# Comparative Analysis of Yield and Economic Benefits of Using different organic manure in Broccoli Cultivation


## Abstract

An experiment was conducted during *Rabi* 2020-21 at Research farm of Department of Horticulture, R.A.K. College of Agriculture, Sehore (Madhya Pradesh) to investigate the effects of different organic manures on growth and yield of Broccoli (*Brassica oleracea var. italica*). The tan treatments were carried out including control (Recommended dose), different concentrations of organic manure, FYM (100% and 50%),Vermicompost (100% and 50%), Neem cake (100% and 50%), andPoultry manure (100% and 50%). All of the organic manures were applied at the time the Broccoli was transplanted into the plot, according to the doses that should be given there.It could be evinced from the data that maximum curd yield of 15.30 t/ha and net income of Rs. 236321 per ha and benefit cost ratio of 4.39 was achieved in Broccoli in the $T_{10}$ (Recommended dose) while the minimum benefit cost ratio 3.15 in the $T_2$ and minimum net income Rs.139820 per ha in the $T_1$With the 3.23 benefit cost ratio.Hence it could be concluded that Broccoli is a remunerative labour intensive crop.


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**Key words:** Broccoli, Benefit cost ratio, Organic manure Neem cake, Poultry manure.


## Introduction

Broccoli (Brassica oleracea var. italica) is a popular and valuable vegetable with green flower heads, thick stems, and thin leaves. The name "broccoli" comes from the Italian word "broccolo", meaning "the flowering crest of a cabbage". It is a member of the Brassicaceae family and is native to the Mediterranean region. It was recently introduced to India and is gaining popularity, especially among affluent consumers, due to its nutritional value. Broccoli is low in fat and calories, and rich in vitamin C, vitamin A, vitamin B2, and calcium (Sanwal and Yadav, 2006). In fact, it contains more vitamin A than cabbage. Broccoli also contains important phytochemicals such as beta-carotene and indole-3-carbinol, which may help prevent cancer and lung disease. The nutritional value of sprouted broccoli per 100

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grams is as follows: water (89.3%), protein (3.6%), fat (0.2%), carbohydrates (5.5%), fiber (1.2%), vitamin A (900). International Units). (1.3 mg), phosphorus (0.79 mg) and sulfur (1.26 mg)

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The global demand for broccoli is increasing due to its health benefits, including its high content of vitamins, minerals, fiber, and antioxidants. More importantly, broccoli is a good source of vitamin C and vitamin K, and many phytonutrients, such as sulforaphane, have known anti-cancer potential (Singh and Nath, 2012). Awareness of these health benefits ~~is increasing~~consumer interest in broccoli, thereby increasing its market value and commercial importance.

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Despite the economic potential of broccoli cultivation, there are still some challenges, especially when it comes to soil fertility and permaculture practices. Traditional reliance on chemical fertilizers to increase production has led to environmental damage such as land degradation and pollution (Nugahedi et al., 2015). In response to these concerns, there have been significant changes in organic farming. Organic fertilizers provide all the necessary macro and micro nutrients in usable form, thereby improving the physical and biological strength of the soil (Abu El-Magged et al., 2006). Organic fertilizers such as farmyard manure (FYM), vermicompost, neem cake and poultry manure are increasingly being used as alternatives to synthetic pesticides. These organic materials not only provide the necessary nutrients but also improve soil structure, water retention and microbial activity, resulting in healthy soil and long-term sustainability (Nugrahedi et al., 2015). The aim of this study was to investigate the economics of broccoli cultivation, focusing on the cost-effectiveness and market potential of different organic fertilizers. This study aims to provide a better understanding of the market potential of organic broccoli cultivation by analyzing the results of these organic treatments in terms of profit, productivity and market value.

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## MATERIALS AND METHOD

The experiments were carried out at Horticulture Research farm of Department of Horticulture, R.A.K., College of Agriculture, Sehore (Madhya Pradesh), during the Rabi season of 2020-21. The study area is situated in the western part of M.P. It is situated at 230.10° north latitude, 760.64° east longitude and 501.5 m above sea level. The present study aims to evaluate the economic

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impact of various organic fertilizers on broccoli (Brassica oleracea var. italica). The soil of the experimental area is medium black clay (Vertisols), has static surface and good drainage capacity. The experiment was adapted to a randomized block design and repeated three times. There are tanning treatment packages containing various combinations of organic fertilizers. Prepare a bed approximately 5-6 meters long, 1 meter wide and 15 cm high. To protect the seedlings from harsh weather conditions, the seedbeds are covered with compost and mulch and then shaded with frames and polythene sheets. Thirty days after sowing, the seedlings are ready for transplanting. Select healthy crops of good shape and size to transplant to the prepared area. Before flowering, five plants from each row were randomly selected and labeled to collect information on specific characteristics.

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**Table 1: Treatment details**

| Symbols | Treatments |
|---|---|
| $T_1$ | 100% FYM |
| $T_2$ | 100% Vermicompost |
| $T_3$ | 100% Neem cake |
| $T_4$ | 100% Poultry manure |
| $T_5$ | 50%FYM +50% Vermicompost |
| $T_6$ | 50% Neem cake +50% Poultry manure |
| $T_7$ | 50% Vermicompost +50% Neem cake |
| $T_8$ | 50% FYM +50% Neem cake |
| $T_9$ | 50% Vermicompost +50% Poultry manure |
| $T_{10}$ | Recommended dose |

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**Economics from different treatments**

**Cost of Cultivation**

The cost of cultivation for each treatment was calculated based on the market prices of all inputs used to grow the crop on a per hectare basis. This included both the cost of common inputs and practices used across all treatments, as well as the cost of variable inputs specific to each treatment. These costs were then combined to determine the total cost of cultivation for each particular treatment.

**Gross Monetary Return**

The gross monetary return for each treatment was calculated based on the current market price of the produce, expressed on a per hectare basis. This figure1. represents the total revenue generated from the crop produced under each treatment.

**Net Monetary Return**

The net monetary return (NMR) per hectare under each treatment was determined by subtracting the cost of cultivation of a particular treatment from the GMR of the same treatment.

Net Monetary Return = Gross Monetary Return - Cost of Cultivation

This calculation provided the profit or loss for each treatment after accounting for the cost of inputs.

**Benefit-Cost Ratio**

To estimate the benefits obtained under different treatments for each rupee of expenditure incurred, B: C ratio of each treatments was calculated as below:-

$$\text{B:C ratio} = \frac{\text{Gross monetary returns}}{\text{Total cost of cultivation}}$$

**Results and Discussion**

**Cost of Cultivation**

The provided data on the cost of cultivation shows a baseline expenditure of Rs. 52,580 across all treatments, with additional costs varying significantly depending on the organic material used. The treatment using 100% poultry manure (T3) fetched the lowest additional cost at Rs. 3,000, resulting in a total cost of Rs. 55,580. Conversely, the treatment with 100% vermicompost (T2) had the highest additional cost of Rs. 30,000, bringing the total to Rs. 82,580. This is followed by treatments T7 and T5 with a total cost of Rs. 73,580 and Rs. 72,580. These different prices are based on previous studies that have shown that poultry manure is a good choice due to its low cost and availability, while the production of vermicompost is more expensive due to its production costs. Despite these costs, vermicomposting is generally valued for its long-term benefits such as improved soil fertility and increased yields (Chandra et al. 2013; Singh et al. 2015). The findings are consistent

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with historical observations, emphasizing the economic efficiency of poultry manure and the costs associated with vermicomposting as a contributor to soil improvement.

**Net Monetary Return**

The analysis of net returns indicates that the highest profit was achieved with treatment T10 (recommended dose) at Rs. 236,321 per hectare, followed closely by treatment T5 (50% FYM + 50% vermicompost) at Rs. 219,820 per hectare, both of which are statistically superior and comparable in maximizing financial returns. In contrast, treatment T1 (100% FYM) yielded the lowest net return of Rs. 139,820 per hectare. These findings are consistent with previous research, which has shown that integrated nutrient management (INM) practices combining organic and inorganic inputs generally result in higher economic benefits compared to using solely organic sources like FYM (Reddy et al., 2016; Kumawat & Sharma, 2018). The superior performance of treatments such as T10 and T5 may be due to the high quality nutrients they provide, increasing the yield and quality of the crops, thus improving the quality of the crop, a pattern also noted in previous studies (Singh et al., 2014; Chatterjee et al., 2014; Patel et al., 2016).

**Benefit-cost ratio**

The study reveals that the highest benefit-cost ratio (BCR) of 4.39 was achieved with treatment $T_{10}$ (recommended dose), indicating its superior economic efficiency compared to other treatments. This high B:C ratio suggests that the returns significantly outweigh the costs, making $T_{10}$ the most financially viable option. In contrast, the lowest B:C ratio of 3.15 was observed with treatment T2 (100% vermicompost), indicating relatively lower profitability.Patel et al. (2015) observed that recommended fertilizer dosages resulted in higher BCRs compared to organic amendments like vermicompost, primarily due to the immediate and substantial yield improvements that chemical fertilizers can induce. Similar studies by Singh and Sharma (2017) further corroborated that while organic treatments, including vermicompost, contribute positively to soil health and long-term sustainability, their short-term economic returns often lag behind those of conventional or recommended practices. These findings align with previous research by Choudhary *et al*. (2012), Narayan *et al*. (2014), Srichandan *et al.* (2015), Choudhary and Paliwal et al.(2017), Negi et al.(2017), Lodhi et al. (2017), Mohanta et al. (2018), Prashad et al.(2018), and Char GR et al.(2020). Which consistently show that integrated nutrient

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management (like $T_{10}$) typically results in higher B:C ratio compared to treatments relying solely on organic inputs (such as $T_2$). The superior performance of integrated treatments can be attributed to the balanced and adequate nutrient supply, which enhances crop productivity and, consequently, the economic returns.

**Table 2: Effect of different organic manures on economics of different treatment**

| Treatment | Common Expenditure (Rs.) | Treatment cost (Rs.) | Total cost of cultivation (Rs./h) | Gross income | Net income (Rs./ha) | B:C Ratio |
|---|---|---|---|---|---|---|
| $T_1$ | 52580 | 10000 | 62580 | 202400 | 139820 | 3.23 |
| $T_2$ | 52580 | 30000 | 82580 | 260200 | 177620 | 3.15 |
| $T_3$ | 52580 | 7050 | 59630 | 246400 | 186770 | 4.13 |
| $T_4$ | 52580 | 12000 | 64580 | 259800 | 195220 | 4.02 |
| $T_5$ | 52580 | 20000 | 72580 | 292400 | 219820 | 4.03 |
| $T_6$ | 52580 | 9525 | 62105 | 262200 | 200095 | 4.22 |
| $T_7$ | 52580 | 23025 | 75605 | 255200 | 179595 | 3.37 |
| $T_8$ | 52580 | 13025 | 65605 | 250400 | 184795 | 3.81 |
| $T_9$ | 52580 | 16500 | 69080 | 288400 | 219320 | 4.17 |
| $T_{10}$ | 52580 | 17099 | 69679 | 306000 | 236321 | 4.39 |

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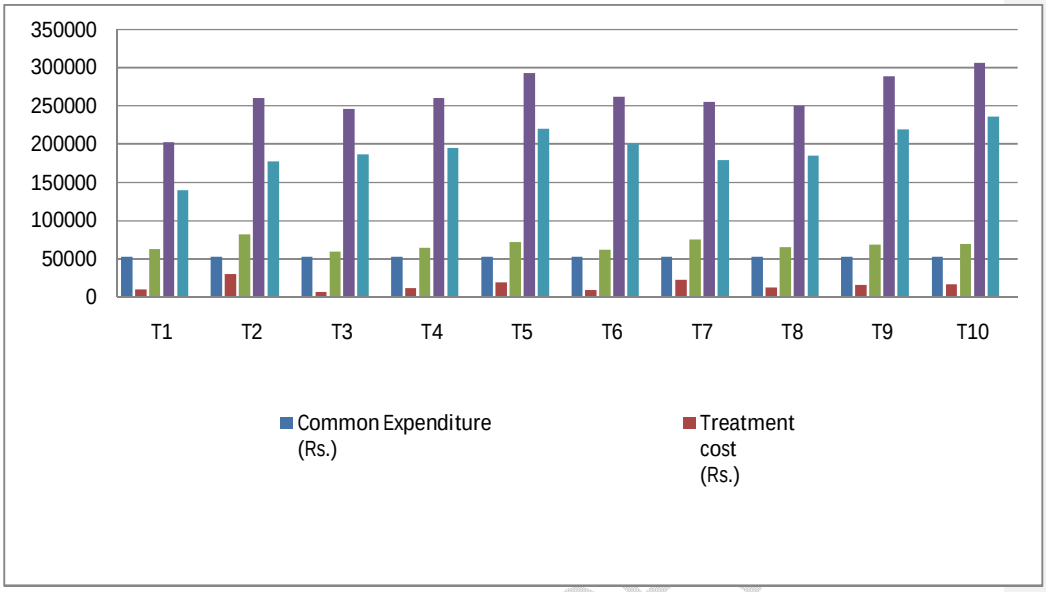


**Fig.1. Effect of different organic manures on Common Expenditure (Rs.), Treatment cost (Rs.), Total cost of cultivation (Rs./h), Gross income, Net income (Rs./ha) and B:C Ratio.**

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## Conclusion

Among the data showed that a significant maximum yield of 15.30 $tha^{-1}$ and net income of Rs. 236321) per ha and benefit cost ratio of 4.39 was achieved in broccoli in the $T_{10}$. However, shows the minimum benefit cost ratio 3.23 and lowest net income 139820 Rs./ha and minimum curd yield of 10.12 t/ha was obtained in Treatment T1-(control).

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UNDER PEER REVIEW

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