

**M.Sc. (Agri)**

**Genetic Analysis of Yield and Yield Components In Diallel Studies  
Involving Ten Genotypes In Cowpea (*Vigna unguiculata* (L.) Walp.)**

**S. J. PATIL**

**1989**

**Major Advisor : R. VENUGOPAL**

Ten parents of cowpea were crossed in all possible diallel combinations (including reciprocals) to study the genetic variability, heterosis, combining ability, estimates of genetic components, inter-character association, path analysis and regression studies for fifteen quantitative characters. Genotypic coefficient of variation was highest for hundred grain volume followed by hundred grain weight, biological yield, harvest index, grain yield, pod weight and protein content, while it was least for seeds/pod. High estimate of broad-sense heritability accompanied by moderate to high genetic advance was recorded for hundred grain volume, hundred grain weight, harvest index and protein content, while it was least for plant height. Four crosses namely, RC 48 X C 152, C 152 x S 488, C 152 x RC 48 and IC 285 x Guj 1 manifested high *per se* performance and maximum heterosis over the best parent, C 152 for grain yield. The combining ability analysis indicated the significance of both GCA and SCA variances for all the characters studied except plant height where SCA variance

was non-significant. Parents, S 488, Guj 1 and RC-48 exhibited high *gca* for most of the characters. The genetic component analysis indicated the predominance of non-additive gene action for days to 50 per cent flowering, pods/cluster, pod weight, grain yield, biological yield and harvest index while additive gene action for plant height but both were equally important for number of primaries, pod clusters/plant, pods/plant, pod length, seeds/ pod, hundred grain weight, hundred grain volume and protein content. Positive genotypic association was observed between grain yield and all the yield components studied except number of primary branches while, negative association was observed between grain yield and pods/cluster. Regression studies indicated the dependence of yield on pod weight, biological yield, pod clusters/plant, pods/plant and hundred grain weight. Path analysis revealed the importance of pods/plant, hundred grain weight, pod clusters/plant and pod length as the major yield components.

**Investigations on Genetic Diversity, Correlation and Path Analysis In  
Blackgram (*Vigna mungo* L. Hepper)**

**S.G. PARAMESHWARAPPA**

**1989**

**Major Advisor : S.S. PATIL**

Two hundred and twenty five genotypes of blackgram were evaluated in RBD with three replications under kharif and summer seasons to determine the nature and magnitude of variability, character associations and diversity. The fifteen characters studied revealed differences in the magnitude of variability. The Gcv was highest for 100 seed weight, plant height and yield/plant during summer whereas during kharif, corresponding decreasing order was yield/plant, 100 seed weight and primary branches/plant. Heritability (broad sense) and expected genetic advance were high

for 100 seed weight in both the seasons. Correlation study indicated that seed yield was positively associated with pod length, seeds/pod, biological yield/plant and harvest index in both the seasons and negatively associated with number of pods/cluster in summer and with days to 50 per cent flowering, days to first podding and days to maturity in kharif season. The direct effects of most of these characters were high signifying their importance in selection. D<sup>2</sup> study revealed eight clusters in both the seasons but in kharif (low moisture condition), 212 genotypes were included in one

cluster as compared to 75 genotypes were included in one cluster in summer (irrigated condition) clearly indicating the effect of stress environment on clustering pattern. Clusters V and VII in summer and clusters VII and VIII in kharif for the most divergent groups of genotypes. The geographic diversity of genotypes did not match with genetic diversity. Canonical analysis confirmed differential

pattern of the genotypes as calculated by  $D^2$  analysis. Both  $D^2$  and canonical analysis revealed the importance of 100 seed weight in causing genetic diversity. A method was proposed to use *per se* performance and  $D^2$  values for identifying most suitable pairs of genotypes for initiating hybridization.

## **Genetic Studies on Yield Traits and Grain Mold Resistance In Sorghum (*Sorghum bicolor* (L.) Moench)**

H. SHIVANNA

1989 Major Advisor : R. PARAMESHWARAPPA

Sorghum Crosses developed by using three lines namely, SB 1085, IS 24996 and SB 101A and the testers namely, SB 905, CS 3541, 168, SPV-462, SPV-346, SB 2413, SB 5501, SB 1066, 2077 B and 296B were evaluated in two environments in line x tester design and the results were analysed to study heterosis and combining ability for days 50 per cent flowering, days to maturity, plant height, number of leaves per plant, internode length, ear weight, ear length, ear breadth, number of primaries, grain yield/plant and 100 grain weight. Genotypes involved in the study exhibited highly significant differences for all the characters in both the environments except for 100 grain weight. In general, SCA variances were larger than GCA variances in most of the characters studied indicating the importance of non-additive gene action for the expression of the traits. The crosses SB 101A x SPV 462 and SB 101A x SB 5501 showed maximum heterobeltiosis. These hybrids can be tested for

further confirmation. Inheritance of grain mold resistance was studied in the sorghum crosses involving resistant lines viz., IS 24996 and SB 1085 and the susceptible lines viz., 296B and 168 by adopting six generation mean analysis. Resistance was found to be inherited as dominant trait. The expression was controlled by an additive pair and a pair of complementary dominant alleles in the crosses IS 24996 x 296B and IS 24996 x 168. In crosses having SB 1085 as a common female parent with two susceptible male parents, resistance was inherited as recessive character. This is due to lack of complementary dominant alleles in the parents.  $F_2$  segregation ratios of 179 : 77 in the crosses IS 24996 x 296B and IS 24996 x 168 and that of 5 : 11 in the crosses SB 1085 x 296B and SB 1085 x 168 were observed. With regard to gene effects, the magnitude of dominance effect was greater than additive effect. In majority of the crosses, interaction effects differed in their magnitudes.

## **An Assessment of Genetic Potential of Some Dormant Culture for Improving Erect Bunch Varieties of Groundnut (*Arachis hypogaea* L.)**

T. S. ASHOK KUMAR

1989 Major Advisor : M.V. CHANNABYREGOWDA

A total of 32 bunch cultures were evaluated for occurrence, nature and extent of dormancy, yield and pod and kernel attributes, some of them over three seasons. The assessment of genetic potential of parents and crosses and a study on dormancy in  $F_1$  generation was done by two

genetical mating designs. Among the 16 cultures identified as dormant, Dharwad Early Runner, ICGS 30, Dh 8, ICG 11498, ICG 11493 and ICGS 57 recorded high intensity and long duration of dormancy. The cultures Dharwad Early Runner, ICG 118, 9489, 11498 and ICG 11497 recorded

high germination upon seed coat removal while ICGS 30 and ICG 11495 recorded no improvement. The seed coat extract of dormant cultures had drastic effect on radicle elongation of non-dormant cultures. Some of the non-dormant cultures exhibited fresh seed dormancy. All the released varieties except TMV 2 and seven dormant cultures performed well for yield components and ICGS 30 was superior among dormant cultures for yield and pod and kernel attributes. In  $F_1$  generation, non-dormant x dormant and dormant x non-dormant crosses expressed a dormancy intermediate between the parents, while the dormant x dormant crosses exhibited a dormancy equal to or more than the

parents. Based on *per se* performance and gca analysis, TMV 2 and Dh 3-30 among non-dormant cultures and Dh 8 and ICGS 30 among dormant cultures were found to be desirable for most of the characters including dormancy. The *per se* performance, heterotic effects and sea effects revealed TMV 2 x Dh 8 and Dh 3-30 x Dh 8 as potential crosses for dormancy, yield and pod and kernel features. Among dormant x dormant crosses Dh 8 x CGC 7 and CGC 7 x ICGS 30 were found to be potential crosses. The mass selection for dormancy in  $F_2$  increased the frequency of dormant plants in  $F_3$  generation.

## Agronomy

### Studies on Forage Yield and Ratoonability of Pearl Millet (*Pennisetum typhoides* (Burm. f.) S & H) as Influenced by Stage of Harvesting, Nitrogen and Phosphorus Levels

RAJENDRA HEGDE

1988

Major Advisor : SUBHASH GUMASTE

A field experiment was conducted on black clayey soil under irrigated conditions at the Agriculture college Farm, Dharwad during kharif 1987, to study the effect of three stages of harvesting of seed crop, two of nitrogen and two levels of phosphorus on forage yield and ratoonability of pearl millet (Var. DFB-1). Dry forage yield of seed crop increased significantly from flag leaf stage (10.90 t/ha) up to full flowering stage (13.83 t/ha). Forage yield of ratoon crop reduced due to the delay in the harvest of seed crop from flag leaf to milk stage (5.03 t to 3.62 t/ha). Increased nitrogen level increased the yield of seed crop only (12.44 t to 13.82 t/ha). Increased phosphorus level increased the yield of ratoon crop only (4.11 to 4.35 t/ha). The increase in the yield was the result of improvements noticed in growth/yield components like dry matter production per shoot and its accumulation in stem and

leaves, number of effective shoots per metre of row length, plant height, per day productivity etc. In seed crop, there was a decrease in the crude protein content (10.17 to 6.39%), ash content (6.63 to 5.62%) phosphorus content (0.159 to 0.136%), leaf to stem index (60.15 to 38.50%) and increase in crude fibre content (21.99 to 29.32%) due to the delay in the harvest from flag leaf to milk stage. Stage of harvest of seed crop had no influence on the same parameters of ratoon crop. Increased level of nitrogen increased only the crude protein content of seed crop (7.97 to 8.95%) and phosphorus increased only the phosphorus content of both the crops. Combined yield of crop harvested at flowering stage was on par with the yield of crop harvested at milk stage and combined yield of crude protein of crop harvested at flowering stage was on par with that of crop harvested at flag leaf stage.

## Weed Management Studies In Groundnut (*Arachis hypogaea* L.) and Sunflower (*Helianthus annuus* L.) Intercropping System

G. K. GIRJESH

1988

Major Advisor : V. C. PATIL

A field experiment was conducted on black clay soil at the Agriculture College Farm, Dharwad, during kharif 1987, on weeds, crop growth components, yield and its components, oil and protein content of groundnut and sunflower and uptake of nitrogen, phosphorus and potassium by crops and weeds in groundnut and sunflower intercropping system. Weed population and dry weight of weeds were significantly reduced at all the growth stages by weed control treatments. Among the weed control treatments, pendimethalin (0.75 kg/ha) as pre-emergence coupled with one interculture (21 DAS) had the lowest weed weight (3.71 q/ha) and higher weed control efficiency (96.97%), whereas in unweeded control, the weed weight was 28.55 q per ha. The reduction in weed weight in weed control treatments may be attributed to a lower number of weeds. The growth of crops was severely hindered due to

weed competition. The crop growth components and dry matter production of both groundnut and sunflower were affected. Significant yield reductions (pod and oil yield of groundnut, seed and oil yield of sunflower and total seed and oil yield per ha) were observed due to the adverse effect of weeds on the yield parameters of groundnut and sunflower. All weed control treatments resulted in significantly higher protein and oil content of both crops compared to unweeded check. Unweeded check showed maximum uptake of N, P and K by weeds which significantly higher than all other treatments. Weed control treatments improved the nutrient uptake by groundnut and sunflower over unweeded check. It can be inferred that application of pendimethalin at the rate of 0.75 kg a.i. per ha pre-emergence supplemented with one interculture at 21 DAS was more economical in groundnut and sunflower intercropping system.

## Response of Sunflower hybrid (BSH-1) to Varied Levels of Nitrogen and Phosphorus Under Irrigated Condition

N.C. MEGUR

1989

Major Advisor : A. S. PRABHAKAR

A field experiment was conducted at Agriculture College farm, Dharwad on black clay soil during kharif 1984, to study the response of sunflower hybrid (BSH-1) to varied levels of nitrogen and phosphorus under irrigated condition. Application of nitrogen at 90 kg per ha gave higher grain yield (27.24 q/ha) compared to rest of nitrogen levels. Total number of grains (718.69) and number of filled grains (550.96) were maximum at 120 kg nitrogen per ha, while lowest number of unfilled grains (167.73) was recorded at this level. However, highest 1000-grain weight (44.70 g) was noticed at 90 kg nitrogen per ha. Higher oil yield (12.43 q/ha) was observed at 90 kg N per

ha compared to the other levels. Highest grain yield (25.06 q/ha) was registered at 120 kg per ha of phosphorus. Phosphorus at 30, 60 and 90 kg per ha resulted in reducing yield by 16.77, 9.81 and 4.72 per cent, respectively. Phosphorus at 120 kg per ha resulted in higher total number of grains per head (628.73), number of filled grains (430.87), lowest number of unfilled grains (197.86), lowest per cent of chaffy grains (37.04%), highest 1000-grain weight (43.33 g) higher oil yield (11.61 q/ha) and grain protein content (33.23%). The interaction effect of N x P was not significant with respect to grain yield.

**Studies on Seed Filling and Yield of Sunflower (*Helianthus annuus* L.) Varieties With Growth Regulator Spray and Hand Pollination.**

**K.J. DEVENDRAPPA**

**1989**

**Major Advisor : M. M. HOSMANI**

A field experiment was conducted on vertisol in kharif 1988 at Agriculture College Farm, Dharwad to study the response of three Sunflower Varieties to TIBA spray, Water spray and hand pollination. The experiment consisting of three varieties, three sprayings and two pollination methods was laid out in RBD with three replications. Morden (B) produced significantly higher yield (724) kg/ha) than others. The higher yield was due to significantly higher capitulum diameter, higher number of filled seeds per capitulum, higher per cent seed filling and higher yield per plant. TIBA spray resulted in significantly higher yield (728 kg/ha) than others. The higher yield was due to significantly higher yield per plant, higher 100-seed weight, higher number of filled seeds per capitulum, higher per cent seed filling and higher harvest index. Water spray significantly

reduced yield (486 kg/ha) compared to no spray. The lower yield was due to significantly lower yield per plant, lower number of filled seeds per capitulum and lower per cent seed filling. Hand pollination significantly increased yield (650 kg/ha) than natural pollination. The higher yield was due to higher yield per plant, higher percent seed filling and higher number of filled seeds per capitulum. Morden (B) with TIBA spray produced significantly higher yield (852 kg/ha) than other combinations. The higher yield was due to significantly higher number of filled seeds per capitulum and higher per cent seed filling. Morden (B) with hand pollination produced significantly higher yield (765 kg/ha) compared to other combinations. The higher yield was due to significantly higher yield per plant, higher number of filled seeds per capitulum and higher per cent seed filling.

**Studies on the Performance of Different Groundnut (*Arachis hypogaea* L.) Varieties Under Intercropping System with Sunflower (*Helianthus annuus* L.)**

**SATISH V. HEGDE**

**1989**

**Major Advisor : M. N. SHEELAVANTAR**

A field experiment was conducted at Agriculture College Farm, Dharwad, on medium black soil under rainfed conditions during kharif 1988 to study the performance of different groundnut genotypes under intercropping with sunflower. Groundnut genotypes viz. Dh 3-30, Dh-8, TMV-2, Spanish improved, ICGS-11 and JL-24 were intercropped with sunflower hybrid BSH-1. The experiment was replicated four times in RBD. Among all the groundnut genotypes tried, JL-24 recorded the highest pod yield/oil yield both under intercropping (25.17 q/ha/12.08 q/ha) and sole cropping (27.21 q/ha/13.06 q/ha) because of number of pods per plant, number of kernels per pod, number of kernels per plant, weight of kernels per plant, 100-pod weight, 100-seed weight and shelling percentage in groundnut, which were higher in JL-24. The seed yield/oil yield of sunflower reduced significantly under intercropping with JL-24 by 34 per cent when

compared to sole cropping. All intercropping systems outyielded their respective sole cropping systems with respect to total seed/oil yield. The highest total seed/oil yield was recorded by intercropping of JL-24 with sunflower (29.06 q/ha/ 16 q/ha). The highest LER with respect to total seed/oil yield was recorded by intercropping of sunflower with JL-24 (1.46/1.24) followed by intercropping sunflower with Dh 3-30 (1.38/1.19), Dh-8 (1.36/1.15), TMV-2 (1.35/1.12), Spanish improved (1.27/1.04) and ICGS-11 (1.27/1.02). The highest cost-benefit ratio was recorded by intercropping sunflower with JL-24 groundnut (2.82). JL-24 gave additional returns to the tune of Rs. 1,108.6, Rs. 2,149, Rs. 3,346, Rs. 5,433 and Rs. 5,869 per hectare, respectively when compared with the return generated by intercropping sunflower with groundnut varieties Dh 3-30, Dh-8, TMV-2, Spanish improved and ICGS-11.

**Soil Science**

**Studies on Forms and Distribution of Manganese in Vertisol Series of Malaprabha Right Bank Command Area**

**S.I. TOLANUR**

**1989 Major Advisor : H.M. MANJUNATHAIAH**

Representative surface and pedon soil samples were collected from nine Vertisol series i.e., Achamatti, Budihal, Chulki, Hanchinal, Hebsur, Hirekumbi, Ingalalli, Kiresur and Nalvadi of Malaprabha Right Bank Command Area, Dharwad district and their manganese form and distribution were determined. The average ranges for water soluble plus exchangeable, easily reducible, active and total manganese of surface soil samples were traced to 2.0, 239.6 to 683, 240.5 to 683.3 and 495.4 to 913.6 ppm, respectively. In the nine Vertisol pedons, total manganese ranged between 425 and 1193 ppm; active manganese between 214.4 and 1000.1 ppm; easily reducible manganese between 214.0 and 999 ppm; and water soluble plus exchangeable manganese between 0.2 and 2.0 ppm. The soils are low in water soluble plus exchangeable manganese content and high in easily reducible, active and total manganese. There was increase in total, active and easily reducible manganese in soil depth, while reverse was true for water soluble plus exchangeable manganese. Among the soil characteristics, clay showed significant negative relationship with water soluble plus exchangeable manganese,

whereas the levels of easily reducible and active manganese showed significant positive relationship with clay. pH showed highly significant positive relationship with total manganese. Organic matter showed significant negative relationship with easily reducible active manganese. The easily reducible active manganese were highly correlated with total manganese, while water soluble plus exchangeable manganese showed no such correlation. Water soluble plus exchangeable manganese is highly negatively correlated with  $H_3PO_4$  extractable available manganese and DTPA extractable manganese is positively correlated with  $H_3PO_4$  - extractable manganese but negatively correlated with double acid extractable manganese. Among the chemical extractants tested, 1 N  $NH_4OAC$  showed significant positive correlation ( $r=0.702^*$ ) with manganese uptake by jowar seedlings (Neubauer technique). 1 N  $NH_4OAC$  extractant is considered as the best extractant for these soils. The soils of Vertisol series of Malaprabha Right Bank Command Area, Dharwad district are rich in total manganese and low in water soluble plus exchangeable manganese.

**Investigations on Physical Properties of Vertisols Derived From Different Parent Materials of Northern Karnataka**

**B.M. HIREKURUBAR**

**1989**

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

Vertisol profile soil samples derived from chlorite schist (Devihosur), Shale (Govinakoppa), deccan trap (Bijapur), granite gneiss (Raichur) and limestone (Kajjidi) were collected to study physical properties. A surface soil sample (0-20 cm) was collected from Water management Research Centre, Belavatagi to know the effect of soil compaction on some physical properties and crop growth. Soils were found to be clayey and rich in

cation exchange capacity. The soil derived from chlorite schist were found to contain higher clay fraction and the lowest clay content was recorded in soil derived from limestone. Maximum water holding capacity, higher levels of volume expansion, moisture retention at 0.33 and 15 bar tension, available water capacity, microporosity, total porosity, liquid limit, plastic limit, plasticity index and specific surface area were found in soils derived from

chlorite schist. The lowest values of these physical properties were noticed in soil derived from limestone. The highest bulk density of  $1.28 \text{ Mgm}^{-3}$ , macroporosity of 17.76 per cent and infiltration of 4.0 cm/hr were recorded in soil of limestone origin. The soil developed from granite gneiss had the lowest infiltration (0.3 cm/hr). The lowest bulk density ( $1.19 \text{ Mgm}^{-3}$ ) and macroporosity (13.44%) were observed in soil derived from chlorite schist. Aggregate indices such as mean weight diameter, per cent aggregate stability and per cent aggregates  $> 0.25 \text{ mm}$  were found to be

higher in soil derived from shale and the lowest values of aggregate indices were observed in soil originated from limestone. The surface soil sample from Belvatagi farm was found to attain the highest bulk density of  $1.55 \text{ Mgm}^{-3}$  at 25 per cent moisture content. It was found that compacting the soil higher than  $1.35 \text{ Mgm}^{-3}$  level decreased the hydraulic conductivity and macroporosity. The bulk density of  $1.35 \text{ Mgm}^{-3}$  was found to be optimum for crop growth and nutrient uptake by maize crop.

## Properties and Genesis of Some Lateritic Soils of North Karnataka

K. NARYANA RAO

1989

Major Advisor : G.S. DASOG

Three lateritic soil profiles from Bidar, Khanapur and Sirsi were studied to understand their properties and genesis and to classify them according to the U.S. Soil Taxonomy. The geology of Bidar site is Deccan trap and that of Khanapur and Sirsi sites is granite Gneiss. The rainfall varies from 907 mm in Bidar, through 1683 mm in Khanapur to 2503 mm at Sirsi. Bidar and Sirsi soils were redder compared to Khanapur soil. The structure varied from granular to subangular blocky and massive in lower most horizons. Iron concretions were noticed throughout the Bidar profile but were restricted to lower horizons of the other two profiles. The texture varied from sandy clay loam at the surface to clay loam in the thick lower solum. The pH of soils ranged from 5.7 to 6.5. The organic carbon content was high in Khanapur and Sirsi soils but medium in Bidar soil. The free iron oxide ranged from 2.86 to 4.73 per cent and increased with depth. The CEC value varied from 5.8 to 13.1  $\text{Cmol kg}^{-1}$  in Bidar and Khanapur soils and from 5.2 to 6.8  $\text{Cmol kg}^{-1}$  in Sirsi soil. The

base saturation of the soils varied between 64 and 78 per cent. The chemical composition data of soil brings out clearly that there has been accumulation of sesquioxides and depletion of silica and bases in these soils. A higher  $\text{SiO}_2/\text{Al}_2\text{O}_3$  ratio of 2.42 to 2.60 and high CEC suggests that the weathering has not advanced to a stage as to result in dominance of 1:1 type of clays and oxides of iron and aluminum. However, Sirsi soil has undergone more intense laterization than Khanapur and Bidar soils, due to higher rainfall. None of these soils meet the criteria of Oxisols. They do meet the criteria of Alfisols and suborder Ustalfs. Because Plinthite forms a continuous phase in Bidar soil below 120 cm, it is classified as Plinthustalf. Both Khanapur and Sirsi soils are Paleustalfs. At subgroup level, Khanapur soil is classified as *Udic Paleustalf* because of lack of carbonates and Sirsi soil as *Oxic Paleustalf* because of apparent CEC of clay lower than  $24 \text{ Cmol kg}^{-1}$ .



## Horticulture

### Studies on Growth and Productivity of Hybrid Mangoes

MALASIDDAPPA S. NAGOD

1989

Major Advisor : N. C. HULAMANI

The investigations on growth, productivity and fruit quality of eight hybrid mangoes were carried out at the Silver Jubilee Orchard of the Agricultural College, Dharwad during 1988-89. There were four growth flushes in each hybrid in a year. But their periodicity varied with the hybrids. While Mallika and A.U. Rumani were the earliest to produce the new flush, Hybrid-2/12 and Hybrid-12/2 were the last to produce the new vegetative flush. The most active growth was observed in Mallika and A.U. Rumani and the least growth in Swarnajehangir. Mallika was found significantly superior to other hybrids in respect of number and percentage of perfect and male flowers and sex ratio. Significant differences with regard to number and percentage of fruit/set per panicle and also the number and percentage of fruits dropped per panicle at different stages of fruit development were recorded between the hybrids. The highest number and percentage of fruit set per panicle were recorded in Mallika. It also recorded the highest fruit drop among the eight hybrids. While the number of days required for maturity of fruits varied from 131 to 139 days, the time required for attaining edible ripeness varied between 11 and 17 days under normal storage conditions. Significant differences were observed between the hybrids

with regard to yield expressed both in terms of number and weight of fruits per tree. Significant differences were also observed with regard to length, breadth and thickness of fruits, weight of fruits at maturity and edible ripe stage and physiological loss in weight per fruit. Mallika recorded maximum weight at maturity and ripe stage. The ratio of edible to non-edible portion was found to be maximum in Mallika and minimum in Swarnajehangir. Mallika was found to be significantly superior to all other hybrids in various physical components and in shelf life of fruits. Mallika recorded the highest percentage of TSS while the Swarnajehangir recorded least. The maximum quantity of reducing, non-reducing and total sugars per fruit and their percentage expressed in weight of pulp were recorded in Mallika. Highest ratio of total sugars/titrable acid was observed in A.U. Rumani which had the least percentage of titrable acidity. Ascorbic acid was found to be maximum in the fruits of Hybrid-2/12 followed by Mallika. The texture of pulp was firm and the flavour excellent to pleasant in almost all the hybrids. The fruits of Mallika and Hybrid-2/12 had very sweet pulp with moderate to scanty juice. No fibres were found in the pulp of Mallika and A.U. Rumani.

### Studies on the Effects of Pruning on Vegetative Growth, Flowering and Fruiting in Guava (*Psidium guajava* L) Navalur Selections

MOHD KAISER SHEIKH

1989

Major Advisor : N. C. HULAMANI

A study in five guava (*Psidium guajava* L) Navalur selections was initiated during January, 1988 at Silver Jubilee orchard of UAS, Dharwad. The effect of pruning on production of new shoots, vegetative and reproductive shoots was less in mild pruned branches. The length of shoot was more with severe pruning and had least effect in the genotype CIW-4. Genotype CIW-2 indicated

the production of shoots with maximum length. The number of leaves were not much reduced with mild pruning. The genotype CIW-4 produced more number of leaves on vegetative shoot and SWY-1 produced more leaves on reproductive shoots. Pruning of branches induced more leaf area and the maximum leaf area with pruning was observed in CIW-2. More number of flowers



were observed on unpruned branches. The genotype CIW-2 was prolific in production of flowers. Pruning had effect in increasing fruit length, diameter, weight and volume. The effect was more clearly pronounced on the fruit weight and volume. Fruits per branch were reduced with pruning. Maximum fruit per branch was observed in genotype CIW-3, but the yield was maximum in CIW-4. The chemical constituents showed no marked differences with reference to the presence of starch, titrable acidity of fruit and total sugar

contents. However, the total soluble solids increased with the severity of pruning. Severe pruning had no effect on the presence of ascorbic acid content of the fruits. The branches with no pruning and mild pruning had very low ascorbic acid contents. There was positive significant correlation between fruit diameter and fruit weight, fruit weight and leaf area and number of flowers and number of fruits. The number of fruits per branch showed negative significant correlation with fruit weight and fruit diameter.

### **Effect of Growth Regulator and Pre-Girdling Treatments on Rooting in Air Layers of Cinnamon (*Cinnamomum verum* Presl.)**

**KISHOR R. HEGDE**

**1989**

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

The experiments were carried out at Agriculture College, Dharwad, during November, 1988. Two growth regulators viz., IBA (Indole butyric acid) and NAA (Naphthalene acetic acid), both at 2,500 ppm, and a phenolic compound, gallic acid at 100 ppm concentration were tried. Pre-girdling was done 45 days prior to air layering. Layers were separated after 90 days. Observations on rooting characters were recorded. Biochemical constituents of the shoots were also studied at the end of the experimental period. Biological activity of 'rooting cofactors' was assayed. Post-separation establishment of layers was also studied. Among different growth regulator treatments, NAA 2,500 ppm recorded the highest percentage of rooting (83.33), the highest number of primary roots per layer (5.07), the maximum length of the longest primary root (6.20 cm) and the highest

cumulative length of primary roots per layer (28.00 cm). The least values for all these rooting characters were observed with control. Pre-girdling treatment did not influence any of the rooting characters studied. However, the best treatment combination was pre-girdling + NAA 2,500 ppm which recorded 80 per cent rooting with maximum cumulative length of primary roots (36.76 cm). The total sugars, starch, total carbohydrates and total nitrogen content were low in the treatment NAA 2,500 ppm and were more in control. NAA 2,500 ppm provided all the four rooting co factors and in control a distinct root inhibiting zone was observed. Layers treated with NAA 2,500 ppm established very well after separation. Pre-girdling treatment did not influence the establishment of layers.

### **Studies on the Effect of Nitrogen, Phosphorus and Potassium on Growth and Yield of Onion (*Allium cepa* L.) Cv. Bellary Red**

**D. THIMMAIAH**

**1989**

**Major Advisor : A.A. PATIL**

A factorial experiment was laid out during Kharif 1988 at the New orchard, UAS, Dharwad with randomised block design with three replications. There were 27 treatment combinations comprising three levels each of nitrogen, phosphorus

and potassium. Plant height, number of leaves, and neck diameter leaf area were found to increase significantly with the increase in levels of nitrogen. Maximum total dry matter production as well as dry matter accumulation in different plant parts

of onion were observed with highest level of nitrogen (175 kg/ha). Phosphorus and potassium did not influence the growth parameters. Higher total uptake of N, P and K was observed with the highest levels of the respective nutrient application. With the increased application of N, P and K, N and P showed synergetic effects with respect to nutrients uptake by plants. Bulb diameter was significantly influenced by the application of higher levels of nitrogen. Bulb yield of onion increased with the higher levels of nutrients applied. Application

of nitrogen at 175 kg/ha, phosphorus at 75 kg/ha and potassium at 175 kg/ha gave highest onion bulb yield. Among the various interaction effects, nitrogen-phosphorus combinations significantly increased the yield of onion. Among all treatment combinations, fertilizer dose of 175+50+175 kg NPK per ha was found to be most remunerative which gave highest net income and the same treatment recorded the highest net gain over the lowest NPK level.

### **Reaction of New Eggplant (*Solanum Melongena* L.) Genotypes to Different Management Practices**

**A. N. PRAKASH**

**1989**

**Major Advisor : B.B. MADALAGERI**

Two field experiments on eggplant were conducted during summer and kharif, 1988 at UAS, Dharwad. In summer, eleven genotypes with good horticultural base were screened to know their reaction to water stress (abiotic) and biotic stresses like shoot and fruit borer and *Cercospora* leaf spot. The elite selections (*Solanum macrocarpon*, Composite 1, Composite 2 and Kalirawai) from summer were advanced to kharif along with local cultivar (Malapur Local) of Dharwad region and were pre-exposed to N nutrition (60 and 125 kg/ha) with and without *Azotobacter* root dip. Environments in the form of mulching and non-mulching did not show significant difference on the marketable fruit yield per plant. The genotypes differed significantly with the highest yield in Composite 1 (1.35 kg/plant) followed by Composite 2 (1.09 kg/plant). The incidence of shoot and fruit borer and *Cercospora* leaf spot were lower in *S. macrocarpon* (10.53% and 10.89 PDI, respectively) and highest in genotypes Pusa

Kranti (41.61%) and PI 176761 X PI 320505 (28.39 PDI). *Azotobacter* in combination with 60 kg N per ha was much more remarkable on all the growth characters and fruit yield (31.13 t/ha) of eggplant compared to the application of recommended dose of nitrogen (125 kg/ha) without *Azotobacter* root dip (29.73 t/ha). This means about 52 per cent saving of N fertilizer by mere application of *Azotobacter*. The genotypes Composite 1 and Composite 2 recorded maximum plant height, leaf area, stem diameter and plant spread. However, number of branches and leaves were more in Malapur Local followed by Composite 1. The genotypes Composite 1 and Composite 2 outyielded others (33.10 and 29.96 t/ha, respectively). The genotypes Composite 1, Composite 2 and Malapur Local had relatively bigger fruits whereas *S. macrocarpon* and Composite 2 had thicker skin and better storage (6.50 to 7.00 days) Genotypes Kalirawai, Malapur Local and Composite 2 were more preferred by the consumers.

### **Studies on Vegetative Propagation of Cocoa (*Theobroma cacao* L.)**

**SATISH G. HEGDE**

**1989**

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

Studies were conducted at the College of Agriculture, Dharwad, from June 1988 to January 1989. Growth regulators viz., IBA 3000

ppm, IBA 1000 ppm + NAA 2000 ppm and IBA 2000 ppm + NAA 1000 ppm gave more than 90 per cent rooting in air layering of cocoa. Rooting

characters like number of primary roots, cumulative length of primary roots, length of longest primary root and rooting zone were better in IBA 2000 ppm + NAA 1000 ppm treatments. Establishment of layers was more than 90 per cent in three treatments. viz., IBA 3000 ppm, IBA 1000 ppm + NAA 2000 ppm and IBA 2000 ppm + NAA 1000 ppm. Of the two structures (chamber and trench) tried to maintain higher relative humidity, cent per cent humidity was maintained for longer period in trench. Besides, temperatures were low in the trench as compared to chamber. Consequently, trench gave 31 per cent more rooting than chamber. Rooting characters like number of primary roots, cumulative length of primary roots, length of longest primary root, number of secondary roots

and cumulative length of secondary roots were higher in trench than in chamber. Among the growth regulators used for rooting of cuttings, IBA 3000 ppm, IBA 2000 ppm + NAA 2000 ppm and IBA 2000 ppm + NAA 1000 ppm recorded higher rooting percentage in both the structures. IBA 3000 ppm and IBA 2000 ppm + NAA 1000 ppm gave the highest values for rooting characters in trench and chamber, respectively. Anatomical studies conducted on stem cuttings showed thick sclerenchyma layer as one of the barriers for rooting. In the case of budding, four month old root stocks recorded highest percentage of success and also sprouts were vigorous in the same treatment. Ten month old root stock gave highest grafting success.

## Crop Physiology

### Physiological and Biochemical Changes in Sorghum (*sorghum bicolor* (L.) Moench) Infected by *Peronosclerospora sorghi* (Western & Uppal) Shaw

JAGADISH RANE

1988

Major Advisor : Y.C. PANCHAL

An experiment was conducted on black clayey soil under rainfed condition at the Agriculture College Farm Dharwad, during kharif 1987, to study the changes in sugars, amino acids, phenols and activities of enzymes like phenylalanine ammonia-lyase (PAL) and tyrosine ammonia-lyase (TAL) in leaves of sorghum infected by downy mildew in both resistant and susceptible genotypes. Resistant genotypes (DMRS-1 and QL-3) recorded more total free phenols than the susceptible healthy genotypes (DMS-652 and IS-643). However, susceptible genotypes exhibited more phenolics at 30 days after sowing (DAS) under infected condition. An increasing trend of total sugars, of both resistant and susceptible genotypes, with the advance in age was observed. However, the infection lead to decrease in the sugar content. The process of utilization of sugars for the synthesis of phenols seemed to be more efficiently working in the resistant genotypes than the susceptible ones. Susceptible healthy plants after 30 DAS exhibited considerably higher amount of amino

acids as compared to both resistant and susceptible diseased plants. At the same time, less amount of phenols was recorded in susceptible healthy plants. Further at 40 DAS, the decrease in amino acids coincided with the increase in total free phenols in the susceptible healthy plants. This was thought to be one of the reasons for inefficiency of susceptible plant in the production of phenols. Amino acid content of resistant plant went on increasing with plant age whereas, the diseased plants exhibited decreasing trend of free amino acids. The enzymes PAL and TAL were found to play a major role in the synthesis of phenols. Increase in the activities of the enzymes coincided with increase in phenols. The activities of the enzymes were higher in the resistant than in susceptible genotypes. The results of the investigation provided sufficient evidence regarding the role of PAL and TAL in phenol metabolism associated with disease resistance and that, sugars and amino acids contribute in parts towards the mechanism of disease resistance.

## Effect of Growth Regulators and Nutrients on Growth, Yield and Seed Viability of Mungbean (*Vigna radiata* (L.) Wilczek) Genotypes.

S.S. KANDAGAL

1988

Major Advisor : Y.C. PANCHAL

Investigations were carried out during Kharif 1987 at the Agriculture College Farm Dharwad on the effect of growth regulators and nutrients on growth, yield and seed viability of two mungbean (*Vigna radiata* (L.) Wilczek) genotypes viz., Pusa Baisakhi and Chinamung. Foliar application of growth regulators (TIBA and NAA, each at 50 ppm concentration) and nutrients (urea, manganese dioxide and potassium nitrate each at two per cent) was done at pre-bloom stage and compared against the water sprayed treatment (control). Foliar application of TIBA and NAA have significantly increased the seed yield (6.88 and 6.57 q/ha, respectively) as compared to control (5.54 q/ha). This was due to the increase in the number of

primary branches, number of pods per plant, number of seeds per pod, pod length, seed yield per plant, 1000 grain weight and higher harvest index. Plant analysis data indicated increase in nitrogen, potassium, calcium and protein content with the application of TIBA and NAA as compared to control. Seed viability studies indicated that the seeds obtained from the plants treated with growth regulators TIBA and NAA had higher germination percentage and vigour index, though not-significant, as compared to control and these values reduced to 50 percent with a shelf life of six months under the existing storage conditions. Genotype Pusa Baisakhi responded better to the treatments than Chinamung and had higher seed yield.

## Physiological and histochemical changes Due to Suckericidal application In Tobacco (*Nicotiana tabacum* L.) Axillary buds

V.S. SHETTEPPANAVAR

1988

Major Advisor : Y.C. PANCHAL

The experiment conducted on *bidi* tobacco (Spurti) showed significant difference in the sucker control by various treatments like ILTD, accotab, neem oil, MH-40 hand removal of suckers and control with no topping. ILTD mixture at different concentration (10 and 3 per cent) was more effective in controlling the suckers. The Chemical composition of leaf such as nicotine, nitrogen and reducing sugars did not differ with various sucker treatments. Anatomical and histochemical observations showed that the apical bud treated with ILTD mixture resulted in the desiccation of bud leading to its death. The buds treated with neem oil and accotab showed more of cellular components like protein, polysaccharide and RNA content in the leaf primordia, apical

dome and central zone in early stage as compared to later stages. However, in the case of non-topped and hand desuckering, buds showed more of the cellular components thus indicating that suckericides induce early senescence. The vascular connection of buds with stem traces were observed to be intact in the case of non topped and hand desucked plants. On the contrary, in the case of suckericide treated buds, the vascular connection with stem was lost. However, in the case of MH 40 treated buds at early stage, abnormal scattered condition of vasculature was observed, thus indicating the loss of vascular connection with stem. But in later stage, vascular connections were observed to be in their normal position indicating the overcomming of chemical effect.

## Agricultural Entomology

### Studies on the Monitoring of Cotton Bollworms with Particular Reference to American Bollworm, *Heliothis armigera* (Hubner) With Sex Pheromone Traps

MOHAN I. NAIK

1988

Major Advisor : S. LINGAPPA

Investigations were carried out at the Agricultural Research Station, Dharwad to monitor the activity of cotton bollworms throughout the year from June 1987 to May 1988 with sex pheromone traps and to elicit the relationship between trap catches and incidence of bollworms. Studies were also made to find out the influence of weather factors on trap catches. Further, different types of traps and rubber septa for capturing *H. armigera* were evaluated. The activity of *H. armigera* and *Pectinophora gossypiella* was found throughout the year with three and five peak catches, respectively. In the case of *Earias vittella*, moths were trapped from last week of August to first week of February with four peaks in moth catches. A positive relationship was found between moth catches and larval population on squares/flowers one and three weeks after (*P. gossypiella*) and two weeks before (*E. vittella*) and on bolls two and three weeks before (*E.*

*vittella*) trap catches. Similar relationship was found between moth catches and infestation on squares/flowers four weeks before (*H. armigera*, *E. vittella*) and two, three weeks before (*E. vittella*) and on bolls four weeks before (*H. armigera*) one and three weeks before (*P. gossypiella*) and two weeks before (*E. vittella*) trap catches. A significant relationship was found between trap catches of bollworms and wind speed, but a negative relationship was evident between trap catches of *H. armigera* and temperatures and minimum relative humidity and between moth catches of *E. vittella* and maximum temperature. ICRISAT standard trap captured maximum number of moths of *H. armigera* followed by polythene sleeve trap and water pan trap while, wing trap, delta trap and oil board trap were not efficient. All the three types of rubber septa (light red, white and blackish red) were proved to be equally efficient as carriers of *H. armigera* lure.

### Genetic Analysis of Midge (*Contarinia Sorghicola* Coq.) Resistance In Sorghum.

S. T. PRABHU

1989

Major Advisor : I.G. HIREMATH

The genetic analysis of midge, *Contarinia sorghicola* Coq. resistance was studied on a set of 56 diallel crosses involving two midge resistant, two susceptible and other four agronomically superior sorghum cultivars under artificial midge infestation at Dharwad during Kharif 1988. Heterosis varied greatly over mid and better parent for all the characters. Commercially exploitable heterosis (over the better parent) was observed in desirable direction with respect to both resistance and yield characters. The crosses, DJ 6514 x SB 1085, SPV 829 x DJ 6514, TAM 2566 x DJ 6514 and SPV 829 x TAM 2566 manifested the best

*per se* performance regarding per cent grain damage. The Sca variance was predominant for all the traits except days to 50 percent flowering, larvae per 100 florets and adult emergence in which GCA variance was predominant. Among the parents, TAM 2566 was the best general combiner for all the traits, although the parent DJ 6514 was best combiner for midge resistance. The susceptible cultivar IS 84 was poor general combiner for all midge resistance character, except for grain size. Majority of the crosses found as the best ones based on their *per se* performance were frequently involved the best

parents namely TAM 2566 and DJ 6514 for imparting midge resistance. The two crosses, TAM 2566 x IS 84 and DJ 6514 x IS 84 were superior in having high Sca for many midge resistance characters. The three hybrids, namely, TAM 2566 x SPV 813, TAM 2566 x SPV 829 and DJ 6514 x SPV 829 were regarded as outstanding

resistant hybrids based on their best *per se* performance for maximum number of characters. The other three combinations TAM 2566 x IS 84, TAM 2566 x SPV 462 and DJ 6514 x SB 1085 exhibited the best *per se* performance and high Sca effects for yielding ability.

### **Studies on Natural Enemies of Teak Defoliators and Evaluation of *Trichogramma chilonis* Ishii Against *Hyblaea puera* Cramer**

**SIDDANAGOUDA U. PATIL**

**1989**

**Major Advisor : K. JAIRAO**

Investigations were made on natural enemies and their seasonal incidence in relation to pest abundance during 1988 at Prabhunagar (Dharwad). A bethylid, a braconid, two eulophids, two ichneumonids, a sphecid, a tachinid and three unidentified hymenopterans were recorded on larvae of *Hyblaea puera*. Formicids, *Leptogenys processionalis* (Jerdon), *Myrmecaria brunnea* saunders, a tiger beetle (*Cicindella aurafaciata*) and a mantid were found to predate on *H. puera* larvae. *Apanteles ruidus* Wilkn and an ichneumonid were the only parasitoids recorded on *E. machaeralis*. Except *p. solennis* which preferred late instar larvae, other parasitoid species preferred younger larvae. *P. solennis* and *Eriborus* sp. were found promising and maximum parasitization by these species was 20.5 and 16.6 per cent, respectively when the pest was in abundance whereas other parasitoid species were active when the pest

density was low. Inundative releases of the egg parasitoid *Trichogramma chilonis* Ishii were made against *H. puera* in different doses at two metres height from the ground level. Parasitization was highest immediately after release. The increase in relative humidity favoured parasitization as indicated by correlation coefficient. Among different heights, the bottom portion recorded high percentage of parasitization as against the remaining heights. No cumulative effect was observed when the parasitoid was reared for five generations. But 't' test indicated the significant difference in fecundity of parasitoid on *H. puera* as compared to its fecundity when reared on *C. cephalonica*. Studies have indicated that *T. chilonis* can be used for effective control of *H. puera* if timely and adequate releases are made synchronizing with the pest ovipositional activity.

### **Parasitisation and Preference of *Trichogramma chilonis* Ishii on *Heliothis armigera* (Hubner) Infesting Different Crops**

**B.S. LAKSHMANAMURTHY**

**1989**

**Major Advisor : K. JAIRAO**

Parasitisation and preference of *Trichogramma chilonis* on the eggs of *Heliothis armigera* reared on bengalgram, redgram, okra, maize, sunflower, chilli, tomato and cotton was studied. Its biology including the effect of food on longevity, fecundity and extent of male and female emergence on *H. armigera* and the laboratory host *Corcyra cephalonia* (Stainton) were studied. The parasitoid completed life cycle in 223.4 to

202.00 hours when *H. armigera* was reared on redgram and sorghum, respectively, on *C. cephalonica* it took 199.40 hours to complete its life cycle. Longevity of the parasitoid considerably enhanced when *H. armigera* was reared on different host plants. On *Corcyra*, males and females survived for more period of 20.72 to 42.98 and 25.96 to 61.80 hours, without and with

food, respectively, when compared to the longevity on *H. armigera* (19.30 and 24.90 hour). However, the fecundity of the parasitoid bred on *H. armigera* was found significantly different. parasitoid bred on *H. armigera* eggs yielded more numbers than on *Corcyra* eggs with food. Male and female emergence was found significantly different when parasitoid was provided with food whereas it was nonsignificant in the absence of food. A Maximum parasitisation (41.35%) was found when *H. armigera* was reared on bengalgram and minimum parasitisation (34.18%) was found when *H. armigera*

was reared on maize, when the parasitoid provided with food. In the absence of food, parasitisation was 27.93 and 33.81 per cent of *H. armigera* reared on redgram and tomato, respectively. On *Corcyra*, it gave more parasitisation as compared to *H. armigera* reared on different food plants, except on tomato and sorghum. Parasitisation under field condition ranged from of 7.00 on chilli to 15.80 eggs on okra. The preference of the parasitoid towards the eggs of *H. armigera* differed with host plant.

## Plant Pathology

### Studies on some Aspects of Stalk-rot Complex of Sorghum (*Sorghum bicolor* (L.) Moench)

APPASAB HUNDEKAR

1988

Major Advisor : K.H. ANAHOSUR

Different aspects of stalk-rot complex of sorghum were studied through various experiments. Seven fungal species, namely, *Macrophomina phaseolina* (Tassi) Goid., *Fusarium moniliforme* Sheldon, *Fusarium moniliforme* var *subglutinans* Wollenw and Reinking, *Fusarium anthophilum* (A. Braun) Wollenw, *Fusarium oxysporum* Schlecht, *Fusarium pallidoroseum* (Woke) Sacc. and *Fusarium* sp. (Section *Diseola*) were isolated from stalk-rot specimens. *M. phaseolina* was the most destructive pathogen followed by *F. moniliforme*, *F. moniliforme* var *subglutinans* was poorly pathogenic, *F. oxysporum* and *F. anthophilum* were contingent, *F. pallidoroseum* and *Fusarium* sp. (Section *Diseola*) were non-pathogenic. The species of *Fusarium* were not antagonistic to *M. phaseolina*. Except *F. pallidoroseum* other *Fusarium* species were antagonistic to *F. moniliforme*. *M. phaseolina*, *F. moniliforme* and other species of *Fusarium* caused the lodging of plant at a faster rate in combinations than singly. But there was

no significant difference in effects due to either combinations or *M. phaseolina* alone, but these effects were significantly greater than the effects of any species of *Fusarium* alone. The infection of *F. moniliforme* started earlier than the *M. phaseolina*. At the age of 90 days, sorghum plants were most susceptible to *M. phaseolina* and *F. moniliforme*. Among the organic amendments, neem, cotton, groundnut and safflower cakes reduced the incidence of stalk-rot. *F. moniliforme* and *M. phaseolina* produced toxic metabolites in the culture filtrates. Undiluted culture filtrates of them caused wilting of tomato cuttings at the 26th and 42nd hours, respectively. Bavistin and Rhizolex were found most effective against *M. phaseolina* and *F. moniliforme* and Thiram was effective among non-systemic fungicides. Under pot culture studies, seed treatment with any fungicides did not reduce the disease and drenching the infested soils with Bavistin and Rhizolex reduced the stalk rot to some extent.



## Studies on Follar Fungal Diseases of Forest Crops in and Around Dharwad

M. NARAYANA BHAT

1988

Major Advisor : R.K. HEGDE

A survey was undertaken during 1986-87 in the forest nurseries and gardens of Dharwad and its suburbs. Diseased leaves were collected periodically and studied for their symptoms and causal nature. The obligatory fungi were studied taking thin sections of infected tissues. Facultative organisms were isolated and their characters were also studied. Cross inoculation studies and assessment of severity of the disease were also undertaken. Thirty three species of fungal pathogens belonging to 26 genera causing fortyone diseases in 33 different forest plants was studied. Leaf blight of *Eucalyptus* hybrid recorded maximum disease intensity (78.59%) while, leaf spot of *Anacardium occidentale* recorded a minimum (6.31%). The most common pathogen, *Colletotrichum gloeosporioides* was observed on eight hosts and a cross inoculation study of this fungus confirmed the possibility of physiological specialisation. *Alternaria alternata* on *Eucalyptus citriodora*; *Cladosporium tenuissimum* on *Pongamia pinnata*; *gloeosporioides* on *Bauhinia malabarica* *Pongamia pinnata*, *Populus deltoides*; *Curvularia*

*verruculosa* on *Lagerstroemia lanceolata*; *Dasturella divina* on *Bambusa arundinacea*; *Entyloma* sp. on *Dalbergia latifolia*; *Exserohilum halodes* on *Bambusa arundinacea*; *Meliola* sp. on *Bauhinia racemosa*; *Leveillula leguminosarum* on *Acacia nilotica*; *Oidium* sp. on *Acacia auriculiformis*, *Acacia eburnea*, *Cordia myxa*; *Pestalotia* sp. on *Lagerstroemia lanceolata*; *Phakospora gossypii* on *Thespesia lampus*; *Phyllachora dalbergiae* on *Dalbergia latifolia*; *Prathigada* sp. on *Grewia tilifolia*, *Stigmata* sp. on *Terminalia bellerica* constitute new records from India. *Camptomeris albizzicola* on *Albizia lebbek*; *Cercospora leucosticta* on *Melia azadirachta*; *C. gloeosporioides* on *A. occidentale*, *Cinnamomum zeylanicum*, *Dalbergia sissoo*; *Cylindrosporium cassiae* on *Cassia fistula*; *Phyllactinia dalbergiae* on *Dalbergia sissoo*; *Phaeoseptoria eucalypti* on *Eucalyptus* hybrid; *Phyllosticta artocarpicola* on *Artocarpus heterophyllous*; *Ravenelia emblicae* on *Embllica officinalis*; *Uredo sissoo* on *D. sissoo* constitute new records from Karnataka.

## Studies on Powdery Mildew of Greengram (*Vigna radiata* (L.) Willczek) Caused by *Erysiphe polygoni* DC.

SURESH KUNKALIKAR

1989

Major Advisor : G.M. PADAGANUR

In four dates of sowing in both the varieties i.e., KDM-1 and China mung, the disease severity at flowering stage varied significantly. The appearance of the disease in the first, second, third and fourth dates of sowing was at 52 days, 37 days, 22 days and 15 days stage of the crop, respectively. Highest grain yield was obtained in first sown crop. Tridemorph (0.02%) gave better result in controlling the disease under field conditions with 1:7.2 cost-benefit ratio. In case of in-vitro evaluation, it could completely inhibit the conidial germination at lower concentration. It was also effective to reduce the rate of spread of the disease in field. Highest germination percentage of conidia were observed which were harvested

at 14 hours. The cardinal temperature required for conidial germination was 15°C, 20°C and 25°C. Relative humidity of 80 per cent was optimum for conidial germination. Plants of 48 days old (post flowering stage) were observed to be highly susceptible to the disease. Among 90 genotypes screened against the disease under natural conditions, Black greengram, Cob-g-Co-4 and Bgg-2 were found to be resistant. The only weed *Euphorbia hirta* (L.) (Euphorbiaceae) was found to be collateral host for *E. polygoni*. There was an increase in per cent severity of the disease on 56 days old crop of China mung during which there was an increase in total phenols, total amino acids, total sugars and reducing sugars

and decrease in non-reducing sugars content. Total phenol content was more in resistant variety, Black greengram as compared to susceptible

variety Pusa-103 and reducing sugar content was low in resistant variety as compared to susceptible variety at 35 days old crop.

**Studies on some Aspects of White Rust of Mustard (*Brassica juncea* (L.) Czern and Coss.) Caused by *Albugo candida* (Lev.) Kunze in North Karnataka**

**VIJAYENDRA M. HEGDE**

**Major Advisor : K. H. ANAHOSUR**

The pathogen causing white rust of mustard was identified as *Albugo candida* (Lev.) Kunze based on its morphological characters, pathogenicity and symptoms. The sporangia were hyaline and spherical measuring 12-20  $\mu$  in diameter. They were in chains in besipetal succession on the tip of club shaped sporangiophores. Oospores were yellowish to brown in colour measuring 43  $\mu$  to 58  $\mu$  in diameter. The inoculation of the pathogen resulted in both local as well as systemic infections. Sporangia and oospores germinated by giving out zoospores and the zoospore germinated by giving a germ tube. The maximum sporangial germination was observed in distilled water incubated at 10° C for three hours and by washing them with sterile tap water at 15°C. The weeds *Cleome viscosa* L. and *Amaranthus viridis* L. were found

to be infected by the pathogen from mustard. Maximum disease intensity was obtained by spray inoculating the germinated sporangia on leaf surface and covered for 48 hr. Crop sown from September 7th onwards to 22nd October showed the least leaf and floral infections. Low temperature, high rainfall and high relative humidity favoured the disease incidence and development. Genotypes TL-15 was moderately resistant among 15 genotypes screened. Maximum disease control during rainy season was achieved by using seed treatment + two sprays with 2 g a.i. metalaxyl MZ and satisfactory results were obtained by the similar treatments with 1 g a.i. metalaxyl MZ or with 1 g.a.i. and 2 g.a.i. metalaxyl MZ. In rabi season seed treatment + two sprays of 1 g a.i. metalaxyl MZ resulted in the maximum disease control.

**Seed Technology**

**Effect of Irrigation Schedules on Seed Production and Quality in Wheat (*Triticum aestivum* L.)**

**M.G. MENEDAL**

**1988**

**Major Advisor : G. N. Kulkarni**

A field experiment was undertaken at the College of Agriculture, Dharwad during rabi 1987-88. The experiment was laid out in split plot design with eight irrigation treatments in sub-plots and two varieties (DWR-16 and DWR-39) in main plots in three replications. It was found that the growth and growth parameter values increased with increase in irrigation frequencies due to increase in vegetative growth. The maximum values were recorded in  $I_7$  followed by  $I_6$ ,  $I_5$  and  $I_4$  which were on par with each other, while  $I_1$

recorded the least. The seed yield increased with increase in irrigation frequencies due to increase in tillers and other yield attributes. Among the irrigation treatments,  $I_4$  has shown optimum values and recorded 42.60, 29.84 and 26.65 per cent increase in respect of seed yield, seed recovery percentage and 1000 seed weight respectively over  $I_3$  treatment. Further, increase by one irrigation ( $I_5$ ) has shown an increase of only 10.29, 4.15 and 3.17 per cent over  $I_4$  in respect of above characters. From the data, it can be observed

that the quality characters like germination percentage, shoot and root length, dry weight of seedlings, vigour index and protein per cent had reached a desired level with  $I_2$ . Further increase in the irrigation ( $I_3$ ) did not show marked influence, though there was marginal improvement. In the

present investigation four irrigations seemed to be optimum for getting higher yield with desired seed quality by economical use of irrigation water to be given at crown root initiation, tillering, flowering, grain filling stages. DWR-39 gave a good response to higher levels of irrigation.

## **Studies on the Effect of Seed Characters on Seed Quality In Cotton (*Gossypium herbaceum* L.)**

**P. BALAKRISHNA**

**1988**

**Major Advisor : G. N. KULKARNI**

Among 20 cotton (*Gossypium herbaceum* L.) genotypes studied for 28 seed characters from diverse geographical origin, the maximum range of variation was observed for seedling vigour index (SVI), root length, shoot length, ginning percentage (GP), seed index, seed size, hard seeds (%), seed lipids, seed proteins and field emergence (%). The genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were observed higher for seed characters viz., hard seeds (%) followed by seed fuzz, seed potassium, SVI, seedling dry weight, shoot length, seed kernel and seed size. The heritability ( $h^2$ ) estimated was the highest for seed potassium, followed by seed kernel, seed lipids, seed magnesium, seed nitrogen, seed hull, seed phosphorus, hull to kernel ratio, seed fuzz and seed index. The expected genetic advance as percentage of mean was high for SVI, seed size, hard seeds (%), seed lipid, shoot length, seed proteins, seed fuzz, germination, seed index, seed kernel and seed length. The estimates of heritability together with genetic advance was high for seed fibre, GP, seed index, SVI, seed size, seed fuzz, seed kernel, seed lipid, seed nitrogen, seed proteins and shoot length. Correlation coefficients at genotypic and phenotypic levels showed similar trends and in general, the genotypic

values were higher than the corresponding phenotypic values. The seed characters like seed hull and seed density showed positive significant correlation with SVI, in turn, root length and shoot length were highly significant and positively correlated with SVI also. Besides, GP and lint index were also significant and positively correlated with SVI. Seedling dry weight, revealed highly significant and positive correlations among seed index, seed kernel, shoot length and field emergence (%). Path analysis for SVI indicated high direct effect of seed size, followed by GP, root and shoot length. Similarly, when path analysis for seedling dry weight (SDW) was considered, the study showed that seed index and seed kernel had high direct effects on SDW. However, seed characters viz., physical, chemical, and biological characters were individually correlated with SDW. The seed characters i.e., seed kernel had high direct effect on SDW, but no seed chemical characters and seed biological characters showed any direct effects on SDW. Therefore, in cotton, seed size, root length, shoot length, seed index and seed kernel were observed to be the most important components in breeding for higher seedling vigour and may be given greater weightage while formulating selection indices.

**Studies on Synchronization of Flowering of Parental Lines in Sorghum  
Hybrid Seed Production of DSH-1 (CSH-10)**

**H. SIVAPPA**

**1988**

**Major Advisor : G.N. KULKARNI**

A field experiment was carried out during kharif 1987 at the College of Agriculture, Dharwad to achieve maximum synchronization of flowering through agronomic manipulation comprised of twelve treatments arising from different N levels and their combination with urea and boron spray. The experiment was laid out in RBD with three replications. Female (296A) and male (SB 1085) parents were sown on 29th June and 4th July 1987, respectively, providing five days staggered planting to bring in synchronization. A ratio of 4:2 between female and male lines was maintained. Observations were recorded on growth and growth attributing characters in both the parents, yield and yield attributing characters and on seed quality in hybrid seed. The treatment receiving dose of 200 kg N per ha through soil coupled with two percent urea spray at flower primordia initiation to female parent hastened the 50 per cent flowering by five days and reduced difference between flowering of both the parents significantly and the highest hybrid seed yield of 12.06 q per

ha was obtained. The treatment receiving 200 kg N per ha through soil was found to be at par with the above treatment which recorded 11.04 per ha. These two treatments were significantly superior over all other treatments in all characters. The hybrid seed yield was 6.34 q per ha in control. Increase in the hybrid seed yield in the above said two treatments was the result of effective synchronization of flowering between parents. This effective synchronization of flowering and maximum seed set led to increase in ear weight, seed weight per ear, number of seeds per ear, 1000-seed weight, recovery per cent and threshing per cent in these treatments. The higher dose of nitrogen also caused significant increase in plant height, number of green leaves, leaf area, index, plant girth and dry matter production. The quality characters such as germination, field emergence, root length, shoot length, dry weight of seedlings, vigour index and mean daily emergence values have shown considerable improvement with additional dose of nitrogen.

**Effect of dates of harvesting on yield, quality and storability of soybean  
(*Glycine max* (L.) Merrill).**

**PRABHAKAR B. ANEGUNDI**

**1989**

**Major Advisor : G. N. KULKARNI**

To investigate the effect of dates of harvesting from 70 to 140 DAS with an interval of 10 days on seed yield and quality of two varieties of soybean and to know the effect of seed treatment (Thiram @ 2 g/kg of seed) on storability of the same varieties of soybean, two experiments were conducted at University of Agricultural Sciences, Dharwad, from June 1987 to November 1987 (Field experiment) and from September 1987 to May 1988 (storability study for each date of harvest). Delay in dates of harvesting gradually increased all the growth parameters upto 100 DAS and later harvesting resulted in reduction of number of branches and pods per plant through shattering due to the over

exposure of the plant to the weather conditions. The dry matter production in stem and pods were maximum at 100 DAS. But in leaf it was maximum at 70 DAS. Moisture content decreased gradually from 70 to 140 DAS. Yield contributing characters increased with delay in harvesting upto 100 DAS and then decreased when compared to earlier harvesting. The same trend was seen in quality characters compared to early and late harvested crop. There was fair degree of preservation in seed quality by seed treatment. Thus, quality was maximum at 100 DAS harvested seed along with seed treatment throughout the storage period. But negative relationship existed with respect to protein and oil content during storage in relation

to harvesting dates. At 130 DAS seeds recorded maximum protein, whereas oil was maximum in seeds at 70 DAS. Among the two varieties stored, Bragg recorded higher quality characters than Hardee. The seed treatment has played a dominant role in warding off fungal infection

resulting in higher germination percentage during six months storage. Quality parameters increased with delay in dates of harvesting upto 100 DAS and showed decreasing tendency with advancing of the storage period.

## **M.Sc.**

### ***Agricultural Economics***

#### **Economics of Cropping Pattern in Ghataprabha Command Area of Bijapur District, Karnataka State – A Case Study of Conjunctive Use of Surface and Ground Water**

**J.S. SONNAD**

**1988**

**Major Advisor : K. C. HIREMATH**

The focus of the study is on the economic evaluation of cropping patterns on lands with and without conjunctive use of water on different sized farms. Ninety six small, 92 medium and 108 large farms covering 3,145 acres spread over six villages were selected using stratified random sampling method. Field level data for the agricultural year 1985-86 were collected through the survey method. Necessary secondary data were also obtained. Cropping patterns on lands with conjunctive use of water in the three size groups were practically identical. The highest proportion was under annual and perennial crops. The planted sugarcane, ratoon sugarcane, kharif maize and cotton were the most important crops yielding a net income of Rs. 4,268.04, Rs. 5,428.93, Rs. 654.29 and Rs. 304.12 per acre, respectively. Rabi cropping was dominant on lands without conjunctive use of water. The important crops

raised and the net profits per acre realised were wheat (Rs. 563.11), bengalgram (Rs. 725.37), rabi maize (Rs. 480.37) and rabi jowar (Rs. 130.59) The farm size had an inverse relationship with (i) the area under conjunctive use of water, ((ii) cropping intensities and (iii) farm business income. The value of gross output per acre on the conjunctively irrigated lands (Rs. 6,441.76) were almost four times that on lands without conjunctive use of water (Rs. 1,664.01) The production function analysis revealed that the cost incurred on irrigation water, manures and fertilisers were higher than warranted for most of the crops. The conjunctive use of surface and ground water generated considerable improvement in the levels of yields and returns of crops besides bringing less inequity in spatial development and increase in stability and sustainability in the growth of production and productivity of crops.

#### **Structure Conduct and Performance of Marketing of Cotton in Dharwad District of Karnataka State – A Case Study**

**U.B. DIXIT**

**1988**

**Major Advisor : K.C. HIREMATH**

In this study an attempt is made to identify the deficiencies in the present system of

marketing of cotton in Gadag and Hubli markets of Karnataka. Both Cross-Sectional and time-

series data were collected on relevant aspects to compute the costs, returns and profits and to analyse the trends. A multistage random sampling technique was adopted in the selection of markets and sample farmers. Tabular, time-series, correlation and regression analyses were adopted. The stability and the entry ratios of market functionaries in Gadag and Hubli markets were identical but the exit ratio was relatively higher in Gadag market. The inter-market price differences for the various months were found to be much higher than the estimated transportation costs between the markets, indicating lack of spatial integration between the two markets. Two important channels viz., Channel - I- Producer-Seller-Commission Agent Wholesaler—Mill-owner, and Channel-II—

Producer-Seller-Co-operative Society-Wholesaler-Mill-owner were identified. Channel- II was more popular than Channel-I. The marketing margins were higher in Hubli market compared to Gadag market and they were higher in Channel-I than in Channel-II. The Producer's share in Consumer's rupee was higher in Gadag market (72 to 80%) compared to Hubli market (71 to 78%). The Prices of DCH-32 and Jayadhar Cotton were more than their respective total costs (Cost D) in all size groups of farmers and in both the markets. The major arrival were found during peak period, December to April for DCH-32 Cotton and March to May for Jayadhar Cotton. The seasonal indices of market arrivals and prices showed a positive correlation.

## **Impact of Technological Changes In Rainfed Cotton on Output, Employment and Factor Shares in Dharwad District, Karnataka – an Economic Analysis**

**B.S. SULIGAVI**

**1988 Major Advisor: H.G.SHANKARAMURTHY**

The present study was undertaken with the objectives of studying the impact of technological change on output, employment and factor shares in cotton and decomposing the output change noticed. The study covered three rainfed cotton growing areas viz., Haveri, Hubli and Gadag with principal varieties hybrid DCH-32 and Jayadhar local. The primary data were collected by personal interview method employing defined questionnaire and they were post-classified into small and large farmers. A sample size of 135 farmers was chosen comprising 72 farmers growing hybrid cotton and 66 farmers growing local variety. Chow test was used to measure the structural break based on Cobb-Douglas production function and output decomposition model to measure output changes. To measure employment effects, 't' test was used and for the factor share effects, the defined terms, actual, absolute and estimated

factor shares were used. There was a significant structural break in the transfer of local (old) to hybrid (new technology. The out put decomposition model showed that there was a 115 per cent change in output of which 62 per cent was contributed by technology alone and the rest 53 per cent by other input factors, namely, seed + fertilizer, plant protection chemicals, capital and labour. The employment effects revealed that the new technology was more labour intensive than the local specially in small farms. Further, no significant difference was found between actual factor shares in old and new technology and estimated ones except plant protection chemicals with regard to new technology. But with regard to old technology farms, labour, capital and seed + fertilizer inputs differed from estimated factor shares. Finally, all factor inputs under new technology stood to gain.

## **Grading of Groundnut and Cotton in Selected Regulated Markets in Northern Karnataka-An Econometric Evaluation.**

**M.M. KALLOLI**

**1988**

**Major Advisor : K.C. HIREMATH**

The present study was undertaken in four regulated markets at Gokak, Soundatti, Dharwad and Hubli to evaluate the existing grading system for groundnut and cotton. Tabular analysis was employed to compare the prices of each commodity in the markets. Percentage of quality characters of samples of both the produce received in each market were computed in order to compare them with those samples received in other markets. Multi-linear and stepwise regression techniques were adopted to find out the impact of quality characters of groundnut and cotton on their grades and to study the relationship between the price and quality of the produce and thereby assess the impact of grades on prices. Average price for groundnut was found to be similar in Gokak and Soundatti Markets as the produce of both the markets had similar quality characters. Large percentage of samples of groundnut of Gokak and Soundatti markets were grown in red soil whereas large percentage of samples of Dharwad and Hubli markets were grown in black soil. The produce grown in red soil was found to be superior

in respect of dryness, maturity, cleanliness and absence of foreign matter. Shelling percentage and moisture percentage were the two important common factors largely considered for grading. Moisture percentage was found to be the price discounting factor in all the markets. The process of grading of groundnut was more comprehensive and broad based in Dharwad market as compared to rest of the markets under study. Average price for DCH-32 cotton was found to be much higher when compared to 170-CO<sub>2</sub>, Jayadhar and Laxmi Varieties as DCH-32 was far superior in terms of fibre length, fineness and bundle strength. Quality characters like cleanliness, fineness, ginning percentage, bundle strength and fibre length had influenced the price in expected direction. A strong nexus between cotton price and its grade was observed in Gokak, Soundatti and Hubli markets. In both groundnut and cotton, scientific grading based on quantitative characters was found to be more efficient than eye sight grading.

## **An Economic Analysis of Overdues of Agricultural Credit in Raichur District of Karnataka State - A Case Study**

**C.R. NAGARAJ**

**1988**

**Major Advisor : K.C. HIREMATH**

The study was conducted in Lingsugur taluk of Raichur district. Primary data for the agricultural year 1985-86 were collected through survey method from 150 defaulters (24 landless labourers, 56 small, 40 medium and 30 large farmers) selected randomly from the Primary Agricultural Cooperative Societies, the Regional Rural Bank at Gurgunta and State Bank of Hyderabad at Lingsugur. Necessary secondary data were also obtained. The share of crop production credit in the total credit increased with the size of holding, whereas livestock credit had inverse relationship. Commercial Banks were the main source of credit to landless labourers and small

farmers forming 58.91 and 70.04 per cent of the total borrowings, respectively. In the case of large farmers, PACS were the main sources accounting for 51.82 per cent of their borrowings. The overall percentage of overdues to borrowings increased with the size of holdings, the least being in landless labourers (51.14 and the highest in large farmers (96.64). The overdue percentage was higher in the case of crop loans (122.15) as compared to livestock loan (55.22). The overdue percentage among the sample beneficiaries was highest in the case of borrowings from PACS (124.93), followed by RRB (60.67) and CB (55.26). Only large farmers had the capacity to repay their



loans, while among other categories, the amount due for payment exceeded the repayment capacity. The percentage of willful defaulters was highest among large farmers (46.67), followed by medium farmers (20.0) In the opinion of the sample farmers, the major causes identified for non-repayment of loans were the low net farm income, social commitments, limited resources, natural calamities

and high non-farm expenditure. The measures proposed to reduce overdues were: i) Proper determination of the repaying capacity of borrowers by the financing agencies, ii) supervision of the credit use, iii) creation of recovery cells and iv) provision of consumption credit to check diversion of loans in the case of small farmers and landless labourers.

## **Production and Marketing of Dry Chillies in Dharwad District-An Economic Analysis**

**RAJASHEKHAR A. YELEDHALLI**

**1988**

**Major Advisor : K. C. HIREMATH**

Both cross section and time-series data were collected on relevant aspects to analyse the trends and compute the costs, returns and profits in marketing of dry chillies in Dharwad district. A multistage random sampling technique was adopted in the selection of markets and sample farmers. Tabular analysis, time-series, correlation and regression techniques and growth rate models were adopted. Growth rate in area of chillies was found to be greater compared to the growth rates of production and productivity. The cost of production of chillies was higher in Byadgi taluk compared to Hubli taluk. The two important channels identified were : Channel - I- Producer-Seller-Village Merchant-Commission Agent- Wholesaler/Exporter; Channel-

II Producer-seller- Commission Agent-Wholesaler/Exporter. Channel-II was found to be more popular. The marketing margins were higher in Byadgi market compared to Hubli market and they were higher in channel-I than in channel-II. The major arrivals were found during December - February in Hubli market and during November-January in Byadgi market. The coefficient of variation in arrivals was found to be higher in short period compared to long period and vice-versa in the case of prices. Hubli market showed higher coefficient of variation in prices and Byadgi in arrivals. Analysis of the structure of market revealed that the 'D' class traders dominated both the markets.

## **An Economic Analysis of Marketing of Jowar in Dharwad District in Karnataka State**

**PRAKASH S. ALADAKATTI**

**1988**

**Major Advisor : K. C. HIREMATH**

The study was undertaken to identify the market structure and to evaluate the conduct and performance of the markets at Gadag and Mundargi. Seventy five farmers (small, medium and large) were selected for each market. Both primary and secondary data were collected for the study. Tabular analysis was employed for identifying the market structure, average arrivals and prices, average costs of production and average cost per quintal under different channels of marketing. Correlation and regression analyses

were also carried out. Coefficients of variation in several parameters were computed and compared and seasonal and monthly indices of arrivals and prices were also worked out. From the structural point of view, the intermediaries were larger in Gadag compared to Mundargi market. The concentration in purchases was also fairly high in both the markets. The extent of market integration was greater from the view point of prices compared to that of arrivals. The commission and transportation charges were the most important

components of the marketing cost, and they were lower in Gadag compared to those at Mundargi. The marketing margins in Mundargi were much higher mainly due to the larger share of market intermediaries. Channel-II (PS-CA-WS-R) appeared

to be more popular in both the markets compared to Channel- I (PS-VM-CA-WS-R). Thus, Gadag market was found to be efficient in market structure, conduct and performance compared to Mundargi market.

## **The Integrated Rural Development Programme In Dharwad District of Karnataka State - An Economic Evaluation**

**MALLAPPA B. KANAGINAHAL**

**1989**

**Major Advisor : K.C. HIREMATH**

An attempt has been made in this study to evaluate the dairy, sheep and minor irrigation schemes of the IRDP in Savanur and Gadag taluks of Dharwad district. A total of 150 beneficiaries and non-beneficiaries was selected for comparison. Tabular analyses and 't' test have been employed for analysing the data. The success of the IRDP mainly depends upon the level of education, family size, ownership of livestock, durable assets and occupational status. The result of the study showed that the financial assistance could play an important role in influencing the employment potentials. The economic benefits of the schemes were linked with operational aspects of the schemes

on one hand and characteristic features of the beneficiaries, on the other. The number of beneficiaries brought above the poverty line was more as compared to the non-beneficiaries as per sixth plant criterion. Dairy enterprise was found to be the best means of improving income levels of agricultural labourers and the minor irrigation scheme for the small and marginal farmers. Similarly, there was an improvement in the consumption expenditure of non-food items by the beneficiary families. For the second dose of assistance, care has to be taken to identify families who could not cross the poverty line due to default or misutilization of loans and subsidies.

### **Agricultural Extension**

## **Socio-Economic Characteristics and Existing Sheep Rearing Pattern of Shepherds in Dharwad District of Karnataka State - A Descriptive Study**

**RUDRAPPA. N. MARILINGANNAVAR**

**1989**

**Major Advisor : L. MANJUNATH**

The Study was taken up with objectives to study the socio-economic characteristics and value orientation of shepherds, to find out intercorrelation between various independent variables, to study the existing sheep rearing pattern practiced by the shepherds, to know the problems encountered by the shepherds in sheep rearing and to find out the possible remedies for the problems which according to shepherds would help them. The study was conducted during the year 1988-89 in Ranabennur taluk of Dharwad district. The selection of taluk and villages was

done by purposive sampling procedure. The selection of 150 respondents from the selected villages was done by random sampling procedure. The data were collected using pre-structured schedule by personal interview method. In the statistical analysis, correlation coefficient (r), frequencies and percentages were used. The independent variables used in the study were age, education, landholding, flock size, family size, annual income, social participation, mass media participation, extension contact and value orientation. The dependent variable used was

existing sheep rearing pattern. Sheep rearing practices such as making up the flock, tupping, lamb management, grazing and shearing were being followed from generations in traditional way. Disease and parasite control were attended by sheep and Wool Development Board and India Development Service (Intl). Majority of the shepherds were middle aged, illiterate and had

smaller flock size, big family size, low annual income and small to marginal landholdings. Independent variables such as education, landholding, flocksize, family size, annual income, social participation, mass media participation and extension contact were dependent on one another. The major problem encountered in sheep rearing was high "mortality rate."

### **A Study on Adoption Behaviour of Chrysanthemum Growers and their Information Source Utilization Pattern in Dharwad District of Karnataka State**

**SANGANAGOUDA. H. ADAPUR**

**1989**

**Major Advisor : L. MANJUNATH**

The study was conducted to know the extent of adoption of recommended practices of chrysanthemum cultivation, to understand the relationship between personal characteristics of the respondents and their adoption behaviour. Information source utilization pattern, problems encountered and remedies for the problems were also studied. The study was undertaken during 1989 in Gadag taluk of Dharwad district. Eight villages were selected and from each village, fifteen farmers were selected, thus making a sample size of 120. Majority of the respondents had adopted row to row spacing, basal dose application of fertilizer, top dressing and time of planting. Recommended variety, number of cuttings per acre, cutting treatment and pinching were not adopted by majority of the respondents. Significant association was found between extent of adoption

and education, annual income, mass media participation, extension contact and value orientation. No association was found between age, social participation, family size and adoption behaviour. Progressive chrysanthemum grower was the most consulted source of information followed by Agricultural Assistant and Assistant Horticultural Officer. High cost of inputs, lack of knowledge, non-availability of inputs and non availability of credit were the important reasons for partial or non-adoption of recommended practices of chrysanthemum cultivation. Marketing and high price fluctuation were the important problems encountered. Providing better marketing facilities and giving support price to the produce were the important suggestions given by the respondents.

### **Knowledge and Adoption Pattern of Improved Dryland Farming Practices by the Farmers of Bijapur District.**

**VENKAPPA. G. BAVALATTI**

**1989**

**Major Advisor : B. SUNDARASWAMY**

The study was conducted to know the knowledge level and extent of adoption of dryland farming practices by farmers. An attempt was also made to understand the relationship between personal characteristics of the respondents and their knowledge and adoption level. Reasons for non-adoption of dryland farming practices were

also identified. The study was conducted during 1988-89 including 150 proportionately selected farmers belonging to 9 villages of three taluks of Bijapur district. Majority of the respondents (57%) belonged to medium knowledge category whereas almost equal percentage of respondents were found in high and low knowledge categories.

Majority of the respondents had adopted the practices like crop rotation, application of FYM, fall ploughing and deep ploughing whereas practices like contour cultivation, contour bunding, strip cropping, ridges and furrow cultivation, zingg terracing and stubble mulching were adopted by less percentage of respondents. Both knowledge and adoption level of dryland farming practices were found to be positively and significantly related with landholding and extension participation.

Variables such as age, education, extension contact, scientific orientation and economic motivation were found to be not related with knowledge and adoption level of dryland farming practices. Not aware, lack of improved implements and risky nature of the practices were found to be the pivotal reasons for non-adoption of practices such as strip cropping, contour bunding, ridges and furrow cultivation, zingg terracing and stubble mulching.

**M.H.Sc.**

## *Child Development and Family Relations*

### **Neonatal Feeding Practices as Influenced by Educational Programme to promote Colostrum Feeding**

**BHARATI TAMAGOND**

**1989**

**Major Advisor : K. SAROJA**

The present study aims to find out the effectiveness of the educational programme to promote colostrum feeding and to compare the effectiveness of the two educational methods used. The study also tried to investigate the influence of the independent variables on colostrum feeding performance of control and experimental groups. The sample for the study consisted of 120 respondents selected randomly from antenatal clinics. These were the mothers who had not fed colostrum to their previous child/children. Of these, 80 respondents were randomly assigned to the experimental group and the rest to the control group. The experimental group was divided into group A and B. The former received education through lectures and the latter received pamphlets. All respondents were observed and interviewed before and after delivery to gather the data regarding changes, if any, in their practice of discarding colostrum. Chi-square and paired 't' test were used to analyse the results. The results were : 1) Education given by the researcher had been effective in motivating more than 50 per cent of experimental group respondents to feed colostrum. 2) No significant difference was found between experimental group A and B in

colostrum feeding. 3) No milk, mother's advise, not good for the neonate, nurse's advise and doctor's advise were found to be first five reasons quoted by control and experimental groups for discarding colostrum. Number of such reasons reduced significantly from first live birth to present birth, in the case of experimental group A and B combined. 5) In both control and experimental groups, the association between type of neonatal feeding and variables viz., age, caste, occupation of respondents, husband, and number of elder female family members was found to be non-significant. 6) Experimental group respondents with high and medium income and pre-university course and above educational level were found to feed colostrum more as compared to respondents with lower levels of education and income. Individuals who advised mothers against colostrum feeding in previous and present delivery were doctor, nurse, mother and mother-in-law. Education given by the researcher was quoted with highest frequency by respondents as a reason for feeding colostrum. 9) Both type and frequency of prelacteal feeds influenced colostrum feeding in case of experimental groups only.

## **A Study of Anxiety and Inferiority Among Adolescents**

**VEENA SHANBHAG**

**1990 Major Advisor : VENKAMMA GOANKAR**

The aim of the present investigation was to determine the anxiety and inferiority level among adolescents, to know the relation between anxiety and inferiority, and to find out the association of anxiety and inferiority among adolescents with their age, sex, birth order, sibling size, family and family income. Sample consisted of 225 randomly selected adolescents including boys (N = 112) and girls (N = 113) belonging to the age group of 13 to 18 years from high schools and colleges located in Dharwad city. The anxiety and inferiority level of the respondents were assessed by using the scales developed by Sinha (1961) and Pati (1974), respectively. General informations were collected with the help of self structured questionnaire. Multiple Regression Analyses, Chisquare test and

Point Biserial Correlation were used to analyse the data. Results revealed that 1) greater proportion of the respondents had medium level of anxiety and inferiority, (ii) anxiety and inferiority were positively related, (iii) birth order had significant negative impact on anxiety and inferiority (iv) respondents parent's education was associated with anxiety and inferiority, (v) academic achievement of the respondent had insignificant negative impact on both anxiety and inferiority, (vi) size and type of the family had influence on anxiety but had no influence on inferiority, (viii) age and sibling size had no influence on anxiety and inferiority and (viii) sex had insignificant association with anxiety but had significant association with inferiority.

## **Birthweight and Length of Urban and Rural Neonates and Its Relation to Selected Factors**

**MANJULA S. PATIL**

**1990 Major Advisor : PUSHPA. B. KHADI**

The birth weight and length of 525 male and female newborns from urban (295) and rural (230) areas was taken within 24 hours of birth. Newborns were selected from six nursing homes of Dharwad city. The information of selected factors such as gender, ordinal position, spacing, gestational age, age of the mother, weight and height of the mother, food habits, consanguinity, antenatal care and gravida, was elicited by interviewing the mothers after delivery. The data was subjected to 'chisquare' and 'Multiple Regression' analysis. The birth weight and length of urban neonates was found to be 2.877 kg and 50.69 cm, respectively. For rural neonates the birth weight and length was found to be 2.684 kg and 49.56 cm, respectively. Incidence of low birth weight (23%) and shorter babies (18%) was quite high among rural neonates. Birth weight and length of urban and rural neonates was significantly

influenced by antenatal care, gestational age and gravida. Ordinal position and spacing were found to affect the birth weight and length of only urban neonates. The birth length of both groups was significantly influenced by consanguinity. Only birth weight of rural neonates was significantly influenced by gender. The birth weight and length of rural neonates and birth weight of urban neonates was significantly affected by weight of the mother. No association was found between the food habits of the mother and birth weight and length of both groups. The percentage of variation in birth weight of urban group, explained by all the factors taken together was to the extent of 35 per cent while it was 56 per cent in the case of rural group. For birth length, in both groups the percentage of variation was lower (28%) than the birth weight (29%).