Agriculture

Agricultural Entomology

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the Department of Agricultural Entomology

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1. Monitoring and Management of Melon Fruit Fly, *Bactrocera cucurbitae* (Coq.) (Tephritidae: Diptera) in Ridge Gourd

ABHILASH J.

ABSTRACT

The presentinvestigation on monitoring, evaluation of traps and management melon fruit fly (*Bactrocera cucurbitae*) using different botanicals was conducted atfarmers field at Bommanakatte, Basavanagangur and Abbalagere villages of Shivamogga district during*Rabi* 2016-17.Monitoring of melon fruit fly revealed that initial incidence of melon fruit fly population begins from the flowering stage of ridge gourd and peak incidence coincides with the peak fruiting period of the crop.The incidence of melon fruit fly from three locations showed significant positive correlation with maximum and minimum temperature. Whereas, afternoon relative humidity and rainfall had significantnegative correlation with melon fruit fly incidence from all three locations. The incidence of melon fruit fly were influenced to an extent of 83.60, 67.50 and 85.90 percent in respective locations by all the weather parameters together. Among the five different types of traps evaluated, PCI trap recorded significantly higher number of fruit flies and followed by Barrix trap in both the locations. Among the various botanicals, Azadiractin 1 percent EC recorded significantly lowest fruit damage (26.53%) which was followed by NSKE 5 percent (29.06%). Highest fruit fly damage was noticed from untreated check *i.e.* 69.65 percent. Azadiractin 1 percent EC recorded maximum marketable yield (45.99 q/ha) followed by NSKE 5 percent (42.48 q/ha). Azadirachtin 1 percent EC treated fruits recorded higher oviposition deterrence with 74.26 over control followed by NSKE 5 percent with 68.26 percent ovipositional deterrence over control. Highest percent reduction of larval survivability over control was observed in Azadiractin 1 percent EC (79.88 %) followed by NSKE 5 per cent (72.08%).

August, 2017

(S. U. Patil)
Major Advisor

2. Survey and Eco-friendly Management of Radish Flea Beetle (*Phyllo tretachotanica* Duv.)

G S UMA

ABSTRACT

Studies onsurvey and eco-friendly management of radish flea beetle were conducted during 2016-17at College of Agriculture, UAHS, Shivamogga. Roving survey was conducted in farmers' field in 17 villagesaround Shivamoggaat fortnightly interval from August first fortnight of 2016 to first fortnight of January 2017.The beetle population was high during first fortnight of December (9.10 adults/ plant) and was least during first fortnight of November (1.20 adults/plant). However the mean population of flea beetle was lower on cabbage and cauliflower crops when compared to radish crop. Radish was intercropped in 3:1 ratio with six selected crops. Inboth *kharif and rabi*seasons, radish intercropped with coriander proved to be superior when compared to all other treatments by recording least number of beetles per plant (3.17).Radish+ green amaranthus was less effective by harbouring significantly higher number of beetles (7.42). Radish grown as sole crop recorded maximum number of beetles per plant (8.70) and proved inferior to rest of the treatments.Maximum root yield (118.00 q ha^{-1}) registered in radish grown with coriander which was proved to be the best treatment compared to all other treatments. Different botanical insecticides were evaluated against radish flea beetle.The mean population of flea beetle was least in malathion 50 EC (3.30) and NSKE (5%)(4.17) treated plots.Untreated check harboured highest number of beetles (8.93/ plant) andnumber of holes per leaf and per cent leaf damage also followed same trend.The highestroot yield of 160.78 q ha^{-1} was recorded with treatment Malathion 50EC which was on par with NSKE 5% (157.33 q ha^{-1}).The untreated check recorded lowest root yield of 143.00 q ha^{-1} .

June, 2017

(M. Manjunath)
Major Advisor

3. Studies on Species Composition, Population Dynamics and Management of Mango Leafhoppers

GIRISH B. R.

ABSTRACT

Investigation on **species composition, population dynamics, screening of different genotypes and the effect of different bio pesticides against mango leafhoppers** were carried out during 2016-17 in farmer's orchard at Doddabbigere, Channagiri, College orchard, Shivamogga. A total of five species of mango leafhoppers were recorded across the four different Agro climatic zones of South Karnatakathose were *Idioscopusnitidulus, I. nagpurensis,I. clypealis*, *Amritodusatkinsoni*and*Amrascasplendens*.Leafhopper population at College of Agriculture Shivamogga during second fortnight of February 2017 was highest (33.54 leafhoppers/ inflorescence) and lowest leafhoppers was found during first fortnight of September 2016 (1.15 leafhoppers/ 5 sweeps in each direction).At Doddabbigere, peak incidence of leafhoppers was found during first fortnight of February 2017 (35.47 leafhoppers / inflorescence) and lowest leafhopper was found during second fortnight of August 2016 (1.60leafhoppers / 5 sweeps in each direction). Mango leafhoppers incidence in both the locations showed a positive and significant correlation with maximum, minimum temperature. Totapuri and Mallika harboured lowest mean number of leafhoppers (8.00 and 9.53) followed by Baneshan (10.69). Whereas, highest mean number of leafhoppers was documented in Alphonso (17.99) followed by Sindhura (14.14), Mulgoa(13.90) and Neelum(13.56). Lower crude proteins, reducing sugars, amino acids and higher phenol content were noticed in Mallika and Totapuri followed by Baneshan whereas, significantly higher in varieties like Alphonso, Sindhura, Mulgoa and Neelum. Phenol content was inversely related to the incidence of leafhoppers.Among the bio pesticides Azadirachtin 5 EC recorded significantly lower number of leafhoppers (12.71 leafhoppers)followed by Azadirachtin 1EC (14.41 leafhoppers).

July, 2017

(Sharanabasappa)
Major Advisor

4. Biology and Management of Bud borer, *Elasmopalpus jasminophagus* (Hampson) (Lepidoptera: Pyralidae) in Jasmine

KIRAN C. M

ABSTRACT

Investigation on **Biology and management of bud borer, *Elasmopalpus jasminophagus* (Hampson) (Lepidoptera: Pyralidae) in Jasmine** was carried out at College of Agriculture, Navile, UAHS, Shivamogga during 2016-17. During the study, thirteen species of insect and mite pests were found damaging the jasmine crop. Among them, bud borers, *Elasmopalpus jasminophagus* (Hampson) and *Hendecasis duplifascialis* (Hampson), leaf web worm, *Nausinoe geometrialis* (Guenee) was found to feed on leaves. Red spider mite, *Tetanychus* sp. and thrips were found to suck the sap from jasmine leaves. Out of these insect and mite pests, banana flower thrips, *Thrips florum* is the first report infesting jasmine from India. Bud borer, *E. jasminophagus* was predominant pest with a maximum incidence of 38.85 per cent affected buds during first fortnight of January. Incidence of bud borer, *E. jasminophagus* was significant and negatively correlated with minimum temperature, while maximum temperature was non-significant and positively correlated. Biological studies of E. *jasminophagus* on *Jasminum multiflorum* revealed that female moth laid eggs singly or in groups on calyx of buds, near the base of green bud stalk and also on white buds. Freshly laid eggs were creamish white coloured and round in shape, incubation period of which ranged from 3.00 to 5.00 days with a mean of 3.30±1.41 days. There were five larval instars, duration of which ranged from 16.00 to 21.60 days with a mean duration of 18.11±1.94 days. Total life cycle of pest lasted for 38.26±3.36 to 40.06±3.24 days in laboratory. Chlorantraniliprole 18 SC @ 0.1 ml/lt was found significantly superior (mean per cent affected buds of 6.80) over all other insecticides in managing bud borer, *E. jasminophagus*. Chlorantraniliprole recorded highest B: C ratio of 1: 3.47 by recording highest flower yield (1975.11 kg/ha).

July, 2017

(Jayalaxmi Narayan Hegde)
Major Advisor

5. Seasonal Incidence and Management of Pod Borers in Cowpea, *Vigna unguiculata* L.

NAVEEN A. S.

ABSTRACT

An investigation on "**Seasonal incidence and management of pod borers in cowpea, *Vigna unguiculata* L."** was carried out at the College of Agriculture, Navile, UAHS, Shivamogga during *kharif* and *rabi* of 2016-17. During the study, four species of pod borers *viz.*, spotted pod borer, *Maruca vitrata* Geyer, gram pod borer, *Helicoverpa armigera* Hubner, African pea moth, *Cydia ptychora* Meyrick and Lycaenid Blue butterfly, *Lampides boeticus* Linnaeus were found damaging the crop. Among them, spotted pod borer, *M. vitrata* was predominant pest with peak incidence during third week of October (2.3 larvae/ten plants), *H.armigera* reached its peak during the second week of October (1.30 larvae/ten plants), *C. ptychora* and *L. boeticus* reached its peak during the third week of October with mean larval population of 0.6 and 0.5 larvae per ten plants. Incidence of spotted pod borer, *M. vitrata* was non significant and positively correlated with maximum temperature, minimum temperature and morning relative humidity, while evening relative humidity and rainfall showed significant and negative correlation. Studies on screening of six genotypes of cowpea against pod borer complex revealed that the genotypes C-152, KBC-2 and IT 38596 were found highly resistant to cowpea pod borer complex with mean per cent pod damage of 14.80, 17.38 and 18.77, respectively. While, DC-47-1, South pearl and North border were found moderately resistant to pod borer complex with mean per cent pod damage of 20.32, 21.97 and 24.25, respectively. Flubendiamide 480 SC (0.2 ml/lt) proved the best of all the insecticides to control the pod borer complex in cowpea with highest pod yield of 22.15 q/ha and B:C ratio of 1:3.22, followed by chlorantraniliprole 18.5 SC (0.1 ml/lt) with pod yield of 20.05 q/ha and B:C ratio of 1:2.49 and organic molecule, NSKE 5% recorded the pod yield of 11.95 q/ha and B:C ratio of 1:1.97.

August, 2017

(Jayalaxmi Narayan Hegde)
Major Advisor

6. Sucking Pest Complex of *Bt* Cotton and their Management

NAVEENA J. B.

ABSTRACT

Investigation on **Survey, population dynamics, screening of different Bt and non Bt cotton hybrids and effect of different insecticides against sucking pests of cotton** were carried out during 2016-17 in a farmer field at Kommanalu Village, Shivamogga and Agricultural and Horticultural Research Station (AHRS), Honnavile farm, Shivamogga. During survey, highest population of sucking pests was noticed in Shivamogga district followed by Davanagere and Chitradurga. The peak incidence of thrips (*Thrips tabaci* Lind) was noticed during first fortnight of September (43.70/ 3 leaves). While, the leafhopper (*Amrasca biguttula biguttula* Ishida) population reached peak during September second fortnight (19.80/ 3 leaves) .The aphid (*Aphis gossypii* Glover) population reached peak during December second fortnight (25.22/ 3 leaves). The Whiteflies (*Bemisia tabaci* Gennadius) population reached peak during November first fortnight (0.75/ 3 leaves). The peak incidence of mirid bug (*Poppiocapsidea biseratense* Distant) was noticed in second fortnight of September (19.25/ 25squares).While, the red cotton bug (*Dysdercus similis* Freeman) population peaked during October first fortnight (0.35/ plant). Sucking pest incidence showed positive and significant correlation with maximum temperature and negative significant correlation with rainfall. The most commonly recorded natural enemies on sucking pest were coccinellids, spider and Chrysopa. Among the different *Bt* and non *Bt* cotton hybrids screened against sucking pests are MRC-7351, double Bt, chamundi BG-II and Ankur HB-2110 shown moderate resistant against sucking pests while, DCH-32 highly resistant against sucking pest. Among different insecticides evaluated, thiamethoxam 25 WG found very effective in bringing down all the sucking pests. The highest per cent (71.81) reduction in population and highest cotton yield (17.20q/ ha) was recorded in thiamethoxam treated plot.

July, 2017

(Sharanabasappa)
Major Advisor

7. Seasonal Incidence and Management of Major Lepidopteran Pests of Cabbage

RAKESH NAYAKA S

ABSTRACT

Seasonal incidence of major lepidopteran pests of cabbage was carried out in the College of Agriculture, Shivamogga during 2016-17. Lepidopteran pests like diamondback moth (*Plutella xylostella* (Linnaeus)), tobacco caterpillar (*Spodoptera litura* (Fabricius)), cabbage leaf webber (*Crocidolomia pavonana* (Fabricius)), cabbage head borer (*Hellula undalis* (Fabricius)) and semilooper *Thysanoplusia orichalcea* (Fabricius) was recorded during *Kharif* and *Rabi*. The biology of *P. xylostella* on cabbage under laboratory conditions revealed that, female moth laid eggs either in single or in small groups of two to six along the midribs and veins of leaves. The mean incubation, larval, pre-pupal, pupal and male and female adult period was 2.70 ± 0.70, 12.50 ± 1.09, 1.05 ± 0.15, 3.92 ± 0.47 and 8.20 ± 0.60 and 10.15 ± 0.70 days, respectively. The biology of *P. xylostella* on Indian mustard revealed no significant difference in morphometrics of different stages of *P. xylostella* on Indian mustard compared to cabbage. Evaluation of insecticide molecules indicated that chlorantraniliprole, emamectin benzoate and flubendiamide were significantly effective against diamondback moth and cabbage leaf webber whereas, NSKE was least effective compared to other treatments. *Spodoptera litura* population was effectively reduced by chlorantraniliprole, flubendiamide and emamectin benzoate. NSKE was least effective in reducing larval population compared to other treatments. Chlorantraniliprole recorded highest C:B ratio of 3.98 compared to rest of the treatments. Untreated check recorded the lowest C:B ratio of 1.10. All treatments recorded higher C:B ratio and superior over untreated check.

July, 2017

(Pradeep, S)
Major Advisor

8. Screening of Genotypes and Evaluation of Selected Insecticides and Acaricides against Chilli Murda Complex

SUMA, G. S.

ABSTRACT

Performance of fourteen different chilli genotypes against sucking pests *viz.*, thrips, *Scirtothrips dorsalis* (Hood), mite, *Polyphagotarsonemus latus* (Banks), aphids, *Aphis gossypii* (Glover) and whitefly, *Bemisia tabaci* (Gennadius), comparative toxicity of insecticides on chilli whitefly and field evaluation of insecticides and acaricides against chilli sucking pests were carried out during *Kharif* 2016-17. Arka Lohit found to be superior over the other genotypes by recording lowest number of thrips and mites. Arka Suphal and Arka Harita were next in the line. Highest number of thrips and mite population noticed from Byadagi Kaddi and Byadagi Dabbi. Arka Lohit, Arka Suphal and Arka Harita had least ahipds infestation and the highest number of aphids recorded on Sarpan Hybrid Chilli-153 and Byadagi Dabbi. Least number of whiteflies were recorded on Arka Harita. However, Sarpan Hybrid Chilli-153 had significantly highest whitefly population. Arka Lohit had least leaf curl index compared to other genotypes and registered as moderately resistant genotype. The genotypes Byadagi Dabbi and Byadagi Kaddi had highest leaf curl index and were graded as susceptible genotypes. Comparitive toxicity of insecticides and oils on whitefly, *Bemisia tabaci* under laboratory condition showed that thiamethoxam and imidacloprid were registered with least LC_{50} values when compared to triazophos. Among oils, neem oil recorded with least LC_{50} value. Acephate was the best chemical against chilli thrips followed by chlorfenapyr and thiamethoxam. However, for mites propargite stood best followed by chlorfenapyr. Thiamethoxam and imidacloprid were the best chemicals in controlling both aphids and whitefly population and also had least leaf curl index. Thiamethoxam recorded the highest yield of 95.55 q/ha when compared to the rest of the treatments. It was followed by imidacloprid (89.63 q/ha) and the lowest yield was registered from fenazaquin (65.92 q/ha).

July, 2017

(B. K Shivanna)
Major Advisor

9. Taxonomy of Thrips Associated with Horticultural Crops with Special Reference to Ecology and Management of Pepper Leaf Gall Thrips, *Liothrips Karnyi* (Bagnall) (Thysanoptera: Phlaeothripidae)

TANUJA NAIK

ABSTRACT

Thrips are economically important pests on several horticultural crops and the damage caused by them has aggravated in recent past owing to their virus transmission abilities. Their diversity has been poorly described and their accurate identification is a challenging task. Studies were conducted to assess the diversity of thrips in and around Shivamogga from different horticultural crops. A total of 13 thrips species were recorded from 10 genera and three subfamilies under two families *viz.*, Thripidae and Phlaeothripidae. Among the total collections, Thripidae was the most dominant family (84.61%) with 11 species in eight genera under two subfamilies *viz.*, Thripinae (81.81%) and Panchaetothripinae (18.18%) followed by Phlaeothripidae (15.38%) with two genera under one subfamily Phlaeothripinae. Illustrated identification keys were prepared systematically based on the morphological variations of collected thrips. Pepper leaf gall thrips, *Liothripskarnyi*causes damage to black pepper having export potential. Population dynamicsof *L. karnyi*on black pepperwas studied at Ikkeri, Sagar from April 2016 to March 2017. The population fluctuated under the influence of presence of young leaves on the vines, which was further influenced by rainfall. Selected insecticides were evaluated against *L.karnyi* at Mugaralli, Mudigere taluk from December 2016 to February 2017.All the nine insecticides tested were superior in suppressing the population of *L.karnyi*at 15, 30 and 45 days after spray. One spray of systemic insecticide was sufficient in reducing the population and maintaining it at a lower level. It appears from the mean population that, biorational insecticides *viz.*, NSKE, azadirachtin and fish oil rosin soap (FORS) were equally effective in suppressing thrips population as those of chemical insecticides. So, such of the treatments may be recommended to avoid residue problem in black pepper.

July, 2017

(Kalleshwaraswamy, C. M)
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. Study on Information Management Behaviour of Arecanut Growers in Shivamogga District of Karnataka

ABHILASH, J.

ABSTRACT

Information management behaviour of farmers play a vital role in adoption of the improved cultivation practices in their farming system. The concept of information management behaviour of arecanut growers is gaining significance as they are emerging as a strong force in increasing the arecanut production in the country.The research study was conducted during 2016-17, in Shivamogga district of Karnataka and found that majority(69.17%) of respondents belonged to medium category of information acquisition behaviour, in case of storage of information 61.66 per cent of respondents grouped under medium category. Whereas, interpersonal sources were the major sources of information for the major chunk of the respondents, 46.67 per cent of the respondents belonged to middle age group, 30.00 per cent of the respondents educated up to high school, 32.50 per cent of the respondents possessed small land holding,42.50 per cent had very high income, 47.50 per cent had medium level scientific orientation, 49.16 per cent belonged to medium mass media utilization category, 47.50 per cent belonged to medium innovative proneness category, 100 per cent of the respondents possessed Television and Mobile/Telephone, 59.16 per cent of the respondents belonged to medium cosmopoliteness category. Out of 12 independent variables, five variables *viz.*, education, extension contact, mass media participation, social participation and cosmopoliteness showed positive and significant relationship at 1% level of probabilitywith acquisition of information. Further,variables like age, education, extension contact, material possession, social participation, extension participation and cosmopoliteness showed positive and significant relationship at 1% level of probability with storage of information. Majority of the respondents had expressed constraint on lack of sufficient training programmes (72.50%).

August, 2017

(A. T. Krishnamurthy)
Major Advisor

2. Readability and Readers Analysis of Selected Agricultural Publications in Kannada

CHAITRA, G.

ABSTRACT

The study was conducted in the year 2016-17 in Dakshina Kannada and Dharwaddistrict of Karnataka state with a sample size of 120 farmers. Simple random sampling procedure was used to select the sample.

The data was collected with the help of structured interview schedule. The socio-economic profile of the respondents revealed that, majority of the respondents belong to middle age group (58.30%), middle school education (35.00%), small land holding category (33.30%), 10-20 years of farming experience (65.00%) and high income level (55.00%). Whereas, majority of the respondents had medium cosmopoliteness (51.67%), medium innovative proneness (39.17%), mediumlevel of extension agency contact (45.00%), low mass media participation (35.00%), medium extension participation category (51.67%) and low political participation category (58.34 %).

The articles published in newspaper, farm magazine and leaflet/folder could be read by the farmers who had an education level up to middle school, high school and above high school level respectively.

With respect to overall reading habit 37.50 per cent of the reader farmers had low level of reading habit, while 33.33 per cent and 29.16 per cent had medium and high level of reading habit respectively.

The variables like age, education, land holding, farming experience, annual income, cosmopoliteness, extension agency contact and extension participation had significant association with reading habit at 0.01 levels. Whereas,innovative proneness, mass media participation and political participation had non-significant association with reading habit.

The major constraints faced by the reader farmers were “Sometimes information published was neither timely nor practical”, “No detailed information about author for future reference” and “Less articles in the form of success stories”.

July, 2017

(Amaresh Kumar. K)
Major Advisor

3. Impact of Vocational Training Programme 'Friends of Coconut Tree and Plant Protection' Conducted by Krishi Vigyan Kendra, Shivamogga

LEELAVATHI, M.

ABSTRACT

The present study was conducted to ascertain the impact of vocational training programme 'Friends of Coconut Tree and Plant Protection' conducted by KVK, Shivamogga. A total of 120 trainees were considered as sample for the study. The study revealed that majority of the respondents possessed low (55.00 %) and high (41.67 %) knowledge level before and after training.The respondents had low(60.83 %) and high (40.84 %) overall adoption level before and after intervention of training. Majority (89.17 %) of the respondents had adopted use of coconut palm climbing equipment, 97.50 per cent of the respondents practicing right time of harvesting coconuts and 81.67 per cent are identifying major pest and diseases. Nearly 33.33 per cent of the respondents possessed 21 to 50 number of coconut trees after training. Only seven respondents (5.83 %) were professional coconut tree climbers before undergoing training and it was enhanced to 20 per cent after training.None of the respondents were using climbing equipment before undergoing training and majority (89.17 %) of the respondents were using it as means of climbing after training.There is an average additional gain of earnings by ₹ 55,812 /- per annum by the professional coconut tree climbers after training.There is an average yield of 120 coconuts per year per tree after training when compared to the yield of 100 nuts per tree per year before training. Majority of the respondents expressed the constraints such as problems related to insurance renewal and claims (81.67 %) and difficulty in using the equipment for the trees with bigger trunk size (55.83 %). Suggestions such as organizing awareness programmes related to insurance (75.00 %) and provision for safety belt (65.00 %) were expressed.

July, 2017

(Basavaraj Beerannavar)
Major Advisor

4. Impact of Mobile Agro-advisory Services on the Farmers of Udupi District

NAVINKUMAR

ABSTRACT

The sector of agriculture benefits more from mobile phones in the developing countries as it saves money, time and offers accurate advantage for farmers. The research study was conducted during 2016-17.

Majority (48.33%) of the respondents' belonged to young age, 35.00 per cent of the farmers were educated upto P.U.C. level, 75.83 per cent had nuclear type of family, 48.33 per cent were engaged in agriculture and animal husbandry occupation, 42.50 per cent farmers possessed small land holding, 40.83 per cent of the respondents belonged to high Annual income category, 65.83 per cent of the farmers had high level scientific orientation, 54.17 per cent of the farmers had high extension contact, 48.33 per cent of the farmers belonged to medium extension participation category, 67.50 per cent of the farmers belonged to high mass media utilization category, 64.17 per cent of the farmers belonged to medium Innovative proneness, 67.50 per cent of the farmers belonged to medium Achievement motivation category, 62.50 per cent of the farmers had high level risk orientation, 55.48 per cent had high level Knowledge and 48.33 percent had high level of Adoption of Mobile agro-advisory services.Total 13 independent variables selected for the study, three variables *viz.*,Education, Achievement motivation and Risk orientation showed positive and significant relationship at one per cent level of probability with Knowledge level, among the 13 independent variables, five variables *viz.*, Achievement motivation, Risk orientation, Scientific orientation,Innovativeness andExtension participation showed positive and significant relationship at one per cent level of probability with Adoption level.Major constraint expressed was lack of Practical exposure (76.67%). Major suggestion expressed was regular weather forecasting (93.33%).

July, 2017

(Dhananjaya B)
Major Advisor

5. Knowledge Impact and Coping Mechanism to Climate Change by Farming Community of Chitradurga District

VASANTHI, C.

ABSTRACT

The study on knowledge impact and coping mechanism to climate change by farming community was conducted in Chitradurga district of Karnataka during 2016-17. By simple random sampling 120 adopter and 30 non adopter farmers were selected, constituting sample size of 150. The data was collected using pretested interview schedule. The result showed that majority of the adopters (74.16%) non adopters (86.67%) had medium level of knowledge on climate change.It was observed that social participation (40.38%) was most impacted followed by extension participation, family type and cosmopoliteness in case of adopter farmers. None of them were significant in case of non adopter farmers.It was found that farmers without adopting any coping mechanism get net returns of ` 11727.65/hectare. The additional return due to adoption of coping mechanism was maximum in case of drip irrigation + mulching + protected cultivation model (` 182384.51). Majority of the adopter and non adopter farmers were male and belonged to middle age category having medium farming experience and medium irrigation potential. Majority of the adopter farmers were educated upto PUC, had medium sized land holding and medium family size. Majority of the non adopters belonged to read only category having marginal land holding and small sized family. Majority of the adopters had medium level of mass media participation, innovativeproness, extension agency contact, risk orientation, management orientation, information seeking behaviour, preparedness for adaptation and change resistance, whereas majority of the non adopters had low level of innovativeproness, extension agency contact, risk orientation, information seeking behaviour, preparedness for adaptation, medium level of mass media participation and management orientation and high level of change resistance. Major constraints faced by adopter and non-adopter farmers were ‘borewell failures’ and ‘high cost of irrigation facility’ respectively. The suggestion included ‘providing subsidies to climate proof technology’ and ‘promoting climate smart agriculture.’

July, 2017

(Sahana, S.)
Major Advisor

Agronomy

Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the Department of Agronomy

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1. Effect of Water Soluble Fertilizers and Molybdenum on Rainfed Groundnut (*Arachis hypogaea* L.) under Southern Transition Zone of Karnataka

GOWDESH, K. T

ABSTRACT

A field experiment entitled Effect of water soluble fertilizers and molybdenum on rainfed groundnut (A*rachishypogaea* L.) under Southern Transition Zone of Karnataka was conducted during *kharif*season of 2015 at the college of Agriculture, Navile, Shivamogga, on red clay loam soil land which was low in nitrogen, medium in available phosphorous, low in available potassium. There were fourteentrarmentscomprising T_1: RDNPK alone (25 kg N 50 kg $P_2O_5$and 25 kg K_2O ha^{-1}),T_2: RNMP + Seed treatment with ammonium molybdate @ 6 g kg^{-1}seed,T_3: RNMP + Foliar application of NPK (18:18:18) @ 1 % at 30 and 45 DAS,T_4:T_3 + Seed treatment with ammonium molybdate @ 6 g kg^{-1}seed,T_5: RNMP + Foliar application of Multi-K@ 1 % at 30 and 45 DAS,T_6:T_5+ Seed treatment with ammonium molybdate @ 6 g kg^{-1}seed,T_7: RNMP + Foliar application of NPK (18:18:18) @ 2 % at 30 and 45 DAS, T_8:T_7 + Seed treatment with ammonium molybdate @ 6 g kg^{-1}seed, T_9: RNMP + Foliar application of Multi-K@ 2 % at 30 and 45 DAS, T_{10}:T_9 + Seed treatment with ammonium molybdate @ 6 g kg^{-1}seed, T_{11}: RNMP + Foliar application of NPK (18:18:18) @ 1 % at 30 DAS + Foliar application of Multi-K @ 1 % at 45 DAS,T_{12}:T_{11} + Seed treatment with ammonium molybdate @ 6 g kg^{-1}seed, T_{13}: RNMP + NPK (18:18:18) @ 2 % at 30 DAS + Foliar application of Multi-K@ 2 % at 45 DAS and T_{14}:T_{13} + Seed treatment with ammonium molybdate @ 6 g kg^{-1}seed, The experiment was laid out in RCBD with replicated thrice.

The result revealed RNMP + Seed treatment with ammonium molybdate@ 6 g kg^{-1} seed + Foliar application of NPK (18:18:18) @ 2 % at 30 DAS + Foliar application of Multi-K @ 2 % at 45 DAS(T_{14})recorded significantly higher plant height (35.07 cm), number of branches per plant (10.90), number of leaves per plant (48.10), leaf area per plant (13.57 dm^2), number of pods per plant (25.97), 100 kernel weight (38.67 g), haulm yield (32.17 q ha^{-1}), kernel yield (19.67 q ha^{-1}), pod yield (26.83 q ha^{-1}), shelling percentage (73.77), oil content (46.83 %), oil yield (917 kg ha^{-1}), harvest index (31 %) compared to other treatments. Similarly, available nutrients (280.03, 29.10, 166.10, 0.23 N, P_2O_5, K_2O kg ha^{-1} and Mo mg kg^{-1}, respectively) nutrient uptake (49.03, 11.61, 45.47, 1.06 N, P_2O_5, K_2O kg ha^{-1} and g ha^{-1}respectively) and were higher gross return (Rs1, 20, 750 ha^{-1}). However, due to higher unit cost of WSF higher ICBR (2.87) was recorded in RNMP + Seed treatment with @ 6 g ammonium molybdate kg^{-1}seed + Foliar application of NPK (18:18:18) @ 1 % at 30 DAS + Foliar application of Multi-K @ 1 % at 45 DASover control.

It is also concluded that RNMP + Seed treatment with ammonium molybdate@ 6 g kg^{-1}seed + Foliar application of NPK (18:18:18) @ 2 % at 30 DAS + Foliar application of Multi-K @ 2 % at 45 DASfound superiorwith respect to yield and returns.

May, 2017

(Narayana S. Mavarkar)
Major Advisor

2. Performance of Little Millet (*Panicumsumatrense* Roth ex Roem and Schult.) Genotypes for Different dates of Sowing

ANUSHA, M. R.

ABSTRACT

A field experiment was conducted at College of Agriculture, UAHS, Shivamogga during *kharif* 2016 to study the performance of little milletgenotypes for different dates of sowing. The experiment was laid out with in split plot design with three replications. There were twelve treatment combinations comprised of four dates of sowing (July last week, August 1st week, August 2nd week and August 3rd week) and three varieties (Hiriyur local, BL-6 and OLM-203) as main and subplots respectively.

Among the dates of sowing, July last week sown crop recorded significantly higher plant height (98.70cm), total dry weight (23.36 g plant^{-1}), leaf area (461.91 cm^2 plant^{-1}), leaf area index (1.54), grain yield (1290 kg ha^{-1}) and stover yield (1569 kg ha^{-1}) compared to other dates of sowing. Among the varieties tested Hiriyur local recorded significantly higher number of tillers (12.8), leaf area (471.44 cm^2 plant^{-1}), total dry weight (23.25 g plant^{-1}), leaf area index (1.57), grain yield (1283 kg ha^{-1}) and stover yield (1542 kg ha^{-1}) followed by OLM-203 which recorded higher leaf area (408.02 cm^2 plant^{-1}), total dry weight (16.18 g plant^{-1}), leaf area index (1.36), grain yield (1016 kg ha^{-1}) and stover yield (1232 kg ha^{-1}), respectively.

However,Hiriyur local sown on July last week recorded higher net returns (` 43,782 ha$^{-1}$) and BC ratio (1.98) followed by OLM-203, whichrecordednet returnsof `20,963 ha^{-1}and BC ratio 1.46. Study revealed that superiority of Hiriyur local at different tested dates of sowing. As an alternative OLM-203 with July last week or for delayed situations may be considered.

July, 2017

(T. Basavaraj Naik)
Major Advisor

3. Management of Nutrients through Organic Manures in SRI Method of Rice Cultivation for Coastal Karnataka

ASHWINI, M.

ABSTRACT

A field experiment was conducted during *kharif*, 2016 at Zonal Agricultural and Horticultural Research Station, Brahmavara, UAHS, Shivamogga to study the effect of different organic manures on growth and yield of rice under SRI method of cultivation. The experiment was laid out in Randomised Complete Block Design with seven treatments replicated four times. The treatment consisted of vermicompost, poultry manure, fish meal to substitute 75 and 50 per cent recommended dose of nitrogen. Top dressing was done thrice with cow urine to substitute 25 and 50 per cent of nitrogen.

Among the treatments, application of 75 per cent recommended dose of nitrogen through vermicompost + 25 per cent recommended dose of nitrogen through cow urine produced significantly higher grain and straw yield (5,710 and 7,845 kg ha^{-1},respectively), followed by 100 per cent recommended dose of fertilizers (60:30:60 kg ha^{-1}) recording higher grain and straw yield (5515 and 7632 kg ha^{-1}, respectively). This was mainly due to growth attributing parameters like plant height (114.03 cm), number of leaves per plant (82.85), number of tillers per plant (29.30), leaf area per plant (2273.46 cm^2), total dry matter production per plant (115 g) and yield contributing characters like panicle length (24.33 cm), panicle weight (3.80 g), 1000 grain weight (24.83 g), number of filled grains per panicle (124.23) and harvest index (0.420). The above treatment also recorded higher nutrient uptake of nitrogen, phosphorous and potassium (107.98, 22.99 and 81.07 kg ha^{-1}, respectively) and gave higher benefit cost ratio (1.46) and net returns (` 39,238).

August, 2017

(Hanumanthappa. M)
Major Advisor

4. Effect of Different Fertilizer Levels on Productivity and Profitability of Little Millet (*Panicum sumatrense* Roth ex Roem. & Schult)

DIVYASHREE, U.

ABSTRACT

A field experiment was conducted during 2016-17 at Agronomy field unit, UAHS, Shivamoggga. The experiment was laid out in Randomized Complete Block Design with twelve treatments replicated thrice. The soil of the experimental site was acidic in reaction, low in available nitrogen, high in available phosphorus and medium in available potassium status. The test variety was Hiriyur local. The treatments comprised of combinations of three levels of nitrogen (10, 20 and 30 kg N ha^{-1}), two levels of phosphorus (10 and 20 kg P ha^{-1}), and two levels of potassium (0 and 10 kg K ha^{-1}). Among the different combinations of NPK fertilizers tested, application of 30 kg nitrogen and 20 kg phosphorus with or without 10 kg K ha^{-1} performed better. However, 30:20:10 kg NPK ha^{-1} recorded significantly taller plants (71.27 cm), higher number of leaves (40.87 $plant^{-1}$), number of tillers (10.87 $plant^{-1}$), leaf area (514.59 cm^2 $plant^{-1}$), total dry matter accumulation (24.25 g $plant^{-1}$), number of productive tillers $plant^{-1}$ (9.4), panicle length (13.43 cm), number of grains $panicle^{-1}$ (592), test weight (3.39 g), grain yield (1580 kg ha^{-1}) and straw yield (1603 kg ha^{-1}). Higher total uptake of Nitrogen (35.48 kg ha^{-1}), Phosphorus (13.23 kg ha^{-1}), Potassium (25.01 kg ha^{-1}) was also recorded in the same treatment. The agronomic nutrient use efficiency of N, P and K was found higher in the treatment supplied with 30:20:10 kg NPK ha^{-1} (4.37, 7.31 and 8.09 kg grain kg^{-1} nutrient applied respectively) and recovery efficiencies were also found higher. Higher gross returns (` 87,015), cost of cultivation (` 47,118), net returns (` 39,897), B : C (1.85) was recorded in the treatment supplied with 30:20:10 kg NPK ha^{-1} and found better for light soils.

July, 2017

(Dinesh Kumar, M)
Major Advisor

5. Performance of Chia (*salvia hispanica* l.) a Super Food Crop Under Different Spacings and Fertilizer Levels in Southern Transition Zone of Karnataka

JEENA MARY

ABSTRACT

A field experiment was conducted during *Kharif*2016 at the research field, College of Agriculture, Shivamogga to determine the 'Performance of Chia (*Salvia hispanica* L.)a super food crop under different spacings and fertilizer levels in Southern Transition Zone of Karnataka'. The experiment consisted of three levels of spacings (S_1: 60cm x 22.5cm, S_2: 60cm x 30cm and S_3: 60cm x 45cm) and three levels of fertilizers (F_1: 30:20:25 kg NPK ha^{-1}, F_2: 60:40:50 kg NPK ha^{-1} and F_3: 90:60:75 kg NPK ha^{-1}). Experimental design adopted was two factor symmetrical experiment with RCBD having three replications. Crop was first established innursery and then transplanted in main field at 18 days after sowing. Full dose of phosphorus and potassium fertilizers were applied as basal while, half of nitrogen was applied as basal and remaining half was applied 20 days after transplanting as top dressing. Variety used was CHIAmpion B-1. Result of study shown significant increase in yield level with spacing, 60cm x 45cm (597.59 kg ha^{-1}) and fertilizer level, 90:60:75 kg NPK ha^{-1} (623.60 kg ha^{-1}). Significant yield (676.58 kg ha^{-1}) obtained in treatment combination, 60cm x 45 cm with 90: 60: 75 kg NPK ha^{-1}compared to other treatment combinations. Oil per cent showed significantly different result with fertilizer dosage and gave significantly superior oil (30.64 %) at lower fertilizer dosage. Protein content in seeds increased significantly with increase in fertilizer levels and recorded significantly higher per cent in F_3 (23.85 %) and was superior to F_2 (21.50 %) and F_1 (20.17 %). Oil and protein per cent were not significantly influenced by the interaction of spacing and fertilizer levels. Further, the treatment combination,S_3F_3resulted higher net returns (`162138.60 ha^{-1}) and B:C (4.97).

July, 2017

(H.K. Veeranna)
Major Advisor

6. Effect of Different Potassium Levels and Time of Application on Growth and Yield of Finger Millet under Drill Sown and Transplanted Conditions

KAVYASHREE, N.

ABSTRACT

A field experiment was conducted at Agricultural and Horticultural Research Station, Bavikere, UAHS, Shivamoggato study the effect of different potassium levels and time of application on growth and yield of finger millet under drill sown and transplanted conditions during *Kharif*2016.The experiment was laid out in RCBD factorial concept with three replications. There were 12 treatments comprising of two methods of establishment (drill and transplanted), three levels of potassium application (25, 37.5 and 50 kg ha^{-1}) and two different times of application of potassium (basal and split).

Among the methods of establishment, transplanting method recorded significantly taller plants (105.87 cm), total dry matter accumulation (43.58 g $plant^{-1}$), number of ear heads (4.28 $hill^{-1}$), test weight (3.19 g), grain yield (3,300 kg ha^{-1}) and straw yield (6,270 kg ha^{-1}) compared to drill sown method. Application of K_2O @ 37.5 kg ha^{-1} recorded significantly taller plants (107.80 cm), total dry matter accumulation (45.09 g), number of ear heads (4.43 $hill^{-1}$), test weight (3.21 g),grain yield (3,467 kg ha^{-1}) and straw yield (6,445 kg ha^{-1}) as compared to other levels of potassium. Basal application of potassium recorded significantly higher plant height (104.44 cm), total dry matter accumulation (41.99 g $plant^{-1}$), number of ear heads (4.21 $hill^{-1}$), test weight (3.11 g), grain (3,203 kg ha^{-1}) and straw yield (6,179 kg ha^{-1}) compared to split application.

Among the combinations, basal application of 37.5 kg K_2O ha^{-1}at the time of transplanting was recorded maximum grain yield (3,589 kg ha^{-1}), straw yield (6,559 kg ha^{-1}), nutrient uptake (94.15, 34.39 and 71.95 NPK kg ha^{-1}, respectively),gross returns (Rs. 10,7051 ha^{-1}), net returns (Rs. 76,238 ha^{-1}) and benefit cost ratio (3.47) and hence found feasible.

July, 2017

(C. Sunil)
Major Advisor

7. Response of different Genotypes and Fertilizer Levels on Growth and Yield of Finger Millet (*Eleusine coracana* (L.) in Bhadra command area.

MANMOHAN, K

ABSTRACT

A field experiment was conducted during 2016 at Agricultural and Horticultural Research Station, Kathalagere, University of Agricultural and Horticultural Sciences, Shivamogga to study the response of different genotype's and fertilizer levels on growth and yield of finger millet in Bhadra command area. The experiment was laid out in RCBD (Factorial concept) with three genotypes (KMR-340, KMR-630 and KMR-301) and three fertilizer levels (100 per cent RDF- 100:50:50 kg NPK ha^{-1}, 125 per cent RDF- 125:62.5:62.5 kg NPK ha^{-1} and 150 per cent RDF- 150:75:75 kg NPK ha^{-1}) replicated three times. The results revealed that genotypes, KMR-301 recorded significantly higher plant height (115.44 cm), number of finger $earhead^{-1}$ (7.06), total dry matter production (37.57 g $plant^{-1}$) and grain yield (37.03 q ha^{-1}) as compared to other genotypes (KMR-340 and KMR-630). Similarly, 150 per cent RDF recorded significantly higher plant height (113.56 cm), number of finger $earhead^{-1}$ (6.84), total dry matter production (36.55 g $plant^{-1}$) and grain yield (35.90q ha^{-1}) followed by 125 per cent of RDF. Among the interaction, KMR-301 with 150 per cent RDF recorded significantly higher grain yield (40.23 q ha^{-1}) and it was on-par with genotype KMR-301 with 125 per cent RDF. Similarly, higher nutrient uptake was observed in KMR-301 genotype (nitrogen of 91.2, phosphorous of 32.06 and potassium of 71.11 kg ha^{-1} respectively). Similar trend was observed in 150 per cent RDF (nitrogen of 89.94, phosphorous of 31.62 and potassium of 70.00 kg ha^{-1} respectively). Growing KMR-301 with 150 per cent RDF was recorded higher net returns (₹ 76529 ha^{-1}) and higher B: C ratio (2.67) it was on-par with 125 per cent RDF. In the farmers point of view growing new genotype KMR-301 with 125 per cent of RDF was found better treatment combination for getting higher yield and net return.

August, 2016

(Kumara O.)
Major Advisor

8. Effect of Sulphur on Growth, Yield and Quality of Castor (*Ricinuscommunis* L.) Hybrids under Central Dry Zone of Karnataka.

MUNESHKUMAR V. KUGATI

ABSTRACT

A field experiment was conducted during 2016 at Zonal Agricultural and Horticultural Research station, Hiriyur, UAHS, Shivamogga to study theeffect of sulphur on growth, yield and quality of castor hybrid under central dry zone of Karnataka. The experiment was laid out in RCBD (Factorial concept) with three sources of sulphur on three castor hybrids replicated three times. The sources of sulphur used were gypsum, single super phosphate and elemental sulphur while different hybrids include DCH-177,HCH-6 and YRCH-1. Among the sources of sulphur application of sulphur at 20 kg per hectare through gypsum recorded significantly higher plant height (113.96 cm), total biomass (5652.67kg ha^{-1}) and seed yield (1308.32 kg ha^{-1}) as compared to other sources. Among the hybrids DCH-177 recorded significantly higher plant height (108.43 cm), total biomass (5603.5 kg ha^{-1}) and seed yield (1226.84 kg ha^{-1}) as compared to HCH-6 and YRCH-1. Among the interactions application of sulphur at 20 kg per hectare through gypsum with DCH -177 resulted in higher total biomass (5851.68 kg ha^{-1}) and seedyield (1388.88 kg ha^{-1}) than other interactions. Similarly higher uptake of nitrogen (78.70 kg ha^{-1}), phosphorous (17.20 kg ha^{-1}), potassium (70.60 kg ha^{-1}) and sulphur (5.70 kg ha^{-1}) was recorded with the same treatment. Higher cost of cultivation (Rs.16131 ha^{-1}), net returns (Rs.32480 ha^{-1}) and higher B: C ratio (2.50) was observed in application of sulphur at 20 kg per hectare through gypsum with DCH-177 hybrid.

September, 2017

(Basavalingaiah)
Major Advisor

9. Efficacy of Herbicide Molecule for Weed Management in Transplanted Paddy for KodaguRegion

RAJATH, H. P.

ABSTRACT

A field experiment entitled 'Efficacy of herbicide molecule for weed management in transplanted paddy for Kodaguregion' was conducted during*Kharif*2016 at AHRS, Ponnampet to screen suitable herbicidesfor weed management in paddy. The herbicides tried were butachlor @ 30kg ha^{-1} at 3 DAT, oxadiargyl @ 100 g a.i.ha^{-1} at 3 DAT,bensulfuron methyl@ 60 g a.i. ha^{-1} + pretilachlor @ 600 g a.i. ha^{-1} at 3 DAT, ethoxysulfuron @ 18.75 ga.i.ha^{-1} at 20 DAT, bispyribac-Na @ 20 g a.i.ha^{-1} at 20 DAT, penoxsulum @ 22.5 g a.i. ha^{-1} at 20 DAT and 2,4 D at 2.5 kg ha^{-1} at 3 weeks after transplanting.Hand weeding twice at 20 and 40 DATand weedy check treatments were also included for comparison.The predominant weed flora observed in the experimental field includes*Fimbristylismiliacea*, *Echinochloaspp.*, *Monochoriavaginalis*,*Ammanniabaccifera* and *Ludwigiaparviflora*. Among herbicides, sequential application of oxadiargyl followed by penoxsulum recorded significantly lower weed population (10.60to 34.28 /0.25 m^2) and dry weight (0.94to 3.46 g / 0.25m^2) as which resulted in significantly higher grain yield (4068kg ha^{-1}). It was closely followed by combined application of oxadiargyl@ 100 g a.i. ha^{-1} at 3 DAT followed by bispyribac-Na @ 20 g a.i. ha^{-1} at 20 DAT yielded 3907 kg ha^{-1} with moderate control of weeds. Weedy check recorded 55.23 per cent reduction in grain yieldcompared to the above treatment. Major nutrients uptake by paddy crop was significantly higher while it was lower in weeds by all weed control treatments compared to weedy check. The maximum net returns of ` 29,962 ha^{-1} and profit of 1.63 per every rupee spent was achieved with the same treatment.

August, 2017

(Jadeyegowda, M.)
Major Advisor

10. Nitrogen and Potassium Management for Mechanized Rice Cultivation in Coastal Zone of Karnataka State

VANIJA, S.

ABSTRACT

A field experiment was conducted during *Kharif* 2016 at Zonal Agricultural and Horticultural Research station, Brahmavar, Udupi, Karnataka to study the nitrogen and potassium management for mechanized rice cultivation in coastal zone of Karnataka. The experiment was laid out in RCBD with 10 treatments and replicated thrice. The treatments consisted of combination of 3 levels (60, 75 and 95 kg ha^{-1}) each of nitrogen and potassium with recommended level of phosphorus (30 kg ha^{-1}) and an absolute control. Nitrogen was applied in 3 splits (50 % as basal, 25 % each at 30 and 55 DAT) whereas potassium was applied in 2 splits (50% as basal and 50 % at 55 DAT) and entire phosphorous was applied in a single basal dose.

Results revealed that the application of 90: 30: 60 kg NPK ha^{-1}produced significantly higher grain and straw yield (5900 and 7567 kg ha^{-1}, respectively) as compared to recommended dose of fertilizer (60: 30: 60 kg NPK ha^{-1}). The same treatment combination recorded significantly higher plant height (99.53 cm), number of tillers (32.17), number of leaves per hill (103.51), leaf area per hill (2380.65 cm^2), total dry matter production (63.10 g $hill^{-1}$) and yield attributing characters like number of productive tillers per hill (30.73), panicle length (29.00), panicle weight (5.46 g per panicle), number of filled grains per panicle (142.10) and harvest index (0.439). the total nutrient uptake of nitrogen, phosphorus and potassium (136.83, 36.94 and 128.44 kg ha^{-1}, respectively) with higher benefit cost ratio (2.16) and net returns (` 73,517) were found in the same treatment (90: 30: 60 kg NPK ha^{-1}) followed by the application of 90: 30: 75 kg NPK ha^{-1}.

July, 2017

(Sudhir Kamath K V)
Major Advisor

11. Performance of Sweet Corn (*Zea mays* L. *saccharata* Strut.) under Graded Levels of Fertilizers in Southern Transitional Zone of Karnataka

VIDYASHREE, M. R

ABSTRACT

A field experiment was conducted at College of Agriculture, Shivamogga, during *Kharif* 2016. The texture of soil was red sandy loam having acidic pH, poor in nitrogen, rich in phosphorus and medium with respect to potassium status. The experiment was laid out in Randomized Block Design with three replications. Three levels of N (75 %, 100 % and 125 % of RDN), two levels of P (75 % and 100 % of RDP) and three levels of K (75 %, 100% and 125 % of RDK) formed 18 different treatment combinations.

Application of 125 % of RDN + 100 % of RDP + 125 % of RDK produced fresh cob yield of 13.7 t ha^{-1}which was 23.42 % higher over 100 % of RDN + 100 % of RDP + 100 % of RDK and 45.74 % over 75 % of RDN + 75% of RDP + 75 % of RDK(9.4 t ha^{-1}). Further, there were improvement in other yield characters due to manifestation of improved growth characters as a result of higher uptake of nutrients caused by application of higher NPK fertilizers. The application of 125 % of RDN + 100 % of RDP + 125 % of RDK also increased the reducing sugars, non reducing sugars and crude protein content (3.83 %, 23.59 % and 10.87 % respectively) as compared 75 %of RDN + 75% of RDP + 75 % of RDK (2.09%, 18.0%, and 8.27% respectively).Application of 125 % of RDN + 100 % of RDP + 125 % of RDK is more cost effective (4.78 B:C) and remunerative with higher net return to the tune of `3,45,043 ha^{-1} as compared to other treatments.

July, 2017

(Narayana S Mavarkar)
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

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1. Assessment of Genetic Variability in Segregating Generation (F2) of Rice (*Oryza sativa* L.)

ASHWINI, K. H.

ABSTRACT

The present investigation in rice (*Oryza sativa* L.) was undertaken during *Kharif*, 2016 at College of Agriculture, Navile, UAHS, Shivamogga, to study variability parameters, character association, path analysis, and identification of transgressive segregants in respect of grain yield and its component traits in F_2 population of MO_4 x Puttabatta cross. The distribution pattern indicated large number of genes with dominance based complementary interaction in the inheritance of plant height, number of tillers per plant, number of productive tillers per plant, number of filled grains per panicle, spikelet fertility, grain yield per plant and L:B ratio and duplicate type of interaction was noticed for panicle length, test weight and harvest index. GCV and PCV values were relatively higher for grain yield per plant, number of productive tillers per plant, number of tillers per plant, harvest index and grain breadth. High heritability coupled with high genetic advance as per cent mean for spikelet fertility, test weight, plant height, harvest index, grain yield per plant, grain length, number of productive tillers per plant, number of tillers per plant and L:B ratio indicating additive gene action in their genetic control. Grain yield per plant was exhibited positive significant correlation with test weight, harvest index, number of productive tillers per plant, number of grains per panicle, plant height, spikelet fertility and panicle length. Path analysis in F_2 generation indicated the positive direct effect for number of grains per panicle, number of productive tillers per plant, harvest index, test weight, grain length, days to 50 per cent flowering, number of tillers per plant and plant height. Superior desirable transgressive segregants (MP-312, MP-319, MP-299, MP-243, MP-238, MP-291, MP-200, MP-242, MP-237 and MP-215) were identified in the cross for advancing to the next generation.

July, 2017

(Dushyantha Kumar, B. M)
Major Advisor

2. Genetic Investigation on End-of Season Drought Stress in Advanced Breeding Lines of Groundnut (*Arachishypogaea* L.)

CHANDRASHEKHARA, G.

ABSTRACT

The present investigation focused on the study of morphological, physiological and biochemical response of forty groundnut genotypes under both managed drought stress (end season drought stress) and normal moisture conditions was conducted at College of Horticulture, Hiriyur using randomized complete block design with two replications. The analysis of variance revealed the existence of highly significant differences among the genotypes under study for all the traits studied. A wide range of variability and high heritability coupled with high genetic advance were recorded for most of the yield contributing traits. The association studies revealed that, pod yield per plant showed significant positive correlation with number of mature pods per plant, number of immature pods per plant, number of pods per plant, number of kernels per plant, kernel yield per plant, fresh seedling weight, harvest index, oil content and root to shoot ratio. The results of path analysis reflected that, the yield related traits *viz.*, relative water content, phenolic content of leaves, oil content, root to shoot ratio, plant height, number of secondary branches per plant, number of mature pods per plant, number of immature pods per plant, number of kernels per plant, test weight, kernel yield per plant, fresh seedling weight, harvest index and days to maturity had direct positive effect on pod yield under moisture stressed field condition. The genotypes Dh - 234, R - 2001 - 3, ICGV - 15151, ICGV - 15138, SB - 14, ICGV - 15145, ICGV - 15154, ICGV - 15146, ICGV - 15159 and ICGV - 15158 have been identified as drought tolerant genotypes in view of their better drought tolerance ability and these can be used as donor parents to develop drought tolerant varieties in further breeding programme.

August, 2017

(Harish Babu, B. N.)
Major Advisor

3. Studies on Variability, Diversity and Characterization of Genotypes in Brinjal (*Solanum melongena* L.)

JYOTI PRABHULINGA JIRANKALI

ABSTRACT

The present investigation in brinjal (*Solanum melongena* L.) was undertaken during *kharif* season of 2016. Hundred brinjal genotypes along with two checks were evaluated in Augmented design in University of Horticultural and Agricultural Sciences, Shivamogga. Analysis of variance revealed high significant differences among genotypes for fifteen out of nineteen characters studied. High estimates of PCV, GCV, heritability coupled with high genetic advance were observed for fruit weight, number of fruits per cluster and shoot borer infestation. Hence indicating high variability for these traits and selection for these traits may be effective.

Correlation studies revealed significant and positive association for total yield per plant with fruit weight, number of primary branches, fruit length, number of fruits per cluster, fruit diameter. Path analysis studies revealed high direct effects for fruit weight, number of primary branches, fruit length, number of fruits per cluster and fruit diameter on total yield per plant.

Mahalanobis D^2 analysis grouped 100 genotypes of brinjal into four clusters. The cluster III showed maximum intra-cluster distance and maximum inter-cluster distance was observed between clusters II and III, these genotypes can be chosen for further breeding programme through hybridization. Yield contributed maximum to the genetic diversity followed by leaf area, fruit borer infestation, fruit weight, Plant spread, days to first fruit maturity. Characterization for qualitative and quantitative characters showed high variability among the genotypes, based on different characters related to spines, flower, stem, leaf and fruit. The genotypes performing well can be released as a variety or it can be put to further use in the breeding programme as a breeding line by the breeder.

July, 2017

(Gangaprasad S)
Major Advisor

4. Assessment of Genetic Diversity of Rice Genotypes for Submergence Tolerance in Rainfed Lowlands

LAHARI, G.

ABSTRACT

The present investigation was carried out atCollege of Agriculture, Shivamogga during summer 2016 to screen 107 rice genotypes including 4 checks (FR13A, Swarna Sub1, Hemavathi and Jyothi) for their survival ability under submergence using Augmented design. Among 107 genotypes, 49 genotypes with higher survival percentage were selectedand laid out using Randomized Complete Block Design with two replications under submergence during *kharif* 2016 for evaluating genetic variability, character association, path analysis and genetic divergence for thirteen traits.

The analysis of variance revealed a significant difference among the genotypes for all the characters under study. High PCV and GCV coupled with high heritability and high GAM was recorded in number of tillers per plant, number of productive tillers per plant, grain yield per plant, straw yield per plant and absolute growth rate. Correlation studies revealed highly positive significant association of grain yield per plant with number of tillers per plant, number of productive tillers per plant, number of spikelets per panicle, number of filled grains per panicle and straw yield per plant.The highest positive direct effect on grain yield was observed in straw yield per plant and harvest index. Using Mahalanobis D^2, 49 genotypes were grouped into eight clusters. The maximum inter cluster distance was observed betweencluster VII and cluster VIII. Among all the characters,absolute growth rate had maximum contribution towards genetic divergence. Hence from the present investigation three promising genotypes viz., IET 19171, IET 17393 andIET 18508 have been identified as high yielding submergence tolerant rice varieties.

August, 2017

(B. M. Dushyantha Kumar)
Major Advisor

5. Genetics of Yield and Yield Parameters in FCV (Flue Cured Virginia) Tobacco Hybrids (*NicotianaTabacum*L.)

MEGHA GANACHARI

ABSTRACT

The present investigation was conducted to assess the combining ability, gene action and heterosis in respect to leaf yield and its component charactersthrough 6 x 6 diallel mating design involving thirty hybrids (developed through full diallel) and six parents in FCV tobacco during *kharif*2016 at ZAHRS,CoA, Shivamogga.

The analysis of variance indicated significant amount of variability among genotypes for sixteen quantitative characters studied except for the characters like number of leaves per plant, reducing sugar and nicotine content.Heterosis was recorded for leaf yield and its component characters andthe studyon standard heterosis revealed that five hybrids *viz.*, 6 x 1, 3 x 1, 2 x 1, 4 x 1 and 6 x 2 exhibited significant positive heterosis for cured leaf yield over bestcommercial check Kanchan.

Combining ability analysis was carried out for leaf yield andits components in FCV tobacco. Both general combining ability (GCA) and specific combining ability (SCA) variances were highly significant for almost all the characters indicating the importance of both additive and non additive gene actions. Parents and F_1 hybrids differed significantly for GCA and SCA effects for all the characters respectively. The ratios of GCA:SCA variance revealed the predominance of non-additive gene action in the inheritance of all the traits and these traits can be improved for combining ability through heterosis breeding. Study on the combining ability revealed that the parents Kanchan, FCH-222 and Tobios-6 were found to be best general combiners for cured leaf yield than others. The highest significant positive SCA effect was observed in the cross 2 x 4 followed by 1 x 3, 6 x 1, 1 x 4 and 1 x 5 for cured leaf yield. These hybrids were found to be suitable for obtaining higher cured leaf yield in FCV tobacco.

July, 2017

(H. D. Mohan Kumar)
Major Advisor

6. Assessment of variability and genetic divergence in cucumber (*Cucumissativus*L.)

MEGHA HOSAMANI

ABSTRACT

Thirty five diverse genotypes of cucumber collected from different indigenous sources were planted in Augmented design, during *kharif* of 2016 at ZAHRS, CoA, Shivamogga and were assessed to know the variability, correlation, path analysis and divergence for different yield related traits.

The analysis of variance indicated significant amount of variability among genotypes for nineteen quantitative characters studied.The high value of GCV and PCV was observed for characters like fruit weight, number of fruits per vine and yield per vine. Low GCV and PCV was observed for days to first female flowering, days to first male flower, internodal length, days to first fruit harvest and vine length. High heritability estimates coupled with high genetic gain were observed for fruit weight, no of fruits per vine and yield per vine.

Total fruit yield per vine had positive correlation with leaf length, leaf breadth, petiole length, no of female per node, number of male per node, vine length, number of branches per vine, node number at which male appears, fruit length, whereas positive significant correlation was observed for number of nodes per vine, fruit weight and number of fruits per vine. Phenotypic path co-efficient analysis for fruit yield per plant revealed that the characters like fruit weight and number of fruits per plant have high positive direct effect towards yield. The genotypes were grouped into two clusters and highest intracluster distance was found in cluster II (479.96). Intercrossing the genotypes from these two clusters generate wider variability and is expected to throw high yielding transgressive segregants in a population improvement programme.

July, 2017

(S. Gangaprasad)
Major Advisor

7. Studies on genetic diversity for drought tolerance in local land races of rice (*Oryzasativa* L.) under aerobic condition

NAVYA, G. T.

ABSTRACT

Rice is the principle food crop for more than half of the world's population. The frequent occurrences of abiotic stress are the key to decreased productivity of rice. Drought is identified as the major abiotic stress affecting the yield of rice.The present study was undertaken to evaluate 49 local land races of rice including checks in field and PVC pipes for screening drought tolerant genotypes, assessing genetic variability, correlation, path coefficients and genetic divergence under control and drought condition. ANOVA revealed highly significant difference for all the characters. Yield per plant was significantly and positively associated with productive tillers per plant, number of spikelets per panicle, number of filled grains per panicle, seed filling per cent and test weight. Physiological characters like chlorophyll content, relative water content, proline content, root length, root to shoot ratio and root volume showed significant positive correlation with yield under drought condition. Phenotypic path-coefficient analysis revealed that test weight in drought and number of spikelets per panicle under control showed highest direct effect on yield per plant and among physiological characters root length under drought and control condition exhibited highest direct effect on yield. Using Mahalanobis' D^2 statistics, genotypes were grouped into eightclusters, wide genetic variability was indicated by the intra and inter cluster distances. Maximum inter cluster distance was observed between cluster IV and cluster VIII under drought condition and between cluster VII and VIII under control condition. Based on yield and yield attributes results under both drought and control conditions the genotypes Sannavaalya, Manjakaime, JGL-1798, Gangadace, Madras sanna and Najarbadwere recommended for drought tolerance breeding programme as well as adoption under drought stress condition.

July, 2017

(B. M. Dushyantha Kumar)
Major Advisor

8. Heterosis and Combining Ability Studies for Yield and Yield Attributing Traits in Brinjal (*Solanum melongena* L.)

NIKHILA

ABSTRACT

The present investigation was conducted to assess the heterosis and combining ability in brinjal with respect to yield and yield attributing traits through line x tester mating design. Seven lines and three testers were crossed to develop twenty-one F_1 hybrids during *kharif* – 2016 and were evaluated during *rabi* 2016-17 at ZAHRS, CoA, Shivamogga.

The analysis of variance due to genotypes was highly significant for most of the characters except for plant spread. Heterosis was recorded for yield and yield attributing traits and the top five hybrids *viz.*, Bili chandu badane x Mullugai badane, Bili udda badane x Mullugai badane, 40 A badane x Mullugai badane, Desi jawari badane x Mullugai badane and Nati badane x Mullugai badane exhibited significant positive heterosis for yield per plant over standard check.

Combining ability analysis was carried out for fruit yield and yield attributing traits in brinjal. Both general a combining ability (GCA) and specific combining ability (SCA) variances were highly significant for almost all the characters indicating the importance of both additive and non-additive gene actions. SCA variances were higher than the GCA variances except for three characters, indicating non-additive gene action in most of the traits and these traits can be improved by heterosis breeding. These hybrids would be advantageous for production and quality improvement. The three characters like plant height, fruit length and fruit length to diameter ratio showed additive gene action which can be improved by reciprocal recurrent selection. The parents like Bili udda badane, Nati badane and Mullugai badane showed highly significant positive GCA effects, the crosses Thailand badane x Dodda mullina badane, Sakleshpur badane x Dodda mullina badane and Bili chandu badane x Mullugai badane showed the highly significant positive SCA effects for the yield per plant.

July, 2017

(T. H. Gowda)
Major Advisor

9. Variability studies in segregating populations of cowpea (*Vignaunguiculata* (L). Walp)

SHEELA, H. K.

ABSTRACT

The present investigation in cowpea **(*Vignaunguiculata* (L). Walp.)** was undertaken during 2015-2016 at ZAHRS, Shimogga tostudy the variability parameters, correlation, path analysis and to identify superior segregants in F_2 and F_3segregating populations of the crosses UAHS 47 X UAHS 34 for brown population and UAHS 58 X North bold for white population. F_2, F_3 and parental cultivars were evaluated for 12 quantitative characters and statistical parameters were estimated. The high GCV and PCV were observed for seed yield per plant, number of pods per plant, plant height, number of clusters per plant and test weight in F_2 and $F_3$of both the crosses.Heritability and genetic advance over mean were higher for plant height, number of primary branches, number of secondary branches, number of clusters per plant, number of pods per plant, pod length, number of seeds per pod, test weight and seed yield per plant in both generation of both the crosses.The correlation coefficient analysis revealed that number of clusters per plant, total number of pods per plant and test weight showing significant positive association with seed yield in F_2 and F_3 of both the crosses.In the path analysis the characters like number of pods per plant and test weight showed highest positive direct effect on seed yield.The diversity analysis between families in F_3 revealed that the selection of families from the clusters formed will helps us to retain the variability present in the families by reducing the families' number. Transgressive families were selected in F_3 for further generation. The selection for the seed yield along with number of clusters per plant, total number of pods per plant and test weight will be highly reliable for developing high yielding genotypes in further generations.

July, 2017

(T. H. Gowda)
Major Advisor

10. Variability and character association in F_3 generation of FCV (Flue Cured Virginia) tobacco (*Nicotiana tabacum* L.)

SHUBHA, K. N.

ABSTRACT

The present investigation was carried out at ZAHRS, UAHS, Shivamogga during 2016-2017 *Kharif* season to study the genetic variability, heritability, genetic advance, character association and path analysis in respect of cured leaf yield and its conributing traits in F_3 generation of FCV (Flue Cured Virginia) tobacco cross TB-70 x TB-102. The mean and variance in sixteen quantitative characters in F_3 generation of the cross TB-70 x TB-102 indicated wide variability among the families for all the traits *viz.*, leaf area per plant, internodal length, plant height, chlorophyll content, specific leaf weight, number of leaves, leaf length, leaf breadth, green leaf yield, cured leaf yield, top grade equivalent, reducing sugar content and nicotine content. GCV and PCV values were relatively higher for leaf area per plant. Heritability estimates were high for all the characters investigated except for nicotine content which exhibited moderate heritability. High heritability combined with high genetic advance as percent mean was observed for plant height, chlorophyll content, specific leaf weight, internodal length, number of leaves per plant, leaf breadth, leaf area per plant, green leaf yield, cured leaf yield, top grade equivalent and reducing sugar. The component characters *viz.*, green leaf yield, top grade equivalent, stem girth, number of leaves per plant, leaf length, leaf area per plant, plant height and leaf breadth exhibited significant positive correlation with each other and also with cured leaf yield. Path analysis in F_3 generation indicated maximum positive direct effect of number of leaves per plant, top grade equivalent, leaf breadth, leaf length and green leaf yield on cured leaf yield. In the present investigation superior promising individual families were identified in F_3 generation. Therefore, for improving cured leaf yield selection may be based on characters which have shown positive direct association with cured leaf yield.

July, 2017

(H. D. Mohan Kumar)
Major Advisor

11. Studies on genetic variability in segregating generation of green gram

VEERASENA REDDY

ABSTRACT

The present investigation in green gram**(*Vignaradiata*(L). Wilczek.)** was undertaken during 2015-2016 at ZAHRS, Shivamogga to study the variability parameters, correlation, path analysis and to identify superior segregants in F_2segregating populations of the crosses MLS x UAHS bold and MLS x BOLD-2. F_2, and parental cultivars were evaluated for 12 quantitative characters and statistical parameters were estimated. The high GCV and PCV were observed for seed yield per plant, number of pods per plant, plant height, and number of clusters per plant in F_2population of both the crosses.Heritability and genetic advance over mean were higher for plant height, number of primary branches, number of secondary branches, number of clusters per plant, number of pods per plant, pod length, number of seeds per podand seed yield per plant in both population of both the crosses. The correlation coefficient analysis revealed that number of clusters per plantand total number of pods per plant showing significant positive association with seed yield in F_2generation of both the crosses. In the path analysis the characters like number of pods per plant and pods per cluster showed highest positive direct effect on seed yield. Transgressive families were selected in F_2 for further generation. The selection for the seed yield along with number of clusters per plant and total number of pods per plant will be highly reliable for developing high yielding genotypes in further generations.

August, 2017

(S. Shivanna)
Major Advisor

12. Assessment of genotypes X environment interaction in advanced breeding lines of rice (*Oryzasativa*L.)

VITTAL TAPASI

ABSTRACT

Rice (*Oryza sativa* L.) isone of the staple food crops of the world. The present study was undertaken to evaluate twenty advanced breeding lines in a Randomized Complete Clock Design with two replications during *Kharif*2016 at six locations*viz,* AHRS, Kattalagere,College of Agriculture (CoA), Shivamogga, AHRS, Honnavile. ZAHRS, Mudigere. AHRS, Bavikere and AHRS, Ponnampetefor variability, diversity and stability for yield and its components. ANOVA revealed significant differences among all the advanced breeding lines for all the characters studied. High range of variation, PCV, GCV and high heritability coupled with high GAM was observed for days to fifty *per cent* flowering, days to maturity, plant height, and grain yield. Plant height, number of tillers, number of productive tillers,number of grains per panicle, test weight, harvest index and straw yield had significant positive association with grain yield at phenotypic level. Harvest index had the highest positive direct effect on grain yield, whereas highest positive indirect effect on grain yields by number of grains per panicle via number of spikelets per panicle. Using Mahalanobis' D^2 statistics, advanced breeding lines were grouped into five clusters, cluster I consists highest number of advanced breeding lines. Days to maturity and plant height had highest contribution towards the genetic diversity. The advanced breeding line JA-6-2 is identified as the stable variety for grain yield in all the six locations, whereas JT-2-16-1 (AHRS, Kattalagere), JT-2-22-5 (CoA shivamogga), JA-4-3 (AHRS,Honnavile), JT-2-15-1(ZAHRS, Mudigere), JB-1-20-2(AHRS, Bavikere) and JK-1-7-5 (AHRS,Ponnampete) are identified as stable lines for specific locations for grain yield.

June, 2017

(C. Malleshappa)
Major Advisor

Plant Pathology

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Plant Pathology

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1. Investigation on Bacterial Leaf Blight of Rice (*Oryza sativa* L.) Incited by *Xanthomonas oryzae* pv. *oryzae*

BALANAGOUDA PATIL

ABSTRACT

Bacterial leaf blight (*Xanthomonas oryzae* pv. *oryzae*) is an important and one of the oldest known disease occurs in many parts of the world in epiphytic proportions and causing huge crop losses. With this economic importance survey was carried out in three districts, among them the highest per cent disease severity of 34.64 was observed in Shivamogga followed by Davanagere (30.23 PDI) and lowest disease per cent severity of 21.04 was documented in Chickamagaluru district. Five isolates were subjected to morphological and biochemical tests, all the isolates were found negative for Gram staining and spore staining, positive for capsule staining with monotrichous flagellation. Bacterial cells were small rods, cells measured with an average size of 0.25 -0.40 x 1.25- 3.00 µm. All isolates showed positive reaction for gelatine liquefaction, protein digestion, ammonia production, KOH test, catalase test, starch hydrolysis and H_2S production and negative reaction for indole production, methyl red test, nitrate reduction, Vogues-Proskaure test and production of fluorescent on King's B medium. Nutrient agar medium was significantly supported for the good growth of five isolates of pathogen followed by GYCA. Efficacy of botanicals, bioagents and chemicals were tested under *in vitro* condition against *X. oryzae* pv. *oryzae*, the results revealed that, Marigold, *Trichoderma harzianum* and Kasugamycin were superior in inhibiting growth of the pathogen. Under field condition management of disease by spraying of streptocycline (0.5g) in combination with copper oxychloride(2.5g) was effective over all other treatments with the lowest per cent disease severity of 22.33 with highest yield (56.49 q/ha) over control. Among 41 genotypes screened under field condition, none of them were found immune, where as 10 genotypes showed resistant, seven were moderately resistant, whereas remaining were susceptible to disease.

July, 2017

(C. Karegowda)
Major Advisor

2. Studies on Wilt complex in Cucumber Incited by *Fusarium oxysporum* f. sp. *Cucumerinum* (Owen) and *Meloidogyne incognita* (Kofoild and White) chitwood.

KOLI GANAPATI

ABSTRACT

Cucumber is one of the important vegetable crops, affected by many soil borne pathogens. Among them, Root- knot nematode and *Fusarium oxysporum* f. sp.*cucumerinum (FoC)* are major pathogens. The present study was undertaken with various aspects of cultural and morphological studies, *invitro*and *in vivo* evaluation of chemicals, bio-agents and botanicals revealed that, maximum radial growth and dry mycelial weight of *FoC*was recorded in Potato dextrose agar (90 mm) and Potato dextrose broth (326 mg) respectively. Among the nine cucumber varieties screened against wilt complex under polyhouse condition, none of the varieties showed resistant reaction.SambarSouthe and Uttamshowed moderately susceptible reaction to wilt complex and Green long showed susceptible and highly susceptible reaction to root knot nematode. *In vitro* evaluation of fungicides against*FoC,* recorded hundred per cent inhibition of mycelial growthin carbendazim at alltested concentrations (0.05, 0.10 and 0.15 %). Among bio-agents, *T. viride*-II showed maximum per cent inhibition of *FoC* (72.00 %), whereas, *P. Lilacinus* showed higher juvenile mortality of*M. Incognita* (61.33%). Among seven plant extracts, turmeric (68.35 %) and garlic clove extract (65.19 %) at 15 per cent showed maximum inhibition of mycelia growthof*FoC.* The field evaluation of fungicides, bio-agents and soil amendments against wilt complex indicated that, combined application of neem cake at 200 g/m^2+ *P. lilacinus*at 50g/m^2 during sowing showed higher plant growthparameters and less nematode population with least RKI. Whereas, Carbendazim (0.1%) and Carbofuran (3G @ 0.3g a.i/m^2) showed less per cent wilt incidence.

August, 2017

(H. Ravindra)
Major Advisor

3. Studies on Leaf spot and Flower Blight of Marigold Caused by *Alternaria tagetica* (Shome and Mustafee)

MAHADEV SHINDHE

ABSTRACT

Marigold (*Tagetes* spp. L.) is one of the most commonly grown and commercially exploited flower crops in India, belongs to the family Asteraceae.This crop is affected by several diseases, among them leaf spot and flower blight caused by *Alternariatagetica* (Shome and Mustafee) is one of the most destructive disease causes severe damage to crop and quality and quantity of the flowers.Cultural and morphological studies revealed that,radial growth of *A. tagetica*was maximum on Potato dextrose agar (88.53 mm) andmaximumdry mycelial weight (343.32 mg)wasobserved in Potato dextrose broth.Morphological characters of *A. tagetica viz.*, colour of the mycelium varied from whitish to dark grey.The growth varied from flat, raised fluffy to sparse and margins varied from smooth to irregular. Among the ten genotypes screened against *A. tagetica* under polyhouse condition, none of the genotype showed the resistant reaction and threegenotypes *viz.*, Arka Agni, Arka Bangara and French Dwarf were found moderately susceptible andremaining sevengenotypes showed the highly susceptible reaction to the disease.*In vitro* evaluation of fungicides revealed that,Propiconazole and Hexaconazoleshowed cent per cent inhibition of mycelial growth at all the tested concentrations. Among the bioagents, *Trichodermaharzianum* UAHS-1(82.30%) and UAHS-2 (79.22%) were found effective against *A. tagetica*. Among the seven plant extracts evaluated, Garlic clove extract at 15 per cent concentration showed maximum inhibition of pathogen (75.32%). The field evaluation of fungicides, bioagents and botanicals indicated that, at 0.1 per cent of Hexaconazoleand 0.2 per cent of Mancozebfound most effective in reducing the disease severity and increased the flower yield.

July, 2017

(H. Narayanaswamy)
Major Advisor

4. Investigation on Wilt complex of Betelvine Incited by *Sclerotium rolfsii* and *Meloidogyne incognita*

NANDEESHA, C. V.

ABSTRACT

Betelvine (*Piper betle* Linn.) is a perennial creeper, commercially cultivated for its economic leaves in the tropical and sub-tropical countries. Wilt disease complex incited by *Sclerotiumrolfsii*and *Meloidogyne incognita* is a major constraint for the cultivation of betelvine as they cause up to 100 per cent yield losses.The disease was noticed in all the surveyed locations of Shivamogga and Davanagere districts during 2016-17.The disease incidence was more severe in Harihara taluk of Davanagere district. Individually, *S. rolfsii* was the most aggressive pathogen, while concomitant inoculation of fungi with nematode was causing more damage to the crop because of the action of nematode as predisposition factor. Among the fungicides evaluated *in vitro* against *S. rolfsii*, propiconazole, thiophanate methyl, triadimefon, difenconazole, captan, chlorothalonil, carboxin + thiram, tricyclazole + mancozeb, carbendazim + mancozeb and tebuconazole + trifloxystobin were found to be highly effective at 0.1, 0.2 and 0.3 per cent concentrations withcent per cent inhibition of mycelia growth.Among bio-agents tested*in vitro*, *Trichoderma harzianum* was found to be most effective in inhibiting the mycelia growth. Among the eight plant extracts tulsi recorded a maximum inhibition of mycelia growth at both 10 and 15 per cent concentrations.Four bioagents were evaluated against juveniles of *M. incognita* under *in vitro* condition and*Paecilomyceslilacinus* recorded the maximum juvenile mortality. Integrated management of wilt complex of betelvinewith soil application of carboxin + thiram (vitavax power) at 0.2% with neem cake 1 kg/plant was significantly effective.

July, 2017

(H. Ravindra)
Major Advisor

5. Management of Bacterial Wilt of Brinjal (Mattigulla) Incited by *Ralstonia solanacearum* (Smith) Yabuchi

REVATHI, R. M

ABSTRACT

Bacterial wilt caused by *Ralstonia solanacearum* (Yabuchi)is most destructive disease of brinjal in tropical, subtropical and warm temperate regions of the world, causing heavy economic loss. In present investigations, isolation of the pathogen, biochemical characterization and pathogenicity of bacterial wilt along with evaluation of different botanicals, bioagents and antibacterial chemicals against *R. solanacearum* were conducted under laboratory condition. Screening of brinjal varieties for disease resistance and integrated disease management was carried out under field condition during *Kharif* -2016. The pathogen was isolated by serial dilution technique and characterized through cultural, morphological and biochemical characteristics. The isolated bacterium was found as Gram negative, rod shaped and the colonies on TZC medium were white with light-pinkish centre and highly fluidal producing copious slime.*In vitro* evaluation revealed that patchouli leaf extract at 20 per cent (13.00 mm), *Psuedomonas fluorescens* (20.30 mm) and copper hydroxide at 500 ppm (15.00 mm) showed maximum inhibition zone among the tested botanicals, bioagents and antibacterial chemicals. Screening of nine brinjal varieties against wilt disease under field condition showed that the varieties Arka Nidhi, Arka Anand and Arka Ashish were found resistant to reaction. In the integrated management of bacterial wilt of brinjal revealed that the highest disease reduction of 29.24 per cent was recorded in the combination of neem cake+ *P. fluorescens*+*T. harzianum*+streptocycline+copper oxychloridewith higher yield of 19.27 kg/plot compared to other treatments and control.

July, 2017

(H. Narayanaswamy)
Major Advisor

6. Studies on Bacterial Leaf Stripe of Arecanut caused *by Xanthomonas campestris* pv. *arecae*

SEEMA, M. N.

ABSTRACT

Arecanut (*Areca catechu* L.) is a palm belongs to the family Arecaceae, which is grown in most parts of the tropical Asia and East African countries. Arecanut is popularly known as betel nut, due to its usage for mastigatory purpose along with betel leaves. It is cultivated as an important commercial crop across many states of India. Arecanut suffers from many biotic and abiotic stresses. Among them bacterial leaf stripe disease is one of the new emerging disease caused by *Xanthomonas campestris pv. arecae* that attacks the crop at an age of 3-6 years or in seedling stage itself. Survey conducted for the incidence of bacterial leaf stripe disease incidence in major arecanut growing areas of Shivamogga, Davanagere and Chickamagaluru districts revealed that, Honnali taluk of Davanagere district was found to be a hotspot for bacterial leaf stripe disease of Arecanut with 36.66 per cent incidence. During biochemical tests, ammonia production, starch hydrolysis, fluorescent test and gram staining showed negative reaction whereas, positive reaction were observed in catalase test, gelatin liquefaction, KOH test, methyl red test and hydrogen sulphide production. Neem, *Trichoderma harzianum and Kasugamycin were found effective in inhibiting the growth of the pathogen under in vitro conditions. However, in field conditions* Kasugamycin *@ 3 mlL*$^{-1}$treated plants showed higher disease reduction over the control.

July, 2017

(B. Gangadhara 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 Long Term Integrated Nutrient Management on Soil Properties and Distribution of NPK Fractions of Soil under rice (*Oryza sativa* L.) -MAIZE (*Zea mays* L.) Cropping System

SACHIN KM

ABSTRACT

A field experiment was conducted during *kharif* 2014 on a sandy clay loam soil belongs to the soil Taxonomy of *TypicHaplustalf*, located at AHRS, Kathalagere,Davanagere district, to study the effect of long term integrated nutrient management on soil properties and distribution of NPK fractions of soil under rice-maize cropping system. The different sources and levels of nutrients are applied through organics (FYM, paddy straw and glyricidia) and inorganics involving twelve treatment combinations were tried in a Randomized Complete Block Design with four replications using rice as test crop.

The results of the experiment indicated that combined application of fertilizers and organic materials viz., FYM, paddy straw and glyricidia reduced the bulk density and significantly increased the maximum water holding capacity, soil pH, electrical conductivity and organic carbon of soil. Significantly, higher concentration of available nitrogen, phosphorous, potassium, exchangeable calcium, magnesium, available sulphur and DTPA extractable micronutrients were recorded in the integrated treatments as compared to only fertilizer treated plots andabsolute control.

Further, the contents of inorganic and organic fractions of nitrogen, phosphorous and potassium were recorded high in integrated treatments as compared to fertilizer treated plots and absolute control.The higher grain (6873.59 kg ha^{-1}) and straw (10775.59 kg ha^{-1}) yield and total uptake of N, P and K by rice were recorded by the treatment which received 75 per cent recommended N along with 25 per cent N through paddy straw. The lowest grain(3556.54 kg ha^{-1}) and straw (5025.59 kg ha^{-1}) yield were recorded in absolute control. It can be concluded that combined application of organic and inorganic sources of nutrients was better than the application of inorganic fertilizers alone and absolute control. Among the plots treated with different organics paddy straw was superior over FYM and glyricidia.

February, 2017

(Dr. Parashuramchandravanshi)
Major Advisor

2. Studies on Status and Distribution of Potassium in Soils under Arecanut Gardens of Bhadra Command Area of Davanagere District

AMRUTHESH, P.

ABSTRACT

An investigation was carried out at College of Agriculture, Shivamogga during the year 2016-17 in order to know the status of potassium in soils under arecanut gardens of Davanagere district, Karnataka. For the study, 200 surface and subsurface samples were collected from soils under arecanut garden of four taluk (Channagiri, Honnalli, Harihara and Davanagere) of Davanagere district. After processing, samples were analyzed for physical and chemical properties and potassium fractions. Results of the study indicated that, the soils had pH in the range of slightly acidic to neutral with organic carbon status ranged from medium to high status (5.47 to 10.02 g kg^{-1}). In surface and subsurface soils of different taluks, the mean water soluble potassium was highest in Channagiri taluk (18.93 mg kg^{-1}) and lowest in Davanagere taluk (10.22 mg kg^{-1}), while the mean exchangeable potassium was highest in Channagiri taluk (127.89 mg kg^{-1}) and lowest in Davanagere taluk (64.39 mg kg^{-1}) and the mean non-exchangeable potassium was highest in Channagiri taluk (289.11 mg kg^{-1}) and lowest in Davanagere taluk (137.93 mg kg^{-1}). Similarly, the mean lattice and total potassium was highest in Channagiri taluk (3103.17 and 3539.10 mg kg^{-1}) and lowest in Davanagere taluk (2077.11 and 2289.65 mg kg^{-1}).

Depth wise distribution of different potassium fractions in the profiles noticed that the available, water soluble and exchangeable potassium content found highest in surface layer and decreased with depth, whereas non-exchangeable, lattice and total potassium increased with depth under arecanut garden soils of Davanagere District, Karnataka.

August, 2017

(Parashuram Chandravamshi)
Major Advisor

3. Status and Behaviour of Copper in Soils under Arecanut Cover in Malnad Region of Shivamogga District

ANUSHA, H. R.

ABSTRACT

An investigation was carried out at College of Agriculture, Shivamogga during 2015-17 to know the status and behaviour of copper in soils under arecanut cover in malnad region of Shivamogga district. Surface and subsurface samples were collected from soils under arecanutcoverin four taluks of Shivamoggadistrict and were analysed for available Cu, Cu-fractions and adsorption, desorption behaviour of Copper in soils. Results of the study indicated that pH, organic carbon and available copper was in the range of 3.49-6.53, and 3.89-6.99, 3.00- 28.40 g kg^{-1} and 1.50-28.40 g kg^{-1} and 0.50 to 62.00 mg $kg^{-1}$and 0.52 to 25.10 mg kg^{-1} in surface and subsurface layers, respectively.

Forms of copper such as water soluble, sorbed, easily reducible manganese bound, calcium carbonate bound, organic bound, Fe and Al oxide bound and residual copper were found in the range of 0.04 to 0.89, 0.23 to 17.80, 0.39 to 5.93, 0 to 2.26, 0.20 to 2.80, 0.68 to 5.78 and 25.85 to 365.05 mg kg^{-1}in surface and 0.02 to 1.33, 1.22 to 8.22, 0.02 to 5.26, 1.08 to 3.12, 0.20 to 2.24, 0.68 to 6.20 and 14.40 to 229.29 mg kg^{-1} in subsurface layers respectively. Total Cuin the range of 27.50 to 397.50 and 18.50 to 250.00 mg kg^{-1} in surface and subsurface layer, respectively.

Adsorption of copper in soils followed both Freundlich and Langmuir's adsorption isotherms. Quantity of adsorption ranged from 39.90 to 322.00 µg g^{-1}. Desorption of copper in soils was followed the Langmuir isotherm model with a % desorption ranged from 5.97 to 22.93.

July, 2017

(H. M. Chidanandappa)
Major Advisor

4. **A Study of Carbon Sequestration Potential of Arecanut based Cropping Systems of Coastal and Hilly zones of Karnataka.**

APURVA, V.

ABSTRACT

An investigation was undertaken at, Department of Soil Science and Agricultural Chemistry, College of Agriculture, UAHS, Shivamogga to know Carbon Sequestration potential of areca nut based cropping systems of coastal and hilly zones of Karnataka.The study area coveredthe soils of Mangaloreand Udupidistrict of coastal (zone-10) and Chikkamagalur, Kodugu and Shivamogga district of hilly (zone-9).Representative soil samples were collected from 0-30 cm, 30-90 cm and 60-90 cm depth from areca nut Sole, arecanut + banana, arecanut+cocoa, arecanut+pepper, arecanut+mixed, arecanut+coffee and areca nut +orangefrom 2 location.The results revealed that soil pH were acidic to neutral with normal EC and Sandy loam to sandy clay loamin texture. TheSOC contents were medium to high ranged and decreases with depth. Among the cropping systems studied, arecanut+mixed recorded higher mean potassium permanganate oxidizable organic carbon(1387.33mg kg^{-1}), cold water extractable carbon (409.06mg kg^{-1}), total carbon (29.39g kg^{-1}), total organic carbon (18.70g kg^{-1}),total inorganic carbon (0.2136g kg^{-1}) andsoil microbial biomass carbon (370.33mg kg^{-1}) fractionsas compared to other cropping systems and decreases with lower depth. Among different areca nut based cropping system E_4/E_6 values were higher in areca nut +mixed (1.166).Carbon fractions were higher in 0-30cm soil depth and decreases in lower depth of areca nut based cropping systems. Humic acid was higher in areca nut +mixed (5.35) and fulvic acid was higher in arecanut+ coffee (5.01).Correlation study showed that the various carbon fractions were positively and significantly correlated amongst themselves and with pH, clay and $CaCO_3$ (%) content of the soils.

July, 2017

(Ganapathi)
Major Advisor

5. Phosphorus Transformation and Productivity of Rainfed Maize under Phosphorus Rich Acid Soils

LAVANYA BAI, T.

ABSTRACT

A field experiment was carried out at Zonal Agricultural and Horticultural Research Station (ZAHRS), Navile, Shivamogga during *kharif* 2016 to study the response of maize to different phosphorus (P) levels with and without seed treatment. Different levels of P @ 0, 30, 45, 60 and 75 kg P_2O_5 ha^{-1} with or without PSB (*Bacillus megatherium*. L) seed treatment were tried in a randomized complete block design with three replications and eleven treatments. The results of the experiment indicated that seed treatment with PSB and higher levels of P application significantly increased the growth, yield and yield attributes of maize. The nutrient content and uptake of N, P and K by maize is also increased with 75 kg P_2O_5 ha^{-1} with PSB seed treatment compared to other treatments. The same treatment at different growth stages recorded higher values of saloid-P, Ca-P and available P status. Higher values of Al-P, Fe-P, reductant-P, occluded-P, organic-P and total-P fractions were recorded in treatments involving P levels without PSB seed treatments. Treatment receiving 75 kg P_2O_5 ha^{-1} without PSB seed treatment recorded higher values of Al-P, Fe-P, reductant-P, occluded-P, organic-P and total-P. The occurrence of P fractions were in the order of total P > organic P > reductant soluble P > Fe-P > Al- P > occluded P > saloid P > Ca-P. Positive response for soil microbial biomass P, acid phosphatase and dehydrogenase enzyme activity has noticed with application of higher P levels and PSB seed treatment wherein highest values were recorded in the treatment 75 kg P_2O_5 ha^{-1} with PSB seed treatment at different crop growth stages. All the P fractions except organic P significantly and positively were correlated with yield attributes, soil properties and P uptake by grain, stover and total uptake at harvest of maize. The highest B:C of 2.43 was found with application of recommended NPK + PSB seed treatment. Hence, application of recommended dose of NPK along with PSB can be used for profitable maize cultivation under high phosphorous rich acid soils.

July, 2017

(B. C. Dhananjaya)
Major Advisor

6. Forms and Status of Potassium in Soils of Vanivilas Command Area, Hiriyur Taluk, Chitradurga District

RAMYA KRISHNA, K.

ABSTRACT

An investigation was carried out during 2016-17 to study the forms and status of potassium in soils of Vanivilas command area, Hiriyur taluk, Chitradurga district.The texture was varied from sandy loam to sandy clay loam, while the soil reaction was alkaline with high EC values indicating salt accumulation at the surface. The organic carbon contents were low to medium and found higher in surface than subsurface soils.The calcium and magnesium values were higher in subsurface than surface soils. The CEC values ranged between 30.22 to 33.07 cmol (p^+)kg^{-1} at the surface and increased with depth. The ESP values were higher in surface than subsurface soils. The available nitrogen content and available P_2O_5 content was low to medium and the available K_2O was varied from 385.86 to 489.05 kg ha^{-1}in surface and decreased with depth.The available S content was high and varied from 40.38 to 46.14 mg kg^{-1} in surface soils.Available potassium, water soluble and exchangeable potassium content of the surface soils was ranged from101.60 to 230.65 mg kg^{-1}, 4.75 to 28.95mg kg^{-1}, and 99.30 to 222.05 mg kg^{-1}, respectively and decreased in subsurface soils, while non-exchangeable, lattice and total forms of potassium was ranged from 107.40 to 363.20 mg kg^{-1}, 4790.36 to 9722.37 and 5302 to 10365 mg kg^{-1}, respectivelyfor surface soil and was found higher in subsurface than surface soils. Among the different forms water soluble potassium contributed lowest and mineral potassium contributed highest to the total potassium. Correlation study showed that the various forms of K were positively and significantly correlated with CEC, clay and silt content of the soils and negatively correlated with sand content of the soils studied. The potassium fixation capacity showed positive and significant correlation with clay (r=0.479*) and CEC (r=0.528**).

July, 2017

(Gurumurthy, K. T.)
Major Advisor

7. Characterisation of Salt Affected Soils of Vani Vilas Command Area Hiriyur Taluk, Chitradurga District

SHIVA KUMAR, S.

ABSTRACT

The present investigation was carried out on "Characterisation of salt affected soils of Vani Vilas command area Hiriyur taluk, Chitradurga district". Hundred soil samples from 0-15 cm depth were collected from ten identified villages of Vani Vilas command area.Samples were analysed for various physical,chemical properties. The mean values of the properties were used to study the variability and understand the relations. Most of samples were texturally classified under sandy clay loam and sandy loam. Bulk density, per cent pore space values ranged between 1.38 to 1.60 Mg m^{-3} and 39.85 to 48.51 respectively. The soils were found to be moderate to strongly alkaline in reaction (pHs8.31 to 8.88), salt content was (ECe 1.76 to 3.38 d Sm^{-1}) and low to medium in organic carbon content, available nitrogen and available phosphorus and high in available potassium and available sulphur. Exchangeable calcium and magnesium were above critical limit with high cation exchange capacity (16.12to 26.15 cmol (p^{+}) kg^{-1}) and Exchangeable sodium percentage and sodium adsorption ratio ranged between 9.13 to 25.79 per cent and 6.66 to 12.83 me L^{-1}.The DTPA extractable micronutrient cations manganese, copper and iron were found above critical limit, soils were deficit in zinc (76%). Soil pH had a significant and positive correlation with exchangeable Na, ESP and SAR values and gypsum requirement. Gypsum requirement depends on chemical properties, ESP found to be correlated with gypsum requirement thus regression equation developed from the relation is useful for the farmers, scientists and agriculture agencies for calculating the quantity of gypsum required to reclaim the salt affected lands of these regions on large scale basis and to take up measures for improving in the soil health.

July, 2017

(Sarvajna B. Salimath)
Major Advisor

8. Effect of Foliar Application of Different Sources of Calcium on Growth, Yield Quality and Nutrient Content and Uptake by Tomato under Poly house Condition

TEJASHVINI, A

ABSTRACT

Poly house experiment was carried out at Zonal Agricultural and Horticultural Research Station (ZAHRS), Navile, Shivamogga during *kharif* 2016 to study the response of tomato fruit to different sources and levels of calcium. Three sources of calcium ($CaCl_2$, $CaNO_3$ &CAN) with three levels each (0.2, 0.5 and 0.8%) were applied as foliar spray in CRD with three replications and ten treatments. The results of experiment indicated that foliar spray of calcium through different sources increased the growth, yield, and quality of tomato significantly over the control (water spray). Among the different sources studied, the treatment receiving 0.5 per cent CAN as foliar spray was recorded highest plant height (149.21 cm), number of branches (24.47), stem diameter (5.47 cm) and yield parameter like fruit diameter (4.72 cm), number of fruits per plant (58.67) fruit yield (91.98 t ha^{-1}) and higher fruit weight (111.89 g) and quality parameters like lycopene content (79.66 mg kg^{-1} of tissue), fruit firmness(0.33 kg cm^{-2}), Ascorbic acid (132.32 mg $100g^{-1}$), total soluble solids (5.00^{o}Brix) and titrable acidity (0.23 %) compared to $CaCl_2$ and $CaNO_3$. The Highest Ca content and uptake by tomato leaves was recorded at flowering (1.55 % &424.94 kg ha^{-1}) and fruiting (1.57 % &430.81kg ha^{-1}) stages respectively. Similarly the Ca content and uptake (0.84 %, 77.26 kg ha^{-1}) by tomato fruits was recorded highest due to foliar spray of 0.5 per cent CAN compared to control and the next best source for foliar spray found to be $CaCl_2$ @ 0.8 per cent.

June, 2017

(G. N. Thippeshappa)
Major Advisor

Horticulture

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 Varietal Evaluation and Integrated Management of Insect and Mite pets of Chilli under Hill Zone of Karnataka

LATHA, S.

ABSTRACT

The investigations were carried out on varietal evaluation of chilli and integrated management of major insect and mite pest of chilli during 2015 at Karkipete, Chikmagalur district, Karnataka. Among the genotypes screened against chilli thrips and mites, genotypes *viz.*, DCC-3, 185, 109 and 89 recorded lowest populations of chilli thrips, mites and LCI. Further, high trichome density, high chlorophyll and total phenol content with higher fruit yield was also recorded in the above genotypes. However, DCC-177, 103, 39, 15, 184, 239, 44, 48, 167, 230 and 43 were categorized as susceptible genotypes which showed highest populations of thrips and mites. DCC-66 and Byadgi Kaddi were categorized as highly susceptible to thrips and mites with less fruit yield. Among the treatments evaluated for the management of major insect and mite pests, chilli crop, bordered by double layered shade net with single sprays of imidacloprid 17.8 SL @ 0.3 ml/l, clorantraniliprole 18.5 SC @ 0.25 ml/l, flubendiamide 48 SC @ 0.2 ml/l, spiromesifen 30 SC @ 2ml/l and spinosad 45 SC @ 0.25 ml/l at 2, 5, 7, 9 and 11 weeks after transplanting respectively were found to be better in the management of insect and mite pest and found to be on par with seed treatment with imidachloprid 70 WS @ 7g/kg, neem cake @ 250 kg/ha. seedling dip with imidacloprid 17.8 SL @ 0.3 ml/l at the time of transplanting, one spray of azadirachtin 10000 ppm @ 2ml/l, cyantraniliprole 10% OD @ 1.2 ml/l, *Lecanicillium leacanii* @ 2g/l + spinosad 45 SC @ 0.25 ml/l, *M. anisoplea* @ 2g/l + spiromesifen 2 ml/l and flubendiamide 48 SC @ 0.2 ml/l, at 2, 5, 7, 9 and 11 WAT, respectively recorded significantly higher chilli fruit yield with highest gross return, net returns and C:B ratio.

May, 2017

(L. Hunumantharaya)
Major Advisor

2. Population Dynamics and Molecular Characterization of Shot-hole Borer, *Xylosandrus compactus* (Eichhoff) (Coleoptera: Curculionidae: Scolytinae) in Robust Coffee

KIRAN, V. S.

ABSTRACT

Studies on population dynamics and molecular characterization of shot-hole borer, *Xylosandrus compactus* (Eichhoff) (Coleoptera: Curculionidae: Scolytinae) in robust coffee was carried out at Department of Entomology, College of Horticulture, Mudigere and Division of Biotechnology, ICAR- IIHR, Bengaluru during 2016-17. Averege shot-holes per robusta twig was 1.32 from April, 2016 to 14th March, 2017 and the range was 1.0 to 2.54. Number of eggs, grubs, pupae and adults of *X. compactus* per twig across months of the year was 1.0, 1.7, 0.8 and 1.3, respectively. *Xylosandrus compactus* incidence was present throughout the year in robusta coffee. The ratio of adult to immature across the year was 1: 2.79 per twig and range was 1: 0.38 to 1: 4.74. Male adult beetle was smaller in size than female beetle and flightless. The sex ratio of *X. compactus* across months of the year was 1:8.62 that ranged from 1:06 to 1: 12. The infestation of shot-hole borer, *X. compactus* was 56.25, 35.38 and 49.25 per cent and the density of *X. compactus* infested twigs per plant was 3.54, 0.89 and 1.71, respectively across robusta coffee plantations located at 960, 1025 and 1125m MSL. The infestation was significantly more under shade than under without shade. The infestation was positively correlated with temperature and negative with relative humidity and rainfall. The infestation of *X. compactus* was more in younger plantations than old plantation. The molecular studies confirmed that there is no species complex within *X. compactus*.

July, 2017

(Revanna Revannavar)
Major Advisor

3. Species Complex of Aphids on Horticultural Crops in selected Taluks of Chikkamagaluru District

ROHINI, B. S.

ABSTRACT

A study on species complex of aphids on horticultural crops in selected taluks of Chikkamagaluru districtwas conducted during 2016-17 and aphid collections were made in Mudigere, Chikkamagaluru, Kadur, and Tarikeretaluksof the district. A total of 26 aphid species across 14 genera, five tribes and four subfamilies of the superfamily Aphidoidea were recorded. Most of the aphid species studied belonged to the subfamily Aphidinae followed by subfamily Greenideinae, Hormaphidinae and Lachninae. However, Hormaphidinae and Lachninae represented least number of aphid species. The subfamily Aphidinae was represented by two tribes, Aphidini and Macrosiphini constituting three (*Aphis*,*Hysteroneura*and*Rhopalosiphum*) and eight genera(*Macrosiphoniella, Macrosiphum, Myzus, Hyperomyzus, Pentalonia, Sitobion, Uroleucon*and *Lipaphis*), respectively. Only one tribe and one genus each were reported under the subfamily Greenideinae (Greenidini and *Greenidea*, respectively), Hormaphidinae (Cerataphidini and *Cerataphis*, respectively) and Lachninae (Cinarini and *Cinara*, respectively). One species of the tribe Macrosiphini, *Uroleucon* (*Uromelan*) *pseudambrosiae* (Olive) was reported for the first time in Asian continent on the host plant *Sonchusarvensis* (L.) (Asteraceae).The severity of aphid infestation was also assessed. The per cent infestation by *Aphiscraccivora, Macrosiphoniellasanborni, Myzuspersicae* and *A. gossypii*was higherand per cent infestation by *A.*(*Toxoptera*) *citricida, Macrosiphumrosae, Greenidea*(*Trichosiphum*)*heeri, G. ficicola, Rhopalosiphumpadi*and *U.* (*Uromelan*)*compositae*waslesser.Out of the 26 aphid species, ten aphid species belonging to the subfamily Aphidinae were associated with 12 species of natural enemies especially predators and 12 species of aphids on 21 species of host plants were attended by seven species of ants. The most common ant genera attending the aphid colonies were *Componotus*and*Monomorium.*

September, 2017

(SuchithraKumari, M. H.)
Major Advisor

4. Studies on Varietal Evaluation and Management of Whitefly, *Bemisia tabaci* Genn. and leaf miner, *Liriomyza trifolii* Burgess on Gerbera under Protected Condition

SHALINI, B.

ABSTRACT

An investigation was carried out on gerbera varietal evaluation and management of whitefly, (*Bemisia tabaci* Genn.) and serpentine leaf miner (*Liriomyza trifolii* Burgess) by using newer molecules of insecticides and botanicals. The experiment was carried out under naturally ventilated polyhouse condition during 2016-2017 at College of Horticulture, Mudigere, Chikamagaluru. Fourteen varieties of gerbera (Teela, kyllion, Susan, Rionigro, Vilassar, Elite, Amelie, Nigella, Havana, Marinilla, Teresa, Julia, Nathasha and Nathan) were evaluated against whitefly and leaf miner. Among the varieties,none of the varieties were found to be resistant to whitefly and leaf miner. However, out of the fourteen varieties only four varieties were observed as moderately resistant to whitefly with lower number of adults per leaf were recorded in Nigela, Julia, Rionegro and Marinilla (28.69, 32.84, 34.75 and 35.44 adults/leaf, respectively). Further, higher trichome density, lower total soluble sugar and higher flower yield was also recorded in these varieties. However, Nathan, Elite, Vilassar and Havana were categorized as highly susceptible varieties, which showed higher whitefly population of 60.70, 62.10, 63.28 and 68.01 adults/leaf, respectively. Whereas, only three varieties, Nigela, Teela and Susan were observed as moderately resistant to leaf miner with lower number of mines per leaf (5.65, 5.95 and 6.20 mines /leaf, respectively) and other four varieties, Kyllion, Rionegro, Nathasha and Nathan(10.73,11.25, 12.07 and 12.38 mines/leaf, respectively) were recorded as highly susceptible to leafminer. Among the insecticides and botanicals, diafenthiuron 50 SC @ 0.75ml/l, fipronil 5 SC @ 1ml/l, thiamethoxam 25 WG @ 0.25g/l, recorded significantly lower whitefly population per leaf. Further, thiamethoxam 25 WG @ 0.25g/l, diafenthiuron 50 SC @ 0.75ml/l and fipronil 5 SC @1ml/l also recorded significantly lower number of mines per leaf and these treatments recorded higher marketable flower yield, gross returns, net returns and C:B ratio.

July, 2017

(L. Hanumantharaya)
Major Advisor

5. Diversity and Abundance of Hemipterans Attracted to Light Trap in Coffee and Cardamom Ecosystem

SHWETA B. BELAGAVI

ABSTRACT

A study conducted on diversity and abundance of hemipterans attracted to light trap in coffee and cardamom ecosystem, revealed that a total of 1,424 individuals were trapped from both the ecosystems, of which, 685 individuals were from coffee that yielded 76 species and 739 from cardamom that contributed to 65 species. In total, 94 hemipteran species were trapped from both the ecosystems, of which, 47 species were common to both the ecosystems, 29 species unique to coffee and 18 species unique to cardamom. The diversity of hemipteran species was high in coffee compared to cardamom as the values of diversity indices; Shannon-Weiner index and Simpson reciprocal's index was high (1.063 and 2.79, respectively) which indicated that coffee supported for greater species compared to cardamom. In coffee, maximum (r = -0.432) and minimum temperature (r = -0.04) were negatively correlated with abundance. While, in cardamom, only maximum temperature (r = -0.056) was negatively correlated which indicated that temperature suppressed the abundance of hemipterans in both the ecosystems. Similarly, species richness exhibited a non-significant positive relationship with all the climatic variables except for maximum temperature (r = -0.041) in coffee. While, in cardamom, species richness was positively and significantly correlated with minimum relative humidity (r = 0.262) and negatively correlated with rainfall (r = -0.020) and maximum temperature (r = -0.028) which indicated that increasing rainfall and temperatures had a negative impact. Of the 1424 individuals recovered through light traps, 1330 were phytophagous and 94 were non-phytophagous hemipterans. Further, out of 1330 phytophagous individuals trapped, 648 were from coffee and 682 from cardamom. Similarly, of the 94 non-phytophagous individuals trapped, 37 were from coffee and 57 from cardamom, which indicated that cardamom supported higher number of phytophagous and non-phytophagous hemipteran individuals than coffee.

September, 2017

(Suchithra Kumari, M. H.)
Major Advisor

6. Studies on Symptoms of Damage, Efficacy of Insecticides and Pheromone Traps against Coffee White Stem Borer, *Xylotrechus quadripes* Chevrolat (Coleoptera: Cerambycidae) in Arabica Coffee

TEJASWI, G. GOWDA

ABSTRACT

Studies on symptoms of damage, efficacy of insecticides and pheromone traps against coffee white stem borer, *Xylotrechus quadripes* Chevrolat (Coleoptera: Cerambycidae) in arabica coffee was carried out at Department of Entomology, College of Horticulture, Mudigere and Division of Biotechnology, ICAR- IIHR, Bengaluru during 2016-17. The morphological and molecular characterization confirmed that yellow banded beetles are *X. quadripes.* Number of rings per stem was significantly more at bottom (2.6) portion of the main stem. Yellowing of leaves gradually increased from August to March, number of berries per branch was significantly higher in uninfested plants (42.33) than infested plant (9.68). The adult emergence holes were significantly more on bottom portion of main stem (3.17). Profenofos (50% EC @ 2.0 ml/l) and combination product (Chlorpyrifos 50%+cypermethrin 5% EC @ 1.20 ml/l) caused 100 per cent egg mortality. Five insecticides caused 100 per cent neonate grub mortality under laboratory condition. Though *Bt* strain BT_IIHR_AND (Cry1I) caused the highest neonate grub mortality (92.86%), BT_IIHR_AU (Cry au) and BT_IIHR_JK (Cry3a) were also on par. The first adult beetle emergence was first noticed in the third week of October in live plant under field condition and emergence was from 17th October to 4th December 2016. Adult emergence from uprooted coffee stumps in mesh house was from 11th October to 19th November 2016. Six male and eight female beetles were trapped on 25 pheromone traps installed in 66.21 per cent infested arabica coffee plantation. The adult beetle trap catches in trap with and without lure in field did not differ significantly. The pheromone trap did not attract adult beetles in a mesh house under field conditions. The pre-exposed glue panels of pheromone trap were sticky to trap 100 per cent up to 3 months and later per cent adult beetles trap gradually decreased.

July, 2017

(Revanna Revannavar)
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. Field Response of Chrysanthemum (*Dendranthemagrandiflora*Tzvelev) to Phosphorus Solubilizing and Mobilizing Bioinoculants with Graded Levels of Phosphorus

HARISH, S. DODDUJJAPPALAVAR

ABSTRACT

A field experiment was conducted to know the 'Field response of chrysanthemum (*Dendranthemagrandiflora*Tzvelev) to phosphorus solubilizing and mobilizing bioinoculants with graded levels of phosphorus' was carried out at Department of Floriculture and landscape architecture, College of Horticulture, Mudigere, during 2016-17. The experiment was laid out in randomized complete block design with twelve treatments replicated thrice. Plants treated with 75 per cent recommended dose of phosphorus + phosphorus solubilizing fungus (*Aspergillusawamori*)+ phosphorus solubilizing bacteria (*Pseudomonas striata*) (T_{11}) recorded significantly maximum plant height (61.00 cm), stem girth (7.10 mm), plant spread North-South and East-West (30.67 cm and 31.53 cm, respectively), number of primary branches (24.31), secondary branches (48.62), tertiary branches (63.33), number of leaves (101.40), leaf area (5175.30 cm^2), leaf area index (2.51), fresh weight of leaves (72.90 g/plant), fresh weight of shoots (64.80 g/plant), fresh weight of flowers (44.64 g/plant), fresh weight of roots (40.30 g/plant), total fresh weight (222.64 g/plant), dry matter of leaves (24.30 g/plant), dry matter of shoots (21.60 g/plant), dry matter of flowers (14.40 g/plant), dry matter of roots (13.00 g/plant), total dry matter (73.30 g/plant), crop growth rate (4.37 g/m^2/day at 90-120 DAP), relative growth rate (0.0066 g/g/day at 90-120 DAP), net assimilation rate (0.00034 g/dm^2/day at 90-120 DAP), total chlorophyll (3.08 mg/g), days to first flower bud initiation (61.60), days to first flower opening (90.90), maximum flowering duration (125.47 days), maximum flower weight (6.10 g), diameter (6.23 cm), number of petals per flower (118.37), flowers per plant (70.83), flower yield (18.08 t/ha), sucker yield (2,31,667 Nos. per hectare) and its quality parameters like shelf life (7.00 days) and vase life (13.87 days). Similarly 75 per cent recommended dose of phosphorus + phosphorus solubilizing fungus (*Aspergillusawamori*) + phosphorus solubilizing bacteria (*Pseudomonas striata*) (T_{11}) recorded significantly highest available N (225.77 kg/ha), P_2O_5 (128.53 kg/ha) and K_2O (221.88 kg/ha) in soil, respectively. The economic analysis clearly indicated that, application of 75 per cent recommended dose of phosphorus + phosphorus solubilizing fungus (*Aspergillusawamori*)+ phosphorus solubilizing bacteria (*Pseudomonas striata*) (T_{11}) realized maximum net returns (` 13,26,994 /ha) and B: C ratio (1:5.30) for flower production and sucker yield.

July, 2017

(B. Hemla Naik)
Major Advisor

2. Influence of Plant Growth Regulators on Growth, Flowering and Corm Yield of Gladiolus (*Gladiolus hybridus*L.) cv. Summer Sunshine

MANASA, M. D.

ABSTRACT

An investigation on "Influence of plant growth regulatorson growth, flowering and corm yield of Gladiolus (*Gladiolus hybridus*L.*)* cv. Summer Sunshine" was carriedoutat Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, during 2016-17. The experiment was laid out in Randomized Completely Block Design (RCBD) and was planted by using the corms dippedfor 24 hrs with different growth regulators *viz*., GA_3 (50, 100 and 150 ppm), NAA (50, 100 and 150 ppm), BA (50, 100 and 150 ppm) andThiourea (10000, 15000 and 20000 ppm) along with control as treatments and was replicated thrice. The results revealed that BA at 100 ppm was recorded maximum per cent sprouting (77.84), more number of suckers per plant (4.03) and leaves per plant (12.43).Corms treated with GA_3 at 150 ppm were taken minimum number of days to sprouting (9.07) also recorded significantly maximum plants height(73.52cm),leaf length (63.30 cm), leaf width(5.11 cm), leaf area (2544.12cm^2) and LAI (4.24), same treatment had shown early spike initiation (62.33 days), maximumspike length (63.31 cm), rachis length (52.50 cm), girth of the spike (11.56 mm), spike weight (89.97 g), number of florets per spike (15.98), floret diameter (10.71 cm), length of floret (12.34 cm) and vase life (15.00 days). The maximum chlorophyll-a, chlorophyll-b and total chlorophyll was noticed from treatment BA @ 150 ppm (1.31, 0.74 and 2.25 mg/g fresh wt., respectively), whereas, minimum chlorophyll-a, chlorophyll-b and total chlorophyll was noticed from control (0.40, 0.10 and 0.77 mg/g fresh. wt., respectively). The maximum yield of spike, corms and cormels (261333.33 /ha, 11.04 t/ha, and 3.63 t/ha, respectively)were noticed from the treatment BA @ 100 ppm. The economic analysis clearly indicated that the corms treatment with BA @ 100 ppm recorded maximum cost benefit ratio (1:4.04) and net profit of Rs. 36, 30,532.98 per ha.

July, 2017

(Chandrashekar, S. Y.)
Major Advisor

3. Variability Studies in Heliconia Genotypes under Shade House Condition

SANTHOSH, N.

ABSTRACT

An investigation was carried out to evaluate genotypes of heliconia for growth, flowering, yield, quality and genetic traits at experimental block of Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, Karnataka during the 2016-2017. The genotypes *viz*., Super Cheri, Lobster Claw II, Rostrata, Guyana, Lady Di, Daintree Red, Golden Yellow, African Dawn, Sassy, Distans, Tropics, Strawberry Cream, Golden Torch and Lobster Claw I were taken for study. Among fourteen genotypes studied, Distans recorded maximum plant height (205.67 cm) and leaf length (55.00 cm). The genotype Tropics recorded the maximum number of shoots per plant (19.73), number of leaves per plant (37.87) and leaf area (23235.30 cm^2). The genotype Lobster Claw II recorded the maximum leaf width (20.53 cm).The days to emergence of spike (141.73 days) and days to opening of spike (147.00 days) were minimum in the genotype Strawberry Cream. The maximum stalk length was recorded in the genotype Sassy (83.53 cm). The maximum stalk girth (15.01 mm) and vase life (12.00 days) was observed in the genotype Lobster Claw II. The maximum spike length (46.00 cm) and number of bracts per spike (16.23) was observed in the genotype Rostrata. The spike width (17.53 cm) and number of flowers per bract (14.20) was maximum in the genotype Distans and Guyana, respectively. The maximum number of stalks per plant (16.27), number of stalks per m^2 (65.07), number of stalks per hectare (6.57 lakhs) and sucker yield per m^2 (15.00) was produced in the genotype Tropics. The estimates on phenotypic coefficient of variation (PCV) were more than genotypic coefficient of variation (GCV) for all characters. High heritability estimates associated with high genetic advance (over mean) was noticed for most of the traits studied. The maximum B: C ratio was recorded in the genotype Tropics (1:5.47),while the minimum was recorded in the genotype Super Cheri Red (1:0.90).

August, 2017

(Chandrashekar, S. Y.)
Major Advisor

4. Influence of Plant Growth Regulators on *Anthurium andreanum* Lind. var. Tropical Under Protected Condition

SEEMANTHINI, N. S.

ABSTRACT

An investigation was carried out on influence of plant growth regulators *viz*., Benzyl Adenine (250, 500 and 750 ppm), Gibberellic acid (100, 150 and 200 ppm), Maleic Hydrazide (100, 150 and 200 ppm) and Cycocel (l000, 1500 and 2000ppm) on *Anthurium andreanum* Lind. var. Tropical under protected condition. The experiment was laid out in randomized completely block design with three replications in the experimental block of department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, Karnataka during 2016-17.Theresults of the experiment indicated that among different treatments, spraying of BA @ 750 ppm recorded maximum plant height (42.70 cm), stem girth (21.30 mm), number of leaves per plant (6.56), leaf length (25.90 cm), leaf width (16.80 cm), leaf area(2435.10 cm^2), leaf area index (1.80), chlorophyll-a (1.32 mg/g fresh weight), chlorophyll-b (0.74 mg/g fresh weight), total chlorophyll (2.25mg/g fresh weight), early to sucker emergence (88.67 days), number of suckers/plant (3.33), early to 1^{st} flowering (97.33 days), early to 100 per cent flowering (157.00 days) and the flower qualityparameters like maximum stalk length (35.87cm), spathe length (12.63cm), spathe width (9.80 cm), spadix length (6.10 cm), flower weight (15.33 g) and number of flowers/plant (6.47) at 240 days after spray. Similarly GA_3 @ 150 ppm depicted early to 50 percent flowering (128.00 days) and GA_3 @ 200 ppm exhibited maximum vase life (14.33 days). The economic analysis of the experiment distinctly shows that spraying of BA @ 750 ppm displayed the maximum net returns (₹ 8,07,473.61/500m^2/year) and B:C ratio (1:2.89) for flower and sucker production.

July, 2017

(Chandrashekar, S. Y.)
Major Advisor

5. Effect of Biostimulants on Flowering and Seed Yield of China aster cv. Kamini

VINUTHA, D. B.

ABSTRACT

A field experiment was conducted to study the effect of biostimulants on flowering and seed yield of China aster cv. Kamini at Department of Horticulture, College of Agriculture, Shivamogga, University of Agricultural and Horticultural Sciences, Shivamogga during 2016-17. The experiment was laid out in randomized complete block design (RCBD) with six biostimulants *viz.*, GA_3, NAA, Boron, Biovita, Humicil and Azospirillum at two different concentrations all together as treatments and was replicated thrice. The plants sprayed with GA_3 @ 200ppm recorded maximum plant height (65.07cm), number of leaves (115.67), leaf area (4259.30cm^2), stem girth (12.71mm), number of primary branches (9.73) and secondary branches per plant (13.00), plant spread East-West and North-South (22.17cm and 19.23cm, respectively), total dry weight per plant (45.03g), total chlorophyll content (21.60 mg/g fresh weight), days to first flowering (59.00), days taken for 50 per cent flowering (73.00) and stalk length (27.50cm). With respect to duration of flowering (70.33 days) and number of petals per flower (136.33) it was found maximum in Humicil @ 1 per cent and Humicil @ 0.5 per cent, respectively. Bigger sized flowers with a diameter (7.39cm), individual flower weight (2.40g) and shelf life (41.00 hrs) was recorded in Azospirillum @ 8 per cent spray. However, the longest vase life was observed in Biovita @ 1 per cent (8.17 days). Among the biostimulants, GA_3 @ 200ppm recorded maximum number of flowers per plant (67.67), flower yield/ha (30.23t), seed yield/plant (4.45g), seed yield/ha (4.57q) and test weight (2.27g). The economic analysis indicated that, foliar application of GA_3 @ 200ppm realized maximum B: C ratio (6.10 and 12.08) for flower and seed production, respectively.

July, 2017

(B. Hemla Naik)
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. Effect of Growth Regulators on Rooting of Stem Cuttings in Italian Lemon (Citrus limon L.)

AMBRESH

ABSTRACT

An experiment was conducted to study the effect of growth regulators on rooting of stem cuttings in Italian lemon (*Citrus limon* L.) under low cost polyhouse of the department of Horticulture, College of Agriculture, Shivamogga, during the year 2016-2017. The experiment was laid out by following Complete Randomized Design with sixteen treatments replicated thrice. The stem cuttings of Italian lemon result reveals that, the least number of days (16.33) taken for root initiation, the maximum values were recorded with respect to percentage of rooting (56.17 %), length of the longest root (22.17 cm), average length of roots per cuttings (6.94 cm), average number of roots per cuttings (22.56), fresh weight and dry weight of root (1.96 g and 0.26 g, respectively), volume of root (1.38 cc), least number of days taken for sprout initiation (8.67), more percentage of sprouting (65.00 %), number of leaves per shoot (12.00), length of sprout and shoot (10.56 cm and 15.22 cm, respectively), diameter of shoot (3.02 mm) and number of shoots (2.67) were recorded in cuttings treated with IBA 2500 ppm.

The maximum values of biochemical parameters like total chlorophyll content (1.44 mg/g of fresh weight) of leaves and C:N ratio (6.98) was observed in cuttings treated with IBA 2500 ppm. Maximum survival percentage of rooted cuttings (97.78 %) was observed in cuttings treated with IBA 2500 ppm. The application of IBA 2500 ppm resulted in maximum Cost: benefit ratio (2.46). Among the different growth regulators with different combination, application of IBA 2500 ppm was found to improve rooting and survivability of stem cuttings in Italian lemon under low cost polyhouse condition.

July, 2017

(D. Thippesha)
Major advisor

2. Standardization of Fertigation schedule for Strawberry (*Fragaria* x *ananassa* Duch.) under Naturally Ventilated Polyhouse

MOUNASHREE, S.

ABSTRACT

An experiment was conducted to standardize the fertigation schedule for strawberry (*Fragaria×ananassa* Duch.)at Department of Fruit Science, College of Horticulture, Mudigere, during 2016-17. The experiment was laid out in Completely Randomized Design with eight treatments in four replications. The study indicated that application of 100 % RDF through fertigation (150:100:120 kg NPK/ha) and 75 % RDF through fertigation (112.5:75:90 kg /ha) performed better among the treatments tested. The maximum plant height (28.56 cm), number of leaves (29.95), flower duration (71.95 days), total leaf chlorophyll content (2.40 mg/g of fresh weight), among the fruit parameters, minimum number of days taken for berry maturity (25.45 days), highest number of berries per plant (21.73), berry weight (17.97 g), fruit volume (18.50 cc), fruit length (4.14 cm)fruit diameter (4.14 cm), with respect to yield it recorded 390.42 g/plant, among fruit quality parameters maximum ascorbic acid content (69.27 mg/100 g), titratable acidity (0.93 %) and sugars to acid ratio (10.55),total sugar content (7.87%)and higher benefit cost ratio (2.67) was recorded in 100 % RDF through fertigation which was on par with 75 % RDF through fertigation (28.10 cm, 28.65, 70.95 days, 2.35 mg/g of fresh weight, 25.90 days, 21.49, 17.96 g, 18.38 cc, 4.10 cm, 4.12 cm, 385.96 g/plant, 68. 86 mg/100gm, 0.92 %, 10.14 and 7.62 % and 2.64, respectively.) and it also given highest fertilizer use efficiency (90.10 %). Based on the above results, plants supplied with 75 per cent RDF through fertigation was performed well.

July, 2017

(D. Madaiah)
Major advisor

3. Effect of Growth Regulators on Rooting of Stem Cuttings in Barbados cherry (*Malphighiaglabra*L.)

NIRUPADI

ABSTRACT

An investigation was conducted to study the effect of growth regulators on rooting of stem cuttings in Barbados cherry (*Malphighiaglabra*L.) under low cost polyhouse at Zonal Agricultural and Horticultural Research Station, Shivamogga, during the year 2016-2017. The experiment was laid out in Complete Randomized Design with 12 treatments and three replications. The stem cuttings of Barbados cherry treated with IBA 2000 ppm recorded significantly higher values of root parameters *viz.*, least number of days (16.67) recorded for root initiation, higher rooting (50.67 %), length of the longest root (25.00 cm), average length of roots (13.78 cm), higher number of primary and secondary roots (11.00 and 23.67), average number of roots (29.00), fresh weight and dry weight of roots (1.10 g and 0.68 g), root:shoot(0.62) and root volume (1.34 cm^3). Significantly higher shoot parameters *viz.*, least number of days taken for sprout initiation (11.00), higher sprouting (55.00 %), number of leaves per shoot (20.31), shoot length (16.60 cm), diameter of shoot (2.55 mm), number of shoots (7.49), fresh and dry weight of shoots (16.37 g and 5.24 g), leaf area per cutting (486.67cm^2) were recorded in cuttings treated with IBA 2000 ppm. Significantly higher total chlorophyll content (1.33 mg/g of fresh weight) of leaves, C: N (5.82), maximum survivability of rooted cuttings (47.89 %) and Benefit: Cost (2.28) was observed in cuttings treated with IBA 2000 ppm. Among the different growth regulators and their combinations, application of IBA 2000 ppm was found superior to improve rooting and survivability of stem cuttings in Barbados cherry under low cost polyhouse condition.

July, 2017

(NagarajappaAdivappar)
Major advisor

4. Studies on the Effect of Integrated Nutrient Management on Growth, Yield and Quality in Sweet Orange (*Citrus sinensis*Osbeck) cv. Mosambi under Central Dry Zone of Karnataka

POOJA, N. U.

ABSTRACT

A field experiment entitled "Studies on the effect of Integrated Nutrient Management on growth, yield and quality in sweet orange (*Citrus sinensis*Osbeck) cv. Mosambi under central dry zone of Karnataka" was conducted in the farmer's field of Gudihalli village, Chitradurga district during 2016-17. The experiment was laid out in randomized block design with eight treatments comprising of inorganic, organic manures ('N' equivalent) and bio-fertilizers replicated thrice. The treatment comprising 75% RDF + poultry manure (12.5 % N equivalent) + vermicompost (12.5 % N equivalent) and Arka Microbial Consortia (T_8) recorded the highest leaf area (34.20 cm^2),current season shoot length (69.33cm), shoot girth (2.54 cm), canopy spread (3.38 m N-S, 3.43 m E-W) and yield attributes such asfruit weight (179.51 g), number of fruits per plant (347.32), yield per plant (61.98 kg),yield per hectare (17.23 t/ha) and better quality parameters *viz*., TSS (10.33^0 B), lower titratable acidity (0.48 %), higher TSS/Acid ratio (21.28), Ascorbic acid (62.54 mg/100g), total sugar (8.33 %), juice recovery (50.71 %), fruit firmness (58.61 newton), shelf life (22.62 days) and lower physiological loss in weight (8.42 %) at 20 days of fruit storage. The sweet orange plants receivingT_8 recorded higher residual soil nutrients status of 365.18, 52.10, and 338.10 kg/ha N, P_2O_5 and K_2O respectively after the harvest. Besides, recorded higher microbial population of *Azotobacter* (23.14, 20.19cfug^{-1} soil) and PSB (25.27, 22.12 cfug^{-1} soil) at 10^{-4} and 10^{-5} dilution respectively. The present study reavealed that commercial sweet orange production under central dry zone of Karnataka by integrated application of nutrients (T_8) is more economical with increased net returns and BC ratio(Rs. 5, 82,103 ha^{-1}& 3.09, respectively).

August, 2017

(B.S. Shivakumar)
Major advisor

5. Agro-technique Intervention for Strawberry (*Fragaria* x *ananassa* Duch.) on Vertical Growing System under Natural Ventilated Polyhouse

RAGHAVENDRA PRASAD

ABSTRACT

An experiment was conducted to study the Agro-technique intervention for strawberry (*Fragaria* x *ananassa* Duch.) on vertical growing systemunder low cost polyhouse of the Department of Fruit Science, College of Horticulture, Mudigere, during 2016-17. The work was initiated to standardize plant density and soilless substrates (*viz*., perlite, vermiculite, coir pith, sphagnum moss and vermicompost) on growth, yield and quality. The experiment was laid out in split plot design with eight main treatments (M-media combinations) and two sub treatment (D-plant density) with sixteen treatment combination (M x D) replicated twice. The results revealed that among different plant density D_1 recorded highest per cent survivability (90.00) and lowest per cent mortality (10.00) whereas, media combination M_1 with perlite+vermicompost was significantly superior with respect to all traits. In interaction, M_1D_1-perlite+vermicompost with one plant per spot recorded highest plant height (18.25 cm), number of leaves (17.17), plant spread North-South and East-West (25.12 cm and 27.97 cm respectively), number of crowns (2.57/plant), leaf area (108.12cm^2), leaf area index (1.37), total dry weight (29.94 g) and total chlorophyll content (2.57mg/g of fresh weight). M_7D_1 treatment with vermiculite+coir pith+vermicompost took minimum number of days for flowering (48.32) whereas, M_1D_2 with perlite+vermicompost and two plants per spot took longest duration for flowering (72.59 days). Highest number of flowers per plant (24.90), number of fruits per plant (24.50), fruit diameter (3.98cm) and yield per plant (365.90g) were recorded in perlite+vermicompost treatment with one plant per spot. The fruit quality parameters liketotal soluble solids (12.68°Brix), ascorbic acid content (39.62 mg/100 g), reducing sugar (5.94 %), non-reducing sugar (1.92 %), total sugars(7.50%), sugars to acid ratio(25.12) and titratable acidity (0.97 %) were highest in M_1D_1 and resulted in highest benefit cost ratio (2.49). Treatment M_1 under D_1 plant density produced superior vegetative, reproductive and quality traits.

July, 2017

(D. Madaiah)
Major Advisor

6. Effect of Different Plant Growth Regulators on Rooting of Softwood Cuttings of Passion Fruit (*Passifloraedulis* Sims)

RESHMA, B. R.

ABSTRACT

An investigation on "Effect of growth regulators on rooting of softwood cuttings of passion fruit (*Passifloraedulis* Sims)" was carried in poly house during 2016-17 at Central Horticultural Experiment Station, Chettalli. The soft wood cuttings of passion fruit were treated in different concentrations of IBA, NAA and their combinations. The experiment was laid out in Completely Randomized Design with nine treatments replicated thrice. The result revealed that, number of days taken for root initiation (14.67), percentage of rooting(67.77 %), number of roots per rooted cutting (167.67), root volume (2.16 ml), root fresh weight (2.26 g), root dry matter(0.64 g), number of days taken for sprout initiation (7.33), percent sprouting (84.44 %), number of leaves per sprout (10.2), leaf area (107.14 cm^2), shoot fresh weight (27.00 g) and shoot dry matter (9.27 g) were recorded in cuttings treated with IBA 750 ppm.

Further total sugar in cuttings was 2.55 per cent with C:N of 7.51when treated with IBA 750 ppm. The N content in the said treatment declined at a faster rate (2.03 to 0.59 %) from initial upto 90 days after planting. Maximum survival percentage of rooted cuttings (96.67 %) was also observed in the same treatment. Hence application of IBA 750 ppm was found effective in improving both rooting and as well survivability of softwood cuttings of passion fruit.

July, 2017

(B.S. Shivakumar)
Major advisor

7. Effect of Growth Regulators and Sucrose on Rooting of Stem Cuttings in Karonda (*Carissa carandas* L.)

SHWETA MARUTI SUTAGATTI

ABSTRACT

Karonda is indigenous fruit of India having tremendous Nutraceutical values and found wild throughout the country. It is usually propagated by seeds however it has got prolonged juvenility. Therefore, it is crucial to produce planting material through vegetative propagation like cuttings with different growth regulator treatment to reduce juvenile period by increasing multiplication rate. An investigation was conducted on "Effect of growth regulators and sucrose on rooting of stem cuttings in Karonda (*Carissa carandas* L.)" variety Konkan Bold at Central Horticultural Experiment Station, Chettalli, Karnataka during 2016-17. The experiment was laid out in a factorial complete randomized design in poly tunnel with two factors of stem cuttings *viz.* semi hardwood and hardwood cuttings and nine treatments including growth regulators and sucrose treatment. The cuttings were planted in polybags with mixture of FYM, fine sand, soil and coir pith in the ratio of 1:3:6:1 proportion. The observations were recorded on root and shoot parameters at different intervals along with assessing the survivability under nursery condition. The results revealed that hardwood cuttings treated with IBA 6000 ppm + 2000 ppm NAA performed better and took minimum number of days for root initiation (19.00 days), maximum percentage of rooted cuttings (58.8%), number of roots per rooted cuttings (5.26), root volume (2.65 cc), fresh weight of root (1.120 g) and dry weight of root (0.812g), highest percentage of cuttings sprouted (65.6 %), number of leaves per sprouted cuttings (7.06), leaf area (19.04 cm^2), fresh weight of shoot (3.76 g) and shoot dry matter (2.96 g) after 90 days of planting. Also maximum per cent survivability (87.26) was recorded in hardwood cuttings treated with IBA 6000 ppm + 2000 ppm NAA 180 DAP.

July, 2017

(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 Integrated Nutrient Management on growth, yield and quality of kalmegh (*Andrographispaniculata*Nees.) under hillzone of Karnataka

ROHAN, H. V.

ABSTRACT

An experiment was carried outto assess the effect of Integrated Nutrient Management on growth, yield and quality of kalmegh(*Andrographis paniculata* Nees.) at ZAHRS, Mudigere with thirteen treatments and three replications in RCBD design during the year 2015-16 rabi season. Amongthe different treatments studied,the treatment withFYM @ 5 t ha^{-1} + 75 % of N,P + *Azotobacter*+ PSB+ 3 % panchagavya foliar spray recorded significantly maximum plant height (45.27 cm), number of branches (63.20 $plant^{-1}$), number of leaves (195.79$plant^{-1}$), leaf area (3046.74 cm^2plant^{-1}), fresh herbage yield (53.66 g) per plant and per hectare (11.92 t), dry herbage yield (19.35 g) per plant and per hectare (4.3 t), andrographolide yield (21.91 kg ha^{-1}),gross returns (₹ 1,98,540ha^{-1}),net returns (₹ 1,26,570ha^{-1}), B:C ratio (1.76),available nitrogen(315 kg ha^{-1}) and phosphorous (27.1 kg ha^{-1}) at 120 days after transplanting.The chlorophyll content (62.63 SPAD) was recorded significantly maximum in vermicompost @ 2.5 t ha^{-1} + 75 % of N,P + *Azotobacter* + PSB + 3 %panchagavya foliar spray treatment. Whereas, maximum andrographolide content (0.796%) was recorded in FYM @ 5 t ha^{-1} + 50 % of N,P + PSB+ 3 % panchagavya foliar spray treated plants at 120 days after transplanting.

August, 2017

(Ravi, C. S.)
Major Advisor

2. Influence of Nurse Crop and Foliar Nutrition on Growth of Young Arecanut (*Areca catechu* L.) Plants Under Hill Zone of Karnataka

KHADEEJA, S.

ABSTRACT

An experiment was carried out to assess the influence of nurse crop and foliar nutrition on growth of young arecanut (*Areca catechu* L.)plants under hill zone of Karnataka at ZAHRS, Mudigere, during the year 2016-17in FRCBD. The factor A consists of shade (Grand Naine and Puttabale) and factor B consists of foliar nutrition (19:19:19, $MgSO_4$ and micronutrients mixture @ 0.3% each). One year nine month old arecanut and banana plants were selected for the study and treated with four foliar sprays at 45 days interval. The results revealed that at 45 days after 4^{th} spray during 3^{rd} year of growth, the plants grown under puttabale banana with combined application of macro and micronutrientsrecorded maximum plant height (2.40 m) and chlorophyll content (2.06 mg/g)whereas, collar girth (31.06 cm), frond length (123.46 cm), number of leaves (6.70) and leaf area (375.31 m^2) was recorded in plants grown under Grand Naine with conjunctive use of macro and micronutrients. The higher available nitrogen(241.67 $kgha^{-1}$) and phosphorus (47.70 $kgha^{-1}$) content in soil was observed in Grand Naine shade without foliar nutrition while, higher available potassium (168.67 $kgha^{1}$) was recorded in Grand Naine shade treated with macro and micronutrients. The higher total nitrogen (2.56%) and phosphorus (0.24 %) in plants were found maximum in puttabale shade with $MgSO_4$ and micronutrients mixture whereas, higher potassium (1.89 %) was recorded in Grand Naine shade with$MgSO_4$ and micronutrients mixture. The lowest spindle bug (16.02 %) infestation was noticed in puttabale shade with $MgSO_4$ and micronutrients mixture while, Grand Naine shade with 19:19:19 and $MgSO_4$ recorded minimum leaf spot infestation (10.33 %) at 45 days after 1^{st}spray. Arecanut plants grown under puttabale banana shade with combined application of nutrients through foliar spray would provide better performance in early stages of growth.

July, 2017

(Ravi, C. S.)
Major Advisor

3. Effect of Liquid Plant Growth Promoting Rhizomicroorganisms (PGPR) on Quality Seedling Production in Arecanut (*Areca catechu* L.)

LATHA, H. K.

ABSTRACT

An experiment was carried out to assess the performance of liquid PGPR on quality seedling production in arecanutat ZAHRS, Mudigere, with nine treatments and three replications in CRD during the year 2016-17 under polyhouse and shade net. Among the different treatments studied, the seedlings inoculated with *Azotobacterchroococum*, *Bacillus megaterium*,*Bacillus mucilaginosus*and VAM recorded maximum plant height (61.73 cm), collar girth (5.20 cm), petiole length (15.43 cm), frond length (31.20 cm), number of leaves (5.40), leaf area (1296.00 cm^2/plant), total chlorophyll content (2.48 mg/g), total dry matter production (18.00 g), number of primary (8.80) and secondary roots (40.83); root length (35.00 cm), thickness (4.33 mm) and volume (23.93 ml), seedling index (156.69) and splitting of leaves (39.97 %) at 270 DAT under polyhouse compared to uninoculated seedlings. The similar trend was observed under shade net condition with conjunctive use of *Azotobacterchroococum*, *Bacillus megaterium*, *Bacillus mucilaginosus* and VAM where higher plant height (53.57 cm), collar girth (4.83 cm), petiole length (12.40 cm), frond length (28.93 cm), number of leaves (4.40), leaf area (1020.32 cm^2/plant), total chlorophyll content (2.14 mg/g), total dry matter production (14.63 g), number of primary (7.63) and secondary roots (32.60); root length (32.20 cm), thickness (3.80 mm) and volume (19.90 ml), seedling index (125.11) and splitting of leaves (35.53 %) were recorded at 270 DAT.The combined inoculation of liquid PGPR proved to be the best consortium than single inoculation under polyhouse for quality seedling production.

July, 2017

(Ravi, C. S.)
Major Advisor

4. Morphological Characterization and Tissue Culture Studies in *Salacia chinensis* L.: A Threatened Medicinal Plant

LAXMI MASTIHOLI

ABSTRACT

An investigation was undertaken to study the morphological characters, *in vitro* propagation, *in vitro* conservation and genetic fidelity assessment of *in vitro* raised plants of *Salacia chinensis* L. at Division of Plant Genetic Resources, Indian Institute of Horticultural Research, Hesaraghatta, Bangalore during 2016-17. Among the thirteen accessions of *S. chinensis* the genotypic and phenotypic coefficients of variations were high for characters *viz*., fruit yield per plant, plant spread, fruit weight and seed weight.High heritability coupled with genetic advance over mean was observed forfruit weight, fruit yield per plant, seed weight and plant width. Correlation study revealed that plant height had positive correlation with fruit yield per plant. According to path analysis the seed length, plant height and seed width had high positive direct effects on fruit yield per plant while, seed weight, fruit length and leaf length had negative direct effects on fruit yield per plant. Nodal segments were cultured on MS media supplemented with different growth regulators like BAP, NAA, IAA, KIN among various combinations used in tissue culture, BAP (2.0 mg/l) +NAA (0.8 mg/l) treatment significantly influenced for increase in shoot length (3.40±0.06), number of shoots (3.00±0.17), number of leaves (7.20±0.10) and survival percent (85). Genetic fidelity assessment of *in vitro* raised plants of *S. chinensis* revealed that micropropagated plants were similar to mother plants indicating no genetic variations in *in vitro* raised plants.

July, 2017

(Raviraja Shetty, G)
Major Advisor

5. Morphological Characterization and Propagation Studies in *Saraca asoca* (Roxb.) De Wilde: An Endangered Medicinal Plant

MADHUSHREE, S. I.

ABSTRACT

An experiment was conducted at Department of Plantation, Spices, Medicinal and Aromatic Crops, College of Horticulture, Mudigere and ICAR- Indian Institute of Horticultural Research, Hessaraghatta, Bengaluru to study the propagation of *Saraca asoca* (Roxb.) De Wilde during the year 2016-17. The work was initiated to study the morphological characterization, seed and vegetative propagation and tissue culture protocol. Among six accessions of *S. asoca* the genotypic and phenotypic coefficients of variation were high for characters viz., number of pods per plant and seed yield. High heritability coupled with high genetic advance over mean was observed in characters like number of pods per plant, pod length, number of seeds per pod, plant height, seed yield and pod width. Correlation study revealed that plant height, leaf length, leaf width, leaf area, number of pods per plant and number of seeds per pod had significant positive correlation with seed yield per plant. In path analysis, plant height, leaf length, leaf width, pod length and number of pods per plant had positive direct effects on seed yield per plant. Among the different germination inducing treatments, the seeds treated with gibberellic acid at 200 ppm showed higher germination (92.33%), germination rate (2.95) and seedling vigour (6315.10). In vegetative propagation, stem cuttings treated with IBA 2000 ppm recorded maximum sprouting (33.70%) and rooting (33.41%) at 120 days after planting. In air layering, branches treated with IBA 2500 ppm recorded maximum root length (13.03 cm) and rooting (88.07%) at 60 days after layering. For tissue culture, nodal segments were used as explant and among various combinations, satisfactory results were obtained in terms of number of sprouts (2.00) and total number of explants survived (32.33) by using a combination of BAP (1.00 mg/l) + NAA (0.50 mg/l).

July, 2017

(Raviraja Shetty, G)
Major Advisor

6. Evaluation of Coriander (*Coriandrum sativum* L.) Genotypes for Growth, Yield and Quality Under Central Dry Zone of Karnataka

NANDAKUMAR, K.

ABSTRACT

An experiment was conducted to evaluate 20 coriander genotypes in Randomized Complete Block Design with three replications to study their performance with respect to growth, yield and quality at Zonal Agricultural and Horticultural Research Station, Babbur farm, Hiriyur during of 2016-17 inwinter season.Significant differences were observed among genotypes for all the characters under study.The results revealed that, Rcr-475 recorded maximum plant height (70.27 cm),number of primary branches per plant (7.33),number of umbels per plant (28.13), number of umbellets per umbel (5.50), number of seeds per umbellet (5.70),seed yield per plant (6.37g), seed yield per hectare (16.83 q), highest test weight (14.53 g) and plant spread (645 cm^2). The genotype DCC-4 took minimum number of days for first flowering (39.33 days) and maximum essential oil content was recordedin Acr-1and Rcr-728 (0.8%). A high heritability coupled with genetic advance over mean were observed for most of the growth, yield as well as quality charactersthat indicated predominance of additive gene action for these traits. Correlation studies showed positive association of seed yield per plant withnumber of primary branches per plant, plant height, plant spread and test weight.Path analysis revealed that, number of primary branches per planthad highest direct positive effect on seed yield followed by plant height suggesting that these parameters may be considered as prime traits during selection to fetch higher seed yield.Genotypesuch asRcr-475, Rcr-446, Rcr-41, Co-4, Rcr-20 and Acr-1were identified as best performing genotypes from the study.

July, 2017

(H. Chandrappa)
Major Advisor

7. Morphological Characterization and Propagation Studies in *Oroxylum indicum* (L.) Vent.: A Threatened Medicinal Tree

SANDESH, M. S.

ABSTRACT

An experiment was carried out to study the morphological characters and propagation of *Oroxylum indicum* (L.) Vent. at the Department of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Mudigere during the year 2016-17. The work was initiated to record morphological characters, tostandardize the seed and vegetative propagation andto develop tissue culture protocol. Among ten accessions of *O. indicum*(L.)Vent.maintained at Field Gene Bank, Division of Plant Genetic Resources, ICAR-Indian Institute of Horticultural Research (IIHR),Bengaluru, the genotypic and phenotypic coefficients of variations were high for characters *viz.*, leaf area, number of pods per tree and pod yield per plant. High heritability coupled with high genetic advance over mean was observed for leaf area, number of pods per tree and pod yield per plant. Correlation studies revealed that highly significant and positive association of podyield per plant with leaf area, number of pods per plant, leaf width and petiole length. Path analysis revealed that, number of pods per plant, leaf length, plant height, pod width and number of seeds per podhad high positive direct effects on pod yield per plant.Among the different germination inducing treatments, theseeds treated with $KNO_3$1.0 at per cent showedmaximum rate of germination (18.89%), germination percentage (96.00) and seedling vigour (6995.2at 120 days after sowing). In vegetative propagation, hardwood cuttings treated with NAA (200 ppm) + IBA (3000 ppm) recorded maximum sprouting (86.67%) and rooting (60.33%) at 120 days after planting. For tissue culture, shoots tips were used as explant and cultured with different concentrations of BAP on MS media andsatisfactory results were obtained in terms ofshoot length(3.30±0.15 cm), number of shoots (3.88±0.12) and number of leaves (4.83±0.17) withBAPat 2.5 mg/l.

July, 2017

(Raviraja Shetty, G)
Major Advisor

Vegetable Science

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Vegetable Science

1. Optimization of Plant Population for Higher Productivity in Yardlong Bean under Varied Environmental Conditions

MANJESH, M.

ABSTRACT

The present investigation entitled "Optimization of plant population for higher productivity in Yardlong bean under varied environmental conditions" was carried out during *Kharif* 2016 at ZAHRS, Navile, Shivamogga. The experiment was laid out in splitplot design with three replications. There were 24 treatment combinations comprised of three different environments (polyhouse, shadenet and open field) and eight spacing treatments(45 cm x30 cm, 45 cm x45 cm, 45 cm x60 cm, 45 cm x75 cm, 60 cm x30 cm, 60 cm x45 cm, 60 cm x60 cm, 60 cm x75 cm).The obtained results showed that all the characters were markedly affected by different environments and spacing.Among different environments significantly higher plant height(325.17cm), number of primary branches(12.46), number of pods per plant (21.66), pod length (70.67 cm), pod girth (3.73 cm), pod weight per plant (31.13 g), yield per plant (458.21 g) and higher pod yield per 1000 m^2 (1605.99 kg) were recorded in polyhouse.Among spacing treatments significantly highernumber of primary branches (12.91), pods per plant(22.30), pod length(71.73 cm), pod girth(3.94 cm), pod weight per plant(33.11g)andpod yield per plant (547.86 g) were recorded with wider spacing of 60 cm x75 cm.Highest plant height (294.29 cm) and yield per 1000 m^2(1791.68 kg) were recorded with the closer spacing of 45 cm x30 cm.The interaction of different environments and spacing were found to be statistically non-significant for all the traits. The evaluation of production economics revealed that growing of Yardlong bean in open condition with 45 cm x30 cm spacing was most remunerative option with a highest benefit: cost of 3.14.

August, 2017

(Nagarajappa Adivappar)
Major Advisor

2. Assessment of Combining Ability of Cucumber (C*ucumis sativus* L.) Germplasm for Exploiting Heterosis

PRASHANT R. NAIK

ABSTRACT

The present investigation on heterosis and combining ability studies in cucumber (*Cucumis sativus* L.) was undertaken at ZAHRS, Navile, Shivamogga, Karnataka during k*harif* and *rabi* seasons of year 2016-17. The diversed group of 12 genotypes (nine lines and three testers) of cucumber and two check cultivars (Poinsette and Malini) were used to fulfil the objective such as to estimate the general combining ability (*gca*) and specific combining ability (*sca*) magnitude and direction of heterosis for yield and yield attributing traits, to identify the highly heterotic combinations. A total of 27 crosses were developed by crossing with nine lines three testers. All the crosses were evaluated along with the parents in randomized block design with two replications. The magnitude of heterosis over the standard checks (Poinsette and Malini) for important traits *viz*., days to first female flower appearance ranged from -7.80 to 13.65 and -1.49 to 21.43 per cent, for node at which first female flower appearance -28.83 to 46.34 and -31.82 to 36.36 per cent, for number of fruits per vine -33.64 to 48.85 and -36.52 to 40.43, for yield per vine -18.36 to 20.47 and -28.76 to 5.12 per cent. The parents Himangi, US-640, DWD and Haveri Local are the good general combiners while, DWD × Haveri Local, US-640 × Haveri Local and Sabra × Bagalkot Local exhibited the significant positive *sca* effect for yield attributing traits. The predominance of *sca* effect over *gca* effect for yield indicate the predominance of non-additive gene action. The present study revealed that heterosis breeding is useful for the improvement of cucumber for exploitation of additive or non-additive gene action.

July, 2017

(Nagarajappa Adivappar)
Major Advisor

3. Genetic Variability Studies in Potato (*Solanum tuberosum* L.) Genotypes Under Hill Zone of Karnataka

RAMACHANDRA, M. K.

ABSTRACT

An investigation on genetic variability studies in potato was carried out in the experimental block, Department of Vegetable Science, College of Horticulture, Mudigere during the year 2016-17. The experiment was laid by adopting Randomized Complete Block Design (RBD) with three replications. The experimental material consisting of sixteen genotypes of potato obtained from CPRI, Shimla and CIP, Peru. Data collected on growth, tuber yield and its components and genetic estimation was made for variance, correlation coefficient and path analysis. Analysis of variance revealed that mean sum of squares was significant for the all parameters which indicated the presence of sufficient variability among the genotypes. The phenotypic coefficient of variation (PCV) for all the parameters was found higher magnitude than genotypic coefficient of variation (GCV). Among different yield attributing characters fresh and dry weight of tuber, tuber volume, marketable and total tuber yield had the highest magnitude of GCV and PCV (>20%). The high heritability (>60%) estimates coupled with high genetic advance (>20%) was recorded for the characters *viz.*, leaf area, fresh weight of tuber, tuber volume, non-reducing sugars, marketable and total tuber yield. Therefore, additive component is predominant here. Thus, there is ample scope for improving these characters through direct selection. Studies on correlation coefficient showed highly significant and positive association of total tuber yield per plot with plant height, number of leaves, number of stems, total fresh weight of plant, total dry weight of plant, number of tubers per plant, fresh weight of tuber per plant, dry weight of tuber per plant, marketable yield per plant and marketable yield per plot. Path analysis indicated that out of thirteen characters studied, the direct effects *via* fresh weight of tuber per plant, followed by starch and dry weight of tuber per plant positively contributed towards total tuber yield per plot, indicating the possibility of simultaneous selection for these traits to improve the tuber yield.

July, 2017

(Srinivasa, V)
Major Advisor

4. Integrated Nutrient Management Studies in Chilli (*Capsicum annuum* L.)

YOGARAJU, M.

ABSTRACT

A field experiment was conducted to know the effect of integrated nutrient management in chilli (*Capsicum annuum* L.) at Department of Vegetable Science, College of Horticulture, Mudigere, during 2016-17. The experiment was laid out in randomized complete block design with fourteen treatments replicated thrice. Plants treated with *Azospirillum* + PSB + VAM + KSB + 75% RDF + MgSO4 + Micronutrient mixture recorded significantly maximum plant height (88.61 cm), plant spread North-South and East-West (63.67 cm and 59.43 cm, respectively), number of primary branches (11.22), secondary branches (18.44), number of leaves (298.87), leaf area (10578.06 cm^2), leaf area index (3.92), fresh weight of leaves (107.33 g/plant), fresh weight of stems (145.11 g/plant), fresh weight of fruits (268.89 g/plant), dry weight of leaves (35.01 g/plant), dry weight of stem (47.69 g/plant), dry weight of fruits (14.40 g/plant), total dry matter (118.48 g/plant), absolute growth rate (2.38 g/plant), crop growth rate (8.99 g/m^2/day), relative growth rate (0.07 g/g/day), net assimilation rate (0.200×10^{-2} g/dm^2/day), minimum days taken for 50 per cent flower initiation (38.67), maximum fruit length (11.60 cm), fruit girth (4.80 cm), fruit yield (658.67 g/plant), fruit yield per hectare (22.92 t/ha) and its quality parameters like chloropyll content (79.74 SPAD Units), ascorbic acid content (141.27 mg/100g), capsaicin content (0.39 %). Similarly *Azospirillum* + PSB + VAM + KSB + 75% RDF + MgSO4 + Micronutrient mixture recorded significantly the highest available N (440.00 kg/ha), P_2O_5 (129.67 kg/ha) and K_2O (241.33 kg/ha) in soil. The economic analysis clearly indicated that application of *Azospirillum* + PSB + VAM + KSB + 75% RDF + MgSO4 + Micronutrient mixture realized maximum net returns (Rs. 558791.2 /ha) and B: C ratio (1:4.33).

July, 2017

(Srinivasa, V)
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

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1. Studies on Population Structure and Nursery studies of *Diospyros ebenum* J. Koenig

BOPANNA C D

ABSTRACT

Diospyros ebenum is a slow-growing medium-sized tree grows up to 20-25 meters tall, which belongs to the family Ebenanceae commonly known as "Kari mara" which is native to India and Srilanka. It is known for its black coloured wood since ancient times. Timber of *D. ebenum* is said to produce the best commercial black ebony. It is resistant to insect attack and fungi and highly durable. Due to high exploitation of this species for its timber it is listed as a rare and endangered tree species. Lack of quantitative data on the baseline information on the population status of this tree species in natural forest is a barrier plan for the future conservation and management hence the present investigation carried on density, population structure and regeneration of *Diospyros ebenum* were carried out in the natural forest of Kodagu. The result revealed that the density and basal area was found to be higher in Makutta. The overall regeneration showed a reverse J shape curve but in regeneration of *D. ebenum* showed lack of regenerates in Class I and in higher classes which may be due to various biotic and abiotic pressures in the natural forest. The effect of fertilizer imposed on seedling growth of *D.ebenum* affected on seedling growth. Maximum seedling height was observed in both seedlings treated with NPK (1g/seedling) and VAM (0.9g/seedling) followed by the treatment Cow dung slurry. The maximum collar diameter was found in NPK (2g/seedling) and the maximum leaves showed in NPK (2g/seedling) which was on par with Cow dung slurry treatment. The Influence of fertilizer on Maximum dry shoot weight, dry root weight and maximum total dry weight was recorded in VAM (0.9g/seedling) and the minimum was recorded in control (T1). The Comparison of the effect of different treatment on seedling quality parameters revealed that sturdiness quotient is maximum in Treatment VAM (0.9g/ seedling).

April, 2017

(N. A. Prakash)
Major Advisor

2. Studies on Seed Storage Technique and Germination in *Lophopetalum wightianum* Arn.

RASHMI DESAI

ABSTRACT

The most convenient methods of *ex-situ* conservation of plant germplasm is by storage of seeds under conditions which maintain its viability. In case of orthodox seeds, this can be achieved by storing it in the dry state under ambient temperature and low relative humidity but desiccation sensitive nature of recalcitrant species act as a hurdle for its storage. *Lophopetalum wightianum*is an important riparian tree with commercial prospects and very little information is available regarding the storability of seeds. To overcome this problem investigation on seed storage technique and germination of *L.wightianum* was conducted by collecting the seeds from a natural population of the species and storing the seeds in three different containers for four storage periods after imposing the seven different storage chemical treatments on seeds. The study reveals that among the different storage containers, the earthen pot was found to be the best storage container, as it could store the seeds and maintain the viability up to two months with maximum germination of 38.23 per cent. Different chemical treatments applied to the seeds helped to maintain the seed viability for a longer period (90 Days), in that seeds treated with Chlorpyriphos (0.89 %) exhibited maximum (30.31 %) germination but there was a gradual decrease in germination with an increase in storage period. Among all the combination of treatments, seeds stored in an earthen pot (M1) treated with Carbendazim (0.25 %) + Chlorpyriphos (0.89 %) (T5) stored for 60 days (S3) exhibited maximum (64.61 %) germination.

June, 2017

(Ashok B. Divatar)
Major Advisor

3. Studies on Population Status and Propagation of Bee Forage Trees of Coffee based Agroforests

BASAVARAJAPPA

ABSTRACT

Coffee based agroforest in Kodagu is one of the most diverse agroforestry system in terms of biodiversity and ecosystem services offered. Shade trees in coffee based agroforests provide additional forage and refuge to pollinators, which ensures the presence of bees in the landscape throughout the year.To assess the population status of bee forage tree species in coffee based agroforests, six locations were selected in Virajpet Taluk and 36 circular plots of 30 m radius were laid such that the sampling intensity in each plantation was 10 per cent. Besides, study on feasibility of vegetative propagation for two important bee forage tree species *viz.Cinnamomum malabatrum* and *Persea macrantha*, was also conducted after treating the semi-hard wood branch cuttings with IBA and NAA at different concentration (2000 ppm, 3000 ppm and 4000 ppm).In the study areaa total of 100 tree species (194 trees ha^{-1}) were recorded and richness ranged from 37 to 50 among study locations. Out of total shade tree species recorded, 74 (177 trees ha^{-1}) were found to be bee forage (Range: 30 to 40). Most of the dominant tree species (based on IVI value) were found to be bee forage such as *Artocarpus heterophyllus*, *Dalbergia latifolia* and *Grevillea robusta* etc. The flowering calendar of bee forage species shows that the blooming of different floral species throughout the year and it was highest from January to April. Twenty seven RET tree species were recorded, of which 81 per cent were bee forage tree species listed in IUCN red data book with high conservation value. The average canopy cover within the coffee agroforests was 44 per cent (Range: 29.5 to 57 %). Spearman's correlation analysis showed that the species richnessof shade and bee forage tree species was significantly and negatively correlated with crown percentage.Hence,there is a need to advise the farmers to ensure sustainable forage resources and increase the availability of suitable nest locations withincoffee based agro-forests by maintaining diverse native bee-preferred trees without pruning.Vegetative propagation of the two important bee forage tree species was not successful. Therefore, there is a need to undertake detailed studies for multiplication of these trees to supply quality planting materials.The results indicate that coffee based agroforests still host large density and diversity of bee forage trees and there is a good opportunity to integrate apiculture in the production system contributing both for ecological and economic sustainability.

Key words: Coffee based agroforests, Bee forage trees, *C. malabatrum*, *P. macrantha*

June, 2017

(C. G. Kushalappa)
Major Advisor

4. Seed Germination and Seedling growth of *Calophyllum inophyllum* L. under elevated Carbon dioxide condition

SUPRIYA K SALIMATH

ABSTRACT

Global climate change induced by the anthropogenic activities is the major challenge faced by the world in this 21st century. The daily average concentration of CO_2 in the atmosphere rose above 400 parts per million for the first time on record in 2013, up from 280 ppm. The acclamatory responses of plants to the rapidly changing environment and understanding the potential impacts of multiple interacting factors have become a subject of debate over the past two decades. Hence, it is prudent to understand the response of tree species in the initial stages, as seed and seedlings, to the elevated carbon dioxide conditions. *Calophyllum inphyllum* one of the important biodiesel yielding tree species distributed widely in the coastal area, which are more vulnerable to climate change. Thus, seeds of these species were collected and germinated under the Carbon dioxide elevated condition and its germinating behavior and growth performance was analyzed. Elevated carbon dioxide condition was created by the decomposition of organic matter in a poly tunnel. The seeds were allowed to germinate under both open as well as elevated CO_2 conditions. The three month old seedlings were subjected to Nitrogen, Phoshporous and Potassium (NPK) treatment at two levels (0.5g and 1g per plant) to understand the growth of species under elevated CO_2 condition in nutrient non deficit condition. Results revealed that, the elevated Carbon dioxide negatively affected the germination of the species to the extent of 40.60 per cent. When supplemented with nutrients, the positive response growth of the seedlings were observed in terms of collar diameter, seedling height, biomass, volume index and their relative growth rates. Thus, the elevated CO_2 condition has the potential to increase the productivity of the seedlings under nutrient rich conditions.

July, 2017

(Ramakrishna Hegde)
Major Advisor

5. Spatial distribution of Soil Organic Carbon pool under Different Land use Systems in Kodagu and Chamarajanagar Districts

ANAND N

ABSTRACT

In the present study spatial distribution of soil organic carbon pool under different land use systems in Kodagu and Chamarajanagar districts was analysed. This study generated information on the effects of different land use systems on the magnitudes and directions of soil organic carbon and soil parameters within and among land use systems and soil depths. The current study utilizes the Land Degradation Surveillance Framework (LDSF) protocol, developed by ICARAF, Nairobi, Kenya, which is spatially balanced, hierarchical field sampling methodology. Based on the reconnaissance survey, topographical and satellite images of districts, different land use systems such as natural forest, teak plantation, coffee agroforest with native trees, coffee agroforest with silver oak, agriculture land and fallow land were selected. The results revealed that statistically significant difference in soil organic carbon (SOC) content, stock, physical and chemical properties among different land use systems and different soil depth at both Madikeri and B.R.Hills sites. The highest SOC content was recorded in natural forest (2.80 %) followed by coffee agroforest with native trees (2.11 %), coffee agroforest with silver oak (1.76 %) and lowest SOC content was recorded in agriculture land (0.86 %) and fallow land (0.73 %). Similarly, SOC stock was found to be highest in natural forest (77.70 t ha^{-1}) followed by coffee agroforest with native trees (61.02 t ha^{-1}), coffee agroforest with silver oak (53.32 t ha^{-1}), agriculture land (29.32 t ha^{-1}) and lowest in fallow land (25.40 t ha^{-1}). Similar trend was also observed at B.R. Hills site. The highest mean values of soil nutrients like N, P, K, Ca, Mg and S were observed under tree based land use systems as compared to the agriculture and fallow land which may be due to presence of higher amount of litter. Soil organic carbon showed positive and significant correlation with N, P, K and Ca.

Key words: Carbon sequestration, natural forest, teak plantation, coffee agroforest, agriculture land, fallow land, SOC, soil physico-chemical properties

August, 2017

(G. M. Devagiri)
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. Studies on Ethnobotanical Knowledge and Population Structure of Wild Edible Fruit Trees of Kodagu

VINAYAK V. PAI

ABSTRACT

Wild edible fruits are one of the important plant resources helps in providing food supplements in the diet to the rural community. Kodagu district is having many such wild edible fruit trees which fulfil the needs of the local people. Therefore, the present study was carried out to know the ethnobotanical knowledge, diversity, population structure and regeneration status of wild edible fruit tree species in different land scapes of moist deciduous forests of Virajpet taluk, Kodagu. Semi structured questionnaire was used for ethnobotanical survey of wild edible fruits. A total 41 wild edible plants were documented of which, 24 species were fruits followed by leaves (11), tubers (4) and bark (2).The population structure of wild edible fruits was assessed by following simple random sampling technique. Belt transacts of 100 m×5 m were laid in natural forest and sacred groves and 50m X 10m plots were laid in coffee based agroforestry system. All trees ≥30 cm gbh in the main plots were enumerated. Species richness and diversity was more in sacred groves compared to natural forest and coffee based agroforestry system. There was significant difference in mean density and mean basal area wild edible fruit species and associated species in natural forest and coffee based agroforestry system. The regeneration of both wild edible and associated species was more in regeneration class I and class II and followed an inverse 'J' shaped pattern indicating healthy regeneration in deciduous forest.*Grewia teliaefolia* and *Terminaliabelerica* were dominant wild edible fruit species and *Terminalia alata* and *Lagerstroemia microcarpa* were found to be the dominant associated species. The study gives an understanding of the diversity, pattern of population and regeneration of the tree species of deciduous forest of Kodagu which will help in conservation and management of the species.

November, 2017

(Satish B.N.)
Major Advisor