Available online at www.agrifarming.org

DOI: http://dx.doi.org/10.18782/2582-7146.234

ISSN: 2582 – 7146

Curr. Rese. Agri. Far. (2024) *5*(4), 16-19

Current Research in Agriculture and Farming

Research Article

Peer-Reviewed, Refereed, Open Access Journal

Impact of Biofertilizers and Organic Manures on the Nutritional Content and Fruit Yield of Strawberries (*Fragaria ananassa* Duch.)

Krishan Kumar Singh, Manjot Kaur*, Gurpreet Singh, Ankur Sharma, Avtar Singh, Ranbir Singh, Anurag Malik, Vijay Daneva

Department of Agriculture, Bhai Gurdas Degree College, Sangrur, Punjab, India

*Corresponding Author E-mail: manjotsroya@gmail.com

Received: 20.06.2024 | Revised: 28.07.2024 | Accepted: 13.08.2024

ABSTRACT

The experiment was carried out at the Bhai Gurdas Degree College's Agriculture Research Centre in Sangrur, Punjab, India, between 2023 and 2024. Chandler is the cultivar that was applied in the study. RBD was used to set up the experiment, which consisted of ten treatments and three replications. In the experiment, organic manure and biofertilizers were utilized in ten treatments: T1 (FYM + Azospirillum), T2 (FYM + PSB), T3 (FYM + Azotobacter), T4 (Vermicompost + Azospirillum), T5 (Vermicompost + PSB), T6 (Vermicompost + Azotobacter), T7 (Poultry manure + Azospirillum), T8 (Poultry manure + PSB), T9 (Poultry manure + Azotobacter), and T10 (Control). Under T5 (Vermicompost + PSB) treatments, the following data were recorded: highest plant height (24.060 cm), number of leaves (12.760), number of main branches (11.150), number of secondary branches (28.167), number of flowers (15.773), number of fruits per plant (8.623), fruit yield (207.230 gm), and fruit yield (59.230 q/ha).

Keywords: *Organic manures, biofertilizers, yield, growth and quality, strawberries.*

INTRODUCTION

The popular fresh fruit strawberry (*Fragaria ananassa* Duch.) grows perpetually in the chilly season. It is a great source of natural antioxidants such carotenoids, vitamins, phenolics, flavonoids, etc. and has a high level of antioxidant capacity against free radical species (Sran et al., 2023). The consumption of fresh strawberry fruit has increased dramatically in recent years as people have become more aware of its possible health benefits. Farmers use chemical fertilizers and insecticides to increase agricultural productivity. Regretfully, numerous researchers have reported finding persistent buildup of these dangerous compounds in grains, fruits, and other edible portions in recent years (Kumar et al., 2018).

The portions of the strawberry that are edible are the ripe fruit and seed, often known as achenes. Runners typically multiply strawberries. Strawberries have a moderate flavor and are high in vitamins and minerals.

Cite this article: Singh, K. K., Kaur, M., Singh, G., Sharma, A., Singh, A., Singh, R., Malik, A., & Daneva, V. (2024). Impact of Biofertilizers and Organic Manures on the Nutritional Content and Fruit Yield of Strawberries (*Fragaria ananassa* Duch.), *Curr. Rese. Agri. Far.* *5*(4), 16-19. doi: http://dx.doi.org/10.18782/2582-7146.234

Its red color is mostly caused by anthocyanin, pelarogonidin, 3-monoglucoside, and trace levels of cyaniding. Himachal Pradesh, Uttarakhand, Maharashtra, West Bengal, Nilgiri Hills, Delhi, Haryana, Jammu & Kashmir, Punjab, and Rajasthan are a few of the Indian states where it is produced extensively and for commercial purposes (Ali, 2008 & Singh, 2020). An efficient and greener alternative to inorganic chemical fertilizers and manures is the use of organic manures and biofertilizers. When used strategically, they can improve the fertility and quality of the soil and increase crop yield. Nutrients can be found in organic manures (FYM, vermicompost, poultry manure, etc.). They also stop soil deterioration, boost the number of helpful soil bacteria, and enhance the physical characteristics of soil (aeration, water-holding capacity, soil aggregation, etc.). Orzco et al. (1996) state that vermicompost offers the highest concentration of nutrients that are available to plants, including phosphates, nitrates, exchangeable calcium, and soluble potassium. Biofertilizers are the byproducts of naturally occurring live microorganisms that are extracted from agricultural soil or the rhizosphere of plants. Among the main bacterial species that encourage plant growth are Acinetobacter, Alcaligenes, Arthrobacter, Bacillus, Burkholderia, Pseudomonas, and Serratia (Negi et al., 2011).

MATERIALS AND METHODS

An experiment titled "Impact of biofertilizers and organic manures on the nutritional content and fruit yield of strawberries (*Fragaria ananassa*Duch.)" was conducted in 2023–2024 at the Bhai Gurdas Degree College in Sangrur, Punjab, India. The ten treatments that made up the Randomized Block Design (RBD) experiment layout were T1 (FYM + Azospirillum), T2 (FYM + PSB), T3 (FYM + Azotobacter), T4 (Vermicompost + Azospirillum), T5 (Vermicompost + PSB), T6 (Vermicompost + Azotobacter), T7 (Poultry manure + Azospirillum), T8 (Poultry manure + PSB), T9 (Poultry manure + Azotobacter), and T10 (Control). Three rows and three replications were present. The rates of application for the organic manures, which are FYM, Vermicompost, and Poultry manure, are 350 gm plant-1, 300 gm plant-1, and 300 gm plant-1, respectively. The rates of application for the biofertilizers, which are Azospirillum, PSB, and Azotobacter, are 2.5 gm plant-1, each.

Table.1Treatments Combination

Treatments	Treatments Combination
T1	FYM + Azospirillum
T2	FYM + PSB
T3	FYM + Azotobacter
T4	Vermicompost + Azospirillum
T5	Vermicompost + PSB
T6	Vermicompost + Azotobacter
T7	Poultry manure + Azospirillum
T8	Poultry manure + PSB
T9	Poultry manure + Azotobacter
T10	Control

RESULT AND DISCUSSION

Table 2 shows that, at 150 days after planting, the T5 (Vermicompost + PSB) treatments produced the highest plant height (24.060 cm), number of leaves (12.760), number of primary branches (11.150), number of secondary branches (28.167), number of flowers (15.773), number of fruits per plant (8.623), fruit yield (207.230 gm) and fruit Yield (59.230 q/ha). In contrast, the T10 (Control)

treatments produced the lowest plant height (19.260 cm), number of leaves (7.320), number of primary branches (7.260), number of secondary branches (17.857), number of flowers (8.090), number of fruits per plant (4.460), fruit yield (99.230 gm), and fruit Yield (46.260 q/ha). Vermicompost, the main component of plant protoplasm and a source of protein, increases the availability of nitrogen, which accelerates the synthesis of amino acids and may have had a role in the indirect increase in plant height observed in strawberry plants. PSB is also advantageous for cell elongation and division in the meristematic part of the plant since it synthesizes plant growth compounds (IAA and GA) (Singh et al., 2011).

The plant development parameters, including biomass, leaf area, and height, showed notable improvements in the results, especially in the treatments that included organic manures and biofertilizers. The combination treatment outperformed the individual treatments as well as the control in terms of yield and fruit quality. Organic manures boosted soil structure and microbial activity, whereas biofertilizers increased nutrient availability and uptake. Increased levels of important minerals, antioxidants, and taste components were found in strawberries treated with biofertilizers and organic manures, suggesting improved nutritional and sensory attributes. This suggests that by improving yield, fruit quality, and soil health, the use of biofertilizers and organic manures in strawberry agriculture can increase sustainable production. Our results corroborated those of El-Araby et al. (2003) regarding the combined treatment of biological fertilizer and organic fertilizer (plant remain compost), who reported a discernible improvement in plant growth as well as quantitative yield characters like yield, fruit weight, and number of fruits per plant. The outcomes supported previous studies on strawberry plants (Tomic et al., 2015).

Table.2 Effect of organic manures and biofertilizers on growth and yield of strawberry (*Fragaria* × *ananassa*Duch.) var. Chandler

Treatments	Plant height (cm)	Number of Leaves	Number of primary branches	Number of secondary branches	Number of flowers	Number of fruits per plant	Fruit yield/plant gm	Fruit Yield (q/ha)
T1	20.813	8.660	8.330	24.160	11.487	5.100	138.450	46.320
T2	22.230	6.150	9.127	24.660	10.447	6.220	145.660	51.230
T3	21.250	10.360	8.960	25.350	11.107	6.550	170.230	53.660
T4	23.040	11.113	9.300	27.047	14.557	7.087	180.660	58.120
T5	24.060	12.760	11.150	28.167	15.773	8.623	207.230	59.230
T6	23.650	12.053	10.440	26.410	14.440	7.557	182.260	58.210
T7	21.630	9.330	9.200	25.187	11.293	5.680	152.120	56.210
T8	21.480	10.230	10.237	26.270	12.077	5.320	135.260	57.120
T9	22.310	9.120	9.433	24.327	9.280	6.260	147.360	54.660
T10	19.260	7.320	7.260	17.857	8.090	4.460	99.230	46.260
C.D.	0.452	0.381	0.173	0.375	0.533	0.196	0.164	0.054
SEm	0.151	0.127	0.058	0.125	0.178	0.066	0.055	0.018

CONCLUSION

The aforementioned findings imply that the application of both biofertilizers and organic manures (Vermicompost + PSB) enhances the growth and yield of strawberry plants by increasing the host plant's access to nutrients in the soil. In conclusion, the use of organic manures and biofertilizers as efficient alternatives to conventional fertilizers promotes environmentally beneficial strawberry farming practices. To find the optimal spraying rates and combinations for different cultivars and growth conditions, more research is suggested.

Acknowledgement:

I would like to sincerely thank my co-authors for their support and kind gesture to complete this manuscript in time.

Funding: NIL.

Conflict of Interest:

There is no such evidence of conflict of interest.

Author Contribution

All authors have participated in critically revising of the entire manuscript and approval of the final manuscript.

REFERENCES

Ali, R., & Radwan, E. A. (2008). Effect of organic and synthetic mulches of some fresh strawberry cultivars. *J. Agric & Env. Sci. Alex. Univ. Egypt. 7*(3), 194.

EI-Araby, S. M., Ghoneim, I. M., Shehata, A. l., & Mohamed, R. A. (2003). Effect of Nitrogen, organic manure and Biofertilizer application on strawberry plants. *J. Agric. & Envi. SCI., Alex. Univ. Egypt., 2*, 36-62.

Kumar, A., Prasad, V. M., Singh, D., Bahadur, V., David, A. A., & Beer, K. (2018). Effect of Bio-Fertilizers, Vermicompost and Trichoderma on Yield and Economics of Strawberry (*Fragaria* × *annanasa*Duch.) cv. Sweet Charlie. *International Journal of Current Microbiology and Applied Sciences. 7*(06), 1534-1538.

Negi, Y. K., Prabha, D., Garg, S. K., & Kumar, J. (2011). Genetic diversity among cold-tolerant fluorescent Pseudomonas isolates from Indian Himalayas and their characterization for biocontrol and plant growth promotion activities. *J Pl. Growth Regul. 30*, 128-143.

Orozco, F., Cegarra, J., Trujillo, L., & Roig, A. (1996). Vermicomposting of coffee pulp using the earthworm Eisenia fetida: effects on C and N contents and the availability of nutrients. *Biol. Fertil. Soils 22*, 162–166. 10.1007/BF00384449

Singh, B. K., Pathak, K. A., Verma, A. K., Verma, V. K., & Deka, B. C. (2008). Effects of vermicompost, fertilizer and mulch on plant growth, nodulation and pod yield of French bean (Phaseolus vulgaris L). *Vegetable Crops Res B. 74*, 153–65.

Singh. K. K. (2020). Cultivation of Strawberry (Fragaria ananassa) Under Greenhouse Condition. *AgriCos e-Newsletter. 1*(4), 155-157.

Sran, A. S., Chahal, M. K., Pahil, V. S., Singh, K. K., Kaur, P., Kumar, A, Sidhu, O. A., Singh, B., Beniwal, M., Mittal, D., Singh, R., Sran, J. K., & Kaur, A. (2023). Organic Cultivation of Strawberry Farming: Status and Possibilities, In: Amanpreet Singh Sran & Krishan Kumar Singh, (eds) Handbook of Strawberry Farming and Production. pp. 91-104, vital biotech publication 772, Basant Vihar, Kota, Rajasthan.

Tomic, J. M., Milivojevic, J. M., & Pesakovic, M. I. (2015). The response to bacterial inoculation is cultivar-related in strawberries. *Turkish Journal of Agriculture and Forestry, 39*(2), 332-341.