



CHAETOMIUM GLOBOSUM: A HIDDEN FUNGAL FACTORY FOR PLANT PROTECTION

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Sustainable agriculture demands innovative approaches to manage plant diseases without over-reliance on chemical pesticides. Among the promising biological control agents, *Chaetomium globosum*, a common saprophytic fungus found in soil, decaying plant matter, and indoor environments, has gained significant attention. It is widely recognized for its ability to produce a diverse array of bioactive secondary metabolites, including chaetoglobosins, chaetoviridins, anthraquinones, and other polyketides, many of which exhibit strong antifungal and antibacterial properties (Chen, 2020; Dwibedi et al., 2023).

Unlike synthetic fungicides that often lead to resistance, environmental pollution, and residue concerns, *C. globosum* offers a multifaceted mode of action: it suppresses plant pathogens through antibiosis, competes for space and nutrients, and even induces systemic resistance in host plants. Laboratory and field studies have demonstrated its effectiveness against a wide range of pathogens, including *Sclerotinia*, *Verticillium*, *Fusarium*, and *Rhizoctonia* (Zhao et al., 2017; Zhang et al., 2021).

In addition to direct disease suppression, *C. globosum* supports sustainable plant health by reducing chemical input, protecting soil biodiversity, and enhancing resilience against stress. Its metabolites are biodegradable and eco-friendly, making the fungus an ideal candidate for integration into integrated pest management (IPM) programs.

Thus, *Chaetomium globosum* represents a natural, renewable, and environmentally responsible solution, aligning perfectly with the global shift toward sustainable crop production and food security. *Chaetomium globosum* — a soil-dwelling fungus that produces a treasure chest of bioactive metabolites with remarkable benefits for crop health.

C. globosum

Like many fungi, *C. globosum* makes two kinds of metabolites:

- **Primary metabolites:** essential for growth and survival.
- **Secondary metabolites:** unique compounds that act as weapons, shields, or messengers in nature.

Among these, scientists have discovered several powerful groups:

- **Chaetoglobosins** – alkaloids that attack the cell structure of harmful fungi (Chen, 2020).
- **Chaetoviridins** – colorful polyketides with strong antifungal action (Frisvad et al., 2018).
- **Anthraquinones** – compounds like emodin and chrysophanol, known for their antimicrobial and antioxidant activity (Dwibedi et al., 2023).

These natural molecules are the real reason *C. globosum* is gaining attention in sustainable crop management.

Metabolites for Plant health

Stopping Pathogens in Their Tracks

Chaetoviridin A has been shown to inhibit the growth and spore germination of notorious plant pathogens like *Verticillium dahliae* (Zhang et al., 2021).

1. Strengthening Plant Defenses

Culture extracts of *C. globosum* can “prime” a plant’s immune system, making it respond faster and stronger when disease strikes (Shores et al., 2010).

2. Supporting Eco-friendly Farming

By replacing or reducing chemical fungicides, *C. globosum* metabolites offer a biodegradable, eco-friendly alternative for pest management (Harman et al., 2004).

From Lab to Field: Practical Uses

Researchers have tested different ways of applying *C. globosum* and its metabolites:

- **Seed treatment:** Coating seeds with the fungus or its filtrate helps seedlings resist soilborne diseases.
- **Soil drench:** Applying culture broth around roots reduces rhizome rot and wilt in crops like turmeric and maize (Zhao et al., 2017).
- **Foliar sprays:** Crude extracts protect leaves from fungal blights, often working as well as synthetic fungicides in trials.

In some experiments, *C. globosum* formulations performed as effectively as carbendazim, a widely used fungicide — but without the chemical footprint (Zhao et al., 2017).

Benefits

- **Multi-talented defender:** Works against several plant pathogens.

- **Lower resistance risk:** Uses multiple compounds, so pathogens can’t adapt easily.

- **Supports sustainability:** Reduces reliance on chemical fungicides.

Conclusion

With climate change and rising concerns over chemical pesticide use, fungi like *C. globosum* could become key players in eco-friendly farming. Imagine a future where crop protection comes not from synthetic sprays, but from the natural chemistry of soil microbes.

Chaetomium globosum reminds us that the answers to tomorrow’s agricultural challenges might already be growing quietly beneath our feet.

References

- Chen, J. (2020). *Bioactivities and Future Perspectives of Chaetoglobosins*.
- Dwibedi, V. et al. (2023). Key insights into secondary metabolites from various fungi.
- Frisvad, J. C. et al. (2018). Secondary metabolite profiling in filamentous fungi.
- Harman, G. E. et al. (2004). *Trichoderma* species as plant symbionts (context for biocontrol fungi).
- Shores, M. et al. (2010). Induced systemic resistance by fungal biocontrol agents.
- Zhang, X. et al. (2021). Antifungal activity of chaetoviridin A from *C. globosum*.
- Zhao, S. S. et al. (2017). Biocontrol potential of *C. globosum* strain CDW7.