Arbuscular mycorrhiza (AM) and sweet cherry

TASMANIAN INSTITUTE OF AGRICULTURE

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Background

This study is investigating the role of arbuscular mycorrhiza (AM) in water uptake of sweet cherry. AM are beneficial fungi that associate with plant roots. Colonisation of plant roots with mycorrhizal fungi greatly increases the "effective" root surface area for water and nutrient uptake by plants, and previous research in other crops has shown that colonised plants are more drought tolerant. However, little is known about cherries, or about the impact on the ability of plants to tolerate excess water.

Cherries, when exposed to excess water late in the growing season can suffer from fruit cracking. This is a major concern for growers. Under a HAL funded project "Reducing the impact of late season rainfall" many factors are being explored to provide further understanding of plant responses to excess supplied water (rainfall) during the ripening and harvest periods. This study is one of them.

Aim of the project

The purpose of this project is to explore water uptake patterns in plants with and without mycorrhizal colonisation by applying excess water after drought and non-drought conditions. It additionally aims to demonstrate any impact on growth performance and nutrient uptake which could potentially lead to improvements in fruit quality as a result of improved plant function. An investigation of the mycorrhizal diversity in two different orchards (one conventional and one organic management) at two different times of year (autumn and spring) will also be performed.

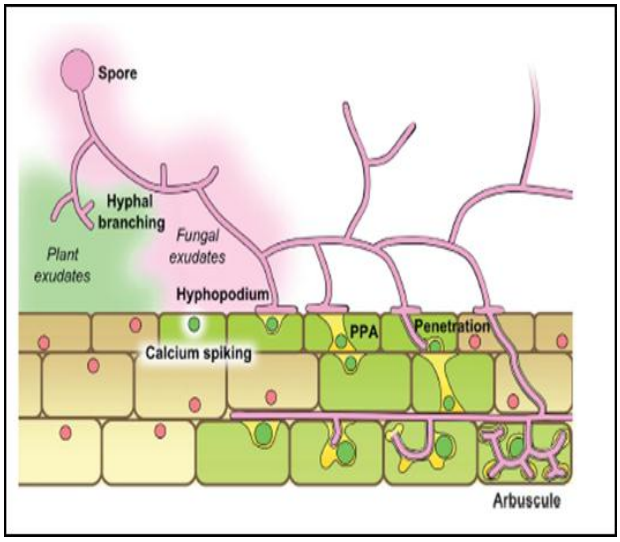

Fig. 1 Colonisation of arbuscular mycorrhiza in plant roots (diagram from Bonfante)

Method

To determine whether the presence of mycorrhizal colonisation improved sweet cherry tolerance both to drought and excess water glasshouse trials were undertaken. The impact of colonisation on strike rate of cuttings, and plant morphology (height, stem properties, number of leaves) was measured.

Plant biomass at the end of the trial was also measured. Physiological measurements such as leaf water potential, stomatal conductivity and photosynthetic rate were taken prior to, during and after drought and excess water treatments. Leaf samples were also taken to analyse for the stress response hormone (Abscisic acid) levels during these times.

Extraction of spores from orchard samples has been undertaken, and identification of the most common species will be attempted by examining spore morphology and applying molecular approaches.

This project has been funded by HAL using the cherry industry levy and matched funds from the Australian Government

HAL Horticulture Australia

CHERRY GROWERS AUSTRALIA INC

UNIVERSITY of TASMANIA

TIA is a joint venture between the University of Tasmania and the Tasmanian Government

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Fig. 2 Cherry cuttings colonised with AM

Key Messages:

- Cherry cuttings treated with AM fungi had better strike rates and early growth than non treated cuttings
- Preliminary data analysis shows that mycorrhizal colonisation influences the physiological functioning of sweet cherry
- The AM cherry plants maintained higher photosynthetic rates
- Hormone analysis and studies of mycorrhizal diversity and abundance are ongoing.

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