

Entomopathogenic Fungi: A Biocontrol Agent

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SUMMARY

There are millions of insects belonging to different orders which act as crop pest and cause serious losses in terms of both quantity and quality of crop. Biological control, particularly by entomopathogenic fungi, *Beauveria*, *Metarhizium* and *Verticillium* is important for reducing the population density of pests in integrated pest management (IPM) programs. These insect pathogenic fungi kill the insect host by obliteration of tissues and also by the toxin produced by fungi.

INTRODUCTION

Insects, constituting the largest class in animal kingdom and whole living world, are the friend and foes of human being. But unfortunately, the role of insects as harmful organism is much wider than the beneficial. A group of fungi that kill an insect by attacking and infecting its insect host is called as entomopathogenic fungi. The entomopathogenic fungi particularly *Beauveria bassiana* (Balsamo) villein, *Metarhizium anisopliae* (Metch) Sorok, *Lecanicillium lecanii* Zimmeman and *Nomuraea rileyi* (Farlow) Samson have been found to be promising in the control of several agriculturally important insects pests (Lingappa *et al.*, 2005). Entomogenous fungi are potentially the most versatile biological control agents, due to their wide host range that often results in natural epizootics. An attractive feature of these fungi is that infectivity is by contact and the action is through penetration (Nadeau *et al.*, 1996).

Entomopathogenic fungi is identified as a promising biocontrol agent in the regulation of insect pest population without harming the non-target pest. When spores of the fungus come into contact with the body of an insect host, they germinate, enter the body, and grow inside, eventually killing the insect. Approximately 750 species of fungi, two species such as *Beauveria bassiana* and *Metarhizium anisopliae* are mostly used for controlling harmful insects and as of 2007 a total of 58 biological preparations were produced by using fungus *Beauveria bassiana* and are being broadly used for controlling harmful insects in rangelands, forests, crop fields and greenhouses (Marcos. R. de Faria 2007).

Mode of Action

The fungus generally infects its host through the host integument. It secret toxin called beauverin. Germ tubes from conidia on the surface of the insect penetrate the cuticle. After crossing the integument, the fungus sporulate within the hemocoel. Histopathological studies indicate that toxins released by the fungus kill the host. After host death, mycelia grow through all tissues. The fungus grows outside the cadaver and develops conidiophores under conducive environmental conditions (Samson *et al.*, 1988).

Toxin Produced

Entomopathogenic fungi produced various type of toxin that affect target insect. “Beauvericin”, Beauverin and insecticidal metabolite “Destruxin” are some examples of toxin produced by fungus.

Entomopathogenic fungi along with their target pest

Entomopathogenic fungi	Target pest
<i>Beauveria bassiana</i>	Cotton bollworm, coffee berry borer (Coleoptera, Lepidoptera and Hemiptera)
<i>Metarhizium anisopliae</i>	Sugar pyrilla, Rhinoceros beetle (Coleoptera, Lepidoptera, Hemiptera and Diptera)
<i>Verticillium lacanii</i>	Whiteflies, aphid
<i>Paecilomyces fumosoroeus</i>	Lepidoptera, Thysanoptera

<i>Nomouraia releyi</i>	<i>Helicoverpa armigera, Spodoptera litura</i>
<i>Hirsutella thompsoni</i>	Phytophagous mites

Merits

- Ecofriendly and no harmful effect on the environment
- Economical and safe to use
- They are target specific
- No residual toxicity on ecosystem

Demerits

- Slow in action
- Affected by ultraviolet radiation, heat
- Less shelf life
- They are effective against selective group of insect pest

CONCLUSIONS

This article describes entomopathogenic fungi which act as a parasite of different insect and are most effective biocontrol agent against target pest. These fungi are producer of toxins which act on host metabolism.

REFERENCES

- Lingappa, S., Saxena, H. and Devi Vimla, P.S. (2005). Role of biocontrol agents in management of *Helicoverpa armigera* (Huber). In: Recent advances in *Helicoverpa armigera* management. Ind. Soc. Pulses. Res. Development, IIPR, Kanpur: 159-184.
- Marcos, R. F. and Wraight, P. S. (2007). Mycoinsecticides and mycoacaricides a comprehensive list with worldwide coverage and international classification of formulation type. Sci. Dir. Biol. Control. 43:237-256.
- Nadeau, M. P., Dunphy, G. B. and Boisvert, J. L. (1996). Development of *Erynia conica* on the cuticle of the adult black flies *Simulium rostratum* and *Simulium decorum*. J. Invertebrates Pathol. 68:50-58.
- Samson, R. A., Evans, H. C. and Latge, J. P. (1988). Atlas of Entomopathogenic fungi, Spring- Verlag, Berlin:172.