BIOCHEMICAL INTERACTIONS IN SHOT-HOLE BORER INFESTATION OF TEA AND STUDIES OF THREE MICROBIAL POLYSACCHARIDES

A THESIS PRESENTED

BY

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ABSTRACT

Title of the thesis:	Biochemical Interactions in Shot-Hole Borer Infestation of Tea and Studies of Three Microbial Polysaccharides
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Summary:

The thesis consists of two parts. The first part describes some studies carried out to understand the biochemical interactions involved in shot-hole borer infestation of tea.

The first chapter consists of a general introduction to shot-hole borer (SHB) infestation of tea. The second chapter describes the general experimental conditions and the principal techniques used to obtain the results discussed in chapter three.

In plugged galleries a *Fusarium* species, *Pestalotiopsis theae* and an *Aspegillus* species were found along with the *Monacrosporium ambrosium*. None of the fungi were able to inhibit the growth of *M. ambrosium*.

The total phenolic content of tea stems was determined as gallic acid and tannic acid equivalents, and was found to be higher in the susceptible tea clone TRI 2025 and highest in tea stems, which were infested with the SHB beetle.

Phenylalanine ammonialyase (PAL) and polyphenol oxidase (PPO) enzyme activities were also found to be higher in the infested stems of both clones, while the highest activity was observed in the susceptible clone.

The cup plate assay was used to determine polygalacturonase (PG) and pectinase activity of culture filtrates from the symbiotic fungus *Monacrosporium*

ambrosium. The PG activity was observed to be weaker than those of standard PG from *Aspergillus niger*.

Chitinase enzyme activity was detected in tea clones of TRI 2023 and TRI 2025, TRI 3015, TRI 3019, TRI 4053 and TRI 4078. The highest enzyme activity was detected in the healthy stem samples of the SHB resistant tea clones of the three series. The chitinase enzyme extracted from the tea stems was able to hydrolyse the chitin in the cell walls of *M. ambrosium*.

The fungus *M. ambrosium* was found to produce xylanase that could free xylose from the xylan in tea stems.

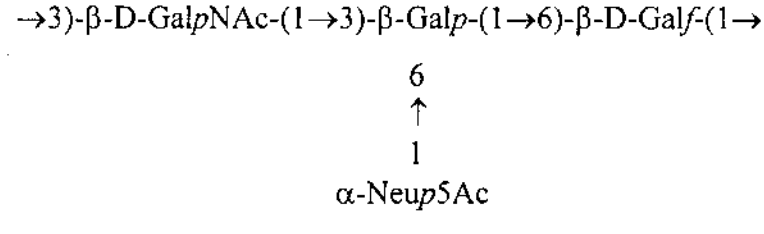
Mycelial development, sporulation and spore germination of *M. ambrosium* were found to be affected by the glucose and inositol composition and/or the ratio of these sugars in tea stems, and also by the concentration of dextrose in the medium.

Part two of the thesis describes the structural studies of three microbial polysaccharides.

Chapter four gives a brief introduction to polysaccharides, while chapter five describes the general experimental conditions and the principal techniques used during the studies of microbial polysaccharides discussed in the next three chapters.

The lipooligosaccharide of *Salmonella dalhem* was found to contain neuraminic acid and therefore it belongs to the *O*-48 sero type.

The structure of the *Hafnia alvei* polysaccharide was found to consist of a tetrasaccharide repeating unit, the structure of which is,



Compositional and methylation analysis of the mycelial polysaccharide isolated from the fungus *M. ambrosium*, indicated it to be a glucogalactomannan.