

Fayoum University
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**The role of chitosan and cutinase gene in biocontrol efficiency of
Hirsutella minnesotensis against soybean cyst nematode**

By

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ABSTRACT

The soybean cyst nematode (SCN; *Heterodera glycines* Ichinohe) is a major yield-limiting factor in soybean-growing regions and accounts for extensive economic losses to farmers worldwide. Chemical nematicides have been conventionally used for the management of plant parasitic nematodes, but they are being reappraised due to environmental hazards and food safety and high cost. Therefore, there is an urgent need to develop alternative management strategies such as methods of biological control that depend on the antagonistic interactions between nematodes and other microorganisms in the soil ecosystem. *Hirsutella minnesotensis* is a promising candidate and an efficient biocontrol agent of *H. glycines*. This fungus parasitizes juveniles of SCN using its adhesive conidia that penetrate and eventually kill the nematode under cooler, drier and heavier soils.

The application of biocontrol agents such as nematophagous fungi in combination with organic amendments (e.g. chitin or chitosan) for soil suppression of nematodes have gained much significance in recent years. However, an understanding of the impact of combined application on rhizobacterial and fungal community for disease suppression is still not demonstrated.

Nematophagous fungi have been demonstrated to produce extracellular enzymes that could be involved in their parasitism. Those enzymes are considered as potential virulence factors involved in either penetration of cuticle or digestion of the host during the infection process. Accordingly, identify effective functional roles of enzymes in fungal parasitism by the molecular mechanisms is important. Cutinase is serine esterase belongs to class α/β hydrolase superfamily, which is considered to be involved in the fungal biocontrol agents against plant diseases. However, the function of cutinase in nematophagous fungi against nematode remains unknown.

The general goals of the present study wereto investigate

1. The effect the combined application of *H. minnesotensis* with chitosan on the rhizosphere microbiota for disease suppression of soybean cyst nematode.
2. Identification of the functional role of cutinase gene and its impact on biocontrol efficiency of *H. minnesotensis* against soybean cyst nematode.