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Effect of organic and inorganic fertilizer on growth and flower yield of jasmine (*Jasminum grandiflorum* L.)

Rohit Diwivedi, S Saravanan, Mohd Shabi and Saurabh Kasera

Abstract
The present experiment was carried out during September 2017 to March 2018 in Departmental Research Field of Department of Horticulture, SHUATS, Allahabad. The experiment was conducted in Randomized Block Design (RBD), with twelve treatments, replicated thrice. the treatments were T_0 (100% RDF(120:240:240g N:P:K), T_1 (75% RDF+5 Kg FYM, T_2 75% RDF+7 Kg FYM), T_3 (75%RDF+1.8 Kg Vermicompost), T_4 (75%RDF+1.5Kg FYM), T_5 (50%RDF+10.5 Kg FYM), T_6 (50%RDF+3.7 Vermicompost), T_7 (50%RDF+3 Kg FYM), T_8 (25%RDF+15.5 Kg FYM), T_9 (25%RDF+5.6 Kg Vermicompost), T_{10} (25%RDF+10.5 Kg FYM) and T_{11} (25%RDF+5 Kg FYM+1.8 KG Vermicompost). From the present experiment treatment T_8 found best in terms of maximum plant height, plant spread, Number of branches, flowering period, weight of 50 flower bud, Number of flower bud/plant, Yield of flower/plant, Yield of flower/ha and minimum for flower bud initiation, days for flower bud development. In terms of cost benefit ratio maximum Gross Return, Net Return and Cost Benefit ratio was also found in treatment T_8 followed by treatment T_6 where as minimum was recorded in treatment T_0 (Control) in all the parameters.

Keywords: Jasmine, FYM, Vermicompost.

Introduction
Jasmine (*Jasminum grandiflorum*) is a highly valued ornamental plant for home gardens and commercial cultivation. Flowers and buds are used for making garlands, bouquets and for religious offerings, while vein is used as hair adornment. The flowers are also used for the production of perfumed hair oils and attars. Jasmine essential oil has a sweet and floral aroma. It is regarded as unique, as it blends well with other floral extracts and which is highly valued throughout the world for its high grade perfumes, which is used in soap and cosmetic industries and in flavouring mouth wash liquids. The flowers should preferably be picked at night for extraction of essential oil. Jasmine fragrance is said to give a feeling of optimism, confidence and euphoria, and is helpful against depression, nervous exhaustion and stress related conditions. Jasmine is also used for catarrh, coughs, laryngitis, dysmenorrhea, labor pains, uterine disorders and many skin problems.
In India, jasmines are commercially cultivated in the states of Tamil Nadu, Karnataka and West Bengal. Although, correct statistics of the area and production are not available, it is estimated that in India, jasmines occupy an area of 8000 ha with an annual production of flower worth Rs. 80 to 100 million. In India, Tamil Nadu has the largest area under jasmine cultivation followed by Karnataka, which together account for 98 per cent of the total cultivated area.

Materials and Methods
The Experimental was conducted in Randomized Block Design (RBD) with 12 treatments and 3 replications in the Departmental Research field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad during the year 2017 - 2018. Total number of treatments were nine *viz.* T_0 (100% RDF(120:240:240g N:P:K), T_1 (75% RDF+5 Kg FYM, T_2 75% RDF+7 Kg FYM), T_3 (75%RDF+1.8 Kg Vermicompost), T_4 (75%RDF+1.5Kg FYM), T_5 (50%RDF+10.5 Kg FYM), T_6 (50%RDF+3.7 Vermicompost), T_7 (50%RDF+3 Kg FYM), T_8 (25%RDF+15.5 Kg FYM), T_9 (25%RDF+5.6 Kg Vermicompost), T_{10} (25%RDF+10.5 Kg FYM) and T_{11} (25%RDF+5 Kg FYM+1.8 KG Vermicompost).

Climatic condition in the experimental site:
The area of Allahabad district comes under subtropical belt in the south east of Utter Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46º C- 48º C and seldom falls as low as 4ºC- 5ºC. The relative humidity ranges between 20 to 94 %. The average rainfall in this area is around 1013.4 mm annually. However, occasional precipitation is also not uncommon during winter months.

Results and Discussion
The present investigation was conducted on four years old Jasmine Plants of cultivar Double mogra. Seventy-two trees with uniform vigour and size, planted at a spacing of 1.5 m x 1.5 m were tagged for the recording observations. The findings of the experiment are summarized in following heads.

(A) Growth Parameters:
In growth parameters, maximum Plant Height (84.33, 92.660 and 102.093 cm), Plant spreads (62.663, 72.320 and 76.533 cm) and Number of branches (13.397, 15.167 and 17.663) was found in treatment T_8 (25% RDF + 15.5 kg FYM) at 60, 120 and 180 days respectively after application of NPK and organic manures followed by T_6 (50% RDF + 3.7 kg Vermicompost) with (82.667, 91.800 and 98.837 cm), (60.873, 70.440 and 75.480 cm) and (11.727, 13.653 and 15.693) Plant height, Plant spreads and Number of Branches respectively at 60, 120 and 180 days, whereas minimum Plant height, Plant spreads and Number of Branches was recorded in treatment T_0 (Control) at 60, 120 and 180 days respectively. Similar results was also reported by Vidyapriyadarsani *et al.* (2008), Anuburani *et al.* (2008), Bhattacharjee (1983) and Shoram *et al.* (2012) found in jasmine.

(B) Flowering Parameters
In Flowering parameters like Days to flower bud initiation (earliness) minimum (125.217 days), Days to flower bud development minimum (15.153 days) and flowering periods maximum (84.243 days) was found in treatment T_8 (25% RDF + 15.5 kg FYM) followed by T_6 (50% RDF + 3.7 kg Vermicompost) with (129.533 days) Days to flower bud initiation (earliness), (15.467 days) Days to flower bud development and (82.373 days) flowering periods. Whereas maximum Days to first Flower bud initiation, Days to flower bud development and minimum Flowering period (days) was recorded in treatment T_0 (Control). Similar results were also reported by Shoram *et al.* (2012), Anuburani and Kavita (2006), Vidhyapriyadarsani (2007) and Gayathiri and Anuburani (2008) found in jasmine.

(C) Yield Parameters
In terms of weight of 50 flower bud maximum (74.947 g), Number of flower bud/plant maximum (129.603), yield of flowers/plant maximum (194.207 g) and yield of flower/ha maximum (9.387 q) was recorded in treatment T_8 (25% RDF + 15.5 kg FYM) after application of NPK and organic manures followed by T_6 (50% RDF + 3.7 kg Vermicompost) with (72.370 g) Weight of 50 flower bud, (121.160) Number of flower bud/plant, (175.027 g) Yield of flower/plant and (8.363 q) Yield of flower/ha where as minimum was recorded in treatment T_0 (Control) in all the yield parameters. Similar results were also reported by Nandakumar *et al.* (1976), Muthuswamy and Pappiah (1980), Sreenivas *et al.* (1999), Anburani and Kavita (2006), Gayathiri and Anuburani (2008) and Shoram *et al.* (2012) in jasmine.
Maximum Rs. 469500.00 Gross Return, Rs. 282764.00 Net Return and 1:2.51 Cost Benefit ratio was also recorded in treatment T_8 (25% RDF + 15.5 kg FYM) followed by T_6 (50% RDF + 3.7 kg Vermicompost) with Rs. 418000.00 Gross return, Rs. 204778.00 Net return and 1:1.96 Cost benefit ratio, whereas minimum Gross return, Net Return and Cost Benefit ratio was recorded in treatment T_0 (Control).

Table 1: Effect of organic and Inorganic fertilizer on Plant height (cm), Plant spread (cm) and Number of Branches of Jasmine (*Jasminum grandiflorum* L.).

Treatment Symbol	Treatment Combination	Plant Height			Plant Spread			Number of Branches		
		60 DAS	120 DAS	180 DAS	60 DAS	120 DAS	180 DAS	60 DAS	120 DAS	180 DAS
T_0	100% RDF @ (120:240:240 g NPK	68.333	75.387	84.890	41.750	50.157	53.967	6.333	8.610	10.467
T_1	75% RDF + 5 kg FYM	72.333	81.227	89.863	54.123	54.037	58.527	8.333	11.030	12.737
T_2	75% RDF + 7 kg FYM	78.000	88.160	96.470	62.500	68.720	71.757	7.083	9.417	11.423
T_3	75% RDF + 1.8 kg Vermicompost	75.667	84.827	92.933	59.500	65.880	71.160	10.520	12.707	14.397
T_4	75% RDF + 1.5 kg FYM	74.000	83.560	92.680	58.333	65.457	70.577	10.033	12.067	14.030
T_5	50% RDF + 10.5 kg FYM	67.333	77.893	85.583	56.787	62.757	67.947	10.750	12.760	14.823
T_6	50% RDF + 3.7 kg Vermicompost	82.667	91.800	98.837	60.873	70.440	75.480	11.727	13.653	15.693
T_7	50% RDF + 3 kg FYM	73.667	82.393	92.757	57.667	64.757	68.887	10.017	12.020	14.110
T_8	25% RDF + 15.5 kg FYM	84.333	92.660	102.093	62.667	72.320	76.533	13.397	15.167	17.663
T_9	25% RDF + 5.6 kg Vermicompost	68.000	77.480	86.963	56.367	63.773	67.757	10.313	12.433	13.953
T_{10}	25% RDF + 4.5 kg FYM	81.333	89.227	97.207	59.000	65.683	69.200	10.747	12.480	14.383
T_{11}	25% RDF + 5 kg FYM + 1.8 kg Vermicompost	60.333	72.727	81.083	60.060	64.513	68.577	9.563	11.930	13.817
F-test		NS	NS	NS	NS	NS	S	NS	NS	NS
SE(d)		10.332	9.844	9.314	6.581	6.082	5.574	2.016	1.934	1.889
C.D.		N/A	N/A	N/A	N/A	N/A	11.634	N/A	N/A	N/

Table 2: Effect of organic and Inorganic fertilizer on Days to first flower bud initiation, Flower bud Development and Flowering period (Days) of Jasmine (*Jasminum grandiflorum* L.).

Treatment Symbol	Treatment Combination	Days to first flower bud initiation	Flower Bud Development (Days)	Flowering period (days)
T_0	100% RDF @ (120:240:240 g NPK	142.953	21.667	70.340
T_1	75% RDF + 5 kg FYM	138.433	20.600	73.267
T_2	75% RDF + 7 kg FYM	137.777	19.167	74.580
T_3	75% RDF + 1.8 kg Vermicompost	136.900	17.940	77.873
T_4	75% RDF + 1.5 kg FYM	132.493	19.390	78.040
T_5	50% RDF + 10.5 kg FYM	131.760	19.383	78.413
T_6	50% RDF + 3.7 kg Vermicompost	129.533	15.467	82.373
T_7	50% RDF + 3 kg FYM	130.260	17.977	80.813
T_8	25% RDF + 15.5 kg FYM	125.217	15.153	84.243
T_9	25% RDF + 5.6 kg Vermicompost	134.900	19.317	80.227
T_{10}	25% RDF + 4.5 kg FYM	136.120	18.280	81.060
T_{11}	25% RDF + 5 kg FYM + 1.8 kg Vermicompost	133.587	19.613	76.417
F-test		NS	S	S
SE(d)		9.045	1.395	3.224
C.D.		N/A	2.913	6.729

Table 3: Effect of organic and Inorganic fertilizer on Weight of 50 flower bud (g), Number of flower bud/plant, Yield of Flower/plant (g), Yield of flower/ha (q) and Cost Benefit Ratio of Jasmine (*Jasminum grandiflorum* L.).

Treatment Symbol	Treatment Combination	Weight of 50 flower bud (g)	Number of flower bud /plant	Yield of Flower per plant (g)	Yield of Flower /ha (q)	Cost: Benefit Ratio
T_0	100% RDF @ (120:240:240 g NPK	50.950	82.320	83.717	5.450	1:1.02
T_1	75% RDF + 5 kg FYM	52.327	87.587	91.820	5.963	1:1.24
T_2	75% RDF + 7 kg FYM	57.967	91.143	105.510	5.797	1:1.21
T_3	75% RDF + 1.8 kg Vermicompost	67.050	100.197	134.477	6.907	1:1.44
T_4	75% RDF + 1.5 kg FYM	66.600	102.780	136.950	6.873	1:1.43
T_5	50% RDF + 10.5 kg FYM	64.773	110.393	143.137	6.487	1:1.52
T_6	50% RDF + 3.7 kg Vermicompost	72.370	121.160	175.027	8.363	1:1.96
T_7	50% RDF + 3 kg FYM	71.597	111.500	159.980	7.487	1:1.75
T_8	25% RDF + 15.5 kg FYM	74.947	129.603	194.207	9.387	1:2.51
T_9	25% RDF + 5.6 kg Vermicompost	65.007	112.547	146.047	6.867	1:1.84
T_{10}	25% RDF + 4.5 kg FYM	62.427	116.333	145.227	6.660	1:1.78
T_{11}	25% RDF + 5 kg FYM + 1.8 kg Vermicompost	60.467	105.560	127.803	5.897	1:1.58
F-test		S	S	S	S	
SE(d)		1.809	9.141	12.394	0.693	
C.D.		3.775	19.079	25.869	1.447	

Conclusion

Based on the present investigation it is concluded that the treatment T_8 found best in terms of maximum plant height, plant spread, Number of branches, flowering period, weight of 50 flower bud, Number of flower bud/plant, Yield of flower/plant, Yield of flower/ha and minimum for flower bud initiation, days for flower bud development. In terms of cost benefit ratio maximum Gross Return, Net Return and Cost Benefit ratio was also found in treatment T_8 followed by treatment T_6 where as minimum was recorded in treatment T_0 (Control) in all the parameters.

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