

## Olfactometric studies on the Shot-hole borer of tea, *Xyleborus fornicatus*

W Subodhi Karunaratne, Vijaya Kumar\* and N Savitri Kumar  
*Department of Chemistry, University of Peradeniya, Peradeniya*

The responses of the shot-hole borer beetle of tea, *Xyleborus fornicatus*, (Coleoptera:Scolytidae) to conspecific and host plant odours of tea were tested using a four way olfactometer. Host location is well documented in Scolytid beetles and some of the compounds utilised arise from tissue damage or are found as stored products in plants. The volatile fractions of tea barks have been shown to contain hexanol,  $\beta$ -pinene, terpenolene, linalool oxide, linalool, geraniol and eugenol as the main constituents.

In our present work, volatiles of tea stem from TRI 2025 clone were analysed by GC to confirm the presence of the above constituents. Mature females were found to be significantly attracted towards each of those compounds when

tested separately against a control in an olfactometer. When combined the effects were shown to be synergistic. Ethanol was more attractive to the beetle than the above compounds singly or in combination.

In olfactometer work, male beetles clearly showed that they were able to distinguish between non-mated and already mated female beetles. Attraction towards non-mated females in the treatments were extremely highly ( $p < 0.0001$ ) and there was an increase in attraction when the number of non-mated female beetles were increased from 1 to 5 beetles in the treatment. When mated beetles were used in the treatment, the response was non significant with neither attraction nor repulsion being shown even with increasing numbers of beetles in treatment.

Mature female beetles were found to be able to identify the odour of the other mature females, with the recognition being density dependent, strong repulsion when the number of females in treatment was increased to ten suggesting a spacing mechanism.

In a study of host plants using tea clones TRI 2025 and TRI 2023, a distinct attraction was seen with fresh tea plants compared with twigs probably because there is continuous release of plant volatiles in fresh plants. No significant attraction was shown towards hexane, dichloromethane or methanol extracts of tea. The main host, tea was recognized better than the alternative host *Gliricidium sepium*. The susceptible clone TRI 2025 was clearly preferred over the resistant clone TRI 2023. This was confirmed in choice tests.

In choice experiments beetles showed strong attraction towards the methanol extract of tea stem. Among the different sugars known to be present in tea stem, glucose showed the highest attraction and also in sugar mixtures, less attraction was shown towards the mixture - glucose: inositol (5:1) ratio present in clone TRI 2023, than towards the mixture - glucose: inositol (3:1) present in clone TRI 2025 and 100 % avoidance was shown towards caffeine by the SHB beetle.