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Effect of integrated nutrient management on growth, yield of Garden Cress (*Lepidium sativum* L.) in Prayagraj

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Abstract

This study assessed the impact of Integrated Nutrient Management (INM) on garden cress (*Lepidium sativum* L.) during the Rabi season of 2025–2026 in Prayagraj. Twelve combinations of inorganic fertilizers (RDF), organic amendments (FYM, vermicompost, poultry manure), and bio-inoculants were evaluated in the experiment. The maximum plant height (74.45 cm), chlorophyll content (28.37 SPAD), and seed yield (23.66 q ha⁻¹) were recorded by treatment T₁₂ (125% RDF + 1 t/ha poultry manure), which far exceeded the other treatments. The combination of enhanced soil fertility from poultry manure and quick nutrient release from chemical fertilizers is credited with this achievement. The most successful and long-lasting method for increasing garden cress yield in the area is T₁₂, which has a high benefit-cost ratio of 3.6.

Keywords: *Lepidium sativum* L., RDF, recommended dose of fertilizer, FYM, farm yard manure

Introduction

Lepidium sativum, also referred to as garden cress (GC), is an annual herbaceous edible plant, belonging to Brassicaceae family that shares a botanical relationship with watercress and mustard. The Garden cress plant is native to South West Asia and Egypt. It is grown in India *L. sativum* is also known as Asaliyo or Chandrasur in local languages, Halim (Urdu). It belongs to the mustard family and is an upright, glabrous, annual herbaceous plant that can reach a height of 15 to 45cm. There are numerous branches on the upper portion. Although *L. sativum* seeds, leaves, and roots are economically significant, the crop is mostly grown for its seeds in order to produce mucilage for a variety of purposes. The leaves are used in salads in both Europe and America. The presence of both diploid forms (2n = 2x = 16) and tetraploid forms (2n = 4x = 32) Morphology of Gc seeds: Gc seeds are small, oval-shaped, pointed and triangular at one end, smooth, about 3-4 mm long, 1-2 mm wide, reddish brown in colour Doke *et al.*, (2014) [7].

Garden cress seeds contain 22 per cent protein, 27.5 per cent fat and 30.0 per cent dietary fibre. Seeds are also reported to be rich in linolenic acid (30.2%) followed by glutamic acid (19.3%) and leucine (8.2%) It can be used in traditional tonic to increase the children height, to increase the milk in lactating mothers and as an eye tonic apart from using seeds against chronic bronchial asthma.

The prudent use of one or more plant nutrient sources, either separately or in combination, to grow crops is known as integrated nutrient management, or INM. A fraction of inorganic plant nutrition sources are partially augmented under INM by utilizing pre-existing organic sources. Through the optimization of benefits from all potential sources of plant nutrients in an integrated way, it primarily seeks to achieve maximum fertilizer usage efficiency, maintenance of soil fertility, and optimal plant nutrient delivery.

Materials and Methods

The field experiment was conducted at the Research Farm of the Department of Agronomy,

Prof. Rajendra Singh (Rajju Bhaiya) University, Naini, Prayagraj, Uttar Pradesh. will be carried out during the *Rabi* season of 2025-2026. The details regarding the experimental site fall in a subtropical belt of North India. The site is located at 25°13'28" N latitude and 81°46' 25"E longitude representative of the South-Eastern Plain Zone of Uttar Pradesh. The experiment consists of Integrated Nutrient Management combinations viz., T₁ Control, T₂ 100% RDF, T₃ 75% RDF + FYM @3.0 t ha⁻¹, T₄ 50% RDF + FYM @5 t/ha + Poultry manure @1 t/ha, T₅ 100% RDF NPK + FYM @3 t/ha, T₆ 75%

RDF + Azotobacter (2 g/kg seed) + Poultry manure @1 t/ha, T₇ 100% RDF + FYM @3 t/ha + PSB (2 g/kg seed), T₈ 50% RDF + PSB (2g/kg seed), T₉ 50% RDF + Vermicompost @1.5 t/ha, T₁₀ 75% RDF + FYM + Vermicompost @ 1.5 t/ha, T₁₁ 50% RDF + PSB + Vermicompost @ 1.5 t/ha, T₁₂ 125% RDF+ Poultry manure @ 1t/ha. were made according to with the treatments at the time of seeding. Five plants per plot were used to record observations on growth and yield parameters, and the study's data was statistically evaluated utilizing

Treatment	Detail
T ₁	Control
T ₂	100% RDF
T ₃	75% RDF + FYM @3.0 t ha ⁻¹
T ₄	50% RDF + FYM @5 t/ha + Poultry manure @1 t/ha
T ₅	100% RDF NPK + FYM @3 t/ha
T ₆	75% RDF + Azotobacter (2 g/kg seed) + Poultry manure @1 t/ha
T ₇	100% RDF + FYM @3 t/ha + PSB (2 g/kg seed)
T ₈	50% RDF + PSB (2g/kg seed)
T ₉	50% RDF + Vermicompost @1.5 t/ha
T ₁₀	75% RDF + FYM + Vermicompost @ 1.5 t/ha
T ₁₁	50% RDF + PSB + Vermicompost @ 1.5 t/ha
T ₁₂	125% RDF+ Poultry manure @ 1t/ha

Results and Discussion

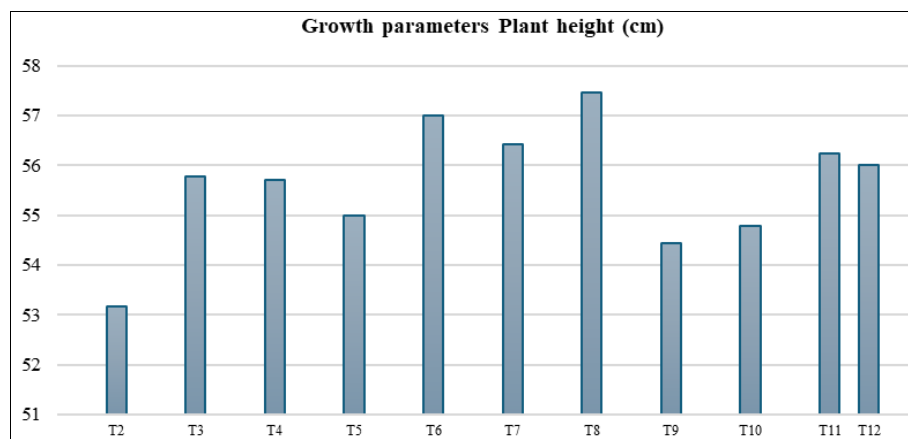
T₁₂ (125% RDF + poultry manure @ 1 t/ha) consistently produced the highest plant height throughout all stages, according to the data. The synergistic effect of poultry manure improving soil fertility and nutrient-use efficiency and inorganic fertilizers supplying instant nutrients is responsible for this notable rise. Because poultry manure is high in phosphate and nitrogen, it encourages long-term vegetative growth and quick cell elongation. On the other hand, the Control (T₁) performed the worst, demonstrating that native soil nutrients were inadequate for ideal growth. These results are consistent with those of Sharma *et al.* (2022) ^[11].

Plant height

The data showed that T₁₂ (125% RDF + poultry manure @ 1 t/ha) continuously generated the tallest plants at every stage. This significant increase is caused by the synergistic effect of inorganic fertilizers providing quick nutrients and poultry manure enhancing soil fertility and nutrient-use efficiency. Poultry manure promotes rapid cell elongation and long-term vegetative development because to its high phosphate and nitrogen content. However, the Control (T₁) did the worst, indicating that local soil nutrients were insufficient for optimal growth. These findings align with those of Sharma *et al.*, (2022) ^[11].

Table 1: Plant height (cm) at successive growth stages of Garden Cress as influenced by various Treatments

Sr. No.	Treatments	Growth parameters
T ₁	Control	Plant height (cm)
T ₂	100% RDF	53.17
T ₃	75% RDF + FYM @3.0 t ha ⁻¹	55.77
T ₄	50% RDF + FYM @5 t/ha + Poultry manure @1 t/ha	55.71
T ₅	100% RDF NPK + FYM @3 t/ha	54.99
T ₆	75% RDF + Azotobacter (2 g/kg seed) + Poultry manure @1 t/ha	57.00
T ₇	100% RDF + FYM @3 t/ha + PSB (2 g/kg seed)	56.43
T ₈	50% RDF + PSB (2g/kg seed)	57.47
T ₉	50% RDF + Vermicompost @1.5 t/ha	54.43
T ₁₀	75% RDF + FYM + Vermicompost @ 1.5 t/ha	54.78
T ₁₁	50% RDF + PSB + Vermicompost @ 1.5 t/ha	56.23
T ₁₂	125% RDF+ Poultry manure @ 1t/ha	56.00
	F-Test	S
	SE m (±)	2.66
	CD at 5%	5.53



Chlorophyll Index (SPAD units)

At the harvest stage, T₁₂ (125% RDF + poultry manure @ 1 t/ha) had the highest chlorophyll content (28.37 SPAD units). The remarkable effectiveness of this treatment is attributed to the balanced supply of nitrogen and essential micronutrients, which are required for chlorophyll formation and photosystem stability.

Conversely, treatments with lower nitrogen inputs had reduced amounts of chlorophyll, suggesting that adequate and balanced fertilization is required to maintain photosynthetic pigments throughout the crop's maturity. These findings align with the research carried out by Adekiya and Agbede (2009) ^[1].

Table 2: Chlorophyll Index (SPAD units) at successive growth stages of Garden Cress as influenced by various Treatments

T. No.	Treatments	60 DAS
T ₁	Control	30.93
T ₂	100% RDF	31.68
T ₃	75% RDF + FYM @3.0 t ha ⁻¹	34.78
T ₄	50% RDF + FYM @5 t/ha + Poultry manure @1 t/ha	31.6
T ₅	100% RDF NPK + FYM @3 t/ha	33.86
T ₆	75% RDF + Azotobacter (2 g/kg seed) + Poultry manure @1 t/ha	36.23
T ₇	100% RDF + FYM @3 t/ha + PSB (2 g/kg seed)	37.07
T ₈	50% RDF + PSB (2g/kg seed)	33.94
T ₁₀	75% RDF + FYM + Vermicompost @ 1.5 t/ha	34.21
T ₁₁	50% RDF + PSB + Vermicompost @ 1.5 t/ha	32.07
T ₁₂	125% RDF+ Poultry manure @ 1t/ha	37.09
F-Test		S
SE m (±)		1.61
CD at 5%		3.34

No of siliqua per plant, Length of siliqua, No. of seeds per siliqua and test weight (gm)

The beneficial impact of combining chemical fertilizers (RDF) with organic amendments and bio-inoculants is responsible for the notable improvement in yield attributes under integrated nutrient management. Poultry manure and FYM enhance soil characteristics and guarantee a steady supply of nutrients, whilst

RDF offers rapid nitrogen availability. PSB also improves phosphorus mobilization, which is essential for *Lepidium sativum*'s reproductive growth and energy transfer. These findings support those of Vaktariya *et al.* (2023) ^[12], who discovered that combined nutrition treatment improves dry matter partitioning and increases photosynthetic activity, resulting in improved siliquae production and seed filling.

Table 3: No. of Siliqua per plant, Length of siliqua, No. of seeds per plant and Test weight (gm) of Garden Cress as influenced by various Treatments

T. No.	Treatments	No. of Siliqua per plant	Length of siliqua	Number of seeds per plant	Test weight
T ₁	Control	718.9	0.14	1.26	2.06
T ₂	100% RDF	866.3	0.18	1.29	2.12
T ₃	75% RDF + FYM @3.0 t ha ⁻¹	910.1	0.17	1.29	2.09
T ₄	50% RDF + FYM @5 t/ha + Poultry manure @1 t/ha	950.3	0.16	1.28	2.12
T ₅	100% RDF NPK + FYM @3 t/ha	1024.9	0.22	1.33	2.22
T ₆	75% RDF + Azotobacter (2 g/kg seed) + Poultry manure @1 t/ha	1078.2	0.21	1.32	2.27
T ₇	100% RDF + FYM @3 t/ha + PSB (2 g/kg seed)	1118.0	0.23	1.39	2.48
T ₈	50% RDF + PSB (2 g/kg seed)	816.3	0.15	1.28	1.95
T ₉	50% RDF + Vermicompost @1.5 t/ha	979.7	0.16	1.31	2.28
T ₁₀	75% RDF + FYM + Vermicompost @ 1.5 t/ha	1183.6	0.20	1.31	2.32
T ₁₁	50% RDF + PSB + Vermicompost @ 1.5 t/ha	1094.1	0.19	1.31	2.16
T ₁₂	125% RDF+ Poultry manure @ 1t/ha	1244.8	0.24	1.41	2.48
F-Test		S	S	S	S
SE m (±)		13.06	0.001	0.005	0.11
CD at 5%		38.30	0.005	0.015	0.23

Yield, Harvest index

The best results from T₁₂ (125% RDF + Poultry manure @ 1 t/ha) and T₇ (100% RDF + FYM @ 3 t/ha + PSB) highlight how well inorganic fertilizers and organic sources can be balanced to maximize crop output. FYM and poultry manure improve the physical and chemical characteristics of the soil, creating a nutrient-rich environment that encourages vegetative growth and biomass accumulation, as seen by increased biological and straw

yields. Additionally, these treatments' increased seed output and harvest index point to more effective photosynthate translocation from source to sink. By enhancing nutrient uptake—which is crucial for maintaining greater production levels in *Lepidium sativum*—the incorporation of biofertilizers like PSB further enhances this process. These results align with those of Vaktariya *et al.* (2023) [12].

Table 4: Seed yield (q ha⁻¹) Straw yield (q ha⁻¹), Biological yield and Harvest index of Garden Cress as influenced by various Treatments

T. No.	Treatments	Seed yield (q/h)	Straw yield q/ha	Biology	Harvest index (%)
T ₁	Control	5.50	24.10	40.77	25.18
T ₂	100% RDF	8.25	30.10	49.00	25.58
T ₃	75% RDF + FYM @3.0 t ha ⁻¹	14.23	38.50	52.73	26.99
T ₄	50% RDF + FYM @5 t/ha + Poultry manure @1 t/ha	12.53	39.80	54.63	27.15
T ₅	100% RDF NPK + FYM @3 t/ha	20.50	41.50	57.13	27.36
T ₆	75% RDF + Azotobacter (2 g/kg seed) + Poultry manure @1 t/ha	14.50	39.20	53.73	27.05
T ₇	100% RDF + FYM @3 t/ha + PSB (2 g/kg seed)	22.05	43.20	61.00	28.38
T ₈	50% RDF + PSB (2g/kg seed)	13.50	32.53	44.07	26.17
T ₉	50% RDF + Vermicompost @1.5 t/ha	15.60	36.13	49.97	27.70
T ₁₀	75% RDF + FYM + Vermicompost @ 1.5 t/ha	19.83	38.97	54.40	28.05
T ₁₁	50% RDF + PSB + Vermicompost @ 1.5 t/ha	14.80	38.25	53.28	28.22
T ₁₂	125% RDF+ Poultry manure @ 1t/ha	23.66	44.20	61.43	29.24
F-Test		S	S	S	S
SE m (±)		0.16	0.40	0.42	0.21
CD at 5%		0.49	1.18	1.24	0.62

Conclusion

The study found that Treatment T₁₂ (125% RDF + Poultry Manure @ 1 t/ha) is the most effective nutrient management strategy for raising garden cress (*Lepidium sativum* L.) productivity in the Prayagraj region. T₁₂ significantly improved all growth indices, including plant height (74.45 cm) and chlorophyll content, while achieving the highest seed yield (23.66 q ha⁻¹) and oil output (560.43 kg ha⁻¹).

The synergistic interaction between poultry manure, which increases soil fertility and nutrient-use efficiency necessary for high-yielding garden cress, and inorganic fertilizers, which provide instantaneous nutrient availability for rapid vegetative development, explains T₁₂ remarkable performance. These findings align with those of Kumar *et al.* (2026) [9], who highlighted the importance of integrated nutrient management (INM) in maximizing the development and quality of oilseed and medicinal crops. Because T₁₂ offers the best economic return (B:C ratio 3.6), it is therefore advised for high-yield, sustainable garden cress production.

References

- Adekiya AO, Agbede TM. Growth and yield of tomato (*Lycopersicon esculentum* Mill.) as influenced by poultry manure and NPK fertilizer. *Emirates Journal of Food and Agriculture*. 2009;21(1):10-20.
- Banjaw DT, Yeshitila WS. A brief note on *Lepidium sativum* L.: a review. *European Journal of Biological Sciences*. 2022;14(2):70-74.
- Bhat GN. Effect of spacing and biofertilizers on growth, yield and quality of garden cress (*Lepidium sativum* L.) [MSc thesis]. Bengaluru: University of Horticultural Sciences; 2018.
- Bouyoucos GJ. Hydrometer method improved for making particle size analyses of soils. *Agronomy Journal*. 1962;54(5):464-465.
- Branch S, Kumar S, Kumar D, Kumar M. Effect of integrated nutrient management on growth, yield and quality in onion cv. Pusa Madhvi. *Plant Archives*. 2014;14(1):557-559.
- Chavda NK, Patel RA, Patel P, Hirpara BV. Effect of nitrogen, phosphorus and sulphur on growth and yield of cress (*Lepidium sativum* L.). *Biosciences Biotechnology Research Asia*. 2017;14(2):527-529.
- Doke S, Guha M. Garden cress (*Lepidium sativum* L.) seed: an important medicinal source. *Cellulose*. 2014;9(3):10.
- Gupta AK, Tripathi YK, Dewangan RK, Guru S, Pradhan M. Influence of various sources of nutrients and their combinations on yield attributes and yield of Chandrasur (*Lepidium sativum* L.). *International Journal of Veterinary Medicine*. 3(9):2534-9767.
- Kumar R, Kumar S, Hansda S, Kumar A, Kaur R, Singh S, *et al.* Integrated nutrient management, irrigation scheduling and moisture conservation effects on water use efficiency of garden cress (*Lepidium sativum*). *International Journal of Plant and Soil Science*. 2026;38(5):282-290.
- Prajapati VD, Maheriya PM, Jani GK, Patil PD, Patel BN. *Lepidium sativum* Linn.: a current addition to the family of mucilage and its applications. *International Journal of Biological Macromolecules*. 2014;65:72-80.
- Sharma T, Arya VM, Sharma V, Sharma J, Gulshan T, Bera A, *et al.* Integrated nutrient management: a long-term approach towards sustainability. *International Journal of Plant and Soil Science*. 2022;34(20):433-446.
- Vaktariya S, Meena KC, Gallani R, Naruka IS, Patidar BK, Soni N. Effect of NPK and bio-fertilizers on growth and yield of Chandrasur (*Lepidium sativum* L.). *Environment and Ecology*. 2023;41(3):1343-1347.