

**Studies on Pod Rot of Pea Caused by *Choanephora cucurbitarum* (Berk. and Rav.) Thaxter**

H.K. SATISHA

2000

MAJOR ADVISOR : Dr. R.V. HIREMATH

Pod rot of pea caused by *Choanephora cucurbitarum* causes moderate damage to pea plants resulting in considerable yield loss.

Studies on pod rot of pea caused by *C. cucurbitarum* includes identification, isolation and proving pathogenicity of the pathogen, of morphological, cultural, physiological and nutritional studies of the pathogen. Effect of data of sowing of pea on disease incidence, effect of stage of the pods on rotting, transmission studies, screening of genotypes for resistance, *in vitro* and *in vivo* evaluation of bioagents, botanicals and fungicides.

The fungus reached maximum growth of 6<sup>th</sup> day of incubation in potato dextrose broth. Potato dextrose agar and Richards's medium supported maximum growth. Glucose and calcium nitrate were found to be best carbon and nitrogen sources for the growth of the fungus respectively. A temperature range of 20°-30°C, a pH 7.0 and a relative humidity of 90-100 per cent were found to be favourable factors for very good growth and sporulation.

Late sown crops were free from the disease. For vegetable purpose, young tender of pods should be harvested for higher yield of green pods as they are less susceptible to pod rot.

The external seed borne nature of *C. cucurbitarum* was noticed. It was associated with 1.5 per cent of seeds. Screening of genotypes indicated that, none of the cultivars showed immune reaction to the disease. However, cultivars viz., P-1688, P-1864 and DMR-7 were found to be moderately resistant.

The bioagents were found to be ineffective whereas, botanical viz., ovis and nimbicidin were found to be moderately effective under field condition. *In vitro* studies indicated that, propiconazole and chlorothal were found to be best systemic and non-systemic fungitoxicants. Propiconazole with one spray showing the higher cost benefit ratio was found to be the profitable chemical under field conditions.

**Investigations on Sunflower Rust Caused by *Puccinia helianthi* Schew.**

G.K. NEGESHA

2000

MAJOR ADVISOR : V.B. NARGUND

The rust of sunflower during 1999-2000 appeared in severe form in rabi as compared to kharif and no rust was observed in summer. Further, rust was more severe in irrigated conditions of rabi season than in rainfed crop. The survey during rabi season, the genotype Morden showed maximum of 59.99 Per cent Disease Index (PDI) and least in DSH-1 (28.88) in Raichur district.

Based on PDI, Area Under Disease Progress Curve, uredia per square centimetre, Uredospores per uredium and uredial size genotypes PAC-36, PAC-304 and GK-2002 were identified as slow rusters and Modern, NSH-160 and Kaveri-618 were identified as fast rusters.

Biochemical components viz., chlorophyll 'a', chlorophyll 'b', total chlorophyll, total phenols and orthodihydroxy phenols were less in diseased leaves compared to healthy leaves, where as sugars content was more in diseased leaves. Further, these components in

healthy and diseased leaves decreased from 40 days after sowing to 75 days after sowing in all the genotypes tested.

In the *in vitro* evaluation of five non systemic fungicides, mancozeb at 1000 ppm showed maximum inhibition of 75.03 per cent uredospore germination and in eight systemic fungicides cent per cent inhibition of uredospore germination was observed in 1000 ppm of hexaconazole and propiconazole. Among 20 plant extracts, *Nerium olender* showed maximum inhibition of 78.63 per cent inhibition of uredospore germination at 10.00 per cent concentration. In field evaluation of nine fungicides propiconazole (0.1%), hexaconazole (0.1%), tridemorph (0.1%) and chlorothalonil (0.2%) gave the best control of rust (<30 PDI) resulting in increased seed yield.

Among the 107 sunflower genotypes screened for rust resistance under field conditions only three genotypes viz., ACC. No.373, ACC.No.410 and RSFH-1 were found highly resistant to rust.

## Abstract of Theses

### Studies on *Alternaria* Leaf Blight of Onion (*Allium cepa*. L.)

B.S. CHETHANA

2000

MAJOR ADVISOR : DR. M.R. KACHAPUR

Among the several disease, *Alternaria* leaf blight is one of the most destructive foliar disease which causes heavy loss in onions. The causal organism of the disease in *Alternaria porri* (Ellis) Ciff. Studies on *Alternaria* leaf blight of onion includes, survey for incidence of disease in parts of northern Karnataka, effect of date of sowing on the incidence of the disease, evaluation of varieties for disease resistance, cultural and nutritional studies, *in vitro* and *in vitro* evaluation of fungicides.

Survey for incidence of *Alternaria* leaf blight in parts of northern Karnataka revealed that disease was moderate during kharif 1999. The conidiophores were straight or flexuous, septate, pale brown in colour and measured 120  $\mu$ m in long and 6-10  $\mu$ m thick, with one or several conidial scars. The fungus reached maximum growth on 12th day of incubation in potato dextrose broth. Potato dextrose medium supported maximum growth of *Alternaria porri* (Ellis) Ciff.

Arbinose and potassium nitrate were found to be best carbon and nitrogen sources for the growth of *Alternaria porri* (Ellis) Ciff respectively.

The highest incidence of the disease was recorded in the early sown crop. But the incidence decreased in late sown crop. Screening of onion genotypes indicated that none of the cultivars were immune and resistance to the disease. But only one genotype Arka kalyan showed, moderately resistant reaction to the disease.

*In vitro* evaluation studies indicated that, mancozeb (Indofil, M-45) and difenoconazole (score) were found to be best systemic and non systemic fungitoxicants against the pathogen respectively. Mancozeb is the best fungicide in controlling the spread of *Alternaria* leaf blight under field condition. The bulb yield and cost benefit ration were high mancozeb sprayed treatment.

### Integrated Management of Phytophthora Foot Rot of Black Pepper Through VA Mycorrhiza and Host Plant Resistance

M.S. LOKESH

2000

MAJOR ADVISOR : Dr. K.H. ANAHOSUR

The black pepper vines of both cultivated and vines in the forest areas are invariably associated with the native isolates of VA mycorrhiza viz., *Glomus fasciculatum* and *Acaulospora* sp. The native isolates VA mycorrhiza were effective in combating the Phytophthora foot rot of black pepper alone and its effects is synergistic when integrated with either *Trichoderma viride* or potassium phosphonate (Akomin, @ 0.3 per cent). The cuttings of black pepper viz., Vokkalu, Mottakare, Thirupukare showed least incidence of disease when the cuttings were preinoculated with native isolates of VA mycorrhiza then challenged with *Phytophthora capsici*. Vokkalu type-1 and 2, Uddakare accession-1 and 2, Thirupukare, Blankotta-II, Neelamundi-II, Naryakodi-IV and Kudargutta showed tolerance to *P.*

*capsici* at lower inoculum potential i.e., 25 zoospores/vine. The explant initiated the callus in presence of 0.5 mg l<sup>-1</sup> BA in combination with either 1.0 mg l<sup>-1</sup> 2,4-D OR 2.9 MG l<sup>-1</sup> NAA or IBA or IAA whereas, the callus could be easily maintained in half strength MS medium supplemented with 1.0 mg l<sup>-1</sup> 2,4-D. Callus of cultivars viz., Vokkalu type-1 and 2 are having slight tolerance at one per cent toxic metabolites of *Phytophthora capsici*. The shoot tip explant of Uddakare and Thirupukare produced multiple shoots in half strength MS medium with 2.0 mg l<sup>-1</sup> BA and 0.01 mg l<sup>-1</sup> NAA. NAA (1.0 mg l<sup>-1</sup>) and IBA (1.0 mg l<sup>-1</sup>) were found effective in rooting of the shoot. Micro propagated plantlets of black pepper were hardened by planting in 1:1 sand and coir pith in humid chamber for 30 days.

Studies on Variability in *Meloidogyne* spp. Causing Root Knot Disease on Major Crops of Northern Karnataka

M.R. ASHOKA

2000

MAJOR ADVISOR : S. LINGARAJU

Studies on variability in *Meloidogyne* spp. causing root knot disease on major crops of northern Karnataka revealed the following : All the thirty five populations collected were initially confirmed on the basis of perineal pattern studies as *Meloidogyne incognita*, *Meloidogyne javanica*, *Meloidogyne arenaria*, *Meloidogyne hapla* and *Meloidogyne graminicola*. This is the first report of *M. hapla* as well as *M. graminicola* from Karnataka

Based on results obtained through differential host test it was found out that sixteen populations from Bidar, Gulbarga, Bijapur, Dharwad and Belgaum regions indicated prevailing species as *Meloidogyne incognita* race-1, 2 and 3. Race-1 was noticed from Bidar, Gulbarga, Dharwad and Yamakanamaradi (Belgaum) and race-2 and race-3 was reported from Nippani (Belgaum) and Jamnal (Bijapur)

regions, respectively. Whereas, five populations collected from Raichur and two populations from Arabhavi (Belgaum) regions showed presence of *Meloidogyne arenaria*, race-2. But three populations from Dharwad and two populations from Sirsi indicated the prevalence of *Meloidogyne arenaria* race-1. Meanwhile five populations obtained from Sirsi and Bellary were identified as *Meloidogyne javanica* and one sample from Sirsi indicated prevailing species as *M. hapla*.

Poly Acrylamide Gel Electrophoresis (PAGE) was employed to study the esterase patterns. Electrophoretic analysis of four representative populations of *Meloidogyne* spp. revealed the presence of  $\beta$ -esterase bands specific for the *M. incognita* population with Rm value 0.183. But non-specific  $\beta$ -esterase bands were observed for *M. arenaria*, *M. hapla* and *M. javanica* populations with Rm values 0.233, 0.200 and 0.283, respectively.

Epidemiology and Management of Fig Rust (*Cerotelium fici* [Cast.] Arth.)

H. SREEKANTAPPA

2000

MAJOR ADVISOR : M.K. NAIK

The survey of the fig rust disease in three districts of Northern Karnataka revealed that the disease was more severe in Koppal than Bellary and was least in Raichur. Koppal district was a hot spot for fig rust disease during 1999-2000. Uredospore germination was maximum after 24 hrs of incubation. The temperature range of 25-30 °C and a relative humidity of 86-100 per cent were the most ideal conditions for maximum uredospore germination. There was a greater increase in disease index during August to October, the period with increased cumulative rainfall ( $r=0.937$ ) with higher number of rainy days ( $r=0.956$ ) having high relative humidity which have significantly influenced the disease development. A step wise multiple regression analysis indicated an  $R^2$  value of 0.878, 0.914 and 0.915 with cumulative rain fall ( $X_1$ ), cumulative rainy days ( $X_2$ ) and combined effect of the two factors respectively. These factors combined with maximum relative humidity accounted for an  $R^2$  values of 0.918. Thus the best mathematic equation with high fitness were identified as :

$$Y = -6.478 + 1.704X_1, Y = 7.362 + 4.55X_2 \text{ and } Y = 4.897 + 0.256X_1 + 3.90X_2$$

The two varieties, Bellary and Poona behaved in a similar fashion to all the components of show rusting viz., AUDPC, latent period, uredium size, uredospore per uredium, number of uredia per cm<sup>2</sup> and hence none of them could be designated as slow rusters. The total phenol, ortho-dihydroxy phenol, reducing sugar and non-reducing sugar contents were high in diseased sample of Bellary and Poona varieties as compared to healthy samples. In the *in vitro* evaluation of fungicides, mancozeb and chlorothalonil among non-systemic fungicides and Hexaconazole, Propiconazole and Tridemorph among systemic ones were very effective in inhibiting the uredospore germination. In the *in vitro* evaluation, Hexaconazole recorded least (31%) disease index followed by Propiconazole (41%), Tridemorph (42.66%), Chlorothalonil (45%) and need based spray of Mancozeb (43%). However, Triadimefon and Wetttable Sulphur were least effective with 67.00% and 63.00% disease indices, respectively.

## Abstract of Theses

### Studies on Leaf Blight of Dicoccum Wheat Caused by *Exserohilum hawaiiensis* (Bugni Court)

Subram and Jain, Ex. M.B. Ellis

C.G. RAMCHANDRA

2000

MAJOR ADVISOR : I.K. KALAPPANAVAR

Leaf blight of wheat caused by *Exserohilum hawaiiensis* (Bugnicourt) Subram and Jain Ex. M.B. Ellis, is more severe in dicoccum wheat in recent years. The survey revealed that maximum disease incidence and severity was recorded in Raibag taluk. Among the several hosts tested, *Avena sativa*, *Gossypium herbaceum*, *Hordeum vulgare*, *Oryza sativa*, *Secale cereale*, *Sorghum bicolor*, *Triticale secalis* and *Zea mays* served as collateral host to the pathogen.

Cross inoculation studies revealed that isolates from DDK-1001, RD-2503, MACS-2846 were cross inoculable. The mode of entry of this pathogen was both by direct and indirect penetrations. Boot leaf stage was found to be more vulnerable to the disease. Out of 62 genotypes tested, none of the genotypes showed either immune or resistant reaction. Extent

of yield loss due to disease was upto 31.5 per cent. Higher application of the nitrogen resulted in severe incidence of leaf blight.

Among biological agents tested, *Pseudomonas fluorescens*, *Trichoderma viride* and *Trichoderma harzianum* were found to be antagonistic to *Exserohilum hawaiiensis*. *In vitro* studies showed that plant extract like *Duranta repens* and *Mangifera indica* at 5 and 10 per cent concentrations were effective against the pathogen. In field studies also 10 per cent plant extracts of *Duranta repens* and *Mangifera indica* were found effective. Among the fungicides tested Hexaconazole @ 0.1 per cent or Mancozeb @ 0.25 per cent found to be better both under laboratory and field conditions. The cost benefit ratio of Hexaconazole was high compared to all other treatments.

### Studies on Blight Disease of Chickpea Caused by *Colletotrichum dematium* (Pers. Ex Fr.) Grove

C.H. VARAPRASADA RAO

2000

MAJOR ADVISOR : Y.D. NARAYANA

Chickpea blight caused by *Colletotrichum dematium* is one of the important disease. About 91% of the disease incidence was observed in Gulbarga district during the survey 1998-1999. The fungus isolated from infected chickpea stems and pathogenicity was proved by spraying conidial suspension on one week old chickpea seedling. The fungus shown concentric ring growth with creamy conidial mass on PDA. The acervuli were thick brown to black. Setae were thick black and hair like, conidia were single celled, hyaline and sickle shaped. The fungus gave maximum growth on 14th day of incubation. Sabouraud's medium was found to be best for growth and Richard's medium was proved to be best for sporulation. Sucrose and sodiumnitrate were best for growth and glucose and potassiumnitrate supported maximum sporulation of *C. dematium* as carbon and nitrogen sources respectively. The temperature of 27 °C, 90% RH and alternate light (12hr) and darkness (12hr) were proved to be best for growth and

sporulation of the fungus. Maximum disease index and high susceptibility was observed on 21 days old plants. The fungus survived upto 150 days in sterilized soil and 125 days in unsterilized soil. Under stored conditions and fungus could not survive beyond 25 days.

Carbendazim, mancozeb were found most effective systemic and non systemic fungicides whereas SAAF, (a combined product of systemic and non systemic fungicides) was found effective in inhibiting growth of *C. dematium in vitro*. Among bioagents *Trichoderma koningii* and plant extract of *Polyalthia longifolia* were found effective in inhibiting fungus growth. Out of 45 chickpea genotypes evaluated ICCV 860190, PG 97-6 found resistant and remaining were shown either susceptible or highly susceptible reaction. Seed treatment with carbendazim and two sprays of SAAF at 15 days interval gave effective control against chickpea blight under glasshouse conditions.

**Studies on Anthracnose of Grape Caused by *Sphaceloma ampelinum* deBary**

B. PAMPANA GOUDA

2000

MAJOR ADVISOR : Dr. V.I. BENAGI

Anthracnose of grape (*Vitis vinifera* L.) caused by *S. ampelinum* deBary (*Elsomoe ampelma* (deBary) Shear) has become a major problem in grape growing areas. The disease is distributed throughout the tropics and subtropics and cause severe yield loss

Roving survey carried out during kharif and rabi/ summer seasons of 1999 in different taluks of Raichur, Bellary, Bidar, Bijapur and Koppal districts of Northern Karnataka revealed the prevalence of disease in all the season and in all the five surveyed districts. Maximum per cent disease index (100%) was recorded in Raichur taluk.

Epidemiological studies indicated a highly and significant positive correlation between the disease, rainfall ( $r=0.602$ ), maximum ( $r=0.801$ ) and minimum ( $r=0.936$ ) relative humidity and negative correlation with maximum ( $r=0.902$ ) and minimum ( $r=-0.240$ ) temperature.

Cultural studies indicated that among the solid media potato dextrose agar (94.00mm) was best followed by Richard's agar (85.00 mm) for radial growth of *S. ampelinum*.

Among the liquid media, maximum dry mycelial weight (195.59 mg) was observed in Richard's medium.

Studies on biochemical mechanism of resistance indicated that total sugar, phenols and ortho dihydroxy phenols content were more in diseased leaves than in healthy leaves in all the genotypes.

In vitro evaluation of fungicides employing different techniques viz., spore germination poisoned food and detached leaf techniques indicated that, Systemic fungicides viz., Thiophanate methyl and Benomyl were superior over the non systemic fungicides viz., Bordeaux mixture and Mancozeb in inhibiting *S. ampelinum*. Plant extracts viz., Onion bulb extract and neem leaf extract were least effective.

Thirteen genotypes were screened against anthracnose of grape in field condition. None of them was immune and Bangalore Blue was moderately resistant. Arka Hans and Arka Shyam were moderately susceptible whereas Gulabi was susceptible and remaining nine were highly susceptible.

**SEED SCIENCE AND TECHNOLOGY**

**Effect of Seed Invigouration on Storability and Field Performance of Soybean (*Glycine max* L. Merrill)**

SANJEEVAKUMAR B. NEGALUR

200

MAJOR ADVISOR : Dr. M.B. KURDIKERI

A laboratory and field experiments were conducted to study the effect of seed invigouration on storability and field performance of soybean in the Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences, Dharwad during 1999-2000. The seven months old soybean seeds of JS-335 variety having initial germination of 72 per cent were obtained from the Main Research Station, College of Agriculture, Dharwad. The seeds were treated by dry dressing or by soaking in different chemical solutions for three hours and dried back to their original moisture content (9%) in mechanical drier at 35 °C for 12 hours. Treated seeds were stored in cloth bag for nine months under ambient conditions of Dharwad. The same chemically treated seeds were also used to study the field performance. The storage study indicated that seed

quality decreased with increase in storage period irrespective of seed invigouration treatments. However, significantly higher germination (75.67%), field emergence (72.36%), root length (12.97 cm), shoot length (8.65 cm), seedling vigour index (1649), seedling dry weight (95.14 mg) and lowest moisture content (9.74%) and electrical conductivity ( $0.99 \text{ dSm}^{-1}$ ) were recorded in the seeds treated with Tocopherol (1%) compared to other treatments at the end of storage period. In the field experiment also the seeds treated with Tocopherol (1%) recorded higher field emergence (87.00%), plant height (46.30 cm), number of leaves (17.11), number of branches (5.21), pods per plant (39), seeds per plant (101.44), yield (19.66 q/ha) and 100 seed weight (13.218) compared to rest of the treatments. The seeds harvested from the plants raised from Tocopherol

## Abstract of Theses

seed treatment recorded higher germination (93.75%), root length (14.80 cm), shoot length (12.70 cm, vigour index (2580), electrical conductivity (0.17 dSm<sup>-1</sup>), dry weight of seedling (97.60 mg), oil content (19.90%) and protein content

(39.20%) compared to other treatments. Apart from Tocopherol, KH<sub>2</sub>PO<sub>4</sub> (2%) and Chlorax (4 g/ka seed) were found superior in maintaining seed viability and vigour and increased the yield.

### Influence of Potassium Nutrition and Stages of Harvesting on Seed Yield and Quality of rabi Sorghum Varieties

M.M. SAJJAN

2000

MAJOR ADVISOR : Dr. M. SHEKHARGOUDA

A study on influence of potassium levels and harvesting stages in rabi sorghum varieties on seed yield and quality was conducted during rabi 1996-97 involving three varieties (V) namely M 35-1, CSV-14R and Swathi as main factor, four potassium levels (K) as sub factor and two harvesting stages (H) as sub-sub factor. Among three varieties the CSV-14R recorded higher number of green leaves (7.03), leaf area per plant (2459 sq.cm per plant), leaf area index (3.64) at harvest, and early in 50 per cent flowering (71.1 days). It also recorded significantly highest ear length (23.6 cm), width (5.9 cm), weight (34.7g) and number of seeds (1449/ear), seed set (90.19%), threshing (79.38%) and seed yield (2714 kg/ha) with an harvest index of 21.62 per cent. Further, CSV-14R also recorded higher seed quality parameters viz., germination (93.46%), root length (13.3 cm), shoot length (10.5 cm), seedling dry weight (26.9 mg) and vigour index (1123).

Among four potassium levels, K<sub>3</sub> at harvest recorded significantly higher plant height (194.5 cm), number of green

leaves (6.43), leaf area (2250 sq.cm/plant), leaf area index (3.33), dry matter production (140.0 g/plant) and early in 50 per cent flowering (72.0 days). Similarly, the yield attributes like ear length (24.5 cm), width (5.5 cm), weight (35.6 g), number of seeds per ear (1345), seed weight per ear (28.7 g), seed set (92.70 %), threshing percentage (80.72), harvest index (20.97 %) were higher with K<sub>3</sub> level besides higher seed yield (2821 kg/ha) and seed quality parameters viz., 100 seed weight (2.12 g), germination (94.78%), root length (14.3 cm), shoot length (10.1 cm), seedling dry weight (28.1 mg) and vigour index (1212).

Harvesting at physiological maturity found to record higher seed yield (2607 kg/ha), yield attributes and seed quality parameters. Among two way interactions, V<sub>2</sub>K<sub>3</sub>, V<sub>2</sub>H<sub>1</sub>, K<sub>3</sub>H<sub>1</sub> and in three way interaction (V<sub>2</sub>K<sub>3</sub>H<sub>1</sub>) were found to record higher values for seed yield and its parameters besides seed quality parameters.

### Influence of Containers and Seed Treatments on Storability of Chickpea

ARATIK. PATIL

2000

MAJOR ADVISOR : Dr. M. SHEKHARGOUDA

A study on influence of containers and seed treatments on storability of chickpea seeds involving two varieties (V) as main factor, eleven seed treatments (T) as sub-factor and two storage containers (C) as sub-sub factor was conducted in the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad from June 1999 to April 2000.

The performance of Annigeri-1 was better compared to ICCV-2 for quality parameters which recorded higher germination (68.71%), seedling length (20.48 cm), seedling dry weight (166 mg/seedling), seedling vigour index

(1406) and field emergence (51.00%) at the end of fourteen months of storage.

Among the different plant products tested, castor oil was found to be superior in maintaining significantly higher germination (68.41%), seedling length (19.90 cm), seedling vigour index (1364) in addition to higher protein content (17.74%) and field emergence (52.00%) with least insect infestation (20.33%) and electrical conductivity (1.39 dSm<sup>-1</sup>) during fourteen months of storage.

Among the different chemicals tested, malathion recorded higher values for germination (68.87%), vigour

index (1340) and protein content (17.72%) with less insect infestation (33.51%) at the end of storage period.

Seeds of both varieties stored in polythene bag maintained higher quality parameters with lesser quantitative losses than the seeds stored in cloth bag. Annigeri-1 stored in polythene bag recorded higher germination (67.68%), vigour index (1504) with less insect

infestation (32.39%), moisture content (9.72%) and electrical conductivity ( $1.30 \text{ dSm}^{-1}$ ) at the end of fourteen months of storage period.

In two way interactions,  $V_1T_2$ ,  $V_1C_2$ ,  $T_2C_2$ , and in three way interaction ( $V_1T_2C_2$ ) were found to record higher values for majority of seed quality parameters with lesser quantitative losses throughout the storage period.

#### Invigouration Studies on Hybrid Sunflower KBSH-1

S. SUNEETA

2000

MAJOR ADVISOR : Dr. M.B. KURDIKERI

A study on the influence of seed invigouration chemicals and stages of treatments on the storability and quality of KBSH-1 hybrid sunflower was conducted in the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad during June 1999 to February 2000.

Treating of four months old sunflower seeds with different invigouration chemicals indicated that soaking of seeds in  $\alpha$ -Tocopherol (1%) maintained satisfactory germination (70%) upto 12 months while, seeds treated with Chlorax (3g/kg seeds), Bavistin (2g/kg seeds), Thiram (2g/kg seeds) dry dressing, Thiram (2g/kg/1) water soaking maintained satisfactory germination upto 10 months. All these treatments also maintained higher seed quality parameters viz., root and shoot length, vigour index, seedling dry weight with low electrical conductivity and

moisture content compared to untreated seeds. Seed soaking in Ascorbic acid (1%), Sodium dihydrogen Ortho Phosphate ( $10^{-2} \text{ M}$ ) and water also recorded higher seed germination, root and shoot length, vigour index, seedling dry weight with low electrical conductivity and moisture content compared to control during storage for 12 months. On the contrary seed invigouration with Ethrel (25 ppm) and Thiourea (1%) had negative effect on all the seed quality parameters during 12 months of storage period.

Among the stages of seed treatment, repeated seed treatment thrice at 5th, 8th and 11th month with Chlorax and Bavistin recorded higher germination, root and shoot length, vigour index, seedling dry weight with lowest electrical conductivity and moisture content compared to single treatment at 5th, 8th or 11th month or any other combination of repeated treatments.

#### Effect of Mother Plant Nutrition, Plant Density and Seed Maturity on Seed Yield and Quality in Marigold (*Tagetes erecta* L.)

C.M. SHIVAKUMAR

2000

MAJOR ADVISOR : Dr. BASAVEGOWDA

Studies were conducted to know the effect of fertilizer, spacing and physiological maturity of seed on seed yield and quality in marigold at Agricultural College Farm, University of Agricultural Sciences, Dharwad during kharif 1999. The treatments included are three levels of fertilizers ( $F_1=225:60:60$ ,  $F_2=270:72:72$  and  $F_3=315:84:84$  NPK kg/ha) and five plant spacings ( $S_1=30 \times 30$ ,  $S_2=45 \times 30$ ,  $S_3=45 \times 45$ ,  $S_4=60 \times 30$  and  $S_5=60 \times 45$  cm) and experiment was laid out in split plot design with three replications. For the

purpose of knowing physiological maturity of seed, heads (capitula) were harvested at seven stages from 13 to 43 days after flower opening (DAF) with an interval of five days.

The results indicated that significantly higher yield of good quality seed (579.7 kg/ha) was noticed with the application of 270:72:72 kg NPK per hectare with 60 x 30 cm spacing (5555 plants/ha) and also it recorded the highest net returns per hectare (Rs.1,17,863). Further,

## Abstract of Theses

increase in fertilizer level to 315:84:84 kg per hectare at the same spacing level did not cause any appreciable effect on seed yield and quality.

Among the seven stages of harvesting, seeds harvested at 28 days after flower opening recorded maximum 1000 seed weight (3.19 g), germination (83%), seedling length (11.92 cm) and vigour index (988) as compared

to the seeds obtained from either delayed or early harvested heads.

Based on the results it could be concluded that fertilizer level of 270:72:72 kg per hectare with the spacing of 60 x 30 cm appeared to be the optimum levels for quality seed production of marigold and the seed crop should be harvested at 28 days after flower opening.

### Effect of Mother Plant Nutrition and Chemical Spray on Seed Yield and Quality of China Aster (*Callistephus chinensis* L. Nees.)

SHIVANAGOUDA R. DODDAGOUDAR

2000

MAJOR ADVISOR : Dr. B.S. VYAKARANAHAL

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad during kharif 1999, to study the effect of mother plant nutrition and chemical spray on seed yield and quality of china aster Cv. Kamini. The experiment consisted of 14 treatment combinations with two levels of fertilizers viz., 180:120:60 ( $F_1$ ) and 240:160:80 ( $F_2$ ) kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup> and five chemicals viz., GA<sub>3</sub> 200ppm, Maleic Hydrazide (MH) 500ppm, Mepiquat Chloride (MC) 500 ppm, TIBA 100 ppm and boron 0.1% spray, water spray and control. The experiment was laid out in split plot design with three replications.

The results indicated that significantly higher growth components viz., plant height, number of branches, number of leaves and dry weight of the plant and higher yield components viz., number of capitula plant<sup>-1</sup>, capitulum diameter, weight of the capitulum, filled seed weight capitulum<sup>-1</sup>, 1000 seed weight, filled seed percentage and seed yield ha<sup>-1</sup> were recorded with GA<sub>3</sub> 200 ppm than any

other chemical spray at both  $F_1$  and  $F_2$ . However,  $F_2$  was found significantly superior over  $F_1$  for growth and yield parameters.

In general, the seed quality parameters viz., germination percentage, germination rate index and vigour index were significantly higher with GA<sub>3</sub> 200 ppm followed by boron 0.1% at both  $F_1$  and  $F_2$  levels.

The cost of cultivation, gross returns and net returns ha<sup>-1</sup> were higher in the combination of GA<sub>3</sub> 200 ppm with  $F_1$  and  $F_2$ . Whereas, the highest cost benefit ratio was recorded in MH 500 ppm followed by MC 500 ppm with  $F_1$  and  $F_2$  than any other combinations.

Based on the results, it was concluded that, the combination of 240:160:80 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup> with GA<sub>3</sub> 200 ppm spray appeared to be the optimum to get higher seed yield (63% more over control) with better quality in china aster seed production.

### Influence of Packaging Material, Disiccant and Chemical Seed Treatments on Seed Quality of Soybean (*Glycine max* L. Merrill) during Storage

S.I. DOMBARMATTUR

2000

MAJOR ADVISOR : Dr. S.D. SHASHIDHARA

Soybean (*Glycine max* L. Merrill) is the most important oilseed crop grown all over the world. Soybean is considered to be a poor storer. Hence, a study on storability of soybean seeds was conducted over a period of ten months under ambient conditions to investigate the effect of packaging material, including desiccant in vapour proof

containers and seed treatment on seed quality. The packaging material included were single layer polythene (500 gauge), double layer polythene (500 gauge each) and cloth bag. The chemical treatments used were bleaching powder (Chlorax) @ 3 g per kg of seed and captan @ 2 g per kg of seed. 10 g silica gel was also included in the

vapour proof polythene packets containing 200 g of seed and with this there were 14 different treatment combinations including control. The initial moisture content of seed before packing was 8 per cent (w. b).

The quality of soybean seeds decreased with increase in storage period in all treatment combinations. However, at the end of the storage period significantly highest germination (83.67%), root length (14.8 cm), shoot length (13.27 cm), seedling dry weight (0.856 g), vigour index (2395) and field emergence (68.67%) were recorded in captan treated seeds stored in two layers of heat sealed polythene package with silica gel compared to without and

with captan treated control. Which was recorded only a germination percentage of 13 per cent and 24 per cent, respectively. The seed moisture in the polythene package with silica gel was reduced to 7 per cent.

Hence, it is concluded that to preserve the quality of soybean seeds in storage, the seeds should be dried to 7 per cent moisture content (w, b) and treated with captan @ 2 g per kg of seed and stored in two layers of heat sealed polythene packet (500 gauge each). If the moisture content is more than 7 per cent, required quantity of silica gel to reduce the moisture content to 7 per cent should be added in the vapour proof package.

## SERICULTURE

### Evaluation of Victory-1 for Leaf Yield and Rearing Performance in Transitional Tract of North Karnataka

C.H. SATYANARAYANA

2000

MAJOR ADVISOR : Dr. R.R. PATIL

Victory-1, a newly evolved mulberry variety was evaluated for leaf yield and plant growth parameters on medium black soils, major pest and disease complex and silkworm feeding trials in transitional tract at Department of Sericulture, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, during July, 1999 to May, 2000. V-1 was superior to  $S_{38}$  in all growth and yield parameters viz., plant height, number of branches per plant, number of leaves per plant, leaf area, leaf area index and leaf yield, indicating the suitability of V-1 for medium black soils ( $PH$  7.5) of Dharwad. Considering the major pest and disease incidence V-1 recorded less incidence compared to that of  $S_{38}$ . Irrespective of the rearings, V-1 was superior to  $S_{38}$  with respect to total larval duration, weight of ten worms just before settling for third moult, maximum fifth instar weight, cocoon weight, shell weight, shell ratio, pupal weight, pupal duration, per cent moth emergence, fecundity, hatching

percentage, single cocoon have length, single filament weight, denier, renditta, ERR (%), cocoon yield by number and weight and disease incidence. Among the various breeds evaluated CSR 18 x CSR 19 performed well with regard to total larval duration, maximum fifth instar weight, cocoon weight, shell weight, pupal weight, pupal duration, per cent moth emergence, fecundity, hatching percentage, single cocoon have length, single filament weight renditta, ERR (%), cocoon yield by number, cocoon yield by weight, flacherie and grasserie. Of the various silkworm breeds ( $NB_4D_2$ ,  $PM \times NB_4D_2$ ,  $CSR_2 \times CSR_4$ ,  $CSR_2 \times CSR_5$  and  $CSR_{18} \times CSR_{19}$ ) evaluated on V-1 variety were performed well. However,  $CSR_{18} \times CSR_{19}$  performed better with respect to total larval duration, weight of 10 larvae just before settling for third moult, pupal duration, single cocoon have length, renditta; while  $PM \times NB_4D_2$  for ERR(%), cocoon yield by number, incidence of flacherie and muscardine; and  $NB_4D_2$  for maximum fifth instar larval weight, cocoon weight, pupal weight, silk filament length on V-1 variety.

### Storability and Field Spray of Botanicals on Mulberry and Its Effect of *Bombyx mori* L.

GANGAPPA D. HIPPARAGI

2000

MAJOR ADVISOR : S.G. RAYAR

Experiments were conducted to study the storability and field spray of botanicals on mulberry and its effect on silkworm economic traits. The storability of aqueous extract

of *Parthenium hysterophorus* (20%) and *Tridax procumbens* (30%) was studied in normal, refrigerator and earthen pot storage for 1, 3, 5, 10 and 15 days. The extract of

## Abstract of Theses

*Parthenium* and *Tridax* stored in refrigerator has recorded highest larval weight (36.59 g), cocoon weight (16.58 g), shell weight (2.72 g), pupal weight (14.36 g), cocoon shell ratio (18.35%), filament length (821 m), effective rate of rearing (78.80%) and cocoon yield (10.32 kg/25 df). It was followed by earthen pot and normal storage. Further, storing the *Parthenium* and *Tridax* extract upto fifteen days in refrigerator and earthen pot and one day in normal storage has recorded maximum larval weight (37.33, 36.73 and 34.78 g), cocoon weight (16.97, 16.09 and 15.51 g), shell weight (2.79, 2.70 and 2.70 g), c/s ratio (18.68, 18.30 and 17.41 %), pupal weight (13.91, 13.11 and 12.86 g), filament length (871, 781 and 699 m), denier (2.30, 2.04 and 2.50), ERR (83.00, 77.80 and 70.70%), fecundity 9549, 515 and 472, hatching (97.80, 97.10 and 96.90%) and cocoon yield/ 25 df (10.81, 9.98 and 8.34 kg) respectively.

Supplementation of aqueous extract of *Parthenium* (20%) and *Tridax* (30%) were found to be statistically on par and recorded maximum larval weight (34.90 and 34.69 g), cocoon weight (15.65 and 15.99 g), shell weight

(2.65 and 2.62 g), pupal weight (12.83 and 13.05 g), cocoon shell ratio (18.00 and 17.60%), filament length 745 and 729 m, denier (2.45 and 2.47), ERR (72.90 and 75.30%), fecundity (514 and 484), hatching (95.80 and 96.10%) and cocoon yield (9.18 and 9.99 kg/25 df) respectively as compared to water and absolute control.

Irrespective of rearing season field spraying of aqueous extract of *Lantana camara* (30%) recorded significantly highest matured larval weight (31.13 g), cocoon weight (15.58 g), denier (2.72) and cocoon yield (11.68 kg/ 25 df). While *Parthenium hysterophorus* (30%) was superior in shell weight (2.90 g), cocoon shell ratio (19.52%), filament length (775.67 m), fecundity (534) and hatching (91.44%).

Among the season, the botanicals were found to be significantly superior during rainy as compared to winter and summer. During rainy season the larval weight (32.88 g), ERR (77.88%), cocoon weight (16.73 g), pupal weight (13.52 g), filament length (755 m), fecundity (537) and cocoon yield (13.31 kg/ 25 df) were superior over other rainy seasons.

## HORTICULTURE

### Effect of Planting Dates, Growth Regulators and Chemicals on Growth, Flowering and Quality of *Gerbera* (*Gerbera jamesonii hybrida* Bolus)

A.V. MEERA MANJUSHA

2000

MAJOR ADVISOR : Dr.V.S. PATIL

The present investigations were carried out in the floriculture unit of Department of Horticulture, University of Agricultural Sciences, Dharwad during 1998-2000. The main objectives of the investigations were to study the effects of dates of planting and growth regulators on growth, flowering and quality, the effect of different chemical preservatives on post harvest physiology, the performance of different genotypes of gerbera under the transitional tract of Northern Karnataka and to select the better performing genotypes for cut flower production.

Regarding planting dates, plants of July planting had the maximum flower yield with longest flower stalk.

Among the applied growth regulators, GA<sub>3</sub> 150 ppm spray resulted in flowers with longest and thickest stalks largest flower diameter. Flower yield for the first five months of flowering were the highest for GA<sub>3</sub> 150 ppm treatment.

Among the chemicals tried at optimum concentration, silver nitrate 1 mM+citric acid 1 mM+seven per cent sucrose was most effective in enhancing the vase life of flowers.

Among the genotypes evaluated, ACC-9 had the highest number of leaves, leaf area, horizontal spread and number of suckers at all stages of growth followed by ACC-3 and 8. ACC-2 was the earliest to flower. ACC-9 produced flowers with longest and thickest stalks. So ACC-9 adjudged as the most promising cultivar considering floriferousness and economic characters.

The results of the present investigation revealed that ACC-9 is the best performing genotype best time for planting is July followed by June. Spraying GA<sub>3</sub> 150 ppm at 30 days after planting resulted in flowers of better quality and higher yield. Further, the flowers can be preserved for long in holding solutions containing 1 mM silver nitrate and 1 mM citric acid with seven per cent sucrose.