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Effect of different growing media on growth and flower yield of calendula (*Calendula officinalis* L.)

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Abstract

The present investigation entitled “Effect of different growing media on growth and flower yield of calendula (*Calendula officinalis* L.)” was carried out during the year 2021-22 in Rabi season at Department of Floriculture and Landscape Architecture, Pt. KLS College of Horticulture and Research Station, Rajnandgaon (C.G.). The growing media were used T₁ Soil (Control), T₂ Soil + Vermicompost, T₃ Soil + F.Y.M., T₄ Soil + Cocopeat, T₅ Soil + Leaf mould, T₆ Soil + Rice husk, T₇ Soil + Vermicompost + Cocopeat, T₈ Soil + Vermicompost + Leaf mould, T₉ Soil + Vermicompost + Rice husk, T₁₀ Soil + F.Y.M. + Cocopeat, T₁₁ Soil + F.Y.M. + Leaf mould, T₁₂ Soil + F.Y.M. + Rice husk. The experimental results revealed that minimum number of days taken for first bud emergence (26.20 days), minimum days to opening of flower from bud emergence (9.27 days), maximum flower longevity (7.40 days), maximum fresh weight of flower (12.90 gm) and maximum diameter of fully opened flower (6.51 cm) was recorded under the treatment containing Soil + Vermicompost + Leaf mould (T₈).

Keywords: Calendula (*Calendula officinalis* L.), growing media, soil, vermicompost, F.Y.M., cocopeat, leaf mould, rice husk

Introduction

Calendula is an annual or short-lived, perennial herb in the daisy family (Asteraceae) originating from Southern Europe and the Eastern Mediterranean area. It is also known as English marigold or pot marigold. It is a scented herbaceous perennial with sparsely branching lax or erect stems that grows up to 80 cm tall. The leaves are oblong-lanceolate in shape, 5-17 cm long, hairy on both sides and have whole or faintly serrated margins.

The inflorescences are yellow with a thick capitulum or flower head of 4-7 cm in diameter and two rows of hairy bracts surrounding the central disc florets; on the wild plant, they have a single ring of ray florets surrounding the central disc florets. The tubular disc florets are hermaphrodite and have a more vivid orange-yellow colour than the female, tridentate, peripheral ray florets. The fruit is a thorny curved achene and weight in average 10.1 mg.

Calendula is used as cut flowers, border annuals, dry flower, calendula loose flower and oil purpose etc. It is also used for its medicinal properties like anti-inflammatory, anti-septic, antiviral, anti-bacterial, and immune-boosting effects. calendula has been for long a popular domestic remedy for skin problems, ranging for bites, stings to wounds and even various veins.

Calendula is grown throughout the world. Its Large-scale production is being done in China, USA, South Europe, India and also Columbia (French Institute of Pondicherry, 2014). In India, it is cultivated in West Bengal, Assam, Uttar Pradesh, Punjab, Karnataka, Tamil Nadu and Pune etc (Assam Science Technology and Environment Council, 2014).

Media is the substrate that provides physical support, moisture and aeration to the growing plant, which also play a vital role in growth and development of plants. The important potting media are- soil, vermicompost, farm yard manure, cocopeat, leaf mould and rice husk etc.

A good growing media should be used for good quality flower production. Characteristics of different material used as substrate have the direct and indirect effects on plant growth and crop production. The characteristics of ideal growing medium for its successful cultivation are porous with better aeration, well drained, good water holding capacity, easily availability with cheapest price. Therefore, standardization of a suitable growing medium for its cultivation is of utmost importance.

To obtain a growing medium with almost all required properties, it is necessary to choose growing medium components that will complement each other on the properties (Anonymous, 2012) [1].

Materials and Methods

The research was conducted at the Horticultural Research cum Institutional Farm, Pt. KLS College of Horticulture and Research Station Pendri, Rajnandgaon which earlier came under IGKV Raipur currently in MGVVV Durg, Chhattisgarh, during the year 2021-22. The field is graphically located at about 21.100 N latitude and 81.030 E longitudes with an average altitude of 307 m. above the mean sea level. The property of soil used in experiment was 7.5 pH, Electrical conductivity (0.62dSm^{-1}), Available nitrogen (150 kg/ha.), Phosphorus (0.16 kg/ha.), Potassium (213 kg/ha.), Zinc (1.30 mg/kg) and organic carbon (0.3%).

The experiment was conducted in Completely Randomized Design having twelve treatments including three replications. Transplanting was done on November 26, 2021. Twelve treatments comprising of T₁ Soil (Control), T₂ Soil + Vermicompost, T₃ Soil + F.Y.M., T₄ Soil + Cocopeat, T₅ Soil + Leaf mould, T₆ Soil +Rice husk, T₇ Soil + Vermicompost + Cocopeat, T₈ Soil + Vermicompost+ Leaf mould, T₉ Soil + Vermicompost +Rice husk, T₁₀ Soil + F.Y.M. + Cocopeat, T₁₁ Soil + F.Y.M. + Leaf mould, T₁₂ Soil + F.Y.M. +Rice husk.

Observation were taken for Flowering parameters viz. Number of days taken for first bud emergence, Days to opening of flower from bud emergence, Flower longevity and Quality parameters viz. Fresh weight of flower (gm), Diameter of fully opened flower (cm).

Results and Discussion

Flowering parameters

1. Number of days taken for first bud initiation: The minimum days taken for first bud emergence (26.20 days) was recorded in application of treatment Soil + Vermicompost + Leaf mould (T₈) and Maximum days taken for first bud emergence (57.22 days) was observed Soil (T₁).

The combined influence of growing media improve drainage, aeration, lower compactness along with Leaf mould and Vermicompost bring down the pH to optimum level for availability of macro and micro nutrient uptake by plant root system which help to improve water holding capacity and

higher photosynthetic activity result in better C:N ratio. When C:N ratio improve, simultaneously florigen plant hormone level also improves, which is responsible for earliest flower bud initiation, flower bud show colour. Similar findings have been reported by Dingdrodiya *et al.* (2017) [6] in Rose.

2. Days to opening of flower from bud emergence: Significantly minimum days to opening of flower from bud emergence (9.27 days) was observed with application of Soil + Vermicompost + Leaf mould (T₈) and longest days to opening of flower from bud emergence (16.87 days) was noted under Soil (T₁).

It might be due to the vigorous growth of the plant growing in the media and the rapid uptake of nutrient and water has a pronouns effect on production Padhiyar *et al.* (2017) [13]. Similar results were reported by Kiran *et al.* (2007) [10] in Dahlia.

3. Flower longevity: Among the different combination of growing media Soil + Vermicompost + Leaf mould recorded maximum flower longevity (7.40 days) Whereas Soil was reported minimum flower longevity (5.43 days).

The increase in flower longevity might be due to the fact that organic substrate contains optimum levels of essential nutrients that produces quality flowers giving superior longevity of flowers on plant. Similar findings recorded by Ikram *et al.* (2012) [8] in tuberose.

Quality parameters

1. Fresh weight of flower (gm): The maximum fresh weight of flower (12.90 gm) was observed in application of Soil + Vermicompost + Leaf mould (T₈). Significantly minimum fresh weight of flower (5.22 gm) obtained in treatment Soil (T₁).

Reason of maximum fresh weight of flower might be due to more availability of nutrients, media and genetic makeup. Similar findings have been reported by Chauhan *et al.* (2014) [5] in gerbera, Padhiyar *et al.* (2017) [13] in chrysanthemum.

Table 1: Reason of maximum fresh weight of flower might be due to more availability of nutrients

Notation	Treatment	Number of days taken for first bud initiation	Days to opening of flower from bud emergence	Flower longevity	Fresh weight of flower (gm)	Diameter of fully opened flower (cm)
T ₁	Soil (control)	57.22	16.87	5.43	5.22	4.78
T ₂	Soil + Vermicompost	28.40	13.00	6.87	7.37	5.98
T ₃	Soil + F.Y.M.	28.47	13.13	6.71	7.40	5.62
T ₄	Soil + Cocopeat	55.53	15.40	6.52	6.52	4.95
T ₅	Soil + Leaf mould	33.73	13.87	6.58	7.53	6.10
T ₆	Soil + Rice husk	47.27	14.27	6.53	6.60	5.03
T ₇	Soil + Vermicompost + Cocopeat	28.67	13.87	6.67	8.37	6.26
T ₈	Soil + Vermicompost+ Leaf mould	26.20	9.27	7.40	12.90	6.51
T ₉	Soil + Vermicompost + Rice husk	28.27	12.27	7.00	8.67	6.36
T ₁₀	Soil + F.Y.M. + Cocopeat	28.47	13.53	6.70	8.39	6.32
T ₁₁	Soil + F.Y.M. + Leaf mould	27.53	11.47	7.17	9.88	6.48
T ₁₂	Soil + F.Y.M. + Rice husk	27.73	12.07	7.07	9.59	6.41
	S.Em±	0.69	0.68	0.22	0.21	0.23
	C.D. at 5%	2.02	1.99	0.65	0.61	0.68
	C.V. (%)	3.43	8.86	5.71	4.38	6.83

2. Diameter of fully opened flower (cm): The maximum diameter of fully opened flower (6.51 cm) was observed in application of Soil + Vermicompost + Leaf mould (T₈) and minimum diameter of fully opened flower (4.78 cm) was

noted in treatment Soil (T₁). The increase flower diameter might be due to the rapid mobilization and accumulation of metabolites influence floral morphogenesis. Which results in larger flower. Furthermore, better translocation of the food

materials in the flowers, which increases the resistance of the sink, may have influence the diameter of the flower. similar results were also reported by Kiran *et al.* (2007)^[10] in dahlia, Padhiyar *et al.* (2017)^[13] in chrysanthemum.

Conclusion

On the basis of present investigation, it may be concluded that among various growing media combination treatment Soil + Vermicompost + Leaf mould (T₈) was found best over all the growing media treatments for Number of days taken for first bud emergence, Days to opening of flower from bud emergence, Flower longevity and Quality parameters *viz.* Fresh weight of flower (gm), Diameter of fully opened flower (cm). In research Soil (T₁) was found most inferior among the all treatments.

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