



## Effect of growing media on growth and flowering of gerbera (*Gerbera jamesonii*) cultivars under naturally ventilated polyhouse

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### ABSTRACT

The performance of gerbera (*Gerbera jamesonii* Bolus ex Hooker F.) cultivars were evaluated in different growing media in naturally ventilated polyhouse during 2012-13 to 2013-14. Three varieties, viz. Batavia, Faith and Antibes were grown on five different growing media, i.e. partially decomposed rice husk, vermicompost, enriched compost, soil based biofertilizer and control. Growth, flowering and physiological characters were evaluated. The cultivar Antibes was found to be superior with respect to number of leaves/plant (34.57), leaf area index (1.73), net assimilation rate (0.059 mg/cm<sup>2</sup>/day), leaf area duration (55.98 LAI days) and vase life (9.37 days). Among the five growing media evaluated; growth, flowering and physiological characters were better in enriched compost. Number of leaves/plant (36.74), leaf area index (1.86), total chlorophyll content (0.246 mg/g), net assimilation rate (0.064 mg/cm<sup>2</sup>/day), leaf area duration (58.94 LAI days), days to flower bud visibility (79.18 days), days to full bloom (17.41 days), number of flowers/plant (12.05), diameter of flower (10.29 cm), length of flower stalk (57.47 cm), diameter of flower stalk (0.75 cm) and vase life (10.89 days) of flower were found to be highest for enriched compost.

**Key words:** Cultivars, Gerbera, Growing media, Polyhouse

Gerbera (*Gerbera jamesonii* Bolus ex Hooker F.), commonly known as Transvaal Daisy, Barberton Daisy or African Daisy, is an excellent cut flower having good demand in the both domestic and international markets. It is being grown in India and abroad under wide range of climatic conditions. As the commercial cultivation of cut flowers have a good potential, introduction and popularization of high yielding cultivars of gerbera gained importance. Recently, there is fall in mineral fertilizers and also soil and water pollution has aggravated the problem of soil health (Bhatia and Gupta 2007). Therefore, nowadays attention is shifted towards the alternate sources, i.e. organic manures. In soil by adding organic manures and microbial agents make easy uptake of nutrients as and when crop required comparing to chemical fertilizers (Vanilaras and Balakrishnamurthy 2014). In the present organic era, use of organic growing media needs to be evaluated both for increasing the production and improving the quality of flowers. However, no efforts were made in the past to identify the suitable cultivars of gerbera for cut flower production under Asom. This investigation was carried out to study the effect of growing media on different cultivars of gerbera under Asom condition.

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### MATERIALS AND METHODS

The present experiment was carried out during 2012-13 and 2013-14 in split-plot design with three replication under naturally ventilated polyhouse at the experimental farm of Assam Agricultural University, Jorhat, Asom. The experimental site was located at 26°47'N latitude, 94°12'E longitude and 86.8m above mean sea level. In general the maximum temperature 34.36°C during summer and minimum 7°C during winter was recorded. Three black centered gerbera cultivars, viz. Batavia (orange), Faith (yellow) and Antibes (red) were planted using five growing media including soil (taken as control), viz. partially decomposed rice husk, vermicompost, enriched compost, soil based biofertilizer. The enriched compost used, is a premium mixture of organic materials of plant origin fortified with rock phosphate, N-fixing *Azospirillum* and PSB. Soil based biofertilizer contains *Azospirillum* and PSB. There were 45 plots each having 17 plants with a spacing of 30cm × 30cm. Individual plot size was 1.56 m<sup>2</sup> and the total area of the experimental site was 104.625 m<sup>2</sup>. Tissue cultured plants with 4 to 6 leaves were planted. Fifteen treatment combinations comprising three varieties on five growing media were evaluated for growth and flower characters for two years. Observations on growth and flower characters were recorded periodically for two years and statistically analyzed.

### RESULTS AND DISCUSSION

Plant growth characters were significantly influenced

Table 1 Growth and flower characteristics of gerbera cultivars under naturally ventilated polyhouse

Cultivar	No. of leaves/plant	LAI	Days to flower bud visibility	Days to bud opening	Days to full bloom	No. of flowers/plant	Diameter of flower (cm)	Length of flower stalk (cm)	Vase life of flower (days)
Batavia	32.87	1.53	83.72	20.59	19.51	8.50	9.30	51.58	9.28
Faith	31.54	1.69	84.28	20.81	20.31	8.63	9.37	52.24	8.81
Antibes	34.57	1.73	84.33	21.25	19.29	9.43	9.32	51.24	9.37
CD (P=0.05)	0.436	0.017	NS	NS	NS	NS	NS	NS	0.436

by cultivars (Table 1). The highest number of leaves, leaf area index was recorded in Antibes and the lowest was recorded in Faith. The similar results were reported by Mahanta *et al.* (2003) and Reddy *et al.* (2003). Among the flower characters vase life shows significant difference among the varieties (Table 1). The cultivar Antibes recorded highest vase life. Similar variations were recorded by Barooah and Talukdar (2009) in gerbera. Other flower characters are non-significant among the cultivars. The cultivar Antibes recorded highest net assimilation rate and leaf area duration (Table 2). Batavia recorded highest total chlorophyll content. The differences in various growth, flower and physiological characters might be attributed to inherent genetic characters of the cultivars evaluated.

The different media used in the present experiment had significant effect on the growth, flower and physiological character (Table 3 and 4). The highest number of leaves/plant was recorded in enriched compost while lowest was recorded in control. The highest leaf area index was recorded in enriched compost while lowest was recorded in control. Enriched compost recorded highest total chlorophyll content, net assimilation rate and leaf area duration (Table 4). Significant increase in growth and

physiological characters of gerbera cultivars under organic treatments was due to increased absorption of nutrients which resulted in increase in the synthesis of carbohydrates, hormones activity produced by *Azospirillum* and PSB which are present in enriched compost. PSB might have increased phosphate availability by solubilising the rock phosphate in the soils which in turn helped better proliferation of root growth and uptake of other nutrients to a great extent. Similar results are in conformity with the reports of Sharma (1995) in tomato, Kale *et al.* (2009) and Thangam *et al.* (2009) in gerbera, Hoseini *et al.* (2013) in *Aloe vera*.

The enriched compost resulted in earliness in flower bud visibility, bud opening and full bloom in all the gerbera cultivars compared to control. The induction of earliness was due to better nutritional status of the soil which ultimately increases the nutritional status of the plants.

Table 4 Effect of growing media on physiological characteristics of gerbera cultivars under naturally ventilated polyhouse

Growing media	Total chlorophyll content (mg/gFW)	Net assimilation rate (mg/cm <sup>2</sup> /day)	Leaf area duration (LAI days)
Partially decomposed rice husk	0.187	0.054	50.23
Vermicompost	0.232	0.060	53.89
Enriched compost	0.246	0.064	58.94
Soil based biofertilizer	0.203	0.054	49.83
Control	0.178	0.050	43.34
CD (P=0.05)	0.006	0.002	1.100

Table 2 Physiological characteristics of gerbera cultivars under naturally ventilated polyhouse

Cultivar	Total chlorophyll content (mg/gFW)	Net assimilation rate (mg/cm <sup>2</sup> /day)	Leaf area duration (LAI days)
Batavia	0.214	0.056	49.203
Faith	0.203	0.055	48.552
Antibes	0.212	0.059	55.983
CD (P=0.05)	0.008	0.003	1.063

Table 3 Effect of growing media on growth and flower characteristics of gerbera cultivars under naturally ventilated polyhouse

Growing media	No. of leaves/plant	LAI	Days to flower bud visibility	Days to bud opening	Days to full bloom	No. of flowers/plant	Diameter of flower (cm)	Length of flower stalk (cm)	Vase life of flower (days)
Partially decomposed rice husk	31.63	1.61	85.74	21.61	20.11	6.83	9.05	49.24	8.44
Vermicompost	33.99	1.70	80.54	19.00	18.76	10.11	9.67	55.29	9.77
Enriched compost	36.74	1.85	79.18	19.07	17.41	12.55	10.29	57.47	10.93
Soil based biofertilizer	32.99	1.63	84.83	21.72	20.50	8.50	8.95	49.25	8.83
Control	29.59	1.45	90.26	23.02	21.74	6.28	8.66	47.17	7.78
CD (P=0.05)	0.708	0.014	1.331	0.974	0.796	0.850	0.237	1.783	0.615

Table 5 Benefit cost ratio of the treatment combinations

Cultivar	Partially decomposed rice husk	Vermicom post	Enriched compost	Soil based bio-fertilizer	Control
Batavia	1.04	1.83	2.41	1.50	1.79
Faith	1.19	1.5	2.66	1.50	2.02
Antibes	1.04	2.25	2.95	1.80	1.94

Prabhu *et al.* (2006) found that cucumber plants treated with organics showed earliness in flowering. Diameter of flower, stalk length and number of flowers/plant were recorded highest in enriched compost while the lowest was recorded in control. Naik *et al.* (2006) reported that in gerbera, greater leaf area, more number of leaves/plant and plant spread in turn resulted in production and accumulation of maximum photosynthates resulting in more number of flowers. Vase life is important criteria to determine the quality of gerbera. The highest vase life of flower was recorded for the enriched compost while the lowest was observed in control. This may be due to enhanced photosynthetic activities of plant, accumulated metabolic substances in flower stalk which might have helped in prolonging the pre and post-harvest life. Singh and Sangama (2002) opined that difference in vase life is due to the increase in stalk length on account of consequent increase in reserved food material. The growth characters like more number of leaves/plant and greater leaf area; higher net assimilation rate, greater chlorophyll content resulted in production and accumulation of maximum photosynthates resulting in more progressive emergence of flowers/plant, which increases the blooming duration (Naik *et al.* 2006) in gerbera. Present findings indicated that enriched compost is the best growing media to obtain maximum growth and flower characters of gerbera. Among cultivars, Antibes was most productive. Present study also indicated that gerbera cultivation in naturally ventilated greenhouse is feasible (Table 5) and can fetch good returns to growers year round.

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