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Aspergillus candidus Link as an Entomopathogen of Spindle Bug *Carvalhoia arecae* M & C (Miriidae: Heteroptera)

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Aspergillus candidus *Link as an entomopathogen affecting the spindle bug* Carvalhoia arecae *M & C (Miriidae: Heteroptera), a major pest of oil palm and arecanut in India is reported for the first time.* A. candidus *is a virulent entomopathogen, producing 50 per cent mortality within two days of inoculation and 100 per cent mortality in four days after inoculation.*

The spindle bug *Carvalhoia arecae* Miller & China (Miriidae: Heteroptera) *(Figure 1)* is primarily a serious pest of areca palms (Nair & Daniel, 1982). In recent years this insect attained the pest status in oil palm secondary nurseries and field-planted young palms (Dhileepan, 1988). In oil palm infestation by *Carvalhoia arecae* was noticed throughout the year, and the incidence was more severe during the rainy season (June to August). During 1986-89, 5.6 to 31.8 per cent of the seedlings in the nursery and 22.8 to 46.2 per cent of the field planted young palms were infested by the spindle bug (Dhileepan, 1990). In both oil palm and arecanut the spindle bug sucks sap from the spindle leaves, resulting in necrosis and linear brown lesions. Except for the general predators like ants, earwigs, spiders, *etc.*, no specific natural enemies, in particular no entomopathogen has been recorded so far on this insect pest. In the present study, an entomopathogen affecting the spindle bug *C. arecae* is reported for the first time.

Survey for the natural enemies of *C. arecae* was made during 1986–88 in the oil palm secondary nursery at Palode, Trivandrum district, Kerala state. During July to September 1988, dead adult spindle bugs and nymphs covered with white mycelia of the fungus firmly attached to the spindle leaves was noticed *(Figure 2)*. The dead insects were brought to the laboratory, and the pathogen was isolated, cultured in PDA medium and identified as *Aspergillus candidus* Link (CMI No. 328481).

Aspergillus spp. (Hyphomycetes) are imperfect fungi, and are most frequently associated with insect diseases (Pierre, 1985; Roberts & Yendel, 1971). Among the several species of *Aspergillus*, incidence of *A. candidus* as entomopathogen is less known. Incidence of *A. candidus* as an entomopathogen infecting *Indarbela* spp. was recorded by Singh & Singh (1982). When cultured in PDA, sporulation was initiated in three to four days. The mycelia and spores are creamy white in colour. The conidia are hyaline, globose, thin-walled, smooth, 2–3 µm in diameter. Inside the body of the spindle bug infected by

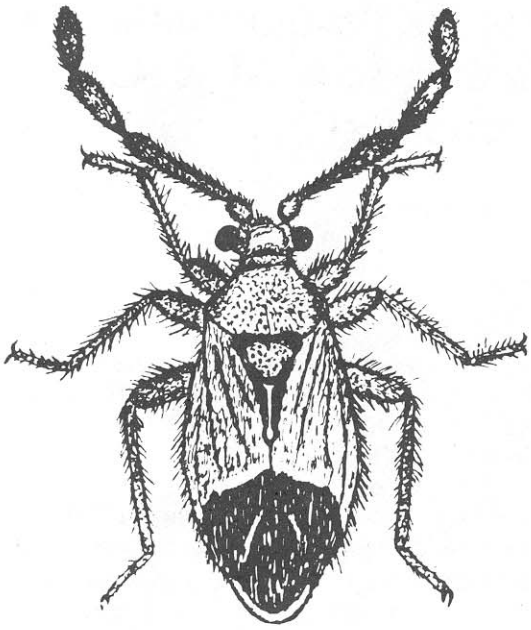

Figure 1. Adult spindle bug.

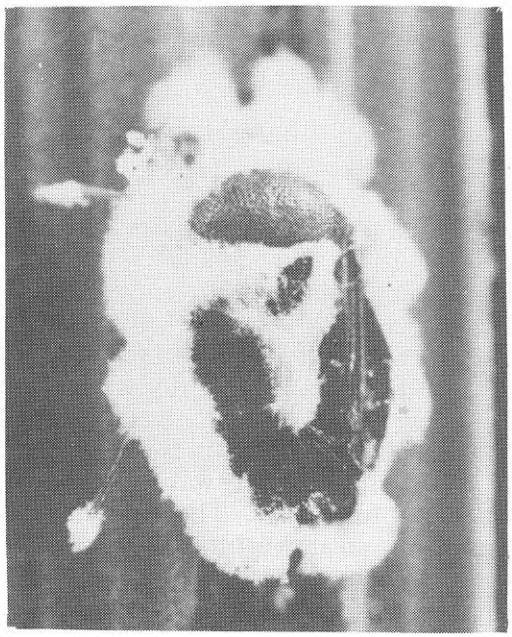

Figure 2. Aspergillus candidus *Link growing on the adult of spindle bug* Carvalhoia arecae.

A. candidus the entire body cavity was filled with mycelial ramification. Conidiophores produced inside the body cavity erupt through the cuticle in the antennae, thorax, abdomen and legs and fix the insect on the spindle surface.

Occurrence of dead nymphs and adults of spindle bug infected with *A. candidus* in the oil palm nursery was common during the rainy season (July-November). Pathogenicity trials of *A. candidus* on *C. arecae* were carried out both in the laboratory and under caged condition in the field, where the adults of *C. arecae* were inoculated with spore suspension of *A. candidus,* by allowing the *C. arecae* to crawl on the leaf surface sprayed with spore suspension or by applying the spore suspension on the body surface of *C. arecae.* The pathogen produced 50 per cent mortality within two days of inoculation and 100 per cent mortality in four days after inoculation *(Figure 3).* In *Indarbela* spp. also, *C. candidus* brought about 100 per cent mortality under laboratory

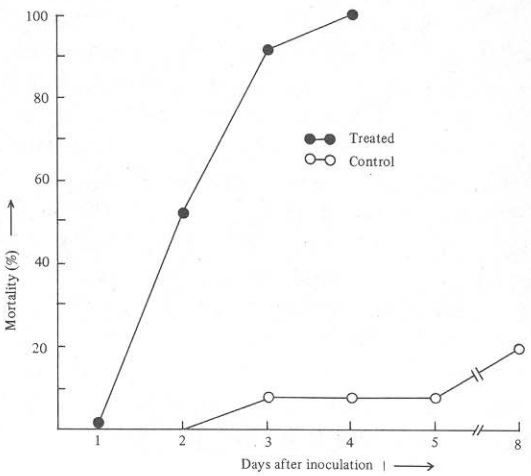

Figure 3. Pathogenicity of Aspergillus candidus *Link on the adults of spindle bug* Carvalhoia arecae.

conditions (Singh & Singh, 1982). The insects which died after inoculation were kept in moist chambers to induce sporulation and the same pathogen was reisolated. The sporulation was delayed when the atmospheric humidity was low. This may be the possible reason for the widespread incidence of *A. candidus* in the field during the rainy season, coinciding with the peak incidence of spindle bug infestation. Since the *C. arecae* is a phloem feeder, the possible mode of entry for the pathogen appears to be that the conidia germinate on the cuticle and then penetrate.

The present study confirms that *A. candidus* is a virulent entomopathogen. Since other species of *Aspergillus* are known to produce carcinogenic toxins (Pierre, 1985) and infect vertebrates (Heimpel, 1985), use of *A. candidus* for the biological suppression of *C. arecae* in the field should be attempted with adequate care only.

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