

Antifungal activity of chitosan-metal organic frameworks against *Aspergillus niger* and *Candida Albicans*

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ABSTRACT

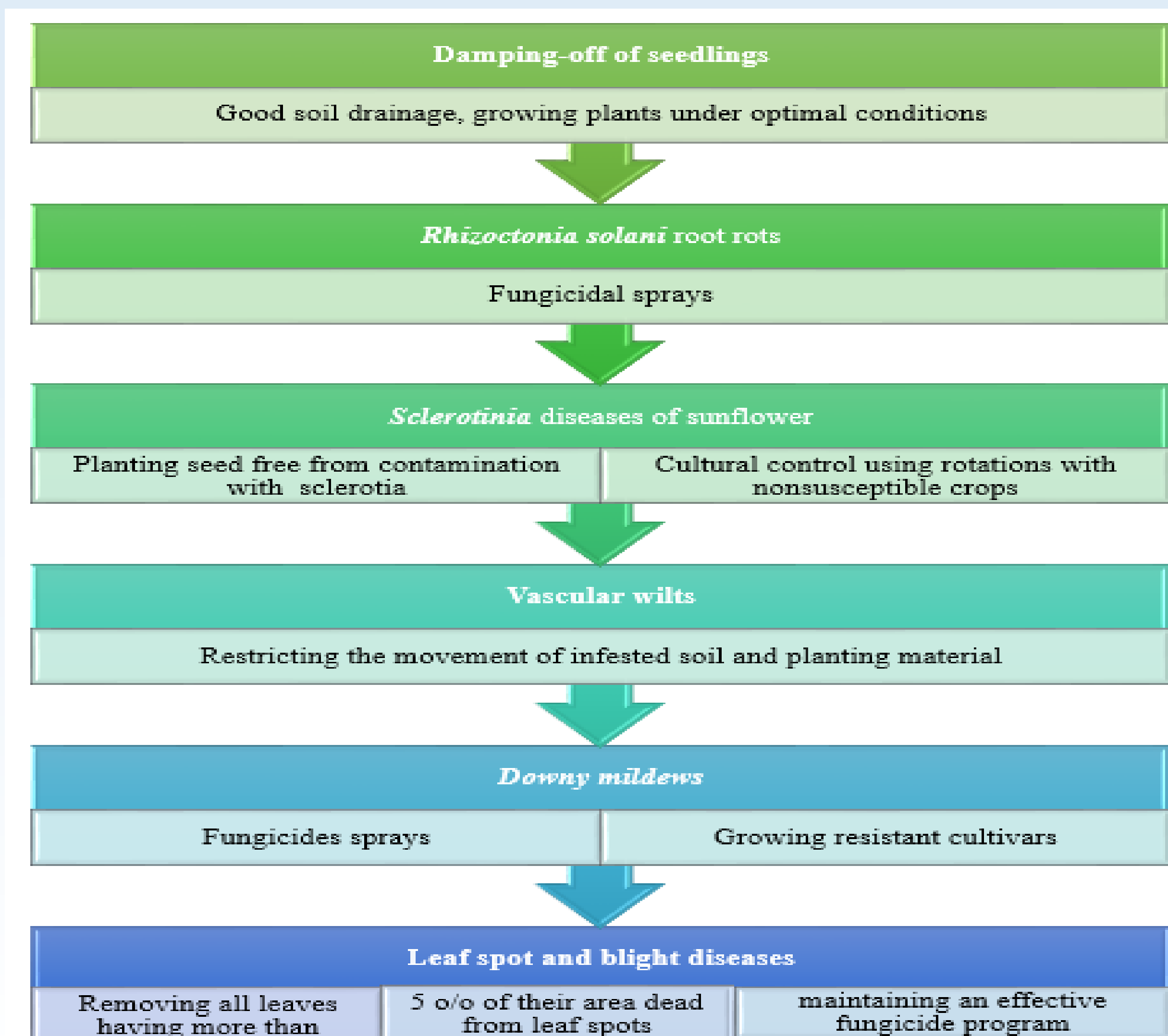
Antifungal resistance necessitate the need to develop new antifungals such as Cs-MOF having Zn²⁺ and Cu²⁺ particles. The Cs was isolated from *Hermetia illucens* (black soldier fly) followed by KIO₄ oxidation to introduce C=O in its structure for complexing Zn²⁺ and Cu²⁺. Metal salts were heated with terephthalic acid in dimethylformamide and OCs was loaded. Glycine (Gly) was finally anchored to unreacted C=O groups in Cs-MOF to obtain Cs-MOF-Gly. The functional groups present and morphologies were monitored using FTIR, XRF and SEM. The elemental composition indicated the removal of extractives, while C=O vibrational bands in IR spectra were proof of Cs oxidation. Cs-MOF-Gly showed good antifungal activity against *A.niger* and *C. albicans* with comparable results with Pirimiphos-methyl when used as standards.

INTRODUCTION FUNGAL CHALLENGES

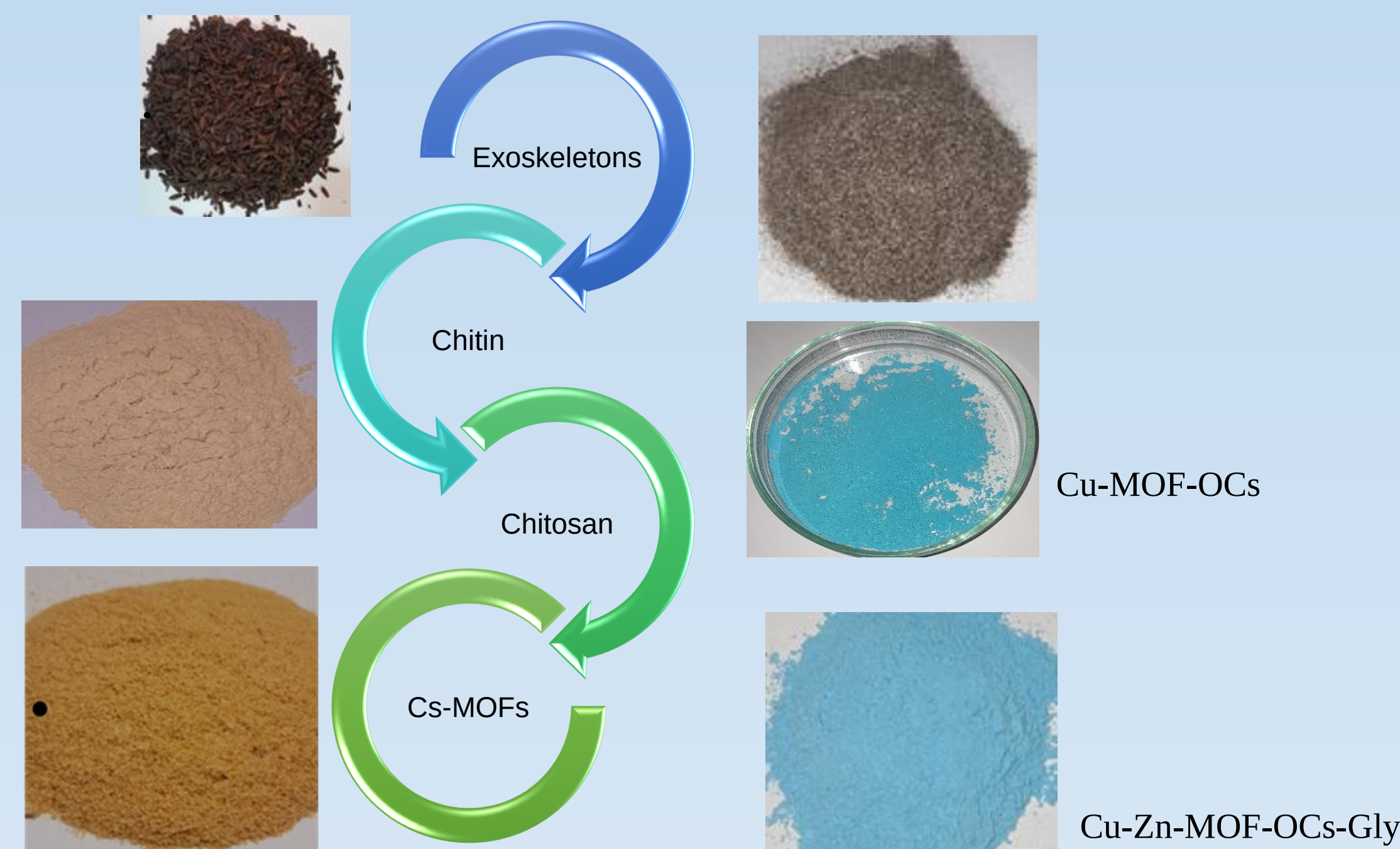


Rots produced by fungus

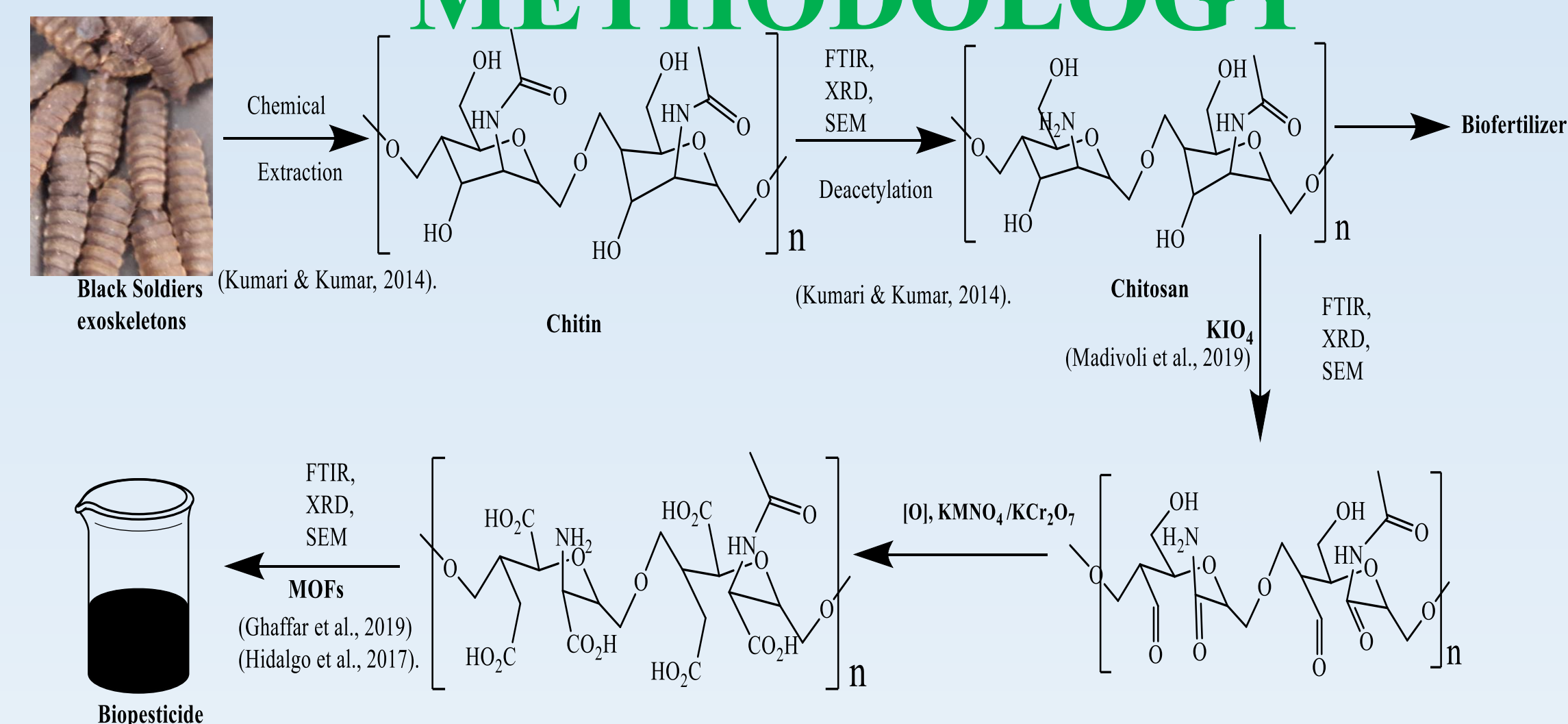
EXISTING FUNGAL DISEASE CONTROLS



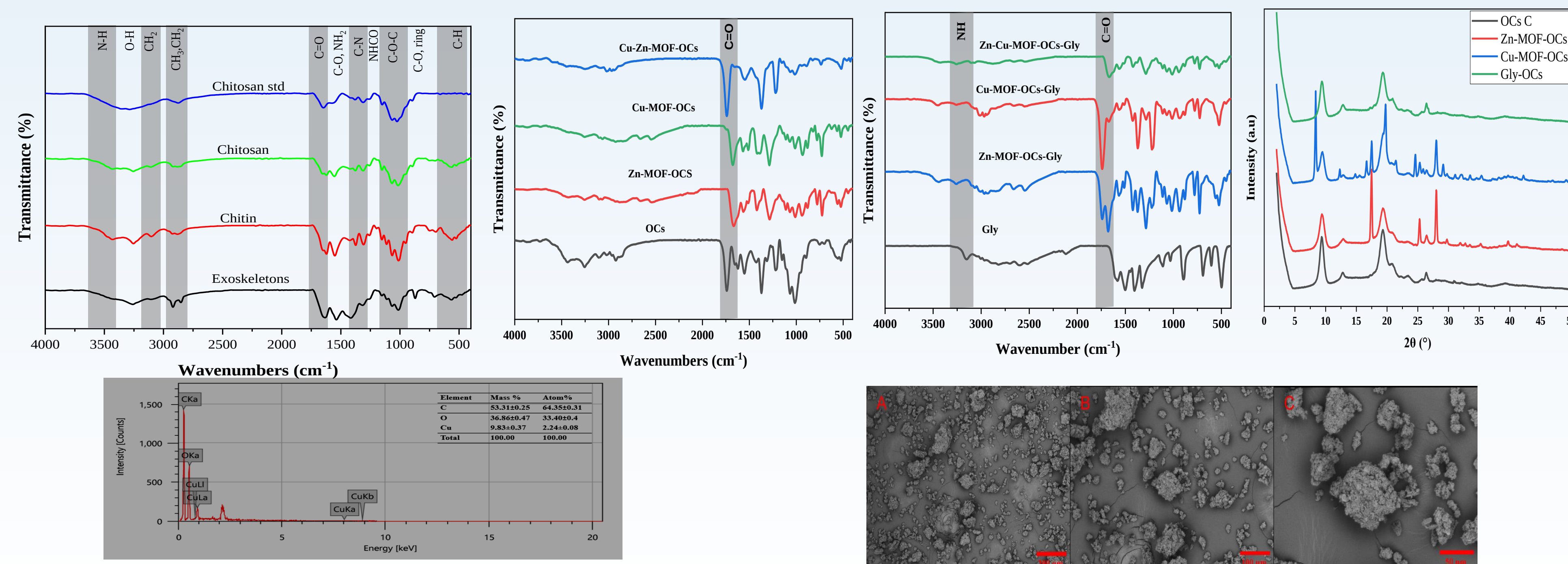
OUR APPROACH



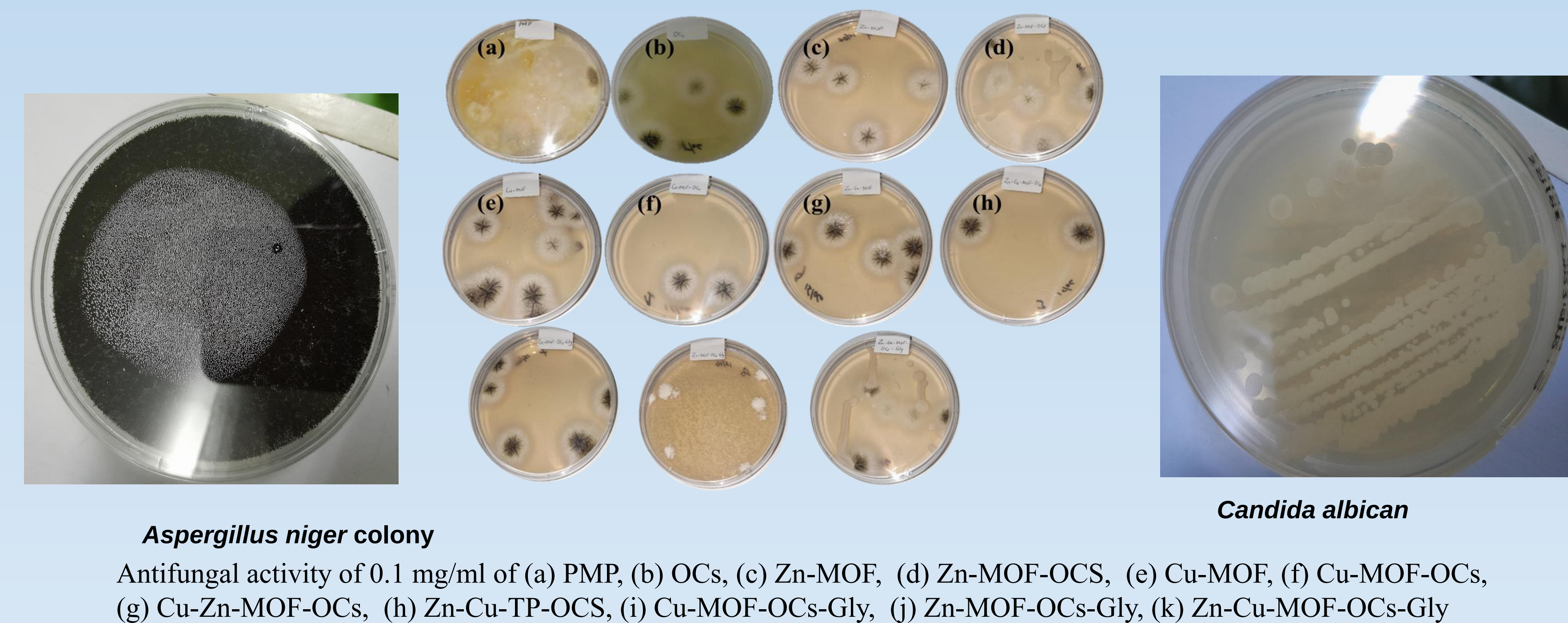
METHODOLOGY



CHARACTERIZATION



Results & Applications



Discussion

Glycine hastens the interaction with fungal membrane amino groups via covalent bonds. This interaction combined with the synergistic antimicrobial effect of Cs, Gly, and metal ions compromises the integrity of the fungal membrane as a protective layer. The Cs-MOF and Cs-MOF-Gly showed effective antifungal activity via a “pronounced killing effect” caused by the gradual release of the metal ions as the framework structure slowly biodegrades. This release resulted in the diffusion of metal ions through the fungal membrane hence the activity of Cs-MOF and Cs-MOF-Gly

Conclusion

The Cs-MOF therefore is promising biopesticide to control fungus during postharvest thereby preventing losses.

Improved
Soil
Quality



Fungal
control

Reference

Kumari, S., & Kumar, P. (2014). DOI:10.1016/j.mspro.2014.07.062
Luo et al., (2019), DOI: 10.1016/j.carbpol.2019.01.030
Madivoli et al., (2019). DOI: 10.1007/s42452-019-0769-9