1-5-2018   FruitLook April 2018: How do we ensure data quality?

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Dear Mr. Doe,

As a user you might have looked at a FruitLook image or graph and thought: "Hmm.. This data looks realistic for my field, but how do I know I can trust the data? What is the FruitLook team doing to make sure the data is telling me the truth?"

A very good question indeed! Researchers from different institutions in South Africa have been working closely with eLEAF (the data supplier) since the start of FruitLook to evaluate the data. Initially the focus has been on actual evapotranspiration (ETact), but in recent years most other data sets have been/are being evaluated as well. In this newsletter we would like to present some of the work done.


The fields used in the ETact data evaluation during the current season. Left to right: Wine grapes in Stellenbosch, Table grapes in Olifantsriver and Tobacco in Oudtshoorn.

Evaluating Actual Evapotranspiration (ETact): ETact refers to all water "used" in transpiration and evaporation from the surface. The models used in FruitLook revolve around solving the surface energy balance, or simply put: determining how the energy from the sun that reaches the earth is used in different processes. This includes warming the air and soil and driving transpiration and evaporation. These same processes can be measured in the field via energy flux measurements. Results from the past 8 years showed that the ETact from FruitLook compares well to the one independently measured in the field, for a range of land uses. Row crops in dry conditions present the biggest challenges in terms of ETact calcutions. A lot of effort goes into ensuring these conditions are modelled as optimal as possible.
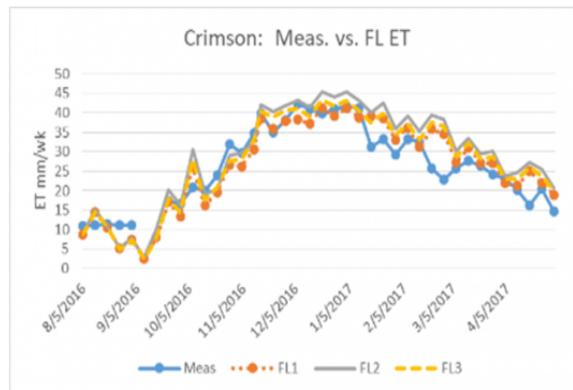
Field measurement of ETact (meas) and the FruitLook ETact for a Crimson vineyard in the Olifantsriver region. F1, F2 and F3 represent different ways of comparing.

Evaluating Biomass Production (BIO): In FruitLook BIO refers to the weekly total growth for a surface: roots, shoots, fruits, stems, weeds and cover crop, in kg/ha/week. Estimating BIO in the field is very labour intensive since it requires "destructive sampling", i.e. cutting down the crop and weighing and drying it. Measuring shoot growth provides a good surrogate to this destructive method. Results from work done in a number vineyards over a few years are very encouraging and showed very good agreement between the BIO-data from FruitLook and the shoot growth.
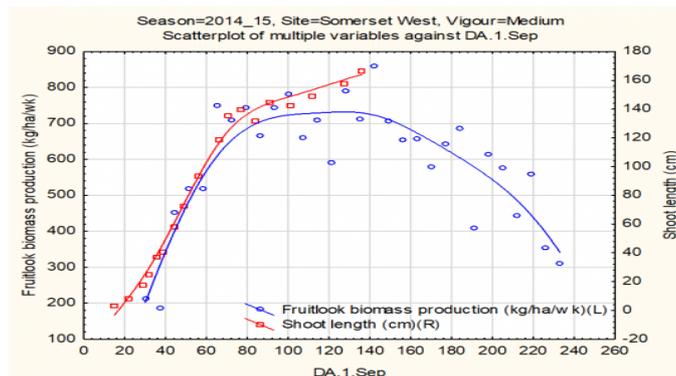
Comparison between Fruitlook biomass production (kg/ha/week) and shoot growth (cm) for a vineyard in Somerset west.

Other running data assessments: In the 2017/18 season, research is taking place into the accuracy of Vegetation Index (=NDVI) and LAI, using field and drone data collected from a vineyard. ETdeficit is also being evaluated against soil water content and plant water potential data collected from 70+ vineyards, with varying soils, cultivars and trellis systems. Apart from the FruitLook team, numerous external researchers and students are involved in evaluating FruitLook.

What else is done? The research focus of FruitLook also includes looking into new data applications. Over the past few years, the Centre for Geographical Analysis (CGA) at Stellenbosch University, has been closely involved in evaluating big FruitLook datasets using Machine Learning (ML). ML allows researchers to investigate relationships between large datasets (e.g. FruitLook and field data) in order to "build models" which can be used for predicitions of certain variables. To date the focus had been on crop yield and soil water content modelling. An example of a simple Decision Tree (DT) developed for modelling apple yield, is shown below.
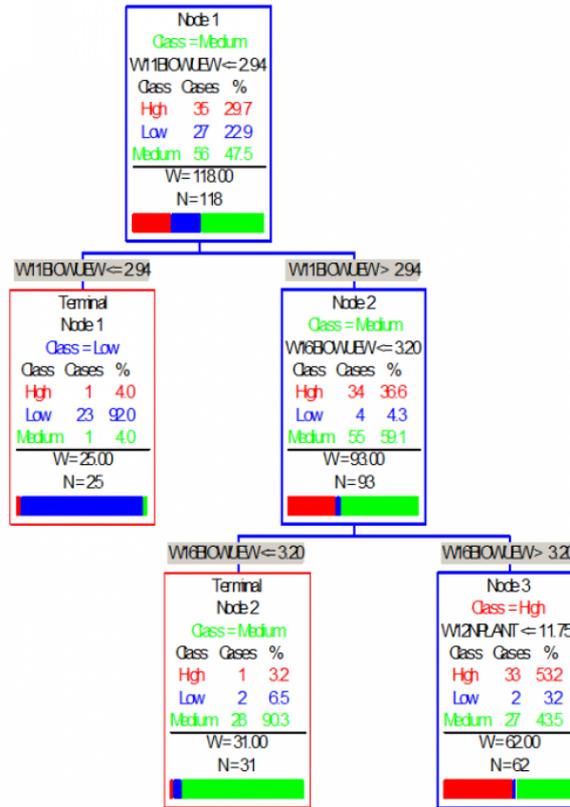
Example of a crop yield Decision Tree for apples, based on weekly FruitLook data.

FruitLook data is also pivotal in research funded by Winetech on the use of FruitLook data for modelling wine grape yield by big data analysis and ML. Also, within a Water Research Commission / Winetech study FruitLook data is utilized, amongst others, to determine the Water Footprint of table and wine grapes.

Much is happening behind the scenes! Know that whilst you are farming, researchers are continuously studying the FruitLook data to ensure that you receive the best quality data possible. They are also continually investigating new creative ways of adding extra value to the existing data. If you have any questions regarding the quality of the FruitLook data or have ideas for complimenting applications, feel free to contact Dr Caren Jarmain (cjarmain@gmail.com) who is currently heading this research.

Good luck with the remainder of the season!

The FruitLook Team

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