



## CHAETOMIUM GLOBOSUM: A HIDDEN FUNGAL FACTORY FOR PLANT PROTECTION

**Durgadevi D\*, Ranjith S, Vijaya Gowri E, Kalaivanan R and Prabakar K**

*Department of Plant Pathology, Vanavarayar Institute of Agriculture, Manakadavu, Pollachi- 642104.*

\*Corresponding Author Mail ID: [devi.agri18@gmail.com](mailto:devi.agri18@gmail.com)

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 (Shoresh 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*.
- Dwivedi, 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).
- Shoresh, 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.