International Journal of Research in Agronomy 2025; 8(9): 865-869

International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X

NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(9): 865-869
Received: 19-07-2025
Accepted: 22-08-2025

Chumeshwari
M.Sc. Horticulture, Department of Plantation, Spices, Medicinal and Aromatic Crops, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Karuna Sidar
M.Sc. Horticulture, Department of Plantation, Spices, Medicinal and Aromatic Crops, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Ritu Sharma
M.Sc. Horticulture, Department of Plantation, Spices, Medicinal and Aromatic Crops, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Tanuja Verma
M.Sc. Horticulture, Department of Plantation, Spices, Medicinal and Aromatic Crops, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Prakash Sahu
M.Sc. Horticulture, Department of Plantation, Spices, Medicinal and Aromatic Crops, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Chitra Sahu
M.Sc. Horticulture, Department of Fruit science, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Chandra Seni
M.Sc. Horticulture, Department of Vegetable science, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Shakina
M.Sc. Horticulture, Department of Fruit science, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Tikeshwar Sahu
M.Sc. Horticulture, Department of Fruit science, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Alok Singh Bargah
Ph.D. Research Scholar, Department of Forest Product and Utilization, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Corresponding Author:
Chumeshwari
M.Sc. Horticulture, Department of Plantation, Spices, Medicinal and Aromatic Crops, Mahatma Gandhi University of Horticulture & Forestry, Sankara, Patan, Durg, Chhattisgarh, India

Effect of different growing media on yield parameter of Aloe Vera (*Aloe barbadensis*) in Durg district of Chhattisgarh.

Chumeshwari, Karuna Sidar, Ritu Sharma, Tanuja Verma, Prakash Sahu, Chitra Sahu, Chandra Seni, Shakina, Tikeshwar Sahu and Alok Singh Bargah

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i9l.3870

Abstract
An experiment was conducted during 2024–2025 at the Shade Net House, Horticulture Farm, Department of Plantation, Spices, Medicinal and Aromatic Crops, College of Horticulture and Research Station, Sankara-Patan, Durg (Chhattisgarh), to evaluate the effect of growing media on the yield of Aloe Vera (*Aloe barbadensis* Mill.). Among the treatments, T_1 (Vermicompost + Sand + Soil) exhibited superior performance across most yield parameters at 180 DAP. Plants in T_1 achieved the highest number of leaves plant^{-1} (7.20), breadth of leaves (4.66 cm), thickness of leaves (1.05 cm), leaf weight per plant (533.03 g), gel yield/leaf (28.08 g), gel yield/ plant (0.186 kg). In contrast, T_0 control (Sand + Soil) consistently showed the lowest values indicating poor yield performance. Statistical analysis revealed significant differences among treatments for most parameters at 120 and 180 DAP, except for Sucker height which were non-significant (NS). Overall, Vermicompost-based medium (T_1) promoted optimal leaf development and Gel yield in Aloe vera. These findings highlight the potential of T_1 as an efficient medium for commercial cultivation under controlled environments.

Keywords: Aloe vera, growing media, vermicompost, growth, gel yield

1. Introduction
Aloe Vera is a perennial succulent that grows to a height of approximately 60–80 cm. Aloe Vera is xerophytic plant with short and thick stems, fibrous roots and evergreen leaves arranged in a rosette form. The leaves are spear-shaped, fleshy and covered with a waxy cuticle, having thorny margins. Aloe produces bright red to yellow flowers on nearly branched inflorescences. Due to its protoandrous nature, in which the anthers mature before the pistil and the filament is longer than the pistil, the plant is self-incompatible and relies primarily on bees for pollination. Mature fruits develop into capsules.
The name "*Alloeh*" derives from Arabic, meaning "shining bitter substance," while "*vera*" is Latin for "true" (Christaki and Florou-Paneri, 2010) [5]. Among more than 400 reported species, *Aloe arborescens* and *Aloe barbadensis* are the most widely cultivated for commercial purposes (Moghaddasi and Verma, 2011; Manvitha and Bidya, 2014) [11, 10]. The species grows predominantly in arid and semi-arid regions of Asia, Africa, Europe and the Americas. Structurally, its leaves consist of an outer green parenchyma enclosing a thick, mucilaginous, colorless gel rich in bioactive compounds (Surjushe *et al.*, 2008) [20].
Growing media plays a vital role in plant growth and the biosynthesis of multiple metabolites that improve the nutritional profile of young seedling (Sukewijaya *et al.*, 2025) [19]. Growing media are used to support the growth of plants and they perform four major functions uphold the roots, supply nutrients, water and air. Good quality media also provide physical support to plants and maximum root growth (Grunert *et al.*, 2016) [6]. Soil is the fundamental resource for growing horticultural crops, playing a crucial role in plant health, growth and productivity. (Cannavo *et al.*, 2025) [4]. Sand is an important natural substrate for plant growth. (Richardson *et al.*, 2025) [15]. Blouin *et al.* (2019) [3] reported that applying vermicompost at 30–50% soil volume

increased commercial crop yields by 26%, shoot biomass by 78% and root biomass by 57%. Furthermore, vermicompost fosters antagonistic microbial populations in the rhizosphere, which suppress plant pathogens and pests (Sarma *et al.*, 2010) [16]. Its eco-friendly nature makes it a sustainable alternative to chemical fertilizers, helping to reduce environmental pollution while improving soil health (Pathma and Sakthivel, 2012) [13]. Coco peat, with its high porosity and water retention capacity, has been recognized as a sustainable medium for water-scarce regions, as it reduces irrigation frequency while maintaining soil moisture. Azospirillum is a free-living bacteria promote the yield and growth of plants (Sun *et al*., 2025) [20]. Ghanjeevamrit improve crop productivity by providing sustainable and balanced nutrient (Pushkarna *et al*., 2025) [14]. Garden soil functions as a baseline medium when supplemented with organic amendments, supports sustainable cultivation by reducing reliance on synthetic inputs (Hussain *et al.*, 2014) [8]. Neem cake, with its antifungal and insect repellent properties, also plays an important role in integrated pest management and organic farming systems (Saurabh *et al.*, 2021) [17].

2. Materials and Methods

The experiment was conducted during the year 2024–2025 in the shade net house of the Horticulture Farm, Department of Plantation, Spices, Medicinal and Aromatic Crops, College of Horticulture and Research Station (CHRS), Sankara-Patan, Durg, Chhattisgarh. The experiment was laid out in a Completely Randomized Design (CRD) with seven treatments *viz*. T_0 Control (Soil + Sand), T_1 (Vermicompost + Soil + Sand), T_2 (Coco peat + Soil + Sand), T_3 (Azospirillum + Soil + Sand), T_4 (Garden soil + Soil + Sand), T_5 (Ghanjeevamrit + Soil + Sand), T_6 (Neem cake + Soil + Sand) replicated three times. Each treatment consisted of 30 plants. The trial was conducted in polybags of size 15 × 15 cm filled with treatment-specific growing media (T_0-T_6). The bags were arranged according to designated treatment groups. Uniform Aloe Vera suckers with 2–3 leaves, 8–10 cm height and free from insect and pest were selected as planting material. Suckers were planted in each polybag filled with growing media according to treatments. The growth and yield parameter were measured including number of leaves plant^{-1}, breadth of leaves (cm), thickness of leaves (cm), sucker height(cm), weight of single leaf (g), leaf weight / plant (g), gel yield / leaf(g) and gel yield / plant (kg) were recorded at 2, 60, 120 and 180 days after planting (DAP).

Table 1: Growth and Yield Parameters of Aloe Vera (3.1-3.8)

Notation	Treatment details	No. of leaves plant^{-1}			Breadth of leaves (cm)			Thickness of leaves (cm)			Sucker height (cm)			Weight of single leaf (g)	Leaf weight/ plant (g)	Gel yield / Leaf (g)	Gel yield/ plant (kg)
		60 DAP	120 DAP	180 DAP	60 DAP	120 DAP	180 DAP	60 DAP	120 DAP	180 DAP	60 DAP	120 DAP	180 DAP	180 DAP	180 DAP	180 DAP	180 DAP
T_0	Control (Soil + Sand 1:2:1)	4.00	4.67	5.13	1.74	2.18	2.74	0.47	0.51	0.75	0.00	0.00	2.04	66.86	364.97	24.47	0.120
T_1	Vermicompost + Soil + Sand (1:2:1)	4.80	6.47	7.20	2.68	4.04	4.66	0.71	0.80	1.05	0.00	1.28	2.55	76.73	533.03	28.08	0.186
T_2	Cocopeat + Soil + Sand (1:2:1)	4.40	4.73	5.40	2.21	2.99	3.44	0.52	0.58	0.77	0.00	0.97	2.04	68.17	367.49	24.94	0.128
T_3	Azospirillum + Soil + Sand (1:2:1)	4.47	5.33	6.47	2.14	3.62	4.15	0.57	0.75	0.97	0.00	1.05	2.32	75.56	488.75	27.65	0.171
T_4	Garden soil + Soil + Sand (1:2:1)	4.07	4.80	5.80	1.99	2.72	3.59	0.48	0.61	0.83	0.00	1.26	2.06	70.66	409.81	25.86	0.143
T_5	Ghanjeevamrit + Soil + Sand (1:2:1)	4.40	5.27	6.00	2.43	3.21	3.81	0.61	0.67	0.89	0.00	1.22	2.29	74.62	447.67	27.31	0.156
T_6	Neem cake + Soil + Sand (1:2:1)	4.13	5.13	5.93	2.06	2.81	3.64	0.53	0.65	0.85	0.00	0.97	2.20	73.83	437.88	27.02	0.153
S.Em±		0.24	0.35	0.33	-	0.39	0.30	0.215	0.216	0.148	-	-	-	0.560	21.325	0.375	0.006
CD		NS	1.075	1.008	NS	1.112	0.912	0.651	0.656	0.351	NS	NS	NS	1.697	64.682	1.137	0.018

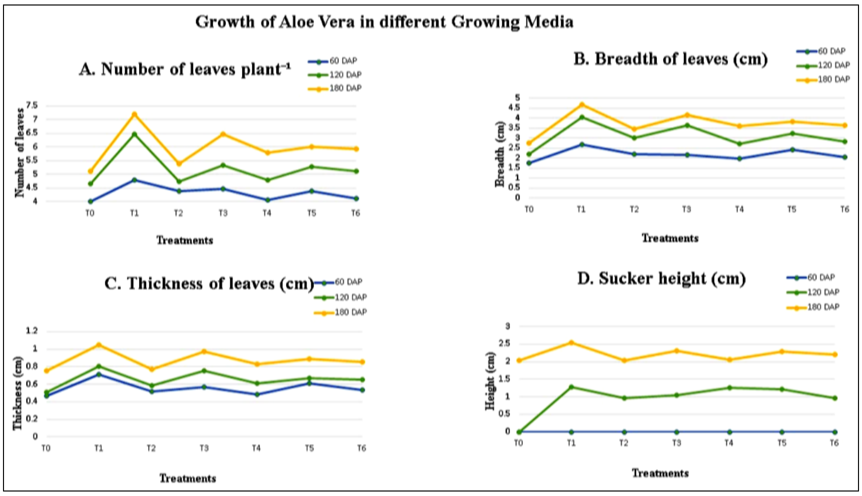

Fig 1: Growth of Aloe vera under different growing media (A – Number of leaves plant^{-1}; B – Breadth of leaves (cm); C – Thickness of leaves (cm); D – Sucker height (cm))

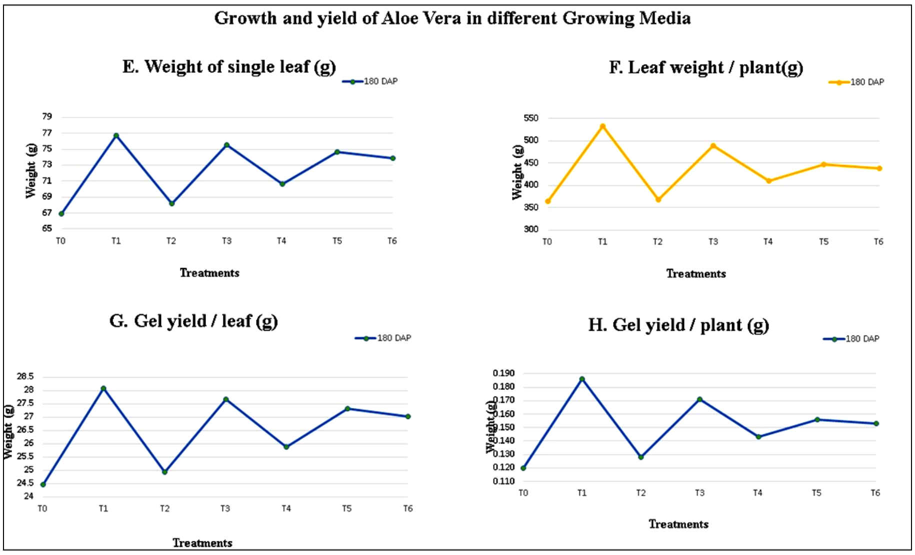

Fig 2: Growth of Aloe vera under different growing media (E – Weight of single leaf; F. – Leaf weight / plant (g); G – Gel yield / leaf; H – Gel yield / plant (g).

3. Results and Discussion

Result of present study revealed that number of leaves plant^{-1}, breadth of leaves, thickness of leaves, leaf weight, leaf yield/plant, gel weight/ leaf and gel yield /plant was significantly influenced by different growing media as presented in table 1.

3.1 Number of Leaves Plant^{-1}

The number of leaves per plant increased progressively from 60 DAP to 180 DAP across all treatments (Table 1). At 60 DAP, the maximum number of leaves (4.80) was recorded in T_1, while the lowest (4.00) was noted in T_0. At 120 DAP, T_1 again showed superiority (6.47), followed by T_3 (5.33), whereas T_0 remained the lowest (4.67). At 180 DAP, T_1 maintained the highest value (7.20), followed by T_3 (6.47) and the minimum was observed in T_0 (5.13).Overall, T_1 was the most effective treatment for enhancing the number of leaves per plant, whereas T_0 consistently showed the lowest performance throughout the growth period. Vermicompost is assumed to be rich availability of enzymes, vitamins, micro and micro elements and growth stimulating hormones which beneficial for growth of medicinal plants more quickly. Through improving N_2 fixation and disbanding phosphorus, it also enhance both nitrogen and phosphorus availability.

3.2 Breadth of Leaves (cm)

The Breadth of leaves increased progressively with plant growth under all treatments ((Table 1).At 60 DAP, the widest leaves (2.68 cm) were observed in T_1, followed by T_5 (2.43 cm), while the narrowest leaves (1.74 cm) were recorded in T_0. At 120 DAP, T_1 again showed the maximum breadth (4.04 cm), followed by T_3 (3.62 cm), whereas T_0 remained the lowest (2.18 cm). At 180 DAP, T_1 maintained superiority with 4.66 cm, followed by T_3 (4.15 cm), while T_0 had the minimum breadth (2.74 cm). Overall, T_1 consistently produced the broadest leaves, indicating it was the most effective treatment for enhancing leaf expansion, whereas T_0 consistently showed the least performance.

Vermicompost is a beneficial macrobiotic manure containing great quantity of humus, micro and macro nutrients, Nitrogen (2 - 3%), Phosphorus (1.55–2.25%), Potassium (1.85–2.25%), high advantageous soil microorganism's alike nitrogen fixation bacteria and mycorrhizal fungi. In many scientific research vermicompost proved as wonder enhancer for plant growth (Chaoui *et al*., 2003; Guerrero 2010; Ansari and Ismail 2012) [, 7, 2].

3.3 Thickness of Leaves (cm)

Thickness of Leaves increased progressively with plant growth across all treatments (Table 1). At 60 DAP, the maximum Thickness of leaves (0.71 cm) was observed in T_1, followed by T_5 (0.61 cm), while the minimum (0.47 cm) was recorded in T_0. At 120 DAP, T_1 again showed the highest Thickness of leaves (0.80 cm), followed by T_3 (0.75 cm), whereas T_0 remained the lowest (0.51 cm). At 180 DAP, T_1 maintained superiority with 1.05 cm, followed by T_3 (0.97 cm), while T_0 recorded the minimum Thickness of leaves (0.75 cm).Overall, T_1 consistently produced the thickest leaves, indicating it was the most effective treatment for improving leaf robustness, whereas T_0 consistently showed the least thickness.

3.4 Sucker Height (cm)

Sucker height increased gradually with plant growth under different treatments (Table 1). At 60 DAP, no suckers had developed in any treatment. There is no significant differences found between the treatments in Sucker height. Dipin (2014) observed that there is no significant difference observed in about 6 month after planting on his experiment.

3.5 Weight of Single Leaf (g)

The weight of individual leaves at 180 DAP varied among the treatments (Table 1). The maximum leaf weight (76.73 g) was recorded in T_1, followed by T_3 (75.56 g) and T_5 (74.62 g), while the minimum (66.86 g) was observed in T_0. Other treatments showed intermediate leaf weights, with T_6 at 73.83 g, T_4 at 70.66 g and T_2 at 68.17 g. Overall, T_6 produced the heaviest leaves, indicating superior leaf growth and biomass accumulation, whereas T_0 had the lowest leaf weight.

3.6 Leaf Weight per Plant (g)

The Leaf weight per plant at 180 DAP differed significantly among the treatments (Table 1). The highest leaf weight per plant (533.03 g) was recorded in T_1, followed by T_3 (488.75 g) and T_5 (447.67 g), while the lowest (364.97 g) was observed in T_0. Other treatments showed intermediate values, with T_6 at

437.88 g, T_4 at 409.81 g and T_2 at 367.49 g. Overall, T_1 was the most effective treatment for enhancing total leaf biomass, whereas T_0 consistently recorded the lowest leaf weight, indicating limited growth under control conditions. Yavari *et al*., (2013) [22] investigated that affirmative effect of vermicompost at Aloe vera leaf weight.

3.7 Gel yield per Leaf (g)

The Gel yield per leaf at 180 DAP varied among treatments (Table 1). The maximum Gel yield (28.08 g) was recorded in T_1, followed by T_3 (27.65 g) and T_5 (27.31 g), while the minimum (24.47 g) was observed in T_0. Other treatments showed intermediate values, with T_6 at 27.02 g, T_4 at 25.86 g and T_2 at 24.94 g. Overall, T_6 produced the highest gel content per leaf, indicating superior quality, whereas T_0 had the lowest gel yield, reflecting limited plant performance under control conditions. Tavali *et al*., (2022) investigated the collective influence of vermicompost on number of bacteria in soil, alkaline phosphatase, β-glycosidase, dehydrogenase, urease and height of the plant, leaf number, herbage yield, sucker number and weight of fresh gel was observed. Additionally examined that in soil bacterial number 140% increased, 125% in urease activity, 122% in alkaline phosphatase activity, 170% in dehydrogenase activity, 123% in β-glycosidase activity, 65% in plant height and 45% in leaf yield and gel weight.

A number of investigation have proven that vermicompost be able to promptly rise production of plant by way of accumulating existing plant nutrients. (Kashem *et al*., 2015; Song *et al*., 2015) [9, 18]

3.8 Gel Yield per Plant (kg)

The Gel yield per plant at 180 DAP showed significant variation among treatments (Table 1). The highest Gel yield (0.186 kg) was recorded in T_1, followed by T_3 (0.171 kg) and T_5 (0.156 kg), while the lowest (0.120 kg) was observed in T_0. Other treatments recorded intermediate values, with T_6 at 0.153 kg, T_4 at 0.143 kg and T_2 at 0.128 kg. Overall, T_6 was the most effective treatment for maximizing gel yield per plant, indicating its superior performance in both growth and quality traits, whereas T_0 consistently produced the lowest yield.

Foregoing research vermicompost has a positive influence on the growth and yield of medicinal plants *viz*. Basil (Anwar *et al*., 2005), Garlic (Arguello *et al*., 2006), Fennel (Darzi *et al*., 2008) and chamomile (Azizi *et al*., 2009).

4. Conclusion

The study demonstrated that significant variations were observed in growth and yield parameters across treatments. Treatment T_1 consistently outperformed the others, exhibiting superior performance in the number of leaves, breadth of leaves, thickness, leaf weight, gel yield /leaf and gel yield/plant at 180 DAP. This indicates that the growing medium used in T_1 is the most suitable for optimizing both growth yield as well as quality attributes of Aloe vera. In contrast, T_0 consistently recorded the lowest values across most parameters, suggesting it is the least effective medium.

These findings provide valuable insights for selecting the optimal growing medium to enhance Aloe vera cultivation for both growth and commercial gel production, aligning with the objective of identifying the best medium for growth and quality attributes.

References

1. Agarwal SB, Singh A, Dwivedi G. Effect of vermicompost, farm yard manure and chemical fertilizers on growth and yield of wheat (*Triticum aestivum* L. var. HD 2643). Plant Arch. 2003;3:9-14.
2. Ansari AA, Ismail SA. Role of earthworms in vermitechnology. J Agric Technol. 2012;8(2):405-15.
3. Blouin M, Barrere J, Meyer N, Lartigue S, Barot S, Mathieu J. Vermicompost significantly affects plant growth: a meta-analysis. Agron Sustain Dev. 2019;39(4):34.
4. Cannavo P, Herbreteau A, Juret D, Martin M, Guénon R. Short-term effects of food waste composts on physicochemical soil quality and horticultural crop production. J Plant Nutr Soil Sci. 2025;188(1):31-44.
5. Christaki EV, Florou-Paneri PC. *Aloe vera*: a plant for many uses. J Food Agric Environ. 2010;8(2):245-9.
6. Grunert O, Reheul D, Van Labeke MC, Perneel M, Hernandez-Sanabria E, Vlaeminck SE, *et al*. Growing media constituents determine the microbial nitrogen conversions in organic growing media for horticulture. Microb Biotechnol. 2016;9(3):389-99.
7. Guerrero RD III. Vermicompost production and its use for crop production in the Philippines. Int J Global Environ Issues. 2010;10(3-4):378-83.
8. Hussain A, Iqbal K, Aziem S, Mahato P, Negi AK. A review on the science of growing crops without soil (soilless culture): a novel alternative for growing crops. Int J Agric Crop Sci. 2014;7(11):833.
9. Kashem MA, Sarker A, Hossain I, Islam MS. Comparison of the effect of vermicompost and inorganic fertilizers on vegetative growth and fruit production of tomato (*Solanum lycopersicum* L.). Open J Soil Sci. 2015;5(2):53-8.
10. Manvitha K, Bidya B. *Aloe vera*: a valuable wonder plant for food, medicine and cosmetic use – a review. J Pharmacogn Phytochem. 2014;2(5):85-8.
11. Moghaddasi S, Verma SK. *Aloe vera*: their chemical composition and applications: a review. Int J Biol Med Res. 2011;2(1):466-71.
12. Manickam NI, Subramanian P. Study of physical properties of coir pith. Int J Green Energy. 2006;3(4):397-406.
13. Pathma J, Sakthivel N. Microbial diversity of vermicompost bacteria that exhibit useful agricultural traits and waste management potential. Springerplus. 2012;1(1):26.
14. Pushkarna M, Sharma RK, Meena RH, Choudhary J, Babu SR, Singh DP. Effect of vermicompost and ghanjeevamrit on growth, yield attributes and productivity of maize (*Zea mays* L.). Int J Environ Agric Biotechnol. 2025;10(4):620071.
15. Richardson P, Goings P, Markel B, Dixon J, Ahmad S, Albert, *et al*. Growth of beach-adapted plants in recycled glass sand compared to natural beach sand. Plant Soil. 2025;1-18.
16. Sarma BK, Singh P, Pandey SK, Singh HB. Vermicompost as modulator of plant growth and disease suppression. Dyn Soil Dyn Plant. 2010;4(1):58-66.
17. Saurabh JR, Ali S, Khandwe R. Impact of integrated nutrient management on growth and yield of okra [*Abelmoschus esculentus* (L.) Moench]. Int J Chem Stud. 2021;9(2):302-5.
18. Song X, Liu M, Wu D, Griffiths BS, Jiao J, Li H, *et al*. Interaction matters: synergy between vermicompost and

PGPR agents improves soil quality, crop quality and crop yield in the field. Appl Soil Ecol. 2015;89:25-34.
19. Sukewijaya IM, Dwiyani R, Bimantara PO. Optimization of growing media to support microgreens growth and nutritional profile. Agro Bali Agric J. 2025;8(1):102-13.
20. Sun W, Shahrajabian MH, Wang N. A study of the different strains of the genus *Azospirillum* spp. on increasing productivity and stress resilience in plants. Plants. 2025;14(2):267.
21. Surjushe A, Vasani R, Saple D. *Aloe vera*: a short review. Indian J Dermatol. 2008;53(4):163-6.
22. Yavari Z, Moradi H, Sadeghi H, Barzegar GB. Evaluation of *Aloe vera* (*Aloe barbadensis* Miller) antioxidant activity and some morphological characteristics in different vermicompost field. J Chem Health Risks. 2013;3(4):19-28.