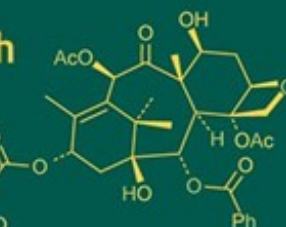


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
Indexing: Embase
IJABR 2026; SP-10(9): 2501-2504
www.biochemjournal.com
Received: 28-06-2026
Accepted: 02-08-2026
Published: 28-09-2026

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Studies on the effect of biofertilizer on the vegetative attributes, flower yield and biomass of daisy (*Glebionis coronaria* L.)

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DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i9Sae.10207>

ABSTRACT

An investigation entitled “Studies on the Effect of Biofertilizer on the Vegetative Attributes, Flower Yield and Biomass of Daisy (*Glebionis coronaria* L.)” was conducted during the Rabi season of 2025–26 at the Horticultural Research cum Instructional Farm, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). With 3 replications and 8 treatments viz., T_1 Control (Without biofertilizer only RDF), T_2 75 % RDF 112.5:60:60 kg/hectare, T_3 75% RDF 112.5:60:60 kg/hectare + Azotobacter +PSB (Root inoculation) (1:10), T_4 75% RDF 112.5:60:60 kg/hectare + Azotobacter + PSB (Foliar spray) (1:10), T_5 75% RDF 112.5:60:60 kg/hectare + Azotobacter +PSB (Foliar spray + Inoculation) (1:10), T_6 50% RDF 75:40:40 kg/hectare + Azotobacter +PSB (Root Inoculation) (1:10), T_7 50% RDF 75:40:40 kg/hectare + Azotobacter +PSB (Foliar Spray) (1:10), T_8 50% RDF 75:40:40 kg/hectare + Azotobacter +PSB (Foliar Spray + Inoculation) (1:10). Among the treatments, T_5 (75% RDF + Azotobacter + PSB through combined root inoculation and foliar spray) recorded superior performance for most vegetative, flowering, flower yield and biomass attributes. It recorded maximum plant height (125.12 cm), primary branches (22.45), secondary branches (54.55), fresh shoot weight (363.28 g), number of flowers per plant (116.59), fresh flower weight per plant (456.54 g), flower yield per plot (3.34 kg), dry shoot weight (123.33 g), fresh root weight (97.17 g) and dry root weight (33.17 g). In contrast, T_1 (100% RDF without biofertilizer) recorded the earliest 50% flowering (43.53 days) and maximum shelf life (2.02 days). Overall, the study demonstrated that integrating biofertilizers with reduced RDF, particularly through combined root inoculation and foliar application, enhanced vegetative growth, flowering, flower yield and biomass production in daisy. The application of 75% RDF along with Azotobacter and PSB through combined inoculation and foliar spray (T_5) proved to be the most effective treatment for improving the overall performance of daisy.

Keywords: Daisy, RDF, Azotobacter, PSB, Vegetative parameters, Flowering parameters, Biomass and Flowering yield

Introduction

Glebionis coronaria L. commonly known as crown daisy, annual chrysanthemum or garland chrysanthemum, is an attractive flowering plant appreciated for its profuse blooming and ornamental value, its flowers are also valued for landscaping and loose flower production. Flower production and quality depend greatly on balanced nutrient availability. In many soils of Central India, including Chhattisgarh, low organic matter and inadequate availability of major nutrients such as nitrogen, phosphorus and potassium may restrict plant growth and flowering. Inorganic fertilizers are essential for achieving higher productivity; however, their excessive and continuous use may adversely affect soil fertility, nutrient balance and environmental quality. Integrated nutrient management through the combined use of inorganic fertilizers and biofertilizers offers a promising approach for maintaining productivity while improving nutrient-use efficiency and soil health. Biofertilizers such as *Azotobacter* and PSB nutrient availability and promote plant growth, thereby reducing dependence on chemical fertilizers. Previous studies have reported improved growth, flowering and yield of annual chrysanthemum with integrated application of inorganic fertilizers and biofertilizers. Godse *et al.* (2006)^[1] reported better flowering and yield with 80% RDF, while Chandel *et al.* (2020)^[2] observed superior growth, flowering and yield with 75% RDF combined with *Azotobacter* and PSB. Biofertilizers have also been reported to improve flower quality and reduce the requirement for inorganic fertilizers Syamal *et al.* (2006)^[3] Prajapati *et al.* (2010)^[4].

Therefore, integrated nutrient management may provide a sustainable approach for improving the growth, flower yield and biomass of annual chrysanthemum. Hence, the present investigation entitled “Studies on the Effect of Biofertilizer on the Vegetative Attributes, Flower Yield and Biomass of Daisy (*Glebionis coronaria*

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L.)” was conducted at the Horticultural Instructional Farm, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.).

Methods and materials

The experiment was carried out at Horticultural Research cum Instructional Farm, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G) during Rabi season 2025-2026. The experiment was laid out in randomized block design with 3 replications and 8 treatment viz., T₁ Control (Without biofertilizer only RDF), T₂ 75 % RDF 112.5:60:60 kg/hectare, T₃ 75% RDF 112.5:60:60 kg/hectare + *Azotobacter* +PSB (Root inoculation) (1:10), T₄ 75% RDF 112.5:60:60 kg/hectare + *Azotobacter* + PSB (Foliar spray) (1:10), T₅ 75% RDF 112.5:60:60 kg/hectare + *Azotobacter* +PSB (Foliar spray + Inoculation) (1:10), T₆ 50% RDF 75:40:40 kg/hectare + *Azotobacter* +PSB (Root Inoculation) (1:10), T₇ 50% RDF 75:40:40 kg/hectare + *Azotobacter* +PSB (Foliar Spray) (1:10), T₈ 50% RDF 75:40:40 kg/hectare + *Azotobacter* +PSB (Foliar Spray + Inoculation) (1:10) were treated. Observation was recorded on vegetative parameters (Plant height (cm), Number of primary branches, Stem diameter (mm)), flowering parameters (Days taken to 50% flowering, Number of flowers per plant, Average yield per plot (kg/plot) Biomass observation (Fresh weight of root (g), Dry weight of root (g)). The recorded observations were subjected to analysis of variance appropriate for a Randomized Block Design (RBD). Treatment means were compared using the critical difference (CD) at the 5% level of significance. Standard error of mean (SEm±) and CD at 5% were calculated from comparison among treatments”

Vegetative parameters

plant height-The data on vegetative parameters as influenced by the application of RDF combined with biofertilizers at 30, 60 and 90 DAT (Table 1) Treatment T₅ (75% RDF + *Azotobacter* + PSB through foliar spray) recorded the maximum plant height at 30, 60 and 90 DAT (31.88, 89.44 and 125.12 cm, respectively), followed by T₃, whereas the minimum was recorded under T₇ (15.68, 69.33 and 98.28 cm, respectively). The superior performance of T₅ may be attributed to improved nutrient availability and utilization through the combined effect of RDF, *Azotobacter* and PSB, which promoted vegetative growth and stem elongation. Similar findings were reported by Panchal (2010) [5] in chrysanthemum, Pansuriya (2015) [6] in gladiolus and Patel (2017) [7, 8] in African marigold.

The number of primary branches- was significantly affected by application of RDF and biofertilizers at all stages of crop growth (Table 1) Treatment T₅ recorded the highest number of primary branches (6.80, 17.38 and 22.45 per plant at 30, 60 and 90 DAT, respectively), followed by T₃, while T₇ recorded the minimum. The increased branching under T₅ may be due to enhanced nutrient availability and efficient nutrient utilization resulting from the combined application of 75% RDF, *Azotobacter* and PSB, thereby stimulating shoot development. These findings are in agreement with Laishram (2010) [9] in China aster and Panchal (2010) [5] in chrysanthemum.

Stem diameter- increased progressively with crop age and was significantly influenced by the nutrient treatments (Table 1) Treatment T₅ produced the maximum stem diameter at 30, 60 and 90 DAT (9.95, 17.03 and 26.76 mm, respectively), followed by T₃, whereas T₇ recorded the minimum values (4.44, 7.92 and 13.88 mm, respectively). The improved stem development under T₅ may be associated with better nutrient availability and uptake, promoting cell division, cell enlargement and structural tissue development. Similar results were reported by Nandre (2005) [10] in China aster.

Flowering parameters

The number of flowers per plant:- was significantly influenced by the application of RDF and biofertilizers (Table 2) Treatment T₅ recorded the maximum number of flowers (116.59), followed by T₃ (105.89), whereas the minimum was observed under T₇ (89.38). The higher flower production under T₅ may be attributed to improved nu-

trient availability and utilization through the combined application of RDF, *Azotobacter* and PSB, which promoted better vegetative growth and flower initiation. Similar findings were reported by Chitra (2007) [1, 11] in China aster and Sunitha (2007) [8] in African marigold.

Days taken for 50% flowering:- Significant differences were observed among treatments for days to 50% flowering. T₁ recorded the earliest flowering (43.53 days), followed by T₅ (44.20 days), whereas T₇ required the maximum time (61.16 days) to reach 50% flowering. Earlier flowering under T₁ and T₅ indicates a favorable response to nutrient management, possibly due to improved plant growth and physiological activity that promoted early floral initiation. Similar results were reported by Pansuriya (2015) [6] in Gladiolus and Patel (2017) [7, 8] in African marigold.

Flower yield:- Flower yield per plot was significantly influenced by the different nutrient treatments (Table 2) The highest flower yield was recorded under T₅ (4.44 kg/plot), followed by T₃ (4.12 kg/plot), while the lowest yield was observed under T₇ (1.77 kg/plot) The superior yield under T₅ may be attributed to the combined effect of 75% RDF with *Azotobacter* and PSB, which enhanced nutrient availability and utilization, resulting in improved vegetative growth, flower production and ultimately higher flower yield. Thus, T₅ proved to be the most effective treatment for improving flowering and flower yield of daisy under the conditions of the present study.

Fresh and Dry weight of root:- significant variation in root biomass was observed among the nutrient treatments (Table 2) Treatment T₅ (75% RDF + *Azotobacter* + PSB through foliar spray and root inoculation) recorded the highest fresh root weight (97.17 g) and dry root weight (33.17 g), followed by T₃ with 86.68 and 27.71 g, respectively. In contrast, the minimum fresh (37.15 g) and dry (12.20 g) root weights were recorded under T₇. The superior root biomass under T₅ may be attributed to the combined effect of RDF, *Azotobacter* and PSB, which improved nutrient availability and uptake, thereby promoting root development and dry matter accumulation. Similar findings were reported by Kumari (2016) [12] in petunia and Sharma (2017) [13] in daisy.

Conclusion

The study revealed that integrated application of inorganic fertilizers and biofertilizers significantly influenced the growth, flowering, root development and flower yield of daisy (*Glebionis coronaria* L.). Among the treatments, T₅ (75% RDF + *Azotobacter* + PSB through foliar spray and root inoculation) consistently performed best, recording the highest plant height, primary branches, stem diameter, number of flowers per plant, fresh root weight (97.17 g), dry root weight (33.17 g) and flower yield (4.44 kg/plot). In contrast, T₇ recorded the lowest values for most growth, flowering and yield attributes. Although T₁ (100% RDF) resulted in the earliest 50% flowering (43.53 days), T₅ achieved flowering at 44.20 days while producing superior overall crop performance. Therefore, treatment T₅ 75% RDF combined with *Azotobacter* and PSB through foliar spray and root inoculation can be considered an effective nutrient-management treatment for enhancing growth, root biomass, flowering and yield of daisy under the conditions of the present study.

Acknowledgement

The author expresses her sincere gratitude to the department of Floriculture and Landscaping, College of Agriculture Indira Gandhi Krishi Vishwavidyalaya Raipur (C.G.), India for providing the necessary facilities, technical support, and academic environment to conduct this research work. The first author is deeply thankful to her major advisor Dr. Pooja Gupta (Assistant professor) and advisory committee members Dr. S.K. Tamrakar, Dr. Diptimayee Das and Dr. M. K. Pradhan for their valuable guidance, constant encouragement and constructive suggestions during the study and also heartfelt thanks to all farm staff of the horticulture nursery, her family and friends for constant support.

Notation	Treatment	Plant height(cm)			Number of primary branches			Stem diameter(mm)		
T ₁	100% RDF 150:80:80 kg/hectare	25.19	85.39	117.25	5.80	15.65	21.66	8.13	15.21	23.76
T ₂	75 % RDF 112.5:60:60 kg/hectare	23.09	78.44	109.14	5.30	12.85	18.56	7.28	13.67	21.69
T ₃	75% RDF 112.5:60:60 kg/hectare + <i>Azotobacter</i> +PSB (Root inoculation) (1:10)	26.88	87.44	120.12	6.32	15.88	22.17	8.38	15.42	24.58
T ₄	75% RDF 112.5:60:60 kg/hectare + <i>Azotobacter</i> + PSB (Foliar spray) (1:10)	23.33	81.76	112.88	4.79	10.26	16.85	6.44	12.03	20.18
T ₅	75% RDF 112.5:60:60 kg/hectare + <i>Azotobacter</i> +PSB (Foliar spray + Inoculation) (1:10)	31.88	89.44	125.14	6.80	17.38	22.45	9.95	17.03	26.76
T ₆	50% RDF 75:40:40 kg/hectare + <i>Azotobacter</i> +PSB (Root Inoculation) (1:10)	17.05	71.65	101.60	4.13	9.48	15.75	4.90	9.48	15.91
T ₇	50% RDF 75:40:40 kg/hectare + <i>Azotobacter</i> +PSB (Foliar Spray) (1:10)	15.68	69.33	98.28	3.92	8.89	15.37	4.44	7.92	13.88
T ₈	50% RDF 75:40:40 kg/hectare + <i>Azotobacter</i> +PSB (Foliar Spray+ Inoculation) (1:10)	17.99	74.49	106.18	4.60	9.76	15.97	5.56	10.14	17.81
SEm±		0.81	3.22	4.15	0.23	0.49	0.78	0.31	1.18	0.64
CD _{at 5%}		2.42	9.67	12.46	0.70	1.49	2.37	0.95	3.54	1.91

Table 1. Effect of Biofertilizers on Vegetative Parameters

Notation	Treatment	Days taken for 50% flowering	Number of flower per plant	Average yield per plot	Fresh weight of Roots (g)	Dry weight of Root (g)
T ₁	100% RDF 150:80:80 kg/hectare	43.53	103.32	2.90	74.86	27.61
T ₂	75 % RDF 112.5:60:60 kg/hectare	50.6	96.98	2.60	61.65	22.50
T ₃	75% RDF 112.5:60:60 kg/hectare + <i>Azotobacter</i> +PSB (Root inoculation) (1:10)	47.3	105.89	3.12	86.68	27.71
T ₄	75% RDF 112.5:60:60 kg/hectare + <i>Azotobacter</i> + PSB (Foliar spray) (1:10)	49.26	98.84	2.20	55.55	20.66
T ₅	75% RDF 112.5:60:60 kg/hectare + <i>Azotobacter</i> +PSB (Foliar spray + Inoculation) (1:10)	44.2	116.59	3.34	97.17	33.17
T ₆	50% RDF 75:40:40 kg/hectare + <i>Azotobacter</i> +PSB (Root Inoculation) (1:10)	56.47	91.96	1.90	42.39	14.19

(continued on next page)

Notation	Treatment	Days taken for 50% flowering	Number of flower per plant	Average yield per plot	Fresh weight of Roots (g)	Dry weight of Root (g)
T ₇	50% RDF 75:40:40 kg/hectare + <i>Azotobacter</i> +PSB (Foliar Spray) (1:10)	61.16	89.38	1.20	37.15	12.20
T ₈	50% RDF 75:40:40 kg/hectare + <i>Azotobacter</i> +PSB (Foliar Spray+ Inoculation) (1:10)	51.23	96.32	1.57	44.38	14.25
SEm±		1.48	4.54	0.27	2.75	0.92
CD _{at 5%}		4.55	13.63	0.81	8.35	2.80

Table 2. Effect of Biofertilizers on Flowering parameters and Biomass parameters

Mamata, K., Khandelwal, S. K., Choudhary, M. R., Kumawat, P. K., Sharma, G.	and Panwar, P. 2017. Effect of integrated nutrient management on growth, African marigold (<i>Tagetes erecta</i> Linn.). Chem. Sci. Rev. Lett., 6 (21): 54-	flowering and yield of African marigold (<i>Tagetes erecta</i> L.). Int. J. Curr.	Microbiol. App. Sci., 6 (8): 60-65.
Manoj Kumar, Khandelwal, S. K., Sunita, K., Saroj, R. and Choudhary, R. 2017.	Effect of NPK, biofertilizers and plant spacing on growth and yield of	African marigold (<i>Tagetes erecta</i> Linn.). Chem. Sci. Rev. Lett., 6 (21): 54-	58.

References

- Chitra R, Patil VS. Integrated nutrient management studied in growth, yield and flower quality in china aster. *Karnataka J. Agric. Sci.* 2007;20(3):689-690.
- Chandel A, Gupta YC, Bhatia S. Effect of integrated nutrient management on growth, flowering and yield parameters in annual chrysanthemum (*Glebionis coronaria* L. Spach). *Int. J. Curr. Microbiol. Appl Sci.* 2020;9(2):577-583.
- Dongardive SB, Golliwar VJ, Bhongle SA. Effect of organic manure and biofertilizers on corms and cormels yield of gladiolus *Plant Arch.* 2007;2:657-658.
- Dubey RK, Mishra RL, Singh SK, Manisha. Efficiency of bio and chemical fertilizers on certain floral qualities of gladiolus *Int. J. Ornament. Hort.* 2010;67:382-385.
- Department of Soil Science & Agricultural Chemistry. Effect of Liquid Formulation of *Azotobacter* and PSB Inoculation on Soil Biological Properties. *Int. J. Pure Appl. Biosci.* 2017;5(4):2178-2181.
- Gangadharan GD, Gopinath G. effect of organic and inorganic fertilizers on growth, flowering and quality of gladiolus cv. White prosperity. *Karnataka J. Agric. Sci.* 2000;11(3):401-405.
- Likhitha K, Kumar V, Gupta P, Venkatesh. Effect of soil and foliar applied bio inoculants on flowering behavior, yield and quality in African marigold grown under drip irrigation system. *Int. J. Adv. Biochem. Res.* 2024;8(12):607-610.
- Patel V, Patel, Desai, Desai, Patel. Integrated nutrient management in African marigold *Int. J. Chem. Stud.* 2017;5(4):1352-1354.
- Mathew S, Singh. Effect of PSB, *Azotobacter* and *Azospirillum* on growth of flowering of marigold *J. Ornament. Hort.* 2003;1(2):7-9.
- Mittal R, Patel HC, Nayee DD, Sitapara HH. Effect of integrated nutrient management on growth and yield of African marigold (*Tagetes erecta* L.) cv. 'Local' under middle Gujarat agro-climatic conditions. *Asian J. Hort.* 2010;5(2):347-349.
- Majumdar S, Lahiri D. Cost benefit and sensitivity analysis of cut flowers and comparison with floriculture crops. *Agricultural situation in India.* 2012;(68):609-624.
- Patel VS, Malam VR, Nurbhanej KH, Vihol AN, Chavada JR. Effect of organic manures and Biofertilizers on growth, flowering and flower yield of rose. *Int. J. Chem. Stud.* 2017;5(5):1924-1927.
- Qadir S. Influence of bioinoculants on growth, flowering and seed yield of French marigold (*Tagetes patula* L.). Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Kashmir. 2024.
- Pattanaik J, Mishra P, Tripathy L, Mandal P, Patra C. Integrated nutrient management affects growth and development of China aster. *J. Pharma. Innov.* 2023;12(9):1727-1730.
- Shaikh AJ, Yadlod SS, Kadari IA. Effect of liquid bio-inoculants and fertilizer levels on growth and yield of African marigold (*Tagetes erecta* L.) cv. Calcutta. *Int. J. Chem. Stud.* 2018;6(6):1968-1970.
- Singh U, Kumar V. Studies on Efficacy of integrated nutrient management on growth and yield of marigold (*Tagetes erecta* L.) cv. *Pusa Narangi* Gaiinda. *Adv. Life. Sci.* 2016;5(20):9252-9258.
- Satapathy S, Mohanty CR. Effect of N, P and bio-fertilizer on growth and flowering of annual chrysanthemum (*Chrysanthemum coronarium* L.). *J. Pharma. Innov.* 2022;11(12):1971-1975.
- Verma SK, Angadi SG, Patil VV, Mokashi AN, Mathad JC, Mummigatti UV. Growth, yield and quality of chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. Raja as influenced by integrated nutrient management. *J. Agric. Sci.* 2011;24(5):681-683.

How to cite this article: Dahariya S, Gupta P, Tamrakar S, Gendre N. Studies on the effect of biofertilizer on the vegetative attributes, flower yield and biomass of daisy (*Glebionis coronaria* L.). *International Journal of Advanced Biochemistry Research.* 2026;SP-10(9):2501-2504. doi: <https://www.doi.org/10.33545/26174693.2026.v10.i9Sae.10207>