

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

1. Influence of Integrated Nutrient Management on Growth and Yield of Davana [Artemisia pallens Wall.]

KUSUMA, M.V.

ABSTRACT

An investigation to study the effect of “Influence of Integrated Nutrient Management on Growth and Yield of Davana [*Artemisia pallens* Wall.]” was carried out in the experimental field, Department of Plantation, Spices, Medicinal and Aromatic crops, at College of Horticulture Mudigere during *rabi* season of 2011-2012. The experiment was laid out in randomized complete block design with 3 replications and 12 treatment combinations, comprising of inorganic fertilizers, organic manures and biofertilizers. Application of 75%RDF + *Azospirillum* 2 kg ha⁻¹ (T₅) recorded the highest plant height (45.18 cm), highest fresh weight of leaves (7.02 g), dry weight of shoot (6.4 g), less number of days (58 days) for inflorescence initiation, maximum fresh herbage yield (20.64 g) and fresh herbage yield per hectare (18.3 t). Application of 50%RDNPK + Vermicompost 2.5 t ha⁻¹ + *Azospirillum* 2 kg ha⁻¹ + PSB 2 kg ha⁻¹ (T₁₂) recorded the highest number of leaves per plant (147.2), number of laterals per plant (19.49), stem girth (1.41 cm), dry weight of leaves (3.12 g), fresh weight of shoot (29.56 g), fresh and dry weight of root (4.57 g and 1.15 g respectively) and recorded maximum length of inflorescence (25.34 cm). The maximum net return (Rs. 66,946 ha⁻¹) and benefit cost ratio (1.56) for herbage yield and the maximum net profit per hectare (Rs. 3, 90, 046) and benefit cost ratio (6.40) essential oil yield was recorded in the treatment supplied with 75%RDF + *Azospirillum* 2 kg ha⁻¹ (T₅). There was an improvement in growth, yield and quality parameters with the application of *Azospirillum*, PSB and Vermicompost along with RDF.

November, 2012

(Raviraja Shetty, G.)
Major Advisor

2. Performance of Turmeric (*Curcuma Longa L.*) Cultivars in Hill Zone of Karnataka.

VEENA HANCHINAMANI

ABSTRACT

A field experiment was carried out in randomized block design with three replications to assess the performance of turmeric cultivars under hill zone condition of Karnataka at College of Horticulture, Mudigere, Karnataka during 2011-12. Among nineteen turmeric cultivars evaluated, Kanti recorded highest plant height (41.44 cm), and maximum number of tillers per plant (5.83), cultivar CLT-325 showed higher number of leaves per plant (19.00), leaf area (38.52 dm²) and leaf area index (4.28) at 180 days after planting. Maximum fresh rhizome yield of 21.34 t ha⁻¹ was observed in Kanti followed by Rajapuri (21.04 t ha⁻¹), CLT-325 (20.99 t ha⁻¹) and PTS-24 (20.95 t ha⁻¹), whereas highest cured rhizome yield was exhibited by Kanti (5.59 t ha⁻¹), CLT-325 (5.33 t ha⁻¹) and PTS-24 (5.33 t ha⁻¹). Highest percentage of curcumin content was observed in PTS-24 (7.23 %), Kanti (7.13 %) and Sobha (6.83 %). The cultivars Kanti (245 days), CLT-325 (235 days), Rajapuri (225 days) and PTS-24 (216 days) are medium duration types which are showed better performance. CLT-325, Kanti and PTS-24 are found resistant to leaf blotch and shoot borer compare to rest of the cultivars under study. Correlation study revealed that fresh rhizome yield per hectare exhibited positive and significant correlation with plant height (0.394), number of tillers per plant (0.325), number of leaves per plant (0.298), petiole length (0.555), number of mother rhizome per plant (0.473), number of primary fingers per plant (0.456), number of secondary fingers per plant (0.492), weight of mother rhizome (0.548), weight of secondary fingers (0.425), length of primary fingers (0.603) and fresh rhizome yield per plant (0.811). Among the turmeric cultivars studied, Kanti, CLT-325, PTS-24 and Rajapuri showed better performance with respect to growth, yield and quality parameters and found promising suitable cultivar for rainfed situations of hilly region of Karnataka.

November, 2012

(Raviraja Shetty, G.)
Major Advisor

3. Genetic Variability for Herbage and Seed Yield in Coriander (*Coriandrum Sativum* L.) Under Hill Zone of Karnataka

ARIF A

ABSTRACT

The experiment was undertaken to evaluate seventy one coriander genotypes in Randomized Complete Block Design with two replications to study the genetic variability, heritability, correlation and path analysis at College of Horticulture, Mudigere during the period between January-2012 to March-2012. Analysis of variance revealed highly significant (at $P=0.01$) difference among genotypes for thirty one parameters studied. Broad genetic base was evident as the value of genotypic and phenotypic coefficient of variance was high for plant height at 30 DAS, thousand seed weight, number of secondary branches at 60 DAS and harvest index. High heritability coupled with high genetic advance was observed for number of leaves and fresh weight of the plant at 30 DAS, dry weight of the plant at 30, 60 DAS at harvest, herbage yield, number of seeds per umbellet at 60 DAS and at harvest, seed yield per plant and seed yield per hectare indicated the predominant role of additive genetic component in governing of these traits. Correlation studies indicated highly significant and positive association of seed yield per plant with number of umbels per plant at 60 DAS, number of umbellets per umbel at 60 DAS and thousand seed weight both at genotypic and phenotypic level, whereas herbage yield and number of seeds per umbel at 60 DAS showed positive and significant correlation for both at genotypic and phenotypic level. Path coefficient analysis revealed that plant height at 60 DAS, number of leaves at 60 DAS, dry weight of the plant at 60 DAS, herbage yield, days to fifty per cent flowering, number of umbels per plant at 60 DAS, number of umbellets per umbel at 60 DAS, crop duration, harvest index, seed yield per hectare characters have direct positive effect on seed yield. Among 71 genotypes evaluated, the genotypes DCC 37, DCC 49 and DCC 51 were found promising in terms of both herbage and seed yield under hill zone of Karnataka.

November, 2012

(Vishnuvardhana)
Major Advisor

4. Effect of Growth Regulators and Media on Rooting of Black Pepper (*Piper nigrum*) Cuttings.

AKSHAY K.R.

ABSTRACT

An investigation on Effect of media and growth regulators on rooting of black pepper (*Piper nigrum* L.) cuttings was conducted during 2011-12 at the Regional Horticultural Research and Extension centre, Mudigere, University of Horticultural Sciences, Bagalkot. The study pointed out that, among the different growth regulator formulations tried, IBA 1000 ppm formulation helped in better induction of rooting by over 70 per cent as against 43.33 per cent in the control. The next promotive effect in this regard was by treatment of IBA 500 ppm and NAA 250 ppm which recorded 66.67 and 63.33 per cent respectively. However, use of higher concentrations of both IBA and NAA were not appreciable for black pepper cuttings. Among the different rooting media tried, black pepper cuttings which were pre-treated with IBA 1000 ppm and planted in the media containing soil + sand + FYM + vermicompost (1:1:1:1) recorded highest rooting percentage i.e. 80 per cent which is on par with soil + sand + FYM + vermicompost in 2:1:1:1 proportion (76.67 %) and soil + sand + FYM + coir dust in 1:1:1:1 proportion (76.67 %). The studies revealed that black pepper plants could be multiplied easily by pretreatment of cuttings with IBA 1000 ppm and growing in the media comprising soil + sand + FYM + vermicompost (1:1:1:1 v/v) in polyhouse conditions. As an alternative, the medium comprising of coir dust can also be used in the places where, vermicompost is scarce and costly. By this way, higher turnover of planting material can be accompanied quite easily.

November, 2012

(Narayana Swamy, M.)
Major Advisor

5. Performance of Ginger (*Zingiber Officinale* Rosc.) Varieties Under Hill Zone of Karnataka

KALLAPPA S NARODE

ABSTRACT

A field experiment was carried out in randomized block design with three replications to assess the performance of ginger varieties under hill zone condition of Karnataka at College of Horticulture, Mudigere, Karnataka during 2012-13. Among ten ginger varieties evaluated, Maran recorded highest plant height (71.80 cm), maximum number of tillers per plant (23.43), higher number of leaves per clump (308.33), leaf area (45.06 cm²) and leaf area index (15.41) at 180 days after planting. Maximum fresh rhizome yield of 29.37 t/ha was observed in Maran followed by Rio-de-Janeiro (28.04 t/ha) and Karkal Local (25.84 t/ha) whereas highest curing percentage was recorded in Maran (28.97%) and the lowest was recorded in the variety Humanabad Local (19.27%). There was significant difference among varieties for cured yield and it ranged from 8.41 tonnes per hectare (Maran) to 3.65 tonnes per hectare (Humanabad Local). The highest crude fibre content was recorded in variety Karkal Local (6.73%) and the lowest was recorded in variety IISR-Varada (3.70%). Essential oil content was maximum in variety Rio-de-Janeiro (2.31%) and the minimum was recorded in variety Humanabad Local (1.06%). The oleoresin content was maximum in Rio-de-Janeiro (9.06%) and the minimum was recorded in variety Himagiri (4.20%). The varieties Rio-de-Janeiro, Maran, IISR-Mahima and IISR-Varada are early (< 209 days) types which showed better performance. Maran and Humanabad Local are found resistant to soft rot and shoot borer compare to rest of the varieties under study. The highest cost-benefit ratio (Rs. 6.93) was obtained in the variety Maran. Among the ginger varieties Maran, Rio-de-Janeiro and Karkal Local showed better performance with respect to growth, yield and quality parameters and found promising suitable varieties for rainfed situations of hilly region of Karnataka.

September, 2013

(Raviraja Shetty, G)
Major Advisor

6. Effect of Spacing and NPK on Growth, Yield and Alkaloid Content of Makoi (*Solanum Nigrum L.*) Under Hill Zone of Karnataka

NAGARAJ GOKAVI

ABSTRACT

A field experiment was carried out to study the response of makoi to different levels of spacing and NPK during 2012-2013 at Horticulture Research Station, Thirthahalli, University of Horticultural Sciences, Bagalkot. The experiment comprised 16 treatment combinations consisting of two levels of spacing and eight levels of nutrients i.e., two levels of nitrogen, two levels of phosphorus and two levels of potassium and their combination. Results revealed that significantly higher plant height (70.41 cm), fresh (14.33 t ha⁻¹) and dry (2.58 t ha⁻¹) herbage yield per hectare, alkaloid content (0.33 % w/w) and higher uptake of nitrogen (92.41 kg ha⁻¹), phosphorus (13.13 kg ha⁻¹), potassium (43.94 kg ha⁻¹) in plants was recorded at 60 x 45 cm spacing. Application of 125:75:75 kg NPKha⁻¹ recorded significantly higher plant height (74.27 cm), fresh (16.03 t ha⁻¹) and dry (3.71 t ha⁻¹) herbage yield per hectare, alkaloid content (0.37 % w/w) and higher uptake of nitrogen (132.56 kg ha⁻¹), phosphorus (15.34 kg ha⁻¹), potassium (66.85 kg ha⁻¹) in plants. Among the different interactions, significantly higher plant height (76.00 cm), fresh (16.74 t ha⁻¹) and dry (4.52 t ha⁻¹) herbage yield per hectare, alkaloid content (0.38 % w/w), higher net returns (Rs. 49, 388.78) and B: C ratio (3.69:1) was observed in crop spaced at 60 x 45 cm and supplied with 125:75:75 kg NPK ha⁻¹. The study indicated that planting the crop at the spacing of 60 x 45 cm and application of 125:75:75 kg NPK ha⁻¹ was found optimum for realizing higher herbage yield, alkaloid content and B:C ratio under hill zone of Karnataka.

September, 2013

(Ravikumar M)
Major Advisor

7. Evaluation of Turmeric (*Curcuma Longa L.*) Cultivars in Southern Dry Zone of Karnataka

SIDDALINGAYYA SALIMATH

ABSTRACT

Afield experiment was carried out in randomized block design with three replications to evaluate the turmeric cultivars under southern dry zone of Karnataka at College of Horticulture, Mysore during 2012-13. Among sixteen turmeric cultivars evaluated, Salem recorded highest plant height (37.07 cm), and maximum number of tillers per plant (3.80), cultivar CLT-325 showed higher number of leaves per plant (17.67), the Cuddapah recorded highest leaf area (55.83 dm²) and leaf area index (7.40) at 180 days after planting. Maximum fresh rhizome yield of 33.67 t ha⁻¹ was observed in Salem which was on par with Rajapuri (32.67 t ha⁻¹), Prathibha (32.56 t ha⁻¹) and CLT-325 (32.49 t ha⁻¹), whereas highest cured rhizome yield was exhibited by Salem (8.31 t ha⁻¹) and CLT-325 (7.98 t ha⁻¹). Maximum percentage of curcumin content was observed in PTS-24 (7.20 %) and Prabha (6.45 %). The cultivars Cuddapah (253 days), Rajapuri (251 days), Salem (240 days), CLT-325 (236 days) and PTS-24 (246 days) were of medium duration types showed better performance. PTS-24, Rajapuri and Prabha were found resistant to leaf blotch and shoot borer compared to rest of the cultivars under study. The Correlation study revealed that fresh rhizome yield per hectare exhibited positive and significant correlation with plant height (0.773), number of tillers per plant (0.689), number of leaves per plant (0.725), petiole length (0.293), leaf area index (0.510), number of mother rhizome per plant (0.609), number of primary fingers per plant (0.686), number of secondary fingers per plant (0.408), weight of mother rhizome (0.778), weight primary fingers (0.819), weight of secondary fingers (0.724), length of primary fingers (0.687), length of secondary fingers (0.700) and fresh rhizome yield per plant (0.988). Among the turmeric cultivars studied, Salem, Rajapuri, Prathibha and CLT-325 showed better performance with respect to growth, yield and quality parameters and found promising suitable cultivars for southern dry zone of Karnataka.

May, 2013

(J. Venkatesh)
Major Advisor

8. Performance of Fenugreek (*Trigonella Foenum-Graecum* L.) Genotypes for Leaf and Seed Yield Under Hill Zone of Karnataka

BASAVARAJA, O.

ABSTRACT

The present investigation was carried out at Regional Horticulture Research and Extension Centre, Mudigere during rabi season of 2011-12 to study the performance of thirty genotypes fenugreek originated in various region. Variability, correlation and path analysis followed to identify the promising genotypes for hill zone of Karnataka. All the genotypes varied significantly with respect to growth, yield and yield attributing characters. Among tested genotype the DFC-17 superior with respect to growth parameters, DFC-21 for yield characters and DFC-16, Belur local genotypes for leaf yield at early and late harvest stage. The phenotypic coefficient of variance (PCV) and genotypic coefficient of variance (GCV) were maximum for the seed yield per plant, plant spread at 60 DAS, number of pods per plant and harvest index. The estimation of Heritability and genetic advance over mean were highest for fenugreek seed yield per plant, harvest index, 1000 seed weight, and number of branches per plant at 60 DAS. The harvest index was found to be positive and significantly correlated with seed yield per plant at genotypic and phenotypic levels. In path analysis it is revealed that plant height at 90 DAS, plant spread at 90 DAS, number of pods per plant, number of seeds per pods and 1000 seed weight were having high positive direct effect on seed yield of fenugreek. Existence of high variability, wide variation between PCV and GCV coupled with moderate to low heritability and genetic advance of both additive and non additive interaction may be exploited for further breeding programme.

May, 2013

(Vishnuvardhana)
Major Advisor

9. Effect of Integrated Nutrient Management on Kasuri Methi (*Trigonella Corniculata* L.) Under Hill Zone of Karnataka

SUNANDA B. BABALESHWAR

ABSTRACT

Kasuri methi is an herbaceous, annual spice crop. The herb as well as seed having the economic importance, the dried herb is used as a spice for seasoning of varieties of foods and the seeds is having medicinal importance. The field experiment entitled "Effect of integrated nutrient management on kasuri methi (*Trigonella corniculata* L.) under hill zone of Karnataka" was conducted at ZAHRS Mudigere, during the *rabi* season of 2013 on red sandy loam soil to study the effect of integrated nutrient management on growth, yield, nutrient uptake and to work out the economics. The experiment was laid out in a randomized complete block design with twelve treatments replicated thrice. Significantly the maximum plant height (45.64 cm), number of leaves (86.05), number of branches (25.64), plant spread NS and EW (30.14 and 30.47 cm respectively), leaf area 60 DAS (414.27 cm²), leaf area index (1.38), AGR at 30-60 DAS and 60-90 DAS (0.21 and 0.26 g/day respectively), CGR at 30-60 DAS and 60-90 DAS (7.09 and 9.23 g/m²/day respectively), chlorophyll content (21.44 mg/100.mg of tissue), fresh herb yield (8.02 t ha⁻¹) and dry herb yield (1.88t ha⁻¹) were recorded in the plants supplied with 75% N (60 kg/ha) + RD PK (25:50 kg ha⁻¹) + FYM (7.5 t/ha) I *Rhizobium* (1.5 kg/ha) + *Azo.spirilhim* (5 kg/ha) + PSB (5 kg/ ha). Similarly number of pods per plant (620), pod length (2.14 cm), seed yield (465.31 kg ha⁻¹), crude protein content in the herb and seed (13.31 % and 21.33 % respectively), nitrogen, phosphorous and potassium uptake in whole plant (70.92 kg ha⁻¹, 21.64 kg ha⁻¹ and 31.82 kg ha⁻¹ respectively) and net returns (79951.94 Rs/ha) and B:C ratio (2.97:1) were recorded in the same treatment.

July, 2014

(Raviraja Shetty. G.)
Major Advisor

10. Effect of Integrated Nutrient Management on Growth, Yield and Quality of Ginger (*Zingiber Officinale* Rosc.) Under Hill Zone of Karnataka

HEMANTH, C. V

ABSTRACT

A field experiment was conducted to study the "Effect of integrated nutrient management on growth, yield and quality of ginger (*Zingiber officinale* Rose.) under hill zone of Karnataka" at the field of Department of plantation, spices, medicinal and aromatic crops, College of Horticulture, Mudigere, during 2013-14. The experiment was laid out in Randomized Complete Block Design with eleven treatments replicated thrice. Significantly the maximum plant height (63.29 cm), number of tillers (20.07), number of leaves (220.76), leaf length (24.42 cm), leaf breadth (2.43 cm), leaf area (39.55 cm²), fresh weight of the plant (314.64 g), dry weight of the plant (60.23 g), number of primary rhizomes (6.80), length of rhizome (18.96 cm), fresh rhizome yield (36.21 t/ha), cured rhizome yield (9.65 t/ha), dry recovery percentage (26.69) and highest oleoresin content (8.42 %) were recorded in the plants supplied with 50% N + PK + coffee husk compost (10 t/ha) + *Azospirillum* (5 Kg/ha) + PSB (5 Kg/ha). Similarly minimum incidence of shoot borer and soft rot disease at 90, 120 and 150 days after planting (10.57 and 9.60, 11.44 and 10.71, 11.90 and 8.64 (%) respectively), maximum uptake of nitrogen (115.62 Kg/ha), phosphorous (29.29 Kg/ha) and potassium (214.88 Kg/ha), higher net returns (Rs 11,23,256 per ha) and B:C ratio (7.79:1) were recorded in the same treatment. The maximum number of secondary rhizomes (20.20) was recorded in T₁ (RD NPK + coffee husk compost (10 t/ha)). The highest essential oil content (2.42 %) was recorded in T₇ (50% N + PK + FYM + *Azospirillum* (5 Kg/ha) + PSB (5 Kg/ha)), whereas highest crude fibre content (6.66 %) was recorded in T₅ (75% N + PK + vermicompost (5 t/ha) + *Azospirillum* (5 Kg/ha) + PSB (5 Kg/ha)).

October, 2014

(Raviraja Shetty G)
Major Advisor

11. Effect of Organic Manures and Inorganic Fertilizers on Growth and Herbage Yield of Makoi (*Solan Urn Nigrum L.*) Under Hill Zone of Karnataka

SHIVAKUMAR, H. J.

ABSTRACT

A field experiment was carried out to study the effect of organic manures and inorganic fertilizers on growth and herbage yield of makoi at Agricultural and Horticulture Research Station, Thirthahalli during 2013-2014. The experiment comprised often treatments of organic manures (FYM and vermicompost) and inorganic fertilizers in different combinations, tested in a randomized complete block design with three replications. The study revealed that significant difference was observed among the treatments for all growth and yield characters under studied. Maximum plant height (65.03 cm), number of leaves/plant (210.33), leaf area (650 cm²), number of branches/plant (14.80), plant spread, north-south direction (51.25 cm) east-west direction (44.23 cm), fresh herbage yield (13.07 t ha⁻¹) and dry herbage yield (4.05 t ha⁻¹), higher alkaloid content (0.40 % w/w), Alkaloid yield (16.20 kg ha⁻¹), higher uptake of nitrogen (126.21 kg ha⁻¹), phosphorus (8.23 kg ha⁻¹), potassium (29.56 kg ha⁻¹) in plants and higher net returns (Rs. 73,781) and B: C ratio (1:3.69) was observed in treatment with the application of vermicompost (It/ ha) + 100 % RD NPK ha⁻¹ followed by the treatment with the application of vermicompost (It/ ha) + 75 % RD NPK recorded higher net returns (Rs.49,437) and B:C ratio (1:2.88).

The study indicated that the application of vermicompost (It/ ha) + 100 % RD NPK was found optimum for realizing higher herbage yield, alkaloid content, higher uptake of nutrients and B: C ratio under hill zone of Karnataka.

July, 2014

(M. Ravikumar)
Major Advisor

12. Studies on Genetic Variability and Tissue Culture in *Decalepis Hamiltonii* Wight. & Arn. : An Endemic Threatened Medicinal Plant

PRANAY KUMAR

ABSTRACT

An investigation was taken up to study the morphological characters, *in-vitro* propagation, *in-vitro* conservation and genetic fidelity assessment of the *in-vitro* raised plants of *Decalepis hamiltonii* Wight. & Arn. at Division of Plant Genetic Resources, Indian Institute of Horticultural Research (IIHR), Hessarghatta, Bangalore during 2014-2015.

Morphological characterization of six accessions of *D. hamiltonii* was studied. The genotypic and phenotypic coefficients of variations were high for characters *viz.*, pedicel length, fruit length and petiole length. High genetic advance over mean coupled with high heritability was observed in characters like petiole length (93.13%), fruit length (87.43%), fruit yield (80.63%) and leaf length (72.44%). Correlation study revealed that petiole length, pedicel length and fruit diameter had significant positive correlation with yield per plant. According to path analysis, leaf width, petiole length and fruit length had high positive direct effects on yield per plant. Plant height, leaf length, pedicel length, fruit diameter, thickness of pericarp and thickness of mesocarp had negative direct effects on yield. Among various combinations used in tissue culture, BA (0.886 mg/l) +2ip (0.24 mg/l) treatment significantly influenced for increase in shoot length, number of shoots, number of leaves and survival per cent.

Genetic fidelity assessment of *in-vitro* raised plants of *D. hamiltonii* revealed that micropropagated plants were similar to mother plant indicating no genetic variation in *in-vitro* raised plants.

July, 2015

(RavirajaShetty. G.)
Major Advisor

13. Propagation Studies in *Celastrus Paniculatus* Willd.- An Endangered Medicinal Plant

POOJITHA, K. G.

ABSTRACT

An experiment was carried out to study the propagation of *Celastrus paniculatus* Willd. at the Department of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Mudigere, during the year 2013-14. The work was initiated to standardize the seed and vegetative propagation techniques and morphological characterization of this important RET medicinal plant. Among the different germination inducing treatments, the seeds treated with gibberellins at 400 ppm showed higher germination percentage (62.67), germination rate (0.78) and seedling vigour (2082.74). In vegetative propagation, stem cuttings treated with IBA 2000 ppm recorded maximum sprouting percentage (98.66) and rooting percentage (74.25) 120 days after planting. For tissue culture, nodal segments were used as explant and among various combinations, satisfactory results were obtained in terms of number of shoots and number of leaves by using a combination of BAP (4.44 μm) + Kn (0.232 μm).

To study the morphology, 6 accessions of *C. paniculatus* Willd. maintained at Field Gene Bank, Division of Plant Genetic Resources, Indian Institute of Horticultural Research (IIHR), Bangalore were studied for 9 quantitative morphological characters. High genetic advance over mean coupled with high heritability was observed in characters like seed yield per plant (97.90%), leaf width (96.30%), leaf area (95.30%), leaf length (89.60%), fruit diameter (89.60%) and plant height (87.80%). Correlation study revealed that plant height, leaf length, leaf width and fruit length had significant positive correlation with seed yield per plant. In path analysis, leaf length, leaf width, leaf area, fruit diameter and seed length had high positive direct effects on yield per plant.

May, 2015

(Raviraja Shetty, G)
Major Advisor

14. Standardization of Sowing Dates and Stage of Pinching for Growth, Yield and Quality of Fenugreek (*Trigonella foenum - Graecuml.*) Under Hill Zone of Karnataka

HEENA KAUSER

ABSTRACT

The study was conducted to standardize the optimum date of sowing and stage of pinching in fenugreek at College of Horticulture, Mudigere, UAHS, Shivamogga during 2014-15. The experiment consisted of five dates of sowing (1st October, 15th October, 1st November, 15th November and 1st December) and three levels of pinching (Pinching at 25 days after sowing (DAS), Pinching at 35 DAS and No pinching) which were assessed in all possible combinations for growth, yield and quality. Among the treatments sowing on 15th October and pinching at 35 DAS recorded maximum plant spread, number of branches per plant, dry matter production of leaves, stem, pods, seeds, total dry matter production, AGR, CGR, RGR, NAR, number of pods per plant, length of pod, fresh weight of pod, number of seeds per pod, weight of seeds per pod, seed yield, harvest index, 1000 seed weight, total chlorophyll content in leaves and protein content in seeds, whereas, maximum plant height was recorded in 1st November sown crop and in the non-pinched plants. Interaction effect of sowing dates and stage of pinching were found significant. The treatment D₃P₃ (Sowing on 1st November + No pinching) recorded significantly maximum plant height (48.24 cm), while D₂P₂ (Sowing on 15th October + Pinching at 35 DAS) registered significantly maximum number of branches per plant (12.06), plant spread (51.62 cm²), total dry matter production (2.00 g/plant), number of pods per plant (13.80), number of seeds per pod (13.60), seed yield (3.44 g/plant and 1148.11 kg/ha), harvest index (29.16 %), total chlorophyll (3.25 g/mg), crude protein content in seeds (5.08 %) and benefit cost ratio (2.62:1) compared to other treatment combinations. The incidence of pest and diseases was found to be least in the 15th October sown crop.

June, 2015

(Bhoomika, H.R)
Major Advisor

15. Morphological Characterization and Propagation Studies in *Embelia ribes* Burm f. - an Endangered Medicinal Plant

SHRUTHI A M

ABSTRACT

An experiment was carried out to study the propagation of *Embelia ribes* Burm f. at the Department of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Mudigere, during the year 2015-16. The work was initiated to standardize the seed and vegetative propagation, tissue culture protocol and morphological characterization of this important RET medicinal plant. Among the different germination inducing treatments, the seeds treated with gibberellic acid at 750 ppm showed higher germination rate (2.07) and seedling vigour (2258.13). Per cent germination (65.33%) was maximum seeds treated with H₂SO₄ 2% + GA₃ 750 ppm. In vegetative propagation, stem cuttings treated with IBA 2000 ppm recorded maximum sprouting percentage (36.00) and rooting percentage (36.00) at 120 days after planting. For tissue culture, nodal segments were used as explant and among various combinations, satisfactory results were obtained in terms of number of shoots and number of leaves by using a combination of TDZ (2.0mg/l)+ Kin (1.0 mg/l).

To study the morphology, 5 accessions of *E. ribes* Burm f. maintained at Field Gene Bank, Division of Plant Genetic Resources, Indian Institute of Horticultural Research (IIHR), Bangaluru were studied for 14 quantitative morphological characters. High genetic advance over mean coupled with high heritability was observed in characters like fruit yield per plant (98.50%), leaf width (56.31%), leaf area (10.54%), leaf length (16.47%), fruit diameter (39.44%) and plant height (39.53%). Correlation study revealed that plant height, leaf length, leaf width and fruit length had significant positive correlation with seed yield per plant. In path analysis, leaf length, leaf width, leaf area, fruit diameter and seed length had high positive direct effects on yield per plant.

July, 2016

(Raviraja Shetty, G)
Major Advisor

16. Evaluation of Velvet Bean (*Mucuna pruriens* L.) Genotypes for Growth, Yield and Quality in Rubber Plantation Under Hill Zone of Karnataka

BASAVARAJ HADAPAD

ABSTRACT

A field experiment was carried out to assess the performance of velvet bean genotypes for growth, yield and quality in rubber plantation under hill zone of Karnataka in the experimental block of Zonal Agricultural and Horticultural Research Station, Mudigere during *rabi* 2015-16. A Randomized Complete Block Design experiment was laid with eleven treatments replicated thrice. The genotypes *viz.*, IIHR Selection-2, IIHR Selection-3, IIHR Selection-8, IIHR Selection-10, Arka Ashwini, Arka Dhanvantari, IC 369144, IC 385926, IC 395193, IC 471876 and Tarikere local were taken for the study. Among velvet bean genotypes, Arka Dhanvantari recorded the maximum vine length (294.13 cm), number of branches (5.60) per plant, number of trifoliolate leaves (93.57) per plant and leaf area (18740.73 cm²) per plant. The days to first (54.00) and 50 per cent flowering (62.00) were minimum in Arka Ashwini and maximum in the genotype Arka Dhanvantari (119.93 and 137.00, respectively). The maximum number of inflorescence per plant (9.13), number of bunches per plant (4.87), number of pods per bunch (5.07) and pod yield (154.69 g plant⁻¹) was produced in the genotype Arka Dhanvantari. Seed yield per plant (82.37 g) and per hectare (3050.86 kg) was maximum in the genotype Arka Dhanvantari and it was on par with IIHR Selection-2 (2906.17 kg ha⁻¹). The alkaloid L-DOPA content (3.74 %) and its yield (114.17 kg ha⁻¹) was found to be maximum in Arka Dhanvantari. The maximum total fresh biomass (388.03 g plant⁻¹) and total dry matter production (112.36 g plant⁻¹) was recorded in genotype Arka Dhanvantari. The number of root nodules (13.53 per plant) and increased nitrogen content (33.33 kg ha⁻¹) in soil was recorded maximum in the genotype IIHR Selection-2. Among the velvet bean genotypes studied, the genotypes Arka Dhanvantari and IIHR Selection-2 were performed better in rubber plantation under hill zone of Karnataka.

July, 2016

(Ravi, C. S.)
Major Advisor

17. Studies on Genetic Variability in Chilli (*CAPSICUM ANNUUM* L.) Germplasm Under Central Dry Zone of Karnataka

MONISHA, S.

ABSTRACT

An experiment was undertaken to evaluate 24 chilli genotypes in Randomized Complete Block Design with three replications to study genetic variability, correlation, path analysis and genetic divergence at College of Horticulture, Hiriyyur during 2015- 2016 under central dry zone of Karnataka. Significant difference was observed among accessions for all the characters under study. G-4 recorded the maximum plant height at harvest (102.53 cm), number of fruits per plant (410.20), fruit yield per plant (200.2 g), fruit yield per plot (2.11 kg) and fruit yield per hectare (2.93 t). The maximum ascorbic acid, oleoresin and capsaicin were recorded in Jayanthi (142.90 mg/100gm), Arka Lohit (18.56%) and LCA 334 (0.58 %) respectively. A high heritability coupled with high genetic advance over mean was recorded for most of the traits indicating the predominance of additive gene action for these traits. Fruit yield per plant showed significant positive association with plant height at harvest, number of branches per plant, plant spread, days taken for ripening, number of fruits per plant, fruit yield per plot, ascorbic acid, oleoresin and capsaicin. Path analysis revealed that number of fruits per plant had highest direct positive effect on fruit yield followed by fruit diameter at pedicel attachment. The chilli genotypes were grouped into three clusters. Among them, cluster I consists of maximum number of genotypes. The characters *viz.*, oleoresin followed by fruit to seed ratio, ascorbic acid, number of seeds per fruit, number of fruits per plant, days taken for ripening, fruit weight, yield per plant and yield per plot contributed maximum towards total genetic divergence. Genotypes G-4, LCA 334, DCA-59, Jayanthi, Chilli Japani Longi were found promising for central dry zone of Karnataka.

October, 2016

(H. Chandrappa)
Major Advisor

18. Genetic Variability and Correlation Studies in Bird's Eye Chilli (*Capsicum frutescens* L.)

VAISHNAVI, B.A.

THESIS ABSTRACT

Bird's eye chilli (*Capsicum frutescens* L.) accessions collected from different geographical regions were evaluated to study the genetic variability, correlation, path analysis and genetic divergence at College of Horticulture, Mudigere during 2015-16. Significant difference was observed among accessions for all the characters under study. Accession 26 recorded significantly higher plant height (94.23 cm), number of primary branches per plant (8.05) and fruit yield (855.97 g/ plant and 20.71 q/ha). Accession 30 recorded highest vitamin-C (159.05 mg/100g) and oleoresin content (11.36 %). Capsaicin content (1.86 %) was maximum in Acc.15, whereas Acc.27 recorded maximum capsanthin content (436.05 Colour units). High heritability coupled with genetic advance over mean were observed for most of the growth, yield as well as quality characters that indicated predominance of additive gene action for these traits. Correlation studies indicated positive association of fruit yield (q/ha) with plant height, number of primary branches per plant, plant spread, total number of fruits per plant, fruit length, width and dry weight of 100 fruits at both genotypic and phenotypic levels. Path analysis revealed that positive direct effects on fruit yield was from days to first flowering, number of fruits per plant and fruit yield per plant suggesting that these parameters may be considered as prime traits during selection to fetch higher yield. The accessions were grouped into six clusters. Among the clusters cluster VI consisted maximum number (14) of accessions. The characters such as dry weight of 100 fruits (36.67 %) followed by weight of seeds per fruit (14.13 %) and oleoresin content (8.03 %) contributed maximum to the total genetic diversity. Accession 26, Acc.15, Acc.30 and Acc.27 were identified as best performing accessions from the study.

August, 2016

(Bhoomika, H.R.)
Major Advisor

19. Effect of Integrated Nutrient Management on growth, yield and quality of kalmegh (*Andrographis paniculata* Nees.) under hillzone of Karnataka

ROHAN, H. V.

ABSTRACT

An experiment was carried out to assess the effect of Integrated Nutrient Management on growth, yield and quality of kalmegh (*Andrographis paniculata* Nees.) at ZAHRS, Mudigere with thirteen treatments and three replications in RCBD design during the year 2015-16 rabi season. Among the different treatments studied, the treatment with FYM @ 5 t ha⁻¹ + 75 % of N,P + *Azotobacter* + PSB + 3 % panchagavya foliar spray recorded significantly maximum plant height (45.27 cm), number of branches (63.20 plant⁻¹), number of leaves (195.79 plant⁻¹), leaf area (3046.74 cm² plant⁻¹), fresh herbage yield (53.66 g) per plant and per hectare (11.92 t), dry herbage yield (19.35 g) per plant and per hectare (4.3 t), andrographolide yield (21.91 kg ha⁻¹), gross returns (₹ 1,98,540 ha⁻¹), net returns (₹ 1,26,570 ha⁻¹), B:C ratio (1.76), available nitrogen (315 kg ha⁻¹) and phosphorous (27.1 kg ha⁻¹) at 120 days after transplanting. The chlorophyll content (62.63 SPAD) was recorded significantly maximum in vermicompost @ 2.5 t ha⁻¹ + 75 % of N,P + *Azotobacter* + PSB + 3 % panchagavya foliar spray treatment. Whereas, maximum andrographolide content (0.796%) was recorded in FYM @ 5 t ha⁻¹ + 50 % of N,P + PSB + 3 % panchagavya foliar spray treated plants at 120 days after transplanting.

August, 2017

(Ravi, C. S.)
Major Advisor

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

KHADEEJA, S.

ABSTRACT

An experiment was carried out to assess the influence of nurse crop and foliar nutrition on growth of young arecanut (*Areca catechu* L.) plants under hill zone of Karnataka at ZAHRS, Mudigere, during the year 2016-17 in FRCBD. The factor A consists of shade (Grand Naine and Puttabale) and factor B consists of foliar nutrition (19:19:19, MgSO₄ and micronutrients mixture @ 0.3% each). One year nine month old arecanut and banana plants were selected for the study and treated with four foliar sprays at 45 days interval. The results revealed that at 45 days after 4th spray during 3rd year of growth, the plants grown under puttabale banana with combined application of macro and micronutrients recorded maximum plant height (2.40 m) and chlorophyll content (2.06 mg/g) whereas, collar girth (31.06 cm), frond length (123.46 cm), number of leaves (6.70) and leaf area (375.31 m²) was recorded in plants grown under Grand Naine with conjunctive use of macro and micronutrients. The higher available nitrogen (241.67 kg ha⁻¹) and phosphorus (47.70 kg ha⁻¹) content in soil was observed in Grand Naine shade without foliar nutrition while, higher available potassium (168.67 kg ha⁻¹) was recorded in Grand Naine shade treated with macro and micronutrients. The higher total nitrogen (2.56%) and phosphorus (0.24 %) in plants were found maximum in puttabale shade with MgSO₄ and micronutrients mixture whereas, higher potassium (1.89 %) was recorded in Grand Naine shade with MgSO₄ and micronutrients mixture. The lowest spindle bug (16.02 %) infestation was noticed in puttabale shade with MgSO₄ and micronutrients mixture while, Grand Naine shade with 19:19:19 and MgSO₄ recorded minimum leaf spot infestation (10.33 %) at 45 days after 1st spray. Arecanut plants grown under puttabale banana shade with combined application of nutrients through foliar spray would provide better performance in early stages of growth.

July, 2017

(Ravi, C. S.)
Major Advisor

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

LATHA, H. K.

ABSTRACT

An experiment was carried out to assess the performance of liquid PGPR on quality seedling production in arecanut at ZAHRS, Mudigere, with nine treatments and three replications in CRD during the year 2016-17 under polyhouse and shade net. Among the different treatments studied, the seedlings inoculated with *Azotobacterchroococum*, *Bacillus megaterium*, *Bacillus mucilaginosus* and VAM recorded maximum plant height (61.73 cm), collar girth (5.20 cm), petiole length (15.43 cm), frond length (31.20 cm), number of leaves (5.40), leaf area (1296.00 cm²/plant), total chlorophyll content (2.48 mg/g), total dry matter production (18.00 g), number of primary (8.80) and secondary roots (40.83); root length (35.00 cm), thickness (4.33 mm) and volume (23.93 ml), seedling index (156.69) and splitting of leaves (39.97 %) at 270 DAT under polyhouse compared to uninoculated seedlings. The similar trend was observed under shade net condition with conjunctive use of *Azotobacterchroococum*, *Bacillus megaterium*, *Bacillus mucilaginosus* and VAM where higher plant height (53.57 cm), collar girth (4.83 cm), petiole length (12.40 cm), frond length (28.93 cm), number of leaves (4.40), leaf area (1020.32 cm²/plant), total chlorophyll content (2.14 mg/g), total dry matter production (14.63 g), number of primary (7.63) and secondary roots (32.60); root length (32.20 cm), thickness (3.80 mm) and volume (19.90 ml), seedling index (125.11) and splitting of leaves (35.53 %) were recorded at 270 DAT. The combined inoculation of liquid PGPR proved to be the best consortium than single inoculation under polyhouse for quality seedling production.

July, 2017

(Ravi, C. S.)
Major Advisor

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

LAXMI MASTIHOLI

ABSTRACT

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

July, 2017

(Raviraja Shetty, G)
Major Advisor

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

MADHUSHREE, S. I.

ABSTRACT

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

July, 2017

(Raviraja Shetty, G)
Major Advisor

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

NANDAKUMAR, K.

ABSTRACT

An experiment was conducted to evaluate 20 coriander genotypes in Randomized Complete Block Design with three replications to study their performance with respect to growth, yield and quality at Zonal Agricultural and Horticultural Research Station, Babbur farm, Hiriyyur during of 2016-17 in winter season. Significant differences were observed among genotypes for all the characters under study. The results revealed that, Rcr-475 recorded maximum plant height (70.27 cm), number of primary branches per plant (7.33), number of umbels per plant (28.13), number of umbellets per umbel (5.50), number of seeds per umbellet (5.70), seed yield per plant (6.37g), seed yield per hectare (16.83 q), highest test weight (14.53 g) and plant spread (645 cm²). The genotype DCC-4 took minimum number of days for first flowering (39.33 days) and maximum essential oil content was recorded in Acr-1 and Rcr-728 (0.8%). A high heritability coupled with genetic advance over mean were observed for most of the growth, yield as well as quality characters that indicated predominance of additive gene action for these traits. Correlation studies showed positive association of seed yield per plant with number of primary branches per plant, plant height, plant spread and test weight. Path analysis revealed that, number of primary branches per plant had highest direct positive effect on seed yield followed by plant height suggesting that these parameters may be considered as prime traits during selection to fetch higher seed yield. Genotypes such as Rcr-475, Rcr-446, Rcr-41, Co-4, Rcr-20 and Acr-1 were identified as best performing genotypes from the study.

July, 2017

(H. Chandrappa)
Major Advisor

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

SANDESH, M. S.

ABSTRACT

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

July, 2017

(Raviraja Shetty, G)
Major Advisor

26. Effect of Different Media and Containers on Rooting of Black Pepper (*Piper nigrum* L.) Cuttings.

SHARATH, H. R.

ABSTARCT

An investigation on “Effect of different media and containers on rooting of black pepper (*Piper nigrum* L.) cuttings” was carried out in naturally ventilated polyhouse with three replications and twenty-three treatments at College of Horticulture, Mudigere during the period from November 2015 to February 2016. In black pepper cuttings, the success rate and root distribution pattern depends on many factors like media, type of containers, climate, planting material etc. Use of root trainers for raising pepper cuttings is a newer concept. Hence in this study the effect of root trainers on various shoot and root parameters is studied, over the conventional method of raising cuttings in polybags, using nine media in different combinations. Most of the shoot and root parameters were observed to be superior in the cuttings raised in root trainers compared to that of polybags. The treatment T₁₃(Soil+Perlite+Vermicompost-2:1:2) recorded early sprouting (20.20days and 20.90days), maximum sprouting percentage (78.20 and 80.00), maximum number of leaves (4.5 and 4.9), length of the shoot (16.54cm and 45.85cm), fresh weight (16.48g and 18.00g) and dry weight (6.55g and 6.94g) of the shoots in polybag and root trainer respectively. Root parameters were also found to be better in the same treatment (T₁₃). Highest rooting percentage (80.50) was recorded in root trainer compared to polybag (78.00). The treatment T₁₃ also recorded maximum fresh (5.32 g and 4.81 g) and dry weight (1.93g and 1.63g) in trainers and polybags respectively. Root volume was found to be maximum in the root trainer (6.25cc) compared to that of polybag (5.5cc) in the treatment T₁₂(Soil+Perlite+FYM in 2:1:2). The treatment T₁₉(Cocopeat+Vermiculite+ FYM-1:1:2) recorded maximum root length (27.80 cm and 8.60 cm in polybag and root trainer respectively). The maximum benefit cost ratio was observed in treatment T₁₃ (2.97:1 and 2.42:1 in polybag and root trainer respectively).

October, 2018

(Bhoomika, H.R.)
Major Advisor

27. Prospecting of *Moringa concanensis* Nimmo for various Chemical Constituents and Morphological Characterization

ANITHA, T. M.

ABSTRACT

An investigation was undertaken to study the morphological characters, chemical profiling and antioxidant activity of *Moringa concanensis* N. at Division of Plant Genetic Recourses, ICAR-Indian Institute of Horticultural Research, Hesaraghatta, Bengaluru during 2017-18. Among the ten accessions of *Moringa concanensis* the genotypic and phenotypic coefficients of variations were high for characters viz., petiole length, leaflet area, leaflet width, leaflet length, leaf length, trunk girth, number of pod per plant and pod yield. High heritability was observed in characters like number of pod per plant (99.87 %), plant spread (92.85 %), total pod yield (91.7 %), 100 seed weight (89.40 %), pod diameter (89.27 %), trunk girth (88.96%), pod length (83.00%), number of seeds per pod (81.25 %). The correlation study revealed that number of pods per plant had significant positive correlation with pod yield. According to path analysis, number of pods per plant, leaflet length, leaflet width, trunk girth, pod diameter, pod length and petiole length recorded positive and direct effect on pod yield per plant and leaflet area, number of seeds per pod and plant height showed negative direct effect towards pod yield.

Among the ten accessions the total phenolic content was more in leaves of accession MC-1 and total flavonoid content was more in flower of accession MC-8. In case of estimation of antioxidant activity, 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay showed more antioxidant activity than ferric reducing antioxidant power (FRAP) assay. In both the assays, the accession MC-1 and MC-6 were found to have high antioxidant activity.

August, 2018

(Raviraja Shetty, G)
Major Advisor

28. Screening of Selected Rare, Endangered and Threatened Medicinal Plant Extracts against various Pathogens or Microbes

PALLAVI, C. R.

ABSTRACT

An investigation was undertaken to study the *in-vitro* antifungal activity of ten rare, endangered and threatened medicinal plant aqueous leaf extracts against four phytopathogens viz., *Alternaria solani*, *Fusarium oxysporum*, *Sclerotium rolfsii* and *Phytophthora capsici* at three different concentrations (5, 10 & 15 %), and chemical profiling of these plant extracts were carried out at Division of Plant Genetic Resources, ICAR - Indian Institute of Horticultural Research, Hesaraghatta, Bengaluru during 2017-18. The minimum mycelial growth of fungus varied greatly with three different concentrations indicating the antifungal activity of plant extract increases with increase in concentration, whereas the 15 per cent concentration showed highest antifungal activity compared to 5 and 10 per cent concentrations. However, all ten plant extracts found to have a good antifungal activity against all the tested pathogens with varied levels of reduction in mycelial growth of fungal organisms. Among ten aqueous plant extracts tested against four phytopathogens, *Embelia ribes* leaf extract showed minimum mycelial growth against *Alternaria solani* (4.73 mm) and *Fusarium oxysporum* (28.5 mm), whereas leaf extract of *Hydnocarpus pentandra* showed least mycelial growth against *Sclerotium rolfsii* (4.56 mm) and *Phytophthora capsici* (0.33 mm). However, the quantitative phytochemical analysis of dried powdered leaf extract found highest total phenolic content (70.15 mg GAE/100 g) and total flavonoid content (37.50 mg CE/100 g) in *Saraca asoca*.

August, 2018

(Raviraja Shetty, G)
Major Advisor

29. Standardization of Seed Rhizome Weight and Nutrition Levels for Mango Ginger (*Curcuma amada* Roxb.) under Arecanut Garden.

PRIYANKA, B. M.

ABSTRACT

A field study was conducted to standardize the seed rhizome weight and nutrition levels for mango ginger (*Curcuma amada* Roxb.) under arecanut garden at College of Horticulture, Mudigere, during 2017-18. The experiment was laid out in a Randomized Block Design with two factors. Factor one being seed rhizome weight (W_1 -20 g, W_2 -40 g, W_3 -60 g) and factor two was nutrition (N_1 - Control, N_2 - 60:50:100 kg, N_3 -90:75:150 kg, N_4 -120:100:200 kg, N_5 -150:125:250 kg and N_6 -180:150:300 kg NPK/ha). Significant differences were recorded for all the parameters under study. Seed rhizomes weighing 60g recorded maximum sprouting, plant height, number of leaves, number of tillers per plant, leaf area, leaf area index, length and width of the rhizomes, primary and secondary rhizomes per clump, fresh and dry weight of rhizomes, yield per plot, yield per hectare and essential oil content in rhizomes. Among the nutrient levels, application of 180:150:300 kg NPK/ha recorded higher values for all the above growth, yield and quality parameters. Interaction effect of seed rhizome weights and nutrition levels were also found significant for the traits under study. The treatment W_3N_6 (seed rhizome weighing 60 g and nutrition level 180:150:300 kg NPK/ha) recorded maximum sprouting (96.33 %), higher plant height (58.20 cm), number of leaves (13.70), number of tillers per plant (3.64), leaf area (42.30 dm²), leaf area index (4.98), length (17.26 cm) and width (16.10 cm) of the rhizome, primary (7.96) and secondary (16.43) rhizomes per clump, fresh (358.93 g) and dry (86 g) weight of the rhizome, dry recovery (24.02 %), yield per plot (10.75 kg), yield per hectare (35.86 t/ha) and essential oil content (0.78 %). The economics of cultivation was worked out and the treatment combination W_1N_6 recorded highest B:C ratio (2.11).

August, 2018

(Bhoomika, H.R.)
Major Advisor

30. Effect of Integrated Nutrient Management on Growth and Yield of French Basil (*Ocimum basilicum* L.)

SAIF ALI KHAN

ABSTRACT

Field experiment was carried out to study the effect of integrated nutrient management on growth and yield of french basil during 2017-2018 at Agricultural and Horticultural Research Station, Thirthahalli. The experiment laid out in randomized complete block design (RCBD) comprised of nine treatments with three replications. Results revealed that application of (T₈) 100 per cent RDF (125:75:60 kg NPK/ha) + vermicompost (10 tons/ha) + *Azotobacter* (12 kg/ha) recorded significantly higher plant height (84.53 cm), maximum number of primary and secondary branches (38.05 and 118.13), number of leaves (546.8), plant spread (N-S and E-W) (53.65 cm and 74.67 cm), leaf area per plant (4994.53 cm²), higher fresh yield per plant (512.13 g), fresh yield per plot (48.11 kg), fresh yield per hectare (35.63 t) and dry yield per plant (267.27 g), dry yield per plot (25.11 kg) and dry yield per hectare (18.60 t), dry matter per cent (52.2%), higher oil yield (230.43 kg), and higher uptake of nitrogen (168.96 kg/ha) phosphorus (16.96 kg/ha), potassium (17.68 kg/ha) After the harvest of crop highest available nitrogen (521.67 kg/ha), phosphorus (35.67 kg/ha), potassium (286.95 kg/ha) and higher microbial content in soil *i.e.*, fungi (28.15 *cfu* × 10⁵/g soil), bacteria, (97.50 *cfu* × 10³/g soil), actinomycets (12.50 *cfu* × 10²/g soil) and *azotobacter* (28.67 *cfu* × 10⁵/g soil) is observed in T₈. The economic analysis clearly indicated that application of 100 per cent RDF (125:75:60 kg NPK/ha.) + vermicompost (10 tons/ha) + *Azotobacter* (12 kg/ha) realized maximum net returns (Rs. 220694.17/ha) and B:C ratio (2.04).

August, 2018

(M. Ravikumar)
Major Advisor

31. Influence of Plant Growth Promoting Rhizo Micro-Organisms and Growth Hormones on Rooting of Plagiotropic Cuttings of Black Pepper (*Piper nigrum* L.)

SANNIDHI, H. S.

ABSTRACT

An experiment was conducted to evaluate the effects of different plant growth promoting rhizo-microorganisms (PGPRs) and growth hormones on rooting of plagiotropic cuttings of black pepper at College of Horticulture, Mudigere during 2017-18. There were nineteen treatments with three replications laid out in Completely Randomized Design inside a naturally ventilated polyhouse. The treatments comprised of three growth hormones viz. IBA, NAA and 2, 4-D at different concentrations and the liquid cultures of PGPRs viz. *Azospirillum lipoferum* and *Pseudomonas fluorescens* @ 5 ml and 10 ml per polybag. The treatments exhibited significant differences for most of the root and shoot parameters studied. Application of *Azospirillum lipoferum* @ 10 ml per polybag (T₅) resulted in early sprouting (19.49 days), maximum sprouting percentage (66.00), maximum shoot length (6.15 cm), more number of leaves (4.20), maximum chlorophyll content (55.50 Spad units), maximum leaf area (42.61 cm²), higher fresh (8.95 g) and dry weight (3.11 g) of shoots. IBA @ 1000 ppm (T₈) resulted in maximum rooting percentage (65.30), more primary (7.48), secondary (18.83) and total roots per cutting (30.18), maximum root length (18.88 cm), root volume (1.85 cc), fresh weight of root (1.10 g), dry weight of root (0.53 g) and survival percentage (54.04) of cuttings. Analysis of the microbial population of the rooting media was done at 180 days after planting and treatment T₅ (*Azospirillum lipoferum* 10 ml) recorded the maximum counts for total bacteria (83.50 and 70.50 cfug of soil⁻¹ at 10⁻⁵ and 10⁻⁶ dilution levels respectively), total fungi (48.25 and 31.00 cfug of soil⁻¹ at 10⁻³ and 10⁻⁴ dilution levels respectively) and total actinomycetes population (19.00 and 15.00 cfug of soil⁻¹ at 10⁻² and 10⁻³ dilution levels respectively). The treatment T₈ (IBA 1000 ppm) recorded maximum net returns (Rs. 10,885.00) and higher B: C ratio (3.28).

July, 2018

(Bhoomika, H.R.)
Major Advisor

32. Studies on Enhancement of Germination in *Pterocarpus santalinus* (Linn.f) and *Pterocarpus marsupium* Roxb. - An Endangered and Vulnerable Tree Medicinal Plants

THANUJA, P. C.

ABSTRACT

An experiment was carried out to study the enhancement of germination in *Pterocarpus santalinus* (Linn.f) and *Pterocarpus marsupium* Roxb. - an endangered and vulnerable tree medicinal plants at the Department of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Mudigere during the year 2017-18. The seeds of *P. santalinus* and *P. marsupium* were treated with different pre-sowing seed treatments which included organics, growth regulators and chemicals. Among the different germination inducing treatments, seeds treated with cow dung slurry (1:1) recorded minimum number of days for germination (11.50 days), days to final germination (45.50 days), maximum germination percentage (47.50), germination rate (0.62), seedling height (32.45 cm), seedling fresh weight (14.02 g), chlorophyll content of leaf (1.37 mg/g), seedling dry weight (6.57 g), root volume (1.33 cc), seedling vigour index I (1542.05) and seedling vigour index II (312.10) in *P. santalinus*.

In *P. marsupium*, seeds treated with sulphuric acid (2 %) recorded least number of days for germination (10.00 days), days to final germination (39.50 days), maximum germination percentage (65.83), germination rate (1.01), seedling height (79.63 cm), seedling fresh weight (22.95 g), chlorophyll content of leaf (1.33 mg / g), seedling dry weight (10.18 g), root volume (1.86 cc), seedling vigour index I (5033.51) and seedling vigour index II (669.85) compared to other treatments and control. From the findings of the present investigation, *P. santalinus* seeds treated with cow dung slurry (1:1) and *P. marsupium* seeds treated with sulphuric acid (2 %) showed enhanced germination and better seedling growth. Hence, these seed treatments can be effectively used for large scale multiplication of both the species.

July, 2018

(Sadashiv Nadukeri)
Major Advisor

33. Effect of Liquid Nutrition and Pinching in Black Pepper (*Piper nigrum* L.) Mother Block on Quality Planting Material Production Under Polyhouse.

(HARSHITH, S. K)

ABSTRACT

An experiment was carried out to assess the effect of liquid nutrition and pinching on quality planting material production of black peppermotherblock at ZAHRS, Mudigere, during 2018-19 in FCRD with three replications. The factor 1 consists of nutrients at 4 levels (N0 - 10:5:5 g of NPK per vine as soil application (control), N1-19:19:19 @ 0.5% + ZnSO₄, MgSO₄ and Borax @ 0.10% each, N2-19:19:19 @ 0.75% + ZnSO₄, MgSO₄ and Borax @ 0.25% each and N3-19:19:19 @ 1% + ZnSO₄, MgSO₄ and Borax @ 0.50% each) and factor 2 consists of pinching at 3 intervals (P0 – without pinching, P1-5 days and P2-10 days before harvest of orthotropic shoot). The results revealed that mother vines treated with 19:19:19 @ 1% + ZnSO₄, MgSO₄ and Borax @ 0.5% each and without pinching (T₁₀) recorded significantly maximum vine length (178.06 cm), number of internodes (24.67), number of leaves (90.53) and number of plantable cuttings (42.00) at 120 DAT. While, the vines applied with 19:19:19 at 1 per cent + ZnSO₄, MgSO₄ and Borax at 0.5 per cent each and pinching at 10 days before harvest of orthotropic shoot (T₁₂) resulted in maximum leaf area (84.13 cm²), chlorophyll content (62.26 SPAD unit), carbohydrates (7.04%) and total sugars (2.15%). The shoot parameters such as days taken for fifty per cent sprouting (21.27), sprouting percentage (80.15), length of new shoot (16.80 cm), number of leaves (5.93), leaf area (73.39 cm²), fresh (21.64 g) and dry weight (8.25 g) of shoots per cutting were recorded significantly maximum at 120 DAP in T₁₂. Similarly, T₁₂ was also recorded maximum root parameters Viz., rooting percentage (78.86), number of primary roots (7.89), length of the longest root (18.37 cm), root volume (5.30 cc), fresh (4.80 g) and dry weight (1.76 g) of roots per black pepper cutting.

34. Effect of Foliar Application of Micronutrients on Growth and Yield of French Basil (*Ocimum basilicum* L.).

(LAKSHMI SAGAR, L.)

ABSTRACT

Field experiment was carried out to study the “Effect of foliar application of micronutrients on growth and yield of French basil (*Ocimum basilicum* L.)” during 2018-2019 at Agricultural and Horticultural Research Station, Thirthahalli. The experiment was laid out in randomized complete block design (RCBD) with nine treatments and three replications. Results revealed that among different treatments, plants treated with micronutrient mixture @ 0.5 per cent recorded higher plant height (82.07 cm), maximum number of primary branches (37.87) and secondary branches (112.20), plant spread (N-Sand E-W) 50.87 cm and 71.33 cm, respectively, number of leaves (538.73), leaf area per plant (4370.39 cm²), leaf area index (3.24), Total dry matter (249.60 g), higher fresh yield per plant (476.33 g/plant), fresh yield per plot (43.87 kg/plot), fresh yield per hectare (32.49 t/ha), dry yield per plant (231.40 g/plant), dry yield per plot (22.67 kg/plot), dry yield per hectare (16.79 t/ha) and oil yield per hectare (188.10 kg/ha), absolute growth rate (1.43 g/plant/day), crop growth rate (9.62 g/m²/day), relative growth rate (0.0044 g/g/day) and net assimilation rate (0.00020 g/dm²/day), chlorophyll-a (0.087 mg/g), chlorophyll-b (0.217 mg/g) and total chlorophyll content (0.304 mg/g), nitrogen content (37.47 g/kg), phosphorus content (2.42 g/kg), potassium content (49.88 g/kg), copper content (18.60 ppm) and iron content (141.66 ppm) in leaves, whereas lower residual nitrogen (195.73 kg/ha), phosphorus (14.37 kg/ha), potassium (50.27 kg/ha), copper (3.74 ppm), iron (5.16 ppm), zinc (0.48 ppm) and boron (0.22 ppm) content was found in soil after harvest in same treatment. The economic analysis clearly indicated that foliar application of micronutrient mixture @ 0.5 per cent realized maximum net return (Rs. 1,00,740/ha) and B: C ratio (2.02).

August, 2019

(Ravikumar M)
Major Advisor

35. Effect of Foliar Application of Nutrients on Yield and Quality of Cashew (*Anacardium occidentale* L.) Genotypes under Hill Zone of Karnataka

(MAHANTESH YAMAKANAMARDI)

ABSTRACT

Field experiment was carried out to study the “Effect of foliar application of nutrients on yield and quality of cashew (*Anacardium occidentale* L.) genotypes under Hill zone of Karnataka” during 2018-19 at College of Horticulture, Mudigere. The experiment was laid out in split plot design with six varieties as the main plot and four different nutrients foliar spray as a subplot with three replications. Results revealed that plants treated with urea @ 2 per cent recorded maximum number of flowering panicles (22.41/m²), male flowers (233.27), perfect flowers (77.50), sex ratio (0.34), fruit set (30.71 %), cashew apple length (68.57 mm) apple width (36.30 mm), apple weight (94.13 g) and apple volume (107.10 ml), nut length (30.63 mm), nut width (18.75 mm), nut weight (8.58 g), kernel length (24.35 mm) kernel width (16.75 mm), kernel weight (3.02 g) and nut yield (3.48 kg / plant and 950 kg / ha). Maximum reducing sugar (8.16 %), non-reducing sugar (4.58 %), total sugar (12.82 %) and juice content (70.68 %) were noticed in the micronutrient mixture (2 %) treatment. Maximum number of flowering panicles (22.28 / m²), kernel length (27.50 mm), reducing sugar (8.59 %), total sugar (12.94 %) and juice content (76.47 %) was observed in Vengurala-4. Maximum number of staminate flowers per panicle (278.13) and flower duration (109.26 days) in NDR-2-1. Highest number of perfect flowers (76.01), sex ratio (0.36), fruit set (34.53 %), nut yield (4.14 kg / plant and 1000 kg / ha) was noticed in Kanaka. Maximum apple weight (106.28 g), apple volume (114.44 ml), apple length (76.18 mm), nut length (32.19 mm), nut weight (10.51 g), kernel weight (3.16 g) was recorded in Priyanka. The economic analysis clearly indicated that foliar application of urea @ 2 per cent realized maximum B: C ratio (3.14).

August, 2019

(Sadashiv Nadukeri)
Major Advisor

36. Genetic Variability and Diversity Studies in Bird's Eye Chilli (*Capsicum frutescens* L.)

(SREELAKSHMI, S)

ABSTRACT

An investigation on genetic variability and diversity in thirty-five accessions of bird's eye chilli collected from different geographical regions of Karnataka was carried out in Randomized Complete Block Design with three replications at the experimental block of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Mudigere during 2018-19. Analysis of variance revealed the presence of significant differences among the accessions for the characters studied. Mean performance of each accession for different growth, yield and quality traits were assessed. Acc.15 is found to be superior in terms of growth parameters viz., plant height (79.81 cm), number of primary branches (7.17) and plant spread (46.46 cm²). The Acc.160 (12.14 kg per plot) and Acc.158 (11.39 kg per plot) were found to be higher yielders of green chilli, Acc.18 (26.67 days) was early maturing type and Acc.133 (120.17 mg per 100g) and Acc.164 (2.16%) recorded high ascorbic acid and capsaicin content respectively. Morphological characterisation of the accessions was done based on UPOV guidelines of chilli. High to moderate estimates of GCV and PCV were reported for most of the characters studied indicating the presence of wide variability among the accessions. High heritability coupled with high genetic advance as per cent mean was noticed for most of the yield related traits indicating the predominance of additive gene action for the expression of these characters. Correlation studies indicated positive association of fruit yield per plant with weight of seeds per fruit, fresh weight of ten fruits and fruit length. Out of nineteen characters studied, sixteen characters showed direct positive effect on yield per plant. Based on Mahalanobis D² analysis, the accessions were grouped into 6 clusters with inter cluster D² values ranging between 172.33 to 1275.15. Fruit width contributed maximum (45.38%) to the genetic diversity. Assessment of molecular diversity using SSR markers revealed monomorphism.

August, 2019

(Bhoomika, H. R.)
Major Advisor

37. Studies on the Influence of Micronutrients on Growth, Yield and Quality of Mango Ginger (*Curcuma amada* Roxb.)

VIDYA, S. P.

ABSTRACT

Mango ginger (*Curcuma amada* Roxb.) is an underground rhizomatous crop belonging to family Zingiberaceae. The rhizomes find wide application in pickling industry due to typical raw mango flavour and found growing in Southern states of India like Kerala, Karnataka and Tamil Nadu. The studies on agronomical requirements of the crop are scarce. Hence the present investigation entitled “Studies on the influence of micronutrients on growth yield and quality of mango ginger (*Curcuma amada* Roxb.)” was carried out at College of Horticulture, Mudigere during 2018-19. The treatment consisted of two micronutrients viz, zinc and boron at 0, 5 and 10 Kg/ha each, which were applied at all possible combinations. Hence there were totally nine treatments replicated thrice. The rhizomes were planted at a spacing of 30×30 cm on raised beds. The plot size was 3m×1.2m. Different growth and yield parameters were recorded at regular intervals and significant differences were recorded for almost all the parameters under the study. Application of ZnSO₄10 (kg/ha) + Borax (10 kg/ha) (T9) performed better with respect to plant height (73.97 cm), number of leaves (7.00), leaf area (133.27 dm²), LAI (1.48) and chlorophyll content (63.44 SPAD units) at 150 days after planting. The same treatment recorded significantly more number of secondary fingers per clump (16.44 cm), rhizome width (16.39 cm), fresh weight (192.13 g/plant) and dry weight (58.30 g/plant), total yield (29.08 t/ha) and essential oil content (1.00%). However, the treatment T6 (ZnSO₄ 5 kg/ha + Borax 10 kg/ha) recorded maximum primary fingers (5.93/clump) and rhizome length (17.17 cm). Nutrient uptake analysis revealed that uptake of N, P, K, S, Zn and B by plant was maximum in T9. The same treatment recorded maximum B: C ratio of 1.91: 1 and the least B: C ratio of 1.49: 1 was recorded in control.

August, 2019

(Bhoomika, H. R.)
Major Advisor

38. Morphological Characterization, Seed Propagation and Tissue Culture Studies in *Hydnocarpus pentandra* (Buch. Ham.) Oken

(VIGHNESHA BHAT)

ABSTRACT

An investigation was taken up to study the morphological characters, seed propagation and tissue culture techniques in *Hydnocarpus pentandra* (Buch. Ham.) Oken at Division of Plant Genetic Resources (PGR), ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru during 2018-19. Among the five accessions of *Hydnocarpus pentandra*, four were male and only one was female accession. Qualitative and quantitative traits were significantly differed among the accessions. Genotypic and phenotypic coefficients of variation were high for plant height and leaf area. Moderate genotypic and phenotypic coefficients of variation were found in leaf length, leaf width, petiole length and stem girth. All the characters were exhibited high heritability. Among the different germination inducing treatments, the seeds treated with GA₃ (350 ppm) showed minimum number of days taken to initiate germination (35 days), maximum rate of germination (0.91), germination percentage (63.42 %), seedling vigour (2028.63) seedling height (30.46 cm), fresh and dry weight of seedling (5.76 g and 3.12 g respectively) and shoot to root ratio (1.66) compared to control. For tissue culture, shoot tips were used as explants and cultured on MS media with different concentrations of growth regulators such as BAP, IAA, Kinetin and Thiadiazuron (TDZ) either in singly or in combination. Among the treatments shoot tips cultured on MS media with combination of BAP (1.0 mg / l) + TDZ (0.5 mg / l) gave maximum number of shoots per explant (3.86) and highest shoot length (2.06 cm). Callus production was noticed in BAP at lower concentrations (0.2-0.5 mg / l) in combination with IAA (0.05 mg / l) and kinetin (0.05 mg / l).

August, 2019

(Raviraja Shetty, G.)
Major Advisor