



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
[www.phytojournal.com](http://www.phytojournal.com)  
JPP 2020; 9(2): 411-413  
Received: 01-01-2020  
Accepted: 03-02-2020

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## Effect of planting time and pinching on growth of chrysanthemum (*Dendranthema grandiflora*) Cv. Ratlam selection

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**Abstract**

The present experiment entitled "Effect of planting time and pinching on growth of chrysanthemum (*Dendranthema grandiflora*) cv. Ratlam Selection." was carried out at the Jambuvadi Farm, Department of Horticulture, J. A.U., Junagadh (Gujarat) during 2017 to 2018. The results of the study indicated that treatment D<sub>1</sub> significantly improved the plant height at 60 DAP (47.22 cm) and 90 DAP (51.98 cm), plant spread E-W direction (45.67 cm), N-S direction (44.71 cm), stem diameter (0.70 cm), increase no. of branches/ plant at 60 DAP (20.25) and 90 DAP (34.29), no. of suckers/ plant (17.65). Growth also affected by treatment P<sub>2</sub> increased plant spread in E-W (45.14 cm), N-S (44.23 cm), no. of branches/ plant at 60 DAP (20.33) and 90 DAP (33.69). While treatment P<sub>1</sub> resulted increase plant height at 60 DAP (46.65 cm) and 90 DAP (50.41 cm). Treatment P<sub>3</sub> resulted in maximum stem diameter (0.69 cm) and no. of suckers/ plant (17.19).

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

**Introduction**

*Chrysanthemum*, the golden flower is derived from two greek word (Chryos meaning golden and anthos meaning flower), is one of the most beautiful and perhaps the oldest flowering plants commercially grown in different parts of the world. *Chrysanthemum* belongs to the family Asteraceae. *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., Plant height (cm), Plant spread (cm) (E-W & N-S), Stem diameter (cm), no. of branches per plant, no. of suckers per plant.

### Plant height

The significant effect of planting time on plant height presented in Table-1. The highest plant height at 60 days after

planting (47.22 cm) and at 90 days after planting (51.98 cm) was obtained with treatment (D<sub>1</sub>) planting during 1<sup>st</sup> week of October. This might be attributed to the fact, that during this period the day and night temperature was very favourable for the vegetative growth resulting in higher plant height. Increased height of plant in present study are in agreement with the results obtained by Yang *et al.* (1989) (1990).<sup>[15]</sup> in *Chrysanthemum coronarium*, Jane *et al.* (2001)<sup>[3]</sup> in annual *Chrysanthemum*, Singh *et al.* (2004)<sup>[13]</sup> in *Chrysanthemum* cv. Flirt.

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

Sr. no.	Treatment	Plant height (cm)			Plant spread (cm)		Stem diameter (cm)	No. of branches per plant			No. of suckers per plant
		30 DAP	60 DAP	90 DAP	E-W	N-S		30 DAP	60 DAP	90 DAP	
<b>Planting time (D)</b>											
1.	D <sub>1</sub>	25.80	47.22	51.98	45.67	44.71	0.70	10.03	20.25	34.29	17.65
2.	D <sub>2</sub>	25.36	45.07	48.18	45.42	44.01	0.68	9.64	19.82	33.35	17.38
3.	D <sub>3</sub>	23.97	43.80	47.64	43.71	42.12	0.66	9.44	18.02	31.62	16.54
4.	D <sub>4</sub>	23.11	43.33	46.78	41.85	40.69	0.63	9.05	17.23	29.24	14.96
C.D. at 5%		NS	2.91	3.82	2.96	2.90	0.04	NS	2.14	2.61	1.28
<b>Pinching (P)</b>											
1.	P <sub>1</sub>	25.50	46.65	50.41	42.29	41.06	0.64	9.22	17.79	30.79	15.83
2.	P <sub>2</sub>	24.83	44.42	49.44	45.14	44.23	0.67	9.86	20.33	33.69	16.88
3.	P <sub>3</sub>	23.35	43.50	46.09	45.06	43.36	0.69	9.54	18.38	31.90	17.19
C.D. at 5%		NS	2.52	3.31	2.57	2.51	0.04	NS	1.85	2.26	1.11
Interaction (DxP)		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

The appraisal of data indicated that the effect of pinching on plant height was found significant at 60 and 90 DAP in Table-1. The highest plant height was recorded at 60 days after planting (46.65 cm) and at 90 days after planting (50.41 cm) was obtained with treatment (P<sub>1</sub>) no pinching. It might be due to the reason of apical dominance in case of unpinched plants. Results were similar with the observations of Rakesh *et al.* (2005)<sup>[9]</sup> and Yassin and Pappiah (1990)<sup>[16]</sup> in *Chrysanthemum*.

### Plant spread

The significant effect of planting time on plant spread is presented in Table-1. The highest plant spread in E-W direction (45.67 cm) and N-S direction (44.71 cm) were obtained with treatment (D<sub>1</sub>) planting during 1<sup>st</sup> week of October. This may be ascribed the fact that these plants could get sufficient time for putting up more vegetative growth in more plant spread. The present study is in agreement with the results obtained by Krijer (1985)<sup>[4]</sup> in *Chrysanthemum*, Yang *et al.* (1989)<sup>[15]</sup> in *Chrysanthemum coronarium*, and Laxmi and Pratap (2011)<sup>[5]</sup> in *Chrysanthemum*.

Data revealed that the plant spread was found significant in E-W and N-S direction due to different pinching (Table-1). The largest plant spread in E-W direction (45.14 cm) and N-S direction (44.23 cm) were obtained with treatment (P<sub>2</sub>) pinching after 25 days of planting. This might be due to pinching reduces the plant height and encourages the side branches due to removal of apical dominance, which might have favoured in increasing the spreading of plant. The present study is in agreement with the results obtained by Sehrawat *et al.* (2003)<sup>[12]</sup> in marigold, Rakesh *et al.* (2005)<sup>[9]</sup> and Salve *et al.* (2016)<sup>[11]</sup> in *Chrysanthemum*.

### Stem diameter

The diameter of stem is vital parameter of growth as stated in Table-1. The data indicated that the maximum stem diameter of the plant (0.70 cm) was recorded planting during 1<sup>st</sup> week of October (D<sub>1</sub>). As growing period was prolonged, more

photosynthates produced which ultimately increased stem diameter. Similar results were also reported by Pakhale *et al.* (2012)<sup>[8]</sup> in African marigold and Dhawle *et al.* (2003)<sup>[2]</sup> in China aster.

Data revealed that the stem diameter was affected significantly by pinching (Table-1). The stem diameter (0.69 cm) was observed significantly highest with the 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 favours more vegetative growth. It is in conformity with the observations of Maharnor *et al.* (2011)<sup>[6]</sup> in African marigold, Rakesh *et al.* (2005)<sup>[9]</sup> and Salve *et al.* (2016)<sup>[11]</sup> in *Chrysanthemum*.

### No. of branches per plant

The data indicated that the maximum no. of branches per plant was found significant at 60 and 90 DAP (Table-1). The highest no. of branches per plant at 60 DAP (20.25) and at 90 DAP (34.29) was obtained with planting during 1<sup>st</sup> week of October (D<sub>1</sub>). Similar results were also reported by Reimherr and Gradner (1987)<sup>[10]</sup> in *Chrysanthemum parthenium*, Singh *et al.* (2004)<sup>[13]</sup> in *Chrysanthemum* cv. Flirt. and Amin *et al.* (2014)<sup>[1]</sup> in *Chrysanthemum* cv. Fanfare mix.

The result indicates that the no. of branches was found significant at 60 and 90 DAP due to pinching (Table-1). The highest no. of branches at 60 days after planting (20.33) and at 90 days after planting (33.69) was obtained with treatment (P<sub>2</sub>) pinching after 25 days of planting. This might be due to the fact that early removal of apical portion of plant encouraged more no. of branches. These results were in agreement with findings of Yassin and Pappiah (1990)<sup>[16]</sup>, Sehrawat *et al.* (2003)<sup>[12]</sup> in marigold and Sunitha *et al.* (2007) in African marigold.

### No. of suckers per plant

Data revealed that the no. of the suckers per plant was affected significantly by different planting time (Table-1). The data indicated that the maximum no. of the suckers per plant (17.65) was recorded in treatment (D<sub>1</sub>) planting during

1<sup>st</sup> week of October. The number of suckers per plant reduced with the delay in planting may be attributed with the shorter growing period due to which sufficient amount of photosynthates were not produced to promote sucker's growth. Similar results were also reported by Nawaz *et al.* (2009) and Amin *et al.* (2014) <sup>[1]</sup> in *Chrysanthemum*.

The significant effect of planting time on no. of suckers per plant presented in Table-1. The data indicated that the maximum no. of the suckers per plant (17.19) 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 favours more vegetative growth and storage of photosynthates that resulted into more no. of suckers per plant.

### 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 and balanced plant growth and 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 and net return.

### References

1. Amin NU, Sajid M, Ahmad H, Sajid M. Effect of sowing dates on enhancing the flowering time in *Chrysanthemum* (*Chrysanthemum morifolium*). *Int. J of Biosci.* 2014; 5(12):152-159.
2. Dhawle DU, Damke MM, Panchbhai DM. Effect of planting dates on growth, flowering and seed yield of China Aster. *P.K.V Research J.* 2003; 25(1):35-38.
3. Jane RN, Kawarkhe VJ, Jadhau BJ. Effect of different dates of planting on the flower yield of annual *Chrysanthemum* (*Chrysanthemum coronarium*). *Orissa J of Horti.* 2001; 29(2):19-22.
4. Krijer D. Height of crop and duration of culture are strongly dependent on light. *Vakblad voor de Bloemisterij.* 1985; 40(38):42-43.
5. Laxmi P, Pratap M. Effect of dates of planting on growth, flowering and yield of different *Chrysanthemum* (*Dendranthema grandiflora* L.) cultivars. *Research on Crops.* 2011; 12(3):813-816.
6. Maharnor SI, Chopde N, Thakre S, Rault PP. Effect of Nitrogen and pinching on growth and yield of African marigold. *Asian J of Horti.* 2011; 6(1):43.
7. Nawaz AS, Anjum MA, Naveed F. x Effect of various sucker sizes and planting times on growth and flower yield of *Chrysanthemum*. *Pakistan J of Agri. Sci.* 2011; 46(1):7-12.
8. Pakhale S, Golliwar VJ, Panchbhai DM, Prarthana J, Deshmane S. Response of African marigold varieties to different planting time on growth and yield under Vidharba conditions (Maharashtra, India). *J of Soils and Crops.* 2012; 21(1):183-187.
9. Rakesh JR, Singhrot RS, Singh S, Sharma JR. Effect of GA<sub>3</sub> and pinching on flowering in *Chrysanthemum*. *Haryana J of Horti. Sci.* 2005; 34(1&2):95-96.
10. Reimherr P, Gradner U. *Chrysanthemum parthenium* 'santana' tested. *Gartnerborse-und-Gartenwelt.* 1987; 87(25):915-916.

11. Salve DM, Panchbhai DM, Badge S, Satar V. Growth and flower yield of *Chrysanthemum* as influenced by varieties and pinching. *Plant Archives.* 2016; 16(2):826-828.
12. Sehwat SK, Dahiya DS, Sukhbir S, Rana GS. Effect of nitrogen and pinching on growth, flowering and yield of Marigold. *J. of Horti. Sci.* 2003; 32(1&2):59-61.
13. Singh H, Grewal HS, Kumar R, Singh M. Factors affecting morphogenesis in *Chrysanthemum* (*Dendranthema grandiflora* Ramat.) cv. Flirt. *J. Research, Punjab Agricultural University.* 2004; 41(4):457-462.
14. Sunitha HM, Hunja R, Vyakarnabal BS, Bablad HB. Effect of pinching and growth regulators on plant growth, flowering and seed yield in African marigold. *J of Ornamental Horti.* 2007; 10(2):91-95.
15. Yang SB, Park KW, Chiang MH. The effects of fertilizer application, spacing and sowing date on the growth and quality of *Chrysanthemum coronarium* L. *J. Korean-Society for Hort. Sci.* 1989; 7(1):72-73.
16. Yassin GMD, Pappiah CM. Effect of pinching and manuring on growth and flowering of *Chrysanthemum* cv. MDU-1. *S. Ind. Horti.* 1990; 38(4):232-233.