

Abstract of Theses

Comparative Performance of Different Bulb Size and Growth Regulators on Seed Yield and Quality of Onion (*Allium cepa* L.)

A. M. SHAIKH

2000

MAJOR ADVISOR: Dr. B.S.VYAKARANAHAL

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad, during rabi 1999-2000, to study the comparative performance of different bulb size and growth regulators on seed yield and quality of onion Cv. Nasik Red. The experiment consisted of three bulb sizes (big, >60g; medium, 30-60 g and small size, <30 g) and ten treatments of foliar spray of growth regulators (GA₃ 25, 50 ppm; Miraculan 1000, 2000 ppm; NAA 100, 200 ppm; MH 10, 20 ppm and CCC 500, 1000 ppm) and a control (without spray), laid out with Randomised Block Design in factorial concept in three replications.

The results revealed that bulb size had significant effect on growth had seed yield of onion plants. Growth parameters like plant height number of leaves dry weight of leaves per plant and yield parameters such as umbels

per plant, umbel diameter, seed yield per plant and per hectare along with all seed quality parameters were increased significantly due to increase in bulb size. Application of growth regulators (GA₃ 50 ppm, Miraculan 2000 ppm and MH 20 ppm) recorded significantly highest seed yield (13.29, 12.69 and 12.43 q/ha, respectively) compared to control (10.32 q/ha). An increase in seed yield over control was 29.7, 23.7 and 21.1 per cent, respectively, which is mainly due to increase in yield parameters. Likewise, percentage increase in germination and vigour index was observed over control.

The net returns per hectare (Rs. 85,065, 75,630 and 74,167) and C:B ratio (3.05, 2.89 and 2.87) were higher in the treatment combination of medium size bulbs sprayed with GA₃ 50 ppm, Miraculan 2000 ppm and MH 20 ppm, respectively.

Effect of Mother Plant Nutrition and Chemical Spray on Seed Yield and Quality in Tomato (*Lycopersicon esculentum* Mill).

HITENDRA B. GODAPPALAVAR

2001

MAJOR ADVISOR: Dr. V.K. DESHPANDE

Two field experiments were conducted at Main Research Station, College of Agriculture, Dharwad during kharif season 1999, to study the effect of mother plant nutrition and chemical spray on seed yield and quality in tomato Cv. Megha (L-15).

The results obtained from experiment -I revealed that the growth parameters viz., plant height and number of branches and the yield parameters viz., number of fruits per plant, fruit yield per plant and per hectare (41.5, 2058.3g, and 34.5 t, respectively) and seed yield per plant and per hectare (12.33g and 211.13kg, respectively) were significantly increased with increase in mother plant nutrition upto 120:180:80 kg NPK per hectare, further increase did not show significant result. The seed quality parameters viz., 1000 seed weight, germination percentage root, shoot length, seedling vigour index and seedling dry weight were also significantly highest with 120: 180:80 kg NPK per hectare, except EC of seed leachate which showed reverse trend.

The results of experiment-II revealed that the growth parameters viz., plant height and number of branches per plant, the yield parameters viz., number of fruits per plant, fruit yield per plant and per hectare (35.9,

1.71 kg and 24.52 t, respectively) and the seed yield per plant and per hectare (9.66 g and 124.5 kg, respectively) and the seed quality parameters viz., 1000 seed weight germination percentage, root, shoot length, seedling vigour index and seedling dry weight were significantly highest with spraying chemicals at 50 per cent flowering stage compare to fruit setting stage.

Among the chemicals GA₃ (100 ppm) recorded significantly higher values for growth, yield and seed quality parameters compared to other chemicals (IAA50 ppm NAA 50 ppm, 2,4-D 1 ppm, Ethrel 200 ppm, TIBA 10 ppm, DAP 2%) and control.

Among the interactions, spraying GA₃ 100 ppm at 50 per cent flowering recorded significantly higher values for growth, yield parameters and seed quality parameters.

In toto, the results indicated that although the application of 120:180:80kg NPK per hectare found better but considering cost benefit ratio, application of 180:60:80 kg NPK per hectare is better for getting higher seed yield with good quality in tomato and seed crop may be sprayed with GA₃ 100 ppm at 50 per cent flowering stage.

SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

Effect of Organics and Inorganic Fertilizer on Yield of Sunflower (*Helianthus annuus* L.) and Nutrients Availability in Vertisol of Malaprabha Command

M.B. KADEMANI

2000

MAJOR ADVISOR: Dr. B.M. RADER

A field experiment was conducted in Vertisol at Water Management Research Centre, Belavatagi in Malaprabha Command during Rabi 1999-2000 to study the integrated effect of organic and inorganic sources of nutrients on yield and yield attributes and nutrients uptake by sunflower and its impact on soil properties. The organic sources included were, maize residue, cotton stalk, FYM each at 5 t ha⁻¹ and vermicompost at 2 t ha⁻¹. The inorganic fertilizer levels were 0, 50, 75 and 100% recommended doses of fertilizer with 16 treatment combinations, replicated thrice and laid out in randomized block design.

Highest available nitrogen, phosphorus, potassium and sulphur at harvest of crop was observed with application of vermicompost at 2 t ha⁻¹ followed by FYM. Among the fertilizer levels, 100% RDF has recorded highest available N as compared to lower levels. The combined application of organics and inorganic fertilizer was nonsignificant.

The highest seed yield of sunflower was recorded in treatment received vermicompost followed by FYM. Among inorganics, 100% RDF resulted in highest seed yield compared to other fertilizer levels. The combined application of vermicompost at 2 t ha⁻¹ with 100% RDF has given maximum seed yield than other combinations.

The uptake of nutrients by crop at harvest differed significantly with the application of organics. The higher uptake of NPK was recorded in vermicompost treatment followed by FYM, cotton stalks and maize residue. Sulphur uptake was found to be nonsignificant with application of both organics and inorganics. Among inorganic fertilizers, 100% RDF has given highest uptake of NPK followed by 75 and 50% RDF. The combined application of vermicompost at 2 t ha⁻¹ with 100% RDF has recorded maximum uptake of nutrients, whereas FYM @ 5 t ha⁻¹ with 50% RDF has shown highest B:C ratio among the various treatment combinations.

Effect of Nitrogen and Sulphur on Onion (*Allium cepa* L.) Cv. Bellary Red in a Sulphur Deficient Soil of GLBC Area

O.S. DAYANANDA

2000

MAJOR ADVISOR: Dr. P. L. PATIL

An investigation was carried out to study the effect of nitrogen and sulphur on onion (*Allium cepa* L.) Cv. Bellary Red in a sulphur deficient soil of GLBC Area. A factorial experiment with four levels of nitrogen and sulphur each comprising 16 treatments was laid out in randomized block design with three replications during kharif season of 1999 at KRC College of Horticulture, Arabhavi.

Plant height, number of leaves and total dry matter accumulation in different plant parts were found to increase significantly with the increase in levels of nitrogen and sulphur. Interaction of nitrogen and sulphur did not influenced growth parameters.

There was increase in yield as well as yield contributing characters like bulb diameter and bulb length with increasing levels of nitrogen and sulphur. Higher total yield was observed with 125 kg N and 40 kg S per hectare, which was significantly superior than other treatments. Increasing levels of sulphur significantly increased the total soluble solids. Nitrogen fertilization and interaction

effect of nitrogen and sulphur did not influence the TSS.

Higher contents of N, P, K, S, Ca and Mg in leaf as well as bulb were observed with the higher levels of nitrogen and sulphur. The higher uptake of N, P, K, S, Ca and Mg were observed with 125 kg N and 40 kg S per hectare.

Highest agronomic efficiency of applied nitrogen and apparent recovery of N was observed with 40 kg S per hectare. Residual N, P, K, S, Ca and Mg status of soil was decreased with increasing levels of nitrogen and sulphur.

Storage life of onion bulbs was significantly reduced with increased nitrogen fertilization. Applied sulphur and its interaction with nitrogen did not show significant difference.

Among all treatment combinations, fertilizer doses of 125 kg nitrogen and 40 kg sulphur per hectare was found to be most remunerative in respect of net returns.

AGRICULTURAL ENTOMOLOGY

Utilization of Biopesticides in the Management of Pod Borer, *Helicoverpa armigera* Hubner on Chickpea

K. DEVARAJA

2000

MAJOR ADVISOR: Dr. B.S. NANDIHALLI

Investigation on Utilization of Biopesticides in the Management of Pod Borer, *Helicoverpa armigera* Hubner on Chickpea were carried out at Main Research Station, Dharwad during 1999-2000. Among, Neem seed kernel (NSK) and Neem Leaf (NL) dusts at different dosages on different developmental stages of *H. armigera* in laboratory and field. NSK 60% talc based dust exhibited highest ovicidal action by recording least egg hatchability (29.20%) and neem leaf 60% talc and chalk based showed least egg hatchability of 35.55 and 36.60%, respectively. NSK and NL 60% talc based dusts caused cent per cent mortality of first and second instar larvae. NSK 60% talc based dust caused 95.44% mortality of third instar larvae and it caused 95.44 per cent mortality of fourth instar larvae. The NL 60% talc based dusts caused 85.44% mortality of third instar larvae whereas on fourth instar only 70.44% mortality was observed. NSK 60% and NL 60% talc based dusts caused 63.33% and 60.00% mortality of pupae, respectively, which were followed by NSK 50 and 60 per cent chalk based dusts. In field, NSK 60% dust was as effective that of malathion 5% dust

which were significantly superior over other treatments and recorded 77.74 and 74.96% larval reduction respectively. 15 days after dusting. The least leaf let damage of 9.23% and 10.1% and pod damage of 12.38% and 12.58% higher grain yield of 13.40 q per ha and 12.83 q per ha and more B:C ratio 27.12 and 28.32 were recorded in these two treatments, respectively.

Nomuraea rileyi (Farlow) Samson @ 1.5 g/l was effective in reducing the larval reduction of 67.36% and recorded the least leaflet (7.89%), pod damage (12.94%) and gave highest grain yield (11.5 q/ha). The spray sequence of three sprays of monocrotophos at vegetative, flowering and pod formation) was most effective by recording 87.27% larval reduction followed by monocrotophos NPV-Neem which recorded 79.22% larval reduction. The plot treated with three sprays of monocrotophos recorded lowest leaf let (7.27%) and pod damage (10.34%) with higher grain yield (14.33 q/ha) which was followed by NPV - Neem - monocrotophos. The highest B:C ratio of 20.38 was observed in NPV - Neem - Monocrotophos.

Studies on the Insects of Economic Importance Attracted to Light Traps and Pheromone Traps

H.M. GIRISH

2000

MAJOR ADVISOR: SHASHIDHAR VIRAKTAMATH

Investigations carried out at the University of Agricultural Sciences, Dharwad during 1998-2000 revealed that the overall sex ratio of the noctuid moths, *Helicoverpa armigera*, *Spodoptera litura*, *Earias vittella*, *Mythimna separata* and *Plutella orichalcea*, was 1:0.97, 1:0.98, 1:0.66, 1:0.72 and 1:0.84, respectively and that of the pyralid moths, *Maruca testalis*, *Chilo partellus*, *Scirpophaga incertulas*, *Hymenia recurvalis* and *Leucinodes orbonalis* was 1:1.19, 1:0.63, 1:0.77, 1:1.52 and 1:1.71 respectively.

All the species of noctuid and pyralid moths had more percentage of gravid moths except *H. armigera* which had more spent females. Among arctiid moths, more percentage of virgins in *Amsacta lineola* and more percentage of gravids in *Spilosoma obliqua* were observed.

Gravid females had a significant positive correlation with the field incidence recorded either after one or two weeks of the catches while the number of spent females had a significant positive relationship either with the field incidence of the same week or after one week of the catches of *E. vittella*, *H. armigera*, *S. litura* and *Pectinophora gossypiella*.

H. armigera moths were observed from July to February with seven peaks and *S. litura* from June to February with six peaks. Five peak catches of *E. vittella* were observed between July to February, while *M. separata* and *P. gossypiella* moths were observed between August to February with five peaks each.

Peak field incidence of *E. vittella*, *H. armigera*, *S. litura* and *P. gossypiella* was preceded as well as followed by the peak moth catches in the light traps and pheromone traps. The relative humidity and positive influence on the trap catches of all the species of insect pests while, the temperature had negative influence. Rainfall had influence only on the trap catches of *H. convulsi*, *Anomala* sp., *Holotrichia* sp. and *N. virescens*. The wind velocity had positive influence on the pheromone trap and light trap catches of *E. vittella*, *E. insulana* and *P. gossypiella* and negative influence on the light trap catches of *M. testalis*, *Cydia ptychota*, *Plutella xylostella* and *H. recurvalis*.

The trap and lure of Pest Control (India) was found to be significantly superior in attracting and capturing the moths of *H. armigera*, *S. litura* and *P. gossypiella* followed by the Bio-pest management trap and the Basarass Bio-control Research Laboratories.

Role of Bee Attractant in Pollination and Productivity of Mustard (*Brassica juncea* L.)

SAMIR MURASING

2000

MAJOR ADVISOR: SHASHIDHAR VIRAKTAMATH

Investigations were carried out to study the pollinator fauna, role of bee attractants in enhancing pollinator visitation, productivity and quality of mustard during *Kharif* and *rabi* season of 1999-2000 on the campus of the University of Agricultural Sciences, Dharwad. Among 14 species of pollinators, *Apis dorsata* F. was the most dominant constituting 60.17 per cent followed by *A. florea* (34.84%), *A. cerana* (2.57%) and other pollinators (2.42%).

Spraying of bee attractant, Bee-Q @ 15 g/l had significant influence in attracting more pollinators. Consequently, significantly more number of pods (61.70 pods/plant vs 47.85 and 19.22 in open pollinated and caged crop, respectively) were recorded. Higher number of seeds (16.40 to 17.37 seeds/pod vs 16.01 and 10.05 in open and caged crop, respectively) was recorded when the crop was sprayed with Bee-Q @ 10, 12.5 and 15 g/l. However,

significantly highest test weight (3.51 g as against 2.85 and 2.77 g in open pollinated and caged crop respectively) and yield (11.81 q/ha as against 6.55 and 1.63 q/ha in open pollinated and caged crop, respectively) was obtained in the treatment with Bee-Q @ 15 g/l. Thus there was an increased of 80.30 and 624.54 per cent over open pollinated and caged plot, respectively.

Oil content of the seeds was not influenced by the spray of attractants. However, Bee-Q @ 12.5 and 15 g/l improved germination percentage (87 to 89.67% as against 75.33 and 72.33 in open pollinated and caged crop, respectively). Higher root length (5.09 cm) was obtained due to treatment of Bee-Q @ 15 g while higher shoot length (5.27 cm) was recorded in the treatment with Bee-Q @ 12.5 g/l.

Studies on Seasonal Incidence and Loss Estimation in Guava Due to Tea Mosquito Bug, *Helopeltis antonii* Signoret (Hemiptera : Miridae)

SUNIL KUMAR

2001

MAJOR ADVISOR: Dr. L. KRISHANA NAIK

Investigations undertaken during 1999-2000 at Department of Agricultural Entomology, College of Agriculture, Dharwad. The survey carried out at MRS, Dharwad on two guava cultivars for seasonal fluctuations of *Helopeltis antonii* indicated that the pest incidence was at its peak during October both on young leaves (18.47%) and fruits (20.53%). No incidence was observed on flower buds during the study period on Cv. L-49.

The peak infestation level on Cv. Navalur local was observed during September on young leaves (18.54%) and during December (8.62%) on flower buds. However, on fruits, it was observed during November (61.33%) and it vanished from February onwards. However on cashew (during off season) the peak incidence of the pest during December on young leaves was 11.98 per cent and on panicles (10.51%). On Cv. L-49, the pest incidence was at its peak during September (24.3%) at Navalur location on young leaves and on flower buds no incidence was

observed excepting in December (0.79%). However, on fruits the highest incidence of 13.66 per cent was observed during September. On Cv. Navalur local the maximum incidence on young leaves was observed during September (17.94%) and no incidence was noticed on flower buds. During August 21.77 per cent incidence was observed on fruits.

The desaping action by bug on fruits resulted in to necrotic lesion within a couple of hours and later on it resulted in scab formation. The dimension of such spots varied from 1.00 to 2.7 mm in diameter. The fruit infestation (8.98%) by the bug resulted in reduction in the monetary loss of Rs. 4,691.28 per ha. Ascorbic acid, pectin, TSS content and weight of infested fruits reduced with the increase in infestation level. Whereas pH was highest at increased infestation level. The order of acceptance by the consumers was decreased as the level of infestation increased.

PLANT PATHOLOGY

Studies on Viral Diseases of Potato with Reference to Epidemiology and Management

DEVARAJU

2000

MAJOR ADVISOR: Dr. M.S. PATIL

Potato is one of the most important commercial vegetable crops cultivated in Karnataka. Among the viral diseases mosaics and leaf roll are most common. The survey was conducted during *kharif* 1999 and summer

2000, the incidence of viral diseases was ranged from 4.20 to 66.75 per cent. Incidence of severe mosaic ranged from tract to 36.00 per cent and leaf roll incidence ranged from 4.20 to 40.75 per cent in both Hassan and Kolar

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districts, whereas mild mosaic incidence was not noticed in both the districts.

The mild mosaic virus (PVX) was sap transmissible to different indicator plants and produced systemic symptoms on tobacco, *Nicotiana glutinosa*, tomato and *Capsicum annuum* and local lesions on cowpea, beans, *Gomphrena globosa* and *Chenopodium amaranticolor*. Severe mosaic virus (PVY) produced systemic symptoms on tobacco, *Nicotiana tabacum* var. white burley and samsun, *Nicotiana glutinosa*, *Datura metel*, *Nicandra physaloids*, *Petunia hybrida* and *Capsicum annuum* and local lesions on *Chenopodium amaranticolor*. The mild mosaic, severe mosaic and leaf roll viruses were transmitted through seed tubers. Aphids (*Myzus persicae*) transmitted severe mosaic and leaf roll viruses in a non-

persistent and persistent manner, respectively.

The mosaics had slight effect on yield and yield parameters, whereas the leaf roll infection at early stages resulted in greater yield loss than later stages infection. The lower disease incidence and the higher tuber yield was obtained in early planted crop (June 1st to June 21st) than late planted crop, therefore the spread of diseases could be minimised by adopting early planting. Mulching with polyethylene sheet and aluminium foil immediately after emergence resulted in reduction of severe mosaic and leaf roll diseases incidence.

In tissue culture studies, maximum number of PVY free potato plantlets were obtained by meristem-tips obtained from seedlings of true potato seeds (94.44) than the of severe mosaic (PVY) infected plants (64.44%).

Biological Control of Wilt of Potato Caused by *Sclerotium rolfsii* Sacc.

S. NARASIMHARAO

2000

MAJOR ADVISOR: Dr. K.H. ANAHOSUR

Potato (*Solanum tuberosum* L.) is one of the most important commercial vegetables cultivated in Northern Karnataka. Wilt of potato caused by *Sclerotium rolfsii* Sacc. is attaining the major status in potato cultivation in Karnataka.

The pathogen was isolated by tissue isolation from infected plant parts and was identified as *S. rolfsii* Sacc on the basis of morphological characters produced on PDA Petriplates and symptoms production.

In vitro evaluation of antagonistic micro-organisms indicated the maximum per cent inhibition of mycelial growth, minimum number of sclerotia production of small sized sclerotia and wider of inhibition zone were observed when *Trichoderma harzianum* Rifai inoculated 24 hours prior to the inoculation of *S. rolfsii*. Least were noticed in *Penicillium* sp. irrespective of inoculation methods.

Among the antagonists screened, *Gliocladium virens* and *T. harzianum* showed very strong antagonism, overgrew on the mycelium and finally destroyed the mycelium and sclerotia.

Microscopic observations on the mechanisms of antagonism revealed that, vacuolation, coagulation of cytoplasm and aggregation of pathogen hyphae. Coiling occurs immediately after contact followed by lysis of pathogen hyphae.

Culture filtrates of antagonists reduced the mycelial growth and dry mycelial weight. Filter sterilized culture filtrates was more effective than heat sterilized culture filtrates.

Among the root exudates tested, sorghum root exudates were more effective in inhibiting the germination of sclerotia and mycelial growth followed by maize and bajra.

Studies on the management of wilt to potato revealed that, tuber treatment (10 gm/kg of tubers) and soil application with *T. harzianum* and *T. viride* resulted in higher germination, lower wilt incidence and higher yield.

Studies on Powdery Mildew of Pea (*Pisum sativum* L.) Caused by *Erysiphe polygoni* DC.

C.N. BIJU

2000

MAJOR ADVISOR: KESHAV S. NAIK

Among several diseases affecting pea crop, powdery mildew caused by *Erysiphe polygoni* DC. is a major constraint in pea cultivation. Therefore the present investigation was carried out with different objectives aiming at the control of this disease.

The conidia were barrel or cylindrical, hyaline, non-septate and measured 30.5 x 15.5 μ . The cleistothecia were small round, dark brown to black and measured 98 μ in diameter.

Spore germination was maximum in five per cent sucrose solution. The congenial temperature and relative humidity for maximum conidial germination were 20°C and 80 per cent respectively.

Propiconazole at 0.1% was found to be the most effective in reducing spore germination. Similarly, Ovis (0.15%) was found to be the most effective among plant products and bioagents.

Among the four methods of inoculation, dusting conidia with camel hair brush was found to be the most effective. Among 17 hosts tested for host range studies, bean, cowpea, greengram, blackgram, *Euphorbia hirta* and *Lagascia mollis* proved to be the hosts of powdery mildew of pea. The pathogens causing powdery mildew of pea, *E. hirta* and *L. mollis* were found to be cross inoculable.

In field evaluation of fungicides, 2 sprays of propiconazole (0.1%) was found to be the most effective in reducing the disease. Similarly, among the plant products

and bioagents, Ovis (0.15%) was found superior.

Lesser disease incidence and higher yields were recorded in early sown crops (21st June and 5th July).

Six pea genotypes viz., DMR-7 Rachna, HFP-4 Pusa-10 P-1864-1 and P-1440-18 were found to be resistant against powdery mildew.

The activity of polyphenol oxidase and phenylalanine ammonialyase was more in resistant genotype (Rachna) than in susceptible one (Bonneville).

Studies on Mosaic Diseases of Soybean

RAGHURAM G. PATIL

2000

MAJOR ADVISOR: Dr. A.S. BYADGI

Soybean, an important oilseed-cum pulse crop, is grown in Northern Karnataka. Of the several viral diseases reported on soybean, mosaic and yellow mosaic are more common and are responsible for low productivity of soybean in our state. The survey undertaken in Northern parts of Karnataka indicated presence of mosaic disease ranging from 1.2 per cent (Karikatti) to 8.5 per cent (MRS, Dharwad). Incidence of yellow mosaic disease ranging from 0.95 per cent (Yedur) to 4.2 per cent (Ankali) was also recorded during the survey.

Soybean mosaic virus affected plants were characterized by production of mosaic and mottling on leaves. The plants were stunted with reduction in leaf size. Yellow mosaic virus produced conspicuous bright yellow colour patches on the infected leaves.

The SMV causing mosaic in soybean was readily transmissible through, sap, seed and aphids but not through whiteflies. Whereas, yellow mosaic virus was easily transmitted through whiteflies but not by sap seed and aphids.

The SMV had a TIP of 55 to 60°C. DEP of 10⁻² to

10⁻³ and LIV of 48 hours at room temperature (26 ± 1°C). Soybean mosaic virus has a narrow host range as it developed symptoms only on two test plants viz., local lesion on *Chenopodium amaranticolor* and diffused mosaic mottling symptoms on *Dolichos lab lab*. Whereas yellow mosaic virus produced symptoms only as soybean.

Electron microscopic studies of SMV shows, presence of few long flexuous virus particles, approximately 650-700 nm in size whereas, no virus particle were seen in the leaf sample showing yellow mosaic symptoms.

Among the different insecticides tested Acephate (0.075%) and Triazophos (0.06%) were effective in controlling aphids and whiteflies and keeping mosaic and yellow mosaic incidence low.

Among the different genotypes screened against mosaic diseases, under natural conditions, none of the genotypes was found to be immune or resistant. However some of genotypes showing tolerant reaction needs to be tested again at location with high disease pressure for further confirmation.

Effect of Threshing Methods on Seed Mycoflora and Seed Quality in Sorghum and Greengram

A. RAMAMURTHY

2000

MAJOR ADVISOR: Dr. P. C. HIREMATH

A study on the effect of threshing methods, storage and seed treatment on seed mycoflora, seed germination and seed quality of sorghum and green gram were carried out during *kharif* 1999 at Agriculture College, Dharwad.

Sorghum and greengram seeds threshed under traditional threshing yards subjected to less mechanical damage and showed low per cent seed germination and vigour index, whereas, the seeds threshed on roads (state highway and main district road) had maximum fungal flora which could be because of more mechanical damage. Totally about 11 and 10 different fungal flora (*Alternaria alternata*, *Aspergillus flavus*, *A. niger*, *Chaetomium* spp., *Collectorium* spp., *Curvularia lunata*, *Exerohilum* spp., *Fusarium* spp., *penicillium* spp., *phoma* spp. and *rhizopus*

spp.) were recorded in sorghum and greengram respectively. Among the different storage methods tested for their effect on seed mycoflora and seed quality, cold storage was most effective in reducing seed mycoflora and increasing seed germination followed by bamboo thatched bins and gunny bags.

Of the different seed treatment methods like fungicides and bioagents tested, fungicides were more effective than the bioagents in reducing fungal flora, improving the seed germination, shoot and root length and thereby seedling vigour. Higher protein content, reducing sugar and total sugar were recorded in seeds treated with fungicides and bioagents than the untreated control, but fungicides were found superior over bioagents.

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AGRICULTURAL MICROBIOLOGY

Role of Plantgrowth Promoting Rhizobacteria on Growth and Yield of Pigeonpea (*Cajanus cajan* L.) Cultivars

B.J. DEVANANDA

2000

MAJOR ADVISOR: Dr. A.B. PATIL

A field experiment was conducted at Raichur on medium black soil, under rainfed conditions to study the role of plant growth promoting rhizobacteria (PGPR) on growth and yield of pigeonpea cultivars ICPL-87 (short duration) and ICPL-87 119 (medium duration).

The parameters like plant height, nodule number, nodule dry weight, dry matter production at different stages of crop growth, in both the varieties were most superior in the treatment receiving the triple inoculation of seeds with *Rhizobium*, (GB-1) *Azospirillum* (ACD-20) and *Pseudomonas striata* (strain No. 27) followed by dual inoculations, single inoculations and uninoculated control. Similarly, the yield parameters like stalk yield, seed weight per plant, 100 seed weight, number of seeds per pod and grain yield also showed a significant increase in triple

inoculation over all other treatment combinations. The same trend was observed with N-uptake, P-uptake, ureide content, bacterial population, N₂-fixers and P-solubilizers.

In vitro germination study indicated that treatment receiving triple inoculation showed maximum germination, seedling vigour which was significantly superior over dual and single inoculation treatments and control.

Rhizobium, *Azospirillum* and *Pseudomonas striata* strains were examined for *in vitro* production of IAA and GA. Maximum IAA production was obtained in dual inoculated culture medium with *Rhizobium* and *Azospirillum* (41.07 µg/25 ml), and was on par with triple inoculated culture. GA production was highest in triple inoculated culture (5.45 µg/25 ml).

AGRICULTURAL ECONOMICS

Evaluation of Alternative Farming Systems in Gazani Lands of Coastal Karnataka An Economic Analysis

B. GANESH KEREMANE

2000

MAJOR ADVISOR: Dr. BALACHANDRA K. NAIK

The study was conducted in the three coastal talukas of Uttara Kannada district, Karnataka State, wherein gazani lands are found extensively. Multistage random sampling technique was employed to select 80 small and 80 large sample farmers. Data collected by personally interviewing them using comprehensive questionnaires were analysed adopting tabular and production function analyses. Of the four systems commonly identified, small farmers practiced paddy cultivation and paddy-prawn farming while large farmers practiced prawn farming and mixed farming systems. Human labour was the important input used in sole paddy cultivation and paddy-prawn farming. In addition to human labour, prawn seeds/fingerlings and feed were the other inputs used in prawn farming and mixed farming. Per hectare total cost of paddy cultivation and paddy-prawn farming was Rs. 18,412.48 and Rs. 31,787.43 respectively. Having almost the same cost structure, higher returns were realised in paddy-prawn farming from the sale of prawns. The total cost of traditional

prawn farming was Rs. 44,790.91 per hectare while the same for scientific prawn farming and mixed farming were Rs. 2,73,257.01 and Rs. 3,12,169.38 respectively. Returns were naturally higher in scientific prawn farming and also in mixed farming wherein an additional income was realised by the sale of fishes. Land and seed had a significant influence on the returns in paddy cultivation. In paddy-prawn farming land and seeds influenced the returns positively on small farms and negatively on large farms. Prawn seeds, feed and manure had a negative impact on the gross returns in case of prawn farming. In mixed farming, land, prawn seeds/fingerlings and feed were the inputs used uneconomically. Problems faced by the respondents were grouped as production financial, infrastructural and marketing problems. Nonavailability of better variety seeds, lack of funds, lack of processing facilities and absence of market information were the severe problems under each group respectively.