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Effect of various organic growing media on growth and yield of gaillardia (*Gaillardia pulchella* FOUG) at Dehradun valley of Uttarakhand

Jamba R Marak, Suneeta Singh and Anil Kumar Saxena

Abstract
A field experiment was planned and conducted during 2021-22 at Horticulture Research Block, School of Agriculture Sciences, SGRR University, Dehradun, Uttarakhand to investigate the "Effect of various organic growing media on growth and yield of Gaillardia (*Gaillardia pulchella* Foug) at Dehradun valley of Uttarakhand". The experiment was laid out in randomized block design with three replications and ten treatments. The treatments comprised following levels of different growing media with different concentrations viz. T_1 (Control), T_2 (vermicompost + soil @3:1), T_3 (FYM + soil @3:1), T_4 (cocopeat + soil @3:1), T_5 (leave manure + soil @3:1) T_6 (cow urine + soil @20%:1), T_7 (Vermicompost + Farmyard Manure + Cocopeat + Soil @1:1:1:1), T_8 (Vermicompost + Farmyard Manure + Cow Urine + Soil @1:1:20%:1) and T_9 (Vermicompost + FYM + leave manure + soil @1:1:1:1) and T_{10} (Vermicompost + Farmyard Manure + Cocopeat + Cow Urine + Leaf Manure + Soil @1:1:1:20%:1:1). The observations on various attributes *viz.* growth and yield were recorded at different harvest intervals. The results showed that treatment T_2 (Soil + vermicompost @3:1) found to be most effective in terms of growth characters such as Plant height (33.35cm), Leaf Length (14.59cm), Leaf Width (4.39cm), Stem diameter (2.21cm), Plant spread N-S (35.86cm) and W-E (41.62cm). The maximum flower yield (0.574 kg/plot) and (57.4q/ha^{-1}) was noted in the treatment T_{10}.

Keywords: Growing media, gaillardia, FYM, vermicompost, cow urine, plant spread

Introduction
Gaillardia (*Gaillardia pulchella* Foug) also known as blanket flower is one of the popular flower crops of India grown on commercial scale as loose flowers and grown in gardens all-round the year mainly in summer and rainy season. Gaillardia is a genus of flowering plants in the family of Asteraceae, native to north and south America. It was named after M. Gaillard de charentonneau, an enthusiastic botanist. Many cultivars of Gaillardia have been bred for ornamental use. These are annual or perennial herbs or subshrubs; the stem is usually branching and erect to a maximum height around 80 cm. The leaves are alternately arranged. Some texa have only basal leaves which are varying in shapes. The inflorescence is a solitary flower head. The head can have 15 or more ray florets, they can be almost any shades of yellow, orange, red, purplish, brown, white, etc. There are many tubular disc florets at the centre of the head in the similar range of colour and usually tip with hairs. The fruits usually have pappus of scales. Gaillardia grows well in any kind of garden soil and it can also tolerate high level of light intensity, drought as well as high temperature in a better way as compared to most of the flowering plants. The flowers of all Gaillardia species are comprised of many small central disc flowers surrounded by 15 or more sterile ray flowers (although a few species lack ray flowers). The ray flowers usually are long and flat like petals with three-toothed tips, but in some they may be curled up like trumpets. Each flower head can appear single or double, with either a classic daisy form, or with the central disc filled with trumpet-shaped, 5-petaled flowers. The ray flowers often have bands of color, typically with the outer half yellow and the rest of the ray red, orange, or maroon. But in other varieties the entire flower head is the same color, or they may have solid-colored rays with a different colored central disc. The 2-4"flowerheads are produced individually on stems held just above the foliage. The mounding or slightly sprawling plants are covered in summer and fall with flowers that butterflies and native bees love to visit. The taller cultivars make nice cut flowers. The flowers age to form a globular, fuzzy-looking head filled with seeds that may be eaten by birds (especially gold finches), or fall to the ground to self-sow. The alternate, gray-green leaves on these plants are generally big, soft and hairy, and strap- shaped.

The edges vary from smooth to toothed to lobed and all types can occur on the same plant. The leaves contain compounds (lactones) that can cause contact dermatitis in susceptible individuals, so gloves should be worn when handling the plants. Indian blanket flower and its related species are the wild flowers and native to much of the US (Mahr, 2021) [29]. The inflorescence is attractive with wide range of colours like red, yellow, red tipped yellow and scarlet. Single to double flowers are produced profusely on long thin stems measuring about 5-7 cm. It typically blooms from February to December. There are many known species out of which *Gaillardia pulchella* Foug, is the most widely known and cultivated. It is also referred to as fire wheel.

In this proposed trail all the growing media are made of organic manures like FYM, vermicompost, cow urine and leave manure. Farmyard Manure (FYM) refers to the decomposed mixture of dung and urine of farm animals along with litter and left-over material from roughages or fodder fed to the cattle. It contains, on an average, 0.5% N, 0.2% P, and 0.5% K. Incorporation of FYM in the soil and its subsequent decomposition results in enhanced organic carbon content of the soil. Vermicompost has much larger microbial biodiversity and act than conventional thermophilic composts. Microbes present in gut wall of earthworm responsible for the biochemical degradation of organic matter and transformed it Vermicompost (Ravimycin, 2016) [36]. Cow urine is one of the important constituents of "Panchagavya" (urine, dung, milk, curd and ghee) contains 95% water, 2.5% urea and the remaining 2.5% a mixture of salts, hormones, enzymes, and minerals (Bhandari *et al*., 2020) [4]. It has been considered that cow urine is very useful in agricultural operations as a biofertilizer and biopesticide. It is a liquid by-product of metabolism in cows. Leaf manure compost is a dark, rich, earthy, organic matter that can be used like soil media. It adds nutrients to the garden soil and the larger particle size helps enhance the tilth and loosen compacted earth. Compost retains moisture and repels weeds when used as a top dressing or mulch. Coco-peat is very good alternative to traditional peat moss. Its air-filled porosity and high-water holding capacity makes it ideal growing medium for the plant crops. It is 100 percent organic and eco-friendly free from soil borne pathogen and weeds. It has PH of (5.7-6.5) which is ideal for plant growth (Patel, 2021) [35]. Therefore, an experiment was carried out to assess the effect of various organic growing media on growth and yield of gaillardia (*gaillardia pulchella* foug) at Dehradun valley of Uttarakhand.

Materials and Methods

The present investigation was carried out at Horticulture Research Block, Department of Horticulture, School of Agricultural Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand during the *rabi* season of 2021–22. The experiment was laid out in Randomized Block Design and replicated thrice. Total ten treatments were tried namely T_1 – Control (Soil 100%), T_2 – Vermicompost + Soil (3: 1), T_3 – Farmyard Manure + Soil (3: 1), T_4 – Cocopeat+ Soil (3: 1), T_5 – Leaf Manure+ Soil (3: 1), T_6 –Cow Urine + Soil (20%: 1), T_7 – Vermicompost + Farmyard Manure + Cocopeat + Soil (1: 1: 1: 1), T_8 – Vermicompost + Farmyard Manure + Cow Urine + Soil (1: 1: 20%: 1), T_9 – Vermicompost + Farmyard Manure + Leaf Manure + Soil (1: 1: 1: 1) and T_{10} – Vermicompost + Farmyard Manure + Cocopeat + Cow Urine + Leaf Manure + Soil (1:1:1:20%: 1: 1). The Gaillardia (*Gaillardia pulchella* Foug*)* was taken for research purpose. The seeds of Gaillardia were sown in raised nursery bed on 28th march 2022. All the precautions were taken regarding nursery management till the seedlings were ready for transplanting. All the growing media i.e., FYM, vermicompost, cocopeat, leave manure and cow urine were prepared according to the treatments. The nursery polythene bags of 1.5kg volume were selected for growing. All the treatments were mixed with garden soil and filled in the polybags. The healthy seedlings were transplanted on 16th April 2022 in polybags. All the cultural practices were done at regular intervals as per the requirement of crop during the period of experiment. During the research trial, from each replication, randomly selected four plants were used for recording various observations on growth, flowering and yield parameters during whole of the cropping period at 30, 60 DAT and at Final harvest stage. The economics of gaillardia crop was calculated as per the fundamental market prices of the input and produced during the *Rabi* season 2022. The obtained data were subjected to the statistical analysis by adopting analysis of variance technique as described by Panse and Sukhatme (1985) [54] for the Randomized Block Design (RBD).

Table 1: Treatment Details

No. of Treatment	Combinations	Concentration/Ratio
T_1	Control	Soil @100%
T_2	Vermicompost + Soil.	3: 1
T_3	Farmyard Manure + Soil.	3: 1
T_4	Cocopeat+ Soil	3: 1
T_5	Leaf Manure+ Soil	3: 1
T_6	Cow Urine + Soil.	20%: 1
T_7	Vermicompost + Farmyard Manure + Cocopeat + Soil.	1: 1: 1: 1
T_8	Vermicompost + Farmyard Manure + Cow Urine + Soil.	1: 1: 20%: 1
T_9	Vermicompost + Farmyard Manure + Leaf Manure + Soil.	1: 1: 1: 1
T_{10}	Vermicompost + Farmyard Manure + Cocopeat + Cow Urine + Leaf Manure + Soil	1:1:1:20%: 1: 1

Results and Discussions

The various growth and yield parameters like plant height, number of leaves, leaf length, leaf width, stem diameter, number of branches per plant, plant spread (N-S) (W-E), flower yield (Kg/plot) and total yield (q/ha) were significantly influenced by different doses of growing media as compared to control during the course of investigation. The data presented in Table- 2, 3 and 4 were showed that the significant improvement was noticed when applied different combinations of growing media on gaillardia as compared to control. The findings of the present investigation were recorded and are thoroughly discussed below:

Plant height

Data pertaining to plant height was recorded at 30 DAT, 60 DAT and at final harvest stage were statistically analyzed and presented in table 2 and fig. 2.1. The observation of plants height was recorded at 30, 60 DAT and at final harvest and the results were significantly differs among the treatments. At 30 days after transplanting the maximum plant height was recorded in treatment T_2 (27.02cm) and it was at par with T_3 (24.91cm) and T_4 (22.96cm). However, significant differences were observed with treatment T_5 (21.16cm), T_6 (20.26cm), T_1 (20.13cm), T_8 (19.83cm), T_9 (19.72cm) and T_7 (18.80cm). The minimum plant height (18.47) was recorded under the treatment T_{10}. In case of 60 days after transplanting the maximum plants, height was obtained in treatments T_2 (35.11cm), which was at par with treatment T_{10} (33.32cm) and T_9 (32.79cm). The significant difference was recorded with treatment T_4 (32.12cm), T_7 (31.84cm), T_6 (31.36cm), T_3 (30.86 cm), T_8 (28.38cm) and T_5 (27.99cm). The minimum plant height (27.79cm) was recorded under treatment T_1. At final harvest, the plant height was maximum in T_2 (37.93cm) which was comparable with T_9 (37.63cm) and T_{10} (37.09cm). However, significant difference was observed with treatment T_4 (37.05cm), T_6 (36.64cm), T_5 (36.36cm), T_5 (36.31cm), T_7 (36.29cm) and T_8 (35.19cm) while, minimum plant height was obtained in the treatment T_1 (34.21cm). The increase in plant height with increased doses of vermicompost might be due to enhanced amount of growth promoting substances at higher doses. Similar, results were obtained by Sardoei, (2014) [45], Chatto *et al.* (2011) and Sultana *et al.*, (2015) [44].

Number of leaves per plant

The number of leaves per plant counted at different stages of crops growth showed significant as presented in table 2 and fig. 2.2. The observation of number of leaves of plants was recorded at 30 DAT, 60 DAT and at final harvest and the results shows significant differences between the treatments. At 30 days after transplanting, the highest no. of leaves of Gaillardia was recorded in treatment T_4 (28.20) and it was at par with T_7 (27.22) and T_2 (17.78) however, significant differences were observed with treatment T_3 (16.66), T_6 (16.11), T_5 (15.63), T_1 (14.33), T_9 (13.32) and T8 (12.44). The minimum number of leaves (12.32) was recorded under the treatment T_{10}. In case of 60 days after transplanting, the maximum number of leaves was obtained in treatments T_2 (39.22), which were at par with the treatments T_3 (37.88) and T_7 (37%). The significant difference was observed with treatment T_4 (34.22), T_6 (33.55), T_5 (33.22), T_9 (32.89) T_1 (31.44) and T_8 (30.99). The minimum number of leaves (27.56%) was recorded under the treatment T_{10}. At harvest days after transplanting, the number of leaves was maximum in T_5 (63.89) which was comparable with T_4 (63.77) and T_7 (61) however, significant difference was observed with treatment T_6 (60.67), T_3 (59.65), T_8 (59.56), T_2 (59.22), T_9 (58.33) and T_{10} (53.22) while, minimum number of leaves was obtained in the treatment T_1 (51.32) which is control. This variation might be due to the balanced supply of nutrients including micronutrients and could be due to the soil water holding capacity. The findings were confirmed with Thakur and Grewal, (2018) [50] and Kumar *et al.*, (2022) [55].

Leaf length (cm)

The data regarding the leaf length at different growth stages are presented in the Table 2 and fig. 2.3. The observation of leaf length was recorded at 30 DAT, 60 DAT and at final harvest and the results shows significant differences between the treatments. At 30 days after sowing, the highest value of leaf length of gaillardia was recorded in treatment T_2 (14.34cm) which were at par with the treatments T_4 (13.55cm) and T_3 (13.27cm). The significant difference was observed with treatment T_1 (13.06cm), T_8 (12.89cm), T_5 (12.63cm), T_6 (12.63cm), T_7 (12.10cm) and T_9 (12.04cm). The lowest value (11.74cm) of leaf length was recorded under the treatment T_{10} (control). In case of 60 days after transplanting, the maximum number of leaf length was obtained in treatments T_3 (14.54cm), which were at par with the treatments T_2 (14.44cm) and T_1 (14.41cm). The significant difference was observed with treatment T_4 (132.81cm), T_5 (13.52cm), T_9 (13.42cm), T_6 (13.31cm), T_7 (12.89cm) and T_8 (12.84cm). The minimum leaf length (12.66cm) was recorded under the treatment T_{10}. At final harvest days after transplanting, the leaf length was maximum in T_3 (15.04cm) which were at par with T_2 (14.98cm) and T_8 (14.86cm) however, significant difference was observed with treatment T_1 (14.79cm), T_4 (14.78cm), T_5 (14.74cm), T_7 (14.66cm), T_9 (14.49cm) and T_6 (14.47cm) while, minimum leaf length was obtained in the treatment T_{10} (14.33cm). The increase in plant height with increased doses of vermicompost might be due to enhanced amount of growth promoting substances at higher doses. Similar, results were obtained by Sardoei, (2014) [45], Chatto *et al.* (2011) and Sultana *et al.*, (2015) [44].

Leaf width (cm)

The data regarding the leaf width at different growth stages are presented in the Table 2 and fig. 2.4. The observation of leaf width was recorded at 30 DAT, 60 DAT and at final harvest and the results shows significant differences between the treatments. At 30 days after transplanting, the highest value of leaf width of was recorded in treatment T_2 (4.43cm) and the lowest value (2.81cm) of leaf width was recorded under the treatment T_9. In case of 60 days after transplanting, the maximum leaf width was obtained in treatments T_3 (4.52cm), which were at par with the treatments T_4 (4.26cm) and T_2 (4.21cm). The significant difference was observed with treatment T_5 (3.77cm), T_6 (3.71cm), T_1 (3.58cm), T_7 (3.47), T_{10} (3.47cm) and T_9 (3.28cm). The minimum leaf width (3cm) was recorded under the treatment T_8. At harvest days after transplanting, the leaf width was maximum in T_3 (4.81cm) which was at the par with T (4.65cm) and T_{10} (4.62cm). However, significant difference was observed with treatment T_7 (4.56cm), T_8 (4.46cm), T_9 (4.45cm), T_5 (4.43cm), T_6 (4.39cm) and T_4 (4.32cm), while minimum leaf width was obtained in the treatment T_1 (4.29cm) which is control. This could be due to release of energy rich organic compounds which increased growth and activity of microbial saprophytes and phosphatase activity. These results were in accordance with Çig and Kocak, (2019) and Chandrashekar *et al.*, (2019) [8].

Stem diameter (cm)

The data regarding the stem diameter at different growth stages are presented in the Table 3 and fig. 3.2. The observation of stem diameter was recorded at 30 DAT, 60 DAT and at final harvest and the results shows significant differences between the treatments. At 30 days after transplanting the highest value of stem diameter of gaillardia was recorded in treatment T_8 (1.80cm) and the lowest value

(1.06cm) of stem diameter was recorded under the treatment T_{10}. In case of 60 days after transplanting, the maximum stem diameter was obtained in treatments T_2 (2.21), which were at par with the treatments T_3 (2.14cm) and T_5 (1.83cm). The significant difference was observed with treatment T_9 (1.76cm), T_8 (1.73cm), T_4 (1.70cm), T_7 (1.67cm), T_1 (1.66cm) and T_{10} (1.66cm). The minimum stem diameter (1.61cm) was recorded under the treatment T_6. At final days after transplanting, the stem diameter was maximum in T_2 (2.65cm) which was at the par with T_3 (2.57cm) and T_7 (2.47cm) however, significant difference was observed with treatment T_5 (2.27cm), T_9 (2.27cm), T_{10} (2.24cm), T_8 (2.22cm), T4 (2.20cm) and T_1 (2.14cm) while, minimum stem diameter was obtained in the treatment T_6 (2.07cm). Organic manures are good source of various macro and micro elements which may have affected the stem diameter of the plant. Similar findings were obtained by Shadanpour *et al.,* (2015) [46] in marigold and Rajput *et al.,* (2022) [40] in Pelargonium.

Number of branches per plant

The number of branches per plant counted at different stages of crops growth showed significant as presented in table 3 and fig. 3.2. The observation of number of branches of plants was recorded at 30 DAT, 60 DAT and at final harvest and the results shows significant differences between the treatments. At 30 days after transplanting, the highest no. of branches of Gaillardia was recorded in treatment T_3 (6.66) and the lowest number of branches was recorded under the treatment T_{10} (0.73). In case of 60 days after transplanting, the maximum number of branches was obtained in treatments T_2 (13.44), which were at par with the treatments T_3 (10.11) and T_4 (9.78). The significant difference was observed with treatment T_1 (9.78), T_7 (8), T_9 (6.78), T_6 (5.98) T_5 (5.56) and T_8 (4.89). The minimum number of branches (4.33%) was recorded under the treatment T_{10}. At harvest days after transplanting, the number of branches was maximum in T_2 (23.56) which was comparable with T_8 (21.56) and T_4 (20.44) however, significant difference was observed with treatment T_9 (20.33), T_3 (20.22), T_5 (20.11), T_7 (19.77), T_1 (19.22) and T_6 (19) while, minimum number of branches was obtained in the treatment T_{10} (18.44). This variation might be due to the balanced supply of nutrients including micronutrients and could be due to the soil water holding capacity. The similar result was found by Waseem *et al.,* (2013) [53] in *matthiola incana.*

Plant spread North to South (cm)

The data regarding the plant spread (North to South) at different growth stages are presented in the Table 3 and fig. 3.3. The observation of plant spread was recorded at 30 DAT, 60 DAT and at final days and the results shows significant differences between the treatments. At 30 days after transplanting, the highest value of plant spread of gaillardia was recorded in treatment T_2 (38.28cm) and the lowest value (27.48cm) of stalk length was recorded under the treatment T_{10}. In case of 60 days after transplanting, the plant spread was maximum in T_2 (43.51cm) which was comparable with T_3 (41.20cm) and T_4 (39.59cm) however, significant difference was observed with treatment T_5 (37.50cm), T_1 (37.48cm), T_6 (36.47cm), T_7 (36.12cm), T_9 (35.88cm) and T_{10} (35.04cm) while, minimum stalk length was obtained in the treatment T_8 (34.99cm). At final days after transplanting, the maximum plant spread was obtained in treatments T_2 (47.60cm), which were at par with the treatments T_3 (46.12 cm) and T_9 (45.99cm). The significant difference was observed with treatment T_7 (45.74cm), T_4 (45.35cm), T_6 (45.31cm), T_8 (45.31cm), T_5 (45.22cm) and T_{10} (45.04cm). The minimum plant spread (40.86cm) was recorded under the treatment T_1 which is control. This might be due to the increase in transport of metabolites and rate of photosynthesis in the plant, which enables the plant to have quick and better upward vegetative growth. These results were in parallel with those publish by Singh *et al.,* (2018) [47] and Daiahun *et al.,* (2018) [12].

Plant spread West to East (cm)

The data regarding the plant spread (West to East) at different growth stages are presented in the Table 3 and fig. 3.4. The observation of plant spread was recorded at 30 DAT, 60 DAT and at final days and the results shows significant differences between the treatments. At 30 days after transplanting, the highest value of plant spread of gaillardia was recorded in treatment T_3 (37.04cm) and the lowest value (27.70cm) of stalk length was recorded under the treatment T_{10}. In case of 60 days after transplanting, the plant spread was maximum in T_3 (41.27cm) which was comparable with T_2 (40.94cm) and T_4 (40.06cm) however, significant difference was observed with treatment T_5 (37.21cm), T_6 (36.69cm), T_1 (36.65cm), T_7 (36.40cm), T_8 (35.45cm) and T_9 (35.22cm) while, minimum stalk length was obtained in the treatment T_{10} (34.47cm). At final days after transplanting, the maximum plant spread was obtained in treatments T_2 (47.30cm), which were at par with the treatments T_5 (46.52cm) and T_3 (46.40cm). The significant difference was observed with treatment T_4 (46.41cm), T_7 (46.10cm), T_8 (46.02cm), T_6 (45.85cm), T_{10} (45.76cm) and T_1 (45.18cm). The minimum plant spread (44.99cm) was recorded under the treatment T_9 which is control. This might be due to the increase in transport of metabolites and rate of photosynthesis in the plant, which enables the plant to have quick and better upward vegetative growth. These results were in parallel with those publish by Singh *et al.,* (2018) [47] and Daiahun *et al.,* (2018) [12].

Flower Yield (kg/plot)

The data regarding yield of flower/plot of gaillardia differed significantly due to various treatments and are presented in table 4 and fig 4.1. The yield of flower/plot varied significantly from 0.440kg/plot (T_1) to 0.574 kg/plot (T_{10}). The maximum yield was noted in the treatment T_{10}. That performance was influenced by the forms and levels of organic manure. This may be due to early breaking of apical dominance followed by easy and better translocation of nutrients to the flowers, better plant growth by the increased availability of nutrients and accelerated mobility of photosynthates from source to sink as influenced by the growth hormones released or synthesized from growing media. Similar results were obtained by Saeed *et al,* (2014) [23].

Total yield (q/ha)

The data regarding total yield of gaillardia flower varied significantly due to various treatments and are presented in table 4 and fig. 4.2. The total yield varied significantly from 44q/ha^{-1} (T_1) to 57.4q/ha^{-1} (T_{10}). The maximum yield was recorded in the treatment T_{10} which is at par with T_7 (55.4q/ha^{-1}). This may be due to early breaking of apical

dominance followed by easy and better translocation of nutrients to the flowers, better plant growth by the increased availability of nutrients and accelerated mobility of photosynthates from source to sink as influenced by the growth hormones released or synthesized from growing media, as a result the yield of flower was increased. Similar result was obtained by Saeed *et al*, (2014) [23].

Table 2: Effect of organic growing media on plant height, number of leaves, leaf length, leaf width of gaillardia at different harvest intervals

Treatment	Plant height (cm)				Number of leaves				Leaf length (cm)				Leaf width (cm)			
	30 DAT	60 DAT	At Final Harvest	Mean	30 DAT	60 DAT	At Final Harvest	Mean	30 DAT	60 DAT	At Final Harvest	Mean	30 DAT	60 DAT	At Final Harvest	Mean
T_1	20.13	27.79	34.21	27.38	14.33	31.44	51.32	32.37	13.06	14.41	14.78	14.08	3.21	3.58	4.29	3.69
T_2	27.02	35.11	37.93	33.35	17.78	39.22	59.22	38.74	14.34	14.44	14.98	14.59	4.34	4.20	4.66	4.40
T_3	24.91	30.87	36.31	30.69	16.66	37.88	59.66	38.07	13.27	14.54	15.04	14.28	3.86	4.52	4.81	4.39
T_4	22.97	32.12	37.05	30.71	28.20	34.22	63.78	42.07	13.55	13.81	14.78	14.05	3.84	4.26	4.32	4.14
T_5	21.17	27.99	36.37	28.51	15.63	33.22	63.89	37.58	12.63	13.52	14.74	13.63	3.52	3.78	4.43	3.91
T_6	20.27	31.37	36.64	29.43	16.11	33.55	60.67	36.78	12.63	13.31	14.478	13.47	3.18	3.71	4.39	3.76
T_7	18.8	31.84	36.29	28.98	27.22	37	61	41.74	12.10	12.88	14.66	13.22	2.89	3.47	4.57	3.64
T_8	19.83	28.38	35.19	27.80	12.45	30.99	59.56	34.33	12.88	12.84	14.87	13.53	3.20	3	4.46	3.55
T_9	19.72	32.79	37.64	30.05	13.32	32.89	58.33	34.85	12.04	13.42	14.49	13.32	2.81	3.28	4.45	3.51
T_{10}	18.48	33.32	37.09	29.63	12.32	27.56	53.22	31.03	11.74	12.66	14.33	12.91	2.91	3.47	4.62	3.67
C.D.(P=0.05)	3.02				5.61				0.69				0.51			
SE(m) ±	1.01				1.87				0.23				0.17			
SE(d) ±	1.42				2.65				0.33				0.24			
C.V.	5.89				8.82				2.91				7.57			

Table 3: Effect of growing media on stem diameter, number of branches, plant spread (N-S & W-E) of gaillardia at different harvest intervals

Treatment	Stem diameter (cm)				Number of branches				Plant spread N-S (cm)				Plant spread W-E (cm)			
	30 DAT	60 DAT	At Final Harvest	Mean	30 DAT	60 DAT	At Final Harvest	Mean	30 DAT	60 DAT	At Final Harvest	Mean	30 DAT	60 DAT	At Final Harvest	Mean
T_1	1.18	1.66	2.14	1.66	3.97	9.78	19.22	10.99	30.44	37.48	40.86	36.26	30.77	36.65	45.18	37.54
T_2	1.76	2.21	2.65	2.21	6.22	13.44	23.56	14.41	38.28	43.51	47.60	43.13	36.62	40.94	47.30	41.62
T_3	1.67	2.14	2.57	2.13	6.66	10.11	20.22	12.33	35.88	41.20	46.12	41.07	37.01	41.27	46.40	41.56
T_4	1.15	1.70	2.20	1.68	3.32	9.78	20.44	11.18	35.42	39.59	45.36	40.12	35.06	40.06	46.31	40.48
T_5	1.08	1.83	2.27	1.73	2.30	5.56	20.11	9.32	34.13	37.50	45.22	38.95	32.18	37.21	46.52	38.64
T_6	1.80	1.61	2.07	1.83	2.30	5.98	19	9.09	31.43	36.47	44.31	37.40	30.47	36.69	45.86	37.67
T_7	1.12	1.66	2.47	1.76	2.42	8.0	19.78	10.07	31.80	36.12	45.74	37.89	31.03	36.40	46.10	37.84
T_8	1.13	1.73	2.22	1.69	0.99	4.89	21.56	9.15	28.46	34.99	45.31	36.26	29.04	35.45	46.02	36.84
T_9	1.10	1.76	2.27	1.71	1.73	6.78	20.33	9.61	27.75	35.88	45.99	36.54	28.48	35.22	44.99	36.23
T_{10}	1.06	1.66	2.24	1.65	0.73	4.33	18.44	7.84	27.48	35.04	45.05	35.86	27.70	34.47	45.76	35.98
C.D.(P=0.05)	0.28				2.34				3.25				2.57			
SE(m) ±	0.09				0.78				1.08				0.86			
SE(d) ±	0.13				1.11				1.54				1.22			
C.V.	9.21				3.04				4.90				3.87			

Table 4: Effect of different growing media on flower yield (kg/plot) and (q/ha) of gaillardia

Treatment	Flower yield (Kg/plot)	Total flower yield (q/ha)
T_1	0.440	44
T_2	0.471	47.1
T_3	0.480	48
T_4	0.523	52.3
T_5	0.544	54.4
T_6	0.548	54.8
T_7	0.554	55.4
T_8	0.540	54.0
T_9	0.509	50.9
T_{10}	0.574	57.4
C.D. 5%	0.039	3.919
SE(m)	0.013	1.309
SE(D)	0.018	1.851
C.V	4.372	4.372

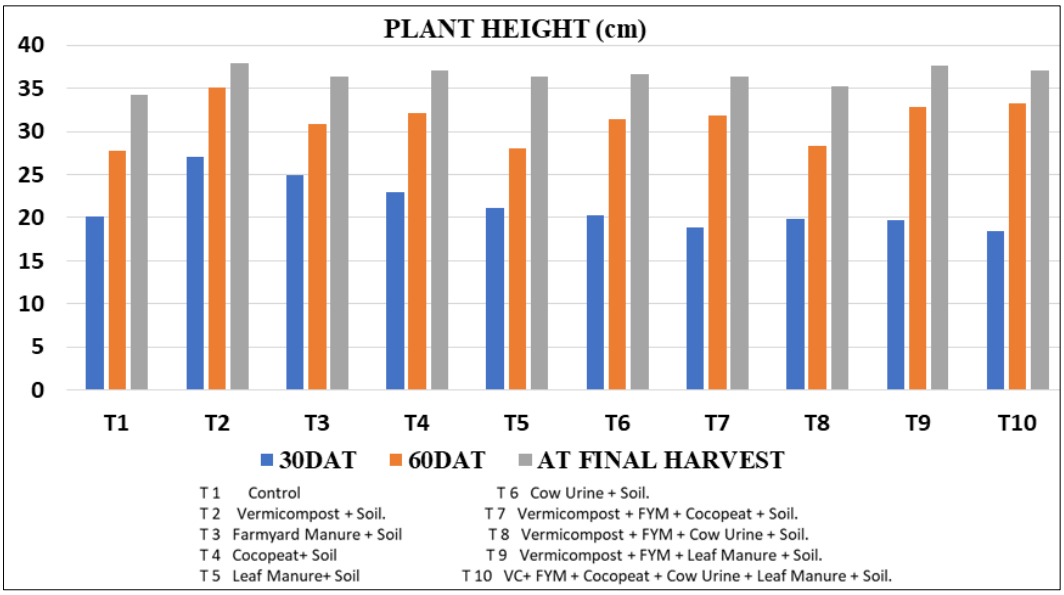

Fig 1: Graphical representation of the effect of Growing media on plant height (cm) at different harvest intervals on Gaillardia

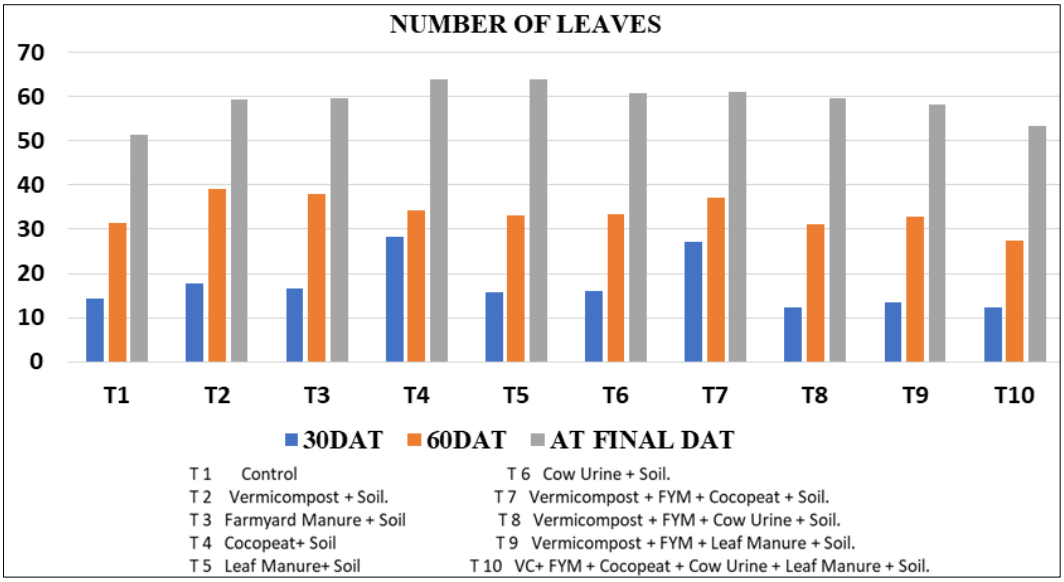

Fig 2: Graphical representation of the effect of growing media on number of leaves per plant at different harvest intervals on Gaillardia

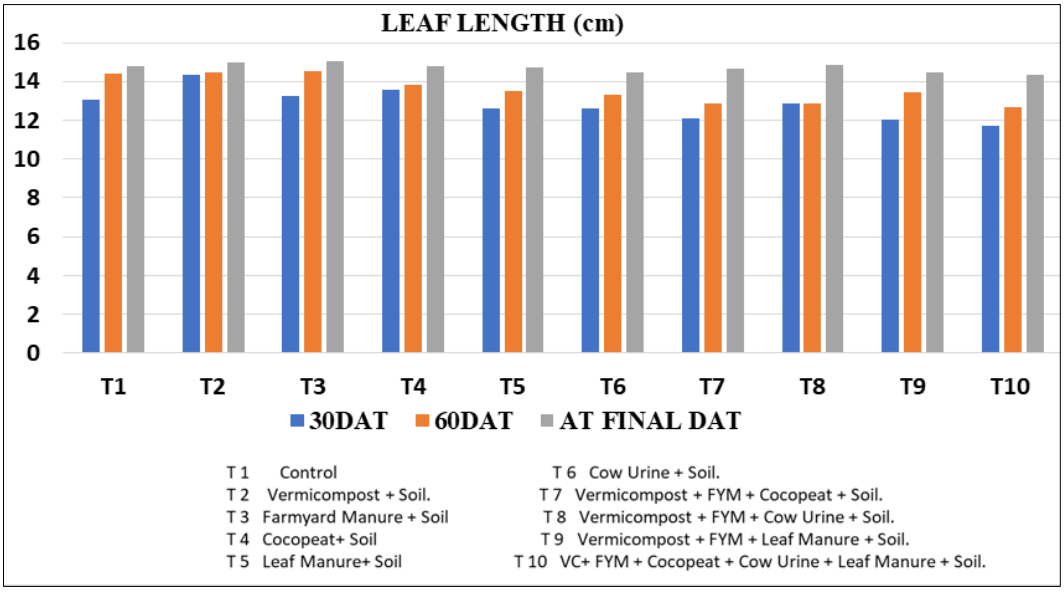

Fig 3: Graphical representation of the effect of growing media on leaf length (cm) at different harvest intervals on Gaillardia

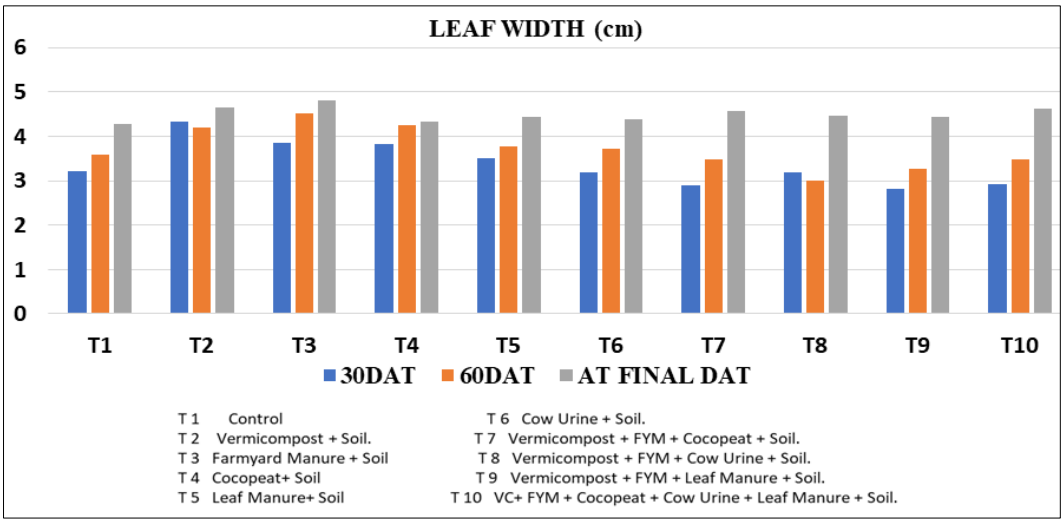

Fig 4: Graphical representation of the effect of growing media on leaf width (cm) at different harvest intervals on Gaillardia

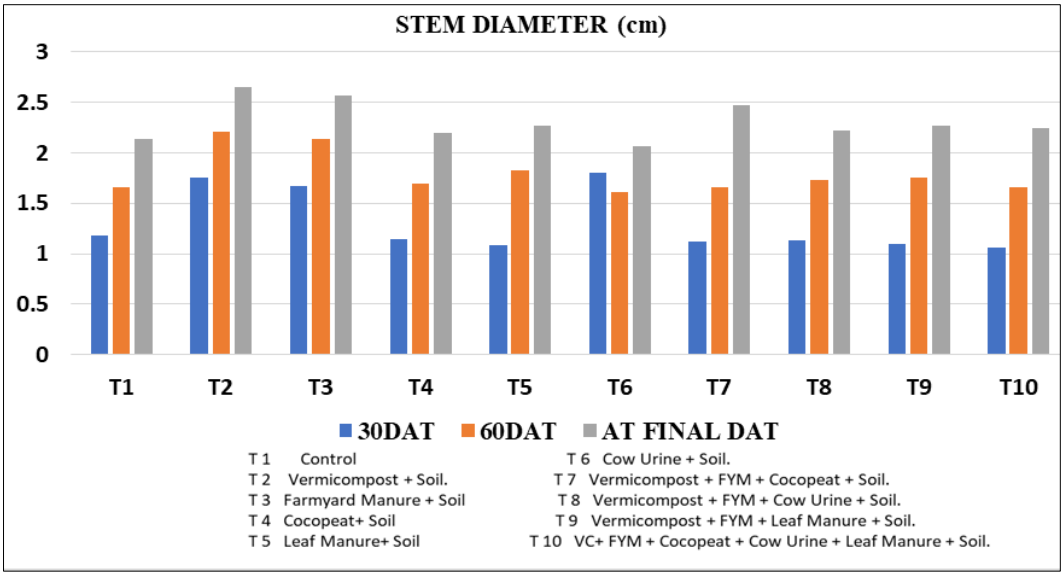

Fig 5: Graphical representation of the effect of growing media on stem diameter (cm) at different harvest intervals on Gaillardia

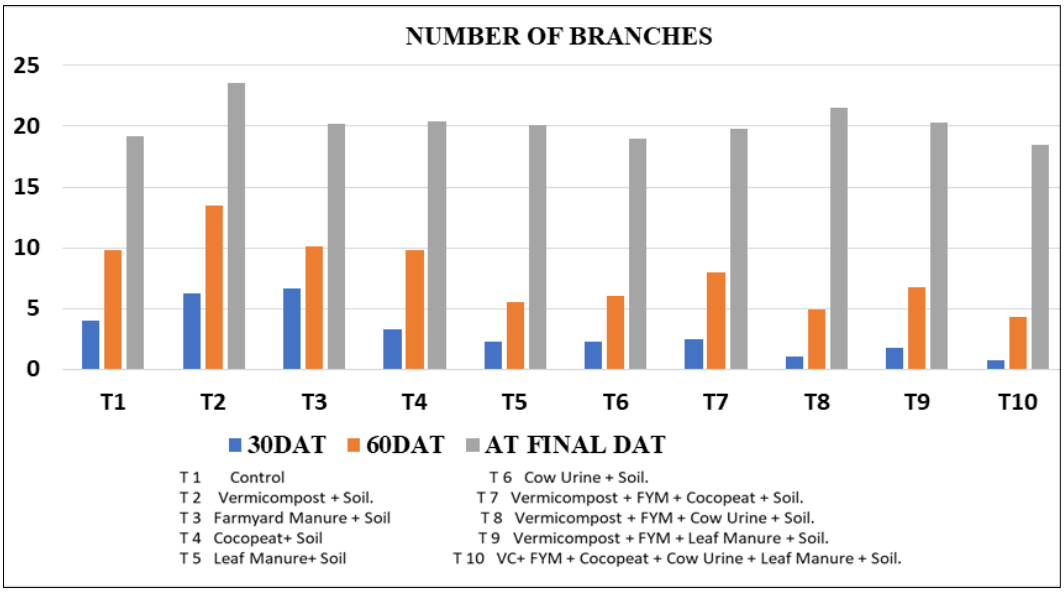

Fig 6: Graphical representation of the effect of growing media on number of branches at different harvest intervals on Gaillardia

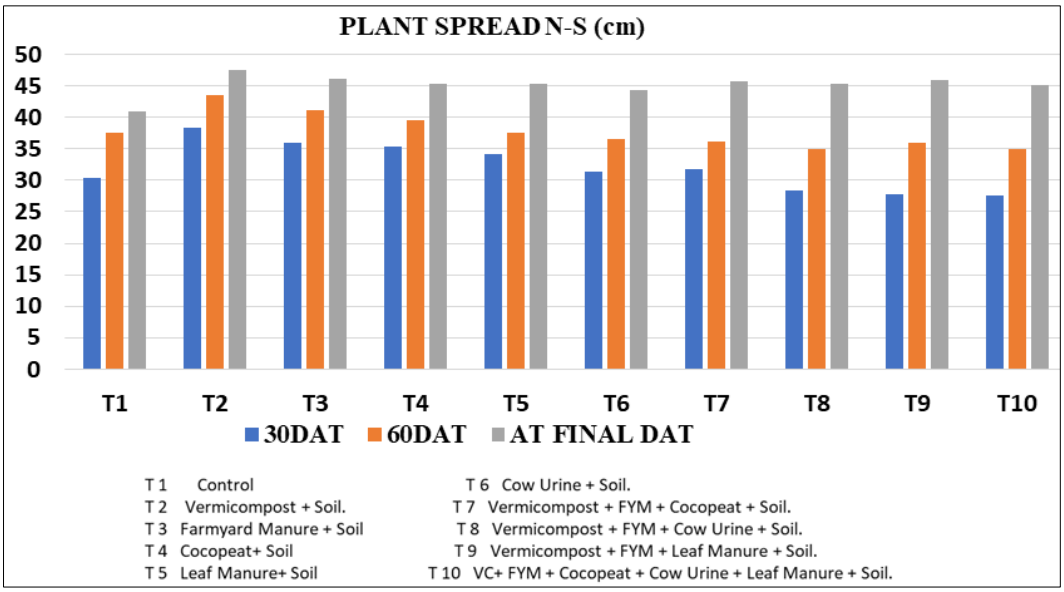

Fig 7: The effect of various growing media on plant spread N-S (cm) at different harvest interval on gaillardia

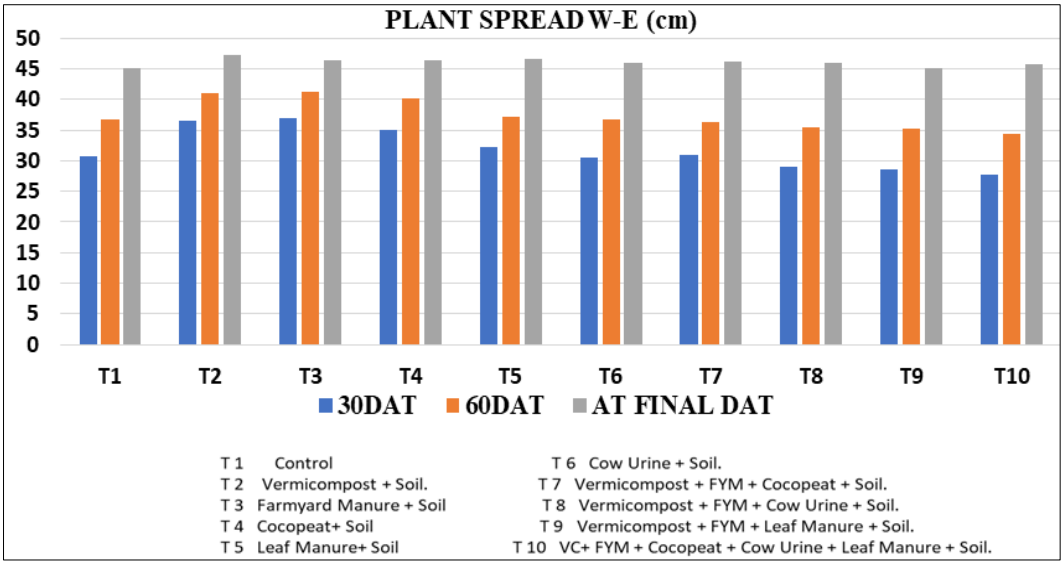

Fig 8: Graphical representation of the effect of growing media on plant spread W-E (cm) at different harvest intervals on Gaillardia

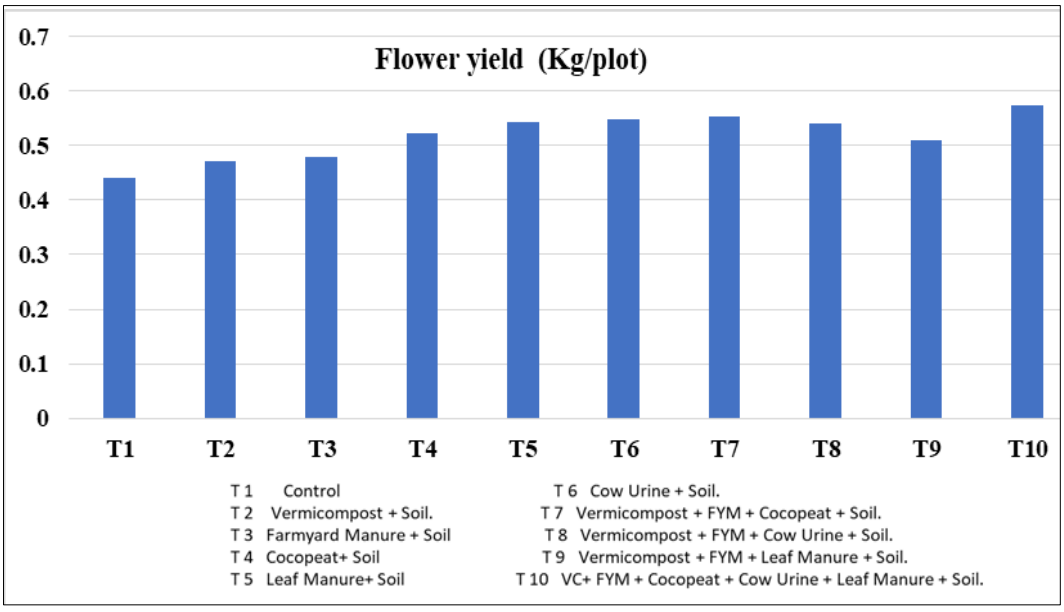

Fig 9: The effect of various growing media on yield per plot at final harvest on Gaillardia

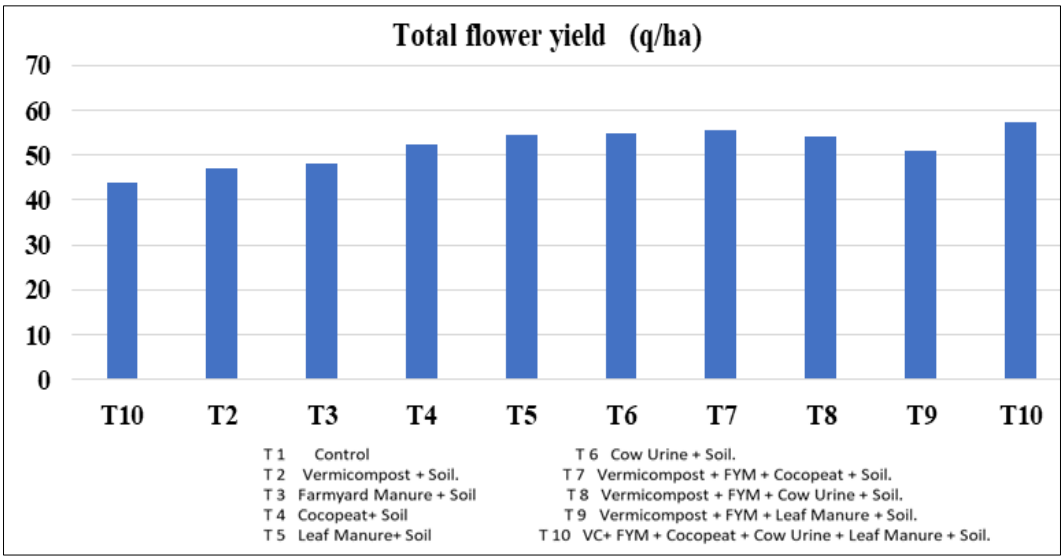

Fig 10: The effect of various growing media on total yield at final harvest on Gaillardia

Conclusion

On the basis of present experimental research on "Effect of various organic growing media on growth, flowering and yield of Gaillardia (*Gaillardia pulchella* Foug*)* at Dehradun valley of Uttarakhand" it can be concluded that among different growing media treatments, the combination of (soil + vermicompost @3:1) i.e., T_2 was found to be most effective for increasing plant height, number of leaves per plant, plant spread (N-S & W-E), leaf width, leaf length, stem diameter, number of branches. However, the flower yield per plot (kg/plot) and total yield (q/ha) were recorded highest in the treatment T_{10} (VC + FYM + Leaf manure + cow urine cocopeat @1:1:1:20%;1).

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