 per cent in Hubli and Byadagi markets, respectively in Channel - III. The Shepherd's marketing efficiency ratio was 9.65 in Channel - I for both the markets. The ratio was high in Byadagi market compared to Hubli market indicated greater marketing efficiency in Byadagi market. The problems of chilli growers and processors were identified and suggestions were made to solve their problems.

### **Development of Grade Standards for Groundnut and Impact of Grading on Prices in Regulated Markets of Chitradurga District, Karnataka**

**MURTHY C.**

**1995**

**Major Advisor : L. K. WADER**

The present study was undertaken in three important regulated markets of Chitradurga, Davanagere and Challakere for the development of grade standards for groundnut crop, to study the impact of eye-sight grading on price and the policy implications emerging from the study. Tabular analysis was employed to compare the prices of groundnut in each market. Percentages of some qualitative characteristics like oil percentage, specific gravity, iodine value, saponification number, Shelling percentage, foreign matter percentage, shravelled kernel percentage and moisture percentage of groundnut samples of both the graded and ungraded samples were computed in order to compare with one another. Stepwise multiple regression analysis, coefficient of variation, correlation and composite index techniques were employed to find out the most influential qualitative and non-qualitative

characteristics of groundnut on price. The relationship between eye-sight grade and scientific grade, was studied and the variation in quality of groundnut was better explained by scientific grading, when compared to eye-sight grading. It was also evident from the study that the eye-sight graded samples' average price was less than that of ungraded samples. This showed that the graders of these APMC's have failed to properly judge the quality of the produce. On the other hand the traders have demonstrated their ability to judge the quality of groundnut properly as evidenced by higher price given to ungraded groundnut samples. Thus, the study clearly indicated that there is an urgent need to replace eye-sight grading by scientific grading. This would go a long way in building confidence among all the market functionaries including the traders and farmers. This is one of

the important findings of the study which helps the policy makers to introduce scientific grading of groundnut which will help the traders to give price commensurate with the quality of groundnut offered

for sale by the farmers. Thus, it would be possible to do away with the present problems of pricing of groundnut in particular and agricultural commodities in general.

## Agricultural Entomology

### Evaluation of Advanced Chilli Lines for the Reaction to *Polyphagotarsonemus latus* (Banks) (Acar: Tarsonemidae) and *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae)

MANOJ S. LINGERI

1994

Major Advisor : J. S. AWAKNAVAR

Investigations on the evaluation of advanced chilli lines for the reaction to the mite *Polyphagotarsonemus latus* (Banks) and the thrips *Scirtothrips dorsalis* Hood, biochemical and morphological factors imparting resistance and seasonal incidence of the two pests were undertaken at the Main Research Station, University of Agricultural Sciences, Dharwad, during 1993-94. Of the eleven genotypes screened against *P. latus* attack, the genotypes GPC-77, GPC-80, KDSC-6-3-27 and Jwala were selected as promising based on population density, incidence and intensity of attack whereas, KDSC-510-10, G-3 and Byadgi were found most susceptible. For *S. dorsalis* the genotypes GPC-77, GPC-80, KDSC-6-3-27 and G-3 were found promising. The genotypes GPC-82, KDSC-510-10 and Byadgi were severely damaged by the thrips. Total leaf phenols and leaf hairiness exhibited negatively significant relation with the populations of mites and thrips. Leaf thickness was not associated with resistance. However the plant height exhibited

non-significant and negatively significant relationship with the mite and thrips attack respectively. Activity of *P. latus* was noticed throughout the cropping period on all dates of transplanting with peaks of population in the months of November and February. The mite population was favoured by higher temperature, lower humidity and lesser intensity of rainfall. The population of *S. dorsalis* remained active all round the cropping period. Incidence was more pronounced during December and January months. The pest population tended to increase during dry periods with lower minimum temperature and lower intensity of rainfall. Positive and significant relationship was observed between flowering period and the populations of mites and thrips. The genotype GPC-80 harboured lower population of these two pests with minimum flowering duration. Highest yield was recorded in the promising genotype GPC-80. Hence the genotype GPC-80 could be considered as potential variety with multiple resistance to both the sucking pests.



**Effect of Intercropping and Release of *Chrysoperla carnea* Stephens on *Helicoverpa armigera* (Hubner) in Pigeonpea**

RAJENDRA HEGDE

1995

Major Advisor : S. LINGAPPA

Field investigations were conducted to know the effect of intercrops (cowpea, soybean, setaria, sorghum and bajra) on the incidence and damage by the pod borer, *Helicoverpa armigera*, on the conservation and multiplication of natural enemies of pod borer and also to assess the impact of releasing *Chrysoperla carnea* against pod borer at different dosages (0, 0.5, 0.75, 1.0 and 1.25 lakh ha<sup>-1</sup>), in pigeonpea. The egg abundance was significantly higher in sorghum and bajra intercrops followed by intercropping with setaria and soybean. It remained at par and minimum in sole and cowpea intercropped pigeonpea. Only cowpea was able to reduce the larval load significantly over pure crop. None of the intercrops was able to improve the yield of pigeonpea. However, the economic returns out of cowpea, soybean and setaria intercrops were more than from sole crop. Coccinellid population was significantly higher

in intercropped situations. Pod borer parasitism on pigeonpea was not influenced by intercrops. The biocontrol agent *C. carnea* reduced the egg abundance in accordance with the predator density after each release. Dosage levels of 1.0 and 1.25 lakh ha<sup>-1</sup> exerted significant effect on egg population. Releasing the predator @ 0.5 and 0.75 lakh ha<sup>-1</sup> did not prove better over unreleased check. The differences in larval load after first release were not high enough to exhibit the dosage difference. The larval reductions after second and third release were not significant. Reduced borer damage and increased yield was recorded with the release of predator @ 1.0 and 1.25 lakh ha<sup>-1</sup>. The profit obtained at these dosage levels was higher (around 10 paise) compared to releasing *Chrysoperla* @ 0.5 and 0.75 lakh ha<sup>-1</sup> which resulted in 1 and 3 paise for a rupee investment respectively. Thus, release of predator did not prove to be cost effective.

**Biology and Management of Hornworm, *Agrius convolvuli* L. on Greengram, *Vigna radiata* (L.) Wilczek**

DHANANJAY C. CHOUGALA

1994

Major Advisor : V. P. DESHPANDE

Studies on the biology and management of hornworm, *Agrius convolvuli* L. on greengram, *Vigna radiata* (L.) Wilczek was conducted at the Department of Agricultural Entomology, U. A. S., Dharwad during 1993-94. Studies on the effect of host plants on the biology of hornworm revealed that the neonate larvae failed to initiate feeding on *Sesamum indicum* (L.) Among other host species, larval period on greengram, blackgram and cowpea were 25.39, 26.39 and 27.51 days, respectively. On greengram the pest completed its life cycle in 52.02 days. Whereas, on blackgram and cowpea it was extended by 1.38 and 2.83 days, respectively. The pathogenecity of *Bacillus thuringiensis* subsp. *kurstaki* (BTK) was carried out against different

larval instars of *A. convolvuli*. When it was tried @ 1.2 g/l, percentage mortality of first and second instar larvae 72 hours after treatment was recorded to the extent of 96.67 and 93.33, respectively. BTK @ 1.0 and 1.8 g/l. resulted 95.00 and 98.33 per cent mortality of third and fourth instar larvae after 96 hours of treatment, respectively. BTK @ 0.6 g/l resulted 93.33 per cent mortality of fifth instar larvae after 144 hours of treatment. Under field conditions, BTK @ 1000 g/ha reduced the larval population of *A. convolvuli* and *Plusia orichalcea* F. to the tune of 85.68 and 80.60 per cent, respectively resulting in greengram yield of 514.40 kg/ha. The combined effect of BTK @ 300 g/ha and monocrotophos 90 g a. i./ha was found to be the

best treatment, against *A. convolvuli* and *P. orichalcea* with 89.08 and 87.67 per cent larval mortality, respectively as compared to other treatments.

Investigations on combination of poison bait and BTK revealed that the bait was less effective in reducing the larval population.

## **Agricultural Extension**

### **A Study on Knowledge of Rural Women about Value of Food for Good Health and Their Food Habits**

**LAXMI GHARGI**

**1995**

**Major Advisor : B. SUNDARASWAMY**

The study was conducted during 1993-94 in Dharwad taluk of Dharwad district of Karnataka. Ten villages from Garag and Amminabhavi ranges were selected randomly. Two hundred respondents were selected in these villages. The results revealed that 56.00 per cent of the rural women had medium level of knowledge. Roti and bhaji was the staple food for majority of the families for breakfast, lunch and dinner (74.00%, 100.00% and 71.00%). Another majority of the families had rice and curry in addition to roti and bhaji in their lunch (53.50%) and dinner (100.00%). Majority of the families (56.00%) consumed milk daily, 53.50 per cent consumed curds daily and butter and ghee was consumed daily by 39.00 per cent of the families. Sixty seven per cent of the families included green leafy vegetables and other vegetables in their daily diet. Majority of the families (58.50%) reported to prepare sweets once in 15 days and 59.00 per cent of the families prepared khara eatables during festival days only. Majority of the

respondents themselves (89.50%) decided the menu for meals. Most of the respondents (93.50%) sought information from Anganawadi worker. Twenty nine per cent of the women were aware of various developmental schemes. Attributes such as age, education, occupation and sources of information exhibited a highly significant association with the knowledge level of the respondents. While the other characters such as caste, income, size of the land holding, size of the family and type of family reported a non-significant association with level of knowledge of the respondents. Size of the family was not associated with the food habits of the families, while other variables like caste, family type, size of the landholding, income and occupation revealed a highly significant association with the food habits. Majority of the respondents reported economic constraint as the main reason for not consuming milk products and fruits daily. Use of pulses was the major reason for not including vegetables in their daily diet.

**A Study on Knowledge of Farm Women about Improved Agriculture and Their Participation in Farm Activities, Gokak Taluk**

**KAVITA C. B.**

**1995**

**Major Advisor : B. SUNDARASWAMY**

The investigation involving 180 farm women of Gokak taluk of Belgaum district was conducted to measure the knowledge about improved agriculture, participation and the relationship between the knowledge level and socio-economic characteristics of the respondents. The results of the study revealed that majority of the respondents belonged to medium knowledge category, followed by low and high knowledge categories. And no much variation was observed with respect to various farm, dairy and household activities performed by farm women. Education, husband's education, annual income, farm experience exhibited a highly significant relationship with knowledge level of the respondents. Majority of the respondents were middle aged,

illiterates, married, big land holders, had an annual income of above Rs. 11,500/- and belonged to joint family. Majority of them possessed improved agricultural implements/equipments. Most of the respondents spent their leisure hours by chitchating with friends. Fifteen per cent of the respondents were members of mahila mandal. Majority of them possessed radio and were regular listeners. Television was possessed by few respondents. Only few respondents were subscribers of newspapers or magazines and were regular readers. Sixteen per cent were aware of women's magazines. Only 31.00 per cent of the respondents were aware of women developmental programmes. In that 24 per cent of the women were deriving the benefits.

**A Study on Attitude and Knowledge of Biogas Technology Users**

**MOHD. FAROOK K. NIMBAL**

**1995**

**Major Advisor : M. R. ANSARI**

An investigation was carried out in ten villages of Dharwad taluk having seven or more biogas plants in each village. In all 180 respondents were interviewed personally. Majority (77.35%) of the biogas users and 52.38 per cent of the non-working biogas owners had favourable attitude towards biogas technology. Sixty three per cent of the biogas users had medium knowledge level. Subsidy on biogas plant (93.33 per cent), smokeless cooking (82.22%), ready manure for field (60.00 per cent), availability of dung (65.58%) were the major motivational factors for farmers. Biogas supervisor was the major formal source of information, whereas friends and neighbours were informal sources of information for 46.11 per cent of respondents. Majority of the respondents (63.33%) belonged to middle aged category. Further, 43.33 per cent had primary to middle level education, while 25.53 per

cent were illiterates. Eighty three per cent of the biogas owners were big farmers with more than 7.4 acres of land. About 86.66 per cent of the owners had annual income above Rs. 11,500. Nearly seventy Eight per cent had 4-8 animals. Among mass media radio was possessed by 88.88 per cent and T. V. by 45.50 per cent of respondents. Majority of the respondents were regular participants as member in various social organisations. The variables namely education, annual and live stock possession showed significant relationship with attitude. Education, land holding, annual income, live stock possession, mass media participation exhibited highly significant relationship with knowledge level. The major problems faced by the owners were covering of plant during winter and rainy season, accumulation of water in gas pipe line and delay in release of subsidy. The suggestions

made by the owners were controlling effect of winter and rainy season on gas production timely sanctioning of loan and subsidy and immediate

service and guidance for installation and maintenance of biogas plant.

**Knowledge and Adoption Behaviour of Shareholders and Non-Shareholders of Co-Operative Sugar Factories In Belgaum District**

GEETA P. CHANNAL

1995

*Major Advisor : M. R. ANSARI*

The study was conducted in Gokak and Hukkeri taluks of Belgaum district. Five villages from each taluka were selected at random. Ten shareholders and ten non-shareholders were selected randomly from each village. The total sample size selected for the study was 200 respondents. Shareholders and non-shareholders exhibited same level of knowledge and majority of them were in medium knowledge category in relation to recommended sugarcane cultivation practices. Shareholders and non-shareholders exhibited almost same type of adoption behaviour in relation to recommended sugarcane cultivation practices. A positive and significant relationship was observed between knowledge and personal characteristics of shareholders like education, size of family, income and scientific orientation, whereas scientific orientation of the non-shareholders had significant relationship with knowledge. A positive and significant relationship was found between adoption level and certain personal characteristics of shareholders like landholding, income, risk orientation and scientific

orientation. A majority of shareholders and non-shareholders obtained benefits from the factories in the form of transportation facilities, labour facilities during cane harvesting and information about cultivation of crop. In addition to the above benefits the shareholders got benefits such as getting sugar on controlled rates, preference while taking cane, voting power, dividends, loan, seed setts and immediate help from factory in the event of fire. None of the variables exhibited significant relationship with the adoption level of non-shareholders. A majority of shareholders and non-shareholders borrowed credit from various sources and most of them expressed that they took credit from banks and co-operative society. Shareholders and non-shareholders expressed problems with regard to sugar factory are; delay in taking cane, bills not paid in proper time, permit not given in time, harvesting and transportation not done in time, lack of guidance from office personnel and frequent visits to factory for permit and bills.

**A Study on Child Labour In Agriculture, Problems and Attitude of Parents Towards Child Labour**

HEMALATHA V. PATIL

1995

*Major Advisor : L. MANJUNATH*

The study was conducted in Humnabad taluk of Bidar district. Ten villages of the taluka were selected based on the total population. Both

child labour and their parents were selected randomly from each village. The total sample for the study was 200 respondents. Majority of child labourers

belonged to low socio-economic status group. Most of the child labours were working whole day on daily wages. Majority of child labours were not interested in schooling. Poverty, large family size, family occupation, death of father, illiteracy, ill health of parents were the main causes for working as child labour. Majority of child labours contributed their whole income to the family. Independent variables annual income, size of the family, education

and land holding had non significant relationship with attitude of parents. Majority of parents had favourable attitude towards child labour. Most of them had the problems like less pay for more work, no timely payment of wage, no adequate food to eat and bad habits of father. Considerable per cent of child labour suggested that wage should be increased. Most of the child labours had the aim of doing works other than agriculture.

**A Study on Rural Mothers' Knowledge, Opinion and Adoption of Immunization Practices, Kudligi Taluk, Karnataka**

**B. RAJALAKSHMI**

**1995**

**Major Advisor : L. MANJUNATH**

A study was conducted to know knowledge, opinion and extent of adoption of immunization practices followed by rural mothers in selected villages of Kudligi taluk of Bellary district, during the year 1993-94. Two hundred randomly selected rural mothers formed the sample for the study. Data was collected by personal interview method with the help of structured pre-tested schedule, and subjected to chi-square and correlation tests for interpretation of the findings. More than 90 per cent of the respondents were aware of BCG, DPT, Polio, measles and TT vaccines. Only 29.50 per cent were aware of DT vaccine and less than 50.00 per cent were aware of DPT and Polio boosters. Majority of the respondents belonged to medium category of knowledge status. Majority of respondents' children were fully immunized by all the vaccines except DT. Whereas DPT and Polio booster was adopted by less than 50.00 per cent

of them. Formal sources were most consulted sources of information regarding immunization. Majority of respondents were having positive opinion regarding child immunization. Irregularity of PHC staff, fear of adverse affects were the main reasons given by majority of non-adopters. Only 20.00 per cent of the respondents encountered problems like irregularity of PHC staff, negligence by AWW and conveyance problems. Large majority of respondents got immunized at their local AWC. Correlation analysis revealed that variables like Education, Age of youngest child, Family's annual income and Education of respondent's husband were positively and significantly correlated with knowledge, while family size was negatively correlated with the same.  $\chi^2$  analysis revealed that urban contact had significant relationship with knowledge level of respondents.

# Agronomy

## Response of Sesame (*Sesamum indicum* L.) Varieties to Fertility and Population Levels Under Irrigation During Summer in Paddy Fields

B. BASAVARAJ

1994

Major Advisor : R. A. SETTY

Investigations were carried out at Agricultural Research Station, Sirguppa on black soil during January to April 1993 to find out the response of sesame varieties to different fertility and population levels under irrigation in paddy fields. Sesame varieties (DS-1 and E-8) were allotted to the Main plot and fertilizer levels ( $F_1 = 40:50:40$ ,  $F_2 = 60:75:40$  and  $F_3 = 80:100:40$  kg NPK  $ha^{-1}$ ) and population levels ( $P_1 = 3.33$  and  $P_2 = 6.66$  lakh plants  $ha^{-1}$ ) were allotted to sub plots and were replicated four times. The difference between two varieties remained on par with DS-1 recording slightly higher seed yield (1722 kg  $ha^{-1}$ ) and oil yield (915 kg  $ha^{-1}$ ) over E-8. A similar trend was observed for dry matter produced per plant, yield components and nutrient content (N, P

and K). Response of sesame varieties to fertilizers indicated that application of 60:75:40 kg NPK  $ha^{-1}$  was optimum with highest seed yield (1777 kg  $ha^{-1}$ ), oil yield (936 kg  $ha^{-1}$ ) and uptake of N, P and K (113.2, 16.2 and 94.4 kg  $ha^{-1}$ , respectively). Further, increase in fertilizer levels was not found economical. Sesame grown at a population of 6.66 lakh plants  $ha^{-1}$  recorded significantly higher seed yield (1736 kg  $ha^{-1}$ ) and oil yield (918 kg  $ha^{-1}$ ) than at 3.33 lakh plants  $ha^{-1}$ . Growing either of the varieties of sesame preferably DS-1 with population of 6.66 lakh plants  $ha^{-1}$  and fertilizer dose of 60:75:40 kg NPK  $ha^{-1}$  recorded higher net returns (Rs. 22336) as well as benefit : cost ratio (3.54).

## Response of Soybean (JS-335) to Rhizobium Inoculation, Nitrogen and Population Levels Under Rainfed Conditions in Vertisols

S. B. DHAVALSHWAR

1994

Major Advisor : C. S. HUNSHAL

A field experiment was conducted to study the effect of Rhizobium inoculation, nitrogen levels (20, 40 and 60 kg  $ha^{-1}$ ) and plant population (3.33, 4.44 and 6.66 lakh  $ha^{-1}$ ) on growth yield and seed quality of soybean variety JS-335 under rainfed conditions during 1993 kharif. Seed inoculation with *Rhizobium* culture increased the grain (32.87 q  $ha^{-1}$ ) and protein yields (12.74 q  $ha^{-1}$ ) compared to uninoculated (31.82 and 12.20 q  $ha^{-1}$  respectively). Seed inoculation significantly increased nitrogen accumulation in leaf, stem pods and in total plant. However, the total uptake of crop was not influenced by *Rhizobium* inoculation. Nitrogen rate of 40 kg  $ha^{-1}$  produced higher grain yield (33.07 q  $ha^{-1}$ )

than 20 kg  $ha^{-1}$  (30.87 q  $ha^{-1}$ ) but was on par with 60 kg  $ha^{-1}$  (33.09 q  $ha^{-1}$ ). The protein yield was highest with 40 kg N  $ha^{-1}$ . At harvest, the total nitrogen uptake of crop increased significantly at 60 kg N  $ha^{-1}$ . Similar trend was noticed with respect to nitrogen uptake in leaf and in the total plant. Whereas, significantly higher nitrogen accumulation in stem and in pods was noticed with 40 kg N  $ha^{-1}$ . Higher plant population of 6.66 lakh  $ha^{-1}$  recorded significantly higher grain yield (33.31 q  $ha^{-1}$ ) than lower (3.33 lakh  $ha^{-1}$ ) and medium (4.44 lakh  $ha^{-1}$ ) population levels. The protein and oil yields were highest with higher population. Significantly higher number of pods per plant, grains per pod, grain

weight per pods and grain weight per plant were recorded with lower population levels. Lower population level recorded higher nitrogen accumulation in total plant, leaf, stem and in pods at maturity as compared to medium and high population levels. Whereas, total uptake by crop was highest with higher population level. The higher grain yield was

noticed with *Rhizobium* inoculation at 40 kg N ha<sup>-1</sup> whereas, in uninoculated treatment highest grain yield was recorded at 60 kg N ha<sup>-1</sup>. Similar trend was observed with respect to protein yield, number of pods per plant, grains per pod, grain weight per pod, 100 grain weight and grain weight per plant.

*Soil Science*

**Chemistry of Phosphorus in Irrigated Vertisols of Tungbhadra Project Area**

MAHADEV S. PATAGUNDI

1994

*Major Advisor : H. T. CHANNAL*

Twelve profiles collected from vertisols of ARS, Gangavati, Karnataka representing the TBP area, were investigated with the objectives to characterize, classify and ascertain the status and distribution of different phosphorus forms, and their contribution to P availability in soils, as influenced by various properties. The soils, being clayey in texture, tested alkaline and electrical conductivity, varying from 0.32 to 13.70 dSm<sup>-1</sup>, tended to increase with profile depth. Amounts of organic carbon, free Al<sub>2</sub>O<sub>3</sub> and free Fe<sub>2</sub>O<sub>3</sub> in soils were low while, CaCO<sub>3</sub> was found in appreciable quantities, though no soil was calcareous. Soils were generally high in CEC, with Ca<sup>2+</sup> + Mg<sup>2+</sup> forming its major portion, followed by Na<sup>+</sup>. In contrast, Na<sup>+</sup> was the dominant cation in soil solution and among anions, Cl<sup>-</sup> and SO<sub>4</sub><sup>2-</sup> were the major, followed by bicarbonates in smaller amounts and carbonates in traces. Salinity alone

or salinity-cum-sodicity was noticed in most profiles, though in general, surface depths were normal. However, ESP in majority of the cases was not a cause for concern. Total P in soils varied from 138.2 to 1280.8 ppm while P in organic form, from 3.48 to 1011.84 ppm, with its contribution to available P being substantial, despite of low organic carbon in soils. Abundance of different P fractions followed the order : Ca-P > Red-P > Al-P > occluded P > Fe-P > Saloid P. All but occluded P form were significantly and positively correlated to available P in soils, indicating lesser possibilities of improved crop response to P fertilization. Soil properties such as, pH, EC, OC, free CaCO<sub>3</sub> and clay content, were found to affect available P status of soils to a greater extent, and it was gypsum, rather than CaCO<sub>3</sub>, which appeared to have played a major role in making Ca-P, the dominant mineral P fraction.

## **Effect of Ugar Sugar Distillery Effluent Irrigation on Soil Properties and Crop Yield**

**A. S. HALLAD**

**1995**

**Major Advisor : V. S. DODDAMANI**

A field experiment to know the effect of diluted Ugar Sugar distillery effluent on soil, yield and uptake of nutrients in presence of pressmud, gypsum, gypsum + pressmud and unamended control revealed that there was an increase in EC, OC, available N, P, K and exchangeable Ca, and Mg under 10 times effluent dilution compared to 25, 50 times effluent dilution and with only Krishna river water. Uptake of N, P, K, Ca and Mg by maize, sugarcane and wheat was also higher under 10 times effluent dilution. Application of pressmud increased the uptake, yield and available N, P, K and exchangeable Ca and Mg of soil. The yields of sugarcane and maize and wheat were

higher when irrigated with 10 and 50 times effluent dilution respectively. The results of soil column leaching with diluted effluent 50 times at an interval of 7 days with 6 cm depth of water each time indicated that pH, EC exchangeable Na and Mg, soluble Na and soluble anions increased with depth while decrease in exchangeable and soluble K, exchangeable Ca and soluble Ca+Mg was noticed with depth. In general lower effluent dilution increased the concentration of soluble and exchangeable cations and anions. Concentration of soluble and exchangeable cations and anions significantly increased with pressmud application.

## **Agricultural Utility of Fly Ash Under Dryland Condition**

**ASHOK. M. JAMBAGI**

**1995**

**Major Advisor : C. V. PATIL**

A field experiment was carried out at Agricultural College Farm Raichur during *rabi* 1993-94 to evaluate the effect of application of fly ash on growth and yield of safflower under rainfed situations. The experiment was laid out in split - split plot design with three replications. The main treatments consisted of black and red soil types. Subplot treatments were no FYM control and FYM at 20 t/ha. Fly ash Levels, viz. 20, 40, 60, 80 and 100 t/ha were taken on sub-sub plot. Application of FYM 20 t/ha increased growth and yield of safflower significantly in both the soils. Seed yield was significantly higher in black soils than in red soil.

The growth and yield of safflower increased significantly with increasing levels of fly ash and the highest seed yield in both the black soil ( 1527 Kg/ha) and the red soil ( 1126 Kg/ha) was recorded at 60 t/ha level. The availability of water and nutrients in both the soils increased significantly due to application of FYM and fly ash levels, consequently the uptake of NPK, S and micronutrients was significantly higher due to combined application of FYM @ 20 t/ha and fly ash at 60 t/ha. Different levels of fly ash application significantly altered the mechanical composition of soil towards increasing silt content, reduced bulk density, and soil pH.



## Effect of Forest Vegetation on Properties of Vertisol and Alfisol

R. M. CONTRACTOR

Major Advisor : V. P. BADANUR

A field experiment was conducted in Vertisol and Alfisol to find out changes in physical and chemical properties of soil and to know the suitable tree species for northern dry zone of Karnataka. The experiment in Vertisol of Bijapur consisted nine treatments, viz. forest tree species like *Tectona grandis*, *Tamarindus indica*, *Eucalyptus tereticornis*, *Dalbergia sissoo*, *Azadirachta indica*, *Acacia auriculiformis*, *Acacia nilotica*, *Albizia lebbek* and cultivated field. In Alfisol of Raichur consisted tree species, *Tectona grandis*, *Tamarindus indica*, *Eucalyptus tereticornis*, *Dalbergia sissoo*, *Azadirachta indica*, *Acacia auriculiformis* and cultivated field. The results on soil reaction indicated that the pH of Vertisol decreased significantly with forest plantation as compared to control. Teak recorded the highest organic carbon content and exchangeable calcium at Bijapur. Exchangeable magnesium content of Alfisol was increased significantly with forest plantation over control. Available nitrogen content of Vertisol and Alfisol increased significantly with forest plantation over control. Infiltration rate of Vertisol was improved

significantly with forest plantation over control. Eucalyptus and teak retained significantly higher moisture at 0.33 bar as compared to control. Teak recorded highest litterfall (284 g/m<sup>2</sup>) at Bijapur while Eucalyptus recorded the highest litterfall at Raichur (38 g/m<sup>2</sup>). The study revealed that there was complete change of ecosystem due to plantation. The study also emphasis as the predominant role of forest trees in improving the productivity of marginal and shallow black soils and imparting stability to the ecosystem. Forest trees helped to rejuvenate productivity of land through recycling of nutrients and made the soil physically, chemically and biologically favourable for tree growth. Teak, bengali jali, acacia, neem and tamarind performed very well in shallow black soils. Eucalyptus, neem and tamarind performed well in red soils. In general teak and eucalyptus added significant amount of litterfall to the soil which in turn improved nutrient status and physical condition of black and red soils. It is also clear that forest tree cultivation is made economical than field crops.

## Effect of Copper Sulphate, Sulphur and Copper Ore Tailings on Groundnut and Their Residual Effect on Bengalgram

RAJSHEKHAR M. DESAI

1995 Major Advisor : H. M. MANJUNATHAIAH

A field experiment was conducted on Typic Chromustert at MRS, Dharwad during *kharif* and *rabi* of 1994 under rainfed condition. The main objective was to study the effect of copper, sulphur and copper ore tailings (COT) on growth, yield and nutrient uptake of groundnut and their residual effect on bengalgram. Four levels 10, 20, 30 and 40 kg CuSO<sub>4</sub> ha<sup>-1</sup> were applied and four levels of sulphur 1.3, 2.6, 3.9 and 5.2 kg ha<sup>-1</sup> were applied to remove the sulphur effect from different levels of CuSO<sub>4</sub> respectively. In addition, higher levels of sulphur 10, 20, 30 and 40 kg ha<sup>-1</sup> were

applied along with RDF. Two levels of copper ore tailings, 160 and 320 kg ha<sup>-1</sup> were applied in addition to RDF. Application of 40 kg CuSO<sub>4</sub> ha<sup>-1</sup> recorded significant increase in pod yield (27.88 q ha<sup>-1</sup>), haulm yield (38.03 q ha<sup>-1</sup>) and oil yield (10.33 q ha<sup>-1</sup>) but there was no significant increase in shelling percentage. Application of CuSO<sub>4</sub> at all levels significantly increased the concentration and uptake of all nutrients except Ca<sup>++</sup> and Mg<sup>++</sup> over respective sulphur doses. Application of 40 kg S ha<sup>-1</sup> increased the pod yield (26.97 q ha<sup>-1</sup>), haulm yield (36.78 q ha<sup>-1</sup>) and oil yield (9.82 q

ha<sup>-1</sup>). Sulphur also increased the concentration and uptake of all nutrients. Similarly COT increased the pod and haulm yield. Oil yield was highest with 320 Kg COT ha<sup>-1</sup> (10.38 q ha<sup>-1</sup>). Residual CuSO<sub>4</sub> increased the bengalgram yield from 15.68 (10 kg CuSO<sub>4</sub> ha<sup>-1</sup>) to 20.42 q ha<sup>-1</sup> (40 kg CuSO<sub>4</sub>

ha<sup>-1</sup>). Residual sulphur also increased the yield from 19.72 (10 kg S ha<sup>-1</sup>) to 22.06 q ha<sup>-1</sup> (40 kg S ha<sup>-1</sup>). Copper ore tailings increased the yield upto 19.12 (320 kg ha<sup>-1</sup>). COT increased the concentration and uptake of all the nutrients over RDF.

## Crop Physiology

### Nitrogen Utilization Studies in Groundnut (*Arachis hypogaea* L.) Genotypes

EDNA ANTONY

1995

Major Advisor : M. B. CHETTI

A field experiment was conducted at Agricultural College Farm, University of Agricultural Sciences, Dharwad during *kharif*, 1993 to find out the effect of different levels of nitrogen and inoculation on morphological, physiological and biochemical parameters, yield and yield components in groundnut genotypes. The experiment consisted of 24 treatment combinations with four genotypes, three nitrogen levels under inoculated and uninoculated conditions laid out in split – split plot design. Morphological characters like plant height, number of branches, total number of flowers increased with increasing nitrogen dose and inoculation. Among the genotypes, Virginia types had maximum partitioning of dry matter to leaf and stem while in Spanish, it was in reproductive parts. The per cent distribution of dry matter into reproductive parts was less at 50 kg as compared to 0 and 25 kg N ha<sup>-1</sup>. Nodule number and weight increased only upto 25 kg and was less at 50 kg N under both inoculated and uninoculated conditions. A significant increase in all the growth parameters was observed with an increase in nitrogen levels and inoculation. Virginia types (ICGS – 76 and Mardur local) had low AGR, CGR, and RGR at earlier stages and more at later stages as compared to Spanish bunch (S – 206 and JL –

24). Nitrogen and inoculation significantly increased the yield and yield components and the per cent increase was more at 25 kg as compared to 50 kg N over control. Among the genotypes, maximum per cent increase in pod yield was observed in Mardur local and ICGS – 76 as compared to JL – 24 and S – 206. But the harvest index and shelling percent were more in these genotypes. The NUE was found to be more in Virginia types at 25 kg over 50 kg N as compared to Spanish bunch. The Chlorophyll content, NRA (leaf and nodules), nitrogen content in leaves and stem increased with an increase in the nitrogen level and inoculation, but the nitrogenase activity increased only up to 25 kg and declined at 50 kg N. Among the genotypes, Virginia types had higher chlorophyll content, while Spanish types had higher NRA and nitrogenase activity. Pod yield was found to have significant positive correlation with HI, nitrogenase activity, leaf nitrogen content, TDM, CGR and Kernel weight. The genotypes belonging to Virginia types were found to be more responsive to nitrogen application over Spanish bunch types with *Rhizobium* inoculation having added effect wherever nitrogen was deficient.

**Physiological and Biochemical Basis of Heterosis in Cotton (*Gossypium hirsutum* L.)**

RAJGOPAL

1995

Major Advisor : B. S. JANAGOUDAR

A field experiment was laid out on medium black soil at Agricultural Research Station, Dharwad, during 1993-94 to study heterosis for different physiological, biochemical, morphological characters and other yield components influencing yield. The experiment consisted of four intra *hirsutum* hybrids and their parents and was laid out in a randomised block design with three replications. Genotypes varied significantly in seed cotton yield. All hybrids recorded positive significant heterosis over mid parent, better parent and local check, except CPD 429 x CPD 420. Positive heterosis for seed cotton yield was attributed to positive heterosis for yield components and other characters such as morphological, physiological, biochemical and biophysical parameters. Genotypes showed significant differences in their growth pattern. Number of monopodia did not differ significantly among genotypes. Growth characters showed maximum increase from 60 to 105 day after sowing. All hybrids recorded positive heterosis for plant height,

number of nodes, sympodia and monopodia. Genotypes also differed significantly in their phenological characters. Total drymatter and leaf area at 60 and 105 days after sowing differed significantly among genotypes. All hybrids recorded positive heterosis for total drymatter, may be because of higher leaf area and growth rate in hybrids at early growth stages. Hybrids also recorded higher stomatal conductance and transpiration rate which may be attributed to positive heterosis for stomatal frequency, length and breadth. In addition all the crosses showed positive heterosis for specific leaf weight, chlorophyll 'a', chlorophyll 'b', total chlorophyll content, nitrate reductase activity and wax content at both the stages and these characters possessed positive correlation with seed cotton yield. In conclusion, it can be said that the hybrids were found to be morpho-physiologically and biochemically efficient in terms of growth, earliness, conductance, enzyme activity and yield parameters and thus, could able to produce higher yields as compared to their parents.

**Genetics and Plant Breeding**

**Heterosis and Combining Ability Studies in Sesame (*Sesamum Indicum* L.)**

G. M. SAJJANAR

1994

Major Advisor : K. GIRIRAJ

The study was undertaken to estimate heterosis and combining ability for seed yield and component characters through diallel cross analysis. A total of 8 parents and 28 hybrids (excluding reciprocals) were evaluated in RBD with three replications. Observations were recorded on ten quantitative characters. Results of heterosis indicated that the cross E-8 x Madhavi showed significant heterosis over midparent and better parent for seed yield. Heterotic effect for seed yield was also reflected in component characters, viz. total number of capsules per plant and 1000-seed weight.

Heterosis over better parent was to the extent of 52 per cent for seed yield. Significant negative heterosis over better parent for days to 50 per cent flowering was exhibited by two crosses, viz. DS-1 x Madhavi and Phule M x JLT-35 and for days to maturity by crosses, viz. Tapi x Phule M, Phule M x JLT-35 and Tapi x JLT-35. Both GCA and SCA variances were significant for all the characters except number of capsules on main branch, indicating thereby that both additive and non-additive types of gene effects were involved in the inheritance of these traits. However, variances

due to GCA were greater than SCA variances for all the characters revealing the greater role of additive gene effects. The parents DS-1 and E-8 were good general combiners for the characters, viz. seed yield, plant height, 1000-seed weight,

total number of capsules per plant, oil content and seed weight per capsule. In general, the crosses showing high sca effect for the trait involved at least one good general combiner.

## **Horticulture**

### **Effect of Plant Density and Nitrogen on Flower Production and Quality of Golden Rod (*Solidago canadensis* L.)**

**Y. H. RYAGI**

**1994**

**Major Advisor : U. G. NALAWADI**

Field experiment was carried out in the Floriculture unit of University of Agricultural Sciences, College of Agriculture, Dharwad during 1993-94 to find out the effect of nitrogen levels, plant density and their interaction effects on growth and yield of golden rod. A closer spacing of 45 x 20 cm recorded the maximum yield of 8.7 t per ha. Nitrogen level of 100 kg per ha recorded the maximum yield of 6.9 t per ha. The interaction effect between spacing and nitrogen levels was insignificant with

respect to flower yield, however, the highest yield of 9.8 t per ha was obtained by treatment combination of 45 x 20 cm spacing and 75 kg nitrogen per ha. Superior quality flowers with more stalk length were obtained when planted at a closer spacing of 45 x 20 cm and supplied with 100 kg nitrogen per ha. The maximum vase life of golden rod flowers (9.24 days) was recorded with  $Al_2(SO_4)_3$  at 0.4 per cent concentration. Cultivation of golden rod yield a net return of Rs. 11,450 per ha.

### **Studies on the Effect of Growth Regulators on Finger Development in Banana [Musa (AAB) group 'Munavalli']**

**DEVADATT R. SIRDSEHPANDE**

**1994**

**Major Advisor : M. M. RAO**

An experiment was conducted to work out the efficacy of growth substances, viz. GA (50/100 ppm) and 2, 4-D (20/30 ppm) in regulating fruit growth and development in banana Cv. 'Munavalli' (AAB) during 1993-94 in a private farm in Munavalli village of Belgaum district. The experiment was laid out in Randomised Block Design with thirteen treatment combinations in three replications. The growth regulator sprays were applied 25/50 days after shooting (DAS). Among the different treatment combinations, spraying 100 ppm GA twice was the most effective treatment in respect of hastened

maturity, increased finger length, girth and weight of finger and higher hand and bunch weight. Even twice spraying of 30 ppm 2, 4-D at the said stages of the bunch development was also effective. The other treatment combinations were also favourable but next in the order to 100 ppm GA/30 ppm 2, 4-D. Even the distal hand also had favourable effect which otherwise is known to remain underdeveloped. In regard to ripening, 100 ppm GA treatment retarded ripening while 20 ppm 2, 4-D sprayed 50 DAS hastened the ripening process.

**Studies on Propagation of Vanilla (*Vanilla planifolia* Andr.)**

**NAGARAJ BHAT**

**1994**

**Major Advisor : G. S. SULIKERI**

Studies on propagation of vanilla were conducted at the College of Agriculture, University of Agricultural Sciences, Dharwad during 1993-94. The influence of length of cuttings (number of nodes) on rooting, subsequent establishment and growth in the field was studied. Four node cuttings excelled the one, two and three node cuttings in all the root and shoot characters. The performance of four node cuttings was found on par with five and six node cuttings. The effect of IBA, NAA, individually and in combination at varying concentrations on rooting of vanilla cutting was studied. The cuttings treated with IBA 2000 ppm + NAA 2000 ppm gave the highest rooting percentage, better root and shoot characters. The influence of different rooting media on rooting of vanilla cutting

was studied. Among different rooting media used, FYM, sand + FYM, sand + biogas slurry and vermicompost were found to produce better root and shoot characters. The present study reveals that, cuttings with four node would be used for multiplication. Further, the rooting of cuttings can be improved by treating the cuttings with growth regulators and placing them in a suitable rooting media. But whenever the availability of the planting material is sufficient, longer cuttings can be used to get comparatively early flowering. Mass propagation of vanilla *in vitro* is one of the best and most successful alternatives to meet the growing demand. *In vitro* with 1 mg l<sup>-1</sup> BA ensure production of large number of true to type planting material in a very short period.

**Effect of Vermiculture on Growth and Yield of China aster (*Callistephus chinensis* Nees.) Cv. 'Ostrich Plume Mixed'**

**BALAJI S. KULKARNI**

**1994**

**Major Advisor : U. G. NALAWADI**

A field investigation was carried out during *rabi* 1993-94 at U. A. S., Dharwad to study the effect of vermiculture on growth and yield of China aster. An experiment was laid out in RBD with different levels of vermicompost, synthetic fertilizers and their combinations. Highest yield of 11.85 t/ha was obtained in the plants supplied with recommended dose of fertilizer (180:120:60 NPK) + FYM (15 t/ha). The yield levels were not affected even after reduction of recommended dose of fertilizers to the extent of 25-50 per cent when vermicompost (2.5 to 5 t/ha) was used. Another treatment imposed showed pronounced effect on the vegetative

parameters studied. The plots applied with recommended dose of fertilizer + FYM recorded maximum plant height, number of branches, number of leaves, increased leaf area, leaf area index and stem girth. It was however, at par with treatments, 75 per cent of recommended dose of fertilizer + 2.5 t vermicompost and *in situ* vermiculture (2 lakh worms/ha). Further, it was observed that vermicompost had an additive effect on the quality parameters like peduncle length, flower diameter and number of petals per flower. Soil fertility status was improved by adopting *in situ* vermiculture and applying vermicompost.

## Plant Pathology

### Studies on Collar Rot of Cotton Caused by *Sclerotium rolfsii* Sacc.

VIRUPAKSHA PRABHU H.

Major Advisor : P. C. HIREMATH

Collar rot caused by *Sclerotium rolfsii* Sacc, is one of the important diseases of cotton in Karnataka. Results indicated that one percent minimum inoculum was sufficient to get the infection. However the inoculum level above 6 percent induced hundred per cent seedling mortality. The fungus survived better at low moisture levels. Thirty percent soil moisture was found to be optimum for maximum saprophytic activity. Among the antagonistic rhizosphere fungi which were isolated by serial dilution technique, when tested *in vitro*, maximum percent inhibition of mycelial growth of *S. rolfsii* was seen with *Trichoderma harzianum* Rifai, *T. viride* Pers. ex. Fr. followed by *Penicillium* sp. and least percent inhibition was noticed with *Aspergillus flavus* when inoculated 24 hours prior to the inoculation of *S. rolfsii*. Maximum reduction of number of

sclerotial bodies was recorded when *T. harzianum* and *T. viride* were inoculated *in vitro* 24 hours prior to the inoculation of *S. rolfsii*. The antagonistic organisms, viz. *T. harzianum* and *T. viride* were highly effective both as seed and soil treatments. Considerable amount of survival was noticed with *A. terreus* and *Penicillium* sp. Out of fifteen cotton genotypes screened, none of the genotypes showed complete resistant reaction to collar rot. Based on the percent seedling mortality, Abadhita showed maximum tolerance to the disease. Jayadhar, DDH-2 proved highly susceptible to the disease. Fungicides, viz. hexaconazole, propiconazole, tridemorph and thiram were found to be effective *in vitro*. These chemicals also gave good results as soil drenching fungicides, but the efficacy decreased with the increase in the depth of soil.

### Studies on Pigeonpea (*Cajanus cajan* (L.) Millspaugh) Wilt (*Fusarium udum* butler.) in Karnataka

S. M. VASTRAD

1994

Major Advisor : V. B. BIDRI

A survey on pigeonpea wilt caused by *Fusarium udum* was conducted in 8 talukas of Dharwad and Gulbarga districts of Karnataka to assess the wilt incidence. Maximum wilt incidence (25.3 per cent) was noticed in Afzalpur taluka of Gulbarga and least wilt incidence (9.78 per cent) was noticed in Navalgund taluka of Dharwad district. Among the several hosts tested, the pathogen could not infect any one indicating *F. udum* as host specific to redgram only. Histopathological studies indicated the presence of pathogen in the xylem vessels and increase in xylem vessel diameter of root and stem tissue in resistant cultivar (ICP-8863) compared to susceptible cultivar (GS-1). Among

the organisms isolated from the rhizosphere soil of pigeonpea, *Trichoderma viride*, *T. harzianum*, *Penicillium* spp. and *Aspergillus* spp. were found to be highly antagonistic to *F. udum* in both *in vitro* and *in vivo*. Resistant cultivar (ICP-8863) + *T. viride* seed treatment (0.6 per cent) was best integrated management practice. The next best treatment was resistant cultivar (ICP-8863) + carbendazim seed treatment + intercropping with sorghum + ridge planting + *T. viride* seed treatment (0.63 per cent) under field conditions. Out of nineteen germplasm lines and seventeen local collections screened in sickplot ICP-8863, ICP-8859 and ICP-8862 showed resistant reaction.

## Studies on Sooty Stripe of Sorghum

V. R. KESHATTI

1994

Major Advisor : R. V. HIREMATH

Sooty stripe of sorghum caused by *Ramulispora sorghi* (Ellis and Everhart) Olive and Lefebvre, is becoming an important disease. An investigation was therefore carried out to study the incidence of the disease, development of disease as influenced by environment, the survival ability of the pathogen and the evaluation of chemicals for the control of the disease as also to find out the suitable resistant lines for the said disease. Low disease incidence was observed in farmers field while the disease was severe at U. A. S. campus. The disease development was maximum in June sown crop compared to July and August sown crop. A temperature range of 23–26° C and humidity of 86–91% prevailing upto 50 days from date of sowing was found most favourable for the disease development. The sclerotia of the fungus survived

for 360 days in plant parts kept in refrigerator and in open condition. Studies of microtome section of the infected leaf portion revealed the aggregation of hyphae forming stroma beneath the stomata/ below the epidermis/within the epidermal cells. The stroma produced sclerotia by protruding outside the epidermis. Out of 7 fungicide evaluated *in vitro* using sclerotia, mancozeb and captan gave 100% inhibition at 1000 ppm. Two sprays of mancozeb (0.2%) and captan (0.2%) at an intervals of 15 days starting from 30th day of sowing gave good control of the disease. Germplasm lines, viz. IS3543, 3547, 5507, 9629, 14332, 14375, 15781, 18521, 18723, 18733, 18737, 18484, 18738 and 18758 showed resistant reaction against the disease in the field.

Studies on Pod Rot of Groundnut (*Arachis hypogaea* L.) with Special Reference to *Sclerotium rolfsii* Sacc. and *Rhizoctonia bataticola* (Taub.) Butler

K. R. DWARAKANATH

1995

Major Advisor : V. B. NARGUND

Pod rot of groundnut is considered to be of complex etiology involving many fungal pathogens. In the present study, main emphasis was given to pod rot caused by *Sclerotium rolfsii* Sacc. and *Rhizoctonia bataticola* (Taub.) Butler. Survey on the occurrence of pod rot in Dharwad and Raichur districts during *rabi*/summer, 1993–94 revealed 19.00 to 32.50 per cent disease incidence. *Sclerotium rolfsii* and *Rhizoctonia bataticola* and *Fusarium* sp. were commonly isolated. In estimation of microbial population in soils treated with fungitoxics, less fungal colonies and more bacterial colonies found compared to untreated soils. However, it did not affect the actinomycetes population. *Trichoderma harzianum* Rifai, *Penicillium* sp. *Bacillus* sp. and *Streptomyces* sp. were found antagonistic to *S. rolfsii* and *R. bataticola*. Fungicides, viz.

propiconazole and captan were effective in inhibiting the growth of both *S. rolfsii* and *R. bataticola* while, cyproconazole and difenoconazole inhibited *S. rolfsii*. All the three tested triazoles and captan were effective as soil drench fungicide against *S. rolfsii* and *R. bataticola*. Out of three soil fumigants tested, busan 1020 and basamid were effective in inhibiting both the pathogens. In field evaluation of fungicides for the management of pod rot, basamid (2%) and busan 1020 (2%) were highly effective in reducing per cent disease index and recorded highest yields. The next best fungicides were captan, carbendazim, chlorothalonil and formaldehyde. Of the 71 genotypes screened under field condition, eight genotypes showed resistant reaction, viz. ICG 1696, ICG 1710, ICG 2354, ICG 3589, ICGS 11, JSSP 3, R 8955 and S 206.

## Seed Technology

### Comparison of Microbial Inoculation with Pre-Soaking Seed Treatment in Improving Seed Quality in Some Oilseed Crops

SHAKUNTALA N. M.

1994

Major Advisor : S. D. SHASHIDHARA

In an experiment conducted in Seed Technology Department, Agriculture College, Dharwad during 1994, microbial inoculation of seeds were compared with different pre-soaking treatments for enhancing the seed quality in three oilseeds namely sesamum (Var. E-8), Sunflower (Hybrid BSH-1) and safflower (Var. A-1). A separate experiment was conducted to select a proper microbial culture and its method of application using three microbial cultures *Azospirillum brasilense*, *Azospirillum lipoferrum* and *Azotobacter chroococcum* and three methods of inoculation, i.e. lignite coating ( $M_1$ ), soaking of seeds in culture broth to sand ( $M_2$ ). Combination of soaking seeds in *A. chroococcum* culture broth was found to be best for sesamum and sunflower. Whereas seed soaking in *A. brasilense* culture broth was found to be good for safflower. These best combinations of microbial culture and method of inoculation for the oil seeds were compared

with different pre-soaking treatments, viz. with biogas slurry, GA (50 ppm), IAA (20 ppm), GA + IAA (50 ppm + 20 ppm respectively), water and control (unsoaked seeds) in the second experiment. Pre-soaking treatment comprised soaking seeds in different solutions for six hours and air drying it to original moisture content. Pre-soaking of seeds with chemicals, microbial broth cultures, biogas slurry and water were superior to control with respect to most of the seed quality characters, indicating the beneficial effects of all these pre-soaking treatments. Among different pre-soaking treatments, pre-soaking with GA + IAA alone gave the maximum beneficial effect followed by the microbial culture treatment with respect to seed quality parameters in all the three oilseed crops studied. Hence cheap and ecologically friendly microbial cultures may be popularised to improve seed quality in these oilseed crops.

### Effect of Dehumidified Air Drying of Groundnut (*Arachis hypogaea* L.) with Respect to Seed Quality

RAJKUMAR B. JOLLI

1994

Major Advisor : S. D. SHASHIDHARA

To investigate the effect of dehumidified air drying of groundnut pods on quality of seed, experiments were carried out at Department of Seed Technology, College of Agriculture, Dharwad during 1993-94. First experiment consisted of four different intervals of tempering (cooling), viz. one hour drying with one hour cooling, one hour drying with half an hour cooling, one hour drying with quarter hour cooling and continuous drying without cooling period in dehumidified air drying. Total

drying time (excluding cooling period) to dry the pods to around 9% (d. b) was lowest (4.5 hours) in continuous drying and was highest in one hour drying with one hour cooling (6 hours). Seed germination was highest in drying with one hour drying with one hour cooling period (72.80%) and was lowest (41.20) in continuous drying. In the second experiment the best treatment in the experiment one (dehumidified air drying) was compared with other methods of drying, viz. shade,



sun, hot air with 35° C air temperature and DOR (Directorate of Oilseed Research) methods. The lowest total drying time to dry the pods to around 9% (d. b) was 200 hours in shade drying and was shortest in dehumidified air drying (6 hours). Seed germination was highest in DOR method (95%). The lowest seed germination was recorded in dehumidified air drying (72.8%). In third experiment the pods dried with different methods were stored

for 6 months. The DOR method was most superior in maintaining seed quality in storage throughout the storage period, and recorded 70.50 per cent germination at the end of the storage period. The lowest germination (37.50%) at the end of the storage was recorded in dehumidified air drying. The DOR method of drying is the best method for drying of groundnut pods for seed purpose.

**Influence of Nipping and Chemical Application on Seed Yield and Quality in 6D-1, Restorer Line of KBSH-1 Hybrid Sunflower (*Helianthus annuus* L.)**

**SURESH BHAT**

**1994 Major Advisor : B. S. VYAKARANAHAL**

A field experiment was conducted at Agricultural College Farm, Dharwad during *kharif* 1993 and summer, 1994 to study the influence of nipping and chemical application on seed yield and quality in 6D-1, restorer line of KBSH-1 hybrid sunflower. The experiment was laid out in randomized block design and consisted of 5 nipping, 9 chemical application and a control (no nipping) treatments. Both in *kharif* and summer seasons, plants nipped continuously from 40 DAS (days after sowing) onwards recorded significantly higher values for all the yield and yield attributing characters such as processed seed yield per ha (222.82 and 212.62 per cent increase over control respectively in *kharif* and summer), total yield per plant, seed recovery percentage, diameter of main head, number of filled seeds per head, seed filling percentage and 100 seed weight. This was followed by other nipping treatments like nipping once at 55, and 45 DAS. However these showed significantly higher values compared to control. Growth parameters like total leaf area and leaf area index were significantly higher in control plants. But dry matter accumulation

(DMA) in main head, DMA in stem, light intensity at middle and bottom of the plant canopy and plant height were higher in nipped plants. Days to 50 per cent flowering was earlier in the plants nipped continuously. But pollen production in secondaries and total pollen production per plant was maximum in control plants. Seed quality parameters like germination percentage, root length, shoot length, vigour index, dry weight of seedlings and husk percentage were significantly higher in the seeds of nipped plants. But oil content and kernel to seed ratio were more in the seeds of control plants. Among the chemical application treatments, auxins (IAA-500 and 1000 ppm, NAA-500 and 1000 ppm) decreased significantly the yield, yield attributes, seed quality characters, pollen production per plant, plant height and also delayed 50 per cent flowering. But maleic hydrazide (2000 and 2500 ppm), ILTD mixture (5 and 10 per cent) and neem oil failed to either inhibit the growth of side branches or to influence on yield, its components and seed quality characters significantly.

## **Sorption Studies In Neem, Coffee, Tamarind and Rain Tree Seeds**

**SATISH S. KANAVI**

**1995**

**Major Advisor : S. D. SHASHIDHARA**

Sorption studies were conducted in the neem, coffee, tamarind and rain tree seeds with the main objectives of determining equilibrium moisture content, constant of sorption equation and the effect of RH and storage period on viability. The EMC of all the seeds taken in this study were determined at 15, 30, 45, 60, 75 and 90 per cent RH by static method at room temperature. Number of days taken to reach equilibrium increased with increase in RH levels. Neem and tamarind seeds showed fungal infection at 90 per cent RH, coffee seeds showed a dull colour at 75 and 90 per cent RH, rain tree seeds showed a slight dull colour at 90 per cent RH. Sorption isotherm of neem, coffee, tamarind and rain tree seeds were sigmoidal in nature. Using the experimental data, the values of constants for different sorption isotherm equations were found out. Harkins-Juza equation was best

suited in relative humidity range of 15 to 90 per cent in coffee and tamarind seeds. Henderson equation was best suited in the relative humidity range of 15 to 90 per cent for neem and tamarind. Chung-Pfost equation was best suited in relative humidity range of 15 to 90 per cent for coffee. Neem seeds maintained more than 50 per cent germination for one month at all RH levels. After 120 days of storage complete loss of germination was noticed indicating recalcitrant nature of neem seeds. Coffee seeds maintained a germination percentage well above 50 per cent at low RH levels for a period of 180 days of storage indicating that coffee is an orthodox seed. Tamarind and rain tree seeds maintained germination percentage well above 60 per cent at all RH levels throughout the storage period.

## **Human Development**

### **Growth Status and Puberty of Urban and Rural Girls**

**VEENA A. M.**

**1994**

**Major Advisor : PUSHPA B. KHADI**

Growth status and menarche of girls of 8-15 years was assessed on a sample of 288 urban and 319 rural girls of Dharwad and Hiriur talukas. From urban area of each taluka four schools were randomly selected. From the same talukas rural sample was drawn from three randomly selected schools. From each schools a minimum of 30 girls studying in classes third/tenth standard were selected randomly. Differences in the heights and weights of girls of urban and rural locality and of two talukas was tested using anova. Influence of selected factors, viz. caste, type of family, age and education of parents, occupation of father,

income and ordinal position on height, weight and menarche was tested using correlation and regression analysis. The results revealed that the girls of different age groups differed significantly in heights and weights. Urban girls were significantly taller and heavier than rural. The girls of Dharwad were significantly taller than girls of Hiriur girls. Sixty two and fifty three percent of urban and rural girls had heights between 3rd and 50th centile. Forty three percent of urban girls had weights below 3rd centile, while 61 percent of rural girls had weights below 3rd centile. The circumference of chest and waist of urban girls was significantly higher than

rural girls at the 11th and 13th year. While hip girth measurement was significantly higher at all ages. The caste, age of parents and education of mother had significant influence on weight and height of urban girls, while ordinal position had significant influence on only weight. Age of parents had significant influence on weight and height of rural girls, while caste, type of family had significant impact on only height and education of parents and occupation of father had influenced only the weight. The selected factors brought about a variation of 76.7 and 71.8 percent in the heights of urban

and rural girls respectively, for weight it was to the extent of 69.3 and 67.2 percent. Twenty seven percent of rural girls had still not attained the menarche in the 15th year, as against only three percent of urban girls. The mean menarcheal age of urban girls (156.21 months) was found lower than rural girls (164.38 months). Caste, type of family, ordinal position and weight of rural girls had significant influence on the menarcheal age while in case of urban girls only weight had the significant impact.

### **A Comparative Study on Adaptive Behavior of Young Children (5 to 8 Years) Reared In Homes and Orphanages**

SHASHIREKHA K. H.

1974

Major Advisor : P. B. KHADI

A comparative study on adaptive behaviour of children (5-8 years) reared in homes and in orphanages was undertaken during the year 1994 in Dharwad, Davanagere and Chitradurga cities of Karnataka State. A sample of 50 children were selected from five orphanages and 50 children reared in homes was selected through Government primary schools in the corresponding cities in order to match socio-economic background. The influence of age, gender, nutritional status, varieties of play materials and time spent in play by child on adaptive behaviour of both home reared and orphanage reared children was studied. Influence of presence or absence of parents was studied only in orphanage reared children. And influence of ordinal position, sibling and family size, age, education and occupation of parents, parent encouragement, parent child-relationship (PCR) was studied only in home reared children to test the difference in adaptive behaviour of home reared and orphanage reared children. ANOVA was computed. Correlation and multiple regression were used to know the influence of selected factors on adaptive behaviour. Results revealed no significant

difference between home reared and orphanage reared children in total adaptive behaviour, communication and socialization domains. However orphanage reared children were significantly better in daily living domain than home reared children, while home reared children were significantly better than their counterparts in motor skills. No significant difference were observed between male and female children of homes and orphanages. However the motor skills home reared males were significantly better than their counterparts. Among home reared children, age had significant influence on total adaptive behaviour, communication, socialization and motor skills. Height had significant influence on motor and socialization skills. While Income had significant influence on socialization skills alone. Children with good PCR were better in total adaptive behaviour and motor skills. Children with poor PCR were better in socialization skills. Only age and weight had significant influence on adaptive behaviour of orphanage children, wherein age significantly influenced communication and total adaptive behaviour and weight significantly influenced the motor skills.

## **Opinion of Post Graduate and Under Graduate Students Regarding Inter-Caste Marriage**

**GEETA K. BALIKAI**

**1994**

**Major Advisor : PUSPHA B. KHADI**

The opinion regarding inter-caste marriage and influencing factors were studied on a sample of 100 each post graduate and under graduate students of University of Agricultural Sciences, Dharwad. The influence of selected factors, viz. caste, gender, locality, ordinal position of students, age of parents, education of parents, family income, occupation of fathers, occurrence of inter-caste marriage within relatives, friends and neighbours, interaction with friends of other caste and reaction to probable inter-caste marriage of their own brothers or sisters on student's opinion was also studied. The differences in the opinion of post graduate and under graduate students was tested through anova and influence of selected factors were tested through chi-square, correlation and regression analysis. The results revealed that the post graduate and under graduate students did not differ significantly

in their opinion regarding inter-caste marriage. A higher percentage of both post graduate and under graduate students (i.e. 39.00% and 42.00% respectively) belonged to low opinion group as compared to medium and high opinion group. There was a close correlation between student's opinion and their preference for inter-caste marriage for themselves. Out of selected factors only modernisation had significant effect on opinion among both post graduate and under graduate students wherein, higher percentage of students with high level of modernisation had high opinion regarding inter-caste marriage. Among under graduate students education of father and level of familism had significant influence on their opinion. The combined effect of personal and familial attributes on opinion of post graduate and under graduate students was 41.80 percent and 39.10 percent respectively.