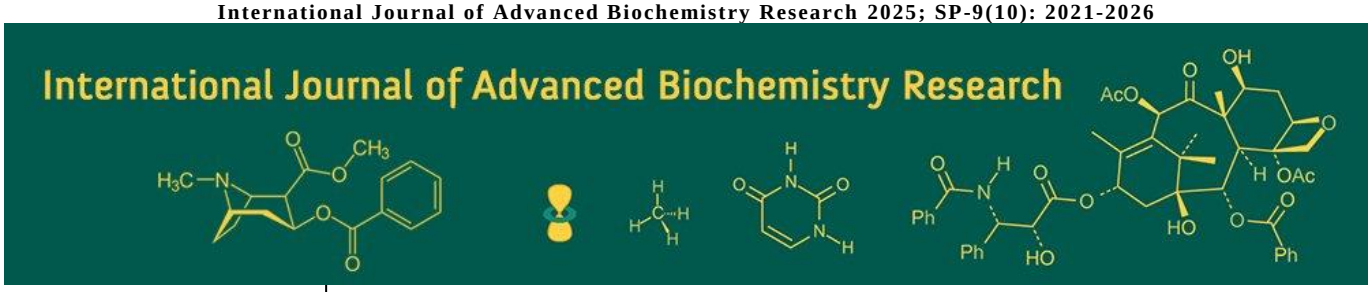

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Evaluation of different organic manure on growth, yield and quality traits of cucumber (*Cucumis sativus* L.) in Bastar plateau

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Abstract
A field experiment entitled "Evaluation of different organic manure on growth, yield and quality traits of cucumber (*Cucumis sativus* L.) in Bastar plateau" was conducted at Krantikari Debridhur College of Horticulture and Research Station, Jagdalpur (C.G.) during the *Kharif* season of 2024-25. The experiment was laid out in Randomized Block Design with three replications. The treatments consisted of ten organic manure management practices *viz.*, T_0 (Control), T_1 (FYM 75% + Poultry manure 25%), T_2 (FYM 75% + Vermicompost 25%), T_3 (Poultry manure 75% + FYM 25%), T_4 (Poultry manure 75% + Vermicompost 25%), T_5 (Vermicompost 75% + FYM 25%), T_6 (Vermicompost 75% + Poultry manure 25%), T_7 (FYM 50% + Poultry manure 50%), T_8 (Poultry manure 50% + Vermicompost 50%) and T_9 (Vermicompost 50% + FYM 50%). Observations on growth parameters *viz*., vine length, days to first male flower emergence, days to first female flower emergence, node at first male and female flower emergence and yield parameters *viz*., number of fruit plant^{-1}, fruit weight (g), fruit length, fruit diameter and fruit yield of cucumber crop were recorded at harvest and nutritional trains *viz*., ascorbic acid, TSS, reducing, non-reducing & total sugar content in cucumber and statistically analyzed were also worked out. The study presented that different organic manure treatments significantly influenced the growth, yield and nutritional quality of cucumber (*Cucumis sativus* L.). Maximum vine length, earliest male and female flower emergence and the highest number of nodes at first flower were observed under T_6 (Vermicompost 75% + Poultry manure 25%), followed by T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%). While, the lowest performance was noted in the T_0 (Control). The combined application of vermicompost and poultry manure T_6 (Vermicompost 75% + Poultry manure 25%) resulted in superior fruit yield attributes, *viz*., maximum number of fruits per plant, highest fruit weight and largest fruit length and diameter. T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%) also performed well and the lowest yield was recorded under T_0 (Control). Treatment T_6 (Vermicompost 75% + Poultry manure 25%) exhibited the highest levels of total soluble solids, reducing sugar, non-reducing sugar and total sugar content, indicating better fruit quality. The T_0 (Control) and single-manure treatments had comparatively lower nutritional performance.

Keywords: Cucumber, vermicompost, poultry manure, FYM, organic and yield

Introduction
Cucumber (*Cucumis sativus* L.), a member of the Cucurbitaceae family, is a commonly grown annual vine known for its edible fruits, which are botanically classified as pepos but typically regarded as vegetables. It is a diploid, self-pollinated plant with a chromosome number of 2n = 2x = 14. Originated in India, cucumber likely descended from the wild species *Cucumis hardwickii*. From its South Asian origin, it has spread extensively and is now cultivated across most continents, supported by widespread trade and consumption. Salad cucumber (*Cucumis sativus* L.) is an important cucurbitaceous crop in India, primarily grown for its tender fruits, which are widely consumed in salads and pickles. It offers various health benefits, such as improving digestion, relieving constipation, preventing dehydration and aiding in the treatment of jaundice. It also possesses cooling, appetite-stimulating, carminative, antipyretic, laxative and vermifuge properties (Sareedha *et al.*, 2006) [26]. Its juicy texture makes it especially popular during the summer. Recently introduced in Kerala, salad cucumber adapts well to rice fallows and garden lands during dry periods and its

tolerance to partial shade allows it to be successfully intercropped in coconut plantations (Emma-Okafor *et al*., 2022) [10]. Immature fruits of cucumber (*Cucumis sativus* L.) are commonly utilized in salads, pickles, *pahari raita* and for commercial brining (Ameta *et al*., 2017) 3[]. These fruits are harvested before reaching full maturity for fresh use. Additionally, the leaves are consumed as potherbs, while both the seeds and seed oil are edible. Cucumber is cultivated commercially in countries such as India, China, Turkey, Iran, Japan, various parts of Europe and the USA. Within India, it is widely grown in states like West Bengal, Madhya Pradesh, Haryana, Karnataka, Punjab, Uttar Pradesh, Assam, Maharashtra and Odisha. According to the National Horticulture Board (NHB) report and data from the Ministry of Agriculture and Farmers Welfare, Government of India (2023-2024), cucumber is grown on about 138,000 hectares nationwide, producing approximately 2.014 million tonnes (MT) (NHB, 2024). Haryana remains the top state in terms of both area and production, followed by Madhya Pradesh, Karnataka and Uttar Pradesh.

The cucumber is used as salad, pickles and also as cooked vegetable. It has many uses in ayurvedic medicines. According to 'Unani' medicines, the oil from its seed is good for the brain and the body. Cucumber has 96.3 g water, magnesium 11 mg, sodium 10.2 mg, Vitamin C 7 mg, 2.5g Carbohydrates, Oxalic acid 15 mg, Calcium 10 mg, Sulphur 17 mg, Potassium 50 mg and many other nutrients out of 100 g of edible portion.

Organic amendments such as manure, compost, green manures, crop residues and biofertilizers play a crucial role in organic farming by enhancing crop productivity and minimizing the risks associated with chemical residues. These inputs improve soil health by providing essential nutrients, increasing microbial activity and enhancing soil structure, water retention capacity and organic matter content. Vermicomposting transforms organic waste into nutrient-rich biofertilizers, while biofertilizers aid in nitrogen fixation, improve nutrient availability and support overall plant growth (Thongney *et al*., 2020) [32]. Organic inputs such as manure, compost, green manures, off-farm organic waste, crop residues, and biofertilizers are vital components of organic farming. Applying the right amounts of these organic supplements not only enhances crop productivity but also helps reduce the harmful effects of chemical residues. Nutrient sources from organic materials include farmyard manure, vermicompost and fresh poultry manure, among others. These manures provide essential nutrients to plants, improve the physical, chemical and biological properties of soil, and boost soil microbial biomass. Such amendments enhance soil fertility, supporting crop growth by increasing nutrient availability, building soil organic matter, improving bulk density and enhancing soil water retention and structure (Prabhu *et al*., 2006) [21]. In recent years, chemical fertilizers have played a key role in supporting intensive crop production, contributing significantly to the Green Revolution in India. However, their continued use has begun to reveal negative impacts on both human health and the environment. These include multiple nutrient deficiencies, reduced soil fertility, declining crop yields and various soil and environmental issues. Therefore, it is essential to increase the use of renewable nutrient sources to supplement and complement synthetic fertilizers. In this context, the judicious application of organic materials such as vermicompost and farmyard manure (FYM) is vital for improving soil fertility and enhancing its physical and chemical properties, thereby promoting sustainable crop yields. A positive correlation has been observed between organic manure use and better root development in plants (Singh *et al.*, 2018) [28, 29].

Materials and Methods

During the *kharif* season of 2024-25, the experiment was carried out at the Krantikari Debridhur College of Horticulture and Research Station, Jagdalpur (C.G.). This area is classified as India's Eastern Plateau and Hill Region (Agro-climatic zone VII). The state of Chhattisgarh is divided into three agro-climatic zones; Jagdalpur is located in the state's Bastar plateau zone. The experiment was laid out in Randomized Block Design with three replications. The treatments consisted of ten organic manure management practices *viz.*, T_0 (Control), T_1 (FYM 75% + Poultry manure 25%), T_2 (FYM 75% + Vermicompost 25%), T_3 (Poultry manure 75% + FYM 25%), T_4 (Poultry manure 75% + Vermicompost 25%), T_5 (Vermicompost 75% + FYM 25%), T_6 (Vermicompost 75% + Poultry manure 25%), T_7 (FYM 50% + Poultry manure 50%), T_8 (Poultry manure 50% + Vermicompost 50%) and T_9 (Vermicompost 50% + FYM 50%). Observations on growth parameters *viz*., plant height, days to first male flower emergence, days to first female flower emergence, node at first male and female flower emergence and yield parameters *viz*., number of fruit plant^{-1}, fruit weight (g), fruit length, fruit diameter and fruit yield of cucumber crop were recorded at harvest and nutritional trains *viz*., ascorbic acid, TSS, reducing, non-reducing & total sugar content in cucumber and statistically analyzed were also worked out.

Results and Discussion

- **Growth parameters**

The maximum vine length was recorded under T_6 (Vermicompost 75% + Poultry manure 25%), which was statistically at par with T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%), but significantly superior to T_1 (FYM 75% + Poultry manure 25%), T_2 (FYM 75% + Vermicompost 25%), and T_3 (Poultry manure 75% + FYM 25%). The lowest vine length was recorded in T_0 (Control). The earliest emergence of both male and female flowers was observed in T_6 (Vermicompost 75% + Poultry manure 25%), followed by T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%). Treatments T_1, T_2 and T_3 showed comparatively delayed flowering, while the latest flower emergence occurred in T_0 (Control).

- **Yield parameters**

The highest number of fruits per plant was obtained in T_6 (Vermicompost 75% + Poultry manure 25%), followed by T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%), which were significantly superior to T_1, T_2, and T_3. The lowest fruit count was recorded in the control (T_0). Similarly, maximum fruit weight was observed in T_6, which remained statistically comparable with T_5 and T_4, while intermediate weights were noted in T_1, T_2, and T_3, and the minimum in T_0. Fruit length and diameter also followed the same trend, with T_6 producing the largest fruits, followed by T_5 and T_4, whereas T_1, T_2, and T_3 showed moderate values, and the smallest fruits were obtained from T_0 (Control).

- **Nutritional parameters**

The maximum Total Soluble Solids (TSS) were recorded in T_6 (Vermicompost 75% + Poultry manure 25%), which was statistically on par with T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%). Treatments T_1, T_2, and T_3 showed moderate TSS values, while the lowest was obtained in the control (T_0). The ascorbic acid content was found to be higher in T_0 (Control) and in treatments with a single manure source. In contrast, combined manure treatments (T_4, T_5, and T_6) recorded slightly lower, but still satisfactory, ascorbic acid levels. The highest reducing sugar content was noted in T_6, followed by T_1 and T_2. Treatments T_5 and T_4 showed moderate values, whereas the minimum was recorded in T_0. Similarly, the highest non-reducing sugar content was obtained in T_6, followed by T_5 and T_4, while moderate levels were observed in T_1, T_2, and T_3, and the lowest in T_0.

Table 1: Effect of different organic manure on vine length of cucumber (*Cucumis sativus* L.).

Treatment details	Vine length (cm)	
	30 DAS	60 DAS
T_0 - Control	114.84	197.46
T_1 - FYM (75%) + Poultry manure (25%)	137.84	233.09
T_2 - FYM (75%) + Vermicompost (25%)	135.46	231.07
T_3 - Poultry manure (75%) + FYM (25%)	138.23	235.44
T_4 - Poultry manure (75%) + Vermicompost (25%)	147.02	248.46
T_5 - Vermicompost (75%) + FYM (25%)	147.89	249.93
T_6 - Vermicompost (75%) + Poultry manure (25%)	149.64	252.89
T_7 - FYM (50%) + Poultry manure (50%)	123.56	213.58
T_8 - Poultry manure (50%) + Vermicompost (50%)	126.28	217.86
T_9 - Vermicompost (50%) + FYM (50%)	125.43	215.74
SEm (±)	2.67	4.39
CD (5%)	7.92	13.04
CV (5%)	9.43	9.31

Table 2: Effect of different organic manure on days to first flower emergence of cucumber (*Cucumis sativus* L.).

Treatment details	Days to first flower emergence	
	Male flower	Female flower
T_0 - Control	56.66	58.93
T_1 - FYM (75%) + Poultry manure (25%)	44.33	46.02
T_2 - FYM (75%) + Vermicompost (25%)	45.00	47.72
T_3 - Poultry manure (75%) + FYM (25%)	43.66	46.33
T_4 - Poultry manure (75%) + Vermicompost (25%)	40.66	42.29
T_5 - Vermicompost (75%) + FYM (25%)	40.00	41.60
T_6 - Vermicompost (75%) + Poultry manure (25%)	39.33	40.90
T_7 - FYM (50%) + Poultry manure (50%)	50.33	52.34
T_8 - Poultry manure (50%) + Vermicompost (50%)	48.33	50.26
T_9 - Vermicompost (50%) + FYM (50%)	49.66	51.65
SEm (±)	1.00	1.02
CD (5%)	2.96	3.02
CV (5%)	9.77	9.68

Table 3: Effect of different organic manure on nodes at first flower emergence of cucumber (*Cucumis sativus* L.).

Treatment details	Nodes at first flower emergence	
	Male flower	Female flower
T_0 - Control	7.62	9.14
T_1 - FYM (75%) + Poultry manure (25%)	13.32	16.18
T_2 - FYM (75%) + Vermicompost (25%)	12.89	15.67
T_3 - Poultry manure (75%) + FYM (25%)	13.73	16.68
T_4 - Poultry manure (75%) + Vermicompost (25%)	15.04	18.05
T_5 - Vermicompost (75%) + FYM (25%)	15.45	18.54
T_6 - Vermicompost (75%) + Poultry manure (25%)	15.68	18.82
T_7 - FYM (50%) + Poultry manure (50%)	9.95	12.14
T_8 - Poultry manure (50%) + Vermicompost (50%)	10.76	13.11
T_9 - Vermicompost (50%) + FYM (50%)	10.33	12.60
SEm (±)	0.63	0.72
CD (5%)	1.88	2.14
CV (5%)	9.78	9.27

Table 4: Effect of different organic manure on number of fruit, fruit weight, fruit length and fruit diameter of cucumber (*Cucumis sativus* L.).

Treatment details	Number of fruits plant^{-1}	Fruit weight (gm)	Fruit length (cm)	Fruit diameter (cm)
T_0 - Control	5.68	109.62	9.35	2.29
T_1 - FYM (75%) + Poultry manure (25%)	11.34	147.54	15.11	4.07
T_2 - FYM (75%) + Vermicompost (25%)	11.01	145.47	14.78	3.98
T_3 - Poultry manure (75%) + FYM (25%)	11.86	148.25	15.54	4.16
T_4 - Poultry manure (75%) + Vermicompost (25%)	13.67	163.83	17.93	4.23
T_5 - Vermicompost (75%) + FYM (25%)	13.88	165.12	18.46	4.29
T_6 - Vermicompost (75%) + Poultry manure (25%)	14.02	167.45	18.89	4.36
T_7 - FYM (50%) + Poultry manure (50%)	9.04	125.38	11.26	3.02
T_8 - Poultry manure (50%) + Vermicompost (50%)	9.86	128.56	12.16	3.26
T_9 - Vermicompost (50%) + FYM (50%)	9.42	127.42	11.75	3.14
SEm (±)	0.69	4.96	0.66	0.22
CD (5%)	2.06	14.73	1.97	0.64
CV (5%)	10.94	9.01	9.91	10.14

Table 5: Effect of different organic manure on average fruit yield per plant of cucumber (*Cucumis sativus* L.).

Treatment details	Average fruit yield (kg per plant)
T_0 - Control	0.62
T_1 - FYM (75%) + Poultry manure (25%)	1.81
T_2 - FYM (75%) + Vermicompost (25%)	1.76
T_3 - Poultry manure (75%) + FYM (25%)	1.85
T_4 - Poultry manure (75%) + Vermicompost (25%)	2.16
T_5 - Vermicompost (75%) + FYM (25%)	2.24
T_6 - Vermicompost (75%) + Poultry manure (25%)	2.31
T_7 - FYM (50%) + Poultry manure (50%)	1.19
T_8 - Poultry manure (50%) + Vermicompost (50%)	1.35
T_9 - Vermicompost (50%) + FYM (50%)	1.27
SEm (±)	0.10
CD (5%)	0.29
CV (5%)	10.21

Table 6: Effect of different organic manure on TSS (Total soluble solid) in cucumber (*Cucumis sativus* L.).

Treatment details	TSS (^{o}Brix)
T_0 - Control	2.36
T_1 - FYM (75%) + Poultry manure (25%)	4.19
T_2 - FYM (75%) + Vermicompost (25%)	4.10
T_3 - Poultry manure (75%) + FYM (25%)	4.28
T_4 - Poultry manure (75%) + Vermicompost (25%)	4.36
T_5 - Vermicompost (75%) + FYM (25%)	4.42
T_6 - Vermicompost (75%) + Poultry manure (25%)	4.49
T_7 - FYM (50%) + Poultry manure (50%)	3.11
T_8 - Poultry manure (50%) + Vermicompost (50%)	3.36
T_9 - Vermicompost (50%) + FYM (50%)	3.23
SEm (±)	0.21
CD (5%)	0.61
CV (5%)	9.38

Table 7: Effect of different organic manure on Ascorbic acid in cucumber (*Cucumis sativus* L.).

Treatment details	Ascorbic acid (mg/100 gm)
T_0 - Control	6.12
T_1 - FYM (75%) + Poultry manure (25%)	4.37
T_2 - FYM (75%) + Vermicompost (25%)	4.44
T_3 - Poultry manure (75%) + FYM (25%)	4.26
T_4 - Poultry manure (75%) + Vermicompost (25%)	4.12
T_5 - Vermicompost (75%) + FYM (25%)	3.91
T_6 - Vermicompost (75%) + Poultry manure (25%)	3.83
T_7 - FYM (50%) + Poultry manure (50%)	5.29
T_8 - Poultry manure (50%) + Vermicompost (50%)	5.06
T_9 - Vermicompost (50%) + FYM (50%)	5.15
SEm (±)	0.26
CD (5%)	0.76
CV (5%)	9.52

Table 8: Effect of different organic manure on Reducing, Non-reducing and Total sugar in cucumber (*Cucumis sativus* L.).

Treatment details	Reducing sugar (%)	Non-Reducing sugar (%)	Total sugar (%)
T_0 - Control	0.529	3.55	4.07
T_1 - FYM (75%) + Poultry manure (25%)	0.707	4.64	5.34
T_2 - FYM (75%) + Vermicompost (25%)	0.698	4.59	5.29
T_3 - Poultry manure (75%) + FYM (25%)	0.716	4.68	5.40
T_4 - Poultry manure (75%) + Vermicompost (25%)	0.723	4.72	5.44
T_5 - Vermicompost (75%) + FYM (25%)	0.729	4.75	5.47
T_6 - Vermicompost (75%) + Poultry manure (25%)	0.736	4.78	5.52
T_7 - FYM (50%) + Poultry manure (50%)	0.602	3.98	4.58
T_8 - Poultry manure (50%) + Vermicompost (50%)	0.626	3.91	4.54
T_9 - Vermicompost (50%) + FYM (50%)	0.614	3.83	4.44
SEm (±)	0.021	0.10	0.20
CD (5%)	0.061	0.31	0.58
CV (5%)	5.323	4.16	6.75

Conclusion

The study presented that different organic manure treatments significantly influenced the growth, yield and nutritional quality of cucumber (*Cucumis sativus* L.). Maximum vine length, earliest male and female flower emergence and the highest number of nodes at first flower were observed under T_6 (Vermicompost 75% + Poultry manure 25%), followed by T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%). While the lowest performance was noted in the control (T_0). The combined application of vermicompost and poultry manure T_6 (Vermicompost 75% + Poultry manure 25%) resulted in superior fruit yield attributes, *viz*., maximum number of fruits per plant, highest fruit weight and largest fruit length and diameter. T_5 (Vermicompost 75% + FYM 25%) and T_4 (Poultry manure 75% + Vermicompost 25%) also performed well and the lowest yield was recorded under T_0 (Control). Treatment T_6 (Vermicompost 75% + Poultry manure 25%) exhibited the highest levels of total soluble solids, reducing sugar, non-reducing sugar and total sugar content, indicating better fruit quality. The T_0 (Control) and single-manure treatments had comparatively lower nutritional performance.

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