

Endophytic Microorganisms from Apple and Pear Fruits as Biocontrol Agents Against *Penicillium expansum*, *Botrytis cinerea* and Other Postharvest Pathogens

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Introduction

- Endophytic fungi are a source of bioactive compounds with biocontrol potential.
- Postharvest pathogens such as *Botrytis cinerea* and *Penicillium expansum* cause major economic losses.
- Sustainable alternatives to synthetic fungicides are urgently needed.

Objective

To evaluate the antagonistic activity of fungal endophytes against major postharvest phytopathogens through direct confrontation and culture filtrate assays.

Experimental workflow

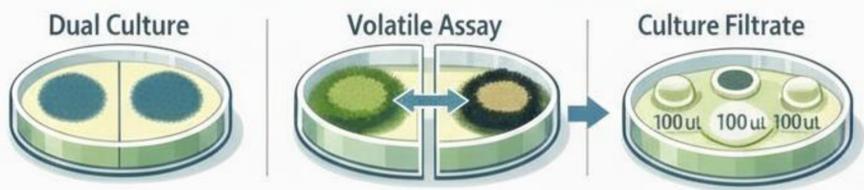
Endophyte collection



Target pathogens



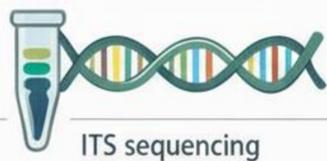
In Vitro Assays



Data Analysis



Molecular identification



Identified endophytic fungal genera

Fusarium sp.

Epicoccum sp.

Parahyphoxylon sp.

Aureobasidium sp.

Diatrypella sp.

Acknowledgments

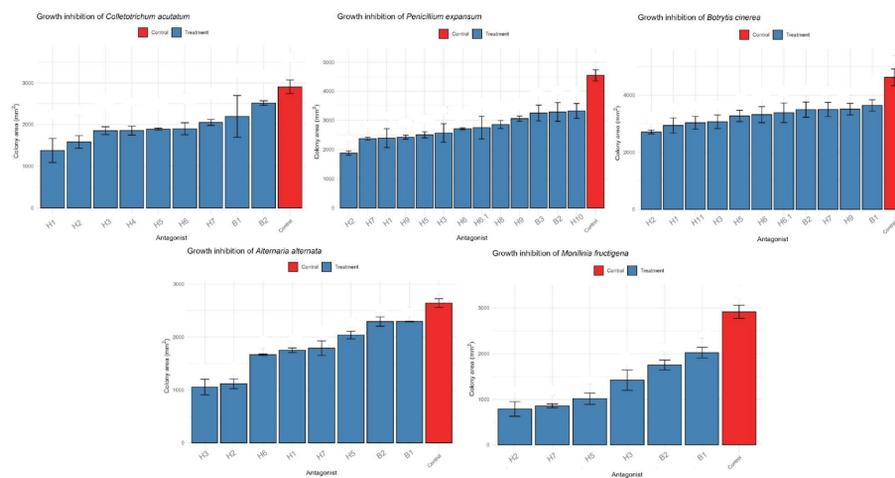
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Results

Direct confrontation assays

Several endophytic isolates significantly reduced mycelial growth across all tested pathogens

- The highest inhibition was observed against *Monilinia fructigena* (75–90%), followed by *Alternaria alternata* (60–65%) and *Penicillium expansum* (up to ~62%).
- Moderate but significant inhibition was recorded for *Colletotrichum acutatum* (45–60%) and *Botrytis cinerea* (32–35%).

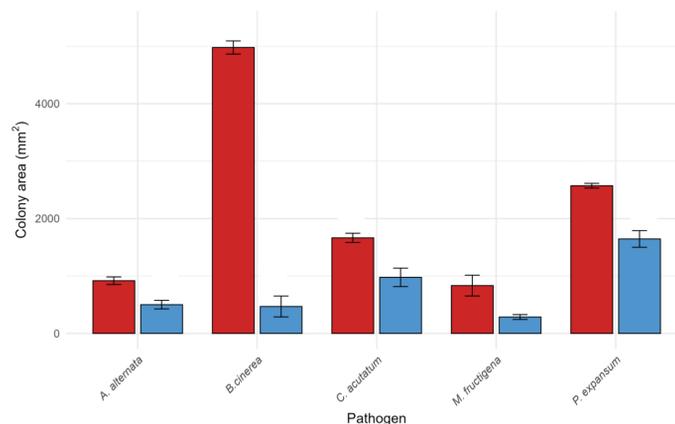
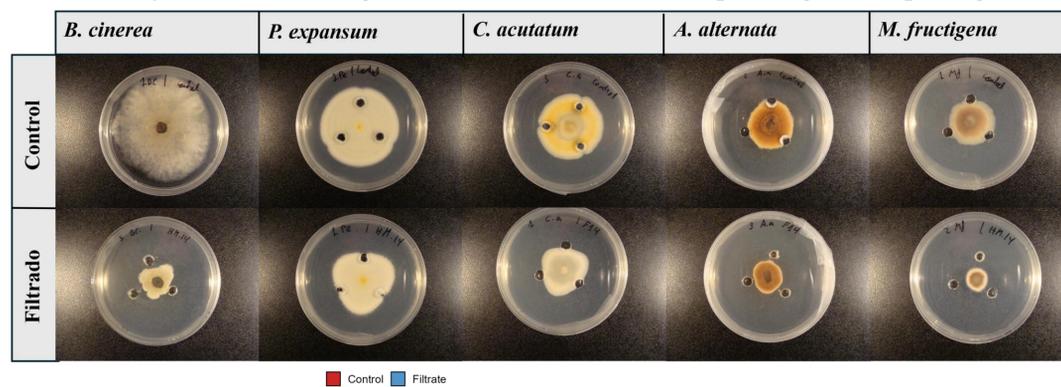


Colony area (mm²) of postharvest pathogens in dual-culture (direct confrontation) assays. Control in red, fungal treatment in blue.

Culture filtrate assays

Culture filtrates exhibited strong antifungal activity.

- Inhibition of *B. cinerea* reached up to 90% at 4 days.
- At 10 days, inhibition ranged from 35.7% to 65.8%, depending on the pathogen.



Colony area (mm²) of postharvest pathogens in the presence of fungal culture filtrates. Control in red and filtrate treatment in blue.

Conclusions

- Fruit-derived endophytes exhibited strong antagonistic activity against major postharvest pathogens.
- Both direct interaction and diffusible metabolites contributed to inhibition.
- Selected isolates show high potential for sustainable postharvest disease management.