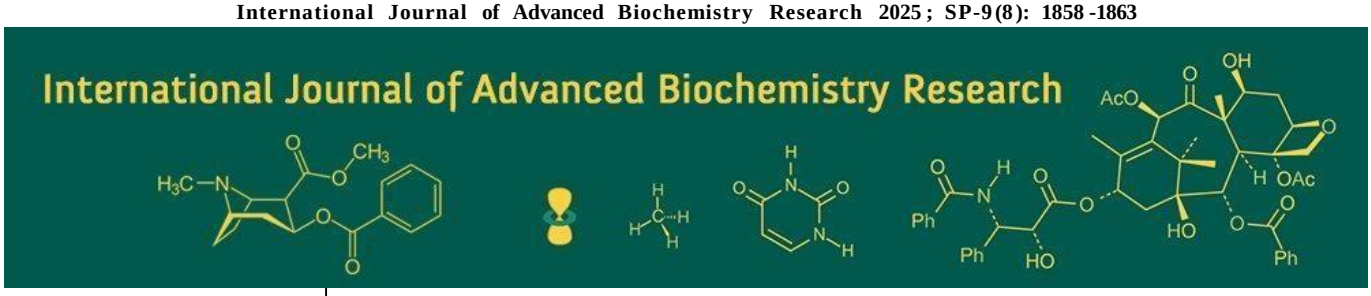

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Effect of the solid and foliar application of organic manures on growth and yield of lentil (*Lens culinaris* L.)

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Abstract
A field experiment was conducted during the Rabi season of 2024–25 at the Crop Research Farm, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) on sandy loam soil with neutral pH to evaluate the effect of solid and foliar application of organic manures on growth and yield of lentil (*Lens culinaris* L.). The experiment was laid out in a randomized block design (RBD) with nine treatments, each replicated three times. The treatment combinations included: T_1 – FYM 4 t/ha + Fish amino acid 1.5%, T_2 – FYM 4 t/ha + Panchagavya 3%, T_3 – FYM 4 t/ha + Vermiwash 5%, T_4 – Vermicompost 1.33 t/ha + Fish amino acid 1.5%, T_5 – Vermicompost 1.33 t/ha + Panchagavya 3%, T_6 – Vermicompost 1.33 t/ha + Vermiwash 5%, T_7 – Goat manure 0.66 t/ha + Fish amino acid 1.5%, T_8 – Goat manure 0.66 t/ha + Panchagavya 3%, and T_9 – Goat manure 0.66 t/ha + Vermiwash 5%. Among the treatments, T_9 (Goat manure 0.66 t/ha + Vermiwash 5%) recorded the significantly highest growth and yield parameters, including plant height (57.69 cm), number of branches per plant (22.27), number of nodules per plant (8.60), plant dry weight (4.048 g/plant), number of pods per plant (97), and seeds per pod (1.73). This treatment also produced the highest seed yield (1.88 t/ha) and stover yield (3.62 t/ha), along with maximum economic returns: gross return of 129,440 INR/ha, net return of 95,083.40 INR/ha, and a benefit-cost ratio of 2.77. These results suggest that the integrated application of Goat manure with Vermiwash is the most effective organic nutrient management practice for improving both growth and profitability in lentil cultivation.

Keywords: Economics, lentil, growth parameters, organic manures, solid, foliar and yield attributes

Introduction
Lentil (*Lens culinaris* L.) is an important pulse crop widely grown for its nutritious seeds, which are consumed whole, split, or processed into flour, and its straw and husk are used as fodder for livestock (Singh *et al*., 2016) [32]. Lentil is highly valued for its protein content, earning the name "poor man's meat," as it provides an affordable and concentrated source of dietary protein, along with carbohydrates, oil, and essential minerals such as iron, calcium, phosphorus, and magnesium (Urbano *et al*., 2007; Singh *et al*., 2016) [38, 32]. It is a legume capable of biological nitrogen fixation through symbiosis with Rhizobium bacteria, reducing the requirement for nitrogenous fertilizers and contributing to sustainable crop production (Humprey *et al*., 2001) [14]. India is the second-largest producer, the largest consumer, and the largest importer of pulses, with lentil cultivated on approximately 1.56 million hectares, producing 1.06 million tonnes at an average productivity of 678 kg/ha (Babbar *et al*., 2015; Anonymous, 2015) [4, 2]. Major lentil-growing states include Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, West Bengal, and Chhattisgarh, collectively accounting for about 85–90% of national area and production (Dixit *et al*., 2011) [9]. Globally, lentil is cultivated in Canada, Australia, Turkey, the United States, Nepal, and India (Zohari, 1973; Ladizinsky, 1979) [40, 14]. The crop is an erect, herbaceous annual with 4–6 primary branches, a well-developed taproot with lateral branches, small pinnate leaves, short pods containing mostly two lens- shaped seeds, and predominantly self-pollinated flowers. Lentil grows well on light loams, alluvial soils, lowlands, and marginal soils and is cultivated under mono-cropping, mixed cropping, intercropping, and relay cropping systems (Singh *et al*., 2016; FAOSTAT, 2016) [32, 11]. Being low in anti-nutritional factors such as hemagglutinins, oligosaccharides, lectins, and trypsin inhibitors, lentil is highly digestible and suitable for human and animal consumption (Urbano *et al*., 2007). Sustainable nutrient management is crucial for enhancing lentil growth and yield while maintaining soil health. Organic manures such as farmyard manure (FYM),

vermicompost, and goat manure improve soil physical properties, supply macro- and micronutrients, increase microbial activity, and provide slow-release nutrients (Subbiah & Asija, 1956; Ghosh *et al*., 2004; Kumar *et al*., 2015) [35, 12, 17]. Liquid organic fertilizers like vermiwash, panchagavya, and fish amino acid contain essential nutrients, vitamins, amino acids, and growth- promoting hormones such as IAA and GA, which enhance root development, flowering, pod formation, and overall plant vigor (Sharma *et al*., 2005; Somasundaram *et al*., 2009; Tharmaraj *et al*., 2011; Priyanka *et al*., 2018) [29, 34, 36, 27]. Application of these organic amendments has been reported to improve plant height, number of branches, nodules, pods, seed yield, and stover yield in lentil and other pulse crops (Singh *et al*., 2005; Patil *et al*., 2012; Kumaravelu *et al*., 2009; Mohbe *et al*., 2015) [31, 26, 20, 23]. Vermicompost provides plant-available nutrients and hormones that stimulate root growth and microbial activity (Edwards & Arancon, 2004),
[10] while goat manure contributes nitrogen and beneficial microbes (Kumar *et al*., 2015) [17]. FYM enhances soil water-holding capacity and nutrient supply (Karnavat *et al*., 2018) [16]. Vermiwash and panchagavya, when applied as foliar sprays or soil drenches, promote vegetative growth, flowering, and pod development, ultimately improving yield and profitability. Fish amino acid also plays an important role in maximizing nutrient uptake and maintaining plant health (Priyanka *et al*., 2018) [27]. These organic practices provide an eco-friendly alternative to chemical fertilizers, supporting sustainable lentil cultivation and ensuring higher productivity and economic returns

Materials and Methods

The experiment was conducted during the Rabi season of 2024 at the Crop Research Farm (CRF), Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (U.P.), situated at 25°24′56″ N latitude, 81°50′56″ E longitude, and 98 m above mean sea level. The site is located on the right bank of the river Yamuna, adjacent to Prayagraj-Rewa Road, approximately 5 km from Prayagraj city, and is organically certified. The experimental soil was sandy loam in texture with silt and clay fractions, a pH of 7.1, low organic carbon content (0.452%), and available nutrients of nitrogen (178.48 kg/ha), phosphorus (23.6 kg/ha), potassium (231.4 kg/ha), and electrical conductivity of 0.645 dS/m. The field experiment was laid out in a Randomized Block Design (RBD) with nine treatment combinations, each replicated appropriately. The treatments included: T_1 – FYM 4 t/ha + Fish amino acid 1.5%, T_2 – FYM 4 t/ha + Panchagavya 3%, T_3 – FYM 4 t/ha + Vermiwash 5%, T_4 – Vermicompost 1.33 t/ha + Fish amino acid 1.5%, T_5 – Vermicompost 1.33 t/ha + Panchagavya 3%, T_6 – Vermicompost 1.33 t/ha + Vermiwash 5%, T_7 – Goat manure 0.66 t/ha + Fish amino acid 1.5%, T_8 – Goat manure
0.66 t/ha + Panchagavya 3%, and T_9 – Goat manure 0.66 t/ha + Vermiwash 5%. Lentil seeds were sown at a depth of
3 cm at a rate of 50 kg/ha. The recommended dose of fertilizers (RDF) of 20-40-20 kg NPK/ha was applied uniformly, while solid and foliar organic manures were applied as per treatment specifications. Observations were recorded on plant height, number of branches per plant, number of nodules per plant, plant dry weight, crop growth rate (g/m²/day), relative growth rate (g/g/day), number of pods per plant, number of seeds per pod, test weight, seed yield, stover yield, and harvest index. The data were statistically analyzed using analysis of variance (ANOVA) as described by Gomez and Gomez (1976) [13]. Additionally, economic analysis was carried out, including cost of cultivation, gross return, net return, and benefit-cost ratio.

Results and Discussion

Growth and Yield attributes

Plant Height (cm)

Among the treatments, the combination of Goat manure @ 0.66 t/ha with Vermiwash @ 5% (Treatment 9) produced the tallest lentil plants, with a maximum height of 57.69 cm. Other treatments, including T_3 (FYM 4 t/ha + Vermiwash 5%), T_4 (Vermicompost 1.33 t/ha + Fish amino acid 1.5%), T_7 (Goat manure 0.66 t/ha + Fish amino acid 1.5%), and T_8 (Goat manure 0.66 t/ha + Panchagavya 3%), were statistically comparable to Treatment 9.

The increased plant height is likely due to the combined benefits of goat manure improving soil fertility, structure, and microbial activity, which enhance root growth and nutrient uptake, while vermiwash provides foliar-applied nutrients and growth-promoting hormones such as auxins, cytokinins, and gibberellins. This dual nutrient supply— through soil and foliage—boosts physiological efficiency, stimulating vegetative growth and cell elongation. Similar results have been reported by Kumaravelu *et al.* (2009) [20] and Singh *et al.* (2021) [21], who found vermiwash to improve growth in pulses, and by Bairwa *et al.* (2017) [3] and Meena, who observed that goat manure enhanced lentil and greengram plant height through better soil nutrient dynamics.

Number of branches/plant

The maximum number of branches per plant (22.27) in lentil was recorded under Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%]. Other treatments, including T_1 (FYM 4 t/ha + Fish amino acid 1.5%), T_2 (FYM 4 t/ha + Panchagavya 3%), T_4 (Vermicompost 1.33 t/ha + Fish amino acid 1.5%), T_5 (Vermicompost 1.33 t/ha + Panchagavya 3%), T_6 (Vermicompost 1.33 t/ha + Vermiwash 5%), T_7 (Goat manure 0.66 t/ha + Fish amino acid 1.5%), and T_8 (Goat manure 0.66 t/ha + Panchagavya 3%) were statistically comparable to Treatment 9. The enhanced branching is likely due to the synergistic effects of improved soil fertility and microbial activity provided by goat manure, combined with the foliar-applied growth- promoting compounds, including auxins, cytokinins, enzymes, and essential micronutrients, present in vermiwash. Goat manure improves soil aeration, organic carbon content, and nutrient availability, while vermiwash stimulates lateral bud activation, promoting increased branching. These findings align with Choudhary *et al.* (2019) [6], who reported enhanced branching in chickpea with combined organic and foliar bio-stimulant application, Yadav *et al.* (2018) [39], who observed improved vegetative growth in lentil due to goat manure, and Jadhav *et al.* (2017) [15], who noted that vermiwash foliar spray promoted branching in greengram through its growth regulator content.

Number of nodules/plant

The highest number of nodules per plant (8.60) in lentil was recorded under Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%], while treatments T_1 (FYM 4 t/ha + Fish amino acid 1.5%), T_2 (FYM 4 t/ha + Panchagavya 3%), T_3 (FYM 4 t/ha + Vermiwash 5%), T_4 (Vermicompost 1.33 t/ha + Fish amino acid 1.5%), T_7 (Goat manure 0.66 t/ha + Fish amino acid 1.5%), and T_8 (Goat manure 0.66 t/ha + Panchagavya 3%) were statistically comparable to T_9.

The enhanced nodulation may be attributed to the synergistic effect of improved soil microbial activity and organic carbon enrichment provided by goat manure, combined with the foliar supply of bioactive compounds such as enzymes, vitamins, and growth hormones (auxins and cytokinins) present in vermiwash. Goat manure fosters a favorable rhizosphere by increasing beneficial microbial populations, including Rhizobium, thereby promoting biological nitrogen fixation. Concurrently, vermiwash delivers readily available nutrients and microbial metabolites to the foliage, enhancing photosynthesis and energy supply to roots for active nodulation. These results are consistent with Kumar *et al*. (2019) [19], who reported increased nodule numbers in lentil with combined organic and liquid bio-fertilizer application, Patel *et al*. (2017) [25], who observed improved root nodulation in pulses due to goat manure, and Desai *et al*. (2019) [7], who found that foliar vermiwash application enhanced nodulation in greengram through growth-promoting constituents and microbial enzyme activity.

Plant dry weight (g/plant)

The application of significant and higher plant dry weight (4.048g) was recorded in treatment 9 [Goat manure 0.66 t/ha + Vermi wash 5%]. However, treatment 1 [FYM 4 t/ha + Fish amino acid 1.5%], treatment 3 [FYM 4 t/ha + Vermi wash 5%] and treatment 4 [Vermicompost 1.33 t/ha + Fish amino acid 1.5%] were found to be statistically at par with treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%]. A significantly greater plant dry weight (4.048 g/plant) was observed in lentil with the combined use of goat manure @0.66 t/ha and vermiwash @ 5%.

This improvement in dry matter accumulation can be ascribed to the complementary effects of goat manure enhancing soil nutrient status and microbial activity, while vermiwash supplies readily available nutrients and growth bio-stimulants through foliar feeding. Goat manure contributes to better soil texture, increased organic carbon, and enhanced microbial biomass, which collectively improve nutrient mineralization and uptake efficiency. Vermiwash, rich in plant growth hormones like auxins and cytokinins, enzymes, amino acids, and micronutrients, accelerates physiological processes like photosynthesis and nutrient assimilation, promoting robust vegetative growth and biomass buildup. This combination ensures a continuous nutrient supply both through root uptake and foliar absorption, resulting in substantial increase in plant dry weight. Mishra *et al*. (2018) [22] also reported that integrated use of goat manure and bio-fertilizers enhanced dry matter production in lentil. Similarly, Sharma *et al* .(2019) [30] found that organic liquid manures like vermiwash significantly increased dry biomass in pulse crops due to improved metabolic activity. Chatterjee and Bandyopadhyay (2017) [5] noted that the combined application of organic manures and foliar nutrition improved plant dry weight in greengram by enhancing photosynthetic efficiency.

Crop Growth Rate (g/m²/day)

During the 75–100 DAS interval, the highest Crop Growth Rate (CGR) of 4.44 g m^{-2} day^{-1} was recorded under Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%], while treatment T_5 [Vermicompost 1.33 t/ha + Panchagavya 3%] was found to be statistically comparable.

The significantly higher CGR observed with the combined application of goat manure and vermiwash may be attributed to the continuous nutrient release from goat manure, which enhances soil fertility, organic matter content, and microbial activity, thereby promoting nutrient uptake throughout the crop growth period. Foliar application of vermiwash supplies readily available growth-promoting substances such as auxins, cytokinins, enzymes, and micronutrients, which stimulate photosynthesis, nutrient translocation, and cell division. The synergistic effect of soil-applied goat manure and foliar-fed vermiwash accelerates biomass accumulation, resulting in an enhanced CGR. These results are in agreement with Pandey, who reported improved CGR in lentil through integrated use of organic manures and bio- stimulants, who observed higher CGR in pulses with combined organic and foliar applications, and Singh and Tomar (2011) [9], who found that vermiwash increased legume growth rates by improving photosynthetic efficiency and nutrient assimilation.

Relative growth rate (g/g/day)

At 75-100 interval DAS, no significant difference was recorded among all the treatments. Statistically highest relative growth rate (0.053 g/g/day) was recorded in treatment 1 [FYM 4 t/ha + Fish amino acid 1.5%].

Yield attributes and Yield

Number of pods/plant

No Significant and maximum number of pods/plant (97.00) was recorded in treatment 9 [Goat manure 0.66 t/ha + Vermi wash 5%].

Number of seeds/pod

The highest number of seeds per pod (1.73) was observed in Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%], which was significantly superior over most other treatments. Treatments 1 [FYM 4 t/ha + Fish amino acid 1.5%], 2 [FYM 4 t/ha + Panchagavya 3%], 3 [FYM 4 t/ha + Vermiwash 5%], 4 [Vermicompost 1.33 t/ha + Fish amino acid 1.5%], 5 [Vermicompost 1.33 t/ha + Panchagavya 3%], 6 [Vermicompost 1.33 t/ha + Vermiwash 5%], and 8 [Goat manure 0.66 t/ha + Panchagavya 3%] were statistically at par with Treatment 9. The increase in seeds per pod may be attributed to the synergistic effect of enhanced soil fertility from goat manure and the foliar supply of growth-promoting substances and micronutrients from vermiwash. Goat manure improves soil organic carbon and microbial activity, facilitating better nutrient uptake, particularly phosphorus and boron, which are critical for flower and pod development. Vermiwash, containing auxins, cytokinins, and enzymes, promotes pollen viability, fertilization, and ovule development, resulting in increased seed formation. These results are in agreement with and Patel and Mehta (2019) [24], who reported that integrated organic and foliar applications significantly enhanced seed setting in lentil and other pulses.

Test weight (g)

The highest test weight (37.06 g) was recorded in treatment 9 [Goat manure 0.66 t/ha + Vermi wash 5%] and though there was no significant difference among the treatments.

Seed Yield (t/ha)

The highest seed yield (1.88 t/ha) was recorded in Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%], which was significantly superior over most other treatments. Treatments 4 [Vermicompost 1.33 t/ha + Fish amino acid

1.5%], 5 [Vermicompost 1.33 t/ha + Panchagavya 3%], 7 [Goat manure 0.66 t/ha + Fish amino acid 1.5%], and 8 [Goat manure 0.66 t/ha + Panchagavya 3%] were statistically at par with Treatment 9. The enhanced seed yield with the combined application of goat manure and vermiwash may be attributed to improved soil fertility and microbial activity from goat manure, which promotes root growth, nutrient uptake, and overall plant vigor. Foliar- applied vermiwash supplies readily available growth- promoting substances such as auxins, cytokinins, enzymes, and essential micronutrients, which improve physiological efficiency, flower retention, pod setting, and seed filling. This integrated approach ensures a balanced nutrient supply through both soil and foliar pathways, optimizing source- sink relationships and translocation of photosynthates to reproductive organs, thereby increasing seed yield. These results corroborate the findings of Ali *et al*. (2018), Choudhary *et al*. (2019) [6], and Patel *et al*. (2019) [24], who reported that the combination of organic manures and foliar bio-stimulants significantly enhanced seed yield in lentil and other pulse crops.

Stover yield (t/ha)

The highest stover yield (3.62 t/ha) was recorded in Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%], which was significantly superior, while Treatment 3 [FYM 4 t/ha + Vermiwash 5%] was statistically at par. The enhanced stover yield with the combined application of goat manure and vermiwash can be attributed to improved soil fertility and nutrient availability provided by goat manure, which promotes vegetative growth and biomass accumulation. Goat manure enhances soil structure, moisture retention, and microbial activity, leading to vigorous shoot development. Foliar-applied vermiwash supplies essential growth regulators such as auxins and cytokinins, along with enzymes and micronutrients, which stimulate chlorophyll synthesis, photosynthesis, and efficient nutrient translocation. This dual approach of soil and foliar nutrient supply ensures optimal vegetative growth, resulting in higher stover yield. These results are consistent with Kumar *et al*. (2019) [19], Yadav *et al*. (2018) [39], and Rai *et al*. (2020) [28], who reported that integrated use of organic manures and foliar bio-stimulants significantly improved biomass and stover yield in lentil and other pulse crops.

Harvest index

The highest harvest index (41.84%) was recorded in Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%], which was significantly superior, while Treatments 4 [Vermicompost 1.33 t/ha + Fish amino acid 1.5%], 5 [Vermicompost 1.33 t/ha + Panchagavya 3%], 7 [Goat manure 0.66 t/ha + Fish amino acid 1.5%], and 8 [Goat manure 0.66 t/ha + Panchagavya 3%] were statistically at par. The enhanced harvest index in lentil with the combined application of goat manure and vermiwash can be attributed to improved nutrient availability from goat manure, which supports balanced vegetative and reproductive growth, along with foliar-applied vermiwash that promotes efficient translocation of assimilates towards seed development. Goat manure enriches the soil with essential macro- and micronutrients and enhances microbial activity, improving overall plant vigor and nutrient uptake efficiency. Concurrently, vermiwash supplies growth regulators such as auxins, gibberellins, and cytokinins, which stimulate flower retention, pod formation, and effective partitioning of photosynthates to reproductive organs. This integrated soil and foliar nutrient management optimizes the source-sink relationship, resulting in a higher proportion of economic yield in total biomass and thus an improved harvest index. Similar observations were reported by Mishra *et al*. (2019) [21], Tiwari *et al*. (2020) [37], and Deshmukh *et al*. (2021) [8], who noted that organic nutrient management and foliar bio-stimulants enhanced harvest index in lentil and other legumes.

Cost of cultivation (INR/ha)

The maximum cost of cultivation (34519.95 INR/ha) was recorded in treatment 5 [Vermicompost 1.33t/ha + Panchagavya 3%].

Gross returns (INR/ha)

The maximum gross return (129440.00 INR/ha) was recorded in treatment 9 [Goat manure 0.66t/ha) + Vermi wash 5%].

Net returns (INR/ha)

The maximum net return (95083.40 INR/ha) was recorded in treatment 9 [Goat manure 0.66t/ha + Vermiwash 5%].

Benefit Cost Ratio (B: C)

The highest benefit-cost ratio (B: C ratio) of 2.77 was recorded in Treatment 9 [Goat manure 0.66 t/ha + Vermiwash 5%]. The superior economic return with goat manure application may be attributed to its role as an organic nutrient source, which improves soil health, enhances plant growth, promotes better yield components, and increases overall productivity, leading to higher market value for organic produce. Similarly, the foliar application of Vermiwash 5% contributed to a higher B: C ratio by supporting adequate plant stand, improving aeration and sunlight interception, and promoting increased pod and seed development, thereby enhancing yield without a proportional increase in cultivation costs. These findings are in agreement with Singh *et al*. (2022–23) [33], who reported similar economic benefits with integrated organic nutrient management.

Table 1: Effect of the Solid and Foliar Application of Organic manures on growth and growth attributes of Lentil

Sr. No	Treatments	Plant height (cm) 100 DAS	Branches/Plant 100 DAS	Nodules/Plant 100 DAS	Plant dry weight (g) 100 DAS	CGR (g/m²/day) 75-100 DAS	RGR (g/g/day) 75-100 DAS
1	FYM 4 t/ha + Fish amino acid 1.5%	49.10	21.60	8.00	3.786	4.44	0.053
2	FYM 4 t/ha + Panchagavya 3%	48.40	21.07	8.06	2.806	2.85	0.039
3	FYM 4 t/ha + Vermi	56.13	21.07	8.60	3.512	3.07	0.033

	wash 5%						
4	Vermicompost 1.33 t/ha + Fish amino acid 1.5%	53.16	18.40	8.00	3.319	3.15	0.036
5	Vermicompost 1.33 t/ha + Panchagavya 3%	50.12	22.20	7.20	2.913	2.88	0.039
6	Vermicompost 1.33 t/ha + Vermi wash 5%	50.06	22.07	7.40	2.782	3.33	0.046
7	Goat manure 0.66 t/ha + Fish amino acid 1.5%	55.08	20.27	8.00	3.090	2.81	0.040
8	Goat manure 0.66 t/ha + Panchagavya 3%	53.63	21.67	8.53	3.140	3.12	0.040
9	Goat manure 0.66 t/ha + Vermiwash 5%	57.69	22.27	8.60	4.048	4.44	0.043
	F-Test	S	S	S	S	S	NS
	S.Em (±)	2.06	0.76	0.28	0.25	0.39	0
	CD (p = 0.05)	6.19	2.27	0.84	0.76	1.18	–

Table 2: Effect of the Solid and Foliar Application of Organic manures on yield and yield attributes of Lentil.

Sr. No	Treatment combination	Pods/plant	Seeds/pod	Test weight (g)	Seed yield (t/ha)	Stover yield (t/ha)	Harvest Index (%)
1	FYM 4 t/ha + Fish amino acid 1.5%	90.73	1.46	29.43	1.06	2.63	29.00
2	FYM 4 t/ha + Panchagavya 3%	92.66	1.60	32.33	1.32	2.93	30.66
3	FYM 4 t/ha + Vermiwash 5%	87.33	1.66	35.90	1.23	3.38	26.61
4	Vermicompost 1.33 t/ha + Fish amino acid 1.5%	89.66	1.53	31.23	1.67	2.65	38.73
5	Vermicompost 1.33 t/ha + Panchagavya 3%	92.26	1.60	36.40	1.54	2.92	34.55
6	Vermicompost 1.33 t/ha + Vermiwash 5%	85.80	1.73	33.36	1.07	3.18	25.19
7	Goat manure 0.66 t/ha + Fish amino acid 1.5%	96.00	1.20	30.93	1.86	2.60	34.16
8	Goat manure 0.66 t/ha + Panchagavya 3%	95.33	1.66	34.50	1.78	3.12	36.36
9	Goat manure 0.66 t/ha + Vermiwash 5%	97.00	1.73	37.06	1.88	3.62	41.84
	F-Test	NS	S	NS	S	S	S
	S.Em (±)	2.44	0.10	1.72	0.15	0.14	2.70
	CD (p = 0.05)	–	0.30	–	0.43	0.43	8.11

Table 3: Effect of the Solid and Foliar Application of Organic manures on economics of Lentil.

Sr. No	Treatment combinations	Cost of Cultivation (INR/ha)	Gross Return (INR/ha)	Net Return (INR/ha)	B:C Ratio
1	FYM 4 t/ha + Fish amino acid 1.5%	34,358.00	74,160.00	39,802.00	1.16
2	FYM 4 t/ha + Panchagavya 3%	34,508.00	91,660.00	57,152.00	1.66
3	FYM 4 t/ha + Vermiwash 5%	34,358.00	86,710.00	52,352.00	1.52
4	Vermicompost 1.33 t/ha + Fish amino acid 1.5%	34,369.95	1,13,850.00	79,480.05	2.31
5	Vermicompost 1.33 t/ha + Panchagavya 3%	34,519.95	1,05,940.00	71,420.05	2.07
6	Vermicompost 1.33 t/ha + Vermiwash 5%	34,369.95	75,910.00	41,540.05	1.21
7	Goat manure 0.66 t/ha + Fish amino acid 1.5%	34,356.60	1,26,100.00	91,743.40	2.67
8	Goat manure 0.66 t/ha + Panchagavya 3%	34,506.60	1,21,940.00	87,433.40	2.53
9	Goat manure 0.66 t/ha + Vermiwash 5%	34,356.60	1,29,440.00	95,083.40	2.77

Conclusion

It is concluded with the application of Goat manure 0.66 t/ha + Vermi wash 5% (Treatment 9), was observed higher yield and benefit-cost ratio in Lentil.

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