Agriculture

Agricultural Entomology

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Agricultural Entomology

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1. Studies on Insect Pests and Natural Enemies in Organic and Inorganic Paddy Ecosystem

(ARPANA, N. S.)

ABSTRACT

The investigation on comparative studies on insect pests and natural enemies in organic and inorganic paddy ecosystem were undertaken at Zonal Agricultural and Horticultural Research Station (ZAHRS), Shivamogga during *Kharif* 2019-20. Major insect pests like stem borer (*Scirpophaga incrtulas* W), leaf folder (*Cnaphalocrocis medinalis* G.), green leafhopper (*Nephottetix virescens* D), earhead bug (*Leptocorisa acuta* T) and major predators like spiders, mirid bugs, odonatans (dragonfly and damselfly) and coccinellids were observed. The insect pest status was lowest in organic ecosystem compared to inorganic ecosystem with highest incidence shown during October to December months withleafhoppers (7.5 and 12.25 /hill), yellow stem borer (6.80 and 8.45% damage), leaf folder (9.00 and 12.40 % damage) and earhead bugs (1.00 and 4.050 /hill) in organic and inorganic ecosystem respectively. Among the predator population organic ecosystem showed a positive response in population build-up while inorganic ecosystem showed negative response by reducing the predator's population with spiders (3.25 and 1.05/hill), mirid bugs (19.20 and 18.35/hill), odonatans (4.25 and 1.05/hill), and coccinellid (2.25 and 1.00/hill) in both organic and inorganic ecosystem respectively. During the survey, different types of organic management strategies were identified and documented among those Neem cake application (97.50%) was more popular to check many pests bothin field and storage condition. Among the various biorationals evaluated against different insect pests of paddy, spinosad 45 SC (38.85 q/ha), chlorantraniliprole 18.5 per cent SC (36.95 q/ha), dashaparani Kashaya5 per cent (35.42 q/ha) and azardiractin 5 per cent (34.85 q/ha)was more effective in reducing the pest population with significantly higher grain yield on insect pests activity and highest benefit cost ratio.

October, 2020

(S. Pradeep)
Major Advisor

2. Competitve Displacement among Lepidopteran Pests Infesting Maize

(DIVYA, J.)

ABSTRACT

The present investigation aimed at understanding the competitive displacement of native lepidopterans by an invasive fall armyworm (FAW), *Spodoptera frugiperda*.The studies mainly focused on the incidence of different lepidopterans after the invasion of FAW, intraguild competition on survival and fitness of *S. frugiperda* and *Sesamia inferens*, time of habitat occupancy and larval density on survival of these two competing species. In addition, different insecticides mixed with sand were evaluated for their efficacy against FAW. The roving survey was conducted in four major maize growing districts of Karnataka to know the incidence of various lepidopteran pests.Total of five lepidopteran pests namely*S. frugiperda*, *S. inferens*, *Chilo partellus*, *Spodoptera litura* and *Trichoplusia ni*were recorded on maize during *Kharif* and *Rabi* 2019-20. Among them, *S. frugiperda* incidence was highest compared to all the other lepidopteran pests. Survival of *S. frugiperda* larvae was not affected in the presence of an intraguild competitor,*S. inferens*. While the survival of *S. inferens* was significantly reduced in interspecific competition with *S. frugiperda* than in intraspecific competition. Fitness cost analysis of survived larvae indicated that non-competing control larvae had higher pupal weight than competing larvae in both the species. Early or late occupancy of whorl did not have any significant effect on the survival of both the species. Survival of *S. frugiperda* was reduced only under higher larval densities,while the survival of *S. inferens* was greatly reduced irrespective of the larval densities.Among the evaluated different insecticides mixed with sand against *S. frugiperda*, chlorantraniliprole 18.5 SC@ 0.4ml/kg of sand and emamectin benzoate 5 SG@ 0.4g/kg of sand were found to be effective in reducing the larval population with maximum grain yield (60.34 q/ha and 58.60 q/ha) and C:B ratio(1:1.29 and 1:1.35), respectively.

October, 2020

(Kalleshwaraswamy, C. M.)

Major Advisor

3. Insect Pest Complex, Screening of Varieties and Management of Sucking Pests in French Bean (*Phaseolus vulgaris* L.)

(JAKKARAY)

ABSTRACT

The present investigation was carried out on 'Insect pest complex, screening of varieties and management of sucking pests in french bean (*Phaseolus vulgaris* L.)' under field conditions at KrishiVigyana Kendra (KVK) farm, University of Agricultural and Horticultural Sciences (UAHS), Shivamogga during 2019-2020. During the study period, different pests were observed *viz.*, leafhopper, *Empoasca fabae* (Harris); aphid, *Aphis craccivora* (Koch); mite, *Tetranychus macfarlanei* (Baker and Pritchard); bean pod borer, *Maruca vitrata* (Fabricius); bean leaf webber, *Omoides indicata*(Fabricius); pod bug, *Riptortus linearis* (Fabricius) and green bug, *Nezaraviridula* (Linnaeus). The natural enemies were spiders and different species of ladybirdbeetles like *Propylea dissecta* (Mulsant), *Coccinella transversalis* (Fabricius), *Harmonia octomaculata* (Fabricius), *Coelophora bissellata* (Mulsant) and *Cheilomenes sexmaculata* (Fabricius) were recorded on french bean in both *Kharif* and *Rabi* seasons. Whereas, thrips, *Megalurothrips usitatus* (Bagnal); whitefly, *Bemisia tabaci* (Gennadius) and bean stem fly, *Ophiomyia phaseoli* (Tryon) were observed in *Rabi*season only. A total of nine french bean varieties were screened against sucking pests, among them ArkaSuvidha recorded the least population (3.07 per three leaves) of leafhoppers, aphids (34.13 per three leaves) and mites (8.16 per leaf), while least leafhoppers (3.71 per three leaves) and mites (6.21 per leaf) were recorded on ArkaArjunand ArkaAnoop, respectively. The efficacy of different insecticides against sucking pests showed that dinotefuran 20 SG (0.4 g/l) found highly effective in reducing leafhoppers followed by flonicamid 50 WG (0.5 g/l) whereas, flonicamid 50 WG(0.5 g/l)effective in suppressing aphids followed by pymetrozine 50 WG(0.6 g/l). The significantly higher yield of 9.88 t/ha was obtained in flonicamid (0.5 g/l) treated plot being statistically on par with dinotefuran (9.21 t/ha) and pymetrozine (8.49 t/ha). The higher cost-benefitratio of 1:3.83 was obtained from flonicamid followed by dinotefuran (1:3.73) and pymetrozine (1:3.30). However, the untreated control registered lowest cost-benefit ratio (1:1.30).

October, 2020

(Hanumanthaswamy, B. C.)

Major Advisor

4. Studies on Insect and Mite Pest Complex of Amaranthus and Palak

(MANJUSHREE, B. J.)

ABSTRACT

The research entitled 'Studies on insect and mite pest complex of amaranthus and palak' was carried out at Zonal Agricultural and Horticultural Research Station (ZAHRS), Shivamogga during 2019-20. During the research study, sixteen major insect and mite pests species *viz*., *Hymenia recurvalis* (Fabricius), *Erectomoceraimpectella* (Walker), *Spodoptera litura* (Fabricius), *Liriomyza* sp., *Hypolixus truncates* (Fabricius), *Xanthochelus* sp.,*Nezara viridula* (Linnaey), *Cletuspunctiger*(Dallus), *Cletomorpha hastate* (Fabricius), *Attractomorpha* sp., *Aphis craccivora* (Koch), *Tetranychus* sp., *Phyllotreta cruciferae* (Goeze), *Thrips palmi* Karny, *Scirthothrips dorsalis* Hood and *Neorthacris* sp. were recorded onamaranthus and four insect pests species *viz*., *Spodoptera litura* (Fabricius), *Liriomyza* sp. (Burgess), *Phenacoccus solenopsis* Tinsely and *Cletuspunctiger* were recorded onpalak. *Phenacoccus solenopsis* Tinsely is the new record on palak. During *Kharif*, the population of *S. litura* attained peak during August second week on amaranthus and palak and had positive correlation with rainfall, evening relative humidity, maximum temperature, morning relative humidity and negative correlation with minimum temperature and sunshine hours. Incidence of leaf miner was maximum during October first week in *Kharif*andattained peak during January fourth week in *Rabi*on amaranthus and palak. There was positive correlation of leaf miner population with minimum temperature, sunshine hours, maximum temperature and negative correlation with evening relative humidity, rainfall and morning relative humidity in *Kharif* and *Rabi*. Aphids showed positive correlation with maximum temperature, sunshine hour and negative correlation with rainfall, minimum temperature, morning relative humidity and evening relative humidity during *Rabi*. Among the organic molecules evaluated, NSKE 5 % was found superior against leaf miner, bugs and tobacco cut worm on amaranthus and palak, and against aphids on amaranths. Cost benefit ratio was highest with NSKE 5% *i.e*. 1: 2.45 and 1: 1.88 with amaranthus and palak, respectively.

October, 2020 (Jayalaxmi Narayan Hegde)

Major Advisor

5. Studies on Acaricidal Resistance in Two Spotted Spider Mite, *Tetranychus urticae* KOCH (Acarina: Tetranychidae) Infesting Tomato

(MOHMAD MOHIN)

ABSTRACT

The present investigation was carried out during 2019-2020 to determine the base-line values for susceptibility of two spotted spider mite, *Tetranychusurticae* Koch (susceptible laboratory population) to major acaricides. Field investigations were carried out at Agriculture and Horticultural Research Station, Bavikere, Chikkamagaluru district of Karnataka. The LC_{50} values estimated for the susceptible laboratory population was decreased over successive generation (from 118th to 128th generations) because of the increased susceptibility of laboratory population to all tested acaricides.The laboratory population of 128th generation was considered as base-line susceptibility of spider mite for corresponding acaricide and was further used to calculate the level of resistance in different field population.The LC_{50} values estimated for reference strain were 0.18 ppm for fenazaquin, 0.20 ppm for propargite, 0.29 ppm for spiromesifen, 0.32 ppm for abamectin, 0.42 ppm for chlorfenapyr and 0.30 ppm for diafenthiuron and dicofol.The resistance ratio was estimated for the two spotted spider mites collected from Chikkamagaluru and Shivamogga district. Among all the tested acaricidesdiafenthiuron showed the moderate level of resistance (41.73 folds) whereas, dicofol showed the high level of resistance (2231.8 folds) in both districts. Among the selected acaricides, diafenthiuron 50 WP was more effective at 3, 7 and 10 days after and second spray against total population of *T. urticae* on tomato under field condition. The least effective chemical was fish oil. The order of bio-efficacy against total mite population was diafenthiuron 50 WP (1.5 g/l) >chlorfenapyr 10 EC (1.2 ml/l) >spiromesifen 22.9 SC (1.5 ml/l) >abamectin 1.9 EC (0.5 ml/l)>etoxazole 10 SC (0.8 ml/l) >propargite 57 EC(1.5 ml/l)>fenazaquin 10 EC (2 ml/l)>dicofol 18.5 EC (2.5 ml/l)> fish oil (5 ml/l).The highest cost benefit ratio of 1:2.91 with high fruit yield of 33.81 t/ha was recorded with diafenthiuron 50 WP.

November, 2020

(Jayalaxmi Narayan Hegde)

Major Advisor

6. Influence of Silicon and Plant Growth Regulators on the Biology and Incidence of Fall Armyworm, *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) on Maize

(NAGARATNA WANGI)

ABSTRACT

The present investigation on the influence of silicon (Si) and plant growth regulators (PGR's) on the biology and incidence of *Spodoptera frugiperda* was carried out during 2019-20. Different sources of silicon such as foliar silicic acid and diatomaceous earth (DE) at different concentrations and combinations were evaluated. The larvae fed on plants treated with Si (DE at 2 and 4 g/plant, silicic acid at 2 and 4 ml/plant and silicic acid at 2 ml/plant + GA_3 at 0.3 and 0.5 mg/plant) and Jasmonic acid (JA) (2 ml/plant) exhibited lower larval, pre-pupal and pupal weight, whereas no effect of GA_3 (0.3 and 0.5 mg/plant) on these parameters. Si and PGR's significantly decreased fecundity, fertility and adult longevity. The biological parameters and damage score of *S. frugiperda* were negatively correlated with nutrients and biochemical parameters of maize. The pooled data of *Kharif* 2019 and *Rabi* 2019-20 on the effect of Si on the field incidence revealed that the number of larvae per plant was lowest for DE at 4g/plant (0.21 larvae/plant) with the highest per cent reduction over control (85.63 %). Similarly, the damage score was lowest for DE at 4 g/plant (1.60 damage score) and per cent infestation was also lower for 4 g/plant (24.87 %) with the highest per cent reduction over control (70.82 %). A significant increase in plant height, stem diameter, chlorophyll content, shoot fresh and dry weight was observed in plant treated with Si and PGR's. There was a significant increase in cob girth and seed test weight. However, there was no increase in the number of leaves per plant, cob length, root fresh and dry weight. Significantly highest yield was recorded for DE at 4 g/plant (63.34 q/ha pooled data of both *Kharif* and *Rabi* season). Among the different Si sources and PGR's, the FSA at 2 ml/plant + GA_3 at 0.5 mg/plant was found to be superior with maximum cost benefit ratio (1: 2.34 pooled data of both *Kharif* and *Rabi* season).

October, 2020

(Kalleshwaraswamy, C. M.)

Major Advisor

7. Screening of Different Hybrids and Evaluation of Insecticides against Fall Armyworm, *Spodoptera frugiperda* (J. E. Smith) on Maize

(SOMASHEKHAR CHANNAYYA MATHAPATI)

ABSTRACT

In India, maize is the third most important food crop after rice and wheat. Karnataka being the top maize producing state, which has affected by the invasion of fall armyworm (FAW) during 2018, threatened the animal feed security of the country. This study was intended to screen the cultivable hybrids commonly grown by the farmers and efficacy of seed treatment combined with spray applications. Out of the 12 hybrids screened against FAW, five hybrids found partially resistant by recording minimum leaf damage score *viz*., LG 36607 (3.38), P3550 (3.66), Tata Dhanya (3.80), P3405 (3.57) and S 6668 plus (4.33). The hybrid, P3401 (7.00) was found to be susceptible and the hybrids namely C. P. 818 (7.33) and Amogha 919 (7.27) were found highly susceptible with higher leaf damage score. In partially resistant hybrids, all the morphological traits were found to have a negative impact on the leaf damage. The biochemical basis of maize resistance to FAW was witnessed in the study. Phenols ($r = -0.76^{**}$) and tannins ($r = -0.83^{**}$) had a significant negative influence on leaf damage score, exerting a direct antibiosis effect. Seed treatment with cyantraniliprole19.8%+thiamethoxam 19.8% FS at 8ml/kg followed by a foliar spray of emamectin benzoate 5 SG at 0.4 g/L or thiodicarb 75 WP at 0.6 g/L or *Metarhizium rileyi* at 3 g/L were capable of reducing the larval population (Up to 3 to 4 weeks after sowing) with highest C: B ratio (Rs.1: 2.13). Among the various insecticides, foliar application of chlorantraniliprole 18.5 SC (0.4 ml/L) at 15 days after sowing followed by a foliar application of spinetoram 11.7 SC (0.5 ml/L) at 25 days after sowing demonstrated the higher efficacy, offered good protection, recorded higher yield (55.84 q/ha) and B: C ratio (Rs.1: 2.04).

October, 2020

(Sharanabasappa)

Major Advisor

8. Species Composition and Management of Sternorrhynchan (Hemiptera) Pests in Arecanut

(VINOD KUMAR DUBEY)

ABSTRACT

Investigations were carried out in major arecanut growing districts of Karnataka during 2019-20 to know the species composition of sternorrhynchan pests *viz.*, whiteflies, mealybugs, scale insects and aphids. A total of 15 species of sternorrhynchan insect pests were recorded in different arecanut growing districts of Karnataka, which belonged to five different families *viz.*, Coccidae Stephens, Diaspididae Maskell, Aleyrodidae Westwood, Pseudococcidae (Heymons) and Aphididae (Buckton). Among the 15 species recorded, Coccidae was the species rich family infesting arecanut. *Aleurocanthus arecae* David & Manjunatha was the most predominant species recorded in arecanut orchards followed by *Prococcus acutissimus* (Green), *Pseudococcus longispinus* (Targioni Tozzetti), *Aleurodicus rugioperculatus* Martin, *Ceroplastes* sp. nr. *rusci* (Linnaeus), *Chrysomphalus aonidum* (Linnaeaus), *Parasaissetia nigra* (Neitner), *Coccus viridis* (Green), *Coccus hesperidum* Linnaeus, *Pseudaulacaspis cockerelli* (Cooley), *Pinnaspis aspidistrae* (Signoret), *Lepidosaphes gloveri* (Packard), *Ferrisia virgata* (Cockerell), *Dysmicoccus brevipes* (Cockerell) and *Cerataphis lataniae* (Boisduval). Illustrations were given and a key to sternorrhynchan pests infesting arecanut is provided for easy and quick identification. Correlation studies revealed that, with different weather parameters, whiteflies showed a significant positive correlation with rainfall and wind speed and significantly negatively correlated with maximum temperature, sunshine and evaporation. For scales maximum temperature, sunshine and evaporation showed significant positive correlation and the relative humidity showed significant negative correlation. However, the mealybugs showed significant negative correlation with relative humidity and significant positive correlation with maximum temperature and evaporation in all the three locations. Among the different insecticides tested for the management of *A. arecae* and *C. aonidum* the neem oil 1 per cent @ 2ml/l showed maximum per cent reduction against the whiteflies (72.92) and wax scales (81.60) compared to other treatments.

October, 2020

(Shivanna, B. K.)

Major Advisor

Agricultural Extension

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Agricultural Extension

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1. A Study on Knowledge and Adoption of Paddy Cultivation Practices in Hosanagara Taluk of Shivamogga District.

(MOHAMMAD EMRAN)

ABSTRACT

The study was conducted in Hosanagara taluk of Shivamogga district.Four Hoblishaving highest areaunder paddy were selected and from each Hobli three villageswere selected. From each village ten paddy farmers were randomly selected. Thus the total sample of 120 respondents. The study indicated thatmajority of the paddy farmers had medium (64.17%) to high (18.33%) level of knowledge.In case of adoption 59.17 per cent had medium level of adoption followed by high (23.33%) level of adoption of paddy production practices.Majority of the respondents were middle-aged(52.50%), having education up to PUC (61.67%).More than half of paddy farmers were belong to medium size of landholding (58.34%), whereas 64.17 per cent of the paddy farmers had medium level of extension contact,extension participation (76.67%). Majority of paddy farmers had a medium social participation (72.50%), innovativeness (55.83%), and risk orientation (59.17%). Medium level of cropping intensity could be observed in case of 77.50 per cent of respondents, followed by mediumlevel of economic motivation (64.17%).Pest and disease problem (94.17%), high cost of labour (92.50%), non-availability of seeds (81.67%) were the major constraints faced by the respondents. The majority of them suggested thatdeveloping high yield varieties (75.83%), followed by less water required paddy varieties (70.83%) andpest and disease resistant varieties (64.17%). Hence, Agriculture Universities, KVKs, and Agricultural departments should provide adequate training to the paddy growing farmers to enhance their knowledge about improved technologies which helps in adoption of scientific paddy cultivation practices.

September, 2020

(M. Sudheendra)
Major Advisor

2. Indigenous Technical Knowledge: a Documentary Study in Chikkamagaluru District

(POORNIMA JADHAV)

ABSTRACT

The study was conducted in the Chikkamagaluru district of Karnataka state during 2019-2020 to document the Indigenous Technical Knowledge (ITKs) in agriculture practiced by the farmers of Chikkamagaluru district. A total of 80 ITK practicing farmer respondents considered as samples for this study from two talukas of Chikkamagalurudistrict viz, Tarikere and Mudigere. From each taluk 40 respondents were selected and interviewed with help of pre-structured interview schedule. During the study, 90 ITKs were documented along with rationale behind practice of these ITKs. Further ITKs documented were categorized into groups viz, soil/nutrient management (8), seed treatment (2), weed management (5), pest management (23), disease management (11), non-insect pests (8), physiological disorders (3), soil and water conservation (4), storage of grains (10), animal husbandry (12) and others (4). The personal and socioeconomic characteristics of the respondents revealed that majority of respondents were old aged (47.50%), had PUC level of education (40.00%), medium family size (86.25%), possesses semi medium sized land holdings (36.25%), high farming experience (42.50%), low level of income (42.50%), practicing poor cropping pattern (46.25%), medium level of livestock possession (48.75%) and medium level of material possession (57.50%), medium level of extension contact (80.00%) and medium level of source of information (55.00%). The major constraints for discontinuation of practicing of ITKs were easy availability of modern technologies (90.00 %), lengthy procedure of preparation of ITK (83.75 %), lack of availability of input- materials for ITK practice (57.50 %), non availability of labors (47.50 %) and constraint of time (58.75).Major suggestions documented by ITK practicing farmers were creating mass awareness about ITK (80.00 %), encouraging the ITK practicing farmers (86.25 %) and educating the farmers regarding benefits of ITK (91.25 %).

September, 2020 (Basavaraj Beerannavar)

Major Advisor

3. Impact of KrishiBhagya Scheme on the Beneficiaries in Shivamogga District

(CHAITHRA, N. R.)

ABSTRACT

The present study was conducted in the Shivamogga district of Karnataka state during the year 2019-20 to analyze the impact of KrishiBhagyaScheme on beneficiaries. A total of 120 respondents were selected, consisting of 60 beneficiaries and 60 non-beneficiaries, respectively. The study results revealed that the majority of beneficiaries (53.33 %) and non-beneficiaries (48.33 %) have medium overall knowledge. The calculated z' statistic shows a highly significant increase in paddy and vegetable yield, with a moderate cropping pattern of 4 to 6 crops followed by low crop yields in the case of non-beneficiaries. The 'z' statistic shows a significant difference in cropping intensity, employment generation and annual farm income, and self-sufficiency in comparison to non-beneficiaries. The majority of the beneficiary farmers (53.33%) had an enterprise combination of agriculture + horticulture + animal husbandry and low-implementation possession (55.00%). In contrast, non-beneficiaries possess agriculture + horticulture as a significant enterprise (38.33%) with not much possession of new implements (45.00%). The significant (48.33%) of beneficiaries have a favorable attitude with a significant association with variables like education, landholding, information-seeking behavior, mass media exposure, and management orientation. It was found that majority of the beneficiaries belong tomedium landholding (56.67%) with medium land under protective irrigation (50.00%), and management orientation (43.33%). The prominent constraints expressed by beneficiary farmers area elevation of polythene sheets during the rainy season (78.76) and clogging of motor nozzles (71.07). In comparison, non-beneficiaries experienced that they couldn't be able to harvest more crops (78.75) and lowered yield (77.00). The significant suggestion given by the beneficiaries is polythene sheets/sprinkler/drippers has to be serviced whenever they got damaged (78.76%) and digging of farm ponds depending on their needs (77.10%).

October, 2020 (Basavaraj Beerannavar)

Major Advisor

4. Farmers' Perception and Adoption of Groundnut Production Technologies in Udupi District

(SRIKANTH SHINDE)

ABSTRACT

The present study was conducted in Udupi district of Karnataka state during the year 2019-20 to assess the farmers' perception and adoption of groundnut production technologies. Three taluks having highest area under groundnut cultivation were selected. Four villages from each taluks were selected and from each village ten farmers were randomly selected. Thus the sample size of the study comprises of 120 farmers. The study revealed that 65.83 per cent of farmers had high perception about groundnut production technologies. In case of adoption 75.00 per cent of the farmers had adopted the recommended groundnut production technologies. Majority (55.83%) of the farmers were middle aged, having education up to high school (46.67%). More than half of the groundnut farmers belonged to nuclear family (65.83%), whereas 82.50 per cent of the farmers had medium annual income and medium social participation (65.00%). Majority (55.83%) of the farmers had high innovativeness and 74.17 per cent of the farmers had low risk orientation. Followed by majority (69.16%) of the farmers had medium achievement motivation, high mass media exposure (71.67%) and high extension participation (65.00%). Followed by majority (44.17%) of the farmers had low market orientation. Hence, SAU, KVKs, RSKs and concerned agriculture department should provide ample training and information to motivate the farmers in order to improve their perception level and to adopt the recommended technologies.

October, 2020

(B. Dhananjaya)
Major Advisor

5. Socio-Economic Impact of E-Tendering System on Arecanut Growers in Karnataka

(VIVEK, M. C.)

ABSTRACT

The study entitled 'Socio-economic impact of e-tendering system on Arecanut growers in Karnataka' was conducted during 2019-20. For the study, two major Arecanut trading APMCs of Karnataka, *viz*., APMC of Shivamogga district and Bheemasamudra APMC of Chitradurga district were selected. From each APMCs, 50 farmers, 10 traders, and 10 commission agents were selected randomly. Thus, the total sample size was 140. The primary data were gathered using a pre-tested interview schedule and secondary data were collected from Krishimaratavahini. The results indicated that majority of the farmers (65.00%), traders (60.00%) and commission agents (50.00%) had medium level of perception about e-tendering system in Arecanut. The factors influencing the perception of farmers about e-tendering system were Market conduct, Operationalisation, Time saving, Transparency and Competition. The Arecanut prices in Shivamogga and Bheemasamudra APMCs increased by Rs. 2020.18 and Rs. 6332.55 per quintal, respectively because of e-tendering system in comparison to the control market. Significant positive social impact was observed in credit orientation, public recognition, organizational participation and self-sufficiency of the farmers. The quantity of Arecanut traded by a farmer increased by 23.15 per cent and 25.02 per cent along with 44.16 per cent and 44.55 per cent increment in the income per quintal of Arecanut in Shivamogga and Bheemasamudra APMC, respectively. The time taken for bid announcement reduced by 35.34 per cent in Shivamogga and 35.90 per cent in Bheemasamudra APMC. Frequent price fluctuation was the major constraint confronted by the farmers and difficulty in rectifying the mistakes after quoting the price was the major issue for traders and commission agents. Majority of the farmers insisted on creating awareness about the operational aspects of e-tendering system, whereas traders demanded a provision to rectify mistakes after quoting the price. Results from this study could provide policy makers with key insights to strengthen the Karnataka model of agricultural marketing.

October, 2020

(Sahana, S.)
Major Advisor

6. Knowledge Management Behaviour of Vegetable Growers in Chikkamagaluru District

(CHETHANA, A. T.)

ABSTRACT

The study was conducted during the year 2019-20 in Chikkamagaluru district of Karnataka state with a sample size of 120 respondents. Simple random sampling procedure was used to select the respondents. The data was collected with the structured interview schedule. The results indicated that majority of the respondents belonged to the medium category of knowledge management (63.33 %), in case of Knowledge acquisition (61.67 %) of the respondents belonged to medium category. Whereas, interpersonal source were the major sources of knowledge management for the major chunk of the respondents, followed by More than half of the respondents belonged to medium Knowledge retention, 44.17 per cent of respondents belonged to medium Knowledge retrieving, majority (68.33 %) of the respondents belonged to medium Knowledge evaluationand 69.16 per centof the respondents belonged to medium Knowledge Dissemination category.The socio economic profile of the vegetable growers revealed that, majority of the respondents belonged to middle age group (54.17 %), primary school education (25.83 %), small land holding (45.00%) and medium annual income (86.67 %). Whereas, majority of the respondents had medium extension participation (57.50 %), medium extension contact (69.17 %), medium mass media utilization (68.00 %), medium social participation (75.50 %), medium cosmopoliteness (68.33 %), medium innovativeness (57.50 %), medium risk orientation (61.67 %) and medium management orientation (56.67 %). The variables like education, extension contact and innovativeness showed positive and significant association at 1 % level of probability. Whereas, farming experience, extension participation and Mass media participation showed positive and significant association at 5 % level of probability with knowledge management. The majority of the respondents had expressed constraint on lack of availability of farm publications in the local (58.33 %). More than half of the respondents (65.00 %) gave suggestions to Increase development department and extension agents at the local level.

November, 2020

(Krishnamurthy, A. T.)
Major Advisor

7. A Study on Knowledge and Adoption of Betel vine (*Piper betel*) Cultivation Practices Followed by the Farmers of Davanagere District of Karnataka

(SUBHASH, V.)

ABSTRACT

The study was conducted in Harihara and HonnaliTaluks of Davanagere District in 2019-20. Eight villages have been selected from two taluks,four villages from each taluk. From each village 15 betel vine farmers were randomly selected. Thus, the total sample was 120 respondents. The study indicated that majority of the respondents had medium (76.67 %) level of knowledge. In case of adoption 65.00 per cent of the respondents belong to medium level of adoption category. Majority of the respondents were middle-aged (47.50 %), and educated up to high school level (40.83 %). Majority of the respondents belong to small farmers category (42.50 %), whereas 67.50 per cent of the respondents are having medium level of farming experience in betel vine cultivation. Majority of the respondents belong to medium (76.67 %) level of annual income category, whereas 68.33 per cent of the respondents are having medium level of the extension contact, Mass media participation (60.83 %), and Information-seeking behaviour (63.33 %). Majority of the respondents are belong to medium level of the Innovativeness (60.00 %), Risk-orientation (70.83 %). Non-availability of the skilled labour (77.50 %), High cost of inputs (75.00 %), lack of technical guidance (56.66 %) and lack of capital (52.50 %) were the major constraints faced by the respondents. Hence the Agricultural Universities, state Horticulture Department and KVKs should provide required training to the farmers and demonstrate the new technologies, organizing the Exhibitions, field days in the villages to increase the level of knowledge of the farmers and to make them adopt the important practices in the betel vine cultivation.

November, 2020

(Basavaraj Beerannavar)
Major Advisor

8. Impact Analysis of Private Advisory Services about Backward and Forward Linkages in Horticultural Crops

(PRIYANKA, R.C.)

ABSTRACT

The study was conducted in the year 2019-20 in Chitradurga district of Karnataka state. Total sample size of 120 farmers taking Private Advisory Services (PAS) were selected as respondents by using Simple random sampling procedure. The study was aims to understand impact of PAS given by the private agencies in backward and forward linkages about horticultural crops. Result indicates that majority of the farmers (72.50%) expressed favorable attitude followed by 15.83 and 11.67 per cent expressed less and more favorable attitude towards backward and forward linkage services received by Private Advisory Service Agencies (PASA). The deviation was observed before and after obtaining advisory services by respondents with respect to practices like selection of appropriate PPCs (64.17%), herbicide application (62.50%) and appropriate methods followed for pest and disease management (57.50%). “Availability of good information and management practices” was a major strength of PASA as expressed by 93.33 per cent of the respondents. “Farmers will get inputs from only specified companies" (68.33%) were said as weaknesses of PASA. “PASA make integration of farmers to grow innovative crops” was a major opportunity expressed by (73.33%) of the respondents. 85.00 per cent of the respondents expressed that “The freedom of farmers is very limited in the selection of inputs and other services” as threat of PAS. Farmers adopted recommended practices given by PASA in both backward and forward linkages. The farmers need to be oriented towards cost-effective production technologies for better returns.

December, 2020

(Amaresh Kumar, K.)
Major Advisor

Agronomy

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Agronomy

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1. Weed Management in Direct Seeded Rice (Oryza Sativa L.) under Bhadra Command Area of Karnataka

(ABHISHEK GOWDA, C. S.)

ABSTRACT

A field experiment entitled "Weed Management in Direct Seeded Rice (Oryza sativa L.) under bhadra command area of Karnataka" was conducted during kharif 2018 in Agricultural and Horticultural Research Station, Kathalagere with twelve treatments combination viz., inter cultivation, pre-emergent (pre em.) herbicides viz., pretilachlor 30.7 EC, pendimethalin 38.7 CS, oxadiargyl 80% WP and post-emergent (Post em.,) herbicides viz, bispyribac sodium 10% SC, chlorimuron ethyl + metsulfuron methyl 20 WP and Ethoxysulfuron 15 WDG.Four hand weeding practices at 15 days interval and weedy check were included and the experiment was laid out in RCBD with three replication.The predominant weed flora observed in the experimental site were Grasses like Echinocloacrusgalli, Echinochloacolonum,Digitariasanguinalis, Sedges likeCyperusrotundus, Cyperusiria,and broad leaf weeds likeDigera arvensis, Physallis minima.The experimental results revealed thatInter cultivation fb Hand weeding at 20 and 40 DAS recorded lower weed population, weed dry weight, weed index (1.81) and higher weed control efficiency (76.89 to 89.29 %). The same treatment combination recorded higher growth and growth attributes. Higher grain yield (5212 kg ha-1), straw yield (5928 kg ha-1) and major nutrients uptake by crop also recorded in above mentioned treatment. These results are on par with inter-cultivation at 20 DAS fbbispyribac sodium10 % SC @ 20 g a.i ha-1. Among herbicide combination treatments, pendimethalin 38.7 CS @0.75 kg a.i ha-1(Pre. em.) fbbispyribac sodium 10% SC @ 20 g a.i ha-1(Post. em.) recorded higher growth and yield attributes without being phytotoxic to the crop.The maximum B:C ratio (2.82) was achieved in treatment Pretilachlor 30.7 EC @ 0.3 kga.i ha-1 with safener (Pre. em.) fb inter-cultivation at 40 DAS. Theirwas no residual effect of herbicides on soil microbial population and succeeding crop.

September, 2019 (Kumara, O.)

Major Advisor

2. Performance of Soybean (*Glycine max* L.) Varieties under Different Sowing Dates in Southern Transition Zone of Karnataka

(BASAVARAJ B. R)

ABSTRACT

A field experiment was conducted at Agricultural and Horticultural Research Station, Bavikere, UAHS, Shivamogga to study the Performance of Soybean (*Glycine max* L.) varieties under different sowing dates in Southern Transition Zone of Karnataka under rainfed condition during *Kharif* 2019. The experiment was laid out in Factorial Randomized Block Design with three replications. There were 12 treatment combinations comprised of four sowing dates under different fortnight intervals (June II fortnight, July I fortnight, July Ii fortnight and August I fortnight and three varieties (DSb-21, JS-335 and JS-93-05).

Among the different dates of sowing crop sown during June II fortnight recorded significantly taller plants (56.86 cm), number of leaves (45.80), leaf area (524.44 cm^2 $plant^{-1}$), total dry matte accumulation (32.25 g $plant^{-1}$), number of pods per plant (29.33), number of seeds per pod (3.01), grain yield (3158 kg ha^{-1}), haulm yield (3817 kg ha^{-1}), protein content (41.30 %), oil content (20.29 %), nitrogen uptake (163.37 kg ha^{-1}), phosphorus uptake (22.03 kg ha^{-1}) and potassium uptake (57.22 kg ha^{-1}). Among the varieties, DSb-21 recorded significantly taller plants (47.72 cm), number of leaves (37.32), leaf area (469.17 cm^2 $plant^{-1}$), total dry matter accumulation (22.95 g $plant^{-1}$), number of pods per plant (24.07), number of seeds per pod (2.60), grain yield (3034 kg ha^{-1}), haulm yield (3627 kg ha), protein content (40.13 %), oil content (20.27 %), nitrogen uptake (145.63 kg ha^{-1}), phosphorus uptake (18.29 kg ha^{-1}) and potassium uptake (49.39 kg ha^{-1}). Hence, for achieving higher yield in soybean the best sowing date found to be June II fortnight for DSb-21 variety.

August, 2020

(Sunil C.)

Major Advisor

3. Influence of Water Soluble Fertilizers and Liquid Plant Growth Promoting Rhizomicrobial Consortia on Black Gram (*Vigna mungo* L.) under Rainfed Condition in Southern Transition Zone of Karnataka

(CHETHAN BABU, R. T.)

ABSTRACT

A field experiment was carried out during *Kharif* 2019 at College of Agriculture, University of Agricultural and Horticultural Sciences, Shivamogga, to study the influence of watersoluble fertilizers and liquid plant growthpromoting rhizomicrobial consortia on blackgram (*Vigna mungo* L.) under rainfed condition in Southern Transition Zone of Karnataka. Experimental design adopted was RCBD with three replications and thirteen treatments consisting of different combinations ofwater soluble fertilizers *viz.*, 19:19:19 (N: P: K) and Mono potassium phosphate (0:52:34) sprayed at 30 and 45 days after sowing with or without liquid plant growth promoting rhizomicrobial consortia application along with the package of practice.The results revealed that,foliar application of 19:19:19 (N: P: K) and Mono potassium phosphate (0:52:34) @ 1 per cent eachat 30 and 45 days after sowing +PGPRalong with a package of practice recorded significantly higher plant height (67.16 cm), number of branches plant^{-1} (10.63), number of leaves plant^{-1}(16.95), leaf area (5.57 dm^2 plant^{-1}), total dry matter production (15.84 g plant^{-1}), number of pods plant^{-1}(25.20), pod length (6.92 cm), number of seeds pod^{-1} (6.53), seed yield (1167 kg ha^{-1}), haulm yield (2019 kg ha^{-1}). The above combination of treatment recorded significant improvement in nutrient uptake of nitrogen (69.49 kg ha^{-1}), phosphorus (9.26 kg ha^{-1}) and potassium (64.08 kg ha^{-1}) in the crop at harvest and also higher N-fixers population (53.73, 57.31 and 47.02), P-solubilizing bacteria population (35.25, 40.32 and 35.58) andK-solubilizing bacteria population (25.03, 31.18 and 26.30) × 10^{5}CFU g^{-1} of soil at 30, 60 DAS and at harvest, respectively. Further, the same treatment exhibitedhigher B: C (2.42) over a package of practice alone.

September, 2020 (Narayana S. Mavarkar)

Major Advisor

4. Effect of Nano-zinc and Silicon on Performance of Wet Land Paddy (*Oryza sativa* L.)

(SOUMYA K)

ABSTRACT

A field experiment entitled "Effect of nano zinc and silicon on performance of wet land paddy (*Oryza sativa* L.)" has been conducted in *Kharif* during the year 2019-20 at Agricultural and Horticultural Research Station, Bavikere, UAHS, Shivamogga to see the effect of nano zinc and silicon on yield, quality and economics of rice. The experiment consisted 12 treatments viz., seed treatment and foliar application of nano zinc and nano silicon either alone or in combination (T_1-T_6), foliar application of EDTA $ZnSO_4$ (0.5%) at 40 DAT (T_7), foliar application of potassium silicate (0.5%) at 40 DAT (T_8), foliar application of EDTA $ZnSO_4$ (0.5%) at 40 DAT + Potassium silicate (0.5%) at 40 DAT (T_9), soil application of $ZnSO_4$ @ 25 kg ha $^{-1}$ (T_{10}), rice hull ash @ 2 t ha $^{-1}$ + RDF (T_{11}) and control (T_{12}) replicated thrice was laid out in completely randomized block design. Applicationof both zinc and silicon (T_6) in nano form as foliar @ 40ppm each at 40 DAT registered significantly higherproductive tillers (18.72 hill^{-1}), panicle length (27.6 cm), grain yield hill^{-1}(123.63 g), filled grains hill^{-1} (100.5), test weight (24.82 g), grain yield (6034 kg ha^{-1})and straw yield (6693 kg ha^{-1}) closely followed by foliar application of nano zincalone @ 40 ppm at 40 DAT (5720 kg ha^{-1}). The yield improvement in these two treatments was to an extent of 41 and 33.83 per cent over control (T_{12}) respectively. Numerically high protein (9.66%) and starch (75.7%) content was also noticed with treatment T_6. Further, higher net return (Rs. 98631 ha^{-1}) and B:C (2.5) also realized with treatment T_6.

September, 2020

(G. K. Girijesh)

Major Advisor

5. Quality and Yield of Tomato as Influenced by Elevated CO2 and Temperature Levels

(TEJASWINI, C. R.)

ABSTRACT

The field experiment was conducted at Centre for Climate Resilient Agriculture (CCRA), UAHS, Navile, Shivamogga during *Kharif* 2019, to study the quality and yield of tomato as influenced by elevated CO_2 and temperature levels. The experiment was laid out in Randomized Complete Block Design with seven treatments replicated thrice. The treatments consisted of elevated CO_2 (700 ppm and 550 ppm) and elevated temperature (+2℃) alone and their combinations along with open field and ambient CO_2+ambient temperature (at OTC). Elevated CO_2 (700 ppm) recorded significantly higher fruit yield (541.12 q/ha) as compared to the open field (445.68 q/ha). Higher fruit yield was mainly attributed to higher plant height(155.07 cm), number of leaves (158.67), canopy spread (6127 cm^2), leaf area (9110.68 cm^2), leaf area index (1.12), total dry matter production (223.0 g/plant), number of flowers (273.80) and fruits per plant (261.13). Significantly higher total chlorophyll content (2.40 mg g^{-1} fresh weight), CSI (80.69%) and radiation interception (479.41MJ m^{-2}) were also recorded with the same treatment. With respect to fruit parameters, maximum fruit length (61.58 mm), girth (52.33 mm), firmness (3.36 kg/cm^2), geometric mean diameter (55.22 mm) and fruit weight (90.46 g) was recorded in elevated CO_2(700 ppm). Among quality parameters, TSS (3.67°Brix), total sugars (4.41%), titratable acidity (0.27%), ascorbic acid (18.88 mg/100g) were higher under elevated CO_2(700 ppm). However, elevated CO_2 (550 ppm) has registered the highest lycopene (9.36 mg/100g) and carotenoid content (14.53 µg/g). Maximum keeping quality of 25.60 days was recorded in fruits of tomato crop grown under elevated CO_2 (700 ppm). At harvest, significantly higher uptake of nitrogen (60.28 and 25.44 kg/ha), phosphorous (6.14 and 20.82 kg/ha) and potassium (19.65 and 67.07 kg/ha) by tomato leaf and stem respectively, was observed with elevated CO_2(700 ppm) as compared to other treatments.

September, 2020

(S.Sridhara)
Major Advisor

6. Effect of Granulated Lime and Bio-Inoculants on the Productivity of French Bean (*Phaseolus vulgaris* L.) under the Hilly Zone of Karnataka

(VIGNESH)

ABSTRACT

A field experiment was conducted at College of Horticulture, Mudigere, Chikamagalur district, Karnataka to investigate the effect of granulated lime and bio-inoculants on the productivity of French bean (*Phaseolus vulgaris* L.) under the HillyZone of Karnataka during late *rabi* season 2019-20. The experiment was laid out in Randomized Complete Block Design with nine treatments replicated thrice. The treatment details are as follows- T_1- 100% RDF + FYM, T_2-100% RDF + FYM + agriculture lime@ 100% LR, T_3-100% RDF + FYM + agriculture lime@ 100% LR + bio-inoculants, T_4-100% RDF + FYM + granulated lime@ 100% LR, T_5-100% RDF + FYM + granulated lime@ 75% LR, T_6-100% RDF + FYM + granulated lime@ 50% LR, T_7-100% RDF + FYM + granulated lime@ 100% LR + bio-inoculants, T_8-100% RDF + FYM + granulated lime@ 75% LR + bio-inoculants, T_9-100% RDF + FYM + granulated lime@ 50% LR + bio-inoculants. The results revealed that significantly higher plant height (51.1 cm), number of branches per plant (6.88), number of leaves per plant (26.42), SPAD readings (49.64) and dry matter accumulation per plant (19.34 g),number of pods per plant (21.43), pod length (15.67), pod weight per plant (177.17 g), green pod yield (12.93 tha^{-1}) and stover yield (2.93 tha^{-1}),total uptake of NPK (41.13, 15.37 and 38.13 kg ha^{-1}, respectively), gross and net returns (`336266.70 and 190883.40 ha^{-1}) and B: C ratio (2.31) were recorded due to the application of 100% RDF + FYM + granulated lime@ 100% LR + bio-inoculants (T_7)compared to the application of 100% RDF + FYM (T_1). It can be concluded that granulated lime can be used as an alternate sourceto agriculture lime to enhance the crop productivity and improve soil health.

September, 2020
(M.Hanumanthappa)

Major Advisor

7. Effect of Different Levels of Jeevamrutha and Ghanajeevamrutha on Yield and Quality of *Rainfed* Groundnut

(DEEPA A GORABAL)

ABSTRACT

Field experiment entitled "Effect of different levels of jeevamrutha and ghana0jeevamrutha on yield and quality of *rainfed* groundnut" was conducted during *Kharif* 2019 at College of Agriculture, UAHS Shivamogga. The experiment was laid out in Randomized Complete Block Design with three replications and ten treatments *viz.*, sole application of ghana0jeevamrutha @ 1000 and 1250 kg ha^{-1} (T_1 and T_2), sole application of jeevamrutha @ 2000 and 3000 l ha^{-1} (T_3 and T_4), combined application of ghana0jeevamrutha @ 10000and01250 kg ha^{-1} with same level of jeevamrutha @ 2000 l ha^{-1} (T_5 and T_6), combined application of ghana0jeevamrutha @ 1000 and 1250 kg ha^{-1} with same level of jeevamrutha @ 3000 l ha^{-1} (T_7 and T_8), recommended RDF + FYM (T_9) and absolute control (T_{10}). Ghana0jeevamrutha in the respective treatments was applied to the soil at the time of sowing and jeevamrutha in the respective treatments was applied through four equal splits at sowing, 30, 60 and 90 DAS. Research results indicated that integrated use of organic (FYM @ 7.5 t ha^{-1}) and inorganic fertilizers (25:50:25 NPK kg ha^{-1}+ $ZnSO_4$ 10 kg ha^{-1} + borax 10 kg ha^{-1}+ gypsum 500 kg ha^{-1}) has registered significant improvement in pod yield (1635 kg ha^{-1}), haulm yield (2650 kg ha^{-1}), nutrient0uptake (NPK-77.95, 14.55 and 68.17 kg ha^{-1}, respectively) andnet returns (Rs. 36,796 ha^{-1}). Among the different levels of ghanajeevamrutha and jeevamrutha either alone or in combination, combined application of ghana0jeevamrutha @ 1250 kg ha^{-1}andjeevamrutha @ 3000 l ha^{-1} throughfour equal splits was equally0effective as compared to application of nutrients through RDF and FYM by recording statistically on0par results with respect to pod yield (1625kg ha^{-1}), haulm yield (2545 kgha^{-1}), net returns (Rs. 37,508 ha^{-1}) and B:C (1.77) besides, recording significant increase inmicrobial population0and0enzymatic activity.

October, 2020

(H. K. Veeranna)
Major Advisor

8. Influence of Integrated Nutrient Management Practices on Growth and Yield of Finger millet (*Eleusine coracana* (L.) Gaertn.) Genotypes under *Rainfed* Condition in Southern Transition Zone of Karnataka

(SUMITHRA, B.S.)

ABSTRACT

A field experiment was conducted during *Kharif* 2019 at Agricultural and Horticultural research station (AHRS), Bavikere, UAHS, Shivamogga to study the Influence of integrated nutrient management practices on growth and yield of Finger millet (*Eleusine coracana* (L.) Gaertn.) genotypes under *rainfed* condition in Southern Transition Zone of Karnataka. The experiment was laid out in a randomized block design with factorial concept having 15 treatment combinations replicated thrice. Treatments comprised of three different genotypes and five integrated nutrient management practices.

Among genotypes, GPU-28 has recorded significantly taller plants (144.00 cm), higher number of tillers (3.87 plant^{-1}), leaf area (1344.81 cm^2 plant^{-1}), dry matter production (47.67 g plant^{-1}) and grain yield (39.29 q ha^{-1}). Among integrated nutrient management practices application of 100 per cent recommended NPK +Vermicompostat 7.5 t ha^{-1}+ PGPR at 625 ml ha^{-1}has recorded significantly taller plants (149.50 cm), high leaf area (1490.89 cm^2 plant^{-1}), total dry matter production (53.11 g plant^{-1}), grain yield (45.83 q ha^{-1}) and straw yield (67.71 q ha^{-1}). It has registered 27 and 14 per cent higher grain and straw yield over 100 per cent recommended NPK + FYM at 7.5 t ha^{-1}. It also recorded higher uptake of NPK, nutrient use and agronomic use efficiency, higher soil available nitrogen (257.11 kg ha^{-1}), phosphorous (58.33 kg ha^{-1}) and potassium (185.89 kg ha^{-1}). Similarly, higher gross (1,50,707 ha^{-1}) and net returns (87,033 ha^{-1}) were recorded in the same treatment. While the B: C (1.64) was found highest with the 100 per cent recommended NPK + FYM at 7.5 t ha^{-1} + PGPR at 625 ml ha^{-1}. Among the interactions application of 100 per cent recommended NPK + Vermicompost at 7.5 t ha^{-1}+ PGPR at 625 ml ha^{-1} has recorded higher plant height (156.00 cm), dry matter production(54.33 g plant^{-1}), grain yield(49.67 q ha^{-1}) and net returns (98,666 ha^{-1}). Hence, in GPU-28 application of 100 per cent recommended NPK +Vermicompost at 7.5 t ha^{-1}+ PGPR at 625 ml ha^{-1} has resulted in achieving higher growth and yield.

October, 2020

(C. J. Sridhara)
Major Advisor

9. Evaluation of Pre and Post Emergent Herbicides for Control of Weeds in *Kharif* Groundnut (*Arachis hypogaea L.*)

(VENKATESHWARA, R.)

ABSTRACT

An investigation was carried out underthe All India Co-ordinated Research Project (AICRP) on Groundnut atZonal Agricultural and Horticultural Research Station, Babbur Farm, Hiriyur during *kharif* 2019to Evaluate Pre and Post Emergent Herbicides for control of weeds in *Kharif* Groundnut (*Arachis hypogaea* L.)on clayey soil. The experiment consisted of nine treatments with three replications was laid out in Randomized Complete Block Design. The treatment consists of different pre and post emergent herbicide followed by manual weeding and intercultural operations. The treatment which received combination of Pendimethalin 30% EC + Imazethapyr 2 % EC @ 1.0 kg ha^{-1} PE (ready mix) + manual weeding at 30 DASrecordedsignificantly higher pod yield (2,897 kg ha^{-1}), net returns (`78,732 $ha^{-1}$), benefit-cost ratio (2.42), lower total number of weeds(7.71$m^{-2}$ at harvest) and total weed dry weight (4.65 g $m^{-2}$at harvest)over the treatment with application of Pendimethalin 38.7 % CS @ 1.0 kg $ha^{-1}$ PEalone, whichrecorded (2,254kg $ha^{-1}$, `52,168 ha^{-1}, 2.00,11.25$m^{-2}$and 7.10 g m^{-2} at harvest, respectively). The results of the study showedthe combination of pre-emergent spray followed byone manual weeding is effective in weed management coupled with higher productivity of groundnut compared to sole application of Pendimethalin 38.7 % CS @ 1.0 kg ha^{-1} PE and Weedy check.

October, 2020

(Kumar Naik, A. H.)

Major Advisor

10. Evaluation of Different Fodder Cowpea (*Vigna unguiculata* (L.) Walp.) Genotypes as an Intercrop in Hybrid Napier (*Pennisetum americanum* (L.) Leek × *Pennisetum purpureum* (L.) Schumach) for Higher Fodder Biomass and Nutritive Value under Different Planting Patterns

(SUSHMA, H. A.)

ABSTRACT

A field experiment on evaluation of different fodder cowpea genotypes as an intercrop in bajranapierhybrid for higher fodder biomass and nutritive value under different planting patterns was conducted during *kharif*, 2019. It was laid out in a randomized complete block design with thirteen treatments and replicated thrice. For the above study three different bajranapierhybrid cultivars *i.e*., Dharwad Hybrid Napier-6, CO-5, Taiwan Super Napier-1 and three fodder cowpea genotypes*i.e*., local cultivar, MFC-09-1 and MFC-08-14 were used. Bajranapierhybrid cultivars grown as sole crop tested against intercrop of fodder cowpea genotypes under normal spacing with an additional two rows and under paired row system with an additional three rows. Among different treatment combinations,performance of cultivar Taiwan Super Napier-1 with fodder cowpea genotype MFC-08-14 recorded higher plant height (373 cm), number of tillers clump^{-1} (73.67), number of leaves plant^{-1} (434.67), green fodder yield (321.21 t ha^{-1}), dry fodder yield (66.09 t ha^{-1}) and per plant yield (17.35 kg plant^{-1}) and found significantly superior over cultivars CO-5 and Dharwad Hybrid Napier-6 under paired row system. It also showed non-significant increase in quality parameters by registering higher crude protein (8.33 %) and total ash content (6.85 %), lower crude fibre (23.50 %), crude fat (1.55 %), acid detergent fibre(34.50 %), neutral detergent fibre (53.11 %) and organic matter content (93.15 %) during fifth cut and it also recorded higher gross returns (Rs. 187645 ha^{-1}), net returns (Rs. 106294 ha^{-1}), crop equivalent yield (375.29 t ha^{-1}) and B:C (1.31).

November, 2020

(M.Dinesh Kumar)
Major Advisor

Genetics and Plant Breeding

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Genetics and Plant Breeding

1. A Study of Genetic and Nutritional Parameters in Traditional Red Rice Genotypes

(KAVYA, M. E.)

ABSTRACT

The current investigation was carried out during *Kharif* 2019 at Zonal Agricultural and Horticultural Research Station, Shivamogga using Randomised Complete Block Design with an objective of evaluating 30 red rice genotypes comprised of 26 landraces and four varietal checks.Out of 23 characters studied following DUS guidelines, four characters were monomorphic, ten traits were dimorphic and nine traits were polymorphic. Analysis of variance revealed the presence of significant variability in yield, yield related traits and quality parameters.Genetic variability parameters like GCV, PCV, h^2(bs)and genetic advance as *per cent* of mean were high for number of tillers *per* plant, number of productive tillers *per* plant, grain yield *per* plant, ash content, fat content, fibre content, iron content and water uptake ratio. Correlation analysis showed significant and positive association of grain yield *per* plant with plant height, panicle length, number of grains *per* panicle, number of filled grains *per* panicle and protein content. The traits *viz.*, number of filled grains *per* panicle, days to fifty *per cent* flowering, number of productive tillers *per* plant, plant height and test weight exhibited direct positive effect on grain yield as estimated through path coefficient analysis. Using Mahalanobis' D^2 analysis genotypes were grouped into four divergent clusters. Cluster III and cluster IV possessed maximum inter cluster distance between them. Out of ten SSR markers used for molecular diversity analysis, five were polymorphic in nature and the genotypes were clustered into 18 distinct clusters.Genotype Krishnaleela was superior for three quality traits fat (4.12g/100g), zinc (44.80ppm) and energy content (376.08 Kcal). Sambamousam was superior for two quality traits *viz.*, fibre content (3.38 g/100g) and iron content (122.72 ppm). Therefore, the genotypes superior for respective traits can be utilized in hybridization program to get desirable transgressive segregants for specific quality traits.

September, 2020

(Dushyantha kumar, B. M.
Major Advisor

2. Diallel Analysis of Yield and Yield-related Traits in Cherry Tomato (*Solanum lycopersicum* L. var. *Cerasiforme*)

(CHANDRASHEKAR, C.)

ABSTRACT

The enumeration of nature of gene action, percentage of heterosis, combining ability and association of characters with yield and its related traits for 20 hybrids generated by execution of a 5 × 5 diallel analysis in cherry tomato was carried out during *Kharif* 2019 and *rabi*2019 at ZAHRS, CoA, Shivamogga. Ample amount of variability pertaining to the material under study was specified by analysis of variance for fifteen measurable traits. Heterosis was assessed for yield and its contributing parameters wherein crosses 2 × 4, 5 × 2, 5 × 4, 2 × 5 and 4 × 5 exceeded commercial check Swarnaratan for yield plant^{-1}. Combining ability analysis was ascertained in cherry tomato for yield and its conferring traits. Much significant variances recorded for general and specific combining abilities stressing the preponderance of additive and non-additive gene action. Hybrids and parents varied significantly for most of the traits. The importance of non-additive gene action was obvious from the ratio of GCA: SCA variance suggesting the betterment of most of the traits *via*heterosis breeding. Critical analysis on combining ability specified that parents EC-211582, Red cherry and Tomato GD were utmost combiners for fruit yield^{-1} over the others. The topmost significant sca effects on yield of fruit were uncovered by the crosses 2 × 5, 2 × 4, 4 × 2, 4 × 5 and 4 × 1. Much of the traits under study depicted significantly positive correlation with the yield of fruit as notified from correlation studies. Path analysis projected that topmost direct effects were exerted by fruit length, mean weight of fruit and cluster number plant^{-1}. The specified hybrids help materialize the goal of achieving high yields.

October, 2020 (H. D. MohanKumar)

Major Advisor

3. Evaluation of Minicore Collection for Growth, Yield and Late Leaf Spot *vis-a-vis* Validation of DNA Markers Linked to Late Leaf Spot Resistance in Groundnut (*Arachis hypogaea* L.)

(HIREMATADA GANGADHAR)

ABSTRACT

Groundnut being a leading oil seed crop is challenged by various biotic and abiotic constraints towards yield. Among them, foliar diseases such as late leaf spot and rust diminishes its yield to agreater extent. In this context, the present investigation was carried out utilizing minicore and other advanced breeding lines to assess genetic variability, diversity and association among growth, yield, yield attributing traits and late leaf spot disease. Experiment was laid down in an augmented design during *kharif* 2019 at ZAHRS, Hiriyur. Most of the studied traits except days to 50% flowering, days to physiological maturity and shelling percentage displayed higher PCV, GCV, heritability and genetic advance as *per cent* of mean. Traits such as kernel yieldperplant, number of immature podsperplant, plant height, test weight, number of primary branchesperplant, number of mature podsperplant and haulm yieldperplant were positively and significantly correlated with pod yieldperplant. Kernel yieldperplant had the highest positive direct effect with pod yieldperplant.Euclidian Cluster analysis based on k-*means* method grouped 260 genotypes into ten clusters.Maximum inter cluster distance was found between clusters II and IV followed by clusters IV and X and, clusters II and VIII. The highest contribution towards total divergence was from late leaf spot. Genotypes ICG 5827 and ICG 12625 found to be high yielding along with moderate disease resistance. Based on field disease scores genotypes, ICG 76, ICG 11426, ICG 7153, ICGV15114, LOCAL-1, GPBD-4, VB-T4, KCG-6 and SB-T1 were grouped as late leaf spot resistant. Validation of SSR markers *viz*., PM 384 and PM 375 revealed their association with late leaf spot resistance and could be utilized as efficient tools in marker assisted selection for the identification of resistant genotypes.

October, 2020

(Harish Babu B.N.)
Major Advisor

4. Assessment of Genetic Variability and Diversity of Rice Genotypes under Direct Seeded Condition

(KARUMANCHI PUSHPA)

ABSTRACT

The present investigation was carried out to assess variability, correlation and diversity of rice genotypes under direct seeded condition at Zonal Agricultural and Horticultural Research Station, Kathalagere. Twenty four rice genotypes including three checks *viz.*,JGL-1798, BPT-5204 and KKP-5 constituted the experiment material and were sown in Randomized Complete Block Design during *Kharif* 2019 with three replications. Analysis of variance revealed significant differences among all the genotypes for all the characters studied. High GCV and PCV coupled with high heritability and high genetic advance as *per cent* mean was observed for the traits *viz.*,root volume, root length and number of productive tillers *per* plant. Correlation studies revealed that characters *viz.*,number of tillers *per* plant, number of productive tillers *per* plant,number of filled grains *per* panicle, number of spikelets *per* panicle, root volume and test weight showed significant positive correlation with grain yield. Path coefficient analysis revealed that characters like days to 50 *per cent* flowering, panicle length,number ofproductive tillers *per* plant, number of filled grains *per* panicle, root volume andtest weight had positive and direct effect on0grainyield. Mahalanobis'D^2statistic grouped the genotypes into five clusters, the maximum intercluster distance was found between the cluster IV and cluster V. Assessment of molecular diversity using ten SSR markers across twenty four rice genotypes revealed that four markers were monomorphic and six markers were polymorphic and genotypes were grouped into five clusters. Genotypes from the crosses KPR-2 × IS 9-2-2-2, J × B Fine (red) and IET SANNA × HYD-3recorded higher yield under direct seeded condition and were found to be superior for most of the characters studied.

October, 2020

(C. Malleshappa)
Major Advisor

5. Assessment of Genetic Variability and Stability Parameters in Advanced Breeding Lines of Rice (*Oryza sativa*. L) under Irrigated Conditions of Command Area

(MAHAMADALI MUGUTASAB GULLADKOPP)

ABSTRACT

The present experiment was conducted to evaluate 29 advanced breeding lines of rice including three checks in Randomized Complete Block Design with two replications during *Kharif* 2019 across three locations *viz.*, ZAHRS, Shivamogga, AHRS, Honnavile and AHRS, Bavikere for variability, correlation, path, stability and molecular diversity analysis for yield and its attributing traits.For all the characters studied, ANOVA reported significant differences among all the advanced breeding lines. The traits *viz.*, number of spikelets *per* panicle and number of filled grains *per* panicle recorded high PCV and GCV values, while plant height, test weight, L/B ratio and grain yield reported moderate PCV and GCV. High heritability coupled with high genetic advance as *per cent* of mean recorded in traits *viz.*, number of filled grains *per* panicle, number of spikelets *per* panicle, test weight, L/B ratio and grain yield. The characters such as number of tillers *per* plant, number of productive tillers *per* plant, panicle length, number of spikelets *per* panicle, number of filled grains *per* panicle, panicle fertility, test weight and L/B ratio had a positive significant correlation with grain yield. Out of 12 traits, six traits*viz.*, days to 50 *per cent* flowering, number of tillers *per* plant, panicle length, number of spikelets *per* panicle and L/B ratio had a positive and direct effect on grain yield.J × B-FINE (RED) and KMLT × MM-4-3-1-1 for ZAHRS, Shivamogga, JGL × KPR2-7-2-3-1-1-1 and KMLT × KPR2-2-8-2-1-1-2-3 for AHRS, Honnavile and AHRS, Bavikere are identified as stable lineswith respect to grain yieldfor specific locations concerned. JGL × KPR2-2-6-5-2, JGL × KPR2-2-6-5-2 and CSR-79 are identified as stable lines across the three locations. Molecular diversity study using ten SSR markers revealed the existence of high molecular diversity between the breeding lines and grouped them into seven clusters.

October, 2020

(Dushyantha kumar B. M.)

Major Advisor

6. Genetic Variability Studies in Cowpea [*Vigna unguiculata* (L.) Walp.] Germplasm

(NAVEEN KUMAR, G.)

ABSTRACT

A field experiment was carried in two seasons *viz. Kharif* 2019 and *Summer* 2020 at ZAHRS, Shivamogga, to determine the genetic parameters among 200 cowpea genotypes. Significant variations in germplasm were documented for most traits during both seasons through analysis of variance, indicating the vast genetic variability. High phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), broad-sense heritability (h^2_{bs}) and genetic advance as *per cent* of mean (GAM) were documented for the traits, seed yield per plant, plant height, number of pods per plant, hundred seed weight and pod length in both seasons specifying that the improvement of these traits could be achieved through selection. From correlation studies, seed yield was found to have a positive association with most of the traits studied and a more positive direct effect on seed yield was exerted by biological yield as documented by path analysis. Diversity analysis using Mahalanobis' D^2 statistics classified the genotypes into nine clusters, where seed yield per plant have contributed largely to the genetic divergence, cluster IV had noticed greater intra-cluster distance whereas, the greater inter-cluster distance was documented between clusters IV and VIII, signifying that the crossing of the genotypes belonging to these clusters will produce superior segregants. Crude protein content estimation in seed samples of the genotypes reported that NBC-48 had the highest (30.03%) crude protein content; in contrast, the genotype EC-458419 had low (13.97%) crude protein content with the mean of 23.24% among the genotypes. In the potential breeding program, choosing the genotypes considering all these parameters would be useful to achieve fruitful results.

October, 2020 (H. D. Mohan Kumar)

Major Advisor

7. Assessment of Genetic Variability in Stabilized Tomato (*Lycopersicon esculentum* L.) Breeding Lines of RED BALL × ARKA VIKAS

(ROJA, M. A.)

ABSTRACT

The present investigation in tomato (S*olanum lycopersicon* L.) was undertaken during *kharif* 2019 at Zonal Agricultural Horticultural Research Station, Navile, UAHS, Shivamogga, to study genetic variability parameters, correlation, path analysis and identification of transgressivesegregants with respect to yield and its related traits in F_3 population of cross, Red Ball (shelf life) × ArkaVikas (high yield). The distribution pattern indicated large number of genes with dominace based complementary interactions in the inheritance of TSS content, Lycopene content, shelf life, number of locules *per* fruit, pericarp thickness, firmness, number of cluster *per* plant, number of fruits *per* cluster, plant height and duplicate type of interaction was noticed for pH content, number of branches *per* plant. Genetic variability analysis showed the presence of sufficient amount of variability among all the traits studied in the segregating lines. Very little difference noticed between GCV and PCV for all the characters indicating that traits were less influenced by environmental for their phenotypic expression. High heritability coupled with genetic advance as *per* cent mean was observed for all the traits indicating that wide scope for improvement through selection for these traits. The highest positive and significant correlation coefficient of fruit yield *per* plant noticed for number of fruit *per* cluster, number of cluster *per* plant, pulp content, fruit length, fruit diameter, fruit weight, number of locules *per* fruit, plant height. Path coefficient analysis revealed that number of fruits *per* cluster had highest positive direct effect followed by number of cluster *per* plant, indicating that these are the most important trait contributing towards fruit yield. Superior transgressive genotypes (P-8, P-14 and P-20) which exhibited higher fruit yield *per* plant with extended shelf life were identified in this cross for advancing to the next generation.

October, 2020

(Gangaprasad, S.)
Major Advisor

8. Assessment of Induced Variability for Quantitative Characters in M_3 Generation of Red Rice Variety MO4

(SANDHYA RANI, S. N.)

ABSTRACT

The present investigation was conducted during kharif 2019 at ZAHRS, Bhramavar, to study genetic variability, correlation, path coefficient analysis and to identify most productive lines in 120 mutant lines of variety MO4 in a Randomized Complete Block Design. The analysis of variance exhibited high significant differences among the mutant genotypes for all the characters studied. High magnitude of GCV and PCV observed in number of grains per panicle and number of filled grains per panicle, indicating existence of larger variations for these traits in base population, such that simple selection can improve these characters. High heritability accompanied by high genetic advance was observed in number of tillers per plant, number of productive tillers per plant, number of grains per panicle, number of filled grains per panicle, straw yield per plant and harvest index, specifying as these traits governed by additive gene action. Grain yield per plant showed positive and significant correlation with test weight, straw yield per plant, and harvest index. Path coefficient analysis revealed harvest index, straw yield per plant, plant height, number of grains per panicle, spikelet fertility, number of tillers per plant, test weight, kernel length and kernel breadth had direct positive effect on grain yield per plant, suggesting as these traits can be considered as a selectioncriterion in the yield improvement program. The highest positive direct effect exhibited by harvest index.From among the mutant lines evaluated, T15-L-9, T15-L-14, T15-L-18 and T15-L-10, these lines performed better in respect of maturity and yield.

October, 2020

(Shridevi A. Jakkeral)
Major Advisor

9. Okra Breeding Lines of Different Crosses

(SRINIVASA KRISHNA)

ABSTRACT

The present study in okra [*Abelmoschus esculentus* (L.) Moench] was undertaken during *Kharif*-2019 at ZAHRS, Navile, UAHS, Shivamogga to study the extent of genetic variability, correlation, path analysis and identification of superior lines with respect to fruit yield and its attributing characters in F_5 advanced breeding lines of different crosses. Analysis of variance showed a significant amount of variability for all the traits studied. Moderate PCV and GCV were observed for traits *viz*., number of branches *per* plant, number of fruits *per* plant and fruit weight. High heritability coupled with high genetic advance as *percent* mean recorded for number of branches *per* plant, number of fruits *per* plant, fruit weight and fruit diameter. Days to first flowering, days to maturity, number of branches *per* plant, number of fruits *per* plant, fruit weight, fruit diameter and fruit length showed positive and significant association with yield *per* plant at the phenotypic level. Among twelve characters studied four characters had a positive and direct effect on fruit yield *per* plant *viz*., number of fruits *per* plant, fruit weight, number of branches *per* plant, and fruit length. In whichnumber of fruits *per* plant had the highest positive direct effect followed byfruit weight, indicated that these are the most important traits contributing towards fruit yield *per* plant. Advanced breeding lines [NO-10-Bulk ×Parbhani Kranthi (C_7F_5), 10-11-135 and ParbhaniKranthi] which exhibited higher fruit yield *per* plant were identified for future breeding programme.

October, 2020

(Gangaprasad, S.)
Major Advisor

Plant Pathology

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Plant Pathology

1. Investigations on Guava Root-Knot Nematode Incited by *Meloidogyne enterolobii*

(BASAYYA)

ABSTRACT

Guava is popularly known as poor man's apple. Due to its high adaptability and returns, area under cultivation is increasing constantly. Along with host, biotic problems associated with it also increasing. One such problem is root-knot disease incited by *Meloidogyne enterolobii*. Hence, the investigations were taken up. Survey was conducted in major guava growing districts of Karnataka *viz*, Bengaluru, Chikkaballapur, Dharwad and Kolar. Which confirmed the presence of root-knot nematode infestation in all the locations. Maximum numbers of nematodes were found in Chikkaballapur district (620.66 J_2/ 200cc) and least in Bengaluru district (470.75 J_2/ 200cc). In general, locations with red sandy soil, drip irrigation and young seedlings showed maximum nematode incidence. Molecular characterization of surveyed (eight representative) samples using ITS primers followed by sequence characterization and blast analysis confirmed the presence of *M. enterolobii* in all the samples. Shivamogga sample was amplified using SCAR primer. Thereby, confirmed the infestation of experimental field with *M. enterolobii*. In *in vitro* evaluation studies, fluopyram was found effective and caused juvenile mortality of 85.33 per cent at 72 hr, this was followed by fluensulfone (83.00 %). Among the bio-agents used, *Pseudomonas fluoresense* caused highest juvenile mortality (76.67 % J_2at 72 hr). Time and percent juvenile mortality were positively correlated. Under field condition also, efficacy of fluopyram was found higher compared to other treatments and showed 72.41 per cent control over initial nematode population (at six months) followed by fluensulfone (70.20%). Consortium of bio-agents (67.14 %) exceeded the effect of carbofuron (64.54 %). Individual application of bio-agents was also able to control more than 55 percent root-knot disease. However, consortium of bio-agents along with neem cake applied at three months interval found effective and an eco-friendly approach in managing the nematode problem in guava orchards for long period of time.

October, 2020

(H. Ravindra)
Major Advisor

2. Investigation on Anthracnose of Cowpea [*Vigna Unguiculata* (L.) Walp.] Incited by *Colletotrichum* Spp.

(NISANTHAN S.T)

ABSTRACT

Cowpea is one of the major source of dietary protein for millions of poor people in many tropical and sub-tropical countries. Among the several fungal diseases affecting cowpea, anthracnose caused by *Colletotrichum* spp. is one of the most important disease. During survey the highest and lowest per cent disease index were recorded in Davanagere (47.21 %) and Mysore (23.17 %) districts respectively. Based on the location of collection, the fungus were categorized into nine groups *viz.,* Cl1, Cl2, Cl3, Cl4, Cl5, Cl6, Cl7, Cd1 and Cd2. In growth phase studies *C. lindemuthianum* reached peak on 14th day and *C. dematium* reached peak on 12th day. The conidia of the *C. lindemuthianum* were cylindrical shaped, hyaline, single celled measuring 9.8-14.3 x 3.1-4.8 µm with disc shaped acervuli of size 143.5-214.1 µm having brown colour setae of length 159.6 - 233.8µm. Similarly conidia of the *C. dematium* were sickle shaped, hyaline, single celled measuring 19.8-21.7 x 5.2-5.4 µm with acervuli of size 267.4 - 284.2 µm having black colour setae of length 281.7-298.3µm. Among the different solid media evaluated, PDA followed by Czapek's Dox agarfound to be best for growth. *In vitro* fungicidal studies revealed that Mancozeb(0.1, 0.2, 0.3%), Carbendazim+Mancozeb(0.1, 0.2, 0.3%), Carbendazim(0.05, 0.10, 0.15%) and Flusilazole (0.15%) were effective in inhibiting the growth of the fungus. *In vitro* bio agents studies revealed that *Trichoderma asperillum* were effective in inhibiting the growth of the fungus. Also field screening results revealed that none of the genotypes showed immune reaction, sixteen genotypes showed resistant reaction.

October, 2020

(H. Narayanaswamy)
Major Advisor

3. Studies on Postharvest Diseases of Onion (*Allium Cepa* L.) with Special Reference to Black Mould Caused by *Aspergillus niger*

(SIDDAYYA)

ABSTRACT

Onion (*Allium cepa* L.) is a commercial vegetable crop grown in India and popularly known as "poor man's Kasturi". It belongs to the family Alliaceae and genus *Allium* with approximately three hundred species. Among the several postharvest diseases, black mould caused by *Aspergillus niger* (van Tiegh) is significant. Black mould observed as surface infection on bulbs which were initially characterized by the black powdery masses of spores that were borne on the outer part of the scales and can beeasily rubbed off. The studies were conducted on the survey for the severity of postharvest diseases of onion in Chikkamagaluru, Chitradurga and Davanagere districts. Cultural and morphological studies of *A. niger* along with varietal screening and *in vitro* evaluation of fungicides and bio-agents were carried out. Among the districts surveyed higher and lower per cent disease index was recorded in Davanagere and Chikkamagaluru districts, respectively. Among the seven different solid media evaluated potato dextrose agar, oatmeal agar and onion bulb extract agar were found best for growth and sporulation. Colony colour of *A. niger* was varied from dirty white or light grey to black colour. Conidial size was ranged from 3.16 µm to 5.50 µm. A total of 12 varieties were evaluated for resistance to black mould (*A. niger)* under *invitro*. Results revealed that ArkaKalyan, Bheema Dark Red and Mahalaxmi showed moderate resistant and BheemaSafed and Bheema Super were found highly suceptible. *In vitro* studies revealed that Carbendazim + Mancozeb, Carboxin + Thiram, Hexaconazole + Zineb, Carbendazim, Hexaconazole and Difenconazole gave cent per cent inhibition and among bio-agents *Trichoderma auroviride* and *Trichoderma asperellum* were effective in inhibiting the growth of fungus.

October, 2020

(H. Narayanaswamy)
Major Advisor

4. Morphological and Molecular Characterization of *Pestalotiopsis* spp., Causing Grey Leaf Blight of Coconut

(VISHWAS GOWDA, G. R.)

ABSTRACT

In ancient Indian literatures, Coconut (*Cocos nucifera* L.) is described as 'KalpaVriksha' which means tree which provides all the necessities of life. Among several fungal diseases affecting coconut, grey leaf blight caused by *Pestalotiopsis* spp., is significant. Symptoms of grey blight characterized as initially minute yellow or brown spots surrounded on the leaflets by a grayish band. Later signs are marked by a grayish center with a dark brown margin and as the disease becomes extreme brown spots coalesce to form blight on the leaves. Studies were conducted on the survey for the severity of grey leaf blight of coconut in the southern part of Karnataka. Cultural, morphological, physiological characters and molecular characterization of the pathogen and *in vitro* evaluation of fungicides were carried out. Among the districts surveyed highest and lowest per cent disease index were recorded in Chikkamagaluru and Shivamogga districts respectively. The results of cultural studies on various media revealed that Potato dextrose agar, Oatmeal agar and Sabouraud's dextrose agar were supported the maximum growth and sporulation. Mycelium of *Pestalotiopsis* spp. was white with flat circular with wavy margin along with black pigmentation. The conidia of *Pestalotiopsis* spp. were five celled with three mediancoloured cells and two hyaline terminal cells and measuring 15.60 to 22.60µm x 4.90 to 6.90 µm. The maximum dry weight of fungus was observed at pH 6 and at 25 °C temperature. Out of eight isolates, seven were identified as *P. microspora* and one identified as *P. sydowiana*through molecular characterization. *In vitro* studies revealed that Mancozeb, Captan, Propiconazole, Difenconazole, Isopyrazam + Difenoconazole and Propiconazole + Difenconazolewere effective in inhibiting the growth of fungus.

October, 2020

(Suresh D. Ekabote)
Major Advisor

5. Studies on Grain Discolouration of Paddy in Hilly Zone of Karnataka

KIRANAKUMARA PUTLAKARA

ABSTRACT

Paddy (*Oryza sativa*L.) is considered as the “global grain”. Grain discolouration is one of the disease which is also known as “Glume discolouration” or “Dirty panicle”. Survey conducted in hilly zone of Karnataka, revealed highest mean per cent grain dicolouration in Kodagudistrict (86.00 %) followed by Shivamogga (84.33 %) and the least mean per cent grain discolouration was noticed in Chikkamagaluru district (78.83 %) with per cent disease index of40.41, 32.33 and 31.00 per cent, respectively. Virajpet and Madikeri areas of Kodagu district were identified as hot spot for paddy grain discolouration in the hilly zone of Karnataka. The grain discolouration of paddy was more predominant in case of Tunga variety which occupies more areas in Kodagu region. Results from Standard blotter methodrevealed that *Fusarium* spp.(12.88 %)was more associated with the tested seed samples followed by *Aspergillus* spp. (9.88 %)and *Curvularia* spp.(9.88 %). Similar results were obtained in Agar plate method, in which *Fusarium* spp. (14.72 %) was predominant when compared to other associated seed mycoflora. All the pathogens associated with grain discolouration produced varied colony color, shape, septations and the dimensions of conidia which varied from pathogen to pathogen. The field evaluation of different fungicides revealed that among the different treatments, Trifloxystrobin25% + Tebuconazole 50 % WG @ 0.8g/kg of seeds as seed treatment and a foliar spray @ 0.4 g/L of water at hundred per cent flowering stage was significantly superior over all other treatments with least per cent disease index (32.58 %)with yield (41.53 q/ha) and it showed that 44.19 % disease reduction over control.

November, 2020

(G.N. Hosagoudar)
Major Advisor

6. Efficiency of *Trichoderma* Secondary Metabolites on Turcicum leaf blight of Maize

(POOJA, P. S.)

ABSTRACT

Maize is considered to be the third most important cereal after rice and wheat in India. It is being cultivated worldwide in a wider range of environmental conditions, due to its greater adaptability. It is known to be affected by more than 62 diseases. Among them, turcicum leaf blight caused by *Exserohilum turcicum* (Pass.) Leonard and Suggs is of significant importance as it drastically reduces the yield by reducing photosynthetic activity of the plant. Hence, in order to know the disease occurrence and extent of its severity, an extensive roving survey was conducted in Shivamogga and Davanagere districts. The highest per cent disease index (PDI) was recorded in Honnali taluk of Davanagere district (61.28) as against least in Soraba taluk of Shivamogga district (18.55).Effect of secondary metabolites obtained from *Trichoderma virens*, was utilized in the study to understand and overcome many of the problems associated with the application of chemical pesticides in comparision to commercially available various *Trichoderma* formulations. *In vitro* studies have demonstrated that, among the different treatments tested, *Trichoderma* secondary metabolites (TSM), Neem seed kernel extract and combination of TSM with NSKE at 20 per cent concentration have shownhigher per cent inhibition of mycelial growth to an extent of 61.28, 72.59 and 68.63 per cent, respectively. Among the fungicides tested, maximum inhibition of mycelial growth of *E. turcicum* (100 %) was observed in both Tebuconazole (25.9 % EC) and Hexaconazole (5% EC) at all concentrations tested. However, under field conditions, seed treatment with Carboxin (37.5%) + Thiram (37.5%)and foliar application of Tebuconazole (25.9 % EC) at 30 and 50 days after sowing was found most effective in controlling TLB with minimum PDI of 21.44 along with 65.95 per cent disease reduction over control.

November, 2020

(B. GangadharaNaik)
Major Advisor

7. Investigations on *Meloidogyne graminicola* in Direct-Seeded Rice Growing Areas.

(POOJA RAJENDRAMEKANMARDI)

ABSTRACT

'Direct Seeded of Rice' (DSR) is a new production system in which specially developed rice cultivars are established in non-puddled, non-flooded fields by direct seeding. Due to lack of labour and scarcity of water, farmers are now urged to follow **DSR** in place of **conventional transplanting.** Now a day, rice root-knot nematode, *Meloidogyne graminicola* causes significant yield losses under the habitats of upland, lowland and aerobic rice. Studies were carried with respect to survey; identification of potential biocontrols and nematicides against *M. graminicola* under *invitro*, integrated disease management under field condition and screening of different breeding lines against *M. graminicola*. The disease was noticed in most of the direct-seeded rice growing areas of Shivamogga and Davanagere districts. Maximum disease incidence was recorded infields ofSoraba, Harihara, Shikaripura taluks with the root-knot index of 4. Out of four bioagents and two nematicides evaluated, fluopyram recorded the maximum mortality of juveniles. Integrated management of *M. graminicola*in field condition using a consortium of bio-agents *viz*., *P. fluoresces* + *T. harzianum* + *B. megatherium*, organic amendments *viz.*, neem cake and poultry manure, nematicides *viz*., fluensulfone, carbofuran and carbosulfan. Among the different treatments tested under integrated management, fluensulfone recorded the maximum plant height, better root length,root weight, root volumeand maximum yield followed by the consortium of bioagents*viz*., *P. fluorescens*+ *T. harzianum*+ *B. megatherium.* Among the ten breeding lines screened against *M. graminicola*JGL1798 andMM×BPT-2-4-1 recorded least root-knot index of 1.0 indicating that they are resistant to root-knot nematode.

November, 2020

(Ravindra. H.)
Major Advisor

8. Studies on Major Soil Borne Fungal Diseases in Tomato (*Solanum lycopersicum* L.) with Special Reference to Root Rot Caused by *Rhizoctonia solani* Kuhn.

(CHANDRAMOULI JAYAVANT GULLA)

ABSTRACT

Soil borne fungal diseases are becoming serious problem in recent years in tomato growing areas of India. Among these, Rhizoctonia root rot disease is the highly destructive disease causing losses up to 50 to 60 per cent. Hence, investigation was carried out on various aspects *viz*., survey for major soil borne fungal diseases, morphological studies and molecular detection of major pathogen like *R. solani* and its integrated disease management under field condition. During survey, maximum disease incidence of Fusarium wilt, Rhizoctonia root rot and Sclerotium rot were 20.02, 22.91 and 17.82 per cent, respectively noticed in Davanagere district, while Shivamogga district recorded least incidence of19.20, 17.00 and 14.79 per cent, respectively. Morphological studies of *Rhizoctonia solani* with respect to sclerotial parameters revealed that six isolates of *R. solani* showed variation in number of sclerotia (100 to 1850 per Petri plate), pattern of production (central, peripheral and scattered), colour (Dark brown to olive brown) and texture (Smooth and rough). Molecular confirmation of six isolates at species level was carried by polymerase chain reaction (PCR) using a pair of ITS primers in which forward universal primer ITS1 (5′-TCCGTAGGTGAACCTGCGG-3′) and *R. solani* specific primer GMRS-3 (5′-AGTGGAACAAGCATAACACT-3′). They were amplified 550bpamplicon from the genome of all six isolates which is similar to that of expected amplicon of *R. solani* genome from this primer pair. Field trial results revealed that, Hexaconazole 5 EC (0.1 %) treated plots recorded the lowest disease incidence (14.22 %) and highest fruit yield of 76.91t / ha. With respect to growth parameters, Hexaconazole 5 EC (0.1 %) treated plants showed maximum shoot length, root length, fresh shoot weight, dry shoot weight, fresh root weight and dry root weight, respectively.

December, 2020

(R. Ganesha Naik)
Major Advisor

Soil Science and Agricultural Chemistry

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Soil Science and Agricultural Chemistry

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1. Effect of Fish Bone Meal on Productivity of Soybean (*Glycine max* L.) and Phosphorus Status in the Soil

(CHELUVARAJ, L. N.)

ABSTRACT

A field experiment was conducted at Agricultural and Horticultural Research Station (AHRS), Bavikere, UAHS, Shivamogga, during *Rabi*-2019 to study the effect of fish bone meal on productivity of soybean (*Glycine max* L.) and phosphorus status in the soil. The recommended dose of N, P and K were applied through fish bone meal (FBM) and mineral fertilizer at 0, 25, 50, 75 and 100 per cent levels with or without PSB seed treatment along with FYM. Ten treatment combinations with three replications in a randomized complete block design (RCBD) was followed in the experiment. Application of 25 per cent of recommended P through FBM and remaining through mineral fertilizer with PSB seed treatment significantly increased the growth, yield attributes and yield of soybean. Highest grain yield (26.15 q ha^{-1}) and stover yield (43.73 q ha^{-1}) of soybean was noticed with 25 per cent of recommended P through FBM and remaining through mineral fertilizer with PSB seed treatment. The nutrient content and uptake of N, P, K, Ca, Mg and S were also recorded highest in the same treatment. Significantly highest available N, P_2O_5, K_2O and secondary nutrient status of soil at critical growth stages were recorded in the treatment receiving 25 per cent of recommended P through FBM and 75 per cent through mineral fertilizer with PSB seed treatment. Treatment receiving 100 per cent of P through FBM without PSB seed treatment recorded significantly higher values of saloid-P, Ca-P, organic-P fractions and total-P. Treatment involving RDF alone recorded higher values of Al-P, Fe-P, reductant-P, occluded-P fractions compared to treatments receiving fish bone meal.

October, 2020

(B. C. Dhananjaya)
Major Advisor

2. Studies on Integrated Nutrient Management Practices on Soil Properties and Yield of Paddy (*Oryza sativa* L.) in Coastal Acid Soil of Karnataka

(DILEEP, R.)

ABSTRACT

A field experiment was conducted during *Kharif* 2019 at ZAHRS, Brahmavar, Udupi to know the effect of combination of organic and inorganic nutrient sources on soil properties and yield of paddy in coastal acid soil 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 50 and 25 per cent of recommended dose of nitrogen applied through poultry manure, vermicompost, FYM, gliricidia and eupatorium. Application of 50 per cent RDN through fertilizer and 50 per cent RDN through poultry manure recorded significantly higher available phosphorus, secondary and micronutrients in soil at paddy harvest. However, higher available soil nitrogen recorded in treatment applied with 50 per cent RDN through fertilizer and 50 per cent RDN through gliricidia and higher available soil potassium recorded in treatment applied with 50 per cent RDN through fertilizer and 50 per cent RDN through eupatorium. However, higher microbial population recorded in treatment applied with 50 per cent RDN through fertilizer and 50 per cent RDN through vermicompost. Significantly higher plant height, total dry matter, productive tillers, number of panicles per hill, number of grains per panicle, grain (5006 kg ha^{-1}) and straw (6534 kg ha^{-1}) yield of paddy recorded in treatment applied with 50 per cent RDN through fertilizer and 50 per cent RDN through poultry manure. Significantly higher nutrient concentration and total uptake by paddy was observed with application of 50 per cent RDN through fertilizer and50 per cent RDN through poultry manure as compared to treatment applied with recommended dose of fertilizer.

October, 2020

(Jayaprakash, R)
Major Advisor

3. Studies on Effect of Different NPK Levels and Intervals of Fertigation on Soil Fertility Status, Growth, Yield and Quality of Onion (*Allium cepa* L.) in Central Dry Zone of Karnataka

(GEETHAKUMARI, B. N.)

ABSTRACT

An investigation was carried out in Onion at Krishi Vigyan Kendra, Babbur0farm, Hiriyur, UAHS, Shivamogga, during0*rabi*season of 20190using six different levels of fertigation along with soil application of recommended dose of fertilizers. After transplanting of seedlings at a spacing of 10 cm×15 cm, three levels of recommended dose of NPK (100, 75 and 50 *per0cent*of recommended dose of NPK ha^{-1}) were imposed at ten days and sevendays intervals along with control (100 *per cent* soil application0of recommended dose of fertilizers).Based on the observations recorded, highest post-harvest available N, P_2O_5 and K_2O were recorded in 100 *per0cent*RDF at 10 days interval. Whereas, the effect of fertigation was found non-significant on exchangeable Ca, Mg, available S and micronutrient status of post-harvest soil. Similarly, the fertigation treatment with 100 *per cent* recommended dose of fertilizer applied at010 days interval (T_2) recorded the higher values of growth parameters like plant height, number of leaves per plant and leaf length, yield and yield attributes (bulb dry matter, weight of five bulbs and bulb yield per hactare), quality parameters (bulb diameter, TSS, pungency, keeping quality and *per0cent*split bulb) and nutrient uptake. Further, the same treatment also registered the highest benefit-cost ratio (2.57) than theother treatments. The0fertigation0treatments with 100 *per cent* RDF at 10 days interval was significantly superior over 75 and 50 *per0cent*RDF and control in all respects.

October, 2020

(Sarvajna B.Salimath)
Major Advisor

4. Characterization of Soil, Water and Nutrient Status of the Leaf under Banana Leaf Margin Affected Gardens in Hiriyur Taluk of Chitradurga District, Karnataka

(HANUMANTA D LAMANI)

ABSTRACT

The experiment on 'Characterization of soil, water and nutrient status of the leaf under banana leaf margin affected gardens in Hiriyur taluk of Chitradurga district, Karnataka' was carried out in the University of Agricultural and Horticultural Sciences, Shivamogga during 2019-2020 to know the problem arising in banana gardens of Hiriyur taluk. Soil samples were collected from two different depths (0 to 30 cm and 30 to 60 cm) in leaf margin affected and healthy banana gardens and analyzed for physical and chemical properties. From the same gardens index leaf samples were collected and subjected to analysis for nutrient composition. Similarly, water samples were collected and analyzed to know the quality irrigation water in the study area. The results of the investigation revealed that soils of banana leaf margin affected gardens showed the high mean clay content than healthy banana gardens, higher soil pH (7.82–9.2 in surface and 8.20-9.40 in subsurface soil) was found in affected gardens and significantly higher electrical conductivity was recorded in affected gardens compared to healthy banana gardens, *i.e.*, (1.09-4.17 dS m^{-1}) in surface and (1.22-4.20dS m^{-1}) subsurface soils. From the investigation, it was observed that the availability of nutrients was diverse in healthy and affected gardens. Soluble chloride was significantly increased in banana leaf margin affected gardens compared to healthy banana gardens. In water samples, EC (1.28dS m^{-1})and chloride (14.01 Me L^{-1}) concentration exceeded the safer limit for the irrigation, out of all the nutrients in banana leaf, the concentration of chloride was found high (856.96 ppm) in leaf margin affected gardens in comparison to healthy banana gardens.

October, 2020

(L. B. Ashok)
Major Advisor

5. Influence of Cob Rind Biochar on Soil Properties and Productivity of Finger Millet (*Eleusine coracona* L.)

(JYOTHISHREE, K. L.)

ABSTRACT

A field experiment entitled 'Influence of cob rind biochar on soil properties and productivity of finger millet (*Eleusine coracona* L.)' was conducted at Agricultural and Horticultural Research Station at Bavikere, UAHS, Shivamogga, Karnataka, during *Kharif* 2019 using cob rind biochar and FYM at different levels of application. The experiment comprised of 10 treatments was laid out in randomized complete block design with three replication. The results revealed that combined application of higher dose of cob rind biochar along with FYM *i.e.*, cob rind biochar @ 4t ha^{-1} + 100 per cent Rec. FYM + RDF significantly improved the soil physical properties such as porosity (33.65 %) and maximum water holding capacity (38.13 %) and decreased BD of soil in comparison with treatment T_2 which received RDF + Rec. FYM (PoP) and absolute control (T_1).The pH and electrical conductivity of acid soil was significantly increased due to addition of cob rind biochar @ 4t ha^{-1} + 50 per cent Rec. FYM + RDF(T_{10}). But the addition of cob rind biochar @ 4t ha^{-1} + 100 per cent Rec. FYM + RDF resulted in significant increase in organic carbon, primary nutrients, secondary nutrients, DTPA extractable micronutrients status of soil at all critical growth stages, total microbial count (*viz*., bacteria, fungi, actinomycetes) and enzymes activity such as dehydrogenase, urease, acidphosphatase. Significantly higher primary nutrients content in leaf and their uptake by finger millet, higher plant growth, grain yield(40.88 q ha^{-1}) and straw yield (62.82 q ha^{-1})of finger millet, was recorded due to application of higher dose of cobrind biochar @ 4t ha^{-1} along with recommended dose of fertilizer (50:40:25 N, P_2O_5, K_2O Kg ha^{-1}) and FYM (10 t ha^{-1}) compared to application of RDF and recommended dose of FYM.

October, 2020

(G. N. Thippeshappa)
Major Advisor

6. Studies on Carbon and Nitrogen Dynamics as Influenced by Different Land Use Systems of Rangapura Micro Watershed, Chikkamagaluru District, Karnataka

(POOJA, R.)

ABSTRACT

The studies on carbon and nitrogen dynamics as influenced by different land use systems of Rangapura micro watershed, Chikkamagaluru district, Karnataka was undertaken during the year 2019-20 at UAHS, Shivamogga. The representative soil samples were collected from different land use systems *viz.*, Maize, Ragi, Coconut, Arecanut and Fallow systems at different soil depths. The present study revealed that the soil texture varied from sandy loam to sandy clay loam. The pH varied from acidic to slightly alkaline and electrical conductivity showed non saline nature of soil. The highest mean value of bulk density was observed under fallow system. The highest mean values of available nitrogen (272.20 kg ha^{-1}) were recorded under coconut, phosphorous (18.62 kg ha^{-1}) in ragi and potassium (189.64 kg ha^{-1}) in maize land use systems. Among the different land use systems, the highest content of organic carbon was recorded in coconut system which ranges from 11.28 to 19.50 g kg^{-1}. The highest mean values of PPOC (290.76 mg kg^{-1}), CWEC (302.56 mg kg^{-1}), SMBC (394.19mg kg^{-1}), TOC (25.24g kg^{-1}), and TC (25.72g kg^{-1}) contents were noticed in arecanut land use system and the values found decreased with increase in soil depth. The highest humic (5.23) and fulvic acid (5.84) contents were registered in arecanut land use system. The highest carbon stock was noticed in arecanut system (19.92 t ha^{-1}) followed by coconut system (16.27t ha^{-1}) and the lowest in ragi land use system (7.68t ha^{-1}). Among the land use systems studied, the highest exchangeable ammonical (36.56 mg kg^{-1}), nitrate (17.92 mg kg^{-1}) and total nitrogen (751.60 mg kg^{-1}) fractions were recorded in coconut system as against least inragi system.

October, 2020

(K. T. Gurumurthy)
Major Advisor

7. Effect of Different Levels of Phosphorus and Pulse Magic on Soil Chemical Properties and Productivity of Soybean under Central Dry Zone of Karnataka

(SHIVAPPA PRTLUR)

ABSTRACT

A field experiment with titled as **"Effect of different levels of phosphorus and pulse magic on soil chemical properties and productivity of soybean under the central dry zone of Karnataka."** was carried out during late *Kharif* 2019at Zonal Agricultural and Horticultural Research Station, Babbur Farm, Hiriyur. The experiment was laid out with nine treatments which were replicated thrice on RCBD design. The treatment comprises of different levels of phosphorous at (75 % and 100 % RDP) and pulse magic as foliar spray at 0.5 %, 1% and 1.5 %. Among the different levels of phosphorous and pulse magic application, treatment which received 100 % RDP and 1.5 % pulse magic as foliar spray was recorded significantly higher growth and yield parameters like plant height (52.56 cm), number of leaves (7.40), number of nodules (51.33), number of pods (51.34 plant^{-1}), seed yield (24.76 q ha^{-1}) and haulm yield (39.86 q ha^{-1}).Uptake of nutrients by soybean like N (216.30 kg ha^{-1}), P_2O_5 (33.76kg ha^{-1}), K_2O (98.63 kg ha^{-1}), Ca (42.70 kg ha^{-1}), Mg (35.41 kgha^{-1}), S (29.67 kg ha^{-1}) and micronutrients like Fe (137.18 g ha^{-1}), Mn (57.014 g ha^{-1}), Zn (58.35 g ha^{-1}) and Cu (32.44 g ha^{-1}) and dehydrogenase activity (55.21 µg TPF gm^{-1} of soil day^{-1}) were significantly recorded higher in treatment which received 100 % RDP and 1.5 % pulse magic as foliar spray when compared with control.

October, 2020

(ParashuramChandravamshi)

Major Advisor

8. Study on Effect of Domestic Grey Water Irrigation on Soil Properties, Growth and Yield of Okra (*Abelmoschus esculentus* L.)

(SRESHMA C. K.)

ABSTRACT

A field experiment was performed in farmer's field at Yelavatti village, Shimoga city, Karnataka to study the effect of grey water irrigation on soil properties, growth and yield of Okra (*Abelmoschus esculentus* L.). This experiment was laid out in RCBD with nine treatments and three replications. Four types of water were used for this investigation. Domestic grey water, treated grey water, structured grey water and bore well water were used in alone or in combination. Grey water is generated from farmer's house except toilet flush, treated grey water is made by filtering the grey water with charcoal and other filtering material, structured grey water by passing the treated grey water through a structural unit due to this some structural changes occurred to the bulky nature of the treated grey water, and bore well water was used as control. From this research it was found that the test crop Okra performed well in grey water applied plot than other treatments studied. Significantly higher plant height (144.47 cm), number of leaves (34.88), number of branches (5.66), dry matter accumulation (12.91 g/plant), fruit per plant (6.93) and fruit yield (6.41 t ha^{-1})were recorded in grey water applied treatment followed by treated grey water. Plant uptake of N(77.11 kg ha^{-1}), P (16.91kg ha^{-1}) and K (50.47kg ha^{-1}) also recorded significantly higher in the treatment which irrigated with grey water followed by treated grey water applied plot. Similar trend of significantly higher soil available nitrogen (325.29 kg ha^{-1}), phosphorus (105.67 kg ha^{-1}), potassium (449.53 kg ha^{-1}) and micro nutrients (Zn, Mn, Cu, and Fe) was recorded in grey water applied plot. Higher dehydrogenase (35.87 µg TPF g^{-1} of soil day^{-1}), phosphatase (39.47 PNP g^{-1} soil hr^{-1}) and urease (359.07 µg NH_4^+ g soil hr^{-1}) enzyme activity were recorded in grey water applied plot.

October, 2020

(Ganapathi)

Major Advisor

9. Potassium Status and Behavior in Soils under Paddy Cover of Bhadra Command, Karnataka

(VINAYDHAN, D. R.)

ABSTRACT

An investigation was carried out during 2019-20 to know the status and behavior of potassium in soils under paddy cover of Bhadra command, Karnataka at College of Agriculture, UAHS, Shivamogga. During this investigation, 145 soil samples were collected from soils under paddy cover of Bhadra command, which comprises of seven taluks of three districts *viz*., Shivamogga, Chikkamagaluru and Davanagere. Soil samples were processed and analyzed for available potassium, potassium fractions, potassium fixation capacity and quantity-intensity relationship of potassium.

Soil reaction was acidic to alkaline, EC was normal and organic carbon was low to high in nature. Available potassium ranged from 49.06 to 646.87 kg K_2O ha^{-1} with a mean value of 193.53kg K_2O ha^{-1}. Potassium fractions such as water soluble, exchangeable, non-exchangeable and lattice K varied from 5.90 to 64.80, 1.05 to 214.20, 2.45 to 910.10 and 1172.90 to 41804.50 mg K kg^{-1}, respectively. Total potassium varied from 1230 to 42050 mg K kg^{-1}. Further, the order of distribution of the fractions in soils was lattice K > non exchangeable K > exchangeable K > water soluble K. All forms of potassium were significantly and positively correlated with organic carbon.

Texture of selected soil samples varied from loamy sand to clay and these samples were analyzed for potassium fixation capacity and quantity-intensity relationship of potassium. Potassium fixation capacity varied from 0.248 to 1.755cmol (p^+) kg^{-1} and it was positive significantly correlated between the K, CEC (r = 0.879**) and clay (r = 0.850**) content in soils. Quantity-intensity relationship of potassium parameters such as AR_e^K and PBC^Kvaried from 3.80 to 7.20 × 10^{-3} $(moles l^{-1})^{0.5}$ and 15.50 to 81.60 cmol (p^+) kg^{-1} $(moles\ l^{-1})^{-0.5}$, respectively. Potassium fixation capacity and PBC^K in soils increased with increase in clay content of the soil.

October, 2020

(H. M. Chidanandappa)
Major Advisor

Horticulture

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Horticulture

1. **Effect of Liquid Plant Growth Promoting Rhizomicrobial Consortia on Growth, Flowering, Yield and Quality of Gladiolus (*Gladiolus grandifloras L.*) at Graded Levels of NPK**

(ASHA, R.)

ABSTRACT

The present study was conducted to find out the suitable combination of graded levels of NPK and biofertilizers on growth, flowering, yield and quality of gladiolus at the experimental block of Department of Horticulture, College of Agriculture, Shivamogga during the year 2019 -20. The experiment was laid out in Randomized Complete Block Design with 15 treatments replicated thrice. The significant differences were observed for growth, flowering, flower quality and yield parameter. Soil inoculated with 75 % RDN and P + *Azotobacter chroococcum* + *Pseudomonas striata* + 100% RDK (T_{10}) recorded significantly minimum number of days taken for sprouting (7.00 days), maximum sprouting percentage (96.33%), plant height (101.33 cm), number of leaves (9.53), leaf area index (2.44), total dry matter accumulation (26.93 g/plant) and total chlorophyll (2.63 mg/g). Whereas, 75 % RDF + *Azotobacter chroococcum* + *Pseudomonas striata*+ *Bacillus mucilaginosus* (T_{14}) recorded least number of days taken for initiation of inflorescence (66.47 days), minimum number of days to 50 per cent flowering (77.41 days) and significantly maximum duration of flowering (24.00 days) and quality of flower also influenced by T_{14} of spike length (94.57 cm), rachis length (60.17 cm), spike girth (12.37 cm), weight of spike (98.00g), length of floret (10.83 cm), floret diameter (10.34 cm) number of florets per spike (18.17), spike yield per plant (2.13), spike yield perhectare (2,35,000) and vase life (15 days). The corm parameters *viz.*, weight of corm(121.33 g), corm diameter (7.13 cm), weight of cormels(24.53 g), similarly the higher uptake of N (2.02 %), P (0.65 %), K (2.32%) and total microbial population was also noted higher in the same treatment (T_{14}). The economic analysis clearly depicted that, maximum net returns (Rs. 19,21,579) and B:C ratio (2.69) for spike production and corms yield was noticed in the treatment T_{14}.

October, 2020

(B. HemlaNaik)
Major Advisor

2. Studies on Genetic Variability in F_2 Population of Cucumber (*Cucumis sativus* L.) for Yield and Quality Attributes

(BHOOMIKA, M. R.)

ABSTRACT

Cucumber (*Cucumis sativus* L.) is the important vegetable crop belongs to the family *Cucurbitaceae*known for its fresh fruit and processed forms. There is a demand to develop high yielding genotypes. Hence, the investigation was carried out to study the variability and association among quality, yield and yield attributing traits in F_2 population. Total of 150 F_2 population along with their parents (Dharwad and Belgaum Local) and standard check (Chitra) were evaluated in augmented design during *Kharif* 2019 at Zonal Agriculture and Horticulture Research Station, Shivamogga. Significant differences were recorded in all the genotypes for the 19 traits except number of locules per fruit. For all the traits the magnitude of genotypic coefficient of variation was lower than phenotypic coefficient of variation. High heritability coupled with high genetic advance as per cent of mean was recorded for the traits *viz.*, number of seeds per fruit (99.29 %), days to last harvesting (99.21 %), fruit diameter (97.79 %), days to first female flower appear (96.64 %) and node at which first female flower appear (77.55%). Correlation studies showed that fruit yield was highly positive and significant ($p=0.01$) with number of fruits per vine (0.719), number of node at which first male flower appear (0.271) and number of branches per vine (0.256). The path coefficient analysis revealed maximum positive direct effects towards fruit yield per vine contributed by number of fruits per vine followed by days to first female flower appearance, number of seeds per fruit, node at which first female flower appear, fruit diameter, number of branches per vine, total soluble solids, and total sugars. Finally, seven high yielding transgressive segregants (No. 22, 38, 39, 5, 49, 57 and 74) were identified among the F_2 population.

October, 2020

(Nagarajappa Adivappar)
Major Advisor

3. **Standardization of Harvesting Time for Xanthophyll Content of Marigold (*Tagetes erecta* L.) and Effect of Petal Meal on Pigmentation of Egg Yolk Quality Parametersin Commercial Layers**

(NAVYA, V. G.)

ABSTRACT

The study was conducted to determine the harvesting time for xanthophyll content of marigold (*Tagetes erecta* L.) and its petal meal on yolk colour and egg quality parameters in commercial layers. Marigold flowers were harvested at hourly interval from 6am to 6pm treatment wise daily and significantly higher ($P \leq 0.01$)flower weight was observed in the morning hours and it was decreased 10am onwards. Whereas,petal meal yieldand xanthophyll content and yield(g/kg petal meal) were significantly higher in 6 to 10 am and decreased from 11 am to 3 pm and again increased from 4 to 6 pm.Xanthophyll yield was negatively correlated (R^2= 0.889)with temperature and light intensity. The marigold petal meal (MPM) was incorporated in the diet of commercial layers at 0 (T_1), 3.0 (T_2), 4.0 (T_3), 5.0 (T_4) and 6.0 per cent (T_5) levels.The marigold petal meal and xanthophyll intake significantly higher in T_5 group than in other groups. No significant difference was observed in feed intakeand egg quality parameters. The xanthophyll content of yolk was positively correlated with xanthophyll intake but transfer of xanthophyll pigment from feed to yolk was 95.04 per cent in T_1 than in other groups.The crude protein content of egg without shell was significantly higher in T_3, T_4 and T_5 groups than in T_1 and T_2groups. It was concluded that 6 to 10 am harvest had higher fresh flowerweight and the xanthophyll was higher at 6 to 10 am and 4 to 6 pm harvest. Whereas, up to 6 per cent level of MPM in the layer diet did not cause any adverse effect on the performance of layers but xanthophyll content of egg yolk, yolk colour and crude protein content were higher as the level of MPM increased in the diet.

October, 2020

(B. HemlaNaik)
Major Advisor

4. Standardization of Time of Layering and IBA Concentration on Rooting and Establishment of Air Layers of Guava cv. Lalit under Southern Transitional Zone of Karnataka

(SINCHANA, K. S.)

ABSTRACT

The study was conducted to know the exact time of layering and IBA concentration on rooting and establishment of air layers of guava cv. Lalit under Southern Transitional Zone of Karnataka during the year 2019-2020 at Guava Mother Block, Organic Farming Research Centre and Department of Horticulture, College of Agriculture, University of Agricultural and Horticultural Sciences, Shivamogga. The experiment was laid out in Factorial Randomized Completely Block Design having sixteen treatment combinations with four repetitions. The study revealsthat, among different time of layering, the minimum number of days for root initiation (38.62), maximum number of primary and secondary root per layer (17.00 and 7.39, respectively), maximum rooting percentage (71.75) and other rooting attributes was observed best in the layers prepared on first fortnight of June. Among different concentration of IBA, the minimum number of days for root initiation (36.75), maximum number of primary and secondary root per layer (18.91 and 8.93 respectively), maximum rooting percentage (77.19) and other rooting attributes was recorded best with 4500 ppm IBA concentration. On the basis of the results obtained in the present investigation, airlayering performed during first fortnight of June, treated with 4500 ppm IBA concentration have been found significantly superior on all treatments under Southern Transitional Zone of Karnataka.

Among different growing media tried, the guava airlayers planted in media containing soil, sand and vermicompost (1:1:1) recorded maximum survival percentage (84.63) after 90 days of planting and this can be utilized by commercial nursery entrepreneurs to produce healthy and vigorous air layers of guava to get higher turnover.

October, 2020

(D. Thippesha)
Major Advisor

Horticulture

Crop Improvement and Biotechnology

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Crop Improvement and Biotechnology

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1. Genetic Variability for Moisture Stress Tolerance and Expression Analysis of Drought Responsive Candidate Genes in Eggplant (*Solanum melongena* L.)

(MAHAMMED FAIZAN)

ABSTRACT

Significant differences were observed among 54 eggplant accessions for drought tolerance based on physiological, root, growth and yield parameters. Higher values of PCV, GCV, heritability and genetic advance as *per cent* over mean were observed for different physiological, root, growth and yield parameters. Genotypes *viz.*,Very Green Long, IIHR-7, CO-2, IC90785, M17, IC99676- Round, Swarna Pratibha, L-2232, IC354597-Round, Malapur local, Pusa Upkar, Hebbal Gulla, IIHR-322, Rampur local and *Solanum mammosum* were identified as drought tolerant based on physiological, root, growth and yield traits. Further, the correlation analysis revealed positive significant association of fruit yield with fruit length and number of fruits per plant (normal moisture) and also with average fruit weight (moisture stress).

Analysis of molecular variance using 23 SSR markers revealed presence of 9.34 *per cent* variation between sub-populations and 90.67 *per cent* variation within eggplant sub-populations and the per cent polymorphism was found to be 85.22 *per cent.* The Neighbour joining tree showed 2 clusters, one with 4 sub-populations and other with single sub-population. The population structure analysis revealed thirteen genetic clusters (*K=13*) which spread across all the sampled populations, forming genetically admixture populations. The *in silico* analysis has identified 109 drought responsive unigenes from STIFDB *V.2* database with sequence identities > 80*per cent* in *solanum* taxid. These 109 unigenes were categorized based on gene ontology (cellular components, biological process and molecular functions). The expression analysis of ten drought responsive candidate genes in the leaf tissues of Malapur local (drought tolerant) and R-2580 (drought susceptible) showed a differential expression pattern of candidate genes in tolerant and susceptible genotypes upon PEG 6000 treatment. Three genes *viz.,Nine-Cis-Epoxycarotenoid Dioxygenase 3*, *Cellulose synthase 6* (2.5 HPT-hours after PEG 6000 treatment) and *Abscissic Acid Responsive Elements-Binding Factor 3* (5 HPT) were up-regulated in Malapur local.

September, 2020

(Harish Babu, B. N.)

Major Advisor

2. Genetic Variability for Salt Tolerance and Expression Analysis of Salt Responsive Candidate Genes in Eggplant (*Solanum melongena* L.)

(RAKSHITH M)

ABSTRACT

In the present study, 60 mM NaCl has been identified as a critical salt concentration for screening eggplant genotypes at germination under *in vitro*based on the LC_{50} concept. Significant differences were observed among 52 genotypes for different characters at 60 mM NaCl. Twenty-two genotypes identified as salt tolerant at 60 mM NaCl were further tested at 120 mM NaCl, which resulted in the identification of Bhagyamati, Vijay, Rampur local, R-2581 and Arka Nidhi as tolerant at higher salt concentration (120 mM NaCl).Further, Punjab Sadabahar, Malapur local, R-2581, IC-112341, ArkaKusumaker, Pusa Bindu, Annamalai and Mattigulla were identified as salt tolerant based on physiological, growth and yield traits in pot culture experiment at vegetative and reproductive stages upon 2 levels of salt stress (60 mM and 120 mM NaCl). Correlation analysis revealed that fruit yield per plant has showed significant positive association with plant height (60 mM NaCl), number of fruits per plant and average fruit weight (60 mM and 120 mM NaCl).

*In silico*biocuration from STIFDB v.2.0 resulted in the identification of 52 salt responsive unigenes from among the 1040 multiple-stress related candidate genes. Twenty-three out of 52 unigenes having > 75 % identity were chosen based on BLASTnsearch against eggplant in Solgenomics Network along with 6 genes from wild eggplant. Ten out of 29 genes were used for expression analysis. The QRT-PCR analysis of 10 salt responsive candidate genes in the leaf tissues of Bhagyamathi (salt tolerant) and R-2580 (salt susceptible) showed a differential expression pattern of candidate genes in tolerant and susceptible genotypes upon 120 mM NaCl treatment. Four genes *viz*., *Cellulose synthase 6*, *Inorganic H pyrophosphatase*, *14-3-3 Protein*, *Cyclophilin like Protein*were up-regulated in Bhagyamathi while three genes *viz*., *NAC domain transcription factor*, *Cellulose synthase 6*, *N- Acetyl-Glutamate Synthase* were up-regulated in R-2580.

Analysis of Molecular Variance (AMOVA) using 20 SSR markers revealed a high intra-population diversity (99.87%) and low inter-population diversity (0.13%) among salt tolerant eggplant sub-populations and the *per cent* polymorphism was found to be 96.7 %. The Principal Coordinate Analysis separated the 3 sub-populations of eggplant as well as 9 individuals of three sub-populations into different quadrants due to presence of fairly good amount of diversity between different genotypes. The population structure analysis revealed fourteen genetic clusters (K=14) which spread across all the sampled populations, forming genetically admixture populations.

September, 2020

(Harish Babu, B. N.)

Major Advisor

3. Genetic Studies for Yield and Seed Quality Traits in Brinjal (*Solanum melongena* L.)

(SACHIN N. HELVAR)

ABSTRACT

The present investigation was carried out in a randomized block design and replicated thrice. Significant differences among 23 brinjal genotypes were observed for all the characters under study. High PCV and GCV, high heritability coupled with high genetic advance over mean were observed for number of flower clusters per plant, number of flowers per cluster, number of fruits per cluster, per cent fruit set, fruit length, fruit diameter and fruit weight under field condition which indicated lesser influence of environmental factor on expression of these traits. Whereas, under *in vitro* condition *viz.*, number of days taken for germination, germination percentage, root length, shoot length, root to shoot ratio, seedling fresh weight, seedling dry weight, seedling vigour index-I and seedling vigour index-II reported same results which indicated prevalence of additive gene action in their inheritance. Hence, these characters play vital role in selection of elite genotypes. Fruit yield per plant was postively and significantly correlated with number of flower clusters per plant, number of fruits per cluster, per cent fruit set, fruit length and fruit diameter at both genotypic and phenotypic level. Path analysis revealed that positive direct effect on fruit yield per plant was observed for number of flower clusters per plant, number of fruits per cluster, number of fruits per plant, fruit length, fruit diameter and fruit weight. Twenty-three brinjal genotypes were grouped into seven clusters based on Mahalanobis D^2 statistic, where cluster I was the largest containing seven genotypes followed by cluster III (6 genotypes). The maximum intercluster distance was between cluster II and cluster V followed by cluster IV and cluster V. Highest intracluster distance was observed in cluster V. Fruit weight contributed maximum to the total genetic diversity followed by fruit length.

October, 2020

(Lakshmana, D.)
Major Advisor

4. Genetic Diversity and Correlation Studies in Brinjal (*Solanum melongena* L.) Germplasm

(PRAVEEN PARASAPPAYANKANCHI)

ABSTRACT

The experiment was carried out during 2019-20*kharif*seasonina Randomized complete block design (RCBD) with two replications at College of Horticulture, Hiriyur.Thestudy aims to estimate the extent of genetic variability, correlation, path coefficient analysis and genetic divergence for yield and yield traits among 33 genotypes of brinjal.Analysis of variance indicated highly significant differences among the genotypes for all the traits under study. High estimates of GCV, PCV, heritability along with genetic advance as percent of mean (GAM) wasobservedfor number of flowers per cluster, fruit length, fruit girth and fruit weightindicates the presence of high variability for these traits and offered better scope for improvement through selection. Correlation study revealed highest significant positive association for total fruit yield with fruit weight followed bynumber of clusters per plant, number of fruits per plant, number of flowers per cluster.High positive direct effects on fruit yield was exhibited through fruit weight, number of clusters per plant, number of secondary branches per plant and fruit length at both phenotypic and genotypic level.

Genetic diversity studies through Mahalanobis D^2analysis indicated that 33 genotypes were grouped into nine clusters and maximum number of genotypes grouped under cluster II. The cluster V showed maximum intra-cluster distance and maximum inter-cluster distance was observedbetween clusters IV and VIII.Hence, hybridization between these genotypes would be effective. The highest cluster mean for total fruit yield was recorded in cluster VII and maximum contribution towards total genetic divergence were obtained from fruit length followed by fruit weight and least from number of primary branches per plant.Study indicated that fruit weight, number of fruits per plant, number of clusters per plant, number of flowers per cluster, number secondary branches per plantandfruit lengthwere important traits for yield improvement in brinjal.

November, 2020

(Lakshmana, D)

Major Advisor

5. Genetic Diversity and Correlation Studies in Brinjal (*Solanum melongena* L.) Germplasm

(PRAVEEN PARASAPPAYANKANCHI)

ABSTRACT

The experiment was carried out during 2019-20*kharif*seasonina Randomized complete block design (RCBD) with two replications at College of Horticulture, Hiriyur.Thestudy aims to estimate the extent of genetic variability, correlation, path coefficient analysis and genetic divergence for yield and yield traits among 33 genotypes of brinjal.Analysis of variance indicated highly significant differences among the genotypes for all the traits under study. High estimates of GCV, PCV, heritability along with genetic advance as percent of mean (GAM) wasobservedfor number of flowers per cluster, fruit length, fruit girth and fruit weightindicates the presence of high variability for these traits and offered better scope for improvement through selection. Correlation study revealed highest significant positive association for total fruit yield with fruit weight followed bynumber of clusters per plant, number of fruits per plant, number of flowers per cluster.High positive direct effects on fruit yield was exhibited through fruit weight, number of clusters per plant, number of secondary branches per plant and fruit length at both phenotypic and genotypic level.

Genetic diversity studies through Mahalanobis D^2analysis indicated that 33 genotypes were grouped into nine clusters and maximum number of genotypes grouped under cluster II. The cluster V showed maximum intra-cluster distance and maximum inter-cluster distance was observedbetween clusters IV and VIII.Hence, hybridization between these genotypes would be effective. The highest cluster mean for total fruit yield was recorded in cluster VII and maximum contribution towards total genetic divergence were obtained from fruit length followed by fruit weight and least from number of primary branches per plant.Study indicated that fruit weight, number of fruits per plant, number of clusters per plant, number of flowers per cluster, number secondary branches per plantandfruit lengthwere important traits for yield improvement in brinjal.

November, 2020

(Lakshmana, D)
Major Advisor

Entomology

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Entomology

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1. Studies on Bee Forage Resources and Melissopalynology of Honey in Kodagu District, Karnataka

(C. N. NIDHI)

ABSTRACT

The present investigation on bee forage resources and melissopalynology of honey wasconductedat four different ecosystemsof Kodagu during 2019 - 2020.Therewere 80,67,89 and 93 forage plants belonging to 44, 38, 38 and 39 families in evergreen, semi-evergreen, moist deciduous and dry deciduous forest ecosystems, respectively.The maximum forage availability was in the winter season. The periods of February to May, June to September and October to January were the major honey flow, dearth and minor honey flow periods, respectively. The similarity index values of species ranged from 0.245 to 0.525 between the ecosystems. There were 38,34,33 and 32 species of forage plants exclusive to evergreen, moist deciduous, dry deciduous and semi-evergreen forest ecosystems, respectively.Among the tree species assessed,*Santalum album*(3µl/flower and 45,975 µl/tree) had the highest nectar yielding potentiality, enticing 1688 nectar foragers. *Gliricidiasepium*(3.92 mg/flower and 20,254.6 mg/tree) was the most potential pollen yielding tree, enticing 1178 pollen foragers. The melissopalynological studies revealed that, of the eight honey samplesanalyzed,five were unifloraland three multifloral belonging to Class III or IVwith high Absolute Pollen Concentration per 10gms of honey. The predominant pollen sources were *Tabebuia sp., Sapinduslaurifolius* and *Alternantherasessilis*in minor honey flow periods of semi-evergreen, moist deciduous and dry deciduous ecosystems, respectively. During March - April, *Cocosnucifera and Taraxacum sp.*were the predominant pollen sources in semi-evergreen and dry deciduous ecosystems. The information generated is useful for planning the migration of bee colonies, augmenting forage resources, and in branding theCoorg honey.

September, 2020

(R. N. Kencharaddi)
Major Advisor

2. Seasonal Incidence and Management of Sapota Seed Borer, *Trymalitis margarias* Meyrick (Lepidoptera: Tortricidae)

BHARTI JAMBUNATHA PATIL

ABSTRACT

An investigation on seasonal incidence and management of sapota seed borer, *Trymalitis margarias* Meyrick was carried out at College of Horticulture and Krishi Vignana Kendra, Mudigere during the year 2019-2020. The seed borer infestation was observed throughout the study period but the intensity varied in Kalipatti and Cricket Ball cultivars, where the severe infestation was documented in *cv*. Kalipatti than in Cricket Ball. The minimum seed borer infestation was noticed during September 2019 (5.13 and 2.56 % fruit damage) while the maximum was in March 2020 (51.92 and 30.13 % fruit damage) in Kalipatti and Cricket Ball cultivars, respectively. Further, rainfall had a significant negative correlation with seed borer infestation (r= -0.757 and -0.765, respectively) while maximum temperature (r= 0.788 and 0.713, respectively), maximum relative humidity (r= 0.661 and 0.676, respectively) and bright sunshine hours (r= 0.866 and 0.708, respectively) had a significant positive influence in both the cultivars. After first and second insecticidal spray, profenophos 50 EC @ 1.5ml per litre was found to be effective in reducing the damage by seed borer to a lowest of 0.13 larvae per fruit and 9.72 per cent fruit damage (85.81 and 81.40 % reduction in larvae and fruit damage, respectively over control) and next best insecticide was novaluron 10 EC @ 0.5ml per litre (0.19 larvae/ fruit and 13.43 % fruit damage with 72.93 and 72.26 % reduction in larvae and fruit damage over control, respectively). Indoxacarb 14.5 SC, thiodicarb 75 WP and deltamethrin 2.8 EC were moderately effective in managing the seed borer whereas azadirachtin 10,000 ppm was least effective. Further, novaluron 10 EC was found most profitable with highest fruit yield (7.37 t/ha) and benefit-cost ratio (2.96) followed by profenophos 50 EC (7.14 t/ha and 2.91, respectively) while untreated plot was least economic treatment (3.75 t/ha and 1.52).

November, 2020

(Suchithra Kumari, M. H.
Major Advisor

3. Faunistic Studies on the Non- *Apis* Bees of Cultivated Ecosystems in Western Ghats of Karnataka

(SANATH, R. M.)

ABSTRACT

Studies conducted on non-*Apis* bee fauna in cultivated ecosystems in Western Ghats of Karnataka revealed a total of 47 species in nine genera. Three families of the Apoidea super family *viz.* Apidae, Megachilidae and Halictidae were represented in Western Ghats of Karnataka. The family Apidae was representedby two subfamilies *viz*., Xylocopinae (3 genera and 23 species and four unidentified species), Apinae (4 species and two genera). Thesubfamily Xylocopinae was represented with three tribes Xylocopini, Ceratini and Allodapini and Apinae was represented with two tribes Anthophorini and Melectini. The family Megachilidae represented with single subfamily Megachilinae (14 species under five genera with an two unidentified species) with two tribes Megachilini and Anthidiini. Family Halictidae was represented with 10 genera. Of the 47 species collected, *Ceratina* (*Neoceratina*) *propinqua* substantiated the earlier record of this species from South India by Prashantha (2014). During this study 15speciesof host plant were reported on which bees were collected.The crop plants like coffee, cashew, cardamom, cucumber were also reported as the host plants which showed their importance in the cropping ecosystem. A checklist of the species documented in the present studyalong with the diagnostic characters and key for their identification areprovided.

November, 2020

(Revanna Revannavar)
Major Advisor

4. Studies on Major Insect Pests of Tomato and their Management under Polyhouse Condition

(SWATHI, H. DIBBAD.)

ABSTRACT

The investigations were carried out on tomato cultivars exhibiting population dynamics, identification of resistance source and evaluation of insecticidal modules for major insect pests like whitefly (*Trialeurodes vaporariorum* Westwood), serpentine leaf miner (*Liriomyza trifolii* Burgess) and tomato pinworm (*Tuta absoluta* Meyrick). The experiment was carried out under naturally ventilated polyhouse condition during 2019-20 at College of Horticulture, Mudigere. Population dynamic studies indicated that, peak incidence of whitefly nymphs and adults were noticed during 16th SMW, which showed a positive correlation with minimum and maximum temperature. Whereas, peak incidence of leaf miner was noticed during 16th SMW, which showed positive correlation with maximum temperature, maximum and minimum relative humidity. However, peak incidence of tomato pin worm was noticed during 18th SMW, which showed positive correlation with maximum, minimum temperature and negative correlation with minimum relative humidity. Ten tomato cultivars were evaluated to identify the resistant source, among them, the cultivars GS 600 (0.86 nymphs/2 cm^2 and 1.95 adults/ leaf) was categorized as resistantto whitefly. Whereas, the cultivars Omnia, Emarald, Arka Rakshak, Arka Samrat and Arka Abhedh (1.75, 2.08, 2.32, 2.66 and 2.80 live mines/ leaf, respectively with 14.54, 15.79, 17.21, 18.90 and 19.87 % leaf infestation) were categorized as moderately resistant to leaf miner. Further, the cultivars *viz.*, Omnia, Emarald and Arka Rakshak (0.91, 0.77 and 1.12 mines/ leaf with 18.02, 16.16 and 20.28 % blotch miner/ pin worm infestation) were categorized as moderately resistant to tomato pinworm. Among insecticidemodules, T_4 (seed treatment with imidacloprid, seedling root dip with imidacloprid, fipronil 5 SC (48 DAT) + imidacloprid 17.8 SL (73 DAT) + chlorantraniliprole 18.5 SC(98 DAT) + dinotefuron 20 SG (123 DAT) insecticide module was proved to be better in reducing whitefly, leaf miner and tomato pinworm population on tomato under naturally ventilated polyhouse condition.

December, 2020

(L. Hanumantharaya)
Major Advisor

Floriculture and Landscape Architecture

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Floriculture and Landscape Architecture

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1. Performance of *Dendrobium* Cultivars under Shade House Condition

(MOHAMMAD MUSTAFA MUSAWER)

ABSTRACT

An experiment on "Performance of *Dendrobium* cultivars under shade house condition" was carried out at Orchidarium, Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, during 2019-20. The experiment was accomplished in a Randomized Completely Block Design (RCBD) and replicated thrice with 11 cultivars. *viz*., Big Jumbo, Blue Planet, Pink Strip, Pink Zoo, Hollywood Cherise, Succulent Sonia, Singapore, Udom Red, Burana Jade, Indigo, Sonia-17. The results revealed that among the cultivars Big Jumbo had maximum pseudobulb height (35.56 cm), pseudobulb girth (3.44 cm), number of pseudobulbs per plant (6.81), number of leaves per pseudobulb (16.35), length of internode (6.00 cm), leaf length (16.50 cm), leaf breadth (4.90 cm), leaf area (54.78 cm^2) and leaf area index (4.89)were observed in cv. Big Jumbo. Whereas,the biochemical parameters such as chlorophyll content (1.016 mg/g.fr.wt.) was registered maximum in cv. Udom Red. The cv. Hollywood Cherise took the minimum days for bud initiation (139.64 days), cv. Blue Planet for bud development (16.16 days), cv. Udom Red for first floret opening to harvest (15.60 days) has taken less number of days whereas, maximum flowering duration was observed in cv. Big Jumbo (25.47 days) and maximum spike length (32.83 cm), spike girth (7.10 mm), spike weight (20.49 g), number of florets per spike (8.40), length of floret (7.80 cm), floret diameter (7.60 cm), vase life (26.01 days), number of spikes per plant (7.20) and number of spikes per square meter (72.00) were recorded. Cultivar Big Jumbo, Burana Jade, Udom Red and Indigo performed better in the hill zone of Karnataka under shade house condition.

September, 2020

(Nataraj S. K.)

Major Advisor

2. Efficacy of Herbicides on Growth, Flowering, Quality and Yield of Gladiolus (*Gladiolus grandiflora* L.) Under Hillzone of Karnataka

(ANAND BURUD)

ABSTRACT

A field experiment was conducted to evaluate the efficacy of pre-emergent herbicides in gladiolus under the hill zone of Karnataka at College of Horticulture, Mudigere, having twelve treatments replicated thrice in Randomized Complete Block Design during 2019 – 20. Among the herbicidal applications, pre-emergence application of pendimethaline at 1.0 kg *a.i.*/ha recorded minimum number of grass weeds, sedge weeds, broad leaved weeds, total weed population and dry weight of weeds (3.92, 2.79, 2.57, 9.28 and 3.92 g, respectively) at 60 days after planting. This treatment also recorded significantly maximum growth and yield attributes at 60 days after planting *viz.* plant height (68.30 cm), number of leaves per plant (10.20), leaf area and leaf area index (1023.93 cm^2 and 1.72, respectively), total chlorophyll content in leaves (2.36 mg/g of fresh weight), weed control efficiency (49.22 %), length of spike (65.91 cm), length of rachis (38.94 cm), length of floret (10.92 cm), diameter of floret (10.21 cm), spike girth (8.73 mm), number of florets per spike (11.32), spike weight (68.87 g), vase life (10.16 days), number of spikes per plant and per hectare (1.40 and 210600.00, respectively), weight of the corms and cormels per plant (96.66 g and 28.19 g, respectively), diameter of the corms and cormels (5.10 cm and 5.18 mm, respectively), number of corms, cormels and yield of corms, cormels (1.73, 33.21, 14450 kg/ha and 912.20 kg/ha, respectively) and maximum B:C ratio (1.73). Weedy check plots recorded significantly lower growth and yield attributes. However, pre-emergence application of pendimethaline at 1.0 kg *a.i.*/ha, pendimethaline at 0.75 kg *a.i.*/ha was found on par with butachlor at 1.0 kg *a.i*/ha for control of total weed population at 30 days after planting.

November, 2020

(Chandrashekar S. Y.)
Major Advisor

3. Effect of Plant Growth Regulators on Growth, Flower Quality and Yield of Spider Lily (*Hymenocallis speciosa* L.)

(CHAITHRA, P. V.)

ABSTRACT

An experiment on “Effect of plant growth regulators on growth, flower quality and yield of spider lily (*Hymenocallis speciosa* L.) was carried out at Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, during 2019-20. The experiment was laid out in Randomized Completely Block Design (RCBD) and replicated thrice with nine treatments *viz.*, Gibberellic acid (150 and 200 ppm), Naphthalene acetic acid (150 and 200 ppm), ChlroemquatChloride (500 and 1000 ppm), Benzyl Adenine (100 and 200 ppm) and control. The plants were sprayed with different plant growth regulators at 45, 60 and 75 days after planting.The results revealed that GA_3 @ 200 ppm recorded maximum plant height (69.67 cm), number of leaves (40.92), leaf length (60.67 cm), leaf breadth (6.67 cm), leaf area (5789.51 cm^2), plant spread (E-W) (N-S) (70.75 cm and 55.57 cm, respectively), and the maximum flowering duration (30.00 days), spike length (57.37 cm), flower bud length (16.53 cm), flower bud diameter (1.21 cm), flower bud weight (2.90 g), flower bud yield per plant (114.00 g), bud yield per hectare (5.98 t), number of spikes per plant (3.23), spikes per plot (58.20), maximum diameter of the bulb (9.28 cm), weight of the bulb (376.00 g), bulb yield per plot (27.82 kg) and minimum daysfor spike emergence (91.33),days taken from bud initiation to harvesting of a flower spike (9.47). The total chlorophyll (5.71 mg/gfr. wt.) content of the leaves was recorded in NAA @ 200 ppm. while, CCC @ 1000 ppm recorded the highest vase life with anthers (2.80 days), vase life without anthers (3.13 days) and shelf life (36.90 hrs). The treatment BA @ 200 ppm recorded the maximum number of suckers (5.00/ plant), number of flowers (15.17/spike),number of bulbs and bulbletsper plant (5.00 and 2.96 respectively) and BC ratio (4.02).

November, 2020

(B. HemlaNaik)
Major Advisor

4. Effect of Benzyl Adenine and Gibberellic Acid on Growth, Flowering, Yield of Flowers and Bulbs in Asiatic Lily

(JAYASHREE, N.)

ABSTRACT

The study on "Effect of benzyladenine and gibberellic acid on growth, flowering, yield of flowers and bulbs in Asiatic lily" was carried out under naturally ventilated polyhouse at College of Horticulture, Mudigere during 2019-2020.The experiment was laid out in a Randomized Complete Block Design (RCBD) with 16 treatments which are replicated thrice. The treatments consist of BA (50,100 and150 ppm),GA_3(100,150 and 200 ppm) and their combinations along with the control(water soaking).The bulbs were soaked for 12hrs in a growth regulator later shade dried for 2 hrs and used for planting.The results revealed that bulbs soaked in GA_3@ 200 ppm exhibited earlier sprouting (6.00 days),maximum sprouting percent (99.03),plant height (83.13cm), number of leaves (67.25),leaf length (10.27 cm), leaf breadth (2.51 cm),leaf area(1139.00 cm^2),leaf area index(3.80), early flower bud initiation(36.00 days),minimum days taken for 50 percent flowering (73.52),maximum duration of flowering(18.22 days), number of spikes /m^2(20.93), number of buds/spike(6.00),bud length(10.24cm),bud diameter(16.07mm),petal length (10.91cm), petal breadth (4.67cm),length of flower stalk(83.04cm), girth of flower stalk (11.20 mm), weight of flower stalk (99.18g), vase life of flowers with anthers (13.03 days),vase life of flowers without anthers(15.17 days),weight of bulbs per plant(74.94g),diameter of bulb(10.03cm), number of scales per bulb(28.22),length of scales(2.87 cm) and breadth of scales (3.07cm). The BA @ 150 ppm recorded maximum basal stem diameter (18.06mm),chlorophyll-a (1.31mg/gfr.wt), chlorophyll-b (0.63mg/gfr.wt),total chlorophyll (1.94mg/gfr.wt),number of bulbs/plant (3.46), number of bulblets/plant (7.02)and also recorded maximum benefit cost ratio(3.00) with net return (₹.1183335.00/1000 m^2).

November, 2020

(Chandrashekar S. Y.)
Major Advisor

5. Ecological Niche Modelling, Regeneration and Conservation of the Endangered Orchid *Vanda thwaitesii* Hook. f.

(KIRANKUMAR, H.)

ABSTRACT

Research on "Ecological Niche Modelling, regeneration and conservation of the endangered orchid *Vanda thwaitesii* Hook. f.," was carried out at College of Horticulture, Mudigere and Division of Floriculture and Medicinal Crops, ICAR-Indian Institute of Horticultural Research, Hesaraghatta, Bangalore during the academic year 2019-20. The experiment was carried out in a Completely Randomized Design (CRD) and replicated thrice. The maximum entropy modelling showed high Area Under Curve (AUC) values (>0.99 for both test and training data) indicating that predicted models were highly accuarate. Among the 19 bioclimatic variables Bio_2 (mean diurnal range), Bio_3 (Isothermality), Bio_1 (Annual Mean Temperature), Bio_{11} (Mean Temperature of Coldest Quarter) and Bio_{12} (Annual Precipitation) were the five important predictors of *Vanda thwaitesii* Hook. f., habitat distribution. Six months old immature seeds responded positively among the various explants selected for initiating *in vitro* regeneration of *Vanda thwaitesii* Hook. f. In contrast leaf, root and inflorescence segments failed to respond in the various media combinations tested. Culture initiation in *Vanda thwaitesii* Hook. f., using seeds was carried out on quarter strength MS media with 87 per cent of *in vitro* seed germination. The medium for initiation and elongation of shoots was $^1/_4{}^{th}$ MS + 0.5 mg L^{-1} NAA + 1.5 mg L^{-1} BAP. The medium for initiation and elongation of roots was $^1/_4{}^{th}$ MS + 1.5 mg L^{-1} IBA + 0.5 mg L^{-1} BAP. Among the methods of cryopreservation, step freezing method (43.01%) elicited the best results over the rapid freezing method (39.19%) . In the interaction study, fresh seeds by step freezing method (79.01%) showed the maximum per cent of seed germination which was on par with the seed germination of fresh seeds through rapid freezing method (79.01%).

November, 2020

(Nataraj S. K.)
Major Advisor

6. Studies on Winter Annuals for their Growth, Flowering, Flower Quality and Yield under Hill Zone of Karnataka

(SINDHU, K.)

ABSTRACT

The investigation entitled "Studies on winter annuals for their growth, flowering, flower quality and yield under hill zone of Karnataka"wascarried out at Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, during 2019-20. The experiment was laid out in Randomized Completely Block Design (RCBD) with twelve treatments and threereplications. The annuals *viz*., *Calendula officinalis* L., *Callistephus chinensis* (L.) Nees, *Cosmos bipinnatus* L., *Chrysanthemum coronarium*L., *Gomphrena globosa* L., *Helichrysumbracteatum*L., *Lupinushartwegii*Lindl., *Salvia splendens*L., *Lathyrusodoratus*L., *Dianthus barbatus* L., *Xerochrysumviscosum*Rx. Bayer, and *Zinnia elegens* L. are evaluated for their mean performance on growth, flowering, flower quality and yield parameters. The observations recorded on various growth and flowering parameters were subjected to statistical measures mean, range, standard error and coefficient of variation. The highest score for cut flower suitability was obtained in *Callistephuschinensis* (L.) Nees (5.00), *Gomphrenaglobosa* L. (5.00), *Helichrysumbracteatum* L. (5.00), followed by *Chrysanthemum coronarium* L. (4.76) and *Calendula officinalis* L. (4.22). The maximum score for loose flower suitability was obtained in *Callistephuschinensis* L. (5.00), *Chrysanthemum coronarium* L. (5.00), followed by *Calendula officinalis* L. (4.74) and *Gomphrenaglobosa* L. (4.66). The highest flower yield per plant was observed in *Chrysanthemum coronarium* L. (432.44 g) followed by *Calendula officinalis* L. (236.28 g) and *Callistephuschinensis* L. (174.25 g) are suited for flower purposes. In case of seed production, the highest average seed yield per plant was obtained in*Chrysanthemum coronarium* L. (79.13 g), *Calendula officinalis* L. (56.22 g), *Lathyrusodoratus* L. (52.65 g) and *Lupinushartwegii*Lindl. (28.50 g) were recorded best of all winter annuals under study. The highest BC ratio was recorded in *Calendula officinalis* L. (12.88),*Chrysanthemum coronarium*L. (11.74), *Lathyrusodoratus* L. (9.55) and *Lupinushartwegii*Lindl. (9.07) with the best suitability for commercialization.

November, 2020

(B. HemlaNaik)

Major Advisor

Fruit Science

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Fruit Science

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1. Studies on Effect Plant Growth Regulators and Chemicals on Seed Germination of Avocado (*Persea americana* Mill.)

(NANGIALAI HAKIMI)

ABSTARCT

Study on "effect of plant growth regulators and chemicals on seed germination of avocado (*Perseaamericana* Mill.)" at the department of fruit science, college of Horticulture, Mudigere, during the year 2019-2020, under Complete Randomized Design with thirteen treatments and replicated thrice. Seeds were soaked in different solutions of plant growth regulators and chemicals. Among all treatments seeds soaked in GA_3 400 ppm recorded early germination (13.00 days) with 50 per cent germination (19.33 days) and highest germination percentage (95.22). Seedling growth parameters like stem girth (7.97 mm), shoot length (75.67 cm), leaf number (20.67), root length and volume (28.08 cm and 14.56 cc, respectively), seedling length (103.74 cm), fresh and dry weight of seedlings (20.08 and 8.47 g, respectively), seedling vigour index-I and II (9878.54 and 806.60, respectively), root: shoot ratio (0.92) were also maximum in seeds treated with GA_3 400 ppm. Among all the treatments, GA_3 400 ppm was superior to the other treatments, followed by GA_3 600 ppm to enhance the germination traits, seedling growth traits, less mortality percentage (2.38 %).

November , 2020

(B.S. Shivakumar)

Major Advisor

2. Effect of Chitosan Foliar Application on Growth, Yield and Fruit Quality of Strawberry (*Fragaria* × *ananassa* Duch.) under Naturally Ventilated Polyhouse

NITHIN, K. M.

ABSTRACT

The experiment was conducted to assess the effect offoliar application of chitosan on growth, yield and fruit quality attributes of strawberry under naturally ventilated polyhouse at Department of Fruit Science, College of Horticulture, Mudigere during 2019-20. The experiment was laid out in Completely Randomized Design with twelve treatmentswith three replications. The significant differences were observed among the different treatmentstested for different parameters. The maximum plant height (28.73 cm), number of trifoliate leaves per plant(28.84), plant spread in North - South (33.32 cm) and East - West direction (32.65 cm), leaf area (105.65 cm^2),number of crowns per plant (4.55), total plant dry weight (33.56 g), chlorophyll-a, chlorophyll-b and total chlorophyll content in leaf (1.85 mg g^{-1}leaf, 0.59 mg g^{-1} leaf and 2.44 mg g^{-1} leaf, respectively), number of flowers per plant (26.78), duration of flowering (94.17), fruit set percentage (73.71), berry length (3.96 cm), berry diameter(3.15 cm), berry volume(19.43 cc), berry weight (18.55 g), number of berries per plant (19.74), yield per plant and per hectare (366.17 g and 6.08 tha^{-1}, respectively), fruit firmness (0.55 kg N^{-1}), total soluble solids (7.96 °Brix), shelflifeof fruits(3.93 days) and also benefit cost ratio (1:1.99) was recorded in plants treated with chitosan 3 g l^{-1}at 45, 90 and 135 DAP. While, maximum antioxidants activity (413.42 µg BHT g^{-1} fruit), total sugars in berries (6.44 %) was recorded in treatment comprised of foliar application of chitosan 2 g l^{-1} at 45, 90 and 135 DAP. The minimum days taken for first flower bud emergence and days to fruit maturity after flowering (51.27 and 24.28 days, respectively)and physiological loss in weight of berries (3.45 %) were observed in plants treated with chitosan 3 g l^{-1} at 45, 90 and 135 DAP.

September , 2020 (D. Madaiah)

Major Advisor

3. Influenceof Organic Manures on Growth, Yield and Quality of Strawberry under Naturally Ventilated Polyhouse

(SAHANA, B. J.)

ABSTRACT

The experiment was conducted to know the effect of organic manures on growth, yield and quality of strawberry under naturally ventilated polyhouse at the Department of Fruit Science, College of Horticulture, Mudigere during 2019-20. The experiment was laidout in Randomized Complete Block Design (RCBD) with nine treatments and three replications. Significant differences were noticed among the treatments. Thehighest values for plantheight(28.85 cm), numberoftrifoliate leavesperplant(27.51),plantspreadinNorth-SouthandEast-Westdirection(30.42 cmand30.04cm,respectively),leafarea(106.78cm^2), leaf area index (0.881), number of crowns per plant (4.65), number of runners per plant (6.21), plant dry weight(36.87g) at harvest, number of flowers per plant (24.50), fruit weight(18.41g), fruit length(4.31 cm), fruit diameter (3.48 cm), fruit volume (21.43 cc), number of fruits per plant (19.05), yield pe rplant (350.79g), shelf life(3.52 days), net income (129428 ₹/500m^2) and benefit to cost ratio (2.20) were recorded in the treatment Vermicompost+ Jeevamruth @ 500ml per pot + Beejamruth seedling treatment.The minimum days taken for first flower emergence (55.78) and minimum titratable acidity (0.819%), maximumTSS (8.030°Brix), chlorophyll (2.679 mg/ g), total sugar (7.568%), ascorbic acid (58.749mg/100g) and sugar to acid ratio (9.240) were recorded in the treatment Vermicompost+ Jeevamruth @ 500ml per pot + Beejamruth seedling treatment.Basedonthe resultsobtained,theplantsgrown with the application of Vermicompost+Jeevamruth @ 500ml per pot + Beejamruth seedling treatment showedthebestresponsetoobtaingrowth,yieldandmaximum returns.

November , 2020 (D. Madaiah)

Major Advisor

4. Effect of Foliar Application of Potassium on Yield and Quality of Pomegranate (*Punica granatum* L.) cv. Bhagwa

(CHIDANANDA, G)

ABSTRACT

Field experiment comprising of thirteen treatments with three replications was conducted to know the "effect of foliar application of potassium on yield and quality of pomegranate (*Punica granatum* L.) cv. Bhagwa"during 2019-2020 at College of Horticulture, Hiriyur, Chitradurga district of Karnataka.Among the different treatments with respect to the foliar spray of various sources of potassium,showed maximum in 3 per cent K_2SO_4treatment *viz.*,fruit yield (14.49 kg/plant and 12.07 t / ha), average fruit weight (381.92 g), diameter (92.07 mm), volume (401.05 ml) and different aril parameters like the number of arils (719.67), total aril weight (315.51 g), the weight of 100 arils (43.06 g), aril percentage (83.40),whereas fruit cracking (2.65 %), seed: aril ratio (0.024 %) was minimum. The maximum rind thickness (4.10 mm) was recorded in the treatment of 3 per cent K_2SO_4.$MgSO_4$ spray.Among the quality parameters,maximum TSS (16.40^0Brix), sugar: acid ratio (35.69), reducing sugars (14.51 %), non-reducing sugars (1.55 %), total sugars (16.14 %), juice pH (3.94), ascorbic acid (17.73 mg/ 100g FW), anthocyanin content (8.98 mg/ 100g FW) with lower acidity (0.45 %) and strong red-A fruit and aril color were recorded in the fruits treated with 3 per cent K_2SO_4 spray.Likewise, with respect to post-harvest parameters, minimum physiological loss in weight (10.91 %) found during twelth day of storageandmaximum shelf life (14.82 days) in the treatments of foliar spray with 3 per cent K_2SO_4. Leaf analysis of macronutrients *viz.*, leaf N (1.94 %), leaf P (0.27 %) and leaf K (1.89 %) was recorded maximum in the treatments 3 per cent KNO_3, 3 per cent KH_2PO_4 and 3 per cent K_2SO_4 whereas, micronutrients was found non-significant except in boron which was reported maximum (28.24 ppm) in the 3 per cent KH_2PO_4(T_{11}). The higher B:C ratio (3.45) was reported in the foliar spray of 3 per cent K_2SO_4 (T_3).

November , 2020

(B.S. Shivakumar)

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

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1. Effect of Foliar Application of Benzyl Adenine and Nutrients on Growth, Yield and Quality of Transplanted Ginger (*Zingiber officinale* Rosc.) under Hill Zone of Karnataka

(RANI JAYADURGA NAYAK)

ABSTRACT

An experiment was carried out to assess the effect of foliar application of Benzyl adenine and nutrients on growth, yield and quality of transplanted ginger (*Zingiber officinale* Rosc.) under hill zone of Karnataka at ZAHRS, Mudigere, with twelve treatments and three replications in RCBD during the year 2019-20. Results of the study reveals that among the different treatments studied, the clumps treated with 70 per cent RDF (NPK) as soil application + 30 per cent RDF (NPK) as foliar spray + micronutrients spray (Zn, Fe and B) at 0.25 per cent each recorded maximum pseudostem height (68.18 cm) and girth (1.10 cm), total fresh weight of the plant (1085.22 g), total dry matter production (237.99 g), total chlorophyll content (57.09 SPAD units), rhizome length and breadth (18.08 and 17.54 cm, respectively), primary finger length (11.78 cm) and circumference (7.38 cm), yield per plant (913.13 g), per plot (5.79 kg) and per hectare (26.80 t), curing percentage (21.88), cured yield (5.91 t / ha), essential oil (1.59 %), oleoresin content (8.79 %) and also highest benefit cost ratio (2.81). While, the maximum number of tillers per clump (21.73), number of leaves per tiller (16.91) and per clump (233.30), leaf length (26.33 cm) and breadth (2.63 cm), leaf area (46.26 cm^2) and leaf area per clump (10792.46 cm^2) were recorded in clumps supplied with 100 per cent RDF (NPK) as soil application + BA spray at 75 ppm. The minimum macronutrients content in the soil and maximum macronutrients content in the leaves were recorded in the clumps treated with 70 per cent RDF (NPK) as soil application + 30 per cent RDF (NPK) as foliar spray + micronutrients spray at 0.25 per cent each.

September, 2020

(Ravi. C. S.)
Major Advisor

2. Morphological Characterization, Tissue Culture and *In-Vitro* Conservation Studies in *Alpiniagalanga* (L.) Willd.

(POOJA, D. A.)

ABSTRACT

An investigation on "Morphological characterization, tissue culture and *in-vitro* conservation studies in *Alpiniagalanga* (L.) Willd." was carried out at the Division of Floriculture and Medicinal crops, ICAR-IIHR, Bengaluru during the year 2019-20. Fourteen accessions of ten years old plants were selected for the study, among the fourteen accessions of *Alpiniagalanga*the genotypic and phenotypic coefficient of variations were high for characters *viz.*, petiole length, inflorescence length and leaf area. High heritability coupled with high genetic advance over mean was observed for petiole length, plant height, leaf area, leaf length and inflorescence length. Correlation study revealed that plant height had a highly significant and positive association with yield per tiller at the phenotypic and genotypic level.Among fourteen accessions evaluated, ACC-8 and ACC-10 were found promising. Healthy rhizome buds were cultured on MS medium supplemented with different concentrations and combinations of growth regulators like BAP, Kinetin and NAA. Among various combinations of growth regulators used in tissue culture,the maximum number of shoots per explants (2.07±0.08)and highest shoot length (3.40±0.05) were found in the combination of Kinetin (3.00 mg/l) + NAA (0.5 mg/l) while the maximum number of roots per explant (1.78±0.02)and highest root length(3.63±0.03) were observed in the combination of BAP (3.00 mg/l) + NAA (0.5 mg/l), whereas BAP (2.0 mg/l) +NAA (1 mg/l) combination significantly recorded the maximum number of leaves per explants (4.85±0.02).

September, 2020

(Raviraja Shetty, G.)
Major Advisor

3. Seed Propagation, Tissue Culture and *In-Vitro* Conservation Studies in *Aristolochia tagala* Cham.

(RAJANI MANJUNATH BHAT)

ABSTRACT

An investigation was undertaken for seed propagation, tissue culture and *in-vitro* conservation studies in *Aristolochia tagala* Cham. at the Division of Floriculture and Medicinal Crops, ICAR-Indian Institute of Horticultural Research, Hesaraghatta, Bengaluru during 2019-2020.Among the different germination inducing treatments, the water soaking treatment responded well with the maximum in all growth parameters like rate of germination, seedling height, seedling vigour index I, seedling vigour index II, shoot length, root length, fresh and dry weight of shoot and seedling followed by thiourea 2.0 per cent. But the maximum germination per cent (70.57%) was observed in thiourea 2.0 per cent, which was on par with water soaking (67.33%). In tissue culture, nodal segments of seedlings as an explant and cultured on MS medium supplemented with various combinations of growth regulators like BAP, kinetin and NAA. Among different combinations, minimum days taken for shoot initiation (6.06±0.04), the maximum number of shoots (3.20±0.04) and the maximum number of the leaves (3.18±0.02) were obtained in treatment combination of BAP (2.0 mg/l) and NAA (0.5 mg/l). The maximum shoot length (1.98±0.02) was obtained in BAP (2 mg/l). The satisfactory results after three months of *in-vitro* conservation were obtained by using the combination of BAP (2.0 mg/l) + NAA (0.50 mg/l) in terms of high survival per cent (100), maximum number of shoots per explant (2.40±0.04) and the maximum number of leaves (2.73±0.02). Thus, MS media supplemented with BAP (2.0 mg/l) + NAA (0.50 mg/l) can be used for both *in-vitro* propagation and also conservation of *Aristolochiatagala* Cham. under reduced culture condition of low temperature (10^0C) and low light intensity (2.97 $\mu m^{-2} s^{-1}$).

October, 2020

(Raviraja Shetty, G.)
Major Advisor

4. Effect of Pinching and Foliar Application of Nitrogen on Growth and Yield of Stevia (*Stevia rebaudiana* B.) under Hill Zone of Karnataka

(MANOHAR CHANDRA NAIK)

ABSTRACT

A field experiment was conducted on 'Effect of pinching and foliar application of nitrogen on growth and yield of stevia (*Stevia rebaudiana* B.) under hill zone of Karnataka' at College of Horticulture, Mudigere during 2019-20. The experiment was laid out in factorial randomized block design. The experiment comprised of two factors, factor A comprised of three pinching levels and factor B comprised of four nitrogen levels. Results of the experiment revealed that, plants pinched at 30 days after planting (DAP)recorded significantly minimum plant height (53.42 cm), maximum plant spread, number of branches (22.50), number of leaves (352.33), leaf area (2633.29 cm^2), leaf area index (2.92), total dry matter (79.75 g), leaf dry recovery (48.15 %), fresh and dry leaf yield per plant (80.20 and 37.65 g) and per hectare (3.76 and 1.59 t). Chlorophyll content and nitrogen content (1.58 %) in leaf was found maximum under pinching at 40 DAP. Foliar application of nitrogen (2 % urea) recorded higher values for all the above parameters. Chlorophyll and leaf nitrogen content were found maximum under three per cent urea. Among the combinations, pinching at 30 DAP along with foliar application of two per cent urea noted significantly maximum number of branches (26.00), number of leaves (379.00), leaf area (3222.36 cm^2), leaf area index (3.58), total dry matter (85.23 g), leaf dry recovery (49.69 %), fresh and dry leaf yield per plant (95.60 g and 48.68 g) and per hectare (4.49 t and 2.22 t). Higher gross return (₹7,88,000/ha), net income (₹5,95,752/ha) and B:C ratio (3.09) was recorded under the same treatment. While, the treatment combinations of pinching at 40 DAP and foliar spray of three per cent urea recorded higher chlorophyll and leaf nitrogen content (1.94 %).

November, 2020

(Sadashiv Nadukeri)
Major Advisor

Vegetable Science

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Vegetable Science

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1. Effect Of Graded Levels Of Npk On Growth And Yield Of Radish (*Raphanus sativus* L.) cv. PusaChetki

AHMAD FAWAD SATARI

ABSTRACT

The study was conducted to find out the optimum nutrient levels of NPK on growth and yield of radish cv. PusaChetki in open field condition at Department of Vegetable Science, College of Horticulture, Mudigere, during 2019-2020. The experiment consists of different levels of major nutrients, which were tried in various combinations and assessed for growth and yield parameters. Among different major nutrient levels, T_4 (200:100:50 kg NPK / ha) was recorded significantly maximum plant height (42.71 cm), number of leaves per plant (14.47), leaf length (32.57 cm), leaf width (11.86 cm), spread of the plant (N-S 40.81 cm and E-W 43.93 cm), stem diameter (1.53 cm), fresh weight of leaves, stem and root (70.94, 31.76 and 271.33 g, respectively), dry weight of leaves, stem and root (7.27, 1.63 and 9.89g / plant, respectively), total dry matter of the plant (18.79 g), leaf area (350.67 cm^2), leaf area index (1.16), absolute growth rate (0.59 g / plant / day @ 31 -45 DAS), crop growth rate (19.66 g / m^2 / day @ 31 -45 DAS), net assimilation rate (0.0291 g / dm^2 / day @ 31 -45 DAS), chlorophyll a & b (0.92 and 0.82 mg / g fr.wt, respectively), total chlorophyll content (1.75 mg / g fr.wt), root length (23.60 cm), root girth (13.13 cm) and root volume (257.00 cc) as compared to control. The maximum root yield per plot (5.00 kg), root yield per hectare (33.33 t) and benefit cost ratio (4.11) were also recorded in T_4 (200:100:50 kg NPK / ha). The above results revealed that application of 200kg nitrogen, 100kg phosphorus and 50 kg potassium per hectare were found to be optimum dose of nutrient level for best growth and yield of radish under hill zone of Karnataka.

August, 2020

(V. Srinivasa)
Major Advisor

2. **Assessment of Genetic Variability and Divergence in Tomato (*Solanum lycopersicum* L.) under Protected Condition**

(KIRAN, T. P.)

ABSTRACT

An investigation on genetic variability and divergence in tomato was carried out by randomized complete block design at Department of Vegetable Science, College of Horticulture, Mudigere during 2019-20. Analysis of variance revealed highly significant difference was noticed among the genotypes for all the studied characters. Higher heritability coupled with high genetic advance as per cent over mean were recorded for the traits *viz.*,plant height (30,60, 90 DAT and last harvest), stem girth (30, 90 DAT and last harvest), number of primary branches per plant (30,60, 90 DAT and last harvest), number of secondary branches per plant (30,60, 90 DAT and last harvest), leaf area (30,60, 90 DAT and last harvest), number of flowers per cluster, number of fruit per cluster, number of fruit clusters per plant, days taken for first harvest to last harvest, number of fruits per plant, fruit yield per plant, fruit yield per hectare, fruit length, fruit diameter, fruit volume, average fruit weight, pericarp thickness, number of locules per fruit, fruit firmness, TSS, lycopene, beta carotene, titratable acidity, non-reducing sugars and total sugars. Thus, there is an ample of scope for improving these traits through direct selection.Correlation studies revealed thatfruit yield per plant had positive and highly significant genotypic and phenotypic association with number of fruits per cluster, days taken from first harvest to last harvest, number of fruits per plant, fruit length, fruit diameter, fruit volume, average fruit weight and pericarp thickness. Path analysis showed that number of fruits per plant had highest positive direct effect on fruit yield per plant. Which was followed by fruit diameter, fruit volume, number of fruits cluster per plant, days from first harvest to last harvest, pericarp thickness, days taken for fruit set, number of flowers per cluster and number of secondary branches per plant at last harvest. Through Mahalanobis D^2 analysis 22 genotypes of tomato were grouped into 5 clusters. Among the characters studied fruit yield per plant (64.50 %), fruit volume (19.91 %) and number of fruits per plant (6.49 %) contributed maximum to total genetic diversity.From the present study,EC 362941, EC 15127,Kashi Vishesh and VRT 13 are best identified promising genotypes which can be utilized for the further crop improvement.

November, 2020

(V. Srinivasa)
Major Advisor

3. **Studies on Genetic Variability and Divergence for Yield and Yield Attributing Characters in Dolichos Bean (*Dolichos lablab* L.)**

(SHILPA, M. L.)

ABSTRACT

An investigation was undertaken on genetic variability studies in dolichos bean genotypes in the experimental block of theDepartment of Vegetable Science, College of Horticulture, Mudigere, during 2019-2020. The experiment was laid out in Randomized Complete Block Design with two replications. Analysis of variance revealed that highly significant differences among the genotypes were noticed for most of the characters under the study. High heritability coupled with high genetic advance as per cent of mean was recorded for plant height at harvest, number of leaves per plant at harvest, days to first flowering, days to 50 per cent flowering, number of flowers per cluster, pod length, pod width, pod thickness, number of pods per cluster, number of pods per plant, average pod weight, average green seed weight, pod yield per plant, pod yield per plot, pod yield per hectare and shelling percentage, which clearly illustrates that these characters are under the influence of additive gene action. Thus, there is a bountiful scope for improving these attributes through direct selection.Correlation studies exhibited that pod yield per plant showed a significant and positive correlation with the number of pods per plant, average pod weight, number of seeds per pod, pod length, number of flowers per cluster and number of pods per cluster. Path analysis revealed that pod yield per plant had a direct and positive effect on plant height at harvest, days to first flowering, number of pods per plant, pod weight, green seed weight, pod length and pod thickness. Based on D^2 analysis, 30 genotypes of dolichosbean were grouped into six clusters.Among the characters studied, pod yield per plant contributed maximum (79.52 %) to the genetic diversity followed by shelling percentage (6.44%) and number of pods per cluster (6.21%). Based on the mean performance, genotypes such asArkaSambram, Arka Jay, GLB-379, CHES DB-31 and CHES DB-04 have been identified as promising genotypes for higher yield, which can be exploited for the further crop improvement programme under the hill zone of Karnataka.

September, 2020

(V. Srinivasa)
Major Advisor

4. Standardisation of Harvesting Stage and Pretreatment for Dehydration of Okra (*Abelmoschus esculetus* L. Moench)

(VARSHITHA, P)

ABSTRACT

The study onstandardisation of harvesting stage and pretreatment for dehydration of okra (*Abelmoschus esculetus* L. Moench)was conducted at KrishiVignana Kendra, Babbur farm, Hiriyur, Chitradurga, during 2019-20. The Experiment-I consists of three varieties (V_1-Arka Nikhita, V_2-Arka Anamika and V_3-Hiriyur Local), three harvesting stages (H_1-4 Days after anthesis, H_2-6 Days after anthesis and H_3-8 Days after anthesis) and in all possible combinations were assessed for physico chemical characters. Among different varieties, V_1recorded maximum pod weight (17.28 cm), dry matter (10.99 %), rehydration ratio (5.24), chlorophyll content (19.23 mg/100g), magnesium (351 mg/100g), calcium(392.50 mg/100g) and iron (11.22 mg/100g) and recorded minimum dehydration ratio (17.70) and crude fiber (4.88 %) content. Among different harvesting stages, H_1 recordedmaximum dry matter (12.5 %), rehydration ratio (5.54), total ash (9.61 %), calcium (664.78 mg/100g)and recorded minimum dehydration ratio (14.40) and crude fiber (3.87 %).With respect to interaction of varieties and harvesting stages,the treatment combination V_1H_1(ArkaNikhita harvested at 4 days after anthesis) recorded significantly higher values with respect to dry matter (12.95 %), rehydration ratio (6.53) and mineral content and recorded minimum dehydration ratio (12.70) and crude fiber content (3.28 %). The results of sensory evaluation of dehydrated (3.75) and rehydrated (3.50) okra shown that V_1H_1treatment combination received highest score for overall acceptance.Based on the results obtained from previous experiment, the Experiment-II was conductedto know the suitability of pre-treatment for dehydration.ArkaNikhita harvested at 4 days after anthesiswasselected and these were pre-treated with blanching, brining and combination of both before dehydration. The results shown that T_4 (Brining solution concentration 1.0 %) treatment recorded maximum score (3.75) for overall acceptability.

November, 2020

(Prakash Kerure)
Major Advisor

5. Performance of Onion (*Allium cepa* L.) Genotypes under Hill Zone of Karnataka (VEENAGONI)

ABSTRACT

A field experiment was conducted during *Rabi* 2019 at College of Horticulture, Mudigere, to study the performance of thirty onion genotypes.The experiment was laid out in randomized complete block design with two replications. Among the genotypes evaluated, Bhima Shakti performed better for most of the characters like plant height (72.53 cm), number of leaves (11.92), leaf length (69.51 cm), plant establishment (94.20 %), polar diameter (5.79 cm), equatorial diameter (5.89 cm), bulb yield per plot (4.81 kg), bulb yield per hectare (29.79 t/ha), marketable yield (29.16 t/ha), A grade bulb yield (46.59 %) and TSS (12.81^0brix). The analysis of variance exhibited highly significant differences among the genotypes for all the characters under study. High heritability coupled with high genetic advance as per cent of mean was recorded for C grade bulb yield, bolting per cent and per cent double bulbs, indicating the prevalence of additive gene action for these traits. Thus, there is a scope to improve these traits through direct selection.Correlation studies indicated that marketable yield had positive and significant correlation with plant height, number of leaves, leaf length, polar diameter, equatorial diameter, A grade bulb yield, bulb yield per plot and bulb yield per hectare. Results on path analysis revealed that the traits like plant height, number of leaves, neck thickness, polar diameter, A grade bulb yield, B grade bulb yield and bulb yield per plot had positive direct effect on marketable yield, while, leaf length, collar thickness and equatorial diameter exhibited negative direct effect. Based on D^2 analysis, 30 genotypes of onion were grouped into seven clusters, with cluster I having maximum number of genotypes. Among the characters studied, marketable yield contributed maximum (24.00 %) to the total genetic diversity. Storage study revealed that Bhima Shakti has recorded minimum sprouting loss (7.68 %), rotting loss (7.34 %) and total loss in weight (16.05 %) at four months after storage. On the basis of mean performance, the cultivars Bhima Shakti, Bhima Super, BhimaSwetha and Pusa Red are found to be superior and high yielding genotypes under hill zone of Karnataka.

November, 2020

(Devaraju)
Major Advisor

6. Line × Tester Analysis in Garden Pea (*Pisum sativum* L.)

(MANJUNATHA, B)

ABSTRACT

The present investigation on "Line × Tester analysis in garden pea (*Pisum sativum* L.)" was carried out at Department of Vegetable Science, College of Horticulture, Mudigere during the year 2019-20. Fifteen F1 hybrids were produced by crossing 5 lines and 3 testers in a Line × Tester design and they were evaluated along with the parents in RCBD design with two replications. The mean sum of squares due to the various source of variation showed significant differences for all the trait except for seed germination (%), plant height at 30 DAS, number of primary branches at 30, 60 DAS in parents and hybrids. The magnitude of heterosis over standard check (ArkaPramodh) was high in the desirable direction for seed germination (23.48%), (-23.50%), days taken for first picking (-17.50 %), average pod weight (4.88%), pod length (15.73%), pod yield per plant (15.27%), total sugar (9.84 %). The cross Arka Tapas × Arka Priya exhibited a maximum significant positive standard heterosis of 9.96 per cent for yield per hectare. The cross Arka Tapas × ArkaSampooorna revealed maximum significant positive heterosis for total sugars (9.84%). Among the 8 parents, Arka Tapas, ArkaUttam and ArkaPriya were identified as good general combiners andthe hybridsArka Tapas × ArkaPriya, Arka Tapas × ArkaAjith, Arka Tapas × ArkaSampoorna act as good specific combiners foroverall character studied.The general combining ability (GCA) variance over the specific combining ability (SCA) variance for most of the studied characters indicated the predominance of additive gene action.The best heterotic hybrid identified in the study is useful for the improvement of garden pea through exploitation of transgressive segregants for economic traits in advanced generations.

December, 2020

(Devaraju)
Major Advisor

7. Effect of Different Sources and Levels of Sulphur on Growth, Yield and Quality of Onion (*Allium cepa* L.) under Central Dry Zone of Karnataka.

(RAGHAVENDRA B HOSAMANI)

ABSTRACT

The experiment was conducted to study the effect of different sources and levels of sulphur on growth, yield and quality of onion (*Allium cepa*L.) under central dry zone of Karnataka at Zonal Agricultural and Horticultural Research Station, Babbur Farm, Hiriyur, Karnataka during 2019-20. The experiment was laid out in Randomized Completely Block Design with nine treatments and three replications. Among different treatments, plants treated with RDF+ sulphur @ 30 kg ha^{-1} through gypsumrecorded maximum plant height, number of leaves, collar thickness and neck thickness. Similar trend was observed for yield and quality parameters such as polar diameter, equatorial diameter, average bulb weight, bulb yield per plot, marketable bulb yield, total bulb yield, per cent A grade bulb yield, per cent B grade bulb yield,bulb shape, total soluble solids, and pungency. Similar trend was also observed for uptake of major nutrients such as nitrogen, phosphorus, potassium and sulphur in leaves and bulbs. Significant differences were recorded between different sources and levels of sulphur in response to nutrient residual status of soil after the harvest of crop. The economic analysis clearly indicates that application of RDF+ sulphur @ 30 kg ha^{-1} through gypsumrealized maximum gross returns, net returns and benefit:cost ratio (1:3.43). Hence, the treatmentRDF+ sulphur @ 30 kg ha^{-1} through gypsum can be recommended for higher bulb yield in onion under central dry zone of Karnataka.

December, 2020

(P. Umamaheswarappa)
Major Advisor

Forestry

Silviculture and Agroforestry

University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Forestry) theses abstracts produced in the Department of Silviculture and Agroforestry

1. Early Growth Assessment of Casuarina Hybrid Clones for Agroforestry

MOHD HUSSNAIN

ABSTRACT

Casuarinas are among the most important tree species for the production of high yielding wood biomass for fibre, rayon and energy needs. Among the 96 species of trees and shrubs in the family Casuarinaceae, *Casuarina equisetifolia* has gained much attention due to its multiple end-uses. India is the largest Casuarina growing country in the world, with an estimated 800,000 ha of plantations. About 500,000 ha are planted with Casuarina in the coastal states of Andhra Pradesh, Orissa, Tamil Nadu and the Union Territory of Puducherry. In order to assess early growth of casuarina hybrid clones for agroforestry, an experiment was conducted at MAHRS, Iruvakki, Shivamogga, Karnataka. Eight casuarina hybrid clones were planted in row-column design with 3 replication and 3 x 2 m spacing. The observations on height (ht) and collar diameter (CD) were recorded up to 9 months. Stem form (axis persistence and stem straightness), branching habit (thickness and length) were assessed by scoring. There was significant difference in quantitative and qualitative parameters observed for eight Casuarinas hybrid clones. Considerable height was recorded in CH2, CH4 and CH5 (2.68 m, 2.72 m, and 2.67 m respectively) at nine months after planting. These clones have also performed better in qualitative parameters compared to clones CJ9 & HPF as these were not suitable for high rainfall areas. Clonal repeatability value for height ranged from 0.82-0.95 and 0.72-0.89 for collar diameter due to genotypic and environment interaction. A significant difference in soil-physicochemical properties were also observed between initial and final readings

July, 2020

(Maheswarappa V.)
Major Advisor

2. Geospatial Approach for Assessment of Trees outside Forest Using High Resolution Satellite Data

(NAVEEN, V.)

ABSTRACT

Trees and forests are the important natural resources, which delivers varieties of ecosystem services in addition to climate change mitigation. Therefore, quantification of forest as well trees outside the forest (TOF), both at different spatial and temporal scales, is essential for sustainable management. Geospatial technology makes it possible to assess and monitor these valuable resources in an extremely precise manner. In this study, a simple and robust geospatial approach was developed for mapping of forest and TOF. The study was conducted in Shikaripura and Shivamogga taluks of Shivamogga district. For forest cover mapping, Sentinel-1A (S1A) microwave and Sentinel-2A (S2A) optical data were used. The datasets were fused using principal component analysis (PCA) technique, and forest and non-forest areas were classified using random forest (RF) machine learning algorithm. Whereas, Resourcesat-2 LISS IV high spatial resolution (5.8 m) data was used for TOF mapping through ISODATA clustering algorithm.The study revealed that the forest and non-forest classification accuracy of S1A and S2A fused image was higher compared to S1A SAR data alone. In Shikaripura taluk, overall accuracy of 73.10% and 88.15% while in Shivamogga taluk, accuracy of 77.65% and 91.25% was achieved with S1A data alone, and S1A and S2A fused data, respectively. The estimated forest cover in Shikaripura and Shivamogga taluk is 279.51 sq. km and 686.39 sq. km, respectively. For TOF mapping, overall accuracy of 91.70% and 88.10% was attained for Shikaripura and Shivamogga taluk. The extent of TOF in Shikaripura and Shivamogga taluk is 139.64 sq. km and 218.39 sq. km, respectively. The methodology developed in this study is simple, easy to compute with high accuracy. Therefore, the developed approach could be up-scaled for the entire state.

August, 2020

(G. M. Devagiri)
Major Advisor

3. Assessment of Growth and Wood Traits of Casuarina Clones at Diverse Sites in Karnataka

(DEEPTHI DECHAMMA N. L.)

ABSTRACT

Plantation forestry in India is playing a crucial role in meeting the wood requirement of the country. The productivity of plantations can be enhanced through the selection and deployment of site-specific clones with desirable traits and suitable silvicultural practices. Among the different fast growing species, Casuarinas are preferred for environmental and commercial planting since the species have the adaptability to a wide range of climatic and edaphic conditions and has also gained importance as major pulpwood species. Site-specific clones can be recommended for particular end uses by assessment of clonal trials. Thus, the present study was conducted to assess the growth performance and wood properties of Casuarina clones inclonal trials located at Kunchenahally, Sindigere and Jakkasandra of Karnataka. The results revealed that CH-10 showed better growth performance at Kunchenahally whereas CH-4 and CH-1 performed better at Sindigere and Jakkasandra sites respectively. Among the different clones, CH-1 had superior wood properties and anatomical ratios in individual sites over other clones and thus exhibit desirable pulping properties. Moderate to higher clonal repeatability (0.34 to 0.99) for clones in individual sites imply that growth is strongly controlled by genetic component. Clonal repeatability for wood traits ranged from low to high (0.03 to 0.93). Significant and strong phenotypic and genotypic correlation was observed among the growth traits and most of the wood traits.

September, 2020

(Ramakrishna Hegde)
Major Advisor

4. Assessment of Early Growth Performance of *Melia dubia* Cav. Clones

(NAYANA H.)

ABSTRACT

Clonal forestry has a remarkable contribution for paper, packaging, tissue paper, paperboard, plywood, veneer industries, etc., for which wood is being used as a raw material. Industrial agroforestry with the fast-growing species *viz.*, poplar, eucalyptus, willow, leucaena, casuarina, bamboo and Malabar neem can be grown commercially in private lands as suitable species for raw materials in many wood based industries. Among these species, *M. dubia* (Malabar neem) is an indigenous tree species belongs to family Meliaceae that has emerged as a suitable raw material due to its increased pulp recovery and exceptional strength. The timber is ideal for plywood manufacture at commercial scale Thus in the present study, the early growth performance of *M. dubia*clones was carried out at the Main Agricultural and Horticultural Research Station, Iruvakki, Sagara (taluka), Shivamogga (district), Karnataka. Ten *M. dubia*clones were planted in RCBD design with the spacing of 4m x 4m in five replications. The observations on total height and collar diameter were recorded up to 9 months. The significant difference was observed for height and collar diameter of different *M. dubia*clones. Considerable height was recorded in clone IFGTBC10 and IFGTBC8 (269.70 cm and 233.56 cm) and maximum collar diameter was recorded in clone IFGTBC8 and IFGTBC10 (1.79 cm and 1.71 cm). Substantial volume index was recorded in clone IFGTBC10 (799.70 cm^3) at nine months after planting. Clonal repeatability of Malabar neem for height (0.91) and collar diameter (0.93) was high. Existences of significant difference in soil-physicochemical properties were noticed between initial and final readings.

December, 2020

(Ashok B Divatar)
Major Advisor

Forest Biology and Tree Improvement

University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Forestry) theses abstracts produced in the Department of Forest Biology and Tree Improvement

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1. Characterization of *Acrocarpus fraxinifolius* Wight &Arn. Populations Based on Growth and Wood Traits.

(ASHWATH, M. N.)

ABSTRACT

Acrocarpus fraxinifolius Wight & Arn. is large tree belongs to sub-family Caesalpinioideae under family Fabaceae. The timber of this species is suitable for making plywood, planks and construction purpose with its various multi-purpose services such as erosion control, fodder, gum, fuelwood, etc. It is mostly cultivated in high rainfall areas as a shade-tree in coffee agroforestry. The study was conducted to assess the variation in growth and wood trait among different populations in Southern Karnataka. Nine populations *viz.*, Shreemangala, Shuntikoppa, Bhagamandala, Chikamagaluru, Mudigere, Balehonnuru, Sakleshpura, Totadagadde and Vanaguru, from three districts (Kodagu, Chikamagaluru, Hassan) were considered for the present study. The growth traits such as tree height, clear bole height, GBH and wood traits *viz*., bark-thickness, wood density, specific gravity, fibre parameters and vessel parameters were analysed to know the extent of variation across the populations. Among the growth traits, tree height and clear bole height were varied significantly, whereas GBH was not significant. The average height of trees varied from 19.99 m to 26.14 m. Maximum mean GBH was recorded from Shuntikoppa population (1.40 m). The basic wood density of species was ranged between 0.370 g cc^{-1} to 0.580 g cc^{-1}. Value for most of the wood traits increased from near to pith to the periphery. It was observed that there is a significant difference in fibre length across the populations. The average fibre length observed was 1225.49µm. Fibre width, fibre lumen width and fibre wall thicknesses have not shown much variation. Vessel parameters varied among the populations. Vessel length varied from 104.78 µm to 124.71 µm. Anatomical indices such as slenderness ratio, Runkel ratio, flexibility coefficient and rigidity coefficient were calculated to know the suitability of species as raw materials for pulp and paper. The wood anatomy screening of *Acrocarpus fraxinifolius* envisages that the species could be best suitable as raw material for pulp and paper production.

Key words: *Acrocarpus fraxinifolius, variation, population, wood traits, density*

July, 2020

(Sathish, B. N.)
Major Advisor

2. Management of Forest Nursery Insect Pests using Entomopathogens

(BASAVARAJU, S.)

ABSTRACT

The present investigation with objectives of recording forest nursery pests, entomopathogens on them and managing them with use of entomopathogens was carried out at three different nurseries in Kodagu, during 2019-20. *Ceroplastesrubens*on *Garciniagummi-gutta*and *G. indica; Rusostigmaeugenie*and a mealybug on *Syzygiumcumini*at Forestry college nursery; *Arytaina* sp. on *Pterocarpusmarsupium*, *Trioza*sp. on *Terminaliaarjuna*atForest nursery, Sampaje and *Trioza*sp. on *T. bellirica*, *Aleurothrixesfloccosus*on *Psidiumguajava*, *Trioza*sp. on *T. arjuna*, *Dasynus* sp. on *Meliadubia* at Forest nursery Thitimati were the insect pests recorded at medium to high levels of infestation. Other 24 species of insects occurred on other species of forest seedlings with low incidence. The occurrence of insect pest had a positive correlation with temperature and negative with RH and rainfall in majority of the insect pests. Natural occurrence of *Beauvariabassiana* was observed and isolated from *C. rubens* and *R. eugenie* infesting Garcinia and guava seedlings, respectively. The occurrence of braconidparasitoids were recorded from *Ascotisselenaria*and from an unidentified hairy caterpillar. Among the entomopathogens and botanicals tested, *B. bassiana*2 x 10^8cfu/g @ 2g/l and Azadirachtin 0.03%EC @ 2ml/ l (61.10% reduction) against pink scales;*B. bassiana*2 x 10^8spores/ml @ 2ml/l and *M. anisopliae* 2 x 10^8cfu/g @ 2g/l, *Isariafumosorosea*2 x 10^8spores/ml @ 2ml/l against whitefly nymphs and adults were highly effective. But other entomopathogens stood on par with them. Azadirachtin was effective initially; entomopathogens were superior at 14 and 21 DAT.The total cost of plant protection was highest (Rs. 71/ bed) in case of Azadirachtin, and lowest (Rs.54/ Bed) in fungal pathogens *Lecanicilliumlecanii* and *B. bassiana*.

Keywords: Forest nursery pests, Management, Bio control, Entomopathogens.

September, 2020

(R. N. Kencharaddi)
Major Advisor

3. Diversity and Ethnobotanical Knowledge of Fern Flora in Sacred Groves

(SURAJ, R.H)

ABSTRACT

An investigation on "Diversity and ethnobotanical knowledge of fern flora in sacred groves'' was carried out in Virajpet taluk, Kodagu during 2019-2020. The study was carried out to know the diversity, ethnobotanical knowledge and combined conservation value of wild fern species in different sacred groves of Virajpet taluk, Kodagu. The population structure of wild ferns was assessed by stratified random sampling technique. Fern diversity status, species richness, dominance and abundance were assessed by adopting Shannon and Simpson diversity indices. The Density, frequency, IVI was calculated by using appropriate methods. Species richness and diversity were more in the sacred groves of semi evergreen vegetation compared to that of moist deciduous vegetation. Among the sacred groves, species diversity was more in KakkottuAyyappa sacred grove of Maggula village. Maximum frequency, density and Important Value Index was recorded in *Tectaria paradoxa*. A semi structured questionnaire was used for the ethnobotanical survey of wild ferns. Totally, 36 fern species were documented, of which nine species were used for medicine followed by edible (8), ornamental (4). Mainly *Drynariaquercifolia* is used for curing jaundice, asthma, dysentery, throat infection and ear bleeding. *Nephrolepis exalatata*, *Nephrolepis undulata* and *Parahemionitis cordata* were used for ornamental purposes. 96 percent of the respondents were using *Diplazium esculentum* as vegetable. Combined Conservation Value (CCV) was calculated for different vegetation types and sacred groves. Conservation status of fern was assessed with their medicinal, endemic and threat values. Among the vegetation types considered, semi evergreen vegetation showed a higher CCV (89.43%) than the moist deciduous (42.76%) indicating that semi evergreen vegetation was found to be maximum number of medicinal, endemic and threatened ferns. Among the sacred groves, Bhagavathi, UttaratAiyappa and BhattamakkiAyyappa showed higher CCV (38.33%) indicating the presence of medicinal, threatened and endemic ferns in these sacred groves. The study gives an understanding of the diversity and ethnobotanical knowledge of the fern species in sacred groves which would help in conservation and management of the species.

November, 2020

(M. Jadeyegowda)
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