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Compiled By

Dr. Santosh D. Kadam

Co-Compiler

Dr. Vandana S. Jadhav

Mr. Bhagwan G. Kamble

Mr. Mohankumar Zore

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VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH, PARBHANI

Title	-	**Fertigation studies in chilli (*Capsicum annuum* L.) Cv. PBNC-1**
Researcher	-	Maind, Mahaveer Machindra
Research Guide	-	Yadlod, S.S.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	1720
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033246

Abstract -

The field investigation entitled "Fertigation studies in chilli (*Capsicum annuum* L.) Cv. PBNC-1." was conducted during *Rabi* season of 2016-17 at experimental field of AICRP on Water Management, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani with a view to find out the optimum level of irrigation and fertigation for better growth and yield of chilli (*Capsicum annuum* L.) Cv. PBNC-1." The experiment was laid out in factorial randomised block design with three replication comprising three irrigation level of (0.6 PE, 0.8 PE. and 1.0 PE) and three fertilizer levels (60% RDF (100:50:50 NPK kg ha-1)), 80% RDF and 100% RDF) thereby involving nine treatment combinations on chilli Cv. PBNC-1. The gross plot size was 47 m x 16 m and net plot size 4 m x 3.6 m, respectively. The crop was sown by dibbling method keeping row to row spacing 60 cm and plant to plant spacing 45 cm. The experimental crop was sown on 10 October, 2017 and all recommended cultural practices were followed.

Among the different treatment combination I_3F_3 (1.0 PE + 100% RDF) noted highest plant growth and yield in respect to plant height (88.86 cm), stem diameter (5.03 cm), no. of leaves (847.00), leaf area (973.33 cm^2), plant spread (66.90cm), dry matter production (100.60 g/plant), relative growth rate (0.0208 g/g/day), no. of fruits/plant (654.26), weight of 10 fruit (35.66g), yield (156.67 g/plant), fruit yield (14.03 t/ha), fruit length (7.47 cm), fruit girth (2.43 cm) and vitamin c (140.26 mg/100g).

In this experiment the treatment I_3F_3 (1.0 PE + 100% RDF) also performed well in respect of vegetative and reproductive growth which showed results viz. reduction in days required for flower initiation (20.84 days), days required for 50% flowering (68.90 days), days required for first harvesting (37.23 days).

In this experiment the treatment I_3F_2 (1.0 PE + 80% RDF) noted highest capsaicin content (0.25%) amongst all the treatment.

Therefore, amongst all the treatment combination I_3F_3 (1.0 PE + 100% RDF) can be considered as most beneficial in terms of yield, vegetative and reproductive growth.

Title	-	**Field evaluation of Gamma irradiated invitro regenerated banana var. Grand Naine under field condition**
Researcher	-	Veena, H.K.
Research Guide	-	Waghmare, G.M.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	1733
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033316
Abstract	-	

The present investigation entitled "Field evaluation of Gamma irradiated invitro regenerated banana var. Grand Naine under field condition" at Department of Horticulture, College of Agriculture, VNMKV Parbhani during 2016-17. To characterize invitro regenerated banana cv. Grand Naine mutants under field conditions. The experiment consists of seven different treatments.

The number of leaves per plant was found to be significant due to effect of gamma radiations. The 30 Gy took maximum number of leaves per plant (29). Minimum girth of pseudo stem was noted at 60 Gy (57 cm). In 40 Gy required minimum days (175 days) for flowering. The number of days required for flowering was significantly affected by different treatments of gamma radiations and it increased with increase in gamma irradiation. It tends to increase with increase in dose of gamma irradiation. The shortest crop duration (276 days) was recorded in 30 Gy dose of gamma irradiations. In general, the expressions of vegetative characters were reduced and retarded.

Bunch weight and number of hands/bunch were not significantly differed. Bunch length decreased with increase in dose of gamma irradiation. Minimum bunch length (50 cm) was recorded in 30 Gy dose of gamma irradiation. The maximum bunch length (69.9 cm) was recorded in control (0 Gy) plant.

The number of fingers per bunch was significantly affected by different treatments of gamma radiations and it decreased with increase in gamma irradiation. The maximum (174) number of number of fingers/bunch was recorded by in control (0 Gy). Significant difference was found in finger length. Finger length decreases with increase in dose of gamma irradiation. Maximum finger length (30.2 cm) was noted in 30 Gy dose of gamma rays. The weight of

finger decreased with increase in doses of treatment. Among all treatments of gamma irradiations maximum weight of fingers (146 g) was recorded in 50 Gy.

Total soluble solids, total sugars and reducing sugars differed significantly and decreased with increase in irradiation doses while acidity and non-reducing sugars differed non-significantly. The maximum number of (21.3% and 21.2%) fruits having reducing sugar in 40 Gy and 30 Gy dose of gamma irradiations. The minimum number (15.3%) of fruits having reducing sugar found in 40 Gy and 50 Gy. Maximum (27% and 26.6%) total soluble solids was recorded in control (0 Gy) and treated with 30 Gy dose of gamma rays.

In present experiment 11 banana mutants were isolated based on morphological characterization like early shooting (Mutant G-30-6, Mutant G-30-10, Mutant G-30-19, Mutant G-40-2 and Mutant G-40-15) and dwarf (Mutant G-30-5, Mutant G-40-8, Mutant G-40-18, Mutant G-40-11, Mutant.

Title	-	**Effect of different growth regulators on air layering in pomegranate (*Punica granatum*) cv. bhagwa**
Researcher	-	Thoke, Nirmala Udhavrao
Research Guide	-	Shinde, S.J.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	1746
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033343
Abstract	-	

The experiment on Effect of different growth regulators on air layering in pomegranate (*Punica granatum* L.) Cv. Bhagwa was carried out at Central nursery, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani, during kharif season in the year 2016-17.

The objective was to study effect of different growth regulators on rooting in pomegranate. The experiment was laid out in Randomized Block Design (RBD) in ten treatments with three replications.

The treatments were IBA 3000 ppm, IBA 4000 ppm, IBA 5000 ppm, NAA 2000 ppm, NAA 3000 ppm, NAA 4000 ppm, IBA 1500 ppm + NAA 1500 ppm, IBA 2000 ppm + NAA 2000 ppm, IBA 2500 ppm + NAA 2500 ppm, and Control.

The result indicated that the treatmentT_3IBA 5000 ppm was found significantly superior for early and profuse rooting and survival per cent over rest of the treatments.

The air layers made with treatment T_3IBA 5000 ppm significantly influenced in regards to root growth parameters as it recorded minimum days to root initiation (18.74), rooting percentage (93.34%), Average length of root (14.68 cm), root diameter (1.08 mm), fresh weight of roots (0.77 g), dry weight of roots (0.083g) , highest number of roots (49.92).

The treatment combination IBA 5000 ppm also significantly influenced in regards to shoot growth parameters as it recorded minimum number of days required for first sprouting (15.87), length of shoot (7.58, 8.75 and 16.63 cm) number of leaves (42.75, 55.11 and 66.55), number of shoot (3.80, 7.56 and 8.79), at 30, 45 and 60 days after transplanting respectively. The treatment IBA 5000 ppm also recorded the maximum number of branches

(9.12), plant height (74.40cm) and maximum survival percentage (85.09%) after 60 days of transplanting.

Based on this investigation use of IBA 5000 ppm may be recommended for early and profuse rooting and survival of air layers in pomegranate Cv. Bhagwa.

Title	-	**Studies on foliar application of soluble fertilizer on banana cv.grand naine**
Researcher	-	Devkate, Amol Mahadev
Research Guide	-	Dhutraj, S.V.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	1786
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033668
Abstract	-	

An investigation on "Studies on foliar application of soluble fertilizer on banana Cv.Grand Naine" was undertaken with objective to study the effect of foliar application of N and K on growth, yield and quality of banana.

The field study was carried out at the farmers field at Mahmadapurwadi, Tal-Vasmat, Dist- Hingoli. The experiment was laid out in Randomized Block Design (RBD) with nine treatment viz., T_1 (2%) SOP, T_2 (3%) SOP, T_3 (1%) urea, T_4 (2%) urea, T_5 SOP (2%) + urea (1%), T_6 SOP (2%) + urea (2%), T_7 SOP (3%) + urea (1%), T_8 SOP (3%) + urea (2%), T_9 control, with three replications.

Observations on growth, maturity, yield and quality attributes of individual treatments were recorded. The results obtained for growth characteristics, maturity attributes, finger attributes, bunch attributes, yield parameters and quality parameters had significant influence due to foliar application of various nutrients.

Among these treatments maximum height of plant (187.67 cm) was recorded in treatment T_3 i.e. spraying of 1% urea, the significant maximum girth of stem (62.86 cm) was recorded in treatment T_6 i.e. spraying of 2% SOP + 2% urea, number of leaves per plant (13.67) was recorded with treatment T_5 i.e. foliar spray of 2% SOP + 1% urea. The treatment T_5 i.e. 2% SOP + 1% urea was significantly influenced in maturity parameters viz. minimum days required from flowering to maturity (118.02 days) and maximum days required from maturity to ripening (13.33 days). The minimum crop duration (350.33 days) in the T_5 i.e. 2% SOP + 1% urea.

The treatment T_5 i.e. foliar application of 2% SOP + 1% urea was significantly superior to produce number of fingers per bunch (181.89), maximum weight of finger found (142.41 g), maximum circumference of finger (13.73 cm), and maximum length of finger (17.87 cm). The highest number of hands per bunch (9.00) and maximum number of finger per hand (21.83) was observed in treatment T_5 i.e. foliar spraying of 2% SOP + 1% urea.

The highest weight of bunch (25.91kg) and high yield (115.17Mt/ha) was observed in treatment T_5 i.e. 2% SOP + 1% urea and also the cost benefit ratio was maximum (3.57) in treatment T_5 i.e. 2% SOP + 1% urea.

In the quality parameters, significantly the highest weight of pulp (104.26 g), maximum pulp to peel ratio (2.74), highest TSS (22.67^0B), maximum reducing sugar (18.30 %), maximum non-reducing sugar (2.83 %) and the highest total sugar (21.13%) was recorded in treatment T_5 i.e. 2% SOP + 1% urea. Whereas as the maximum weight of peel (38.39 g) was noted in the treatment T_6 i.e. 2% SOP + 2% urea, lowest acidity (0.11%) was noted in treatment T_5 i.e. 2% SOP + 1% urea.

The present study concluded that along with the recommended dose of fertilizer (200: 160:200) spraying of 2 per cent sulphate of potash and 1 per cent of urea during six month after planting, after shooting and 1 month after 2^{nd} spray helps in increasing the yield and quality of banana Cv. Grand Naine.

Title	-	**Drying of spine gourd (*Momordica cochincinensis* L.)**
Researcher	-	Karma, Bahiram Vipul
Research Guide	-	Waskar, D.P.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	1796
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033681
Abstract	-	

The experiment entitled "Drying of spine gourd (*Momordica cochincinensis* L.)" under Parbhani conditions was carried out during 2016-17 under the parbhani at Horticulture Department, V.N.M.K.V, Parbhani. During 2016-2017 with 18 treatment combination and two replication of spine gourd with a view to assess the physicochemical profile of spine gourds.

The experiment was conducted on drying methods at different level compared with control in Factorial Randomized Block Design with two replications and 6 pre-treatment.

During the investigation carried out on chemical pre-treatment, T_2 ($MgCO_3$-0.25%) dried under cabinet drying was found superior in maintaining minimum moisture, dehydration ratio, while maximum rehydration ratio, vitamin C, TSS, acidity, chlorophyll, sugar, iron thought the storage periods. However, the T_6 (control) treatment had registered the maximum moisture, dehydration ratio where as minimum rehydration ratio, vitamin C, TSS, acidity, chlorophyll, sugar, iron.

In case of the dehydration methods used for the preparation of drying of spine gourd slices, the cabinet drying was found to be superior in maintaining the lower percent of moisture and higher percent of rehydration ratio, vitamin C, TSS, acidity, chlorophyll, sugar, iron.

Chemical compounds like ascorbic acid, TSS, acidity, chlorophyll, sugar and iron decreased with advancement of storage period.

Treatment combination T_2M_3 ($MgCO_3$-25% + cabinet drying) stood superior and scored maximum points followed by (NaCl-2% + cabinet drying) (T_3M_2) of fried spine gourd chips

with respect to colour, texture, and flavour as evaluated by five member expert panel in sensory evaluation test and exhibited maximum consumer acceptability.

Title	-	**Studies on preparation of aonla candy**
Researcher	-	Ghanwat, Archana Bhagwanrao
Research Guide	-	Khandare, V.S.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17108
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033724
Abstract	-	

The present investigation entitled "Studies on preparation of aonla candy " was carried out during 2015-16, in the Department of Horticulture, V.N.M.K.V. Parbhani, Maharashtra. Aonla (*Emblica officinalis*) also known as Indian gooseberry is one of the oldest Indian fruits and considered as "Wonder fruit for health". The aonla candy was made up by using different treatments i.e. sugar syrup solutions, dipping time and drying methods. There are two levels of sugar syrup concentrations i.e. 60% and 70%, three dipping times i.e.36 hrs, 42 hrs and 48 hrs and three drying methods i.e. sun drying, solar drying and cabinet drying. Candy was prepared by combining these treatments. Eighteen treatment combinations were taken in factorial combined randomized design with three replications.

The aonla candy was evaluated for various physico-chemical constituents and organoleptic quality after preparation of candy and during storage of candy.

During storage period there is significant decrease was observed in titrable acidity, ascorbic acid and tannins whereas TSS was increased in aonla candy. A gradual and significant decrease in titratable acidity of aonla candy was observed during 120 days storage period. The decrease in titratable acidity during storage might be due to the co-polymerization of organic acids with sugars and amino acids and loss of volatile acids during storage. The decrease in ascorbic acid during storage was observed during storage, the possible reason of reduction in vitamin C could be due to oxidation by oxygen, which resulted in formation of dehydroascorbic acid. Gradual decline in tannin during storage might be due to their condensation into brown pigments. A significant increase in TSS was observed during storage period. This might be due to conversion of polysaccharides into sugars during hydrolysis process. The treatment $S_1T_2M_2$ showed the highest values for hardness (43.278 kg). The hardness was found to be less in treatment $S_2T_2M_3$ (20.720 kg.).

The treatment S_2T2M_1 showed lowest value of cohesiveness (0.140) and treatment S1T1M3 showed the highest value (1.384). The highest springiness value (1.172) was found in$S_1T_3M_2$ and treatment $S_2T_2M_1$ showed lowest value i.e. 0.996. Morever, adhesiveness was found to be highest in treatment $S_2T_2M_1$ i.e. 0.297 and least in treatment $S_1T_1M_3$ i.e. 0.037.

Organolaptic quality of candy was decreased significantly during the storage period. Colour and appearance, texture, taste and overall acceptability of candy gradually decreased with the advancement of storage period. Treatment T18 showed maximum values during storage period for all organolaptic qualities and reported highly acceptable at the time of preparation and during storage period, this is due to the high concentration of sugar solution, longer dipping time and use of cabinet dryer in comparison to other treatments. Use of Cabinet dryer during candy preparation showed more overall acceptability than sun and solar dryer. High sugar concentration imparted good colour, appearance and texture to aonla candy sensory basis.

Title	-	**Studies on standardisation of sweet orange peel candy**
Researcher	-	Tulsi, Bisht
Research Guide	-	Waghmare, G.M.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17129
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033871
Abstract	-	

The present investigation entitled "Studies on standardisation of sweet orange peel candy" was carried out during 2016-17, in the Department of Horticulture, V.N.M.K.V. Parbhani, Maharashtra.Sweet orange fruits are mainly utilized as for table purpose and for squash preparation. After extraction of juice peel is used to discard as waste material. Peel is quite nutritious but goes waste and does not fetch any economical price to the industry. The useful option is to utilize waste peel for preparation of peel candy. The sweet orange peel candy was made up by using different treatment i.e. dipping time and concentration of sugar solution. There are three dipping times i.e. 12 hrs, 24 hrs and 36 hrs and three levels of concentrations i.e. 50%, 60% and 70%. Candy was prepared by combining these treatments. Nine treatment combinations were takenin factorial randomized block design with three replications.

The fresh sweet orange peels were evaluated for various physic-chemical characteristic. On fresh weight basis, moisture content and total solids of fresh peel was found to be 74.8% and 25.6. Total soluble solids (TSS), pH, titratable acidity and ascorbic acid were analyzed to be 11.5, 3.88, 0.48% and 35.6 g/100 g, whereas, reducing sugars, total sugars, pectin and tannins and were found to be 4.5%, 6.75%, 13.34 (% calpectate) and 170 mg/100 g respectively.

The result regarding storage (120 days) of candy revealed that the maximum moisture content and titrable acidity reported from T_1S_1 i.e. 12.91% and 0.61% while minimum value reported from T_3S_3 i.e. 8.77% and 0.48%. Maximum total solids, pH, Total Soluble Solids, reducing sugars and total sugars were reported from T_3S_3 i.e. 91.13%, 3.15 84.66%, 22.40%, 68.54% respectively while minimum values were reported from T_1S_1 i.e. 87.00%, 2.22, 60.33%,

18.08% 44.55% respectively. Maximum ascorbic acid content reported from T_1S_3 (2.05 mg/100g) while minimum from T_3S_1 (0.21 mg/100g) and maximum pectin and tannins were reported from T_1S_3(1.54% calpectateand 74.99 mg/100g) while minimum values reported from T_3S_1 (0.90% calpectate and 53.06 mg/100g). Organolaptic quality evolution was done in 9 point hedonic scale and it reveal that the treatment combination T_3S_3 showed maximum score regarding colour, texture, flavour and overall acceptability during storage period and remained more acceptable in comparison to other treatments.

Title	-	**Studies on effect of different levels fertilizer and its application period on growth, yield and quality of strawberry (fragaria ananassa duch.) var. winter dawn under poly-house**
Researcher	-	Bharade, S V
Research Guide	-	Bhagat, V.V.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17131
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033874
Abstract	-	

The field investigation entitled "Studies on effect of different levels fertilizer and its application period on growth, yield and quality of strawberry (*Fragaria ananassa* Duch.) var. Winter Dawn under poly-house" was conducted during winter season of 2016-2017 at experimental poly-house of Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani with a view to find out appropriate combination of time of application and fertilizer levels to improve the growth, yield and quality of strawberry. The experiment was laid out in factorial randomised block design with three replication comprising three level of time of application (monthly, fortnightly and weekly) and four fertilizer levels (100%, 80%, 70% and 60% of RDF) thereby involving twelve treatment combinations on strawberry cv. Winter dawn. The crop was sown by transplanting method keeping row to row and plant to plant spacing with 30×30 cm. The experimental crop was transplanted on 14th December, 2016 and all recommended cultural practices were followed.

On the basis of investigation, it was concluded that adoption of time application (weekly) found to be beneficial in recording higher growth and yield attributes of strawberry, higher quality attributes. As regard to fertilizer levels, 80% of RDF found to be beneficial in producing higher growth, yield and improved its quality as compared to rest of treatments under study. Interaction effect between time application and fertilizer levels was found significant for growth attributes, yield of crop and quality attributes of strawberry var. Winter Dawn.

Title	-	**Studies on different grades and methods of application of micronutrient mixture on growth yield and quality of sweet orange (citrus sinensis l.osbeck). cv. sathgudi**
Researcher	-	Mane, S N
Research Guide	-	Bhosale, A.M.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17137
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033880
Abstract	-	

The experimentation entitled, "Studies on different grades and methods of application of micronutrient mixture on growth yield and quality of sweet orange *(Citrus sinensis* L.Osbeck). cv. Sathgudi" was carried out on field of Horticulture Research Scheme (Pomology), V. N. M. K. V., Parbhani, Dist-Parbhani during mrig bahar in 2016-17. The experiment was laid out in factorial randomized block design with two factors i.e. micronutrient mixture (Grade) and time of application. These factors consist of four and three levels respectively, twelve treatment combination and three replications.

The experiment was conducted on ten years old sweet orange plants of Sathgudi cultivar. The micronutrient mixtures i.e. Grade-1 (sulphate & chelated) and Grade-2 (sulphate & chelated) were applied monthly, bimonthly and six monthly by soil and foliar application method respectively.

Among the different treatment combination the treatment G_4T_1 (Grade-2 chelated by foliar application monthly) noted the highest plant growth and yield in respect to, no. of leaves per plant (38000), days to initiate flowering (28.43days) and final fruit set (68.00%), number of fruits per plant (320), weight of fruit (200.00g), volume of fruit (216.00g), breadth of fruit (6.53cm), length of fruit (6.33cm),juice of fruit (45.03%),peel of fruit (21.00%), rag of fruit (26.50%), number of fruits per plant (320.00), yield per tree (70.00kg). The physico-chemical parameters also recorded maximum viz. T.S.S. (11.00%), ascorbic acid (55.00mg) and total sugar of fruit 8.05% (reducing sugar 5.20% and non-reducing sugar 2.85%) with reduction in acidity (0.85%).

In this experiment the treatment G_4T_1 (Grade-2 chelated by foliar application monthly) also performed well in respect of growth and yield which showed results viz. reduction in days required for initiation of new flush (16.03days) and days for first harvesting (232.00 days), leaf area (60.25cm^2) and number of flowers per plant (375.18).

Therefore, amongst all the treatment combinations Grade-2 chelated by foliar application monthly can be considered as most beneficial in terms of growth, yield and quality.

Title	-	**Effect of spacing and training levels on growth and yield of capsicum (Capsicum annuum L.) variety Indra**
Researcher	-	Sasane, M. P.
Research Guide	-	Bhagat, V.V.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	17138
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033918
Abstract	-	

The present investigation entitled "Effect of spacing and training levels on growth and yield of capsicum (*Capsicum annuum* L.) variety Indra" under protected conditions. The experiment was laid out in Factorial Randomized Block Design, experiment was conducted at Department of Horticulture, College of Horticulture, VNMKV Parbhani (MH) during *kharif* 2016-17. The treatment combinations comprised of three spacing levels (S) viz. S_1 (60x30 cm), S_2 (60x45 cm), and S_3 (60x60 cm) and three training levels (T) viz. T_1 (two shoots), T_2 (three shoots), and T_3 (four shoots).The observation recorded in the field are plant height (cm), number of leaves, leaf area (cm^2), days taken for flower initiation, number of flowers per plant, days for 50% flowering, days taken for fruit set, number of fruits per plant, days taken for first harvest, percent fruit set, individual fruit weight (g), length of fruit (cm), fruit breadth (cm), yield per plant (kg), marketable yield per plant (kg), yield per harvesting (t), total yield (t), marketable yield per hectare (t). From the present investigation it can be concluded that the combination S_1T_3 (plant spaced at 60x30 cm and three shoots) was found superior over all the other treatments in terms of economic characters such as yield per harvesting, marketable yield per hectare and total yield per hectare, which is an ultimate goal of any experiment. Therefore, plant spacing S_1 (60x30 cm) in combination with T_3 (four shoots) can be recommended for commercial cultivation for getting the higher yield in capsicum under protected conditions in Marathwada (MS).

Title	-	**Studies on effect of planting dates on growth, yield and quality of broccoli (Brassica oleracea L. var. italica) cv. Green Magic**
Researcher	-	Kanse, V.J.
Research Guide	-	Bhosale, A.M.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	17139
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033922
Abstract	-	

The investigation entitled, "Studies on effect of planting dates on growth, yield and quality of broccoli (*Brassica oleracea* L. var. italica) cv. Green magic" was designed and conducted at Department of Horticulture, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani and Dist-Parbhani during *rabi* season of 2016-17. The experiment was laid out in randomized block design with three replications and eight treatments viz., date of sowing D_1 (October 11th), D_2 (October 18th), D_3 (October 25th), D_4 (November 1st), D_5 (November 8th), D_6 (November 15th), D_7 (November 22nd) and D_8 (November 29th) to study crop growth under different dates of sowing in broccoli.

Among the different treatments the treatment D_4 (November 1st) noted the highest plant growth and yield in respect to, height of plant (59.82 cm), girth of main stem (21.00 cm), weight of central head per plant (638.84 g), diameter of central head (20.88 cm), height of central head (21.00), volume of central head (762.96 cm^3), days for curd initiation (45.30), days for harvesting (55.00), number of leaves per plant (23.00), length of leaf (48.78 cm), leaf width (22.00), leaf area of plant (724.00 cm^2), total yield per plant (1202.80 g), total yield per plot (30.07 kg), total yield per hector (445.49 q), benefit cost ratio (3.36) and quality parameters like total chlorophyll (0.31 mg/g) and ascorbic acid (125.50 mg/100g).

Therefore, amongst all the treatments D_4 planted at November 1st can be considered as most beneficial in terms of yield, vegetative and reproductive growth.

Title	-	**Effect of different plant growth regulators on air layering of guava (*Psidium guajava* L.)var.sardar**
Researcher	-	Shaikh, A.F.
Research Guide	-	Shinde, S.J.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17140
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033925
Abstract	-	

The experiment on effect of different growth regulator on air layering of guava (*Psidium guajava* L.) Var.Sardar was carried out at Central Nursery, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani . during kharif season in year 2016-17.

The objective was to find out suitable concentration of growth regulators for success and survival of air layer. The experiment was laid out in Randomized Block Design in Ten treatments with three replications. The treatments were IBA-3000 ppm , IBA-4000 ppm, IBA-5000 ppm , NAA-2000 ppm , NAA-3000 ppm , NAA-4000 ppm , IBA+NAA-1500 ppm , IBA+NAA-2000 ppm , IBA+NAA-2500 ppm and control.

The result indicated that treatment IBA-5000 ppm was found significantly superior for early and profuse rooting and survival per cent over the resr of treatment followed by IBA+NAA-2500 ppm.The air layers made with IBA-5000 ppm significantly influence in regards to root growth parameters as it recorded highest rooting per centage (91%) number of root (14), fresh weight (2.94 g), dry weight (0.74 g), diameter of root (2.20 mm), length of root (3 cm), minimum days taken to root initiation (16.83).

The treatment IBA-5000 ppm also shows significantly influenced in regards to shoot growth parameters as it recorded minimum number of days required for sprouting (20), number of sprout (10.22), length of shoot (78.33 mm),number of leaves (42.40),stem girth (9.03 mm),number of branches (10.87) seedling height (48.48), success per centage (96.29).

Title	-	**Influence of growth regulators on yield and quality of custard apple (annona squmosa l.) cv. balanagar**
Researcher	-	Thorat, Umesh Karbhari
Research Guide	-	Dheware, R.M.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17141
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033929

Abstract -

The present investigation entitled "Influence of growth regulators on yield and quality of custard apple (*Annona squamosa* L.) Cv. Balanagar" was conducted on a well established custard Apple orchard of eight years age at Custard Apple Research Station, Ambajogai, Dist. Beed, during 2016-17. The experiment framed was concentrated to find out effective concentration of GA_3 and NAA as well as their combination for getting high yield and better quality of custard apple fruits. The experiment was laid out in a Randomized Block Design with 10 treatments viz., T_1: GA_3 25 ppm, T_2: GA_3 50 ppm, T_3: GA_3 75 ppm, T_4: NAA 10 ppm, T_5: NAA 20 ppm, T_6: NAA 30 ppm, T_7: GA_3 25 + NAA 10 ppm, T_8: GA_3 50 +NAA 20 ppm, T_9: GA_3 75 + NAA 30 ppm and T_{10}: control (water spray) with three replications. The observations on different yield and quality attributes of custard apple were recorded.

The result revealed that, there were significant variations in yield and quality attributes of custard apple due to foliar application of growth regulators. As regards to yield parameters, maximum number of fruits per tree (67.30), fruit yield per tree (14.83 kg) and fruit yield per hectare (9.27 t) was recorded under the treatment T_7 (GA_3 50 + NAA 20 ppm). The maximum length of fruit (9.10 cm), diameter of fruit (8.65 cm), weight of pulp (90.56 g), weight of peel (110.20 g) was recorded under the treatment T_7 (GA_3 50 + NAA 20 ppm). Minimum values of most of these attributes were observed in control (T_{10}). The seed to pulp ratio, per cent of peel, number of seeds, weight of seed and fruit volume were not changed by the application of plant growth regulators. The maximum value of TSS (25.29 %) was recorded in the treatment T_8 (GA_3 50 + NAA 20 ppm). The results revealed that significantly maximum reducing sugar (20.18 %), non reducing sugar (2.07%) and total sugars were recorded in the treatment T_9 (GA_3 75 + NAA 30 ppm). Acidity of fruit was significantly influenced due to application of plant growth regulators. However, it was maximum (0.27 %)

in the treatment T_{10} *i.e.* control (water spray). While, it was minimum (0.22 %) in the treatment T_7 (GA_3 25 + NAA 10 ppm).

In general, the foliar application of growth regulators was found beneficial for increasing yield and quality of custard apple fruits. While, the combine spraying of GA_3 25 + NAA 10 ppm twice i.e. before flowering (second fortnight of may) and one month after the first spray is beneficial for getting higher fruit yield and quality of custard apple cv. 'Balanagar' under Marathwada region of Maharashtra.

Title	-	**Studies of softwood grafting technique in custard apple (*Annonasquamosa* L.)**
Researcher	-	Patale, Shweta Ashok
Research Guide	-	Munde, G.R.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17142
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033934
Abstract	-	

The present investigation entitled "Studies on softwood grafting technique in Custard apple (*Annona squamosa* L.) Cv. Balanagar" was conducted during July 2016 - March 2017, under shadenet house at Custard Apple Research Station, Ambajogai with object to study the success, survival and vegetative character of softwood grafting in custard apple. The experiment consists of fourteen different treatment viz T_1 (1^{st} July), T_2 (15^{th} July), T_3 (1^{st} August), T_4 (15^{th} August), T_5 (1^{st} October), T_6 (15^{th} October), T_7 (1^{st} November), T_8 (15^{th} November), T_9 (1^{st} January), T_{10} (15^{th} January), T_{11} (1^{st} February), T_{12} (15^{th} February), T_{13} (1^{st} March) and T_{14} (15^{th} March) replicated twice in Randomized Block Design .

The observations on days required for sprouting, success percent at 30 and 60 days and mortality percentage (%) were recorded. The growth observations like girth of scion, height of scion ,number of leaves and leaf area were recorded at 15, 30, 45 and 60 days interval. In biomass study the fresh and dry weight of shoot and roots was recorded at the end of experiment.

The results of present investigation clearly showed significant differences among the grafts of different treatment for most of the characters studied. Significantly minimum number of days (13.01) was required for sprouting in treatment T_{14}, while maximum days (26.68) were required in grafts of treatment T_1. The maximum success percentage of grafts at 30 DAG, (93.45%) was recorded in T_{14} and maximum success percentage of grafts at 60 DAG, (74.14%) was recorded in treatment T_{14} and minimum mortality percent (%) was recorded in T_{14} (10.19%) The maximum values of growth parameters like girth of grafts (9.84 mm), height of scion (14.02 cm) number of leaves (28.55), leaf area (22.53 cm^2), maximum fresh weight of shoot (19.80 g) and dry (10.20 g)

weight of shoot were also observed in grafts of treatment T_{14} which was at par with treatment T_{13}.

Hence, it was concluded that, the grafting in custard apple done on 15th March had shown significantly superior performance in relation to growth attributes like girth of scion, height of scion, number of leaves, leaf area, success percentage at 30 and 60 DAG, mortality percent, and biomass characters like fresh and dry weight of shoot and root.

Title	-	**Evaluation of f1 progenies for growth and yield of okra (abelmoschusesculentus(l.) moench)**
Researcher	-	Gajbhiye, Shital Kishor
Research Guide	-	Munde, G.R.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	17143
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033936
Abstract	-	

The present investigation entitled **"**Evaluation of F_1 progenies for growth and yield of okra **(***Abelmoschus esculentus* (L.) Moench**)"** was carried out during *kharif* season, 2016-2017, at the Instructional cum-Research-Farm, Department of Horticulture, College of Agriculture, Latur, VNMKV, Parbhani. The experiment was laid out in a Complete Randomized Block Design with 8treatments and three replications.

The experiment consisted of eight different treatments viz; T_1 (Parbhani Kranti [checks]), T_2 (Pusa-A4 x Parbhani Bhendi), T_3 (Parbhani Bhendi x Phule Utkarsha), T_4 (Pusa A4 x BO-2), T_5 (BO- 2x Kashi Pragati), T_6 (Pusa-A4x Phule Utkarsha), T_7 (BO-2 x Phule Utkarsha), T_8 (Hybrid No. 10 [Check]).

The observation on growth attributes viz. plant height (cm), girth of stem. (cm), number of branches per plant, number of nodes per plant, inter nodal length (cm), leaf area, days to first flowering, days to 50% flowering, length of pod (cm), diameter of pod (cm), number of pods per plant, average weight of pod (g), number of seed per pod, seed yield per pod, fruit yield per plant (g), fruit yield per plot, fruit yield per hectare (q/ha), number of picking, keeping quality (shelf life), fruit borer incidence (%) and YVMV incidence (%) were recorded.

Significantly maximum height of plant (104.33 cm), stem girth (3.32 cm),number of branches per plant (4.0),number of nodes per plant(15.6),inter nodal length (6.43 cm) and leaf area (492.53 cm^2) were recorded by treatment T_2.

The minimum days to first flowering, days to 50% flowering were recorded by treatment T_2.The maximum length of pod (cm), diameter of pod (cm), number of pods per plant, average weight of pod (g), weight of seed per fruit and seed yield were obtained in treatment T_2. Minimum incidence of pest and diseases was recorded by treatment T_2.

Present investigation indicated that, the highest yield (q/ha) with good quality of okra fruit should be obtained by treatment T_2.

Title	-	**Effect of foliar application of micronutrients on growth, yield and quality of cabbage (brassica oleracea var. capitata l.)**
Researcher	-	Jadhav, Rahul Ashruba
Research Guide	-	Kadam, A.S.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	17145
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033994
Abstract	-	

A field experiment entitled "Effect of foliar application of different micronutrients on growth, yield and quality of cabbage (*Brassica oleracea* var. *capitata* L.*)*" Cv. Green-challenger was conducted during rabi season of 2016-17 at instructional cum research farm, college of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out in randomized block design (RBD) with eleven treatments replicated thrice. The cabbage variety Green-challenger was selected for the study and the trial framed was intended to study the effect of foliar application of micronutrients alone or in combination on growth, yield and quality of cabbage. The foliar application of micronutrients as per treatments was done at 30, 45 and 60 days after transplanting and the growth observations were recorded at 15 days interval and yield observations were recorded at harvest. The treatments consist of Fe 0.5% (T_1), Fe 1.0 % (T_2), Zn 0.5% (T_3), Zn 1.0%(T_4), Mn 0.5%(T_5), Mn1.0% (T_6), B 0.3% (T_7), B 0.6% (T_8), Fe 0.5% +Zn 0.5%+Mn 0.5%+B 0.3%(T_9), Fe 1.0% +Zn 1.0%+Mn1.0%+B0.6%(T_{10}) and Control (T_{11}) where, only water spray was given. The results revealed that, the foliar application of Fe 0.5% + Zn 0.5% + Mn 0.5% + B 0.3% (T_9) was found significantly superior over rest of the treatments in respect of growth, yield and quality parameters in cabbage, whereas the foliar application of Zn 0.5% (T_3) has produced highest net monetary returns and recorded highest B: C ratio. In nutshell, it can be concluded that, for getting optimum growth, high yields with better quality of cabbage heads the combined foliar application of Fe 0.5% + Zn 0.5% + Mn 0.5% + B 0.3% should be done at 30, 45 and 60 days after transplanting, whereas, the highest B: C ratio was obtained with the sole application of Zn 0.5% at 30, 45, 60 days after transplanting. Hence, among the micronutrients the first preference should be given for zinc application.

Title	-	**Drying techniques and storage studies in carnation**
Researcher	-	Bandal, Komal Dattatray
Research Guide	-	Yadlod, S.S.
Department	-	Horticulture
Subject	-	Floriculutre and Landscapping
Degree	-	M.Sc
Thesis No.	-	17146
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033995
Abstract	-	

The present experiment entitled, "Drying techniques and storage studies in carnation " was carried out in PG Laboratory, Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during the year 2016-17 to evaluate the drying techniques and desiccants for drying of carnation flowers.

The experiment was laid out in factorial completely randomized design with two factors i.e. varieties and drying methods and replicated thrice. Flowers were dried as per treatments and Observations were recorded. Significantly, maximum weight of dry carnation flower (2.50) was found in interaction of V_1D_3 *i.e.* Baltico flowers embedded in sand, which was statistically at par with treatment combination of V_2D_3 (2.46) *i.e.* Domingo variety dried by embedding in sand, however minimum dry weight (2.10) was found in interaction of V_1D_5 *i.e.* Baltico variety dried by embedding in borax. Significantly, maximum diameter of dry carnation flowers (21.77 mm) was found in interaction V_1D_4 *i.e.* in Baltico variety when dried with silica gel, which was statistically at par with the treatment combination V_1D_5 with scoring (19.78mm) when Baltico variety dried in borax. However, minimum diameter (18.29 mm) was found in interaction V_1D_1 *i.e.* when Baltico variety of carnation flowers was air dried. Significantly, minimum days were recorded in treatment combination of V_1D_4 *i.e.* Baltico dried by embedding in silica gel, which was statistically at par with interaction of V_2D_4 *i.e.* Domingo flowers dried by embedding in borax (8.34). and maximum days (10.97) in V_1D_1.

Significantly, better colour of dry carnation flower (3.59) was found in interaction of V_2D_4 *i.e.* Domingo flowers dried by embedding in silica gel, followed by the treatment combination of V_2D_3 *i.e.* Domingo flowers dried by embedding in sand. However, minimum score (2.12) was found in interaction of V_1D_2 *i.e.* Baltico flowers dried with saw

dust. Highest score on brittleness of dry carnation flower (3.86) was found in treatment combination of V_2D_3 *i.e.* Domingo flowers dried by embedding in sand, which was statistically at par with the treatment combination of V_1D_3 (3.63) *i.e.* Baltico variety dried in sand. And minimum score (2.04) was found in interaction of V_1D_1.

Domingo a red colored carnation variety dried by embedding in silica gel recorded maximum score and minimum colour fading and no incidence of pests and diseases were occur during storage upto 150 days.

Title	-	**Effect of growth regulators and chemicals on germination and growth of ranpur lime seedlings under nursery condition**
Researcher	-	Yadav, Shubhangi Vaijinath
Research Guide	-	Patil, M.B.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17149
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034000
Abstract	-	

The present investigation entitled "Effect of Growth regulators and chemicals on germination and growth of Rangpur lime seedlings under nursery condition." The study was conducted at Institutional nursery, Sweet Orange Research Station, Badnapur, College of Agriculture, Badnapur, Dist. Jalna during the year 2016-2017.The experiment was laid out in Randomized Block Design with thirteen treatments replicated thrice, comprising three treatments of GA_3 concentrations i.e. (50, 100 and 150 ppm), three treatments of NAA concentrations i.e. (50, 100 and 150 ppm), three treatments of KNO_3 concentrations i.e. (0.5, 1.0 and 2.0 %), three treatments of Thiourea concentrations i.e. (1.0 , 1.5 and 2 %) and control (Distilled water).

The observations on seed germination (viz percentage of seed germination, physical parameters of growth (viz. height of plant, number of leaves per plant, number of branches per plant, circumference of stem, fresh and dry weight of shoot) and root growth (viz. length of tap root, fresh and dry weight of roots,number of secondary roots, number of fibrous roots) were recorded.

The results of the investigation revealed that, there were significant variations in germination and seedling growth of Rangpur lime due to growth regulators and chemicals. Amongst the effect of growth regulators and chemicals , the seed soaked in GA_3 150 ppm solution for 12 hours prior to sowing resulted in maximum germination percentage (91.33 %). The maximum height (52.12 cm), maximum number of leaves (46.59), maximum fresh weight (31.35 g) and dry weight of shoots (16.40 g) was also recorded under the treatment T_3 i.e. GA_3 150 ppm at 270 DAS. The maximum number of branches (6..66) was recorded under the treatment T_{12} i.e. Thiourea 2% at 270 DAS.

Maximum circumference of stem (22.23 mm), maximum length of tap root (49.65 cm), significantly more fresh weight of roots (14.56 g), and dry weight of roots (9.69 g),

maximum secondary roots (14.71) and maximum fibrous roots (194.49) was recorded under the treatment T_6 i.e. NAA 150 ppm at 270 DAS and survival percentage of seedling (80.00%) was recorded under the treatment T_3 i.e. GA_3 150 ppm at 270 DAS.

Title	-	**Studies on zinc biofertilization of soil and it's impact on growth, quality and productivity of sweet orange (Citrus sinensis L. Osbeck)**
Researcher	-	Gonte, Madhushri Kishan
Research Guide	-	Patil, M.B.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17150
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034001
Abstract	-	

The present investigation entitled "Studies on zinc biofertilization of soil and it's impact on growth, quality and productivity of sweet orange (*Citrus sinensis* L. Osbeck.)" was conducted in a well-established sweet orange orchard with 8 years old Nucellar Orange trees planted at 6 x 6 m spacing having uniform growth and productivity at the Sweet Orange Research Station, Badnapur, Dist- Jalana, during 2016-17 with the object to study the effect of zinc biofertilization of soil on growth of sweet orange and to study the effect of zinc biofertilization of soil on yield and quality of sweet orange. The experiment was laid out in Randomized Block Design (RBD) with ten treatments replicated thrice. The treatment comprised of (Recommended Nutrient Management Practices (RNMP)) i.e. (T_1), (RNMP + *Burkholderia cepacia*) (T_2), (RNMP + *Burkholderia cenocepacia*) (T_3), (RNMP + *Pseudomonas fluorescence*) (T_4), (RNMP + *Pseudomonas striata*) (T_5), (RNMP + *Trichoderma viride*) (T_6), (RNMP + *Trichoderma harzianum*) (T_7), (RNMP + *Bacillus megaterium*)(T_8),(RNMP + *Pseudomonas extremorientalis*) (T_9), (RNMP + *Bacillus subtilis*) (T_{10}). The observations on growth yield and quality parameters were recorded.

The results revealed that, there were significant variations in growth, yield and quality attributes of sweet orange due to application liquid biofertilizers (zinc solubilizers). The values of vegetative growth parameters height of the trees tem girth number of leaves per branch showed the significant effect by treatments and spread of the tree and number of branches per tree showed the non-significant effect by treatments. The height of tree, stem girth and number of leaves per branch showed most effective in T_6 (RNMP+ *Trichoderma viride*) followed by treatment T_5 (RNMP + *Pseudomonas striata)* and T_8 (RNMP+ *Bacillus megaterium*) and minimum effective in T_1 (RNMP). The quality parameters like reducing sugar, non-reducing sugar, acidity, TSS, ascorbic acid, pH are most effective in the T_6

(RNMP+ *Trichoderma viride*) followed by treatment T_5 (RNMP + *Pseudomonas striata)* and T_8 (RNMP+*Bacillus megaterium*) and minimum effective in T_1 (RNMP). The physical parameter of fruit like average fruit diameter of fruit most effective in T_6 (RNMP+ *Trichoderma viride*) followed by treatment T_5 (RNMP + *Pseudomonas striata)* and T_8 (RNMP+*Bacillus megaterium*) and minimum effective in T_1 (RNMP). Peel thickness, rind percent and number of seed per fruit most effective in T_1 (RNMP) and minimum effective in T_6 (RNMP+ *Trichoderma viride*). The yield parameters number of fruit per tree and weight of fruit per tree, weight of one fruit and weight of five fruit were noticed maximum in T_6 (RNMP+ *Trichoderma viride*) followed by treatment T_5 (RNMP + *Pseudomonas striata)* and T_8 (RNMP+*Bacillus megaterium*) and minimum effective was noticed in T_1 (RNMP). Application of RNMP+*Trichoderma viride* (T_6) improved economics in Sweet orange.

Hence, it can be concluded that, effective liquid biofertilizers (zinc solubilizers) such as *Trichoderma viride* followed by *Pseudomonas striata* and *Bacillus megaterium* along with RNMP were most effective than the control i.e. RNMP in all the parameters of sweet orange.

Title	-	**Effect of plant growth regulators on flowering, fruit set, yield and quality of custard apple (annona squamosa l.)**
Researcher	-	Mahorkar, Kunal Dhananjay
Research Guide	-	Naglot, U.M.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17156
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034017
Abstract	-	

The present investigation entitled "Effect of plant growth regulators on flowering, fruit set, yield and quality of custard apple (*Annona squamosa* L.)" was carried out on located farmers field at Malegaon Tal. Badnapur, Dist- Jalna during the year 2016- 2017. The experiment was laid out in Randomized Block Design with ten treatments of plant growth regulators and replicated thrice. The treatment consists of three treatments each of NAA (50, 75 and 100 ppm), GA_3 (50, 75 and 100 ppm), Ethrel (100, 200 and 300 ppm) and control.

The observations were recorded periodically on different characters viz., number of flowers per shoot, fruit set per cent, fruit drop per cent, number of fruits per plant, fruit yield kg/plant, fruit yield qt/ha, fruit yield MT/ha, days required for flowering to harvesting, fruit size, fruit volume, fruit weight, pulp weight per fruit, rind weight per fruit, number of seeds per fruit, stony fruit per cent, cracked fruit per cent, total soluble solids.

The results of this experiment revealed that, the highest percentage of fruit set (70.13 %), lowest percentage of fruit drop (15.78 %), maximum number of fruits per plant (59.83), maximum fruit yield (11.18 kg/plant, 44.72 qt/ha and 4.47 MT/ha) was recorded in treatment of GA_3 @ 75 ppm (T_5). The application of NAA @ 100 ppm, significantly increased the number of flowers per shoot (28.11), minimum per cent of stony fruit (25.07 %) and cracked fruit (0.67 %), significantly the minimum days (111.00 days) required for flowering to harvesting was recorded in treatment of Ethrel @ 300 ppm (T_9).

The fruit quality parameters, were all significant influenced due to foliar application of GA3 @ 75 ppm and recorded maximum values for most of the characters like fruit length (7.12 cm), fruit breadth (7.24 cm), fruit volume (180.20 cc), fruit weight (186.35 g), pulp weight (115.30 g) and minimum rind weight (59.41 g). Whereas, minimum number

of seeds per fruit (38.22) was recorded in treatment of GA_3 @ 100 ppm (T_6), whereas maximum total soluble solids (26.55 °Brix) was recorded in treatment of Ethrel @ 300 ppm (T_9).

Hence, considering the promising results obtained in the present study with the application of GA_3 @ 75 ppm for most of the yield and quality characters it can be concluded that two foliar applications of GA_3 @ 75 ppm for custard apple trees at full bloom and fruit set stage is beneficial for getting higher yield of quality fruits.

Title	-	**Effect of plant growth regulators on yield and quality of pomegranate (punicagranatum .l) cv. Bhagwa**
Researcher	-	Manasa, P.
Research Guide	-	Jagtap, V.S.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17160
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034026
Abstract	-	

The present investigation entitled "Effect of plant growth regulators on yield and quality of pomegranate (*Punica granatum* L.) cv. Bhagwa, was carried out at Krishi Vigyan Kendra, Manjra, Latur during *Mrig bahar* of 2016-2017. The experiment was laidout in Factorial Randomized Block Design (FRBD) with three replications. Three plant growth regulators at different concentrations were sprayed at four different times *i.e*. at fruit set, 20^{th}, 40^{th} and 60^{th} days after fruit set. The treatments consists of T_1 (NAA 10 ppm), T_2 (NAA 20 ppm), T_3 (NAA 30 ppm), T_4 (GA_3 25 ppm), T_5 (GA_3 50 ppm), T_6 (GA_3 75 ppm), T_7 (2, 4-D 20 ppm), T_8 (2,4-D 30 ppm), T_9 (2,4-D 40 ppm) and T_{10} (Control). Observations regarding fruit yield and quality were recorded.

The yield and quality of pomegranate fruits were significantly influenced by various plant growth regulators at different time of application. Among the various plant growth regulators used, maximum number of days required for maturity was recorded in the treatment T_{10} (control) *i.e.*192 days and minimum was recorded under T_1 (NAA 10 ppm). The maximum days to maturity after fruit set (176.10) was recorded by spraying at 60^{th} and 40^{th} days after fruit set. The minimum (174.20) was recorded by 20^{th} days after fruit set. In general maximum yield /ha was recorded by T_9 (2, 4-D 40 ppm) and T_6 (GA_3 75 ppm) 143.53 q/ha and 137.02 q/ha respectively.

The treatment T_9 (2,4-D 40 ppm) significantly increases fruit size characteristics *viz*., length (8.56 cm), diameter (8.62 cm), weight of fruit (223.24 g) and volume of fruit (244.80 ml) and minimum was recorded under treatment T_{10}(Control). It was observed that, the maximum (1.99) aril : rind ratio was observed in treatment T_9 (2,4-D 40 ppm) and minimum (1.60) was observed under control (T_{10}). The treatment T_{10} (control) showed maximum rind

thickness (1.52 mm) and minimum (0.91 mm) was observed in treatment T_9 (2, 4-D 40 ppm). The treatment 2,4-D 40 ppm (T_9) showed minimum (1.37 g) seed weight and treatment T_{10} (Control) showed maximum (1.69 g) seed weight.

The chemical characteristics were significantly improved by application of plant growth regulators. The highest juice percentage was observed under treatment T_9 (2, 4-D 40 ppm) and maximum TSS (15.02 %) was observed under treatment T_6 (GA_3 75 ppm) and minimum TSS percentage (12.24 %) and juice percentage was in T_{10} (control). The treatment T_6 (GA_3 75 ppm) significantly showed minimum acidity percentage (0.26 %).

The treatment T_6 (GA_3 75 ppm) and T_9 (2,4-D 40 ppm) showed significantly better results on reducing suagr, non reducing sugar and total sugar percentage. The treatment T_6 (GA_3 75 ppm) showed maximum anthocyanin percentage (0.49 %) and also recorded by spraying at 60^{th} days after fruit set (0.40 %).

The economics of pomegranate cultivation with application of plant growth regulators showed a wide range of variation in cost of cultivation, gross monetory returns, net monetory returns and B:C ratio (3.45) were obtained in the treatment T_9 (2,4-D 40 ppm) and lowest was observed in the treatment T_{10}(control).

Hence it can be concluded that, for getting higher yield and better quality of fruits, net monetory returns and B : C ratio the spraying of 2,4-D 40 ppm and GA_3 75 ppm were found significantly superior than the other treatments in pomegranate under marathwada conditions.

Title	-	**Studies on preperation of ready to serve (rts) of bael (*aegle marmelos*)**
Researcher	-	Karnale, Sulochana Madhav
Research Guide	-	Khandare, V.S.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17168
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034052
Abstract	-	

The investigation were carried out to standardize a protocol for preparation of RTS beverages from bael pulp and to study changes in composition and quality of beverages during storage. Bael pulp was extracted and analyzed for physicochemical composition. Preliminary trails to be conducted to find out optimum level of pulp and other ingredients for preparing RTS beverage. The RTS beverage prepared with selected level of ingredients was preserved at refrigerated temperature (7±1 0C) and ambient temperatures. The stored beverage samples were evaluated periodically at an interval of 30 days for chemical and sensory properties. Based on physicochemical composition of fresh RTS beverage containing bael pulp 15%, TSS 15 % and acidity 0.30% was found to be best giving highest score over other combinations studied. During the storage of RTS beverage, the Total soluble solids, acidity was increased while ascorbic acid, pH, iron, and tannin contents were decreased. The bael RTS beverage stored at refrigerated temperature, exhibited better quality than that stored at room temperature.

Title	-	**Effect of biofertilizers on growth and yield of spinach (beta vulgaris.l)**
Researcher	-	Shinde, Ashwini Ashok
Research Guide	-	Kadam, A.S.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	17171
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034057
Abstract	-	

An investigation on "Effect of biofertilizers on growth and yield of spinach (*Beta vulgaris* L.)" was conducted at the experimental farm, College of Horticulture, V.N.M.K.V Parbhani, during kharif season 2016-2017. The experiment was laid out in Randomized Block Design (RBD) with ten treatments replicated thrice by using the variety Pusa All Green. The treatment comprises of control(T_1), *Azotobacter*@10kg/ha(T_2),PSB@10kg/ha(T_3),*Azotobacter*+PSBeach@10kg/ha(T_4),*Azotobacter* +PSB as seed treatment (T_5), *Azotobacter* @ 2lit/ha (T_6) PSB @2lit/ha (T_7),*Azotobacter* +PSB each @ 2lit /ha (T_8), Azotobacter @ 10kg and PSB @2lit/ha(T_9),and *Azotobacter* @2lit +PSB @10kg/ha(T_{10}). The variety 'Pusa All Green' was used for the study. The experiment framed was intended to study the effect of biofertilizers (*Azotobacter* and phosphorus solublizing bacteria) on growth, yield and quality of spinach. The data on growth, yield and quality parameters were recorded and subjected for statistical analysis.

The results of the present study indicated significant differences with respect to growth, yield, quality and economics of spinach among the different treatments of biofertilizers tried. Regarding the growth attributes it is observed that, the maximum values of growth parameters like plant height (26.66 cm), number of leaves per plant (19.33), number of branches per plant (1.32) and minimum days required for maturity (28.12 days) were recorded with the application of *Azotobacter* + PSB each @2lit/ha (T_8).The yield attributes like maximum fresh weight of whole plant (98.11 g) was recorded in treatment of *Azotobacter*+PSB each @2lit/ha (T_8) weight of shoot (69.11 g) and shoot root ratio (2.47) was recorded in treatment PSB @ 10kg/ha (T_3). However, the minimum values for all other characters and maximum root weight (44.33 g) was recorded in control (T_1) treatment. Significantly maximum yield (3.8 kg/ plot) and yield (63.34 q)per hectare was recorded in the

treatment (T_8) i.e. application of *Azotobacter* +PSB each @ 2lit /ha and it was at par with treatment of Azotobacter + PSB each @ 10kg/ha(T_4) and the application of *Azotobacter* @ 10kg+ @ 2lit/ha (T_9). As regards quality attributes of spinach like maximum moisture (80.80 %), vitamin C (0.65 mg/100g),chlorophyll A content (38.04 mg/cm^2), shelf life (5 days) and minimum physiological weight loss at 5 th days of storage and was observed in the treatment of *Azotobacter* + PSB each @2lit/ha (T_8). While, maximum vitamin A (730.00 IU/100g) was noticed in the treatment of *Azotobacter* @ 10kg and PSB@ 2 lit/ha (T_9) the maximum iron content (27.44 mg/g) were observed in the treatment of *Azotobacter* + PSB as seed treatment (T_5).Regarding the economics of spinach, the treatment of *Azotobacter* + PSB each @ 2lit/ha (T_8) produced maximum net monetary returns/ha (Rs.53,499)and recorded highest B:C ratio (2.29) over rest of the treatment under study.

In nutshell, the application of biofertilizers in liquid from produced significantly superior results. As the treatments of application of *Azotobacter* + PSB each @2lit/ha in spinach produced significantly maximum yield, better quality and high B: C ratio. Hence it can be concluded that, application of liquid form of *Azotobacter* + PSB each @ 2lt/ha for spinach crop number marathwada condition will be beneficial for getting maximum yield and monetary benefits. However, the treatment of application of solid form of biofertilizers viz. *Azotobacter* + PSB each @10kg/ha has also produced at par results with respect to yield, but considering the high net monetary returns and B:C ratio the preference should be given to liquid from of *Azotobacter* and PSB.

Title	-	**Studies on heterosis and combining ability in ridge gourd (luffa acutangula l.)**
Researcher	-	Wakle, Dhondiba Govind
Research Guide	-	Jagtap, V.S.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	17172
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034058
Abstract	-	

The present investigation entitled "Studies on heterosis and combining ability in ridge gourd (*Luffa acutangula* L.)" was conducted during *kharif*- 2016 at Instructional-Cum-Research Farm, Department of Horticulture, College of Agriculture, Latur, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. A set of 7x7 half diallel was attempted in summer, 2016 and the resulting 21 hybrids along with seven parents were evaluated in RBD with two replications during *kharif*-2016, to study the heterosis, combining ability, gene action and heritability for growth and yield of F_1 hybrid and their parents.

The mean squares due to GCA and SCA were significant for all the characters indicating variability among the parents and crosses. The heterosis over better parent and standard hybrid check were found maximum for length of vine, length of internodes, number of nodes per plant, length of fruit, diameter of fruit, number of fruits per vine, weight of fruit, weight of fruit per vine, weight of fruit per plot and fruit yield per hectare. The significant heterosis crosses involved high x high, low x high, low x low and high x low performance of parents.

Studies on combining ability revealed that, the parent Konkan Harita (P_1),Arka sujat (P_2) and Krishna-51 (P_4) were found good combiners for most of the characters.

The hybrid derivatives or cross like combinations *viz*. P_2 x P_4 (Arka Sujat x Krishna -51), P_4 x P_6 (Krishni-51 x Kranti-30), P_3 x P_7 (Pusa Nasdar x Swati Green) and P_4 x P_5 (Krishna-51 x Jaipuri) were found promising for the growth characters like length of vine, number of nodes per vine and yield contributing characters like number of fruit per vine, length of fruit, , weight of fruit, weight of fruit per vine , weight of fruit per plot and

fruit yield per ha. They have also exhibited higher additive variance. Hence, they may be exploited for development of hybrid in ridge gourd.

High, moderate and low heritability was recorded in present study. The moderate to low heritability showed with more dominance variance and have greater potential under heterosis breeding. While, those characters which exhibited moderate to low heritability coupled with more additive variance will be suitable for advancing hybrid derivatives in development of open pollinated cultivars.

Title	-	**Studies on effect of chemicals on success and survival of cuttings in karonda (carissa carandas l)**
Researcher	-	Hake, Prakash Dnyaneshwar
Research Guide	-	Naglot, U.M.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17176
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034062
Abstract	-	

The present investigation entitled "Studies on effect of chemicals on success and survival of cuttings in karonda (*Carissa carandas* L)" was carried out at the Instructional Cum Research Farm, Department of Horticulture, College of Agriculture, Badnapur during the year 2016-2017. The experiment was laid out in Randomized Block Design with ten treatments replicated thrice, comprising three treatments of sucrose concentrations i.e. (2, 3 and 4 %), three treatments of IBA concentration i.e. (6000, 7000 and 8000 ppm), three treatments of NAA concentration i.e. (500, 1000 and 1500 ppm) and control.

The observations were recorded on days taken for sprouting, number of sprouts per cuttings, shoot height, number of leaves per cutting, shoot diameter or thickness, fresh weight of shoot, dry weight of shoot, total number or roots, length of longest root, diameter of root, fresh weight of root, dry weight of root and final survival percentage of cuttings.

The results of present study indicated significant differences with shoot and root growth observations *viz*., minimum days taken for sprouting of cuttings (10.20 days), maximum number of sprouts per cutting (4.09), maximum number of leaves per cutting (15.30) were recorded in treatment T_3 i.e. sucrose 4%. However other shoot growth parameters such as maximum shoot height (15.35 cm), maximum shoot diameter (6.72 mm). However, fresh weight of shoot (1.523 g) and dry weight of shoot (0.603 g), total number of root (11.88 cm), length of longest root (6.90 cm), diameter of root (1.08 mm), fresh weight of root (0.433 g), dry weight of root (0.209 g) and final survival percentage (49.07 %) was found in treatment T_6 (IBA 8000 ppm) at 90 days after planting.

Application of chemical treatment *viz.*, karonda cuttings dipping in Sucrose 4 % and IBA 8000 ppm solution, 1-2 cm (at the lower portion) for 3-5 seconds to be beneficial for maximum growth and survival percentage.

Title	-	**Studies on effect of media and bio-inoculants on germination, growth and vigour of rangpur lime(citrus limonia osbeck.) seedlings**
Researcher	-	Pokharna, Gaurav Subhashlal
Research Guide	-	Nainwad, R.V.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17177
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034063
Abstract	-	

The present investigation entitled "Studies on effect of media and bio-inoculants on seed germination, growth and vigour of rangpur lime (*Citrus limonia* Osbeck.) seedlings"was carried out at Department of Horticulture, College of Agriculture, Badnapur, during the year 2016-2017.The experiment was laid out in Factorial Randomized Block Design with twenty treatment combinations replicated twice,comprising of two factors i.e. Factor A and Factor B. Factor A comprising five different media compositions *viz.*M_0 {Soil: Sand: FYM (control) (2:1:1)}, M_1 {Soil: Sand: Vermicompost (2:1:1)}, M_2 {Soil: Sand: Coco peat (2:1:1)}, M_3 {Sand: Coco peat: FYM (2:1:1)}and M_4 {Sand: Coco peat : Vermicompost (1:1:2)} while factor B consist of four bio-inoculant treatments including control *viz.* B_0 {Control (Water soaking)}, B_1(*Trichoderma viride*), B_2(*Pseudomonas fluorescens)* andB_3 (*Azotobacter*).

The observations on seed germination (*viz.* number of days taken for

initiation and 50 per cent germination, germination percentage), physical parameters of growth (*viz*. height of seedling, number of leaves per seedling, stem diameter, fresh and dry weight of shoot),root growth (*viz*. length of root, fresh and dry weight of root) and vigour of seedling (vigour index-I and vigour index-II) were recorded.

The results of the investigation revealed that, there were significant variations in germination andseedling growth of rangpur lime due to different media compositions, pre-sowing treatments with different bio-inoculants and interaction effect of both factors. Amongst the different media treatments, the medium M_1 i.e. Soil: Sand: Vermicompost (2:1:1) recorded earliest germination (12 days), 50 % germination (13.25 days) and maximum germination percentage (82.50 %), whereas under the bio-inoculants treatments, the treatment B_3 (Azotobacter) recorded earliest germination (14 days), 50 % germination (17 days) and

maximum germination percentage (82 %). The maximum height(28.63 cm), maximum number of leaves (28.20),maximum fresh weight (18.31 g) and dry weight of shoot (9.17 g) was also recorded under the treatment media M_1 i.e. Soil: Sand: Vermicompost (2:1:1) at 180 DAS. While, bio-inoculant treatment B_3 (Azotobacter) recorded maximum height (27.26 cm), maximum number of leaves (27.28), maximum fresh weight (16.85 g) and dry weight of shoot (8.25 g) at 180 DAS. Interaction effect of treatment combination M_1B_3 i.e. Soil: Sand: Vermicompost (2:1:1) and Azotobacter recorded maximum height (29.85 cm), maximum number of leaves (30.81), maximum fresh weight (21.11 g) and dry weight of shoot (11.26 g) at 180 DAS.

The media treatment M_1 i.e. Soil: Sand: Vermicompost (2:1:1) and bio-inoculant treatment B_3 (Azotobacter) recorded maximum stem diameter (3.49 mm and 3.23 mm), maximum length of root (29.74 cm and 28.29 cm), and significantly maximum fresh weight of root (8.36 g and 7.35 g) and dry weight of root (5.90 g and 5.26 g) respectively at 180 DAS. While regarding to interaction effect, the treatment combination M_1B_3 i.e. Soil: Sand: Vermicompost (2:1:1) and Azotobacter recorded maximum length of root (30.72 cm),

and significantly maximum fresh weight of root (9.08 g), and dry weight of root (6.66 g)at 180 DAS.

Title	-	**Studies on in vitro mutagenesis of banana cv. Grand Naine**
Researcher	-	Kalalbandi, B.M.
Research Guide	-	Waghmare, G.M.
Department	-	Horticulture
Subject	-	Horticulture
Degree	-	Ph.D.
Thesis No.	-	17182
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034079
Abstract	-	

The present investigation "Studies on *in vitro* mutagenesis of banana cv. Grand Naine was carried out at, Tissue Culture Project unit and Instructional cum research farm of Department of Horticulture, VNMKV, Parbhani during the year 2014-2017 with an objectives to standardize the dose of gamma irradiation for production of *in vitro* raised banana plantlets, to generate variability and to select desirable banana mutants by morphological characters based on performance in field conditions.

The shoot tip of banana cv. Grand Naine were taken from sword suckers of three months age having weight of 1 kg were collected from the experimental mother plants at BRS, Nanded. The shoot tips were established on MS medium containing 2 mg/l BAP were exposed to ^{60} Co gamma rays doses ranging from 0, 10, 20, 30, 40, 50 and 60 Gy @ 20 Gy/min. at BARC, Mumbai. The irradiated explants were sub-cultured (M_1V_0) onto shoot proliferation medium (MS medium containing 2mg/l BAP). Further sub-culturing was performed at an interval of 30 days upto M_1V_4 generation and then transferred for rooting media (1/2 strength MS medium supplemented with 2 mg/l IBA and 3g/l activated charcoal) to obtain rooted plantlets. After four weeks in primary hardening, the plantlets were transferred to polybags containing 1:1 mixture of soil and farmyard manure and hardened for eight weeks in the green house. Finally three months old banana plants were eventually planted in field. The banana plants of M_1V_4 generation were observed for mutational changes in the biometric parameters both under greenhouse and field conditions. Analysis of data for laboratory and morphological characters in hardening process was analyzed by using Completely Randomized Design (CRD). The significance of different treatment under field conditions was analyzed using Randomized Block Design. Variations induced in

morphological characters under field conditions was studied by using statistical parameter such as mean, range, variance and coefficient of variation.

Survival per cent and regeneration of shoot tip cultures was recorded 100 % and 94.41% respectively in control treatment while 33.33% and 30.50% respectively in treatment of 60 Gy. Days required for greening was required comparatively more in higher doses of irradiations i.e. 12.2 days in treatment of 60 Gy than control (3.9 days).The probit value of LD_{50} value for Grand Naine is 42.56 Gy by using gamma irradiations. There was gradual decrease in multiplication ratios of *in vitro* shoot tip cultures of banana from M_1V_1 to M_1V_4 generation.

The inhibitory effect of gamma irradiation on *in vitro* shoot and root attributes was noticed in irradiated treatments as compared to control. The maximum number of shoots per explants (3.90), number of leaves per shoot (4.60) and average shoot length (5.65 cm) and minimum numbers of days (10.24 days) for first leaf emergence were recorded in the treatment control over rest of the treatment under study. Significantly minimum number of shoots per explants (1.0), number of leaves per shoot (2.4) and average shoot length (2.77 cm) and maximum numbers of days for first leaf emergence (23.05 days) were recorded in the treatment applied with 60 Gy gamma irradiations followed by the treatment T_6. Regarding root characters, significantly maximum per cent rooting (100), length of primary root (6.2 cm), number of roots per shoot (8.1), minimum days for first root initiation (3.10 days) and days for complete rooting (21.45 days) were recorded in shoot tip cultures applied with 0 Gy gamma irradiation which was found statistically superior over rest of the treatments of irradiations under investigation. The treatment of 60 Gy recorded significantly minimum per cent rooting (85.33 %), length of primary root (2.92 cm), and number of roots per shoot (2.9), maximum days for first root initiation (27.8 days) and days for complete rooting (53.58 days).

During hardening stage of M_1V_4 generation of banana plantlets revealed significant differences with maximum (16.8 cm) plantlet height, number of leaves (5.95), leaf length (17.60 cm), leaf breadth (11.8 cm), leaf area (23.71 cm^2), stem diameter (13.5 mm), number of roots (11.8) and chlorophyll content (48.95 Spad units) were recorded in the treatment control over rest of the treatments of irradiations under study. However, the treatment consisting of 60 Gy recorded minimum plantlet height (8.1 cm), number of leaves (3.43), leaf length (6.27 cm), leaf breadth (4.1 cm), leaf area (159.31 cm^2), stem diameter (7.9 mm),number of roots (3.8) and chlorophyll content (37 Spad units) followed by the treatment

of 50 Gy. The total mutation spectrum of irradiated plants was 18.25% and showed predominance of dwarf shoot (74.41%) with maximum mutation frequency percent (54.74), mutagenic effectiveness (0.15 Mp/kR) in treatment of 40 Gy.

In field conditions, the control treatment recorded maximum plant height (189.99 cm), stem girth (72.80 cm), number of suckers (4.46), number of leaves (21.8), leaf area (11.8 m^2) and leaf area index (8.75) over rest of the treatments under study. While the treatment T_7 recorded less plant height (163 cm), stem girth (56.57 cm), number of suckers (2.9), number of leaves (17.6), leaf area (7.8 m^2) and leaf area index (6.0). The results on shooting, bunch and finger characters showed that the treatment 0 Gy irradiation recorded significantly minimum days for flowering (209.9 days), days to fruit maturity from flowering (97.86 days) and crop duration (308.53 days) while bunch attributes *viz.*, bunch length (63.35 cm), number of hands per bunch (9.83), number of fingers per hand (16.1), number of fingers per bunch (155.26) and bunch weight (22.7 kg) of banana and finger attributes *viz.*, finger length (23.7 cm), finger girth (14.68 cm) and fingers weight (133.41g) of banana was recorded more as compared to remaining treatments of gamma irradiations under study.

Regarding quality attributes, the control treatment recorded significantly maximum total soluble solids (23.5 %), total sugar (23.25 %) and reducing sugar (17.65 %) over rest of treatments under study while, the treatment applied with 60 Gy recorded less total soluble solids (20.91 %), total sugar (20.6 %) and reducing sugar (16.29 %). The acidity and non-reducing sugar differed non-significantly. Per cent disease incidence of cucumber mosaic virus and banana streak virus showed non-significant differences as affected by irradiations. The total mutation spectrum of irradiated plants was 14.22 % and showed predominance of plant stature type of mutant (31.34 %) with maximum mutation frequency (42.84 %), mutagenic effectiveness (0.12 Mp/kR) in treatment of 40 Gy.

Maximum variability for various quantitative and quality parameters in field conditions were recorded in treatment applied with 40 Gy. Total 07 useful putative mutants (03 early maturing and 04 dwarf type) were selected at harvest from the wide range of M_IV_4 generation of gamma rays induced putative mutants population of Grand Naine for their performance and further utilization.

Title	-	**Effect of Bio-fertilizer and chemical fertilizers on growth, yield and quality of Sweet Orange (Citrus sinensis L. Osbeck)**
Researcher	-	Jugnake, Maheshkumar Omdev
Research Guide	-	Patil, M.B.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17193
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034121
Abstract	-	

The experimentation entitled, "Effect of Biofertilizers and chemical fertilizers on growth, yield and quality of Sweet Orange (*Citrus sinensis* L. Osbeck)"was carried out on field of Sweet Orange Research Station, Badnapur, At. Post- Badnapur, Dist-Jalna durind mrug bahar in 2015-16. The experiment was laid out in randomized block design with seven treatments replicated thrice. The treatment comprised of Chemical fertilizer (800:400:400 g NPK) + 80 ml *Azotobacter* (T_1), Chemical fertilizer (800:400:400 g NPK) + 80 ml PSB (T_2), Chemical fertilizer (800:400:400 g NPK) + 80 ml *Azotobacter* + 80 ml PSB (T_3), RDF (800:400:400 g NPK + 50 kg FYM) + 80 ml *Azotobacter* (T_4), RDF (800:400:400 g NPK + 50 kg FYM) + 80 ml PSB (T_5), RDF (800:400:400 g NPK + 50 kg FYM) + 80 ml *Azotobacter* + 80 ml PSB (T_6), Control RDF (800:400:400 g NPK + 50 kg FYM) (T_7). The observations on growth, yield, and quality status were recorded.

The results revealed that, there were significant variations in growth, yield and quality attributes of sweet orange due to application of different combination of biofertilizers (*Azotobacter* + PSB) and chemical fertilizers. The maximum values of the growth characters like tree height, stem girth, tree spread and plant volume were observed with the application of RDF (800:400:400 g NPK + 50 kg FYM) + 80 ml *Azotobacter* + 80 ml PSB (T_6) and it was at par with T_5 and T_4 for most of the characters.

The flowering characteristics in terms of days required for flowering and days from fruit set to maturity of fruits were also minimum in the RDF (800:400:400 g NPK + 50 kg FYM) + 80 ml *Azotobacter* + 80 ml PSB (T_6) treatment. The highest yield and marketable yield of fruits per plant (107.36 kg/tree and 105.46 kg/tree respectively) was recorded with the treatment of RDF (800:400:400 g NPK + 50 kg FYM) + 80 ml *Azotobacter* + 80 ml PSB

(T_6) and it was at par with T_5 and T_4. The numbers of fruits per plant were also maximum in the said treatment.

The maximum values of fruit quality aspects like weight of pulp, weight of peel and weight of seeds with non significant values of pulp to peel ratio and number of seeds per fruit and chemical attributes like juice per cent, TSS, ascorbic acid, reducing, non reducing sugars and total sugars was observed with the application of T_6.The fruits obtained with the application of RDF (800:400:400 g NPK + 50 kg FYM) + 80 ml *Azotobacter* + 80 ml PSB (T_6) recorded minimum physiological loss in weight and showed maximum shelf life (27.33 days).

Hence, it can be concluded that, for getting better growth, yield and quality of sweet orange fruits. The trees should be fertilized with RDF (800: 400: 400 g NPK) + FYM @ 50 kg along with the combined application of biofertilizers (*Azotobacter* + PSB each at 80ml/tree) per year.

Title	-	**Effect of micronutrients, chemical and plant growth regulators on banana cv. Grand naine**
Researcher	-	Borate, Akshay Shivaji
Research Guide	-	Tambe, T.B.
Department	-	Horticulture
Subject	-	Fruit Science
Degree	-	M.Sc
Thesis No.	-	17196
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034125
Abstract	-	

An investigation on "effect of micronutrients, chemical and plant growth regulators on banana cv. Grand Naine" was undertaken with objective to study the effect of micronutrients, potassium dihydrogen phosphate and plant growth regulators on growth, yield and quality of banana.

The field study was carried out on the field at Mahmadapurwadi, Tal-Basmat, Dist-Hingoli. The experiment was laid out in Randomized Block Design (RBD) with eight treatments viz., T_1 control, T_2 Zn (0.5%) + Fe(0.2%) + Cu (0.2%) + B (0.1%), T_3 Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B GA_3 (300 ppm), T_5 Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + BA (10 ppm), T_6 Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + BA (20 ppm), T_7 Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + KH_2PO_4 (0.5%), T_8 Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + KH_2PO_4 (1%), with three replications. Observations on growth, maturity, yield and quality attributes of individual treatments were recorded.

The results obtained for growth characteristics, fingers attributes, bunch attributes, yield parameters and quality parameters had significant influence due to foliar application of given treatments.

Among these treatments growth attributes such as height of plant (189.48 cm) and girth of stem (65.38 cm), length of finger (17.99 cm), number of hands per bunch (9.08) were found maximum in treatment T_4 i.e. spraying of Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + GA_3 (300 ppm) which were respectively 18.69 per cent, 24.48 per cent, 21.96 per cent and 27.17 per cent more as compared to control. Maturity parameters such as crop duration (344.65 days) was found minimum (5.48%) than the control (364.67 days). Given

treatments also enhanced the yield attributes i.e. weight of bunch (26.04 kg and 25.82 kg) and average yield (116.38 Mt and 112.63 Mt) in the treatment T_6 i.e. Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + BA (20 ppm) and T_7 i.e. Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + KH_2PO_4 (0.5%) respectively. In case of average yield significant increment were found with such treatments (45.78 and 41.08 per cent resp.) as compared to the control.

The quality parameters such as acidity (0.18%), reducing sugar (18.21%) and total sugars (21.18%) were found positively enhanced (43.75, 24.72 and 30.09 per cent) over the control. Maximum pulp to peel ratio was found in treatment T_4 i.e. spraying of Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + GA_3 (300 ppm) which was comparatively more (43.82%) than the control.

Close analysis of the present investigation revealed that the foliar application of micronutrients in the mixture form, alone or in combination with plant growth regulators and chemical i.e. potassium dihydrogen phosphate were able to increase the growth, yield and quality characters of banana cv. Grand Naine. Among the eight different treatments of sprays with Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + GA_3 (300 ppm) and Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + BA (20 ppm) was found to be more effective in increasing the growth attributing characters respectively.

In present investigation the foliar application of Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + BA (10 ppm) and Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + KH_2PO_4 (0.5%) found to be best in improvement of quality characters. Treatments such as Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + BA (20 ppm) and Zn (0.5%) + Fe (0.2%) + Cu (0.2%) + B (0.1%) + KH_2PO_4 (0.5%) results best in case of yield improving characters which were also found better to increase B:C ratio (3.55 and 3.35) respectively. In short, micronutrients in combination with GA_3 found best to improve the growth and with BA and KH_2PO_4 showed best response in increasing the yield and quality characters of banana.

Title	-	**Studies on response of micronutrients and biofertilizers on yield and quality of sugar beet (beta vulgaris l. ssp. vulgaris)**
Researcher	-	Singgam, Supriya
Research Guide	-	Khandare, V.S.
Department	-	Horticulture
Subject	-	Vegetable Science
Degree	-	M.Sc
Thesis No.	-	17208
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034165
Abstract	-	

An investigation on **"Studies on Response of Micronutrients and Bio-fertilizers on Yield and Quality of Sugar Beet (*Beta vulgaris* L. *ssp. vulgaris*)."** was under taken with an objective to study the effect of foliar application of micronutrients and soil application of biofertilizers on yield and quality of sugar beet.

The field study was carried out at the Vegetable Research Station, Dept. of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out in Randomized Block Design (RBD) with three replications. The treatments were classified towards different foliar spray of micronutrients, two times first at 60 and second at 90 days and soil application of biofertilizers.

The parameters investigated in this study included plant height, leaf characteristics *viz.*, number of leaves, leaf area and leaf area index, shoot fresh weight, physiological characteristics viz., total chlorophyll content, root characteristics *viz.*, root length, root diameter, root fresh weight, chemical characteristics viz., total soluble solids, sucrose percentage, purity percentage and yield characteristics *viz.*, root yield per plot (kg), root yield per hectare(t), sugar yield per plot(kg), sugar yield per hectare (t), top yield per plot (kg) and top yield per hectare (t).

The results showed that, the effects of foliar spray of different micronutrients and soil application of biofertilizers significantly affected the growth attribute i.e., plant height. The highest plant height at peak vegetative days (55.72 cm) was recorded under treatment T_8 (Recommended dose of NPK + boric acid @ 0.1% + zinc sulphate @0.1% + ferrous sulphate @ 0.1% + manganese sulphate @ 0.1%+ *Azotobacter* @0.001g/plot).

The maximum (32.33) number of number of leaves, leaf area (39.12 dm^2), leaf area index (3.91) and total chlorophyll (58.49 SPAD) were produced in treatment T_8 while the maximum shoot fresh weight (486.54 g) was recorded under treatment T_{12}.

The maximum root length (42.79 cm), root diameter (13.63 cm) and root fresh weight (42.79 cm) were recorded under treatment T_8.

The maximum total soluble solids (23.2%) and sucrose (20.09%) were recorded under treatment T_{12} while the maximum purity percentage (95.03%) was under the control (recommended NPK) which was at par with treatments $T_{1.}$. The maximum root yield (99.48 t/ha) and top yield (49.23 t/ha) were recorded under treatment T_8 while the maximum sugar yield (19.54 t/ha) was recorded under treatment T_{12}.