International Journal of Advanced Biochemistry Research 2025; SP-9(12): 1023-1025

International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; SP-9(12): 1023-1025
www.biochemjournal.com
Received: 15-10-2025
Accepted: 18-11-2025

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Performance of Amaranthus (*Amaranthus* spp.) genotypes under different organic growing media in shade net condition

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DOI: https://www.doi.org/10.33545/26174693.2025.v9.i12Sm.6650

Abstract

The present study evaluated the performance of Amaranthus (*Amaranthus* spp.) genotypes under different organic growing media was carried out in 2024-2025 during the *Rabi* season at College of Horticulture, Dr. B.S.K.K.V., Dapoli. The experiment consisted of three Amaranthus genotypes and four organic growing media arranged in a factorial randomized block design with three replications. Growth and yield parameters such as days required for germination, plant height, number of leaves, leaf length, number of harvest cycles and yield were recorded. The treatment combination T_7 (Nigdi + soil + vermicompost @ 10 t ha^{-1}) recorded superior performance for most growth and yield attributes and remained at par with T_5 (Nigdi Local + soil + FYM @ 10 t ha^{-1}). Vermicompost application improved soil physical and nutritional conditions, which resulted in higher yield, enhanced growth and early harvest. However, genotypic differences played a significant role in determining overall performance under shade net conditions.

Keywords: Amaranthus, farm yard manure, vermicompost, raised bed system, shade net

Introduction

Amaranthus (*Amaranthus spp*.) belongs to the family *Amaranthaceae* (2n = 34) and is valued for its leafy vegetables, grains and ornamental importance. The family comprises about 65 genera and 850 species distributed across tropical, subtropical and temperate regions of the world, of which nearly 50-60 species are edible. The genus name *Amaranthus* is derived from the Greek word *Amarantos*, meaning “immortal” or “everlasting” (Rezwana *et al*., 2017) [8]. Amaranthus is an annual herbaceous plant characterized by a monoecious inflorescence, well-developed taproot system and erect to spreading growth habit. Important cultivated species include *A. tricolor*, *A. dubius*, *A. caudatus*, *A. cruentus* and *A. hypochondriacus*, which are grown for edible leaves, seeds and aesthetic value. Leafy amaranthus is believed to have originated in South and Southeast Asia, particularly India (Shanmugavelu, 1989) [10]. It is known by various regional names such as Rajgira, Cheera, Chaulai (Hindi) and Math (Marathi), reflecting its cultural and nutritional significance.

Demand for organically produced vegetables has increased steadily in both developing and developed countries. Organic cultivation of leafy vegetables such as amaranthus offers better market value and export potential. Under protected cultivation, amaranthus responds well to organic manures and generally experiences reduced pest and disease incidence (Preetha *et al*., 2005) [6]. Organic manures improve soil fertility, structure and microbial activity, thereby enhancing crop productivity. Considering the economic importance of amaranthus and the need for sustainable production practices, the present study was undertaken to evaluate the performance of different Amaranthus genotypes under various organic growing media in shade net conditions.

Material and Methods

In the agro-climatic Konkan region of Maharashtra, the experiment was conducted. It took place in 2024-2025 during the *Rabi* season at the Department of Vegetable Science, College of Horticulture, Dr. B.S.K.K.V., Dapoli. The geological location is situated in latitude 17º46'0" north and longitude 73º11'0" east on the globe map.

The experiment consisted of Factor A: Amaranthus genotypes (1. Konkan Durangi, 2. Nigdi local and 3. KPS 182 AMAR) and factor B: Growing media [1. FYM + soil (20 t ha^{-1}), 2. FYM + soil (10 t ha^{-1}), 3. Vermicompost + soil (10 t ha^{-1}) and 4. Vermicompost + soil (5 t ha^{-1})] arranged in factorial randomized block design (FRBD). Using twelve treatments and three replications, namely, T_1 [Soil Durangi + FYM (20 t ha^{-1})], T_2 [Soil Durangi + FYM (10 t ha^{-1})], T_3 [Konkan Durangi in Soil + Vermicompost (10 t ha^{-1})], T_4 [Konkan Durangi in Soil + Vermicompost (5 t ha^{-1})], T_5 [Nigdi Local in Soil + FYM (20 t ha^{-1})], T_6 [Nigdi Local in Soil + FYM (10 t ha^{-1})], T_7 [Nigdi Local in Soil + Vermicompost (10 t ha^{-1})], T_8 [Nigdi Local in Soil + Vermicompost (5 t ha^{-1})], T_9 [KPS 182 AMAR in Soil + FYM (20 t ha^{-1})], T_{10} [KPS 182 AMAR in Soil + FYM (10 t ha^{-1})], T_{11} [KPS 182 AMAR in Soil + Vermicompost (10 t ha^{-1})] and T_{12} [KPS 182 AMAR in Soil + Vermicompost (5 t ha^{-1})]. Every cycle of *Rabi* was used to record the observations.

Results and Discussion

Days required for germination

Germination plays a very crucial role in determining the further plant growth, days required for harvest and form of the plant. Significant differences were observed among treatment combinations for days required for germination. The minimum days required for germination were recorded in treatment T_7 (2.7, 3.0, 3.7 and 4.0 days), while the maximum days were observed in T_{10} (4.1, 4.6, 5.6 and 6.1 days) during November, December, January and February, respectively. Vermicompost-amended media improved soil aeration and moisture retention, which favored early germination. Similar results were also seen by Modupeola *et al.* (2018) [5] in Logos spinach and Saleh *et al.* (2022) [9] in *Amaranthus*.

Plant height (cm)

Plant height was significantly influenced by the interaction of genotypes and growing media. The maximum plant height was recorded in treatment T_7 (20.3, 18.6, 15.3 and 13.6 cm), whereas the minimum was observed in T_{10} (16.4, 15.0, 12.3 and 10.9 cm) during November to February.

Vermicompost application improved soil physical conditions and nutrient availability, thereby promoting better vegetative growth. Similar results were also reported by Modupeola *et al.* (2018) [5] in Logos spinach; Saleh *et al.* (2022) [9] in Amaranthus.

Table 1: Effect of Amaranthus genotypes and growing media on days required for germination, plant height, number of cycles and yield of Amaranthus in *Rabi*

Treatment	Days required for germination				Plant height (cm)				Number of cycles	Yield t ha^{-1}			
	Nov	Dec	Jan	Feb	Nov	Dec	Jan	Feb	*Rabi*	Nov	Dec	Jan	Feb
T1	3.3	3.7	4.5	4.9	18.8	17.3	14.1	12.6	4.2	1.00	0.88	0.87	0.96
T2	3.3	3.8	4.6	5	17.2	15.8	12.9	11.5	4.1	0.84	0.75	0.75	0.81
T3	3.2	3.6	4.4	4.8	19.6	17.9	14.7	13.1	4.3	1.14	1.02	0.99	1.1
T4	3.3	3.8	4.6	5	18.1	16.6	13.6	12.1	4.2	1.01	0.9	0.91	0.98
T5	2.8	3.2	3.9	4.2	19.2	17.6	14.4	12.8	4.1	1.26	1.12	1.1	1.21
T6	3.1	3.6	4.2	4.6	18.4	16.9	13.8	12.3	4.1	0.89	0.79	0.79	0.85
T7	2.7	3	3.7	4	20.3	18.6	15.3	13.6	4.4	1.28	1.14	1.12	1.23
T8	2.9	3.3	4	4.4	18.9	17.3	14.1	12.6	4.3	1.09	0.97	0.97	1.05
T9	3.7	4.2	5.1	5.6	17.3	15.9	12.9	11.5	4.2	0.93	0.83	0.8	0.89
T10	4.1	4.6	5.6	6.1	16.4	15	12.3	10.9	4.0	0.77	0.68	0.66	0.74
T11	3.3	3.8	4.6	5	18	16.5	13.5	12	4.1	1.03	0.92	0.91	0.99
T12	3.7	4.1	5	5.5	16.9	15.6	12.7	11.3	4.1	0.8	0.71	0.68	0.77
S.E m ±	0.08	0.09	0.11	0.12	0.12	0.11	0.09	0.08	0.1	0.02	0.02	0.02	0.02
CD at 5%	0.23	0.26	0.33	0.35	0.36	0.33	0.27	0.24	0.3	0.06	0.05	0.04	0.05

Number of leaves

The maximum number of leaves per plant was recorded in treatment T_7 (7.2, 6.6, 5.4 and 4.7), while the minimum was observed in T_{10} (4.6, 4.2, 3.4 and 3.0) during different months of the *Rabi* season. Improved nutrient availability under vermicompost-based media enhanced leaf production. Similar observations were reported by Saleh *et al*. (2022) [9] in Amaranthus; Raksun *et al*. (2022) [7], Yadav *et al.* (2022) [14] and Indurthi *et al*. (2024) [4] in *Amaranthus*.

Leaf length (cm)

Treatment T_7 recorded the maximum leaf length (7.2, 6.6, 5.4 and 4.8 cm), whereas T_{10} recorded the minimum leaf length (4.6, 4.2, 3.4 and 3.0 cm) during November, December, January and February, respectively. Leaf length in Amaranthus genotypes was largely influenced by genetic variation, while vermicompost-enriched soil improved nutrient availability, warmth and aeration that supported leaf development. The similar findings were reported by Anjali *et al*. (2022) [1] and Raksun *et al*. (2022) [7] in *Amaranthus.*

Leaf breadth (cm)

Maximum leaf breadth was observed in treatment T_{11} (5.3, 4.9, 4.0 and 3.6 cm), while the minimum was recorded in T_6 (2.7, 2.4, 2.0 and 1.8 cm). Improved soil structure and nutrient availability under organic amendments enhanced leaf expansion. The similar results were seen by Raksun *et al*. (2022) [7] in *Amaranthus*.

Days required for harvest

During *Rabi* season, the shortest period required for harvest was observed in the T_7 (22.0, 24.8, 30.3 and 33.0 days), while the longest number of days required for harvest was recorded in T_{10} (24.0, 26.6, 33.0 and 36.0 days) during November, December, January and February, respectively. Vermicompost in soil generally improved growing conditions by enhanced nutrient availability, drainage, soil temperature and aeration, which accelerated growth and enabled earlier harvests. Similar result also reported by Chaudhary *et al.* (2018) [2] in (*Amaranthus Spp.*) Cv. Arka Suguna and Indurthi *et al*. (2024) [4] in Amaranthus tristis.

Number of cycles

The maximum number of harvest cycles during the *Rabi* season was recorded in treatment T_7 (4.4), while the minimum was recorded in T_{10} (4.0). Improved growing conditions under vermicompostbased media facilitated faster regrowth and more harvest cycles. Similar result also reported by Chaudhary *et al.* (2018) [2] in (*Amaranthus Spp*.) Cv. Arka Suguna.

Yield kg m^{-2}

The highest yield per square meter was recorded in treatment T_7 with 1.28, 1.14, 1.12 and 1.23 kg m^{-2} during November, December, January and February, respectively. The lowest yield was observed in treatment $T_{10.}$ These results are in agreement with findings reported by Vasava *et al*. (2016) [12] and Saleh *et al*. (2022) [9], Solangi *et al.* (2017) [11] in spinach, Anjali *et al*. (2022) [1] and Saleh *et al*. (2022) [9] in *Amaranthus*.

Yield t ha^{-1}

The highest yield (t ha^{-1}) of Amaranthus after interaction between Amaranthus genotype and growing media during the *Rabi* season were achieved by treatment T_7 producing 12.8 t ha^{-1} in November, 11.4 t ha^{-1} in December, 11.2 t ha^{-1} in January and 12.3 t ha^{-1}in February. In contrast, the lowest yields were observed in treatment T_{10}. Higher plant height and number of leaves results in higher yield. Similar result also reported by Vasava *et al.* (2016) [12]; Anjali *et al*. (2022) [1] and Saleh *et al*. (2022) [9].

Conclusion

Based on the results recorded from the present investigation, it was concluded that the presence of nutrients in organic growing media *viz*., FYM and Vermicompost may synergize with Amaranthus genotypes to enhance germination and shoot elongation results in higher yield in respective treatments. On the other hand, different Amaranthus genotypes exhibited unique genetic traits influencing growth and yield when combined with various growing media. Treatment combination T_7 [Nigdi Local in Soil + Vermicompost (10 t ha-1)] was found to be significantly superior with respect to growth and yield attributing characters (days required for germination, plant height, number of leaves, leaf length and number of cycles, yield kg m^{-2}, t ha^{-1}), treatment T_{11} in terms of leaf breadth in comparison with the other treatment combinations. Vermicompost in soil generally improved growing conditions by enhanced nutrient availability, drainage, soil temperature and aeration, which accelerated growth and earlier and high harvest of Amaranthus. However, the final performance was mainly determined by the inherent genetic traits of each genotype.

References

1. Anjali KT, Topno SE, Kerketta A. Effect of different organic and inorganic fertilizers on growth, yield and quality of amaranthus under polyhouse condition (*Amaranthus cruentus*) cv. NSC 99 IUS. Int. J Environ Clim Change. 2022;12(11):1647-53.
2. Chaudhary BM, Varma LR, More SG, Acharya MD, Rabari SS. Effect of biofertilizers and different sources of organic manures on growth parameters and yield attributes of amaranth (*Amaranthus* spp.) cv. Arka Suguna. J Entomol Zool Stud. 2018;6(3):166-171.
3. Cheema DS. Status and scope of net house cultivation of vegetables in North Indian plains. In: *School on Protected Cultivation for Enhanced Profitability*. Palampur: College of Agriculture, Dept. of Vegetable Science and Floriculture, CSK Himachal Pradesh Krishi Vishvavidyalaya; 2010, p. 32-35.
4. Indurthi S, Sarma I, Gogoi S, Kalita B, Das S, Dutta S. Impact of integrated nutrient management on growth, yield and economic profile of *Amaranthus tristis* L. Environ Conserv J. 2024;25(4):986-90.
5. Modupeola TO, Dixon HG, Adewumi AG. Effect of different tillage methods and plant spacing on growth and herbage yield of Lagos spinach (*Celosia argentea* L.). J Pet Environ Biotechnol. 2018;9(3):1373-7.
6. Preetha D, Sushama PK, Marykutty KC. Vermicompost and inorganic fertilizers promote yield and nutrient uptake of amaranth (*Amaranthus tricolor* L.). J Trop Agric. 2005;43:87-9.
7. Raksun A, Merta IW, Mertha IG, Ilhamdi ML. Effect of vermicompost and NPK fertilizer on growth of spinach (*Amaranthus tricolor*). J Pijar MIPA. 2022;17(5):691-5.
8. Rezwana A, Reshi ZA, Jan S, Rashid I. Biology of *Amaranthus*. Bot Rev; 2017. DOI: 10.1007/s12229-017-9194-1.
9. Saleh R, Gunupuru RL, Abbey L. Growth and yield of kale, Swiss chard, amaranth and arugula microgreens in response to different growing media substrates. Hortic Int J. 2022;6(4):180-187.
10. Shanmugavelu KG. Amaranthus. In: *Production technology of vegetable crops*. New Delhi: Oxford & IBH Publishing; 1989, p. 680-699.
11. Solangi M, Soomro AA, Sheikh MJ, Baloch AW, Abro SI. Effect of sowing methods on growth and yield of spinach. Pak J Sci. 2017;69(1):12-16.
12. Vasava HV, Chudasama VR, Rathva VD, Dalvaniya DG, Leua HN. Performance of different varieties of amaranth (*Amaranthus* spp.) under net house and open field conditions. Ecol Environ Conserv. 2016;22(3):169-176.
13. Xu HL, Wang R, Xu RY, Mridha MAU, Goyal S. Yield and quality of leafy vegetables grown with organic fertilization. Acta Hortic. 2003;627:25-33.
14. Yadav S, Asati KP, Barche S. Effect of integrated nutrient management strategies on growth and yield of amaranthus (*Amaranthus tricolor* L.). Pharma Innov J. 2022;11(2):2545-2549.