Project Title:
Validation of the shoot assay as a proxy to determine progression of dormancy in intact apple trees.

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Objectives and Rationale

To date most of our dormancy research relied on the use of a laboratory based "shoot assay" to determine the dormancy level of buds. Recent studies on the induction period of dormancy and the availability of potted apple nursery trees led to the need and possibility to conduct a formal validation of this "shoot assay" as a proxy for dormancy behaviour in intact apple trees.

Methods

The traditional "shoot assay" (forcing of defoliated, 30cm shoots at 25˚C and continues light) was tested in parallel to the forcing of intact apple nursery trees grown in plastic bags. The trial included trees and shoots with and without leaves to determine the effect of defoliation on dormancy. Trees were be kept at a nursery in Simondium and their dormancy levels were determined on eight occasions during the winter period by forcing the intact trees and shoot-cuttings from the trees, including defoliation upon forcing versus natural leaf drop.

Key Results

Results from the first season indicated that the onset of dormancy was significantly earlier in the presence of leaves. As natural leave fall occurred, this effect became less and the overall rate of dormancy induction became independent of the presence of leaves. Defoliated, excised shoots (shoot assay) have a later dormancy start date and slower induction rate compared to intact trees. Their maximum dormancy level was lower and dormancy release was significantly slower resulting in dormancy ending later than intact trees. When a RBA agent was applied, the shoot assay results provided bud break patterns similar to intact trees by advancing the onset and increasing the total percentage bud break regardless of the presence of roots.

Conclusion and Discussion

This trial is currently in progress and all conclusions are based on data from the first season and can change upon further investigation in the second season. Both roots and leaves influence dormancy induction while dormancy release appears to be affected by the presence of roots. The shoot assay indicated later onset, lower dormancy levels and later release date dissimilar to the absolute values of the dormancy parameters of intact trees although overall trends appeared the same. After one season's data it appears as if the shoot assay is a suitable proxy for the evaluation of RBA especially if the RBA has a strong growth stimulating action. The robustness of this statement will be revealed with the completion of a second season's data.