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Biodiversity of endophytic fungi in genus *Miliusa*

Ghugal Archana , Dr. Kejariwal Mona , Dr. Shende Mukund

Department of Botany, R. D & S.H. National College, Bandra, Mumbai-50.

INTRODUCTION & AIM

The genus Meliusa is renowned for its medicinal properties. It also hosts a diverse range of endophytic fungi, which play a vital role as producers of bioactive metabolites.Plants are widely utilized for their antibacterial, anticancer, anthelmintic, antiparasitic, and antidiabetic properties, demonstrating a broad spectrum of therapeutic potential.

The main objective of the current research was to study biodiversity of endophytic fungi from the stem, leaf, and bark of *Miliusa velutina var deviyarina*.

Medicinal plants and microbes have established complex evolutionary interactions. In this relationship, medicinal plants provide photosynthates and nutrients to endophytic fungi, which subsequently enhance secondary metabolism, synthesize bioactive compounds, promote growth, and increase resilience to environmental stressors.

The study systematically evaluates these fungi for their potential to stimulate plant growth, biosynthesize secondary metabolites, and produce extracellular enzymes.

Fungal colonies were cultivated on different media to assess their enzymatic activity. These endophytic fungi demonstrated significant potential as biofertilizers and exhibited antimicrobial activity against certain groups of microorganisms, including both gram-positive and gram-negative bacteria.

METHOD

- **Isolation of endophytic fungi from plant tissues.**

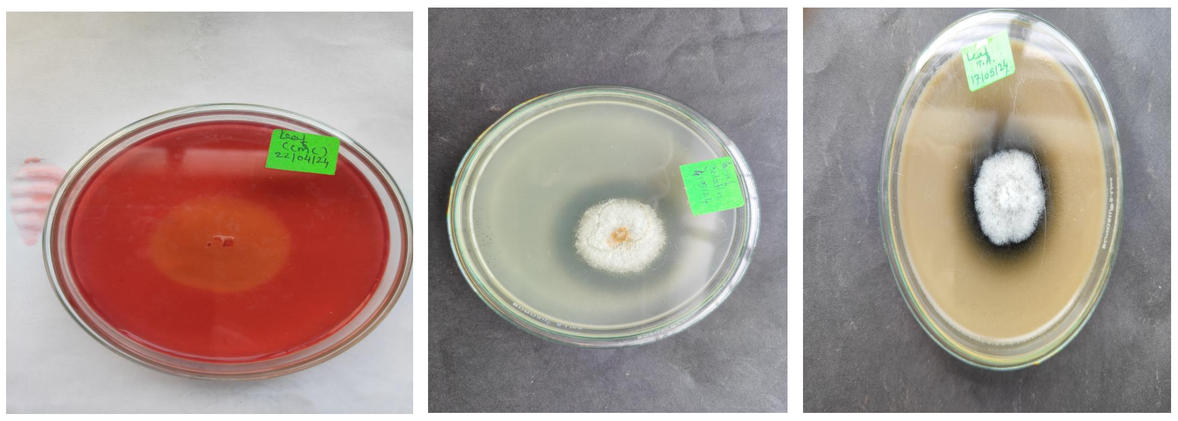
- **Preliminary screening for antimicrobial activity.**
  By agar well diffusion, agar plug, and perpendicular streak techniques.

- **Identification of fungal isolate.**
  Fungi were identified based on morphological characteristics as well as through molecular identification using the ITS-4 and ITS-5 primers.

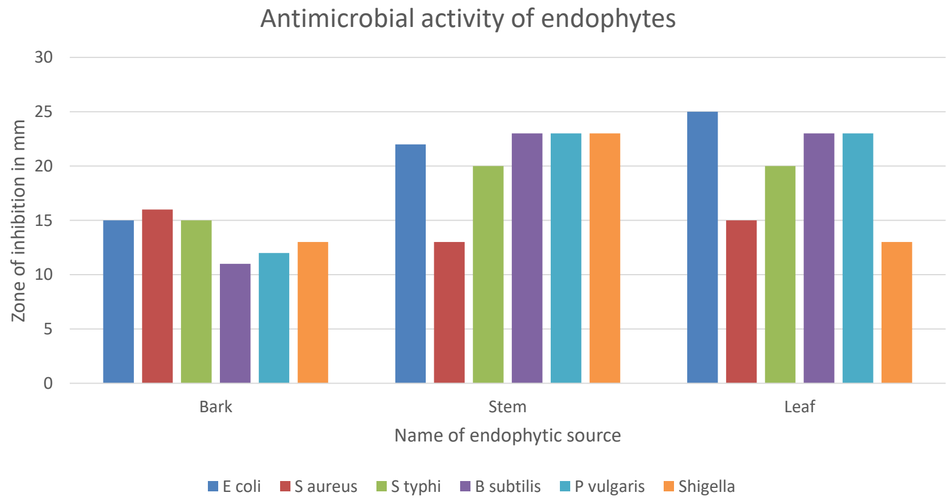
- **Identification of extracellular enzymes from endophytic fungi.**
  Selected dominant fungi were cultivated on different media to evaluate enzyme activity.
- **Evaluation of biofertilizer activity.**
  Fungal strains were inoculated as biofertilizers, and several growth parameters were monitored, including germination rate, root length, and shoot height.

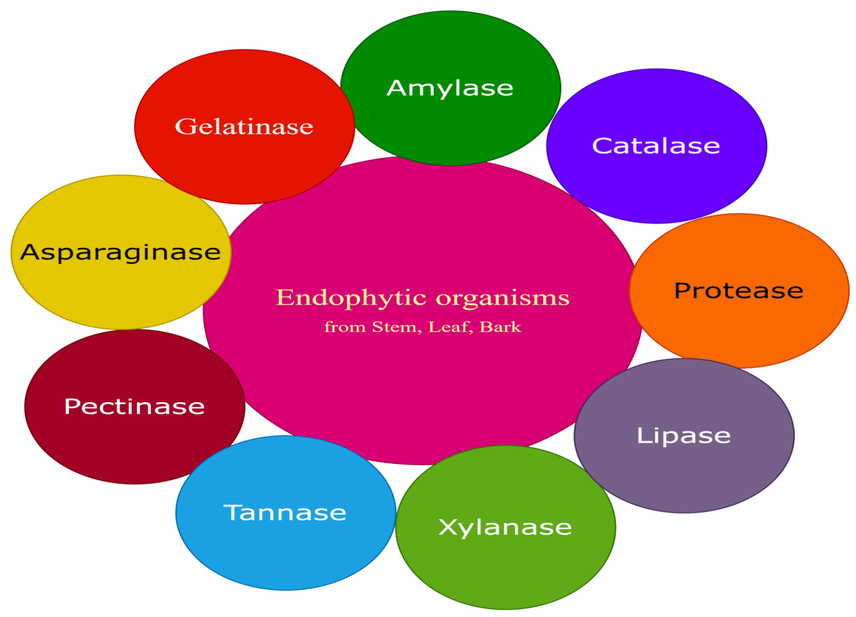
RESULTS & DISCUSSION

Antimicrobial activity



Enzymatic activity





- The endophytic fungi showed promising antibacterial activity against Gram-positive and Gram-negative microorganisms..
- Demonstrated the presence of endophytic fungi genus i.e. *Aspergillus niger* Tiegh., *Colletotrichum siamense* Prihast., *Diaporthe* sp. from *Miliusa velutina var deviyarina.*
- Identified the activity of several key extracellular enzymes secreted by these endophytic fungi..
- The plants exhibited significant biofertilizer effects, demonstrating enhanced growth.

CONCLUSION

The isolated endophytic fungi displayed significant antibacterial activity against Gram-positive and Gram-negative microorganisms, with MIC values ranging from 0.025 to 1.0 mg/ml. These fungi produced essential extracellular enzymes and demonstrated the ability to enhance nutrient uptake and promote plant vigor through fungal inoculation.This research underscores the value of endophytic fungi in agricultural and biotechnological applications, highlighting their role as biofertilizers and antimicrobial agents.

FUTURE WORK / REFERENCES

Investigating the mechanisms of action of the identified endophytic fungi could enhance the development of biofertilizers and biopesticides. Moreover, optimizing the production of their extracellular enzymes may lead to valuable commercial applications in agriculture, improving crop yield and sustainability.

References

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