

Effect of N, P, K and organic manures on Flower yield and Flower quality of Dahlia (*Dahlia variabilis*)

Hybrid “Eternity sports”

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Abstract

The present investigation entitled, “Effect of NPK and organic manures on Plant growth, Flower yield and Flower quality of Dahlia (*Dahlia variabilis*) Hybrid “Eternity sports” was under taken in the Department of Horticulture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad during rabi season (2015-2016). The experiment was layout in RBD having 13 treatments and 3 replication. The treatments consisted of different combinations of NPK and organic manures i.e. inorganic fertilizers and FYM, Vermicompost and poultry Manure. The treatment T₆ (50 % NPK + 50 % VM per ha⁻¹) was found to be statistically significant compared to other treatment combination, which recorded highest Days required to first flower bud initiation (50.53), Days required duration of flowering (64.93), flower stalk length (25 cm), flower diameter (25.13 cm), Longevity of flower on plants (15.33 days), Vase life in normal tap water (7.67 days), numbers of flowers per plant (10.13), yield of flowers per plant (908.34 g), Number of flowers per plot (60.8), Yield of flowers per plot (5.45 kg). Number of flowers per hectare (4.05 Lakhs), numbers of Tubers per plant (11), yield of Tubers per plant (637.99 g), Number of Tubers per plot (66), Yield of Tubers per plot (5.45 kg). Yield of Tubers per hectare (25.35 q) followed by T₅ (50 % NPK + 50 % FYM per Ha⁻¹) except weight of Single Flower (92 g) and weight of single tuber (53.6 g) where the treatment T₇ (50% NPK + 50% PM per Ha⁻¹) found significant followed by the treatment T₆ (50 % NPK + 50 % VM per Ha⁻¹) and lowest yield was obtained from T₀ (control).

Keywords: Jasmine, NPK, Farm Yard Manure, Vermicompost, Poultry Manure

1. Introduction

The importance of flowers in daily life of an average Indian is well known. Flowers are symbol of beauty, love and happiness. Although, flowers are mute beauties, they convey best massage of love, joy and affection and for expressing their finest feelings, flowers are the best media. The cultivation of flowers in India is as old as Indian culture itself. For beautification, flowers have been one of the main ingredient since the beginning of the history and its importance has not yet decreased but rather increased as time proceeds. Flowers do not make only out house beautiful but also make it homely. Even the birth and death of human being is associated with flowers.

After green revolution, India has achieved self-sufficiency on the food front. Indian agriculture is changing rapidly and it has adopted other fields of commercialization. In last 10-15 years, the special attention was given towards horticulture as better commercial option. Floriculture, a branch of horticulture is getting prime importance.

The total area under floriculture crops in India during the year 2013-2014 was estimated to be 242 thousand hectare with the production of 1847 thousand metric tons of loose flowers and 79432 lakh number of cut flowers. India's total export of floricultural products and flowers was costing 455.90 crores during 2013-2014. (Anon., 2014).

Dahlia is one of the most popular bulbous flower grown in many parts of the world for its beautiful ornamental blooms of varying shades of colours for the beautification of gardens and cut flowers. It is belonging to the family Asteraceae having its origin in Mexico (Willis, 1966) which received its name by Cavanilles in the year 1791 (Smith, 1963). Dahlia

was introduced in India by Agri-Horticulture Society of India, Calcutta in 1857. (Ajeet & Babita Singh Salaria, 2010).

Dahlia (*Dahlia variabilis*) is a very beautiful flower which by virtue of extra-ordinary quality has attained attention of many people all over the world. It is a perennial, half hardy, herbaceous plant with tuberous root system and erect growing habit. In India it is mostly grown as winter flower because of severe climatic conditions during summer. Number of chromosomes to (*Dahlia variabilis*) $2n = 64$. Many of varieties have been developed through planned crosses and open pollinated seedlings selection in India by IARI & NBRI (Ajeet & Babita Singh Salaria, 2010). Nine cultivars of (*Dahlia variabilis*) were collected and evaluated at ARS, Udaipur with the view to find out suitable cultivar for cut flowers and loose flowers.

Dahlia has many ornamental characteristics such as wide range of plant heights (varies from 30 -180 cm), single and collaret varieties, decorative in various sizes with double flowers having broad petals and cactus varieties (double with narrow petals) show a pompon Dahlia have ball- like flowers and these are orchid- flowered and anemone flowered types. Dahlia offers a most extensive colour range with two colours in same flower, because of accumulation of anthocyanidin and other flavonoids in their ray florets. (www.ScienceDirect.com).

There are certain medicinal and nutritional uses of dahlia. Tubers of this plant contain significant amount of insulin and fructose and small quantities of medicinally active compounds such as phytin and benzoic acid. An insulin extract from tuber of dahlia is used in diagnosis of renal function. Seeds of dahlia are a good source of fats and

proteins. Seeds contain more than 16 per cent oil and 20.9 to 47.0 per cent protein. The root exudate is nematotoxic and the mortality of the nematode was increased with increase in the concentration of exudates and exposure period of nematode species such as *Hoplolaimus indicus*, *Tylenchus filiformis*, *Helicotylenchus indicus*, *Meloidogyne incognita* and *Tylenchorhynchus brassicae*. (Vikas, 2009).

Dahlias prefer rich, fertile, moist and well- drained soil with pH 6.5 in areas with heavy or clay type soil, use well- rotten manure or suitable organic matter and sand in equal quantities to make it ideal for planting (www.TNAU.agri portal.com). Dahlia grows better in high organic residues. Leaf mold, compost or FYM can also be used for good results. Dahlia like other plants needs NPK in large amounts and other elements like Fe, Zn, Cu, and Cl in small quantities. Nutrition is an important factor which is directly related to growth and flowering of dahlia. Many experiments regarding fertilizer applications has been conducted in different parts of the world to improve the growth and flowering of dahlia. At present certified area under organic cultivation has spread over 8.65 lakh ha either certified (4.01 lakh ha) under conversion (4.64 lakh ha) in recent years. It is estimated by 2014, certified organic area would be more than 2.5 million hectares. Keeping in view all the above factors an experiment has been conducted to access the effect of organic manures and inorganic fertilizers on plant growth, yield, fruit quality and shelf life of tomato along with the comparative economics of various treatment combinations.

2. Material and Methods

The present investigation was carried out at Horticultural Experimental field, Department of Horticulture, SHIATS, Allahabad during November 2015 to 2016. Entitled "Effect of N, P, K and organic manures on Plant growth, Flower yield and Flower quality of DAHLIA (*Dahlia variabilis*) hybrid Eternity sports".

The different treatment manipulated as follows T₀ Control, T₁ (100%NPK) 100:120:100 Kg/ha, T₂ 75 % NPK + 25% FYM, T₃ 75% NPK+ 25% VM, T₄ 75 % NPK + 25% PM, T₅ 50 % NPK +50 % FYM, T₆ 50 % NPK + 50 % VM, T₇ 50 % NPK + 50 % PM, T₈ 25% NPK +75% FYM T₉ 25% NPK +75% VM, T₁₀ 25% NPK + 75% PM, T₁₁ 25% NPK + 25% FYM +25% VM +25 % PM and T₁₂ 33.3% FYM+ 33.3% VM+33.3%PM. The treatments were arranged in a randomized block design with 13 treatments in 3 replications.

3. Results and Discussion

3.1 Flowering Parameter

Flowering parameters like Days to first flower bud initiation (50.53), Duration of flowering (64.93 days) were showed the significant difference is recorded due to application of different combinations of NPK and organic manures. The treatment T₆ as (50 % NPK + 50 % VM) recorded of the Maximum, followed by T₅ as (50 % NPK +50 % FYM) Minimum was recorded to be in treatment (T₀) control respectively. The probable reason for increasing the growth parameters in the best treatment T₆ is due to the easy balanced availability of nutrients to plants by vermicompost for better root proliferation enhanced microbial activity excellent uptake of NPK due to improved biological characteristics, enhancement of photosynthetic activity. Similar results were obtained by Airadevi (2010) in chrysanthemum.

3.2 Quality parameters

Quality parameters like Flower stalk length (25 cm), Flower diameter (25.13 cm), Longevity of flowers on plant (15.33 days), Vase life in normal tap water (7.67 days) were showed the significant difference in recorded due to application of different combinations of NPK and organic manures. The treatment T₆ as (50 % NPK + 50 % VM) recorded of the Maximum, followed by T₅ as (50 % NPK +50 % FYM) Minimum was recorded to be in treatment (T₀) control respectively. The probable reason for increasing the quality parameters in the best treatment T₆ is due to Application of vermicompost along with 50% RDF resulted in longer stalk length due to enhanced physiological activity and also more cell elongation due to increased amount of photosynthesis, which increases the length of flower stalk.

The increase in flower diameter in the treatment applied with 50%RDF+50%VC might be due to better nutrients availability, translocation of higher amounts of photosynthets and maintainance of proper physiological activity of the plants result in more food which inturn might have been utilised for better development of flower size.

The cut flowers are actively matabolizing living plant parts subjected to basic process of aging which depends on amount of respirable substrates, water balance and physiological factors like respiration and transpiration. The cut flowers from the treatment with vermicompost and 50% RDF might have inhibited ethylene production increase in minerals uptake and reduction in rate of respiration as these are known for inhibition of ethylene biogenesis and ultimately enhanced vase life. Similar findings were reported by Nagavallema (2004) in chrysanthemum and Keditsu (2013) in Gerbera.

3.3 Yield parameter

Yield parameters like Number of flowers per plant(85.33),Yield of flowers per plant (77.92 g), Yield of flowers per plot (311.68 g), Number of flowers per plot (60.8),Number of flowers per hectare (4.05 Lakhs),Number of tubers per plant (11),Tuber yield per plant(637.99g),Number of tubers per plot(66),Tuber yield per plot (3.82Kg),Tuber yield per hectare(25.35tons) were showed the significant difference is recorded due to application of different combinations of NPK and organic manures. The treatment T₆ as (50 % NPK + 50 % VM) recorded of the Maximum followed by T₅ as (50 % NPK +50 % FYM) and Minimum was recorded to be in treatment (T₀) control respectively. The probable reason for increasing the yield parameters in the best treatment T₆ is due to integrated approach through vermicompost and inorganic fertilizers which resulted in easy balanced availability of nutrients to plants by vermicompost for better root proliferation enhanced microbial activity excellent uptake of NPK due to improved biological characteristics, enhancement of photosynthetic activity. Similar results were obtained by Chaitra (2007) in China aster.

Other Yield parameters like flower weight (92 g) and tuber weight (60g) were showed the significant difference is recorded due to application of different combinations of NPK and organic manures. The treatment T₇ as (50 % NPK + 50 % PM) recorded of the Maximum followed by T₆ as (50 % NPK +50 % VM) and Minimum was recorded to be in treatment (T₀) control respectively. The probable reason for increasing the yield parameters in the best treatment T₆ is due to

integrated approach through Poultry manure and inorganic fertilizers which resulted in Strong root systems. The composting process and bacteria in chicken manure make the

nutrients soluble, which means that the plants can more readily absorb them from soil.

Table 1: “Effect of N, P, K and organic manures on Flower yield and Flower quality of Dahlia (*Dahlia variabilis*) Hybrid “Eternity sports”

Treatments	Days required to first flower bud initiation (earliness)	Flowering Duration(days)	Flower stalk length (cm)	Flower diameter (cm)	Longevity of flower on plants (days)	Vase life in normal tap water (days)	weight of single flower (g)	Number of flowers per plant	Number of flowers per plot	Yield of flowers Per plot (kg)
T ₀	60.13	48.97	12.13	18.47	10.33	3.33	61.67	5.33	32.00	1.97
T ₁	58.47	54.93	16.70	20.93	11.7	4.13	71.66	6.67	40.00	2.86
T ₂	53.66	60.93	21.21	22.77	13.93	5.43	82.63	8.70	52.20	4.31
T ₃	52.42	61.67	22.20	22.93	14.33	5.93	85.73	8.93	53.63	4.59
T ₄	54.60	59.27	20.00	22.07	13.13	5.33	80.13	7.53	45.21	3.62
T ₅	51.13	63.33	24.93	24.93	15.13	6.93	88.33	9.67	58.67	5.18
T ₆	50.53	64.93	25.00	25.13	15.33	7.67	89.64	10.13	60.8	5.45
T ₇	51.67	62.93	23.93	23.5	14.93	6.20	92.00	9.07	52.33	4.81
T ₈	56.23	56.67	18.87	21.67	12.67	4.47	75.61	7.07	42.42	3.20
T ₉	55.13	58.07	19.40	21.93	12.93	4.67	79.70	7.33	44.00	3.50
T ₁₀	57.33	55.45	17.33	21.33	11.93	4.33	74.67	6.83	40.83	3.04
T ₁₁	59.67	50.67	14.67	19.62	10.93	3.93	65.67	6.13	36.84	2.41
T ₁₂	59.07	52.33	15.7	20.70	11.07	4.07	67.82	6.33	38.00	2.58
S. Ed. (±)	0.24	0.33	0.40	0.19	0.24	0.30	0.26	0.27	1.44	0.10
C.D.at 5%	0.50	0.68	0.82	0.39	0.49	0.63	0.54	0.55	2.96	0.22

Table 2: “Effect of N, P, K and organic manures on Flower yield and Flower quality of Dahlia (*Dahlia variabilis*) Hybrid “Eternity sports”

Treatments	Number of flowers per ha (In lakhs)	weight of single Tuber (g)	Number of Tubers per plant	Yield of Tubers per plant (g)	Number of Tubers per plot	Yield of Tubers per plot (kg)	Yield of Tubers per ha (kg)	Yield of flowers per plant (g)
T ₀	2.13	47	5.67	266.32	34	1.59	10.60	329.00
T ₁	2.67	50.4	6.33	319.27	38	1.91	12.73	477.09
T ₂	3.48	55.2	8.67	478.33	52	2.87	19.11	718.92
T ₃	3.57	56.17	9.33	524.27	56	3.14	20.92	765.86
T ₄	3.01	54.63	8.33	455.27	50	2.73	18.22	603.71
T ₅	3.91	57.33	10.93	626.87	65.6	3.76	25.02	853.67
T ₆	4.05	58	11	637.99	66	3.82	25.35	908.34
T ₇	3.49	60	9.93	595.99	59.6	3.57	23.80	834.13
T ₈	2.83	52.83	7.2	380.4	43.2	2.28	15.19	534.25
T ₉	2.93	53.6	7.7	412.71	46.2	2.41	16.04	584.45
T ₁₀	2.72	51.33	6.93	355.87	41.6	2.13	14.22	507.06
T ₁₁	2.45	48.6	6.07	294.84	36.4	1.76	11.75	402.18
T ₁₂	2.53	49.6	6.13	304.23	36.8	1.82	12.11	429.4
S. Ed. (±)	0.10	0.24	0.26	14.41	1.59	0.09	0.58	19.52
C.D.at 5%	0.20	0.49	0.55	29.73	3.28	0.18	1.21	40.29

4. Conclusion

From the present investigation it may be concluded that the application of 50 % NPK + 50 % VM per ha⁻¹ was found beneficial for Plant growth, Flower and tuber Yield and Flower Quality of Dahlia except flower weight and tuber weight where the application of 50% NPK + 50% PM found significant.

5. References

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