



Regulation of Flowering in Annual Chrysanthemum by using Pinching and Cycocel

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Abstract

The present investigation was undertaken at Horticulture Section, College of Agriculture, Nagpur. There were four levels of pinching viz., No pinching (P₀), pinching at 30 DAT (P₁), pinching at 45 DAT (P₂) and pinching at 30 & 45 DAT (P₃) and four levels of Cycocel viz., Control (C₀), Cycoel (C₁)1000 ppm, Cycoel (C₂)1500 ppm and Cycoel (C₃) 2000 ppm in factorial randomized block design with three replications. Pinching and Cycocel significantly influenced on flowering parameters viz., days to first flower bud initiation from date of transplanting, days to fully open flower from flower bud initiation, flowering span and flower yield ha⁻¹ in annual chrysanthemum. Significantly early flowering was recorded in control treatment and flowering was delayed in pinching treatment as well as higher concentration of cycocel. Whereas, flower yield ha⁻¹ was found to be maximum in pinching at 30 days after transplanting as well as cycocel 1000 ppm. The application of pinching and cycocel had significant effect on quality parameters viz., weight of flower, diameter of fully opened flower, length of pedicel and longevity of intact flowers.

Key words:- Pinching, Cycocel, Flowering, Quality, Annual Chrysanthemum

INTRODUCTION

Among the flowers, the annual chrysanthemum (*Chrysanthemum coronarium*) has its own importance. It is one of the most important flower crop grown in India. Maharashtra is one of the leading states in flower production. It has a great demand during various functions, festivals, marriages and floral decorations. In Maharashtra, annual chrysanthemum is more popular among the farmers because of easy cultivation for cut as well as loose flowers. The growers get attracted towards annual chrysanthemum due to its short duration to produce marketable attractive yellow and white colour flowers with good keeping quality.

In Vidarbha region, the demand of chrysanthemum flowers is for various purposes and increasing tremendously. Growers in this region facing problem in scientific cultivation of chrysanthemum due to lack of technical information and improved agro-technique, cultural practices like pinching and application of cycocel. Flowering span of annual chrysanthemum is less and hence the flowers are available for very limited period in the market. Pinching and cycocel plays an influencing role in growth and flower regulation in flower crops. Therefore, the present investigation was undertaken to study the effect of pinching and cycocel on flowering regulation in annual chrysanthemum. Standardization of agro-techniques in annual chrysanthemum is essential to obtain the higher yield of quality flowers for longer period.

MATERIAL AND METHODS

The present study was undertaken during 2009-10 at Horticulture Section, College of Agriculture, Nagpur with four levels of pinching viz., No pinching (P₀), Pinching at 30 DAT (P₁), Pinching at 45 DAT (P₂) and Pinching at 30 & 45 DAT (P₃) and four levels of Cycocel viz., Control (C₀), Cycoel (C₁)1000 ppm, Cycoel (C₂)1500 ppm and Cycoel (C₃) 2000 ppm in factorial randomized block design with three replications.

The soil was medium black with uniform texture, colour and good drainage. The seedling were transplanted in field with the spacing at 45 cm row to row and 30 cm plant to plant. The protective irrigations were given at timely interval as and when required. The field was kept free from weeds by adopting hand weeding from time to time. Urea was used as a source of nitrogen and single super phosphate of phosphorus. Half dose of nitrogen and entire dose of phosphorus was applied as a basal dose, at the time of transplanting and remaining half dose of nitrogen was given one month after transplanting. The pinching and application of cycocel was done as per the treatment. The observations on flowering and flower yield were recorded viz., days to first flower bud initiation from date of transplanting, days to fully opened flower from flower bud emergence and flower yield ha⁻¹ and flower quality parameter viz., weight of flower, diameter of fully opened flower, diameter of flower disc, length of pedicel and longevity of intact flowers were recorded.

The data on flowering, flower yield and quality parameters were recorded during the

course of investigation and subjected to statistical analysis as per Gomez and Gomez (1980).

The appropriate standard error of mean S.E.(m) and the critical difference (C.D.) were calculated at 5% level of probability.

RESULTS AND DISCUSSION

Growth parameter

Pinching treatments significantly influenced on growth parameter in annual chrysanthemum. The results (Table 1) revealed that significantly minimum plant height (79.89 cm) was recorded in double pinching at 30 and 45 DAT followed by pinching at 45 DAT and 30DAT. Whereas, maximum plant height of plant was recorded in no pinching treatment.

As regards number of branches plant⁻¹, diameter of main stem and plant spread significantly the highest number of primary branches plant⁻¹ (32.35), diameter of main stem (2.81 cm) and plant spread (40.99 cm) was observed in pinching at 30 DAT followed by pinching at 45 DAT and in double pinching at 30 and 45 DAT. Whereas, number of branches plant⁻¹, diameter of main stem and plant spread was recorded minimum in no pinching treatment.

From above results, pinching treatment are helpful for beneficial effect to all the growth parameters. This might be due to in pinching, apical portion of main stem was pinched out which arrested vertical growth and reduced the plant height, increased side branches, thicker stem diameter and also increased plant spread. The similar result were reported by Sen and Naik (1970), Yassin and Pappiah(1990), Bholane (1998), Pawar (2001) in chrysanthemum.

Foliar application of cycocel significantly influenced on growth parameter in annual chrysanthemum. The results from Table 1 revealed that significantly minimum plant height (81.99cm) was recorded in Cycocel 2000 ppm followed by Cycocel 1500 ppm and cycocel 1000 ppm. However, minimum plant height was recorded in control treatment.

As regards, number of branches plant⁻¹, diameter of main stem and plant spread, significantly more number of primary branches plant⁻¹ (30.41), diameter of main stem and plant spread (39.86cm) was recorded in Cycocel 1000 ppm followed by Cycocel 1500 ppm and Cycocel 2000 ppm. However, minimum number of branches plant⁻¹, diameter of main stem and plant spread was recorded in control treatment.

The application of Cycocel 2000 ppm recorded significantly highest stem diameter (2.77 cm) followed by Cycocel 1500 ppm.

This is might due to the cycocel act as growth retardant. Cycocel arrest the vertical growth and increased number of primary branches. Due to this reducing the size of vessel and sieve tube and delayed lignification led down towards increased stem thickness. The results of similar nature were reported by Talukdar and Paswan (1996) in chrysanthemum and Khandelwal *et al.* (2003) in African marigold.

Flowering and Flower yield parameter:

The pinching and cycocel levels to annual chrysanthemum crop resulted in favourable effect on days to first flower bud initiation from date of transplanting, days to fully opened flower from flower bud emergence, flowering span and flower yield ha⁻¹(q). The results (Table 1) revealed that significantly, an early flower bud initiation (44.51 days) and fully opened flower from flower bud initiation (16.03 days) were recorded significantly minimum days in control i.e. (no pinching). However, the late flowering was observed in pinching treatment as pinching advanced from 30days to 45days after transplanting(45.68days) followed by pinching at 45 days after transplanting. Significantly maximum flowering span was recorded in double pinching at 30 and 45 days after transplanting. Longer flowering span is most desirable in annual chrysanthemum for regular supply of flowers in market which can be achieved by single and double pinching at 30 and 45 days after transplanting. Whereas, maximum flower yield ha⁻¹ (202.48 q) due to the pinching at 30 DAT.

Foliar spray of cycocel was significantly influenced of flowering and regulation of flowering in annual chrysanthemum. Significantly early flowering was recorded in control treatment(45.51 days) and minimum days (17.81) for fully opened flower from flower bud initiation. An application of cycocel delayed flowering and regulate the flowering for longer period. The maximum flower yield ha⁻¹ (182.05 q) was recorded in cycocel 1000ppm which was followed by the cycocel 1500ppm (174.65 q). The results of similar nature were reported by Parmar and Singh (1983) in marigold, Bhloane (1998) and Pawar (2001) in chrysanthemum, Sehrawat *et al.* (2003) in marigold and Lokhande (2007) in annual chrysanthemum.

The interaction effect of pinching and cycocel on flower yield was found to be non significant.

Quality parameter:

The pinching and cycocel levels to annual chrysanthemum crop resulted in favourable effect on weight of flower, diameter of fully opened flower, diameter of flower disc, Length of pedicel and longevity of intact flower. The results (Table 2) revealed that, the weight of flower (2.42 g), diameter of fully opened flower (5.99 cm) and longevity of intact flower (12.17 days) recorded significantly maximum with an pinching at 30 DAT. However, minimum diameter of flower disc (1.86 cm) recorded in control and double pinching at 30 and 45 DAT. Whereas, an application of cycocel 1000ppm recorded significantly maximum weight of flower (2.21 g) and maximum diameter of fully opened flower (5.51 cm) which followed by pinching at 45 DAT (2.14 g). Significantly maximum length of pedicel (9.11 cm) was recorded in control treatment. Maximum longevity of intact flower (11.63 days) was recorded at cycocel 2000ppm. However, minimum diameter of flower disc (1.82 cm) recorded in control. These results are in conformity with the results of Dutta *et al.* (1993) and Bholane (1998) in chrysanthemum, Khandelwal *et al.* (2003) in marigold.

The interaction effect of pinching and cycocel on flower yield was found to be non significant

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Table 1: Growth parameters of Annual chrysanthemum as influenced by Pinching and Cycocel

Treatments	Plant height (cm)	Number of primary branches plant ⁻¹	Diameter of main stem (cm)	Plant spread (cm)
Pinching (Days After Transplanting)				
P ₀ - No Pinching	88.29	21.07	2.62	32.83
P ₁ - Pinching at 30 DAT	83.98	32.35	2.82	40.99
P ₂ - Pinching at 45 DAT	82.21	31.27	2.81	38.53
P ₃ -Pinching at 30 & 45 DAT	79.89	30.38	2.74	37.93
SE (m) ±	0.322	0.277	0.009	0.213
C.D.at 5%	0.930	0.799	0.027	0.615
Cycocel (ppm)				
C ₀ -Control	85.41	26.78	2.72	34.89
C ₁ -1000 ppm	84.02	30.41	2.73	39.86
C ₂ - 1500 ppm	82.94	29.35	2.75	38.54
C ₃ - 2000 ppm	81.99	28.51	2.77	37.01
SE (m) ±	0.322	0.277	0.009	0.213
C.D.at 5%	0.930	0.799	0.027	0.615

Table 1: Flower yield parameters of Annual chrysanthemum as influenced by Pinching & Cycocel levels

Treatments	Days to first flower bud initiation	Days to fully opened flower from flower bud emergence	Flowering span (days)	flower yield ha ⁻¹ (q)
Pinching levels (Days After Transplanting)				
P ₀ - No Pinching	44.35	16.03	34.10	131.80
P ₁ - Pinching at 30 DAT	48.90	19.6	41.07	202.48
P ₂ - Pinching at 45 DAT	51.20	21.66	43.52	176.86
P ₃ -Pinching at 30 & 45 DAT	53.55	23.66	45.68	169.32
SE (m) ±	0.387	0.285	0.267	2.20
C.D.at 5%	1.118	0.823	0.772	6.36
Cycocel levels (ppm)				
C ₀ -Control	45.51	17.81	38.11	150.2
C ₁ -1000 ppm	48.86	20	40.50	182.05
C ₂ - 1500 ppm	51.16	21.11	42.08	174.54
C ₃ - 2000 ppm	52.45	22.03	43.66	173.65
SE (m) ±	0.382	0.285	0.267	2.20
C.D.at 5%	1.118	0.823	0.772	6.36

Table 2: Quality Parameter of Annual chrysanthemum as influenced by Pinching & Cycocel levels

Treatments	Weight of flower (g)	Diameter of fully opened flower	Diameter of flower disc	Length of pedicel	Longevity of intact flowers
Pinching levels (Days After Transplanting)					
P ₀ - No Pinching	1.89	4.87	1.86	9.25	10.27
P ₁ - Pinching at 30 DAT	2.42	5.99	2.07	9.08	12.17
P ₂ - Pinching at 45 DAT	2.17	5.14	2.00	8.96	11.28
P ₃ -Pinching at 30 & 45 DAT	2.11	5.10	1.86	7.77	11.35
SE (m) ±	0.015	0.144	0.011	0.251	0.221
C.D.at 5%	0.045	0.418	0.032	0.726	0.639
Cycocel levels (ppm)					
C ₀ -Control	2.06	4.99	1.82	9.11	10.86
C ₁ -1000 ppm	2.21	5.51	2.02	8.79	11.3
C ₂ - 1500 ppm	2.14	5.37	1.97	8.73	11.26
C ₃ - 2000 ppm	2.15	5.20	1.96	8.42	11.63
SE (m) ±	0.015	0.144	0.011	0.251	0.221
C.D.at 5%	0.045	--	0.032	--	--
Interaction effect					
SE (m) ±					
C.D.at 5%					

