Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Sustainable Organic Growing Media for Improved Growth and Yield of Eggplant (*Solanum melongena* L.)

Syeda Sana Aamir *
National Agricultural Research Centre, Islamabad-45500, Pakistan
sana.syeda2014@gmail.com
Saba Maalik
National Agricultural Research Centre, Islamabad-45500, Pakistan
sabamaalik123@gmail.com
Tahira Taqveem Somra
National Agricultural Research Centre, Islamabad-45500, Pakistan
tahirasomra@gmail.com
Qandeela Nigar
National Agricultural Research Centre, Islamabad-45500, Pakistan
qandeelanigar@gmail.com
Uzma Arif
National Agricultural Research Centre, Islamabad-45500, Pakistan
uzmaarif47@gmail.com
Nausherwan Nobel Nawab
National Agricultural Research Centre, Islamabad-45500, Pakistan
nnnawab24a@gmail.com
Ali Hassan Khan
National Agricultural Research Centre, Islamabad-45500, Pakistan
alihassanpbg@gmail.com
Muhammad Salman
National Agricultural Research Centre, Islamabad-45500, Pakistan
salmanhorti42@gmail.com

ABSTRACT

The present study aims to know the effect of different growing media on growth and yielding attributes of brinjal (*Solanum melongena* L.). Seeds were sown in pots under greenhouse at Horticultural Research Institute (HRI), National Agricultural Research Centre (NARC) Islamabad, Pakistan. The pot experiment has 5 treatments each replicated 5 times; with control T0 (Soil), and rest of the treatments as mixtures; such as T1 (Sand+Soil+Farm yard Manure), T2 (Sand+Soil+FYM+Peat Moss), T3 (Sand+

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

Peat Moss), T4 (Sand+Soil+Ash). Different parameters i.e., Plant height (cm), Leaf length (cm), Leaf width (cm), and number of fruits were observed on 4 months of trials. Maximum plant height (59 cm) was observed in T1 (Sand+Soil+FYM), the maximum leaf length (19 cm) was observed in T4 (Sand+Soil+Ash), maximum leaf width (13 cm) was observed in T4 (Sand+Soil+Ash), and the maximum number of fruits (8) were observed in T2 (Sand+Soil+FYM+Peat Moss). It was concluded from experiment that treatment with mixture of sand, soil, and farmyard manure (T1) considerably raised plant height, whereas the treatment mixture of sand, soil, and ash (T4) increased leaf length and width. The combination of sand, soil, farmyard manure, and peat moss (T2) produced the greatest quantity of fruits. Hence, T2 proved to be most effective in producing greater number of fruits thus enhancing yield. These findings demonstrate the effectiveness of organic fertilizers in enhancing plant growth and output while being ecofriendly. So, organic fertilizers should be used as an alternative to chemical treatments in brinjal plants.

Key words: Ash, Brinjal, FYM, Organic fertilizer, Organic media, Peat Moss

Introduction

Brinjal (*Solanum melongena* L.) commonly known as eggplant is a member of the *Solanaceae* family and ranks 3rd most significant plant in family in terms of both area and productivity (Dou *et al.,* 2022). Brinjal plant originated from Indo-China domain, is now being grown all over the world in tropical and subtropical areas (Rehman *et al.,* 2019). In Pakistan, Punjab is the largest producer of brinjal in respect of area and production, followed by Sindh and Baluchistan. Brinjal is diversely utilized vegetable due to its unique flavor and high nutritional value. The fruit is rich in minerals, vitamins and is considered to be a low-fat food. Its fruit contains phenolic compounds, among them the most important one is chlorogenic acid, which is beneficial against cardiovascular problems. Its bark has nasunin anthocyanin, which is considered as the causative agent of its specific black color. Nasunin is a powerful antioxidant which combats free radicals and helps in protecting cell membranes (Ali *et al.,* 2023; Karimi *et al.,* 2021).

The seed germination is a fundamental step for any plant's growth and development, It directly depends on how quickly the seed germination proceeds to seedling. Every type of soil that is utilized as a growing medium is not ideal for seed germination and/or later plant growth. The medium utilized for the growth of plants in pots significantly influences different parameters associated with plant growth, such as height of plants, number of leaves, shoot length, proportion of florets on spike, spike length, and yield. This is achieved by maximizing a suitable supply of nutrients, and water holding limit, thereby sufficient airflow for the growth of the plant (Bhardwaj *et al.,* 2019).

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

There are different types of inorganic and organic ingredients which could be effectively utilized as growing medium for cultivation of brinjal in greenhouses. The substances that are utilized as organic consists of peat moss, peat bark, coconut coir, hulls of rice, and other similar substances (Sedak *et al*., 2014). The inorganic materials consisted of perlite as well, pumice, vermiculite, sandy material, hydrogel material, and other similar substances (Gautam *et al*., 2019). Soil is often unsuitable for growing plants in pots due to poor air circulation, water supply, and water holding limits (Savvas and Gruda, 2018). Use of wood ash is also commonly recommended to serve as a defensive measure against soil acidity resulting from atmospheric pollutants or heavy forest harvesting for producing bioenergy (Eriksson, 1998).

Different growth media serves as planting media for seeds and seedling cultivation as a source of nutrients for plant growth (Dahanayake *et al.,* 2012). An ideal growth medium for the cultivation of different plants in pots must consist of combination of nutrients that are sufficiently important for the germination and seedling establishment. It has to retain enough moisture, facilitating drainage of the excess water, and supplying sufficient nutrients for the growth and development of seedlings (Choudhary and Deena, 2020). The present study was undertaken with an aim to check the effect of different organic growth media on the growth parameters of brinjal plants planted in pots.

Material and Methods

The research study was carried out at Horticultural Research Institute (HRI), National Agricultural Research Centre (NARC) Islamabad, Pakistan. The study region is located in the arid zone, which is known for its rainy and chilly winters along with warm and moderately hot summers. With majority of the rainfall occurs during winter and spring seasons. July and August are the warmest months, with temperatures exceeding 30°C. In September, the temperature drops during nights, and the cold season begins around mid-November.

Experiment Setup

To check the effect of different growth media on growth parameters of brinjal plant, seeds were planted in pots stationed in a greenhouse. The experiment was conducted in a completely randomized design (CRD) having 5 treatments such as T0 (Garden Soil as control), T1 (Sand+Soil+FYM), T2 (Sand+Soil+FYM+Peat Moss), T3 (Sand Peat Moss), T4 (Sand+Soil+Ash). All treatments have 5 replications. Growth Parameters i.e., Plant height (cm), Leaf length (cm), Leaf width (cm), and number of fruits were measured after 4 months of trials.

Data analysis

The study was carried out using CR design (CRD). The data analysis by ANOVA using the statistical software Statistix version (Ver. 8.1).

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

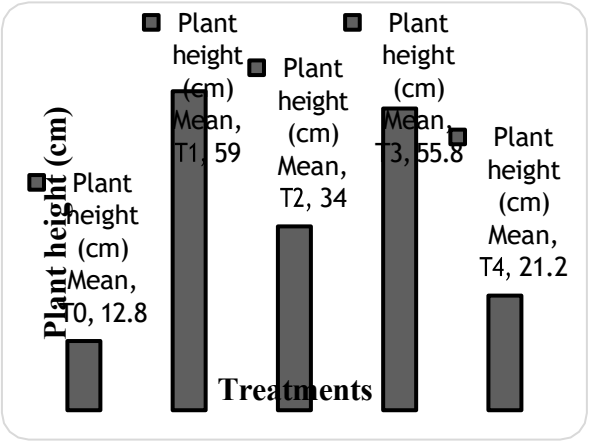
Results

. Analysis of variance (Table 1) depicted significant difference among all treatments regarding different measured parameters. Effect of different growing media was observed on plant height of brinjal Results showed that among different growing media, T1 (Sand+Soil+FYM) showed best results by promoting plant height. Maximum plant height of 59 cm was observed in T1 (Sand+Soil+FYM) followed by 55.8 cm in T3 (Sand+ Peat Moss), and 34 cm in T2. (As shown in Figure 1 (A))

Leaf length showed significant differences among all treatments.Effect of different growing media was checked on leaf length of brinjal plants. Among different growing media, T4 which was combination of sand, soil and ash showed best results by promoting leaf length. Maximum leaf length of 19 cm was observed in T4 (Sand+Soil+Ash) and minimum of 9 cm in T0 (Garden Soil as control). (As shown in Figure 2 (B))

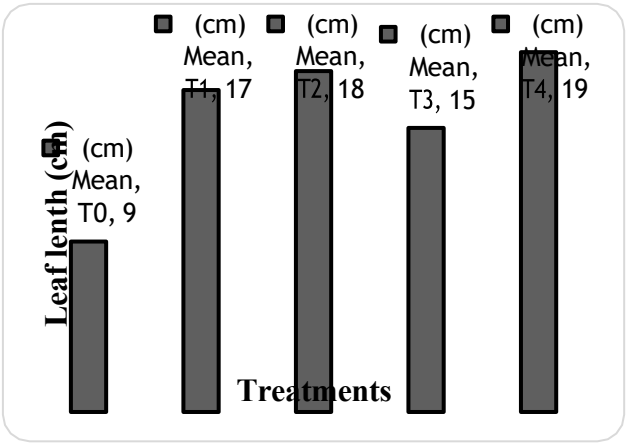
Effect of different growing media was checked on leaf width of brinjal plants. Among different growing media, T4 consisting of sand, soil and ash showed best results by promoting leaf width. Maximum leaf width of 13 cm was observed in T4 (Sand+Soil+Ash) and minimum of 4.5 cm in T0 (Garden Soil as control). (As shown in Figure 3 (C))

Effect of different growing media was observed on Number of fruits of brinjal plants. Among different growing media, T2 (Sand+Soil+FYM+Peat Moss) showed best results by promoting no. of fruits. Maximum number of 8 fruits were observed in T2 (Sand+Soil+FYM+Peat Moss) and minimum of 4 fruits in T1 (Sand+Soil+FYM). (As shown in Figure 4 (D))

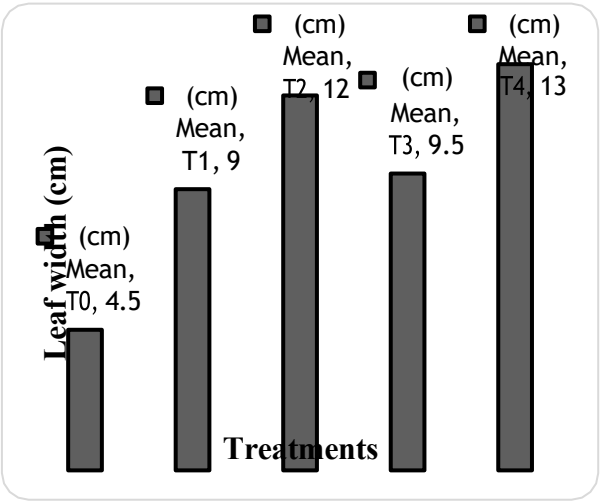


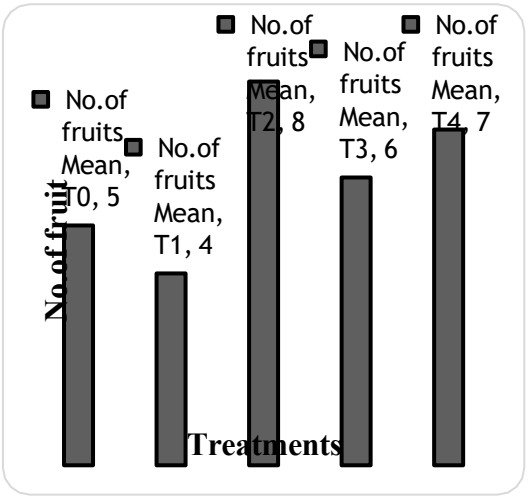
Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about



(A) (B)





(C) (D)

Figure 1. Effect of different growing media on (A) Plant Height (B) Leaf length (C) Leaf width (D) Number of fruits

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

Table1. ANOVA for different yield related parameters at different treatments

		MS			
Source	Df	Plant Height	Leaf Length	Leaf Width	Number of Fruits
Treatment	4	2100.94**	79**	54.2434**	16.0826**
Error	20	0.3383	0.50590	0.3434	0.44
Total	24				

Discussion

Brinjal which is also known as *Solanum melongena* L., is the most significant Asian vegetable that is cultivated throughout world. The extensive use of chemical fertilizers, insecticides, and chemical herbicides can enhance yield of brinjal crop. But there is an increasing fear regarding the negative impacts of chemical usage on the health of humans, soil, and the quality of the environment (Sharma *et al.,* 2012). The utilization of organic fertilizers provides an effective and appropriate mean in providing essential nutrients to the soil. Organic fertilizers are important as they provide plant with the nutritional requirements, without having been an undesirable impact on environment (Njoroge and Manu, 1999). Addition of different organic manures increase the growth of plant such as number and height of leaves, plant height, number of shoots per plant and fresh and dry weight of shoots of plants etc (Zhang *et al.,* 1998). Nitrogen present in organic matter functions for vegetative growth of leaves which helps in leaf formation and enhances number of leaves on plant (Mahammad *et al*., 2022)

This study showed that combine applications of different organic fertilizers increase the plant growth parameters and yield of brinjal plants. Combined application of sand, soil and farmyard manure increases the plant height of brinjal. These results showed that FYM increases the plant height as compared to other treatments. These results agreed with findings of Suge et al., (2011) which state that utilization of organic manures greatly improves the growth, productivity, and fruit quality of eggplant. Further results showed that treatment T4 (Sand+Soil+Ash) increased the leaf length, width while number of fruits were increased at T2 (Sand +FYM+Peat Moss). These results are consistent with the findings of Rai and Fatmi, (2022) who concluded with that the treatment consisting of 50% soil, 25% fly ash, and 25% FYM showed excellent results in terms of the growth of plant, yield of fruit, and quality of solanaceous vegetable crops in pot culture. The findings have demonstrated that the utilization of fly ash in soil contributes vital nutrients, hence enhancing crop productivity.

Conclusion and Recommendations

The study presents the promising effect of combining organic fertilizers with diverse growing media on brinjal growth, yield, and quality. The treatment of sand, soil, and

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

farmyard manure (T1) considerably raised plant height, whereas the treatment of sand, soil, and ash (T4) increased leaf length and width. The combination of sand, soil, farmyard manure, and peat moss (T2) produced maximum numberof fruits. These findings demonstrated the effectiveness of organic fertilizers such as farmyard manure and peat moss in enhancing plant growth and output while minimizing environmental impact. Organic fertilizers and fly ash provide a sustainable eco-friendly alternative to chemical treatments in brinjal plants.

Novelty Statement:

This study offers an innovative approach, proving the advantages of integrating organic nutrients such as farmyard manure and peat moss with various growing media to greatly improve brinjal growth, yield, and quality and used as a sustainable alternative to chemical fertilizers highlights its potential for eco-friendly agricultural methods.

Conflict of interest

There is no conflict of interest among the authors of the manuscript.

References

1. Ali, N., Rafiq, R., Wijaya, L., Ahmad, A., & Kaushik, P. 2024. Exogenous citric acid improves growth and yield by concerted modulation of antioxidant defense system in brinjal (*Solanum melongena* L.) under salt-stress. J. King Saud Univ. Sci., 36(1): 103012.
2. Arif. M., M. T. Jan, N.U. Khan, A. Khan, M. J. Khan and I. Munir. 2010. Effect of seed priming on growth parameters of soybean. Pak.J. Bot. 42(4):2803-2812.
3. Bhardwaj, A., Goswami, B. K., Bhardwaj, V., & Singh, N. 2019. Effect of organic amendments and growing media on plant attributes of brinjal nursery. Plant Arch. 19(2): 44-46.
4. Choudhary, J., & Deena, W. 2020. To study the effect of different growing media

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

on papaya (*Carica papaya*) seedling on germination percentage under protected condition cv. Pusa Nanha. Int J Curr Microbiol App Sci., 9(12): 1035-1041.

5. Dahanayake, N., Madurangi, S.A.P. and Ranawake, A.L., 2013. Effect of potting mixture on growth and yield of chilli varieties (*capsicum spp*) and microbial activity. Trop. Agric. Res. Ext., 15(3).
6. Dou, L., Mu, S., Yang, G., Chang, J. and Zhang, K., 2022. Dissipation, residue and dietary intake risk assessment of penthiopyrad in eggplants and its removal using various household processing techniques. Foods, 11(21): 3327.
7. Eriksson, H.M. 1998. Short-term effects of granulated wood ash on forest soil chemistry in SW and NE Sweden. PhD thesis, Swedish University of Agricultural Sciences, Uppsala, Sweden.
8. Gautam, R., Singh, P., Kumar, P., Singh, M., Dhital, S., Rani, M., VK Sharma & Kumar, J. 2021. Advances in soilless cultivation technology of horticultural crops. Indian Journal of Agricultural Sciences 91 (4): 503–8
9. Karimi, A., M. Kazemi, S.A. Samani, and J. Simal-Gandara. 2021. Bioactive compounds from by-products of eggplant: Functional properties, potential applications and advances in valorization methods. Trends Food Sci. Technol., 112: 518-531.
10. Mahamad, N.I.A., S.N.A.A. Samah, and M.N.A.M. Khidzir. 2022. Effects of different organic fertilizers on growth and yield potential of *Solanum melongena* (eggplant) in Malaysia. IOP Publishing. In IOP Conference Series: Earth and Environmental Science, 1114 (1): 012083.
11. Njoroge, W.J. and C. Manu. 1999. Organic farming. A textbook for post-secondary education. Kenya Inst. Org. Farm., Nairobi, Kenya, 162-165.
12. Rai, A.K., Mishra, S.N. & Fatmi, U., 2022. Fly ash as growing media for pot culture of solanaceous vegetable crops for urban areas. Pharma Innov. J., 11(1S): 710-714.
13. Sadek, I. I., Moursy, F. S., Salem, E. A., Schüch, A., & Heggi, M. A. M. 2014. Enhancing rice straw media for growing eggplant under modified climatic conditions using compost and bacterial inoculation. Carbon, 37, 77-56.
14. Savvas, D. and Gruda, N., 2018. Application of soilless culture technologies in the modern greenhouse industry—A review. Eur. J. Hortic. Sci., 83(5): 280-293.
15. Sharma, J.P., Rattan, P. and Kumar, S., 2012. Response of vegetable crops to use of integrated nutrient management practices. SABB J. Food Agric. Sci., 2(1): 15-19.
16. Suge, J.K., Omunyin, M.E. and Omami, E.N., 2011. Effect of organic and inorganic sources of fertilizer on growth, yield and fruit quality of eggplant (*Solanum Melongena L*). Arch. Appl. Sci. Res., 3(6): 470-479.
17. ur Rehman, S., Hafiz, I.A., Ali, I. and Abbasi, N.A., Growth and Yield Response

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

of Different Brinjal Cultivars to Irrigation Deficit Conditions.

18. Zhang, C.L.Y.D., Zhang; ZM Gao; GH Xu; LY Wang and QS Zhou 1998. *J. Soil Sci. Chim*, 19(6): 276-278.