



Bioefficacy of Leaf Extracts of *Tridax procumbens* L. and *Amaranthus viridis* L. Against *Fusarium* and *Alternaria* Fungal Pathogens

Swaranjali D. Jangle¹ and Suchita K. Rajurkar²

¹Research student at Deogiri College Chhatrapati Sambhajanagar,

²Professor at Deogiri College, Chhatrapati Sambhajanagar, Maharashtra

*Corresponding author email: bandgeswara@gmail.com¹ | suchita.rajurkar@gmail.com²

Manuscript details:

Received: 09.04.2026

Accepted: 09.05.2026

Published: 30.05.2026

Cite this article as:

Swaranjali D. Jangle and Suchita K. Rajurkar (2026) Bioefficacy of Leaf Extracts of *Tridax procumbens* L. and *Amaranthus viridis* L. Against *Fusarium* and *Alternaria* Fungal Pathogens, *Int. J. of Life Sciences*, 14 (1A): 103-106.

<https://doi.org/10.5281/zenodo.20653885>

Available online on <http://www.ijlsci.in>

ISSN: 2320-964X (Online)

ISSN: 2320-7817 (Print)



Open Access This article is licensed under a Creative Commons

Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

ABSTRACT

Plant pathogenic fungi such as *Fusarium* and *Alternaria* are responsible for significant crop losses worldwide, affecting both yield and quality. The increasing resistance of these pathogens to synthetic fungicides and the associated environmental concerns have prompted the search for eco-friendly and sustainable alternatives. In this context, medicinal plants have gained attention due to their rich phytochemical composition and antimicrobial properties. The present study aims to evaluate the antifungal potential and bioefficacy of leaf extracts of *Tridax procumbens* L. and *Amaranthus viridis* L. species against *Fusarium* and *Alternaria* under in vitro conditions. Leaf extracts were prepared using suitable solvents, and antifungal activity was assessed using standard techniques such as the poisoned food method or agar well diffusion method. The results indicated that both plant extracts exhibited significant inhibitory effects on the growth of the tested fungal pathogens, with varying degrees of efficacy depending on the concentration and type of extract. The antifungal activity is attributed to the presence of bioactive compounds such as flavonoids, alkaloids, tannins, and phenolic compounds known for their antimicrobial properties. The findings of this study highlight the potential use of *Tridax procumbens* L. and *Amaranthus viridis* L. leaf extracts as natural antifungal agents. These plant-based alternatives could serve as eco-friendly substitutes for chemical fungicides in sustainable agriculture. Further studies are recommended to isolate specific active compounds and evaluate their effectiveness under field conditions.

Keywords: Antifungal activity, *Tridax procumbens*, *Amaranthus*, *Fusarium*, *Alternaria*, plant extracts, phytochemicals

INTRODUCTION

Fungal diseases represent a major constraint to agricultural productivity, causing substantial economic losses globally. Among the various plant pathogens, species of *Fusarium* and *Alternaria* are particularly important due to their widespread distribution and ability to infect a wide range of crops. *Fusarium* species are known to cause diseases such as wilt, root rot, and damping-off, while *Alternaria* species are responsible for leaf spots, blights, and post-harvest spoilage (Agrios,

2005). These pathogens not only reduce crop yield but also deteriorate the quality of agricultural produce, posing a threat to food security.

Conventionally, synthetic fungicides have been extensively used to control fungal infections. However, the indiscriminate and prolonged use of these chemicals has led to several adverse effects, including environmental pollution, development of resistant fungal strains, and health hazards to humans and animals (Brent & Hollomon, 2007). Therefore, there is an urgent need to explore alternative, eco-friendly, and sustainable methods for managing plant diseases.

In recent years, plant-derived compounds have emerged as promising alternatives due to their biodegradability, low toxicity, and broad-spectrum antimicrobial activity. Medicinal plants are rich sources of secondary metabolites such as alkaloids, flavonoids, terpenoids, and phenolic compounds, which play a crucial role in plant defense mechanisms and exhibit significant antifungal properties (Cowan, 1999). The use of plant extracts in controlling phytopathogens aligns with the principles of sustainable agriculture and integrated pest management.

Tridax procumbens, commonly known as coat buttons, is a widely distributed medicinal plant belonging to the family Asteraceae. It has been traditionally used in folk medicine for wound healing, antimicrobial, and anti-inflammatory purposes. Previous studies have reported the presence of bioactive compounds in *Tridax procumbens* L. that contribute to its antimicrobial activity (Saxena & Albert, 2005). Similarly, species of *Amaranthus viridis* L. are known for their nutritional and medicinal value. They contain various phytochemicals with antimicrobial and antioxidant properties, making them potential candidates for plant-based disease management (Kumar et al., 2010).

Despite the documented medicinal properties of these plants, their antifungal potential against major plant pathogens such as *Fusarium* and *Alternaria* requires further investigation. Evaluating the bioefficacy of these plant extracts can provide valuable insights into their potential application as natural fungicides.

Therefore, the present study aims to assess the antifungal activity of leaf extracts of *Tridax procumbens* L. and *Amaranthus viridis* L. species

against *Fusarium* and *Alternaria*. The study focuses on determining the inhibitory effects of these extracts under controlled laboratory conditions and exploring their potential role in sustainable plant disease management.

MATERIAL AND METHOD

Study Area and Plant Material Collection

Fresh and healthy leaves of *Tridax procumbens* L. (Family: Asteraceae) and *Amaranthus viridis* L. (Family: Amaranthaceae) were collected from local areas of Chhatrapati Sambhajnagar, Maharashtra, India. The plant materials were taxonomically identified based on standard floristic literature.

Preparation of Plant Material

The collected leaves were washed thoroughly under running tap water followed by distilled water to remove dust and contaminants. The plant material was shade-dried at room temperature for 7–10 days until complete dehydration. The dried leaves were then ground into a fine powder using a mechanical grinder and stored in airtight containers for further use. Approximately 17.5 g of *Tridax procumbens* and 15.8 g of *Amaranthus viridis* powdered samples were used for extraction.

Soxhlet Extraction Method

The extraction of bioactive compounds was carried out using the Soxhlet extraction technique. The powdered plant material was placed in a thimble and loaded into the Soxhlet apparatus. Ethanol was used as the extraction solvent due to its efficiency in extracting phytochemicals.

The extraction process was carried out for approximately 24 hours under controlled temperature conditions. During each cycle, the solvent evaporated, condensed, and passed through the plant material, ensuring thorough extraction of soluble compounds. After completion, the extract was allowed to cool and transferred into sterile Petri dishes. The solvent was allowed to evaporate completely at room temperature to obtain a dry extract. The dried extract was scraped, powdered, and stored in airtight containers for further antifungal analysis.

Test Fungal Organisms

The antifungal activity was tested against the following phytopathogenic fungi:

- *Fusarium proliferatum*
- *Alternaria alternata*

These fungal cultures were maintained under laboratory conditions for experimental use.

Preparation of Extract Concentrations

Different concentrations of plant extracts (50 ppm, 100 ppm, and 150 ppm) were prepared using Dimethyl Sulfoxide (DMSO) as a solvent.

Antifungal Assay (Well Diffusion Method)

The antifungal activity was evaluated using the well diffusion method. Sterile agar plates were inoculated with fungal cultures. Wells were created in the agar medium, and different concentrations of plant extracts were introduced into the wells.

The plates were incubated at 35°C for 24 hours. After incubation, the diameter of the inhibition zone (in mm) around each well was measured using a zone reader. The results were recorded and analyzed.

RESULT AND DISCUSSION

The antifungal activity of ethanolic leaf extracts of *Tridax procumbens* L. and *Amaranthus viridis* L. was evaluated against *Fusarium proliferatum* and *Alternaria alternata*.

Activity Against- *Fusarium proliferatum*

The results demonstrated that both plant extracts exhibited antifungal activity against *Fusarium proliferatum*. The zone of inhibition increased with increasing concentration, indicating a concentration-dependent effect.

- *Tridax procumbens* showed inhibition zones of **20 mm, 25 mm, and 27 mm** at 50 ppm, 100 ppm, and 150 ppm, respectively.
- *Amaranthus viridis* showed inhibition zones of **13 mm, 14 mm, and 17 mm** at corresponding concentrations.

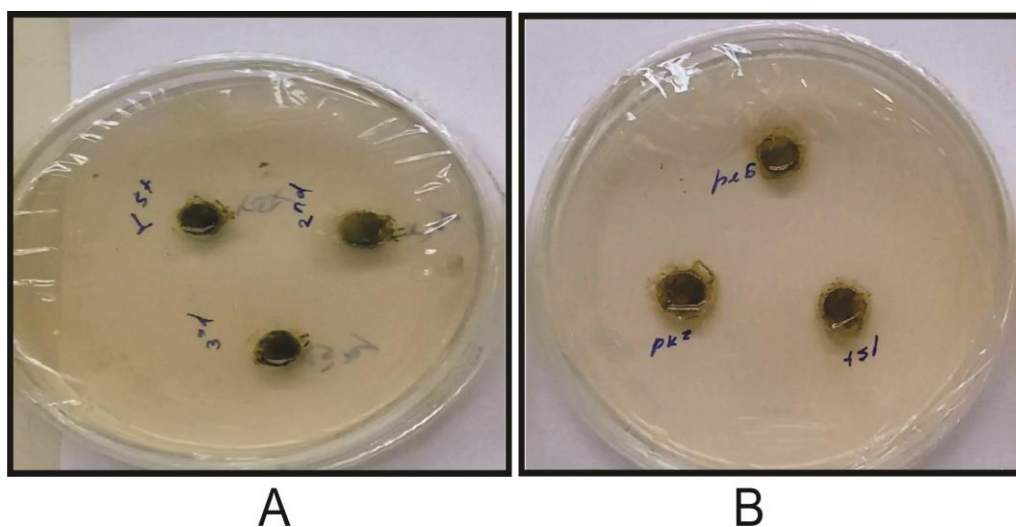


Fig.1 (A) Antifungal activity of *Tridax procumbens* L. against *Fusarium proliferatum*.
(B) Antifungal activity of *Amaranthus viridis* L. against *Fusarium proliferatum*

Activity Against- *Alternaria alternata*

No antifungal activity was observed against *Alternaria alternata* for either plant extract at all tested concentrations (50, 100, and 150 ppm). The absence of inhibition zones indicates resistance of the pathogen or ineffectiveness of the extracts under the tested conditions

DISCUSSION

The present study demonstrates that the ethanolic leaf extracts of *Tridax procumbens* L. and *Amaranthus*

viridis L. possess notable antifungal activity against *Fusarium proliferatum*, while no activity was observed against *Alternaria alternata*.

The higher inhibition observed in *Tridax procumbens* suggests that it contains more potent antifungal compounds compared to *Amaranthus viridis*. The increase in antifungal activity with concentration confirms a dose-dependent response, which is consistent with earlier studies on plant-derived antimicrobial agents (Fawzi et al., 2009).

The antifungal activity may be attributed to the presence of secondary metabolites such as flavonoids, alkaloids, tannins, and phenolic compounds. These compounds are known to disrupt fungal cell walls, interfere with metabolic pathways, and inhibit spore germination (Cowan, 1999).

The absence of activity against *Alternaria alternata* suggests that the phytochemicals present in these extracts may not be effective against all fungal species. This variation in sensitivity among fungal pathogens has been reported in previous studies (Rizvi et al., 2011).

The findings of this study are in agreement with earlier research highlighting the antimicrobial and pharmacological properties of *Tridax procumbens* (Manjamalai et al., 2012). The results also support the concept that medicinal plants can serve as a valuable source of natural antifungal agents.

CONCLUSION

The present study concludes that the ethanolic leaf extract of *Tridax procumbens* L. exhibits significant antifungal activity against *Fusarium proliferatum*, whereas *Amaranthus viridis* L. shows comparatively lower activity. No antifungal effect was observed against *Alternaria alternata*, indicating species-specific action of plant extracts. The antifungal activity was found to be concentration-dependent, suggesting that higher concentrations enhance efficacy. The results highlight the potential of *Tridax procumbens* as a promising natural antifungal agent. These findings support the use of plant-based extracts as eco-friendly, cost-effective, and sustainable alternatives to synthetic fungicides in agricultural disease management. Further research is recommended to isolate and characterize the active compounds and to evaluate their effectiveness under field conditions.

Acknowledgement

I sincerely thank the Govt. of Maharashtra's SARTHI Fellowship for its financial and academic support. I am grateful to Deogiri College for providing the necessary facilities to carry out this work. I also express my heartfelt thanks to my guide and the Department of Botany for their valuable guidance and support. Finally, I thank my family and friends for their encouragement.

Conflict of interest

The authors declare no competing interests.

Data Availability Statement: Not applicable.

Correspondence and requests for materials should be addressed to **Suchita K. Rajurkar**

Reprints and permissions information is available at <https://www.ijlsci.in/reprints>

REFERENCES

- Agrios GN (2005) Plant pathology (5th ed.). Elsevier Academic Press.
- Brent KJ, Hollomon DW (2007) Fungicide resistance in crop pathogens: How can it be managed? Fungicide Resistance Action Committee.
- Cowan MM (1999) Plant products as antimicrobial agents. Clinical Microbiology Reviews 12(4): 564–582.
- Kumar R, Sharma RJ, Bairwa K (2010) Pharmacological review on *Amaranthus viridis* L. species. International Journal of Pharmacy and Pharmaceutical Sciences 2(4): 10–14.
- Saxena VK, Albert S (2005) β -sitosterol-3-O- β -D-xylopyranoside from the flowers of *Tridax procumbens*. Journal of Chemical Sciences 117(3): 263–266.
- Fawzi EM, Khalil AA, Afifi AF (2009) Antifungal effect of some plant extracts on *Alternaria alternata* and *Fusarium proliferatum*. African Journal of Biotechnology 8: 2590–2597.
- Jindal A, Kumar P (2013) In vitro antifungal potential of *Tridax procumbens* L. against *Aspergillus* species. Asian Journal of Pharmaceutical and Clinical Research 6: 123–125.
- Manjamalai A, Valavil S, Grace V (2012) Evaluation of essential oil of *Tridax procumbens* L. for antimicrobial and anti-inflammatory activity. International Journal of Pharmacy and Pharmaceutical Sciences 4: 356–363.
- Ravikumar V, Shivashangari KS, Devaki T (2005) Hepatoprotective activity of *Tridax procumbens*. Journal of Ethnopharmacology 101: 55–60.
- Rizvi S, Zeeshan M, Khan S, Arif JM (2011) Evaluation of antibacterial potential in *Tridax procumbens*. Journal of Chemical and Pharmaceutical Research 3: 80–87.
- Salahdeen HM, Yemitan OK, Alada ARA (2004) Effects of aqueous leaf extract of *Tridax procumbens*. African Journal of Biomedical Research 7: 27–29.
- Talekar YP, Das B, Paul T, Apte KG, Parab PB (2012) Evaluation of wound healing potential of *Tridax procumbens*. Asian Journal of Pharmaceutical Research 5: 141–145.
- Tiwari U, Rastogi B, Singh P, Saraef DK, Vays SP (2004) Immunomodulatory effects of *Tridax procumbens*. Journal of Ethnopharmacology 92: 113–119.

© The Author(s) 2026

Publisher's Note

IJLSCI remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.