

# Influence of Pinching on Growth and Flowering of Spray Type of Chrysanthemum (*Dendranthema grandiflora*) cv. Shyamal

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## ABSTRACT

An investigation entitled "Influence of pinching on growth & flowering of spray type of chrysanthemum (*Dendranthema grandiflora*) cv. Shyamal" was undertaken at Agricultural Research Station, Binjhagiri, Institute of Agricultural Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, in year 2024-25. With 9 treatments and 3 replications, experiment has been set up in R.B.D. Treatments under this trial were found significant for all the characters under observation. Studies revealed that the treatment T<sub>3</sub>, i.e. Pinching thrice at 30, 40 and 50 DAT was found best for all the growth characters like plant height (25.02cm), plant spread (32.11 cm<sup>2</sup>), number of primary (6.34), secondary (23.34), tertiary branches (8.34), number of leaves (76.28) except plant girth which was found best (2.39 cm) under the treatment T<sub>4</sub>, i.e. pinching thrice at 40,50 and 60 DAT. Whereas flowering characters like days taken to first bud initiation (78.67 days), days taken to colour break stage (85.03 days) and days taken to full open stage (91.11 Days) were found optimum to delay the flowering in treatment T<sub>3</sub>, i.e. pinching thrice at 40, 50 and 60 DAT. Large-sized flowers were obtained in control as compared to pinched ones while treatment T<sub>3</sub>, i.e. single pinching at 40 DAT was found effective in getting longest shelf life (12.46 days). And all the yield attributing characters encompassing number of flowers/plant (64.25), yield/plant on weight basis (321.26 g), yield/plot (8.67 kg) and yield/ha (11.73 ton) were found effective in treatment T<sub>6</sub>, i.e. pinching twice at 30 and 40 DAT.

*Key words: Chrysanthemum, Pinching, Spray type.*

## Introduction

Chrysanthemum flower is one of the most versatile flowers and is the second most popular flower, next to rose having several types, size and colour. The extensive range of shapes, sizes, and colors that its various cultivars exhibit is the most significant of all the criteria. The demand for the loose flowers is growing significantly every day as a result of increased urbanization and elevated aesthetic value in

current culture and civilization. In Odisha's climate, chrysanthemums can only be grown in winter. Commonly cultivated varieties of chrysanthemum in Odisha are Bidhan Jayanti, Flirt, Bidhan Madhuri, Yellow Gold, White Reagan, Arka Chandrika. The ideal soil pH for Odisha conditions is between 6.5-7.0. It should also be friable, rich in organic matter, well-drained, and have a good capacity to hold water. In Odisha, chrysanthemum loose flowers are utilized for preparing garlands, veni, rangoli, Gajra.

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They are also offered for worship in both homes and religious places.

The spray-type chrysanthemums have been introduced from the Netherlands and U.S.A. since 1974 by the author. The demand is gradually increasing day by day. The benefit of the spray-type chrysanthemums are as follows: 1) saving labor for disbudding, 2) uniform growth, 3) short growing period 4) necessity of accurate control of photoperiod and temperature. Spray flower varieties serve well as loose flowers for gajara, veni, garlands.

Pinching is a most important operation in chrysanthemum cultivation. To minimize the height of the plant and induce lateral branches, the terminal growing part of the stem is pinched off. The chrysanthemum with the smallest flowers requires pinching the most. Each plant has more flowering stalks when it is pinched. Chrysanthemums that are pinched become bushier, more compact, produce more flowers. Number of primary branches, leaves, flowers, plant spread are maximum under double pinching & minimum under single pinching & no pinching (Jena *et al.*, 2021). Pinching dramatically enhanced flower diameter while greatly delaying flower bud emergence, decreasing plant height, flower diameter, growth index, vase life of cut flowers (Hasan *et al.*, 2022). Pinching at 30 DAT is superior to no pinching regarding blooming and quality criteria (Yogita *et al.*, 2021). In recent years, numerous new chrysanthemum cultivars with large variety of colour have entered in market, but all cultivars can't give good flowering & yield. Hence, it is felt necessary to experiment to explore influence of pinching on growth as well as flowering of spray type of chrysanthemum (*Dendranthema grandiflora*) cv. Shyamal in Odisha environment.

## Materials and Methods

Current research work entitled "Influence of pinching on growth and flowering of spray type of chrysanthemum (*Dendranthema grandiflora*) cv. Shyamal" has been performed at Agricultural Research Station, Binjhagiri, Chhatabar, Faculty of Agricultural Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar in 2024-2025 to study impact of several levels of pinching on growth as well as flowering in spray type of Chrysanthemum. 9 treatments and 3 replications have been comprised in the R.B.D. experimental design. Fifteen days old rooted cuttings (7-10 cm long) of chrysanthemum

cv. Shyamal was procured from Regional Plant Resource Center, Bhubaneswar for the investigation. The treatments were T1: Control (No pinching), T2: Single pinching at 30DAT, T3: Single pinching at 40DAT, T4: Single pinching at 50DAT, T5: Single pinching at 60DAT, T6: Double pinching at 30, 40DAT, T7: Double pinching at 40 and 50 DAT, T8: Pinching thrice at 30, 40 and 50 DAT, T9: Pinching thrice at 40, 50 and 60 DAT. All experimental plots were subjected to standard culture practices uniformly for Chrysanthemums.

Pinching is done to reduce the plant height and to promote auxiliary branching in chrysanthemum. There were four levels of pinching such as no pinching, Single pinching, double pinching and 3 times pinching as per treatment schedule. In case of single pinching, it was done at 30, 40, 50 and 60 days after transplanting. In case of double pinching, the first pinching was done at 30 and second at 40 days of transplanting and at 40 and 50 days after transplanting. In case of pinching thrice the first one has been performed after 30 DAT followed by a second pinching which is done at 40 & third at 50 DAT. Similarly pinching thrice at 40, 50 & 60 DAT. In case of no pinching, plants were left un-pinched.

Observations have been observed on following growth or quality parameters i.e. Plant height (cm), Number of primary branches (No.s), Plant spread (cm<sup>2</sup>), Number of secondary branches (No.s), Number of leaves/plant (No.s), Number of tertiary branches (No.s), plant stem girth (cm), diameter of flower (cm), Days taken to colour break stage (days), Days taken to full open stage (days), Days taken to first bud emergence (days), Number of flowers/plant (No.s), yield/plant on weight basis (gm), yield/plot (kg), Flower yield/ha (ton).

## Results and Discussion

Observations on plant height after pinching were recorded and data are given in Table 1. It is observed from the table that plant height was maximum i.e. 53.34 cm in treatment T<sub>1</sub>, i.e. no pinching. Pinched plants decrease height as a result of the apical section of the main branch being repeatedly removed; the auxiliary branch breaks free from the corresponding inhibition of apical dominance and begins to grow. More branching was result of this. This result is in confirmation of outcomes displayed by Ehsanullah *et al.* (2021) in chrysanthemum. Equivalent findings demonstrated by Jena *et al.*

(2021) in annual chrysanthemum. The data for Plant stem girth after pinching is presented in Table 1 indicating that maximum plant stem girth (2.39 cm) has been recorded in T<sub>9</sub>, i.e. pinching thrice at 40,50, 60 DAT and the increase in stem girth might be since reduction in plant height is always linked to rise in stem girth. Outcomes of current investigation closely align with outcomes of Nagdeve *et al.* (2021) in the annual chrysanthemum. Treatment T<sub>8</sub>, i.e. pinching thrice at 30,40 and 50 DAT attained maximum plant spread (32.11 cm<sup>2</sup>) was at par with T<sub>9</sub>, i.e. pinching thrice at 40, 50, 60 DAT. A high number of branches with more leaves under pinched 3 times plants may be the cause of the outcome, which would ultimately lead to increased plant spread. This is in confirmation with Ehsanullah *et al.*, 2021. According to Jena *et al.* (2021), this could be because the auxiliary bud under pinched part received more food or carbohydrates, minimizing the effect of apical dominance which results in elevated number of primary branches, reduction in plant height, plant spread. In China Aster, Gaidhani *et al.* (2020) came to same result.

Highest number of primary branches (6.34) has been noticed in the treatment T<sub>8</sub>, i.e., pinching thrice at 30,40 and 50DAT followed by treatment T<sub>9</sub>, i.e. pinching thrice at 40, 50 and 60 DAT. Pinching treatments may increase the number of primary branches as they repeatedly remove apical buds, which increases the number of branches. Above findings are same as of Ehsanullah *et al.* (2021) in Chrysanthemum. According to Nagdeve *et al.* (2021), because apical dominance of plant has been stopped, auxiliary buds under pinched stem of the plant were compelled to grow luxuriantly, which may demonstrate increase in primary branches

caused by pinching treatments. As a result, there were more primary branches per plant. Beniwal *et al.* (2003) also observed similar results in chrysanthemum cv. Flirt, Chezhiyan *et al.* (1986) in chrysanthemum cv. CO-1 Number of secondary as well as tertiary branches is maximum in treatment T<sub>8</sub> i.e. pinching thrice at 30,40 and 50 DAT that has been at par with T<sub>9</sub>, i.e. pinching thrice at 40, 50 and 60 DAT. The result might be because of repetitive elimination of apical bud that results increased branch number. The above outcomes are same as Ehsanullah *et al.* (2021) in Chrysanthemum.

According to the data in Table 2, plants that received T8, which involves pinching 3 times at 30, 40, 50 DAT, produced highest number of leaves (76.28), which was significantly more as compared to plants receiving other treatments. The outcome supports the chrysanthemum research conducted by Ehsanullah *et al.* (2021). When carnation plants were pinched 3 times, Kumar *et al.* (2014) also noticed rise in number of leaves. Adequate number of leaves is necessary for regular development and yield. Better growth and development result from more photosynthesis being accumulated when there are more leaves. The plant's lateral dominance, which results in more branches and more leaves, may be the cause of results of this research. It was confirmed by Khobragade *et al.* (2012), who discovered that pinching China Aster plants had beneficial result and pinched plants produced more leaves when compared to the un-pinched plants.

Data given in Table 3 revealed elevated number of pinching caused in significant delay in bud initiation. Hence, earliest bud initiation (55.23 days), early colour break stage (58.62 days) and early full bloom stage (67.55 days) were noticed in treatment T<sub>1</sub>, i.e.

**Table 1.** Effect of different pinching levels on plant height, stem girth, plant spread

Treatment number	Treatment	Plant height (cm)	Stem girth (cm)	Plant spread (cm <sup>2</sup> )
T <sub>1</sub>	Control (No pinching)	53.34	1.43	27.70
T <sub>2</sub>	Single pinching at 30 DAT	39.36	1.53	30.53
T <sub>3</sub>	Single pinching at 40 DAT	37.44	1.64	30.78
T <sub>4</sub>	Single pinching at 50 DAT	34.97	1.73	30.33
T <sub>5</sub>	Single pinching at 60 DAT	34.26	1.84	30.05
T <sub>6</sub>	Double pinching at 30 & 40 DAT	28.11	1.95	31.13
T <sub>7</sub>	Double pinching at 40 & 50 DAT	30.00	2.13	30.81
T <sub>8</sub>	Pinching thrice at 30,40 & 50 DAT	25.02	2.29	32.11
T <sub>9</sub>	Pinching thrice at 40,50 & 60 DAT	27.17	2.31	31.69
	SE(m)±	0.37	0.02	0.28
	CD (5%)	1.09	0.07	0.84

no pinching and delay in bud initiation has been noticed by pinching the plants thrice at 40, 50, 60 DAT in treatment T<sub>9</sub>. Lack of the physiologically mature region may be the cause of the delay in bud initiation, and the branches that emerged from the pinched plants took longer than those from non-pinched plants to become physiologically inductive for producing flower buds. Ehsanullah *et al.* (2021) have noted similar outcomes in chrysanthemum. The flower's delayed opening was caused by delay in the color break stage, which may have resulted from the apical region being repeatedly removed. According to Jena *et al.* (2021), Khandelwal *et al.* (2003) in marigold, Ehsanullah *et al.* (2021) in chrysanthemum, these findings are similar.

Diameter of flowers also significantly influenced

by different levels of pinching that was depicted in Table 3. The maximum flower diameter (6.2 cm) has been noted under treatment T<sub>1</sub>, i.e. no pinching followed by 5.72 cm in T<sub>2</sub>, i.e. pinching at 30 DAT and minimum flower diameter (4.17 cm) was recorded under treatment T<sub>9</sub>, i.e. pinching thrice at 40, 50, 60 DAT. Maximum diameter of flowers was noticed when plants were not pinched. This might be due to more accumulation of carbohydrates in no pinching which was utilized by the plants to increase in size of flowers. This result is in confirmation with the results suggested by Yogita *et al.* (2021). Resembling outcomes have been also noted by Kour (2009) in Chrysanthemum, Sailaja and Panchbhai (2014) in China Aster and Jindal *et al.* (2018) in Chrysanthemum. This is proved from data displayed in Table 3,

**Table 2.** Effect of different pinching levels on no. of primary branches, secondary branches, tertiary branches and no. of leaves

Treatment number	Treatment	No. of primary branches (no.)	No. of secondary branches (no.)	No. of tertiary branches (no.)	No. of leaves (no.)
T <sub>1</sub>	Control (No pinching)	2.34	8.34	2.67	51.87
T <sub>2</sub>	Single pinching at 30 DAT	3.34	14.67	4.67	65.12
T <sub>3</sub>	Single pinching at 40 DAT	4.34	16.34	5.34	65.41
T <sub>4</sub>	Single pinching at 50 DAT	3.34	12.67	4.67	64.32
T <sub>5</sub>	Single pinching at 60 DAT	3.00	12.34	4.00	63.37
T <sub>6</sub>	Double pinching at 30 & 40 DAT	6.00	18.67	6.67	67.48
T <sub>7</sub>	Double pinching at 40 & 50 DAT	5.00	17.67	5.67	66.53
T <sub>8</sub>	Pinching thrice at 30,40 & 50 DAT	6.34	23.34	8.34	76.28
T <sub>9</sub>	Pinching thrice at 40, 50 & 60 DAT	5.34	22.34	7.34	71.36
	SE(m)±	0.30	0.40	0.46	0.46
	CD (5%)	0.91	1.20	1.39	1.37

**Table 3.** Effect of different pinching levels on days taken to first bud initiation, colour break stage, full open stage, diameter of flower and shelf life of flower

Treatment number	Treatment	Days taken to first bud initiation (days)	Days taken to colour break stage (days)	Days taken to full open stage (days)	Diameter of flower (cm)	Shelf life of flower (days)
T <sub>1</sub>	Control (No pinching)	55.23	58.62	67.55	6.2	11.34
T <sub>2</sub>	Single pinching at 30 DAT	59.08	62.58	66.75	5.72	12.19
T <sub>3</sub>	Single pinching at 40 DAT	59.28	63.73	68.37	5.41	12.46
T <sub>4</sub>	Single pinching at 50 DAT	66.71	70.6	74.77	5.35	11.54
T <sub>5</sub>	Single pinching at 60 DAT	74.61	78.77	82.23	5.31	10.75
T <sub>6</sub>	Double pinching at 30 & 40 DAT	59.56	63.22	67.19	5.29	9.43
T <sub>7</sub>	Double pinching at 40 & 50 DAT	63.84	68.01	71.93	4.63	9.21
T <sub>8</sub>	Pinching thrice at 30,40 & 50 DAT	69.18	75.67	81.44	4.61	8.52
T <sub>9</sub>	Pinching thrice at 40, 50 & 60 DAT	78.67	85.03	91.10	4.17	8.32
	SE(m)±	0.49	0.50	0.53	0.10	0.03
	CD (5%)	1.49	1.51	1.59	0.31	0.11

longest shelf life of flower (12.46 days) was noticed in T<sub>3</sub>, i.e. single pinching at 40 DAT followed by T<sub>2</sub>, i.e. single pinching at 30 DAT and the least shelf life of flower (8.32 days) was noticed in treatment T<sub>9</sub>, i.e. pinching thrice. The result might be due to limited vegetative growth that may have favoured to develop larger-sized flowers. Comparable outcome was attained by Khandelwal *et al.* (2003) in marigold.

Data illustrated in Table 4 showed number of flowers/plant has been significantly affected by varying levels and time of pinching. Maximum number of flowers/plant (64.25) has been obtained in T<sub>6</sub>, i.e. pinching twice at 30, 40 DAT and minimum number of flowers/plant (43.10) has been noticed in T<sub>1</sub>, i.e. no pinching. Reason for the increase in flowering could be that pinched plants produced more auxiliary shoots, which in turn produced more flowers. This is in confirmation with Jena *et al.* (2021). It was noticed that highest yield (321.26 g) on weight basis was found in treatment T<sub>6</sub>, i.e. pinching twice at 30 and 40 DAT and the lowest yield (215.53 g) on weight basis has been attained in T<sub>1</sub>, i.e. no pinching. This could be because early pinched plants had more branches per plant. Yield per ha was highest (11.73 ton) in treatment T<sub>6</sub>, i.e. pinching twice at 30 and 40 DAT and the lowest flower yield per ha (8.20 ton) has been noted under T<sub>1</sub>, i.e. no pinching. Rise in yield of flowers per hectare was result of increase in yield/plot which may be because of pinching at proper time and additional flowering was produced as a result of each plant producing additional branches. But it showed a decreasing trend towards

increase in level and duration of pinching. Same outcomes have been also obtained by Jena *et al.* (2021) in chrysanthemum, supported by Nagdeve *et al.* (2020).

## Conclusion

From the current research, this may be determined that positive effect of different levels of pinching was clearly visible as compared to control i.e. no pinching. But pinching thrice at 30, 40 and 50 DAT was effective for all the growth characters except plant girth. Whereas pinching thrice at 40, 50 and 60 DAT was found effective in delaying some of the flowering characters like days taken to colour break stage, days taken to first bud initiation, and days taken to full open stage. Large-sized flowers were obtained in control as compared to pinched ones while single pinching at 40 DAT was effective in getting longest shelf life. All the yield attributing characters were found effective in pinching twice at 30 and showed significant effect in flowering, growth, yield attributes of Chrysanthemum cv. Shyamal as compared to control. Thus, findings indicated utilization of several levels of pinching showed significant effect on growth, flowering, and yield attributes of Chrysanthemum cv. Shyamal as compared to control.

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**Table 4.** Effect of different pinching levels on number of flowers per plant (volume basis), yield on weight basis, flower yield per plot, yield per ha

Treatment number	Treatment	Number of flowers per plant (volume basis)	Yield per plant on weight basis(g)	Yield per plot (kg)	Yield per ha (ton)
T <sub>1</sub>	Control (No pinching)	43.10	215.53	5.81	8.20
T <sub>2</sub>	Single pinching at 30 DAT	48.51	242.55	6.54	9.11
T <sub>3</sub>	Single pinching at 40 DAT	55.57	277.88	7.49	10.28
T <sub>4</sub>	Single pinching at 50 DAT	52.29	264.76	7.12	10.51
T <sub>5</sub>	Single pinching at 60 DAT	49.21	246.08	6.64	10.22
T <sub>6</sub>	Double pinching at 30 & 40 DAT	64.25	321.26	8.67	11.73
T <sub>7</sub>	Double pinching at 40 & 50 DAT	62.11	310.58	8.38	11.38
T <sub>8</sub>	Pinching thrice at 30, 40 & 50 DAT	47.84	239.23	6.45	8.99
T <sub>9</sub>	Pinching thrice at 40, 50 & 60 DAT	45.33	226.62	6.11	8.57
	SE(m)±	0.52	3.16	0.08	0.09
	CD(5%)	1.56	9.47	0.25	0.28

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**Conflict of interest** – None

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