

# TEAK BEEHOLE BORER AND THE CONTROL RESEARCH IN THAILAND

by

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## SUMMARY

The author has given a precise report on the biology and ecology of the Beehole Borer of Teak, *Xyleutes ceramicus*, WALKER based on his observation in Northern Thailand. A discovery of the fungal disease, *Beauveria bassiana* (BALSOMO) VUILLEMIN on the dead larvae in nature and a successful test to kill the borer with such entomogenous fungus lead to the possible control of this important forest pest.

## Introduction

The beehole borer, *Xyleutes ceramicus* WALKER (fig. 1) is the most important forest insect pest of teak, *Tectona grandis* LINN. Teak trees in the plantation are evidently more susceptible than those in the mixed natural forests. The biology and ecology of this insect in Burma have been recorded in detail by BEESON (1921). The borer attacks only living tree from sapling through maturity, it does not kill the tree, but causes a severe defect inside the heartwood which greatly reduce quality and value of the marketable timber. The pest is generally distributed throughout natural teak forests of Southeastern Asia.

According to a recent work on control measures made during 1963-1965 in the teak plantations of Northern Thailand, a successful test for inoculation and establishment of a fungal disease, *Beauveria bassiana* (BALSOMO) VUILLEMIN was made upon the beehole larvae. The result leads to a possible biological control of this forest insect pest that still need a further research on proper techniques for disseminating the micro-organism in a broad scale.

## Evidence of infestation

The most evident indication of the beehole borer infestation is the presence of irregular scars under the bark resulting from larval

burrowing. The tunnel is carried into the heartwood at an upward angle of about 45 degree for 2 or 3 inches and then vertically upwards for another 8-10 inches (fig. 2). The scars are usually sealed up quickly and left behind the permanent holes inside the stem.

#### **Life history**

The development of a beehole borer requires about 1-2 years to complete its life cycle depending on locations and environmental factors. The emergence of the adult occurs within a period of 2-3 months starting around March. One female lays thousand of eggs up to 50,000. The incubation period is about 12 days to 20 days. The larval stage of the insect is nearly one year, or abnormally of 2 seasons. Pupation takes place about 2-3 weeks before the adult emergence.

#### **Habits**

The larva does not feed on the wood but the bast and callus of new bark formed around the mouth of the tunnel.

The pupa lies in the chamber at a position with head directed downwards and the moulted larval skin behind. The mature pupa moves itself downwards to the mouth of the tunnel where emergence of new adult takes place.

Adult moths are nocturnal in habit and they are not attracted to light. The female's scent attracts the male from a long distance, and mating usually occurs soon after its emergence. The oviposition begins the night after mating and normally continued for two nights.

#### **Natural enemies**

Little is known about the effect of biotic forces on the beehole borer. According to the observations made by ATKINSON (1937) in Burma, woodpeckers are believed to be its most important natural enemies. Some parasites such as Ichneumonid wasp, *Nemeritis tectonae*; Tachinid fly, *Podomyia atkinsoni*; and a fungal disease, *Cordyceps* sp. are also reported.

### Control measures

For beehole borers in the forest, no practical controls have ever been successful, while silvicultural practices such as fire protection, arrangement of stand composition, and the use of resistant varieties are under consideration for a possible control measure.

Chemical tests by means of aerosol and knapsack spray with DDT, Dieldrin, and Phosdrin over the plantation in Northern Thailand in 1964 (figs. 3,4) to kill young larvae gave no evidence of an effective check to the normal infestation. Although chemical treatments with fumigants such as DDVP and carbon disulphide by injecting the gas into living holes has proved very effective, but it is not practicable in a wide scale as in the case of forest plantation.

Special attention has been given to the investigation of natural enemies of the beehole borer in Thailand since 1963. Woodpeckers were observed in some localities but with a limited number. The predatory ants of the genus *Crematogaster* are commonly found in all teak plantations. They are generally living in a colony inside the holes. The ants attack the larva as well as the pupa and the newly emerging adult of the beehole borer.

A few specimens of mummified larvae, covered with fungal spores (fig. 5) were detected by the author at the Thachai teak plantation, Sukhothai. Three species of *fungi imperfecti* were isolated from these larvae, upon which only one species is proved to be a parasite identified as *Beauveria bassiana* (BALSOMO) VUILLEMIN (fig. 6). The fungus grows very well on potato dextrose agar, so that it can be reared easily for mass production (fig. 7).

### Field tests for the effective inoculation of the fungal disease

The field tests made in the plantation during 1965, have shown a high rate of mortality when the inoculation of *Beauveria bassiana* (BALSOMO) VUILLEMIN was made on premature larvae in November–December. The dusting appeared to cause a higher rate of mortality than the application of spore-suspension solution. The dusting by means of a direct injection of a mixture of dried fungal spores and talc into living holes effected more than 95 percent mortality, while

a surface dusting caused only 20 percent infection. The success of the inoculation is vital to a natural dissemination of this fungal disease, and will be a pioneer work on a wide scale biological control against this forest insect pest. Further studies on effective technique and proper timing of such microbial application including the introduction of foreign entomogenous species are needed for a future biological control.

#### REFERENCES

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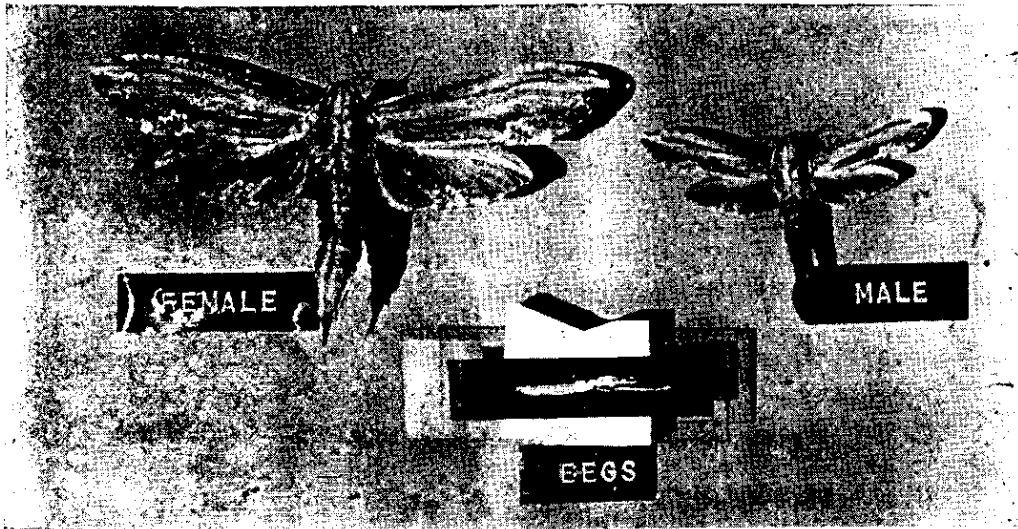


Fig. 1. Adults of teak beehole borer, *Xyleutes ceramicus*, WALKER.



Fig. 2.  
Tunnel inside the trunk  
of young teak.



Fig. 3. Chemical application by aerosol.



Fig. 4.  
Chemical application  
by Knapsack sprayer.

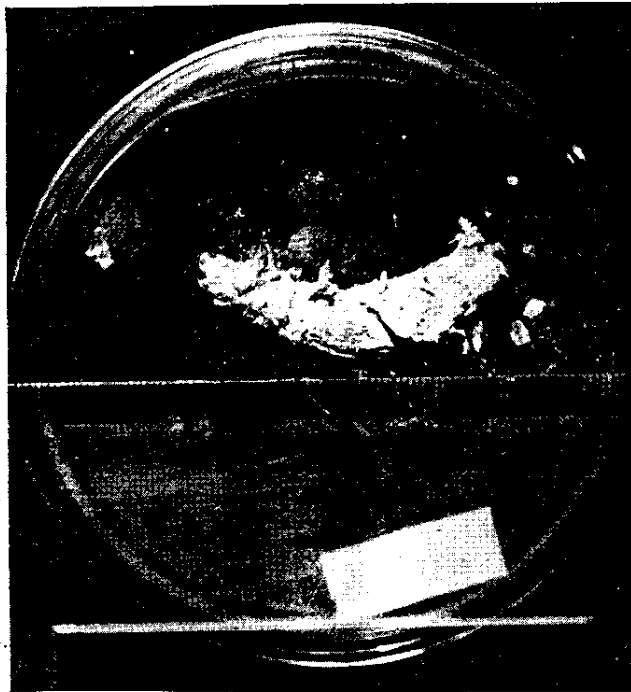


Fig. 5. Mummified larva collected from Thachai, Sukhothai.



Fig. 6. Dead bee larvae from testing holes caused by fungal disease, *Beauveria bassiana* (BALSOMO) VUILLEMIN.

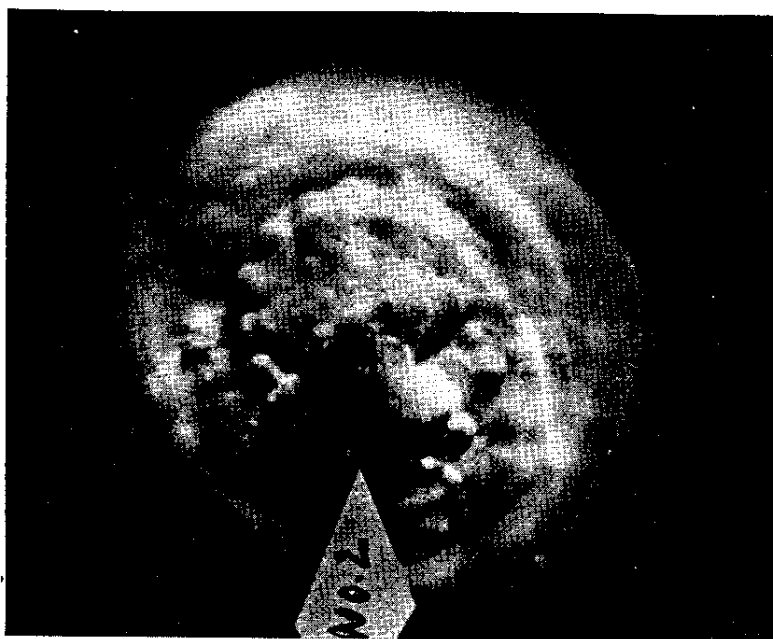


Fig. 7. Colony of *Beauveria bassiana* (BALSOMO) VUILLEMIN on potato dextrose agar.