

Agricultural Entomology

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the

Department of Agricultural Entomology

1. Population Dynamics, Varietal Screening And Management Of Pod Borers In Soybean

(Bharath, N. A.) ABSTRACT

The present investigation was carried out on "Population Dynamics, Varietal Screening and Management of Pod Borers in Soybean'' under field conditions during *Kharif*, 2021 at ZAHRS, Bavikere. During the investigation, three species of pod borers viz., Cvdiaptvchora, EtiellazinckenellaandMarucavitratawere noticed. Among them, highest per cent of pod damage was recorded in C. ptychora, followed by E. zinckenellaand M. vitrata. Correlation studies with different weather parameters revealed that C. ptychora, E. zinckenellaand M. vitratashowedsignificant positive correlation with maximum temperature and non-significant positive correlation with minimum temperature, rainfall and sunshine hours, whereas, morning and evening relative humidity showed non-significant negative correlation. Out of nine soybean varieties screened against pod borers, Hardee found highly resistant, DSb 21, DSb 23, KBS23 and MAVS2 were found moderately resistant, JS 335, KHSB2 and Karune were found intermediate. KB79 variety was susceptible to pod borers. Phenols attribute significant negative correlation on pod damage, in highly resistant and moderately resistant varieties indicating antibiosis as positive correlation with crude protein and total sugar. Among the insecticides evaluated chlorantraniliprole 18.5 SC @ 0.25 ml/l at 60 and 75 days after sowing was effective in the management of pod borers with highest seed yield (2389 kg/ha) and C: B ratio of 1:3.4, followed by indoxacarb 15.8 EC @0.66 ml/l.

November, 2022

(Shivanna B K) Major Advisor

2. Insect Pest Complex Of Cashew With Special Reference To Leaf Miner, *Acrocercops syngramma* meyrick (Lepidoptera: Gracillariidae)

(CHETHANA, O.)

ABSTRACT

The study onInsect Pest Complex of Cashew with Special Reference to Leaf miner, AcrocercopssyngrammaMeyrick (Lepidoptera: Gracillariidae)was carried out at Zonal Agricultural and Horticultural Research Station, Shivamogga and Agricultural and Horticultural Research Station, Bavikere during 2021-22.Out of 22 species of insect pests recordedon cashew during the study period, leaf miner, A.syngramma, tea mosquito bug, Helopeltis spp. and thrips, Scirtothripsdorsalis(Hood) were found as major.A.syngrammawas predominant with a peak population of 4.54 larvae per 20 leaves during fourth week of November with highest per cent leaf incidence of 22.70. Helopeltis spp. was found at new flushing and panicle stage with peak activity during second week of December with 6.50 bugs per 20 shoots with peak per cent shoot incidence of 32.75. S. dorsalis occurred both at panicle and nut stage with peak population during third week of February (6.70 thrips per 20 panicles) and peak per cent nut incidence on nut surface during first week of April (33.75 %). Out of the fourteen cashew cultivars screened for their resistance/susceptibility, the lowest mean number of leaf miner larvae and per cent leaf incidence were observed on Ullal-2 (1.49 larvae and 7.45%, respectively) and was rated as resistance to leaf miner. The minimum per cent shoot incidence and mean damage score of TMB were recorded on Amruth (11.10 % and 1.24, respectively) and was rated as moderately susceptible to TMB. The least per cent nut incidence and mean damage score of thrips were recorded on Ullal-1 (10.21 % and 1.04, respectively) and was rated as susceptible to thrips. Out of the six insecticides evaluated for leaf miner, lambda cyhalothrin 2.5% EC @1 ml per litre was found to be statistically superior with mean larvae of 1.90 per 20 leaves and 83.39 per cent reduction over control.

November, 2022

(Jayalaxmi Narayan Hegde) Major Advisor

3. Relative Toxicity And Efficacy Of Different Insecticides Against Brinjal Shoot And Fruit Borer, *Leucinode sorbonalis* (Guenee)

(G. Virupaksh Reddy) ABSTRACT

An experiment was conducted under *invitro* and field conditions at Organic Farming Research Centre (OFRC), Navile, Shivamogga to investigate six different insecticidesagainstBrinjal Shoot and Fruit Borer (BSFB), Leucinodesorbonalis (Guenee). Fruit dip bioassay method was followed to evaluate the relative toxicity of different insecticides against BSFB. While, chlorantraniliprole was found 11.98, 10.16, 7.19, 3.72and 1.59 times more toxic when compared to fenpropathrin, malathion, cypermethrin, flubendiamideandspinosad, respectively. While the persistence of chlorantraniliprole 18.5 SC against the larvae of BSFB was able to continuously reduce the larval population up to 11 Days After Spray (DAS)and PT₅₀ was around 7 days. It was followed by spinosad and flubendiamide with PT₅₀ of 6 days and 4.5 days, respectively underlaboratory conditions. In case of field conditions, all the insecticides were effective in reducing the shoot and fruit borer infestation resulting in increased marketable fruit yield over the untreated control. Among the different insecticides, The lowest mean shoot as well as fruit infestation were recorded in the experimental plots treated with chlorantraniliprole 18.5 SC at 0.4 ml/Lwith highest fruit yield of 17.24 t/haand C: B ratio of 1:3.48, which was followed by spinosad 45 SC at 0.38 ml/L with fruit yield of16.44 t/haand C: B ratio of 1:3.27 over the untreated control.

November, 2022

(S. Pradeep) Major Advisor

4. Population Dynamics And Management Of Whitefly, Bemisia tabaci (Gennadius) (Hemiptera: Aleyrodidae) In Tobacco

(Lavanya, B. N.) ABSTRACT

The present investigation was carried out on Population dynamics and management of whitefly, Bemisiatabaci(Gennadius) (Hemiptera: Aleyrodidae) in tobaccounder field condition during 2021-22 at All India Network Project on Tobacco, Zonal Agricultural and Horticultural Research Station, Navile, Shivamogga. During the investigation, Spodopteralitura, Bemisiatabaci, Helicoverpaarmigera, Myzuspersicae and *Trichoplusiani*were found damaging the crop. Out of the sixteen tobacco cultivars screened against whitefly infestation, five cultivars viz., Aurea, Sahyadri, Kanchana, Thrupthi and FCS-4 were proved resistant, four cultivars viz., NC-37-NF, SPEIGTT-G-28, DELCRAST-66 and RG-13 were found to be moderately resistant and remaining seven cultivars viz., Rhomas-7, REAM-151, TANTA, VA-509, VA-310, VA-21 and VA-770 were found moderately susceptible to whitefly infestation. A negative effect of trichome density on the leaf curl disease was found in resistant and moderately resistant cultivars inducing resistance to whitefly incidence, whereas leaf length, leaf width, number of leaves per plant and leaf thickness were positively correlated with the leaf curl disease. The biochemical analysis of tobacco cultivars for resistance to whitefly incidence revealed that phenols, tannins and chlorophyll had a significant negative influence on leaf curl disease exerting a direct antibiosis effect on whiteflies, while total sugar was positively associated. Among the different modules evaluated, the integrated module (Spray of seedlings with imidacloprid 0.3 ml/litre one day before planting + maize as a barrier crop + two sprays of neem oil 10,000 ppm @ 2ml/litre at 20 and 30 DAT + one spray of imidacloprid 17.8 SL @ 0.3 ml/litre at 40 DAT) was found to be most promising with lowest mean whitefly population and highest cost benefit ratio of 1:2.61 followed by chemical and bio-intensive module.

December, 2022

(Rajashekharappa, K) Major Advisor

5. Insect Pest Complex Of Tef, *Eragrostis tef* (Zuccagni) Trotter With Special Reference To The Management Of Shoot Flies

(Madhu, G. A.)

ABSTRACT

A field experiment was conducted during 2021-22 at College of Agriculture, Shivamogga to study the insect pest complex of tef and management of shoot fly (Atherigonapulla) through different seed treatment and foliar spray insecticides.Pests like shoot fly, leafhopper, grasshopper and gundhi bug were found to infest the tef crop. Among them, shoot flywas the major pest, causing 40 to 60 per cent of damage, hence the management of shoot fly was necessiated. Shoot fly found to infest the tef during early and later stages of crop. For the management of early incidence five insecticides selected for seed treatment werechlorantraniliprole 625 FS @ 4ml/kg, thiomethoxam 30 FS @ 10ml/kg, thiomethoxam 19.5 FS+ cyantraniliprole 19.5 FS @ 4ml/kg, imidaclorpid 600 FS @ 4ml/kg, chlorpyriphos 20 EC @ 5ml/kg and untreated control. The results revealed that the seeds treated with imidacloprid 600 FS @ 4ml/kg recorded significantly lowest incidence of dead heart (14.96%) with highest grain yield (191 kg/ha). Least grain yield was recorded in control plot (98kg/ha). For later stages of crop growth seven insecticides selected for foliar spray were cypermethrin 10 EC @ 0.5ml/l, dinotefuran 20 SG 0.3ml/l, imidacloprid 17.8 SL @ 0.3ml/l, fipronil 5 SC @ 2ml/l, flonicamid 50 WG @ 0.3ml/l, clothianidin 50 WDG @ 0.5g/l and thiamethoxam 25 WG @ 0.25g/l were used with control. The treatment sprayed withimidacloprid 17.8 SL @ 0.3ml/l significantly reduced the incidence of dead hearts (5.92 and 7.15/m²)during first and second spray) and recorded highest grain yield (195 kg/ha). Whereas, significantly lowest grain yield was recorded in control plot (96 kg/ha). Hence, imidacloprid 600 FS @ 4ml/kgas seed treatment and imidacloprid 17.8 SL @ 0.3ml/l as foliar spray can be recommended for the management of tef shoot fly.

November, 2022

(S. U. Patil) Major Advisor

6. Bioefficacy Of Sand Mixed Chlorantraniliprole 18.5 Sc Against Fall Armyworm, Spodoptera frugiperda (J. E. Smith) (Lepidoptera: Noctuidae) In Maize

(Meghana) ABSTRACT

The effect of whorl application of sand mixed chlorantraniliprole 18.5SC on the fitness of Fall Armyworm (FAW), Spodopterafrugiperda(J. E. Smith) was evaluatedat College of Agriculture, Shivamogga during Kharif- 2021 and rabi- 2022. The studies mainly focused on the effect of lethal and sublethal concentrations of sand mixed chlorantraniliprole on reproductive biology in laboratory. In addition, whorl application of different concentrations of sand mixed chlorantraniliprole was evaluated in field for their efficacy and to compare with the recommended foliar spray (0.4ml/L). The treatment with 0.4ml/kg sand mixed chlorantraniliprole recorded increased mean mortality (75.93%), decreased foliar consumption (73.13 cm²), pupal weights of male and female (0.169 mg and 0.170mg, respectively), fecundity (737.83) and hatchability (35.59%) compared to foliar spray. Under laboratory condition, maximum of three spermatophores per female were observed but majority of females had lesser mating frequency (55.35%). Chlorantraniliprole at 0.4ml as sand mixed whorl application also reduced the number of egg masses and mean number of eggs per mass (0.66 and 25, respectively). In field experiment, sand mixed chlorantraniliprole at 0.4ml/kg and 0.5ml/kg were the most effective in recording the highest grain yield (58.72 and 58.84 g/ha, respectively) and cob length (17.79 and 17.63 cm, respectively), which alsorecorded the highest C: B ratio of 1:2.80 than 1:2.77 in 0.5ml/kg of sand. Sand mixed chlorantraniliprole at 0.4ml/kg was found to be effective and can be used as alternative to foliar spray for managing the fall armyworm.

November, 2022

(Kalleshwaraswamy, C. M) Major Advisor

Studies On The Legume Pod Borer Complex On Yardlong Bean (Vigna unguiculata Sub Sp. Sesquipedalis)

(Nuzhat Banu Didgur) ABSTRACT

The present investigation was carried out on 'Studies on the legume pod borer complex on Yardlong bean, Vignaunguiculatasubsp. sesquipedalis' under field condition during 2020-21 at AHRS, Bavikere, KSNUAHS, Shivamogga. During the investigation, three species of pod borers viz., spotted pod borer, Marucavitrata, gram pod borer, Helicoverpaarmigera and blue butterfly, Lampidesboeticus were found damaging the crop. Out of the fifteen vardlong bean genotypes screened, two genotypes viz., IC-622570 and IC 622574 were proved highly resistant, two genotypes viz., ICMTYLB 33 and IC 622567 were found to be moderately resistant, two genotypes IC 622569 and IC 622559 were proved intermediate and remaining nine genotypes viz., MTYLB-48, MTYLB-49, IC 822571, IC 622566, IC 622561, IC 622562, IC 622557, IC 622586, IC 622589 were found susceptible to pod borers. A negative effect on the pod damage was found in highly resistant and moderately resistant genotypes indicating the involvement of morphological attributes viz., pod wall thickness, trichome density and number of pods per plant inducing resistance to pod borers, whereas pod length, pod girth and number of seeds per pod were positively correlated with the pod damage. The biochemical analysis of yardlong bean for resistance to pod borers revealed that phenols ($r = -0.819^{**}$) had a significant negative influence on pod damage exerting a direct antibiosis effect on pod borers, while crude protein and total sugar were positively associated. Among the insecticides evaluated spinetoram 11.7 SC @ 0.40ml/l was found effective against Marucavitrata and Lampidesboeticus, whereas, chlorantraniliprole 18.5 SC @ 0.30 ml/l was proved effective against Helicoverpaarmigera, by recording the lowest mean larval population. The cost benefit ratio was highest in spinetoram 11.7 SC @ 0.40 ml/l (1:4.43) treated plots.

January, 2022

(Rajashekharapa, K.) Major Advisor

8. Evaluation Of Rice Husk Biochar As A Source Of Silicon Against Fall Armyworm, Spodoptera frugiperda (J.E.Smith) (Lepidoptera: Noctuidae) On Maize

(Pavani, P. S.) ABSTRACT

The current study on the evaluation of rice husk biochar as a source of silicon against fall armyworm, Spodopterafrugiperda(J. E. Smith) (Lepidoptera: Noctuidae) on maize was carried out during 2021-22under laboratory and field conditions. Rice husk biochar as a source of silicon and imidazole, a silicon carrier and solubilizer were evaluated alone and in combinations. The larvae fed on plants treated with rice husk biochar at 10g/plant and imidazole at 0.102mg exhibited wear in the mandibles, lowered larval weight, larval survivability, pupal weight and pupal survivability. Rice husk biochar and imidazole when used in combination also significantly reduced the fecundity, fertility and adult longevity. The pooled data of Kharif2021 and Rabi2021-22 revealed that the effect of rice husk biochar and imidazole on the field incidence on number of larvae per plant was lowest in rice husk biochar at 4.8kg/ plot +0.59g/plot (0.38 number of larvae/ plant) with the highest per cent (74.50%) reduction over control. Similarly, the lowest damage score (2.22) and the per cent infestation in rice husk biochar at 4.8kg/plot +0.59g/plot(60.79%) with the highest per cent reduction over control (32.84%) was recorded. A significant increase in plant height, stem diameter, chlorophyll content, fresh and dry weight of shoot was observed in plants treated with rice husk biochar and imidazole in combination. There was a significant increase in cob girth and seed test weight.Significantly higher yieldwas recorded in rice husk biochar at 4t/ ha + imidazole at 40.8g/ ha (65.89 g/ha pooled data of both *Kharif* and *Rabi* season). Among the different treatments, rice husk biochar at 4t/ ha + imidazole at 40.8g/ ha was found to be the superior with maximum cost benefit ratio about 1:1.49 (pooled data of both Kharifand Rabi season).

November, 2022

(Onkarappa, S) Major Advisor

9. Prospects Of Using Entomopathogenic Nematodes Against Invasive Fall Armyworm, Spodoptera frugiperda (J. E. Smith) In Sweet Corn

(Ratnakala) ABSTRACT

Fall armyworm (FAW), Spodopterafrugiperda(Lepidoptera: Noctuidae) feeds in the whorl region of sweet corn, this behaviour renders protection against foliar spray of insecticides. Entomopathogenic nematodes (EPNs) are potential biocontrol agents and available in various formulation. In laboratory, bio efficacy study revealed that treatment of Heterorhabditisindica and Steinernemacarpocapsae@ 500 infective juveniles (IJs) per larva caused 100% mortality in all larval instars. In second to sixth instar cadavers, EPN penetrated the host (10.95 to 24.93%) and reproduced within the cadaver body (7758.33 - 99561 IJs/ larva). EPNs also had significant effect on the pupae with 30.00-71.67% mortality and 43.33-100% of the emerged adults from EPN-treated pupae had deformed wings and died with 48 h post-eclosion. A preliminary study on effect of EPN application on FAW was carried out undergreenhouse conditions, application of H. indica and S. carpocapsae @ 500 IJs per five g of sand to whorl of sweet corn against third instar induced mortality of 86.67 and 83.33%, respectively. Further, field evaluations were carried out at two different locations. Application of S. carpocapsaeat 500 IJs per five g of sand to the whorl region of sweet corn at 25 and 40 days after sowing was proved to be effective. It significantly reduced the larval population (0.13 during Kharif-2021 and 0.25 during Rabi-2021-22), leaf damage score (2.33 during Kharif-2021 and 2.37 during Rabi-2021-22) and increased cob yield were observed (20.19 t/ha). It was statistically on par with whorl application of chlorantraniliprole18.5 SC (0.4ml/ Kg of sand) that was taken as check against S. frugiperda. Both greenhouse and field studies of whorl application of sand mixed EPNs showed significant reduction in larval population and leaf damage. Hence, EPNs can be used as an eco-friendly option for management of fall armyworm.

November, 2022

(Kalleshwaraswamy, C. M) Major Advisor

10. Population Dynamics And Management Of Rugose Spiralling Whitefly, *Aleurodicus rugioperculatus* martin (Hemiptera: Aleyrodidae) On Coconut

(Rohini, K. O.) ABSTRACT

The study on population dynamics of rugosespiralling whitefly (RSW), AleurodicusrugioperculatusMartin (Hemiptera: Aleyrodidae) was carried out at College of Agriculture, Shivamogga and Agricultural and Horticultural Research Station, Bavikere during 2020-21. During the survey, three whitefly species viz., RugoseSpiralling Whitefly Aleurodicusrugioperculatus, (RSW). Bondar's nesting whitefly (BNW). Paraleyrodesbondari and Nesting whitefly, Paraleyrodesminei were recorded in five taluks of Shivamogga district viz., Shivamogga, Shikaripura, Thirthahalli, Sagara and Hosanagara. Though distribution the of P. minei was reported from all the surveyed places, the intensity of infestation was negligible. Among the five taluks surveyed, Shivamogga recorded the highest mean population of whiteflies on coconut with 5.07±1.01colonies/ leaflet, while the lowest mean population of whiteflies was recorded in Hosanagara (1.71±0.74). The intensity of infestation of A. rugioperculatus was found high in Shivamoggataluk (70.50%) with an infestation index of 2.03 and was lowest in Hosanagara (10.70%) with an infestation index of 0.50. In case of P. bondari, the high intensity of infestation was recorded in Shivamoggataluk (80.50%) with an infestation index of 2.70 and was lowest in Hosanagara (20.70%) with an infestation index of 0.70. The study on seasonal incidence of RSW and BNW at College of Agriculture, Shivamogga revealed that the mean number of colonies of both RSW and BNW reached peak with 6.58 and 24.81/ leaflet, respectively during 12th standard week with a rise in temperature. In the present study, seven natural enemies were recorded from the whitefly infested palms. Out of the six organic insecticides evaluated for the management of both the whitefly species at College of Agriculture, Shivamogga, Azadirachtin 10,000 ppm @ 2 ml/l was found superior over other treatments by recording the highest per cent reduction of colonies of both RSW (88.92) and BNW (90.56).

February, 2022

(Jayalaxmi Narayan Hegde) Major Advisor

11. Studies On Yield Loss Estimation And Management Of Fall Armyworm, Spodoptera frugiperda (J. E. Smith) On Maize

(Sanga Thejaswini) ABSTRACT

The Fall Armyworm (FAW), Spodopterafrugiperda (J. E. Smith) is a polyphagous and highly mobile migratory pest. The concept of Economic Injury Level (EIL) serves as the economic foundation in decision making. Thus, the present investigation was carried out to study the yield loss, calculation of EIL and management of the recently invaded pest, S. frugiperda. The experiments were carried out at Department of Entomology, College of Agriculture, Shivamogga, Karnataka. The highest yield loss of 55.99 and 53.79 per cent was observed from control, when compared to three and two sprays protected plots, respectively and these per cent yield loss can be avoided by protecting the crop through sprays at 20 and 30 days after sowing (DAS). The EIL worked out from the two seasons data were 2.6, 3.0 and 6.1 larvae per 10 plants at 15, 25 and 35 DAS, respectively and an overall, 3.9 larvae per 10 plants upto 35 DAS. From the EIL, the ETL calculated was 1.9, 2.2 and 4.6 larvae per 10 plants at 15, 25 and 35 DAS, respectively and the overall ETL was 2.9 larvae per 10 plants. Among the insecticides tested, higher ovicidical effect was found with profenophos 50EC and thiodicarb 75 WP under both field (13.57 and 25.95 %) and laboratory conditions (13.42 and 20.76 %). But, the efficacy of profenophos 50 EC and thiodicarb 75 WP was low under field conditions, recording the highest mean number of larvae per plant (1.33 and 1.23). Emamectin benzoate 5 SG, chlorantraniliprole 18.5 SC and novaluron 5.25 + emamectin benzoate 0.9 SC were found to control the larval load (0.80, 1.11 and 1.16 larvae/plant, respectively) effectively under field conditions and also found to have ovicidal effect (49.10, 54.58 and 55.03 %, respectively).

November, 2022

(Hanumanthaswamy, B. C.) Major Advisor

12. Quantification And Dissipation Of Seed Treatment And Foliar Insecticides Against Fall Armyworm, *Spodoptera frugiperda* (J. E. Smith) On Maize

(Shivaprasadmaranabasari)

ABSTRACT

The Fall Armyworm (FAW), Spodopterafrugiperda(J. E. Smith, 1797)emerged as a major threat in several maize growing countries worldwide. Bioassay conducted on second instar larvae of fall armyworm showed that, the larvae fed with leaves treated with chlorantraniliprole 625 FS @ 6 ml/kg of seed at different intervals, caused significant mean mortality of (61.25%), followed by cyantraniliprole 600 FS @ 4 ml/kg of seed (56.56%) and cyantraniliprole + thiamethoxam 19.8 FS @ 6 ml/kg of seed (46.25%). Whereas, thiamethoxam 30 FS @ 8 ml/kg of seed and imidacloprid 600 FS @ 5 ml/kg of seed did not have significant impact on mortality of fall armyworm. Similar results were obtained under field conditions where chlorantraniliprole 625 FS and cyantraniliprole 600 FS recorded the least mean number of, 0.62 and 0.69 larva/plant, respectively and leaf damage score per plantof 1.59 and 1.73, respectively after 28 days of crop emergence. Chlorantraniliprole residues in leaves persisted for more than 30 days after sowing, cyantraniliprole for more than 25 days and cyantraniliprole + thiamethoxam for more than 15 days in maize seedlings complementing their efficacy under laboratory and field conditions. Among the foliar insecticides evaluated,tetraniliprole 18.18 SC @ 0.5ml/L of water was found to be more effective in reducing both number of larvae per plant and leaf damage score, recording the highest yield (54.95 q/ha) and C: B ratio (1: 2.43), followed by isocycloceram 200 SC @ 0.4 ml/L, broflanilide 20 SC @ 0.25 ml/L and chlorantraniliprole 18.5 SC @ 0.4 ml/L. The insecticide, chlorfluazuron 5.4 EC was found to be least effective in managing fall armyworm populations under field conditions recording lowest yield (38.78 q/ha) and C: B (1: 1.86) ratio among the tested insecticides.

November, 2022

(Sharanabasappa)

Major Advisor

13. Taxonomic Studies On The Genus Adoretus (Coleoptera: Scarabaeidae: Rutelinae: Adoretini) of India

(Sushma S.P.) ABSTRACT

Scarabaeidae is one of the most diverse and economically important families under the superfamily Scarabaeoidea of order Coleoptera comprising 91 per cent of all known scarabaeids. The family consists of about 27,800 species comprising Laparosticti and Pleurosticti beetles, of which the latter are phytophagous causing severe losses to most of the economic crops distributed worldwide under 16 subfamilies, 118 tribes and 94 sub tribes. PleurostictiScarabaeidae (around 25,000 species known worldwide) includes four subfamilies viz., Melolonthinae, Rutelinae, Cetoniinae and Dynastinae. Rutelinae is the second largest subfamily covering around 200 genera with over 4,100 described species under seven tribes globally. Of these tribes, the tribe Adoretini is exclusively distributed in the Old World mainly in tropical and subtropical regions. The genus Adoretus is large and widespread consisting of about 475 species. As there is no much work carried out on the descriptions and redescriptions of the species of genus Adoretusof India in the recent past, the study was carried out in ICAR- NBAIR during 2020-2021. The study included detailed descriptions of morphological characters of 18 species supported with illustrated diagnostic keys, checklist and distributional records. All the species are redescribed for the first time, after their original descriptions in 19th century. Morphometrics and detailed illustrations of distinguishing characters of each species were carried out. Adoretuspusillus, A. versutus, A. lasiopygus, A. duvauceli were predominant across India and few species formed new distributional records documented from Karnataka, Uttar Pradesh, Uttarakhand and Maharashtra. The present study yielded a checklist of 70 species of Adoretus and the geographical datashowed that the species diversity was highest in West Bengal, Tamil Nadu, Madhya Pradesh, Karnataka and Assam. Developed distribution map and diagnostic keys with additional characters facilitates easy identification of these species for further studies.

January, 2022

(Shivanna, B. K.) Major Advisor

14. Lethal And Sublethal Effects Of Different Insecticides On Growth And Development of Spodoptera frugiperda (J. E. Smith)

(Vaibhavi, A. S.)

ABSTRACT

The fall armyworm (FAW), Spodopterafrugiperda (J. E. Smith) is an invasive, polyphagouslepidopteran pest primarily feeding on maize leaves. Chemical control has become the primary method for the management of fall armyworm worldwide. The present investigation was carried out in order to know the lethal and sublethal effects of different insecticides on growth and development of S. frugiperda. The laboratory experiments were carried out in theDepartment of Entomology, College of Agriculture, Shivamogga, Karnataka. The median lethal concentrations (LC₅₀) ranged from 0.090 to 2.056 ppm for different insecticides. The lowest LC50 value for third instar larvae was recorded in emamectin benzoate (0.090ppm), followed by broflanilide (1.141ppm), tetraniliprole (1.236 ppm), chlorantraniliprole (1.541ppm) and the highest value noticed for spinetoram (2.056 ppm).All the insecticides effectively induced sublethal effects, which were observed as increased larval duration and decreased pupal weight, formation of larval-pupal intermediates, pupal deformations and adults with deformed wings. The increased larval and pupal durations due to decreased consumption and food utilization. Similarly, the transgenerationalsublethal effects of different insecticides were found in FAW when the F₂generation was exposed to sublethal concentrations. All the insecticides at LC₂₀ treatment significantly prolonged larval and pupal duration decreased male and female pupal weight in F₂generation. When adults were exposed to lethal and sublethal concentrations of different insecticides with 10 per cent honey solution significantly affected the biological parameter of FAW in the T₁ (LC_{50(Ω)} × LC_{50(β)}).On exposing the adults to sub lethal concentrations of emamectin benzoate and chlorantraniliprole by spraying on different days, a slight decrease in fecundity was observed when the adults were exposed on the sprayed day. The shortened male and female longevity was observed in T₄ (LC₂₀, adults released on the day of spray).

November, 2022

(Sharanabasappa)

Major Advisor

Agricultural Extension

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the

Department of Agricultural Extension

1. Entrepreneurial Behaviour Of Coffee Growers

(Bharath, H. L.)

ABSTRACT

The study was conducted in Chikkamagaluru and Kodagu District of Karnataka in2021-22 to study the entrepreneurial behaviour and adoption practices of coffee growers. Random sampling method was used to select 120 respondents. The primary data was collected from respondents using pre-tested interview schedule. The study indicated that about 40.00 per cent of the respondents belonged to medium level of entrepreneurial behaviour. In case of extent of adoption, 40.83 per cent of the respondents belonged to medium adoption category. Majority of the respondents were middle aged (61.67 %) and educated up to high school level (40.00 %). More than half (52.50%) of the coffee growers were from medium sized families, whereas 74.16 per cent of the respondents had agriculture as their main occupation. Two fifth of the respondents belonged to medium (40.00 %) level of market orientation.Nearly half (48.34%) of the respondents had medium extension participation. About 45.00 per cent of the respondents belonged to medium extension contact, whereas 47.50 per cent of the respondents had high credit orientation. The Chi square statistics implies that Education, farming experience, annual income, extension participation, credit orientation and market orientation are significantly associated with the entrepreneurial behaviour of the respondents. Variables like farming experience, annual income, occupation, market orientation, credit orientation, mass media exposure and extension contactare significantly associated with extent of adoption of the respondents. Exploitation by middlemen (81.66%) and non-availability of labour (80.83%) were the major constraints faced by the respondents. Standardized price for the produce (84.16%) and to eliminate middlemen (81.66%) were the major suggestion given by the respondents.Periodic and intensive entrepreneurship development capacity building programmes need to be organized by the government and other extension agencies for creating awareness about entrepreneurial opportunities.

December, 2022

(Bharath Kumar, T. P.) Major Advisor

2. Innovative And Decision Making Behavior Of Krishi Awardee Farmers (Gangalakshmamma)

ABSTRACT

Farmers' innovations play a vital role in recent years which can supplement formal research, since these innovations are cost effective, eco-friendly and easy to adopt. Hence, documentation of farmers' innovations will becomes need of the hour. The study was conducted during the year 2020-21 in two districts of southeast Karnataka. The sample comprised of 120 awardee farmers from Shivamogga and Davangere districts. After analysis, 52.50 per cent and 47.50 per cent of the awardee farmers had high level of farming experience with medium landholding. Nearly half (45.83%) of the respondents belonged to high level of annual income. Majority (70.00 %) of the respondents comes under medium mass media exposure, more than half (53.33 %) of the respondents had medium level of scientific orientation and just less than half (49.17 %) of the respondents fall under high level of innovative behaviour. More number of the men respondents participated in decision making in agricultural activities. PCA method was employed for analysis resulted in six factors being extracted, which were named appropriately by looking at their variables grouping and factor loadings. These factors were ranked according to mean variable scores in the decreasing order as: Financial (I), Marketing (II), Technical (III), Society management (IV), Weather based (V) and Postharvest management (VI). High level of aspiration towards dissemination of agriculture technology and it was top most ranked suggestion given by awardee farmers as para-professional experts. Extension personnel engage awardee farmers on an ad-hoc basis as a stop-gap measure and it ranked II. While disseminating agricultural technology, awardee farmers maintain good relationships with fellow farmers and their credibility was ranked third by awardee farmers. To conclude, the awardee famers' innovative behaviour was highly correlated with decision making behaviour which shows the importance of right decisions at right time was influenced to adopt innovative technologies by the farmers for better livelihood.

January, 2022

(Gajendra T. H) Major Advisor

3. Information Seeking Behaviour And Marketing Behaviour Of Pepper Growers (Gulshan Ekram) ABSTRACT

The study was conducted in Chikkamagaluru and Kodagu Districts of Karnataka in 2021-22, Twelve villages have been selected from four taluks, three villages from each taluk. From each village 10 pepper growers were randomly selected. Thus, the total sample was 120 respondents. The study indicated that about 49.17 per cent of the respondents belonged to medium level of information seeking behaviour. In case of marketing behaviour 41.67 per cent of the respondents belong to medium level of marketing behaviour. Majority of the respondents were middle aged (75.83 %) and educated up to high school level (53.33 %). About 42.50 per cent of the respondents belong to medium size land holding category, whereas 39.17 per cent of the respondents are having medium level of farming experience in pepper cultivation. Majority of the respondents belong to medium (56.67 %) level of annual income category, whereas 45.84 per cent of the respondents are having high economic motivation, Majority of the respondents belonged to medium (40.00 %) level of market orientation, cosmopoliteness (51.67 %), mass media exposure (47.50 %), extension participation (47.50 %). Non-availability of pest and disease resistant varieties (76.66 %). fluctuation of prices (72.50 %), increased wages (64.16 %), high input costs (59.16 %), lack of timely information (56.66 %), poor transportation (53.33 %), erratic weather conditions (45.83 %) were the major constraints faced by the respondents. Hence the Horticulture Departments, Universities and KVKs must aim towards providing required information of new technologies and increase the level of knowledge of farmers regarding important practices in the pepper cultivation.

December, 2022

(Krishnamurthy, A.T.) Major Advisor

4. Impact Of Sujala-Iii Watershed Development Programme

(Navaneetha, R.)

ABSTRACT

The present study was conducted in three transition taluks of Chikkamagaluru district during the year 2021-22 to analyse the impact of Sujala-III Watershed Development programme.A total of 90 beneficiaries and 30 non- beneficiaries were selected from eight major watershed villages. The study results revealed that less than half of the beneficiaries (45.55%) had a medium overall knowledge level and in case of non-beneficiaries, 66.67 per cent of them have a low level of knowledge. The calculated 'z' statistics shows a highly significant increase in potato and ragi yield, with moderate cropping pattern of 3 to 5 crops followed by low crop yields in case of non-beneficiaries. There is increase in cropping intensity, employment generation, annual farm income and possession of new agricultural implements of beneficiaries in comparision with non-beneficiaries. The majority of the beneficiaries (51.13 %) had an enterprise combination of agriculture + horticulture and in contrast he non-beneficiaries possess agriculture alone as enterprise(63.33 %). It was noticed that nearly 88.88 per cent of them benefited from Check dam and fromfield bund (87.77 %).The results shows that there is significant relationship with adoption of watershed practices and independent variables likeeducation, area under watershed, organizational participation, risk orientation, extensioncontact, farming experience, landholding and occupation. It was noticed that the majority of the beneficiaries (73.94%) expressed poor quality of work in watersheds as the major problem. Maintenance of structure after completion of project was the major suggestion. It was evident from study that government should take more of watershed programmes to conserve soil and water.

December, 2022

(Basavaraj Berannavar) Major Advisor

5. Knowledge And Entrepreneurial Behaviour Of Onion Seed Producing Farmers In Chitradurga District

(Nishanth, P. S.)

ABSTRACT

Study on "Knowledge and Entrepreneurial Behaviour of Onion Seed Producing Farmers in Chitradurga District" during 2021-22. Random sampling method was used to select 120 respondents. The primary data was collected from respondentsusingpre-tested interview schedule. For interpreting the results, data was tabulated using frequency, mean, standard deviation, garrett ranking technique and chi square. The study revealed that 45.00 per cent of the respondents had medium knowledge level about onion seed production. Majority (88.33 %) of the respondents had knowledge regarding planting material, marketing information(74.58 %), certification and germination test (57.92 %). Nearly half (48.33 %) of the respondents belonged to the medium entrepreneurial behaviour category. Family business income accrued to onion growers was relatively higher at Rs 126251.09 in case of onion seed production compared to onion bulb production (Rs 38020.59). The economic efficiency of onion seed production reflected in benefit cost ratio was higher at 2.44 compared to 1.46 in case of onion bulb production. The Chi-square statistic implies that age, education, family size, farming experience, occupation, annual income, mass media exposure, extension participation, source of information, source of capital, market orientation and training orientation were found to have significant association with the knowledge of respondents. Variables like education, type of family, family size, farming experience, occupation, annual income, mass media exposure, extension participation, source of capital, market orientation and training orientation were found to have significant association with the entrepreneurial behaviour of respondents. Major problems and suggestion expressed by respondents were high incidence of pests and diseases (81.90 %), unorganized marketing of Onion seeds (69.52 %) and capacity building on integrated pest and disease management (80.00 %) and coverage of Onion seed production under crop insurance (65.83 %). The study enables the stakeholders in formulating of suitable policy to strengthen the scientific onion seed production.

November, 2022

(T. S. Ganesh Prasad.) Major Advisor

6. Technological Gap In Black Pepper Cultivation Practices

(Rakshitha, H. K.)

ABSTRACT

A study was conducted in Chikkamagaluru district of Karnataka during 2020-21 with a sample of 90 black pepper growers. The data was collected by personal interview method using structured schedule to assess the socio-economic profile, knowledge level, technological gap and problems of pepper growers. Most of the respondents (44.44 %) had medium level of knowledge about recommended cultivation practices of black pepper. Majority of the respondents had high level of knowledge regarding general awareness on black pepper cultivation practices (78.89 %), nursery management (71.11 %) and nutrient management (80.00 %). More than half of the respondents had high level of knowledge regarding land preparation and planting (56.67 %) and medium level of knowledge on marketing (53.33 %). More than half of the respondents (57.77 %) had medium overall technological gap. Higher technological gap of 54.44 per cent was found in adopting drip irrigation and 23.33 per cent gap in case of sprinkler irrigation method. Greater technological gap of 88.89 per cent was found in bio fertilizer application. Significantly higher per cent of technological gap was found in following recommended pest and disease control measures, use of manual rubbing and gunny bags with polythene lining for storage. More than half of the respondents belong to middle age group, medium extension contact and medium management orientation. Majority of the respondents had medium level of annual income category, innovativeness, management orientation, high school education, medium farming experience, semi-medium size land holding category, and high economic orientation. The major constraints faced by the respondents are non-availability of pest and disease resistant varieties, lower price of the product, increased labour wages and high cost of inputs. Suggestions expressed by the respondents are development and supply of disease resistant varieties in time and providing timely advisory services.

January, 2022

(Basavaraj Beerannavar) Major Advisor

7. Perception And Usefulness Of Krishi Mela

(Renuka, A. B.)

ABSTRACT

A study on Perception and usefulness of Krishimela was conducted during 2021-22in KeladiShivappaNayaka University of Agricultural and Horticultural Science. Shivamogga. District wise list of Krishimela participants were collected for the period of 2016-2021 from University Directorate of Extension.Shivamogga, Chitradurga, Davanagere, Chikkamagaluru and Udupi districts were selected based on highest number of participants and farmers who have attended Krishimela at least twice were selected as a sample. A total of 120 farmers were selected based on proportionate random sampling method for the study. The necessary data was collected from the participants using pretested interview schedule. The results indicated that nearly half of the farmers expressed medium level of perception(45.83 %) and usefulness(47.50 %)towards Krishimela. Majority of farmers belonged to middle age (56.67 %) group and they had 11 to 20 years of experience in farming (43.33 %). Farmers had high level of extension participation (40.00 %) and innovativeness (41.67 %), one third of participants spent 4 to 5 hours in Krishimela. Age, education, land holding and annual income had highly significant association with perception. Whereas, extension participation and time spent had 1 per cent level of significant association with usefulness. Majority of the farmers expressed that non-availability of quality seeds and planting material (70.00 %), lack of information and guidance on marketing(66.66 %) as major constraints. Experienced guides/ volunteers shall be provided for each group (80.83 %) and Krishimela should be arranged prior to crop season(74.17 %) were some of the suggestions given by farmers for improvement of Krishimela. Although the Krishimelas are play an effective role in information dissemination, new technologies based on needs and demand in the market has to be exhibited effectively to improve usefulness.

November, 2022

(M. Sudeendra) Major Advisor

8. Perception And Usefulness Of Negila Miditha Farm Magazine

(Sandhya, B.)

ABSTRACT

A study on Perception and usefulness of NegilaMiditha farm magazine was conducted during 2020-21 in Shivamogga district. The list of farmer subscribers was period 2015-2019 from University collected for the communication centre.Shivamogga district was purposively selected as it has the highest number of farmer subscribers who have completed five years of subscription. The stratified random sampling was employed to select 120 subscribers from seven taluks. The necessary data was collected from the subscribers using pre-tested interview schedule. The results indicated that majority of farmers had medium (64.17 %) and high (23.33 %) perception towards farm magazine. The farmers had expressed medium (60.84 %) and high (27.50 %) level of usefulness towards content published in NegilaMiditha. More than half of farmers belonged to middle age group (59.17 %) and 11 to 20 years of experience (50.83 %). Majority of respondents had medium level of social participation (40.00 %), extension contact (44.17 %), extension participation (65.83 %), mass media participation (44.17 %), innovativeness (41.66 %), risk orientation (40.00 %), high economic motivation (53.33 %) and high scientific orientation (42.50 %). Extension contact, extension participation, economic motivation and scientific orientation had high significant association with perception. Whereas, age, land holding and social participation had non-significant association with perception level. Majority of the farmers expressed that less coverage of region specific articles (76.07 %) and lack of articles based on present market scenario (67.44 %) as major constraints. Pages of the magazine should be increased (90.83 %) and monthly availability of farm magazine (77.50 %) were the suggestion given by farmers for improvement of farm magazine.

January, 2022

(M. Sudheendra) Major Advisor

9. A Study On Marketing Behaviour And Market Linkage Of Arecanut Growers Of Chitradurga And Davanagere Districts

(Siddesh)

ABSTRACT

The study was conducted in Chitradurga and Davanagere Districts of Karnataka state in 2021-22. Twelve villages were selected from four taluks. Further, three villages were selected from each taluk. From each village 10 arecanut growers were randomly selected. Thus, the total sample considered was 120 respondents. The study indicated that about 44.17 per cent of the respondents belonged to medium level of marketing behaviour. In case of market linkage 55.00 per cent of respondents belonged to medium level of market linkage. The socio-economic profile of the respondents revealed that majority (67.50 %) of the respondents were middle aged and educated up to pre-university level (35.83 %). About 60.84 per cent of the respondents belonged to big land holding category. Whereas, 38.30 per cent of the respondents possessed medium level of farming experience in arecanut cultivation. About 41.00 per cent of the respondents had medium social participation. Whereas, cent per cent of the respondents belonged high annual income category. Further, (37.50 %) of the respondents had medium level of risk orientation, economic motivation (39.17 %), decision making ability (40.00 %) and low level of exposure to various sources of information (46.67 %). The correlation statistics implies that variables such as education, landholding, experience in arecanut cultivation, social participation, annual income, risk orientation, economic motivation and decision-making ability were found to have significant relationship with the marketing behaviour of arecanut growers. Constraints expressed by arecanut growers during marketing of arecanut, majority (81.66 %) of the respondents expressed limited exposure to online marketingas their constraint. Limited procurement from the government (80.00%), fluctuation in market price (76.66%), illegal deduction while selling (62.50%). Hence, the concerned Departments, Universities and KVKs must aim towards providing marketing information to arecanut growers.

December, 2022

(K.Amaresh Kumar) Major Advisor

10. Socio-Economic Impact Of Fall Armyworm On Livelihood Of Maize Farmers

(Tanuja, P.)

ABSTRACT

Karnataka being the major producer of Maize cultivated in an area of 1.29 m ha with production of 3.55 MT.The incidence of Fall Armyworm (FAW) was severe in Karnatakawith an extent of 22.13 per cent to 46.80 per cent causing a yield loss of 33.00 to 60.00 per cent. Thus, study becomes imperative. For the present study Davanagere and Shivamogga district were selected, totally eight villages from four taluks of two districts were selectedbased on the highest area under Maize cultivation. From each village 20 respondents who were growing Maize from last five seasons were selected. Thus, the total sample size for the study was 160. The primary data were collected using pre-tested interview schedule. The results indicated that nearly half of the farmers had medium level of knowledge (44.33 %) and perception (45.62%) regarding FAW. Profitability, management, biology and incidence, climatic factors and ignorance of farmers were the factors influencing perception of farmers on FAW. Thenegativesocial impact was observed in standard of living, bargaining power, public recognition of Maize farmers.Net returns was found to be lower by Rs. 5934.03 per acre, reduction in yield up to 19.18 per cent and returns to 45.10 per centper acre due to incidence of FAW. The expenditure on account of plant protection measures increased by one and half times. Majority of farmers were practicing application of emamectin benzoate in controlling FAW (82.50 %). The major constraints faced by the farmers was financial constraints with a mean rank score of 9.38 followed by marketing (9.06), constraints. Development of FAW resistant varieties (80.62 %), increasing access to effective chemicals at subsidized rates (75.00 %) were the major suggestions offered. Due to lack of knowledge, farmerscannot take intime operations. Hence, suitable extension strategiesshould be developed to achieve the success.

November, 2022

(Sahana S) Major Advisor

11. Production And Marketing Constraints Of Onion In Chitradurga District

(Varun, C)

ABSTRACT

The study was conducted in the year 2020-21 in Chitradurga district of Karnataka state. The total sample size was 120 farmers who were cultivating onion were selected using simple random sampling method. The study aims to assess the severity of production and marketing constraints faced by onion growers in Chitradurga district. The results indicated that a majority (72.50% and 70.84%) of the farmers had a medium level of knowledge regarding production and marketing practices of onion, respectively. Majority of the respondents had knowledge regarding varieties (93.33%), seed rate (96.67%), pests (79.16%) and diseases (85.00%). Most of the respondents (75.83%) were aware of overseas markets followed by awareness about APMCs (85.83%) etc. It was observed that majority (37.50%) of the respondents belonged to middle age group, most of the respondents (44.17%) possessed medium landholdings. Among the identified constraints, unavailability of seed material at the right time was the most severe constraint in production, fluctuation in market price was the most severe constraint in marketing and limited exposure of government agencies to establish onion processing plants was the most severe constraint in processing of onion with Mean Constraint Severity Score (MCSS) of 1.94, 1.95 and 1.758 and ranked first, respectively. Timely supply of quality seeds was the major suggestion given by majority (95.00%) of the respondents. Four marketing channels were identified, among them Channel-IV was the efficient channel with highest price for the produce i.e., Rs. 2145/ Q and Channel-IV had highest producer's share in consumer's rupee (84.28%) and least price spread (15.72%). The study identified various constraints and its severity regarding production, marketing and processing of onion. To minimise the production and marketing constraints, the Govt. and the concerned department should take necessary measures to solve these problems.

February, 2022

(Amaresh Kumar, K.) Major Advisor



Keladi Shivappa Nayaka University of Agricultural and Horticultural

Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the

Department of Agronomy

1. Assessment Of Production, Profitability and Sustainability of Integrated Farming System under Irrigated Condition of Davanagere District of Karnataka

(AMOGHPATIL)

ABSTRACT

A survey was conducted during 2021 in Davanagere district of Karnataka to study and compare the Synthesized Scientific Model (SSM) of AICRP-IFS (Crop +Horticulture +Sheep +Dairy +Poultry +Vermicompost +Boundary plantation) with fifteen different IFS models practiced by progressive farmers under irrigated condition. The data was collected through a pre-structured and pre-tested interview schedule. The results revealed that, among different IFS models, the SSM of AICRP-IFS emerged as the best IFS model in terms of resource recycling, where it generated highest quantity (18,500 kg/annum) of recycled farm wastes and saved highest quantity of fertilizers (2,514kg) and highest value of fertilizers quantity of fertilizers saved (2,514kg) through resource recycling and saved(₹17,046) compared to other IFS models.SSM of AICRP-IFS regarded as best with respect to nutrient budgeting where, total quantity of fertilizer (514:264:421 kg of N: P: K) required was supplied through different sources viz., in situ green manuring (167:28:46 kg of N: P: K) and resource recycling (274: 227: 175 kg of N: P: K). From both the nutrient sources, it saved₹20,023 value of nutrients.IFS model F11 (Crop +Horticulture +Dairy) was best with respect to net return (₹7,77,700/year). The highest marketable surplus (₹8,33,500) was obtained in the model F5 (Crop +Horticulture +Dairy+Beekeeping). The SSM of AICRP-IFS generated the highest employment (673 man-days) which accounted for₹1,68,250 at the rate of₹250/day.IFS models F2 (Horticulture +Dairy+ Sheep +Poultry) and model F11 have shown a higher value of physical (4.96 kg/m³) and economic $(₹56.40/m^3)$ water productivity. As per the economic sustainability index (0.66), ecological sustainability index (1.30) and sustainable livelihood security index (1.49) F5, SSM and F2 models, respectively emerged as best models over other models in the study.

November, 2022

(Kumara, O.)

Major Advisor

2. Response of Different Foxtail Millet (Setaria italica L.) Genotypes to Foliar Nutrition of Biostimulants in Southern Transition Zone of Karnataka.

(CHETHAN, G. S.) ABSTRACT

A field experiment was conducted to study the "Response of Different Foxtail Millet (*Setariaitalica* L.) Genotypes to Foliar Nutrition of Biostimulants in Southern Transition Zone of Karnataka" at AHRS, Bavikereduring late *kharif*2021.The experiment was laid out in split plot design with 12 treatment combinations and replicated thrice. Main plot treatments include three genotypes *viz.*, SiA-3156 (G₁), HMT-100-1 (G₂) and DHFt-109-3 (G₃). Subplot treatments include four levels of foliar nutrition of biostimulants*viz.*, humic acid @ 0.1% (F₁), panchagavya @ 3 % (F₂), combination of humic acid @ 0.1% + panchagavya @ 3 % at 30 and 60 DAS (F₃) and control (RDF only) (F₄). The results revealed that, among the genotypes, HMT-100-1(G₂) recorded significantly higher total dry matter (22.33 g plant⁻¹), number of tillers per meter row length (81.87), grain yield (1701.0 kg ha⁻¹) and straw yield (4066.0 kg ha⁻¹) with higher uptake of total nitrogen, phosphorus and potassium (46.37, 14.19 and 34.04 kg ha⁻¹, respectively). It also recorded higher net returns (₹ 38,834) and B:C ratio (2.46) compared to SiA-3156 (G₁) and DHFt-109-3 (G₃).

Among foliar nutrition of biostimulants, application of humic acid @ 0.1% + panchagavya @ 3 % (F₃) recorded significantly higher total dry matter (25.33 g plant⁻¹), number of tillers per meter row length (85.87), grain yield (1781.2 kg ha⁻¹) and straw yield (4139.5 kg ha⁻¹). Further, significantly higher total nitrogen, phosphorus and potassium uptake (48.25, 15.23 and 38.33 kg ha⁻¹, respectively), net returns (₹ 40,606) and B:C ratio (2.47) compared to control (only RDF) (F₄). Among the interaction effects, combination of HMT-100-1 with foliar application of humic acid @ 0.1% + panchagavya @ 3% has recorded significantly higher growth, yield and nutrient uptake compared to other treatment combinations.

November, 2022

(A.Y. Hugar) Major Advisor

3. Influence of Water Soluble Fertilizers and PGPR on Growth, Yield and Quality of Green Chilli (*Capsicum Annuum* L.) under Hill Zone of Karnataka

(DODDAHAIDE GOWDA)

ABSTRACT

A field experiment was conducted at Amble, Mudigeretaluk, Chikkamagaluru district, Karnataka, during the summer season 2021, to study the Influence of foliar application of water soluble fertilizers and PGPR on growth, yield and quality of green chilli. The texture of the soil was clay having neutral pH (7.31) with organic carbon (6.61 g kg⁻¹), available nitrogen (240 kg ha⁻¹), available phosphorous (28.41 kg ha⁻¹) and potassium (240 kg ha⁻¹). The hybrid chilli was used for this experiment. The experiment was laid out in a Randomized Complete Block Design (RCBD) with ten treatment combinations and replicated thrice. The treatments comprised of water soluble fertilizers (viz., 1 % 19:19:19, 0.5 % monoamonium phosphate, 0.5 % potassium nitrate and PGPR) along with RDF. Among different treatment combinations, foliar application of monoamonium phosphate and potassium nitrate each @ 0.5 per cent with PGPR at 30, 45, 60, 75 and 90 DAT along with RDF recorded significantly higher plant height (86.54 cm), number of branches plant⁻¹ (22.52), number of leaves plant⁻¹ (126.23), leaf area (3949.00 cm² plant⁻¹), leaf area index (1.096), total dry matter production (151.00 g plant⁻¹), chlorophyll content (82.65 SPAD), ascorbic acid content (137.63mg g⁻¹), number of green fruits (278.29 plant⁻¹), fruit length (12.02 cm), fruit weight (12.58 g), fruit diameter (1.81 cm), green chilli yield (36.73 t ha⁻¹) at harvest and the same treatment recorded significantly higher total nutrient uptake of nitrogen (112.79 kg ha⁻¹), phosphorus (17.77 kg ha⁻¹) and potassium (125.40 kg ha⁻¹) over the RDF alone. Higher gross return (` 550950 ha⁻¹), net returns (` 410767 ha⁻¹) and B: C ratio (3.93) were registered with foliar application of monoamonium phosphate and potassium nitrate with PGPR each @ 0.5 per cent 5 sprays at 30, 45, 60, 75 and 90 DAT along with RDF.

January, 2022

(Shivaprasad, M.)

Major Advisor

4. Effect of Salvinia molesta vermicompost on Soil Fertility and Crop Productivity on paddy-Groundnut Cropping System In Udupi District Of Coastal Karnataka

(GAUTHAMI KAYARGA) ABSTRACT

A field experiment was conducted during the *kharif* and *rabi*2021-22 on sandy loam soil at Zonal Agricultural and Horticultural Research Station, Brahmavara, Udupi, to study the "Effect of *Salviniamolesta*Vermicompost on **Soil Fertility and Crop Productivity on Paddy-Groundnut Cropping System in Udupi District of Coastal Karnataka**". The experiment was laid out in RCBD (Randomized Complete Block Design) with five treatment combinations, replicated four times. The treatments comprised of application of *Salviniamolesta*vermicompost based on N content in the final product applied at 3.3, 6.6, 9.9 and 13.2 t ha⁻¹ + 45: 30: 75 kg N: P₂O₅: K₂O ha⁻¹, which was tested against Recommended dose of fertilizer (10 t Farm yard manure + 60: 30: 75 kg N: P₂O₅: K₂O ha⁻¹) for comparison.

The study revealed that application of 13.2 t ha⁻¹*Salviniamolesta*vermicompost + 45: 30: 75 kg N: P₂O₅: K₂O ha⁻¹ achieved maximum grain yield (5231 kg ha⁻¹), straw yield (6657 kg ha⁻¹) in paddy during *kharif* and pod yield (1598 kg ha⁻¹), kernel yield (1134 kg ha⁻¹) in groundnut during *rabi* due to the residual effect of added treatment and it was at par with the application of 9.9 t ha⁻¹*Salviniamolesta*vermicompost + 45: 30: 75 kg N: P₂O₅: K₂O ha⁻¹. Due to the impact of the above factors, treatment with the application of 13.2 t ha⁻¹*Salviniamolesta*vermicompost + 45: 30: 75 kg N: P₂O₅: K₂O ha⁻¹ had higher production efficiency (38 kg ha⁻¹day⁻¹) and REY (Rice Equivalent Yield) [9627 kg ha⁻¹]. However, based on economics, the application of 9.9 t ha⁻¹*Salviniamolesta*vermicompost + 45: 30: 75 kg N: P₂O₅: K₂O ha⁻¹ achieved maximum net returns (₹ 113511 ha⁻¹), B: C ratio (3.48) and economic efficiency (₹ 732 ha⁻¹day⁻¹) in paddy-groundnut cropping system under coastal ecosystem of Udupi, Karnataka.

November, 2022

(N. E. Naveen) Major Advisor

5. Crop Weather Relationships in Cotton as Influenced by Dates of Sowing And Nitrogen Levels And Forecasting Cotton Production Over Karnataka

(GIRISH R. KASHYAP) ABSTRACT

A field experiment was conducted at College of Agriculture, Shivamogga during *Kharif*2021 to study the crop weather relationships in Cotton as influenced by dates of sowing and nitrogen levels and forecasting cotton production over Karnataka.The experiment was laid out in factorial RCBDinvolving three dates of sowing (10th July, 25th July, 10th August) and three nitrogen levels (75% RDN, 100%RDN, 125% RDN), replicated thrice. The results revealed that, crop sown on July 10th recorded significantly higheryield (1736 kg ha⁻¹) with higher growth and yield components ascompared to other dates of sowing.Among the nitrogen levels, application of 125 %RDNresulted in a significantly highergrowth, yield components and final cotton yield (1772 kgha⁻¹). The interaction effects were found non-significant.

Correlation analysis between weather parameters and cotton yield at different phenophases of cotton indicated that rainfall (r=0.490**), sunshine hours (r = 0.569**), solar radiation (r = 0.681**) and pan evaporation (r = 0.677**) from boll opening to harvest stage had a significant positive relationship with cotton yield. Among the micrometeorological parameters, soil temperaturewas negatively correlated with cotton yield during the phenophases, sowing to emergence (r=-0.510**), pinhead to first flower (r =-0.554**) and boll opening to harvest (r = -0.544**). Soil moisture and canopy temperature depression (r = 0.613** and r = 0.469*, respectively) were positively correlated with cotton yield during boll opening to harvest phase.

Yield forecasting of cotton over major cotton growing districts of Karnataka was attemptedusing machine learning algorithm ANNand regression approaches like LASSO, ENET and SMLR.Models were ranked based on the R^2 and model efficiency values. Among the four models, ANN was the best fit model for all districts with R^2 and model efficiency values ranging from 0.94 to 1.00.

November, 2022

(S. Sridhara) Major Advisor

6. Influence of Nano Urea Application on Growth, Yield and Quality Parameters of Okra (Abelmoschus esculentus L.)

(HEMAVATHI, G. S.)

ABSTRACT

The field experiment was conducted in ZAHRS, Navile, Shivamogga to study the "Influence of nano urea application on growth, yield and quality parameters of okra (Abelmoschusesculentus L.)" during kharif2021. The experiment consist of 8 treatments viz., Absolute control (T_1) , Package of practices (T_2) , 25 per cent of recommended dose of N as basal through commercial N fertilizer with 3 sprays of nano urea at 20, 30 and 40 DAS (T₃) and with 4 sprays of nano urea at 10, 20, 30 and 40 DAS (T₄), 50 per cent of recommended dose of N as basal through commercial N fertilizer with 2 sprays on nano urea at 30 and 40 DAS (T₅) and with 3 sprays of nano urea at 20, 30 and 40 DAS (T₆), 50 per cent of recommended N as basal + 25 per centof recommended N as top dress at 25-30 DAS through commercial N fertilizer + 1 spray of nano urea at 40 DAS (T₇), 4 Sprays of nano urea at 10, 20, 30 and 40 DAS (T₈) replicated thrice, which was laid out in randomized complete block design. Application of 50 per cent of recommended N as basal + 25 per cent of N as top dress at 30 DAS and 1 spray of nano urea at 40 DAS recorded highest plant height (155.30 cm), plant girth (5.74 cm), number of branches (3.38), number of leaves (13.47). Better growth results in better yield. Thus, T_7 registered highest number of fruits (18.43 plant⁻¹), fruit length (19.63 cm), fruit girth (6.81 cm), protein content in fruit (12.26 %) and fruit yield (17.89 t ha⁻ ¹) which was on par with package of practices (T_2) and significantly different from all other treatments. There was 9.88 per cent increase in yield over package of practices (T₂). Further, higher net returns (₹ 2, 92,652) and B: C ratio (2.89) also noticed in treatment T_7 .

November, 2022

(BasavarajNaik, T)

Major Advisor

7. Effect of Varied Levels and Methods of Molybdenum Application in Soybean (JEEVAN, H.R.)

ABSTRACT

A field experiment was conducted at Agricultural and Horticultural Research Station, Bavikere, KSNUAHS, Shivamogga under rainfed condition during Kharif, 2021 to study the effect of varied levels and methods of molybdenum application in soybean. The experiment was laid out in Randomized complete block design with ten treatments replicated thrice. The treatments included, seed treatment with molybdenum(Mo) @ $2g kg^{-1}$ of seeds(T₁), seed treatment with molybdenum(Mo)@ 4g kg⁻¹ of seeds (T₂),seed treatment with molybdenum(Mo)@ 6g kg⁻¹ of seeds(T₃), foliar application of Mo at 0.025% (T₄), foliar application of Mo at 0.05% (T₅), foliar application of Mo at 0.1 % (T₆), soil application of Mo @ 500 gha⁻¹(T₇), soil applicationMo @1000 gha⁻¹ (T₈), soil applicationMo @1500 gha⁻¹ (T₉),control(No Mo application) (T₁₀). POP was followed for all treatments.Among the treatments tried, significantly higher plant height (58.65cm), number of branches per plant (7.53), leaf areaindex at 60 DAS (2.03), number of root nodules per plant (63.53) at 45 DAS, total dry matter (25.65 gplant⁻¹),total nutrient uptake (N:176.04, P:18.18, K:104.18kg ha⁻¹) and (Mo:246.57 g ha⁻¹)were recorded in seed treatment with Mo@ 6g kg⁻¹ of seeds (T₃). The better values of these indices resulted in higher number of podsplant⁻¹(56.87), No. of grainspod⁻¹(3.51), seed yield(1695.02kg ha⁻¹),haulm yield(2520kg ha⁻¹),oil percent (20.63) and protein percent (41.17) in the same treatment(T_3), which was closely followed by (T_8). The treatment T₃recorded 17.2 per cent increased seed yield over the control. Further, the same treatment excelled economically over the other by recording higher net returns(₹ ha⁻¹)and 41866.26

B: C ratio (2.30).

November, 2022

(C. Sunil) Major Advisor
8. Performance of Prilled And Nano Urea on Growth And Yield of Wetland Paddy (KIRAN KUMAR, H. C.) ABSTRACT

An experiment entitled "Performance of prilled and nano urea on growth and yield of wetland paddy" was conducted during Kharif 2021 at College of Agriculture, Navile, Shivamogga, in sandy loam soil. The experiment was laid out in RCBD with nine treatments and three replications. The foliar application of nano urea at 15, 30, 45 and 60 DAT were tested with application of prilled urea at 0, 25, 50,100 per cent recommended N (RDN)and N management through leaf color chart (LCC). The outcome indicated that 75 per cent RDN through prilled urea (50 per centas basal + 25 per cent as top dress at 30 DAT) + one spray of nano urea at 60 DATrecorded significantly the highest plant height (107.37 cm), number of tillers per hill (23.37), number of leaves per hill (68.82) and total dry matter (62.88 g hill-¹)except with 100 per cent RDN through prilled urea and N management through LCC. Better growth in the said treatment favoured in achieving highergrain yield of 5437 kg ha⁻¹, net returns of ₹57707 ha⁻¹ and B:C of 2.17.Nitrogen management only throughnano urea application showed better grain yieldof 13.28 per cent over 0 per cent RDN butfailed w.r.t. package of practice to an extent of 27.59 per cent. The combined application of prilled urea (75 % RDN) and nano urea spray revealed higher nitrogen use efficiency of 61.72 per cent compared to sole application of prilled urea.

November, 2022

(H. K. Veeranna)Major Advisor

9. Study on Effect of Potassium Schoenite + Chitosan on Growth, Yield and Quality Of Tomato (Solanum lycopersicum L.)

(LINGA ALEKYA)

ABSTRACT

A field experiment was conducted at ZAHRS, Navile, Shivamogga during late kharifof 2021 to study the effect of potassium schoenite + chitosan on growth, yield and quality of tomato (SolanumlycopersicumL.). The experiment consisted of ten treatments viz., soil application of potassium schoenite + chitosan @ 25,20 and 15 kg ha⁻¹(T_1 , T_2 and T_3 , respectively), K₂SO₄ (9.20 kg ha⁻¹) and MgSO₄ (23.15 kg ha⁻¹) on 20 kg ha⁻¹ potassium schoenite K and Mg equivalent nutrient basis (T₄), each at pre-flowering and fruit development stages, foliar application of potassium schoenite + chitosan @ 20, 15 and 10 g l⁻ 1 (T₅, T₆ and T₇, respectively), K₂SO₄ (6.9 g l⁻¹) and MgSO₄ (17.37 g l⁻¹) on 15 g l⁻¹ potassium schoenite K and Mg equivalent nutrient basis (T₈) each at pre-flowering, flowering and fruit development stage control (T_9) and water spray (T_{10}) replicated thrice was laid out in RCBD. Significantly higher plant height (125.43 cm), branches (34.67 plant⁻¹), leaf area (46.71 dm² plant⁻¹), leaf area index (1.15), leaf area duration (39.90 days), chlorophyll content (1.41 mg g⁻ ¹ fresh weight), number of fruits (43.33plant⁻¹) and fruit yield (4.45 kg plant⁻¹ and 53.75 t ha⁻¹) was recorded with treatment T_5 . Improvement in fruit yield ha⁻¹ due to treatment T_5 was to an extent of 9.67, 23.99 and 34.85 percent higher over T₄, T₈ and T₉, respectively. Significant improvement in quality parameters like TSS (5.13 ⁰Brix), titrable acidity (0.49 %), lycopene (11.39 mg 100g⁻¹), ascorbic acid (23.81 mg 100 g⁻¹) and carotenoid (26.67 $\mu g~g^{-1})$ was also observed with T₅. Further, Higher total nitrogen (160.41 kg ha⁻¹), phosphorous (27.16 kg ha⁻¹) ¹), potassium (235.61 kg ha⁻¹), calcium (139.50 kg ha⁻¹), magnesium (46.52 kg ha⁻¹) and sulfur (78.27 kg ha⁻¹) uptake was again recorded in T_5 . Higher net returns (17,28,669) and benefit cost ratio (9.80) was too realized with T₅.

November, 2022

(Girijesh, G. K.) Major Advisor

10. Effect of Varied Levels of Fertilizer and PGPR on Growth and Yield of Green Gram (Vigna radiata L.)

(MANASA, S. R.) ABSTRACT

A field experiment was conducted at College of Agriculture, KeladiShivappaNayaka University of Agricultural and Horticultural Sciences, Shivamogga, during *rabi*2021, on sandy loam soil to study the effect of varied levels of fertilizer and PGPR on growth and yield of green gram (*Vignaradiata* L.). The texture of the soil was sandy loan having acidic pH (6.10) with organic carbon of 4.57 g kg^{-1,} available nitrogen 230.22 kg ha⁻¹, available phosphorous 75.89 kg ha⁻¹and available potassium 135.23 kg ha⁻¹. The variety used was KKM-3. The experiment was laid out in a Randomized Complete Block Design with nine treatments replicated thrice. Treatment includes application of PGPR both solid and liquid formulation with 75, 100 and 125 % RDF tested against its sole application.

Among different treatments application of 125 % RDF + liquid formulation of PGPR recorded significantly higher plant height (55.09 cm), number of branches plant⁻¹ (9.46), number of leaves plant⁻¹ (15.55), leaf area (5.18 dm² plant⁻¹), total dry matter production (21.89 g plant⁻¹), number of pods plant⁻¹ (25.60), pod length (8.92 cm), number of seeds pod⁻¹ (13.55), seed yield (1015.82 kg ha⁻¹) and haulm yield (1649.92kg ha⁻¹) and the same treatment recorded significantly higher total nutrient uptake of nitrogen (62.63 kg ha⁻¹), phosphorus (9.00 kg ha⁻¹), potassium (59.80 kg ha⁻¹) and alsohigher gross returns (`82916 ha⁻¹), net returns (` 49103 ha⁻¹) and B: C (2.45) werealso obtained with above said treatment.

November, 2022

(C. J. Sridhara) Major Advisor

11. Effect of Planting Geometry and Nutrient Levels on Growth and Yield of Knol-Khol (*Brassica oleraceae* Var. *Gongylodes* L.) Under Protected Cultivation

(MUHAMMED FARIS, P.)

ABSTRACT

An experiment entitled "Effect of planting geometry and nutrient levels on growth and yield of knol-khol (Brassica oleraceae var. gongylodes L.) under protected cultivation"was carried out atAHRS, Madikeri, during Rabi and Summer season of 2021-22. The experiment consisted of nine treatment combinations involving three levels of nutrient (100, 125 and 150 % of RDF) and planting geometry (30 cm \times 15 cm, 30 cm \times 20 cm and 30 cm \times 25 cm) was laid out in Factorial CRD with three replications. The result revealed that crop fertilized with150 per cent of RDF was recorded significantly superior values for total dry matter accumulation (26.07 g plant⁻¹), fresh weight and diameter of knob (181.38 g and 7.29 cm, respectively), knob yield (29.22 t ha⁻¹), ascorbic acid content (41.80 mg 100g⁻¹), shelf life of knob (6.81 days), uptake of nitrogen, phosphorus and potassium (145.94, 30.87 and 131.57 kg ha⁻¹, respectively) by plant at harvest which was on par with 125 per cent of RDF. Among planting geometry, spacing of 30 cm \times 25 cm was recorded significantly superior values for total dry matter accumulation (27.21 g plant⁻¹), fresh weight and diameter of knob (189.02 g and 7.49 cm, respectively), ascorbic acid content (42.89 mg 100g⁻¹) and shelf life of knob (7.06 days)whereas, knob yield (32.96 t ha⁻¹) and uptake of nitrogen, phosphorus and potassium (157.21, 32.82 and 140.73 kg ha⁻¹, respectively) by plant at harvest were significantly higher with a spacing of 30 cm \times 15 cm over rest of the treatments. Significantly superior values for net return and B:C ratio were fetched with 150 per cent of RDF (Rs. 8,24,925 ha⁻¹ and 3.40, respectively) and spacing of 30 cm \times 15 cm (Rs. 9,71,977 ha⁻¹ and 3.81, respectively) over rest of the treatments.

November, 2022

(Basavalingaiah) Major Advisor

12. Comparative Evaluation of Pre and Post-Emergence Herbicides in Groundnut (Arachis hypogaea L.)

(PALLAVI M) ABSTRACT

A field experiment was conducted to study "Comparative evaluation of pre and postemergence herbicides in groundnut(*ArachishypogaeaL.*)" at the field unit of All India Coordinated Research Project (AICRP) on groundnut, Zonal Agricultural and Horticultural Research Station (ZAHRS), Babbur farm, Hiriyur during *kharif*, 2021. The experiment consisted of ten treatments with thee replications laid out in randomized complete block design. The treatments consisted of different pre and post emergent herbicide followed by manual weeding and intercultural operations.

Intercultural operation at 15 and 30 DAS *fb* manual weeding for intra rows(weed free) registered excellent weed control and higher pod yield(2,621 kg ha⁻¹). Among herbicides, Treatment receiving combination of Diclosulam 84 WDG at 25 g a.i. ha⁻¹ (PE) *fb* hand weeding at 30 DASrecordedsignificantly higher pod yield (2,602 kg ha⁻¹), net returns ($\overline{\$$ 68,138 ha⁻¹), lower total number of weeds (5.65 m⁻², at 60 DAS), total weed dry matter (3.41 g m⁻², at 60 DAS)over alone PE application of Pendimethalin 30 % EC @ 1.0 kg ha⁻¹ recorded lower pod yield (1,902 kg ha⁻¹), net returns ($\overline{\$$ 40,901 ha⁻¹), B:C ratio (0.76), higher total number of weeds (8.01 m⁻², at 60 DAS) and total weed dry weight (4.79 g m⁻², at 60 DAS). However, higher B:C ratio was recorded in the treatment receiving combination of both PE and PoE application of Diclosulam 84 WDG at 25 g a.i. ha⁻¹*fb*Quizalofop-p-ethyl 5% EC 50g a.i. ha⁻¹(2.21). Thus, application of both pre and post emergent herbicides resulted in controlling broad spectrum of weeds compared to alone PE application of Pendimethalin 30 % EC @ 1.0 kg ha⁻¹.

November, 2022

(Kumar Naik, A. H) Major Advisor

13. Comparative Evaluation of Prilled and Nano Urea Application on Growth and Yield of Maize (*Zea Mays L.*)

(TILAK, K.) ABSTRACT

A field experiment on "Comparative Evaluation of Prilled and Nano Urea Application on Growth and Yield of Maize" was conducted during Kharif 2021 at College of Agriculture, Navile, Shivamogga, on sandy loam soil. The experiment was laid out in RCBD with nine treatments replicated thrice. Treatments include combinations of basal application of prilled urea at 25 and 50 per cent recommended N (RDN) with spray application of nano urea at 15, 30, 45 and 60 DAS, which were compared with package, absolute control and N management through LCC using nano urea. Among the treatments tested, basal application of 50 per cent RDN + 25 per cent RDN top dressed at 30 DAS using prilled urea with a spray application of nano urea at 60 DAS recorded significantly higher plant height (228.73 cm), leaf area (6680.35 cm^2) at 90 DAS, dry matter (272.81 g plant⁻¹), cob length (14.58 cm) and number of kernelscob⁻¹ (524)at harvest compared to the other treatments in test except package of practice. Due to the impact of above parameters, mentioned treatments not only achieved maximum grain yield (6279 and 6112 kg ha⁻¹) but also nutrient uptake (155and 146 kg ha⁻¹ of N, 32and 29kg ha⁻¹ of P, 83 and 78 kg ha⁻¹ of K) and use efficiency of nutrients (56and 40% for N, 27 and 24 % for P, 59and 52% for K). Based on economics, it was found to save 25 per cent recommended N (37.5 kg ha⁻¹) applied at 45 DAS by using single spray of nano urea at 60 DAS as best treatment. However, relying only on nano urea based N application as spray (4 times) resulted 16 per cent improvement over control but failed to match the package application by 45 per cent.

November, 2022

(M. Dinesh Kumar) Major Advisor

14. Feasibility of Crop Intensification Through Inter-Cropping of Legumes in FCV Tobacco

(VAISHNAVI, H. N.) ABSTRACT

A field experiment on feasibility of crop intensification through inter-cropping of legumes in FCV tobacco was carried out at All India Network Project on Tobacco, Zonal Agricultural and Horticultural Research Station (ZAHRS), Navile, Shivamogga during *kharif* of2021. The experiment was laid out in RCBD with eleven treatments involving five legumes *viz.*, green gram, black gram, cowpea, field bean and groundnut as intercrops with FCV tobacco in alternate rows and their sole crops for comparison. Experiment was replicated four times. The results revealed that, FCV tobacco + Groundnut recorded significantly higher cured leaf yield of FCV tobacco (1771 kg ha⁻¹) as compared to sole FCV tobacco. The yield was 13.9 per cent higher as compared to sole FCV tobacco. Also, the higher values of intercrop indices were observed in FCV tobacco+ Groundnut with 2124 kg ha⁻¹ tobacco equivalent yield,

1.62 land equivalent ratio and ₹ 147472 monetary advantage index. However, highest area time equivalent ratio (1.51) was observed in FCV tobacco + Black gram. B:C recorded was higher in FCV tobacco + Groundnut (2.36) compared to other legumes as intercrops and sole FCV tobacco. Further, FCV tobacco + Black gram showed higher uptake of nitrogen(40.28 kg ha⁻¹) and potassium (114.14 kg ha⁻¹). Whereas, higher uptake of phosphorus (7.68 kg ha⁻¹) was observed in FCV tobacco + Groundnut. The chemical quality parameters, *viz.*, nicotine, reducing sugars and chloride in leaf lamina were within the acceptable limit. Among the inter-cropping systems, FCV tobacco + Cowpea and it was superior over all intercropping systems. Further, disease incidence was minimum when FCV tobacco was intercropped with cowpea and

field bean.

November, 2022

(Soumya, T. M.) Major Advisor

15. Effect of Various Levels of Chickpea Magic on Growth and Yield of Chickpea (*Cicer arietinum* L.).

(**VIDYA**, **V**. **S**.)

ABSTRACT

A field experiment was conducted during Rabi season of 2021-22 under rainfed conditions at ZAHRS, Babbur farm, Hiriyur, Chitradurga, to know the "Effect of various levels of chickpea magic on growth and yield of chickpea (Cicerarietinum L.)". The field experiment consists of nine treatments viz., 100 per cent RDF (13:25:25 kg N:P₂O₅:K₂O ha⁻¹ + FYM @ 7.5 t ha⁻¹) (T₁), Farmers practice (T₂), 100 per cent RDF (13:25:25 kg $N:P_2O_5:K_2O$ ha⁻¹ only) + 2 per cent DAP (T₃), 100 per cent RDF (13:25:25 kg N:P_2O_5:K_2O) ha^{-1} only) + 0.75 per cent chickpea magic (T₄), 100 per cent RDF (13:25:25 kg N:P₂O₅:K₂O) ha^{-1} only) + 1 per cent chickpea magic (T₅), 100 per cent RDF (13:25:25 kg N:P₂O₅:K₂O ha^{-1} + FYM @ 7.5 t ha⁻¹) + 2 per cent DAP (T₆), 100 per cent RDF (13:25:25 kg N:P₂O₅:K₂O ha⁻¹) 1 + FYM @ 7.5 t ha⁻¹) + 0.75 per cent chickpea magic (T₇), 100 per cent RDF (13:25:25 kg N:P₂O₅:K₂O ha⁻¹ + FYM @ 7.5 t ha⁻¹) + 1 per cent chickpea magic (T₈)and 1 per cent chickpea magic only (T₉) replicated thrice and laid out in RCBD. Among treatments tried, significantly higher plant height (40.28 cm), number of primary and secondary branches plant⁻¹ (4.46 and 13.95 plant⁻¹, respectively), number of nodules and effective nodules plant⁻¹ at 60 DAS (31.59 and 25.69 plant⁻¹, respectively), dry matter accumulation plant⁻¹ (20.39 g plant⁻¹) were recorded in treatment with the application of 100 per cent RDF (13:25:25 kg N:P₂O₅:K₂O ha⁻¹ + FYM @ 7.5 t ha⁻¹) + 1 per cent chickpea magic (T₈).Similarly higher nitrogen, phosphorus and potassium uptake by chickpea crop (95.25, 14.98 and 82.01 kg ha⁻¹, respectively) was also noticed in the above said treatment. The better values of these indices in the treatment resulted in higher yield parameters like number of pods plant⁻¹ (47.03), pod yield plant⁻¹ (28.24 g), seed yield (18.53 q ha⁻¹) and haulm yield (26.96 q ha⁻¹) as well as higher protein content (21.12 %) in seeds. Further, the highest net returns (`58,045 ha⁻¹) and benefit cost ratio B: C ratio (2.61) were realized in the same treatment which received 100 per cent RDF (13:25:25 kg NPK + FYM @ 7.5 t/ha) along with foliar spray of 1 per cent chickpea magic at 45 DAS. The magnitude of increase in seed yield was up to 39.63 per cent over farmers practice treatment without any chickpea magic application.

November, 2022

(Rudragouda, F. C.) Major Advisor

Genetics and Plant Breeding

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the

Department of Genetics and Plant Breeding

1. Studies On Terminal Drought Tolerance In Bengal Gram Genotypes Under Field Condition

(ASHOK MALLAPPA BIDARI)

ABSTRACT

Drought is the most common abiotic stress limiting chickpea production because it is usually grown under the residual soil moisture. To evaluate and identify drought tolerant chickpea genotypes, an investigation was carried out during Rabi season of 2021at ZAHRS, Hiriyur using 24 genotypes in a randomized complete block design with two replications. The analysis of variance revealed the existence of significant differences among the genotypes under study for all the traits studied. A wide range of variability and high heritability coupled with high genetic advance as per centof mean were recorded for most of the yield contributing traits. The association studies revealed that, number of branches per plant, number of pods per plant, number of seeds per pod and root length had shown significant positive association with seed yield. Correlation study between drought tolerance indices (GMP-Geometric Mean Productivity, YI-Yield Index, MP-Mean Productivity, SSI-Stress Susceptibility Index and TOL-Tolerance index) and grain yield under both water stress and normal condition revealed that, MP, GMP and YI showed significantly positive and high correlation with grain yield. Considering this, the genotypes which showed higher value for these indices were reported to be most tolerant. Accordingly, JG-11, Phule Vikram, JG11 \times WR315, SKM-13, Nbeg 47, DBGV-II-164 and SKM-4 have been identified as drought tolerant genotypes in view of their better drought tolerance ability and these can be used as donor parents to develop drought tolerant varieties in future crop improvement programs.

November, 2022

(B N Harish Babu.) Major Advisor

2. Assessment Of Genetic Divergence In Hill Rice (*Oryza sativa* L.) Genotypes And Their Comparative Study Under Submergence

(BINDU, L.)

ABSTRACT

The present investigation was conducted at College of Agriculture, KSNUAHS, Shivamogga during Kharif 2021. Nineteen rice genotypes and six checks were studied for genetic variability, character association and genetic diversity under non-submergence condition. Twenty-five rice genotypes and five checks were screened for submergence tolerance under submerged condition. Under non-submergence, analysis of variance revealed high significant differences for all the characters studied. Genetic variability revealed high estimates of PCV, GCV, heritability and genetic advance for the traits viz., plant height, number of grains per panicle, number of filled grains per panicle, panicle length, test weight and grain yield. Correlation study revealed significant positive association for days to fifty percent flowering, days to maturity, total number of tillers per plant, number of productive tillers, number of grains per panicle, number of filled grains per panicle, panicle length, panicle fertility and test weight. Path analysis disclosed highest direct positive effect on grain yield by total number of filled grains per panicle. Mahalanobis D² statistics grouped twentyfive rice genotypes into eight clusters. Maximum inter-cluster distance was observed between cluster III and VII. Under submerged condition, highest survival percentage was observed for KHP-11 × MM-1-3-1. Genetic variability revealed high PCV, GCV, heritability and genetic advance for survival and stem elongation percentage. Phenotypic correlation for physiological traits revealed significant positive correlation of survival percentage with harvest index and grain yield. Top performing rice genotypes were selected based on grain yield and related traits. KHP-11×MM-1-3-1 recorded significantly higher yield (6148.75 kg/ha) than check KPR-1 (5203.75 kg/ha). Hence, KHP-11 × MM-1-3-1 may be advanced to Multi-location trials, large scale demonstrations and proposed for varietal release in hill zone (low lands) of Karnataka.

November, 2022

(Dushyantha Kumar, B. M) Major Advisor

3. Stability Analysis In Advanced Breeding Lines Of Chickpea (Cicer arietinum L.)

(JAYARAJ MASTAPPA NAIK)

ABSTRACT

The present experiment was conducted to evaluate variability, correlation and stability in 12 advanced breeding lines of chickpea. The evaluation was carried out during Rabi 2020 across three locations viz., ZAHRS, Hiriyur, Hosadurga and Ajjampura by using Randomized Complete Block Design with three replications including two checks. Analysis of variance (ANOVA) depicted significant differences among all the advanced breeding lines studied. The traits viz., number of primary branches per plant and seed yield per plant recorded high PCV and GCV values, while plant height, 100 seed weight, number of pods per plant, number of seeds per pod and seed yield per hectare reported moderate PCV and GCV. High heritability coupled with high genetic advance as *per cent* of mean recorded in traits viz., plant height, number of primary branches per plant, 100 seed weight, seed yield per plant and seed yield per hectare. The characters such as days to maturity, plant height, number of primary branches per plant, number of pods per plant, number of seeds per pod and seed yield per plant had a significant positive correlation with seed yield per hectare. To analyse stability, Additive Main Effect and Multiplicative Interaction (AMMI) model and GGE biplot methodology were used for yield and its attributing traits. The AMMI analysis showed highly significant Genotype \times Environment Interaction (GEI) for yield and its attributing traits. Two Interaction Principal Component Axis viz., IPCA1 and IPCA2 were highly significant for all traits. AMMI Stability Value (ASV) identified PV (M.H) and NBeg-47 (M.H) as stable lines for seed yield per hectare. The identified stable lines can be tested in larger environments for general cultivation.

January, 2022

(B N Harish Babu.) Major Advisor

4. Assessment Of Genetic Variability And Divergence In Advanced Breeding Lines Of Tomato (*Solanum lycopersicum* L.)

(KAVANA, K. P.)

ABSTRACT

The presence of genetic variation is very much essential for any crop improvement. An experiment was conducted during Kharif 2021 at ZAHRS, Shivamogga, to determine the genetic variability, diversity, correlation and path analysis amongF5 genotypesof cross (IIHR2349 X ArkaVikas) in tomato. All the 24genotypes along with checks ArkaRakshak and ArkaSamratwere evaluated in RCBDin two replication. Significant variations were documented for all the traits. High phenotypic coefficient of variation and genotypic coefficient of variation wasrecorded for most of the traitsindicating greater variability.Based on Mahalanobis D² values the 24 genotypes were grouped into 5 clusters. Cluster III and V had maximum distance (682.55) which can be used as source of parents for hybridization programme.Fruit length (41.30%) and number of fruits per plant (26.45%) contributed maximum towards total genetic divergence. Yield was found to have a significant positive association with fruit weight, number of fruits per plant, number of flower cluster per plant, fruit length and days to 50 per cent flowering, phenotypic and genotypic level respectively. Shelf life was positively associated with pericarp thickness and pulp content. Path analysis revealed that fruit weight, number of fruits per plant and fruit length had high direct effect on yield. In conclusion, these characters can be considered while selection to improve fruit yield and shelf life of tomato. The residual effect (0.2719) advocates that majority of the characters were included under study. Considering all this G-7, G-12 and G-16 genotypes were identified as superior advanced breeding line which can be further utilized in breeding programme.

November, 2022

(Shashikala S Kolakar) Major Advisor

5. Induced Variability Through Gamma Irradiation For Yield And Yield Attributing Traits In Traditional Red Rice Variety Kajejaya

(**LEKHA**, **P. S.**)

ABSTRACT

An experiment was conducted during Kharif2021 at Zonal Agricultural and Horticultural Research Station, Brahmavar, to study the genetic variability in different treatments (15, 25, 35 and 45kR) of gamma rays in M₅ generation of red rice variety Kajejaya. The experiment was carried out in Randomized complete block design with two replications. Significant variations in mutant lines were documented for the traits through analysis of variance. High magnitude of PCV and GCV was recorded for leaf width and number of productive tillers per plant which implies negligible influence of environment. High heritability coupled with high genetic advance as per cent of mean (GAM)was observed for the traits, number of tillers per plant, number of productive tillers per plant, number of grains per panicle, number offilled grains per panicle and test weight indicating that these traits are governed by additive gene action. Grain yield per plant showed positive and significant correlation with number of tillers per plant, number of productive tillers per plant, number of grains per panicle, number of filled grains per panicle and spikelet fertility. Path coefficient analysis revealed direct positive effecton grain yield through number of tillers per plant, number of grains per panicle and spikelet fertility, suggesting as these traits can be considered as selectioncriterion in the yield improvement program. The highest positive direct effect exhibited by number of grains per panicle.From each treatment of gamma irradiation, top five superior mutants were selected based on higher grain yield and yield related traits, the selected mutant lines were exhibiting lesser days to mature and were having more number of productive tillers per plant, number of filled grains per panicle and test weight.

December, 2022

(Shridevi, A. Jakkeral) Major Advisor

6. Assessment Of Genetic Variability And Divergence In North-Eastern Rice (*Oryza* sativa L.) Germplasm

(MANOHAR, B. N.)

ABSTRACT

Appraisal of variability and trait associations incrop helps widen the selection opportunity spectrum for plant breeder. With this objective, a study was undertaken to evaluate 44 North-Eastern rice germplasm, including checks for variability, diversity, character association and path-analysis for twelve yield and yield attributing characters. Using RCBD with two replications during Kharif 2021 at ZAHRS, Shivamogga. ANOVA revealed the existence of significant differences for all the traits under study. PCV was found slightly elevated than the GCV. The high GCV, PCV, heritability and GAM was observed for number of productive tillers plant⁻¹, number of tillers plant⁻¹, total number of spikelet panicle⁻ ¹, total number of filled grains panicle⁻¹, L/B ratio and grain yield. Traits with high heritability and high genetic advance aspercentage of mean indicate a predominance of additive gene action, and these traits can be improved through simple selection. Correlation studies revealed that grain yield had a positive-significant correlation for all characters except for L/B ratio, which hadpositive non-significant correlation (0.1566) and test weight withnegative non-significant effect(-0.0101). Path-analysis demonstrated the highest directpositive effect was shown by number of spikelet panicle⁻¹(0.9718), and the highest directnegative effect was seen for number of filled grains panicle⁻¹(-0.5681). MahalanobisD² analysis clustered the genotypes into eight clusters. Cluster-I constituted maximum number of genotypes with 18 genotypes. Maximum inter-cluster distance was observed between cluster-VI and VIII, followed by cluster-III and VIII, suggesting that the genotypes from these clusters can be selected to yield superior segregants and further genetic improvement. Maximum genetic divergence was exhibited by test weight(41.08%), L/B ratio(20.29%), days to flowering(9.29%), plant height(8.84%) followed by number of tillers(6.31%). Altogether, these traits accounted for 85.73% of the total genetic divergence indicating their importance as selection criteria in the choice of parents for hybridization programmes.

November, 2022

(Narayanaswamy, M) Major Advisor

7. Identification Of Qtls For Salinity Tolerance At Seedling Stage In Rice (Oryza sativa L.)

(POBBAREDDY HIMAJA)

ABSTRACT

Salinity stress is the most prominent stress impacting rice productivity worldwide. Evaluation of RILs for salt tolerance and incorporation of desirable traits into crop plants may mitigate the effects of salinity on productivity. MTU 1001 is the high yielding variety of Karnataka covering an area of more than 70,000 hectares, but susceptible to salinity. The present investigation was conducted during Kharif 2021 to evaluate and identify saline tolerant RILs. 175 RILs and two parents (Kalarata and MTU 1001) were subjected to 10dSm⁻ ¹ salt stress during the seedling stage using a randomized complete block design with three replications at the College of Agriculture, Shivamogga. Vigor score, root and shoot length, sodium and potassium concentrations of root and shoot were measured after two weeks of salinization. These parameters were found to be significant among RILs. High heritability and high genetic advance were recorded for traits studied. The correlation studies revealed that the effect of the increased Na⁺ concentration in the medium is detrimental to root length and shows a negative correlation. A significant positive correlation was noticed between vigor score, shoot length and shoot potassium. The principal component analysis study revealed that RILs 31, 46, 90, 26, 28 and 156 were the best performers adjudged on the morpho-physiological criteria in saline stress. Genotyping by sequencing approach was followed for SNP identification. Genetic linkage map was constructed with 6020 SNPs, which covers a map length of 1451.67 cM with an average marker distance of 0.24 cM. A total of seven QTLs were identified using Inclusive Composite Interval Mapping for five morpho physiological traits. Of which three were major OTLs and four were minor OTLs. After fine-mapping, the putative QTLs identified in this study could be used to indirectly select salt tolerant traits in marker assisted selection.

November, 2022

(Dushyantha Kumar, B. M) Major Advisor

8. Studies On Genetic Variability In Ragi (*Eleusine coracana* Gaertn.) For Yield And Nutritional Quality

(PONNAM MANISHA)

ABSTRACT

The present investigation was conducted to assess the extent of genetic variability for vield and nutritional traits in 34 finger millet genotypes during *Kharif* 2021, in randomized block design with two replications at Zonal Agricultural and Horticultural Research Station (ZAHRS), Hiriyur. The analysis of variance (ANOVA) revealed the existence of highly significant differences among the genotypes with respect to all the evaluated traits. Moderate variability and high heritability coupled with high genetic advance was recorded for most of the yield contributing traits indicating that these traits permit a reasonable scope for the yield improvement through selection due to their moderate genetic variability. A wide range of variability and high heritability coupled with high genetic advance was recorded for calcium, magnesium, iron and crude protein. Grain yield (kg/ha) showed highly significant positive association with number of productive tillers per plant, number of fingers per ear and average finger length. Two genotypes, VL-408 (4955.56 kg/ha) and CFMV-2 (4866.67 kg/ha) recorded significantly higher yield. Genotypes, KMR-240 (432 mg/100 g), VL-400 (172.80 mg/100 g), RAUF-17 (15.83 mg/100 g) and GPU-28 (3.31 mg/100 g) were shown to be superior for Ca, Mg, Fe and Zn nutrient concentration, respectively. KMR-340 and Local ragi genotypes recorded higher values for total sugars (78 %) higher values of crude protein were recorded by VL-408 (11.40 %) and KMR-340 (9.6 %). The nutritionally potential genotypes identified can be further utilized as donor parents to transfer these desirable traits to the superior high yielding genotypes for biofortification of popular varieties.

November, 2022

(B N Harish Babu.) Major Advisor

9. Genetic Investigation Of Cowpea (*Vignaunguiculata* L. Walp.) Genotypes For Yield And Its Attributing Characters

(SMITHA, D.)

ABSTRACT

An experiment was conducted during Summer 2022 at ZAHRS, Navile, Shivamogga to assess the genetic variability, heritability, genetic advance, association studies for yield and yield attributing traits and to estimate genetic divergence among the genotypes. The material used in the present investigation was44genotypes of cowpea including four checks (C-152, DC-15, DC 47-1 and Sahyadri Yukthi)which were evaluated in randomized complete block design with two replications. It is apparent from the analysis of variance that the genotypes varied significantly for all the traits under study. High phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability and genetic advance as per cent of mean (GAM) were observed for the traits number of primary branches per plant, number of clusters per plant, number of pods per cluster, number of pods per plant, number of seeds per pod, pod length and seed yield per plant. Correlation analysis results showed that seed yield per plant exhibited very strong association with number of pods per plant (0.8100) and number of pods per cluster (0.7999). Path analysis revealed the high positive direct effect of number of pods per cluster (0.3667) on seed yield per plant. Selection would be rewarding if these traits are considered accordingly. Mahalanobis D²analysis clustered 44 genotypes into six clusters. Cluster I came out as the largest cluster with 32 genotypes and cluster II, III and VI were solitary clusters. The genotypes belonging to the clusters IV and VI were more diverged as evident by more inter cluster distance followed by clusters II and IV, signifying that the genotypes residing in separate clusters may be hybridized to get high competency segregants. Plant height (21.56%) contributed maximum towards total divergence. Genotypes ABL-7 and IC-249161 documented maximum seed yield per plant. To achieve a desirable increment in yield, these genotypes could be included in the hybridization program.

November, 2022

(Shashikala S Kolakar) Major Advisor

Plant Pathology

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the

Department of Plant Pathology

1. Variability Studies On *Colletotrichum gloeosporioides* Causing Inflorescence Die-Back And Leaf Blight Disease In Arecanut

(ARUNA PRASAD, K. M.)

ABSTRACT

Arecanutis an important plantation crop of India, it suffers from many diseases caused by various biotic agents. Among the diseases affecting arecanut, inflorescence die-back and leaf blight caused by Colletotrichum gloeosporioidesare of economically significant. Roving survey carried out to assess the occurrence inflorescence die-back and leaf blight disease of arecanut in Chikkamagaluru, Shivamogga and Davanagere districts of Karnataka staterevealed, the maximum PDI of inflorescence die-back in Shivamogga (45.77 %). Whereas for leaf blight recorded highest in Thirthahalli (72 %) taluk.Cultural studies showed that Mathur's agar media was found good for the growth of C. gloeosporioides, whereas conidiafound to be cylindrical or dumbel shaped with both theend rounded. The polymerase chain reaction (PCR) assay of C. gloeosporioides using species-specific primer (CgINT) with ITS4 vielded a single band of 450bp. Among the contact fungicides tested, propineb showed hundred per cent mycelial growth inhibitionwhereas among the combi-products maximum inhibition of mycelial growth (100 %) was noticed withpropiconazole + difenconazole combination.Systemic fungicides viz., propiconazole was found to be most effective against Colletotrichumgloeosporioides which inhibited (96.05 %). Among the seven plant extracts evaluated, maximum fungal growth inhibition (52.47 %) was observed in garlic extract, which was followed by Siam weed extract (52.35 %). Among the fungal bio-agents tested, Trichodermaharzianumshowed 60.27 per cent inhibition of the pathogen. Similarly, among the bacterial bio-agents tested, maximum inhibition was observed in Bacillussubtilis(71.55 %).

November, 2022

(B. Gangadhara Naik) Major Advisor

2. Investigations On Phyllosticta Leaf Spot Of Ginger (*Zingiber officinale* Rose.) (ARPITHA, J.)

ABSTRACT

Ginger (Zingiber officinaleRose.) is an important spice crop with medicinal importance. Several pathogens are known to hinder the ginger production, among them leaf spot disease caused by Phyllosticta zingiberi (Ramakr.) is an emerging foliar disease affecting the crop to a greater extent by interfering photosynthesis as well as reducing the size and weight of the rhizomes. Roving survey conducted to know the severity of leaf spot disease in Shivamogga, Chikkamagaluru and Hassan districts revealed that, maximum disease severity (32.24 %) was recorded in Hassan followed by Shivamogga district (30.72 %). Among the seven different media's tested for their cultural characterization, potato dextrose agar supported the maximum radial growth (90 mm) of P. zingiberi. From the morphological studies it was observed that the conidia released from pycnidia fruiting body was hyaline and its shape varied from oval to ellipsoidal. From the molecular characterization, it was observed that *P. zingiberi* showed highest similarity of 95.30 per cent with P. citricarpa. In vitro evaluation of seven different botanicals at various concentrationsviz., 5, 10, 15 % showed that lantana was the best with highest mean mycelial of 63.26 of five different bio agents inhibition per cent. Out tested, Tricodermaharzianum was found to be superior in inhibiting the mycelial growth of the pathogen (57.22 %) under dual plate method. Among the non-systemic fungicides tested, maximum mycelial inhibition of 91.29 per cent was recorded in mancozeb 75 % WP. Whereas, among systemic fungicidescarbendazim 50 % WP and tebuconazole 45 % SC were effective with cent per cent inhibition. Among the combi product fungicides tested, carbendazim 12 % + mancozeb 63 % WP combinationshowed cent per cent inhibition of the test fungus.

November, 2022

(R Ganesha Naik) Major Advisor

3. Studies On Stem Rot Of French Bean (*Phaseolus vulgaris* L.) Incited By Sclerotium Rolfsii Sacc.

(GNANAMBIKA, P. T.)

ABSTRACT

French bean (Phaseolus vulgaris L.) is an important pulse and vegetable crop belongs to the family leguminaceae, which is mainly grown for its dry grain and tender pods. Several pathogens are known to hinder the French bean production, among them stem rot disease caused by Sclerotium rolfsii Sacc., is a major problem causing 55 to 65 per cent yield loss. Hence, investigation were carried out on stem rot of French bean caused by S. rolfsii with respect to survey for disease incidence, cultural, morphological and molecular characterization of the pathogen, efficacy of botanicals, bioagents and fungicides against S. rolfsii under in vitro conditions. Roving survey was carried out in three districts, among them maximum disease incidence of 11.65 per cent was recorded in Davanagere followed by Shivamogga district (8.74 %). Cultural and morphological characters of S. rolfsii studied on seven different solid media, indicated the maximum radial growth (90 mm) on potato dextrose agar with white coloured colonies and produced 247 brown coloured and round shaped sclerotia/plate. Molecular characterization revealed the isolates as Sclerotium rolfsii which was amplified at 680 bp. Among the different botanicals evaluated under in vitro against S. rolfsii, maximum inhibition of mycelial growth was recorded by garlic clove extract (55.55 %). Among the bioagents evaluated in vitro, Trichoderma asperellum was found to be significantly superior in inhibiting the growth (58.33 %). Among the fungicides evaluated under in *vitro*, propiconazole, hexaconazole, tebuconazole, captan + hexaconazole, propiconazole + difenoconazole, carboxin + thiram, tebuconazole + trifloxystrobin and azoxystrobin + tebuconazole showed 100 per cent inhibition of mycelial growth.

December, 2022

(R Ganesha Naik) Major Advisor

4. Studies On Fruit Rot Of Drumstick (*Moringa oleifera* L. (KOUSALYADEVI) ABSTRACT

The drumstick (Moringa oliefera L.) belongs to the Family Moringaceae which is mainly grown in tropical and subtropical regions of the world. It is a fast growing and well known for its medicinal, antimicrobial properties. Excellent source of nutrition for human and animal food. Fruit rot caused by Fusarium sp. adversely affects the fruit quality, quantity and reduces the market value. The fruit rot of drumstick causes losses in field. The drumstick fruits showing typical characteristic symptoms of fruit rot were collected from Babbur farm Hiriyur. Infected fruits exhibited water-soaked spots, softening and mummification of fruits. Among the different solid media evaluated potato dextrose agar and Czapek's dox agar (90mm) found to be best for growth and maximum sporulation. The conidia of Fusarium *incarnatum* were sickle shaped macroconidia with three to four septate measuring $25.17 \times$ 2.81 to $37.43 \times 3.33 \mu m$ and ovoid shaped microconidia measuring 3.39×1.10 to 6.53×1.32µm. Molecular characterization revealed 99.99% similarity of F.incarnatum with already deposited sequences .The maximum dry weight of *F.incarnatum* was observed from physiological studies at 25 degree celsius (428.50 mg) and pH at 7.0 (560 mg). Invitro studies revealed that fungicides like propineb 70 % WP (100%), carbendazim 50% WP (100%), carbendazim 12 % + mancozeb 63 % WP (93.18%) were effective in inhibiting the growth of fungus. Among different bioagents and botanicals tested Trichoderma harzianum (61.11 %) and neem leaf extract (37.87 %) respectively showed highest inhibition of fungal growth.

November, 2022

(Suresh D Ekabote) Major Advisor

5. Studies On Powdery Mildew (*Leveillula taurica* (Lev.) Arn.) Of Chilli (MADDURI UMA SHANKAR) ABSTRACT

Chilli (*Capsicum annum* L.) is a popular commercial horticulture crop cultivated for domestic and international markets. The present study was undertaken on powdery mildew (Leveillula taurica (Lev.) Arn.) of chilli. Survey was conducted in different chilli growing areas of the Southern Transition Zone of Karnataka viz., Chikmagalur, Davanagere, Hassan and Shivamogga districts. Maximum per cent disease index (PDI) was found in Davanagere district with 47.91 per cent followed by Chikmagalur (38.92 %) and the least was recorded in Hassan district (36.20 %). The conidial morphology of the different isolates of Leveillula taurica (Lev.) Arn. collected during the survey showed the presence of pyriform conidiospores, cylindrical conidiospores and pyriform + cylindrical conidiospores. The size of the pyriform conidiospores was found to be $50.70-80.20 \times 12.60-25.10$ µm, and that of cylindrical conidiospores was 42.60-62.10 x 9.80-18.60 µm. The conidiophores were hyaline, septate, both branched and unbranched were observed with an average size of 155.40-220.10 μm x 5.80-8.40 μm. The influence of environmental factors revealed that the maximum per cent disease index (PDI) of 60.10 per cent was observed during the 11th MSW of 2021. During that period, the maximum temperature (34.50[°] C), minimum temperature (20.77[°] C), maximum RH (84.00 %), minimum RH (36.00 %), rainfall (00 mm) and wind speed (4.10 km/hr) remained most favourable for powdery mildew disease development. Among seven fungicidal treatments, Tebuconazole + Trifloxystrobin and Flusilazole + Carbendazim at 0.05 per cent concentration were found effective against Leveillula taurica (Lev.) Arn. with mean per cent disease reduction over untreated control (Mean PDR) up to 62.87 and 56.05 per cent and obtained green chilli yield of 130.83 q/ha and 116.50 q/ha, respectively. The benefit cost ratio was more in Tebuconazole + Trifloxystrobin treated plots with 1.91 followed by Flusilazole + Carbendazim with 1.79.

February, 2022

(H. Narayanaswamy) Major Advisor

6. Studies On Narrow Brown Spot Of Paddy (Oryza sativa L.) Incited By Cercospora oryzae

(MANJUNATH, R.)

ABSTRACT

Rice is the most extensively cultivated food crop of Asia and it is affected by several diseases. The narrow brown spot caused by Cercospora oryzae is one of the most destructive fungal disease causing significant yield loss in all the rice growing regions of the world. The present survey conducted for the disease in hilly zone of Karnataka, revealed highest mean per cent disease index in Kodagu (26.38 %) followed by Chikkmagaluru(18.41 %) and the least mean per cent disease index (10.25 %) was observed in Shivamogga district. Among 118 rice genotypes screened, 7 genotypes (IET 29637, IET 28889, IET 28222, IET 28904, IET 28911, IET 29663 and IET 29668) were found resistant, twenty eight were moderately resistant and thirty nine were moderately susceptible. Thirty seven genotypes recorded susceptible reaction and another 7 genotypes (IET 29642, IET 28917, IET 28910, IET 29656, VL Dhan 158, CH-45 and Rasi.) were shown highly susceptible reaction. Cultural and morphological studies revealed that radial growth of Cercosporaoryzae was maximum on potato dextrose agar (90.00 mm) fallowed by Oat mealagar (89.23 mm) and V8 juice agar (87.06mm). In vitro evaluation of all the fungicides tested were effective in inhibition of pathogen at all the concentrations and maximum mean inhibition was recorded in Propiconazole25 % EC (93.89 per cent) at 50, 100, 250 ppm concentration. The field evaluation of fungicides revealed that Propiconazole 25 % EC @ 1 ml / Lit. recorded the least per cent disease index (11.12 %) of narrow brown spot followed by Hexaconazole 5 % EC @ 1 ml / Lit.(13.33 %) with the highest yield of 51.46 q/ha and 49.75 q/ha, respectively.

November, 2022

(G. N. Hosagoudar) Major Advisor

7. Studies On Nematophagous Fungi: A Potential Bio-Control Agent Of Phytonematodes

(PAVANASHREE, Y. N.)

ABSTRACT

Plant-parasitic nematodes (PPNs) cause severe damage to agricultural and horticultural crops worldwide. For the management of nematode diseases there are hardly few nematicides available in the market and most of them are hazardous to environment. There is a greater need to develop efficient biocontrol methods to combat the nematode problems in various crops. Among them, nematophagous fungi are most efficient in the sustainable management of plantparasitic nematodes. The present investigations were undertaken to develop the potential biocontrol agents *i.e.*, nematophagous fungi against tomato root knot nematode. The micro plot experiment was conducted to know the efficacy of nematophagous fungi viz., Purpureocilliumlilacinum(UAHSNEM8) and Trichoderma spp. (UAHSNEM5) through different delivery approaches, such as seed treatment, seedling dip and soil application, mass multiplied and formulated in different carriers, in-vitro compatibility with chemicals and bioagents were tested. Among various treatments tested, better plant growthwith maximum yield(5.26g per plot) and highest reduction in number of galls/root (2.96), nematode population (131.33/200 cc soil) and root knot index (1.33) were observed in plots which received soil drenching with combination of FYM enriched with P. lilacinum (UAHSNEM8) and Trichoderma spp. (UAHSNEM5) followed by soil drenching with combination of P. lilacinum (UAHSNEM8) and Trichoderma spp. (UAHSNEM5) talc formulations. Among the different formulations of P. lilacinum (UAHSNEM8) and Trichoderma spp. (UAHSNEM5), talc formulation of both fungi showed highest survivability even at 90 days of storage with $106.10 \times$ 10^5 and 98.6×10^5 cfu/g respectively. *In-vitro* compatibility with chemicals revealed that both fungi were compatible with antibiotics followed by nematicides while all the fungicides tested were incompatible. In-vitrocompatibility with bio-agents such as Trichodermaharzianum, Pseudomonas fluorescens, Bacillus subtilis and B. megatariumwere found compatible with bothP. lilacinum (UAHSNEM8) and Trichoderma spp. (UAHSNEM5).

November, 2022

(R Ganesha Naik) Major Advisor

8. Eco Friendly Management Of *Phytophthora meadii* Causing Fruit Rot Disease Of Arecanut

(SUSHMA, J.)

ABSTRACT

An investigation was carried out on Phytophthora meadii (McRae), which causes "Koleroga" (fruit rot) of arecanut, poses a serious threat for the cultivation of arecanut in regions receiving heavy rainfall resulting 10-100 per cent yield loss. Present study was carried out with an aim to survey the areca gardens for the incidence of disease, characterizing the pathogen through cultural, morphological, and molecular means, invitro evaluation of botanicals, bioagents and fungicides against Phytophthora meadii. Among the districts surveyed Shivamogga recorded maximum per cent disease incidence (67.02%) followed by Chikkamagaluru with 52.66 per cent. Cultural studies showed PDA (90.00 mm) and V8 agar media (85.00 mm) supported maximum growth of mycelia of the pathogen whereas, pathogen colony found to be stelloid, floral, petaloid and plain pattern. Fungal hyphae were hyaline, 9-12 µm in diameter and aseptate whereas, sporangial characters of all isolates revealed the presence of papillate and semi-papillate having diverse sporangial shapes viz., globose, ovoid, obpyriform, ovoid-obpyriform and lemoniform. Molecular characterization of the isolates through amplification of cox region of *Phytophthora* DNA using specific primers FMPhy 8b and FMPhy 10b yielded bands in the range of 450 bp. Sequencing and Blast analysis revealed 95-100 per cent nucleotide similarity with *Phytophthora meadii* isolates and the isolates were submitted in the NCBI Genbank and accession numbers were obtained. In-vitro evaluation of botanicals revealed highest mycelial inhibition of 88.88 per cent by Ocimum sanctum and Emblica officinalis at 15 per cent concentration. Among different bio-agents tested the highest inhibition (63.88%) of mycelial growth was observed with Trichoderma asperellum. In-vitro studies of contact, systemic and combi fungicides revealed that copper hydroxide, metalaxyl, potassium phosphonate, fluopicolide + propamocarb hydrochloride, iprovalicarb + propineb and fluopicolide + fosetyl-Al recorded cent per cent mycelial inhibition of P. meadii.

November, 2022

(B. Gangadhara Naik) Major Advisor

9. Studies On Xanthomonas vasicola Pv. arecae Causing Bacterial Leaf Stripe Disease Of Arecanut

(THANUSHREE, S. P.)

ABSTRACT

Arecanut (Areca catechu L.) is a palm belongs to the family Arecaceae, cultivated as a cash crop in India and popularly known as betel nut. However, among the diseases, bacterial leaf stripe is one of the emerging disease known to attack the crop during the early growth period between 1-6 years resulting the death of the palms. Screening of different arecanut varieties viz., Thirthahalli local, Maidan local, Madhuramangala, Sreemangala, Sumangala, Swarnamangala, Mangala and Mohitnagar against the bacterial leaf stripe pathogen. Among the varieties screened, Thirthahalli local which was moderately resistant to the disease with a mean lesion length of 10.56 mm on the individual inoculated leaves whereas, all other varieties were found susceptible to the disease. Biochemical analysis of two arecanut varieties viz., Thirthahalli local and Maidan local revealed highest synthesis of active biochemical compounds such as total phenols, total flavonoids and total alkaloids (850, 630 and 840 µg/g of sample)in Thirthahalli local upon challenge inoculation of the pathogen. To identify the pathogen ≈1490 bp region of 16S rRNA gene was amplified,≈491 bp region ofgyrB was targeted from pathogen isolates through polymerase chain reaction (PCR).Based on sequence comparison, all three isolates 16S rRNA gene fragments were identified as Xanthomonas vasicola pv. arecae. In vitro studies revealed better efficacy of Neem leaf extract in supressing the growth of the pathogen at 15 per cent concentration. Among the chemicals tested, Kasugamycin 5 per cent + Copper oxychloride 45 per cent WP was found to be very effective in supressing the pathogen growth at all the three concentrations tested.

November, 2022

(B. Gangadhara Naik) Major Advisor

Soil Science and Agricultural Chemistry

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the

Department of Soil Science and Agricultural Chemistry

1. Studies On Soil Nitrogen Fractions In Groundnut Under Different Nutrient Management Approaches In The Central Dry Zone Of Karnataka

(ANANYA JALAN)

ABSTRACT

A field experiment was conducted during *kharif*(2021) season to study soil nitrogen fractions in groundnut under different nutrient management approaches in the central dry zone of Karnataka, using groundnut variety TMV-2 as test crop at Zonal Agriculture and Horticulture Research Station (ZAHRS), Hiriyur. The experiment was laid out in RCBD design with four treatments, five replications in an area of 20mx10m size of experimental plot. This experiment comprises the treatments viz., Organic farming - Seed treatment with *Rhizobium* and PSB + Recommended dose of FYM (10 t ha^{-1}) + P equivalent basis of FYM:Natural farming - Seed treatment with beejamritha + ghanajeevamrutha @ 1000 kg ha⁻¹ before sowing + jeevamrutha @ 500 L ha⁻¹ @ 30 days interval + mulching; POP (package of practice) - Seed treatment with *Rhizobium* and PSB + Recommended dose of FYM (10 t ha⁻¹) + 25:75:37.5 kg ha⁻¹ NPK + ZnSO₄ @ 10 kg ha⁻¹ + Borax @ 10 kg ha⁻¹ + Gypsum @ 500 kg ha-1;Farmer's practice - 40:20:30 kg ha-1 NPK. The data after harvest of the groundnut revealed that soil properties like bulk density, pH, EC did not vary significantly. Organic carbon was recorded highest in organic farming and natural farming. Available macronutrients and secondary nutrients like nitrogen, phosphorus, potassium, exchangeable calcium and magnesium and sulphur were observed highest in POP. Dehydrogenase, phosphatase and urease activities were recorded significantly higher in organic farming. Nitrogen fractions like total nitrogen was recorded highest in organic farming. Available nitrogen, NH₄⁺-N andNO₃⁻ -N were initially higher for farmer's practice but at later growth stages, it was higher for POP. Total nitrogen, available nitrogen, NH4⁺-N and NO3⁻ -N were positively correlated with yield. Plant height, yield, yield attributes and total biomass production were significantly higher for POP.

November, 2022

(Parashuram Chandravamshi) Major Advisor

2. Influence Of Sulphur Nutrition On Growth, Quality Of Soybean And Properties Of Soil Under The Southern Transitional Zone Of Karnataka

(DARSHAN, S. S.)

ABSTRACT

A field experiment was conducted to study the "Influence of Sulphur Nutrition on Growth, Quality of Soybean and Properties of Soil under the Southern Transitional Zone of Karnataka" during the Late Kharif season of 2021 at Agricultural and Horticultural Research Station, Bavikere, KSNUAHS, Shivamogga. The experiment was laid out in Randomized Complete Block Design with ten treatments and replicated thrice. The treatments consisted two sources of sulphurviz., gypsum and sulphur bentonite applied at varied levels of 20, 30, 40 and 50 kg ha⁻¹. The results revealed that, among the different sources and levels of sulphur, application of sulphur at 50 kg ha⁻¹ through gypsum recorded significantly higher growth, yield and quality parameters such as plant height (64.31 cm), number of branches per plant (7.56), number of leaves per plant (48.74), leaf area (1617.29 cm²), number of root nodules per plant (61.52), number of pods per plant (64.91), number of seeds per pod (3.52), seed yield (18.35 q ha⁻¹) and haulm yield (21.54q ha⁻¹). Similarly, higher nutrient content like nitrogen (6.14 % and 1.43 %), phosphorus (0.42 % and 0.62%), potassium (1.96 % and 0.72 %), calcium (0.68 % and 0.94 %), magnesium (0.34 % and 0.37 %), sulphur (0.40 % and 0.51 %) in seed and haulm respectively and higher total uptake of nitrogen (143.47 kg ha⁻¹), phosphorus (21.06 kg ha⁻¹), potassium (51.66 kg ha⁻¹), calcium (32.73 kg ha⁻¹), magnesium (13.23 kg ha⁻¹), sulphur (18.33 kg ha⁻¹), quality parameters like protein content (38.38 %), protein yield (704.27 kg ha⁻¹), oil content (20.47 %) and oil yield (375.62 kg ha⁻¹) was recorded compared to other treatments. The available nitrogen (325.83kg ha⁻¹) and sulphur (27.47 kg ha⁻¹) were found higher and other available nutrients were found lower compared to all other treatments.

November, 2022

(Thippeshappa, G. N) Major Advisor

3. Fertility Status Of Soils Under Arecanut Based Cropping Systems In Coastal Region Of Udupi District

(FAIJALAHMAD MULLA) ABSTRACT

The fertility status of soils under arecanut based cropping systems in Coastal region of Udupi district was studied by collecting the surface samples from farmers' field of Udupi, Kundapura and Karkala taluks during 2019-21. The soil samples were analysed for physical and chemical properties and also different forms of soil iron was estimated from randomly selected soil samples. The results revealed that soils were extremely acidic to strongly acidic range with pH ranged from 4.03 to 6.60, organic carbon status was medium to high with normal electrical conductivity. The cation exchange capacity of soils ranged from 2.34 to 10.02 cmol (p⁺) kg⁻¹. Analytical results showed that available nitrogen and potassium status were found low to medium, whereas, available phosphorus status was medium to high. The exchangeable calcium (86.7 %) and magnesium (78.5 %) were found to deficient in soils under arecanut based cropping systems, whereas 84.37 per cent soils were low in available sulphur. The DTPA extractable micronutrients viz., iron, manganese and copper were found to be sufficient whereas zinc content found deficient. Forms of iron such as available iron, exchangeable iron, organically bound iron, crystalline oxide bound iron, amorphous oxide bound iron and total iron in soils ranged from 12.26 to 29.12, 1.22 to 17.05, 2.97 to 9.96, 310 to 2278.1, 271.54 to 1204.80, 603.90 to 3541.96 mg kg⁻¹ with an average value of 19.61, 8.95, 5.50, 910.27, 754, 1732.85 mg kg⁻¹, respectively. Among the iron forms, crystalline oxide bound iron was found to be the dominant fraction. Correlation results indicated that all the iron forms had positive and significant relationship between them. Total iron showed positive and significant correlation with crystalline oxide bound, amorphous oxide bound, available and exchangeable iron. It showed positive correlation but non-significant with amorphous and organically bound iron.

January, 2022

(Jayaprakash S. M) Major Advisor

4. Response Of Paddy To Potassium Solubilizing Bacteria (Ksb) And Foliar Application Of Potassium In Coastal Acid Soils Of Karnataka

(KAVYA, V.)

ABSTRACT

Field experiment was conducted during Kharif 2021 at ZAHRS, Brahmavar, Udupi to know the effect of soil application of potassium solubilizing bacteria and foliar application of potassium on soil properties and yield of paddy in coastal acid soils of Karnataka. The experiment was laid out in Randomized Complete Block Design with eleven treatments replicated thrice. The treatment comprised of recommended dose of fertilizer and absolute control for comparison along with supplemental addition of soil application of KSB (Bacillus *mucilaginous*) @ 5 kg ha⁻¹plusfoliar application of 2 per cent KCl @ 30 and 60 DAT and 50 and 75 per cent recommended dose of K. Among the eleven treatments, the treatment received with recommended dose of N and $P_2O_5 + 75 \% K_2O + soil application of KSB @ 5$ kg per ha + 2 % KCl @ 30 and 60 DAT has significantly recorded higher growth and yield parameters *i.e.*, plant height (102.10 cm), number of tillers hill⁻¹ (22.90), number of leaves hill⁻¹ (9.92), leaf area (310 cm² hill⁻¹), leaf area index (1.03), total dry matter production (84.61 g hill⁻¹), number of productive tillers hill⁻¹ (19.88), panicle length (22.71 cm), panicle weight (4.23 g), number of filled grains panicle⁻¹ (119), total number of grains panicle⁻¹ (129), test weight (26.14 g), grain yield (5436 Kg ha⁻¹) and straw yield (7079 kg ha⁻¹) as well as higher soil available nutrient status at harvest (N: 275.86 kg ha⁻¹, P₂O₅: 65.76 kg ha⁻¹, K₂O: 129.10 kg ha⁻¹, Zn: 2.63 mg kg⁻¹ and Cu: 4.47 mg kg⁻¹). Further, higher nutrient uptake and content of grain and straw of paddy (N: 63.87, 43.11 kg ha⁻¹ and 1.175, 0.609 per cent, P: 20.10, 26.18 kg ha⁻¹ and 0.370, 0.328 per cent and K: 57.31, 84.04 kg ha⁻¹ and 1.054, 1.187 per cent respectively) and soil general microflora, potassium solubilizing bacteria, nutrient use efficiency and potassium determination and performance indicator also noticed in the above said treatment.

November, 2022

(Jayaprakash, R.) Major Advisor

5. Effect Of Fertigation On Soil Nutrient Status, Nutrients Uptake And Productivity Of Ridge Gourd [*Luffa acutangula* (L.) Robx.]Under Protected Cultivation

(MEGHANA, P.)

ABSTRACT

An investigation was carried out at Main Agricultural and Horticultural Research Station, Iruvakki, KSNUAHS, Shivamogga during Rabi season 2021 to study theeffect of fertigation on soil nutrient status, nutrients uptake and productivity of Ridge gourd[Luffa acutangula (L.) Robx.] under protected cultivation. The experiment was laid out in Randomized Block Design under polyhouse with seven treatments replicated thrice. The fertigation was given at 10 days interval in 9 splits. The results of the experiment indicated that fertigation with 125 per cent RDF increased growth, yield and soil nutrient status over soil application. Fertigation with 125 per cent RDF (T₇) recorded significantly highervalues of vine length (278.30 cm) and number of leavesper vine (88.50), number of fruits per vine (15.20), average fruit weight (392.67 g), fruit length (49.23 cm), fruit girth (18.23 cm), fruit yield per vine (2.79 kg) and fruit yield (25.86 t ha⁻¹) than other treatment studied. Significantly higher nitrogen (72.98 kg ha⁻¹), phosphorus (37.90 kg ha⁻¹) and potassium (78.01 kg ha⁻¹) uptake by Ridge gourd(vine + fruit) was registered in treatment with 125 per cent RDF through fertigation. Similarly, available N (234.90 kg ha⁻¹), available P₂O₅ (39.63 kg ha⁻¹), available K₂O (150.10 kg ha⁻¹) and available S (35.14 mg kg⁻¹) was recorded significantly higher in 125 per cent RDF through fertigation which was statistically on par with 100 per cent RDF through fertigation (T_5) . Whereas effect of fertigation was found non-significant on exchangeable Ca, exchangeable Mg and micronutrients(Zn, Fe, Mn and Cu). Therefore, fertigation levels significantly influenced growth, yield and soil available nutrients than soil application in Ridge gourd grown under protected cultivation.

November, 2022

(Ganapathi) Major Advisor

6. Assessment Of Fertility Status Of Soils Under Ginger (*Zingiber Officinale*) Cultivation In Shivmogga District, Karnataka

(NICHITHA, C. V.) ABSTRACT

Ginger, an important spice crop grown in Shivamogga district. A survey-based study was conducted at College of Agriculture, Shivamogga during 2021-22 to assess the fertility status of ginger grown soils in Shivamogga district covering three taluks - Sagara, Shikaripura and Shivamogga. Twenty farmer fields were selected from each location and interviewed on nutrient management practices and ginger yield. The soil samples at two depths were collected from the same farms after harvest.

The quantity of organic manures used in ginger ranged from 9.50 to 34.87 t ha⁻¹. Similarly, the amount of major nutrients N, P₂O₅ and K₂O added through fertilizers ranged from 84.57-315.45 kg, 58.69-342.65 kg and 52.12-303.09 kg, respectively. Based on nutrient applications, the farmers were grouped into three categories namely, category 1 (Low organic manures + high fertilizers), category 2 (Low organic manures + very high fertilizers) and category 3 (High organic manures + moderately high fertilizers) using k-clustering statistical technique. The total nutrient addition among three categories of farmers varied significantly - category 2 > category 3 > category 1. The ginger soils were found in moderately acidic to neutral range and they were non-saline. The soil organic-C and enzyme activities were higher in fields applied with high organic manure. The available nitrogen, phosphorus and potassium varied significantly in the order of category 2 > category 3 > category 1. Available sulphur varied significantly in the order of category 2 = category 3 > category 1. The exchangeable calcium and magnesium contents and DTPA-extractable micronutrients were observed in sufficient ranges. Ginger yields varied significantly in the order of category 2 > category 3 > category 3 > category 2 > category 1. However, yield reductions were observed with high nutrient applications.

November, 2022

(M. S. Nagaraja) Major Advisor

7. Influence Of Different Levels Of Phosphorus And Citric Acid On Productivity Of Soybean And P Status In An *Alfisol*

(SHILPA KUMARI)

ABSTRACT

A pot culture experiment was conducted during Kharif2021 at College of Agriculture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga to assess the effect of different levels of phosphorus and citric acid application on productivity of soybean (JS-335) and P status in an Alfisol. Citric acid (CA), a low molecular weight organic acid exuded by plant roots in very low concentration undergo rapid microbial dissociation in soil and helps in phosphorus solubilization. Therefore, this experiment was conducted with an objective to know the effect of external application of citric acid at four different rates (0, 2.5, 5.0 and 7.5 kg ha⁻¹) along with different levels of phosphorus(0, 40, 60 and 80 kg ha⁻¹) in factorial completely randomised experimental design with three replication. The results revealed that, application of 80 kg P ha⁻¹+7.5 kg CA ha⁻¹ had significantly increased plant growth parameters like plant height, number of branches, yield parameters like number of seeds pod⁻¹, pod weight plant⁻¹, seed yield and plant yield and root parameters like root length and root dry weight. Major nutrient content and uptake (N, P, K, Ca, Mg and S) by soybean is also observed with application of 80 kg P ha⁻¹+7.5 kg CA ha⁻¹. Incubation experiment was conducted with different levels of citric acid (0, 2.5, 5.0 and 7.5 kg ha⁻¹)indicated that pH of the soil significantly decreased and temporal availability of phosphorus was increased upto 45 days of incubation thereafter it was decreased. This study concluded that citric acid application along with phosphorus application increased soil available phosphorus, growth and yield of soybean.

November, 2022

(B.C.Dhananjaya) Major Advisor
8. Characterization Of Lowland Acid Soils For Secondary Nutrients In Hilly Zone Of Karnataka

(SUSHMA, N.)

ABSTRACT

An investigation was carried out to study the secondary nutrient status of soil and their ralationship with soil properties in lowland acid soil of Kodagu and Chikkamagaluru, Karnataka during the year 2021-2022 at college of agriculture, KSNUAHS, Shivamogga. A total 200 surface soil samples (0-15) were collected from lowland paddy soil in central parts of westren ghats. Experimental results revealed that soils of Kodagu and Chikkamagaluru districts are moderately acidic to neutral in soil reaction, ranged from 5.16 to 6.97. Organic carbon low to high ranged from 4.12 to 22.90 g kg⁻¹and Cation exchange capacity of soils ranged from 10.60 to 26.90 (cmol (p^+) kg⁻¹) with normal electrical conductivity respectively. Available Calcium in soil was high, ranged 4.30 to 16.00 cmol (p⁺) kg⁻¹, Water soluble calcium ranged from 1.50 to 4.90 cmol (p^+) kg⁻¹, Exchangeable calcium ranged from 2.60 to 12.70 cmol (p⁺) kg⁻¹, Total calcium ranged from 10.40 to 39.40 cmol (p⁺) kg⁻¹. Available magnesium in soil was ranged from 2.00 to 9.80 cmol (p^+) kg⁻¹. Water soluble magnesium ranged from 0.70 to 3.70 cmol (p⁺) kg⁻¹, Exchangeable magnesium ranged from 0.80 to 8.70 cmol (p⁺) kg⁻¹, Total magnesium ranged from 6.20 to 27.80 cmol (p⁺) kg⁻¹. Available sulphur in soil was medium to high, ranged from 9.40 to 22.90 mg kg⁻¹, Water soluble sulphur ranged from 1.05 to 6.92 mg kg⁻¹, Exchangeable sulphur ranged from 4.39 to 21.35 mg kg⁻¹, Organic sulphur ranged from 116.30 to 356.47 mg kg⁻¹ and Total sulphur ranged from 190.47 to 433.37 mg kg⁻¹. Above results showed that Secondary nutrient status was high in lowland paddy soils, this suggests that appropriate management practices are very much essential for sustainable crop production by modifying the method of application of liming materials in lowland paddy soils.

November, 2022

(Ravikumar, D.) Major Advisor

Horticulture

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the

Department of Horticulture

1. Response Of Chrysanthemum (Chrysanthemum morifolium Ramat.) To The Inoculation Of Bioinoculants At Graded Levels Of Potassium For Growth, Flowering, Yield And Quality Under Protected Condition

(CHANDANA, M.)

ABSTRACT

An experiment was conducted to study the response of Chrysanthemum to bioinoculants with different levels of potassium under protected condition at College of Agriculture, Shivamogga during 2021-22. Ten treatments viz., 100% RDF, 100% N P₂O₅ K₂O + KSB, 100% N P₂O₅ K₂O + KSF, 100% N P₂O₅ K₂O + KSB+ KSF, 100% N & P₂O₅ + 75% K₂O+ KSB, 100% N & P₂O₅+ 75% K₂O + KSF, 100% N & P₂O₅+ 75% K₂O + KSB+ KSF, 100% N & P₂O₅ + 125% K₂O+ KSB, 100% N & P₂O₅+ 125% K₂O + KSF, 100% N & P₂O₅+ 125% K₂O+ KSB+ KSF) were replicated thrice in Randomized Complete Block Design. The plants supplied with 75 per cent of recommended dose of potassium (75 kg ha⁻¹) + KSB (Bacillus mucilagenosus) + KSF(Aspergillus awamorii) @ 12.5 kg ha⁻¹ + nitrogen (100 kg ha⁻¹) and phosphorous (150 kg ha⁻¹) showed significantly the highest plant height (60.04 cm), stem girth (6.57 mm), number of primary (9.12) and secondary (26.37) branches per plant, number of leaves per plant (104.68), leaf area (72.05 cm² plant ⁻¹), total fresh weight (217.97 g) and dry weight (72.97 g) of plant, CGR (8.80 g m⁻² day⁻¹), RGR (0.0168 g g⁻¹ day⁻¹), NAR (1.27 g dm⁻² day⁻¹), total chlorophyll (2.51 mg g⁻¹ of leaf), minimum days to first initiation (64.43), flowering duration (71.67 days), flower weight (6.36 g), flower diameter (6.69 cm), vase life (12.00 days), flower yield per plant (360.60 g), per m^2 (4.16 kg) and per poly house (2.68 t/560 m²), number of suckers per plant (7.21), available N, P_2O_5 and K₂O in soil (292.13, 85.67 and 205.68 kg ha⁻¹, respectively), total fungi, bacteria and potassium solubilizing microorganisms at lower dilution (39.07, 125.21 and 45.22 cfu g⁻¹ soil, respectively), net returns (Rs. $3,84,332/560 \text{ m}^2$) and BCR (4.70).

December, 2022

(B. Hemla Naik.) Major Advisor

2. Evaluation Of Gladiolus (*Gladiolus grandiflorus L*.) Cultivars Under Southern Transitional Zone Of Karnataka

(LAKSHMI DEVI, A. M.)

ABSTRACT

Gladiolus occupies 4th position in international cut flower trade. In order to fulfil the demand for cut flowers in the southern transitional zone of Karnataka, there is a need to introduce and popularise gladiolus cultivars suitable for cut flower production. An experiment was conducted to study the performance of gladiolus cultivars under this region during the year 2021-2022 at the Department of Horticulture, College of Agriculture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka. The experiment was laid out in Randomized Complete Block Design. There were 13 cultivars of gladiolus that were replicated thrice. The experimental findings regarding gladiolus growth, flowering, flower quality, corm and cormel attributes were recorded. Significant differences were observed for all the characters studied. The results revealed that, the cultivar Arka Kesar recorded minimum number of days for corm sprouting (8.00 days), maximum number of shoots per corm (4.55), leaf area index of plant (1.81), girth of stem (10.89 cm), minimum number of days taken for initiation of inflorescence (53.26 days), 50 per cent flowering (69.10 days), maximum flowering duration (27.31 days), number of florets per spike (19.98), floret length (12.12 cm), spike weight (104.5 g) and vase life (9.04 days), spike yield per hectare (2,83,305), maximum corms per hectare (4,79,952), cormels yield (4,858 kg/ha) and highest net returns (Rs. 34,82,073 per hectare) with highest Benefit: Cost ratio (3.17). Arka Gold recorded highest diameter of cormel (2.38 mm) and maximum plant height (37.93 cm). Arka Amar showed highest percentage of sprouting (86.70 %). Arka Naveen recorded maximum spike length (83.67 cm). The maximum weight of corms per plant was observed in Arka Kumkum (68.02 g). Arka Nazrana recorded maximum corm diameter (5.27 cm). The Arka Kesar was found to perform better with maximum returns and can be grown on commercial scale under southern transitional zone of Karnataka.

December, 2022

(D. Thippesha.) Major Advisor

3. Effect Of Nano Urea On Growth, Yield And Quality Of French Bean (Pole Type) Under Naturally Ventilated Polyhouse

(SATYASHRAYA, P. T. ENIGI)

ABSTRACT

The study was conducted during 2021-22 under naturally ventilated polyhouse at Zonal Agricultural and Horticultural Research Station, Shivamogga. The experiment was laid out in Randomized Complete Block Design (RCBD) with eight treatments which were replicated thrice. The results revealed that the treatment 75% RDF of N through prilled urea + 0.4% nano urea foliar spray at 45 and 60 days after sowing (DAS) (T_6) recorded significantly higher leaf area (77.02 cm²) and total chlorophyll (1.47 mg g⁻¹) at 60 DAS. Similarly, significantly higher pod length (16.68 cm), pod girth (0.72 cm), pod weight (7.30 g), number of pods vine⁻¹ (88.88), pod yield vine⁻¹ (559.04 g) and pod yield per 1000 m² (1.68 t) were recorded in the same treatment. However, it was statistically on par with 50% RDF of N through prilled urea + 0.4% nano urea foliar spray at 30, 45 and 60 DAS (T₅) and 75% RDF of N through prilled urea + 0.4% nano urea foliar spray at 60 DAS (T7). Among the treatments 75% RDF of N through prilled urea + 0.4% nano urea foliar spray at 45 and 60 DAS (T₆) showed higher leaf nutrient content (N- 3.19%, P- 0.51%, K- 2.55%) after third spray and whole plant nutrient content (N- 3.05%, P-0.40%, K- 2.47%) at 60 DAS. The highest net returns (₹ 84000) and benefit : cost (3.74) were obtained from treatment (T₆) *i.e.*, 75% RDF of N through prilled urea + 0.4% nano urea foliar spray at 45 and 60 DAS. From the study, it is concluded that the treatment 75% RDF of N through prilled urea + nano urea foliar spray 0.4% at 45 and 60 days after sowing was superior over all other treatments.

November, 2022

(Nagarajappa Adivappar.) Major Advisor

4. Standardization Of Npk For Yield In Indian Noni (*Morinda citrifolia* L) Under Southern Transitional Zone Of Karnataka

SNEHA KARANI

ABSTRACT

The field experiment was conducted to study the effect of NPK on growth yield in Indian noni (Morinda citrifolia L) under Southern Transitional Zone of Karnataka, during the year 2020-2021 in three year old noni plot at Raminakoppa village, Shivamogga under the department of Horticulture, College of Agriculture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, with the main objective of the experiment was to standardize optimum dose of NPK on growth, yield and quality of Indian noni. The study was undertaken with seventeen treatments with different combinations of Inorganic fertilizers (Nitrogen, Phosphorous, Potassium) and experiment was laid out in Randomized Complete Block Design replicated thrice. The results revealed that the application of 70:40:40 g NPK/plant (T_{16}) recorded significantly higher growth parameters viz, plant height (3.20 m), canopy spread (5.06 m²), plant girth (56.00 cm), minimum days taken from flowering to fruit set (51.67), fruit set to fruit maturity (19.33) and yield parameters viz maximum fruit weight (146.20 g), fruit volume (81.50 cc), Number of fruits (523.33/plant), fruit yield (76.13 kg/plant) and total yield (55.50 t/ha) and highest quality parameters viz shelf life (4.12 days), juice recovery (52.21 %), pulp recovery (64.09 %), TSS (12.63 ⁰Brix), Ascorbic acid (95.90 mg/100g) and maximum benefit cost ratio (4.95). The minimum values of growth, yield and quality parameters were observed in control T_1 where noni plants were supplied with only with 5kg/plant FYM alone. From the above study it was concluded that application of 70:40:40g NPK/plant resulted in better growth, yield, quality parameters and maximum profit of Noni plants under Southern Transitional Zone of Karnataka.

March, 2022

(D. Thippesha.) Major Advisor

5. Evaluation Of Yardlong Bean (Vigna unguiculata (L.) Walp. ssp. Sesquipedalis Verdc.) Genotypes For Yield And Quality Traits Under Southern Transition Zone Of Karnataka

(VIJAYALAXMI GUMASHETTI) ABSTRACT

Yardlong bean is an economically important leguminous crop cultivated for its green pods. The present investigation was carried out at Zonal Agricultural and Horticultural Research Station (ZAHRS), Shivamogga, during Rabi 2020-21 to know the superior genotypes for yield and quality traits of 23 Yardlong bean genotypes in Southern Transitional Zone. The experiment was conducted by using RCBD design with two replications. The study revealed significant differences were recorded for all the traits. PCV values were higher than GCV values, indicating that there is a large degree of genetic variability and thus a lot of scope for selection. High heritability coupled with high genetic advance as *per cent* of mean were recorded for pod length (99.90), pod weight (99.44) number of pods /vine (99.30), pod yield /vine (98.90), protein (92.10), ascorbic acid (81.20), indicating the preponderance of additive gene action making selection effective. D^2 statistics revealed that 23 genotypes of Yardlong bean were grouped into five clusters. Among the 18 traits studied, protein (59.68) contributed maximum towards divergence fallowed by pod yield per vine (11.86), total soluble solids (10.60). Cluster III exhibited the highest intra cluster distance. High inter cluster distance was observed between Cluster II and Cluster V. The highest cluster mean values were recorded for most of the characters with the genotypes present in cluster V. Correlation study revealed highly positive significant relation with pod weight (0.9221), 100 seed weight (0.7571), pod length (0.6344), terminal leaf length (0.5704), pods /cluster (0.5630), number of seeds /pod (0.4257), ascorbic acid (0.3933) at the phenotypic level. Path coefficient study revealed that the characters pod weight (1.0783), number of pods /vine (0.4104), terminal leaf length (0.1316) and pod length (0.1131) exhibited high positive direct effect with pod yield /vine. Consequently, these traits would be more effective in improving yield and evolving superior high yielding genotypes.

January, 2022

(Nagarajappa Adivappar.) Major Advisor

Horticulture

Genetics and Plant Breeding

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga M. Sc. (Hort.) theses abstracts produced in the Department of Genetics and Plant Breeding

1. GENETIC VARIABILITY STUDY IN ADVANCED MUTANT LINES OF CLUSTER BEAN [Cyamopsis tetragonoloba (L.) TAUB.]

(ARKESH, V.P.)

ABSTRACT

Advanced cluster bean mutant lines developed by treating seeds of Pusa Navbahar variety with gamma radiation were evaluated in randomised complete block design with two replications to study the genetic variability, correlation and path analysis at the Department of Genetics and Plant Breeding, College of Horticulture, Mudigere during summer, 2022. The analysis of variance revealed highly significant differences among the mutant lines of cluster bean for all the characters studied. The GCV and PCV values were high (>20 %) for number of vegetable pods per plant, pod yield per plant, pod yield per plot, pod weight, dry pod yield per plant, seed yield per plant and seed yield per plot indicating the existence of broad genetic base, which would be amenable for further crop improvement. High heritability (>60 %) coupled with high genetic advance over mean (>20 %) were observed for characters viz. plant height, number of vegetable pods per plant, number of pods per cluster, pod vield per plant and seed yield per plant which indicated predominance of additive gene action for these traits and hence direct selection would be more effective in improving these traits. Correlation studies revealed that vegetable pod yield per plant was highly significant and positively correlated with number of pod clusters per plant, number of pods per cluster, number of pods per plant, pod length, pod breadth and pod weight, while it was positively and significantly associated with plant height at both phenotypic and genotypic level. Path analysis showed that high positive direct effect towards pod yield per plant was exerted by number of pods per plant, pod breadth, pod weight and days to first flowering indicating that significant improvement in pod yield per plant can be expected through selection in the component traits with high positive direct effects.

October, 2022

(Lakshmana, D.) Major Advisor

2. Genetic Variability And Diversity Studies In Sponge Gourd (*Luffa Cylindrica* L.) For Growth And Yield Traits

(PURUSHOTTAMA, K.)

ABSTRACT

An experiment was carried out at College of Horticulture, Mudigere during 2020-21 to assess the extent of genetic variability and diversity for growth and yield traits in sponge gourd. The experiment was laid out in a randomized complete block design with three replications including twenty two sponge gourd genotypes. Analysis of variance revealed highly significant differences among the genotypes for yield and its attributing traits. The promising genotypes identified, based on the yield performance are Yadagiri local, Sirsi Local, Hospet Local and Sringeri Local-1. High genotypic coefficient of variation and phenotypic coefficient variation were observed for vine length, number of primary branches per vine, sex ratio, rind thickness, number of seeds per fruit, number of fruits per vine and yield per vine which indicated existence of broad genetic base. High heritability coupled with high genetic advance was observed for most of the characters. Yield per vine was significantly and positively correlated with vine length, number of primary branches per vine, internodal length, number of nodes on the main vine, fruit length, number of fruits per vine, rind thickness and fruit firmness at both genotypic and phenotypic level. The traits viz., vine length, number of primary branches per vine, internodal length, number of nodes on the main vine, days to appearance of first female flower, fruit length, fruit weight, number of fruits per vine, fruit firmness, flesh thickness and number of seeds per fruit had higher magnitude of positive direct effect on yield. Divergence study revealed that, highest inter cluster distance was observed between cluster VI and cluster IV. Hence, the crosses between genotypes of these clusters can be tried for improvement of yield.

January, 2022

(Shashikala S. Kolakar.) Major Advisor

Entomology

Keladi Shivappa Nayaka University of Agricultural and Horticultural

Sciences, Shivamogga

M. Sc. (Hort.) theses abstracts produced in the

Department of Entomology

1. Studies On Population Dynamics And Integrated Management Of Insect Pests Of Tomato Under Naturally Ventilated Polyhouse Condition

(ARPITHA, G. R.)

ABSTRACT

The investigation on population dynamics, scheduling of insecticides and entomopathogens and evaluation of IPM modules for the management of whitefly, Trialeurodes vaporariorum (Westwood), serpentine leaf miner, Liriomyza trifolii (Burgess) and pinworm, Phthorimaea absoluta (Meyrick) were carried out on tomato cultivar, Arka Abhedh. The experiment was carried out under naturally ventilated polyhouse condition during 2021-22 at College of Horticulture, Mudigere. Peak incidence of whitefly nymphs, adults were noticed during 17th Standard Meteorological Week (SMW) and peak incidence of leaf miner was noticed during 16th SMW. Whereas, peak incidence of pinworm was noticed during 18th SMW. The whitefly nymphs, adults, leaf miner and pinworm showed positive correlation with maximum temperature. Minimum temperature showed positive correlation with whitefly nymphs, adults and pinworm and a negative correlation with leaf miner. Whereas, maximum relative humidity showed positive correlation with whitefly nymphs, adults, leaf miner and pinworm. Whereas, whitefly nymphs, adults, leaf miner and pinworm had recorded negative correlation with minimum relative humidity. Under scheduling of insecticides and entomopathogens, Treatment consists of alternate spray of spinoteram 12 SC @ 1.25 ml/l and chlorantraniliprole 18.5 SC @ 0.30 ml/l proved to be better in reducing whitefly, leaf miner and pinworm population on tomato under naturally ventilated polyhouse condition. Further, Module 1 consisting of seed treatment with imidacloprid 48 % FS @ 7g/kg of seeds, seedling dip with imidacloprid 17.8 SC @ 0.5 ml/l, collection and destruction of infested leaves, installation of sticky traps at 30/1000 m² area, installation of sex pheromone traps 20/1000 m² area and spraying of chlorantraniliprole 18.5 SC @ 0.3 ml/l, spinoteram 12 SC @ 1.25 ml/l followed by flubendiamide 480 SC @ 0.3 ml/l proved to be better in reducing whitefly, leaf miner and pinworm population on tomato under naturally ventilated polyhouse condition.

November, 2022

(L. Hanumantharaya.) Major Advisor

Floriculture and Landscape Architecture

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Hort.) theses abstracts produced in the

Department of Floriculture and Landscape Architecture

1. Mutation Studies In Hybrid Cut Chrysanthemum (Dendranthema grandiflora Tzvelev.) Using Gamma Irradiation

(ARPITHA, D. M.) ABSTRACT

An experiment entitled "Mutation Studies in Hybrid Cut Chrysanthemum (Dendranthema grandiflora Tzvelev.) Using Gamma Irradiation" was conducted at the experimental block of Floriculture and Landscape Architecture, College of Horticulture, Mudigere during 2021-22. The experiment was laid in Augmented block design. The rooted cuttings of five chrysanthemum varieties viz., Arctic Queen, Feeling Green Dark, Champagne Orange, Lexy Red and Champagne Yellow were treated with six doses (0, 10, 15, 20, 25, 30 Gy) of gamma irradiation. The maximum survival percentage (100.00) was observed in control (0 Gy) and minimum survival percentage (0.00) was observed in 25 and 30 Gy in all varieties studied, except Champagne Orange and Lexy Red (0.00 %) which were 30 Gy. Based on the survivability, LD₅₀ was lying between 20 and 25 Gy. In cv. Arctic Queen, the analysis of variance found to be significant for most of the traits indicating the existence of variability among the mutant population. Higher PCV, GCV and heritability observed for plant height, number of leaves, plant spread, number of flowers per plant (PCV 37.39 %, GCV 22.80 % and heritability 60.19 %). Correlation studies revealed that number of flowers per plant had positive significant association with plant height (0.399), leaf area (0.357), plant spread (E-W 0.243) and diameter of flower (0.397). Path co-efficient analysis indicating that plant height (0.1878), number of leaves (0.0485), days to colour visibility (0.0349) and diameter of flower (0.2651) had direct positive association with number of flowers per plant indicating these traits respond to selection in turn improves the yield trait. From this experiment fifty-two putative mutants with variations in flower number, form and colour were isolated and can be studied for their stability in subsequent generation. Among five varieties irradiated, Champagne Orange, Champagne Yellow and Arctic Queen varieties showed more mutants as compared to Feeling Green Dark and Lexy Red.

November, 2022

(Nataraj, S. K.) Major Advisor 2. Studies On Planting Geometry Of Lupin (*Lupinus perennis* L.) For Growth, Flowering, Yield And Quality Of Cut Flower And Seed

(KAVYA, B.)

ABSTRACT

The present investigation entitled, "Studies on Planting Geometry of Lupin (Lupinus Perennis L.) for Growth, Flowering, Yield and Quality of Cut flower and Seed" was conducted at Department of Floriculture and Landscape Architecture, College of Horticulture Mudigere, during the year 2021-22. The experiment was laid out in Randomized Block Design comprising of 11 treatments viz., T₁ (30×30 cm), T₂ (30×45 cm) check, T₃ (30×60 cm), T₄ (30×75 cm), T₅ (45×45 cm), T₆ (45×60 cm), T₇ (45×75 cm), T₈ (60×30 cm), T₉ (60×45 cm), T_{10} (60×60 cm) and T_{11} (60×75 cm) with three replications. Results revealed that growth, flowering, cut flower quality and seed yield were significantly influenced by spacing. Spacing 30×30 cm recorded the maximum plant height (77.45 cm) and minimum days for flower stalk emergence (49.12). Whereas, 45×45 cm recorded the maximum number of leaves (113.60), number of branches (15.43), total dry matter (27.48 g), number of root nodules per plant (44.50), total chlorophyll content of leaves (2.59 mg/ g fresh weight), maximum flowering duration (56.74 days), stalk length (55.71 cm), flower diameter (1.35 cm), number of florets per stalk (112.21), cut flowers per plant (8.63), per hectare (4.26 lakhs) with higher B:C ratio of 6.65, seed yield per plant (15.47 g) and test weight (17.31 g). Hence, 45×45 cm spacing may be recommended for commercial cultivation of Lupin. Further, it was also standardized the vase chemicals for extending the longevity of lupin cut flower with nine treatments. The treatment T₂ (citric acid 100 ppm with 2% sucrose) exhibited the maximum water uptake (2.27 g), water loss (5.11 g), final fresh weight of flower (5.12 g) and vase life (7.33 days) compared to control (4.17 days). Hence, citric acid 100 ppm with 2 per cent sucrose may be recommended for extending the longevity of Lupin cut flowers under ambient condition.

November, 2022

(B. Hemla Naik.) Major Advisor

3. Genetic Variability Studies In Lisianthus (*Eustoma grandiflorum* Shinn.) For Yield And Yield Attributing Parameters

(NAMRATHA, G.)

ABSTRACT

Investigation on "Genetic variability studies in Lisianthus for yield and yield attributing parameters" was carried out in the experimental block (under protected cultivation) at Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere (KSNUAHS, Shivamogga) during 2020-21. The experiment consisted of 15 genotypes which were replicated thrice in Randomized Complete Block Design (RCBD). The results revealed that Echo Purple recorded maximum plant height (94.02 cm) and internodal length (8.05 cm). The minimum days taken for bud initiation and flower opening was observed in the genotype Echo Pure White (62.29 and 12.95, respectively). The maximum flower diameter, number of petals per flower, individual weight of flower were recorded in Robella 2 Pure White (6.76 cm, 18.00 and 11.16 g, respectively). The maximum number of buds per plant (16.59), number of stalks per plant (2.62), number of stalks per sq. m (41.92), number of stalks per 560 sq. m (20,960) recorded in Echo Lavender. The maximum vase life was observed in Rosita Blue Picotee (16.13 days). The estimates of high heritability (> 60 %) coupled with high genetic advance as per cent over mean (> 20 %), indicating, there is ample scope for improving these traits through direct selection. Correlation studies flower stalk yield revealed high significant positive correlation with plant height, leaf area, number of leaves, number of branches, internodal length, flower bud length. Path analysis for stalk yield per plant revealed that the plant height, number of branches, internodal length, flower length, individual weight of flower, have high positive effect indicating the possibility of increasing stalk yield by selecting these characters directly. The maximum BCR recorded in the genotype Echo Lavender (1:5.03). The genotype Echo Lavender followed by Echo Purple found to be superior with regard to most of traits such as morphological, flowering, quality and yield parameters.

January, 2022

(Chandrashekar, S.Y.) Major Advisor 4. Studies On Foliar Application Of Ga₃ On Growth, Flowering And Yield Of Lupin (Lupinus perennis L.) Under Hill Zone Of Karnataka

(PUSHPA, H. A)

ABSTRACT

An experiment entitled "Studies on foliar application of GA3 on growth, flowering and yield of lupin (Lupinus perennis L.) under hill zone of Karnataka" was conducted at the Experimental block of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, during 2021-22. The experiment was laid out in Randomized Block Design (RBD) having seven different treatments viz., T₁- Control, T₂- GA₃ @ 100 ppm, T₃-GA₃ @ 150 ppm, T₄- GA₃ @ 200 ppm, T₅- GA₃ @ 250 ppm, T₆- GA₃ @ 300 ppm and T₇-GA₃ @ 350 ppm replicated thrice. The plants were sprayed with different concentration of gibberellic acid at 30, 60 and 90 days after sowing. The results of the experiment indicated that among different treatments, GA₃ @ 350 ppm recorded maximum plant height (102.74 cm), plant spread E-W (86.38 cm) and N-S (75.78 cm), leaf area (8119.63 cm²), total dry matter content of plant (43.66 g/plant), crop growth rate (4.67 g/m²/day), net assimilation rate $(1.83 \times 10^{-4} \text{ g/cm}^2/\text{day})$, minimum days taken for flower stalk emergence (48.60), days taken for 50 per cent flowering (22.30) and maximum duration of flowering (61.90 days). The treatment GA₃ @ 300 ppm recorded maximum number of branches per plant (15.30), number of flower stalks per plant (9.50), number of florets per stalk (120.50), diameter of floret (1.39 cm), stalk length (59.79 cm), vase life (4.98 days), flower yield per hectare (6.08 lakh), seed yield per hectare (15.30 q), chlorophyll a, b and total chlorophyll content of the leaves (1.82, 0.61 and 2.43 mg/g fresh weight, respectively) with maximum B:C ratio *i.e.*, 4.69 and 3.96 for cut flower and seed yield per ha, respectively. Hence, foliar application of GA₃ @ 300 ppm (thrice) may be recommended for commercial cultivation of lupin under hill zone of Karnataka.

November, 2022

(Chandrashekar, S.Y.) Major Advisor

Fruit Science

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga M. Sc. (Hort.) theses abstracts produced in the

Department of Fruit Science

1. Influence Of Bio-Stimulants On The Yield And Quality Attributes Of Mango (Mangifera indica L.) Cv. Mallika Under Central Dry Zone Of Karnataka

(ARPITHA, S.)

ABSTRACT

A field experiment on "Influence of bio-stimulants on the yield and quality attributes of mango (Mangifera indica L.) cv. Mallika under central dry zone of Karnataka" was carried out in Zonal Agricultural and Horticultural Research Station (ZAHRS), Hiriyur, during the year 2021-2022. The experiment was laid out in Randomized Complete Block Design (RCBD) comprising of nine treatments viz., T_1 – control, T_2 - jasmonic acid (100 μ M), T₃ - jasmonic acid (150 μ M), T₄ - salicylic acid (100 ppm), T₅ - salicylic acid (150 ppm), T₆ - brassinosteroid (0.40 ppm), T₇ - brassinosteroid (0.60 ppm), T₈- triacontanol (7.5 ppm) and T₉ - triacontanol (10.0 ppm) with four replications, sprayed at an interval of 70 and 90 days after anthesis. Among the treatments, triacontanol (10.0 ppm) applied plots recorded maximum average fruit weight (571.98 g), fruit length (17.53 cm), fruit diameter (92.38 cm), fruit volume (723.75 cc), pulp weight (435.91 g), pulp percentage (76.24), number of fruits (75.25), yield per tree (41.31 kg) and minimum stone weight (40.99 g) with highest B:C ratio (5.20). However, plots received salicylic acid (150 ppm) recorded maximum firmness (5.45 lbs), fruit color, TSS (22.86 °B), reducing sugars (6.29%), non-reducing sugars (9.43%), total sugars (15.72%), total carotenoids and flavonoids (5.56 mg/100g and 30.63 mg QE/100 g, respectively), proline content (23.42 μ g/g of fresh weight), total antioxidant activity (42.10%), shelf life (14.75 days) and highest score for organoleptic evaluation with minimum acidity (0.35%), moisture content (76.58%) and physiological loss in weight (17.69%) with minimum cost of cultivation (Rs. 76617.82 ha⁻¹). Hence, application of triacontanol @ 10.0 ppm and salicylic acid @ 150 ppm proved their potentiality in improving yield and quality of mango, respectively.

November, 2022

(Madaiah, D) Major Advisor

2. Influence Of Patch Budding In Selected Cultivars Of Jack Fruit (Artocarpus heterophyllus Lam.)

(CHAYA, G. B.)

ABSTRACT

The study was conducted during 2021-22 at Ankur nursery, Ripponpet, Shivamogga district. The experiment was laid out in Factorial Completely Randomised Design with three replications. The experiment consists of two factors viz., Cultivars (C) with five levels and Time of budding (T) with eight levels. Among the cultivars, cv. Shankara recorded significantly higher budding success (73.95 %) and height of the plant (28.29 cm), number of leaves (14.23) per budded plant at 120 days after budding (DAB). The least days taken to bud sprout (48.28) and leaf emergence (59.38) were recorded in cv. Siddu and Byrachandra respectively. The time of budding showed significant effect on growth parameters. Budding on April 1 (T₇) recorded maximum budding success (69.54 %) whearas, highest plant height (28.50 cm), number of leaves (13.94) per budded plant was observed on April 15 (T₈) at 120 DAB. Among different treatment combinations, Shankara budded on March 1 (C₃T₅) recorded maximum budding success (88.88 %), Shankara budded on April 15 (C₃T₈) took least number of days for bud sprout (40.24), Shankara budded on April 1 (C₃T₇) recorded least number of days for leaf emergence (52.92). The height (30.81 cm) and number of leaves (15.21) per budded pant was found maximum in Shankara budded on April 15 (C_3T_8) treatment at 120 DAB. Significantly higher chlorophyll content (0.58 mg/g) was registered in Byrachandra, protein content (0.21 %) was maximum in Shankara. From the present study, it was found that cv. Shankara in selected cultivars, April 1 and April 15 in different time of budding and Shankara budded on April 1 in combinations was found significantly superior compared to rest of the treatments.

December, 2022

(Nagarajappa Adivappar) Major Advisor

3. Studies On Efficacy Of Water Soluble Nutrients On Yield And Quality Of Banana Cv. Grand Naine Under Hill Zone Of Karnataka

(DEEPA GUNASAGAR)

ABSTRACT

A field experiment on "Studies on Efficacy of Water Soluble Nutrients on Yield and Quality of Banana cv. Grand Naine under hill zone of Karnataka" was carried out in farmer's field at Anajooru village, Mudigere taluk, Chikkamagaluru district during the year 2021-2022. The treatments consist of foliar application viz., sulphate of potash (1 %), calcium nitrate (0.3 %), magnesium sulphate (0.2 %), borax (0.2 %) and potassium schoenite (1 %) at an interval of one month from 7th months of planting. The experiment was laid out in Randomized Complete Block Design (RCBD) with ten treatments, replicated thrice. Among the treatments, T_9 -sulphate of potash (1 %) + calcium nitrate (0.3 %) + magnesium sulphate (0.2 %) + Borax (0.2 %) recorded maximum pseudostem height (191.5 cm), pseudostem girth (61.23 cm), total number of leaves (17.67), total number of functional leaves (15.67) at shooting stage. Finger weight (200.95 g), finger length (22.38 cm), finger girth (43.88 mm), finger circumference (13.78 cm), number of fingers per hand (20.13), number of fingers per bunch (182.00), hand weight (4.02 kg), internodal length between hands (12.04 cm), bunch length (95.87 cm), bunch weight (39.21 kg), yield per hectare (98.03 t), green life (11.23 days), shelf life (10.85 days), fruit weight (178.36 g), pulp weight (135.24 g), peel weight (43.12 g), pulp to peel ratio (3.14), firmness (2.49 lbs), TSS (23.91 °Brix), reducing sugars (15.75 %), non-reducing sugars (2.98 %), total sugars (18.73 %), TSS to acid ratio (88.56), sugar:acid ratio (69.37) and B:C ratio (4.37:1) were also recorded maximum in the treatment T₉ with minimum days from shooting to harvest (112.16), acidity (0.27 %) and physiological loss in weight (11.24 %). The present findings would be commercially used in making banana production more profitable by improving yield and quality attributes under hill zone of Karnataka.

November, 2022

(Yallesh Kumar, H. S) Major Advisor

4. Assessment Of Banana Cultivars For Flour Production

(GURURAJ BASAVARAJ BAGALAKOT)

ABSTRACT

The study "Assessment of Banana Cultivars for Flour Production" was carried out during 2021-22 at College of Horticulture, Mudigere, under laboratory conditions. The first experiment was laid out in Factorial Completely Randomized Design (FCRD) with two factors viz., C- Cultivars of banana (C1- Ney Poovan, C2- Nendran, C3- Mysore baale, C4-Grand naine and C₅- Rajapuri), M- Maturity stage (M₁- Unripe stage, M₂- Ripe stage) and their interaction (C \times M) in 3 replications. The main objective was to evaluate banana cultivars and the stage of harvest for flour production. Among different treatment combinations, powder recovery (%) was found to be maximum in C_2M_1 (Nendran at the unripe stage; 25.87%) and drying duration was minimum (2 hrs. 55 min) in C₁M₁ (Ney Poovan at the unripe stage). Bio-chemical parameters like starch (69.03%), carbohydrates (86.56%), potassium (988.25 mg/100g) and energy (355.88 kcal) were found to be maximum in C_2M_1 which is on par with C₁M₁. While, TSS and protein were optimum in both the treatment combinations. The highest overall sensory acceptability score was noticed in C_2M_1 (4.65), followed by C₁M₁ (4.41). The production cost was found minimum for C₁M₁ (118.86 Rs/kg of flour), which is less than C₂M₁ (155.20 Rs/kg of flour). Based on physical, bio-chemical and production cost, it was proved that C₁M₁ is best suited for flour production. Based on the physical, bio-chemical and organoleptic evaluation, the best three treatments from experiment-1 were selected for the second experiment. The second experiment was laid out in a Completely Randomized Design (CRD) in 3 replications to study the effect pre-treatments on physico-chemical properties of banana flour. Among the pre-treatments, 750 ppm Potassium Meta bi-Sulphite (KMS) treated showed better results for physical and biochemical characteristics.

December, 2022

(Chaitanya, H. S) Major Advisor

5. Effect Of Preharvest Foliar Application Of Bio-Stimulants And Nutrients On Yield And Fruit Quality Of Pomegranate (*Punica granatum* L.) Under Central Dry Zone Of Karnataka

(KRITHIKA, C. K.)

ABSTRACT

A field experiment on "Effect of Preharvest Foliar Application of Bio-stimulants and Nutrients on Yield and Fruit Quality of Pomegranate (Punica granatum L.) Under Central Dry Zone of Karnataka" was carried out in farmer's field in Challakere (Chitradurga district) during the year 2021-2022. The experiment was laid out in Randomized Block Design, comprising eleven treatments $viz_{.}$, T_1 - control, T_2 - methyl jasmonate (0.5 mM), T_3 - methyl jasmonate (1 mM), T₄ - salicylic acid (300 ppm), T₅ - salicylic acid (500 ppm), T₆ - kaolin (3 %), T₇ - kaolin (6 %), T₈ - calcium chloride (0.20 %), T₉ - calcium chloride (0.40 %), T₁₀ sulphate of potash (0.50 %), and T_{11} - sulphate of potash (0.80 %) with three replications, sprayed at an interval of 30 days at 85, 115, 145 and 175 days after first irrigation. Among the treatments, T₆ - kaolin (3 %) recorded the maximum fruit length (8.73 cm), fruit diameter (8.43 cm), rind weight (119.09 g), aril weight per fruit (257.63 g), number of arils per fruit (615.65), juice percentage (60.91 %), average fruit weight (376.37 g), number of fruits per plant (78.33), yield (16.19 kg/tree) and marketable fruits (86.23 %). However, T₄ - salicylic acid (300 ppm) recorded the maximum total sugars (14.48 %), TSS (16.85 °B), ascorbic acid (16.47 mg/100ml), total anthocyanin content (25.58 mg/100g), total phenolic content and (247.46 mg GAE/100g), fruit colour, relative water content (73.35 %), proline (3.66 µ moles/g of fresh weight), organoleptic scores, shelf life (30.33 days) and the minimum physiological loss in weight (17.88 %) and acidity (0.44 %) with the highest B:C ratio (5.70). Hence, T_6 - kaolin (3 %) and T_4 - salicylic acid (300 ppm) proved to be promising in enhancing the yield and quality of pomegranate.

November, 2022

(Sridhar, R) Major Advisor

6. Management Of Secondary Nutrients In Acid Soils And Its Effect On Yield And Quality Of Banana Cv. Ney Poovan

(NIVVETHAPRIYA, G.) ABSTRACT

An experiment was conducted in farmer's field at Aldur village, Mudigere taluk, Chikkamagalur district during the year 2021-2022, entitled "Management of secondary nutrients in acid soils and its effect on yield and quality of banana cv. Ney Poovan under Hill Zone of Karnataka". The experiment was laid out in Randomized Complete Block Design comprising of eleven treatments replicated thrice. The treatments consist of 100 per cent recommended dose of fertilizer (RDF) along with Agricultural lime, Dolomite and Gypsum at 250 and 500g applied solely and in different combinations. Among the treatments, T₉ -RDF + 500g of Mixture -1 (Agricultural lime: Dolomite: Gypsum - 1:1:1) recorded maximum pseudostem height (267.80 cm), pseudostem girth (62.15 cm), total number of leaves (17.13), leaf area (0.81 m²) and leaf area index (2.52) at shooting stage. Finger length (13.36 cm), finger girth (3.92 cm), finger weight (90.66 g), hand weight (1.33 kg), bunch length (72.30 cm), bunch weight (13.10 kg), yield per hectare (29.69 t), green life (5.60 days), shelf life (10.46 days), fruit weight at ripe stage (80.74 g), pulp weight (70.39 g), peel weight (10.35 g), pulp to peel ratio (6.80), firmness (1.56 lbs), TSS (27.73 °Brix), reducing sugars (17.51 %), non-reducing sugars (3.31 %), total sugars (20.82%), sugar to acid ratio (79.08) and B:C ratio (2.96:1) were also recorded maximum in the treatment T_{9} - RDF + 500g of Mixture -1 (Agricultural lime: Dolomite: Gypsum - 1:1:1) with minimum titratable acidity (0.26 %), physiological loss in weight (10.94 %) and days for shooting to harvest (121.76). The present findings are feasible in acid soils of Karnataka for profitable production of banana.

November, 2022

(Shivakumar, B.S.) Major Advisor

7. Standardisation Of Tender Jack (Artocarpus heterophyllus Lam.) For Canning

(POORNIMA, K. R.)

ABSTRACT

The study was carried out during the year 2021-22 at the College of Horticulture, Mudigere under the laboratory condition on "Standardisation of Tender Jack (Artocarpus heterophyllus Lam.) for canning". The experiment was laid out in Factorial Completely Randomised Design with two factors viz., H- Harvesting stage at four different stages (H₁- 45 DAFS (Days After Fruit Set), H₂- 60 DAFS, H₃- 75 DAFS, and H₄- 90 DAFS) and B- Brine solution at four different concentrations (B₁- 2 %, B₂- 4 %, B₃- 6 %, and B₄- 8 %), and their interaction $(H \times B)$ in three replications. Harvesting stages, brine concentration and their interaction showed significant results among the parameters studied in canned tender jack. Among different treatment combinations, H₂B₁ (60 DAFS with 2 % brine solution) showed better result with respect to physical-chemical parameters viz., texture (10.34 N), colour (84.05 L*), protein (3.01 g/100 g), optimum pH (4.20), moisture (88.73 %), carbohydrates (16.66 %), total phenolic content (TPC) (38.33 mg GAE), crude fiber (3.92 %), calcium (62.99 mg), potassium (257.94 mg), acidity (0.25 %), and the highest sensory score in appearance (4.86), consistency (4.85), taste (4.90), overall acceptability (4.87) and B:C (1: 2.70). The treatment also recorded the minimum changes in physico-chemical parameters during initial to 180 days of storage viz., texture (10.34 to 10.10 N), colour (84.05 to 82.75 L*), pH (4.20 to 4.35), TPC (38.83 to 35.73 mg GAE/100 g), moisture (88.73 to 83.45 %), protein (3.01 to 2.75 %), crude fiber (3.92 to 3.88 %), carbohydrates (16.66 to 16.18 %), and overall sensory acceptability score (4.87 to 4.38). Based on bio-chemical, physical, sensory parameters, B:C and storage stability, it was proved that H₂B₁ (60 DAFS with 2 % brine solution) is significantly superior for the preparation of tender jack canning.

November, 2022

(Kantharaj, Y.) Major Advisor

8. Studies On Viability, Age Of Rootstock And Influence Of Growth Stimulants On Growth And Graft-Take In Avocado (*Persea americana* Mill.) Under Hill Zone Of Karnataka

(PUSHPA SHINDRE)

ABSTRACT

An investigation was carried out during 2021-22 in low cost polyhouse, Department of Fruit Science, College of Horticulture, Mudigere. The experiment was carried out in completely randomized design. In first experiment, avocado seeds sown on zero day after extraction recorded minimum number of days for initiation of germination (14.34), 50 per cent germination (24.33), complete germination (36.34), maximum germination per cent (93.33), rootstock height (45.87 cm), number of leaves (18.64), primary root length (23.52 cm) and vigour index (6460.75 cm). In graft parameters, seeds sown at five days after extraction recorded maximum graft height (44.72 cm) and sprout length (11.26 cm). Seeds sown on zero day after extraction recorded maximum sprout diameter (2.42 mm), number of sprouts (7.20), number of leaves (19.50), graft percentage (86.67) and graft survival percentage (84.72). In second experiment, 60 days old rootstock recorded maximum graft height (46.43 cm), sprout length (12.77 cm), sprout diameter (2.58 mm), graft percentage (90.00), graft vigour index-I (853.30 cm) and graft vigour index-II (3639.47 cm). 120 days old rootstock recorded maximum number of sprouts (7.28), number of leaves (18.68), graft survival percentage (77.77) and stionic ratio (1.32). In third experiment, avocado grafts sprayed with GA₃ @ 200 ppm recorded maximum graft height (43.72 cm), sprout length (12.73 cm), number of sprouts (7.48), number of leaves (19.68), graft percentage (86.17), graft survival percentage (82.74) and graft vigour index-II (3259.59 cm). Grafts sprayed with Biovita @ 4 ml per litre recorded maximum sprout diameter (2.68 mm) and stionic ratio (1.68). Grafts sprayed with Vipul @ 5 ml per litre recorded maximum graft vigour index-I (793.37 cm).

November, 2022

(Yallesh Kumar, H. S) Major Advisor

Plantation, Spices, Medicinal and Aromatic Crops

University of Agricultural and Horticultural Sciences, Shivamogga M. Sc. (Hort.) theses abstracts produced in the Department of Plantation, Spices, Medicinal and Aromatic Crops

1. Mutagenic Studies In Black Turmeric (*Curcuma caesia* Roxb.)- An Underexploited Medicinal Plant

(ANITTA BENNY)

ABSTRACT

An investigation entitled "Mutagenic Studies in Black Turmeric (Curcuma caesia Roxb.)- An underexploited medicinal plant" was undertaken at College of Horticulture, Mudigere during the academic year 2021-22. The experiment was laid out in RCBD design with thirteen treatments and replicated twice. Three different mutagens like gamma rays (at 10, 15, 20, 25, 30 and 35 Gy), EMS (at 1, 1.25 and 1.5 %) and colchicine (at 0.1, 0.2 and 0.3 %) were used along with untreated control. Among the different treatments, T_{13} (control) recorded maximum per cent sprouting (100.00), plant height (71.80 cm), pseudostem girth (9.32 cm), number of tillers (5.85), number of leaves (25.30) and leaf area index (12.15), number of primary fingers (4.59), number of secondary fingers (11.64), number of tertiary fingers (13.22), mother rhizome weight (30.75 g), girth of mother rhizome (13.90 cm), rhizome yield per plant (130.03 g), essential oil (0.36 %), oleoresin (6.80 %), crude fibre (4.69 %) and curcumin content (0.008 %). The mutagenic treatments resulted in the reduction of growth, yield and quality parameters and also caused changes in chemical composition of essential oil. Both chlorophyll mutants (albino and xantha) and morphological mutants (split leaf type and dwarf plant type) were observed. Colchicine treatment resulted in an increase in chromosome number. There was a slight difference between GCV and PCV for all the characters indicating they were least affected by the environment. High heritability coupled with high genetic advance over per cent mean were observed for all the yield parameters. Correlation studies revealed that plant height, pseudostem girth, number of tillers and leaves, mother rhizome weight, number of primary, secondary and tertiary fingers had highly significant and positive correlation with rhizome yield per plant. Pseudostem girth, number of tillers, leaves, primary fingers, secondary fingers and rhizome length showed positive and direct effect on rhizome yield per plant.

November, 2022

(Bhoomika, H. R.) Major Advisor

2. Effect Of Vermicompost And Microbial Inoculants On Growth And Yield Of Chia (Salvia hispanica L.) Crop

(ASIF MAHIBOOB HULYAL)

ABSTRACT

Field experiment was carried out to study the "Effect of vermicompost and microbial inoculants on growth and yield of chia (Salvia hispanica L.) crop" under hill zone of Karnataka at Agricultural and Horticultural Research Station, Thirthahalli during 2020-21. The experiment comprised of eleven treatments and three replications and it was laid out in randomized complete block design (RCBD). The study revealed that among different treatments, plants treated with vermicompost @ 10 t/ha + Azotobacter + Phosphate solubilizing bacteria + Potassium solubilizing bacteria (T_{11}) at 90 days after transplanting recorded higher plant height (93.03 cm), number of branches (23.13), number of leaves (110.30), total fresh weight of plant (424.53 g/plant), total dry weight of plant (135.90 g/plant), leaf area per plant (4407.59 cm²/plant), leaf area index (1.63), at 60-90 days interval absolute growth rate (2.09 g/plant/day), crop growth rate (7.72 g/m²/day), number of spikes per plant (58.07) and seed yield (688.88 kg/ha). The same treatment (T₁₁) also recorded maximum total chlorophyll (2.42 mg/g of fresh weight) and total nutrient uptake *i.e.*, nitrogen (116.67 kg/ha), phosphorous (14.71 kg/ha) and potassium (105.24 kg/ha). Whereas, higher residual nitrogen (293.03 kg/ha), phosphorous (28.50 kg/ha) and potassium (148.32 kg/ha) content was found in soil after harvest in same treatment. The study indicated that application of vermicompost @ 10 t/ha + Azotobacter + Phosphate solubilizing bacteria + Potassium solubilizing bacteria was found optimum for realizing higher growth, seed yield and higher uptake of nutrients and improved the soil fertility, followed by vermicompost @ 10 t/ha + Azotobacter (T_7) and vermicompost @ 10 t/ha + Phosphate solubilizing bacteria (T_8) under hill zone of Karnataka. On the basis of research results, vermicompost and microbial inoculants application can be used in improvement of growth and yield of chia crop.

January, 2022

(Ravikumar, M.) Major Advisor **3.** Effect Of Naa And Ethephon On Flower Attributes And Yield In Cashew *(Anacardium occidentale L.)* Genotypes Under Hill Zone Of Karnataka

(ASHA, N. S.)

ABSTRACT

Cashew is one of the *India's* major foreign exchange earners and productivity in India is less than African countries. Uses of plant growth regulators at right time will help in improving the yield of the crop. Hence, the field trial was conducted at College of Horticulture, Mudigere in Chikkamagaluru district of Karnataka, India during 2020-21. The experiment was laid out in Factorial Randomized Block Design (FRBD) with three replication having thirty treatments on ten year old plants. Two sprays (NAA @100 ppm and ethephon @ 50 ppm) along with water spray were given at three different stages (full flushing, flowering and fruit set). In the present study, the treatment showed variation in terms of flower characters, yield and quality parameters of cashew genotypes. Among the treatments, ethephon @ 50 ppm significantly decreased the days to panicle initiation in Kanaka (73.67), increased number of panicles per meter square in Sulabha, Dhanashree and NDR-2-1 (12.67), number of staminate flowers per panicle in Vengurla -4 (18.67) number of perfect flowers in Priyanka, Vengurla-4 and Ullal-2 (4.67), sex ratio in NDR-2-1 (0.33), fruit set percent in Priyanka (26.50), nuts per panicle in Priyanka (9.33), apple volume in Kanaka (104.33 cc), kernel length in Priyanka (25.00 mm), nut weight in Priyanka (9.10 g), kernel weight in Priyanka and Amrutha (2.80 g), yield per tree in Priyanka (4.53 kg/tree) and (776.67 kg/ha) and shelling percentage in Sulabha (28.40). Foliar application of NAA @ 100 ppm showed significant response towards quality parameters of cashew apple like TSS in Sulabha and Ullal-2 (13.17 °Brix), juice content in Sulabha (73.33 %), total sugars in Kanaka and Dhanashree (2.55 %) and reducing sugars in Dhanashree (2.40 %). Thus, ethephon @ 50 ppm had beneficial effect on cashew flowering and yield attribute and NAA @ 100 ppm had beneficial effect on cashew apple quality parameters.

January, 2022

(Sadashiv Nadukeri.) Major Advisor

4. Physico-Chemical Characterization Of Big Apple Cashew (*Anacardium occidentale* L.) Genotypes

(CHAITHRA, K.)

ABSTRACT

A field experiment entitled "Physico - chemical Characterization of Big Apple Cashew (Anacardium occidentale L.) Genotypes" was conducted at Directorate of Cashew Research, Puttur, during the year 2021-2022. The experiment was laid out in RCBD design fifteen including Vengurla-8 check replicated with genotypes as variety, thrice. Morphological characterization of genotypes was done for growth, apple and nut parameters. Maximum tree height (7.75 m) and canopy spread (92.61 m^2) were recorded in NRC-112. Whereas, maximum number of flowering laterals per m^2 (28.34), number of perfect flowers per panicle (310.00), sex ratio (0.72), number of nuts per m^2 (47.93), number of nuts per panicle (9.40), shelling percentage (35.14), apple yield (56.47 kg/tree) and nut yield (5.01 kg/tree) were recorded in NRC-175. Significantly higher apple weight (183.10 g) was recorded in NRC-301, while maximum nut weight (13.41 g) in NRC-183. Highest ascorbic acid (572.40 mg/100g), antioxidants (204.74 mg AEAC/100g) and protein contents (17.50 %) were recorded in NRC-144, NRC-120 and NRC-270 respectively. Significantly higher phenols (165.36 mg/GAE/100g) and fat (30.75 %) were recorded in check variety V-8. Least tannin content (3.43 mg TAE/100g) and higher TSS (14.93° B) was recorded in NRC-175 indicating the possibility of exploring the genotype in value addition. Correlation studies showed that the traits viz., sex ratio, number of nuts per panicle and apple yield per tree had highly significant positive correlation with nut yield per tree. The traits, trunk girth, canopy spread, sex ratio, number of nuts per panicle, nut weight and apple yield per tree showed direct positive effect on nut yield per tree indicating the utilization of these parameters in crop improvement programme to evolve high yielding cashew varieties.

November, 2022

(Bhoomika, H. R.) Major Advisor

5. Genetic Variability Studies In Mandukaparni (*Centella asiatica* L.) Accessions Of Coastal Zone Of Karnataka

(NANDITHA, R. J.) ABSTRACT

An investigation was carried out at ZAHRS, Mudigere during 2021-22 to ascertain the variability existed in germplasm collected from different geographical regions of coastal Karnataka (20 accessions). The collected accessions were morphologically characterized for 13 qualitative traits based on NBPGR descriptors which revealed wide morphological variability for all the traits studied except leaf surface. The experiment was laid out in RCBD design with 03 replications using two check varieties (Arka Prabhavi and Arka Divya). Among 22 accessions evaluated, the accession Acc. 42 performed better for most of the growth, herbage yield and quality attributes as compared to the check variety Arka Divya. The genetic variability study indicated that, considerable variability among the accessions for most of the economic characters. Higher magnitude of GCV and PCV accompanied by higher heritability and GAM were recorded for fresh and dry herbage yield and total triterpenoids. Character association studies revealed that, all the yield contributing traits had highly significant and positive genotypic correlation with dry herbage yield except chlorophyll content. Positive and highly significant genotypic correlation of total triterpenoids content with madecassoside, asiaticocide and asiatic acid was also observed. Genotypic path coefficient analysis clearly indicated that number of stolons per rosette (2.022), rosette length (1.930) and stolon length (1.129) had very high positive direct effect on dry herbage yield. While, madecassoside content (0.836) and asiaticoside content (0.225) exhibited high direct positive effect on total triterpenoids content. Based on Mahalanobis D^2 analysis, clustering of accessions resulted in the formation of three clusters, the largest being cluster I (17 accessions). The diversity analysis revealed that petiole length and fresh herbage yield per m^2 contributed maximum towards divergence. Therefore, genetic improvement of mandukaparni through selection shall be based on genetic diversity rather than geographic diversity. Hence, accession Acc.42 may be tested over different seasons to know the stability.

November, 2022

(Ravi, C. S.). Major Advisor

6. Seed Germination And Grafting Studies In Cashew (Anacardium occidentale L.) Varieties

(POOJA, R.)

ABSTRACT

Seed germination and grafting studies in cashew varieties was carried out at the Agricultural and Horticultural Research Station, Bavikere, KSNUAHS, Iruvakki, Shivamogga. Germination and seedling vigour studies was carried out with ten cashew varieties (Ullal-1, Ullal-2, Ullal-4, VRI-1, VRI-3, Vengurla-3, Vengurla-4, Vengurla-7, Bhaskara and Priyanka) in Randomized Complete Block Design and three replications during the year 2021-22. The results of the study revealed that, the variety Priyanka showed the highest germination per cent (94.24) and seedling vigour index-1 (2941.65). The variety vengurla-4 showed the highest shoot length (52.76 cm), number of leaves (17.26), number of internodes (7.25) and plant girth (1.82 cm). Thus, it implies that the variety Priyanka has the highest germination percentage, while the variety Vengurla-4 possesses significantly superior traits in terms of growth parameters, which exhibits that both the varieties can be used as a potential rootstock to produce high-quality seedlings of cashew. Further, the effect of grafting height on graft success and survivability was evaluated with six cashew varieties (Ullal-2, VRI-3, Vengurla-4, Vengurla-7, Bhaskara and Priyanka) and three grafting height (10 cm, 15 cm and 20 cm) in Factorial Randomized Complete Block Design with three replications. The results of the study revealed that, initiation of sprouting was observed earliest in the variety Bhaskara at 20 cm height (21.33). The highest number of sprouts per graft were noticed in the variety Vengurla-4 at 20 cm height (2.37). The highest number of leaves per graft (8.93) and the highest sprouting success, graft success and graft survival per cent were noticed in the variety Bhaskara at 20 cm height (85.24, 83.00 and 81.81 respectively). Thus, the variety Bhaskara found to be responding best to grafting at a height of 20 cm in terms of graft sprouting, success and survival per cent.

November, 2022

(Sadashiv Nadukeri.) Major Advisor

Assessment Of Productivity And Carbon Sequestration Potential Of Arecanut (Areca catechu L.) + Coffee (Coffea canephora) Cropping System In Mudigere Taluk Under Hill Zone Of Karnataka

(PRAVEEN KUMAR G. K.)

ABSTRACT

A study was conducted in Mudigere taluk of Chikkamagaluru district of Karnataka during the year 2020-21, with the objective to study the productivity and carbon sequestration potential of Arecanut + Coffee cropping system. Three cropping systems viz., Arecanut monocropping, Coffee monocropping and Arecanut + Coffee mixed cropping systems of two age groups viz., 15-20 years and 20-25 years were selected for the study. The experimental locations included Balehole, Banakal, Belagodu, Kanachuru and Mudigere. The statistical design adopted was randomized complete block design (RCBD) and analysis of variance revealed the presence of significant variations among the cropping systems for most of the characters studied. Performance of arecanut and coffee for growth, yield and carbon sequestration potential were studied. In arecanut, significantly superior values for height of the palm (13.85 m), stem diameter (14.74 cm), internodal distance (14.87 cm), number of inter nodes (6.69/m), number of leaves (10.60/palm), number of bunches (3.40/palm/year), average bunch weight (7.32 kg), fresh bunch yield (22.85 kg/palm), stem biomass (13.90 kg/palm), carbon stock (6.79 kg/palm) and CO₂ sequestration (24.94 kg/palm) were recorded in Arecanut + Coffee mixed cropping system of 20-25 years age group. Coffee also performed better in the above cropping system for growth and yield traits viz., height of the plant (2.61 m), stem diameter (11.76 cm), fresh berry yield (23.54 kg/plant), stem biomass (18.96 kg/palm), carbon stock (8.91 kg/palm) and CO₂ sequestration (32.71 kg/palm). Soil carbon stock (SCS) was analysed in the rhizosphere and interspaces of arecanut and coffee among the cropping systems at two different depths (0-30 cm and 30-60 cm). SCS was more in surface layer of soil than the subsurface layer and maximum SCS was recorded in Arecanut + Coffee mixed cropping system of 20-25 years age group. The benefit cost ratio was worked out for all the cropping systems and the above system recorded highest B:C ratio of (4.67).

January, 2022

(Bhoomika, H. R.) Major Advisor

8. Germplasm Characterization And Propagation Studies In Madhunashini [Gymnema sylvestre (Retz.) R. Br. Ex Schult.]

(RAGHAVENDRA, H. C.)

ABSTRACT

Madhunashini [Gymnema sylvestre (Retz.) R. Br. ex Schult.] is a highly valued medicinal crop for its anti-diabetic and immense therapeutic properties. The current investigation was carried out at the ICAR-Indian Institute of Horticultural Research, Bengaluru, to characterize 35 accessions of Madhunashini for morphological traits and active bio-component 'gymnemagenin'. Morphologically, the accessions were characterised for nine quantitative and eight qualitative traits. High performance liquid chromatography (HPLC) method was used for the characterization and quantification of the gymnemagenin content. Wide morphological and biochemical variations were observed between the 35 accessions studied. Higher magnitude of GCV and PCV (> 20 %) accompanied by higher heritability (> 60 %) and genetic advance over mean (> 20 %) were recorded for fresh and dry leaf yield per plant and gymnemagenin content which indicated predominance of additive gene action for these traits and hence direct selection would be more effective in improving these traits. The correlation and path analysis studies revealed that, fresh leaf yield per plant and gymnemagenin content among the accessions shall be considered for selecting superior genotypes with better quality attributes. The accessions IIHR-GS-9, IIHR-GS-25, IIHR-GS-37 and IIHR-GS-44 performed better for growth, yield and quality traits. These promising accessions can be further deployed in future crop improvement programs for promoting cultivation and commercialization. Further, standardization of the propagation method in Madhunashini to produce quality planting materials was carried out. The effect of different types of cuttings, growth regulators and their combinations on the shooting and rooting behaviour revealed that the basal cuttings pre-treated with a combination of IBA @ 750 ppm + NAA @ 250 ppm exhibited early sprouting, more leaves per cutting, higher root length, maximum sprouting and rooting per cent and maximum fresh and dry weight of both roots and sprouts. The results of the research are useful in the identification of elite genotypes, promotion of its cultivation and conservation of the endangered medicinal plant in its natural habitat.

November, 2022

(Raviraja Shetty, G.) Major Advisor
Vegetable Science

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga M. Sc. (Hort.) theses abstracts produced in the Department of Vegetable Science

1. Effect Of Bio-Regulators And Boron On Growth And Yield Attributes Of Chilli (*Capsicum annuum* L.)

(FAIZIYA)

ABSTRACT

An investigation was carried out at Amble village of Chikkamagaluru taluk, during the year 2021-22. The main aim of this study was to find the effect of bio-regulators and boron on growth, yield and quality attributes of chilli. The study was conducted in RCBD design with nine treatments by adopting three replications. The treatments consist of T₁: (Control), T₂: (Triacontanol @ 0.25 %), T₃: (Triacontanol @ 0.50 %), T₄: (Seaweed extract @ 0.25 %), T₅: (Seaweed extract @ 0.50 %), T₆: (Humic acid @ 0.25 %), T₇: (Humic acid @ 0.50 %), T₈: (Boron @ 0.10 %) and T₉: (Boron @ 0.20 %). Among the various treatments, foliar application of T₂: (Triacontanol @ 0.25 %) recorded significantly maximum plant height (72.05 cm), canopy spread (N-S and E-W) (62.23 and 56.23 cm, respectively), total number of primary branches (12.70), total number of secondary branches (19.44), total number of branches per plant (39.14), total number of leaves per plant (278.44), leaf area per plant (7570.86 cm^2) and leaf area index (2.10). The foliar application of T₈: (Boron @ 0.10 %) recorded significantly minimum days to 50 per cent flowering (41.65) and first fruit set (42.23). However, maximum number of flowers per plant (287.18), number of fruits per plant (205.00), percentage fruit set (71.38), fruit length (12.30 cm), fruit girth (14.78 mm), 100 fruits fresh weight (615.00 g), green chilli yield per plant (1.230 kg) and hectare (34.17 t/ha), chlorophyll-a (1.64 mg/g fr. wt.), chlorophyll-b (0.70 mg/g fr. wt.), total chlorophyll (2.35 mg/g fr. wt.), reducing sugars (2.00 %), non-reducing sugars (0.81 %), total sugars (2.81 %), ascorbic acid (134.30 mg/100 g). The same treatment also registered maximum gross returns (6,30,357 $\overline{2}$ /ha), net returns (4,85,590 $\overline{2}$ /ha) and B:C ratio (3.35) in chilli.

December, 2022

(Umamaheswarappa, P..) Major Advisor

2. Evaluation Of Advanced Breeding Lines Of Brinjal (Solanum melongena L.) For Yield And Yield Attributes

(KARAKAMBADI VAISHNAVI)

ABSTRACT

The present investigation was carried out to assess the genetic variability in thirty advanced breeding lines of brinjal at College of Horticulture, Mudigere during Rabi 2021-22. The experiment was laid out in randomized complete block design with three replications. Significant differences were observed among genotypes for all the characters under study. High heritability (>60 %) coupled with high genetic advance (>20 %) as per cent over mean was observed for plant height and number of primary branches at 30, 60 and 90 DAT, days to first flowering, number of flowers per cluster, number of fruits per cluster, days taken to first picking, number of fruits per plant, average fruit weight, fruit length, fruit diameter, fruit yield per plant, dry matter content and fruit phenol content indicating that these characters are governed by additive gene action. Hence, direct selection can be followed for improvement of these characters. Correlation studies revealed that fruit yield per plant exhibited highly significant and positive association with number of fruits per plant, plant height at 60 DAT, fruit setting percentage, plant height at 90 DAT, number of primary branches at 60 DAT, number of fruits per cluster, number of primary branches at 90 DAT and fruit diameter. Path analysis revealed that fruit yield per plant had direct positive effect on number of fruits per plant, average fruit weight, plant height at 60 and 90 DAT, number of fruits per cluster and fruit diameter. Based on the mean performance, the lines CHMB - 2, CHMB - 17, CHMB - 6, CHMB - 18, CHMB - 4, CHMB - 9, CHMB - 29, CHMB - 20, CHMB - 24 and CHMB - 23 were found superior and these lines can be utilized for further improvement of brinjal crop.

November, 2022

(Devaraju.) Major Advisor

3. Morphological And Molecular Characterization Of Garden Pea (*Pisum sativum* L.) Genotypes For Yield And Yield-Attributing Traits

(LATHA, G. K.)

ABSTRACT

The present investigation was conducted on garden peas to characterize the diversity among 22 genotypes. The genetic diversity was assessed using morphological parameters and molecular markers (SSRs). Analysis of variance showed highly significant differences among the genotypes for all the characters under the study. High heritability coupled with high genetic advance as per cent over mean for all the characters studied except for days to first flowering, days to 50 per cent flowering, days taken for first picking and firmness suggesting that these traits can be improved through natural selection due to predominance additive gene action. In this study, five promising genotypes, viz., Arka Apoorva, Arka Sampoorna, Arka Tapas, IIHR-570 and IIHR-684, have been identified for higher yield, which can be utilized for the further crop improvement program. Agglomerative hierarchical cluster analysis grouped the tested germplasm into two major and five subgroups, while D^2 grouped the test material into five clusters. The green pod vield per plant contributed the maximum towards the total genetic diversity, followed by total soluble solids and dehydration ratio. DNA polymorphism was utilized to cluster the genotypes into different clusters based on dissimilarity coefficients. Out of the 8 SSR primer pairs, three primers revealed polymorphic patterns, which resulted in the amplification of 6 putative alleles with an average of 2 alleles per locus. Polymorphic information content values ranged from as low as 0.09 to as high as 0.75. On the basis of SSR data, the dendrogram clustered 22 genotypes into two major groups based on tall and dwarf plant types. The dendrogram based on SSR markers showed no congruence with morphological data. Using molecular marker data, the garden pea genotypes were subdivided into tall and dwarf plant types, indicating that molecular markers are more reliable and authenticated for assessing genetic diversity.

November, 2022

(Prakash Kerure.) Major Advisor

4. Genetic Investigation In F₂ Segregating Population Of Tomato (Solanum lycopersicum L.) For Yield And Yield Traits

(NIKHIL GOWDA, M.N.)

ABSTRACT

The study under protected condition was conducted to assess the extent of genetic variability, correlation and path coefficient analysis between yield and yield attributes in F₂ segregating population of the two tomato crosses viz., EC15127 \times EC362941 and EC521069 \times EC362941. The experiment was carried out during 2021–2022 at College of Horticulture, Mudigere. Analysis of variance showed highly significant differences among the traits. High PCV and GCV were registered for fruit yield per plant, locules per fruit, number of fruits per plant, fruit volume, average fruit weight and yield per hectare among the progenies of both the crosses. Estimates of high heritability coupled with high genetic advance as per cent over mean recorded for most of the studied characters which supports the notion that selection could actually improve these traits by highlighting the significance of additive gene action. Correlation study revealed that fruit yield per plant had highly significant positive correlation with average fruit weight, number of fruits per plant, number of fruit clusters per plant and fruit length in both the studied crosses. Path coefficient analysis for fruit yield per plant showed that number of fruit clusters per plant, secondary branches per plant, number of flowers per cluster, fruit length, average fruit weight and number of fruits per plant had positive direct effect in both the crosses suggesting the possibility of increasing fruit yield per plant by selecting these traits directly. The superior segregants identified with respect to fruit yield per plant in the cross EC15127 × EC362941 were P₇-5(82) -2.90 kg, P₆-5(81)-2.88 kg and P₈-5(127)-2.73 kg. Whereas, in the cross EC521069 \times EC362941, P₇-13(138)- 2.75 kg, P_1 -13(02)-2.70 kg and P_6 -13(122)-2.69 kg were identified as superior segregants, which could be developed into pure lines by selfing and selection or released as variety after stabilization.

November, 2022

(Srinivasa, V.) Major Advisor

5. Effect Of Growth Promoters And Micronutrients On Growth And Bulb Yield Of Onion (*Allium cepa* L.) Under Hill Zone Of Karnataka

(P J NIVETHAA)

ABSTRACT

A field experimentwas conducted at College of Horticulture, Mudigere during the year 2021-22 to investigate the effect of growth promoters and micronutrients on growth and bulb yield of onion (Allium cepa L.) under hill zone of Karnataka. The study consists of eleven treatments with three replications laid out in Randomised Complete Block Design (RCBD). The treatments include different plant growth promotersviz., GA₃ and NAA each at 75 ppm, 100 ppm, 125 ppm and different micronutrients viz., ZnSO₄ and Boron each at 0.25per cent and 0.50per cent. Results showed that foliar application of GA₃ @ 125 ppm recorded significantly maximum plant height and leaf length. The foliar application of GA₃ @ 100 ppm exhibited significantly maximum number of leaves, leaf girth, total chlorophyll content, collar thickness, days taken for maturity(125 days), bulb yield (6.21 kg/plot and 34.50 t/ha), marketable bulb yield (33.30 t/ha), A grade bulb yield(53.81 % and 18.56 t/ha), polar diameter, equatorial diameter, bulb volume, reducing sugar, TSS content(12.83°B), dry matter(13.80%), net returns (₹3,69,514) with benefit cost ratio (2.11) and minimum nonmarketable bulb yield (1.20 t/ha), C grade bulb yield, neck thickness (0.93 cm), moisture content and physiological loss in weight (8.35 %). The treatment of NAA @ 100 ppm observed significantly maximum B grade bulb yield, total sugars and minimum number of double bulbs. Hence, the study concluded that foliar application of GA₃@ 100 ppm found to be suitable for obtaining maximum yield and good quality bulbs in onion under hill zone of Karnataka.

September, 2022

(Devaraju.) Major Advisor 6. Performance Studies Of Chilli (*Capsicum annuum* L.) Quality Traits Under Hill Zone Of Karnataka

(SHARATH, M. N.)

ABSTRACT

An investigation was undertaken at Department of Vegetable Science, College of Horticulture, Mudigere during 2021-22. The experiment consisting of nineteen chilli hybrids with standard check, Arka Harita was laid out in a randomized complete block design with three replications to evaluate for growth, yield and quality parameters. The hybrid H-20 recorded maximum plant height (66.30 cm), number of primary branches (7.35), total number of branches (11.93), plant spread North-South (59.40 cm), number of leaves (212.93), fruit yield per plant (1.41 kg) and total chlorophyll content in leaves (3.05 mg/g). The highest number of secondary branches (12.07), plant spread East-West (59.57 cm) and ascorbic acid (212.58 mg/100 g) was noticed in the hybrid CO (Ch)-1. The same hybrid also took minimum number of days for first flowering (30.27), fifty per cent flowering (50.07) and days to first harvest (48.87). The hybrid Arka Gagan recorded the maximum number of fruits per plant (256.67). The hybrid LHC-Diya showed maximum fruit length (12.46 cm) and average fruit weight (7.27 g). The pungency content of 1.23 per cent was seen in the hybrid H-43 which was highest among all the hybrids. Correlation studies indicated that plant height, primary branches, plant spread, number of fruits per plant, average fruit weight, fruit diameter and fruit length had positive and significant correlation with fruit yield. Path studies highlighted that plant height, primary branches, plant spread, number of fruits per plant, fruit diameter, average fruit weight and fruit length had positive direct effect on fruit yield per plant at both genotypic and phenotypic levels. Finally, it can be inferred that among the hybrids, H-20 (38.40 t/ha), H-25 (37.44 t/ha) and Arka Gagan (36.85 t/ha) were high yielding hybrids, these can be tested across the locations to know their stability before recommending for commercial cultivation.

November, 2022

(Srinivasa, V.) Major Advisor

(VIJAYKUMAR, M. N.)

ABSTRACT

A field experiment was conducted to study the efficacy of different weed management practices in onion at Zonal Agricultural and Horticultural Research Station, Babbur Farm, Hiriyur, Chitradurga during rabi 2020-21, having nine treatments replicated thrice in Randomized Complete Block Design. Among the different weed management practices, hand weeding at 15, 30, 45 and 60 days after transplanting (DAT) recorded significantly maximum growth parameters at 90 DAT viz., plant height (72.47 cm) and number of leaves per plant (11.93) and also yield parameters viz., polar (5.69 cm) and equatorial diameter (6.43 cm) of bulb, total bulb yield (32.04 t/ha) and marketable bulb yield (31.70 t/ha). This treatment also recorded lowest weed density (31/m²), dry weight of weed (10.20 g/m²) and higher weed control efficiency (79.9 %). These values are statistically on par with the treatment T_6 (Oxyfluorfen 45 % EC @ 0.75 l/ha 3 DAT + hand weeding at 45 DAT) i.e., plant height (69.73 cm) and number of leaves per plant (11.20) and also yield parameters viz., polar (5.25) cm) and equatorial diameter (6.12 cm) of bulb, total bulb yield (31.85 t/ha), marketable bulb yield (31.44 t/ha), lowest weed density (35.33/m²), dry weight of weed (10.33 g/m²) and higher weed control efficiency (77.16 %). The lowest values are observed in control treatment aspect to all growth and yield parameters. The maximum B:C ratio (3.46) was observed in T₆. Based on the results obtained from the present investigation, hand weeding at 15, 30, 45 and 60 days after transplanting found to be promising for getting higher onion yield. However due to sever scarcity and non-availability of labours, it is not possible to carry out timely weeding operation in onion. So, the economically viable and comparatively effective weed control was observed in treatment T₆.

January, 2022

(Umamaheswarappa, P..) Major Advisor

Forestry

Silviculture and

Agroforestry

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga M. Sc. (Forestry) theses abstracts produced in the Department of Silviculture and Agroforestry

1. Assessment Of Casuarina Clones And Intercrops In Agroforestry

(JINCY JUSTIN J.K.)

ABSTRACT

Casuarina is one of the most important tree species ideal for agroforestry due to its nitrogen-fixing ability, desirable stem form, fast growth and light crown characteristics. Identification of suitable tree-crop combinations is important for maximizing the resource use efficiency of the components. In this context, the present study was conducted at MAHRS, Iruvakki to assess the growth performance of eight Casuarina clones, the yield performance of intercrops and the impact of intercrop cultivation on soil nutrient status. The eight Casuarina clones were planted in row-column design with a spacing of 3 m \times 2 m in three replications. Horse gram and cowpea were intercropped in between tree rows during October 2021-January 2022 and April 2022-June 2022, respectively. Clone CH2 recorded a maximum height (8.41m) and GBH (25cm) at the end of experiment. The clones viz., CH2, CH4 and CH5 performed better in terms of quantitative and qualitative parameters compared to the clones viz., HPF, CJ9 and MTP. The green pod yield and biomass yield of cowpea was found to be highest in sole crop (8235 kg ha⁻¹ and 5840 kg ha⁻¹) and lowest in CH1 (2763 kg ha⁻¹ and 1683 kg ha⁻¹). And also, it was evident that the yield of intercrops was found to be lowest under the clones which performed well. This may be attributed due to the shade effect caused by the Casuarina clones on the intercrops. The effect of intercrop cultivation on soil chemical properties was found non-significant. Whereas, the soil pH showed an increase in value with increase in soil depth and other properties such as Electrical Conductivity, Organic Carbon, Available Nitrogen, Phosphorus and Potassium showed a decreasing trend with an increase in soil depth.

November, 2022

(Maheswarappa V.) Major Advisor

2. Studies On Tree-Crop Performance Of *Melia dubia* Cav. Based Agroforestry In The Central Dry Zone Of Karnataka

(SYED ALI)

ABSTRACT

Agroforestry is becoming more significant in light of the increased need for wood and the accessibility of farmland. The main area for agroforestry consideration is the creation of a suitable tree crop spacing combination and productivity evaluation. The present experiment was conducted at Zonal Agricultural and Horticultural Research Station, Hiriyur during the year 2021-2022 to assess tree-crop performance and the effect of intercrop cultivation on soil nutrient status in Melia dubia based agroforestry. Horse gram cultivated in the interspaces of tree rows and also as sole crop in open field condition. The study revealed that performance of Melia dubia with and without horse gram intercrop was on par and relatively higher in intercropped condition. The growth and yield parameters of horse gram were recorded highest in sole horse gram followed by $4 \text{ m} \times 3 \text{ m}$ spacing and lowest were recorded in closer spacing of 4 m \times 1 m. The grain yield of horse gram ranged from 599.00 kg ha⁻¹ to 1220.20 kg ha⁻¹ wherein, sole horse gram recorded relatively higher yield. Soil chemical properties of the experiment revealed that they differ significantly between the treatments both prior to horse gram intercropping and after harvest. There was significantly decline in soil pH and EC wherein significantly increased in soil available N, P₂O₅, K₂O and soil organic carbon in Melia dubia based agroforestry compared to sole horse gram plot. This might be due to decomposition of organic materials and nutrient pumping in agroforestry. It is evident from present study that higher tree spacing of 4 m \times 3 m might be suitable for *Melia dubia* based agroforestry in the central dry zone of Karnataka.

November, 2022

(Vasudev. L.) Major Advisor

Forest Biology and Tree

Improvement

M. Sc. (Forestry) theses abstracts produced in the

Department of Forest Biology and Tree Improvement

1. Impact Of Alien Invasive Species (*Lantana camara* L.) On Floristic Diversity, Natural Regeneration And Soil Properties In Nagarahole Tiger Reserve

(RASHMITHA, H.R.)

ABSTRACT

Lantana camara L. is an alien invasive species widespread in India. The spreading patterns of Lantana indicate a serious threat to native plant biodiversity and regeneration. The present study was carried out to assess the effect of Lantana invasion on floristic diversity, natural regeneration and soil properties in two ranges of Nagarahole Tiger Reserve, Karnataka. Four levels of lantana infestation that is, highly infested, moderately infested, lantana uprooted areas and areas without lantana infestation were considered for the present study. In each of these categories, 15 quadrates of 20 m ×20 m were laid randomly. Five sub quadrates of 2×2 m were laid in each main quadrant to assess the regeneration status. Four soil samples were collected at 0-15 cm and 15- 30 cm depths randomly and a composite sample was made and analyzed for moisture content, bulk density, pH, EC and available organic carbon. The results from the study indicate that, non-infested areas and moderately infested areas recorded maximum density as well as basal area in both the ranges. Girth class distribution showed an inverse J-shaped pattern under all the categories except highly infested areas. Higher species richness and diversity were observed in moderately infested areas and non-infested areas followed by highly infested areas. Highest density of regenerates was observed in uprooted areas (1121±108.79 stems ha⁻¹) followed by moderately infested areas (660±108.79 stems ha⁻¹) in Antharasanthe. Highest density of regenerates was observed in non-infested areas (845±73.31 stems ha⁻¹) followed by uprooted areas (740±73.31 stems ha⁻¹) in Kallahalla range. It was noticed that, higher canopy openings had higher Lantana infestation. Maximum soil moisture content, bulk density, pH and Electric conductivity were observed in highly infested areas but percentage of organic carbon and organic matter was highest in non-infested areas. From the study, it is evident that the natural regeneration is being affected by the higher Lantana infestation and Lantana uprooting is helping to improve the regeneration status.

November, 2022

(Sathish, B.N.) Major Advisor