

## Abstract of Theses

parental lines of BSH-1 and KBSH-1 sunflower hybrids.

The progenies of different crosses made in all possible combinations involving branched and non branched CMS-234A and 234B did not produce branches, though their parental lines were of branched types implying that basal branching is not heritable. Neither the nitrogen nutrition nor the planting dates influenced the branching phenomenon.

Application of 90 kg nitrogen per ha delayed the flowering significantly, but produced bigger seeds, higher seed yields and resulted in higher germination and vigour. However, the oil content was reduced at higher levels of nitrogen. Among the planting dates early dates were

significantly superior to delayed plantings. The flowering was significantly early in August planting followed by July, September, October and December. July planting resulted in significantly higher seed yields owing to bigger heads, more number of seeds per head as compared to other dates. With respect to seed quality the germination percentage and vigour were highest in December planting compared to other dates.

Among the genotypes studied, the sterile lines performed better over their maintainers and restorers for yield and yield attributing characters and seed quality. However, the seed filling percentage was highest in the maintainers than the sterile and restorer lines.

### Comparative Performance of Fresh and Revalidated Seeds in Different Crops

G. SRIDHAR

1998

MAJOR ADVISOR : A. NAGARAJA

Both laboratory and field experiments were conducted to compare the revalidated certified seeds with fresh certified seed as regards to seed quality, field performance and yield in different crops viz., maize, sorghum, cotton, pigeonpea and greengram. In the laboratory, fresh seeds were significantly superior to revalidated seeds with respect to germination in sorghum and pigeonpea. Fresh seeds in all the crops had high speed germination, vigour index, seedling length, dry weight of seedlings and field emergence in comparison to the revalidated seeds. Electrical conductivity of seed leachates was more in revalidated than in fresh seeds of sorghum, cotton, pigeonpea and greengram.

In the field studies at no stage of the crop growth, the height of plants from fresh seeds was comparable to the revalidated seeds in sorghum and pigeonpea. Whereas, in maize, cotton and greengram plant height was significantly high in fresh seeds only in the initial stages of

growth. The crops raised from fresh seeds flowered early compared to revalidated seeds in all the test crops. Number of branches per plant were high in fresh seeds of pigeonpea while, in cotton and greengram no such differences were evident.

Yield and yield components in maize and greengram from revalidated seeds were comparable with the fresh seeds, whereas in sorghum, cotton and pigeonpea yield per hectare and yield per plant were high in the crops grown from fresh seeds in comparison to the revalidated seeds. Ear length in sorghum, number of bolls per plant in cotton and number of pods per plant in pigeonpea were high in the crop grown from fresh seeds.

Correlation studies revealed that the speed of germination, germination rate and vigour index were significantly and positively correlated with field emergence in all the crops except fresh seeds of sorghum and maize.

### Studies on Storability of Onion Seeds (*Allium cepa* L.)

SURESH

1999

MAJOR ADVISOR: Dr. S. D. SHASHIDHARA

Onion (*Allium cepa* L.) is one of the important commercial vegetable crop grown all over the world. The seed storage assumes greater importance now a days. Hence the study on storability of onion seeds was conducted over a period of ten months under ambient conditions to investigate the effect of packing material, including desiccant in vapour proof containers and seed treatment on seed quality. The packaging material included were single layer polyethene (500 gauge) double layer polyethene (500 gauge each) and cloth bag. Seeds were treated with Captan @ 2 g per kg of seed. 5 g or 10 g silica were also included in the vapour proof polythene packets with this there were 14 different treatment combinations including

control.

The quality of onion seeds decreased with increase in storage period in all treatment combinations. However, significantly highest germination (88.00%), root length (5.23 cm), shoot length (5.62 cm), seedling dry weight (0.320 g), vigour index (951) and field emergence (59%) were recorded in treated seeds stored in two layers of polythene packet with 10 grams of silica gel compared to control at the end of storage period.

The moisture content of seeds stored in polythene packet with silica gel decreased gradually, while initial moisture content was retained at the end of storage period

in seeds stored in polythene packet without silica gel. However, seed moisture content fluctuated according to the atmospheric relative humidity in seeds in cloth bag.

The increasing trend of electrical conductivity of seed leachate was observed throughout the storage period. However, the lowest (0.600 dSm<sup>-1</sup>) electrical conductivity was recorded in treated seeds stored in two layers of

polythene packet with 10 grams of silica gel.

Hence, it is concluded that to preserve the quality of onion seeds in storage, the seeds should be treated with Captan (@ 2 g/kg of seed) and stored in two layers of polythene packet (500 gauge each) with 10 grams of silica gel desiccant.

#### Effect of Zinc and Molybdenum on Seed Yield and Quality in Soybean (*Glycine max* (L.) Merrill)

ANAND B. HUGAR

1999

MAJOR ADVISOR: Dr. M. B. KURDIKERI

An attempt was made to study the "Effect of Zinc and Molybdenum on Seed Yield and Quality in Soybean". The field experiment was laid out in Randomised Block Design (RBD) with factorial concept in three replications during kharif 1997 at Agricultural College Farm, Dharwad. The treatments comprised three methods of application (seed treatment, foliar spray and seed treatment + foliar spray) as main and nine levels of micronutrients (Zn and Mo, each at 0, 1 and 2 g as seed treatment, 0, 0.25 and 0.50 per cent as foliar spray and combination of seed treatment and foliar spray, respectively) in soybean Cv. JS-335.

The results indicated that among application methods, the combined method of application of micronutrients was found to be better for plant height, number of leaves, dry matter accumulation, yield and yield components and was followed by seed treatment and foliar

spray as compared to control.

Among zinc and molybdenum levels, the crop growth, yield attributes and yield were more at higher levels of zinc and molybdenum compared to lower levels and control. Similarly, all growth, yield attributes and yield were superior at higher levels of zinc and molybdenum applied through seed treatment + foliar spray followed by seed treatment and foliar spray.

The seed quality parameters viz., seed germination, oil and protein contents did not differ significantly due to application methods but were significantly superior at higher levels of zinc and molybdenum. Interaction effect of application methods and levels of zinc and molybdenum did not differ significantly among seed quality parameters. However, at higher levels of zinc and molybdenum, seed quality parameters were superior over control.

#### Effect of Organic Manures and Biopesticide on Seed Yield and Quality of Cotton

DRAKSHAYANI MATH

1999

MAJOR ADVISOR: Dr. M. SHEKHARGOUDA

The field experiment carried out at Agricultural Research Station, UAS, Dharwad on medium black soils under rainfed conditions during kharif 1998-99 revealed that, recommended pesticide application was significantly superior in all the growth and yield characters and further, the increase in seed yield was six per cent (430 kg/ha) compared to biopesticide application (405 kg/ha). The recommended pesticide treatment was also significantly superior in seed quality parameter like germination (92.9%), vigour index (3023) and field emergence (87.4%) over biopesticide treatment.

Among the organic manures, FYM (10 t/ha) application recorded significantly higher plant height (87.4 cm), leaf area index (2.5), sympodial branches per plant (14.3) and increase in seed yield was 76 per cent compared to 339 kg per ha of control. Seed quality characters like germination (95.9%), seedling weight (30.2 mg), germination rate index (42.3), vigour index (3199) and field emergence

(91.8%) were also significantly higher with FYM (10 t/ha) application compared to control. The interaction effects of plant protection and organic manures were significantly higher for plant height (88.0), number of seeds per boll (27.9), kapas yield (910.8 kg/ha) and seed yield (599.4 kg/ha) with the recommended pesticide spray in combination with FYM (10 g/ha) application.

Seed quality characters like germination (95.9%), seedling dry weight (30.2 mg), germination rate index (42.3), vigour index (3199) and field emergence (91.8%) were also significantly higher with FYM (10 t/ha) application compared to other organic manures and control. The interaction effects of plant protection and organic manures were significantly higher for plant height (88.0 cm), number of seeds per boll (27.9), kapas yield (910.8 kg/ha) and seed yield (599.4 kg/ha) with the recommended pesticides application combined with the application of FYM (10 t/ha).

## HORTICULTURE

### Standardization of Agrotechniques for Ajowan (*Tetrachyspermum ammi* L.)

V. KRISHNAMOORTHY

1998

MAJOR ADVISOR : Dr. M. B. MADALAGERI

A field experiment was conducted at Vegetable Research Unit, Division of Horticulture, University of Agricultural Sciences, Dharwad, during kharif 1997 to know the possibility of raising ajowan crop in transitional zone of North Karnataka and to find out the effect of nitrogen and phosphorus on growth, seed yield and essential oil content in the seeds. The experiment was laid out in randomized block design with three factors viz., two genotypes (BEN-1 and BEN-2), two levels of phosphorus (25 and 50 kg ha<sup>-1</sup>) and three levels of nitrogen (25, 50 and 100 kg ha<sup>-1</sup>). The results revealed that ajowan, a new crop to this zone, can be raised successfully. Though the two genotypes are comparable in seed yield, BEN-2 because of short duration (151.61 days) had an edge over BEN-1 when the yield potentiality was accounted on per day basis (6.09 kg ha<sup>-1</sup>). However, despite of long duration (211.06 days) BEN-1 was a valuable genotype in view of its high seed essential

oil content (3.61%) and oil yield (36.70 kg ha<sup>-1</sup>) than BEN-2 (15.36 kg ha<sup>-1</sup>).

The ajowan plants responded positively upto 100 kg N ha<sup>-1</sup> recording higher seed (12.70 q ha<sup>-1</sup>) and essential oil yield (36.78 kg ha<sup>-1</sup>). The higher phosphorus level (50 kg ha<sup>-1</sup>) was also favourable recording highest seed (13.48 q ha<sup>-1</sup>) and essential oil yield (38.22 kg ha<sup>-1</sup>). Most of the growth as well as yield parameters were also positively responded to higher level of nitrogen and phosphorus along with improvement in the uptake of N, P and K. A fertilizer dose of 100 kg nitrogen and 50 kg phosphorus was found optimum for ajowan crop, as at this level both the genotypes recorded highest seed yield (20.50 q and 14.61 q ha<sup>-1</sup>, respectively for BEN-1 and BEN-2) and essential oil yield (82.04 and 26.30 kg ha<sup>-1</sup>, respectively for BEN-1 and BEN-2). Disposing of the produce in the form of essential oil was found more profitable than selling the seeds.

### Studies on Association of Characters, Heterosis and Combining Ability in Processing Tomato (*Lycopersicon esculentum* Mill.)

SHIVANGOU DA S. PATIL

1998

MAJOR ADVISOR : M. G. PATIL

The present study was undertaken to elicit information on the nature of association of component characters with yield, heterosis and combining ability for several economic characters like yield and processing quality in tomato. The experiment was carried out on red sandy loam soil at Regional Research Station, Raichur during 1997-98. Five parents diallel analysis (without reciprocals) mating design was adopted. The resulting F<sub>2</sub>'s hybrids, along with five parents and one commercial check (Roma) were planted in Randomised Block Design with three replications.

The yield can be improved by selecting the number of fruits per plant and average fruit weight, as these two characters have showed highly significant and positive correlation with yield. Quality traits like TSS, total acidity, pH and lycopene showed positive association with yield. While, per cent juice recovery was negatively associated with yield.

The study of path analysis have indicated that number of fruits per plant and average fruit weight had high

positive direct as well as, indirect effect on yield. Among the quality traits, total acidity and lycopene showed positive direct effect while, total soluble solids, pH and per cent juice recovery had negative direct effect.

Hybrids showed significant differences for most of the characters studied, the crosses DWD-1 x 79B 1390-29-SP-2-2 x DWD-1 x DWD-2-10b-4 and UC-204 B x 79B 1390-6-11-C-C x DWD-1 x 79B 1390-20-2-SP-2-2 showed significant positive heterosis for yield, these hybrids in addition to high yield has advantage of processing quality traits as per the critical limits prescribed for processing with low incidence of leaf curl and late blight diseases.

The combining ability studies indicated both additive and non-additive type of gene actions operated in determining the expression of characters. Parent 3 (DWD-1 x 79B 1390-29-SP-2-2) and parent 4 (DWD-1 x DWD-2-10b-4) are good general combiners for eleven and three characters, respectively. The crosses 3 x 4 and 1 x 3 were good specific cross combinations for yield and yield components.

**Response of Papaya (*Carica papaya* L.) to Vesicular, Arbuscular Mycorrhizal Fungi at Graded Levels of Phosphorus**

S. H. MANKANI

1998

MAJOR ADVISOR : Dr. P. B. PATIL

A field experiment was conducted at Kittur Rani Channamma College of Horticulture, Arabhavi from July 1997 to August 1998 to study the response of papaya (*Carica papaya* L.) to vesicular arbuscular mycorrhizal fungi at graded levels of phosphorus on growth and yield of papaya. There were nine treatment combinations laid out in split plot design with four replications.

Inoculation of *Glomus fasciculatum* produced significantly higher fruit yield and it was 6 and 22 per cent higher over inoculation of *Sclerocystis dussii* and uninoculated control, respectively. The higher fruit yield obtained with the inoculation of *Glomus fasciculatum* was found to be consequences of phosphorus uptake and yield

components.

Application of 100 per cent recommended dose of phosphorus produced significantly higher fruit yield per plant and it was 10.59 and 23.11 per cent higher over 75 per cent and 50 per cent recommended dose of phosphorus, respectively.

Inoculation of VAM along with application of 75 per cent recommended dose of phosphorus was as good as applying 100 per cent recommended dose of phosphorus alone, thereby saving 24 per cent recommended dose of phosphorus. Thus the investigation indicated the usefulness of VA mycorrhizae (*Glomus fasciculatum*) in reducing the phosphorus application to papaya by 25 per cent.

**Effect of Nitrogen, Phosphorus and Potassium on Growth, Yield and Quality of China Aster (*Callistephus chinensis* Nees) cv. Kamini**

B. N. RAVINDRA

1998

MAJOR ADVISOR : Dr. B. SATYANARAYAN REDDY

A field experiment was carried out at the Floriculture Unit of Kittur Rani Chennamma College of Horticulture, Arabhavi during the Rabi season of 1997-98 to work out the optimum levels of N, P and K and to study their effects on growth, yield and quality of china aster (*Callistephus chinensis* Nees) cv. Kamini.

All the growth components were influenced by nitrogen and phosphorus, but the effect of potassium was minimum. The time taken for flowering increased with the application of nitrogen while phosphorus reduced the time taken for flowering. Flowering duration was increased with increased nitrogen and phosphorus application, while potassium had no influence on both time taken for flowering and duration of flowering. The flower yield was maximum with the application of 200:100:100 kg NPK per hectare however, it did not differ significantly with that of 200:100:50 kg NPK per hectare.

Flower quality with respect to flower size and stalk length improved with application of nitrogen and phosphorus, while potassium had no effect. But, with respect to vase life, application of nitrogen reduced the vase life, whereas phosphorus and potassium had no effect.

The nitrogen and phosphorus content of all the plant parts and their uptake by china aster plants increased due to application of nitrogen and phosphorus, while the potassium content of the plant parts and its uptake decreased with increasing levels of nitrogen and increased with increasing levels of potassium.

From the findings of the present study, it is concluded that the nutrient combination comprising of 200:100:50 kg NPK per hectare would be best to achieve optimum vegetative growth and flower yields, superior quality flowers and better nutrient uptake of china aster crop.

**Studies on Storage of Banana Fruits cv. Rajapuri (*Musa AAB*)**

G. S. JAYASWAMY

1998

MAJOR ADVISOR : Dr. A. K. ROKHADE

The investigation entitled "Studies on Storage of Banana Fruits cv. Rajapur (*Musa AAB*)" was carried out at the Kittur Rani Chennamma College of Agriculture, Arabhavi, University of Agricultural Sciences, Dharwad during the month May, 1998. The experiment was carried out to evaluate the effectiveness of packaging in

polyethylene bag with or without potassium permanganate, calcium hydroxide and post-harvest treatment with waxol (6%), sodium benzoate (500 ppm), calcium nitrate (2%), calcium chloride (2%) and carbendazim (500 ppm) on physico-chemical changes, organoleptic character and shelf-life of banana fruits cv. Rajapur when stored either at

**Influence of Thidiazuron on Productivity and Quality Traits of Grape (*Vitis vinifera* L.) cv. Thompson Seedless**

MALLAPPA H. KOTI

1998

MAJOR ADVISOR : P. NARAYAN REDDY

An investigation was carried out at the Regional Research Station, Raichur during 1997-98 to study the effect of thidiazuron on productivity and quality traits of grape cv. Thompson seedless. Thidiazuron alone at 50 ppm during peanut stage significantly increased the length, width and weight of berries and bunches over control. The treated bunches were found to have thick and elongated pedicel and rachis.

Dipping of bunches in GA<sub>3</sub> 20 ppm at bloom stage followed by 50 ppm GA<sub>3</sub> + 25 ppm Thidiazuron at peanut stage significantly increased the bunch length and breadth, weight of 100 berries and yield (26.71 t/ha). Thidiazuron with or without GA<sub>3</sub> found to be better in extending the on vine

shelf-life of berries when compared to control and recommended practice of GA<sub>3</sub> application.

Further, storage study revealed that thidiazuron treated bunches had longer shelf-life of 12 days under ambient condition without affecting the quality. Treated bunches recorded less physiological loss in weight (PLW) and berry drop when compared to untreated and recommended dose of GA<sub>3</sub>. The treatment of thidiazuron and GA<sub>3</sub> though increased the keeping quality of the bunches/berries under ambient storage condition with least PLW, the untreated berries were better in quality and recorded more total soluble solids (22.2%) and low acid (0.42%) content.

**Studies on Chemical Weed Control in Golden Rod (*Solidago canadensis* L.)**

H. T. BHAJANTRI

1999

MAJOR ADVISOR : Dr. B. SATYANARAYANA REDDY

A field experiment was carried out to study the effect of chemical weed control in golden rod (*Solidago canadensis* L.) at the Floriculture Unit of New Orchard, Division of Horticulture, University of Agricultural Sciences, Dharwad during 1997-98. The experiment consisted of thirteen treatments viz., Diuron, Atrazine, Metolachlor, Alachlor and Pendimethalin each at the rate of two concentrations and these treatments were compared with hand weeding at 30, 60 and 90 days after planting, weed free throughout the crop period and unweeded control. The experiment was laid out in randomized block design (RBD) with three replications.

Higher yield and more number of quality flower stalk were recorded in weed free treatment throughout the crop period, pendimethalin @ 1.50 kg a.e. ha<sup>-1</sup> alachlor @ 2.00 kg a.e. ha<sup>-1</sup> and pendimethalin @ 0.75 kg a.e. ha<sup>-1</sup>.

Growth parameters viz., plant height, number of

leaves, leaf area, dry weight of plant and number of suckers were also higher in weed free treatment throughout the crop period, pendimethalin @ 1.50 kg a.e. ha<sup>-1</sup> alachlor @ 2.00 kg a.e. ha<sup>-1</sup> and pendimethalin @ 0.75 kg a.e. ha<sup>-1</sup>.

However, weed control efficiency was higher in weed free treatment throughout the crop period, and with application of atrazine @ 1.50 kg a.i. ha<sup>-1</sup> and pendimethalin @ 1.50 a.e. ha<sup>-1</sup>. But application of atrazine at 1.00 kg and 1.50 kg a.i. ha<sup>-1</sup> and diuron at 0.75 kg a.i. ha<sup>-1</sup> showed moderate to very severe toxicity on golden rod.

Higher net returns and marginal returns were obtained in weed free treatment throughout the crop period. Among the herbicides, application of pendimethalin @ 1.50 kg a.e. ha<sup>-1</sup>, alachlor @ 2.00 kg a.e. ha<sup>-1</sup> and pendimethalin @ 0.75 kg a.e. ha<sup>-1</sup> resulted in higher net and marginal returns.

**Productivity of Garlic (*Allium sativum* L.) As Influenced by Planting Date, Clove Size and Growth Regulators**

KALYANI S. JAMADAR

1998

MAJOR ADVISOR : Dr. P. NARAYANAREDDY

Field experiments were conducted at Regional Research Station, Raichur during rabi 1997-98 to study the effect of planting, clove size and use of growth regulators on growth, yield and yield contributing characters of garlic. In the first experiment there were four dates of planting as main treatments and three clove sizes as sub plot treatment and the second experiment comprised of 13 growth regulator treatments.

Dates of planting exerted significant effect on early germination, number of leaves, neck thickness, bulb growth and bulb yield in crop sown during first fortnight of October (D<sub>1</sub>).

Among the different size of cloves used for planting, bigger size cloves recorded maximum germination, number of leaves, cloves per bulb, neck thickness, bulb weight,

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bulb diameter, clove size and bulb yield followed by medium size cloves. Interaction effects of date of planting and clove size were found to be significant with respect to number of leaves at 40 DAS, bulb diameter and number of cloves per bulb. The highest number of leaves (40 DAS), number of cloves per bulb and highest bulb diameter were recorded in first fortnight of October sowing with bigger cloves ( $D_1 S_3$ ).

The highest benefit cost ratio (B:C ratio) was observed in first fortnight of October sowing with bigger size cloves (1.17) followed by first fortnight of October with medium size cloves (0.94).

Growth regulator treatments have helped to enhance the growth and yield of garlic. The maximum number of leaves, neck thickness, size of cloves, bulb weight, bulb diameter and number of cloves were recorded in  $GA_3$ -200 ppm seed treatment + foliar spray ( $T_9$ ). Maximum yield (5.45 t/ha) was observed in  $T_9$  ( $GA_3$ -200 ppm seed + foliar spray) followed by kinetin-100 ppm seed treatment + foliar application ( $T_{12}$ ), and  $GA_3$ -200 ppm as only seed treatment ( $T_1$ ). However, the maximum benefit cost ratio (1.30) was recorded in  $T_1$  followed by  $T_9$ . Thus, in view of the beneficial effects of growth regulators,  $GA_3$ -200 ppm as only seed treatment may be applied for higher yields of garlic.

### Studies on Planting Material, P & K Nutrition And Micropagation in Turmeric (*Curcuma longa* L.)

N. MEENAKSHI

1999

MAJOR ADVISOR : Dr. G.S. SULIKER

A field experiment was conducted at the Plantation Crops Unit of Agricultural College, Dharwad, during kharif, 1998 to study the planting material (mother rhizomes and fingers), P & K nutrition and micropagation in turmeric. Growth parameters like number of tillers, number of leaves, plant height and leaf area increased with increasing P & K levels and also the highest was observed in mother rhizomes.

The differences in rhizome yield due to planting material was significant. The higher rhizome yield of 13.64 t per ha was obtained with mother rhizome ( $M_1$ ). The higher rhizome yield (15.57 t ha<sup>-1</sup>) was recorded by the application

of highest fertilizer dose 150:100:100 NPK kg ha<sup>-1</sup>) resulted in the highest number of mother and primary fingers per plant. There was higher uptake of nitrogen, phosphorus and potassium which in turn resulted in better rhizome yield. Curcumin content (3.64%) was observed maximum in mother rhizomes supplied with the highest levels of P & K (100 and 100 kg ha<sup>-1</sup>).

*In vitro* culture of axillary buds of turmeric on MS media supplemented with 2,4-D 1.0 mg/l + GA 0.1 mg/l + NAA 0.1 mg/l produced large number of multiple shoots which were rooted in a medium containing NAA 0.3 mg/l.

### Influence of Vesicular Arbuscular Mycorrhizae (VAM) on Rooting and Growth of Black Pepper Cuttings

THANUJA, T.V.

1999

MAJOR ADVISOR : RAMAKRISHNA V. HEGDE

Studies on influence of vesicular arbuscular mycorrhizae (VAM) on rooting and growth of pepper cuttings, were conducted under two experiments at the Department of Horticulture, University of Agricultural Sciences, Dharwad during July, 1998.

In the first experiment, the influence of VAM on rooting, subsequent establishment and growth in the field was studied. Rooting and other root characters such as number of primary roots per cutting, length of longest primary root, fresh weight and dry weight of roots were higher in VAM inoculated plants. *Acaulospora laevis* was more efficient in inducing rooting than other VAM fungi and showed 171.5 per cent increase in rooting success over uninoculated plants. Compared to IBA treatment, *Gigaspora margarita* recorded 77.9 per cent increase in number of

roots, 1.9 times and 1.7 times more fresh weight and dry weight of roots respectively. *Glomus fasciculatum* showed 21.8 per cent increase in root length over IBA treated cuttings. *Acaulospora laevis* also resulted in earlier and higher number of sprouts. Orthotropic cuttings showed better response in rooting and root growth than runners on inoculation with VAM fungi.

In establishment studies also mycorrhizae improved survival per cent and vegetative growth. All vegetative characters like number of leaves, shoot length and leaf area were higher on inoculation with *A. laevis* over IBA treated and uninoculated plants, both in greenhouse and field establishment studies.

In another experiment to study the effect of VAM

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bulb diameter, clove size and bulb yield followed by medium size cloves. Interaction effects of date of planting and clove size were found to be significant with respect to number of leaves at 40 DAS, bulb diameter and number of cloves per bulb. The highest number of leaves (40 DAS), number of cloves per bulb and highest bulb diameter were recorded in first fortnight of October sowing with bigger cloves ( $D_1 S_3$ ).

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In another experiment to study the effect of VAM

on growth of rooted pepper cuttings, inoculation of *A. laevis* resulted better growth response both in greenhouse and open condition. *Glomus fasciculatum* also enhanced the growth of pepper plants in greenhouse condition. The rapid vegetative growth achieved by mycorrhizal plants helped them to attain transplanting stage one month prior to uninoculated plants.

The present study revealed that pepper responded well to the inoculation of VAM fungi. Besides, when the planting material is in shortage, VAM inoculated orthotropic cuttings also can be used to get elite planting material. The investigation also indicated the usefulness of VAM fungi in reducing the nursery life of black pepper.

#### Effect of Light Intensity and Vermicompost on Crop production and Micropropagation in Ginger

NEETA V. VASTRAD

1999

MAJOR ADVISOR : Dr. G.S. SULIKERI

A field experiment was conducted on black soils, at the College of Agriculture, Dharwad, during 1998-99 to study the effect of light intensity and vermicompost on crop production and micropropagation of ginger. The crop was grown under normal and reduced light condition (main treatment) and five levels of organic manures as sub-treatments viz., recommended dose of fertilizer - RDG alone, 75% RDG + 25% vermicompost, 50% RDG + 50% vermicompost, 25% RDF + 75% vermicompost and vermicompost alone. The experiment was laid out in split plot design with three replications.

The fresh rhizome yield differed significantly with highest yield of 12.65 t per hectare from treatment combination RDF alone and normal light. The same treatment combination recorded the highest total dry matter

production which resulted in higher fresh rhizome yield. Highest cured rhizome yield (4.11 t/ha) was recorded by the treatment combination vermicompost alone and normal light situation, although curing percentage was maximum (18.13) with RDF alone under normal light condition.

Crude protein content and NVEE content was significantly influenced by light intensity and vermicompost. Highest crude protein content was recorded in RDF alone under normal light condition whereas, highest NVEE content (9.13%) was recorded with 25% RDF + 75% vermicompost under reduced light. A protocol for mass multiplication of ginger through micropropagation was also developed. Rhizome buds were used as explants which were cultured on MS media supplemented with 2.5 mg per liter BA + 0.5 mg per liter NAA. The rooting of the plantlets was obtained at 1 mg per liter NAA in MS media.

#### Studies on Planting Dates and NPK Levels on Growth and Yield of Garlic (*Allium sativum* L.)

VEERESH

1999

MAJOR ADVISOR : Dr. S.I. HANAMASHETTI

A field experiment was conducted at Kittur Rani Chennamma College of Horticulture, Arabhavi during 1998-99 in both kharif and rabi seasons to study the effect of dates of planting and nutrient levels on the performance of garlic. Which consisted of seven dates of planting and three nutrient levels and was laid out in factorial randomized block design with three replications. The maximum plant height, higher number of leaves with maximum length and neck thickness were recorded in October first fortnight planting and the plots receiving 75 per cent of RDF. Similar trend was observed with respect to fresh weights and dry matter accumulation in different plant parts.

The various yield attributing components like average bulb weight (5.10g), bulb diameter (2.89cm) and number of cloves per bulb (10.76) were higher in the crop planted in first fortnight of October resulting in production

of higher yield (4.75 t/ha). Lower yield (3.54 t/ha) was noticed in September second fortnight planting. Uptake of major nutrients were significantly affected by dates of planting and maximum uptake was noticed in October first fortnight planting (132.80, 21.53 and 71.70 kg NPK per hectare).

The higher values of yield (4.54 t/ha) and yield components were noticed with plot receiving 75 per cent RDF. Total uptake of major nutrients were also found highest in treatment of 75 per cent of RDF (117.76, 18.33 and 63.38 kg NPK per hectare). Interaction effects of dates of planting and fertilizer levels were significant with respect to yield and yield attributing parameters and were maximum in October first fortnight planting with 75 per cent of RDF (4.88 t/ha). From the economic point of view planting of garlic cv. Belgaum local should be carried out in the first fortnight of October or November or Second fortnight of July with 75 per cent of RDF.



## Abstract of Theses

### Effect of Time of Planting on Growth, Flowering and Vase Life Studies in China Aster (*Callistephus chinensis* Nees)

G. GURUPRASAD

1999

MAJOR ADVISOR : Dr. B. SATHYANARAYANA REDDY

China aster is an important annual commercial flower crop grown for its flower. As a cut flower it is used for interior decoration and as a loose flower used for worshipping and as a whole plant for herbaceous borders and for growing in flower beds in garden decoration.

Investigations on effect of time of planting on growth, flowering and vase life studies in china aster flowers were carried out during 1998-99 at Floriculture unit, Department of Horticulture, College of Agriculture, Dharwad.

The plants of November planting followed by those of October planting expressed better vegetative growth in terms of plant height, girth, number of branches and leaves.

Further, these plants flowered for longer duration. While the plants of September and August plantings flowered early but flowered only for a shorter duration.

November planting, followed by October and July plantings produced maximum flower yields. Further, these plants produced superior quality flowers as compared to September and August plantings.

Among the different chemicals tried to know their effects on the post harvest physiology of aster cut flower, cobalt sulphate and aluminium sulphate at 1.0 mM along with 4 per cent sucrose are best to promote the vase life and quality of china aster cut flowers.

### Influence of Inorganic Nitrogen Levels, *Azospirillum* sp. and Organics on Yield and Quality of Paprika (*Capsicum annuum* L.)

VIJAYA SAVANUR

1999

MAJOR ADVISOR : Dr. N. BASAVARAJA

Field experiment was laid out in split factorial design with three replications on black soil at Main Research Station, University of Agricultural Sciences, Dharwad during kharif, 1998-99 to study the influence of inorganic nitrogen levels, *Azospirillum* sp. and organics on yield and quality of paprika. The treatments included were, two sources of organic manures (vermicompost and farm yard manure), four levels of nitrogen (0, 50, 100 and 150 kg N ha<sup>-1</sup>) and *Azospirillum* inoculation (with and without).

The highest paprika yield of 259.48 q ha<sup>-1</sup> was recorded in vermicompost treatment. The fruit yield of paprika increased significantly from 254.21 to 260.10 q ha<sup>-1</sup> with *Azospirillum* inoculation. The nitrogen levels also had significant influence on fruit yield and the highest yield of 290.40 q ha<sup>-1</sup> was obtained at 150 kg N ha<sup>-1</sup>. The quality parameters like total soluble solids (TSS) and ascorbic

acid content of paprika different significantly due to application of organic manures. The highest TSS (9.76%) and ascorbic acid (121.76 mg per 100 g) content were recorded with application of vermicompost. Significant and highest TSS (9.73%), ascorbic acid (121.94 mg per 100 g) and total extractable colour (198.59 ASTA units), were recorded in *Azospirillum* inoculated plants compared to without *Azospirillum* inoculation. Application of 150 kg N ha<sup>-1</sup> recorded significant and maximum TSS (10.88%), ascorbic acid (127.68 mg/100 g) and total extractable colour (213.35 ASTA units) compared to other levels of nitrogen.

From the study it can be concluded that the combinations of vermicompost, *Azospirillum* and inorganic nitrogen helps to achieve better yield, quality and higher net returns in paprika production.

### Studies on *in vitro* Propagation of Curry Leaf (*Murraya koenigii* Spreng)

M. KALPANA

1999

MAJOR ADVISOR : RAMKRISHNA V. HEGDE

An investigation on *in vitro* propagation of curry leaf (*Murraya koenigii* Spreng) was carried out in the Tissue Culture Laboratory, Department of Horticulture, University of Agricultural Sciences, Dharwad during 1997-99. The highest aseptic culture establishment was observed when

the explants were treated with HgCl<sub>2</sub> (0.1%) for 15 minutes. Among the five different explants viz., shoot tips, stem segments, sucker shoot tips, sucker stem segments and roots tried, stem segments gave quickest response and maximum survival percentage.

The polyvinyl pyrrolidone (PVP) 0.25 mg/ml emerged as the best antioxidant for minimising media and explant browning besides showing quickest establishment of culture among the various treatments viz., incorporation of PVP, ascorbic acid, L-cystein, charcoal, use of liquid media, dark incubation tested for control of phenolic exudation. Early response for sprouting and better culture establishment of stem segments were observed on Murashige and Skoog (MS) medium.

After 30 days of inoculation, the internodal segments were subcultured on MS medium supplemented with various concentrations of NAA, BAP and their combinations. The highest morphogenic response was

obtained on MS medium supplemented with a mg/l BAP after 4th subculture. The treatment gave a proliferation rate of 7.766 per explant. However, the length of shoot was less. The increased concentration of BAP (more than 5 mg/l) inhibited adventitious shoot formation.

Sago at 60 g/l when added in MS medium gave highest number of elongated shoots, leaves, maximum fresh weight and dry weight after 2nd subculture. *In vitro* grown microshoots failed to root when cultured on 1/2 strength of MS agar medium containing various concentration of NAA, IBA and their combination. However, sparse rooting was observed on MS medium containing sago 60 g/l and IBA 1mg/l.

#### Heterosis, Combining Ability and Reaction to Tomato Leaf Curl Virus in Tomato

GURURAJ P. KULKARNI

1999

MAJOR ADVISOR : Dr. M.B. MADALAGERI

Field investigations on Heterosis, combining ability and reaction to tomato leaf curl virus in tomato were conducted during 1998-99 at the College of Agriculture, Dharwad.

The diallel analysis involving 6 parents (without reciprocal) revealed that the crosses H-36 x L-15, H-86 and NDT-VR-73 x H-88 were most heterotic for the yield. The heterosis for high yield was found to be due to the combined effect of heterosis in yield parameters like number of trusses per plant, number of fruits per plant and average fruit weight. The first two hybrids (H-36 x L-15 and H-36 x H-86) apart from high yield were short in stature (negatively heterotic for plant height) which could be exploited for high density planting. The three crosses H-36 x NDT-VR-60,

H-36 x L-15 and NDT-VR-73 x H-36 x NDT-VR-60 manifested heterosis in desired direction for locules per fruit and pericarp thickness. Thus, they can be used for the production of tomatoes for long distance market.

*In toto*, there were three resistant hybrids viz., H-36 x NDT-VR-73, H-36 x H-86 and H-36 x L-15 to TLCV besides good yield per plant, which could be exploited for production of tomato during summer.

Combining ability for the fourteen traits indicated that non-additive gene action was predominant for thirteen of 14 traits except fruit shape index. Thus, here heterosis breeding is the most practicable approach for improvement in both yield and quality components.

#### Effect of Storage Conditions and Post-Harvest Treatments on Shelf-Life and Quality of Sapota (*Manilkara achras* (Mill.) Fosberg) cv. Kalipatti

PRADEEPA GOUDA

1999

MAJOR ADVISOR : Dr. A.K. ROKHADE

The effect of storage conditions and post-harvest treatments on shelf-life and quality of sapota fruits cv. Kalipatti was investigated during February, 1999 at the College of Agriculture, UAS, Dharwad. Sapota fruits subjected post-harvest treatments viz., dipping in 3 per cent waxol, 500 ppm sodium benzoate, 2 per cent  $\text{CaCl}_2$  and  $\text{Ca}(\text{NO}_3)_2$ , packing in ventilated polythelene bag or sealed polythylene bag containing  $\text{KMnO}_4$  on vermiculite block or paper shred or  $\text{Ca}(\text{OH})_2$  in sachet and were stored under ambient storage conditions (ASC) and Zero Energy Cool Chamber (ZECC).

Storage of sapota fruits in ZECC after treating with three per cent waxol was found to extend the self life upto seventeen days compared to six days in control fruits under ASC and maintain better physico chemical qualities and organoleptic characters. This treatment was also found to be most effective in reducing PLW and maintaining optimum TSS and sugars. Fruits treated with 500ppm Sodium benzoate stored in ZECC to extended the shelf life upto sixteen days with all good quality parameters.

The fruits sealed in polythelene bag containing