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Original Research Article

Effect of Different Doses of Cycocel and Maleic Hydrazide on Yield and Benefit: Cost Ratio of African Marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda

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A B S T R A C T

The field experiment entitled Effect of different doses of Cycocel and Maleic Hydrazide on Yield and Benefit: Cost Ratio of African marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda was carried out at Horticultural Research Centre (HRC) of Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut, Uttar Pradesh during the year 2019-2020.The experiment was laid out in Randomized Block Design (RBD) with nine treatment and three replications. Treatment details were T_1 (Control), T_2 (Cycocel @ 700 ppm), T_3 (Cycocel @ 800 ppm), T_4 (Cycocel @ 900 ppm), T_5 (Cycocel @ 1000 ppm) T_6 (MH @ 100 ppm), T_7 (MH @ 150 ppm), T_8 (MH @ 200 ppm) and T_9 (MH @ 250 ppm) 25 DAT. The results indicates that among all the treatments, T_9 (MH @ 250 ppm) this treatment also showed maximum yield parameters viz. average weight of flowers (11.73 g), number of flowers per plant (45.71), yield of flower per plant (414.63 g), yield of flower per plot (6188.00 g), highest yield of flower per hectare (23.80 t/ha), in African marigold (*Tagetes erecta* L). cv Pusa Narangi Gainda the economics analysis reveals that maximum benefit cost ratio (2.40), net income, gross income were maximum with this treatment.

Keywords

Cycocel, Marigold (*Tagetes erecta* L.) Maleic Hydrazide, Pusa Narangi Gainda

Introduction

Marigold (*Tagetes erecta* L.) is an important commercial flower in India belongs to family Asteraceae (Compositae). It is very popular due to easy to grow and wide adaptability. In India, African marigold flowers are sold in the market as loose for making garland. Besides this, marigold is being cultivated today as commercially important source of carotenoid pigments. Major pigments present in the flowers are Xanthophyll, particularly lutein which accounts for more than 80-90 per cent and is present in the form of esters of palmitic and myristic acid (Alam *et al.*, 1968). In India Marigold is one of the most commonly grown flowers and use extensively on religious and social function in different form. It was introduced in India during the 16^{th} century and now it has been naturalize in different agro-climatic regions of India in such a way that it now appears to be a native of this country. Among the cultural practices, application of plant growth regulators is one

of the most important practices for better growth and flowering of marigold. Plant growth regulators consist of a large group of naturally occurring or synthetically produced organic chemicals and considered as helping tool in the modem production system of ornamentals. In India, the present area under marigold cultivation is 55,890 hectares with a production of 5,11314 metric tons, In Karnataka, the present area under marigold cultivation is 9,100 hectares with a production of 74,900 metric tons (Anonymous, 2015).

Growth retardant like CCC and MH are synthetic compound that either slows down the cell division or inhibits the cell elongation. This is mainly used because of their retarding effects on shoot growth, breaking of apical dominance which induce dwarfness with increased number of lateral branches and ultimately increased the yield. Growth retardants reduced the plant height at considerable rate as synthetic growth retardants, which act in a variety of ways in natural growth mechanism of the plant. They either inhibit cell division or cell elongation and reduce plant height Kandelwal *et al.*, (2003) in African Marigold.

Materials and Methods

An experiment was carried out to access the effect of different doses of Cycocel and Maleic Hydrazide on growth and flower yield of African marigold (*Tagetes erecta* L.) at Horticultural Research Centre (HRC) of Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut, Uttar Pradesh during the year 2019-2020. The experiment was laid out in a randomized block design with three replications having a plot size of (2.6×2.6) m^2. The seeding of African marigold (*Tagetes erecta* L) *cv*. Pusa Narangi Gainda was transplanted 30 days after seed sowing in the evening at a distance of 40 ×40cm. The recommended dose of fertilizers i.e. 120:80:80 kg/ha NPK was applied in experimental field where half dose of nitrogen, full dose of phosphorus and potash was thoroughly mixed in the soil at the time of preparation of bed. The remaining half does of nitrogen was applied one month after transplanting of seedlings. Irrigation was done just after transplanting and subsequent light watering was done for better establishment of all seedlings. After establishment of plants field was irrigated at 15 days interval throughout the cropping period harvesting of marigold. The treatments included four levels of CCC (700, 800, 900, and 1000 ppm) and Maleic Hydrazide (100,150, 200, and 250ppm). Spraying of growth regulators was done 25 days after transplanting. The yield parameter such as the average weight of flower (g), average number of flowers per plant, average flower yield per plant (g), average flower yield per plot (g), average yield (t ha^{-1}), and economics was recorded in five randomly selected plants per replication in each treatment. Data under different characters were analyzed statistically as suggested by Panse and Sukhatme (1978).

Results and Discussion

The data clearly indicates that the yield parameters of marigold were significantly affected by different doses of MH & CCC (Table 1).

Average weight of flowers (g)

The weight of flower was recorded significantly maximum (11.73 g) was recorded in treatment with (MH 250 ppm). The weight of flower was found to be minimum (6.60 g) in treatment with control. These results are in conformity with the results of Narayana and Jayanthi (1991), Malik *et al.*, (2017) and Majeed *et al.*, (2017)

Average number of flowers per plant

The numbers of flowers per plant was recorded significantly maximum (45.71) were observed in treatment with (MH 250 ppm). The minimum number of flowers per plant (32.20) was found with the control plot. The effect of MH 250ppm increase the Average number of flower per plant Similar results were also reported by Mishra and Pandey (2006), Pawar *et al.,* (2011) and Khobragade *et al.,* (2014).

Average flower yield per plant (g)

The flower yield per plant was recorded significantly maximum (414.63 g) was observed in treatment with (MH 250 ppm) followed by treatment. The flower yield per plant was found to be minimum (265.98 g) in treatment with control. Similar results were also reported by Majeed *et al.,* (2017).

Average flower yield per plot (g)

The flower yield per plot was recorded significantly maximum (6188.00 g) was observed in treatment with (MH 250 ppm). The flower yield per plant was found to be minimum (3741.33 g) in treatment with control. Dani *et al.,* (2010) also found similar results.

Average Flower yield per hectare (t/ha)

The flower yield was recorded significantly maximum (23.80t/ha) was found in with (MH 250 ppm) followed by treatment. The flower yield per hectare was found to be minimum (14.39 t/ha) was recorded in with control. Khobragade *et al.,* (2019) also found similar results.

Table.1 Effect of different doses of CCC & MH on yield and economic of African marigold

Treatments		Average Weight of flowers (g)	Average Number of flowers per plant	Average Flower yield per plant (g)	Average Flower yield per plot (g)	Average Flower yield per hectare (t/ha)	net return	benefit: cost ratio
T_1	Control	6.60	32.20	265.98	3,741.33	14.39	83900	2.40
T_2	CCC 700 ppm	7.50	35.07	297.07	4,031.33	15.50	92559	2.48
T_3	CCC 800 ppm	6.71	37.90	328.10	5,505.00	21.17	148964	3.37
T_4	CCC 900 ppm	7.94	38.07	370.33	5,694.00	21.90	155797	3.47
T_5	CCC 1000 ppm	8.47	44.40	367.47	5,905.00	22.71	163561	3.57
T_6	MH 100 ppm	10.39	35.93	335.07	4,882.33	18.78	127643	3.12
T_7	MH 150 ppm	10.69	36.57	346.86	5,229.67	20.11	140934	3.34
T_8	MH 200 ppm	9.12	42.62	398.28	5,878.33	22.61	165816	3.75
T_9	MH 250 ppm	11.73	45.71	414.63	6,188.00	23.80	177657	3.94
SEm±		0.545	1.883	16.445	318.027	1.223	19726.89	0.47
CD at 5%		1.648	5.693	49.727	961.653	3.699	9305.55	0.22

Economics

The maximum gross return was recorded in (MH 250 ppm) (Rs. 238000.00/ha) was recorded with control. The maximum net return T_9 (MH 250 ppm) was recorded in (Rs. 177657.00/ha). The minimum net return (Rs. 83900.00/ha) was recorded with control. Maximum Benefit: Cost ratio was recorded in (MH 250 ppm) (3.94) and the minimum Benefit: Cost Ratio (2.40) was recorded in the control. The maximum yield of flower, gross return, net return and benefit: cost ratio was obtained with the treatment (MH 250 ppm). Similar observations have been recorded by Kumar *et al.,* (2013), and Verma *et al.,* (2019) in African marigold.

On the basis of present investigation, it can be concluded that treatment T_9 with (MH250 ppm) was found to be best treatment in terms of present parameters studied. This treatment also showed maximum yield parameters in African marigold (*Tagetes erecta* L). cv. Pusa Narangi Gainda. The economics analysis reveals that maximum benefit cost ratio (2.40), Net income, Gross income are maximum with this treatment.

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