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## Effect of planting time and pinching on flowering and yield of chrysanthemum (*Dendranthema grandiflora*) cv. Ratlam selection

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**Abstract**

The present experiment entitled “Effect of planting time and pinching on flowering and yield of Chrysanthemum (*Dendranthema grandiflora*) cv. Ratlam Selection.” was carried out at the Jambuvadi Farm, Department of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat) during 2017 to 2018. The results of the study indicated that the no. of flowers/ plant (40.83), flower yield/ net plot (1.55 kg), flower yield/ hectare (8.48 t) and flowering span (48.78 days) is significantly improved by the treatment D<sub>1</sub> and maximum flower weight (4.01 g) is observed in treatment D<sub>4</sub>. Flower yield also affected by the treatment P<sub>2</sub> is increased no. of flowers/ plant (39.43), flower yield/ net plot (1.51 kg) and flower yield/ hectare (8.43 t). While treatment P<sub>1</sub> resulted in maximum flower weight (3.96 g). Also, treatment P<sub>3</sub> resulted in longer flowering span (48.51 days). The interaction effect of all parameters were found non-significant.

**Keywords:** Planting time, pinching, growth, *Chrysanthemum*, Ratlam selection

**Introduction**

*Chrysanthemum (Dendranthema grandiflora)* occupies a prominent place in ornamental horticulture, and it is one of the commercially exploited flower crop. It is one of the world's favourite flower. *Chrysanthemum* a member of the family Asteraceae (Anderson, 1987)<sup>[1]</sup> and is one among the top ten most cut flowers and pot plants of the world. It is native to Northern hemisphere, chiefly from Europe and Asia. The name “*Chrysanthemum*” is derived from the Greek word *chrysos* (gold) and *anthemon* (flower). *Chrysanthemum* popularity due to having extremely beautiful and colourful flowers. *Chrysanthemum* has wide adaptability for varying climatic and soil conditions. *Chrysanthemum* is one of the important flower crops in Gujarat. Its popularity and demand are increasing day by day. *Chrysanthemum* cultivation is gaining good momentum in Gujarat because of its keeping quality and wide range of flower colours and shapes. Productivity and quality of flowers crop can be improved either by high yielding cultivar or improved horticulture practices including proper agriculture inputs and practices such as planting time and pinching. Comprehensive information on planting time for growers are very limited, due to which the growers are unable to produce quality *chrysanthemum* flowers at the specific time. The growers can earn more profits by adjusting the proper planting time to produce quality flower and avoid crop flood in the market. Early removal of terminal portion of main stem shoot promotes production of large number of primary branches resulting in well spread bushy plant and a greater number of good quality flowers.

**Materials and Methodology**

The present investigation was carried out at the Jambuvadi farm, Department of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat) during 2017-2018. Junagadh is situated in Saurashtra region of Gujarat state. Geographically, this place is situated at 21.50 N latitude and 70.50 E longitudes with an altitude of 60 meters above the mean sea level and 80 kilometers away from Arabian sea. The soil of this region is classified as Vertic Ustochrepts. Physical and chemical properties of the soil of the experimental field were determined with pH 7.85. For planting healthy diseases and pest free suckers were used. Transplanting of suckers was done according to different planting time and pinching was done according to different pinching level. Transplanting was done early in the morning or late in the evening immediately followed by irrigation. Pinching was done by removing terminal portion of the plant to encourage growth. The observations on growth parameters were recorded at different growth stages. The experiment was laid out in Factorial Randomized Block Design (FRBD) with three replications and twelve treatment combinations.

The treatment comprised of four planting time *viz.*, 1<sup>st</sup> week of October (D<sub>1</sub>), 3<sup>rd</sup> week of October (D<sub>2</sub>), 1<sup>st</sup> week of November (D<sub>3</sub>), 3<sup>rd</sup> week of November (D<sub>4</sub>) and three levels of pinching i.e., No Pinching (P<sub>1</sub>), Pinching after 25 DAP (P<sub>2</sub>) and Pinching after 50 DAP (P<sub>3</sub>) were considered as treatments.

### Results and Discussion

The result indicates that the different planting time and pinching had produced significant effect on growth parameters *viz.*, Number of flowers per plant, Flower weight (g), Flower yield per net plot (kg) and Flower yield per hectare (t).

**Number of flowers per plant:** The data from (Table-1) showed that the number of flowers per plants was significantly influenced by different planting time. The maximum number of flowers per plants (40.83) was recorded in treatment (D<sub>1</sub>) planting during 1<sup>st</sup> week of October. Effect of early sowing resulted in increased plant height and this produced higher no. of branches, hence they produced more no. of flowers. Similar findings were also reported by Anjum *et al.* (2007) [2] and Meher *et al.* (1999) [10] in *Chrysanthemum*. The data revealed that the number of flowers per plant was significantly influenced by pinching (Table-1). The maximum number of flowers per plants (39.43) was recorded in treatment (P<sub>2</sub>) pinching after 25 days of planting. This was due to increased number of branches per plant. Later which bear more no. of flowers per plant. Similar result was also obtained by Gowda and Jayanti (1986) [6], Kour (2009) [7] in *Chrysanthemum* and Kumar and Singh (2003) [8] in carnation.

**Flower weight:** Flower weight was significantly influenced by different planting time (Table-1). The maximum flower weight (4.01 g) was recorded in treatment (D<sub>4</sub>) planting during 3<sup>rd</sup> week of November. Early planting may be attributed to the more no. of flowers that reduced the nutrients required to increase the flower size and thus reduce the flower weight. Similar results were also obtained by Anjum *et al.* (2007) [2] and Barman *et al.* (1993) [3] in *Chrysanthemum*.

The data revealed that the flower weight was significantly influenced by pinching. (Table-1). The maximum flower weight (3.96 g) was recorded in treatment (P<sub>1</sub>) no pinching. This might be attributed to sharing of energy by the developing side branches in pinching treatment. This resulted into smaller size and less weight of flowers. Similar result was also obtained by Patel and Arora (1983) [11] and Kour (2009) [7] in *Chrysanthemum*.

**Flower yield per net plot:** Flower yield per plot was significantly influenced by different planting time (Table-1). The data indicated that the maximum flower yield per net plot

(1.55 kg) was recorded in treatment (D<sub>1</sub>) planting during 1<sup>st</sup> week of October. Which may be ascribed to the fact that early planting resulted into higher no. of branches per plant later on these branches bear more no. of flowers per plant. Thus lead to higher flower yield per net plot. Similar results were obtained by Laxmi and Pratap (2011) [9] in *Chrysanthemum*.

Flower yield per net plot was significantly influenced by pinching (Table-1). The data indicated that the maximum flower yield per net plot (1.51 kg) was recorded in treatment (P<sub>2</sub>) pinching after 25 days of planting. This was due to increased number of branches per plant in early pinched plants. Later which bear more no. of flowers per plant. This result was in line with findings of Pawar (2001) [12] in *Chrysanthemum*.

**Flower yield per hectare:** The data revealed that the Flower yield per hectare was significantly influenced by different planting time (Table-1). The data indicated that the maximum flower yield per hectare (8.48 t) was recorded in treatment (D<sub>1</sub>) planting during 1<sup>st</sup> week of October. Which may be ascribed to the fact that in early planting plants could get higher number of branches per plant later on these branches bear more no. of flowers. Thus leads to higher flower yield per hectare. These results were in conformity with Gowda and Jayanti (1986) [6] and Deshmane *et al.* (2012) [5] in Marigold.

Flower yield per net plot was significantly influenced by pinching (Table-1). The data indicated that the maximum flower yield per net plot (1.51 kg) was recorded in treatment (P<sub>2</sub>) pinching after 25 days of planting. This was due to increased number of branches per plant in early pinched plants. Later which bear more no. of flowers per plant. This result was in line with findings of Pawar (2001) [12] in *Chrysanthemum*.

**Flowering span:** Flowering span was significantly influenced by different planting time (Table-1). The data indicated that the maximum flowering span (48.78 days) was recorded in treatment (D<sub>1</sub>) planting during 1<sup>st</sup> week of October. Flowers opened in early planted plants were smaller in size and more compact. This could be the reason which led the flowers to bloom for longer period. This result was in line with findings of Deotale *et al.* (1994) [4], Barman *et al.* (1993) [3] and Anjum *et al.* (2007) [2] in *chrysanthemum*.

The data indicated that in (Table-1) the maximum flowering span (48.51 days) was recorded in treatment (P<sub>3</sub>) pinching after 50 days of planting. This might be due to the fact that by removing apical portion, the plant enters vegetative phase and new shoots took longer time to be physiologically mature and thus resulted in extended flowering span in late pinching. This result was in line with findings of Ubukata (1999) [13] in Carnation

**Table 1:** Effect of planting time and pinching on flower yield of *Chrysanthemum* cv. Ratlam Selection

Sr. no.	Treatment	No. of flowers per plant	Flower weight (g)	Flower yield per net plot (kg)	Flower yield per hectare (t)	Flowering span (days)
<b>Planting time (D)</b>						
1.	D <sub>1</sub>	40.83	3.37	1.55	8.48	48.78
2.	D <sub>2</sub>	37.59	3.49	1.44	8.10	47.88
3.	D <sub>3</sub>	35.67	3.78	1.35	7.84	46.50
4.	D <sub>4</sub>	33.86	4.01	1.32	7.39	43.60
C.D. at 5 %		3.43	0.37	0.15	0.75	3.76
<b>Pinching (P)</b>						
1.	P <sub>1</sub>	34.45	3.96	1.35	7.69	44.45
2.	P <sub>2</sub>	39.43	3.55	1.51	8.43	47.11
3.	P <sub>3</sub>	37.09	3.47	1.39	7.74	48.51
C.D. at 5 %		2.97	0.32	0.13	0.65	3.26
Interaction (DxP)		NS	NS	NS	NS	NS

## Conclusions

The observations recorded from the present investigation revealed that among the four different experimental planting time, 1<sup>st</sup> week of October planting resulted an effective production for highest number of good quality flowers. Pinching carried out in *Chrysanthemum* once at 25 DAP improved in number of flowers per plant, plot and yield per hectare. In the light of these findings, it can be recommended that the 1<sup>st</sup> week of October planting and pinching carried out at 25 DAP for *Chrysanthemum* under Junagadh conditions is beneficial to obtain maximum quality flower yield and net return.

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