

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 on effect of NPK and organic manures on flower yield and flower quality of dahlia (*Dahlia variabilis*) Hybrid “Eternity sports” was under taken in the 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 dura-

tion 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.

Introduction

The total area under floriculture crops in India during the year 2013–2014 was estimated to be 242 thousand hectare with 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.

Dahlia is one of the most popular bulbous flower

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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)	Vaselif e 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 ₃	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
SEd (±)	0.24	0.33	0.40	0.19	0.24	0.30	0.26	0.27	1.44	0.10
CD at 5%	0.50	0.68	0.82	0.39	0.49	0.63	0.54	0.55	2.96	0.22

grown in many parts of the world for its beautiful ornamental blooms of varying shades of colors for the beautification of gardens and cut flowers. It is belonging to the family Asteraceae having its origin in Mexico, which received its name by Cavanilles in the year 1791. Dahlia was introduced in India by Agri-Horticulture Society of India, Calcutta in 1857 [1]. Number of chromosomes of *Dahlia variabilis* is $2n=64$. Many of varieties have been developed through planned crosses and open pollinated seedlings selection in India by IARI and NBRI [1].

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% oil and 20.9 to 47.0% protein. The root exudate is nematotoxic for nematode species such as *Hoplolaimus indicus*, *Tylenchus filiformis*, *Helicotylenchus indicus*, *Meloidogyne incognita* and *Tylenchorhynchus brassicae* [2].

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.

Dahlia grows better in high organic residues. Leaf mould, 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 dahlia along with the comparative economics of various treatment combinations.

Materials and Methods

The present investigation was carried out at Horticultural Experimental field, Department of Horticulture,

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	50	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
SEd (±)	0.10	0.24	0.26	14.41	1.59	0.09	0.58	19.52
CD at 5%	0.20	0.49	0.55	29.73	3.28	0.18	1.21	40.29

SHIATS, Allahabad during November 2015 to 2016.

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.

Results and Discussion

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 (50% NPK + 50% VM) recorded of the maximum, followed by T₅ (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 in chrysanthemum [3—5].

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 (50% NPK + 50% VM) recorded of the maximum, followed by T₅ (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 photosynthates and maintenance of proper physiological activity of the plants result in more food which in turn might have been utilized for better development of flower size.

The cut flowers are actively metabolizing 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 in chrysanthemum [6] and in Gerbera [7].

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 (637.99 g), number of tubers per plot (66), tuber yield per plot (3.82 kg), tuber yield per hectare (25.35 tons) showed significant difference due to application of different combinations of NPK and organic manures (Tables 1 and 2). The treatment T₆ (50% NPK + 50% VM) recorded of the maximum followed by T₅ (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 earlier in China aster [8, 9, 4].

Other yield parameters like flower weight (92 g) and tuber weight (60 g) were showed the significant difference is recorded due to application of different combinations of NPK and organic manures. The treatment T₇ (50% NPK + 50% PM) recorded of the maximum followed by T₆ (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 [10].

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.

References

1. Ajeet S, Babita S (2010) A to Z horticulture at a glance. pp 34—35.
2. Singh Dhiraj Kumar, Singh VN (2009) Effect of integrated nutrient management on growth, flowering behavior and yield of African marigold (*Tagetes erecta* L.) cv African Giant Double Orange. J Hort Sci 4 : 134—137.
3. Airadevi PA, Mathad JC (2012) Effect of INM on growth, yield and economics of garland chrysanthemum. Asian J Soil Sci 7 : 93—97.
4. Bhat BJ, Sheetal Dogra Pandey RK, Sharma JP, Shivani Jamwal (2010) Influence of integrated nutrient management on growth, flowering and yield of African marigold cv pusa narangi. Environ Ecol 28 : 466—468.
5. Sultana S. Khan, Haque FN, Akhter MA, Noor S (2006) Effect of NPK on growth and flowering in tuberose. J. Subtrop Agric Res and Develop 4 : 111—113.
6. Nagavallemma KP, Wani SP, Stephane Lacroix, Padmaja VV, Vineela C, Babu Rao M, Sahrawat KL (2004) Vermicomposting: Recycling wastes into valuable organic fertilizer. An Open Access J Publ by ICRISAT 2.
7. Longchar A, Keditsu R (2013) Flower yield and vase life of Gerbera in response to planting time and organic manures on Alfisol. Sci J Agric 2 : 124—128.
8. Chaitra R, Patil VS (2007) Integrated nutrient manage-

- ment studies in China aster (*Callistephus chinensis* L.) growth and flowering of potted Gerbera (*Gerbera jamesonii* H. Bolus) cv Cabana. Karnataka J Agric Sci 20 : 689—690.
9. Kabir et al. (2011) Reported that the highest bulb and flower yield of tuberose both per plant and per hectare were recorded in poultry manure @ 20 t/ha followed by cow dung @ 20 t/ha.
 10. Norman QA, Clive AE (2005) Effect of Vermicomposts on plant growth. Int Symp Workshop on Vermi Technologies for Developing Countries (ISWVT 2005). 16—18 Nov, 2005. Los Banos, Philippines.