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Study on Effect of Pinching and Organic Manures on Growth, Flowering and yield of Dahlia (*Dahlia variabilis* L.) cv. Red Symphony

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ABSTRACT: An experiment was conducted in Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during November, 2020 to March, 2021 to find out effect of pinching and Organic manures on growth, flowering and yield of Dahlia (*Dahlia variabilis* L.) cv. Red symphony. The seedlings were planted at a spacing of 60 cm × 80 cm from row to row and plant to plant to accommodate six plants per 1.8 meter square area. The experiment was laid out with thirteen treatments replicated thrice in Randomized Block Design. Based on the present investigation it is concluded that the treatment T10 Pinching 40 DAT + Poultry manure (3t/ha) followed byT6 Pinching 40 DAT + Vermicompost (5t/ha) and T2 Pinching 40 DAT + FYM (10t/ha). Found best in terms of plant growth parameters, flower and yield and tuber yield of Dahlia. However, while the experiment was conducted, it was observed that flower size reduced and failed to attain an expected large bloom also pinching operation was done in chilly winters (In January) which delayed the emergence of lateral buds. Sudden weather change patterns also affected the expected outcome from the crop. In terms economics maximum Cost Benefit ratio (1: 3.76) was also found in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha) whereas minimum Cost benefit ratio (1:1.10) was recorded in treatment T_0 (Control). By conducting this experiment, it was observed that in a single crop more flowers emerged and this can aid in total benefit from the market. Different duration of pinching enabled appearance of flowers at different intervals which sustained the influx of flower to market.

Keywords*:* Pinching, Organic manures, growth, flowering, yield and Dahlia (*Dahlia variabilis* L.) cv. Red symphony.

INTRODUCTON

Dahlia (*Dahlia variabilis*) is one of the most popular bulbous flowers 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 and received its name by Cavanilles in the year 1791. Dahlia (genus Dahlia), genus of about 40 species of flowering plants in the aster family (Asteraceae). It is a perennial, half hardy, herbaceous plant with tuberous root system and erect growing habit (Marina, 2015). About six of the species in the Dahlia genus have been bred for cultivation as ornamental flowers and are popular in the floral industry and in gardens. The thousands of Dahlia cultivars are classed into a variety of types, including single, double, pompon, cactus, waterlily, peony-flowered, and dinner plate Dahlias. Dahlias are tuberous perennials, and most have simple leaves that are segmented and toothed or cut. The compound flowers may be white, yellow, red, or purple in colour. In the language of flowers, Dahlias represent dignity and instability, as well as meaning my gratitude exceeds your care (Connolly, 2004). Dahlia offers a most extensive colour range with two colors in same flower, because of accumulation of anthocyanin and other flavonoids on their rayflorets. 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 exudateisnemato toxic and the mortality of the nematode was increased with increase in with increase in the concentration of exudates and exposure period of nematode species such as *Hoplolaimus indicus, Tylenchusfiliformis, Helicotylenchus indicus, Meloidogyne incognita and Tylenchorhynchus brassicae*. Vikas, (2009). The flower petals are used in salads. Root cooked and used as a vegetable. The bitter flavor isinedible according to another report. A sweet extract of the tuber, called “Dacopa”, is used as a beverage or as a flavoring. It is

mixed with hot or cold water and sprinkled on cream. Pinching treatment at different times can help in achieving the twin objective of proper plant spread and flowering at different times for maintaining steady supply of flower to the market over longer period resulting in more economic returns. One of the prerequisites for boosting the yield is to provide balanced dose of nutrients for better growth and quality. The total area under floriculture crop in India during the year 2018-2019 was estimated to be 312 thousand hectares with the production of 2058.72 thousand metric ton of loose flowers and 806.55 thousand metric ton of cut flowers. India's total export of floriculture products and flowers was costing 412.27 Crores during 2018-2019 (NHB National Horticulture Board 2020).

MATERIALS AND METHODS

This experiment was conducted during winter season during the year 2020-2021 in Research field, Department of Horticulture, Naini Agricultural Institute, Prayagraj. It is situated at 25º8´N latitude and 81º50´ E longitudes on elevation of 98 meters from the sea level (MSL) this can represented by Fig. 1. Prayagraj district is located in Uttar Pradesh's subtropical region, which has veryhot summers and relatively mild winters. The location's highest temperature ranges from 46°C to 48°C, with temperatures seldom falling below 4°C or 5°C. The relative humidity levels range from 20% to 94%. The average yearly rainfall in this area is about 1013.4 mm.

According to Table 1, Randomized Block Design (RBD) with three replications is used to test thirteen different treatment combinations were made with Pinching at different days intervals (40, 45 and 50 days after transplanting) along with the Organic manures like Farmyard manures, Vermicompost and Poultry manures. The Organic manures were applied on the field after field preparation as a basal dose. The seedlings were planted at a spacing of 60cm × 80cm from plant to plant and row to row respectively to accommodate six plants per 1.8meter square area. The pinching operation has been followed at different days intervals (40, 45 and 50 days after transplanting) manually. Statistical analysis of variance was performed on the data collected throughout the experiment. The significance of the treatments was determined using the 'F' test at a level of significance of 5%. The objectives were to assess the effect of pinching on plant growth flowering and yield, to analyze the effect in plant growth flowering and yield of Dahlia by application of various organic manures. The observations were recorded on the parameters like Plant height, Plant spread (cm), Number of leaves, Number of branches, Days taken for first flower bud initiation, Number of flowers per plant, Pedicel length(cm), Flower diameter(cm), Weight of a single flower (g), Flower yield per plant (g), Flower yield per plot (Kg), Flower yield (t/ha), Number of tubers per plant, weight of single tuber (g), Tuber Yield per plant (g),Tuber Yield per plot (Kg) and Tuber yield(t/ha).

Fig. 1.

Table: 1.

Sr.No.	Treatments	Treatments combination
1.	T_0	Control
2.	T_1	No Pinching + FYM (10t/ha)
3.	T_2	Pinching 40 DAT + FYM (10t/ha)
4.	T_3	Pinching 45 DAT + FYM (10t/ha)
5.	T_4	Pinching 50 DAT + FYM (10t/ha)
6.	T_5	No Pinching + Vermicompost (5t/ha)
7.	T_6	Pinching 40 DAT + Vermicompost (5t/ha)
8.	T_7	Pinching 45DAT + Vermicompost (5t/ha)
9.	T_8	Pinching 50 DAT + Vermicompost (5t/ha)
10.	T_9	No Pinching + Poultry manure (3t/ha)
11.	T_{10}	Pinching 40 DAT + Poultry manure (3t/ha)
12.	T_{11}	Pinching 45 DAT + Poultry manure (3t/ha)

RESULTS AND DISCUSSION

The data on growth parameters pinching and organic manures as influenced by pinching (40, 45, and 50 days after transplanting) with organic manures viz., Farmyard manures (10 t ha^{-1}), Vermicompost (5 t ha^{-1}) and Poultry manures (3 t ha^{-1}) in different treatment combinations was recorded and are presented in Table 2. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to growth parameter of Dahlia (*Dahlia variabilis* L.) cv. Red symphony. The maximum significant plant height (100.84 cm) at 120 DAT was recorded in treatment T_9 No Pinching + Poultry manure (3t/ha), and minimum plant height (76.47 cm) at 120 DAT was observed in treatment T_0 (Control). This result were confined by Phetpradap *et al.*, (1994) on dahlia and Khan *et al.*, (2018) on marigold. The maximum significant plant spread (46.87cm) at 120 DAT was recorded in treatment T_{10} Pinching 40 DAT + Poultry manure (3t/ha), and minimum plant spread (36.45cm) at 120 DAT was observed in treatment T_0 (Control).The maximum significant number of leaves $plant^{-1}$ (47.67) at 120 DAT was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum number of leaves plant-1 (36.93) at 120 DAT was observed in treatment T_0 (Control). Similar findings were described by Ahmed *et al.*, (2004) on dahlia. The maximum significant number of branches $plant^{-1}$ (10.87) at 120 DAT was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum number of branches $plant^{-1}$ (3.60) at 120 DAT was observed in treatment T_0 (Control). This present findings are supported by Sahu *et al*., (2021), on dahlia Singh *et al*., (2019), on marigold.

Table 2: Effect of Pinching and Organic manures Growth parameters of Dahlia (*Dahlia variabilis* L.) cv. Red symphony.

Treatments No.	Treatments combination	Plant height (cm)	Plant spread (cm)	No. of leaves $plant^{-1}$	No. of branches $plant^{-1}$
T_0	Control	76.47	36.45	36.93	3.60
T_1	No Pinching + FYM (10t/ha)	96.18	42.12	41.80	6.40
T_2	Pinching 40 DAT + FYM (10t/ha)	74.13	45.01	43.53	9.60
T_3	Pinching 45 DAT + FYM (10t/ha)	66.68	42.77	42.13	8.67
T_4	Pinching 50 DAT + FYM (10t/ha)	58.68	42.41	41.47	8.40
T_5	No Pinching + Vermicompost (5t/ha)	97.75	41.18	38.00	6.27
T_6	Pinching 40 DAT + Vermicompost (5t/ha)	75.95	45.61	45.53	9.80
T_7	Pinching 45DAT + Vermicompost (5t/ha)	67.16	43.39	41.07	8.40
T_8	Pinching 50 DAT + Vermicompost (5t/ha)	59.09	43.59	40.27	8.27
T_9	No Pinching + Poultry manure (3t/ha)	100.84	41.23	39.80	6.27
T_{10}	Pinching 40 DAT + Poultry manure (3t/ha)	76.07	46.87	47.67	10.87
T_{11}	Pinching 45 DAT + Poultry manure (3t/ha)	69.93	42.28	43.60	8.80
T_{12}	Pinching 50 DAT + Poultry manure (3t/ha)	61.15	41.20	41.07	8.27
	F-Test	S	S	S	S
	C.D.at 0.5%	2.446	2.707	2.605	0.807
	S.Ed. (±)	1.185	1.312	1.262	0.391

Effect of Pinching and Organic manures Floral parameters of Dahlia (*Dahlia variabilis* L.) cv. Red symphony

The data on floral parameters pinching and organic manures as influenced by pinching (40, 45, and 50 days after transplanting) with organic manures viz., Farmyard manures (10 t ha^{-1}), Vermicompost (5 t ha^{-1}) and Poultry manures (3 t ha-1) in different treatment combinations was recorded and are presented in Table 3. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to floral parameter of Dahlia (*Dahlia variabilis* L.) cv. Red symphony. The minimum significant days to 1st flower bud intuition (48.87) was recorded in treatment T_9 No Pinching + Poultry manure (3t/ha), and maximum days to 1st flower bud intuition (76.27) was observed in treatment T_4 Pinching 50 DAT + FYM (10t/ha). Similar findings were reported by Sathappan, (2018) on marigold. The maximum significant number of flower $plant^{-1}$ (10.60) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum number of flower $plant^{-1}$ (3.27) was observed in treatment T_0 Control. The maximum significant flower diameter (cm) (19.95) was recorded in treatment T_9 No Pinching + Poultry manure (3t/ha), and minimum flower diameter (cm) (14.89) was observed in treatment T_0 Control. This result were confined by Singh *et al*., (2019) on marigold. The maximum significant pedicel length (cm) (24.10) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum pedicel length (cm) (16.83) was observed in treatment T_0 Control. The results are in agreement with Kholiya *et al*., (2020) on marigold & Ehsanullah *et al*., (2021) on chrysanthemum.

Table 3: Effect of Pinching and Organic manures Floral parameters of Dahlia (*Dahlia variabilis* L.) cv. Red symphony.

Treatments No.	Treatments combination	Days to 1st flower bud intuition	No. of flower plant^{-1}	Flower diameter (cm)	Pedicel length (cm)
T_0	Control	56.60	3.27	14.89	16.83
T_1	No Pinching + FYM (10t/ha)	53.87	6.00	19.37	18.29
T_2	Pinching 40 DAT + FYM (10t/ha)	65.20	8.53	17.46	22.79
T_3	Pinching 45 DAT + FYM (10t/ha)	70.60	7.60	16.38	20.47
T_4	Pinching 50 DAT + FYM (10t/ha)	76.27	7.20	14.23	18.50
T_5	No Pinching + Vermicompost (5t/ha)	51.00	6.33	19.77	19.68
T_6	Pinching 40 DAT + Vermicompost (5t/ha)	64.53	9.33	17.61	23.48
T_7	Pinching 45 DAT + Vermicompost (5t/ha)	70.00	8.20	16.44	21.20
T_8	Pinching 50 DAT + Vermicompost(5t/ha)	75.67	7.47	14.40	19.00
T_9	No Pinching + Poultry manure (3t/ha)	48.87	6.53	19.95	20.40
T_{10}	Pinching 40 DAT + Poultry manure (3t/ha)	63.20	10.60	17.74	24.10
T_{11}	Pinching 45 DAT + Poultry manure (3t/ha)	69.53	8.73	16.59	21.77
T_{12}	Pinching 50 DAT + Poultry manure (3t/ha)	74.53	8.00	14.59	18.81
	F-Test	S	S	S	S
	C.D.at 0.5%	1.318	0.297	0.272	1.034
	S.Ed. (±)	0.639	0.144	0.132	0.501

Effect of Pinching and Organic manures Flower Yield parameters of Dahlia (*Dahlia variabilis* L.) cv. Red symphony

The data on flower yield parameters pinching and organic manures as influenced by pinching (40, 45, and 50 days after transplanting) with organic manures *viz.*, Farmyard manures (10 t ha^{-1}), Vermicompost (5 t ha^{-1}) and Poultry manures (3 t ha^{-1}) in different treatment combinations was recorded and are presented in Table 4. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to flower yield parameter of Dahlia (*Dahlia variabilis* L.) cv. Red symphony.The maximum significant weight of single flower (g) (63.46) was recorded in treatment T_9 No Pinching + Poultry manure (3t/ha), and minimum weight of single flower (g) (43.92) was observed in treatment T_0 Control. This result were confined by Maharnor *et al.*, (2011) on African marigold. The maximum significant flower yield (g) plant^{-1} (509.56) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum flower yield (g) plant^{-1} (142.95) was observed in T_0 Control. The maximum significant flower yield (kg) plot^{-1} (3057.40) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum flower yield (kg) plot^{-1} (857.80) was observed in T_0 Control. The maximum significant flower yield (t ha^{-1}) (16.89) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum flower yield (t ha^{-1}) (4.76) was observed in treatment T_0 Control. The results are in agreement with Prasad *et al*., (2018) on dahlia & Baskaran and Abirami (2017), on African marigold.

Table 4: Effect of Pinching and Organic manures Flower Yield parameters of Dahlia (*Dahlia variabilis* L.) cv. Red symphony.

Treatments No.	Treatments combination	Weight of single flower (g)	Flower yield (g) plant^{-1}	Flower yield (kg) plot^{-1}	Flower yield (t ha^{-1})
T_0	Control	43.92	142.95	0.8	4.76
T_1	No Pinching + FYM (10t/ha)	58.43	350.78	2.1	11.69
T_2	Pinching 40 DAT + FYM (10t/ha)	44.17	379.59	2.2	12.44
T_3	Pinching 45 DAT + FYM (10t/ha)	41.67	317.17	1.9	10.57
T_4	Pinching 50 DAT + FYM (10t/ha)	40.03	288.63	1.7	9.61
T_5	No Pinching + Vermicompost (5t/ha)	61.90	397.05	2.3	13.02
T_6	Pinching 40 DAT + Vermicompost (5t/ha)	46.10	429.98	2.5	14.22
T_7	Pinching 45 DAT + Vermicompost (5t/ha)	42.42	348.04	2.08	11.56
T_8	Pinching 50 DAT + Vermicompost (5t/ha)	40.91	306.02	1.8	10.29
T_9	No Pinching + Poultry manure (3t/ha)	63.46	414.35	2.4	13.66
T_{10}	Pinching40 DAT + Poultry manure (3t/ha)	46.74	509.56	3.05	16.89
T_{11}	Pinching 45 DAT + Poultry manure (3t/ha)	43.86	382.33	2.2	12.77
T_{12}	Pinching 50 DAT + Poultry manure (3t/ha)	42.89	342.37	2.05	11.15
	F-Test	S	S	S	S
	C.D.at 0.5%	2.304	19.316	0.112	0.471
	S.Ed. (±)	1.116	6.618	0.054	0.228

Effect of Pinching and Organic manures Tuber yield parameters of Dahlia (*Dahlia variabilis* L.) cv. Red symphony

The data on tuber yield parameters pinching and organic manures as influenced by pinching (40, 45, and 50 days after transplanting) with organic manures *viz.*, Farmyard manures (10 t ha^{-1}), Vermicompost (5 t ha^{-1}) and Poultry manures (3 t ha^{-1}) in different treatment combinations was recorded and are presented in Table 5. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to tuber yield parameter of Dahlia (*Dahlia variabilis* L.) cv. Red symphony. The maximum significant tuber weight (g) (66.85) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum tuber weight (g) (32.94) was observed in treatment T_0 Control). Similar findings were reported by Sabah, (2014), on dahlia and Jhon *et al.*, (2007) on tulip. The maximum significant number of tuber $plant^{-1}$ (7.80) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum number of tuber $plant^{-1}$ (3.40) was observed in treatment T_0 Control. The maximum significant tuber yield (g) $plant^{-1}$ (521.19) was recorded in treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha), and minimum tuber yield (g) $plant^{-1}$ (111.96) was observed in T_0 Control. The maximum significant tuber yield (kg) $plot^{-1}$ (3.13) was recorded in treatment T_{10} Pinching 40 DAT + Poultry manure (3t/ha), and minimum tuber yield (kg) $plot^{-1}$ (0.67) was observed in T_0 Control. The maximum significant tuber yield (t ha^{-1}) (10.86) was recorded in treatment T_{10} Pinching 40 DAT + Poultry manure (3t/ha), and minimum tuber yield (t ha^{-1}) (2.33) was observed in T_0 Control. Similar findings were described by Pandey *et al*., (2017); Sahu *et al*., (2021) on dahlia.

Table 5: Effect of Pinching and Organic manures Tuber yield parameters of Dahlia (*Dahlia variabilis* L.) cv. Red symphony.

Treatments No.	Treatments combination	Tuber weight (g)	No. of Tuber $plant^{-1}$	Tuber yield (g) $plant^{-1}$	Tuber yield (kg) $plot^{-1}$	Tuber yield (t ha^{-1})
T_0	Control	32.94	3.40	111.96	0.67	2.33
T_1	No Pinching + FYM (10t/ha)	44.21	5.07	223.91	1.34	4.66
T_2	Pinching 40 DAT + FYM(10t/ha)	63.31	7.27	460.11	2.76	9.59
T_3	Pinching 45 DAT + FYM(10t/ha)	53.58	6.53	350.01	2.10	7.29
T_4	Pinching 50 DAT + FYM (10t/ha)	52.33	6.20	324.49	1.95	6.76
T_5	No Pinching + Vermicompost (5t/ha)	45.79	5.60	256.41	1.54	5.34
T_6	Pinching 40 DAT + Vermicompost (5t/ha)	64.01	7.40	473.90	2.84	9.87
T_7	Pinching 45 DAT + Vermicompost (5t/ha)	54.87	6.87	376.67	2.26	7.85
T_8	Pinching 50 DAT + Vermicompost (5t/ha)	53.83	6.40	344.47	2.07	7.18
T_9	No Pinching + Poultry manure (3t/ha)	48.21	5.80	279.60	1.68	5.82
T_{10}	Pinching 40 DAT + Poultry manure (3t/ha)	66.85	7.80	521.19	3.13	10.86
T_{11}	Pinching 45 DAT + Poultry manure (3t/ha)	57.75	7.07	408.17	2.45	8.50
T_{12}	Pinching 50 DAT + Poultry manure (3t/ha)	55.94	6.67	373.22	2.24	7.78
	F-Test	S	S	S	S	S
	C.D.at 0.5%	1.951	0.307	17.292	0.104	0.360
	S.Ed. (±)	0.945	0.149	8.378	0.050	0.175

CONCLUSION

Based on the present investigation it is concluded that the treatment T_{10} Pinching 40 DAT+ Poultry manure (3t/ha) followed by T_6 Pinching 40 DAT + Vermicompost (5t/ha) and T_2 Pinching 40 DAT + FYM (10t/ha). Found best in terms of plant growth parameters, flower and yield and tuber yield of Dahlia.

FUTURE SCOPE

Pinching treatment at different times can help in achieving the twin objective of proper plant spread and flowering at different times for maintaining steady supply of flower to the market over longer period resulting in more economic returns. One of the prerequisites for boosting the yield is to provide balanced dose of nutrients for better growth and quality. The indiscriminate use of chemical fertilizers alters the soil fertility and increase the cost of production as well. However, considering the concept of eco-friendly and the use of effective and with sustainable integration of organic manures restores the soil health while keeping soil productive and sustainable.

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Conflict of Interest. As a Corresponding Author, I Abdul Rahman M., confirm that none of the others have any conflicts of interest associated with this publication.

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