



Seasonal incidence of *Beauveria bassiana* on *Gargara mixta* Buckton (Hemiptera: Membracidae) and *B. brongniartii* on chrysomelids (Coleoptera: Chrysomelidae) in the Central Forest Circle of Kerala

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ABSTRACT: Surveys for entomopathogenic fungi in the central forest circle of Kerala revealed the seasonal incidence of *Beauveria bassiana* in small pockets on *Gargara mixta* Buckton (Hemiptera: Membracidae) feeding on the leaves of *Helicteres isora* (Sterculiaceae) in the moist deciduous forests (MDF) at Vazhachal. Incidence of *B. brongniartii* on chrysomelid beetles (Coleoptera) feeding on teak leaves was also observed in small pockets in teak plantations. Infection was prevalent during post-monsoon months. The infection due to *B. bassiana* and *B. brongniartii* ranged from 36.8 to 100 and 45.5 to 100 per cent, respectively. The seasonal incidence of naturally occurring entomofungal pathogens, *B. bassiana* and *B. brongniartii* form small scale epizootics in nature under favourable environmental conditions. Such virulent pathogens can be exploited in pest control programmes.

KEY WORDS: Entomopathogenic fungi, *Beauveria bassiana*, *Beauveria brongniartii*, *Gargara mixta*

The entomopathogenic fungi, *Beauveria bassiana* and *B. brongniartii*, attack all stages of insects of all groups. *B. bassiana* has over 700 recorded host species (Moore and Prior, 1993) and occurs worldwide in soil as a ubiquitous saprophyte (Tanada and Kaya, 1993). The host insects are mainly Lepidoptera, Coleoptera and Hemiptera. *B. bassiana* is known to cause muscardine disease in many forest pests (Agarwal *et al.*, 1988; Rajak *et al.*, 1993; Mohammed Ali and Varma, 1994). Natural infection of *B. brongniartii* on the larvae of *Hypsipyla robusta* was also reported (Kandaswamy, 1969). This study deals with the observations made on the seasonal incidence of *B. bassiana* on *Gargara mixta* Buckton (Hemiptera: Membracidae) and *B. brongniartii* on chrysomelids (Coleoptera: Chrysomelidae) in the central forest circle of Kerala.

Survey and collection of cadavers of *G. mixta* and chrysomelid beetles was carried out in moist deciduous forests (MDF) and teak plantations in the central forest circle (Vazhachal - Lat. 11° 18' 24" N to Long. 76° 13' 15" E) in the Kerala part of the Western Ghats. Three permanent plots (25 × 25 m) were laid in the study area. The plots were selected in such a way that the sample points were systematically dispersed in the study area. Sampling of cadavers was made through time-constrained search, in which two persons searched the study area for three hours in the afternoon of a day in the 2nd/ 3rd week of each month.

Sampling was carried out for a period of two years from October 2003 to October 2005. Collections were made during both wet (May-October) and dry (November-April) periods.

Infected cadavers of *G. mixta* and chrysomelid beetles were collected in sterile plastic vials and observed under a stereo microscope for external morphology. The fungi were isolated in Potato Dextrose Agar (PDA) media. Microscopic slides of fungal fructification were prepared from 10-day-old cultures, stained using lactophenol cotton blue and observed under a bright field microscope. The fungi were identified as *B. bassiana* and *B. brongniartii* with the help of monographs and relevant taxonomic literature.

Seasonal incidence of *B. bassiana* and *B. brongniartii* as small scale epizootics was observed in moist deciduous forests (MDF) and teak plantations in the central forest circle in the Kerala part of the Western Ghats. Epizootics of *B. bassiana* on *G. mixta* feeding on leaves of *Helicteres isora* (Sterculiaceae) were observed in small pockets in MDF (Fig. 1). All the infected insects collected were young ones and infection in adults was not observed. The infection ranged from 36.8 to 100 % and was prevalent during post-monsoon months (August-December), which peaked during September.



Fig. 1. Infected by *B. bassiana* Gargara mixta

Incidence of *B. brongniartii* in chrysomelid beetles feeding on teak leaves was observed in small pockets (Fig. 2). The infection ranged from 45.5 to 100% and was frequent during post-monsoon months (August-December) and practically nil during January-July. Both the insects infected with fungi are non-pest species and the number of infected insects obtained was less than hundred in every month.

During post-monsoon months, monthly average relative humidity was always >85% and monthly average temperature varied between 25 and 28 °C. The high relative humidity and optimum temperature enhance the rate of infection (Fargues and Luz, 2000; Inglis *et al.*, 2001) during post-monsoon months. Evans (1974) recorded small-scale epizootics of entomopathogenic fungi as seasonal outbreaks on coccids in the forests of Ghana. He reported that the epizootics appeared in small pockets and the number of colonies observed was around hundred per year. In the present study also, epizootics of *B. bassiana* and *B. brongniartii* in non-pest insects were observed seasonally in small pockets. Mohamed Ali *et al.* (1987) reported a moderate level of infection of *B. bassiana* in *Atteva fabricella* (Lepidoptera: Yponomeutidae) and epizootics of *Paecilomyces fumosoroseus* and *P. farinosus* on *Eligma narcissus* (Lepidoptera: Noctuidae) from the central and high range forest circles in Kerala. This study shows that naturally occurring entomofungal pathogens, *B. bassiana* and *B. brongniartii* are able to suppress the populations of insects in nature under favourable environmental conditions. Such virulent pathogens of wild type can be exploited in pest control programmes.



Fig. 2. Infection of *B. brongniartii* on chrysomelid beetle

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