

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(4): 748-750
www.biochemjournal.com
Received: 19-02-2026
Accepted: 23-03-2026

RP Patil

Associate Professor and
University Head, Department
of Plant Physiology,
UAS, Raichur, Karnataka,
India

Harish Menpadi

Assistant Professor,
Department of Plant
Physiology, COA, Hagari,
Karnataka, India

TC Suma

Associate Professor and Head,
Department of Plant
Physiology, UAS, Raichur,
Karnataka, India

Shamarao Kulkarni

Associate Professor,
Department of Agronomy,
COA, Bgudi, Karnataka, India

Influence of foliar spray of Terresol biostimulant on growth and development of tomato (*Solanum lycopersicum* L.)

RP Patil, Harish Menpadi, TC Suma and Shamarao Kulkarni

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i4Si.8188>

Abstract

A field experiment was conducted at the Experimental Farm, College of Agriculture, Budi, to study the influence of foliar spray of Terresol biostimulant on morphophysiological traits and yield of tomato (*Solanum lycopersicum* L.). The experiment was laid out in a randomized block design with 11 treatments and three replications. The treatments comprised different levels of recommended dose of fertilizers (RDF) in combination with Terresol foliar spray at varying concentrations, along with an absolute control. The results revealed that application of 100% RDF along with Terresol @ 4 mL L⁻¹ (T₄) recorded superior growth and physiological parameters, including higher plant height, leaf area, total dry matter and photosynthetic rate at 45 DAS. The same treatment also produced the highest yield (17.0 q ha⁻¹), followed by T₃ (100% RDF + Terresol @ 3 mL L⁻¹) and T₅ (75% RDF + Terresol @ 2 mL L⁻¹). The untreated control (T₁₁) recorded the lowest values for all the parameters studied. The improvement in growth, physiological traits and yield may be attributed to enhanced nutrient availability through RDF and stimulation of metabolic activities due to foliar application of Terresol. The results suggest that application of Terresol @ 4 mL L⁻¹ along with 100% RDF is effective in improving growth and yield of tomato, while comparable performance at reduced RDF levels indicates scope for optimizing fertilizer use.

Keywords: Terresol, tomato, foliar spray, morphophysiological traits, marketable yield

Introduction

Tomato (*Solanum lycopersicum* L.) is an important vegetable crop belonging to the family Solanaceae and is widely cultivated for its nutritional and economic importance. Globally, tomato is grown over an area of about 5 million hectares with a production of around 189-190 million tonnes. In India, it contributes significantly to vegetable production, with major growing states including Maharashtra, Karnataka and Andhra Pradesh. Tomato is highly sensitive to environmental factors, particularly water and nutrient management, which greatly influence its growth and yield. Proper irrigation and nutrient supply during critical stages such as flowering and fruit development are essential for achieving optimum productivity.

In recent years, biostimulants have gained considerable attention in sustainable agriculture due to their ability to enhance plant growth, nutrient uptake and stress tolerance (Calvo *et al.*, 2014; du Jardin, 2015; Ruzzi *et al.*, 2024) [2, 5, 9]. Biostimulants are known to improve physiological processes such as photosynthesis, enzyme activity and nutrient assimilation, leading to improved crop performance (Colla *et al.*, 2015; Garg *et al.*, 2024) [3, 6].

Terresol, a commercially available biostimulant, contains bioactive compounds such as amino acids, humic substances and micronutrients that stimulate metabolic activities in plants. Studies have shown that biostimulants can significantly enhance growth, yield and quality of tomato under different environmental conditions (Dasgan *et al.*, 2024) [4]. Furthermore, the combined application of biostimulants with fertilizers has been reported to improve nutrient use efficiency and yield under stress conditions (Benito *et al.*, 2025) [1]. However, information on the combined effect of different fertilizer levels and Terresol application on morphophysiological traits and yield of tomato under field conditions is limited. Hence, the present investigation was undertaken.

Corresponding Author:**RP Patil**

Associate Professor and
University Head, Department
of Plant Physiology,
UAS, Raichur, Karnataka,
India

Materials and Methods

A field experiment was conducted at the Experimental Farm, College of Agriculture, B'gudi, during the cropping season to study the influence of foliar application of Terresol biostimulant on growth, morphophysiological traits and yield of tomato (*Solanum lycopersicum* L.). The experimental site is located in the Northern Dry Zone of Karnataka, characterized by semi-arid climatic conditions.

The experiment was laid out in a Randomized Block Design (RBD) with 11 treatments and three replications. The treatments consisted of different levels of recommended dose of fertilizers (RDF) in combination with varying concentrations of Terresol biostimulant applied as foliar spray, viz., T₁ (100% RDF without Terresol), T₂ (100% RDF + Terresol @ 2 mL L⁻¹), T₃ (100% RDF + Terresol @ 3 mL L⁻¹), T₄ (100% RDF + Terresol @ 4 mL L⁻¹), T₅ (75% RDF + Terresol @ 2 mL L⁻¹), T₆ (75% RDF + Terresol @ 3 mL L⁻¹), T₇ (75% RDF + Terresol @ 4 mL L⁻¹), T₈ (50% RDF + Terresol @ 2 mL L⁻¹), T₉ (50% RDF + Terresol @ 3 mL L⁻¹), T₁₀ (50% RDF + Terresol @ 4 mL L⁻¹) and T₁₁ (absolute control: no fertilizer and no Terresol).

Tomato seedlings were raised in a nursery and transplanted to the main field at appropriate spacing of 75-90 cm × 45-60 cm. Recommended agronomic practices were followed uniformly for all treatments except for the imposed fertilizer and biostimulant treatments. The recommended dose of fertilizers (RDF) was applied as per the package of practices of the University of Agricultural Sciences, Raichur. Foliar application of Terresol biostimulant was carried out at three stages, namely at 3-5 leaf stage, 25 days after sowing (DAS) and 50 days after the first application, using a hand sprayer to ensure uniform coverage.

Observations on growth parameters such as plant height, number of branches and leaf area were recorded at different growth stages. Physiological parameters including photosynthetic rate were measured using standard procedures. Yield attributes such as number of flowers, fruit setting percentage and number of marketable fruits per plant were recorded at harvest. The data collected were subjected to statistical analysis following the analysis of variance (ANOVA) technique appropriate for Randomized Block Design as described by Panse and Sukhatme (1967). The

significance of treatment differences was tested using the critical difference (CD) at 5 percent level of significance.

Results and Discussion

The results of the present study revealed that significant variation among treatments with respect to growth, physiological parameters and yield of tomato.

Among the treatments, T₄ (100% RDF + Terresol @ 4 mL L⁻¹) recorded superior growth parameters such as plant height, leaf area and total dry matter, along with higher photosynthetic rate at 45 DAS. The enhancement in growth may be attributed to improved nutrient availability and stimulation of metabolic activities by the biostimulant. Biostimulants are known to enhance cell division, elongation and chlorophyll synthesis, thereby improving plant growth (Henderson *et al.*, 2025) [7]. The enhanced growth and physiological performance may be attributed to improved metabolic activity and nutrient use efficiency induced by biostimulants, which is in agreement with earlier findings (Colla *et al.*, 2015) [3].

The increased photosynthetic rate observed under Terresol application could be due to improved chlorophyll content and enzyme activity, leading to enhanced carbon assimilation. Similar findings were reported by Dasgan *et al.* (2024) [4], who observed improved physiological performance in tomato with biostimulant application.

Yield parameters were also significantly influenced by treatments, with T₄ recording the highest yield (17.0 q ha⁻¹). The improvement in yield may be attributed to better source-sink relationship, enhanced assimilate production and efficient translocation to developing fruits. The role of biostimulants in improving yield through enhanced physiological efficiency has been well documented (Ruzzi *et al.*, 2024) [9].

The untreated control recorded the lowest values for all parameters, indicating the importance of nutrient and biostimulant application in crop production. The results also suggest that partial reduction in fertilizer levels, when combined with biostimulant application, can maintain reasonable productivity, which is in agreement with earlier findings (Benito *et al.*, 2025) [1].

Table 1: Influence of foliar application of Terresol biostimulant on growth, physiological parameters and yield of tomato

Treatments	Plant height (cm)	Leaf area (dm ²)	TDM (g plant ⁻¹)	Photosynthetic rate (μmol CO ₂ m ⁻² s ⁻¹)	Yield (q ha ⁻¹)
T ₁	45.3	225.6	140	16	12.5
T ₂	46.2	236.4	155	20	13.0
T ₃	45.5	241.5	163	21	15.0
T ₄	48.6	244.3	170	26	17.0
T ₅	47.4	226.5	142	18	15.0
T ₆	51.6	228.6	148	19	13.0
T ₇	50.3	232.7	152	22	12.0
T ₈	42.4	210.8	135	15	12.5
T ₉	43.6	207.4	140	17	10.5
T ₁₀	44.4	200.3	145	21	10.0
T ₁₁	38.6	185.5	102	12	7.5
S. Em±	1.25	6.80	4.25	1.10	0.85
CD (P = 0.05)	3.75	20.40	12.75	3.30	2.55

References

- Benito P, Trigueros S, Celdrán M, Sánchez V, Coronado A, Bellón J, *et al.* The combined effect of a biostimulant and plant growth-promoting bacterium increases tomato yield under salt stress. *Chem Biol Technol Agric.* 2025;12:117-117.
- Calvo P, Nelson L, Kloepper JW. Agricultural uses of plant biostimulants. *Plant Soil.* 2014;383:3-41.
- Colla G, Nardi S, Cardarelli M, Ertani A, Lucini L, Canaguier R, *et al.* Protein hydrolysates as biostimulants in horticulture. *Sci Hortic.* 2015;196:28-38.

4. Dasgan HY, Aksu KS, Zikaria K, Gruda NS. Biostimulants enhance the nutritional quality and physiological performance of greenhouse tomatoes. *Plants*. 2024;13(18):2587-2587.
5. du Jardin P. Plant biostimulants: Definition, concept, main categories and regulation. *Sci Hortic*. 2015;196:3-14.
6. Garg S, Nain P, Kumar A, Joshi S, Punetha H, Sharma PK, *et al*. Next generation plant biostimulants and genome-based strategies for sustainable agriculture. *Front Microbiol*. 2024;15:1439561-1439561.
7. Henderson BCR, Sanderson JM, Fowles A. Foliar application of amino acids as plant biostimulants: A review. *Discov Agric*. 2025;3:69-69.
8. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. New Delhi: Indian Council of Agricultural Research; 1967. p. 1-381.
9. Ruzzi M, Colla G, Rouphael Y. Biostimulants in agriculture: Towards a sustainable future. *Front Plant Sci*. 2024;15:1427283-1427283.