**Project Title**
Investigating the effect of different autumn/winter/spring scenarios on bud break in apple trees.

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**Objectives and Rationale**

Deciduous trees require sufficient winter chill to have a synchronised and condensed bloom period in spring. Yet, even under such conditions, and/or with the use of rest breaking agents, we see protracted bloom and delayed foliation in commercial orchards. Recent research indicated that chill accumulation during the autumn period (dormancy induction period) seems to be important for successful bud break. From this we hypothesis that not just the total amount of cold accumulated throughout the dormancy period contributes to bud break success, but also the distribution of the chill throughout this period.

**Methods**

To investigate the effect of different climate scenarios during the dormant period we are exposing apple trees (nursery trees produced in pots) to different autumn, winter and spring conditions and then monitoring their bud break patterns.

**Key Results**

After the first season of trials the dormancy progression results showed that the maximum dormancy level was only significantly different amongst the scenarios in the warmer winter. The dormancy release date was significantly different among the scenarios with the warm winter scenarios showing a significantly later release. The bud break results indicated that the winter temperatures contributed most to the bud break success. A colder autumn and winter accompanied by a warm spring yielding the highest percentage bud break although statistically equal to other cold winter scenarios. Cold autumn temperatures increased the bud break only under milder winter temperatures and only when combined with warm spring conditions. Although warmer spring temperatures decreased the onset to bud break, it only had an effect on the bud break percentage after a mild winter.

**Conclusion and Discussion**

This trial is currently in progress and no conclusions are final as they are only based on the results from a single season. These results indicated that although winter chill is the key factor in determining dormancy release, the quality of bud break under mild winter conditions benefit from colder autumn conditions providing that the heat accumulation in spring is sufficient. Therefore, successful bud break under mild winter conditions is not solely dependent on the amount of chill accumulated during the autumn and winter, but rather the timing of the chill accumulation throughout the seasons and the heat accumulation in spring.