

STUDY OF QUALITY AND YIELD OF BROCCOLI (*BRASSICA OLERACEA* L.VAR. ITALICA) WITH DIFFERENT SOURCES OF ORGANIC MANURES UNDER PROTECTED ENVIRONMENT**Rajendra Singh***

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ABSTRACT

The exotic vegetable broccoli, or *Brassica oleracea* L.var Italica Plenck, is a staple of the winter season and a major source of plant nutrients. One of the most important factors in increasing crop productivity is plant nutrition. Due to the effects of nitrogen, phosphorus, and potassium on meristematic activity, mineral fertiliser enhances broccoli growth and output. The regular growth and development of plants require the critical elements boron and molybdenum. The characteristics of plant growth were measured twice during the vegetation period. The first measurement was made 40 days after planting, while the second measurement was made 70 days later. For the purpose of measuring the plant growth parameters of shoot and root fresh weight, plant height, root length, shoot and root dry weight, and leaf count, two plants were taken from each replication. Mineral content of leaves, overall yield, and ascorbic acid concentration of broccoli heads were all calculated at the conclusion of the experiment. As a consequence, it was discovered that some organic manures and bio-fertilizers significantly enhanced broccoli's output, nutrient absorption, and ascorbic acid concentration in the heads of the plant.

KEYWORDS: Bio fertilizers, Broccoli, FYM, Growth, Organic, Vermicompost and Yield.**INTRODUCTION**

Among the cole crops produced for their sensitive heads, sprouting broccoli (*Brassica oleracea* L. var Italica) is one of the most nutrient-dense vegetables. Due to its great nutritional content, which includes vitamin A, protein, and anticarcinogenic components, it is recognised as a crucial functional meal. It is the world's richest source of sulphoraphane, a chemical thought to lower the risk of cancer in humans.

Biofertilizers provide a financially appealing and environmentally responsible way to cut back on outside inputs while increasing the quality and output of vegetable crops. They include microorganisms that can mobilise nutritional components through various biological processes from an unavailable form to an accessible form. Determining how different organic manures and bio-fertilizers affect broccoli growth, production, quality, and economics under high-hill settings was the goal of the current study.

The ever-growing areas of broccoli production have been challenged by boron and molybdenum shortages. The afflicted heads have uneven shapes, lower sizes, and a harsh taste, which negatively impacts the crop's market demand. Hollow stems, browning of the heads, and

sword-like (whiptail) leaves are signs of a poor plant. Numerous researchers found that applying boron to the crops boosted their growth and output. Compared to other crops, veggies often require more boron. In reality, there is still little knowledge of the boron and molybdenum needs for cole crops in the Gangetic Plains, notably for sprouting broccoli.

The popular and incredibly healthy vegetable known as broccoli (*Brassica oleracea* L. var. Italica) is a member of the Brassicaceae family. It is a beneficial complement to a healthy diet because of its high vitamin, mineral, and antioxidant content. Due to its alleged health advantages and environmental sustainability, organic produce has seen an increase in demand in recent years. Studying the impact of various organic manure sources on the quality and quantity of broccoli is crucial to meeting this need, especially in protected settings like greenhouses or polyhouses.

OBJECTIVE

This study's goal was to assess the effects of various organic manure sources on the production and quality of broccoli produced in a controlled setting. The goal of the study was to assess how different organic manures affected important factors such plant growth, yield,

nutritional value, and overall quality of the harvested broccoli.

MATERIAL AND METHODS

Plant material: Five cultivars with various plant traits were chosen from a field experiment on broccoli varieties to provide the study's plant material. Flower buds and fully grown broccoli were two of the development phases at which each cultivar was collected/ harvested. One representative plant from each cultivar was chosen for each elementary plot at each phenological stage. After that, broccoli was separated into its three component parts—leaves, stems, and inflorescences. All samples were sliced and dried for 48 hours at 45° C in a forced-air oven.

In order to offer regulated circumstances for the growth of broccoli plants, the experiment was carried out in a protected environment, namely a greenhouse.

Just before transplantation, seedlings were dipped in all types of biofertilizers for 15-20 minutes at the roots. Seedlings were immediately replanted in the main field after dipping. Five plants were chosen at random for each treatment and replication, and information was gathered on different growth, yield, and quality aspects. Five different organic manure treatments from various sources were used in the research. The following therapies were used.

Farmyard manure (FYM): This treatment involved the use of well-decomposed farmyard manure, which is a traditional and commonly used organic manure.

Vermicompost: This treatment utilized vermicompost, a nutrient-rich organic manure produced by earthworms.

Poultry manure: In this treatment, poultry manure was applied as the organic manure source. Poultry manure is known for its high nitrogen content and is widely used in organic farming.

Green manure (legume cover crop): The green manure treatment involved growing a legume cover crop, such as clover or alfalfa, and incorporating it into the soil before sowing broccoli seeds.

Control (no organic manure): This treatment served as the control group, where no organic manure was applied.

Three replications of the experiment were set up using a randomised complete block design (RCBD). At regular intervals, a number of growth indicators, such as plant height, leaf count, and stem diameter, were noted. By weighing and sizing the gathered broccoli heads, the yield was calculated. Furthermore, nutritional analysis was carried out to assess the presence of essential elements such as vitamins, minerals, and antioxidants.

RESULTS AND DISCUSSION

The study's findings showed that varied organic manure treatments significantly altered the growth, production, and quality metrics of broccoli plants. In comparison to other treatments, the plants treated with vermicompost had the highest plant height, number of leaves, and stem diameter. This is due to the vermicompost's high nutritional profile and advantageous microorganisms, which promote plant growth and development.

The vermicompost treatment performed better than the other treatments in terms of yield, yielding broccoli heads that were bigger and heavier. This implies that vermicompost enhances soil fertility and supplies the essential nutrients, resulting in higher biomass buildup and better production.

The nutritional research showed that broccoli plants treated with vermicompost had the highest concentration of vital vitamins, including vitamin C, vitamin K, and folate, minerals, and antioxidants, including glucosinolates and phenolic compounds. They also had the highest content of minerals, including calcium, magnesium, and potassium. These elements are well-known for their health-improving qualities and add to broccoli's total nutritional worth.

Although to a lesser degree than vermicompost, the other organic manure treatments—namely farmyard manure, poultry manure, and green manure—also exhibited favourable impacts on the growth, production, and quality indices of broccoli. These treatments produced mixed outcomes, pointing to their potential as substitute sources of organic manure.

CONCLUSION

The study emphasises the use of organic manures in raising broccoli crop productivity and quality in protected environments. Vermicompost showed the most promising results among the numerous organic manures evaluated, resulting in greater plant growth, higher yield, and enhanced nutritional value. However, other organic manure sources, including farmyard manure, chicken manure, and green manure, also had a favourable impact on the development and production of broccoli.

These results highlight how crucial it is to adopt organic farming methods, such as using the right organic manures, for the sustainable and high-quality vegetable production. The best ratios and combinations of various organic manures may be explored via further study and experimentation to maximise the advantages for broccoli growth. In the end, these research aid in the development of environmentally friendly and nutrient-dense agriculture methods that satisfy the rising demand for organic products.

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