# LOOKING TO THE FUTURE

## Developing a South African phenophase-temperature database

A need to better understand seasonal temperatures and bud break in pome and stone fruit has inspired a new project that aims to establish a phenophase-temperature database. The project is jointly led by Dr Esmé Louw from the Department of Horticultural Science at Stellenbosch University and Dr Iwan Labuschagne from specialist evaluation company Provar. The project is funded by Hortgro Pome and Hortgro Stone.

**BELOW The Pro-Hort site at Klipboschlaagte is home to some of the trees in this project. Click here to read more about Pro-Hort.**

Spring flowering is a pivotal event in fruit production. Now is the moment when fruit begin to set — or not. Trees that linger in dormancy and blossom unevenly are troublesome to manage compared to trees that wake up smartly and get on with the job of flowering. Uneven flowering complicates operations such as fruit thinning and result in variable fruit maturity with implications for postharvest management.

Trees — like us — rouse more readily after a good rest. Growers have long known that many deciduous fruit trees need winter chill for dormancy and that a lack of adequate chill is a red flag for protracted flowering. Protracted and uneven flowering leads to large variations in the size of fruitlets. Reduced vegetative bud break results in fewer fruit-bearing positions. Growers are compelled to leave more than one fruit per fruit-bearing position — ending up with smaller and less deeply coloured fruit.

The long-term growth habit of the tree is also affected by bud-break behaviour. Trees develop more basal dominance in areas with warmer winters. Growers struggle to train these more basal-dominant trees to fill their allocated vertical space. This can have a dramatic impact on the long-term yield and profitability of orchards.

> **Winter chill is not the whole story**

Growers can take action to break the dormancy of trees that they suspect of wanting to sleep in. The question is how to identify these laggards and decide on appropriate action to shake them out of their rest. Several models have been developed that predict bud break based on winter temperatures. The problem is that these models are not founded on South African data so are not always reliable when applied to South African orchards.

The phenophase-temperature database will help to answer local questions using local data about the bud-break patterns of our orchards.

## WHAT WILL THE NEW PROJECT DO FOR GROWERS?

The researchers will gather data on temperature and the phenology of bud break and flowering in both newly-established and mature apple and plum orchards in three areas. Their phenological data will include total bud break and the dates of onset of growth, first flower, full bloom and end of bloom. This will allow them to calculate parameters such as the duration of the early, late and total bloom periods.

Data will be collected for five years. It will be used to investigate which autumn, winter and spring temperature scenarios are associated with different bud-break and flowering patterns. Growers already recognise that winter chill is not the whole story — this past winter was mild but a warm spring gave trees the push they needed to blossom better than expected. The outcome would have been much less favourable had spring been cold. A large data set will provide more insight into the role of spring and autumn temperatures in bud-break and flowering phenology.

The data set will also allow researchers to assess different chill models and see which works best under local conditions.

The final objective of the project is to apply the chill models to climate data for the main apple and plum production areas in South Africa. This will facilitate predictions about the most likely temperature patterns in different areas — vital information for growers trying to adapt to a warming world.

A better understanding of temperature effects on bud break and flowering can help growers manage dormancy more effectively. Knowing what to expect and the most appropriate treatment to break dormancy will go a long way to ensuring even flowering and fruit set as well as optimal development of fruiting wood and tree architecture.

At present most growers consider only the total amount of winter chill when planning for rest break — an unreliable strategy. Growers need models that are specific to South African conditions and that take the temperature fluctuations outside of winter into account. More accurate models will give growers the tools they need to get trees off to a flying start — the first step toward a great harvest. **FQ**

**TOP RIGHT Iwan Labuschagne explains why these apple trees are struggling with rest break.**

**BOTTOM RIGHT Esmé Louw records the progress of young cherry trees.**

PHOTOS: ANNA MOUTON