



## EFFECT OF PINCHING AND FOLIAR APPLICATION OF BIO REGULATORS ON GROWTH AND FLOWER YIELD OF GOMPHRENA (*GOMPHRENA GLOBOSA* L.)

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### Abstract

A field experiment was conducted in randomized block design at floriculture unit, Department of Horticulture, faculty of Agriculture, Annamalai university, Tamil Nadu to study the effect of pinching and foliar application of bio regulators on growth and flower yield of Gomphrena (*Gomphrena globosa* L.). The experiment comprised of 13 treatment combination pinching at 15, 20 and 25 days after transplanting along with foliar application of bio regulators Vermiwash @ 1:5 dilution, Panchagavya @ 3%, humic acid @1% and Seaweed extract @ 1:5 dilution and with Control (without pinching). Among the treatments, pinching at 15 days after transplanting along with Vermiwash @ 1:5 dilution foliar spray was significantly increased the growth, flower yield parameters viz., plant height (cm), number of primary branches, number of productive branches, stem girth (cm), inter nodal length (cm), number of leaves, chlorophyll content index (CCI) and dry matter content ( $\text{g plant}^{-1}$ ), Days taken for first flowering, number of flowers per plant, flower yield  $\text{plant}^{-1}$ (g) Flower yield per plot (g) and Flower yield per hectare ( $\text{t ha}^{-1}$ ). In general, pinching at 15 days after transplanting along with Vermiwash @ 1:5 dilution foliar spray could adjudged as the best treatment in performance of Gomphrena.

**Key words:** Gomphrena, Pinching, Vermiwash, Humic acid,

### Introduction

Gomphrena (Globe amaranth or Bachelor's button) botanically named as *Gomphrena globosa* belongs to the Amaranthaceae family. It is one of the important commercial flower crop grown for "loose flower" used for garland making. Though not fragrant, the flowers are very popular due to their attractive colour, light weight and good keeping quality. The plants are bushy in natural having flowers with round or oval like or button flowers are borne on upright, long and thin but strong stems above the foliage. They have colorful bracts with shade of white, orange, magenta, purple, violet, rose and pink. Among the various horticultural techniques pinching and balanced nutrients is the main factors which govern the quality and yield of gomphrena under any agro climatic conditions. Using to the above facts, it is on imperative need to ascertain and standardize the package of practices to improve the productivity of these crops. Pinching the terminal portion of shoots is removed early, emergence of side branches starts and more number of flowers are produced (Salve *et al.*, 2016). Application of organic nutrients viz., Vermiwash, Panchagavya, humic acid and Seaweed extract have a adverse effects on production of gomphrena. In light of the facts an attempt was made towards findings of appropriate pinching and with different foliar application of bio regulators on the performance of Ghomphrena.

### Materials and Methods

The present study on the effect of pinching and foliar application of bio regulators on growth and yield of Gomphrena (*Gomphrena globosa* L.) was carried out during the year 2017-2018. The experiment was conducted in the Floriculture Unit of Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Cuddalore District of Tamilnadu, India. As per the treatment details shown in the table 1, the experiment was laid out in Randomized Block Design with 13 treatments and replicated three times (Panse and Sukhatme 1985). Thirty days old (8-10 cm height) uniform healthy seedlings were transplanted in to the experimental field. The seedlings were planted in a uniform spacing of 30 cm x 45 cm in the plots. The inorganic nutrients (100:50:50 kg of NPK  $\text{ha}^{-1}$ ) recommended fertilizer dose were applied during the last ploughing. Pinching was done at 15, 20 and 25 DAT as per the treatment schedule. The terminal growing of meristem was pinched by removing 7 cm length of shoot from top. Foliar application of required quantity of Vermiwash @ 1:5 dilution, Panchagavya @ 3%, humic acid @1% and Seaweed extract @ 1:5 dilution given in two sprays starting from 30 and 60 days after transplanting. The observations are recorded on the selected five plants for each treatment in each replication and the mean data is statistically analyzed.

## Results and Discussion

Growth is multidimensional web of many parameters. It is phenotypic expression with respect to nutrient status, provided all other conditions are favorable. The per se effect of pinching along with foliar application of bio regulators a complementary or synergistic effect on growth and yield could be achieved. The data on growth and yield suggests that the growth parameters *viz.*, plant height, number of primary and productive branches, inter nodal length, number of leaves were significantly influenced by the pinching and foliar application of bio regulators. The maximum plant height (73.53 cm) was recorded in control (without pinching) and it seems to be reduction in plant height in pinched plants. The reduction of plant height in pinched plants is mainly due to elimination of apical dominance and diversion of the plant metabolites from vertical growth to horizontal growth and recording more number of branches per plant. As the apical dominance is removed usually the plant itself adjusts to encourage the growth of auxiliary buds to produce more number of flower bearing branches which in turn contributed for higher flower yield. Similar effects were reported by Baskaran and Abirami (2017) and Sunitha *et al.* (2007) in African marigold, Amita Chattopadhyay (2014) in Zinnia.

Highest values in number of primary branches (16.98), number of secondary branches (46.81), inter nodal length (12.24 cm), number of leaves (278.22). The increase in growth parameters with the application of Vermiwash and pinching operation. Pinching is one of the most suitable tactics for successful cultivation of Gomphrena due to pinching the apical meristem and young expanding leaves constitute a metabolic sink and auxin source that inhibit the outgrowth of lateral buds by improving the flower yield. Application of bio regulator seems to encourage the development of growth parameters is due to the probable reasons for increased morphological characters may be due to cumulative effect of foliar application of Vermiwash which ultimately lead to enhanced cell division and cell enlargement, promotion of protein synthesis coupled with higher dry matter accumulation in the plant. Similar results were reported by Samir Kumar Tamrakar *et al.* (2018) in Gladiolus and Nagalakshmi *et al.* (2010) in Anthurium. The internodal length, number of leaves per plant was significantly enhanced due to foliar spray of Vermiwash @ 1:5 dilution and pinching at 15 DAT. The effects of the pinching done at 15 days

after transplanting along with foliar application of Vermiwash @ 1:5 dilution were observed significantly superior to growth attributed parameters *viz.*, chlorophyll content index (CCI) and dry matter content ( $\text{g plant}^{-1}$ ) as for as in this experiment is concerned. This trend was in concurrence with findings of Sharma *et al.* (2014) in Okra, Singh *et al.* (2016) in Carnation and Sunitha *et al.* (2007) in African marigold.

In the present investigation, the flower characters *viz.*, Days taken for first flowering, number of flowers per plant, was significantly influenced by both pinching and foliar application of various concentrations of bio regulators. Days taken for first flowering (36.12 days) and maximum number of flowers per plant (185.37) might be due to production of more number of branches at early stage, which had sufficient time to accumulate reserve carbohydrates for proper flower bud differentiation. This might be due to synergetic effect of auxin with gibberellins generally obtained in short day plants. The delayed flowering seen in the treatment (T<sub>13</sub>) control at (58.48 days) in gomphrena might be due to lesser mitotic activity and preservation of biosynthesis of plant hormones.

Pinching was done 15 days after transplanting along with foliar application of Vermiwash @ 1:5 dilution recorded the highest Performance of the crop with respect to flower yield parameters is much economically valued for their flowers. Among all the treatments, maximum flower yield were found in T<sub>4</sub> with the values of 131.85 g of flower yield  $\text{plant}^{-1}$ , 1373.10 g of flower yield per plot and 13.73 t  $\text{ha}^{-1}$  of flower yield per hectare. followed by pinching was done at 15 days after transplanting along with foliar application of Panchagavya @ 3%. This may be due to the increased number of branches by the effect of pinching and foliar application of bio regulators which led to promote more number of flowers. The findings are in accordance with Ona *et al.* (2015) in Snowball Chrysanthemum, Aravind Kumar Verma *et al.* (2013) in Gerbera, Samir Kumar Tamrakar *et al.* (2018) in Gladiolus.

Based on the above facts and results of the present studies on the effect of pinching and foliar application of bio regulators on growth and yield of Gomphrena, it is revealed that pinching carried out at 15 days after transplanting along with foliar application of Vermiwash @ 1:5 dilution was found to be superior in good growth with maximum flower yield than other treatments.

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

Treatment details	
T <sub>1</sub>	Pinching at 15 DAT + Panchagavya @ 3% foliar spray
T <sub>2</sub>	Pinching at 20 DAT + Panchagavya @ 3% foliar spray
T <sub>3</sub>	Pinching at 25 DAT + Panchagavya @ 3% foliar spray
T <sub>4</sub>	Pinching at 15 DAT + Vermiwash @ 1:5 dilution foliar spray
T <sub>5</sub>	Pinching at 20 DAT + Vermiwash @ 1:5 dilution foliar spray
T <sub>6</sub>	Pinching at 25 DAT + Vermiwash @ 1:5 dilution foliar spray
T <sub>7</sub>	Pinching at 15 DAT + Humic acid @ 1% foliar spray
T <sub>8</sub>	Pinching at 20 DAT + Humic acid @ 1% foliar spray
T <sub>9</sub>	Pinching at 25 DAT + Humic acid @ 1% foliar spray
T <sub>10</sub>	Pinching at 15 DAT + Seaweed Extract @ 1:5 dilution foliar spray
T <sub>11</sub>	Pinching at 20 DAT + Seaweed Extract @ 1:5 dilution foliar spray
T <sub>12</sub>	Pinching at 25 DAT + Seaweed Extract @ 1:5 dilution foliar spray
T <sub>13</sub>	Control

**Table 2:** Effect of pinching and foliar application of bio regulators on growth parameters of Gomphrena (*Gomphrena globosa* L.)

Treatments	Plant height (cm)	No. of branches	No. of Productive branches	Stem girth (cm)	Inter nodal length (cm)	No. of leaves	Leaf area (cm <sup>2</sup> )	Chlorophyll Content Index (CCI)	Dry matter Content (g plant <sup>-1</sup> )
T <sub>1</sub>	69.91	16.45	24.72	5.81	11.39	133.79	31.89	30.65	43.09
T <sub>2</sub>	59.84	14.92	20.42	4.96	10.50	119.29	29.14	25.34	37.33
T <sub>3</sub>	52.61	13.66	17.28	4.32	9.83	107.20	27.15	21.54	31.55
T <sub>4</sub>	73.53	16.98	26.19	6.10	11.66	138.61	32.83	32.43	45.03
T <sub>5</sub>	59.10	14.69	20.19	4.86	10.39	116.89	28.99	25.09	35.41
T <sub>6</sub>	56.22	14.18	18.73	4.59	10.10	112.04	28.06	23.31	33.47
T <sub>7</sub>	66.32	15.94	23.26	5.53	11.09	128.96	30.98	28.88	41.17
T <sub>8</sub>	48.99	13.15	15.84	4.06	9.54	102.38	26.22	19.78	29.64
T <sub>9</sub>	41.77	12.12	12.91	3.51	8.98	92.70	24.38	16.25	25.80
T <sub>10</sub>	62.70	15.44	21.82	5.26	10.80	124.12	30.07	27.12	39.26
T <sub>11</sub>	45.39	12.62	14.37	3.79	9.27	97.55	25.31	18.03	27.71
T <sub>12</sub>	38.14	11.60	11.47	3.23	8.71	87.87	23.47	14.48	23.88
T <sub>13</sub>	77.14	11.07	10.02	2.97	8.42	83.05	22.53	12.70	21.94
S.Ed	1.79	0.24	0.71	0.12	0.13	2.40	0.45	0.87	0.95
CD(P=0.05)	3.59	0.49	1.43	0.25	0.26	4.81	0.90	1.74	1.90

**Table 3:** Effect of pinching and foliar application of bio regulators on flower yield parameters of Gomphrene (*Gomphrena globosa* L.)

Treatments	Days taken for first flowering	Number of flowers plant <sup>-1</sup>	Flower yield (g plant <sup>-1</sup> )	Flower yield (g plot <sup>-1</sup> )	Flower yield (t ha <sup>-1</sup> )
T <sub>1</sub>	37.99	177.75	125.29	1316.50	13.19
T <sub>2</sub>	43.57	154.83	105.59	1146.76	11.51
T <sub>3</sub>	49.15	131.94	85.87	976.99	9.86
T <sub>4</sub>	36.12	185.37	131.85	1373.10	13.73
T <sub>5</sub>	45.44	147.21	99.00	1090.17	10.97
T <sub>6</sub>	47.30	139.58	92.44	1033.59	10.42
T <sub>7</sub>	39.85	170.12	118.73	1259.91	12.64
T <sub>8</sub>	51.02	124.29	79.29	920.41	9.30
T <sub>9</sub>	54.75	109.00	66.14	807.24	8.19
T <sub>10</sub>	41.72	162.48	112.17	1203.33	12.08
T <sub>11</sub>	52.88	116.65	72.70	863.84	8.73
T <sub>12</sub>	56.61	101.36	59.57	750.65	7.62
T <sub>13</sub>	58.48	93.71	52.98	694.05	7.05
S.Ed	0.91	3.80	3.27	28.28	-
CD(P=0.05)	1.83	7.61	6.55	56.56	-

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