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Performance of strawberry (*Fragaria* × *Ananassa* Duch.) cv. 'Sweet Sensation' as influenced by different growing media under shadenet conditions

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ABSTRACT

A field experiment was conducted at the Instructional Farm, Dr. Sharadchandra Pawar College of Agriculture, Baramati during the Rabi season of 2025–26 to study the influence of different growing media on plant growth and fruit yield of strawberry (*Fragaria* × *ananassa* Duch.) grown in growbags under shadenet conditions. The experiment was laid out in a Factorial Completely Randomized Design (FCRD) with three growing media, namely red soil + FYM (T_1), red soil + cocopeat (T_2) and red soil + vermicompost (T_3), with three replications. Growing media significantly influenced plant growth and yield attributes of strawberry. Among the growing media, red soil + vermicompost (T_3) recorded the highest plant height, leaf area and chlorophyll content, with values of 27.61 cm, 117.96 cm² and 46.34 SPAD units, respectively, at 120 days after transplanting. It also recorded the highest number of fruits per plant (17.17), average fruit weight (24.28 g) and fruit diameter (58.11 mm). The highest fruit yield was recorded with T_3 (14.08 t ha⁻¹), followed by red soil + cocopeat (T_2) (11.47 t ha⁻¹) and red soil + FYM (A_1) (9.04 t ha⁻¹). Thus, red soil + vermicompost was found to be the most suitable growing medium for obtaining superior plant growth and higher fruit yield of strawberry under shadenet grow-bag conditions.

Keywords: Strawberry, Growing media, Vermicompost, Cocopeat, Growbag, Shadenet, Plant growth, Fruit yield

Introduction

Strawberry (*Fragaria* × *ananassa*) is among the most widely consumed soft berries around the world (Thoudam, 2022) [1]. Although it is a temperate crop, it can also be successfully grown in tropical and sub-tropical regions. It belongs to the Rosaceae family. The cultivated garden strawberry is an octoploid species ($2n = 8x = 56$) with a base chromosome number of $x = 7$. It is a hybrid derived from a cross between *Fragaria virginiana* and *Fragaria chiloensis* and is thought to have originated in Europe (Unal et al., 2023; Finn, 2013; Singh et al., 2022) [3, 2, 4]. This herbaceous perennial is a short-day plant, thriving best in day-time temperatures between 22 °C and 25 °C and nighttime temperatures between 7 °C and 13 °C (De et al., 2012) [5].

Strawberry cultivation in India is mainly concentrated in Maharashtra, Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Uttarakhand, Uttar Pradesh, West Bengal and Rajasthan (Rana et al., 2003) [6]. The Mahabaleshwar–Panchgani region of Maharashtra is the major strawberry-producing belt in the country. Strawberry cultivation is gradually expanding to other regions due to increasing consumer demand and adoption of protected cultivation technologies (National Horticulture Board, 2024) [7].

Vermicompost is an important organic component of growing media due to its favourable physical, chemical and biological properties. It improves nutrient availability, water-holding capacity, aeration, porosity and microbial activity, thereby promoting root growth, nutrient uptake, vegetative growth, flowering, fruit set and yield in strawberry (Abul-Soud et al., 2015; Yeganeh et al., 2024) [8, 9]. Farmyard manure (FYM) improves the structure, moisture retention, microbial activity and fertility of the growing medium. Its gradual release of nutrients supports root development, vegetative growth, flowering, fruit development and yield (Zuo et al., 2018; Mehta et al., 2023) [10]. Cocopeat provides high water-holding capacity, good aeration, low bulk density and adequate porosity. It creates a favourable root-zone environment, improving root growth, nutrient uptake, plant establishment and ultimately fruit yield and quality (Gruda, 2012; Wahlang et al., 2024) [11]. Red soil provides plant support and mineral nutrients but generally has limited organic matter and water-holding capacity. Incorporation of vermicompost, FYM and cocopeat improves its physical, chemical and biological properties, creating a favourable root environment for better growth and yield of strawberry (Gruda, 2019; Mehta et al., 2023) [12, 10]

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Strawberries are traditionally grown in open fields, shade net cultivation offers advantages such as moderated temperatures, reduced pest pressure and improved fruit quality. Similarly, the selection of appropriate growing media plays a crucial role in ensuring proper root development, water retention and nutrient availability.

Material and Methods

The experiment was conducted at the Instructional Farm, Dr. Sharadchandra Pawar College of Agriculture, Baramati, Maharashtra, during Rabi season 2025–26 under a shadenet house. Strawberry (*Fragaria × ananassa* Duch.) cv. Sweet Sensation (FL 09 127) was used as planting material. Healthy runners were transplanted during the second week of October into growbags of 30 × 30 × 30 cm³ containing the respective growing media.

Three growing media viz., red soil + FYM (1:1), red soil + cocopeat (1:1) and red soil + vermicompost (1:1) were evaluated. The experiment was conducted in a Factorial Completely Randomized Design (FCRD). Irrigation was provided through the pegger system, while fertigation and other cultural practices were followed as per the experimental schedule.

Observations on plant height, leaf area and chlorophyll content were recorded to assess plant growth, while number of fruits plant⁻¹, average fruit weight, fruit diameter, fruit yield plant⁻¹ and fruit yield (t ha⁻¹) were recorded as yield-related parameters. The recorded data were subjected to analysis of variance (ANOVA) appropriate for FCRD following Panse *et al.* (1989) [13]. Treatment differences were tested at the 5 per cent level of significance, and critical difference (CD) was calculated wherever the *F*-test was significant.

Result and Discussion

Effect of growing media on plant growth

The growing media significantly influenced the plant growth of strawberry from 60 days after transplanting (DAT) onwards, whereas the differences at 30 DAT were non-significant. Among the growing media, T₃ (red soil + vermicompost) recorded the highest plant height of 21.81 cm, 23.38 cm and 27.61 cm at 60, 90 and 120 DAT respectively. It was followed by T₂ (red soil + cocopeat) with 20.30 cm, 21.30 cm and 25.63 cm, while the lowest values were recorded under T₁ (red soil + FYM) with 18.85 cm, 20.40 cm and 24.40 cm, respectively. Thus, T₃ was significantly superior to the other media at the

later growth stages. The superior plant height under vermicompost-based media may be attributed to improved nutrient availability and favourable root-zone conditions, which promoted root activity and nutrient uptake. Similar improvement in strawberry vegetative growth with vermicompost application was reported by Uddin *et al.*, (2015) [14].

Growing media also significantly affected leaf area from 60 DAT onwards. The maximum leaf area was recorded under T₃, increasing from 80.35 cm² at 60 DAT to 102.14 cm² at 90 DAT and 117.96 cm² at 120 DAT. T₂ recorded 74.97 cm², 96.08 cm² and 114.01 cm², whereas T₁ recorded the minimum values of 69.83 cm², 89.80 cm² and 109.50 cm², respectively. The larger leaf area under red soil + vermicompost may be associated with better moisture retention, aeration and nutrient availability, which favored root development and leaf expansion. The greater photosynthetic surface under T₃ would also have supported higher assimilate production and subsequently contributed to improved fruit development and yield. Similar beneficial effects of suitable growing media on vegetative growth of strawberry have been reported by Sharma *et al.*, (2022) [15] and Singh *et al.*, (2024) [16].

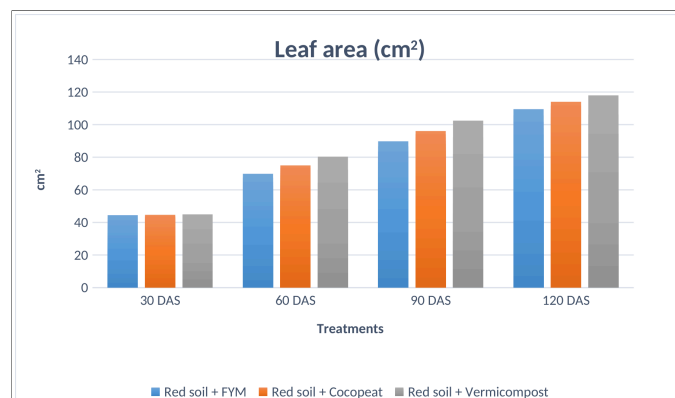
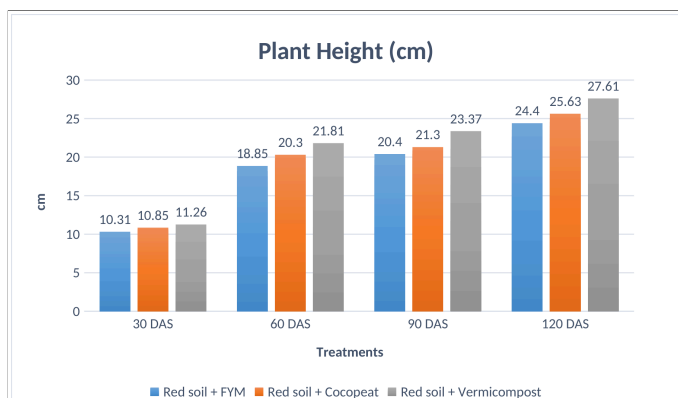
The growing media significantly influenced chlorophyll content from 60 DAT onwards, while the effect was non-significant at 30 DAT. The highest chlorophyll content was recorded under T₃, with 42.25 SPAD units, 44.81 SPAD units and 46.34 SPAD units at 60, 90 and 120 DAT, respectively followed by T₂ with 39.84 SPAD units, 42.59 SPAD units and 44.72 SPAD units. The lowest values were recorded under T₁ with 36.07 SPAD units, 40.74 SPAD units and 43.01 SPAD units, respectively. The higher chlorophyll content under vermicompost-based media may be attributed to improved nutrient and water availability and favourable root-zone conditions, which supported better nutrient uptake and maintenance of active foliage. The higher chlorophyll content together with greater leaf area indicates better photosynthetic potential under A₃, which may have contributed to greater assimilate production and subsequent yield.

Table 1.

Treatment no.	Treatment details
T ₁	Red soil + FYM (1:1)
T ₂	Red soil + Cocopeat (1:1)
T ₃	Red soil + Vermicompost (1:1)

Table 2. Effect of growing media on plant height in strawberry cv. Sweet Sensation

Treatments	Plant Height (cm)			
	30 DAT	60 DAT	90 DAT	120 DAT
Red soil + FYM (1:1)	10.31	18.85	20.40	24.40
Red soil + Cocopeat (1:1)	10.85	20.30	21.30	25.63
Red soil + Vermicompost (1:1)	11.26	21.81	23.38	27.61



Effect of growing media on fruit yield

The growing media significantly influenced the yield-contributing characters and fruit yield of strawberry. Among the growing media, T₃ (Red soil + vermicompost) recorded the highest number of fruits per plant (17.17), average fruit weight (24.28 g) and fruit diameter (58.11 mm), followed by T₂ (Red soil + cocopeat) with (15.65 fruits plant⁻¹), (21.73 g) and (57.00 mm), respectively. The lowest values were recorded under A₁ (Red soil + FYM), with (14.25 fruits plant⁻¹), (18.93 g) and (56.05 mm), respectively. The superiority of vermicompost-based media may be attributed to its favourable physical, chemical and biological properties, particularly better nutrient availability, moisture retention and root-zone conditions, which promoted root activity, nutrient uptake and fruit development.

Fruit yield was significantly influenced by the growing media. Red soil + vermicompost (T₃) recorded the highest fruit yield of 14.08 t ha⁻¹, followed by red soil + cocopeat (T₂) with 11.47 t ha⁻¹, while the lowest yield of 9.04 t ha⁻¹ was recorded under red soil + FYM (T₁). The higher yield under T₃ can be related to the combined effect

of greater fruit number, fruit weight and fruit diameter, which ultimately resulted in higher total fruit production of strawberry under shadenet growbag conditions.

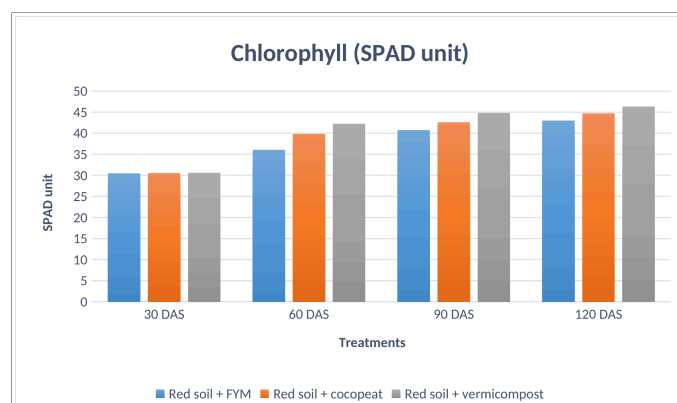
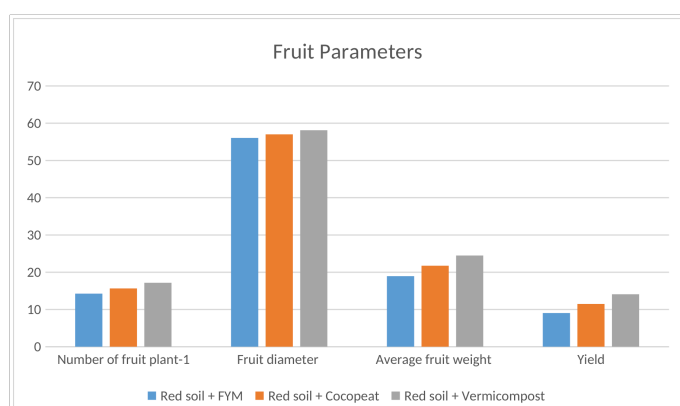


Table 3. Effect of growing media on leaf area (cm²) and chlorophyll (SPAD unit) in strawberry cv. Sweet Sensation

Treatments	leaf area (cm ²)				Chlorophyll (SPAD unit)			
	30 DAT	60 DAT	90 DAT	120 DAT	30 DAT	60 DAT	90 DAT	120 DAT
Red soil + FYM (1:1)	44.44	69.83	89.80	109.50	30.48	36.07	40.74	43.01
Red soil + Cocopeat (1:1)	44.63	74.97	96.08	114.01	30.53	39.84	42.59	44.72
Red soil + Vermicompost (1:1)	44.91	80.35	102.43	117.96	30.59	42.25	44.81	46.34

Table 4. Effect of growing media on Number of fruits plant⁻¹, Fruit diameter, Average fruit weight, Yield in strawberry cv. Sweet Sensation

Treatments	Number of fruit plant ⁻¹	Fruit diameter (mm)	Average fruit weight (gm)	Yield (t ha ⁻¹)
Red soil + FYM (1:1)	14.25	56.05	18.93	9.04
Red soil + Cocopeat (1:1)	15.65	57.00	21.73	11.47
Red soil + Vermicompost (1:1)	17.17	58.11	24.28	14.08



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