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Influence of organic nutrient management practices on growth and quality attributes of sesame

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Abstract

Sesame (*Sesamum indicum* L.) is an important export-oriented oilseed crop valued for its nutritional and medicinal uses. However, the presence of pesticide and chemical residues has emerged as a major barrier to sesame export and environmental sustainability. Organically produced sesame can ensure optimum yields, nutrient conservation, and a sustainable environment while fetching premium market prices. A field experiment was conducted to study the effect of organic nutrient management practices on soil nutrients, microbial population, and yield of sesame. The experiment comprised four main treatments and four foliar organic nutrient applications with three replications in a plot size of $5.1 \times 5 \text{ m}^2$. The main treatment T_4 (75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha^{-1}) recorded significantly higher plant height at 25, 50, 75 DAS, and at harvest (24.6, 58.8, 79.6, and 82.0 cm, respectively) and maximum dry matter accumulation (53.5, 112.8, 169.4, and 189.8 g m^{-2} , respectively). Among foliar applications, Panchagavya @ 3% (S_i) resulted in the highest plant height (60.3 cm at 50 DAS) and dry matter accumulation (181.8 g m^{-2} at harvest). Leaf area was significantly higher under T_4 (592.6 $\text{cm}^2 \text{ plant}^{-1}$ at 75 DAS). SPAD chlorophyll meter readings were non-significant but highest under T_4 (34.5 at 75 DAS). Protein yield was maximum (68.92 kg ha^{-1}) with T_4 , while the lowest (48.24 kg ha^{-1}) was recorded in T_3 . Oil yield was also significantly higher under T_4 (219.2 kg ha^{-1}). Overall, the integrated application of FYM, vermicompost enriched with rock phosphate, and microbial consortia significantly enhanced sesame growth, yield, and quality parameters under organic management conditions.

Keywords: Plant height, dry matter accumulation, leaf area, SPAD chlorophyll meter reading, protein yield, oil yield

1. Introduction

Organic agriculture is increasingly recognized as a sustainable farming approach that enhances soil health, promotes ecological balance, and ensures residue-free food. In India, the total area under organic certification reached 10.17 million hectares in 2023-24, of which 5.39 million ha is cultivable and 4.78 million ha is under wild harvest collection (APEDA, 2024) ^[1]. During this period, the country produced about 3.60 million MT of certified organic products, covering oilseeds, cereals, pulses, spices, fruits, vegetables, and plantation crops. Among these, oilseeds alone contributed nearly 47.6% of the export value, highlighting their significance in the organic sector (APEDA, 2024) ^[1].

Sesame (*Sesamum indicum* L.) is one of the oldest oilseed crops and is widely cultivated for its high-quality edible oil and multiple uses in food, medicine, and cosmetics. Globally, sesame is grown on 12.5 million ha with an annual production of 6.35 million tonnes and productivity of 515 kg ha^{-1} . India is a major player with 29.8% of global sesame area, 25.8% of production, and nearly 40% share in exports (INDIASTAT, 2024) ^[10]. Within India, sesame is cultivated on about 1.0 million ha, producing 0.82 million tonnes, with an average productivity of 450 kg ha^{-1} . Telangana is one of the leading states, cultivating 57,485 ha with an annual production of 1,48,310 tonnes and productivity of 714 kg ha^{-1} , particularly concentrated in northern districts such as Adilabad, Jagtial, Karimnagar, and Nizamabad (INDIASTAT, 2024) ^[10]. Sesame oil is rich in unsaturated fatty acids (85%), resistant to rancidity, and contains bioactive compounds with cholesterol-lowering and cardioprotective effects (Gopinath *et al.*, 2011) ^[9].

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Its high oil content (46-49%), nutritional value, and export potential make sesame a crop of national and international importance.

Despite its advantages, sesame production and exports are challenged by pesticide residues and the long-term negative effects of indiscriminate chemical fertilizer use, which include nutrient imbalance, soil health deterioration, and reduced input-use efficiency (Kumar *et al.*, 2010; Cai *et al.*, 2016) [16, 4]. Organic farming offers a sustainable solution by avoiding synthetic inputs and emphasizing the use of FYM, composts, enriched vermicompost, neem cake, humic acid, and biofertilizers to supply nutrients (Muthuswamy *et al.*, 1990) [20]. Biofertilizers in particular enhance nutrient availability by fixing nitrogen, solubilizing phosphorus, and mobilizing potassium, while foliar organics like Panchagavya and vermiwash improve crop growth and quality. Balanced and prolonged nutrient supply from such inputs has been shown to enhance dry matter production, seed yield, protein content, and oil yield in oilseed crops (Parthasarathi *et al.*, 2012; Dharati *et al.*, 2017; Nirav Parmar *et al.*, 2020) [24, 6, 22].

Considering the nutritional and export value of sesame, coupled with the rising global demand for organic produce, the present study was undertaken to evaluate the effect of organic nutrient management practices on plant growth parameters, protein yield, and oil yield of sesame under rainfed conditions.

2. Materials and Methods

2.1 Experimental site and climate

A field experiment was conducted during late *kharif* 2019 at the College Farm, Agricultural College, Polasa, Jagtial, Professor Jayashankar Telangana Agricultural University, Telangana. The site is located at 18°49'40" N latitude, 78°56'45" E longitude, at an altitude of 243.4 m above mean sea level, and falls under the Northern Zone of Telangana. During the crop period, the weekly mean maximum temperature ranged from 29.2-32.3°C (mean 31.2°C) and the minimum from 15.6-24.1°C (mean 21.1°C). The total rainfall was 465.1 mm received in 37 rainy days, with prolonged dry spells during the 45th-49th standard weeks. The mean sunshine duration was 6.4 h day⁻¹.

2.2 Soil and nutrient sources

Composite soil samples (0-30 cm) collected before sowing were analyzed for pH, EC, organic carbon, and available N, P, and K. The soil was sandy loam, neutral in reaction, low in available N, medium in P, and high in K. The nutrient contents of organic inputs were estimated as per Bradstreet (1965) [3], and were 0.51, 0.17, and 0.43% for FYM; 1.16, 0.21, and 0.62% for vermicompost; 4.31, 0.63, and 1.26% for neem cake; and 1.21, 1.50, and 0.67% for enriched vermicompost, respectively.

2.3 Treatments and experimental design

The experiment was laid out in a Factorial RBD design with four main treatments of basal organic nutrient management and four sub treatments of foliar organics, replicated thrice. The main treatments included:

- **T₁:** 50% N through FYM + 25% N through vermicompost + 25% N through neem cake
- **T₂:** 50% N through FYM + 25% N through enriched vermicompost + microbial consortia @ 2 kg ha⁻¹
- **T₃:** 50% N through FYM + 25% N through neem cake + humic acid granules @ 12.5 kg ha⁻¹
- **T₄:** 75% N through FYM + 25% N through enriched vermicompost + microbial consortia @ 2 kg ha⁻¹

The sub treatments consisted of foliar applications:

- **S₁:** Panchagavya @ 3%
- **S₂:** NSKE @ 3%
- **S₃:** Vermiwash @ 10 ml L⁻¹
- **S₄:** Humic acid @ 1 ml L⁻¹

FYM, neem cake, humic acid granules, and microbial consortia were applied as basal, while vermicompost and enriched vermicompost were top-dressed at 25 and 50 DAS. Foliar sprays were imposed at flowering, 52 DAS, and 59 DAS.

2.4 Crop details and management

Sesame variety JCS-1020, released from RARS, Jagtial in 2019, was used. It is a non-branched, multi-capsular, white-seeded variety with 46-49% oil content, resistant to powdery mildew, and has a crop duration of 100 days. The crop was sown at 30 cm spacing using a seed rate of 2.5 kg acre⁻¹. Gap filling was carried out at 10 DAS and thinning at 20 DAS. The gross plot size was 5.1 × 5.0 m² and net plot size 3.9 × 4.4 m². Weeding was done manually at 25 and 45 DAS. *Bacillus thuringiensis* @ 2 g L⁻¹ was applied at flowering to control lepidopteran pests, and *Trichoderma viride* @ 5 g L⁻¹ was drenched at 60 DAS to manage sucking pests and foliar diseases. Two irrigations were given at pod filling stage due to extended dry spells, and the crop was harvested on 5th December 2019.

2.5 Observations recorded

1. **Growth parameters:** Plant height, number of branches plant⁻¹, number of capsules plant⁻¹, leaf area index (LAI), and total dry matter production were recorded at 30, 60 DAS and at harvest. LAI was calculated using the formula of Watson (1952).
2. **Protein content and yield:** Seed nitrogen content was estimated using the Kjeldahl method (Jackson, 1973). Protein content (%) was calculated as N × 6.25 and protein yield (kg ha⁻¹) was obtained by multiplying seed protein content with seed yield.
3. **Oil content and yield:** Oil content (%) was estimated using the Soxhlet extraction method with petroleum ether as solvent (AOAC, 1995). Oil yield (kg ha⁻¹) was calculated by multiplying oil content with seed yield.

3. Statistical analysis

Data were analyzed using analysis of variance (ANOVA) for Factorial RBD design as per Gomez and Gomez (1984). Treatment means were compared using the critical difference (CD) at 5% level of significance.

4. Results and Discussion

4.1 Plant Height

Effect of organic nutrient management practices on plant height of sesame at different growth stages is presented in Fig 1. Significant differences were observed among main treatments at 25 and 50 DAS. T₄ (75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha⁻¹) recorded the tallest plants at all stages: 24.6 cm (25 DAS), 58.8 cm (50 DAS), 79.6 cm (75 DAS) and 82.0 cm (harvest). This may be attributed to enhanced nutrient availability through microbial consortia and organic sources, as reported by Piploda and Kumawat (2022) [26] and Sagar and Chandra (2004) [28]. At 25 DAS, T₄ was on par with T₂ (50% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia), while at 50 DAS it was not significant with T₁ (50% N through FYM + 25% N through vermicompost + 25%

N through neem cake). However, at 75 DAS and harvest, differences among main treatments were non-significant. Among sub-treatments, variations in plant height were non-significant at 25, 75 DAS and harvest. Panchagavya @ 3% recorded highest plant height at all stages: 22.5 cm (25 DAS), 60.3 cm (50 DAS), 79.2 cm (75 DAS) and 82.9 cm (harvest), being on

par with other foliar sprays at early stages and significantly superior at later stages. Similar findings were reported by El Naim *et al.* (2010) [8], Veeral *et al.* (2019) [32] in sesame and Kandil (2015) [12] in horse gram. The interaction effect between main and sub-treatments on plant height at all stages was non-significant.

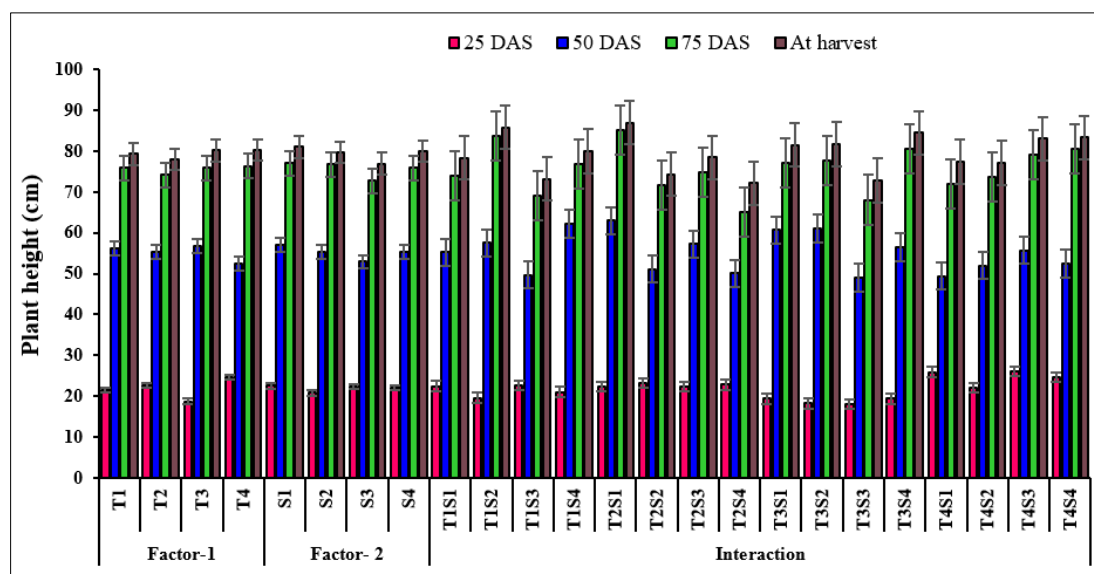


Fig 1: Plant height (cm) of Sesame as influenced by Organic Nutrient management practices

4.2 Dry matter

Dry matter accumulation of sesame was significantly affected by organic nutrient management practices at all stages of growth (Fig 2). Among the main treatments, T₄ (75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha⁻¹) consistently produced the highest dry matter with 53.5 g m⁻² at 25 DAS, 112.8 g m⁻² at 50 DAS, 169.4 g m⁻² at 75 DAS and 189.8 g m⁻² at harvest, being on par with T₂ (101.5 g m⁻²) at 50 DAS. T₂ (46.1, 101.5, 154.0 and 172.6 g m⁻²) was the next best and remained comparable with T₁ at 75 DAS and harvest, while T₃ recorded the lowest values. The superiority of vermicompost enriched with rock phosphate (T₄ and T₂) over neem cake or humic acid sources could be attributed to enhanced microbial activity and nutrient release, corroborating

earlier reports (Tas *et al.*, 2024 [30]; Dharati *et al.*, 2017) [6].

Among the sub-treatments, Panchagavya @ 3% (S₁) recorded maximum dry matter (47.7, 106.2, 161.8 and 181.8 g m⁻²) at successive stages, on par with humic acid @ 1 ml lit⁻¹. Vermiwash @ 10 ml lit⁻¹ and NSKE @ 3% recorded comparatively lower values but were statistically similar. The interaction effect was significant, with T₄S₁ recording the highest dry matter at 75 DAS (180.9 g m⁻²) and harvest (202.4 g m⁻²), which was at par with T₂S₁, T₄S₂, T₄S₃, T₄S₄, T₁S₁ and T₁S₄. The results indicate that integrated application of enriched organic sources with foliar sprays effectively enhanced nutrient availability and biomass accumulation, as also reported by Duhoon *et al.* (2004) [7] in sesame and Parthasarathi and Sinha (2012) in groundnut.

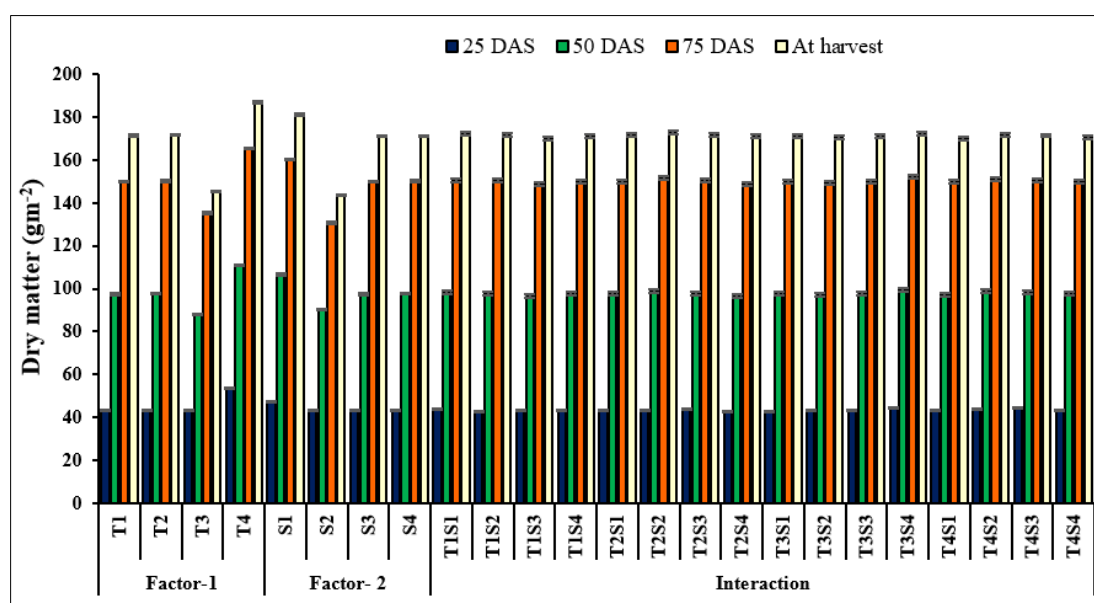


Fig 2: Dry matter accumulation (gm⁻²) of sesame as influenced by Organic nutrient management practices

4.3 Leaf area

Leaf area of sesame at different growth stages is presented in Fig. 3. At 25 DAS, leaf area was not significantly influenced by main or sub-treatments. However, significant differences were observed at 50 and 75 DAS. Among the main treatments, T₄ (75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha⁻¹) recorded the highest leaf area with 421.7 and 592.6 cm² plant⁻¹ at 50 and 75 DAS, respectively, distinctly higher than other treatments. This was followed by T₂ (373.8 and 549.8 cm² plant⁻¹) which remained significantly superior to T₁ and T₃. At 50 DAS, T₃ (345.1) was on par with T₁ (341.4), but at 75 DAS, T₃ surpassed T₁. The superiority of P-enriched vermicompost in T₄ and T₂ may be attributed to its higher nutrient quality and sustained release, as earlier reported by Sagar and Chandra, (2004) [28].

Among sub-treatments, differences were not evident at 25 DAS,

but at 50 DAS Panchagavya @ 3% (S₁) recorded the maximum leaf area (495.1 cm² plant⁻¹), followed by vermiwash (386.6), humic acid (362.2), and NSKE (338.1). At 75 DAS, vermiwash (S₃) produced the highest leaf area (564.3 cm² plant⁻¹), followed by Panchagavya (542.0), humic acid (506.2) and NSKE (499.9), with S₂ and S₄ being statistically at par. The interaction effect was significant at 50 and 75 DAS. The combination T₄S₃ recorded the maximum leaf area at both stages (564.0 and 784.8 cm² plant⁻¹), followed by T₄S₁ (546.0) and T₂S₄ (515.6) at 50 DAS, while at 75 DAS it was followed by T₃S₁ (757.4), T₄S₄ (733.6) and T₄S₁ (708.4). Lowest leaf area was observed in T₂S₂ (412.3) at 50 DAS and T₁S₂ (602.4) at 75 DAS. The beneficial effect of foliar organics, particularly humic acid and Panchagavya, in improving photosynthetic surface has been earlier reported by Ayoubizadeh *et al.* (2018) [2], Khaled *et al.* (2012) [15].

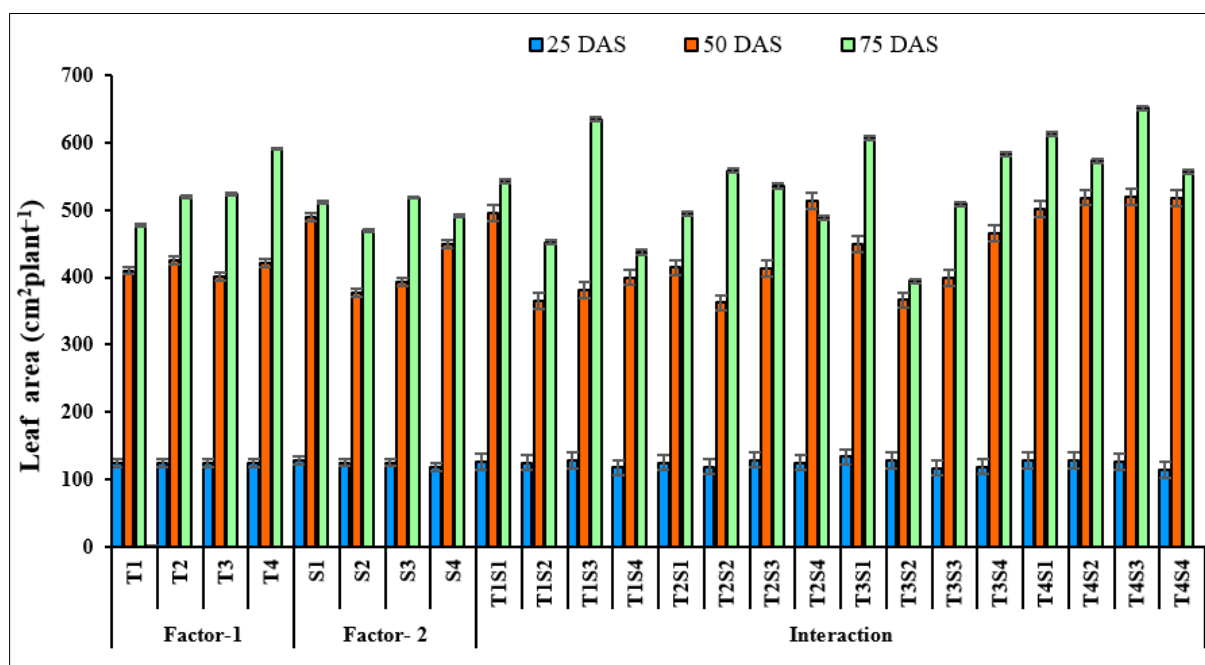


Fig 3: Leaf Area (cm² plant⁻¹) of Sesame as influenced by Organic nutrient management practices

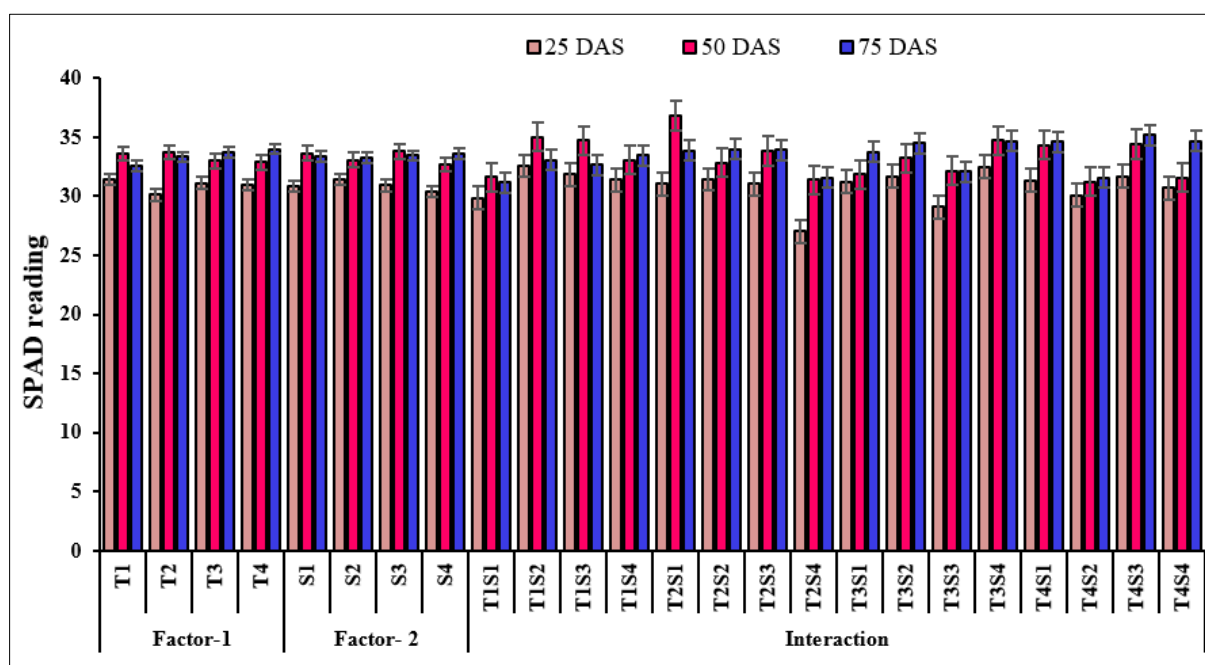


Fig 4: SPAD chlorophyll meter reading of Sesame as influenced by Organic nutrient management practices

4.4 SPAD chlorophyll meter reading

SPAD chlorophyll meter readings of sesame at 25, 50 and 75 DAS are presented in Fig 4. The values were not significantly influenced by main or sub-treatments at any stage. At 25 DAS, readings ranged between 30.6-31.3; at 50 DAS, 32.7-34.2; and at 75 DAS, 32.6-34.5. Among the main treatments, application of 75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia (T₄) recorded relatively higher chlorophyll values (31.3, 34.2, 34.5 at 25, 50 and 75 DAS, respectively), though differences were statistically comparable with other treatments.

Similarly, no significant differences were observed among sub-treatments. Panchagavya @ 3% (S₁) recorded relatively higher values at 25 and 50 DAS (31.2 and 33.8), which may be due to enhanced availability of Fe, N, P and S promoting chlorophyll synthesis, as also reported by Tejada and Gonzalez (2003) [31]. At 75 DAS, humic acid @ 1 ml L⁻¹ (S₄) showed a comparatively higher value (33.6). The interaction effect between main and sub-treatments was not significant at any stage.

4.5 Seed Yield

Seed yield of sesame as influenced by organic nutrient

management practices is presented in Fig 5. Main treatments and their interaction with foliar organic sources significantly affected yield, whereas the effect of foliar sources alone was non-significant. Among main treatments, application of 75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha⁻¹ (T₄) recorded the highest seed yield (478 kg ha⁻¹), followed by T₂ (433 kg ha⁻¹), which was at par with T₁ (424 kg ha⁻¹) and T₃ (405 kg ha⁻¹). The superior performance of vermicompost enriched with rock phosphate could be attributed to improved availability of P, K and S, leading to enhanced yield and quality, as also reported by Parthasarathi *et al* (2012) [24].

Although sub-treatments did not differ significantly, foliar application of organic sources enhanced sesame yield. Panchagavya @ 3% (450 kg ha⁻¹) recorded the highest value, followed by humic acid, vermiwash and NSKE. The beneficial effect may be linked to the presence of nutrients, enzymes and growth regulators that improved yield and reduced pest incidence (Tejada and Gonzalez, 2003) [31]. The interaction effect was significant, with combined application of enriched manures and foliar sprays showing greater impact on seed yield.

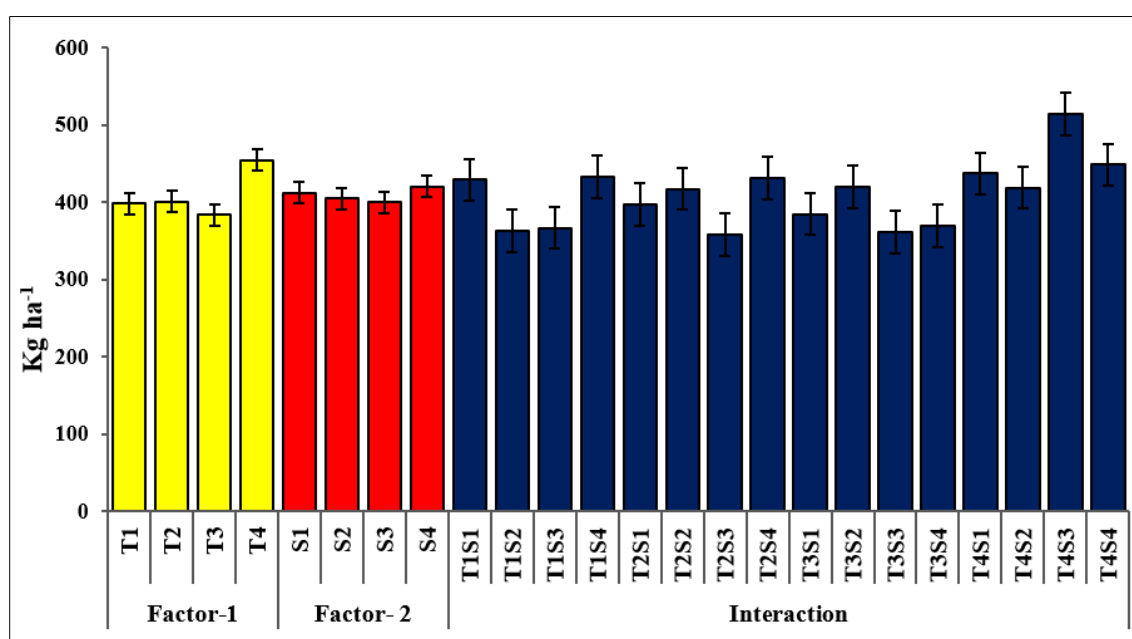


Fig 5: Seed yield of Sesame as influenced by Organic nutrient management practices

4.6 Protein yield

Protein yield of sesame as influenced by organic nutrient management is presented in Table 1. Sesame is a rich source of 12-18% protein, vitamin B1, PUFA (palmitic and stearic acids), natural antioxidants, and lignans such as sesamin and sesamol (Pathak *et al.*, 2014 [25]; Meena *et al.*, 2018) [18]. Main treatments significantly affected protein yield, with T₄ (75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha⁻¹) recording the highest yield (68.92 kg ha⁻¹). This was followed by T₂ (56.78 kg ha⁻¹) and T₁ (52.99 kg ha⁻¹), while the lowest was observed in T₃ (48.24 kg ha⁻¹).

Higher protein yield under T₄ may be attributed to improved N and S availability through enriched vermicompost and microbial consortia, as also reported by Ramakrishna *et al.* (2017) [27] in groundnut and Duhoon *et al.* (2004) [7] in sesame.

Foliar applications did not significantly influence protein yield. However, S₁: Panchagavya @ 3% recorded the highest protein yield (59.0 kg ha⁻¹), followed by humic acid (56.57 kg ha⁻¹). The enhanced protein accumulation could be linked to better nutrient mobilization and physiological stimulation by these organic inputs (Vishal Kumar *et al.*, 2019) [33]. The interaction effect between main and sub treatments was not significant.

Table 1: Protein content (%) and protein yield (Kg ha⁻¹) of Sesame as influenced by Organic nutrient management practices

Treatments	Protein content (%)	Protein yield (Kg ha ⁻¹)
Main Treatments		
T ₁ : 50% N through FYM + 25% N through vermicompost + 25% N through Neem cake	12.50	52.99
T ₂ : 50% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha ⁻¹	13.12	56.78
T ₃ : 50% N through FYM + 25% N through Neem cake + Humic acid granules @ 12.5 kg ha ⁻¹	11.90	48.24
T ₄ : 75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha ⁻¹	14.40	68.92
SEm±	0.22	2.64
CD (P=0.05)	0.63	7.56
Sub treatments		
S ₁ : Panchagavya @ 3%	13.12	59.00
S ₂ : NSKE@ 3%	12.50	53.72
S ₃ : Vermiwash @ 10ml lit ⁻¹	12.50	53.75
S ₄ : Humic acid @ 1ml lit ⁻¹	13.12	56.57
SEm±	0.22	2.64
CD (P=0.05)	NS	NS
Interaction (T X S)		
SEm±	0.45	5.25
CD (P=0.05)	NS	NS

4.7 Oil yield

Oil yield of sesame as influenced by organic nutrient management is presented in Table 2. Main treatments and their interaction with sub treatments significantly affected oil yield, while foliar applications alone were non-significant. Among main treatments, T₄ (75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha⁻¹) recorded the highest oil yield (219.2 kg ha⁻¹), followed by T₂ (194.9 kg ha⁻¹) and T₁ (187.6 kg ha⁻¹). The lowest yield was observed under T₃ (168.6 kg ha⁻¹). The superiority of T₄ could be attributed to balanced nutrient availability from diversified

organic sources that enhanced oil synthesis, as also supported by Keller and Bliesner (2000) [14].

Foliar applications recorded oil yields ranging from 188.3 to 199.8 kg ha⁻¹, with S₁: Panchagavya @ 3% (199.8 kg ha⁻¹) being superior, followed by humic acid (192.3 kg ha⁻¹). Positive effects of humic acid in enhancing physiological and biochemical traits have been reported in tomato (Yildirim, 2007) [34] and pepper (Karakurt *et al.*, 2009) [13]. The interaction effect was significant, where T₄S₁ (232.47 kg ha⁻¹) recorded the highest oil yield, and was on par with T₄S₂, T₄S₃, T₄S₄, T₂S₁ and T₂S₂.

Table 2: Oil content (%) and Oil yield (Kg ha⁻¹) of Sesame as influenced by organic nutrient management practices

Treatments	Oil content (%)	Oil yield (Kg ha ⁻¹)
Main Treatments		
T ₁ : 50% N through FYM + 25% N through vermicompost + 25% N through Neem cake	44.3	187.6
T ₂ : 50% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha ⁻¹	45.0	194.9
T ₃ : 50% N through FYM + 25% N through Neem cake + Humic acid granules @ 12.5 kg ha ⁻¹	41.6	168.6
T ₄ : 75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha ⁻¹	45.8	219.2
SEm±	0.3	5.5
CD (P=0.05)	0.7	16.0
Sub treatments		
S ₁ : Panchagavya @ 3%	44.4	199.8
S ₂ : NSKE@ 3%	43.7	188.3
S ₃ : Vermiwash @ 10ml lit ⁻¹	44.1	190.0
S ₄ : Humic acid @ 1ml lit ⁻¹	44.6	192.3
SEm±	0.3	5.5
CD (P=0.05)	0.7	NS
Interaction (T X S)		
SEm±	0.6	11.0
CD (P=0.05)	1.4	32.0

Conclusion

The experiment demonstrated that organic nutrient management significantly improved sesame growth, yield, and quality attributes. Application of 75% N through FYM + 25% N through vermicompost enriched with rock phosphate + microbial consortia @ 2 kg ha⁻¹ (T₄) recorded the highest plant height, dry matter accumulation, leaf area, seed and stalk yield, protein, and oil yield, followed by T₂. SPAD chlorophyll readings and harvest index were not significantly influenced. The superior performance of T₄ may be attributed to improved nutrient

availability and microbial activity. Overall, the integrated use of organic nutrient sources enhanced sesame productivity, soil fertility, and environmental sustainability, indicating its suitability for organic and eco-friendly sesame cultivation.

Future scope

Application of organic sources helps to maintain sustainability and higher profitability in sesame by saving the cost of production.

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Conflict of Interest: None.

References

1. Agricultural and Processed Food Products Export Development Authority (APEDA). Certification of organic products. New Delhi: Government of India; 2024. <https://apeda.gov.in>
2. Ayoubizadeh N, Laei G, Amini Dehaghi M, Sinaki JM, Rezvan S. Seed yield and fatty acids composition of sesame genotypes affected by drought and foliar applications. *Applied Ecology and Environmental Research*. 2018;16(6):7585-7604.
3. Bradstreet RB. Determination of nitro nitrogen by Kjeldahl method. *Analytical Chemistry*. 1954;26(1):185-187.
4. Cai A, Xu H, Shao X, Zhang W, Xu M, Murphy DV. Carbon and nitrogen mineralization in relation to soil particle-size fractions after 32 years of chemical and manure application in a continuous maize cropping system. *PLoS One*. 2016;11(3):e0152521.
5. Chaudhary AK, Rahi S. Integrated crop-management practices for enhancing productivity, profitability, production-efficiency and monetary-efficiency of pigeonpea (*Cajanus cajan*) in Indo-Gangetic plains region. *Indian Journal of Agricultural Sciences*. 2016;86(6):778-784.
6. Dharati P, Patel RA, Ghosh S. Effect of irrigation, vermicompost and sulphur on growth and yield of summer sesamum (*Sesamum indicum* L.). *International Journal of Current Microbiology and Applied Sciences*. 2017;6(11):1647-1652.
7. Duhoon SS, Jyotishi A, Yadav MR, Singh AK. Exploitation of heterosis for raising productivity in sesame. In: *Proceedings of the 4th International Crop Science Congress*; 2004 Sep 26-Oct 1; Brisbane, Australia.
8. El Naim AM, Ahmed MF, Ibrahim KA. Effect of irrigation and cultivar on seed yield, yield components and harvest index of sesame (*Sesamum indicum* L.). *Journal of Agricultural Extension and Rural Development*. 2010;2(4):58-65.
9. Gopinath KA, Venkateswarlu B, Venkateswarlu S, Srinivasa Rao CS, Palloli SS, Yadav SK, *et al.* Effect of organic management on agronomic and economic performance of sesame and on soil properties. *Indian Journal of Dryland Agricultural Research and Development*. 2011;26(1):16-20.
10. Indiatat. Agriculture production in India. 2024. <http://www.indiatat.com>
11. Jarvan M, Edesi L, Adamson A, Vosa T. Soil microbial communities and dehydrogenase activity depending on farming systems. *Plant, Soil and Environment*. 2014;60(10):459-463.
12. Kandil EE. Impact of sowing method and humic acid on sesame production. *Alexandria Science Exchange Journal*. 2015;36(3):320-333.
13. Karakurt Y, Özdamar Ünlü H, Ünlü H, Padem H. The influence of foliar and soil fertilization of humic acid on yield and quality of pepper. *Acta Agriculturae Scandinavica, Section B — Soil & Plant Science*. 2009;59(3):233-237. <https://doi.org/10.1080/09064710802022952>
14. Keller J, Bliesner RD. Sprinkler and trickle irrigation. Caldwell: The Blackburn Press; 2000.
15. Khaled AS. Effect of soil amendments on soil fertility and sesame crop productivity under newly reclaimed soil conditions. *Egyptian Journal of Soil Science*. 2012;52(1):1-14.
16. Kumar H, Bajpai VK, Dubey RC, Maheshwari DK, Kang SC. Wilt disease management and enhancement of growth and yield of *Cajanus cajan* (L.) var. Manak by bacterial combination amended with chemical fertilizer. *Crop Protection*. 2010;29(3):591-598.
17. Liang Q, Chen H, Gong Y, Yang H, Fan M, Kuzyakov Y. Effect of 15 years of manure and mineral fertilizers on enzyme activities in particle size fractions in a North China Plain soil. *European Journal of Soil Science*. 2014;65(6):912-921.
18. Meena R, Choudhary M, Sharma D. Performance of front line demonstrations on sesame in Karauli district of Rajasthan, India. *International Journal of Current Microbiology and Applied Sciences*. 2018;7(3):2320-2326.
19. Mokariya LK, Vaja RP, Malam KV, Jani CP. Effect of microbial consortia enriched vermicompost on growth, yield and quality of summer sesame (*Sesamum indicum* L.). *The Pharma Innovation Journal*. 2021;10(12):974-977.
20. Muthuswamy P, Santhy P, Ramanathan G. Longterm use of fertilizer on soil fertility and yield of crops in irrigated Inceptisol. *Journal of the Indian Society of Soil Science*. 1990;38(3):541-542.
21. Nardi S, Carletti P, Pizzeghello D, Muscolo A. Biological activities of humic substances. In: Senesi N, Xing B, Huang PM, editors. *Biophysico-chemical processes involving natural nonliving organic matter in environmental systems*. Hoboken: Wiley; 2009. p. 305-339.
22. Parmar N, Jat JR, Malav JK, Kumar RP, Pavaya SK, Patel JK. Effect of different organic and inorganic fertilizers on nutrient content and uptake by summer sesamum (*Sesamum indicum* L.) in loamy sand. *Journal of Pharmacognosy and Phytochemistry*. 2020;9(3):303-307.
23. Patra PS, Sinha AC. Studies on organic cultivation of groundnut (*Arachis hypogaea* L.) in Cooch Behar. *Indian Journal of Agronomy*. 2012;57(4):386-389.
24. Parthasarathi T, Vanitha K, Lakshmanakumar P, Kalaiyarasi D. Aerobic rice — Mitigating water stress for the future climate change. *International Journal of Agronomy and Plant Production*. 2012;3(7):241-254.
25. Pathak N, Rai AK, Kumari R, Thapa A, Bhat K. Sesame crop: An underexploited oilseed holds tremendous potential for enhanced food value. *Agricultural Sciences*. 2014;5(6):519-529. <https://doi.org/10.4236/as.2014.56054>
26. Piploda S, Kumawat K. Varietal preference of major insect pests of sesame. *Biological Forum*. 2022;14(2):807-812.
27. Ramakrishna K, Suneetha Devi KB, Sailaja V, Saritha JD. Nutrient use efficiency of groundnut with organic manures. *Environment Conservation Journal*. 2017;18(3):1-8.
28. Sagar RL, Chandra G. Frontline demonstration on sesame in West Bengal. *Agriculture Extension Review*. 2004;16(2):7-10.
29. Swaminathan C, Swaminathan V, Vijayalakshmi K. Panchagavya — Boon to organic farming. 1st ed. Lucknow: International Book Distributors; 2007. p. 20-63.
30. Tas İ, Akcura S, Kaplan M, Jagosz B, Atılğan A, Kocięcka J, *et al.* The effect of drip irrigation and nitrogen levels on the oil and fatty acid composition of sesame and its economic analysis. *Agronomy*. 2024;14(9):2092.

- <https://doi.org/10.3390/agronomy14092092>
31. Tejada M, González JL. Effects of the application of a compost originating from crushed cotton gin residues on wheat yield under dryland conditions. *European Journal of Agronomy*. 2003;19(2):357-368.
[https://doi.org/10.1016/S1161-0301\(02\)00089-8](https://doi.org/10.1016/S1161-0301(02)00089-8)
 32. Veeral DKM, Nayakanti G. Effect of integrated organic nutrient management (INM) practices on plant architecture and yield of sesame (*Sesamum indicum* L.). *Crop Research*. 2019;54(5-6):126-130.
<https://doi.org/10.31830/2454-1761.2019.020>
 33. Kumar V, Singh RK, Dharminder, Kumar M. Effect of farm yard manure and sulphur on production of Indian mustard: A review. *Journal of Pharmacognosy and Phytochemistry*. 2019;8(3):2890-2894.
 34. Yildirim E. Foliar and soil fertilization of humic acid affect productivity and quality of tomato. *Acta Agriculturae Scandinavica, Section B — Soil & Plant Science*. 2007;57(2):182-186.
<https://doi.org/10.1080/09064710600813107>