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Effect of different growing media on growth, flowering and quality attributes of China aster (*Callistephus chinensis*) cv. ARKA Archana

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Abstract

The present study entitled “Effect of different growing media on growth, flowering and quality attributes of China aster (*Callistephus chinensis*) cv. Arka Archana” was carried out in the year 2023-2024 at Pt. K.L.S. College of Horticulture and Research Station, Pendri, Rajnandgaon, (C.G.). The research was organized in CRD (Completely Randomized Design) with 8 treatments which were replicated 3 times. Growing media were prepared as per treatment detail after thoroughly mixing of various ingredient on volume-by-volume basis viz., soil (control), Soil + Poultry Manure (3:1 v/v), Soil + Vermicompost (1:2 v/v), Soil + Farm Yard Manure (1:1 v/v), Soil + Cocopeat + Vermicompost (1:1:1 v/v), Soil + Leaf Mould + Vermicompost (1:1:1 v/v), Soil + Sand + Vermicompost (1:1:1 v/v), Soil + Farm Yard Manure + Rice Husk (1:1:1 v/v).

The interpretations were recorded on various growth, flowering and quality parameters of china aster. Growing media comprising Soil + Leaf Mould + Vermicompost (1:1:1) T₆ recorded maximum plant height (42.21cm), plant spread in N-S (49.07 cm), plant spread E-W cm), number of leaves (354.80), stem diameter (14.43 mm), maximum number of branches (39.67), longest blooming period (42.07 days), maximum number of flower per plant (78.13), individual flower weight (2.69 g) and maximum flower diameter (5.41 cm) at 90 days after transplanting. For some parameters such minimum number of days to first flower bud initiation (41.13), number of days taken for first flower opening (53.47), days taken for 50% flowering (66.00) observed in growing media comprising Soil + Cocopeat + Vermicompost (1:1:1) T₅ and the maximum net return Rs. 36.44 with B:C ratio 1:1.27 was recorded in treatment Soil + Leaf mould+ Vermicompost (1:1:1) T₆.

Keywords: China aster, growing media, vermicompost, Leaf mould, flowering and quality

Introduction

China aster (*Callistephus chinensis*) belongs to ‘Asteraceae’ family and it is china originated. The ploidy level is diploid (2n = 18). It is one of the prominent cut flowers as well as loose flowers grown throughout the world. The increasing admiration of China aster in few year is highly evident from the statistics that Pune alone, it is being grown in an area about 400 ha. with adequate yield of 11–25 tonnes/ha (Janakiram and Manjunath, 2002) ^[4]. It bears magnificent pure white flowers. Productivity and quality of flower crop can be enhanced either by high yielding. It is one of the most significant annual flower crops grown in most areas of the world. Among annual flowers, it ranks third next solely to Chrysanthemum and Marigold .To Raised flower quantity and quality with perfection in the form of plants are significant objectives to be figured in commercial flower production. Although, there are satisfied number of cultivars under cultivation. The blooms are used as cut flower, loose flower and bedding plant, for flower decoration, bouquets, garlands and also landscape gardening to provide mass beauteous effect. In India, china aster is widely grown in Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Maharashtra. China aster is one of the most significant annual flower crops used commercially as cut flower, loose flower and for interior ornamentation. It is also used for edges, herbaceous borders, and potting purpose in landscaping and window boxes. It’s sturdy free blooming, nature, wide spectrum of shape, colours and their long lasting quality have made it as popular cut flower (Janakiram, 2002) ^[4].

Materials and Methods

The research was carried out in the year 2023-2024 at Pt. K.L.S. College of Horticulture and Research Station, Pendri, Rajnandgaon, (C.G.). Chhattisgarh is located between 17°14' - 24°45' northern latitudes and 79°30' - 84°15' eastern longitudes. Rajnandgaon is located at 21° 06' North Latitude, 81° 02' East Longitude, on the banks of the Shivrath River, at an altitude of 307 meters above sea level. The climate of Rajnandgaon is classified as hot and arid. The experiment adopted a completely randomized design with 8 treatments and 3 replicates. All growing media in this study, such as Soil, sand, FYM, vermicompost, cocopeat, poultry manure, leaf mould and rice husk were kept in the sun for solarization before mixing. 8 growing media were prepared as per treatment detail after thoroughly mixing of various ingredient on volume- by-volume basis *viz.*, T₁ – soil (control), T₂ - Soil + Poultry Manure (3:1 v/v), T₃ - Soil + Vermicompost (1:2 v/v), T₄ - Soil + Farm Yard Manure (1:1 v/v), T₅ - Soil + Cocopeat + Vermicompost (1:1:1 v/v), T₆ - Soil + Leaf Mould + Vermicompost (1:1:1 v/v), T₇ - Soil + Sand + Vermicompost (1:1:1 v/v/v) and T₈ - Soil + Farm Yard Manure + Rice Husk (1:1:1v/v/v). The China aster variety Arka Archana used for the experiment was released by IIHR, Bangalore. Purchase 10 g of China Aster variety Arka Archana seeds and receive them in a sealed package within 10 days from the date of purchase. On the evening of December 10, 2023, transfer healthy, disease-free seedlings with 4-6 leaves into plastic bags. Flowering and quality parameters such as Days to first flower bud initiation, Number of days taken for first flower opening, Blooming periods (days), Days taken for 50% flowering, Number of flower per plants, Flower diameter (cm), Individual flower weight (g).

Results and Discussion

Flowering parameters

Days to first flower bud initiation

Minimum days to first flower bud initiation taken in potting mixture T₅ Soil + cocopeat + vermicompost (1:1:1) due to the combined effect of soil with cocopeat improve water holding capacity, minimize compactness, drainage and aeration along with vermicompost get down the pH to optimum level that make easy for plant roots to absorb macro and micronutrient with the higher photosynthetic activity resulted in better carbon : nitrogen ratio. As the C:N ratio increases simultaneously the level of florigen plant hormone also increases and this treatment showed their early vegetative growth so its converted into early reproductive phase as well, which is responsible for earliest bud initiation. similar result was found by Swarupa *et al.* (2019) ^[13] in gerbera on Gerbera.

Number of days taken for first flower opening

T₅ Soil + cocopeat + vermicompost (1:1:1) treatment taken minimum no. of days for first flower opening due to the same treatment recorded early appearance of first flower bud rather than other treatments. Early flowering can also be attributed to the macro and micronutrients, enzymes and growth hormones provided by vermicompost that also contains humic acid, which is known to increase nutrient accumulation in nutrient deficient conditions and the high nitrogen content can increase protein synthesis and promote

early flower growth. The results are similar with finding of Swarupa *et al.* (2019) ^[13] in chrysanthemum.

Blooming periods (days)

Highest blooming period observed in (Soil: leaf mould: vermicompost) media composition, this media composition might have provided proper and balanced dose of macro and micro nutrient, better physico – chemical and biological properties, plant growth hormones and enzymes which prolongs the flower bloom life (Giri *et al.* 2020) ^[12].

Days taken for 50% flowering

T₅ taken minimum days for 50% flowering may be due to adequate application of vermicompost with soil and cocopeat as it is rich in humic acid and helps in the production of gibberellins and cytokinins growth hormone in the early stages of growth and also transports these growth-promoting substances to lateral/axillary buds resulted in breakage of apical dominance in plant, ultimately these processes result in better site for drive/mobilization of photosynthesis which resulted in conversion of vegetative parts of plant to reproductive stage thus leading earliness in flowering (Patel *et al.* 2011) ^[9]. The finding was attentively in agreement with Patel *et al.* (2011) ^[9] on marigold.

No. of flower per plant

The maximum number of flower observed in potting mix T₆ Soil + Leaf mould + Vermicompost (1:1:1) that might be due to the increase in carbohydrate reserves and the absorption of all the nutrients. Likewise, increased availability of essential elements at critical growth stages and increased number of branches leads to production of more number of flower. These findings are in agreement with the results of Kameswari *et al.* (2014) in chrysanthemum and Lokhande *et al.* (2019) ^[7] in marigold.

Quality parameters Flower diameter (cm)

Maximum flower diameter recorded in T₆ Soil + Leaf mould + Vermicompost (1:1:1) potting mix. The increase in flower diameter may be related to the optimum growing condition of (soil: leaf mould: vermicompost) that contains many nutrients and hormones that promote flower growth and acquire photosynthates in Flower (sink) from leaves (source) (Shadanpour *et al.* 2011). The continuous availability of photosynthates, cell elongation, cell division and cell enlargement stay on peak resulted in maximum flower diameter. The finding was nearly in agreement with Kiran *et al.* (2007) in dahlia, Sardeoie *et al.* (2014) ^[11] in zinnia.

Individual flower weight (g)

Maximum flower weight observed in T₆ Soil + Leaf mould + Vermicompost (1:1:1) may be due to the high content of nutrients in the potting mix including Nitrogen, Phosphorus, potassium, Calcium, Magnesium, Iron, Manganese, Zinc, Copper and Boron the uptake of which has a positive effect on plant nutrition, photosynthesis, the content of chlorophyll in the leaves which improves the content of the different plant components like flower weight (Mandavi 2023) ^[8]. The finding is similarly in agreement with Mandavi *et al.* (2023) ^[8] in china aster in Gladiolus and Sahu *et al.* (2023) ^[10] in Calendula.

Table 1: Effect of different growing media on flowering parameter in China aster

Treatment	Days to first flower bud initiation	Number of days taken for first flower opening	Blooming periods (days)	Days taken for 50% flowering	No. of flower per plant
T ₁	58.40	71.27	18.40	86.00	31.13
T ₂	55.67	68.40	23.33	81.33	50.33
T ₃	46.27	59.47	30.53	73.67	71.07
T ₄	48.73	63.33	25.73	79.00	62.47
T ₅	41.13	53.47	34.47	66.00	74.13
T ₆	42.03	54.53	42.07	68.67	78.13
T ₇	44.07	56.40	31.27	72.33	66.67
T ₈	47.20	60.13	28.33	76.33	59.93

Table 2: Effect of different growing media on quality parameters in China aster

Treatment	Flower diameter (cm)	Individual flower weight (g)
T ₁	4.39	1.20
T ₂	4.63	1.65
T ₃	4.95	2.04
T ₄	4.78	1.92
T ₅	5.07	2.40
T ₆	5.41	2.69
T ₇	5.03	2.22
T ₈	4.82	2.02

Conclusion

On the basis of results obtained from the experiment most of the important parameters viz., number of branches per plant, plant spread, stem diameter, Blooming period, No. of flower, Flower diameter and individual flower weight was found superior on the treatment Soil + Leaf mould+ Vermicompost T₆. The treatment Soil + Cocopeat + Vermicompost T₅ found superior for some parameters like days taken to first flower bud initiation, number of days taken for first flower opening and days taken for 50% flowering. T₅ shown great response for plant height and no. of leaves at 30 DAT which was at par with T₆ but its overtaken by T₆ at 60 and 90 DAT. Hence T₆ along with T₅ may be recommended for the production of china aster plant in the pot.

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