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Effect of vermicompost and Ghanjeevamrit on growth, yield of maize (*Zea mays* L.)

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Abstract

The field experiment entitled “Effect of Vermicompost and Ghanjeevamrit on Growth, Yield Attributes and Productivity of Maize (*Zea mays* L.)” was conducted during the Rabi season of 2025–2026 at the experimental farm of Maris Stella College, Vijayawada, Andhra Pradesh, India. The experiment was laid out in a Randomized Block Design (RBD) with five treatments and two replications to evaluate the effect of organic nutrient sources on maize growth and yield. The treatments consisted of different levels of vermicompost and ghanjeevamrit applied individually and in combination along with a control treatment.

The results indicated that the application of organic nutrient sources significantly improved the growth and yield attributes of maize. Among the treatments, the combined application of vermicompost @ 5 t ha⁻¹ and ghanjeevamrit @ 500 kg ha⁻¹ (T₄) recorded the highest plant height (203 cm), number of leaves per plant (14), cob length (20.0 cm), cob breadth (5.4 cm), and number of cobs per plant (1.4). The same treatment also produced the highest grain yield (6.5 t ha⁻¹), followed by the treatment receiving vermicompost @ 2.5 t ha⁻¹ + ghanjeevamrit @ 250 kg ha⁻¹ (5.7 t ha⁻¹). The control treatment recorded the lowest values for all parameters.

The improvement in growth and yield parameters may be attributed to enhanced nutrient availability, improved soil structure, and increased microbial activity resulting from the application of vermicompost and ghanjeevamrit. The study concludes that the combined application of vermicompost and ghanjeevamrit is an effective organic nutrient management practice for improving maize productivity while maintaining soil health.

Keywords: Vermicompost, ghanjeevamrit, maize productivity, organic nutrient management, soil health

Introduction

Maize (*Zea mays* L.) is one of the most important cereal crops cultivated worldwide, playing a significant role in the food, feed, and industrial sectors. It is widely grown due to its high yield potential, adaptability to diverse agro-climatic conditions, and versatile uses. In India, maize is considered the third most important cereal crop after rice and wheat, contributing significantly to national food security and the livestock feed industry. However, achieving higher productivity while maintaining soil health has become a major challenge due to excessive dependence on chemical fertilizers. India has the 4th rank in terms of area under organic land in the world and 1st in terms of the number of organic producers in the world. In 2023, there were 4.3 million organic producers worldwide. India remains the country with the 110th most organic producers (2.36 million). India ranks 2nd in terms of World Organic Agricultural land and 1st in terms of the total number of producers (FIBL & IFOAM, 2024). The total area under organic certification in India is 7.3 million hectares. The certified area includes 4.4 million hectares under cultivation and 2.8 million hectares under wild harvest collection. India has produced nearly 3.6 million MT of certified organic products during 2023-2024 (APEDA, 2023-24).

It is known as the queen of cereals due to its highest genetic potential among cereals. It is the staple food for human beings and quality feed for animals. It is also used as a basic material for industrial products such as starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceuticals, cosmetics, films, textiles, gum, packages, and paper industries. Its grain contains about 10 percent protein, 4 percent fats, 70 percent carbohydrates, 2.3 percent crude

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fiber, 10.4 percent albuminoids, and 1.4 percent ash. The crop also contains the vitamins A, B, C, and E, including mineral salts and essential trace elements such as carotene, thiamine, and tocopherol.

Continuous use of synthetic fertilizers often leads to soil degradation, reduced microbial activity, and deterioration of soil structure and fertility. In recent years, there has been increasing interest in sustainable and eco-friendly nutrient management practices that improve soil fertility and crop productivity while minimizing environmental impacts. Organic nutrient sources such as vermicomposting and Ghanjeevamrit have gained attention as effective alternatives or supplements to chemical fertilizers.

Using organics improves soil health by increasing organic matter, physiochemical characteristics, and beneficial bacteria. Organic manure, such as vermicompost, farmyard manure, and cow urine, plays a vital role in maintaining soil fertility and crop productivity. Fermented liquid organics, such as cow urine, jeevamrit, and ghanjeevamrit, include nutrients, growth-promoting chemicals, and beneficial bacteria that improve plant metabolism, growth, development, and resistance to diseases and pests. Soil organic matter plays an indispensable role in the process of the soil ecosystem, including nutrient cycling, soil formation, carbon sequestration, retention of water, and supply of energy to microorganisms.

Earthworms improve and restore soil fertility and boost crop productivity through their excretory products, known as vermicast. Vermicast is popularly known as Black gold because of rich in nutrients, growth-promoting substances, beneficial soil micro flora, and has properties of inhibiting pathogenic microbes and synergistic relationships in plant rhizospheres. Vermicompost is also considered as bio fertilizer because of its richness in humus and nitrogen-fixing microorganisms (Yadav *et al.* 2020). It improves soil structure, increases nutrient availability, enhances water-holding capacity, and promotes beneficial microbial communities in the rhizosphere. Such improvements can help soils retain moisture and sustain plant growth under erratic rainfall or drought conditions, which are becoming more frequent due to climate change. Vermicompost provides a higher amount of macro and micro nutrients to the soil as compared to other compost (Thakur *et al.* 2021) [3]. Vermicompost has also been shown to enhance plant physiological attributes and reduce heavy metal uptake in crops, making it a promising amendment for sustainable agriculture. Vermicompost imparts a dark colour to the soil and thereby helps to maintain the temperature of the soil (Dhaka *et al.* 2022). The combined application of vermicompost and Ghanjeevamrit may improve soil fertility, growth parameters, and yield attributes of maize. Therefore, the present study was conducted to evaluate the effects of vermicompost and Ghanjeevamrit on growth, yield attributes, and productivity of maize.

Methods and Materials

The field experiment for the study entitled “EFFECT OF VERMICOMPOSTING AND GHANJEEVAMRIT ON GROWTH, YIELD ATTRIBUTES, and PRODUCTIVITY OF MAIZE” was conducted during the year 2025-2026 in the Experimental Farm of Maris Stella College, Vijayawada, India. The details of the materials used and methods employed during the experimentation have been described below.

Details of the experimental site

Location and Climate: The experimental site, Vijayawada, lies

in the NTR district of Andhra Pradesh, situated on NH 16 Service Rd, located at a 16.503° N latitude and 80.662° E longitude at an elevation of about meters above mean sea level in the East Coast Plains and Hills Region. The soil in this area is alluvial with a pH range between 6.5 and 7.5, and the temperature ranges from 25°C to 30°C in the Rabi season.

Experimental detail

The field experiment entitled “Effect of Vermicompost and Ghanjeevamrit on the Growth, Yield Parameters and Productivity of Maize (*Zea mays* L.)” was conducted during the Rabi season of 2025–2026 at the experimental field located in Maris Stella College, Vijayawada, Andhra Pradesh, India. The experimental site is situated in the Krishna agro-climatic zone, which is characterized by a tropical climate with moderate winter temperatures during the Rabi season.

The soil of the experimental field was fertile, loamy in texture, and well-drained, suitable for maize cultivation. Before sowing, the field was thoroughly prepared by ploughing, harrowing, and levelling to obtain a fine tilth. Recommended agronomic practices were followed throughout the crop growth period. The crop used for the study was maize (*Zea mays* L.), which was sown on 23 December 2025. Seeds were sown manually at a spacing of 75 cm between rows and 25 cm between plants to maintain optimum plant population. Standard crop management practices such as irrigation, weeding, and plant protection measures were carried out uniformly in all plots whenever required.

The experiment was laid out in a Randomized Block Design (RBD) consisting of five treatments and two replications. Each treatment was randomly allocated within each replication to minimize experimental error. The treatments consisted of different combinations and levels of vermicompost and ghanjeevamrit applied to study their influence on maize growth and yield.

The treatments included various organic nutrient management practices involving vermicompost and ghanjeevamrit either individually or in combination, along with a control treatment. These treatments were applied as per the treatment schedule before sowing and during crop growth stages where required. Observations were recorded on important growth parameters such as plant height, number of leaves per plant, and growth rate, as well as yield attributes including cob length, cob girth (breadth), number of cobs per plant, and grain yield. At harvest, the total grain yield from each plot was recorded and converted into productivity per unit area.

Treatment details

The experiment consisted of five treatments arranged in a Randomized Block Design (RBD) with two replications to evaluate the effect of vermicompost and Ghanjeevamrit on the growth and yield of maize.

Treatment	Treatment Details
T ₀	Control (No application of vermicompost or ghanjeevamrit)
T ₁	Vermicompost @ 5 t ha
T ₂	Ghanjeevamrit @ 500 kg ha
T ₃	Vermicompost @ 2.5 t ha + Ghanjeevamrit @ 250 kg ha
T ₄	Vermicompost @ 5 t ha + Ghanjeevamrit @ 500 kg ha

The organic nutrient sources were applied uniformly in the respective treatment plots before sowing and incorporated into the soil during land preparation. The control plot (T₀) did not receive any organic nutrient application.

Observation parameters recorded**Growth Parameters**

1. Plant height (cm) – measured at 30, 60, and harvest stage.
2. Number of leaves per plant
3. Stem girth (cm)
4. Days to tasseling and silking

Yield Parameters

1. Cob length (cm)
2. Cob girth / breadth (cm)
3. Number of cobs per plant
4. Number of grains per cob
5. 1000 grain weight (g)

Productivity

1. Grain yield per plot (kg)
2. Grain yield per hectare ($t\ ha^{-1}$)

Results and Discussion**Table 1:** Growth Parameter

Treatment	Plant Height (cm)	No. of Leaves	Stem Girth (cm)
T ₀ Control	162	11	6.1
T ₁ Vermicompost	178	12	60.7
T ₂ Ghanajeevamrit	171	12	6.4
T ₃ VC+GJ (medium)	188	13	7.0
T ₄ VC + GJ (high)	203	14	7.5

Table 2: Yield Attributes

Treatment	Co Length(cm)	Cob Breadth(cm)	No. of Cobs per Plant
T ₀	14.2	4.1	1.0
T ₁	17.0	4.7	1.2
T ₂	16.1	4.5	1.1
T ₃	18.3	5.0	1.3
T ₄	20.0	5.4	1.4

Table 3: Yield Productivity

Treatment	Grain Yield per Plot(Kg)	Grain Yield(tha^{-1})
T ₀	8.2	4.1
T ₁	10.0	5.0
T ₂	9.3	4.6
T ₃	11.4	5.7
T ₄	13.0	6.5

Table 4: Statistical Analysis

Parameter	SEm ($\pm$)	CD(P=0.05)
Plant Height	3.2	9.5
Cob Length	0.6	1.8
Cob Breadth	0.3	0.9
Grain Yield	0.5	1.4

The application of organic nutrient sources significantly influenced the growth and yield parameters of maize. The treatment T₄ (Vermicompost @ 5 t ha⁻¹ + Ghanajeevamrit @ 500 kg ha⁻¹) recorded the highest plant height, number of leaves, cob length, and cob breadth compared to other treatments. The control treatment (T₀) recorded the lowest values for all parameters.

The improvement in growth and yield attributes may be attributed to the increased availability of nutrients, improved soil structure, and enhanced microbial activity resulting from the application of vermicompost and Ghanajeevamrit. The combined application of these organic inputs resulted in better

nutrient uptake, which ultimately improved grain yield and productivity of maize.

Conclusion

From this study, it is clear that using organic inputs like vermicompost and ghanajeevamrit can make a real difference in maize cultivation. When both were applied together at higher levels, the crop showed better growth, healthier plants, and higher yield compared to other treatments and the control.

This improvement happened because these organic materials naturally improve the soil-making it richer, improving its structure, and increasing beneficial microbial activity. As a result, plants were able to absorb nutrients more efficiently and grow better.

In simple terms, combining vermicompost and ghanajeevamrit is not just effective but also a sustainable way of farming. It helps farmers get good yields while keeping the soil healthy for future crops. This makes it a practical and eco-friendly alternative to heavy use of chemical fertilizers.

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