Proceedings of the Annual Research Sessions, University of Peradeniya, Sri Lanka. Vol. 7. October 30, 2002

CHANGES IN VOLATILE COMPOUND LEVELS IN SUSCEPTIBLE AND RESISTANT TEA CULTIVARS UPON SHOT-HOLE BORER INFESTATION

G. DE SILVA*, I.S.B ABEYSINGHE* AND N.S. KUMAR**

**Biochemistry Division, Tea Research Institute, Talawakelle*
***Department of Chemistry, Faculty of Science, University of Peradeniya*

The Shot-Hole Borer (SHB), *Xyleborus fornicatus* Eichh. (Coleoptera : Scolytidae) is the most serious insect pest of tea in Sri Lanka. *Xyleborus* causes primary damage to tea bushes in which galleries in newly formed branches affect the current growth and reduce vegetative yield leading to branch breakage during agronomic operation and loss of crop. Secondary and long-term effects include attack by wood rotting fungi and scavenging termites.

The volatile compounds present in the tea plant were studied to explore possibility of using them as semiochemicals to control SHB infestation. The volatile compounds in the leaves and stems of the tea plant were extracted using a simultaneous distillation and extraction apparatus and identified by GC-MS, the diastereoisomers of linalool and its oxides being quantified using a chiral column.

Twenty five volatile compounds were identified. The major volatile compounds in tea leaves were linalool, cis-3-hexenol and geraniol. Tea bark contained linalool, linalool oxide-1 and -2, methyl salicylate and geraniol as the major volatile compounds. It was found that there were significant differences between the ratio of cis-3-hexenol:linalool in the leaves of resistant and susceptible clones. In resistant clones, the linalool content was higher whereas in susceptible clones, cis-3-hexenol content was higher.

Although the linalool content was higher in the resistant cultivar, TRI 2023 (0.5 ppm) than in the susceptible cultivar, TRI 2025 (0.3 ppm), the content of linalool oxide-1 (0.3 ppm) and linalool oxide-2 (0.8 ppm) was higher in the susceptible cultivar than in the resistant cultivar (0.1 ppm and 0.3 ppm respectively). Chiral analysis showed that the content of the S-isomer of linalool oxide-1 (0.2 ppm) and linalool (0.2 ppm) in the healthy susceptible clone is twice that of the R-isomer (0.1 ppm and 0.1 ppm). The content of S-isomer of linalool oxide-2 (0.1 ppm) was seven times that of the R-isomer (0.7 ppm) in this clone. In the resistant cultivar, the only difference was seen in linalool-oxide-2 where the S-isomer (0.2 ppm) content was more than twice that of the R-isomer (0.08 ppm).

The major change on SHB infestation was the increase of linalool oxide-2 content in both resistant and susceptible cultivars with the content being higher in the latter. Upon infestation, a ten fold increase of the *S*-isomer of linalool oxide-2 (1.1ppm) in the susceptible clone was observed. These observations showed that the major differences between susceptible and resistant cultivars and upon infection were in the content of the *S*-isomer of linalool and its oxides. Olfactometry studies have been initiated to study the repellent or attractant properties of linalool and its oxides to SHB.