



ISSN Print: 2618-060X
 ISSN Online: 2618-0618
 NAAS Rating (2026): 5.20
 IJRA 2026; 9(9): 1482-1484
www.agronomyjournals.com
 Received: 28-07-2026
 Accepted: 30-08-2026
 Published: 30-09-2026

OR Patne

PG Scholar, Department of Agronomy, College of Agriculture, Latur-413512 (Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India.)

VP Suryavanshi

Professor, Department of Agronomy, College of Agriculture, Latur-(Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India.)

MJ Patange

Assistant Professor, Department of Agronomy, College of Agriculture, Latur-413512 (Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India.)

LK Duveio

PG Scholar, Department of Agronomy, College of Agriculture, Latur-413512 (Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India.)

K Chandana

PG Scholar, Department of Agronomy, College of Agriculture, Latur-413512 (Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India.)

Corresponding Author: OR Patne

PG Scholar, Department of Agronomy, College of Agriculture, Latur-413512 (Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India.)

Effect of foliar application of fertilizers on growth and yield of sunflower (*Helianthus annuus* L.)

OR Patne¹, VP Suryavanshi², MJ Patange³, LK Duveio⁴, K Chandana⁵

DOI: <https://www.doi.org/10.33545/2618060X.2026.v9.i9t.6720>

ABSTRACT

A field experiment was conducted during kharif season, 2025 at the Experimental Farm, Department of Agronomy, College of Agriculture, Latur (Maharashtra), to study the effect of foliar application of fertilizers on growth and yield of sunflower (*Helianthus annuus* L.). The experiment was laid out in Randomized Block Design with eight treatments, replicated thrice. The treatments were T_1 - Control, T_2 - RDF, T_3 - RDF + FYM, T_4 - RDF + FYM + 19:19:19 @ 1% at 30 DAS, T_5 - RDF + FYM + Spraying of multi-micronutrients Grade-II at 30 DAS, T_6 - RDF + FYM + Boron 0.1% at ray floret stage, T_7 - RDF + FYM + foliar spray of 00:52:34 @ 1% at grain filling stage and T_8 - RDF + FYM + foliar spray of 13:00:45 @ 1% at grain filling stage. The soil of the experimental field was clayey in texture, slightly alkaline in reaction (pH 7.6), low in available nitrogen and phosphorus and very high in available potassium. The result revealed that the application of RDF + FYM + 19:19:19 @ 1% at 30 DAS (T_4) recorded significantly highest growth attributes and yield viz., plant height at harvest (206.15 cm), number of functional leaves at 60 DAS (25.76), leaf area at 60 DAS (61.38 dm² plant⁻¹), stem girth at 75 DAS (8.87 cm), head diameter at harvest (21.69 cm), total dry matter at harvest (133.62 g plant⁻¹) and seed yield (2520 kg ha⁻¹), which was statistically at par with the application of RDF + FYM + foliar application of 00:52:34 @ 1% at grain filling stage (T_7) and RDF + FYM + foliar application of boron @ 0.1% at ray floret stage (T_6) and found significantly superior over rest of the treatments.

Keywords: Sunflower, Foliar application, 19:19:19, 00:52:34, Boron, Growth, Yield

Introduction

Oilseeds are the second most important determinant of the agriculture economy after grains, they are cornerstone of human nutrition Industry and sustainable agriculture, making them a crucial subject for academic research. Sunflower (*Helianthus annuus* L.) is an important oilseed crop known for its wider adaptability, short duration, high yield potential and good quality edible oil. Sunflower seed contains about 40 to 50 per cent oil and the crop responds well to balanced nutrient management. The crop has a relatively high nutrient requirement because of its rapid growth and high biomass production. Adequate nutrient availability is particularly important during active vegetative growth, flowering, seed setting and seed development. Farmyard manure and inorganic fertilizers contribute differently to crop nutrition. Farmyard manure supplies essential nutrients and organic matter while improving soil physical and biological properties, whereas the recommended dose of fertilizer provides readily available nutrients to the crop. Their combined application ensures a balanced and sustained supply of nutrients, creating a favorable nutritional environment for crop growth. However, nutrient demand is not uniform throughout the crop growth period and supplementary nutrition through foliar application provides an opportunity to supply nutrients directly during critical stages. Foliar application of nutrients normally reduces the losses through absorption, leaching, fixation and other processes associated with soil application. Foliar application of nutrients promotes root absorption by stimulating root growth and enhancing the translocation of nutrients and assimilates from the leaves to the roots. It provides an additional opportunity to meet the nutrient requirement of sunflower during important stages of crop development. Application of balanced water-soluble fertilizers during the active growth stage can help in maintaining better nutritional status of the crop. Foliar fertilization is particularly useful when nutrients are required rapidly during active growth and reproductive development. Water-soluble fertilizers such as 19:19:19, 00:52:34, and 13:00:45 provide readily available nitrogen, phosphorus and potassium. Boron supports reproductive development, pollen viability, fertilization and seed setting. Keeping in view the importance of balanced and stage-specific nutrient supply, the present investigation was undertaken to study the effect of foliar application of fertilizers on growth and yield of sunflower and to work out the economics of different treatments.

Materials and Methods

The field experiment was conducted during *kharif* season, 2025 at the Experimental Farm, Department of Agronomy, College of Agriculture, Latur, Maharashtra. The experimental site is situated at an elevation of about 631 m above mean sea level and falls under the semi-arid region of Maharashtra. The soil was clayey in texture, black in colour with good drainage and fairly level topography. The initial soil analysis showed pH 7.6, electrical conductivity 0.29 dS m⁻¹, organic carbon 0.63 per cent, available nitrogen 110.9 kg ha⁻¹, available phosphorus 10.32 kg P₂O₅ ha⁻¹, available potassium 784 kg K₂O ha⁻¹, available zinc 0.54 ppm and available boron 0.14 ppm. The crop was sown by dibbling on 20 July 2025 using sunflower hybrid LSFH-171. The recommended dose of fertilizer was 90:45:45 kg N:P:K ha⁻¹. The experiment consisted of eight treatments replicated three times in a Randomized Block Design, resulting in 24 plots. The gross plot size was 5.40 m × 4.50 m and net plot size was 4.20 m × 3.90 m. Seed was sown at 60 cm × 30 cm spacing with a seed rate of 5 kg ha⁻¹. The treatments were: T₁- Control, T₂- RDF, T₃- RDF + FYM, T₄- RDF + FYM + 19:19:19 @ 1% at 30 DAS, T₅- RDF + FYM + Spraying of multi-micronutrients Grade-II at 30 DAS, T₆- RDF + FYM + Boron @ 0.1% at ray floret stage, T₇- RDF + FYM + foliar spray of 00:52:34 @ 1% at grain filling stage and T₈- RDF + FYM + foliar spray of 13:00:45 @ 1% at grain filling stage. Half of the nitrogen and the full dose of phosphorus and potassium were applied as basal, while the remaining half of nitrogen was applied at 30 DAS. Foliar sprays were imposed according to the respective treatments. Five representative plants from each net plot were selected and labelled for biometric observations. The experimental data were subjected to analysis of variance as described by Panse and Sukhatme (1967).

Results and Discussion

Growth attributes

The data presented in table 1 indicates that maximum plant height of sunflower was recorded with the foliar application of RDF + FYM + 19:19:19 @ 1% at 30 DAS (T₄), which was significantly superior

over all the treatments. Where as application of RDF + FYM + 19:19:19 @ 1% at 30 DAS (T₄) found to be better for producing higher number of functional leaves per plant and leaf area per plant which was at par with the application of RDF + FYM + Boron @ 0.1% at ray floret stage (T₆). The highest stem girth was also recorded with the application of RDF + FYM + 19:19:19 @ 1% at 30 DAS (T₄) which was at par with the application of RDF + FYM + foliar spray of 00:52:34 @ 1% at grain filling stage (T₇) and the application of RDF + FYM + Boron @ 0.1% at ray floret stage (T₆) and found significantly superior over rest of the treatments. Treatment control (T₁) recorded the lowest values for growth and yield attributing characters. The better performance under the application of RDF + FYM + 19:19:19 @ 1% at 30 DAS (T₄) was attributed to the balanced and readily available supply of N, P and K during the active vegetative phase. These nutrients promoted cell division and elongation, leaf initiation and expansion, chlorophyll formation and efficient nutrient assimilation, resulting in greater plant height, functional leaves, leaf area and stem girth. Enhanced leaf development improved canopy development and light interception, resulting in higher photosynthetic activity and greater accumulation of photosynthates. The increased vegetative biomass and maintenance of active foliage ensured a continuous supply of assimilates, thereby supporting its growth and development. The comparatively better performance of foliar spray of 00:52:34 @ 1% at grain filling stage (T₇) supplied readily available phosphorus and potassium during the reproductive phase, supporting energy metabolism, photosynthetic activity and translocation of assimilates towards the developing capitulum. Similarly, foliar application of RDF + FYM + Boron 0.1% at ray floret stage (T₆) was associated with the role of boron in cell division, cell wall formation and reproductive development, which supported leaf retention and capitulum development. These complementary effects resulted in better growth. These findings were in accordance with Gebremedhin *et al.* (2015) [1], Immanuel *et al.* (2019), Lotha *et al.* (2021) [2], Ravikumar *et al.* (2021) [3], Vadlamudi *et al.* (2022) [4] and Mallick *et al.* (2023) [5].

Table 1. Mean of important growth and yield attributes of sunflower as influenced by different treatments

Treatments	Plant height AH (cm)	No. of functional leaves plant ⁻¹ (60 DAS)	Leaf area plant ⁻¹ (60DAS) (dm ²)	Stem girth 75 DAS (cm)	Head diameter AH (cm)	Total dry matter plant ⁻¹ AH (g)	Seed yield (kg ha ⁻¹)
T ₁ - Control	140.33	17.79	33.36	7.00	13.02	97.92	1032
T ₂ - RDF	172.96	19.01	41.06	7.20	14.07	102.03	1568
T ₃ - RDF + FYM	178.53	19.12	50.13	7.57	14.52	110.62	1861
T ₄ - T ₃ + 19:19:19 @ 1% at 30 DAS	206.15	25.76	61.38	8.87	21.69	133.62	2520
T ₅ - T ₃ + multi-micronutrients Grade-II @ 30 DAS	181.47	22.21	54.38	7.80	16.26	113.43	2025
T ₆ - T ₃ + boron 0.1% at ray floret stage	181.44	23.64	58.03	8.20	19.41	118.69	2394
T ₇ - T ₃ + 00:52:34 @ 1% at grain filling	172.44	21.28	54.04	8.41	19.74	126.19	2451
T ₈ - T ₃ + 13:00:45 @ 1% at grain filling	171.56	21.01	51.25	7.72	14.95	111.78	2006
SE ±	7.68	0.93	2.18	0.33	0.79	5.24	108
CD @ 5%	23.28	2.81	6.60	1.00	2.38	15.88	328

*AH-at harvest *DAS- days after sowing

Yield attributes and yield

The data presented in table 1 indicates that the highest head diameter (21.69 cm), dry matter accumulation per plant (133.62 g) and seed yield (2520 kg ha⁻¹) was recorded with the application of RDF +

FYM + 19:19:19 @ 1% at 30 DAS (T₄) which was statistically at par with the application of RDF + FYM + foliar spray of 00:52:34 @ 1% at grain filling stage (T₇) and the application of RDF + FYM + Boron 0.1% at ray floret stage (T₆) and found statistically superior over rest

of the treatments. The lowest head diameter, dry matter accumulation per plant and seed yield was recorded under the control (T_1). The better performance under the application of RDF + FYM + 19:19:19 @ 1% at 30 DAS (T_4) was due to the balanced and timely supply of N, P and K during the critical crop growth period. The combined application of RDF, FYM and foliar 19:19:19 enhanced nutrient availability and utilization, thereby improving photosynthetic activity and assimilate production. The enhanced photosynthetic activity promoted greater dry matter accumulation and better head development. The greater availability of assimilates during the reproductive phase facilitated their efficient partitioning towards the developing reproductive structures, which enhanced seed production and ultimately resulted in higher seed yield. The comparable performance of RDF + FYM + 00:52:34 @ 1% at grain filling stage (T_7) was due to the timely supply of phosphorus and potassium during seed development, supporting assimilate translocation and seed filling. Similarly, the application of RDF + FYM + Boron 0.1% at ray floret stage (T_6) improved reproductive development and seed setting by promoting pollen germination, pollen tube growth and fertilization, thereby enhancing seed formation and contributing to higher seed yield. These findings were in accordance with Patil *et al.* (2006) [6], Jadhav *et al.* (2017) [7], Mallick *et al.* (2023) [5] and Vadlamudi *et al.* (2023) [8].

Conclusion

From above investigation it can be concluded that the application of RDF + FYM + Foliar spray of 19:19:19 @ 1% at 30 DAS (T_4) was found to be most effective treatment for getting higher growth attributes as well as yield of sunflower, which was closely followed by the application of RDF + FYM + foliar spray of 00:52:34 @ 1% at grain filling stage (T_7) and RDF + FYM + boron @ 0.1% at ray floret stage (T_6).

Acknowledgement

The authors are grateful to the Department of Agronomy, College of Agriculture, Latur, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, for providing the facilities and support required for conducting the field experiment.

References

- Gebremedhin T, Shanwad UK, Gebremedhin W, Rama A. Efficacy of foliar nutrition on vegetative and reproductive growth of sunflower (*Helianthus annuus* L.). Global Journal of Science Frontier Research: Agriculture and Veterinary. 2015;15(9):37–41.
- Lotha N, Dawson J. Effect of micronutrients on growth and yield of sunflower (*Helianthus annuus* L.) variety DRSH-1. The Pharma Innovation Journal. 2021;10(11):1023–1026.
- Ravikumar C, Karthikeyan A, Senthilvalavan P, Manivannan R. Effect of sulphur, zinc and boron on the growth and yield enhancement of sunflower (*Helianthus annuus* L.). Journal of Applied and Natural Science. 2021;13(1):295–300.
- Vadlamudi, *et al.* Effect of combined application of non-nano and nano fertilizers on the growth, yield and oil content of sunflower under semi-arid conditions. [Reference as listed in the synopsis. 2022.
- Mallick R, Kar S. Influence of foliar nutrients on growth, yield attributes and yield of spring sunflower in southern part of West Bengal. Journal of Soils and Crops. 2023;33(1):90–93.
- Patil SB, Vyakaranahal BS, Deshpande VK, Shekhargouda M. Effect of boron and zinc application on seed yield and quality of sunflower (*Helianthus annuus* L.) restorer line, RHA-857. Karnataka Journal of Agricultural Sciences. 2006;19(3):708–710.
- Jadhav SM, Takankhar VG, Raja D, Kumbhar CS. Influence of foliar nutrition on growth characters of black gram (*Vigna mungo* L.) under rainfed condition. Agriculture Update. 2017;12:2015–2020.
- Vadlamudi JS, Anitha S, Sawargaonkar GL, Kamdi PJ, Vijayan D. Response of sunflower (*Helianthus annuus* L.) to foliar application of nano fertilizers. The Pharma Innovation Journal. 2023;12(2):1477–1482.
- Immanuel RR, Saravanan D, Rao GS, Thiruppathi M. Zinc and boron micronutrients on yield and economics of sunflower grown on coastal regions of northern Tamil Nadu, India. Plant Archives. 2020;20(2):2070–2075.
- Panse VG, Sukhatme PV. Statistical methods for agricultural workers (2nd ed.). Indian Council of Agricultural Research. 1997.

How to cite this article: Patne O, Suryavanshi V, Patange M, Duveio L, Chandana K. Effect of foliar application of fertilizers on growth and yield of sunflower (*Helianthus annuus* L.). *International Journal of Research in Agronomy*. 2026;9(9):1482–1484. doi: <https://www.doi.org/10.33545/2618060X.2026.v9.i9t.6720>