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Chitinase Activity in Stems of Tea Clones TRI 2023 and TRI 2025

Shot-hole borer (SHB) *Xyleborus fornicatus*, infestation of tea *Camellia sinensis*, involves the ectosymbiotic ambrosia fungus *Monacrosporium ambrosium*. Chitin, a common constituent of fungal cell walls and exoskeletons of fungal cell walls and exoskeletons of arthropods, is a linear polymer of β-2, 4-linkked N-acetyl glucosamine. Organisms composed of chitin produce chitinases. Chitinases do not occur naturally in plants but plants may produce chitinase to defend themselves from microorganisms and insect predators. We have been studying the biochemical factors responsible for differences in susceptibility of tea clones to SHB attack. Since SHB and the fungus both contain chitin it was of interest to compare chitinase enzyme activity in stems of the susceptible and resistant tea clones TRI 2023 and TRI 2025 respectively.

Chitinase activity was determined by measuring the release of p-nitrophenol when p-nitrophenyl-β-D-N,N—diacetylglucosamine was treated with enzyme extracts prepared from stem samples. Chitinase activity was measured (1 mL/ 100 µL of enzyme extract, six replicates) by determining the UV absorbance at 410 nm. Chitinase activity was higher in healthy stems. For example, mean activity for release of P-nitrophenol was 4.8 mM per mL of enzyme extract from healthy TRI 2023 stem whereas it was 1.06 mM/mL in enzyme extract from beetle infested TRI 2023 stems. Of the two tea clones, chitinase activity of TRI 2025 was lower (2.5 mM/mL) and TRI 2023 which is more resistant to SHB showed a higher activity (4.8 mM/ mL of enzyme extract). The observation that chitinase enzyme activity is lower in beetle infested tea stems suggests that either the beetle or the fungus is able to suppress the activity of the enzyme.