E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(12): 925-928
Received: 26-10-2025
Accepted: 29-11-2025

Effect of organic and inorganic sources of nutrients on growth, yield and economics of Indian mustard (*Brassica campestris* L.)

Eeshu Lal, Santosh Kumar Sahu, Pravindra Kumar Salam, Tejpal Chandrakar, Devendra Pratap Singh, Ashwani Kumar Thakur, Asam Bharate, Ujjwal Mandal, Mahaveer Nishad, Sangita Mandavi and Radheshyam

Eeshu Lal
Student, M.Sc. (Agriculture), S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Dr. Santosh Kumar Sahu
Assistant Professor, Section of Agronomy, Rani Avanti Bai Lodhi College of Agriculture and Research Station, IGKV, Chhuikhadan, Chhattisgarh, India

Pravindra Kumar Salam
Scientist, Section of Agronomy, S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Dr. Tejpal Chandrakar
Senior Scientist, Section of Soil Science and Agriculture Chemistry, S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Dr. Devendra Pratap Singh
Professor, Department of Agriculture Statistics and Social Science, Collage of Agriculture, IGKV, Raipur, Chhattisgarh, India

Dr. Ashwani Kumar Thakur
Principal Scientist, Section of Agronomy, S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Asam Bharate
Student, M.Sc. (Agriculture), S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Ujjwal Mandal
Student, M.Sc. (Agriculture), S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Mahaveer Nishad
Student, M.Sc. (Agriculture), S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Sangita Mandavi
Student, M.Sc. (Agriculture), S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

Radheshyam
Student, M.Sc. (Agriculture), Pt.S.K.S. College of Agriculture and Research Station, IGKV, Rajnandgaon, Chhattisgarh, India

Corresponding Author:
Eeshu Lal
Student, M.Sc. (Agriculture), S. G. College of Agriculture and Research Station, IGKV, Jagdalpur, Chhattisgarh, India

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i12m.4526

Abstract
A field experiment was conducted during *Rabi* season of 2024-25 at Instructional cum Research Farm, SG College of Agriculture and Research Station, Jagdalpur, to evaluate the Effect of organic and inorganic sources of nutrients on growth, yield and economics of Indian mustard (*Brassica campestris* L.). The experiment was laid out in Randomized Block Design with 8 treatments *viz.*, RDF 100:60:40:35 NPKS kg ha^{-1}, RDF + FYM 10 t ha^{-1}, RDF 75%, RDF 75% + FYM 10 t ha^{-1}, RDF 50%, RDF 50% + FYM 10 t ha^{-1}, FYM 10 t ha^{-1}, Control replicated thrice. Increase in the application of varying organic and inorganic nutrient sources exhibited a significant influence on all growth parameters significantly the highest growth characteristics *viz.*, Number of branches (25.10 plant^{-1}), leaf area index (10.93) and Days to maturity (99 days), yield attribute and yield included No. of siliqua (155.16 plant^{-1}), grain yield (18.00 q ha^{-1}) reported under recorded under RDF + FYM @ 10 t ha^{-1} combination and economics indicated the B:C ratio (2.80) recorded under RDF 100:60:40:35 NPKS kg ha^{-1} treatment.

Keywords: Organic nutrient, inorganic nutrient, FYM, grain yield, indian mustard

Introduction
Mustard (*Brassica campestris* L.), commonly referred to as Sarson, is a member of the Brassica genus and the Cruciferae family. This plant is believed to have originated in China before spreading to India. Initially, mustard served as a condiment, with the term "mustard" deriving from the Latin word "mustum". Mustard is a tender green plant and its leaves are often prepared as a vegetable dish known as "sarson ka saag". The oil extracted from mustard seeds is widely used for culinary purposes across the country.

Mustard seeds are employed as a spice in pickles and for flavoring curries and vegetables. Additionally, mustard oil is utilized in the production of ghee, hair oil, soaps, lubricating oils, medicines and in the tanning industry. The plant is notable for its synthesis of essential amino acids, such as cysteine, cystine and methionine, which contribute to the characteristic pungency of mustard oil. Furthermore, it plays a major role in the formation of glycosides or glucosinolates, which upon hydrolysis enhance the oil content of the seeds. The oil content in mustard seeds typically ranges from 37- 49%, while the protein content varies between 20% and 24%. (Bhowmik *et al*., 2014) [6].

China is the largest producer of mustard followed by Canada. The area, production and yield of mustard in the world was 36.59 million hectares (m ha), 72.37 million tones (mt) and 1980 kg ha^{-1}, respectively, (Anonymous, 2022) [2].

India is the third largest producer of rapeseed and mustard contributes to around 11% of the world total production. Mustard production has increased by 40% from 91.24 to 128.18 lakh tons during last 3 years. The productivity saw 11% increase from 1331 to 1447 kg ha^{-1}. The area under rapeseed and mustard enhanced by 29% from 68.56 lakh ha^{-1} in 2019-20 to 88.58 lakh ha^{-1} in 2022-23. Mustard is predominantly grown in the states *viz.* Rajasthan, Madhya Pradesh, Uttar

Pradesh, Haryana and Gujarat. (Anonymous, 2023) [3].

Chhattisgarh is a prominent producer of rapeseed and mustard in India. In the *Rabi* season of 2023, mustard was cultivated across an area of 36.22 thousand hectares resulting in a total annual production of 18.73 thousand tones and a productivity rate of 517 kg ha^{-1}. (Anonymous, 2021) [1]. The area under rapeseed-mustard in Bastar plateau is 4858 ha. (10.22%) and production is 2906 metric tons (10.76%) of total area and production in Chhattisgarh. (Sonvanee and Pathak, 2016) [17].

Organic manures play a significant role in crop production. They influence the physical properties of the soil, as the organic matter encourages the formation of soil aggregates, resulting in a friable texture. This condition enhances the movement of air and water within the soil and improves the absorption of rainfall. Farmyard manure (FYM) serves as the primary source of organic matter in our nation, a practice that has been utilized since ancient times. It comprises 0.5% N, 0.2% P and 0.5% K. The organic carbon within this organic matter provides energy for soil microorganisms and through the process of mineralization, it releases vital elements necessary for crop development. Besides directly supplying available plant nutrients, the application of FYM also facilitates the mobilization of nutrients that are otherwise unavailable within the soil system. (Cooke, 1967) [8].

Nitrogen serves as the most crucial nutrient influencing the growth of mustard crops, significantly enhancing both protein content and overall yield. The presence of nitrogen facilitates the effective utilization of phosphorus and potash. Additionally, it plays a vital role in promoting flowering, the formation of siliqua and increasing both the size of the siliqua and the yield. (Singh and Meena, 2004) [12, 16]. The Sulphur plays a crucial role in the synthesis of amino acids, proteins and oils, while also activating the enzymatic systems within plants. The application of Sulphur, when combined with appropriately balanced levels of other nutrients, has been shown to markedly enhance both oil and protein content in Brassica species. (Pasricha and Aulakh, 1991) [13].

Materials and Methods

An experiment was conducted during the *Rabi* season 2024-25 at the Instructional cum Research Farm, S.G. College of Agriculture and Research Station, (IGKV), Jagdalpur to Effect of organic and inorganic sources of nutrients on growth, yield and economics of Indian mustard (*Brassica campestris* L.). The experiment was laid out in Randomized Block Design with 8 treatments *viz*., RDF 100:60:40:35 NPKS kg ha^{-1}, RDF + FYM 10 t ha^{-1}, RDF 75%, RDF 75% + FYM 10 t ha^{-1}, RDF 50%, RDF 50% + FYM 10 t ha^{-1}, FYM 10 t ha^{-1} and Control plot replicated thrice.

Recommended dose of fertilizers (RDF) used was (NPKS -100-60-40-35 kg ha^{-1}) was applied in the form of Urea, SSP and Muriate of Potash respectively to respected plots. Half dose of Nitrogen and full dose of Phosphorus, Potash and Sulphur applied before sowing of mustard. Half dose of nitrogen split into two part 30 DAS and 50 DAS after sowing of mustard.

The soil of the experimental field was *Inceptisols* was low in available N and S, availability of P and K was medium. organic carbon was about low, pH with slightly acidic in reaction. EC was about normal in reaction. The variety DRMR 150-35 was used as test crop, seed were sown as per the treatment; experimental plots were prepared and the crop were sown in line row to row and plant to plant spacing 45 cm × 10 cm for mustard on 19th November 2024. Recommended agronomic practices were followed to raise the experimental crop. The data recorded were analyzed following standard statistical analysis of variance procedure as suggested by Gomez and Gomez (1984) [9].

Results and Discussion

Pre harvest observations

No. of branches plant^{-1}

Significant effects of organic and inorganic nutrient sources on the number of

branches plant^{-1} were observed highest at harvest. The related data are given in Table 1. The maximum number of branches (25.10 plant^{-1}) was obtained under RDF + FYM 10 t ha^{-1} treatment was at par to T_1 and T_4 treatment. However, the minimum number of branches (9.30 plant^{-1}) was recorded under control plot treatment. These results agree with the findings of Meena *et al.* (2021) [12], who noted that using integrated nutrient sources significantly increased the number of primary and secondary branches in mustard. Likewise, Kumar and Singh (2020) [10] reported that the combined use of FYM and RDF supports a steady nutrient supply and improves overall crop structure.

Leaf area index

The leaf area index of Indian mustard increased significantly highest at 60 DAS with the application of organic and inorganic nutrient sources, as presented in Table 1. The maximum leaf area index (10.93) was reported under RDF + FYM 10 t ha^{-1} treatment showed at par to RDF 75% + FYM 10 t ha^{-1} treatment. However, the minimum leaf area index (1.66) was listed under control plot treatment. These findings are consistent with the earlier work of Sharma *et al.* (2020) [15], who reported an increase in LAI in mustard under integrated nutrient management practices. Likewise, Rani and Singh (2018) [14, 16] observed a significant rise in LAI with the application of FYM in combination with recommended fertilizers.

Days to maturity

The maturity duration of Indian mustard was significantly affected by the application of organic and inorganic nutrient sources, as presented in Table 1. The minimum day to maturity (89 days) was observed under control plot treatment (T_8). While, the maximum day to maturity (99 days) was noticed under T_2 (RDF + FYM 10 t ha^{-1}). The results also corroborate with findings of Verma *et al.* (2020) [18], who reported earlier maturity in mustard with integrated nutrient management involving FYM and balanced fertilizers.

Post harvest observations

No. of siliqua plant^{-1}

Integrated nutrient management using both organic and inorganic sources significantly increased the number of siliqua plant^{-1}, as shown in Table 2. The maximum number of siliqua (155.16 plant^{-1}) was noted under RDF + FYM 10 t ha^{-1} treatment which was at par to T_1, T_4 and T_6 treatment. However, the minimum number of siliqua (80.66 plant^{-1}) was noticed under control plot treatment. These findings are consistent with those of Maurya *et al.* (2022) [11], who reported that the integration of organic and inorganic fertilizers significantly increased the number of siliquae plant^{-1}, along with other growth and yield attributes in mustard. Similarly, Bhalavi *et al.* (2023) [5] observed that the IPNS treatment (NPK + 5 t FYM) produced the highest number of siliquae (296 plant^{-1}), significantly surpassing the absolute control.

Grain yield (q ha-1)

A significant improvement in grain yield (q ha⁻¹) of Indian mustard was recorded with the application of integrated nutrient management, as shown in Table 2. The maximum grain yield (18.00 q ha-1) was observed under RDF + FYM 10 t ha-1 treatment which was at par to T_4 treatment. On the other hand, the minimum grain yield (4.90 q ha-1) was noted under control plot where no uses of any treatments. These findings align with the results reported by Awasthi *et al.* (2024) [4], who noted that the integrated application of RDF with FYM or vermicompost markedly increased mustard yield compared to the control.

Economics

B:C ratio

The higher B:C ratio recorded under integrated nutrient management, as shown in Table 2, reflects enhanced profitability resulting from more efficient utilization of nutrients and biomass. The maximum B:C ratio (2.80) of Indian mustard was observed under T_1 (RDF 100:60:40:35 NPKS kg ha-1) treatment followed by T_5 treatment. Whearas, minimum B:C ratio (0.06) was reported under T_7 treatment. These results are in line with the observations of Chavan *et al.* (2021) [7], who also reported that INM treatments enhanced profitability by increasing yield and improving resource-use efficiency.

Table 1: Effect of organic and inorganic sources of nutrients on no. of branches per plant, Leaf area index and Days to maturity of Indian mustard

Notation	Treatment	No. of branches plant-1	Leaf area index	Days to maturity
T_1	RDF (100:60:40:35 NPKS kg ha-1)	23.74	7.76	96
T_2	RDF + FYM 10 t ha-1	25.10	10.93	99
T_3	RDF 75%	18.57	5.69	94
T_4	RDF 75% + FYM 10 t ha-1	23.83	9.66	98
T_5	RDF 50%	17.23	4.88	94
T_6	RDF 50% + FYM 10 t ha-1	20.00	6.34	95
T_7	FYM 10 t ha-1	11.10	2.64	93
T_8	Control	9.30	1.66	89
SEm±		1.13	0.48	3.55
CD (P=0.05)		3.48	1.48	NS
CV (%)		10.58	13.57	6.47

Table 2: Effect of organic and inorganic sources of nutrients on number of siliqua per plant, Grain yield and Benefit: cost ratio of Indian mustard

Notation	Treatment	No. of siliqua plant-1	Grain yield (q ha-1)	Benefit: cost ratio
T_1	RDF (100:60:40:35 NPKS kg ha-1)	135.68	16.40	2.80
T_2	RDF + FYM 10 t ha-1	155.16	18.00	1.04
T_3	RDF 75%	120.00	11.63	1.95
T_4	RDF 75% + FYM 10 t ha-1	140.91	17.33	1.03
T_5	RDF 50%	116.60	11.10	2.04
T_6	RDF 50% + FYM 10 t ha-1	131.64	16.13	0.98
T_7	FYM 10 t ha-1	95.08	8.07	0.06
T_8	Control	80.66	4.90	0.52
SEm±		9.69	0.45	0.08
CD (P=0.05)		29.26	1.38	0.24
CV (%)		13.76	6.05	10.58

References

1. Anonymous. Agriculture statistics. Raipur: Commissioner Land Record, Government of Chhattisgarh; 2021.
2. Anonymous. World food and agriculture: Statistical yearbook. Rome: Food and Agriculture Organization; 2022.
3. Anonymous. ICAR-Directorate of Rapeseed-Mustard Research. Bharatpur (Rajasthan): ICAR; 2023.
4. Awasthi S, Singh R, Maurya DK, Pal RK, Yadav N. Integrated nutrient management on growth and yield of mustard (*Brassica juncea* L.) in central alluvial tract of Uttar Pradesh. International Journal of Research in Agronomy. 2024;6(7):795-799.
5. Bhalavi S, Chouhan R, Wanjari RH. Effect of integrated plant nutrient supply (IPNS) on growth and yield of Indian mustard (*Brassica juncea* L.) under Vertisol. International Journal of Plant and Soil Science. 2023;35(24):149-156.
6. Bhowmik B, Mitra B, Bhadra K. Diversity of insect pollinators and their effect on the crop yield of mustard (*Brassica juncea* L.). International Journal of Recent Scientific Research. 2014;5(6):1207-1213.
7. Chavan NR, Ghotmukale AK, Karpe PJ. Effect of different nutrient sources on growth, yield attributes and yield of mustard (*Brassica juncea* L.). The Pharma Innovation Journal. 2021;10(12):256-262.
8. Cooke GW. The control of soil fertility. London: Crosby Lockwood and Son Ltd.; 1967.
9. Gomez KA, Gomez AA. Statistical procedures for agricultural research. 2nd ed. New York: John Wiley & Sons Inc.; 1984.
10. Kumar R, Singh M. Effect of organic and inorganic sources of nutrients on growth and yield of Indian mustard (*Brassica juncea* L.). Indian Journal of Agronomy. 2020;65(1):83-88.
11. Maurya SK, Singh RN, Kumar S. Effect of integrated nutrient management on growth and yield attributes of mustard (*Brassica juncea* L.). International Journal of Plant and Soil Science. 2022;34(22):190-197.
12. Meena R, Singh PK, Naresh RK, Chandra MS, Maurya DK, Vedvrat, Gupta SP. Effect of integrated nutrient management modules on yield, yield attributes and profitability of Indian mustard (*Brassica juncea* L.) in western Uttar Pradesh. International Journal of Environment and Climate Change. 2021;11(12):324-330.
13. Pasricha NS, Aulakh MS. Twenty years of sulphur research and oilseed production in Punjab. Sulphur in Agriculture. 1991;15:13-23.
14. Rani R, Singh D. Impact of organic and inorganic nutrient sources on growth and productivity of mustard.

International Journal of Current Microbiology and Applied Sciences. 2018;7(6):1925-1932.
15. Sharma R, Meena RS, Yadav GS, Layek J. Effect of integrated nutrient management on growth and yield attributes of Indian mustard (*Brassica juncea* L.). Journal of Oilseed Brassica. 2020;11(1):45-50.
16. Singh A, Meena NL. Effect of nitrogen and sulphur on growth, yield attributes and seed yield of mustard (*Brassica juncea* L.) in eastern plains of Rajasthan. Indian Journal of Agronomy. 2004;49(3):186-188.
17. Sonvanee OP, Pathak H. An economic analysis of production and marketing in rapeseed-mustard crop in Bastar Plateau of Chhattisgarh, India. Plant Archives. 2016;16(1):37-44.
18. Verma R, Singh A, Sharma N. Effect of integrated nutrient management on growth, yield and phenology of Indian mustard (*Brassica juncea* L.). Journal of Oilseed Brassica. 2020;11(2):145-150.