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Studies on the Effect of Pinching and Cycocel on Flower Yield of Gaillardia (*Gaillardia pulchella*. L)

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ABSTRACT

A field experiment was carried out in college of agriculture, Nagpur, Dr. PDKV Akola, on the effect of pinching and cycocel on growth and flowering of gaillardia (*Gaillardia pulchella*. L) during the year 2012 - 2013 (September-March). The experiment was laid out in Factorial Randomized Block Design with four pinching levels (No pinching, 30 DAT, 45 DAT and 30 and 45 DAT) and four levels of cycocel (water spray, 500 ppm, 1000 ppm and 1500 ppm) with sixteen treatment combinations replicated thrice. The yield contributing character like number of flowers per plant, flower yield per plant, flower yield per plot and flower yield per hectare were recorded maximum under single pinching at 30 days after transplanting as well as cycocel 1000 ppm. The interaction effect of pinching and cycocel for all yield parameters was found non significant.

Key words *Gaillardia, Pinching, Cycocel, Flowering and Yield*

The flowers are one of the nature's most beautiful boons to mankind that bring joy and happiness to one and all. Flowers are real symbols of joy, peace, passion, beauty and love. Flowers are given as gifts brighten people's spirits and bring a big smile to their face and make their eyes light up. Flowers can express and convey many feelings, especially compassion and at times a token of forgiveness and motivate us in positive way. Flowers have always been a part of the many special events in a person's life. It's pretty colors and aromatic fragrances add a special touch to any occasion.

Indian Floriculture industry more or less was established itself in the national and international market after initial struggle. The quantum jump is a witness in production and trade of horticultural produce due to sound research system which focused attention of the government coupled with innovative entrepreneurs. The traditional flowers have been given a mainly in the country, but, the production of flowers under greenhouse with international quality standard is only an ancient development. In today's life flower is found at all occasion i.e. birth, death, marriage, festival, inauguration programmes and also used for the purpose of garlands, veni, bouquets etc. Due to that demand for loose flowers and cut flowers in domestic market, export has been increasing tremendously. The floriculture trade is one of the most rapidly expanding and dynamic global enterprise in today's world. It has far a greater annual growth potential of 25 to 30 percent, which is 25 to 30 times more than that of any other agriculture produce.

Among the wide range of commercial flower crops, Gaillardia occupies a selective position because of its prettiness, elegance, diverse forms and varied attractive colour ranges. It has gained considerable importance in flower trade because of their short life, less input requirement and can obtain early returns. Its flowers are used as loose flowers for garlands, decoration and also used for bedding and potting purposes. It has got very beautiful effect when it is grown in large masses in beds and are valuable for filling gaps in mixed herbacious borders. Their long life tends them beautifully to different floral arrangement for interior decoration.

Gaillardia (*Gaillardia pulchella*) belongs to Asteraceae family, native to North and South America. It was named after Mr. Gaillard de Charentonneau, an 18th century French botanist. Gaillardia is commonly known as "blanket flower" or "fire wheel". The common name refers to the inflorescence's resemblance to brightly patterned blankets made by native American. There are more than two dozen known species of Gaillardia grown to tall, with bright daisy like single color and bicolor blooms in shades from buff to red brown.

Gaillardia is a drought tolerant and perennial herbaceous plant. These plants form wiry, branched stems of hairy and upright , growing to 60 cm tall with lanceolate to linear basal leaves are alternate, mostly basal ,4-8 cm long, with edges smooth to coarsely toothed or lobed. The pinwheel, daisy like inflorescences are 4-6 cm diameter, vividely colored with red, orange and yellow. The central disc florets of the flower head tend to be more red-violet, with the outer ray florets being yellow.

All Gaillardia species have an erect habit and are conspicuous for their hairy foliage. In Maharashtra it is grown in Pune, Nashik and Solapur districts on large scale. It is also grown in Kolhapur, Thane and districts of Vidharbha regions. It grows on light to medium black soil, though sandy and well-drained are best. It has a high drought tolerance and does best with a dry colored flowers can be seen carpenting fields and the sides of highways for miles in the summer to late fall. In the garden, the flowers can be removed to promote further blooming.

In Gaillardia, an inflorescence of florets is born on a head. It means terminal types of flowering were observed in it. After transplanting the growth of plant is mostly upward with very little branching. To arrest such tall growth and to promote axillary branching pinching is used. Pinching refers to the removal of the growing tips of the

Table Effect of pinching and cycocel on flower yield parameters of *Gaillardia pulchella*. L

Treatments	Number of flowers plant^{-1}	Flower yield plant^{-1} (g)	Flower yield plot-1 (Kg)	Flower yield hectare^{-1} (q)
Pinching				
No pinching (P_0)	56.49	196.63	2.95	72.82
Pinching at 30 DAT (P_1)	75.95	304.08	4.56	112.62
Pinching at 45 DAT (P_2)	73.31	269.18	4.04	99.70
Pinching at 30 and 45 DAT (P_3)	70.67	261.28	3.92	96.77
'F' test	Sig	Sig	Sig	Sig
SE(m)	2.21	8.32	0.12	3.08
CD at 5%	6.39	24.01	0.36	8.89
Cycocel levels				
Control (C_0)	58.55	215.46	3.23	79.80
CCC 500 ppm (C_1)	71.39	261.99	3.93	97.04
CCC 1000 ppm (C_2)	74.07	285.53	4.24	104.64
CCC 1500 ppm (C_3)	72.42	261.99	4.07	100.74
'F' test	Sig	Sig	Sig	Sig
SE(m)	2.21	8.32	0.12	3.08
CD at 5%	6.39	24.008	0.36	8.89
Interaction effect (PxC)				
'F' test	N.S	N.S	N.S	N.S
SE(m)	4.43	16.64	0.24	6.16
CD at 5%	-	-	-	-

plants to induce the growth of vegetative laterals, manipulate the plant physiology, plant architect which may eventually lead to enhance number of flower bearing branches, leaves, flower and alter source and sink relationship leading to higher yield. Cycocel is a important growth retardant useful in most of the plant. Growth retardant is also useful to arrest vertical growth as it is act as antagonistically to auxin and thus counteracts apical dominance and hence it may be also useful in increasing number of branches per plant.

In Vidarbha region of Maharashtra state, Gaillardia is cultivated throughout the year but the productivity is low and there are no proper recommendations based on latest technology to increase the yield potential. Farmers are unable to regulate the supply of flowers to market so as to assure better price for their produce. Looking to these facts, the present investigation, "Effect of pinching and cycocel on growth, yield and quality of Gaillardia" was undertaken at Horticulture Section, College of Agriculture, Nagpur.

MATERIAL AND METHODS

The field experiment was carried out during the year 2012 - 2013 at the department of Horticulture, College of Agriculture, Nagpur. Nagpur is situated at 20^0 10' North latitude and 79^0 19' East latitude at the elevation of 321.26 meter above mean sea level (MSL) and lies under subtropical zone. Nagpur is characterized by hot, dry summer and fairly cool winter. The area shows wide diurnal fluctuation in temperature. Meteorological data in respect of rainfall, humidity, maximum and minimum temperature was recorded at Agro Meteorology laboratory, Agronomy section, College of Agriculture, Nagpur.

The experiment was laid out in Factorial Randomized Block Design with four pinching levels (No pinching, 30 DAT, 45 DAT and 30 and 45 DAT) and four levels of cycocel (water spray, 500 ppm, 1000 ppm and 1500 ppm) with sixteen treatment combinations replicated thrice.

Seeds of Gaillardia var. *Local* was collected from Plot No.16, Ravinagar, Horticulture Section, College of Agriculture, Nagpur. The seeds were sown on raised bed on 25th September 2012. The seeds were treated with thiram @ of 3 g per kg of seed weight and sown on raised beds. A regular watering, weeding and plant protection measures were carried out as and when required. The land was prepared. The uniform and healthy seedlings were selected for transplanting and one day prior to transplanting irrigation was given to the plot. The seedlings were transplanted in field on 27th October, 2012 by keeping 45 cm distance between plant to plant and 60 cm between rows. Immediately after planting watering was given.

A standard dose of NPK at the rate of 100 kg N, 50 kg P and 50 kg K per hectare was applied through urea, Single super phosphate and murate of potash. The basal dose of

50 kg N and full dose of P and K was applied at the time of transplanting, remaining 50 kg of N was applied as top dressing after 30 days of transplanting.

Five plants were selected randomly from each plot for recording data on various growth and flowering attributes. The data on growth, flowering, flower quality and flower yield were recorded during the course of investigation and subjected to statistical analysis as per Panse and Sukhatme (1967). 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

Flower Yield Parameters

Effect of Pinching

The results presented in Table 1 indicated that, Significantly maximum number of flowers per plant was noticed in treatment single pinching at 30 days after transplanting (75.95) which was at par with pinching at 45 days after transplanting (73.31). Whereas, significantly minimum number of flowers per plant was recorded in control treatment i.e. no pinching (56.49). The early pinching produced more number of flowers per plant might be due to the development of more auxiliary shoots with flowers located terminally. Single pinching at earlier stage induces vigorous branching, which might have favoured to the development of more flowers. Similar results were also reported by Pawar (2001) in chrysanthemum and Ryagi et al. (2007) in carnation.

Significantly maximum yield of flowers per plant was noticed in treatment pinching at 30 days after transplanting (304.08 g), followed by treatment pinching at 45 days after transplanting (269.18 g) and pinching at 30 and 45 days after transplanting (261.28 g). Whereas, significantly minimum yield of flowers per plant was recorded in control treatment i.e. no pinching (196.63 g). From the above results it is indicated that, pinching increased the yield of flowers per plant. The maximum yield of flowers per plant was observed in treatment pinching at 30 days after transplanting (304.08 g). The early pinching produced more number of branches and more vegetative growth resulted in the production of maximum number and weight of flowers per plant. Similar results were also reported by Pawar (2001) in chrysanthemum, Maharnor *et al.* (2011) in African marigold.

Whereas maximum yield of flowers per plot was noticed in treatment single pinching at 30 days after transplanting (4.56 kg) followed by pinching at 45 days after transplanting (4.04 kg) and pinching at 30 and 45 days after transplanting (3.92 kg). Whereas, significantly minimum yield of flowers per plot was recorded in control treatment i.e. no pinching (2.95 kg). The early pinching produced more number of branches and more vegetative growth resulted in the production of maximum number and weight of flowers per plant. Similar results were also reported by Sehrawat *et al.* (2003) in marigold.

Significantly maximum yield of flowers per hectare was noticed in pinching at 30 days after transplanting (112.62q) followed by pinching at 45 days after transplanting (99.70 q) and pinching at 30 and 45 days after transplanting (96.77 q). Whereas, significantly minimum yield of flowers per hectare were recorded in control treatment i.e. no pinching (72.82 q). Early pinching produce more number of branches per plant, more number of flowers per plant and more flower yield per plot which might be increased yield per hectare. These results are in close agreement with the findings of Maharnor *et al.* (2011) in African marigold.

Effect of Cycocel

Significantly maximum number of flowers per plant were recorded in cycocel 1000 ppm (74.07) which was at par with cycocel 1500 ppm (72.42) and cycocel 500 ppm (71.39). Whereas, significantly minimum number of flowers per plant were noticed in control treatment (58.55). From above results it is noticed that, the maximum number of flowers per plant observed in treatment cycocel 1500 ppm (74.07). This implies that cycocel stimulates to produce more number of flowers might be due to production of more number of branches or auxiliary shoots with flowers located terminally. These results are in close agreement with the finding of Patil *et al.* (2004) in Golden rod.

Whereas maximum yield of flowers per plant was recorded in cycocel 1000 ppm (282.53 g) which was at par with the treatments cycocel 1500 ppm (271.19 g) and cycocel 500 ppm (261.99 g). Whereas, significantly minimum yield of flowers per plant was noticed in control treatment (215.46 g).It is might due to maximum utilization of food by suppressing height of plants, resulted for increased flower size and weight of flowers. These results are in close agreement with the finding of Pawar *et al.* (2005) in Gaillardia.

Significantly maximum yield of flowers per plot was recorded in treatment cycocel 1000 ppm (4.24kg) which was at par with the treatments cycocel 1500 ppm (4.07kg) and cycocel 500 ppm (3.75 kg). Whereas, significantly minimum yield of flowers per plot was noticed in control treatment (3.53 kg). These results are in close agreement with the findings of Khandelwal *et al.* (2003) in African marigold.

Significantly maximum yield of flowers per hectare was recorded in cycocel 1000 ppm (104.64 q) which was at par with the treatments cycocel 1500 ppm (100.44 q) and cycocel 500 ppm (97.04 q). Whereas, significantly minimum yield of flowers per hectare was noticed in control treatment (79.80 q). From the above results it is indicated that, the maximum yield of flowers per hectare was observed in cycocel 1000 ppm (104.64 q). Yield per hectare was increase might be due to foliar application of cycocel resulted into more number of branches, more number of flowers per plant and more flower yield per plot. These results are in close agreement with the findings of Patil *et al.* (2004) in golden rod and Lokhande (2007) in annual chrysanthemum. .

The interaction effect due to the pinching and cycocel on all the flower yield parameters were found non significant.

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