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Effect of organic manures and biostimulants on flowering and flower yield of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow

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Abstract
The present investigation entitled "Effect of Organic manures and Biostimulants on growth and flowering of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow." was carried out at PG Research Block, College of Horticulture, Mojerla during 2019 to 2020. The experiment was laid out in Factorial Randomized Block Design with 18 treatments and two replications. The treatments consists of two factors *i.e*. Organic manures *viz*., F_1-FYM (2 kg/sqm), F_2 - Vermicompost (0.5 kg/sqm), F_3 – Neem cake (0.3 kg/sqm and Biostimulants *viz*., B_1 - Humic acid 0.2%, B_2 - Humic acid 0.4%, B_3 - Biovita (Seaweed extract) 0.2%, B_4 - Biovita (Seaweed extract) 0.4%, B_5 - Nitrobenzene 0.2% and B_6 - Nitrobenzene 0.4%. Among the organic manures, Neem cake at 0.3 kg/sqm (F_3) recorded the best results in floral parameters like minimum days taken for first flower bud intiation (59.46 days) and days taken for 50 percent flowering(84.60 days), duration of flowering(130.38 days), no. of flowers per plant (76.64), flower yield per plant (247.26 g), flower yield per plot (2.97 kg), flower yield per hectare (14.89 t) followed by Vermicompost at 0.5 kg/sqm (F_2). Among the biostimulants, Biovita 0.4% (B_4) recorded the best values in terms of minimum days taken for flower bud intiation (54.70 days) and 50 percent flowering (81.31 days), duration of flowering (137.59), no. of flowers per plant (77.45), flower yield per plant (265.03 g), flower yield per plot(3.18 kg), flower yield per hectare(15.90 t) followed by Biovita 0.2% (B_3). The treatment of Neem cake at 0.3 kg/sqm + Biovita 0.4% (F_3B_4) recorded the minimum days taken for first flower bud initiation (51.23 days) and days taken for 50 percent flowering (77.03 days) followed by F_3B_3 (Neem cake at 0.3 kg/sqm + Biovita 0.2%). Further, other floral parameters like duration of flowering (139.79 days), no. of flowers per plant (80.25), flower yield per plant (279.87 g), flower yield per plot (3.36 kg), flower yield per hectare (16.79 t) was also highest with the combination of Neem cake at 0.3 kg/sqm + Biovita 0.4% (F_3B_4) followed by F_3B_3 (Neem cake at 0.3 kg/sqm + Biovita 0.2%).

Keywords: Gaillardia, biovita, nitrobenzene, humic acid, neem cake, vermicompost, FYM

Introduction
Gaillardia (*Gaillardia pulchella* Foug.) is well known as Indian blanket flower or fire wheel or sundance in the family Asteraceae. It is diploid (2n=36) in nature and is one of the hardiest summer annuals grown on variety of soils in different climatic conditions. It is native to northern Mexico and the southern and central United States and the genus name Gaillardia was named in honour of Gaillardia de Marentoneau, a French patron of botany. Genus Gaillardia includes about 23 species but only three are commonly known, these include *Gaillardia pulchella* which is an annual, while *Gaillardia grandiflora* and *Gaillardia aristata* are perennial plants.

Gaillardia due to its hardy nature adaptability to soil and climatic factors and its performance under summer condition it is considered as an alternative to chrysanthemum during summer season, where other flower crops will not grow under these conditions in most parts of the country.

It is gaining popularity among the farmers now-a-days due to its sun loving nature and higher production in summer months. It peaks its production from April to June and fetches remunerative prices to farmers. Hence, the area under Gaillardia as commercial crop is increasing year by year and requirement for new advanced production strategies is gaining more significance to get qualitative and quantitative yields.

At present, wide spread requirement for eco-friendly agriculture for the production of quality flowers is in high demand. Efforts are underway for the sustainable way of crop production with organic fertilizers and biostimulants from natural resources to enhance the production of commercially important flower crops.

Biostimulants helps the farming community to negate the effects of unfavourable weather conditions and make profits with higher and quality produce. Further, use of biostimulants can drastically reduce the dependence on chemical fertilizers and pesticides and provides a sustainable alternative to practice farming without causing environmental pollution.

Further, Biostimulants enhances soil carbon pool for getting a dual purpose of striking atmospheric CO_2 in the form of soil organic carbon, so as to manage the increasing CO_2 levels within the atmosphere, while simultaneously promoting soil carbon build up for better soil health in long term. Thus, biostimulants application in combination with recycled farm waste derivatives will not only ensure relatively substainable yields in stress areas but also potentially improve the ecosystem and secure environmental sustainability.

Addition of organic manures to soil make easy uptake of nutrients when crop required comparing to chemical fertilizers. Mineral nutrition does play an important role in influencing the quality of crops and it is fact that the soil health deteriorates due to continuous use of chemical fertilizers. The deterioration of soil fertility through continuous use of chemical fertilizers and increase production is of main concern. Duration of flower in the field was improved through using organic manures. Neem cake is an excellent source of organic amendment and can replace not only the use of chemical fertilizers but also replace the use of pesticides by suppressing pathogens and insects.

Considering the above facts, the present study was conducted to assess the 'Effect of organic manures and biostimulants on flowering and flower yield of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow' was carried out.

Materials and Methods

The present investigation entitled "Effect of organic manures and bio stimulants on growth and flowering of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow." was carried out during the Rabi season of the year 2019-2020 at College of Horticulture, Mojerla, Sri Konda Laxman Telangana State Horticultural University. The experiment was laid out with factorial randomized block design with 18 treatments. The treatment details are T_1-F_1B_1(FYM 2kg/sqm + Humic acid 0.2%), T_2-F_1B_2(FYM 2kg/sqm+ Humic acid 0.4%),T_3-F_2B_1(Vermicompost 0.5kg/sqm + Humic acid 0.2%),T_4-F_2B_2(Vermicompost 0.5kg/sqm + Humic acid 0.4%),T_5-F_3B_1(Neem cake0.3kg/sqm + Humic acid 0.2%),T_6-F_3B_2(0 acid 0.4%),T_7-F_1B_3(FYM 2kg/sqm + Biovita 0.2%),T_8-F_1B_4(FYM 2kg/sqm + Biovita 0.4%),T_9-F_2B_3(Vermicompost 0.5kg/sqm + Biovita 0.2%),T_{10}-F_2B_4(Vermicompost 0.5kg/sqm + Biovita 0.4%),T_{11}-F_3B_3(Neem cake 0.3kg/sqm + Biovita 0.2%),T_{12}-F_3B_4(Neem cake 0.3kg/sqm+Biovita 0.4%),T_{13}-F_1B_5(FYM 2kg/sqm + Nitrobenzene 0.2%),T_{14}-F_1B_6(FYM 2kg/sqm + Nitrobenzene 0.4%),T_{15}-F_2B_5(Vermicompost 0.5kg/sqm + Nitrobenzene 0.2%),T_{16}-F_2B_6(Vermicompost 0.5kg/sqm + Nitrobenzene 0.4%),T_{17}-F_3B_5(Neem cake 0.3kg/sqm + Nitrobenzene 0.2%),T_{18}-F_3B_6(Neem cake 0.3kg/sqm + Nitrobenzene 0.4%). The experiment was carried out with the Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow and was procured from Floricultural Research Station, Rajendranagar, Hyderabad.

Humic acid, Biovita (sea weed extract) and Nitrobenzene chemical solutions each of 0.2% and 0.4% were prepared by dissolving 0.2 ml and 0.4 ml of solution in 100 ml of distilled water. Biostimulants were sprayed on standing crop as foliar application in three intervals *viz.*, 30, 45 and 60 days after transplanting.

The soil was ploughed to fine tilth and nursery bed of 15 cm height, 90 cm width and 2.5 m length was prepared by mixing required quantity of farm yard manure. In order to get the healthy seedlings, sterilization of the nursery bed was done with drenching of Copper oxy chloride at 3 g per litre.

The entire experimental land was divided and raised beds were prepared measuring 2 x 1.0 with a height of 15 cm and spaced at 40 cm between the beds. The experiment was laid out in folded FRBD replicated twice.

Organic manures *viz.*, well decomposed farm yard manure at 2 kg/sqm and vermicompost at 0.5 kg/sqm, Neem cake at 0.3 kg/sqm were incorporated in to the respective experimental plots uniformly as treatment application.

The seedlings 45 days old with 5 to 6 leaves were transplanted on 1st week of January month 2020 in the main field during evening hours with a spacing of 40 x 30 cm followed by light irrigation. Before transplanting the seedlings were treated with carbendazim solution (1.5 g/litre).

The observations were recorded from five randomly selected plants and statistically analyzed for different flowering parameters like days taken for first flower bud appearance, days taken for 50 percent flowering, no. of flowers per plant, flower yield per plant(g) flower yield per plot(kg)flower yield per hectare(t).

Results and Discussion

Number of days taken for first flower bud initiation (days)

The data on number of days taken for first flower bud intiation as affected by organic manures, biostimulants and their interation effects are presented in the Table 1.

Among the biostimulant treatments, B_4 (Biovita 0.4%) recorded significantly minimum number of days taken for first flower bud appearance (54.70 days) followed by B_3 (Biovita 0.2%) (56.37 days), whereas it was significantly maximum in B_1 (Humic acid 0.2%) (67.92 days). which might be due to the ability of Biovita to benefit the plant to receive directly naturally balanced nutrients (major and minor) and plant growth substances because of its unique composition lead to early bud break. Hence, early production of florigen and other flower inducing substances in Biovita treated plant resulted in early bud initiation. These results are in consonance with the findings of Shinde *et al.* (2010) [6] in Marigold, Bhargavi *et al*. (2018) [2] in Chrysanthemum and Pruthvi *et al*. (2021) [5] in Orchids.

Organic manures also exerted significant difference on number of days taken to first flower bud appearance. Among them, F_3 (Neem cake 0.3 kg/sqm) recorded significantly minimum days to flower bud appearance (59.46 days). Whereas, maximum days was recorded in F_1 (FYM 2 kg/sqm) (63.40 days). The earliness in flowering by Neem cake might be due to its NPK content and also micro nutrients and amino acids. This might have promoted the translocation of phytohormones to shoots and resulted in early flower initiation.

The interaction between organic manures and biostimulants

was found to be significant. Minimum number of days taken to first flower bud appearance was recorded in F_3B_4 (Neem cake 0.3 kg/sqm + Biovita 0.4%) (51.23 days) followed by F_3B_3 (Neem cake 0.3 kg/sqm + Biovita 0.2%) (53.21 days). Whereas, the significantly maximum no. of days was recorded in the F_1B_1 (FYM 2 kg/sqm + Humic acid 0.2%) (70.18 days).

Number of days taken for 50 percent flowering (days)

The data pertaining to number of days taken to 50 percent flowering as influenced by the organic manures, biostimulants and their interaction effects are presented in the Table 2.

Among the biostimulants, B_4 (Biovita 0.4%) recorded significantly minimum number of days taken to 50percent flowering (81.31 days), followed by B_3 (Biovita 0.2%) (81.92 days). Whereas B_1 (Humic acid 0.2%) registered significantly maximum days (93.70 days).

Significant differences were observed among the organic manure treatments on number of days taken to 50 percent flowering. Among them, F_3 (Neem cake 0.3 kg/sqm) recorded significantly minimum number of days (84.60 days), whereas F_1 (FYM 2 kg/sqm) registered significantly maximum days (88.95 days).

The interaction effect was significant between organic manures and biostimulants on number of days taken to 50 percent flowering. The treatment F_3B_2 (Neem cake 0.3 kg/sqm + Biovita 0.4%) recorded less number of days taken to 50 percent flowering (77.03 days) followed by F_3B_3 (Neem cake 0.3 kg/sqm + Biovita 0.2%) (78.59 days). Whereas, F_1B_1 (FYM 2 kg/sqm + Humic acid 0.2%) registered the maximum days (95.84 days).

The least number of days taken to 50 percent flowering was recorded in Biovita as the same treatment registered minimum number of days taken for first flower bud appearance as compared to rest of the biostimulants and their concentrations. Likewise, less number of days taken for 50 percent flowering was recorded in Neem cake is due to same treatment recorded the lowest number of days taken for first flower bud appearance over other organic manures.

Duration of flowering (days)

The data on duration of flowering as affected by the organic manures, biostimulants and their interaction effects are presented in the Table 3.

The influence of organic manures showed significant difference on duration of flowering. Among the organic manures F_3 (Neem cake 0.3 kg/sqm) recorded significantly longest duration of flowering (130.38 days) followed by F_2 (Vermicompost 0.5 kg/sqm) (128.23 days), whereas it was significantly lowest in F_1 (FYM 2 kg/sqm) (124.98 days).

The biostimulants treatment also exerted significant difference on duration of flowering. Among them B_4 (Biovita 0.4%) recorded significantly longest duration of flowering (137.59 days), whereas B_1 (Humic acid 0.2%) recorded lowest value (117.74 days).

The interaction between organic manures and biostimulants was found to be significant for this parameter. Maximum duration of flowering was recorded in F_3B_4 (Neem cake 0.3 kg/sqm + Biovita 0.4%) (139.79 days) followed by F_3B_3 (Neem cake 0.3 kg/sqm + Biovita 0.2%) (139.55 days), whereas it was significantly minimum in F_1B_1 (FYM 2 kg/sqm + Humic acid 0.2%) (115.85 days).

Number of flowers per plant

The results related to no. of flowers per plant as affected by organic manures, biostimulants and their intraction effects are presented in the Table 4.

All organic manures differed significantly for this parameter. Among the organic manures, F_3 (Neem cake 0.3 kg/sqm) (76.64) recorded maximum no. of flowers per plant followed by F_2 (Vermicompost 0.5 kg/sqm) (73.64). The plants treated with FYM (69.15) resulted in lowest no. of flowers per plant.

Significant difference was observed among the biostimulants on no. of flowers per plant. Among biostimulant treatments, B_4 (Biovita 0.4%) recorded the highest no. of flowers per plant (77.45) followed by B_3 (Biovita 0.2%) (74.78), while it was minimum in B_1 (Humic acid 0.2%) (71.10).

The interaction between organic manures and biostimulants were found to be significant for this parameter. The maximum no. of flowers per plant was recorded in F_3B_4 (Neem cake 0.3 kg/sqm + Biovita 0.4%) (80.25) followed by F_2B_4 (Vermicompost 0.5 kg/sqm + Biovita 0.4%) (78.65). Whereas, minimum no. of flowers per plant was noticed in F_1B_1 (FYM 2 kg/sqm + Humic acid 0.2%) (65.95).

Number of flowers/plant increased with the Biovita 0.4% may be due to the increased plant height and plant spread increased biomass resulted in more photosynthates accumulation and resulted in more yield. These results are in line with those obtained by Tartil *et al.* (2016) [7] in marigold.

Flower yield per plant (g)

The results related to flower yield per plant as influenced by organic manures, biostimulants and their interaction effects are presented in the Table 5.

All organic manure treatments differed significantly with respect to flower yield per plant. Among them, F_3 (Neem cake 0.3 kg/sqm) recorded highest flower yield per plant (247.26 g) followed by F_2 (Vermicompost 0.5 kg/sqm) (237.18 g).

Significant difference was observed among the biostimulant treatments for flower yield per plant. Among the treatments, B_4 (Biovita 0.4%) registered the significantly maximum flower yield per plant (265.03 g) followed by B_3 (Biovita 0.2%) (253.55 g), whereas it was recorded minimum in B_1 (Humic acid 0.2%) (215.18 g).

The interaction between organic manures and biostimulants on flower yield per plant was found to be significant. Among the treatment combinations, F_3B_4 (Neem cake 0.3 kg/sqm + Biovita 0.4%) showed the maximum flower yield per plant (279.87 g) followed by F_3B_3 (Neem cake 0.3 kg/sqm + Biovita 0.2%) (266.96 g). While it was minimum in F_1B_1 (FYM 2 kg/sqm + Humic acid 0.2%) (208.75 g). The highest flower yield per plant was recorded in the Neem cake and Biovita treatment is due to the same treatment recorded the more no. of flowers per plant as compared to other treatments.

Flower yield per plot (kg)

The data pertaining to flower yield per plot as affected by the organic manures, biostimulants and their interaction effects are presented in the Table 6.

There was significant difference observed due to the organic manures on flower yield per plot. The maximum flower yield per plot was recorded in F_3 (Neem cake 0.3 kg/sqm) (2.97 kg) significantly followed by F_2 (Vermicompost 0.5 kg/sqm) (2.84 kg).

Similarly, biostimulants and their concentrations also exhibited significant differences with respect to flower yield per plot. Significantly higher yield per plot was recorded in B_4 (Biovita 0.4%) (3.18 kg). Whereas, it was significantly lower in B_1 (Humic acid 0.2%) (2.60 kg).

The interaction effect was also found to be significant between organic manures and biostimulants on flower yield per plot. The treatment F_3B_4 (Neem cake 0.3 kg/sqm + Biovita 0.4%) recorded the highest yield per plot (3.36 kg) followed by F_3B_3 (Neem cake 0.3 kg/sqm + Biovita 0.2%) (3.23 kg). Whereas, it was lowest in F_1B_1 (FYM 2 kg/sqm + Humic acid 0.2%) (2.55 kg).

Flower yield per hectare (t)

Flower yield per hectare as affected by the organic manures and biostimulants and their interaction effects are presented in the Table 7.

Significant difference was observed among the organic manure treatments for this parameter. The treatment, F_3– Neem cake (0.3 kg/sqm) recorded the maximum flower yield per hectare (14.89 t) followed by F_2 – Vermicompost (0.5 kg/sqm) (14.21 t).

Biostimulants also exerted significant difference on this parameter. Significantly maximum flower yield per hectare was recorded in B_4 - Biovita (0.4%) (15.90 t) minimum was registered in B_1 - Humic acid (0.2%) (12.93 t).

The interaction effect between organic manures and biostimulants on flower yield per hectare indicated that the treatment F_3B_4 (Neem cake 0.3 kg/sqm + Biovita 0.4%) recorded the highest flower yield per hectare (16.79 t) followed by F_3B_3 (Neem cake 0.3 kg/sqm + Biovita 0.2%) (16.42 t). Whereas, F_1B_1 (FYM 2 kg/sqm + Humic acid 0.2%) registered the lowest flower yield per hectare (12.60 t).

The highest flower yield per hectare was recorded in F_3 (Neem cake 0.3 kg/sqm) which might be due to the fact that the same treatment recorded the maximum flower yield per plant and flower yield per plot as compared to other treatments. Further, highest flower yield per hectare was recorded in B_4 (Biovita 0.4%) as the same treatment recorded the highest flower yield per plot over other biostimulants and their concentrations. Similar results were also reported by Arti *et al*. (2021) [1] in Gaillardia, Pruthvi *et al.* (2017) [4] in Chrysanthemum and Praveen *et al*. (2021) [3] Floribunda Rose.

Table 1: Effect of organic manures and biostimulants on no. of days taken for flower bud initiation (days) of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow.

Biostimulants (BS)	Organic manures(OM)			Mean
	F_1 – FYM (2 kg/sqm)	F_2 –Vermicompost (0.5 kg/sqm)	F_3 - Neem cake (0.3 kg/sqm)	
B_1 - Humic acid (0.2%)	70.18	67.61	65.99	67.92 [f]
B_2 - Humic acid (0.4%)	68.16	65.10	65.11	66.12 [e]
B_3 - Biovita (0.2%)	59.58	56.33	53.21	56.37 [b]
B_4 - Biovita (0.4%)	58.18	54.69	51.23	54.70 [a]
B_5 - Nitrobenzene (0.2%)	63.18	62.51	61.61	62.43 [d]
B_6 - Nitrobenzene (0.4%)	61.11	60.82	59.65	60.53 [c]
Mean	63.40 [c]	61.18 [b]	59.46 [a]	
Factors	SE (m) +		CD (5%)	
OM	0.04		0.12	
BS	0.08		0.24	
Factor F X B	0.24		0.74	

Table 2: Effect of organic manures and biostimulants on no. of days taken for 50 percent flowering (days) of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow.

Biostimulants (BS)	Organic manures(OM)			Mean
	F_1 – FYM (2 kg/sqm)	F_2 –Vermicompost (0.5 kg/sqm)	F_3 - Neem cake (0.3 kg/sqm)	
B_1 - Humic acid (0.2%)	95.84	91.77	93.49	93.70 [f]
B_2 - Humic acid (0.4%)	94.32	90.67	84.61	89.59 [e]
B_3 - Biovita (0.2%)	84.73	82.46	78.59	81.92 [b]
B_4 - Biovita (0.4%)	84.50	82.42	77.03	81.31 [a]
B_5 - Nitrobenzene (0.2%)	90.57	89.06	87.38	89.00 [d]
B_6 - Nitrobenzene (0.4%)	83.74	89.60	86.50	86.61 [c]
Mean	88.95 [c]	87.66 [b]	84.60 [a]	
Factors	SE (m) +		CD (5%)	
OM	0.07		0.22	
BS	0.15		0.44	
Factor F X B	0.45		1.34	

Table 3: Effect of organic manures and biostimulants on duration of flowering (days) of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow.

Biostimulants (BS)	Organic manures(OM)			Mean
	F_1 – FYM (2 kg/sqm)	F_2 –Vermicompost (0.5 kg/sqm)	F_3 - Neem cake (0.3kg/sqm)	
B_1 - Humic acid (0.2%)	115.85	117.53	119.85	117.74 [f]
B_2 - Humic acid (0.4%)	116.83	118.89	126.98	120.90 [e]
B_3 - Biovita (0.2%)	133.66	137.05	139.55	136.75 [b]
B_4 - Biovita (0.4%)	134.87	138.11	139.79	137.59 [a]
B_5 - Nitrobenzene (0.2%)	123.04	127.51	123.77	124.77 [d]
B_6 - Nitrobenzene (0.4%)	125.64	130.28	132.33	129.42 [c]

Mean	124.98 [c]	128.23 [b]	130.38 [a]	
Factors	SE (m) +		CD (5%)	
OM	0.11		0.34	
BS	0.23		0.69	
Factor F X B	0.69		2.07	

Table 4: Effect of organic manures and biostimulants on no. of flowers per plant of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow.

Biostimulants (BS)	**Organic manures(OM)**			**Mean**
	F_1 – FYM (2 kg/sqm)	**F_2 –Vermicompost (0.5 kg/sqm)**	**F_3 - Neem cake (0.3 kg/sqm)**	
B_1 - Humic acid (0.2%)	65.95	71.05	76.30	71.10 [f]
B_2 - Humic acid (0.4%)	66.48	73.00	74.85	71.44 [e]
B_3 - Biovita (0.2%)	70.70	75.45	78.20	74.78 [b]
B_4 - Biovita (0.4%)	73.45	78.65	80.25	77.45 [a]
B_5 - Nitrobenzene (0.2%)	67.50	71.50	75.40	71.47 [d]
B_6 - Nitrobenzene (0.4%)	70.80	72.20	74.85	72.62 [c]
Mean	69.15 [c]	73.64 [b]	76.64 [a]	
Factors	SE (m) +		CD (5%)	
OM	0.07		0.21	
BS	0.14		0.42	
Factor F X B	0.42		1.26	

Table 5: Effect of organic manures and biostimulants on flower yield per plant (g) of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow.

Biostimulants (BS)	**Organic manures(OM)**			**Mean**
	F_1 – FYM (2 kg/sqm)	**F_2 –Vermicompost (0.5 kg/sqm)**	**F_3 - Neem cake (0.3 kg/sqm)**	
B_1 - Humic acid (0.2%)	208.75	213.33	223.48	215.18 [f]
B_2 - Humic acid (0.4%)	219.06	226.18	232.92	226.05 [e]
B_3 - Biovita (0.2%)	242.13	251.56	266.96	253.55 [b]
B_4 - Biovita (0.4%)	252.89	262.32	279.87	265.03 [a]
B_5 - Nitrobenzene (0.2%)	226.96	234.12	235.09	232.06 [d]
B_6 - Nitrobenzene (0.4%)	225.25	235.58	245.26	235.36 [c]
Mean	229.17 [c]	237.18 [b]	247.26 [a]	
Factors	SE (m) +		CD (5%)	
OM	0.29		0.87	
BS	0.58		1.74	
Factor F X B	1.75		5.22	

Table 6: Effect of organic manures and biostimulants on flower yield per plot (kg) of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow.

Biostimulants (BS)	**Organic manures (OM)**			**Mean**
	F_1 – FYM (2 kg/sqm)	**F_2 –Vermicompost (0.5 kg/sqm)**	**F_3 - Neem cake (0.3 kg/sqm)**	
B_1 - Humic acid (0.2%)	2.55	2.56	2.68	2.60 [f]
B_2 - Humic acid (0.4%)	2.65	2.70	2.79	2.71 [e]
B_3 - Biovita (0.2%)	2.91	3.02	3.23	3.05 [b]
B_4 - Biovita (0.4%)	3.04	3.15	3.36	3.18 [a]
B_5 - Nitrobenzene (0.2%)	2.72	2.78	2.82	2.78 [d]
B_6 - Nitrobenzene (0.4%)	2.70	2.82	2.95	2.82 [c]
Mean	2.77 [c]	2.84 [b]	2.97 [a]	
Factors	SE (m) +		CD (5%)	
OM	0.003		0.01	
BS	0.007		0.02	
Factor F X B	0.023		0.07	

Table 7: Effect of organic manures and biostimulants on flower yield per hectare (t) of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow.

Biostimulants (BS)	**Organic manures (OM)**			**Mean**
	F_1 – FYM (2 kg/sqm)	**F_2 –Vermicompost (0.5 kg/sqm)**	**F_3 - Neem cake (0.3 kg/sqm)**	
B_1 - Humic acid (0.2%)	12.60	12.80	13.38	12.93 [f]
B_2 - Humic acid (0.4%)	13.32	13.48	13.95	13.58 [e]
B_3 - Biovita (0.2%)	14.53	15.09	16.42	15.35 [b]
B_4 - Biovita (0.4%)	15.17	15.74	16.79	15.90 [a]
B_5 - Nitrobenzene (0.2%)	13.54	14.10	14.08	13.91 [d]
B_6 - Nitrobenzene (0.4%)	13.52	14.07	14.72	14.10 [c]
Mean	13.78 [c]	14.21 [b]	14.89 [a]	
Factors	SE (m) +		CD (5%)	
OM	0.02		0.06	
BS	0.04		0.13	
Factor F X B	0.13		0.41	

Conclusion

It can be concluded from the present investigation that, effect of organic manures and biostimulants significantly influenced flowering and flower yield of Gaillardia (*Gaillardia pulchella* Foug.) cv. Local Yellow. The treatment of Neem cake at 0.3 kg/sqm + Biovita 0.4% (F_3B_4) recorded the best results in terms of minimum days taken for first flower bud initiation (51.23 days) and days taken for 50 percent flowering (77.03 days), duration of flowering (139.79 days), no. of flowers per plant (80.25), flower yield per plant (279.87 g), flower yield per plot (3.36 kg), flower yield per hectare (16.79 t) followed by F_3B_3 (Neem cake at 0.3 kg/sqm + Biovita 0.2%).

References

1. Arti A, Kaushik RA, Lakhawat SS, Bairwa HL, Arvind V. Effect of integrated nutrient management on growth, flowering and yield of Gaillardia. International Journal of Current Microbiology and Applied Sciences. 2021;10(01):3461-3468.
2. Bhargavi SP, Naik B, Chandrasekhar HSY, Ganapathi M, Kantharaj Y. Efficacy of biostimulants on morphology, flowering and yield of chrysanthemum (*Dendranthema grandiflora*) cv. Kolar local under fan and pad greenhouse. International Journal of Chemical Studies. 2018;6(5):1831-1833.
3. Praveen TM, Patil SR, Patil BC, Seetharamu GK, Rudresh DL, Pavankumar P, *et al*. Influence of biostimulants on growth and yield of floribunda rose cv. Mirabel. Journal of Pharmacognosy Phytochemistry. 2021;10(1):2701-2705.
4. Pruthvi PH, Hemla BN, Shivaprasad M, Beeralingappa. Effect of biostimulants on morphology, flowering and yield of chrysanthemum (*Dendranthema grandiflora* Tzvelev.) cv. Kolar local under naturally ventilated polyhouse. An International Quarterly Journal of Life Sciences. 2017;12(1):273-276.
5. Pruthvi PH, Patil BC, Kulkarni MS, Hegde NK, Laxman R, Shiragur M, *et al*. Efficacy of biostimulants on growth and flowering of Dendrobium orchid (*Dendrobium nobile* Lindl.) var. Sonia-17 under protected cultivation. The Pharma Innovation Journal. 2021;10(10):1189-1191.
6. Shinde D, Naik M, Bhosale A. Effect of Bioenzymes on flowering, yield and vase life of marigold (*Tagetes erecta* L.). Asian J Hort. 2010;5(2):420-422.
7. Tartil, Emam M, Hosni AM, Ibrahim AK, Hewidy M. Response of pot marigold (*Calendula officinalis* L.) to different application methods and concentrations of seaweed extract. The Journal of Agricultural Science. 2016;24(2):581-591.