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## INFLUENCE OF ORGANIC NUTRIENTS AND BIO REGULATORS ON CERTAIN GROWTH AND FLOWER QUALITY ATTRIBUTES OF CELOSIA (*CELOSIA CRISTATA* L.)

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### ABSTRACT

An experiment on the influence of organic nutrients and bio-regulators on certain growth and flower quality attributes of Celosia (*Celosia cristata* L.) was conducted in randomized block design at floriculture unit, Department of Horticulture, Faculty of Agriculture, Annamalai university, Tamil Nadu, India. The experiment consists of ten treatments comprised of organic manures viz., farmyard manure @ 20 t ha<sup>-1</sup>, vermicompost @ 5 t ha<sup>-1</sup> and poultry manure @ 10 t ha<sup>-1</sup> along with bio regulators like panchagavya, humic acid and seaweed extract each @ 100 ppm was given as foliar application. Among the various treatments, application of vermicompost @ 5 t ha<sup>-1</sup> along with panchagavya @ 100 ppm was significantly increased the growth parameters viz., plant height (cm) at 60 and 90 DAT, number of laterals shoots at 60 and 90 DAT, number of leaves at 60 and 90 DAT, leaf area (cm<sup>2</sup>), stem girth (cm), internodal length (cm). Flower quality parameters viz., Days taken for first flowering (days), duration of flowering (DAT), number of flower per plant, single flower weight (g), flower head width (cm), chlorophyll content (CCI) and dry matter production (g plant<sup>-1</sup>) was achieved in Celosia. From the experiment, the results showed that application of vermicompost @ 5 t ha<sup>-1</sup> with combination of panchagavya @ 100 ppm had significant effect in performance of Celosia on growth and flower quality parameters.

**Keywords:** Vermicompost, Panchagavya, *Celosia cristata*

### Introduction

Floriculture is a branch of horticulture concerning cultivation of flowering and ornamental plants for gardens and floristry. It includes loose flowers, cut flowers, cut greens, bedding plants, house plants, flowering garden and potted plants etc. The celosia (*Celosia cristata* L.) a C<sub>3</sub> plant, is one of the most versatile annual herbaceous plants belongs to the Amaranthaceae family and is of tropical origin. Celosia or Cockscomb is grown for 'loose flower' and it is popular for dry flower and for garden land making. Though not fragrant, the flowers are very popular due to their attractive colour, light weight and good keeping quality. Earlier, it was exclusively used for bedding purpose alone in ornamental gardens, but at present, it also cultivated as a commercial loose and cut flower for internal market. Dwarf varieties of celosia serves as an attractive border in flower gardens all varieties of this flower crop may be used as a flower. It has the habit of profuse flowering, short duration to produce marketable flowers, wide spectrum of attractive colours, shape and size and good keeping quality, attracted the attention of producers and traders (Okusanya,1980). The celosia flower in combination with jasmines and tuberoses are becoming very popular in garland making in southern parts of Tamil Nadu, Karnataka and Andhra Pradesh. Celosia is commercially cultivated in number of districts in Tamil Nadu by traditional method and the average yield of flower head range from 4 to 4.5 t ha<sup>-1</sup>. The production of economical

yield and better quality of celosia flowers requires proper crop management techniques. Crop regulation and flower forcing are important techniques to make the celosia production profitable. In order to meet the demand for fresh flowers several effects are carried out by the scientists to increase the production through improved management techniques. Integrated systems of flower producer are less dependent on intensive management. Organic manure has received considerable attention by the farmers as a source of nutrients for enhanced plant growth and productivity. They help in supplying a balanced nutrition of the growing plants and improve the production and quality of crop. Bio regulators are the organic chemical compounds which modify or regulate physiological process in an appreciable measure in plants when used in small concentrations. The use of bio regulators with recommended horticultural practices in specific cultivars seems to be novel theme of modifying plant for sustained production. They are readily absorbed and move rapidly through tissues when applied to different parts of the plant. Hence, strategies such as application of organic manures along with foliar application of bio regulators are essential to improve the growth continuously. By considering these facts, an field experiment were carried out with the following specific objectives in order to study the effect of organic nutrients and bio regulators on growth and flower quality of celosia (*Celosia cristata* L.).

### Materials and Methods

The present investigation was under taken in the floriculture unit, Department of Horticulture, Faculty of Agriculture, Annamalainagar, Cuddalore District, Tamilnadu. The experiment was laid out in on randomized block design (RBD) with 10 treatments and replicated three times. The experiment was conducted by using different organic manures viz., farmyard manure, vermicompost and poultry manure and bioregulators viz., panchagavya, humic acid and seaweed extract given as foliar application. The observations

are recorded on the selected five plants for a treatment in each replication and the mean data is statistically analyzed. The plots were kept free from weeds by periodic hand weeding. Earthing up operations was done whenever found necessary. Pests and diseases were controlled periodically during the entire crop period. The data were subjected to statistical analysis as suggested by Panse and Sukhatme (1985). Data of three replications were tabulated and recorded. The treatment details are shown in the Table 1.

**Table 1:** Treatment details of the experiment

No.	Treatment details
T <sub>1</sub>	Farmyard manure @ 20 t ha <sup>-1</sup> + Panchagavya @ 100 ppm
T <sub>2</sub>	Farmyard manure @ 20 t ha <sup>-1</sup> + Humic acid @ 100 ppm
T <sub>3</sub>	Farmyard manure @ 20 t ha <sup>-1</sup> + Sea weed extract @ 100 ppm
T <sub>4</sub>	Vermicompost @ 5 t ha <sup>-1</sup> + Panchagavya @ 100 ppm
T <sub>5</sub>	Vermicompost @ 5 t ha <sup>-1</sup> + Humic acid @ 100 ppm
T <sub>6</sub>	Vermicompost @ 5 t ha <sup>-1</sup> + Sea weed extract @ 100 ppm
T <sub>7</sub>	Poultry manure @ 10 t ha <sup>-1</sup> + Panchagavya @ 100 ppm
T <sub>8</sub>	Poultry manure @ 10 t ha <sup>-1</sup> + Humic acid @ 100 ppm
T <sub>9</sub>	Poultry manure @ 10 t ha <sup>-1</sup> + Sea weed extract @ 100 ppm
T <sub>10</sub>	Control

**Table 2:** Influence of organic nutrients and bio-regulators on growth parameters of Celosia (*Celosia cristata* L.)

Treatments	Plant height (cm)		No. of lateral shoots		No. of leaves plant <sup>-1</sup>		Leaf area (cm <sup>2</sup> )	Stem girth (cm)	Internodal length (cm)
	60	90	60	90	60	90			
	DAT	DAT	DAT	DAT	DAT	DAT			
T <sub>1</sub>	52.51	75.79	12.12	15.26	80.12	127.59	14.52	3.34	3.45
T <sub>2</sub>	56.12	80.01	15.22	20.41	94.26	148.24	18.67	4.88	4.72
T <sub>3</sub>	55.10	78.71	14.33	19.12	90.21	142.33	17.49	4.44	4.36
T <sub>4</sub>	57.16	81.30	16.10	21.71	98.30	154.14	19.84	5.31	5.07
T <sub>5</sub>	53.03	76.14	12.56	16.51	82.14	130.54	15.11	3.56	3.63
T <sub>6</sub>	54.07	77.43	13.43	17.81	86.18	136.43	16.30	4.01	3.99
T <sub>7</sub>	51.80	74.20	11.24	14.56	76.07	121.69	13.33	2.90	3.09
T <sub>8</sub>	49.91	72.26	9.90	12.59	70.00	112.82	11.55	2.23	2.53
T <sub>9</sub>	50.44	72.92	10.35	13.25	72.03	115.78	12.15	2.45	2.72
T <sub>10</sub>	48.89	70.97	9.02	11.29	65.95	106.91	10.36	1.79	2.16
S.ED	0.51	0.64	0.43	0.64	2.01	2.94	0.58	0.21	0.17
CD(P=0.05)	1.02	1.28	0.87	1.29	4.03	5.89	1.17	0.42	0.34

**Table 3 :** Effect of organic nutrients and bio-regulators on flower quality parameters of Celosia (*Celosia cristata* L.)

Treatments	Days taken for first flowering	Duration of flowering (days)	No. of flowers plant <sup>-1</sup>	Single flower weight (g)	Flower head width (cm)	Chlorophyll content index (CCI)	Dry matter production (g plant <sup>-1</sup> )
T <sub>1</sub>	36.49	57.60	13.29	6.75	6.34	9.89	34.42
T <sub>2</sub>	29.88	63.37	17.74	8.51	6.86	10.86	38.98
T <sub>3</sub>	31.77	61.73	16.47	8.01	6.73	10.58	37.68
T <sub>4</sub>	28.00	65.00	19.00	9.01	7.00	11.13	40.27
T <sub>5</sub>	35.55	58.42	13.93	7.01	6.42	10.03	35.07
T <sub>6</sub>	33.67	60.08	15.19	7.50	6.58	10.31	36.37
T <sub>7</sub>	38.7	55.97	12.02	6.26	6.19	9.62	33.13
T <sub>8</sub>	41.21	53.49	10.09	5.51	5.95	9.19	31.17
T <sub>9</sub>	40.26	54.33	10.74	5.97	6.03	9.34	31.83
T <sub>10</sub>	43.11	51.84	8.81	5.01	5.80	8.91	29.87
S.ED	0.93	0.81	0.62	0.24	0.06	0.13	0.64
CD(P=0.05)	1.87	1.62	1.25	0.48	0.13	0.26	1.28



## Result and Discussion

Among the organic sources, FYM, Vermicompost and Poultry manure vermicompost is an excellent soil conditioning agent. Incorporation of vermicompost in soil improves the texture, structure, permeability and water holding capacity of soil. Farmyard manure is a store-house of plant nutrients including micronutrients; it improves the physico-chemical properties of the soil, which is very useful for the sustainable crop productivity as well as soil fertility and productivity. Poultry manure are very popular among the farmers because of its eco-friendly nature and simply availability. These products are helpful in minimizing the environmental hazards and increase of soil fertility. Application of bio regulators like Panchagavya, Humic acid and Seaweed extract provides good quality of organic nutrients. Panchagavya, an organic product has the potential to play the role of promoting growth and providing immunity in plant system. Its application is found to be more profitable than fertilizer application and chemical spray. Humic acid and seaweed extract play a major role for producing the good quality and higher yield for ecological sustainable farming.

There are various technologies to boost up the productivity but nutrient management has got a greater significance in maximizing the yield of the crops. Balanced use of fertilizers alone will not sustain high productivity due to the emergence of multi nutritional deficiencies besides, indiscriminate and continuous application of fertilizers alone will not sustain high productivity and continuous application of fertilizers and pesticides render the soil lifeless. Hence a shift back to our traditional practice of organic farming has gained momentum not only to ensure wholesome flower production but also to sustain it by keeping the land in healthy condition with better use of farm resources. This celosia is commercially cultivated in Tamil Nadu but the use of organic manure and bio regulators for increasing the yield and quality has not been practiced. The results of the present study entitled "Effect of organic nutrients and bio regulators on growth and flower quality of Celosia (*Celosia cristata* L.)." are discussed hereunder.

Application of organic nutrients and bio-regulators significantly influenced the growth, flowering and quality parameters. The data and the result on the effect of organic nutrients and bio-regulators on growth and yield of Celosia (*Celosia cristata* L.) and their results is present in table (2) on growth parameters *viz.*, plant height (cm), number of laterals shoots, number of leaves, leaf area (cm<sup>2</sup>), stem girth(cm) and Internodal length (cm). The plant observation on flowering and quality parameters *viz.*, days taken first flowering (days), duration of flowering (days), number of flower per plant, single flower weight (g) and flower head width (cm), chlorophyll content (CCI) and dry matter production (g plant<sup>-1</sup>) are tabulated in Table 3

### Growth parameters

Growth is one of the essential parameter which determines the yield attributes of any crop. The results of the present's investigation revealed that there were significant differences on the growth parameters. Vermicompost owing to its surplus nutritive content enhanced beneficial soil micro flora and increase the plant growth. Hence it can be used as best source of organic nutrients for flower productivity as reported by Ali Salehi Sardoei (2014). This may be due to increased supply of major plant nutrients, which are required

in larger quantities for the growth and development of plant, the application of nitrogen at optimum level attributed to acceleration in development of growth and reproductive phases.

In regard to plant height, which it is maximum occurred at 60 and 90 DAT (57.16 cm and 81.30 cm) in T<sub>4</sub> (Vermicompost @ 5 t ha<sup>-1</sup> along with foliar application of panchagavya @ 100 ppm) followed by treatment (T<sub>2</sub>) (56.12 cm and 80.01cm at 60 and 90 DAT). It was much minimum in T<sub>10</sub> control (48.89 cm). The highest number of lateral shoots (16.10 and 21.71 at 60 and 90 DAT), number of leaves per plant (98.30 and 154.14 at 60 and 90 DAT), leaf area (19.84 cm<sup>2</sup>), stem girth (5.31 cm) and inter nodal length (5.07 cm). The reason for the highest value in the best treatment (T<sub>4</sub>) could be due to combined application of organic and bio regulators. Organic farming has become obligatory or mandatory in recent times. It has become relevant to carry out more researches in order to come up with organic cultivation rates that would be comparable or superior to the expensive mineral fertilizer formulation in flower crop production. Similar results have been reported by Harshavardhan *et al.* (2016) in Carnation and Suseela *et al.*, (2016) in Tuberose (*Polianthes tuberosa* L.)

### Flower quality parameters

In flower quality parameters significantly higher in T<sub>4</sub> *viz.*, days taken first flowering (28.00 days), duration of flowering (65.00 days), number of flower per plant(19.00), single flower weight (9.01g) and flower head width (7.00 cm), chlorophyll content (11.13 CCI) and dry matter production (40.27 g plant<sup>-1</sup>). In the present study the earliness in flowering was recorded by the best treatment is due to the increased synthesis of cytokine and auxin in the root tissue by their enhanced activity due to the application of panchagavya and their simultaneous transport to the auxiliary buds would have resulted in a better mobilization of assimilates from the source to the sink at a faster rate which in turn, helped in the early transformation from the vegetative phase might have been influenced by the triggering of such metabolic process and narrowing of Carbon: Nitrogen ratio by the significant accumulation of carbohydrates. Furthermore, foliar spray of panchagavya facilitates greater uptake of nutrients which leads to the effective conversion of vegetative phase to flowering phase.

The soil and foliar application of organic nutrients and bio regulators significantly influenced the flowering and quality characters. Application of vermicompost has been found to effectively enhance the root formation, elongation of stem and production of bio-mass. More available plant nutrients and microbial activities and metabolism and also influence microbial population. Vermicompost usually contained more nutrient elements than chemical plant growth media and composts released nutrients gradually in available forms that could be readily taken up by the plants. Since it is very effective, it can be recommended to farmers as best organic manures. Performance of the crop with respect to flower quality parameters is much important for crop like Celosia as they are economically valued for their flowers. In general these parameters were significantly varied due to *Per se* and interaction effects of growth promoting treatments. In the present study, foliar application of bio regulators increases the flower and quality parameters. On the other hand panchagavya is a single organic input, which can act as

growth promoter and immunity booster. It has significant role in providing resistance to pest and diseases and in increasing the quality of flowers. Thus, results are in conformity with the findings of Yathindra *et al.* (2016) in Bird of paradise and Acharya and Dashora (2004) in African marigold. Application of organic nutrients and bio regulators also is a reason for increased chlorophyll content (CCI) and dry matter production (g plant<sup>-1</sup>). Application of vermicompost increased microbial biomass, humic materials and other plant growth influencing substances such as plant growth hormone, produced by microorganism during vermin composting and dehydronagnose activity in soil. This might be due to nitrogen is an essential part of nucleic acid this plays vital role in promoting the plant growth. It is obvious that phosphorus is a constituent of chlorophyll and is involved in many physiological process including cell division, development of carbohydrates, fats and proteins etc. This was reported by Bharathisingh *et al.*, (2007) and Dhanumjaya Rao *et al.* (2015) in Tuberose.

### Conclusion

Based on the present investigation it can be concluded that the treatment combination of Vermicompost @ 5 t ha<sup>-1</sup> along with foliar application of Panchagavya @ 100 ppm is best suited to grow Celosia (*Celosia cristata* L.) in open field condition to achieve good growth, profuse flowering and quality.

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