

The potential of entomopathogens in biological control of white grubs

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ABSTRACT

White grubs are highly polyphagous and most destructive soil pests inflicting damage to a wide variety of crops. In India, more than 1000 species of white grubs are known of which over 40 species attack wide range of plants. White grubs are naturally infected by various entomopathogens which include fungi, bacteria and nematodes. Entomopathogenic fungi offer great potential and members of genera *Beauveria* and *Metarhizium* are widely used against white grubs. Several commercial products of entomopathogenic fungi like Bio Green, ORY-X, Grub X 10G, Betel, Biotrol FMA and Meta-Guard have been developed for the control of white grubs. In India, good control of white grubs in paddy, ginger and sugarcane has been achieved with different entomofungi. Among EPNs, *Heterorhabditis bacteriophora* is moderately effective against *Popillia japonica* and *Rhizotrogus majalis*. *H. indica* and *H. bacteriophora* are effective against potato white grubs in India. *Paenibacillus popilliae* cause milky disease in *P. japonica* grubs. The bacterium is pathogenic to *Holotrichia consanguinea*, *H. serrata* and *Leucopholis lepidophora*. In north-western Himalaya, *B. cereus* is highly toxic to the grubs of *H. seticollis* and *Anomala dimidiata*.

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1. Introduction

The superfamily Scarabaeoidea contains a large number of species whose larvae live in the soil and are commonly known as white grubs. As many species of white grubs are root feeders, they are also known as rootgrubs, but not all white grubs are rootgrubs (Gardner 1935). The white grubs are found chiefly in grasslands feeding on roots of various plants. Others grow on decaying organic matter (Misra and Chandel 2003). They live concealed and sudden increase in their population takes up in places having enough food and least soil-disturbance (Chandel and Kashyap 1997). The white grubs cause extensive damage to the roots of grasses, legumes, small fruit plants, shrubs and trees in many parts of the world (Pathania 2014). Larvae of greatest economic importance belong mainly to the tribe Melolonthini (Ritcher 1958). The first known white grub damage to crops in India is that by Stebbing grub damage to crops in India is that by Stebbing (1902) from Punjab. More than 1000 species of white grubs are known from the Indian sub-continent of which over 40 species attack a wide range of crop plants (Veeresh et al. 1991). First major epidemic of white grubs in India was reported in sugarcane from Bihar during 1956 (Gupta and Avasthy 1956). They have now been included in the

category of five national pests (Misra and Chandra 1989), and are reported from every state causing damage to a wide variety of cultivated crops. Yadava and Sharma (1995) reported that *Holotrichia serrata* Fab., *Holotrichia consanguinea* Blanch., *Holotrichia longipennis* Blanch., *Brahmina coriacea* (Hope), *Holotrichia seticollis* Moser, *Anomala dimidiata* (Hope), *Holotrichia reynaudi* Blanch., *Leucopholis lepidophora* Blanch., *Leucopholis coneophora* Brum., *Melolontha* spp and *Lepidiota* spp are the key pest species that attack different plants in different regions of the country.

The current method for the control of white grubs is through the use of chemical pesticides. However, concern about safety, environmental contamination and poor efficacy of recommended insecticides has increased the need to develop IPM approaches for these pests (Kumawat 2001). The naturally occurring entomopathogens (fungi, nematodes, bacteria and viruses) are important components in the soil ecosystem which brings about effective suppression of soil pests in nature. We provide an overview of microbial control of white grubs in different crops with special reference to fungi, nematodes and bacteria and their future prospects in white grub management.


Self attested