

A CRITICAL REVIEW ON THE NATURAL OCCURRENCE OF ENTOMOPATHOGENIC FUNGI IN AGRICULTURAL ECOSYSTEM

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INTRODUCTION

Entomopathogenic fungi mostly belong to deuteromycetes and entomophthorales. Fungi from about 90 genera are pathogenic to insects, which includes more than 700 sps. However, only 20 fungal species have been remarkably studied for their use against insect pests in Agriculture. Most of them induce natural epizootics on insects. The fungi have been observed to cause mortality in pest populations and several fungal species have been investigated for their potential use as an alternative to chemical control or as a part of Integrated Pest Management programmes. There is a resurgence of interest in the use of microbial insecticides for biological control of insect pests. The development of resistance to chemical insecticides and concerns over the deleterious effects of chemicals on environmental and humans safety have provided an impetus for exploring and developing microbial control agents.

The previously reported findings on entomopathogenic fungi against noctuids including semiloopers in India and Abroad were critically reviewed and presented here

NATURAL OCCURRENCE OF ENTOMOPATHOGENIC FUNGI

Balakrishnan *et al.*, (1994) reported the natural infection of entomopathogenic fungus, *Beauveria bassiana* on coffee berry borer, *Hypothenemus hampei* Ferrari and coffee shoot borer, *Xylosandrus compactus* Eichhoff. 60 per cent adult females of *H. hampei* were infected and infection of *X. compactus* were low during October 1993 in coffee plantations in Tamilnadu. Sreedhar and Devaprasad (1995) reported higher per cent of mycosis of *Nomuraea rileyi* (Farlow) Samson in larval population of *Spodoptera litura* Fabricius, when groundnut was used as food plant than chillies, black gram and tomato. Vimaladevi *et al.*, (1996) reported epizootics of the entomopathogen, *Nomuraea rileyi* (Farlow) Samson on lepidopteran pests of oil seed crops. They observed infected *Spodoptera litura* larvae were more in castor followed by groundnut, pigeon pea and niger. Vimaladevi and Prasad (1997) reported epizootics of *Nomuraea rileyi* on *Spodoptera litura* and *Helicoverpa armigera* Hubner in *kharif* groundnut when relative humidity and temperature ranged between 70-92% and 21 - 27 °C. Manjula (2003) recorded for the first time infection of *N.rileyi* on *H.armigera* larvae during October in scarce rainfall zone of Andhra Pradesh in *kharif* groundnut. She stated that, the receipt of good rains during September and October months resulted in the luxuriant crop growth which maintained high humidity in the ecosystem. The temperature and relative humidity during the period of maximum disease occurrence were 21-23°C and 79 – 84%.

Ambethgar (2002) recorded natural occurrence of entomopathogenic fungi in rice, pulses, groundnut and cotton fields at Tamil nadu and Pondicherry during 1990-99. He identified sixteen types of entomogenous fungi including 11 of Deuteromycotina & 5 of Zygomycotina. Natural occurrence of entomopathogenic fungus, *Beauveria bassiana* on rice leaf folder, *Cnaphalocrocis medinalis* Guenee was reported by Alice *et al.* (2003) during *rabi* season at Karaikal, Tamilnadu. Manjula *et al.*, (2003) surveyed for incidence of *N.rileyi* on *Helicoverpa armigera* Hubner and *S.litura* on cotton, tomato, red gram, black gram and groundnut for two seasons in different areas of Guntur district, Andhra Pradesh. Cotton and groundnut recorded 100 per cent mycosed larvae of *H.armigera* and *S.litura* due to infection by *N.rileyi*. According to Gupta (2003) soybean semilooper (*Chrysodeixis acuta*) was naturally infected by *N.rileyi* at Rajasthan in 2001.

Ingle *et al.*, (2004) observed severe infections of *N.rileyi* in *Thysanoplusia orichalcea* Fabricius on soybean and *H. armigera* and *S.litura* on green gram and lower incidence of *N.rileyi* on *Spilosoma obliqua* Walker in soybean, during August 2003. Ingle *et al.*, (2004) again recorded epizootics of *N. rileyi* on larvae of *Nephoteryx eugraphella* Reg. in chiku orchards during September at Akola. *Beauveria bassiana* infection to red hairy caterpillar, *Amsacta albistriga* Walker was recorded for the first time by Veena Kumari *et al.* (2006) in groundnut crop at Pavagada, Karnataka. Rachappa *et al.*, (2007) from Karnataka recorded ten entomopathogenic fungi during rainy and summer seasons on lepidopteran caterpillars in different crops. Among the fungi, *N.rileyi* was most predominant on *S.litura*, *H.armigera* and *T. orichalcea*. Eight isolates of *N.rileyi* were collected during their study. Natural occurrence of entomopathogenic fungus, *Acremonium zeylanicum* (pech) gams et Evans on sugarcane wooly aphid, *Ceratovacuna lanigera* Zehntener noticed for the first time in Karnataka during July 2005 by Tippannavar *et al* (2006). The fungus is the cause for more than 90% pest control by inducing spectacular epizootics.

Isolation of Entomopathogenic fungi from soil.

David *et al.* (2003) conducted the survey in South eastern United States for entomopathogenic fungi, 105 soil samples were collected from surveyed fields. Twenty two fungal isolates of *B. bassiana* and *M. anisopliae* were isolated by exposing soil to greater wax moth larvae, *Galleria mellonella* (Linnaeus) and Pecan weevil, *Curculio caryae* Horn. Neuman and Shields (2004) conducted survey for entomopathogenic fungi in Hungary during Spring 2002. The entomopathogenic fungi, *B.bassiana* and *M.anisopliae* were isolated from collected soil samples from surveyed fields by using bait method. *Galleria mellonella* (L.) larvae were used as bait insects. Torasco and poliseno (2005) reported the occurrence of entomopathogenic fungi, *B.bassiana* and *M.anisopliae* from 69 soil samples collected from Albania soils from September 2000 to June 2001. Sookar *et al.*, (2008) examined 224 soil samples from 19 locations in three climatic zones of Mauritius for the entomopathogenic fungi, and finally they were able to isolate three agents, *M.anisopliae*, *B.bassiana* and *Paecilomyces fumosoroseus*. Bing Da Sun *et al.*, (2008) collected soil samples from two habitat types (field crops and orchards) from 2004-2005 at two months interval and detected insect – pathogenic species such as *B.bassiana* , *M.anisopliae* and *P. fumosoroseus* in both field crop and orchard soils. They also reported that, diversity of insect pathogenic fungi was greatest in field crop soil than in orchard.

Sergio *et al.*, (2010) collected the soil samples from different habitats of Mexico and isolated *B.bassiana* *M.anisopliae* using the insect bait method with *Tenebrio molitor* (L.)

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