

Studies on Anthracnose of Chilli (*Capsicum annum* L.) and Its Management

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1999

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They survey of the anthracnose disease undertaken in three districts representing rainfed and irrigated situations indicated that the disease was more prevalent in irrigated tracts in Raichur than rainfed tracts in Dharwad and Gadag districts. Raichur taluk is considered as hot spot for anthracnose during kharif.

The fungi *Colletotrichum capsici* (Sydow) Butler and Bisby and *C. gloeosporioides* (Penz) Penz and Sac were isolated from the affected chilli fruits collected from Regional Research Station farm, Raichur. The pathogenicity was proved with the pure culture on detached red chilli fruits using pinprick method of inoculation. Among the solid media potato dextrose agar was best followed by Czapek's agar for the growth of the *C. capsici*. The maximum dry mycelial weight was observed after 16 days of incubation. Of the various liquid media, maximum dry mycelial weight was recorded in Richards medium. Temperature of 30°C and an acidic pH towards 6 were most favourable for growth of *C. capsici*.

Among thirty seven genotypes screened under laboratory using pinprick method, genotypes viz., PC-1, CO-1, IHR-3023 and LCA-301 showed resistance whereas genotypes CO-1, H-232, IHR-3023, KDSC-1 1 0-1 0, LCA-301 and PC-1 were resistant under field condition.

In the in vitro evaluation of fungicides, mancozeb among non-systemic fungicides and carbendazim and triademefon among systemic ones were very effective in inhibiting the growth of *C. capsici*, whereas neem seed kernal extract and nimbidine among plant extracts showed considerable amount of inhibition of fungal growth.

In the in vivo evaluation of fungicides and botanicals, carbendazim recorded least disease incidence and highest yield. Subsequently, net returns were more in carbendazim treated chilli plots at both concentrations (0.1 % and 0.15%). The carbendazim gave the highest cost-benefit ratio of 1:10.04 AND 1:7.96 respectively at 0.1 and 0.15 per cent concentrations and thus were found to be the best followed by mancozeb.

Studies on Sunflower Necrosis Disease

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Sunflower necrosis disease, causing considerable damage to the crops, is a serious disease and present in almost all parts of Northern Karnataka wherever sunflower is grown.

Affected plants were characterised by production of mosaic and chlorotic ringspots. In extreme cases the affected leaves developed marginal necrosis with reduction in leaf size. In later stage of disease development, affected plants produced malformed head and seeds of poor quality.

The virus causing necrosis disease in sunflower was sap transmissible but not with ease. It was not transmitted through seeds and dodder. The virus was transmitted by thrips (*Thrips tabaci*) vector from sunflower to sunflower and to tomato. But not by aphids, Jassids and whiteflies.

The virus had a narrow host range and infected only 3 plant species among 15 different hosts tested

belonging to 6 families. The virus had DEP between 10^{-3} to 10^{-4} , TIP between 35° to 45°C and retained infectivity upto 2 hours at room temperature.

Based on symptoms, host range, transmission and physical properties, it was concluded that the sunflower necrosis disease in this area, is probably caused by member of Tomato spotted wilt virus (Tospovirus) group.

In early infected crop (15 days after sowing) the disease had a severe effect on yield and yield parameters. The disease reduced yield of sunflower to a tune of 90.86 per cent when appeared in early stage of the crop growth as compared to 31.69 per cent when appeared late. Field trials indicated that the spread of the disease could be minimised by spraying Imidacloprid (0.025%) insecticide.

None of the 56 sunflower hybrids screened were resistant to virus infection, but hybrid UH-32 and 7 other exhibited some tolerant properties.

Studies on Stem Rot of Groundnut Caused by *Sclerotium rolfsii* Sacc.

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Stem rot of groundnut caused by *Sclerotium rolfsii* Sacc. has attained the major status in many groundnut cultivating areas of northern Karnataka. It is wide spread accounting for economic yield loss of 10-25 per cent in severely infested fields. Survey was conducted in nine taluks of Northern Karnataka. The maximum disease incidence was (13.01%) recorded in Ramdurga taluk and minimum (10.22%) in Dharwad during kharif (1998-99). In rabi/ summer of 1998-99 the higher incidence of disease (9.09%) was noticed in Saundatti taluk and it was low (6.74%) in Ranabennur taluk. Experiment on effect of inoculum density on disease incidence indicated, cent per cent pre-emergence mortality of germinating seed in four per cent inoculum level or more, when inoculum used was in the form of either mycelium or sclerotial body. Among the different plant extracts, cold and heat extracts (20%) of *Parthenium hysterophorus*, *Polyalthia longifolia* and *Azadirachta indica* inhibited the mycelial growth of *S. rolfsii*

significantly. Twenty per cent cold aqueous and heat extract of *Glyricidia maculate* recorded maximum inhibition of sclerotial body formation. Evaluation of bio-agents against *S. rolfsii* indicated *Trichoderma harzianum*, *T. viride*, *Clodadium vrens* and *Pseudomonas fluorescens* were highly effective. Among different root exudates of crops, sorghum root exudate was highly effective to *S. rolfsii* followed by that of maize in inhibiting germination of sclerotia. Effect of rotational crops on disease indicated that sorghum-groundnut rotation system was found effective in reducing the stem rot (33.18%) as compared to non rotational practice (63.48%). In screening test all groundnut genotypes showed susceptible disease reaction. Studies on integrated management of stem rot revealed that seed treatment (6 g/kg seed) and soil application of *T. harzianum* (1.25 kg/ha) resulted lower incidence of disease and higher pod yield.

Studies on Viral Diseases of Potato

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1999

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Potato is one of the most important commercial vegetable crops cultivated in Northern Karnataka. The crop is known to suffer from many viral diseases among which mosaic and leaf roll are more common. The studies on survey indicated the mild mosaic incidence ranged from trace (Beivadi) to 22.25 per cent (Mritunjayanagar), severe mosaic ranged from trace (Belavadi) to 36.60 per cent (Rayapura) and leaf roll ranged from trace (Beivadi) to 85.50 per cent (Jafarwadi).

The mild mosaic virus (PVX) was sap transmissible to different indicator plants and produced systemic symptoms on tobacco, *Nicotiana glutinosa*, tomato and local lesions on cowpea and *Chenopodium amaranticolor*. Severe mosaic virus, (PVY) produced systemic symptoms on tobacco Var. KST 19, white burley and samsun and *N. glutinosa*. Aphid (*Myzus persicae*) transmitted severe mosaic and leaf roll viruses in a non-persistent and persistent manner, respectively.

The mild mosaic and severe mosaic viruses had a

Thermal Inactivation Point (TIP) between 70-75°C and 50-55°C, a Dilution End Point (DEP) between 10^{-5} - 10^{-6} and 10^{-2} - 10^{-3} and the Longevity *In Vitro* (LIV) of 28 days and 48-72 hours, respectively at room temperature (25-28°C).

The mosaic disease had slight effect on yield and yield parameters while the leaf roll infection at early stages resulted in greater yield loss than those infected later.

Under field conditions the crop could be protected by spraying systemic insecticide, acephate (0.15%) (5 sprays) followed by bougainvillea leaf extract. Alternate sprays of acephate and bougainvillea/lantana leaf extract reduced the viral disease incidence on potato.

Among the different genotypes screened 85-P-670 was moderately resistant to both mosaic and leaf roll diseases. MP/90-94, MS/87-1192, JX-14 and OP-1 were found to be the other moderately resistant genotypes against leaf roll disease.

**Studies on Plant Parasitic Nematodes of Cotton with Special Reference to
Rotylenchulus reniformis Linford and Oliveiran**

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A nematode random survey of the cotton crop rhizospheres from the important cotton growing areas of North Karnataka revealed the presence of plant parasitic nematodes like *Aphelenchus* sp., *Helicotylenchus* sp., *Meloidogyne* sp., *Pratylenchus* sp., *Rotylenchulus reniformis*. Tylenchus-like plant parasitic nematodes, *Xiphinema* sp. and other dorylaimid plant parasitic nematodes.

Rotylenchulus reniformis was found to be the most predominant nematode associated with cotton as revealed by the community analysis of plant parasitic nematodes. Pathogenicity tests conducted on cotton cultivar CPD-8-1 (Sharada) showed that initial inoculum densities of 1 00 and above infective juveniles of the reniform nematode significantly reduced the plant growth parameters of cotton like plant height; root and shoot weights (fresh and dry); and number of squares and bolls. This initial inoculum level

therefore proved to be pathogenic to cotton cultivar CPD8-1. This nematode was found to complete its life cycle in 27 to 29 days in cotton cultivar Sharada under Dharwad conditions.

Among the various cultivars or hybrids evaluated for their reaction to the reniform nematode, cultivar JK-119 from *Gossypium hirsutum* was found to be immune, cultivars/hybrids Deltapine, DCH-32, DHH-1 1 and RAH-101 proved to be moderately resistant and cultivars LRA-5166, Abadhitha, Sahana, RAH-221, DB-3-12 and RAHS-131 were found to be resistant, based on the number of females or eggsacs that developed on these cultivars/hybrids.

Of the different organic amendments incorporated to the soil fresh leaves of pongamia proved to be effective in reducing the populations of the reniform nematode when incorporated at 150g per pot, one week prior to sowing.

Biological Control of Fruit Rot (*Koleroga*) of Arecanut

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Investigations were carried out at Main Research Station, Dharwad on Biological Control of Fruit Rot (*Koleroga*) of Arecanut caused by *Phytophthora meads*. Research was taken up on the aspects like isolation of pathogen from different hosts, cross inoculation and isolation of native antagonists, their evaluation against *P. meads*. Field trial was conducted in arecanut plantation situated at Murur (Kumta).

The rotten arecanuts, cocoa, coconut and cardamom were collected from the multistorey crop garden. The isolation of the pathogens was made by tissue isolation technique. Pathogen from arecanut and cardamom was identified as *P. meadii* and from cocoa and coconut as *P. palmivora*. Sporangial suspension (10^5 /ml) was found useful in proving pathogenicity. Pathogens produced severe symptom on their respective hosts in shorter period compared to their non-host.

Native antagonists viz., *Pseudomonas fluorescens*, *Trichoderma viride* and *T. harzianum* were isolated on their

selective media. Isolates found to be good were evaluated under *in vitro* and *in vivo* against *P. meadii*.

Under *in vitro*, performance of *P. fluorescens* was superior with mean zone of inhibition of 12.2 mm while *T. viride* and *T. harzianum* over grew pathogen when antagonists were inoculated 12 h before the inoculation of *P. meadii*. Aqueous leaf extracts of eupatorium and glyricidia at 10 per cent inhibited both mycelium and sporangium production to the extent of 100 per cent. Yam corm extract at 10 per cent inhibited 100 per cent mycelial growth while neem and ocimum at 10 per cent inhibited sporangium production only.

In field, excellent control of *Koleroga* was obtained when arecanut bunches were treated with either bioagents like *P. fluorescens*, *T. harzianum* (10^4 cfu/ml) or plant extract viz., ten per cent eupatorium and glyricidia extracts followed by polythene cover than bioagents or plant extracts alone. Metalaxyl MZ 72 WP at 0.2 per cent concentration also gave good control of the disease.

Integrated Management of Settle Borne Diseases of Sugarcane in Northern Karnataka

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Survey during 1997-98 and 1998-99 around the different sugarcane factory areas of Northern Karnataka revealed that Co-740, CoC-671, CoC-92061, Co-8011, Co-8014, Co-6415, Co-88028 and CoM-88121 varieties were cultivated extensively. Maximum incidence of whip smut (12.50%) in Co-740 and red rot (3.28%) in CoC-92061 was recorded in Varada Sugars of Haveri district. Pineapple disease incidence (13.01 %) was more in Co-88028 in Hira Sugars, Sankeshwar of Belgaum district.

The pathogens isolated from the smut, red rot and pineapple disease specimen were identified as *Ustilago scitaminea* Syd., *Colletotrichum falcatum* Went. and *Ceratocystis paradoxa* (Dade) Moreau., respectively and pathogenicity was proved successfully.

In vitro evaluation of biocontrol agents revealed that maximum inhibition of *C. falcatum* and *C. paradoxes* was recorded in *Trichoderma viride* followed by *Pseudomonas fluorescens*. Among the different fungicides tested under *in vitro* condition Carbendazim, Carboxin and Triadefon at 1000 ppm completely inhibited the germination of *U. scitaminea* spores, propiconazole, Carbendazim at 1000

ppm and Copper oxychloride at 3000 ppm completely inhibited the growth of *C. falcatum*.

Maximum spore germination of *U. scitaminea* was observed at 30°. Better growth of *C. falcatum* was observed on Glucose asparagin agar and oatmeal agar media at pH 6.0 to 7.0 with a temperature range of 30-35°C. While maximum growth of *C. paradoxa* was recorded at pH 5.0 to 6.0 with a temperature range of 20-30°C.

Sett dip in spore suspension and internodal injection in case of whip smut, standard plug method and nodal method in case of red rot and set dip in conidial suspension and germinated conidial suspension in case of pineapple disease gave cent per cent disease incidence.

The lowest incidence of whip smut (2.26%), red rot (7.09%), pineapple disease (4.83%), leaf spot (10.25%) and rust (9.33%) and also increase in yield (91.00 t/ha) was recorded in an IDM trial treatment consisting of sett treatment with *T. viride* (10 g/l), soil application of FYM (10 t/ha) and press mud (25 t/ha).

Studies on White Rot of Onion Caused by *Scierotium rolfsii* Sacc. and Its Management in Karnataka

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White rot caused by *Scierotium rolfsii* sacc. is one of the important disease of onion in Karnataka. In order to understand various aspects of disease and pathogen in question, different experiments were carried out and results are briefed in the following paragraphs.

The disease was noticed in almost all potential onion growing tracts of Karnataka, AP and Maharashtra. Maximum white rot incidence of 56.25 per cent was recorded in Agricultural College, Dharwad Farm.

Thirty per cent soil moisture was found to be optimum for maximum saprophytic activity of *S. rolfsii*. Among the antagonistic rhizosphere fungi which were isolated by serial dilution technique when tested *in vitro*, maximum per cent inhibition of mycelial growth of *S. rolfsii* was seen with *Trichoderma harzianum* Rifai, followed by *Pencillium* sp. Maximum reduction of number of sclerotial bodies was recorded when *T. harzianum* and *T. viride* were inoculated 24 hours prior to the inoculation of *S. rolfsii*.

Ten important field crops tested against *S. rolfsii* took infection and showed typical collar/stem rot symptoms. *Scierotium rolfsii* isolates obtained from the foot rot/collar rot of groundnut, potato, tomato, bhendi and chilli when inoculated to onion showed typical white rot symptom.

Trichoderma harzianum reduced a maximum of 11.66 per cent disease intensity when bulbs were treated with the test fungus while least effect was seen with *Pseudomonas fluorescens*. Among the fungicides tested hexaconazole and propiconazole were found highly effective at all the concentrations tested in restricting the mycelial growth of *S. rolfsii* under laboratory conditions.

Drenching of 0.1 per cent hexaconazole reduced PDI to the extent of 92 per cent followed by propiconazole.

Out of eleven varieties and two genotypes Arka Pitamber showed least PDI when they were exposed to 2 per cent *S. rolfsii* inoculum. On the contrary, at 4 per cent all exhibited more than 60 per cent PDI.

SEED SCIENCE AND TECHNOLOGY

Influence of Provenance on Seed Quality and Storability in DCH-32 Hybrid Cotton

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1999

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Studies on influence of provenance on seed quality and storability in DCH-32 hybrid cotton were made in the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad during 1998.

Freshly harvested seeds of DCH-32 hybrid cotton produced during kharif 1998 were collected from 18 talukas belonging to five agro-climatic zones through the Karnataka State Seed Certification Agency, Bangalore.

The initial seed quality parameters viz., 100 seed weight, germination, seedling length, vigour index, seedling dry weight and field emergence were better with lower moisture content and electrical conductivity in seeds produced in Gadag, Bagalkot, Koppal, Kustagi and Ron talukas of Northern dry zone, Manvi taluka of North Eastern dry zone and Sira taluka of Central dry zone. While, all these seed quality parameters were lower with higher moisture content and electrical conductivity in seeds of

Chintamani and Srinivasapur talukas of Eastern dry zone and Hiriyur taluka of Central dry zone.

The storability studies indicated that seeds produced in Gadag, Bagalkot, Koppal, Kustagi and Ron talukas of Northern dry zone, Manvi taluka of North Eastern dry zone and Sira taluka of Central dry zone stored under ambient conditions in cloth bags maintained the germination above the seed certification standard (65%) upto 10th month of storage with high seedling parameters. While, seeds of Srinivasapur and Chintamani talukas of Eastern dry zone and Hiriyur taluka of Northern dry zone maintained viability only for six months.

Among different storage containers satisfactory germination was maintained upto 11th month in seeds stored in polythene bag and high density polyethylene bag and for eight months in seeds stored in cloth and gunny bags.

Effect of Planting Ratios and Nitrogen Levels on Growth, Seed Yield and Quality of Dharwad Sorghum Hybrid-3

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The field experiment with four planting ratios (female to male) viz., 2:1, 3:1, 2:2 and 4:2 and three nitrogen levels viz., 100, 125 and 150 kg per hectare revealed that the planting ratio did not significantly influence the plant height, leaf number and leaf area of the parental lines of DSH-3 sorghum hybrid, whereas, higher doses of nitrogen increased the plant height, number of leaves and leaf area. The significant reduction in 50 per cent flowering with 150 kg N per ha was observed in both the parental lines.

Higher hybrid seed yield was obtained with 2:1 planting ratio compared to other planting ratios mainly due to increased ear length (23.7 cm), ear width (4.0 cm), ear weight (33.2g), number of seeds per ear (374), threshing percentage (34.2), seed set (44.5%) and 1000 seed weight (11.48 g).

Increase in the nitrogen level from 100 to 150 kg N per ha increased hybrid seed yield from 573.1 kg to 800 kg per ha and it is due to increased values for ear length (22.6 to 23.3 cm), ear width (3.4 to 3.9 cm), ear weight (30.0 to 32.1 g), number of seeds per ear (282.2 to 327.0), threshing percentage (27.9 to 32.0), seed set 32.7 to 40.6% and 1000 seed weight (29.30 to 31.8g).

The planting ratios did not significantly influence the germination, shoot length, root length and vigour index. While, the germination percentage increased by 3 per cent with the application of 150 kg N per ha. The other seed quality attributes like shoot and root length, seedling dry weight and vigour index increased significantly due to additional doses of nitrogen application. The interaction effects due to planting ratios and nitrogen levels were nonsignificant for all the characters.

Seed Technological Investigations in Naturally Coloured Cotton Genotype, DDCC-1

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Investigations on standardisation of isolation distance, effect of foliar spray of chemicals and stages of picking on seed yield and quality and standardisation of sieve size of seed grading of naturally coloured cotton genotype, DDCC-1 were carried out at Agricultural Research Station, Dharwad during the year 1998-99.

The studies on isolation distance indicated that a distance of 7 m from colour cotton plots is found to be sufficient to produce Genetically pure seeds.

Results of foliar spray of chemicals indicated that, spraying of DAP @ 2% had resulted in significantly highest plant height, sympodial branches and number of bolls per plant followed by NAA (20 ppm) and cytozyme (0.1%). Foliar spraying of NAA significantly increased the seed yield followed by DAP, cytozyme and CuSO₄. Spraying of growth regulators and nutrients also significantly influenced the seed quality parameters. Significantly higher germination, shoot length, root length, field emergence and vigour index

were observed in plants sprayed with NAA followed by cytozyme and DAP.

The stages of picking showed significant influence on number of bolls harvested per plant, mean boll weight, seed index and number of seeds per boll and seed weight. All these parameters were significantly higher in first picking followed by second and third picking and nearly 89.0 per cent of seed yield was contributed by the first two pickings.

Picking stages were significantly influenced the seed quality parameters. In general, first picking seeds recorded significantly higher germination, field emergence, root and shoot length and seedling vigour compared to second and third picking seeds.

The studies on size grading indicated that, seed grading with 4.75 mm (R) sieve higher seed recovery (86.75%), germination (82.04%), field emergence (65.0%), root length (12.63 cm), shoot length (8.78 cm) and seedling vigour index (1752).

Investigations on Seed Production Techniques in Sugarcane (*Saccharum officinarum* L.)

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Investigations on effect of cane portion, number of eye buds on setts, age of the seedcane and growth regulators on performance of sugarcane were initiated at Karnataka Institute of Applied Agricultural Research, Semeerwadi on medium deep black soils during 1998-99 under irrigated conditions.

The Setts from top one third portion cane recorded significantly higher germination (69.70%) at 45 days after planting (DAP), number of millable canes (NMC) (94.610/ha), cane yield (104.58 t/ha) and sugar yield (11.84 t/ha) compared to setts obtained from middle one third portion.

Setts from top one third portion cane with single eye bud recorded significantly higher germination (74.5%) at 45 DAP. Whereas, setts from top one third portion cane with three eye buds significantly higher NMC (98,310/ha), cane yield (107.40 t/ha) and sugar yield (11.84 t/ha) compared to entire sugarcane.

Age of the seedcane influenced significantly on germination, NMC, cane and sugar yield. Six months old

seedcane recorded significantly higher germination (73.50%) at 45 DAP, while, nine month old seedcane recorded significantly higher NMC (1,00,830 t/ha) and cane yield (101.87 t/ha) whereas eight month old seedcane yielded significantly higher sugar (11.04 t/ha) compared to other treatments.

Polybag raised seedlings recorded significantly highest seedling survival (94.66%), NMC (97,030 t/ha) and cane yield (98.63 t/ha) compared to nursery raised seedlings.

Spraying of ethrel (100 ppm) at 15 days after transplanting (DAT) of polybag seedlings showed significantly higher seedling survival (95.67%). Further, it was indicated that setts dipped in ethrel (250 ppm) for 30 minutes and raised in polybag and sprayed with ethrel (100 ppm) at 15 DAT recorded significantly higher NMC (1102,000/ha), cane yield (106.13 t/ha) and sugar yield (10.71 t/ha) compared to direct planting of single eye bud sett.

Synchronisation Studies in Seed Production of Sorghum Hybrid : DSH-3

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The present investigation was carried out to study the influence of staggered sowing, additional nitrogen application to the soil in combination with urea spray and gibberellic acid on synchronisation of flowering in the parental lines, seed yield and quality of hybrid sorghum DSH-2 at Main Research Station, University of Agricultural Sciences, Dharwad from September, 1995 to January, 1996.

Sowing of female parent (SB401 A) four days early (S_1), four days late (S_2) to male parent (SB7001) and simultaneous sowing (S_0) with the male did not significantly influence the synchronisation of flowering, whereas, 50 per cent and complete flowering showed significant differences in female parent. Staggered sowing recorded higher stem girth, leaf area, leaf area index and dry matter production in female compared to male parent.

The application of fertilizer to male parent showed significant difference for initiation of flowering, 50 per cent flowering and complete flowering. The additional application

of nitrogen, GA_3 (250 ppm) and urea (2%) spray to male not only caused the earliness in flowering but also helped in increasing the plant height compared to female parent by 4cms, 15cms, and 7cms, at 30, 60, and 90 DAS, respectively, further at 30 DAS the increase in number of leaves per plant was 0.87 compared to female parent.

The difference in flower initiation between male and female parents was minimum in S_1F_1 combination (0.66 day) and followed by S_1F_2 (2.33 days). The similar trend was noticed in 50 per cent flowering, wherein treatment S_1F_2 was early by 1.84 days and it was followed by S_1F_4 (2.42 days) and for complete flowering studies, the male parent in the treatment combinations of S_1F_1 and S_2F_3 was early by 0.66 and 2.5 days compared to female parent.

The seed yield, yield parameters and seed quality of hybrid seed was not influenced either by staggered sowing or by fertilizer application and their interaction effects.

Effect of Fumigation on Seed Quality and Field Performance on Dicoccum Wheat (*Triticum dicoccum* L.)

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Studies on effect of fumigation on seed quality and field performance in dicoccum wheat Cv. DDK-1001 were made in the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad during rabi 1996-97. Wheat seeds were fumigated once and twice with ethylene dibromide at four dosage levels viz., 0, 2, 4 and 6 ml/kg of seeds. Once fumigated seeds recorded significantly higher germination percentage, field emergence and dry weight of seedling whereas root length, shoot length and seedling vigour index were numerically higher in once fumigated seeds. Among the dosages unfumigated seeds recorded higher values for germination, field emergence, root length, shoot length, dry weight of seedlings and seedling vigour index. The above fumigated seeds were subsequently sown early and late to study the influence of

fumigation on field performance. Once fumigated seeds recorded significantly higher initial plant stand, plant height, number of productive tillers, dry matter at harvest, number of spikelets per spike and seed yield whereas number of tillers, spike length, 1000 seed weight recorded in once fumigated seeds were numerically higher with less number of abnormal spikes and also took less days to 50 per cent heading and days to maturity. Among the dosages significantly higher values of initial plant stand, plant height, number of tillers, dry matter at harvest with less number of abnormal spike and days to 50 per cent heading were recorded by unfumigated seeds. Between the sowing dates early sowing recorded significantly higher values of all the growth parameters and seed yield, with significantly less number of abnormal spikes and days to 50 per cent heading.

Influence of Seed Treatment and Containers on Seed Quality During Storage in Chickpea

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The study on storability of chickpea cultivars (BG-256, Annigeri-1, ICCV-10, ICCV-2 and BG-267) seed treatment and containers on seed quality during storage in Cv. Annigeri-1 was conducted in the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad during 1998-99.

The freshly harvested seeds of BG-256, Annigeri-1, ICCV-10, ICCV-2 and BG-267 produced during rabi 1997-98 were stored for a period of twelve months under ambient conditions of Dharwad from May, 1998.

The seed quality decreased with increase in storage period in all cultivars. However, significantly higher germination (64%), speed of germination (13.5), root length (14.42 cm), shoot length (4.7 cm), vigour index (1338), seedling dry weight (170 mg/seedling) and lowest moisture content (10.7%) and electrical conductivity (0.950 d S/m) were recorded in BG-256 compared to other cultivars at the end of twelfth month of storage.

The percentage reduction in protein content (10.00%), fat (7.83%), seed density (4.63%) and carbohydrate content (6.45%) was lowest in BG-256 compared to other cultivars from initial to the end of storage period.

At the end of twelve months of storage period Cv. Annigeri-1 treated with malathion (1g/kg) + captan (2g/kg) recorded significantly higher germination (75.10%), speed of germination (15.12), root length (16.60 cm), shoot length (6.06 cm), vigour index (1687), seedling dry weight (171 mg/seedling) and lowest moisture content (9.53%) compared to other seed treatments.

Among the storage containers, polythene lined gunny bag recorded significantly higher germination (76.30%), speed of germination (16.01), root length (16.28 cm), shoot length (6.35 cm), vigour index (1723), seedling dry weight 171 mg/seedling and lowest moisture content (8.37%) compared to other containers at the end of storage period.

SERICULTURE

Studies on Extrafoliation of Aqueous Extracts of Few Botanicals on *Bombyx mori* L.

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1999

MAJOR ADVISOR : Dr. R.R. PATIL

Foliar supplementation of mulberry leaves with aqueous extracts of *P. hysterophorus* (20%) and *T. procumbens* (30%) improved all the economic traits of *B. mori* without extending larval duration. 20 per cent *P. hysterophorus* and 30 per cent *T. procumbens* recorded maximum larval weight before second, third, fourth moult and a day before spinning and differed significantly with water control. The ERR increased from 73.41 per cent (water control) to 87.08 and 85.58 per cent due to foliar supplementation of *P. hysterophorus* (20%) and *T. procumbens* (30%) respectively. Irrespective of the concentrations tested *P. hysterophorus* and *T. procumbens* recorded lowest larval mortality of 16.09 and 17.13 per cent compared to all other treatments. Supplementation of *P. hysterophorus* (20%) and *T. procumbens* (30%) were effective in bringing down the flacherie from 10.58 per cent (water control) to 5.09 and 7.83 per cent and grasserie from 13.00 per cent (water control) to 5.50 and 8.91 per cent, respectively. *P. hysterophorus* (20%) and *T. procumbens* (30%) recorded maximum cocoon weight of 19.38 and 19.56g, pupal weight of 15.88 and 15.78 g, shell weight of 3.76 and 3.67 g, shell ratio of 18.73 and 18.70 per cent, silk

filament length of 1006 and 991 m, silk filament weight of 0.257 and 0.225 g and lowest denier of 2.30 and 2.32 respectively compared to water control (17.28 g, 13.87 g, 2.96 g, 16.91%, 857 m, 0.237 g, and 2.49). Higher cocoon yield by weight and number/df was recorded due to extrafoliation of 20 per cent *P. hysterophorus* (337 g and 241) and 30 per cent *T. procumbens* (343 g and 242) compared to water control (303 g and 223). Foliar supplementation of 20 per cent Parthenium and 30 per cent Tridax effected maximum food consumption (1.90 and 1.87 kg/5.25 kg) food utilisation (1.00 and 0.980 kg), fecal matter voided (0.891 and 0.888 kg) and CFU values (53.16 and 52.38%) and were significantly superior to water control. Though extrafoliation of *T. procumbens* (30%) and *P. hysterophorus* (20%) increased fecundity, none of the plant products could improve the hatchability. The response of NB₁₈ breed was better than the PM X NB₁₈ to extrafoliation of plant products with respect to silkworm growth and development, food consumption and all the economic parameters except ERR, fecundity, cocoon yield by number and disease incidence.

AGRICULTURAL EXTENSION EDUCATION

A study on Knowledge and Adoption Behaviour of Rainfed Maize Growers in Jammu District of Jammu and Kashmir

LAKSHMI KANT

1999

MAJOR ADVISOR: Dr. D.M. CHANDARGI

The study on knowledge and adoption behaviour of rainfed maize growers was conducted in Akhnoor taluka of Jammu district in Jammu and Kashmir state. Among the 6 villages selected purposively, 150 farmers were selected by following random sampling procedure and data were collected by personal interview method.

The major findings of the study were ; majority of the respondents possessed medium level of knowledge (70.0%) and belonged to medium adoption category (68.66%). Very few of the respondents (26.0%) had adopted the recommended varieties and -only 12.0 per cent of the respondents were treating the seeds. As regards to seed rate, 62.0 per cent of the respondents were using recommended seed rate. Almost all the respondents (98.66%) had sown the crop as per recommended time of sowing. Majority of the respondents (65.33%) had sown the seed by broadcasting method and remaining (34.67%) followed line to line method of sowing. A large majority of the respondents (92.67%) applied F.Y.M. Regarding fertilisers 86.0 per cent of the respondents applied nitrogen, 60.66 per cent applied phosphorus and only 14.0 per cent

applied potassium to the field. Regarding the adoption of the plant protection measures, cent per cent of the respondents were non-adopters.

A considerable percentage of the farmers were educated upto middle school. Over half of the respondents (56.67%) had land holding between 2.6 to 7.5 acres. A positive and significant relationship was observed between level of knowledge, adoption and socioeconomic characteristics viz. education and mass media exposure. The relationship of yield was positively significant with the knowledge and adoption level of respondents.

The major constraints in rainfed maize cultivation as expressed by the respondents were, unreliability of monsoon (100.0%), non-availability of inputs in time (97.33%), high cost of inputs (90.0%), lack of finance (82.0%) and non-availability of F.Y.M. (79.33%), as major constraints in rainfed maize cultivation. Other constraints expressed were lack of knowledge (68.66%) and hybrids not suitable under adverse conditions (64.66%).

A Study on Knowledge and Adoption Behaviour of Grape Growing Member Farmers of Maharashtra Rajya Draksha Bagaitdar Sangh, Solapur

BIRAJDAR SOMSHEKHAR, R.

1999

MAJOR ADVISOR : Dr. M.R. ANASARI

The study on knowledge and adoption behaviour of grape growing member farmers of Maharashtra rajya draksha bagaitdar sangh, Solapur was carried out in Maharashtra during 1998-99. By following proportionate random sampling 160 member farmers were selected and data were collected by personal interview method.

The important findings of the study were., majority of the grape growers had medium level of knowledge about recommended practice of grape cultivation. Nearly fifty four per cent of grape growers adopted Thompson seedless variety. Spacing was adopted by majority of grape growers. Majority of the grape growers applied nitrogenous fertilizers close to recommended dose and nearly 42.0 and 50.0 per cent of grape growers applied phosphatic and potassic

fertilizers close to the recommended dose during summer season. Where as in winter season 80.62, 67.56 and 55.00 per cent of grape growers applied nitrogenous, phosphatic and potassic fertilizers close to the recommended dose. Drip irrigation method was followed by majority of the grape growers. 42.50 per cent of the grape growers prepared raisin, cent per cent of them followed cold dip method.

All the grape growers were literate and majority belonged to middle age. Nearly 90.0 per cent of grape growers possessed land between 10-30 acres. While majority of grape growers were having medium level of extension participation, mass media participation, social participation, economic motivation, risk orientation and scientific orientation. The total maintenance cost incurred

on one acre of grape garden was Rs.39,222.00, of which Rs.27,859.00 and Rs.11,363.00 were incurred on inputs and labour with a gross income of Rs.1,14,147.00 per acre.

A positive and significant relationship was observed between knowledge level and socioeconomic characteristics like age, education, extension participation

mass media participation, social participation and scientific orientation.

The major constraints in grape production faced by more than 50.0 per cent of the grape growers were high cost of fertilizers, plant protection chemicals, irregular supply of electricity for irrigation and rain during pollination and harvesting stages.

A Study on Knowledge, Cultivation Practices Followed and Marketing Behaviour of Sweet Orange Growers in Nanded District, Maharashtra State

KADAM RAJESH PARBHATRAO

1999

MAJOR ADVISOR: Dr. J.G. ANGADI

The study on knowledge, cultivation practices followed and marketing behaviour of sweet orange growers was conducted during the year 1998-99 involving 160 farmers from Nanded and Kandhar talukas in Nanded district of Maharashtra State.

The important findings of the study were, a majority of the respondents (68.13%) had medium level of knowledge about recommended practices of sweet orange cultivation. Eighty five per cent of the sweet orange growers adopted nucellar variety. Recommended spacing was followed by 98.12 per cent of the respondents. More than half the number of sweet orange growers (51.25%) used recommended filler materials in the pit. A majority of the respondents (65.62%) had applied nitrogen below 450 gm/plant, whereas phosphorous was applied by 58.75 per cent of respondents above 315 gm/plant and 53.75 per cent of the respondents had applied potash below 220 gm/plant. Check basin method of irrigation was followed by 87.50 per cent of the sweet orange growers. Nearly cent per cent of the sweet orange growers was literate of which 67.50 per cent belonged to middle age group. Nearly 68.12 per cent of the respondents possessed land between 10-30 acre, while 63.12 per cent of the sweet orange growers

were having medium level of mass media participation, social participation, extension participation, risk orientation, scientific orientation and economic motivation. The total maintenance cost incurred on one acre of sweet orange garden was Rs.5,920-00.

A positive and significant relationship was observed between knowledge level of sweet orange growers and mass mediaparticipation, social participation, extension participation, economic motivation, scientific orientation and risk orientation. Age was negatively significant with knowledge level of the respondents.

Cent per cent of the respondents sold sweet orange through auction in different market places. Seventy six per cent of the respondents collected information on market price from those who visited market. The major constraints faced by sweet orange growers in cultivation and marketing of produce were, high cost of transportation change (87.50%), high cost of plant protection chemicals (79.37%), high cost of fertilizers and manures (78.12%), low price of produce if given on lease basis 70.62% and non-availability of fruit processing unit (57.50%),

A Study on Opinion of Women Beneficiaries Towards DWCRA and Benefits Derived in Vizianagaram District - AP

USHA RANI, R.

1999

MAJOR ADVISOR : Dr. M.R. ANSARI

DWCRA scheme was launched in Vizianagaram district of Andhra Pradesh during 1998-99. So far about 2003 groups of rural women were provided with revolving fund. The study was conducted during the year 1998-99 in Parvatipuram division of Vizianagaram district. Based on

the criteria of maximum number of beneficiaries, 4 mandals and 16 villages from these four mandals were selected. From each selected village, 10 beneficiaries were selected randomly thus the total sample size was 160.

A majority of the women beneficiaries were having favourable opinion towards various aspects of DWCRA like general, procedural, financial and employment whereas, 66 per cent had unfavourable opinion towards marketing aspects under DWCRA and also about provision of material help. 70.63 per cent of the women beneficiaries had medium level of knowledge about various aspects of DWCRA. Nearly 26.25 per cent of the women beneficiaries had taken-up vegetable vending. Maximum income of Rs.8,400-00 was generated from tailoring by two women beneficiaries. A majority of the women beneficiaries were grouped under income level of Rs. 1001 to 2000 and 2001 to 3000 rupees.

Regarding personal, socio-psychological and economic characteristics of the women beneficiaries 56.75 per

cent belonged to young age group and 65 per cent of them were illiterate. Nearly 91.87 per cent of the them were landless. Only 36.25 per cent of women beneficiaries were members of Mahila Mandal. Three fourth (72.50, 75.00%) of the women beneficiaries possessed medium level of achievement motivation and self confidence.

Education, family size, social participation, mass media exposure, self confidence and sources of information had positive and significant relationship with knowledge of women beneficiaries about DWCRA.

Major problems encountered by the women beneficiaries were less loan amount, difficult to maintain group, marketing of produce. Common suggestions made by them were to increase the loan amount, single outlet for marketing of produce and to provide subsidy.

A Profile Study of Farm Opinion Leaders and Their Followers in Guntur District of Andhra Pradesh

RAMA KRISHNA, K.

1999

MAJOR ADVISOR: Dr. D.M. CHANDARGI

The study was conducted during the year 1998-99 in the purposively selected Bapatla mandal of Guntur district in Andhra Pradesh. Out of 20 villages in Bapatla mandal, 2 villages Murukondapadu and Bhartipudi were selected on progressiveness criteria as progressive and nonprogressive villages respectively. Six opinion leaders and 48 followers from each village were selected based on sociometric scores. Selected opinion leaders and followers were interviewed to know their personal, socioeconomic and psychological characteristics and to assess their knowledge and adoption regarding rice cultivation practices.

The major findings of the study were : The concentration of sociometric score of the best perceived opinion leader was higher with sociometric score of 318 in the non-progressive village, than that in the progressive village where the best perceived opinion leader had sociometric score of 79 only.

In non-progressive village, 50.00 per cent each of the opinion leaders had middle school and high school levels of education. In progressive village majority of the opinion leaders (83.33) had high school level of education. Majority of the followers in non-progressive and progres-

sive village had lower educational levels compared to opinion leaders.

Majority of the opinion leaders in non-progressive village (66.67%) and in progressive village (83.33%) belonged to middle age group. Among the followers 66.67 per cent in non-progressive village and 62.50 per cent in progressive village were in middle age group. In both villages, majority of the opinion leaders had medium to high levels of participation in formal organizations, cosmopolitaness, mass media participation, extension participation, extension contact, innovative proneness, economic motivation, scientific orientation and risk preference whereas, the followers belonged to medium to low level.

In non-progressive and progressive villages, majority of the respondents (81.48% and 68.52%, respectively) had medium level of knowledge regarding recommended cultivation practices of rice.

In non-progressive village and progressive village, majority of the respondents (72.22% and 53.70%, respectively) had medium level of adoption regarding recommended cultivation practices of rice.

AGRICULTURAL ECONOMICS

An Economic Analysis of Integrated Pest Management in Cotton in Raichur District, Karnataka

M.S. VEERAPUR

1999

MAJOR ADVISOR: Dr. L.B. HUGAR

The study on economics of integrated pest management technology in cotton production in Raichur district of Karnataka was taken up where large scale demonstrations were carried out by the scientists of University of Agricultural Sciences (Dharwad), Raichur campus in collaboration with Karnataka State Department of Agriculture and Cotton Corporation of India. During the demonstration year of 1997-98, the total cost of cultivation of cotton in IPM farmers was 21.11 per cent less than Non-IPM farmers mainly due to savings (67.19%) in plant protection chemicals. This savings (Rs.5,662/ha) when projected to the area under cotton in Raichur district (43,255/ha) would amount to Rs.24.48 crores annually. The net returns in IPM farmers (Rs.29,783.44/ha) was significantly higher than Non-IPM farmers (Rs.16,803/ha) mainly due to increase in yield (16.62%) on one hand and decrease in total cost of cultivation on the other. The analysis of resource use efficiency indicated that the plant protection chemicals significantly influenced the yield on cotton in IPM farmers, while it was negative and non-significant in the case of Non-IPM farmers. Further, the ratio of MVP to MFC being 00.98 clearly indicated that the plant protection chemicals were optimally used by IPM farmers. In the case

of Non-IPM farmers, not only the regression coefficient of plant protection chemicals was negative (-0.15) but also the ratio of MVP to MFC was less than one indicating its excessive use. The decomposition analysis revealed that the net contribution of IPM technology in promoting output was 32.73 per cent and it declined to 16.89 per cent in the subsequent year. In the second year of the study (1998-99) when the agencies supporting the IPM demonstration were withdrawn, the extent of adoption of IPM components declined while use of chemical pesticides increased resulting in decline in yield (7.96%) and net returns (24.91%). Non-availability of IPM components was the major reason for non-adoption followed by withdrawal of regular technical know-how from University of Agricultural Sciences/Karnataka State Department of Agriculture and non-supply of inputs by demonstrating agencies. Therefore, it is suggested to strengthen the existing system with the subject experts under Karnataka State Department of Agriculture as well as University of Agricultural Sciences, Dharwad to take up regular monitoring of cotton pests and consultancy along with establishment of production units for multiplication and distribution of IPM components for effective management of pests in cotton.

AGRI BUSINESS MANAGEMENT

Management of Agro-Processing Industries in Karnataka - A Case Study of Turdal Industry

MAHESH V. CHIDRI

1999

MAJOR ADVISOR: J.S. SONNAD

Tur being most important pulse crop of tropical and sub-tropical regions of the world, ranks second next to bengalgram in India. In India there are about 10,000 (1996-97) processing units spread over in several states and nearly 90% of them are under small-scale sector. In Karnataka, there are 160 tur processing units working.

Ineffective management on the part of the processors has led to the failure or poor performance of many tur-processing units. Therefore the present study attempts to identify the managerial lapses and the problems faced by

them in order to evolve appropriate policies for improving efficiency. Thirty tur processing units in Gulbarga district of Karnataka were selected. Further they were categorised into small and large based on their installed capacity. The primary data was collected for the year 1997-98.

The investment in both category of tur processing units is financially viable and economically feasible. Totally Three patterns of tur procurement were noticed. Procurement of tur was maximum during the months of February and March. The cost of carrying inventory per quintal of tur