

Agriculture

Agricultural Entomology

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

1. Population Dynamics and Evaluation of Biopesticides against Fall Armyworm,
Spodoptera frugiperda (J. E. Smith) on Maize

(PALAM PRADEEP)

ABSTRACT

The investigations on population dynamics of fall armyworm in maize were carried out at AHRS, Kathalagere, Davanagere in kharif & rabi of 2019 and 2020. During the kharif season, in July and in the rabi season, November month recorded highest of 23 and 14.9 male moth trap catches. The early whorl stage (V₁-V₆) of maize crop found to be susceptible to fall armyworm by having higher larval load. Whereas, late whorl stage (V₇-V₁₆) of the crop showed higher damage to the leaf. During the study period, 26 species of natural enemies were recorded including eight parasitoids, 16 predators and two pathogens. Between the two egg parasitoids noticed, *Telenomus* sp. found to be dominant over *Trichogramma chilonis*. Among the larval parasitoids, *Euclyptus* sp. reported as a parasitoid on fall armyworm for the first time from India. Among the predators, *Forficula gravelyi* Burr, 1914, *Elaunon bipartitus* (Kirby, 1891) and *Euborellia annulipes* (Lucas, 1837) are the species of earwigs reported as natural enemies on fall armyworm for the first time from Karnataka. The pathogen *M. rileyi* infection to fall armyworm was found to be higher in September causing > 70 per cent mortality of fall armyworm larvae. Biology of *Rhynocoris marginatus* studied on fall armyworm under laboratory conditions showed that the incubation period of 9.65 days. The total nymphal/developmental period was 55.89 days. The male and female adult longevity was 85.65 and 95.9 days, respectively. Among the evaluated biopesticides and botanicals, azadirachtin 1 EC @ 2 ml/lit found to be superior in reducing larval population and had significantly higher yields (44.58 q/ha) followed by *M. rileyi* @ 3 gm/lit (44.08 q/ha). However, when C: B ratio concerned, *M. rileyi* found to be superior (1:1.83) followed by NSKE 5% (1:1.69), *B. thuringiensis* (1: 1.61) and azadirachtin 1 EC (1:1.60).

June, 2021

(Sharanabasappa)
Major Advisor

2. Termite Fauna of Coastal Karnataka with Special Reference to Pest Status of Termites in Coconut Based Farming Systems

(SANTHRUPTHI, B.)

ABSTRACT

Termite diversity is influenced by various environmental factors and hence regional assessment provides a base for future taxonomic work. Termite diversity of coastal Karnataka is poorly studied and hence, morphological and molecular identification of termites collected from coastal region was made. Soldier caste was used for morphological identification. A total of 31 species belonging to 12 genera and 6 subfamilies under two families viz., Termitidae and Rhinotermitidae were recorded. Termitidae was the most dominant family, with 27 species belonging to ten genera. Among subfamilies, Termitinae contributed the highest number of species (11), followed by Macrotermitinae (9), Nasutitermitinae (4) and Apicotermitinae (3). An illustrated identification key was developed for the collected termite species. Molecular identification with 16S rRNA gene was done for seven termite species (*Labiocapritermes distortus*, *Trinervitermes biformis*, *Microtermes obesi*, *Odontotermes anamallensis*, *O. assmuthi*, *O. yadevi* and *Heterotermes malabaricus*) with two new submissions to NCBI's GenBank. Diversity and pest status of termites in coconut based farming system along coastal Karnataka was studied. Occurrence of ten species belonging to four subfamilies (Termitinae, Macrotermitinae, Nasutitermitinae and Heterotermitinae) was recorded in coconut orchards. Four species of *Odontotermes* (*O. bellahunisensis*, *O. obesus*, *O. assmuthi*, *O. anamallensis*), two species of *Microcerotermes* (*M. pakistanicus*, *M. fletcheri*), and *Heterotermes* (*H. malabaricus*, *H. indicola*) and *Nasutitermes brunneus* and *Microtermes obesi* were recorded in coconut orchards. *Odontotermes obesus* was the only species found making galleries on the tree trunks. Mounds of *Microcerotermes pakistanicus* were also observed near tree base frequently. Among the bioagents tested against pest species, *Heterorhabditis indica* @ 20 lakh IJs/palm (50.26 % population reduction over control) and talc formulation of *H. indica* (Soldier - WP) @ 25 g/palm (50.00 % population reduction) was proved to be effective followed by *H. indica* @ 10 lakh IJs/palm and talc formulation of *Metarhizium anisopliae* (25 g/palm).

October, 2021

(C. M. Kalleshwaraswamy)

Major Advisor

3. Morphological and Molecular Identification of Grasshoppers (Orthoptera) in Different Cropping Ecosystems

(LOKA MOUNIKA)

ABSTRACT

A study was carried out on the morphological and molecular identification of grasshoppers in different cropping ecosystems during 2020-21. A checklist for short-horned grasshoppers of Karnataka has been developed through an extensive literature survey and the present study, including 102 species belonging to 13 subfamilies. Surveys conducted in six districts of Karnataka resulted in a total of 275 specimens, which include 30 species belonging to 22 genera, 12 subfamilies and two families of Orthoptera. Among the subfamilies, the Oxyinae was dominant with the highest species diversity (six) and abundance (26.09%), while Oedipodinae had the highest generic diversity (four). Among the species, *Spathosternum prasiniferum prasiniferum* (8%) was recorded as the most dominant. The grassland ecosystem was the richest among the different ecosystems with the maximum number of species (26). Several species were recorded for the first time from surveyed districts of Karnataka viz., Chikkamagaluru (eight); Dakshina Kannada (four); Hassan (one); Shivamogga (four); Udupi (nine); Uttar Kannada (one). *Aulacobothrus taeniatus* is a new record from Karnataka, and the epiphallus of *Xenocatantops henryi* was described for the first time. The collected species were characterized using external morphological and genitalial characters. DNA barcoding was done for the selected grasshopper species viz., *A. lutipes*, *A. taeniatus*, *A. socius*, *Oxya nitidula* and *O. fuscovittata* of Acrididae and *Atractomorpha crenulata* of Pyrgomorphidae using the mtCOI gene. The phylogenetic relationship was deciphered with the sequences of grasshopper species of various subfamilies of present study and those retrieved from NCBI's GenBank. The results revealed that Acrididae and Pyrgomorphidae had shown monophyletic lineage. The subfamilies, Eyprepocnemidinae, Gomphocerinae, Oedipodinae of Acrididae showed monophyletic grouping. Similarly, Cyrtacanthacridinae and Catantopinae formed a monophyletic group with a close evolutionary relationship. The subfamily Oxyinae formed polyphyletic lineage and is sister to Spathosterninae. An illustrated identification key has been developed for the collected grasshopper species.

November, 2021

(C. M. Kalleshwaraswamy)

Major Advisor

4. Biological Attributes, Feeding and Oviposition Preference of Fall Armyworm, *Spodoptera frugiperda* (J. E. Smith) on Different Host Plants

(D. Nandhini)

ABSTRACT

The biological attributes and nutritional indices of Fall armyworm (FAW), *Spodoptera frugiperda* (J. E. Smith), on different host plants like maize, sorghum, cowpea, castor, banana, marigold and cotton were studied under laboratory conditions. The larval duration was shortest when reared on maize cobs (14.40 days) and longest on marigold flowers (18.25 days). The larval weight was highest at its sixth instar when fed on banana leaves (446.05 mg) whereas, the lowest was recorded on marigold flowers (259.90 mg). The pupal duration did not vary among the treatments. Castor leaves resulted in the highest pupal weight (201.20 mg) whereas, marigold flowers recorded the lowest (125.50 mg). The longevity of females was one day longer than the males on all host plants except marigold flowers. Adult fecundity, hatchability and survivorship per cents were higher when the larvae were reared on maize leaves (985 eggs/female, 93.40% and 49.89%, respectively), followed by maize cobs (919 eggs/female, 86.41% and 45.48%, respectively). Cotton leaves did not support the larval growth and development and there was 100 per cent larval mortality when the third instar larvae reared on them. Consumption index (4.77 g/g/day) and relative growth rate (0.65 g/g/day) of third instar larvae were higher on maize cobs whereas, approximate digestibility (93.18%) was higher on castor leaves. The efficiencies of conversion of digested (20.99%) and ingested food (18.79%) were highest on cowpea leaves. Marigold flowers and cotton leaves were not suitable for the growth and development of the FAW larvae. Under choice and no-choice conditions, maize cobs and leaves were the most preferred host plants for feeding by the larvae. The number of egg masses was higher on maize plants, both under choice and no-choice conditions (8.67 and 11.67 egg masses, respectively), indicating that maize was the most preferred host plant for oviposition by the adults.

November, 2021

(Sharanabasappa)

Major Advisor

5. Toxicity and Efficacy of Botanicals Against Fall Armyworm, *Spodoptera frugiperda* (J. E. Smith) on MAIZE

(PAVANA J. K.)

ABSTRACT

The invasive pest, fall armyworm *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) causes significant loss in maize crop and necessitates the use of alternative low chemical control strategies, such as the application of bioinsecticides. The present investigation was carried out during 2020-21 to evaluate the effect of botanicals on the growth and development of larvae, to establish the dose-response relationship and field investigations were carried in Rabi Zonal Agricultural and Horticultural Research Station (ZAHRS), Kathalagere, Karnataka. Azadirachtin 1 EC, anosom 1 EC, derisom 2 EC, Neem Seed Kernel Extract (NSKE) 5%, neem leaf extract and tobacco leaf extract were tested for its toxicity and efficacy. The botanicals treated at sublethal dose of LC_{30} against third instar larvae registered lower nutritional indices values. But, anosom recorded the least efficiency of conversion of digested food (ECD) and efficiency of conversion of ingested food (ECI) values of 13.28 ± 0.89 and 8.43 ± 0.43 %, respectively. NSKE recorded the least consumption index of 1.71 ± 0.08 g/day/g. Growth rate in all the evaluated botanicals was significantly lower than control and also induced growth inhibition in *S. frugiperda* by reducing larval and pupal weight, increasing larval durations, deformations in pupae and adults. In the leaf dip bioassay treated against second instar larvae, azadirachtin and anosom recorded the least LC_{50} value of 15.61 and 18.05 ppm, respectively followed by derisom (122.07 ppm) and NSKE 5% (7747.58 ppm). Azadirachtin 1 EC was found to be superior in reducing the larval population, leaf damage in field conditions and registered significantly higher yield of 42.69 q/ha. Among all the treatments, NSKE 5% recorded the higher C:B ratio of 1:1.63 with net returns of Rs. 23,324/ha, followed by azadirachtin (1:1.54). However, the standard check spinetoram 11.7 SC recorded highest C:B ratio of 1:1.93. All the evaluated botanicals were found safer to the natural enemies.

November, 2021

(Sharanabasappa)

Major Advisor

6. Species Diversity of Whiteflies in Malnad Region of Karnataka with Special Reference to Evaluation of Entomopathogenic Fungus, *Isaria fumosorosea* Wize against Rugose Spiralling Whitefly, *Aleurodicus rugioperculatus* Martin

(ANGALAKUDITI SANDEEP)

ABSTRACT

Whiteflies (Hemiptera: Aleyrodidae) are polyphagous and some species are important pests in agricultural crops that cause both direct losses and indirectly by acting as vectors of viral diseases. However, information about their species and their host plants is still limited. A study was conducted to determine the whitefly species composition and its host plants status in the Malnad region of Karnataka. A total of 35 species of whiteflies belong to 22 genera were collected from 42 host plants. Among 35 species, four species belonged to the subfamily Aleurodicinae and 31 species belonged to subfamily Aleyrodinae. Among the different species, *Rutaleyrodes atalantiae* was recorded on *Atalantia monophylla* for the first time from Karnataka. Ten whiteflies species were recorded for the first time from the Malnad region of Karnataka. Out of 35 species, *Aleurodicus rugioperculatus* was found breeding on maximum number of host plants. New host plants of certain whitefly species such as *Tetraleyrodes acaciae* on *Pterocarpus macrocarpus*, *Pithecellobium dulce*, *Pisidium guajava*, *Glicidialepium* and *Millettiapinnata* while, *Aleuroputeus baccaureae* on *Pisidium guajava* were found breeding on respective host plants for the first time in India. An illustrated identification key has been developed for all the collected whitefly species from the Malnad region of Karnataka. Study on management of rugose spiralling whitefly (RSW), *A. rugioperculatus* indicated that palms sprayed with a combination of *Isaria fumosorosea* (ICAR-NBAIR Pfu-5) @ 5ml/ L + profenophos 50 EC @ 2ml/ L twice at an interval of 15 days was found effective in reduction of per cent infestation (82.97 %), per cent intensity (80.49 %) and mean live colonies (79.68 %) of RSW.

December, 2021

(B.C. Hanumanthaswamy)

Major Advisor

7. Taxonomic Studies on Tribe Saperdini of Lamiinae of Cerambycidae (Coleoptera)

(ASHWINI, R.)

ABSTRACT

The family Cerambycidae (34,500 species) is one of the largest, most diverse, ecologically and economically important groups of order Coleoptera. The family Cerambycidae is spread across eight subfamilies worldwide, of which Lamiinae (20,000 species) is the most speciose. The tribe Saperdini of Lamiinae represents one of the colourful and diverse group of longhorn beetles. Taxonomic studies on 20 species belonging to five major genera viz., *Glenea* (8), *Nupserha* (2), *Oberea* (6), *Obereopsis* (2) and *Stibara* (2) of tribe Saperdini of South India was carried out during 2020-2021. The study included detailed descriptions of external morphological characters with respect to body and pubescence colouration, characteristic spots/markings/patterns on head, pronotum and elytra, vestiture and habitus characters of each species, supported with morphometrics and illustrated photographs. Of the studied taxa, redescription are presented for the first time for *Glenea andamanensis* sub *andamanensis* Breuning, *G. coelestina* Gahan, *G. ornamentalis* Breuning, *Glenea (Stirolenea) spilota* (Thomson), *Oberea lateapicalis* Pic, *O. artocarpi* Gardner, *Nupserha malabarensis* Woodpecker, and *N. nitidior* Pic, after their initial descriptions in 19th and mid 20th century. The study revealed several new distributional records, of which *Glenea coelestina* collected from Chikmagalur district of Karnataka is a new record for India. *Glenea (Stirolenea) spilota* is a first report for Goa; *Glenea coelestina*, *Oberea artocarpi* and *Nupserha malabarensis* are first reports for Karnataka. Within the state Karnataka, Kodagu district forms a new distributional range for *G. pseudoalbosignatipennis*; *O. lateapicalis* and *O. artocarpi* are first records for Mudigere, Chikmagalur district; *N. malabarensis* is a first report Shivamogga district; *Stibara nigricornis* is a first report for Kailasgiri, Chintamani, Chikkaballapur district. Illustrated identification keys are presented for the first time for the taxa studied that aids in easy and quick identification of the species.

December, 2021

(Shivanna, B. K)

Major Advisor

8. Insect Pollinator Diversity with Special Reference to Role of Attractants in Increasing the Productivity of Pumpkin, *Cucurbita moschata* (Duch.)

(Deepa, T. M.)

ABSTRACT

A study was conducted on diversity, abundance, foraging behavior and role of attractants on quantitative and qualitative parameters of pumpkin during *Rabi*, 2021 at KSNUAHS, Navile, Shivamogga. The results revealed that a total of 22 species of insect flower visitors were recorded on pumpkin flowers. Of which, 17 were Hymenopterans, three were Lepidopterans and two were Coleopterans. The Hymenoptera order consisted of four families; Apidae (Nine species), Megachilidae (One species), Halictidae (Four species) and Vespidae (Three species). There are three families in the order Lepidoptera; Pieridae (One species), Nymphalidae (One species) and Lycaenidae (One species). However, only two species of flower visitors were recorded from order Coleoptera belonging to single family, Coccinellidae. The abundance of flower visitors of pumpkin revealed that *Apis florea* (32.06 %) was more abundant followed by *A. cerana* (28.61%), *A. dorsata* (21.88 %) and other pollinators (17.45%). The mean quantity of nectar was more in female flowers (18.8 ± 0.73 μ l) compared to the male flowers (12.66 ± 0.60 μ l). The number of flowers visited and mean pollen carrying capacity was recorded highest in *A. dorsata* (8.4 ± 1.84 flowers/min, 10345), followed by *A. cerana* (7.7 ± 1.16 flowers/min, 7214) and *A. florea* (5.1 ± 0.88 flowers/min, 4608). Between three insect flower visitors, *A. florea* spent the most time on pistillate and staminate flowers and was superior to *A. cerana* and *A. dorsata*. The role of attractants on quantitative and qualitative parameters such as fruit drop, fruit set, fruit weight, fruit volume, fruit length, number of sound seeds per fruit, seed weight, ash content, moisture, TSS and germination percentage recorded maximum in open pollination with Citral-a compared to Citral-b, Jaggery solution (10%) and Sugar solution (10%). However, there was no fruit set in the control condition because of the absence of flower visitors.

December, 2021

(Pradeep S.)

Major Advisor

Agricultural Extension

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

1. A Study on Impact of Custom Hiring Centres on Farmers of Chikmagalur District

(MOHAN NAIK, S)

ABSTRACT

A study was conducted in Chikmagalur district of Karnataka state during 2018-19 with a sample of 120 respondents under Custom Hiring Service Centre programme. The data was collected by personal interview method using pre structured schedule to assess the impact on socio-economic status, knowledge, extent of utilization and constraints in availing services at Custom Hiring Centre.

The results pertaining to know the impact, the season-wise machineries required, the extent of utilization of machineries revealed that major impact seen in material possession, the score 4.55 before has increased to 4.78 after implementation of Custom Hiring Centres with per cent increase of 5.05 per cent and was significant, for annual income the score 2.36 before increased to 2.39 with per cent increase of 1.27 per cent and was non-significant, for land holding the score 10.12 before increased to 10.24 with per cent increase of 1.18 per cent and was non-significant.

The results pertaining to season-wise machineries required in Kharif, majority (60.00 %) of farmers required paddy transplanter, tractor cage wheel (56.67%) and paddy harvester (54.17 %). In Rabi majority (45.83%) of farmers required tractor, M.B. Plough (40.00%) and cultivator (35.00%). In summer majority (55.83 %) of farmers required back pack sprayer, motorized power sprayer (48.33 %) and tractor (38.33 %). Further, extent of utilization of machineries majority (450) of farmers utilized tractor with a number of 2700 hours covering an area of 3200 acres, mini tractor (200) with a number of 450 hours covering an area of 600 acres and power tiller (40) with a number of 40 hours covering an area of 55 acres.

February, 2021

(Krishnamurthy, A. T.)

Major Advisor

2. An Assessment of Listening Behaviour of Agricultural Information Disseminated by All India Radio Bhadravathi

(PAVANKUMAR.G)

ABSTRACT

The present study titled on “ **An assessment of listening behaviour of agricultural information disseminated by All India Radio Bhadravathi**” was carried out at AIR Bhadravathi in Shivamogga district of Karnataka state during the year Jan 2018 to Dec 2018 with an objectives, to assess the listening behavior of respondents, to know the awareness on various agricultural programmes broadcasted, to assess extent of utilization of agricultural information and their relevance by farmers and to enlist the preference of the programmes by the listeners and their suggestions for improvement. The sample size comprised of 80 radio listeners selected randomly from four taluks of shivamogga district. The study revealed that 38.75 percent of the listeners belong to medium listening behavior category and cent percent of the farmers were fully aware about the AIR programmes. Majority (56.25%) of the farmers belongs to middle age group with medium family size and studied up to high school education (47.50 %). About 40.00 percent of farmers belonged to small land holding category with high income group and majority of the farmers had high level of farming experience. More than (57.50%) of the farmers were medium level of scientific orientation and 43.75 percent of farmers had high level of innovativeness. More than half of the farmers had medium level of extension and high mass media participation. Majority of the farmers suggested increasing the duration of radio programmes, increasing agricultural programmes, improving network coverage and creating more awareness on agricultural programmes. Hence, these suggestions should be considered by the AIR Bhadravathi in order to increase the listening behavior of the farmers.

February, 2021

(B.Dhananjaya)

Major Advisor

3. Gender Disparity in Dairy Farming in Shivamogga District

(PRAHLAD, P. BHAT)

ABSTRACT

The study on gender disparity in dairy farming was conducted in Shivamogga district during 2020-21 in two taluks namely, Bhadravathi and Shikaripur based on the number of functioning District Milk Co-operative Societies. A sample size of 80 farm families, 40 from each taluk involved in dairy farming from last five years, registered with SHIMUL having a minimum herd size of four milk yielding cows, were selected using Multistage random sampling technique. The necessary data was collected from 160 respondents from 80 dairy farm families using pre-tested interview schedule. The results indicated that participation rate of men was highest in case of control over resources (0.83), while it was highest in case of women in management (0.53). Gender disparity was in favour of men in case of control over resources, access to resources and decision making, while it was in favour of women for management. The perception about gender disparity was found to be medium for both men (66.25 %) and women (56.25 %) dairy farmers, respectively. The net returns per litre of milk was highest at ₹ 8.38 in case of high level of women participation, followed by medium (₹ 6.76) and low (₹ 6.58). Marketing constraints appeared as the most severe constraint (5.21), while non-availability of quality semen (2.73) was recorded as crucial specific constraint. Majority of the dairy farmers suggested for better supply of quality semen (85.00%) followed by arrangement of timely payment of incentive prices by government (75.50%). The study enables the stakeholders in formulation of suitable policies to strengthen the participation of women in dairy farming and also to rectify handicaps existing in institutional arrangements.

December, 2021

(Sahana S.)
Major Advisor

4. Migration Behaviour Of Labourers In Coffee Plantations

(RAHUL PRASAD, R.)

ABSTRACT

The study on 'Migration behaviour of labourers in Coffee plantations' was conducted during 2020-21 in two major Coffee-growing districts of Karnataka, viz., Chikkamagaluru and Kodagu. A sample size of 140, 70 from each district were purposively selected from the villages having highest area under Coffee. The necessary primary data was collected from the migrant labourers using pre-tested interview schedule. The results indicated that most of the migrant labourers (86.43 %) belonged to the young age group with middle school level of education (52.14 %) and the annual income of the families were low (50.00%). It was observed that nearly half (47.86 %) of the migrant labourers had a very high level of migration, while 66.43 per cent of migrant labourers exhibited permanent migration. It was observed that more than three-fourth (77.14 %) of the labourers had migrated to Coffee plantations from different states, viz., Assam, West Bengal, Tamil Nadu and Kerala. The push and pull factors influencing migration of labourers was ascertained. Among the push factors, lack of employment opportunities and lower wages at native places occupied first and second rank, respectively. While, availability of ample work opportunities in Coffee plantations ranked first and family welfare purpose ranked second among the pull factors. The majority of migrant labourers (77.85 %) believed that, provision of appropriate job opportunities in their native places throughout the year would be beneficial and almost three-fourth of them (73.57 %) expressed that wage rates should be increased to improve their living conditions were the notable suggestions given by migrant labourers to mitigate the migration. The results of the study enable administrators and policy makers of the concerned state to formulate suitable programmes to check migration.

December, 2021

(Krishnamurthy, A. T.)
Major Advisor

5. A Study on Knowledge and Adoption of Udupi Jasmine Cultivation Practices by Trained Farmers of Krishi Vigyan Kendra, Udupi District

(SHARMILA)

ABSTRACT

The present study was conducted in the operational area of the KrishiVigyan Kendra, Brahmavara, Udupi district during the year 2020-21. A total of 120 farmers trained on Udupi jasmine cultivation from KrishiVigyan Kendra, Brahmavara during the period from 2016 to 2019 were considered as sample for the study. The data was collected using the pre-tested interview schedule. The study results revealed that, majority (55.00 %) of the respondents possessed medium level of knowledge about Udupi jasmine cultivation practices. Less than half (49.17 %) of the respondents had known about the treatment of pruned cut ends with Bordeaux paste. Exactly 50.00 per cent of the respondents belong to high adoption level of Udupi jasmine cultivation practices. None of the respondents have followed the picking of fully opened jasmine flowers for scent purpose due to its mild fragrance. It was also showed that family members are only involved in making 'Chendu' in the majority of the respondent's houses and for 55.00 per cent of the respondents malligekatte is the source of information related to daily price. More than half of the respondents belong to middle age group, joint family and had marginal size of land holding. Majority of the respondents had medium level of annual income, extension contact, economic motivation, scientific orientation and high level of mass media participation. The prominent constraints faced by the respondents is greater price fluctuation which resulting in a lower margin of profit. So the Government should develop a strategy to ensure a remunerative price for the Udupi jasmine. Other constraints are low yield in winter season, pest and disease incidence and high cost for plant protection chemicals. The major suggestions given by the respondents are remunerative price for jasmine and credit at a low rate of interest.

December, 2021

(B.Dhananjaya)

Major Advisor

Agronomy

1. Influence of Different Moisture Conservation Materials on the Performance of FCV Tobacco (*Nicotiana tabacum* L.)

(VINODRAJ)

ABSTRACT

The field experiment entitled 'Influence of different moisture conservation materials on the performance of FCV Tobacco (*Nicotianatabacum*L.)' was carried out on sandy loam soils of Zonal Agricultural and Horticultural Research Station, Navile, Shivamogga, Karnataka during *kharif* season of 2019. The investigation included eight treatments involving seven different moisture conservation materials *viz.*, gunny bag (whole bag with two layers), gunny bag (Single layer), transparent polyethylene film, HDPE weed mat, mulch sheet, areca husk and hydrogel and control which were laid out in a Randomized Complete Block Design (RCBD) with three replications. The response of tobacco to different moisture conservation materials were measured for growth and yield parameters. Results revealed that the treatment receiving areca husk as a crop residue @10 t ha⁻¹ on ridge mulch showed significantly higher plant height at harvest (157.53 cm), number of leaves harvested per plant (23.87), leaf area at X position (862.50 cm²), leaf area at L position (670.27 cm²), leaf area index at all growth stages, total dry matter accumulation at harvest (124.25 g plant⁻¹), green leaf yield (13434 kg ha⁻¹), cured leaf yield (2039 kg ha⁻¹) and top grade equivalent (1002 kg ha⁻¹) over control. However the highest root volume (88.78 cc) and root weight (65.65 g plant⁻¹) was recorded in treatment receiving transparent polyethylene film as mulch material followed by treatment covering the ridges with mulching sheet (86.78 cc and 63.11 g plant⁻¹, respectively). Further, areca husk as a crop residue @10 t ha⁻¹ on ridge mulch showed higher uptake of N (38.76 kg ha⁻¹), P (5.69 kg ha⁻¹) and K (97.21 kg ha⁻¹). The chemical quality parameters, *viz.*, nicotine, reducing sugars, potassium and chloride in leaf lamina were within the acceptable limits irrespective of moisture conservation materials.

February, 2021

(T. M. Soumya)

Major Advisor

2. Performance of teff (*Eragrostis tef* [Zucc.] Trotter) as influenced by the different fertilizer levels and spacing

(PUNITH GOWDA, H. N.)

ABSTRACT

The field experiment was conducted at Centre for Climate Resilient Agriculture (CCRA), KSNUAHS, Navile, Shivamogga during *Kharif* 2020, to study the “Performance of teff (*Eragrostis tef* [Zucc.] Trotter) as influenced by the different fertilizer levels and spacing”. The experiment was laid out in Randomized Complete Block Design with Factorial concept involving four different fertilizer levels viz., 10:20:10 kg N:P₂O₅:K₂O ha⁻¹, 15:20:10 kg N:P₂O₅:K₂O ha⁻¹, 0:20:10 kg N:P₂O₅:K₂O ha⁻¹ and 10:20:15 kg N:P₂O₅:K₂O ha⁻¹ and three spacing levels viz., 20 × 10 cm, 15 × 10 cm and 25 × 10 cm replicated thrice. Among the different fertilizer levels application of 15:20:10 kg N:P₂O₅:K₂O ha⁻¹ recorded significantly higher grain yield (228 kg ha⁻¹), straw yield (409 kg ha⁻¹), crude protein (12.25 %) and also growth parameters viz., plant height (48.43 cm and 72.60 cm, respectively), number of tillers per hill (7.02 and 9.30, respectively), number of leaves per hill (59.78 and 53.78, respectively), and dry matter production (18.42 g m⁻² and 40.92 g m⁻², respectively) at 60 DAT and at harvest was found significantly higher. However, application of 0:20:10 kg N:P₂O₅:K₂O ha⁻¹ recorded significantly higher carbohydrates (74.50 %) and crude fiber content (3.06 %) compared to other treatments. Among the different spacing levels 20 × 10 cm registered significantly higher grain yield (214 kg ha⁻¹), crude protein (11.92 %) and crude fiber (2.89). While, 15 × 10 cm spacing recorded higher straw yield (395 kg ha⁻¹) and plant height (44.93 cm and 67.34 cm, respectively) at 60 DAT and at harvest. Interaction between 15:20:10 kg N:P₂O₅:K₂O ha⁻¹ and 20 × 10 cm recorded significantly higher grain yield (266 kg ha⁻¹) however, application of 15:20:10 kg N:P₂O₅:K₂O ha⁻¹ and 15 × 10 cm spacing recorded higher straw yield (438 kg ha⁻¹).

August, 2021

(S. Sridhara)

Major Advisor

3. Influence of Water Soluble Fertilizers and Liquid Plant Growth Promoting Rhizomicrobial Consortia on Growth, Yield and Nutrient Use Efficiency of Groundnut (*Arachishypogaea*L.) Under Rainfed Condition

(NANDINI, Y. N.)

ABSTRACT

A field experiment was carried out during *Kharif* 2020 at College of Agriculture, KeladiShivappaNayakaUniversity of Agricultural and Horticultural Sciences, Shivamogga, to know the influence of water soluble fertilizers and liquid plant growth promoting rhizomicrobial consortia on groundnut (*Arachishypogaea* L.) under rainfed condition. Experimental design adopted was RCBD with three replications and fourteen treatments consisting of different combinations of water soluble fertilizers viz., Monopotassium phosphate (00:52:34) and Sulphate of potash (00:00:50) sprayed at 25 and 40 DAS with or without liquid Plant growth promoting rhizomicrobial consortia along with the package of practice. The results indicated that, foliar application of MPP and SOP each @ 1 per cent at 25 and 40 DAS + liquid PGPR along with the package of practice recorded significantly higher plant height plant⁻¹ (68.87 cm), number of branches plant⁻¹ (9.97), number of leaves plant⁻¹ (66.90), leaf area plant⁻¹ (419.18 cm²), number of nodules plant⁻¹ (26.33), dry matter production plant⁻¹ (71.08 g), number of pods plant⁻¹ (31.08), 100-kernels weight (40.50 g), pod yield (1440 kg ha⁻¹), haulm yield (1101.40 kg ha⁻¹) and harvest index (0.38). Significant improvement in uptake of nitrogen (64.02 kg ha⁻¹), phosphorus (12.18 kg ha⁻¹) and potassium (50.43 kg ha⁻¹) by the crop at harvest was recorded in the above treatment and also higher available soil nutrient status for available nitrogen (233.57 kg ha⁻¹), phosphorous (78.16 kg ha⁻¹) and potassium (223.93 kg ha⁻¹) was also noticed in the same treatment. Further, the same treatment exhibited higher B: C ratio (2.00) over the package of practice alone.

September, 2021

(Narayana S Mavarkar)
Major Advisor

4. Influence of Pink Pigmented Methylobacterium on Growth, Yield and Nutrient Use Efficiency of Maize (*Zea mays* L.)

(RUDRA VEDAVANI)

ABSTRACT

A field experiment was conducted during summer season of 2021 at college of Agriculture, KSNUAHS, Shivamogga on sandy loam soils to evaluate the Influence of Pink Pigmented Methylobacterium (PPMB) on Growth, Yield and Nutrient Use Efficiency of Maize. The experiment was laid out in RCBD with 12 treatments replicated thrice. Treatments include application of PPMB both solid and liquid form as basal and split with 75 and 100 per cent RDF tested against its sole application.

Among the treatments tested, application of 100 % RDF + PPMB (Basal application of either solid/liquid formulations or split application of liquid formulation) recorded significantly higher plant height (206- 208 cm), leaf area (6100- 6600 cm²), dry matter (284- 297g plant⁻¹), cob length (14- 15 cm) and number of kernels cob⁻¹ (516- 543). By virtue of above parameters, said treatments achieved maximum grain yield of 6167 to 6235 kg ha⁻¹. Highest nutrient content (2- 2.43 % of N, 0.53- 0.58 % of P and 1.26- 1.33 % of K), availability (213- 220 kg ha⁻¹ of N, 35- 38 kg ha⁻¹ of P₂O₅ and 173- 184 kg ha⁻¹ of K₂O), uptake (150- 165 of N, 37- 41 of P₂O₅ and 96-104 of K₂O), use efficiency (4- 12 % for N, 11- 16 % for P and 19- 27 % for K), gross returns (₹112037- ₹113327 ha⁻¹), net returns (₹73226- ₹76516ha⁻¹) and B: C ratio (1.88- 2.07) were also obtained with the above said treatments.

September, 2021

(M. Dinesh Kumar)
Major Advisor

5. Influence of Complex Fertilizer Containing Magnesium and Sulphur on Growth and Yield of Finger Millet (*Eleusine coracana* (L.) Gaertn.)

(YOGESHA, M. S.)

ABSTRACT

Field experiment on “Influence of complex fertilizer containing magnesium and sulphur on growth and yield of finger millet” was conducted at Agricultural and Horticultural research station (AHRS), Bavikere, KSNUAHS, Shivamogga, during late *Kharif* 2020. The experiment was laid out in RCBD with seven treatments and three replications. The treatments consisted of T₁- absolute control, T₂- 50 % complex fertilizer dose (139 kg ha⁻¹), T₃-75 % complex fertilizer dose (209 kg ha⁻¹), T₄-100 % complex fertilizer dose (278 kg ha⁻¹), T₅-125 % complex fertilizer dose (348 kg ha⁻¹), T₆- 150 % complex fertilizer dose (417 kg ha⁻¹) and T₇- recommended dose of fertilizer (100 N : 50 P₂O₅: 50 K₂O kg ha⁻¹). The complex fertilizer grade was 12:11:18:1.2:7.6 % of N-P₂O₅-K₂O-Mg-S. Application of 150 % complex fertilizer produced significantly higher plant height (133.33 cm), number of tillers hill⁻¹ (7.50), leaf area (1358.82 cm² hill⁻¹), leaf area index (4.52), total dry matter accumulation (97.47 g hill⁻¹), number of ear head hill⁻¹ (5.37), ear head length (11.02 cm), number of fingers ear⁻¹ (8.19), ear head weight (7.30 g) and 1000-grain weight (3.64 g) than T₁, T₂, T₃ and T₇ and it was on par with T₅, followed by T₄. Similarly, application of 150 % complex fertilizer recorded significantly higher grain and straw yield (4384 and 6576 kg ha⁻¹, respectively) than T₁ (849 and 1509 kg ha⁻¹, respectively), T₂ (2710 and 4421 kg ha⁻¹, respectively), T₃ (3330 and 5433 kg ha⁻¹, respectively) and T₇ (3425 and 5588 kg ha⁻¹, respectively) and it was on par with T₅ (4134 and 6466 kg ha⁻¹, respectively) followed by T₄ (3876 and 6324 kg ha⁻¹, respectively). Similarly, application of 150 % complex fertilizer reported significantly higher protein content (8.00 %). T₄ gave higher benefit cost ratio (2.25) than other treatments.

September, 2021

(C. J. Sridhara)

Major Advisor

6. Study on Comparative Performance of Nano Nitrogen and Zinc with Conventional Foliar Sources on Growth, Yield and Quality of Green Chilli.

(JAYANTH KANAVI, G. B.)

ABSTRACT

A field experiment entitled ‘Study on comparative performance of nano nitrogen and zinc with conventional foliar sources on growth, yield and quality of green chilli.’ was carried out in the *summer* season, 2021 at Agriculture and Horticultural Research Station, Bavikere, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, to study the effect of nano nitrogen and zinc on growth yield and quality of chilli. The experiment consisted of eight treatments, viz., RDF soil application alone (T₁), T₁ with two sprays of water (T₂), RDN (125%) with two sprays of nano N (0.4%) and Zn (0.4%) (T₃), RDN (100%) with two sprays of nano N (0.4%) and Zn (0.4%) (T₄), RDN (75%) with two sprays of nano N (0.4 %) and Zn (0.4%) (T₅), RDN (125%) with two sprays of urea (2%) and ZnSO₄ (0.2%) (T₆), RDN (100%) with two sprays of urea (2%) and ZnSO₄ (T₇), RDN (75%) with two sprays of urea (2%) fertilizer and ZnSO₄ (T₈), which replicated thrice and laid out in completely randomized block design. Foliar application of nano N (0.4%) and Zn (0.4%) along with RDN (125%) registered significantly higher plant height (76.40 cm), number of leaves (224.56), leaf area (4383.48 cm²) and dry matter (135.71 g plant⁻¹) at 90 DAT. Further, significantly more number of fruits plant⁻¹ (242.67), higher average fruit weight (5.2 g) and fresh fruit yield (32.76 t ha⁻¹) compared to control were also recorded in T₃ and the treatment T₄ followed it. Yield increment reported in these treatments was to the magnitude of 38.94 and 33.85 per cent over control. Significantly higher ascorbic acid (178.07 mg g⁻¹) and oleoresin (17.40%) content and economically highest net returns (₹. 371810) and B:C (3.86) ratio were also realized in treatment T₃.

October, 2021

(C. Sunil)
Major Advisor

7. Performance of Groundnut (*Arachishypogaea* L.) as Influenced by Potassium and Zinc Solubilizing Microorganisms in Coastal Zone of Karnataka

(ASHWINI PATIL)

ABSTRACT

Field experiment was conducted during summer season of 2021 at ZAHRS, Brahmavara, KSNUAHS, Shivamogga, to study the “Performance of Groundnut (*Arachis hypogaea* L.) as Influenced by Potassium and Zinc Solubilizing Microorganisms in Coastal Zone of Karnataka.” the field experiment consisted of eight treatments viz., absolute control (T_1), RDF (T_2), RDF with KSB and ZnSB either alone (T_3 and T_4) or in combination (T_5), RDNP + 75 % RD of K and $ZnSO_4$ + seed treatment with KSB +ZnSB (T_6), RDNP + 50 % RD of K and $ZnSO_4$ + seed treatment with KSB +ZnSB(T_7) and RDNP + seed treatment with KSB + ZnSB (T_8) replicated thrice and laid out in RCBD. Among treatments tried, significantly higher plant height (68.35 and 67.17 cm), number of branches (9.84 and 9.5), leaf area (1186.7 and 1174.6cm² plant⁻¹), number of pods plant⁻¹ (29.1 and 28.3), pod weight plant⁻¹ (21.9 and 21.4 g) were recorded with treatments recommended dose of fertilizer + seed treatment with KSB + ZnSB (T_5) and RDNP + 75 % RD of K and $ZnSO_4$ + seed treatment with KSB + ZnSB (T_6), respectively. The better values of these indices in T_5 and T_6 resulted in higher pod yield (1675 and 1654 kg ha⁻¹), kernel yield (1245 and 1224 kg ha⁻¹) and haulm yield (2630 and 2625 kg ha⁻¹) as well as higher soil available nutrient status at harvest (N: 242 and 233 kg ha, P₂O₅:103.75 and 101.18 kg ha⁻¹, K₂O: 96.6 and 92.3 kg ha⁻¹ and Zn: 0.83 and 0.81 mg kg⁻¹), respectively. Further, higher total nutrient uptake by groundnut crop (N:79.50 and 78.00 kg ha⁻¹, P: 14.29 and 13.70 kg ha⁻¹, K:77.62 and 76.37 kg ha⁻¹ and Zn: 110.59 and 108.45 kg ha⁻¹) also noticed in the above said treatments. Economically also T_5 and T_6 treatments excelled over other by recording higher net return (45,407 and 44,790 Rs ha⁻¹) and B: C ratio (2.21 and 2.20), respectively.

November, 2021

(Girijesh G. K.)

Major Advisor

8. Effect of foliar nutrition and humic acid on growth, yield and nutrient uptake in late *kharif* sown Foxtail millet (*Setaria italica* L.) in Southern Transition Zone of Karnataka

(PRASHANT)

ABSTRACT

A field experiment was conducted to evaluate the “Effect of foliar nutrition and humic acid on growth, yield and nutrient uptake in late *kharif* sown Foxtail millet (*Setaria italica* L.) in STZ of Karnataka” at AHRIS, Bavikere, during late *kharif* 2020. The experiment was laid out in RCBD with three replications and eight treatments viz., Only RDF (T₁), foliar application of 1 % urea (T₂), foliar application of 0.2 % SOP (T₃), foliar application of 0.1 % humic acid (T₄), foliar application of 1 % urea + 0.2 % SOP (T₅), foliar application of 1 % urea + 0.1 % humic acid (T₆), foliar application of 0.2 % SOP + 0.1 % humic acid (T₇) and foliar application of 1 % urea + 0.2 % SOP + 0.1 % humic acid (T₈). RDF and FYM were commonly applied to all the treatments. Results revealed that foliar application of 1 % urea + 0.2 % SOP + 0.1 % humic acid (T₈) recorded significantly higher leaf area (410.0, 772.5 and 243.2 cm² plant⁻¹ at 30, 60 DAS and at harvest respectively), total dry matter accumulation (3.46, 11.90 and 23.65 g plant⁻¹ at 30, 60 DAS and at harvest respectively), grain yield (2076.7 kg ha⁻¹) and straw yield (3915.6 kg ha⁻¹). Also, recorded the highest total nitrogen uptake (6.65, 31.33 and 86.18 kg ha⁻¹), total phosphorus uptake (3.00, 11.89 and 19.18 kg ha⁻¹) and total potassium uptake (6.19, 31.73 and 85.79 kg ha⁻¹) at 30, 60 DAS and at harvest respectively. The highest gross returns (₹ 59,986 ha⁻¹), net returns (₹ 36,779 ha⁻¹) and B:C (2.58) were recorded in T₈. Significantly lower growth, yield and nutrient uptake were recorded in treatment with application of RDF without any foliar nutrition.

November, 2021

(A.Y.Hugar.)

Major Advisor

9. Performance of Paddy (*Oryza sativa* L.) Cultivars Under Different Farming Types in Irrigated Situation of Bhadra Command Area.

(AMRUTHA, T. S.)

ABSTRACT

A field experiment was conducted at Agricultural and Horticultural Research Station, Kathalagere, KSNUAHS Shivamogga during *Kharif* 2020 to study the “Performance of paddy cultivars under different farming types in irrigated situation of Bhadra command area”. Experiment was laid out in split-plot design having four farming types as main plots (conventional, organic, natural farming and absolute control) and four paddy cultivars as subplots (Chinnaponni, Mysore mallige, RNR-15048 and KRH-4) with three replications. Among different farming types, conventional farming recorded significantly higher grain and straw yield (5915 kg ha^{-1} and 7931 kg ha^{-1}) as compared to natural farming (4832 kg ha^{-1} and 6255 kg ha^{-1}) and absolute control (2525 kg ha^{-1} and 4025 kg ha^{-1}) but it was statistically on par with organic farming (5399 kg ha^{-1} and 7243 kg ha^{-1}). Among the paddy cultivars, hybrid KRH-4 recorded significantly higher grain and straw yield (6550 kg ha^{-1} and 7556 kg ha^{-1}) and it was on par with RNR-15048 (5744 kg ha^{-1} and 6507 kg ha^{-1}), and lowest was recorded in local cultivar Mysore mallige. Among the interactions, KRH-4 grown under conventional farming recorded higher grain and straw yield (8200 kg ha^{-1} and 9525 kg ha^{-1}) which was followed by KRH-4 under organic farming (7700 kg ha^{-1} and 8900 kg ha^{-1}). Conventional farming recorded significantly higher nutrient uptake ($150.90 \text{ kg N ha}^{-1}$, $47.53 \text{ kg P ha}^{-1}$ and $136.63 \text{ kg K ha}^{-1}$) compared to other farming types. Among the cultivars, KRH-4 registered maximum nutrient uptake ($145.54 \text{ kg N ha}^{-1}$, $36.38 \text{ kg P ha}^{-1}$ and $125.21 \text{ kg K ha}^{-1}$) as well as nutrient use efficiencies. Natural farming registered higher nutrient use efficiencies compared to other farming types. Amidst the farming types, natural farming recorded the highest net return (Rs. 66790 ha^{-1}) and B:C ratio (2.77) and among the cultivars, KRH-4 recorded higher net returns of Rs. 84688 ha^{-1} and B:C ratio of 2.88.

December, 2021

(H.K. Veeranna.)

Major Advisor

10. Effect of Folia rapplication of humicacid with varied nutrient level son performance of sweetcorn (*Zea mays convar. saccharata* L.)

(KIRAN HARANAL)

ABSTRACT

A field experiment was conducted at Agricultural and Horticultural Research Station Kathalagere, KSNUAHS, Shivamogga to study the effect of foliar application of humic acid with varied nutrient levels on performance of sweet corn during summer season of 2021. The experiment was laid out in RCBD with eight treatments replicated thrice. The treatments include viz., absolute control (T_1), 75 % RDF (T_2), 100% RDF (T_3), 125% RDF (T_4), humic acid @ 0.2% foliar spray (T_5), 75% RDF + humic acid at 0.2 @ foliar spray (T_6), 100 % RDF + humic acid @ 0.2 % foliar spray (T_7) and 125 % RDF + humic acid @ 0.2 % foliar spray (T_8). The results revealed that significantly higher plant height (223.40 cm), number of leaves per plant (14.88), leaf area (5986.54 cm² plant⁻¹) and total dry matter accumulation (218.59 g plant⁻¹) at harvest, cob length (21.42 cm), cob girth (15.77 cm), fresh husked cob weight (294.81 g cob⁻¹), number of grains per cob (643.37), fresh cob yield with husk (198.18 q ha⁻¹) and green fodder yield (263.80 q ha⁻¹), total uptake of NPK (198.51, 48.94, 169.16 kg ha⁻¹, respectively), gross returns (₹284,009 ha⁻¹), net returns (₹197,328 ha⁻¹) and B: C ratio (3.28) were recorded with the application of 125 per cent RDF + humic acid @ 0.2 per cent foliar spray (T_8) as compared to recommended dose of fertilizers (T_3). It can be concluded that, foliar application of humic acid can be used as a organic source to enhance the crop productivity.

December, 2021

(M.Hanumanthappa.)

Major Advisor

11. Effect of Nano Nitrogen and Nano Zinc Nutrition on Nutrient Uptake, Growth and Yield of Irrigated Maize During *SUMMER* in The Southern Transition Zone of Karnataka

(REDDY MALLIKARJUNA PATIL)

ABSTRACT

A Field experiment was conducted at Agricultural and Horticultural Research Station, Kattalagere, KSNUAHS, Shivamogga, to study the effect of nano nitrogen and nano zinc nutrition on nutrient uptake, growth and yield of irrigated maize during summer in Southern Transition Zone of Karnataka. The experiment was laid out in RCBD with eight treatments replicated thrice. The treatments include viz., absolute control (T_1), 100% RDF + RD Zn soil application (T_2), 50% RDN + two sprays of 0.4% nano N and Zn (T_3), 75% RDN + two sprays of 0.4% nano N and Zn (T_4), 100% RDN + two sprays of 0.4% nano N and Zn (T_5), 50% RDN + two sprays of 2% urea + 0.2% Zn SO_4 (T_6), 75% RDN + two sprays of 2% urea + 0.2% Zn SO_4 (T_7) and 100% RDN + two sprays of 2% urea + 0.2% Zn SO_4 (T_8). 100% phosphorous and potassium is common for all treatment except T_1 . The results revealed that application of 100% RDN + nano N and Zn as foliar spray produced the highest growth, yield parameters and nutrient uptake. A significantly higher total dry matter production at harvest (238.7g/plant), kernel and stover yield (8850 and 10428 kg/ha respectively) and nutrient uptake N and Zn (204.5 kg/ha and 35.2 mg/kg respectively) (T_5) and was statistically on par with T_4 . Also, the lowest was observed in absolute control (T_1). Overall, there was a 36 and 21 percent increase in kernel and stover yield respectively due to 100% RDN + nano N and Zn at 0.4 % as foliar spray (T_5) over RDF (T_2).

December, 2021

(H.G. Sannathimmappa.)

Major Advisor

Genetics and Plant Breeding

**M. Sc. (Agri.) theses abstracts produced in the
Department of Genetics and Plant Breeding**

**1. Assessment of Genetic Variability and Diversity of Rice Advanced Lines for
Submergence Tolerance**

(TASLEEMA SULTANA)

ABSTRACT

The present investigation was conducted at College of Agriculture, KSNUAHS, Shivamogga during *Kharif* 2020. Twenty-six rice advanced lines and four checks were screened for submergence tolerance under submerged conditions. Genetic variability, character association and genetic diversity were studied under non-submergence. Under submerged conditions, highest survival percentage was observed for KHP-11×MM-1-3-1. Genetic variability studies revealed high PCV, GCV, heritability and genetic advance for survival and stem elongation percentages. Phenotypic correlation for physiological traits revealed a significant positive correlation of survival percentage with harvest index and grain yield. Under non-submergence, analysis of variance revealed the presence of high significant differences for all the characters studied. Genetic variability studies revealed high estimates of PCV, GCV, heritability and genetic advance for number of tillers per plant, number of productive tillers per plant, test weight and grain yield. Correlation studies revealed a significant positive association of plant height, number of tillers per plant, number of productive tillers per plant, panicle length, number of filled grains per panicle, number of spikelets per panicle, panicle fertility, test weight, straw yield and harvest index with grain yield. Path analysis disclosed highest direct positive effect on grain yield by test weight. Mahalanobis D^2 statistics grouped thirty rice advanced lines into six clusters. Maximum inter-cluster distance was observed between cluster III and IV. Molecular diversity analysis done using fifteen SSR markers revealed the presence of high molecular diversity among the rice advanced lines and grouped them into eight clusters according to UPGMA clustering system. Top-performing rice advanced lines were selected based on grain yield and its related traits. KHP-11×MM-1-3-1 recorded significantly higher yield (6637.50 kg/ha) than presently cultivated variety KHP-11 (5160 kg/ha) which is used as check. Hence, KHP-11 × MM-1-3-1 may be advanced to multi-location trials, Farm trials and proposed for variety release in hill zone area of Karnataka.

November, 2021

(Dushyantha Kumar B. M.)

Major Advisor

2. Assessment of Genetic Variability by Combined Hybridization and Mutation in Blackgram [*Vigna Mungo*(L.) Hepper.]

(ANILKUMAR LALASING CHAVAN)

ABSTRACT

A field experiment was carried out during *Rabi* 2020 at ZAHRS, Shivamogga, to determine the genetic parameters among 400 F_3M_2 progeny lines of cross (PU31 \times Rashmi) in blackgram. Significant variations in progeny lines were documented for most of the traits through analysis of variance, indicating the vast genetic variability. High phenotypic coefficient of variation (PCV) was recorded for the trait seed yield per plant and moderate genotypic coefficient of variation (GCV) were observed for the traits viz., number of branches per plant, number of seeds per pod, number of pods per plant and seed yield per plant. The estimated GCV and PCV values depict the level of variability available in the population. High heritability combined with high genetic advance as *per cent* of mean were documented for number of pods per plant. This indicates that effective selection can be made for these traits. Correlation studies displayed that traits viz., days to 50 *per cent* flowering, plant height, number of branches per plant, number of clusters per plant, number of pods per cluster, number of pods per plant, pod length, 100 seed weight and number of seeds per pod were positively and significantly correlated with seed yield per plant. Path coefficient analysis revealed highest positive direct effect were observed for traits number of pods per plant and number of seeds per pod on seed yield per plant. Highest number of transgressive segregants were identified for plant height and number of clusters per plant. The results showed the existence of large count of transgressive segregants in early segregating generations for all the traits which showed a wide scope for the meticulous selection of these genotypes.

December, 2021

(Shashikala S Kolakar.)

Major Advisor

3. Assessment of Genetic Variability and Diversity in Segregating Generations of Greengram [*Vignaradiata* (L.) Wilczek]

(ASMA BISTI)

ABSTRACT

Genetic analysis of segregating lines of two crosses KKM-3×IPM 205-7 and KKM-3×YADADRI in greengram was carried out to assess the genetic variability, diversity and association for yield and its contributing traits to make effective selection for increased yield. Significant mean differences among F_3 families of both the crosses were reported for all the traits through analysis of variance, indicating the adequate amount of genetic variability. The traits like number of pods per plant, seed yield per plant, number of clusters per plant, number of seeds per pod and hundred seed weight exhibited the highest values of phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), broad-sense heritability (h^2_{bs}) and genetic advance as *per cent* of mean (GAM), signifying that selecting certain attributes is highly rewarding to achieve enhanced production. The genetic diversity was assessed using Mahalanobis D^2 statistics. Based on the genetic distance, F_3 populations of Cross 1 and Cross 2 *viz.*, $C1F_3$ and $C2F_3$ were classified into nine and eight clusters, respectively where the number of pods per plant contributed maximum towards divergence. The highest inter-cluster D^2 value was found between clusters VIII and IX and clusters VII and VIII in $C1F_3$ and $C2F_3$ respectively, signifying that the families residing in separate clusters are more diverse. Correlation analysis reported that the seed yield per plant exhibited a positive relationship with all the traits except days to 50 *per cent* flowering in both the crosses. Path-coefficient analysis revealed that traits like hundred seed weight, number of pods per plant and pod length exerted a positive direct effect on seed yield per plant. The superior high yielding segregants were selected from both the populations and advanced to the next generation for the crop improvement in greengram.

December, 2021

(Harish babu B. N.)

Major Advisor

4. Assessment of Genetic Variability and Divergence in Advanced Breeding Lines of Rice (*Oryza sativa* L.) in Lowlands of Hill Zone

(HONNESH, H. R.)

ABSTRACT

The present study was undertaken to evaluate thirty-nine advanced breeding lines of rice in Randomized Complete Block Design with two replications during *Kharif*2020 at ZAHRS, Mudigere for variability, diversity, correlation and path analysis for thirteen yield and yield attributing characters. The same lines were screened for blast reaction at AHRS, Ponnampet. Analysis of Variance revealed significant differences among the advanced breeding lines for all the characters studied. Moderate PCV, GCV coupled with high heritability and high GAM were recorded for traits *viz.*, plant height, total number of grains per panicle, test weight, grain L/B ratio, straw yield, grain yield and harvest index. Number of tillers per plant, number of productive tillers per plant, panicle length, panicle fertility, straw yield and harvest index exhibited positive and significant phenotypic association with grain yield. Harvest index had the highest positive direct effect on grain yield whereas highest positive indirect effect of grain yield with trait harvest index *via* panicle fertility was recorded. Using Mahalanobis' D² statistics advanced breeding lines were grouped into six clusters, the cluster I consists of maximum number of advanced breeding lines (18) followed by cluster III (11) and cluster II (7). Based on cluster distance, the highest intra cluster distance was shown by cluster III and cluster IV while cluster V showed highest inter cluster distance. Among all the characters, the maximum per cent contribution towards divergence was made by test weight followed by plant height. Rice lines screened for blast disease showed that 16 lines were moderately blast resistant. The line KPR-2 × IS-1-4-1-2 was found to be the best performing line for lowland situation of hill zone.

December, 2021

(Dushyanthakumar, B. M.)

Major Advisor

5. Heterosis and Combining Ability Analysis in Advanced Breeding Lines of Okra [*Abelmoschus esculentus* (L.) Moench]

(PREM SAGAR, S. P.)

ABSTRACT

The present experiment entitled “Heterosis and combining ability analysis in advanced breeding lines of okra [*Abelmoschus esculentus* (L.) Moench]” was undertaken with the objectives to explicate information on the extent of heterosis and to study the combining ability of parents and their hybrids for yield and yield attributes. Five advanced breeding lines (Parents F₈) and their 20 hybrids obtained through the diallel mating system including reciprocals with a standard check (Arka Anamika), were evaluated during *Kharif* 2020 in a randomized block design with two replications at ZAHRS, Shivamogga. The experimental data recorded were statistically analyzed to study the magnitude of heterosis, GCA and SCA effects. Among the crosses, the combinations P1 × P2 (26.44%), P2 × P3 (26.02%), P2 × P4 (25.68%), P1 × P3 (22.59%) and P1 × P4 (18.69%) were manifested desirable and significant positive heterosis for yield and its attributes. General combining ability effects proclaimed that Parent (P1) and Parent (P3) were better combiners for yield characters and cross combinations P1 × P2, P2 × P1, P1 × P3, P3 × P1, P1 × P4, P4 × P1, P3 × P2, P4 × P3 and P5 × P2 remarked as better specific combiners for yield attributes. GCA and SCA effects were significant for all the characters studied. The estimates of combining ability effects depicted that GCA variances were lesser than SCA variances indicating the predominance of non-additive gene action. The cross combinations viz., P1 × P2, P2 × P3 and P2 × P4 which exhibited better heterosis over standard hybrid can be tested for their superior and stable performance over different environments.

December, 2021

(Dushyanthakumar, B. M.)

Major Advisor

6. Genetic evaluation of advanced breeding lines of tomato (*Solanum lycopersicum* L.) for the assessment of genetic divergence and variability

(SANA TABASSUM, K.)

ABSTRACT

The present study in tomato (*Solanum lycopersicum* L.) was carried out during *kharif* 2020 at Zonal Agricultural Horticultural Research Station, Navule, KSNUAHS, Shivamogga, to assess genetic variability, diversity, correlation, path analysis and identification of superior segregants regarding yield and its attributing traits in advanced breeding lines of cross, Red Ball (Shelf life) \times Arka Abha (High yield). The distribution pattern revealed complementary interactions for shelf life, number of locules *per* fruit, pericarp thickness, number of cluster *per* plant, number of fruits *per* cluster, fruit length, fruit diameter, fruit weight, lycopene content and pulp content. Duplicate interaction for pH content, number of branches *per* plant, plant height, firmness and yield *per* plant. Dominance based complementary interaction for TSS content. Genetic variability analysis indicated the presence of sufficient amount of variability among all the characters. Slight difference noticed between GCV and PCV for all the characters indicating traits were less influenced by environment. High heritability coupled with genetic advance as *per* cent mean was observed for all traits indicating, wide scope for improvement by selecting these traits. In the genetic divergence analysis of forty advanced breeding lines based on the D^2 statistics, they were grouped into nine clusters. The highest positive and significant correlation coefficient of fruit yield noticed for plant height, fruit diameter, fruit weight, number of fruits *per* cluster, number of clusters *per* plant, pulp content, fruit length, number of locules *per* fruit, number of branches *per* plant and pericarp thickness. Path coefficient analysis revealed that plant height, fruit length, number of fruits *per* cluster, pericarp thickness, and number of locules *per* fruit had positive direct effect on fruit yield. These characters can be considered for selection to increase fruit yield. Superior genotypes (G-23, G-04, G-32, G-11, G-29 and G-38) derived from this cross can be advanced for fifth generation.

December, 2021

(Dushyanthakumar, B. M.)

Major Advisor

7. Genetic Variability, Heritability and Diversity Analysis in Advanced Breeding Lines of Rice (*Oryza sativa* L.) for Yield and its Component Traits in Wetland Situations

(B. V.SINCHANA)

ABSTRACT

An experiment was conducted during *kharif* 2020 at ZAHRS, Navile, Shivamogga with an aim to determine the nature and magnitude of genetic variability, character association, path and diversity analysis for eleven yield and yield attributing traits. The 35 advanced breeding lines of F₆ generation with four checks *viz.*, BPT-5204, JAYA, JYOTHI and KPR-1 constituted the experimental material and were laid out in Randomized Complete Block Design with two replications. The results from the investigation exposed that, mean squares were highly significant for all the eleven characters under study, indicating considerable genetic variation among the genotypes. High PCV and GCV coupled with high heritability and GAM values were observed for the number of tillers per plant, the number of productive tillers per plant, the total number of grains per panicle and test weight. Correlation studies revealed that, grain yield showed significant positive correlations with plant height, number of tillers per plant, number of productive tillers per plant, panicle length, number of grains per panicle, panicle fertility and test weight. The panicle length (0.5509) followed by the number of productive tillers per plant (0.3560) had the highest positive direct effect. In contrast, days to 50 per cent flowering (-0.1201) had the highest negative direct effect on grain yield. Mahalanobis' D² analysis indicated wider genetic diversity among 35 advanced breeding lines of rice, which were grouped into six clusters. Maximum genetic divergence was observed between cluster VI and IV (203.42), while closest proximity was noticed between cluster III and I (69.25). The characters *viz.*, the number of grains per panicle, L/B ratio contributed much to the total genetic divergence. The advanced breeding lines *viz.*, KMLT-4 × KPR-2-4-3-1-1, JGL-1798 × KPR-2-7-2-3-4, KMLT-4 × KPR-2-1-7-1-2, KMLT-4 × KPR-2-2-3-1-2-4 and KMLT-4 × KPR-2-2-2-8-2-1-1-2-3 recorded superior mean yield performance compared to the checks under wetland conditions.

December, 2021

(Shridevi, A. Jakkeral.)

Major Advisor

Plant Pathology

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

1. Studies on Powdery Mildew of Bhendi Incited by *Erysiphe cichoracearum* DC.

(KAVYASHREE, S.)

ABSTRACT

Bhendi [*Abelmoschus esculentus* (L.) Moench] is one of the important vegetable crop, belongs to the family Malvaceae and it grows well in relatively warmer temperatures. Hence, it is cultivated in tropical, subtropical countries and warmer temperate regions around the world. India is a major producer, consumer and exporter of bhendi. Bhendi suffers from many diseases, among them powdery mildew caused by *Erysiphe cichoracearum* DC. is a major problem in bhendi growing areas of Karnataka. Survey work revealed that, maximum per cent disease index was recorded in Davanagere (37.99 %) followed by Chitradurga district (28.24 %). Whereas, least per cent disease index was observed in Shivamogga district (24.93 %). The correlation studies showed that, all the weather parameters had negative correlation with the disease severity. In multiple regression equation, maximum relative humidity was significant ($P < 0.05$), with an R^2 value of 0.829. Disease progress curve showed a slow progress at the beginning followed by a logistic increase, reached peak disease progress during 5th MW and it then gradually decreased. Maximum 'r' value (0.0758) was observed between 3rd and 4th MW. *In vitro* studies revealed that, hexaconazole 5 EC (systemic fungicides), dinocap 48 EC (contact fungicides), potassium chloride and potassium sulphate (chemical salts) and *Pseudomonas fluorescens* (bio-agents), showed highest per cent inhibition of conidial germination irrespective of concentration. Under field conditions, highest per cent reduction of disease over control, benefit cost ratio and maximum yield was observed in case of hexaconazole 5 EC at 0.1 per cent (52.74 %, 1:3.29 and 131.66 q ha⁻¹, respectively). Correlation of potassium and sulphur content in bhendi leaves by the foliar spray of potassium chloride and potassium sulphate on powdery mildew disease intensity showed negative correlation.

October, 2021

(R. Ganesha Naik)
Major Advisor

2. Investigations on Endophytes from Tomato Plant Against Root-Knot Nematode.

(SUPRIYA J.)

ABSTRACT

Endophytes are plant associated microorganisms that live inside plant tissues without causing any harm to plants. A roving survey was conducted in major tomato growing districts such as Shivamogga, Davanagere and Chikmagalur for isolation of endophytes. A maximum number of endophytes were obtained from Chikmagalur (12 endophytes) and Shivamogga (12 endophytes) districts, followed by Davanagere (10 endophytes) district. A total of 22 fungal and 12 bacterial endophytes were isolated from different parts of the healthy tomato plant. Both fungal and bacterial endophytes were characterized based on cultural and morphological methods and results revealed that all isolated endophytes showed a varied types of characters on different media. All isolated endophytes were evaluated against root-knot nematode under *in vitro* condition, among 22 fungal endophytes, RFSGM1 isolate showed maximum juveniles mortality (93.11 %) followed by RFCKM1 (91.11 %), SFDVG1 (90.00 %), RFCKM2 (88.67 %), LFSMG3 (86.89 %), LFDVG1 (85.11 %) and RFDVG1 (84.33 %) isolates. Similarly, among 12 bacterial endophytes, RBSMG1 isolate showed maximum juveniles mortality (92.67%) followed by LBCKM1 (88.56 %), SBSMG1 (87.23 %) and LBSMG2 (87.12 %) isolates. In growth promotion test, fungal endophytic isolate RFCKM1 showed highest vigor index (1443.33) and isolate RFCKM3 showed lowest vigor index (854.68) compared to control. In bacterial endophytes, RBSMG1 isolate showed highest vigor index (1243.76) and isolate SBCKM1 showed lowest vigor index (867.73) compared to control. Further, effective endophytes confirmed under *in vitro* evaluation were identified through molecular characterization by using ITS primers for fungal endophytes and universal bacterial primers for bacterial endophytes followed by sequence characterization and blast analysis confirmed that fungal isolates RFSGM1, RFCKM1 and SFDVG1 as *Trichoderma harzianum*, RFCKM2 and RFDVG1 as *Fusarium oxysporum*, LFSMG3 and LFDVG1 as *Nigrospora oryzae*. Similarly, bacterial isolates were identified, RBSMG1 as *Pseudomonas aeruginosa*, LBCKM1 and SBSMG1 as *Acinetobacter schindleri*, and LBSMG2 as *Acinetobacter johnsonii*.

November, 2021

(H. Ravindra)
Major Advisor

3. Investigations on Septoria Leaf Spot of Tomato (*Solanumlycopersicum*L.)Incited by *Septorialycopersici* Speg.

(UMADEVI K.)

ABSTRACT

Tomato (*Solanumlycopersicum* L.) is one of the most popular and widely grown vegetable crop in India and throughout the world. It is known to be affected by more than 200 diseases. Among them septoria leaf spot of tomato caused by *Septorialycopersici* Speg. is of significant importance as it reduces the yield by premature defoliation and affecting normal fruit setting. Hence, to know the disease occurrence and extent of severity, an extensive roving survey was conducted in Shivamogga, Chitradurga and Davanagere districts. The highest per cent disease index was recorded in Chitradurga district (12.93) followed by Davanagere district (11.79) and least PDI was recorded in Shivamogga district (9.37). The cultural studies revealed that potato dextrose agar media was found to be best for the growth of *S. lycopersici*. Molecular confirmation of the pathogen revealed that, the isolate has 90 per cent sequence homology with the expected *S. lycopersici*. Weather parameters and disease severity correlation studies revealed that, maximum temperature, minimum temperature and maximum relative humidity had positive correlation with PDI. Minimum RH and rainfall had negative correlation with PDI. Multiple linear regression with an R^2 (0.8888) explained 88.88 per cent variation in PDI was due to weather parameters. There was logistic increase in the disease severity and reached peak disease progress in 11th MW with maximum 'r' value (0.177) at 5th MW. *In-vitro* studies revealed that among fungicides, botanicals and bioagents tested, Propiconazole 25 EC, Copper oxychloride 50 WP and Carbendazim 12 + Mancozeb 63 WP, garlic bulb extract and *T. harzianum* were showed maximum mycelial inhibition. Among nine treatments, Propiconazole 25 EC and Carbendazim 12 + Mancozeb 63 WP were found to be effective in reducing disease severity (17.75 and 18.33 %) and increase in yield (30.10 and 29.60 t ha⁻¹) with B:C ratio of 3.39 and 3.37, respectively under field conditions.

November, 2021

(R. Ganesha Naik)
Major Advisor

4. Investigations on Indigenous Nematophagous Fungi Infecting *Meloidogynespp.* in tomato

(VANDANA G.)

ABSTRACT

Root-knot nematode (*Meloidogynespp.*) is considered as a major constraint to tomato cultivation where it causes anyield loss up to 30 per cent. Environmental side effects associated with the chemicals has diverted the interest for other management strategies including biological control. Hence, investigations were carried out to collect the infested root and soil samples from major tomato growing districts of Karnataka such as Chitradurga, Chikmagalur, Davanagere and Shivamogga for the isolation of nematophagous fungi. A total of 8 nematophagous fungi were isolated from the 16 samples collected. Cultural, morphological and molecular characterisation of 8 isolated nematophagous fungi aided in identification of genus and species. The identified fungi were 4 *Fusarium* spp., 2 *Trichoderma* spp., 1 *Penicillium citrinum* and 1 *Purpureocilliumlilacinum*. Culture filtrate of all the fungi tested for juvenile mortality at 10, 20, 30 and 50 per cent concentration revealed thatmaximum juvenile mortality of 100 per cent was recorded in *Trichoderma* spp. (Nem1, Nem5), *Penicillium citrinum* (Nem3) and *Fusarium* spp. (Nem4, Nem7) at 50 per cent culture filtrate concentration after 96 hours after inoculation. In the *in-vitro* efficacy test of isolated fungi grown on water agar, eggs of root knot nematode showed 100 per cent colonisation by *Trichoderma* spp. (Nem1, Nem5) *Fusarium* spp. (Nem4, Nem7) and *Purpureocilliumlilacinum* (Nem8) after 96 hours. Maximum colonisation of 100 per cent of females was observed after 96 hours of inoculation by *Trichoderma* spp., *Fusarium* spp. (Nem4, Nem7) and *Penicillium citrinum*. (Nem3) after 96 hours of inoculation.Maximum juvenile parasitisation of 71.67 and 71.33 per cent on water agar was recorded by *Trichoderma* spp. after 96 hours of inoculation. Trapping structures like constricting rings and non-constricting rings were observed in water agar plates of *Fusarium* spp. (Nem2, Nem4, Nem7) and *Trichoderma* spp. (Nem1, Nem5).

November, 2021

(H.Ravindra)
Major Advisor

5. Morphological and Molecular Characterization of The Blight of Tuberose

(VINEETH, M.)

ABSTRACT

Tuberose is an important commercial cut flower as well as loose flower crop having wider adaptability to varied climate and soil. Among several fungal diseases affecting tuberose, blight caused by *Fusarium equiseti* and *Curvularia pseudobrachyspora* are important. The studies were conducted on the survey for the severity in Central Dry Zone of Karnataka. Cultural, morphological, physiological characters and molecular characterization of the pathogen and *in vitro* evaluation of fungicides were carried out. Among the different districts surveyed highest and lowest *per cent* disease index were recorded in Chitradurga (49.90 %) and Hassan (30.70 %) district respectively. In growth phase studies *F. equiseti* and *C. pseudobrachyspora* reached peak on 12th and 10th day after inoculation. Among the different solid media evaluated potato dextrose agar and oatmeal agar found to be best for growth and maximum sporulation. The conidia of *F. equiseti* were sickle shaped macroconidia with three to four septate measuring 28.9 to 32.8 × 3.25 to 3.5 µm and ovoid shaped microconidia measuring 5.89 to 10.2 × 2.32 to 2.49 µm and conidia of *C. pseudobrachyspora* were dark brown, typically geniculate curved with three to four septate spores measuring 19.67 to 22.85 × 5.78 to 6.93 µm. The maximum dry weight of *F. equiseti* and *C. pseudobrachyspora* was observed from the physiological studies at 25 °C temperature. Molecular characterization revealed 99.83 *per cent* and 99.65 *per cent* similarity of *F. equiseti* and *C. pseudobrachyspora*, respectively with already deposited sequences. *In vitro* studies revealed that mancozeb, propineb, hexaconazole, tebuconazole + trifloxystrobin, pyraclostrobin + epoxiconazole and carbendazim + mancozeb were effective in inhibiting the growth of fungus. This was the first report of *Curvularia pseudobrachyspora* causing blight of tuberose.

December, 2021

(Dr. Suresh D. Ekabote)
Major Advisor

6. Studies on Yellow Mosaic Disease of Major Gourds

BHAVANA, S

ABSTRACT

Yellow mosaic disease (YMD) in ridge gourd, bitter gourd, ivy gourd and bottle gourd caused by tomato leaf curl New Delhi virus (ToLCNDV) was an economically important disease which hampered the crop growth and yield. ToLCNDV is abegomovirus that was persistently transmitted by whitefly (*Bemisia tabaci*). Among major diseases occurring on gourds, YMD was one of the most prevalent and serious problem in Karnataka. Roving survey was conducted during summer 2020-21 to assess the incidence of YMD in Chikmagalur, Davangere and Shivamogga districts. Survey results revealed that the highest disease incidence of 58.18 per cent in ridge gourd, 59.21 per cent in bitter gourd, 32.50 per cent in ivy gourd and 42.50 per cent in bottle gourd were documented. Among the district surveyed, Davangere district has recorded the highest mean disease incidence of YMD in all the gourds. Suspected YMD infected samples collected during surveyed areas were tested by PCR using begomovirus specific primers for conserved region, Rep associated protein and coat protein gene. The PCR product of 560bp and 1200bp was obtained, respectively. The nucleotide sequences of replication associated protein and coat protein gene of YMD infected ridge gourd, bitter gourd, ivy gourd and bottle gourd showed 99.72, 98.94, 99.00 and 100 per cent identity with ToLCNDV, respectively. Phylogenetic analysis of Rep associated protein and coat protein gene sequences of ToLCNDV isolates of ridge gourd, bitter gourd and ivy gourd formed a single cluster, while bottle gourd formed a separate cluster. Ridge gourd yellow mosaic virus (strain of ToLCNDV) has been successfully transmitted by whiteflies (*Bemisia tabaci*). Inoculating 10 adult whiteflies per plant with 12h of acquisition access period (AAP) and inoculation access period (IAP) resulted in 100 per cent virus transmission. The virus transmitted in persistent manner and retained in whiteflies for 5-8 days.

December, 2021

(R. Ganesha Naik)
Major Advisor

Soil Science and Agricultural Chemistry

1. Digital Land Resource Appraisal and Planning of Nagavangala Micro-Watershed in
Tarikere Taluk, Chikkamagaluru District of Karnataka

(ANAND, S.)

ABSTRACT

The research was carried out to appraise the land resources of Nagavangala micro-watershed and also to assess the soil erosion risk in it by employing remote sensing and GIS techniques. Land capability and crop suitability in the study area and a micro-level land and water conservation plan for the study area was also generated. Ten master pedons were selected and studied for their characteristics. The depth of soils varied from moderately shallow to deep. The texture of soils ranged from sandy loams to clay. They belonged to *Inceptisols* and *Alfisols*. Ten soil series and fifteen soil phases were identified and mapped. The pH of surface soil samples ranged from moderately acidic to strongly alkaline (5.05-8.86) and soils were non-saline in nature. SOC was found to be low to high (2.1-11.7 g kg⁻¹) and available nitrogen was low to medium (144.26 – 332.42 kg ha⁻¹). Available phosphorus was medium to high (28.85-99.57 kg ha⁻¹), whereas available potassium was medium to high (166.66-523.62 kg ha⁻¹). Available sulphur was low to medium (7.31-13.41 mg kg⁻¹). Micronutrients like copper, iron and manganese were sufficient. Zinc was sufficient in majority of the area. The predicted average annual soil loss rate was found to be 9.80 t⁻¹ ha⁻¹ yr⁻¹. It was found that soil erosion was highest in scrubland. The study area belonged to land capability classes II and III. The soil phases were moderate and marginally suitable for pomegranate, chilli, maize, sorghum, soybean, and red gram. A few soil phases were highly suitable for cultivation of groundnut. The soil phases were not suitable and marginally suitable for sapota and mango. Various conservation structures like check dams and boulder checks were proposed as part of micro-level land and water conservation plan. Cadastral level conservation structures like contour bund and contour trench cum bund were also proposed.

November, 2021

(Ravikumar, D.)
Major Advisor

2. Soils Characterization of Varada River Basin Area Under Paddy Land Use System of Shivamogga District, Karnataka

(CHAITRA)

ABSTRACT

A survey type investigation was carried out on “Soils Characterization of Varada River Basin Area under Paddy Land Use System of Shivamogga District, Karnataka” during the year 2020-2021. The study area was under continuous flooding in paddy growing land of Varada river basin areas of Sagara and Soraba taluk of Shivamogga district. Total of 100 soil samples from 0 to 15 cm depth were collected from identified villages. Results revealed that the surface soil of river basin varied from moderately acidic (4.48) to slightly acidic (5.78) with non-saline nature of soils ($0.02-0.07 \text{ dSm}^{-1}$) which may be due to flooding and low (5.81 g kg^{-1}) level of soil organic carbon. The available nitrogen ($101.71 - 307.32 \text{ kg ha}^{-1}$) was found low to medium, potassium ($54.16 - 97.84 \text{ kg ha}^{-1}$) and sulphur ($1.19 - 7.04 \text{ mg kg}^{-1}$) found low status of paddy growing soils. Available P_2O_5 ($20.77 - 74.44 \text{ kg ha}^{-1}$) content was medium to high in the study area. The exchangeable calcium ($1.38 - 3.41 \text{ cmol (p}^+) \text{ kg}^{-1}$) and magnesium ($0.32 - 0.83 \text{ cmol (p}^+) \text{ kg}^{-1}$) in most of soils deficient while DTPA extractable iron ($19.06 - 36.52 \text{ mg kg}^{-1}$), manganese ($1.93 - 20.34 \text{ mg kg}^{-1}$) and copper ($1.26 - 6.19 \text{ mg kg}^{-1}$) were sufficient and available zinc was ranged from 0.37 to 2.67 mg kg^{-1} was recorded in the Varada river basin areas. Soil samples were collected from 0-15 cm, 15-30 cm, 30-45 cm and 45-60 cm soil depth from upland, midland and lowland position at Suruguppe village of Sagara taluk and Kadasuru village of Soraba taluk. The texture was sandy clay throughout depth studied. The available N, P_2O_5 and K_2O status decreased with depth. Depth wise decrease trend of total organic carbon was observed in both the villages studied. Higher TOC was recorded in 0-15 cm soil depth and lowest in 45-60 cm soil depth.

November, 2021

(Ganapathi.)
Major Advisor

3. Nutrient Use Efficiency, Productivity and Quality of Tomato as Influenced by Split Application of Npk Nutrients

(PRIYA MARIA JACOB)

ABSTRACT

An experiment was conducted in ICAR-KVK, COA, KSNUAHS, Shivamogga during *rabi* 2020-21 to determine the nutrient use efficiency, productivity and quality of tomato as influenced by split application of NPK nutrients. The experiment was laid out in Randomized Complete Block Design with nine treatments and three replications. The results showed that available soil nutrient status was recorded highest in treatments provided with split application compared to recommended practice of fertilizer application (250: 250: 250 N, P₂O₅, K₂O kg ha⁻¹). Split application of 100 per cent RD N + 100 per cent RD P₂O₅ + 125 per cent RD K₂O (T₇) significantly improved the NPK content and uptake in tomato plant and fruit along with the growth parameters such as plant height, number of branches per plant and leaf area at flowering, fruiting and harvesting stages. The yield attributes viz., number of flower clusters per plant (16.05), number of fruits per plant (50.63), girth of fruit (18.27 cm), individual fruit weight (76.73 g) and fruit yield per hectare (107.88 t ha⁻¹) and quality parameters viz., total soluble solids (5.90°Brix), lycopene (6.50 mg 100g⁻¹), ascorbic acid (15.19 mg 100g⁻¹) and shelf life (15.30 days) were registered highest under the same treatment. The percentage yield increase in the split application of 100 per cent RD N + 100 per cent RD P₂O₅ + 125 per cent RD K₂O (T₇) over the recommended dose of fertilizer application is 39 per cent. Split application of 100 per cent RD N + 100 per cent RD P₂O₅ + 125 per cent RD K₂O (T₇) significantly improved the nutrient use efficiency and economics viz., nitrogen use efficiency (29.23 kg yield kg N⁻¹), phosphorus use efficiency (29.23 kg yield kg P⁻¹), potassium use efficiency (23.38 kg yield kg K⁻¹), gross returns (Rs. 828943 ha⁻¹), cost of cultivation (Rs. 189849 ha⁻¹), net returns (Rs. 639094 ha⁻¹) and B: C (4.37). From this study, it can be concluded that the split application of 100 per cent RD N + 100 per cent RD P₂O₅ + 125 per cent RD K₂O is ideal for getting higher yield with better quality fruits throughout the year.

November, 2021

(Sarvajna B. Salimath.)
Major Advisor

4. Evaluation of Micronutrients Status of Soil and Their Relationship with Soil Properties in Bettadahalli Micro-Watershed of Tarikere Taluk, Chikkamagaluru District, Karnataka

(SHWETHA, G. Y.)

ABSTRACT

An investigation was carried out to study the micronutrients status of soil and their relationship with soil properties in Bettadahalli micro watershed of Tarikere taluk, Chikkamagaluru district, Karnataka during the year 2020-21 at college of agriculture, KSNUAHS, Shivamogga. A total of 66 surface soil samples (0-15 cm) were collected at 320m X 320m grid intervals. Ten pedons were selected based on the soil heterogeneity and topography and analysed for morphological characteristics and also soil samples were collected at 0-20, 20-40, 40-60cm depths in different land use systems of the study area and analysed for physical and chemical properties of the soil. The surface soil samples were sandy clay to clay in texture and moderately acidic to moderately alkaline in soil reaction with non-saline nature. The soil organic carbon content and available nitrogen were low to medium in status. The DTPA extractable micronutrients status of the micro watershed was found to be sufficient except zinc and boron. Zinc was found to be sufficient (11.67 %) to deficient (63.51 %) and boron content was found to be low (41.07 %) to medium (34.11 %). Among the different land use systems, the pH was increased with increase in depth irrespective of the land use systems. The higher organic carbon content, primary nutrients and secondary nutrients were found to be high in surface soils as compared to sub-surface soil in all the land use systems. The DTPA-extractable iron, manganese and copper were found to be sufficient in all the land use systems, whereas zinc was found to be deficient ($<0.6 \text{ mg kg}^{-1}$) in all the land use systems. As compared different land use systems, boron was found high in arecanut (0.81 mg kg^{-1}) system and low in mango (0.38 mg kg^{-1}) land use system.

November, 2021

(K. T. Gurumurthy.)
Major Advisor

5. Influence of Phosphorus Supplementation through Fish Bone Meal on Soil Chemical Properties and Yield of Tomato

(SUHAND)

ABSTRACT

A pot experiment was conducted at College of Agriculture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences (KSNUAHS), Shivamogga, during *Rabi* season, 2021 to study the influence of phosphorus supplementation through fish bone meal on soil chemical properties and yield of tomato. Acidulation of fish bone meal (FBM) with sulphuric acid at 0, 2.50, 5.0, 7.50, 10, 15, 20, 30, 40 and 50 per cent (w/v) was conducted and water-soluble- P was estimated for a week in these acidulated levels. The 15 per cent acid-treated FBM recorded the highest WSP and was used for the experiment. The recommended dose of P through mineral fertilizer and FBM (raw and acidulated) at 100, 75 and 50 per cent levels plus recommended N and K along with FYM (except control), PSF and VAM were imposed in a completely randomized design with eleven treatment combinations and three replications. Application of P through mineral fertilizer and acidulated FBM in 75:25 ratio increased the biometric parameters, quality and yield attributing characters of tomato. The highest fruit yield of tomato (5.48 kg ha⁻¹) was observed in the treatment receiving 75 per cent of recommended P through mineral fertilizer and 25 per cent through AFBM. The nutrient content and uptake of N, P, K, Ca, Mg, S and micronutrients (Fe, Zn, Cu and Mn) by tomato and highest available N, P₂O₅, Ca and S nutrient status in the soil at 30 and 60 DAP and after final harvest were recorded with the application of 75 per cent recommended P through mineral fertilizer plus 25 per cent through acidulated FBM compared to other treatments.

December, 2021

(B. C. Dhananjaya.)
Major Advisor

6. Potassium management For improving Productivity of Rainfed maize (*Zea mays* L.) and Its Effect on Potassium Status of Soil

(POOJA, K.)

ABSTRACT

A field experiment on investigation on “Potassium management for improving productivity of rainfed maize (*Zea mays* L.) and its effect on potassium status of soil” was conducted during *kharif* season 2020 at Agricultural and Horticultural Research Station, Bavikere, KSNUAHS, Shivamogga. The experiment was laid out in Randomized Complete Block Design with thirteen treatments and replicated thrice.

The treatments consisted of three levels of K at 100 %, 125 % and 150 % recommended dose of K with or without split and foliar spray of 1.5 % K_2SO_4 at silking stage. The results revealed that, among the K levels, application of higher dose of K at 150 % of recommended dose in 2 splits and foliar spray of 1.5 % K_2SO_4 at silking stage recorded significantly higher growth parameters such as plant height (211.04 cm), number of leaves (14.85) and stem girth (2.45 cm) kernel yield (92.84 qha⁻¹), stover yield (116.91 qha⁻¹). Similarly, higher primary nutrients content like nitrogen (1.21 % and 0.63 %), phosphorus (0.24 % and 0.19 %) and potassium (0.66 % and 0.74 %) in kernel and stover respectively and higher total uptake nitrogen (185.99 kg ha⁻¹), phosphorus (44.49 kg ha⁻¹), potassium (147.78 kg ha⁻¹), quality parameters like protein (7.56 %), starch (78.21 %) was recorded compared to lower dose and recommended dose of K with or without split and foliar spray. With respect to fractions of K in soil, higher water soluble-K (15.10 mg kg⁻¹) and exchangeable K (105.24 mg kg⁻¹) similarly, higher potassium use efficiency (49.13 %) and B: C ratio of 2.92 was noticed due to 150 % of recommended dose of K in 2 splits with foliar spray, compared to lower dose and recommended dose of K with or without split and foliar spray.

December, 2021

(Thippeshappa, G. N.)
Major Advisor

Horticulture

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

1. Response of China Aster [*Callistephus chinensis* (L.) Nees] to Phosphorus Solubilizing and Mobilizing Bio-inoculants with Graded Levels of Phosphorus

(ASHWINI, C. P.)

ABSTRACT

A research was conducted to investigate the response of China aster [*Callistephus chinensis* (L.) Nees] with different grades of phosphorus at the Department of Horticulture, College of Agriculture Navale, during 2020-21. Eight treatments were replicated three times in Randomized Complete Block Design. The plants supplied with 75 per cent of the recommended dosage of phosphorus + phosphorus solubilizing fungi (*Aspergillus awamori*) + bacteria (*Pseudomonas striata*) + mobilizing Vesicular Arbuscular Mycorrhiza (*Glomus fasciculatum*) along with recommended dose nitrogen and potassium. The results were recorded significantly highest plant height (59.87 cm), stem girth (4.23 mm), internodal length (2.23 cm), number of primary (9.83) and secondary (24.50) branches, plant spread North-South and East-West (19.08 and 19.82 cm, respectively), number of leaves (127.37), leaf area (4480 cm²), fresh weight of roots (25.91 g), total fresh weight of plant (222.19 g), dry matter of roots (8.99 g), total dry matter of plant (71.98 g), total chlorophyll (1.23 mg/g of fresh weight), relative growth rate (0.0160 g/g/day), crop growth rate (10.08 g/m²/day), net assimilation rate (0.0252 g/dm²/day), minimum days to first flower bud initiation (49.84), days to first flower opening (60.08), maximum flowering duration (69.93 days), highest flower weight (2.42 g), flower and disc diameter (7.38 and 1.21, respectively), number of petals per flower (131.30), flowers per plant (66.80), flower yield (8.47 t/ha), and its quality parameters like shelf life (49.68 hours) and vase life (7.66 days), seed yield (4.34 q/ha). The lowest available N, P and K (390.02, 35.33 and 306.79 kg/ha in soil, respectively) and highest uptake of N, P and K in plant (110.83, 26.65 and 107.21 kg/ha). Likewise, in economic analysis the plants supplied with 75 per cent of the recommended dosage of phosphorus + phosphorus solubilizing fungi (*Aspergillus awamori*) + bacteria (*Pseudomonas striata*) + mobilizing Vesicular Arbuscular Mycorrhiza (*Glomus fasciculatum*) along with recommended dose of nitrogen and potassium showed maximum net returns (₹2,88,193 and ₹7,51,543/ha) and B:C ratio (4.10 and 7.45) for flower production and seed yield, respectively.

2. Studies on Integrated Nutrient Management on Growth, Yield and Quality of Indian Noni(*Morindacitrifolia* L.) under Southern Transitional Zone of Karnataka

(HARSHITA, B)

ABSTRACT

The experiment was conducted in three years old noni plot in Raminakoppavillage, Shivamogga taluk under the Department of Horticulture, College of Agriculture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, during 2020-2021 to study the effect of Integrated Nutrient Management on Growth, Yield and Quality of Indian Noni(*Morindacitrifolia* L.) under Southern Transitional Zone of Karnataka. The experiment was laid out in RCBD with 11 treatment combinations, comprising of inorganic fertilizers, biofertilizers, organic manures and organic liquid formulations with 4 replications. The result revealed that the noni plants received 60:30:30 g NPK along with 2 kg Vermicompost + 100 g *Azotobacterchroococcum* + 100 g Phosphorus Solubilizing Bacteria + 100 g Potassium Solubilizing Bacteria + 250 ml Vermiwash + 250 ml Panchagavya was recorded the maximum vegetative parameters such as plant height (2.84 m), plant girth (37.20 cm), number of secondary shoots per plant (50.57), canopy spread (4.52 m²), also registered maximum yield and better quality parameters such as number of fruits per plant (156.03), fruit weight (132.69 g), fruit yield (59.61 kg/plant), total fruit yield (46.02 t/ha), fruit length (8.76 cm), fruit width (5.19 cm), fruit volume (79.51 cc), fruit firmness (6.13 kg/cm²), pulp recovery (61.41 %), total soluble solids (10.43 °B), Ascorbic acid (96.24 mg/100g), least physiological loss in weight (3.68 %) and longer shelf life of fruits (4.03 days). Further, maximum available soil nutrients (N, P₂O₅ and K₂O), leaf nutrient content (N, P and K) and total soil microbial population and maximum gross return (9,20,400 ₹/ha), net returns (6,51,206 ₹/ha) and benefit cost ratio (3.42) was observed in the same treatment combinations. The present findings have conclusively proved that treatment 11 was found to be effective for sustainable production and quality improvement of Indian noni fruits under Southern Transitional Zone of Karnataka.

December, 2021

Dr. D. Thippesha
Major Advisor

3. Response of Bottle Guard [*Lageinariasiceraria* (Molina) Standl.] for Foliar Application of Biostimulants and Bioinoculants Under Southern Transitional Zone of Karnataka

(SACHIN BONDADE)

ABSTRACT

An experiment was conducted at Zonal Agriculture and Horticultural Research Station, Shivamogga, during *Rabi* 2020, to study the effect of foliar application of bio-stimulants and bio-inoculants on Arka Bahar variety of bottle gourd. The experiment was carried out using randomized complete block design with three replications and ten treatments. The different combinations of biostimulants and bioinoculants such as Sea weed extract, Humic acid, Jeevamrutha, *Azospirillum* and *Pseudomonas fluorescens* were used as treatments with recommended cultural practices to study the impact of different treatments on growth, yield and quality parameters. It was observed that, T₁₀{Sea weed extract (0.5 %) + *Azospirillum* (4 ml/l) + *Pseudomonas fluorescens* (4 ml/l)} has recorded the highest vine length (778 cm), vine girth (26.06 mm), number of internodes (91.40), inter-nodal length (12.90 cm), number of branches (17.66), leaves per plant (125.60), leaf area (5946 dm²), leaf area index (198.23), total dry matter accumulation of plant (369.70 g at 90 DAS), total fresh weight at 90 DAS (623.40 g/plant), days to first female flower appearance (51.53), days to first male flower appearance (48.43), nodes on first female flower appear (9.33), number of female flowers (24.43), number of male flowers (71.83), fruit set per cent (74.09 %), number of fruits per plant (16.40), fruit length (41.63 cm), fruit girth (18.17 cm), flesh thickness of fruit (71.23 mm), fruit weight (1013.40 g), fruit yield per vine (16.65 kg), total yield (51.27 t), number of seeds per fruit (645.67), seed weight per fruit (105.27 g), seed yield per vine (1.73 kg), seed yield per hectare (52.87 q), Ascorbic acid content (8.07 mg/100g), TSS (12.20⁰Brix), Reducing sugar (8.17 mg/100g%), Crude fibre content (1.65 g/100g). The economic analysis clearly showed that, the maximum net returns (Rs. 4,03,045.70) and B: C ratio (2.47) was also found in treatment T₁₀.

December, 2021

B. Hemla Naik
Major Advisor

Horticulture

Genetics and Plant Breeding

M. Sc. (Hort.) theses abstracts produced in the
Department of Genetics and Plant Breeding

1. Studies on Heterosis and Combining Ability in Cucumber (*Cucumis sativus* L.)

(HALESH KUMAR, B. H.)

ABSTRACT

The research on “Studies on heterosis and combining ability in cucumber (*Cucumis sativus* L.) was undertaken during 2019-20 at the Department of Genetics and Plant Breeding, College of Horticulture, Mudigere and Agricultural and Horticultural Research Station, Bavikere. Twenty-eight hybrids derived from eight parents crossed in half diallel mating design were evaluated along with parents and standard check in a Randomized Complete Block Design with two replications. The variance due to genotypes was significant for all the traits studied. The mean performance of most of the hybrids was better than parents for almost all quantitative and qualitative characters. The magnitude of heterosis over mid parent, better parent and standard check Chitra were in desirable direction for the traits studied. The cross Malini x Nungems exhibited significant positive heterosis over check Chitra (7.33%) for fruit yield (t/ha). GCA to SCA variance ratio was found greater than unity for all the traits indicating the predominance of additive gene action. The parents Malini and Nungems were identified as good general combiners for overall characters studied. Similarly, crosses Malini x Nungems and Malini x Sabra were identified as good specific combiners. Hybrids Malini x Nungems (33.45 t/ha) and Nungems x Green long (32.14 t/ha) were considered as most productive hybrids and Sabra x Mullu Savathe (45.66 %) and Malini x Mullu Savathe (27.25 %) were considered as most heterotic hybrids.

January, 2021

(Narayana Swamy, M.)
Major Advisor

2. Genetic Variability Studies in Chilli (*Capsicum annuum*L.) for Yield and Yield Attributing Characters

(JAYANTHI, B. V.)

ABSTRACT

The present investigation in chilli (*Capsicum annuum* L.) was carried out during rabi season 2019 with 63 genotypes in Augmented block design. Analysis of variance revealed that highly significant difference for all the characters indicating existence of genetic variability among genotypes. Estimates of PCV were higher than GCV with narrow differences for most of the traits. The high estimates of heritability coupled with genetic advance as per cent mean was observed for plant height, number of primary branches, secondary branches, fruit length, fruit diameter, fruits per plant, fruit weight, fruit yield per plant, fruit yield per plot, test weight, germination percentage, root length, shoot length, root to shoot ratio and seedling vigour index-1. Fruit yield per plant was positively and significantly correlated with number of secondary branches, fruit diameter, number of fruits per plant and fruit weight in both green and red ripe chilli. Path analysis revealed that fruit yield per plant had a direct positive effect on days to first flowering, days to 50 per cent flowering, days to first picking, plant height, number of secondary branches, fruit length, fruit diameter, number of fruits per plant, and fruit weight which are important characters to be accounted for gaining improvement in yield. Chilli genotypes were grouped into seven clusters based on Mahalanobis D^2 statistic. Cluster I was largest having 38 genotypes followed by cluster II with 19 genotypes. The maximum inter cluster distance was observed between clusters IV and V. Highest intra cluster distance was observed in cluster II. Red ripe fruit yield per plant contributed maximum to the total genetic divergence (36.61 %) followed by green fruit yield per plant (32.97 %). IC-545662, IC-119556, IC-545660 and G-3 recorded higher yield and can be utilized for further breeding programme.

January, 2021

(Shashikala S. Kolakar)

Major Advisor

3. Genetic Variability and Character Association in F₂ Segregating Population of Tomato (*Solanum lycopersicum* L.)

(DEEPASHRI, J)

ABSTRACT

The present investigation was carried out to understand the extent of genetic variability, correlation and path coefficient analysis between yield and its components in F₂ segregating population of two tomato crosses viz., AR 29 × PKM 1 and AR 21 × ArkaVikas. The experiment was conducted in farmer's field at Mudigere during the year 2020-21. Highly significant differences were observed for the traits which indicated sufficient genetic variation among the genotypes. Plant height, plant canopy, locules per fruit, fruit clusters per plant and fruit yield per plant exhibited high GCV (>20 %) and PCV (>20 %) indicating the presence of additive gene. Low values of GCV (0-10 %) and PCV (0-10 %) was reported for leaf area, days to first flowering and days taken to fruit set in population of both crosses shows the involvement of non-additive gene for these traits. Plant height, plant canopy, flower clusters per plant, fruit clusters per plant, fruits per cluster, fruits per plant, fruit yield per plant, average fruit weight and TSS recorded high heritability (>60 %) coupled with high GAM (>20 %). Hence, more scope for improving these traits through direct selection. Correlation study revealed that fruits per plant followed by flower clusters per plant and fruit clusters per plant had significant positive correlation with fruit yield per plant. Negative and significant correlation was noticed for fruits per cluster. Path analysis indicated fruits per plant and average fruit weight had high positive direct effect which shows the possibility of increasing fruit yield per plant by selecting these characters.

November, 2021

(Dr.Lakshmana, D)

Major Advisor

Entomology

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

1. Survey, Seasonal Incidence and Management of Citrus Leaf Miner, *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae) in Hilly Region of Chikkamagaluru District

(PRABHUDEV, P. M.)

ABSTRACT

The present investigation entitled “Survey, seasonal incidence and management of citrus leaf miner, *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae) in hilly region of Chikkamagaluru district” was undertaken at College of Horticulture, Mudigere and different locations of Chikkamagaluru district during 2019-2020. A roving survey conducted in different villages of Chikkamagaluru district on Coorg mandarin crop revealed the peak incidence of Citrus leaf miner (CLM) in October at Muttigepura (3.90 no./plant). Lesser incidence of CLM was noticed during September at Addagadde, Begar and Kigga (0.56, 0.65 and 0.81 no./plant, respectively) of Shringeri taluk. Seasonal incidence of CLM revealed the prevalence of its activity all round the year. Three peaks were noticed during the IV week of July 2019, III week of October 2019 and II week of April 2020. The activity of CLM was prominent from September to December 2019 and less during January-February 2020. Further, the correlation of weather parameters with CLM incidence indicated that rainfall, minimum and maximum temperature and minimum relative humidity had a non-significant effect. In contrast, maximum relative humidity had a positive and significant impact ($r=0.301$). The observations recorded at three, seven and ten days after pesticide spray, spinosad 45 SC @ 0.3 ml/l was most effective against CLM damage (4.78 larvae/plant with 69.80 % reduction over control) followed by NSKE 5% @ 50 g/l (4.88 larvae/plant with 69.17 % reduction over control). Imidacloprid 17.8 SL, thiamethoxam 25 WG, lambda-cyhalothrin 5 EC, cypermethrin 10 EC, thiodicarb 75 WP and profenophos 50 EC were moderately effective and azadirachtin 10000 ppm was least effective (6.72 larvae/plant and 57.55 % reduction over control). The microbial insecticide, spinosad 45 SC and botanical NSKE 5% were the most profitable treatments compared to inorganic insecticides with the highest fruit yield (3.20 t/ha and 3.00 t/ha, respectively) and benefit-cost ratio (2.44:1).

March, 2021

(Suchithra Kumari, M. H.)
Major Advisor

2. Studies on Incidence and Management of Cashew Apple and Nut Borer, *Thylocoptilapanrosema* Meyrick (Pyrallidae: Lepidoptera)

(VINAY, N. R.)

ABSTRACT

Studies on incidence and management of cashew apple and nut borer, *Thylocoptilapanrosema* Meyrick (Pyrallidae: Lepidoptera) was carried out at Department of Plantation, Spice, Medicinal and Aromatic orchard, Zonal Agricultural and Horticultural Research Station, Mudigere and survey in some district of southern Karnataka during 2019 to 2021. Screening of some promising cashew varieties for pest incidence was observed from January to June 2021. The infestation was started from March and ended during May month coinciding the fruit and nut bearing stage. Among the varieties screened, maximum infestation was recorded in variety Sulabha and least in variety Priyanka with a range from 43.05 to 20.00 per cent. The biochemical basis of resistance with respect to vitamin C showed higher in Amrutha (179.23 mg/100g) and Ichapur (172.80 mg/100g) and tannin content was higher in variety Priyanka (0.59 mg/100g) and Amrutha (0.57 mg/100g) recorded less apple and nut infestation. While, lower vitamin C and tannin content was observed in variety Sulabha (79.98 and 0.39 mg/100g, respectively).

Survey across the altitude revealed that, highest nut damage (25.03%) was recorded at Mudigere; further least was recorded at Ullal (1.22%). Positive correlation was observed between apple and nut borer with elevation to the extent of 95 per cent. higher elevation record maximum infestation compared to lower elevation. None of the abiotic factors had any significant role in pest damage during flowering and fruiting stage.

Among the different insecticides evaluated against cashew apple and nut borer, the highest per cent reduction over control was observed in treatments lambda cyhalothrin 5 EC @ 1 ml/L. (50.33) and quinalphos 25 EC @ 2 ml/L. (47.73). Whereas, lowest was observed in spinetoram 11.7 SC @ 1 ml/L (24.37). The treatments lambda cyhalothrin 5 EC and quinalphos 25 EC were superior with respect to benefit cost ratio (3.2 and 2.8) compared to other treatments.

December, 2021

(Dr. Girish, R..)

Major Advisor

**Floriculture
and
Landscape
Architecture**

**1. Standardization of Media for Leatherleaf Fern (*Rumohra adiantiformis* G. Forst.)
for Growth and Cut Foliage Production Under Protected Condition**

(HARSHITHA, H. M.)

ABSTRACT

An investigation was carried out in the College of Horticulture, Mudigere, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga in the year 2020-21 to study the effect of growing media on the growth of *Rumohra adiantiformis* G. Forst. The pot culture method was laid out in CRD and replicated thrice, which included eleven treatments with various substrates, namely T₁–Soil + Sand + FYM (2:1:1 v/v) as Check, T₂–Soil + Sand + FYM + Sphagnum moss (1:1:1:1 v/v), T₃–Soil + Vermiculite (2:1 v/v), T₄–Soil+Cocopeat (2:1 v/v), T₅–Soil+ Perlite (2:1 v/v), T₆–Soil+ Cocopeat + FYM (1:1:1 v/v), T₇–Soil+ Cocopeat + Vermiculite (1:1:1 v/v), T₈–Soil+ Perlite+ Vermiculite(1:1:1 v/v), T₉–Soil + Cocopeat + Vermiculite + FYM (1:1:1:1 v/v), T₁₀–Soil+ Cocopeat + Perlite + Vermiculite(1:1:1:1 v/v) and T₁₁–Soil+ Cocopeat + Perlite + FYM (1:1:1:1 v/v). The results revealed that significant differences were observed among treatments and the treatment comprising of Soil+ Cocopeat + Vermiculite + FYM (1:1:1:1 v/v) exhibits the maximum plant height(40.14cm), plant spread in N-Sand E-W(34.50 and 36.47cm, respectively) direction, number of croziers(7.93), number of fronds(19.83), frond length and width (40.95 and 19.66cm, respectively), number of leaflets(17.41), leaflet length and breadth(13.51 cm and 4.53cm, respectively), vase life with and without sori (26.33 and 29.33 days, respectively), visual plant grade (4.56), N, P and K (2.83, 0.65 and 3.57 %, respectively) in leaves, total C:N ratio of root (52.59), total chlorophyll (1.58 mg/g of fresh weight) and benefit-cost ratio (2.65) against check.

November, 2021

(Dr. S.Y. Chandrashekar)

Major Advisor

2. Standardization of Npk for Lupine (*Lupinus perennis* L.) Cut Flower and Seed Production Under Hill Zone of Karnataka

(POOJA MURTHY, S.)

ABSTRACT

The investigation entitled "Standardization of NPK for Lupine (*Lupinus perennis* L.) cut flower and seed production under hill zone of Karnataka" was carried out in the open field at the experimental farm of the Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga during 2020-21. The experiment was laid out in Randomized Block Design (RBD) having ten treatments viz., T₁ - 85:21:43 (Check), T₂ - 50:20:40, T₃ - 50:25:40, T₄ - 75:20:40, T₅ - 75:25:40, T₆ - 50:20:45, T₇ - 50:25:45, T₈ - 75:20:45, T₉ - 75:25:45, T₁₀ - Control and three replications. The results revealed that growth, flowering, quality and yield parameters of lupine were significantly influenced by the application of different doses of NPK. In growth parameters, the treatment comprising of 85:21:43 kg NPK/ha recorded the maximum plant height (96.59 cm), leaf area (296.07 cm²), number of branches per plant (25.67), dry weight of plant (67.25 g/plant) and it was statistically on par with the treatment comprising of 75:25:45 kg NPK/ha. Whereas flowering, quality and yield parameters of lupine viz., minimum days taken for flower stalk emergence (48.20), days taken for 50 per cent flowering (25.40), maximum duration of flowering (58.03 days), stalk length (71.56 cm), vase life (4.85 days), cut flower yield per ha (4.07 lakh), seed yield per ha (13.75 q/ha) with maximum B:C ratio i.e., 5.95 and 6.22 for cut flower and seed yield per ha, respectively and lower available N, P and K i.e., 271.55, 19.86 and 192.47 kg per ha, respectively were recorded in treatment comprising of 75:25:45 kg NPK/ha which was found superior over check and other treatments studied. Hence, treatment combination 75:25:45 kg/ha may be recommended for commercial cultivation of lupine under hill zone of Karnataka.

November, 2021

(B. Hemla Naik)

Major Advisor

3. Standardization of Npk for Spider Lily (*Hymenocallis speciosa* L.) Under Hill Zone of Karnataka

(SHWETA G. HEBBALE)

ABSTRACT

The present investigation entitled, “Standardization of NPK for spider lily (*Hymenocallis speciosa* L.) under hill zone of Karnataka,” was conducted at the College of Horticulture, Department of Floriculture and Landscape Architecture, Mudigere, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, during the year 2020-21. The experiment was laid out in a Randomized Block Design, with nine treatments (viz., T₁- Control, T₂ - 50:15:25 kg NPK/ha, T₃ - 50:20:25 kg NPK/ha, T₄ - 75:15:25 kg NPK/ha, T₅ - 75:20:25 kg NPK/ha, T₆ - 50:15:50 kg NPK/ha, T₇ - 50:20:50 kg NPK/ha, T₈ - 75:15:50 kg NPK/ha and T₉ - 75:20:50 kg NPK/ha) and three replications. The results revealed that significant differences were observed among different treatments of NPK doses. The treatment comprising of 75:20:50 kg NPK/ha recorded the maximum plant height (96.40 cm), leaf length (99.63 cm), leaf breadth (6.97 cm), leaf area (458.67 cm²), number of suckers (5.80), spike length (81.66 cm), flower bud length (21.40 cm), flower bud diameter (1.27 cm), flower bud weight (3.59 g), flowering duration (32.20 days), flower bud yield per plant (185.79 g), flower bud yield per plot (3.33 kg), bud yield per hectare (9.73 t), number of flowers per spike (21.31), number of spikes per hectare (90.54), vase life with and without anthers (2.96 and 3.34 days, respectively), shelf life (37.79 hrs.), number of bulbs and bulblets per plant (5.87 and 5.83, respectively), diameter of bulbs and bulblets (13.98 cm and 5.87 cm, respectively), weight of bulb (997.46 g), bulb and bulblet yield (94.63 and 6.48 kg, respectively), B:C ratio for loose flowers and bulb yield (5.23) and cut spike (3.23), available N, P and K (250.80, 13.83 and 156.48 kg/ha, respectively) and minimum days taken for spike emergence (25.00). Hence, the above treatment may be recommended for commercial cultivation of spider lily under hill zone of Karnataka.

November, 2021

(B. Hemla Naik)
Major Advisor

4. Characterization of Jasmine Ecotypes and Off-Season Flower Induction in Udupi Mallige (*Jasminumsambac* var. *Aeyaneanum*)

(SHREEDEVI BADIGER)

ABSTRACT

The study on “Characterization of jasmine ecotypes and off-season flower induction in Udupi mallige (*Jasminumsambac* var. *Aeyaneanum*)”. The morphological characterization of jasmine ecotypes was carried out in Randomized Complete Block Design with three replication at experimental block of Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere and off-season flower induction in Udupi Mallige (*Jasminumsambac* var. *Aeyaneanum*) was carried out in Factorial Randomized Complete Block Design with three replication at farmer field, Mandarti village, Bramhavar during 2019-20 and 2020-21. Among the nine jasmine ecotypes *Jasminum malabaricum* recorded maximum plant height (112.10 cm), leaf length (9.63 cm) and open flower diameter (4.58 cm), *Jasminum multiflorum* cv. Kakada recorded maximum number of flowers per shoot (27.67) and flower yield per plant (1898.34 g). *Jasminumsambac* cv. Aravattuesalin mallige recorded the maximum number of primary shoots (8.67), secondary shoots (37.67) and number of petals (46.30). Hence, Kolkatamallige has outperformed with respect to plant height, yield and it is found to be blooming throughout the year followed by Kakada and Hadagalimallige under hill zone of Karnataka. Effect of pruning, growth regulators and interaction of both revealed that significant differences among the treatments. The effect of pruning P₁ (October pruning) recorded highest plant height (110.62 cm), number of primary shoots (23.6), number of secondary shoots (111.53), number of days taken for first bud bearing (31.67) and flower weight per plant (434.27 g). The effect of plant growth regulator G₂ (GA₃ @ 150 ppm) recorded the highest plant height (117.05 cm), number of primary shoots (31.50), number of secondary shoots (131.67), number of days taken for first bud bearing (21) and flowers weight per plant (780.23 g). Interaction between pruning and growth regulator P₁G₂ (October pruning + GA₃ @ 150 ppm) reported the highest plant height (122.10 cm), number of primary shoots (33.33), number of secondary shoots (135.33), number of days taken for first bud bearing (20.67) and flowers weight per plant (810.56 g) in October pruning over control (P₁G₅ and P₂G₅).

December, 2021

(Dr. Nataraj, S. K.)
Major Advisor

Fruit Science

University of Agricultural and Horticultural Sciences, Shivamogga

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

Department of Fruit Science

1. Effect of Foliar Spray of Bio-Stimulants and Micronutrients on Growth, Flowering and Fruiting of Coorg Mandarin

(MALLIKARJUN BIRADAR)

ABSTRACT

A field experiment was conducted on 'Effect of foliar spray of bio-stimulants and micronutrients on growth, flowering and fruiting of Coorg mandarin' at College of Horticulture, Mudigere during 2019-20. The experiment was laid out in Randomized complete block design (RCBD) with eleven treatments replicated thrice. Treatments comprised of different levels of bio-stimulants and micronutrients, sprayed at three different stages such as vegetative, flowering and fruit set. Results of the experiment revealed that, Foliar spray of biovita (0.5 %) exhibited superior performance over other treatments with respect to morphological parameters viz., plant height (1.97 m), stem girth (6.30 cm), plant spread (1.59 m in N-S and 1.51 m in E-W), canopy volume (6.23 m³), number of new shoots per plant (44.26), length of newly emerged shoots (20.50 cm) and leaf area (11.33 cm²), followed by citrus special (0.5 %) and the lowest was recorded with control. Flowering parameters like days taken for first flower emergence (28.67 days), days taken for 50 per cent flowering (34.00 days), number of flower clusters per plant (56.33), number of flowers per cluster (6.03) and flowering intensity (33.69) were maximum with biovita at 0.5 % and minimum was recorded with control. Foliar application of biovita (0.5 %) was found significantly superior for days taken for first fruit initiation (35.67 days). Among different treatments foliar application of biovita (0.5 %) was recorded maximum (22.67) number of fruits per plant and is *on par* with citrus special (0.5 %) and boron (0.2 %). Zinc and boron content of leaf was maximum (44.33 and 29.53 ppm) with application of ZnSO₄ (0.5 %) and boron (0.2 %), respectively and the lowest was recorded with control.

January, 2021

(Yallesh Kumar, H. S.)

2. Evaluation of Aonla (*Emblica officinalis* G.) Cultivars for Value Addition.

PAVITRA, G

ABSTRACT

The study was carried out during the year 2019-20 at College of Horticulture, Mudigere under laboratory condition to evaluate the aonla cultivars for value addition. Six cultivars were evaluated for candy, murabba and pickle with four replication and storage studies were also conducted. The physico-chemical and sensory scores were analysed during the product preparation and storage. Cultivars yielded significant results in the parameters studied. Candy and murabba prepared from cv. Chakaiya proved much better with respect to quality parameters studied ranged viz. recovery percentage (69.32 & 68.28 %), texture (5.25 - 4.81 kg/cm² & 4.64 - 4.30 kg/cm²), Total sugar (68.35 - 69.23% & 53.46 - 55.43 %), reducing sugar (37.03 - 37.52 % & 27.25 - 29.02 %), non-reducing sugar (32.18 - 32.20 % & 26.23 - 27.41 %), overall acceptability score (8.73 - 8.95 & 8.24 - 8.35) was highest and acidity (0.31 - 0.27 % & 0.72 - 0.64%), tannin (0.19 - 0.12% & 1.18 - 1.24 %), pH (2.37 - 3.79 & 2.24 - 2.99), microbial load (0 - 1.1 × 10⁴ CFU & 0 - 1.0 × 10⁴ CFU) respectively showed lowest value at initial and 90 days storage period. Same cultivars were also evaluated for pickle preparation the maximum recovery percentage (78.02%), ascorbic acid (498.88 - 495.20 mg /100g), texture (4.91 - 4.40 kg/cm²), acidity (2.74 - 1.32 %), and the lowest tannin (2.49 to 1.36 %) at initial and during 90 days of storage period. All the qualitative and sensory parameters were proved cv. Chakaiya significantly superior with candy and murabba and Krishna was suitable for pickle preparation.

March, 2021

(Kantharaj, Y.)

Major Advisor

3. Exploration and Identification of Elite Avocado (*Persea americana* Mill.) Accessions in Hill Zone Taluks of Chikkamagaluru District

(RANJITHA, V.)

ABSTRACT

The exploration study was carried out in hill zone taluks of Chikkamagaluru district (Mudigere, Chikkamagaluru, Sringeri and Koppa), Karnataka state during *Kharif* season (2019-20). The morphological characterization of 30 accessions showed a wide variation for tree, leaf, fruit, flesh and seed characteristics. Analysis of variance revealed the significant differences among 30 accessions for yield and quality attributes studied and recorded significantly higher fruit weight (729.17 g) fruit length (19.24 cm), pulp weight (629.19 g) and total fat content (22.23 %) in Acc. 28. While the Acc. 23 recorded significantly higher seed weight (105.45 g), seed length (7.10 cm) and diameter (5.98 cm). The maximum total carotenoids content of 1.23 mg/ 100g, TSS of 11.4° Brix and minimum moisture content (68.78 %) were recorded in Acc. 20, 7, and 25, respectively. The higher GCV and PCV coupled with higher heritability and the genetic advance was observed for most of the economic traits indicating that these characters are highly heritable and likely to provide high selection response. Correlation studies revealed that the fruit yield per tree had a positive and highly significant correlation with the number of fruits per tree, pulp to fruit ratio, pulp weight and fruit weight at both genotypic and phenotypic levels. Genotypic path co-efficient analysis for fruit yield per tree indicated that, the pulp weight (4.515) had the highest positive direct effect followed by the number of fruits per tree (0.855). While, for total fat content, the fruit weight (7.173) followed by seed to fruit ratio (2.620) and the number of fruits per tree (1.563) had a high positive direct effect. The seed weight (32.5 %) contributed the maximum for genetic diversity followed by fruit yield per tree (27.37 %) which results in the formation of six clusters.

March, 2021

(Chaitanya, H. S.)

Major Advisor

4. Effect of Growth Regulators and Bioinoculants on Macropropagation of Banana cv. Ney Poovan by Miniset Technique

MAHESH SADASHIVBHAJANTRI

ABSTRACT

An experiment was conducted to investigate the effect of growth regulators and bioinoculants on macropropagation of banana under naturally ventilated shade house at Department of Fruit Science, College of Horticulture, Mudigere, during 2019-20. The experiment was laid out in Completely Randomized Design with twelve treatments and three replications. Among the treatments, the corms treated with *Azospirillum brasiliense* + *Bacillus subtilis* + VAM + KSB was found maximum results such as, minimum number of days taken for first bud emergence (24.06 days), number days taken for primary decapitation (28.80 days), number of days for second decapitation (55.40 days), maximum number of primary plantlets per corm (3.90), maximum number of plantlets before secondary decapitation (7.80), total number of plantlets per corm (15.45), minimum duration for plantlet production (80.40 days), benefit cost ratio (1: 4.88) and also maximum survivability of plantlet 96.66, 99.10 and 99.80 per cent was recorded at 10, 20 and 30 days, respectively, after transplanting plantlets in low cost polyhouse. Further, most of the vegetative parameters like, plantlet height (35.70cm), plantlet girth (40.10mm), number of leaves (4.40), leaf area (358.40cm²), number of primary roots (17.50), primary root length (49.33cm), shoot fresh weight (75.60g), shoot dry weight (6.78g), root fresh weight (8.11g), root dry weight (0.92g), chlorophyll-a (1.84mg/g of leaf), chlorophyll-b (0.61mg/g of leaf), total chlorophyll (2.46mg/g of leaf), vigour and vigour index of the plantlets was recorded in the treatment saw dust + vermicompost. Thus the experiment it was found that combination of bioinoculants given best results for early plantlet regeneration and number of plantlets production per corm. Whereas Vermicompost + saw dust, performed good for all the vegetative parameters.

July , 2021

(Yallesh Kumar, H. S.)
Major Advisor

5. Standardization of Ripening Stage for Pineapple Jam Preparation

(VIDYA, N. A.)

ABSTRACT

The study was carried out during the year 2020-21 at College of Horticulture, Mudigere under laboratory condition on “Standardization of ripening stage for pineapple jam preparation”. The experiment was laid out in Completely Randomized Design with 12 treatments and three replications. Effect of ripening stages on the physico-chemical and sensory score was analyzed during storage. Ripening stages showed significant results in the parameters studied in jam preparation. Among different treatments, T₄(50% ripening stage + 750 g of sugar + 1g pectin) showed better results with respect to physical and chemical parameters viz.,the highest jam recovery percentage (78.55 %), sensory qualities like appearance (4.89), consistency (4.87), aroma (4.61), taste (4.59), overall acceptability score (4.79), acidity (0.69 %),vitamin-C (12.30 mg/100g), calcium (2.13 mg/100g), magnesium (0.95 mg/100g), moisture (29.79 %), protein (0.80 %), crude fiber (0.79 %), B:C ratio (1.82:1) and the minimum cooking time (40 minutes), pH(3.61), carbohydrates (67.54 %) and microbial load (1.0×10^4). The treatment recorded the minimum changes in chemical parameters during initial to 180 days of storage period viz.,acidity (0.69 to 0.59 %), TSS (68.12 to 72.83°Brix), pH (3.61 to 4.52),total sugars (50.44 to 54.50 %), vitamin-C (12.30 to 9.67 mg/100g), total phenols (26.16 to 22.66 mg GAE/100g), moisture (29.79 to 23.80 %), protein (0.80 to 0.59 %), crude fiber (0.79 to 0.67 %), microbial load (1.0×10^4 to 3.0×10^4) and overall acceptability score (4.79 to 4.69). Based on all the qualitative and sensory parameters and Benefit Cost ratio, it was proved that treatment T₄(50% ripening stage + 750 g of sugar + 1g pectin) significantly superior for jam preparation.

September , 2021

(Dr. Kantharaj, Y.)
Major Advisor

6. Influence of Bunch Cover on Yield and Quality of Banana cvNey Poovan (AB) under High Density Planting System in Hill Zone of Karnataka

(SAHANA, P. V)

ABSTRACT

A field experiment was conducted to study the influence of bunch cover on yield and quality of banana cvNey Poovan (AB) under high density planting system in hill zone of Karnataka during 2020-21 at farmer's field, Kittlegandi village, Mudigere taluk. Experiment was laid out in Randomized Complete Block Design comprising of eight treatments with three replications. Among the different treatments studied, the treatment blue non-woven polypropylene bunch cover (17 GSM 100 % UV stabilized) recorded maximum bunch weight (11.05 kg), bunch width (35.01 cm), bunch length (60.13 cm), number of hands per bunch (11.58), number of fingers per bunch (162.14), finger weight (69.12 g), finger girth (37.68 mm), finger length (12.28 cm), hand weight (1.11 kg), number of fingers in second hand (15.48) and yield per hectare (36.82 t). The same treatment recorded minimum number of days taken from shooting to harvest (115.94). Behavioural parameters such as maximum green life (5.10 days), shelf life (9.20 days), minimum physiological loss in weight (8.20 %). Fruit quality parameters viz., TSS (27.37⁰B), total sugars (20.50 %), reducing sugars (17.17%) and non-reducing sugars (3.33%) were recorded maximum in bunch covered with blue non-woven polypropylene (17 GSM 100 % UV stabilized) bag. There was no incidence of thrips and anthracnose observed and also maximum B:C ratio (2.43 : 1) was obtained in the same treatment. Hence, the treatment blue non-woven polypropylene bunch cover (17 GSM 100 % UV stabilized) proved to increase yield, quality and reduce the incidence of pests and diseases in banana cv. Ney Poovan under high density planting system. Further, the treatment white non-woven polypropylene bunch cover (17 GSM 100 % UV stabilized) also recorded on par results with the above treatment with respect to yield, quality and in reducing the pest and diseases in banana.

November , 2021

(Yallesh Kumar, H. S.)
Major Advisor

**7. Studies on Split Application of Npk Fertilizers and Liquid Bio - Formulation
(Jeevamrutha) on Growth, Yield and Quality of Pomegranate (*Punicagranatum* L.) in
Central Dry Zone of Karnataka**

(THEJASWINI, H.P.)

ABSTRACT

A study was conducted in farmer's field atChillahallivillage, Hiriyur taluk, Chitradurga district during the year 2020-2021, entitled as "Studies on split application of NPK fertilizers and liquid bio-formulation (Jeevamrutha) on growth, yield and quality of pomegranate (*Punicagranatum*L.) in Central Dry Zone of Karnataka". The experiment was laid out in Randomized Complete Block Design comprising of seven treatments replicated thrice. The treatment comprising of 100 per cent RDF through split application along with jeevamrutha (T₇) recorded maximum canopy spread (EW- 1.95 m, 2.70 m and NS - 1.98 m, 2.64 m) and leaf area (10.78 cm², 14.94 cm²) at both vegetative and harvesting stages. However, at different stages of plant growth, maximum total chlorophyll content (2.08 mg/g of fresh weight) was recorded at vegetative stage in T₇. Among fruit and yield parameters, fruit length (8.60 cm), fruit diameter (82.10 mm), fruit volume (369.38 cc), number of fruits per plant (63.95), average fruit weight (290.11 g), fruit set (85.69 %) and fruit yield (18.55 kg/plant) was maximum in 100 per cent RDF through split application along with jeevamrutha. The maximum TSS (16.24 °Brix), TSS : acid ratio (33.83), ascorbic acid (17.34 mg/100 ml), moisture content in arils (87.01 %), juice content (81.16 %), minimum acidity (0.48 %) along with maximum leaf nutrients viz., nitrogen at vegetative stage (2.73 %), phosphorous at flowering stage (0.27 %) and potassium at harvesting stage (1.51 %), respectively was observed in T₇. Therefore, 100 per cent RDF through split application along with jeevamrutha at different stages *i.e.*, 160:80:80 N: P₂O₅: K₂O g per plant from defoliation to flowering stage, 100:60:40 N: P₂O₅: K₂O g per plant from flowering to fruit set stage and 140:60:80 N: P₂O₅: K₂O g per plant at fruit development stage proved to be promising for fetching higher yield in pomegranate cv. Bhagwa.

November , 2021

(Dr. Shivakumar, B. S.)
Major Advisor

8. Evaluation of Aonla (*Emblica officinalis* G.) Genotypes for Yield And quality traits

(BHAGYASHREE DUNDAPPA HOSUR)

ABSTRACT

An experiment was conducted for evaluation of aonla genotypes for yield and quality traits in Southern Transition Zone, during 2020-21 at Forest Research Station, Govinakovi, Honnalitaluk, Davangere district in Karnataka. The experiment was laid out in randomized complete block design with three replications involving 14 vegetatively propagated genotypes (18 years old). The genotypes showed significant variation in terms of fruit, yield and biochemical parameters. With respect to fruit parameters the maximum fruit weight (50.84 g), fruit length (4.15 cm), fruit diameter (4.55 cm), fruit volume (47.33 cc), pulp weight (48.43 g), pulp to seed ratio (20.09) and yield (54.11 kg/plant) was recorded in genotype NA-7. With respect to biochemical parameters the maximum acidity content (2.39 %), vitamin C (403.65 mg/100g), phenol (1.62 %), flavonoid (1.73 mg QE/g) and antioxidant (92.18 %) recorded in K-23 genotype. In general, phenotypic coefficients of variation (PCV) were higher in magnitude than genotypic coefficients of variation (GCV) and narrow difference between them indicates the less environmental influence on expression of trait. High heritability coupled with high genetic advance was observed for all the characters except number of seeds per fruit, phenol and antioxidant. Correlation studies revealed that, yield per tree showed highly significant and positive association with fruit weight, volume, length, diameter and pulp weight at both phenotypic and genotypic levels. Whereas, biochemical parameters showed significant and positive association with yield at genotypic level only. Path analysis for yield per tree showed direct and positive association with fruit diameter, pulp weight, acidity, total sugar and reducing sugar. Among the characters studied, tannin content contributed maximum (18.68%) to the genetic diversity. Among 14 aonla genotypes, NA-7 is promising genotype for yield parameters followed by NA-6. Whereas, K-23 is superior for quality parameters in Southern Transition Zone of Karnataka.

December , 2021

(Dr. Nagarajappa Adivappar.)

Major Advisor

9. Evaluation and Characterization of *Garcinia* Biotypes in Chikkamagaluru District

(NANDINI, T)

ABSTRACT

An experiment was conducted on “Evaluation and characterization of *Garcinia* biotypes in Chikkamagaluru District” during 2020-21. The research was implemented using factorial completely randomized design with two factors (species and locations) and four replications. The morphological and biochemical parameters of fruits were studied in explored three species of *Garcinia* viz., *Garcinia gummigutta* (S₁), *Garcinia indica* (S₂) and *Garcinia xanthochymus* (S₃) from five locations of Chikkamagaluru district viz., Mudigere (L₁), Narasimha RajaPura (L₂), Sringeri (L₃), Koppa (L₄) and Chikkamagaluru (L₅). It was found that, with respect to morphological characteristics viz., fruit length (6.46 cm), fruit diameter (7.16 cm), fruit weight (180.50 g), fruit volume (200 cc), rind weight (121.70 g) and seeds weight per fruit (25.10 g) were recorded maximum in *Garcinia xanthochymus* from Sringeri (L₃S₃), compared to *G. indica* from Koppa (L₄S₂). With respect to the nutritional and phytochemical compositions viz., crude fibre (14.50 %), ascorbic acid (37.45 mg/100g), potassium (46.50 mg/ 100g), calcium (14.00 mg/100g), anthocyanins (2.40 mg/100g), polyphenols (45.40 mg GAE/100g) and tannins (1.70 %) were recorded highest in *Garcinia indica* from Sringeri (L₃S₂), than the *Garcinia gummigutta* from Koppa (L₄S₁). However, the antioxidant activity was maximum (41.62 µg/ml) in *Garcinia indica* from Koppa (L₄S₂), which was on par with (40.45 µg/ml) *Garcinia indica* from Sringeri (L₃S₂). Whereas, the potential antiobesity component, Hydroxycitric acid (HCA) was recorded maximum (9.72 %) in *Garcinia gummigutta* from Sringeri (L₃S₁) than the *Garcinia xanthochymus* (0.14 %) from Koppa (L₄S₃). Hence, the study shows *Garcinia xanthochymus* from Sringeri (L₃S₃) highly significant for morphological parameters. However, *Garcinia indica* from Sringeri shows the maximum significant values for the nutrients and phytochemical compositions. The *Garcinia gummigutta* species from Sringeri shows the maximum significant values for the Hydroxycitric acid than *Garcinia xanthochymus*.

December , 2021

(D. Madaiah.)

Major Advisor

58. Studies on The Effect of Split Application of Npk Fertilizers on Growth, Yield and Quality of Papaya (*Carica Papaya* L.) Under Central Dry Zone of Karnataka

(Y. RAMMOHAN)

ABSTRACT

The field experiment entitled “Studies on the effect of split application of NPK fertilizers on growth, yield and quality of papaya (*Caricapapaya*L.) under central dry zone of Karnataka” was conducted in farmer’s field at Eswargere village, Hiriur taluk, Chitradurga district during the year 2020-2021. The experiment was laid out in Randomized Complete Block Design which comprises seven treatments with four replications. Among the treatments, 125 per cent RDF through split application (T₅) recorded significantly maximum plant height (186.70 cm), stem girth (46.38 cm) at 300 days after transplanting and for the yield parameters viz., fruit length (23.54 cm), fruit diameter (14.36 cm), number of fruits per plant (30.85), fruit weight (1.46kg) and fruit yield (138.83t/ha) were also recorded maximum in T₅, which was on par with T₄ (100% RDF through split application 250:250:500 g NPK/plant) when compared to T₁ (100 % RDF). With respect to quality parameters viz., total soluble solids (13.45 °Brix), reducing sugars (10.10 %), non-reducing sugars (2.68 %) and total sugars (12.97 %) also found to be significantly maximum in T₅, which was on par with T₄ compared to T₁. Hence T₄, at different growth stages i.e., 150:125:100 N:P₂O₅:K₂O g plant⁻¹ in vegetative stage (4 months) 50:100:150 N:P₂O₅:K₂O g plant⁻¹ in flowering to fruit set stage (2 months) 50:25:250 N:P₂O₅:K₂O g plant⁻¹ in fruit development stage (3 months) at monthly intervals, split application of fertilizers proved to be promising for fetching higher yield and good quality of papaya fruits.

December , 2021

(Dr. Shivakumar, B. S.)
Major Advisor

**Plantation,
Spices,
Medicinal
and
Aromatic
Crops**

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

1. Evaluation of Arecanut (*Areca catechu* L.) Cultivars for Yield and Carbon Sequestration Potential under Malnad Region of Karnataka

(MANASA RAMANATH HEGDE)

ABSTRACT

A study was undertaken to evaluate the yield and carbon sequestration potential of arecanut (*Areca catechu* L.) cultivars in the experimental field of Agricultural and Horticultural Research Station, Thirthahalli, during 2019-2020. The experiment was laid out in Randomized Complete Block Design in a ten-year-old areca garden with eight treatments (cultivars) and three replications. Analysis of variance revealed the presence of significant variations among the cultivars for most of the characters studied. The mean performance of each cultivar for growth, yield, fruit and kernel characters were noted. Cultivar SAS-1 was found to be superior in terms of growth viz., palm height (8.93 m), stem diameter (17.85 cm) and internodal distance (17.35 cm). The fruit length was highest in Mangala (5.77 cm) and fruit breadth was maximum in SAS-1 (4.33 cm). The study indicated that both fresh weight (44.68 g) and dry weight (13.41 g) of fruit were maximum in Mangala. The cultivar Mohit Nagar and Sreemangala recorded maximum kernel length (2.12 cm) and breadth (2.84 cm) respectively. The kernel fresh weight was maximum in SAS-1 (18.38 g) whereas, Mangala (7.86 g) recorded the highest kernel dry weight. Thirthahalli local was found to be the highest chali (3.30 kg/palm) and kalipak (2.84 kg/palm) yielder. Whereas, highest chali and kalipak recovery was recorded in SAS-1 (20.63 % and 19.36 %, respectively). The stem biomass (15.09 t/ha), carbon stock (7.54 t/ha) and carbon sequestration (27.69 t/ha) were found to be maximum in SAS-1. Total organic carbon content and total carbon content were maximum in the rhizosphere of Sumangala at 0-30 cm (13.10 g/kg and 13.24 g/kg, respectively) and at 30-60 cm (11.43 g/kg and 11.55 g/kg, respectively). The soil carbon stock was also highest in the root zone of Sumangala at both surface and sub-surface layers (52.77 t/ha and 46.41 t/ha at 0-30 and 30-60 cm, respectively).

January, 2021

(Bhoomika, H. R.)
Major Advisor

2. Effect of Moisture Stress on Performance of Chia (*Salvia hispanica* L.)

(SHIVASHANKAR)

ABSTRACT

A study on “Effect of moisture stress on performance of chia (*Salvia hispanica* L.)” was conducted at College of Horticulture, Mudigere during 2019-20. The experiment comprised of twelve treatment combinations involving four genotypes and three moisture stress levels tested in a factorial completely randomized design with three replications. Results of the experiment revealed that, genotype H. D. Kote local recorded significantly maximum plant height (96.85 cm), number of leaves per plant (36.83), root length (17.96 cm), root volume (4.03 cc), total fresh weight of plant (25.16 g), total dry matter (12.21 g/plant), leaf area (1548.36 cm²/plant), total chlorophyll content (3.93 mg/g of fresh weight), number of spikes per plant (18.70), seed yield per plant (3.97 g/plant), protein content (21.29 %) and proline content (53.27 µg/g fresh weight). Control - 100 per cent of field capacity (FC) recorded higher values for all the above parameters. Root length, root volume and protein content were found maximum under milder stress level (75 % of FC). Proline content was found maximum (68.75 µg/g of fresh weight) under severe stress level (50 % of FC). Among the interactions, H. D. Kote local with 100 per cent of FC noted significantly maximum plant height (98.66 cm), number of leaves per plant (41.50), total fresh weight of plant (26.43 g), total dry matter (12.87 g/plant), leaf area (2056.99 cm²/plant), number of spikes per plant (20.16) and seed yield per plant (4.95 g/plant). While, the interaction of H. D. Kote local with 75 per cent of FC recorded higher root length (19.08 cm) and root volume (4.11 cc). Similarly, the interaction of H. D. Kote local with 50 per cent of FC recorded higher proline content (76.06 µg/g of fresh weight).

January, 2021

(Sadashiv Nadukeri)
Major Advisor

3. Effect of Foliar Application of Micronutrients on Growth and Herbage Yield of Makoi (*Solanum nigrum* L.) under Hill Zone of Karnataka.

(SHRINIVASA)

ABSTRACT

Field experiment was carried out to study the “Effect of foliar application of micronutrients on growth and herbage yield of Makoi (*Solanum nigrum* L.)” under hill zone of Karnataka at Agricultural and Horticultural Research Station, Thirthahalliduring 2019-20. The experiment comprised of nine treatments and three replications, The experiment was laid out in randomized complete block design (RCBD). The study revealed that among different treatments, plants treated with micronutrient mixture @ 0.5 per cent recorded higher plant height (72.33 cm), number of branches (39.80), plant spread (66.33 cm and 57.20 cm at N-S and E-W, respectively), number of leaves (281.20), leaf area per plant (4455.45 cm²), leaf area index (1.64), higher fresh herbage yield per plant (393.33 g), fresh herbage yield per plot (9.83 kg), fresh herbage yield per hectare (14.56 t), dry herbage yield per plant (123.13 g), dry herbage yield per plot (3.07 kg), dry herbage yield per hectare (4.56 t), dry recovery (34.91 %). The same treatment (T₉) also recorded maximum chlorophyll-a (0.088 mg/g), chlorophyll-b (0.214 mg/g) and total chlorophyll (0.303 mg/g), nitrogen (3.932%), phosphorus (0.314%), potassium (5.036%), copper (19.89 ppm) and iron (134.67 ppm) content in leaves. Whereas, lower residual nitrogen (200.73 kg/ha), phosphorus (17.12 kg/ha), potassium (56.62 kg/ha), copper (3.93 ppm), iron (6.31 ppm), zinc (0.54 ppm) and boron (0.23 ppm) content was found in soil after harvest in same treatment.

The study indicated that foliar application of micronutrient mixture @ 0.5 per cent + RDF + FYM was found optimum for realizing higher growth, herbage yield and higher uptake of nutrients followed by micronutrient mixture @ 0.25 per cent under hill zone of Karnataka.

January, 2021

(Ravikumar, M.)
Major Advisor

4. Effect of Different Media and Nutrient Levels on Growth, Yield and Quality of Ginger (*Zingiber officinale* Rosc.) in Soilless Culture under Protected Structure.

(SUPRIYA G S)

ABSTRACT

A study was conducted to evaluate the effect of different growing media and nutrient levels on growth, yield and quality of ginger (*Zingiber officinale* Rosc.) in soilless culture under protected structure at College of Horticulture Mudigere during 2019-2020. The experiment was laid out in a Factorial Completely Randomized Design with two factors inside a naturally ventilated polyhouse. Factor one being media (cocopeat, cocopeat + perlite – 75:25 and cocopeat + sand – 75:25) and factor two was nutrient levels (80 % RDF + 80 % Secondary and micronutrients, 100 % RDF + 100 % Secondary and micronutrients, 120 % RDF + 120 % Secondary and micronutrients and 140 % RDF + 140 % Secondary and micronutrients). Significant differences were recorded for all the growth and yield parameters under study. M₃(cocopeat + sand – 75:25) recorded maximum plant height, number of leaves, number of tillers per clump, leaf length, leaf breadth, leaf area, leaf area index, number of primary and secondary rhizomes, length of primary and secondary fingers, length of rhizome, width of rhizome, yield per plant and yield per hectare. Media did not exhibit significant influence on absolute growth rate, crop growth rate, crude fibre and oleoresin content in rhizomes. Among the nutrient levels, application of 140 % of RDF + 140 % of secondary and micronutrients recorded maximum values for all the above growth, yield and quality parameters. Interaction effect of media and nutrient levels were also found significant for the traits under study. The treatment M₃N₄(cocopeat + sand – 75:25 and 140 % of RDF + 140 % secondary and micronutrients) recorded maximum plant height (111.70 cm), number of leaves (130.20), number of tillers per clump (13.00), leaf length (22.98 cm), leaf breadth (2.26 cm), leaf area (4503.00 cm² / clump), leaf area index (5.00), AGR (0.81 g / day), CGR (8.97 g / m² /day), number of primary fingers (5.44), secondary fingers (15.78), length of primary fingers (12.57 cm), secondary fingers (6.08 cm), length of rhizome (25.57 cm), width of rhizome (9.49 cm), yield per plant (631.98 g), yield per 1000 square meter (3.79 t) and yield per hectare (37.92 t) . The economics of the cultivation was worked out and the same treatment combination (M₃N₄) recorded highest B: C ratio (1.90).

January, 2021

(Bhoomika, H. R.)

Major Advisor

47. Pollen Cryopreservation And *in Vitro* Studies in *Oroxylum indicum* (L.) Vent.

(HARSHA, R.)

ABSTRACT

An investigation entitled “Pollen Cryopreservation and *In vitro* Studies in *Oroxylum indicum* (L.) Vent” was carried out at the Division of Floriculture and Medicinal Crops, ICAR- Indian Institute of Horticultural Research, Hesaraghatta, Bengaluru in collaboration with College of Horticulture, Mudigere during the academic year 2020-21. The experiment was carried out in Completely Randomized Design (CRD) and replicated thrice. Pollen cryopreservation was undertaken in *O. indicum* and percent pollen germination was studied for 12 accessions at different storage temperatures for six months. Pollens preserved at -196°C (liquid nitrogen) showed the best results when compared to 5°C and -20°C. Among different accessions highest per cent pollen germination was observed in Accession ASRET-2 (98.25±0.25 %) and the pollen had 86.65±0.45 per-cent germination even after 6 months of storage at -196°C. Morphological measurements of pollen such as pollen length, width and perimeter were recorded and results revealed that there was no significant difference among the accessions, and also between the storage temperatures. *In vitro* propagation was carried out using nodal segments as explants and inoculated in MS medium augmented with various combinations of growth regulators (BA, kinetin and NAA). Results revealed that BA (3.0 mg/l) and IAA (0.5 mg/l) combination exhibited higher response with minimum days taken for shoot initiation (19±0.57), maximum number of shoots (3.76±0.08), shoot length (3.4±0.05 cm) and number of leaves (3.50±0.05) per explant. Satisfactory results were obtained after three months of *in vitro* conservation without sub culturing by providing reduced light intensity (2.97 µm⁻²s⁻¹) and maintaining low temperature (10°C) for conservation of tissue cultured plantlets. Among different combinations and concentrations, BA (3.0 mg/l) and IAA (0.5 mg/l) recorded better results with respect to higher survival percentage (100), length of shoot (2.54±0.01 cm) and number of leaves per explant (2.00±0.04). Number of shoots per explant (2.08±0.01) was highest in the treatment combination of BA (3.0 mg/l) and Kinetin (0.5 mg/l) after three months of *in vitro* conservation.

November, 2021
G.)

(Dr. Raviraja Shetty,

Major Advisor

48. Tissue Culture And *in-Vitro* Conservation Studies in *Operculina turpethum* (L.)

Silva Manso.

(RAJESHWARI S. DURGAD)

ABSTRACT

An investigation was undertaken on tissue culture and *in-vitro* conservation studies in *Operculina turpethum* (L.) Silva Manso. at the Division of Floriculture and Medicinal Crops, ICAR- Indian Institute of Horticultural Research, Hesaraghatta, Bengaluru in collaboration with College of Horticulture, Mudigere during 2020-21. The experiment was laid out in Completely Randomized Design (CRD) and replicated thrice. Shoot multiplication was achieved by using nodal explants cultured on MS medium supplemented with various combinations of growth regulators like BAP, Kinetin and NAA. Among different combinations, BAP (1 mg/l) + NAA (0.5 mg/l) induced shoot growth at the earliest (9.15 ± 0.06 days) with the highest shoot multiplication (3.25 ± 0.05) and leaves per explant (4.95 ± 0.04). Whereas, the highest shoot length (4.65 ± 0.05 cm) was noticed on BAP (1 mg/l). The satisfactory results after three months of *in-vitro* conservation were also obtained using BAP (1 mg/l) + NAA (0.5 mg/l) in terms of high survival per cent (100), the highest number of shoots (3.30 ± 0.02) and leaves per explant (4.68 ± 0.04). The highest shoot length (4.78 ± 0.06 cm) was recorded on MS medium supplemented with BAP (1 mg/l). Genetic fidelity assessment of *in-vitro* raised plants and mother plant carried out using ten RAPD (Random Amplified Polymorphic DNA) markers revealed that the micropropagated plants were monomorphic and comparable to the mother plant, which confirmed the genetic uniformity among the clones. These aspects are helpful in conservation, utilization and commercialization of valuable threatened medicinal plant, *Operculina turpethum* (L.) Silva Manso.

November, 2021

(Dr. Raviraja Shetty, G.)

Major Advisor

49. Effect of liquid microbial inoculants and foliar nutrition on quality seedlings production in small cardamom (*Elettaria cardamomum* Maton)

(DARAVATHDIVYABHARATHI)

ABSTRACT

An experiment was carried out to assess the effect of liquid microbial inoculants (nine treatments replicated thrice) and foliar nutrition (seven treatments with three replications) on quality seedling production in Completely Randomized Design during 2020-21 at Zonal Agricultural and Horticultural Research Station, Mudigere. The results of liquid microbial inoculants revealed that, combined inoculation of *Azotobacterchroococcum*, *Bacillus megaterium*, *Bacillus mucilaginosus* and VAM recorded significantly maximum pseudostem height (63.93 cm), pseudostem girth (5.74 cm), number of leaves (10.33), leaf area (1174.41 cm²) per plant, total chlorophyll content (2.30 mg/g), total dry matter production (5.44 g), number of primary (11.30) and secondary roots (78.81), root length (45.39 cm), root thickness (1.71 mm), root volume (13.56 cc), tillering percentage (37.1), Dickson quality index (1.26) and volume index (557.17) at 150 days after inoculation in the secondary nursery compared to other treatments. Similarly, significantly higher microbial population in terms of total bacteria (94.00 cfu/g) at 10⁻⁵, fungi (46.00 cfu/g) at 10⁻³, actinomycetes (23.00 cfu/g) at 10⁻² and C:B ratio (1:1.89) were observed in the nursery media with conjunctive use of liquid microbial inoculants. In case of foliar nutrition study, the treatment comprised of 19:19:19 @ 0.50% + MgSO₄ @ 0.25% + ZnSO₄ @ 0.25% + Borax @ 0.25% recorded significantly maximum pseudostem height (56.07 cm), number of leaves (7.26), leaf area (646.90 cm²), total chlorophyll (1.68 mg/g), total dry matter production (5.61 g), number of primary roots (13.66), number of secondary roots (76.85), root length (41.40 cm), root thickness (1.58 mm), root volume (17.88 cc), tillering percentage (25.43), Dickson quality index (1.56) and volume index (259.87) at 150 days after transplanting. The above results indicated that, combined inoculation of liquid microbial inoculants (*Azotobacterchroococcum*, *Bacillus megaterium*, *Bacillus mucilaginosus* and VAM) found better than foliar nutrition for raising quality seedlings of small cardamom.

December, 2021

(Dr. Ravi, C.S.)
Major Advisor

50. Influence of Growth Retardant and Nutrient Levels on Ginger (*Zingiberofficinale*Rosc.) in Soilless Culture.

(TAMANNAARIF)

ABSTRACT

An experiment was carried out to analyze the influence of nutrient and growth retardant levels on ginger (*Zingiberofficinale*Rosc.) in soilless culture. The experiment was laid out in Completely Randomized Block Design (Factorial) at College of Horticulture, Mudigere, during 2020-2021. Plants were grown in soilless media comprising cocopeat and sand (75:25) in grow bags inside naturally ventilated polyhouse. The experiment consisted 12 treatment combinations comprising of two factors namely growth retardant (Chlorocholine chloride) at three levels (G_1 : CCC@500ppm, G_2 : CCC@1000ppm, G_3 : Control) and nutrients (N) at four levels (N_1 : 100% RDF + 100% Secondary nutrients + Micronutrients, N_2 : 140% RDF + 140% Secondary nutrients + Micronutrients, N_3 : 180% RDF + 180% Secondary nutrients + Micronutrients, N_4 : 220% RDF + 220% Secondary nutrients + Micronutrients). Significant differences were recorded for growth, yield and quality traits with respect to growth retardant, nutrient application and their interaction. Application of CCC@1000ppm and nutrients@ 180% RDF + 180% Secondary nutrients + Micronutrients recorded maximum values for all plant growth, yield and quality parameters. Among the interaction, treatment combination N_3G_2 recorded maximum leaf length (26.57 cm), number of leaves/clump (350.87), leaf area (14274.10 cm²), number of tillers (15.73), chlorophyll content (60.33), length (24.00 cm) and width (11.37 cm) of rhizome, primary fingers (9.70) and secondary fingers (11.60) and fresh rhizome yield (826.67 g/plant and 49.60 t/ha). Quality parameters like essential oil content (1.40%), oleoresin content (10.20%) and crude fibre content (4.70%) were also found highest in the same treatment combination. Pest and disease incidence was recorded throughout the study period and no incidence of diseases was found. Among the insect pests, rhizome fly infestation was recorded and noted in N_1G_1 (3.33%), N_1G_3 (6.66%), N_2G_3 (3.33%) and N_3G_3 (3.33%), which was below the economic threshold level. N_3G_2 combination was found economical with maximum benefit cost ratio (1.91).

December, 2021

(Bhoomika, H. R.)

Major Advisor

Vegetable Science

M. Sc. (Hort.) theses abstracts produced in the
Department of Vegetable Science

1. Heterosis and Combining Ability Studies in Tomato (*Solanumlycopersicum*L.)
Under Protected Condition

(NAYANA, K. R.)

ABSTRACT

The present investigation on “Heterosis and combining ability studies in tomato (*Solanumlycopersicum*L.) under protected condition” was carried out at Department of Vegetable Science, College of Horticulture, Mudigere, during *kharif* and *rabi* season of the year 2020-21. Twenty hybrids derived by crossing five parents in full diallel fashion were evaluated along with the parents and check (ArkaVikas) in a randomized complete block design with two replications. Variance due to parents, hybrids, F_1 s and reciprocals were highly significant for all the characters under study. In case of interaction of F_1 vs. reciprocals except for fruit diameter and firmness, all other traits showed significant differences. Maximum significant economic heterosis and *per se* in desirable direction were recorded in several crosses. Based on heterosis, experimental results revealed that the cross combination EC 15127 \times EC 362941 (119.78%) followed by EC 521069 \times EC 362941 (119.22%) exhibited the maximum heterosis over the standard check for fruit yield per plant. Maximum standard heterosis for lycopene content was observed in the cross VRT 13 \times EC 15127 (30.07%) followed by VRT 13 \times EC 362941 (25.91%), while for firmness cross EC 15127 \times EC 362941 (37.74 %) outlined maximum better parent heterosis. Highly significant GCA effect in desirable direction was exhibited by parent EC 362941 for yield per plant, fruit length, fruit diameter, fruit weight, firmness and shelf life. Among the hybrids, EC 362941 \times EC 15127, EC 362941 \times EC 521069 and EC 15127 \times EC 521061 were found to be good specific combiners for yield and quality characters. The preponderance of SCA variance over GCA variance for most of the traits indicated the predominance of non-additive gene action. Thus, present study revealed that heterosis breeding is useful for the improvement of tomato crop.

November, 2021

(Srinivasa, V.)
Major Advisor

2. Genetic Variability and Character Association Studies for Fruit Yield and Quality Traits in F₄ Population of Brinjal (*Solanum melongena* L.)

(POORNIMA SAJJAN, T. S.)

ABSTRACT

The present investigation was carried out to understand the extent of genetic variability, association between yield and its component traits in F₄ segregating population of three crosses of brinjal viz., Surya × UtkalAnushree, PusaShyamala × Harita and SarparamVanga × Harita at College of Horticulture, Mudigere during Rabi 2020-21. The analysis of data revealed the presence of considerable amount of variability for all the characters studied. High GCV and PCV was recorded for number of flower clusters per plant, number of primary branches, number of fruits per cluster, fruit set percentage, number of fruits per plant and fruit yield per plant among the progenies of three crosses. High heritability coupled with high genetic advance as per cent over mean was observed for most of the characters studied suggesting that these characters can be improved through direct selection due to predominance additive gene action.

Correlation studies among three crosses for fruit yield per plant revealed highly significant positive correlation with the number of primary branches and average fruit weight in the cross Surya × UtkalAnushree, number of flower clusters per plant, number of fruits per plant and average fruit weight in the cross PusaShyamala × Harita and number of flower clusters per plant, number of fruits per plant in the cross SarparamVanga × Harita. Path coefficient analysis for fruit yield per plant revealed that number of fruits per cluster, number of fruits per plant, average fruit weight and days to first flowering had high positive direct effect in all the three crosses indicating the possibility of increasing fruit yield per plant by selecting these characters directly. Among the selected transgressive segregant lines P-165, P-85 and P-116 from the crosses Surya × UtkalAnushree, PusaShyamala × Harita and SarparamVanga × Harita respectively had recorded highest ascorbic acid and anthocyanin content, which can be utilized for further crop improvement programme.

November, 2021

(Dr. Devaraju.)
Major Advisor

3. Genetic Variability Studies in Colocasia (*Colocasia esculenta* L.) Genotypes for Yield and Quality Components Under Hill Zone of Karnataka

(SANGEETA)

ABSTRACT

A field experiment was conducted during *rabi* 2020-21 at College of Horticulture, Mudigere, to assess the genetic variability in twenty colocasia genotypes. The experiment was laid out in a randomized complete block design with three replications. The analysis of variance exhibited highly significant differences among the genotypes for all the characters under study. Among the twenty genotypes evaluated, Piriya pattana Local performed better for most of the characters like plant height (174.97 cm), number of leaves per plant (9.37), leaf length (48.16 cm), leaf breadth (42.80 cm), petiole length (37.93 cm), petiole girth (6.73 cm), leaf area (1545.93 cm²), leaf area index (5.36), number of corms per plant (3.60), corm weight (4.31 kg), corm yield per plant (891.33 g), tuber yield per plant (1149.00 g), total sugars (5.75 %), protein content (11.68 %) and dry matter (46.00 %). High heritability coupled with high genetic advance as per cent over mean was recorded for all the traits except for leaf thickness, cormel width and protein content. Thus, there is a bountiful scope for improving these attributes through direct selection. Correlation studies revealed that tuber yield per plant exhibited highly significant and positive correlation with plant height, number of leaves per plant, leaf length, petiole length, leaf area, cormel weight, number of corms per plant, number of cormels per plant, corm yield per plant, cormel yield per plant. Path coefficient analysis revealed that tuber yield per plant had direct positive effect on plant height, number of leaves per plant, leaf length, corm yield per plant and cormel yield per plant. Based on the mean performance, genotypes such as Piriya pattana Local, Balehonnur Local, Kushalnagar Local and Hyderabad Local were found superior and these genotypes can be utilized for further crop improvement programme.

December, 2021

(Dr. Devaraju.)
Major Advisor

4. Genetic Investigation on Yiled and Yield Attributing Characters in Pole Type of Dolichos Bean (*Lablab purpureus* L.) Germplasm Under Hill Zone of Karnataka

(BHAGYASHRI)

ABSTRACT

The field experiment was conducted to study genetic variability in pole type of dolichos bean genotypes in the experimental block of Department of Vegetable Science, College of Horticulture, Mudigere, during 2020-2021. The experiment was laid out in Randomized Complete Block Design with two replications during *Rabi* season. The analysis of variance revealed that highly significant differences among genotypes for most of the characters under study. High estimate of heritability coupled with high genetic advance over per cent of mean were noticed for number of primary branches at 30 DAS, leaf area per plant at 30, 60 and 90 DAS, chlorophyll b at 30, 90 DAS and harvest, days to first flowering, number of flowers per cluster, number of pods per cluster, number of pods per plant, average pod weight, pod length, total sugars, reducing sugars, non-reducing sugars and total soluble solids which indicated that these attributes are under the influence of additive gene action. Thus, there was plentiful scope for improving these characters through direct selection. Correlation studies revealed that pod yield per plant showed highly significant and positive correlation with the number of pods per cluster, average pod weight and number of seeds per pod. Path analysis exhibited that pod yield per plant had direct positive effect on total chlorophyll at harvest, number of pods per plant, number of pods per cluster, average pod weight and number of seeds per pod. Based on D² analysis, 30 genotypes of dolichos bean were grouped into five clusters. Among the characters studied, pod yield per plant contributed maximum (32.00 %) to the genetic diversity. The top five promising genotypes identified based on mean performance from present study were IC-426959, ArkaAdarsh, IC-526921, IC-427443 and IC-426957 for higher yield which can be utilized for further crop improvement under hill zone of Karnataka.

December, 2021

(Dr. Srinivasa, V..)
Major Advisor

5. Assessment of Onion (*Allium cepa* L.) Varieties for Yield and Dehydration Attributes

(MEGHANA, N.)

ABSTRACT

A field experiment was conducted during *rabi* 2020-21 at Zonal Agricultural and Horticultural Research Station, Babbur Farm, Hiriyur, Chitradurga to assess the eleven onion varieties for yield and dehydration. The experimental material consisted of ten onion varieties collected from Directorate of Onion and Garlic Research, Pune along with local check variety Satara Garva. The analysis of variance exhibited highly significant differences among the varieties for all the characters under study. Among the eleven varieties evaluated, the Bhima Shakti performed better for most of the characters *viz.*, plant height (62.33 cm), number of leaves (8.53), leaf length (61.24 cm), polar diameter (4.65 cm), equatorial diameter (5.25 cm), bulb weight (88.21 g), total bulb yield per hectare (38.31 t/ha) and marketable bulb yield (94.93 %). Correlation studies indicated that marketable bulb yield had positive and significant correlation with leaf length, collar thickness and total bulb yield per plot. Results on path analysis revealed that traits like leaf length, neck thickness, polar diameter, total bulb yield per plot and per cent A grade bulb yield had positive and direct effect on marketable bulb yield. Same eleven onion varieties were used for dehydration and this experiment was conducted at Department of Post Harvest Technology, College of Horticulture, Mudigere. Among them, physico-chemical parameters were found superior in the variety Bhima Shubra *viz.*, dry matter (13.25%), total sugar content (23.80 %), dehydration ratio (9.55) and rehydration ratio (5.77). The results of sensory evaluation of dehydrated onion flakes revealed that, Bhima Shubra was superior among the eleven varieties tested, having overall acceptability score of 4.50 which was on par with Bhima Kiran (4.18) and Bhima Red (4.03) respectively. Considering the growth, yield and dehydration attributes the varieties *viz.*, Bhima Shakti, Bhima Shubra, Bhima Kiran and Bhima Red were suitable for *rabi* season under central dry zone of Karnataka.

December, 2021

(Dr. Prakash Kerure.)
Major Advisor

Forestry

Silviculture and Agroforestry

1. Studies on Seed Storage Techniques and Germination in *Persea macrantha* Nees

JYOTHI, K. C

ABSTRACT

Seed storage is an important *Ex-situ* conservation method especially for rare, endangered and threatened tree species. *Perseamacrantha* is an important tree which has been used extensively for the extraction of Jigatu from its bark and vulnerable to under category of RET. The seeds are recalcitrant which loose viability in shorter period as in case of orthodox seeds, this can be achieved by storing dry state under ambient temperature and low relative humidity but desiccation sensitive nature of recalcitrant species act as a hurdle for its storage. To overcome this problem investigation on seed storage technique and germination of *Perseamacrantha* was conducted by collecting the seeds from natural population and storing seeds in three different containers for four storage periods after imposing seven different storage chemicals and materials. The study reveals that among the different storage containers, germination per cent of seeds was maximum (55.51%) in polythene bags and without treating with chemicals and materials exhibited maximum germination (72.49 %). Maximum germination (45.92 %) was observed in seeds sown after 90 days of storage (D4). Seeds stored in Polythene bags attained maximum shoot and root length (51.23 cm and 30.44 cm respectively). Seeds treated with chemicals revealed that seeds under control had maximum shoot and root length (35.26 cm and 20.10 cm respectively).

February, 2021

(Maheswarappa, V)
Major Advisor

2. Studies on Enhancement of Flowering and Fruiting in Teak Clonal Seed Orchard

(SANDESH KUMAR)

ABSTRACT

Teak is an important tree species in the Indian subcontinent and south-east Asia, which yield timber of a versatile range of uses. In India, teak has existed in an area of 8.9 m ha and annually around 50,000 ha plantations are being raised. It has been estimated that about 190 tonnes of seeds are required were collected from unidentified sources. Hence, the seed production area and seed orchards play an important role by providing quality seeds. However, poor seed set due to self-incompatibility among the breeding populations is a major concern for forest managers for supplying the quality planting material for raising plantations. An attempt has been done in assessing flowering behavior and the impact of different treatments on flowering and fruiting enhancement at Majjigehalla teak clonal seed orchard at Thithimathi. Flowering phenology was assessed for 24 clones to ascertain synchrony and asynchrony among clones with different treatments were imposed to enhance flowering and fruiting. Flower initiation in teak starts from the 2nd week of May and continued up to October. Clones from the southern region initiate flowering early when compared to clones from the northern region. Peak flowering occurs from June to September. Overlap index showed that there is good synchrony has existed between the clones for the better exchange of genes. Fruit development in teak had taken more than six months and matured fruits are available from January month onwards. The effect of different treatments on enhancing flowering and fruiting was found to be significant among treatments, provenances, and clones. Among various treatments, application of 2.5 kg DAP was found effective in enhancing flowering, whereas, application of 50 ml paclobutrazol, soil working around the tree has enhanced fruiting in Teak. The combination of soil working and fertilizer application can be taken as standard orchard management.

February, 2021

(Hareesh T. S.)
Major Advisor

3. Studies on Nutrient Management in *Calamus thwaitesii* becc. at Nursery Stage

(DIVYA R)

ABSTRACT

Rattans (canes) are long slender stemmed climbing/trailing palms exploited for their flexible stems. Species of *Calamus* are dioecious, seed set is poor and seed availability is uncertain. Besides, extraction of canes is often done before flowering and hence seed-bearing mature palms are confined to protected forests in wildlife sanctuaries and national parks. Production of large number of seedlings of *Calamusthwaitesii* is a challenging task because of poor seed germination and very slow growth of seedlings. Therefore the present study was devised to enhance the growth rate of the *Calamusthwaitesii* seedling by nutrient management in the nursery stages, and also to understand the effect of conventional (organic and inorganic fertilizers) and biofertilizers on seedling growth. The results revealed that in conventional fertilizers 1.5 g of DAP with 1.5 g of MOP is recommended for the better growth performance of the *Calamusthwaitesii* seedlings in nursery stage. But in case of Bio-fertilizers T4 (KSB (10 g) + Mycorrhizal culture (10g) /seedling) and T5 (*Azospirillum* (10 g) + PSB (10 g) + Mycorrhizal culture (10g) /seedling) showed the best result with respect to height (52.34 cm), collar diameter (13.32 mm), number of leaves (7) and biomass. Hence, T4 and T5 is recommended for the *Calamusthwaitesii* seedlings in nursery stage for better seedling performance. It is evident that the use of phosphate solubilizing bacteria along with the recommended inorganic phosphate and potassium fertilizers will result in the efficient utilization of the inorganic fertilizers leading to the better growth and development of *Calamusthwaitesii* seedling in the nursery stage.

April, 2021

(Sathish B.N.)
Major Advisor

4. Influence of Host Plants and Potting Mixture on Growth and Development of Sandal at Nursery Stage

(SHUBHASHREE SAHU)

ABSTRACT

Sandalwood (*Santalum album* L.) is one of the most valuable commercially cultivated aromatic species throughout the world. However, the availability of quality planting stock is the current bottleneck in its establishment on large scale. The major problems, noticed during quality planting stock production in nurseries are scarce knowledge about host-parasite relationship and use of appropriate potting mixture apart from its seed germination. In this regard two experiments were carried out at the College of Forestry, Ponnampet during 2020-2021 to identify suitable host plant and potting mixture for production of quality seedlings. Growth parameters and physiological parameters were recorded at 90, 180 and 270 days after transplanting sandal seedlings into treatments. At the end of experiment in the host plant *Albizia lebeck* recorded higher survival of sandal seedlings (81.89 %) and in the host plant *Casuarina junghuhniana* had higher height growth (10.40 cm) with collar diameter 2.33mm. Similarly, at the end of experiment the volume index and volume index increment, root to shoot ratio of sandal (0.49) was highest in host plant *Casuarina junghuhniana*. The minimum sturdiness quotient found in host plant *Alternanthera sessilis* (3.15) suggesting importance of host plant at nursery stage. Stomatal conductance and intercellular CO₂ concentration was higher in host plant *Alternanthera sessilis* (66.13 mol H₂O m⁻² S⁻¹ and 290.85 μmol CO₂ mol⁻¹). Potting mixture sand, soil, vermicompost, *Glomus intraradices* along with *Casuarina junghuhniana* found effective for height (18.25 cm), collar diameter (2.58 mm) and sturdiness quotient (6.15) of sandal seedlings.

July, 2021

(Ramakrishna Hegde)

Major Advisor