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# APPLICATION OF ENTOMOPATHOGENIC FUNGUS *BEAUVERIA BRONGNIARTII* FOR MANAGEMENT OF CHAFER BEETLE OF THE WHITE GRUB *HOLOTRICHIA SERRATA* INFESTING RUBBER SEEDLINGS

C. R. Nehru, K. Jayarathnam and G. K. Karnavar

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The infectivity of the entomopathogenic fungus *Beauveria brongniartii* to adult beetles, which are responsible for the abundance and distribution of white grubs (*H. serrata*) in rubber nurseries, is reported. Longevity of the adult beetles of both sexes infected with *B. brongniartii* was significantly less than that of the uninfected ones. The results indicated that *B. brongniartii* spreads from contaminated adults to healthy ones through mating contact. Release of the contaminated adults in the nursery was effective for biological suppression of *H. serrata*.

*Key words:* Rubber nurseries, *Holotrichia serrata*, *Beauveria brongniartii*.

C. R. Nehru (for correspondence), K. Jayarathnam, Rubber Research Institute of India, Kottayam-686 009, India and G. K. Karnavar, Department of Zoology, University of Kerala, Kariavattam Campus, Trivandrum, India.

## INTRODUCTION

White grub is a serious pest of rubber seedlings in India, the most predominant and serious one being *Holotrichia serrata* F. The pest causes severe damage to seedlings in nurseries rendering them unfit for transplanting (Jayarathnam and Nehru, 1984; Nehru and Jayarathnam, 1988). The biological control of white grubs by the entomogenous fungus *Beauveria brongniartii* (Sacc.) Petch, has been tested by several workers (Ranganathaiah *et al*, 1973; Veeresh, 1977; Jayaramaiah and Veeresh, 1983).

## MATERIALS AND METHODS

*B. brongniartii* was isolated from the cadaver of *H. serrata* beetle in the laboratory and was employed in the study. The pathogen isolated was cultured in a liquid medium containing hot water extract of silkworm pupae and 2 per cent glucose, on a rotary shaker (100 rpm), for three to four days at 30°C. About 20 ml (1 x $10^9$ spores/ml) of the culture broth was spread, on the surface of a polyurethane foam sheet, 600 mm long, 100 mm wide and 20 mm thick and incubated at 25°C for 8 to 15 days, for sporulation.

In the first test, newly emerged male and female beetles, 60 each, obtained from light trap collections during March and April, 1988 were used. The adult beetles were allowed to freely walk for 5 min on the surface of the opolyurethane foam sheet kept in a plastic container 30 cm in diameter and 30 cm in depth. The adult chafers contaminated with the fungus were transferred to another cage and reared individually. An untreated check was also maintained. Survival counts were recorded daily, for one month.

In test 2, observations were made to ascertain whether the fungus can be spread by mating contact. Freshly emerged adults obtained from light trap collections during April 1988 were used for this study. Sixty each of males and females were contaminated with *B. brongniartii* as in test 1. They were individually reared overnight in plastic cages of 30 cm diameter and 30 cm height. Each contaminated beetle was placed in another cage and allowed to mate with an untreated beetle, for one hour. 60 each of uncontaminated males and females were maintained as check and allowed to mate in cage. Adults which mated were reared individually in new plastic cages without fungus.

In both the tests beetles were reared at room temperature. Each cage contained moist soil to which a filter paper with water and honey was provided. Fresh neem leaves or shoots were provided daily as food for adults. The infectivity of *B. brongniartii* was determined by the fungal growth on cadavers.

## RESULTS AND DISCUSSION

In the first test, the infection of the fungus, *B. brongniartii* was observed in cadavers of all beetles which had come in contact with the fungal culture, but not in that of any of the non-treated ones (Table 1). This study thus indicated that the fungus *B. brongniartii* readily infected and was pathogenic to the adults of *H. serrata*. It was also confirmed that the longevity of adult beetles of both sexes infected with *B. brongniartii* was significantly shorter than that of uninfected healthy beetles.

In the second test, 60 non-treated males which mated with the contaminated females and 60 non-treated females mated with contaminated males were severely infected with *B. brongniartii* and both the groups recorded 100 per cent infection by this fungus. On the other hand, 60 each of non-treated males and non-treated females which had mated with one another were not infected with *B. brongniartii*. This study thus confirmed that the contaminated adults spread *B. brongniartii* to non-treated adults through mating contacts.

Table 1. **Susceptibility of adult *H. serrata* to infection**

| Date of collection | Treatment | Per cent infection | Days to death | |
|---|---|---|---|---|
| | | | Mean | Range |
| March 20 | Fungus inoculated | 100 | 13.1a | 11–15 |
| | | 100 | 16.1b | 14–18 |
| | Control | 0 | 24.5a | 14–28 |
| | | 0 | 26.5b | 22–28 |
| April 10 | Fungus inoculated | 100 | 9.0c | 7–12 |
| | | 100 | 7.8d | 7–9 |
| | Control | 0 | 21.0c | 16–25 |
| | | 0 | 27.2d | 26–29 |

a, b, c, d: Days followed by the same letters are significantly different (t – test, $P<0.05$), as per Duncan's MRT

In preliminary studies, it was seen that regular release of contaminated adults in rubber nurseries is an effective method for managing this pest biologically. It was observed that spraying of *B. brongniartii* to the branches of neem or cassava was also effective in spreading infection to chafer beetles which congregate and defoliate the plants. The extent of pest suppression in nursery fields achieved by this method ranged from 0.10 grub/30 $cm^3$ pits to 0.05 grub/30 $cm^3$ pits. Occurrence of 100 per cent fungal growth on cadavers observed in the present study clearly indicated that *B. brongniartii* was highly pathogenic to chafer beetles. Veeresh (1977) had

also reported the effectiveness of *B. brongniartii* as a biocontrol agent of *H. serrata*, infesting groundnut in Karnataka State.

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