E2-06: Carbohydrate constituents of tea stems and their effect on sporulation and spore germination of *Monacrosporium ambrosium*

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The Shot-hole borer beetle (*Xyleborus fornicatus*), an insect pest found in the tea plantations of Sri Lanka, has a symbiotic relationship with the fungus *Monacrosporium ambrosium*, which is essential for the completion of the life

cycle of the beetle. Factors which affect the growth of the fungus may have a bearing on tolerance/susceptibility of tea clones. This paper reports a continuing study on the biochemical relationships between the tea bush, the shot-hole borer beetle and *M.ambrosium* in an attempt to develop a method for control of the beetle. Pruning of infected branches is now the most effective method used in tea plantations for the control of this insect pest.

Morphological and chemical plant factors may result in the selection of a tea clone by the beetle. It has been reported that accumulation of caffeine, an alkaloid which was found to inhibit the growth of *M. ambrosium* and is known to be toxic to insects, occurs to a greater extent in the tolerant clone 2023. Lack of sufficient levels of phytochemicals. such as carbohydrates, may also affect the growth of the fungus/beetle and/or the selection of tea stems by the beetle. The carbohydrate constituents of healthy and infected pencil thick stems of the clones 2023 and 2025, and their effect on development of *M.ambrosium* was investigated.

Stem samples were collected from the TRI Sub-station at Hantane during the morning and sugar analysis was carried out on extracts from the nodal and internodal regions of healthy and infected pencil thick stems from the clones 2023 and 2025. The hot methanol extract of tea stems was partitioned with butanol, the water layer was separated and freeze dried.

Sporulation was observed using a haemocytometer 14 days after incubation. Germination of spores was counted for 8 h at 1 h intervals in a liquid medium.

GLC of the derived alditol acetates showed the presence of mannose, galactose, glucose and inositol. Glucose was the major (47-71%) reducing sugar in all the samples of stems analysed. the content of galactose was low (>0.5-3%) and an appreciable amount of inositol (7 - 28%) was detected. Inositol is known to be essential for the growth of certain strains of fungi, while phosphoric acid esters of inositol are found widely distributed in nature.

Sporulation and spore germination of *M.ambrosium* was studied in media containing glucose, galactose and inositol as the carbohydrate source. Sporulation was found to vary from 28 - 34. Sporulation in media containing glucose and galactose (1:1) was 24.4. A marked difference was observed in media containing glucose and inositol (1:1) in which sporulation was very low (5.7). The ratio glucose: inositol was observed to be approximately 5:1 in the clone 2023, while it was 3:1 in the clone 2025. Hence sporulation was studied in media containing (a) glucose (b) inositol (c) glucose and inositol (3:1) (d) glucose and inositol (5:1) and was observed to be 30.5, 23.3, 8,3 and 0.7 to respectively. Therefore a high glucose:inositol ratio appears to inhibit *in vitro* sporulation.

Germination of spores was studied after 8 h in a liquid medium containing glucose and inositol as the carbohydrate source. Germination was 60% in glucose and in inositol it was 26%. Combinations of glucose and inositol (1:1, 3:1 and 5:1 respectively) gave lower readings (10-14%).

Carhohydrates are important nutrients for phytophagous insects and sugars are of great importance as phagostimulants. Results indicate that the nature and amount of free sugars present in stems may also be related to the development of the symbiotic fungus *M monacrosporium* in shot-hole borer beetle galleries.