Eco. Env. & Cons. 31 (4) : 2025; pp. (1591-1594)
Copyright@ EM International
ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2025.v31i04.039
Website: www.envirobiotechjournals.com

Effect of Different Organic Manures on Yield and Economics Parameters of Cape gooseberry (*Physalis peruviana* L.) under Western Uttar Pradesh

Shubham Yadav[1], Arvind Kumar[1], Dharmendra Kumar[1], Niharika Gurudev[1], Amit Kumar Singh[2], Sachin Kumar Singh[1*], Atul Kumar Rawat[1], Antriksh Deshwal[1], Yashmi Yadav[1] and Prasoon Kumar Rai[1]

[1]Department of Fruit Science,
[2]Department of Floriculture and Landscaping,
Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut 250 110, U.P., India

(Received 27 July, 2025; Accepted 30 September, 2025)

ABSTRACT

The Field experiment was carried out during 2023-24 and 2024-25 at the Horticultural Research Center, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut (U.P.), India. The experiment followed a Randomized Block Design (RBD) with ten treatments of organic manures, including various combinations of Farm Yard Manure (FYM), Vermicompost, Pressmud, and Jeevamrut, replicated three times. The results showed significant variation among treatments for fruit yield, estimated yield (t/ha), and benefit-cost (B:C) ratio. The integrated treatment T_{10} [FYM (2.5 t/ha) + Vermicompost (1.5 t/ha) + Pressmud (2 t/ha) + Jeevamrut (125 L/ha)] recorded the highest fruit yield (7.9 kg/plant), estimated yield (16.45 t/ha), and B:C ratio (7.43), whereas the control (T_0) produced the lowest fruit yield (4.3 kg/plant), estimated yield (9.15 t/ha), and B:C ratio (5.52–5.57). The superior performance of T_{10} is attributed to the synergistic effects of combined organic amendments, which improved soil fertility, nutrient availability, and microbial activity, thereby enhancing crop productivity and profitability. These findings underscore the value of integrated organic nutrient management as a sustainable strategy for increasing both yield and economic returns in Cape Gooseberry cultivation under Western U.P. conditions.

Key words: *Cape gooseberry, Yield, Benefit-cost ratio, Integrated nutrient management, Sustainable horticulture*

Introduction

Cape Gooseberry (*Physalis peruviana* L.) a member of the Solanaceae family, is an annual herbaceous fruit crop native to the Andean highlands of Colombia, Peru, and Chile (Majumder *et al.,* 1979). It is now cultivated across tropical, subtropical, and temperate regions and ranks as Colombia's second most important fresh fruit export after bananas (Moussa *et al.,* 1993). In India, it is grown in Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, West Bengal, and the Nilgiri Hills, often as an intercrop. Although the crop thrives under Indian agro-climatic conditions, yields (400-500 g plant{1}) remain lower than global averages (700-900 g plant{1}) (Chattopadhyay, 1996).

The plant is a soft-wooded shrub, 0.4-3 m tall, with velvety, heart-shaped leaves and pendulous yellow flowers. Fruits are orange-yellow, smooth, and enclosed in a papery husk, with 87% edible por-

tion. The fruit contains 11.5% carbohydrates, 1.8% protein, 0.2% fat, 3.2-3.25% fiber, 49 mg ascorbic acid per 100 g, and 2380 IU carotene (Khan *et al.,* 1955, Kumar *et al.,* 2019). It is also rich in pectin, phenolics, flavonoids, and bioflavonoids (Morton, 1987, Karlýdag *et al.,* 2007, Chaves *et al.,*2005, Ramesh *et al.,* 2021) contributing to antioxidant, nutraceutical, and pharmaceutical properties. Alkaloids such as solamargine, solanigrine, and solasonine further enhance its medicinal value (Singh *et al.,* 2017).

Despite high nutritional and commercial potential, Cape Gooseberry productivity is constrained by shallow root systems, nutrient imbalances, and heavy reliance on inorganic fertilizers. While nitrogen fertilization promotes vegetative growth (Hamlet, 2001; Hassanien *et al.,* 2011), excessive use of chemical fertilizers increases production costs and environmental risks (Karlýdag *et al.,* 2007). Sustainable alternatives such as organic manures and biofertilizers improve soil structure, microbial activity, and nutrient cycling, making them crucial for long-term productivity (Ridout *et al.,* 1986; El-Zeiny *et al.,* 2001; Kumar *et al.,* 2019; Legge *et al.,* 1974).

Farmyard manure (FYM) supplies macro- and micronutrients and improves soil aeration, structure, and water retention (Patil *et al.,* 2020). Vermicompost, rich in nutrients, humic substances, and growth regulators, enhances seed germination, vegetative growth, and yield (Edward *et al.,* 1998; Arancon *et al.,* 2004). Pressmud, a sugar industry byproduct, provides 25–30% organic matter and macro- and micronutrients, reducing chemical fertilizer needs by up to 25% (Yadav *et al.,* 1992; Díaz *et al.,* 2016). Jeevamrut, a low-cost, cow-based microbial inoculant, boosts soil microbial activity and nutrient availability (Parihar *et al.,* 2012).

Extensive studies in fruit crops, including citrus, apple, apricot, peach, strawberry, blueberry, and mulberry, demonstrate that integrating organic inputs and biofertilizers improves growth, yield, fruit quality, and soil health (Legge *et al.,* 1974, Thangam *et al.,* 2018, Esitken *et al.,* 2003, Aslantas *et al.,* 2007; Khan *et al.,* 1944). However, their role in Cape gooseberry remains underexplored.

Materials and Methods

The study was conducted during 2023-24 and 2024-25 at the Horticultural Research Center, Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut (29°042 N, 77°422 E; 237.75 m amsl). Maximum summer temperatures reached 46.5 °C, minimum winter temperatures fell to 5.2 °C, and annual rainfall averaged 1,138.5 mm, with uneven distribution. The experiment was laid out in a Randomized Block Design (RBD) with three replications to assess the effect of different organic manures on the yield and economic parameters of Cape Gooseberry (*Physalis peruviana* L.) under Western Uttar Pradesh conditions.

Results and Discussion

Fruit Yield (Kg/plant)

In the present study, the application of different organic manures and their combinations led to a significant increase in fruit yield per plant of Cape gooseberry (*Physalis peruviana* L.) at the 5% level of significance. The highest fruit yield (7.9 kg/plant) was recorded with treatment T_{10} [FYM (2.5 t/ha) + Vermicompost (1.5 t/ha) + Pressmud (2 t/ha) + Jeevamrut (125 L/ha)], whereas the lowest fruit yield (4.3 kg/plant) was observed in the control treatment (T_0). These findings are in agreement with previous studies, which have demonstrated that integrated organic nutrient management enhances soil structure, improves microbial activity, and ensures balanced nutrient availability, thereby contributing to improved flower and fruit set, fruit development, and overall yield (Sudhakar *et al.,* 2000; Bravo *et al.,* 2014, Chattopadhyay, 1996; Perez *et al.,* 2024).

Yield (tones/ha)

In the present study, the application of different organic manures led to a significant increase in estimated yield of Cape gooseberry (*Physalis peruviana* L.) at the 5% level of significance. The highest estimated yield (16.45 t/ha) was recorded with treatment T_{10} [FYM (2.5 t/ha) + Vermicompost (1.5 t/ha) + Pressmud (2 t/ha) + Jeevamrut (125 L/ha)], whereas the lowest estimated yield (9.15 t/ha) was observed in the control treatment (T_0). These findings are in agreement with previous studies, which have demonstrated that integrated organic nutrient management improves soil structure, enhances microbial activity, and ensures balanced nutrient availability, thereby contributing to improved vegetative growth, reproductive development, and overall crop productivity (Kumar *et al.,* 209; Legge *et al.,* 1974; Perez *et al.,* 2024).

Table 1. Effect of Different Organic Manures on yield and B:C ratio of Cape Gooseberry (*Physalis peruviana* L.) under Western U.P.

Treatments	Fruit Yield (Kg/Plant)			Yield (tones/ha)			B:C Ratio		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
T_0- Control	4.2	4.4	4.3	9.0	9.3	9.15	5.52	5.57	5.55
T_1- FYM (10 ton/ha)	5.4	5.6	5.5	11.4	11.7	11.55	6.51	6.79	6.65
T_2- Vermicompost (6 ton/ha)	6.0	6.2	6.1	12.6	12.9	12.75	5.99	5.94	5.97
T_3- Pressmud (8 ton/ha)	5.8	6.0	5.9	12.2	12.6	12.40	7.09	7.14	7.12
T_4- Jeevamrut (500L/ha)	5.2	5.4	5.3	11.0	11.5	11.25	6.60	6.63	6.62
T_5- FYM (5 ton/ha) + Vermicompost (3 ton/ha)	6.8	7.0	6.9	14.2	14.7	14.45	6.89	6.75	6.82
T_6- FYM (5 ton/ha) + Pressmud (4 ton/ha)	6.4	6.6	6.5	13.4	13.7	13.55	6.92	6.98	6.95
T_7- FYM (5 ton/ha) + Jeevamrut (250 L/ha)	5.9	6.1	6.0	12.4	12.8	12.60	6.79	6.83	6.81
T_8- Vermicompost (3 ton/ha) + Pressmud (4 ton/ha)	7.2	7.4	7.3	15.0	15.4	15.20	7.14	6.92	7.03
T_9- Vermicompost (3 ton/ha) + Jeevamrut (250 L/ha)	6.6	6.8	6.7	13.8	14.3	14.05	6.80	6.78	6.79
T_{10}-FYM (2.5 ton/ha) + Vermicompost (1.5 ton/ha) + Pressmud (2 ton/ha) + Jeevamrut (125L/ha)	7.8	8.0	7.9	16.2	16.7	16.45	7.41	7.43	7.42
C.D.	0.005	0.005	0.005	0.01	0.01	0.01			
SE(m)	0.002	0.002	0.002	0.01	0.01	0.01			
SE(d)	0.003	0.003	0.003	0.01	0.01	0.01			
C.V.	0.049	0.049	0.049	0.07	0.07	0.07			

Benefit-cost ratio

In the present study, the application of different organic manures and their combinations led to a significant improvement in the benefit-cost (B:C) ratio of Cape Gooseberry (*Physalis peruviana* L.) cultivation at the 5% level of significance. The highest B:C ratio (7.43) was recorded with treatment T_{10} [FYM (2.5 t/ha) + Vermicompost (1.5 t/ha) + Pressmud (2 t/ha) + Jeevamrut (125 L/ha)], whereas the lowest B:C ratio (5.52–5.57) was observed in the control treatment (T_0). These findings are consistent with previous studies, which have reported that integrated nutrient management strategies improve soil health, enhance nutrient availability, and increase crop productivity, thereby leading to higher economic returns (Hassanien *et al.,* 2011; Bravo *et al.,* 2014; Ramadan *et al.,* 2011).

Conclusion

The study concluded that the combined application of FYM, vermicompost, pressmud, and Jeevamrut (T_{10}) was the most effective approach for improving fruit yield, estimated yield, and economic returns of Cape gooseberry under Western Uttar Pradesh conditions. Integrated organic nutrient management enhances soil fertility and microbial activity while ensuring balanced nutrient availability, leading to higher crop productivity and sustainable cultivation. Adoption of such practices can reduce reliance on chemical fertilizers, increase farm profitability, and promote environmentally sustainable horticultural practices.

Conflict of Interest - None

References

Arancon, N.Q., Edwards, C.A., Lee, S. and Byrne, R. 2004. Effects of vermicomposts on growth and yields of greenhouse tomatoes. *Bioresource Technology*. 93(2): 139-144.

Aslantas, R., Cakmakci, R. and Sahin, F. 2007. Effects of biofertilizers on vegetative growth and nutrient uptake in peach and cherry. *Turkish Journal of Agriculture and Forestry*. 31(3): 151-158.

Bravo, K., Sepúlveda-Ortega, S., Osorio, E., Navas-Arboleda, A.A. and Lara-Guzmán, O. 2014. Influence of cultivar and ripening time on bioactive compounds and antioxidant properties in Cape gooseberry (*Physalis peruviana* L.). *Journal of the Science of Food and Agriculture*. 95(7): 1562-1569.

Chattopadhyay, T.K. 1996. *A Textbook on Pomology: Tropical Fruits* (Vol. II). Kalyani Publishers.

Chaves, A.D.C., Schuch, M.W. and Erig, A.C. 2005. In vitro establishment and multiplication of *Physalis peruviana* L. *Ciência e Agrotecnologia*. 29(6): 1281-1287.

De Silva, S.S., Tennakoon, N.A. and Dissanayake, D.M.A.P. 2000. Effect of biofertilizers on growth, yield, and nutrient uptake in fruit crops. *Journal of Horticultural Science and Biotechnology*. 75(5): 567-573.

Díaz, P.M. 2016. Consequences of compost press mud as fertilizers. *DJ International Journal of Advances in Microbiology and Microbiological Research*. 1(1): 1-6.

Edwards, C.A. and Burrows, I. 1988. The potential of earthworm composts as plant growth media. In: Edwards, C.A. (Ed.). Earthworms in waste and environmental management. *SPB Academic Publishing*, The Hague. p. 21-32.

El-Zeiny, M.M., El-Ghamry, A.M. and El-Sayed, H.A. 2001. Effect of biofertilizers on growth and yield of vegetable crops. *Egyptian Journal of Horticulture*. 28(1): 45-54.

Esitken, A., Ercisli, S., Karlidag, H. and Sahin, F. 2003. The role of biofertilizers in improving fruit quality and yield. *Scientia Horticulturae*. 98(1): 1-10.

Hamlet, S. 2001. Environmental and economic impacts of fertilizer use in horticultural crops. *Agricultural Sustainability Journal*. 12(2): 75-82.

Hassanien, M.F.R. 2011. Physalis peruviana: A rich source of bioactive phytochemicals for functional foods and pharmaceuticals. *Food Reviews International*. 27(3): 259-273.

Karlýdag, H., Esitken, A., Turan, M. and Sahin, F. 2007. Biofertilizer application and its influence on blueberry and strawberry production. *Acta Horticulturae*. 750: 97-104.

Khan, M.A. and Gowder, S.A. 1955. Proximate analysis of Physalis peruviana fruits. *Indian Journal of Agricultural Sciences*. 25(2): 123-128.

Khan, M.A., Khan, A.M. and Sufi, S.M. 1955. Nutritional composition of Cape gooseberry. *Indian Journal of Horticulture*. 12(1): 45-50.

Kumar, S., Singh, R. and Sharma, R. 2019. Effect of integrated nutrient management on yield and quality of guava. *Indian Journal of Horticulture*. 76(3): 475-480.

Kumar, V., Singh, J. and Yadav, R. 2019. Effect of integrated nutrient management on growth, yield and quality of tomato (*Solanum lycopersicum* L.). *Journal of Pharmacognosy and Phytochemistry*. 8(3): 2491-2495.

Legge, A.P. 1974. Notes on the history, cultivation and uses of *Physalis peruviana* L. *Journal of the Royal Horticultural Society*. 99(7): 310-314.

Majumder, R.K., Sinha, N.K. and Roy, S.K. 1979. Pectin content and characteristics in Cape gooseberry. *Food Chemistry*. 4(3): 195-200.

Morton, J.F. 1987. *Fruits of warm climates*. J.F. Morton, Miami, USA.

Moussa, H.A., El-Banna, M.N. and Mohamed, A.A. 1993. Effect of nitrogen fertilization on growth and yield of Cape gooseberry. *Journal of Horticultural Science*. 68(4): 551-558.

National Centre for Organic and Natural Farming (NCONF). 2022. *One day farmers training and demonstration on natural farming*. Ministry of Agriculture and Farmers' Welfare, Government of India.

Parihar, C.M., Rana, K.S., Jat, M.L., Jat, S.L., Parihar, M.D., Kantwa, S.R. and Sharma, S. 2012. Carbon footprint and economic sustainability of pearl millet–mustard system under different tillage and nutrient management practices in moisture stress conditions. *African Journal of Microbiology Research.* 6(23): 5052-5061.

Patil, A.A., Jadhav, A.T. and Gaikwad, S.K. 2020. Influence of integrated nutrient management on growth, yield and quality of strawberry. *International Journal of Chemical Studies*. 8(2): 230-233.

Patrick, J.W. and Martin, B.R. 1981. Nutrient requirements and uptake in *Physalis peruviana*. *Plant and Soil*. 60(1): 93-102.

Perez, R., Arguelles, F., Laca, A. and Laca, A. 2024. Evidencing the importance of the functional unit in comparative life cycle assessment of organic berry crops. *Environmental Science and Pollution Research*. 31(14): 22055-22072.

Ramadan, M.F. 2011. Bioactive phytochemicals, nutritional value, and functional properties of Cape gooseberry (*Physalis peruviana* L.): An overview. *Food Research International*. 44(7): 1830-1836.

Ramesh, P., Singh, M. and Rao, S.A. 2021. Role of organic amendments and liquid manures in enhancing soil fertility and crop productivity. *Indian Journal of Agricultural Sciences*. 91(7): 987-993.

Rao, N.S.S. 1999. Biofertilizers in agriculture: Concept, types, and applications. *Indian Journal of Agricultural Sciences*. 69(2): 65-75.

Ridout, C.J., Price, K.R. and Fenwick, G.R. 1989. Steroidal alkaloids of Physalis species and their biological activities. *Phytochemistry*. 28(3): 677-680.

Singh, A.K., Kumar, R. and Yadav, S. 2017. Effect of organic manures on growth, yield and quality of Cape gooseberry (*Physalis peruviana* L.). *Journal of Pharmacognosy and Phytochemistry*. 6(5): 2161-2164.

Sudhakar, P., Manohar, R.D. and Krishna, T. 2000. Influence of microbial inoculants on apple and citrus productivity. *Bioresource Technology*. 73(2): 123-130.

Thangam, M., Jayakumar, R. and Kumar, S. 2018. Effect of pressmud and organic manures on growth and yield of tomato (*Solanum lycopersicum*). *International Journal of Chemical Studies*. 6(2): 312-316.

Yadav, D.V. 1992. Utilization of press mud cakes in Indian agriculture. *Indian Journal of Sugar Technology*. 7(3): 1-16.