# Data-drive Farming

**Real-time information and forecasting of pest and disease development**

By Engela Duvenage

Information gathered daily on farms can be fed into effective modelling programmes to take precision farming to a next level. Modelling can help producers time disease and pest control programmes better, and determine the best times for fruit thinning. So said Dr Gideon van Zyl of the agricultural consultancy firm ProCrop. He was presenting on behalf of his colleague, Bekker Wessels.

Van Zyl was referring to the cloud-based interactive decision support system RIMpro. RIMpro is used by fruit producers worldwide. It is based on simulation models developed and tested globally. It uses localised weather forecasts to simulate how specific diseases or pests might spread within a matter of hours or days.

RIMpro uses data gathered from a virtual weather station based on a predetermined location, and not real data from the weather stations on a specific farm. ProCrop has found that the virtual weather data correlates very well with real-time weather data.

ProCrop has been evaluating RIMpro's performance on the farms of 27 clients for the past three years. Van Zyl described their results in the context of codling moth, apple scab and fruit thinning.

### CODLING MOTH

RIMpro's codling moth model was validated by Bekker Wessels of ProCrop by comparing real-time events with RIMpro forecasts. RIMpro's model forecasts when the first female flights are expected, when eggs will be laid and when larvae will start moving.

RIMpro's codling moth model takes into account how much heat insects accumulate over a 24-hour period, as well as fluctuations in day length. These environmental variables stimulate pupation of overwintering larvae and the onset of the first moth flight of the season. Once this so-called biofix is set, the model forecasts mating, egg-laying, egg



**Apple scab is one of several RIMpro models of potential interest to South African producers.**

> **RIMpro could help producers better plan their apple scab spray programmes.**

hatch and subsequent instar development.

This information is critical in timing first-generation sprays, planning spray intervals and deciding when it is safe to stop applications under low infestation pressure.

"By knowing what's going on at a specific time in an insect's life cycle, we know when to react, and how to react. This saves money and increases the efficacy of spray programs," Van Zyl explained.

### APPLE SCAB

Older models for modelling scab epidemiology base disease forecast only on climatological parameters and ontogenic resistance of fruit to scab infection. For primary scab infections, the RIMpro model incorporates the maturation of ascospores — overwintering spores — as well as the quantity of spores to be released during an infection event.

This allows for a much more accurate measure of the severity of infection events and better guidance on the aggression of fungicide intervention needed to prevent lesion development.

Van Zyl believes that RIMpro could help producers better plan their apple scab spray programmes.

Validation of the apple scab module is being done by ProCrop in conjunction with Prof. Adéle McLeod of the Department of Plant Pathology at Stellenbosch University. The project is funded by Hortgro Pome.

### FRUIT THINNING

RIMpro's fruit thinning model uses temperature and radiation data to simulate the carbohydrate metabolism of trees.

According to Van Zyl, the limited contribution of photosynthesis to carbo-hydrate accumulation during and shortly after flowering can easily result in trees with a negative carbohydrate balance during cloudy weather at relatively high temperatures, because respiration exceeds photosynthesis. The indiscriminate use of chemical thinning products during such periods could result in overthinning and therefore crop loss.

The RIMpro fruit thinning model indicates the occurrence of such periods and helps growers time thinning events and choose products according to prevailing climatic conditions.

Van Zyl singled out the RIMpro codling moth, apple scab, apple powdery mildew and thinning models as especially relevant to South African apple producers. He believes that many other RIMpro models show promise for local use. **FQ**

Dr Gideon van Zyl
ProCrop
GideonVZ@procropsa.co.za