Objectives & Rationale

Endodormancy is an important factor in determining the quality of blossom and therefore the potential yield, for the next growing season. It is a gradual process whereby the inability to grow is established and maintained and then released from the bud. Most dormancy research focuses on the release from dormancy and often neglect the induction/entrance into dormancy as this is a process that happens relatively quickly in regions with sufficient winter chill. Chill models have been developed and tested to work well in certain low chill regions. However some regions which experience mild winters, have a drawn out dormancy induction period that starts in autumn and often continue throughout the entire dormancy period. The effect of chilling temperature and the responsiveness of buds under these climatic conditions has not been tested or documented. This project aims to address this gap by testing different temperature treatments in the induction period of apple buds exposed to mild winter conditions.

Methods

Several methods are used during many trials, all of them include exposure of excised apple shoots ('Royal Beaut' and 'Cripps Pink') to temperature regimes related to chilling or heat wave conditions. Plant material from two climatically contrasting production regions were used in all trials and the common 'forcing experiment' conditions were used to quantify the effects of the treatments.

Key Results

Dormancy induction is not dependant on chilling temperatures and will starts in the absence of accumulated winter chill. During dormancy induction apples buds are, however, sensitive to chilling temperatures and can react to them from an early stage by increasing their dormancy level. This sensitivity seems to be affected by the growing regions as well as the current year's climate. Production regions with milder weather during the induction phase seem to be more sensitive to chilling during induction. Chilling models are poor at describing and predicting chill accumulation during dormancy induction and as the dormancy induction period makes up a large proportion of the total dormant period in mild winter regions, it explains why these models are not suitable. Short term, extreme temperate exposure during the induction period affects the dormancy level of the bud, showing region and seasonal differences.

Conclusion and Discussion / Recommendation

These results contributes to the understanding of the complexities driving bud dormancy and growth resumption. The results explain why the current chill models are inadequate in mild winter regions and begs for more research into the induction of dormancy to find a model/mechanism to explain/quantify the way a meristem interprets environment.