

FruitLook is gaining traction from local users. We asked producers how they use and integrate it with other technologies and information.

Producers are embracing various new-generation tools to better understand their block and orchard development.

FruitLook employs satellite remote sensing and this is becoming increasingly popular.

This online tool has been tailor-made for local use. It offers a unique view on different aspects of a block or orchard, including water-use and crop-production. This is possible thanks to FruitLook's ability to collate useful information that is not always visible to the naked eye.

FruitLook's data is made available in the form of a range of user-friendly maps of production units and can be used by the producer in many ways. See graphic for examples. Producers can, for instance, use it to monitor growth differences in their production units by using FruitLook's indicators on biomass production over time. It can also be used to decide where to place soil moisture probes and even to harvest selectively.

"Each one of FruitLook's data sets (on growth, water use and nitrogen) shows a different picture and provides insights on your block," explains independent researcher Dr Caren Jarman. "The more picture elements available, the more comprehensive the puzzle that can be built with it."

As part of FruitLook's dataservice to producers, it is now also possible to automatically let them know if the satellites detect huge differences in blocks compared with the "normal" picture. This electronic "watchdog" feature that automatically alert producers of such changes via email, is called FruitSupport.

A healthy vineyard-block will look rather uniform throughout the season when it comes to FruitLook's growth indicators. If this picture changes suddenly, it can be because of pests, water stresses and other issues related to crop-growth in the block. "This enables producers to adjust their management decisions or if there is a problem to correct it to ensure optimal growth in the block," says Jarman.

Nigel Cook, a consultant from Prophyta, considers FruitLook a handy tool when it comes to irrigation scheduling. "FruitLook offers an independent tool to measure what is happening in the block and can inform decisions on scheduling." Cook adds to this: "Before FruitLook was available, it was much more difficult for a producer to get a bird's eye view of a block or a farm. You can compare it with someone playing golf without a scorecard. FruitLook is also not only useful in-season, but to look back on a season to see how well you fared (from a management perspective)."

He believes it is really important to consider soil

conditions when making decisions on irrigation scheduling on a farm. Integrating this information with FruitLook's water indicators provides unique farm-based intelligence.

Dr Albert Strever, a viticulturist from the University of Stellenbosch, considers FruitLook a valuable tool for producers, especially when it is integrated with other technologies. The difference in the growth of areas in a block can, for instance, be useful to provide information on its management, given that variations are often linked to soil differences related to water and growth.

"It can be used to assess resource-use on farms and make it more efficient if possible," he says. "It, however, depends on the readiness of a producer or consultant to interpret and/or apply the data that is being generated," he says.

Strever is involved in a research project on how FruitLook can be used to do yield projections. The team, with Jarman as its project leader, is looking at phenological as well as yield data and employs statistical and machine learning techniques for this. The project employs both statistical analysis and machine learning to discover relationships between remote sensing data and yield data, in order to model yield in future.

FruitLook's unique datasets can also be used in combination with other technologies and information, for instance, when it comes to soil moisture samples.

Tiaan Snyman, a soil scientist from Agrimotion, says this process of integration can yield interesting information for producers. "If a soil moisture probe, for instance, shows that the soil is dry and we see that the orchard or block is using water in a less-efficient way, we can say with certainty that this is due to under-irrigation. The more data we integrate, the better our answers and recommendations.


"Growth differences in blocks often indicates soil differences and soil samples are therefore taken in different areas," he says. "FruitLook, along with soil and plant samples allows us to compile a comprehensive picture."

He considers FruitLook a very efficient tool to

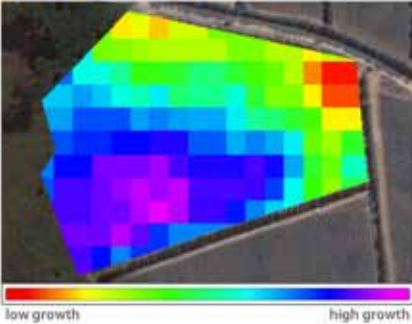
fruitlook.co.za helps farmers to define management zones and decide on sampling points for better field and crop management

Views of a vineyard block

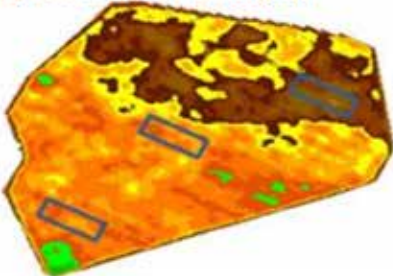
A vineyard near Somerset West



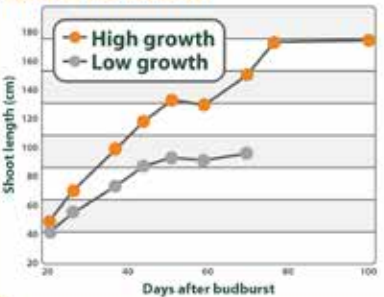
FruitLook shows clear growth variation in this block



This variation is also visible in a high-resolution aerial photograph



Field measurements of shoot growth confirm this variation

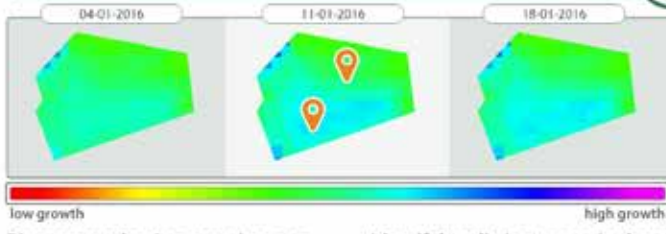


| Days after budburst | High growth (cm) | Low growth (cm) |
|---------------------|------------------|-----------------|
| 20 | 40 | 40 |
| 30 | 70 | 55 |
| 40 | 100 | 70 |
| 50 | 130 | 85 |
| 60 | 140 | 90 |
| 70 | 150 | 95 |
| 80 | 160 | 95 |
| 90 | 170 | 95 |
| 100 | 175 | 95 |

How to create sampling zones using FruitLook

Biomass production

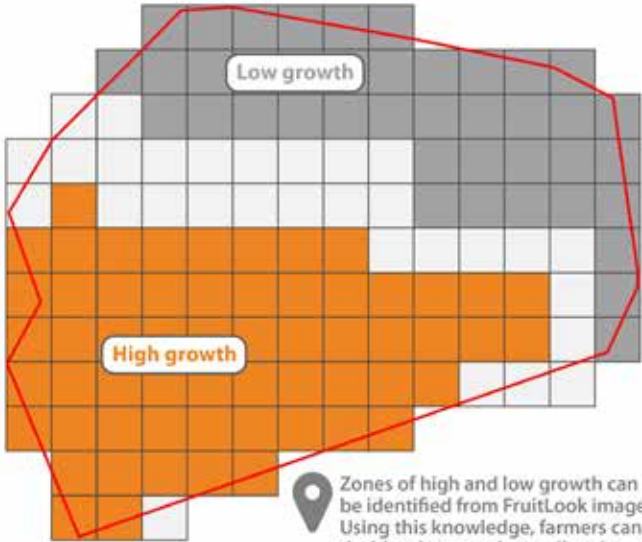
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low growth high growth

Biomass production over time can help farmers identify growth variation in a block

Identifying distinct zones in these blocks can help farmers identify where to sample fruits or leaves




Zones of high and low growth can be identified from FruitLook images. Using this knowledge, farmers can decide where to place soil moisture probes or take samples

Where to place soil moisture probes

Evapotranspiration deficit

25-01-2016 01-02-2016 08-02-2016



low stress high stress

Evapotranspiration deficit over time will show which areas in a block are prone to stress

Soil moisture probes at these locations will give early warnings of crop stress

understand variation in a block. "Consider data from a warm week in December, for instance. FruitLook's indicators on how efficient water is used as well as what type of variation are visible along with soil moisture meters will provide the

most representative measurement." Distell has been using FruitLook in season in combination with measurements on optimal ripeness. At Plaisir de Merle (near Franschhoek) grape samples were taken

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Visit www.fruitlook.co.za for more information.

Growing Fruit IQ

MATTHEW ADDISON

The research environment regarding crop protection in the deciduous fruit industry is constantly changing, and the rate of change seems to be picking up. The combination of new research findings and the need for research on new and existing subjects makes for a very dynamic environment.

The current situation regarding phytosanitary requirements in the overseas markets is challenging. The status of the phytosanitary risks associated with false codling moth (FCM) illustrates a number of issues. Firstly, the insect represents a significant phytosanitary risk to importing countries, that is, nobody wants it. This is understandable as it attacks numerous hosts and is relatively mobile. The local citrus industry is also grappling with this problem. In order to limit the risk for importing countries, a series of pest management actions, both pre- and post-harvest, have to be taken. That is easily said, but they have to be effective and applied correctly. For example, the host status of a given crop has to be defined before anything else. In other words, does FCM attack the crop and if so, when and to what extent? There are a number of factors that have to be examined to answer this question. Pest management actions in orchards also have to be assessed and optimized. In addition, the actual number of insects in the harvested crop has to be determined. This is often a long and tedious task which involves inspecting huge amounts of fruit. The next step is to determine the effects of post-harvest treatments on the survival of the insect. This list goes on. We are fortunate in that we have some unique local knowledge and industry approaches to the problem. Firstly, if needed, there is an established sterile insect release programme running in the citrus industry. If required, sterile insects could be used to treat high risk crops and areas. The method is effective and easily integrated

into current management strategies. Allied to this is the local biological control knowledge that has been accumulated over time. A number of agents are available and have been well researched. Some of these will complement the release of sterile insects. Another factor is the application of pheromone mating disruption for FCM. We, as an industry, have extensive experience with pheromone disruption of codling moth and very high compliance. I am aware that the application of pheromone disruption in the stone fruit industry will differ in some ways. For example, stone fruit orchards tend to be more fragmented relative to apple and pear orchards. This could lead to an increase in edge effects where the pheromone is not as effective as it should be. Having said that, we have experience on how to handle this, and can therefore address any pending problem. There are a number of industry funded research projects on FCM and the results are promising.

Another phytosanitary issue is the Oriental fruit fly *Bactrocera dorsalis*. Initial predictions indicated that the insect would spread rapidly within South Africa. It has yet to arrive in the Western Cape, possibly because the number of infested fruit arriving in the area is very limited. We have had some very welcome lead time in which some vital research has been carried out. Current research has centred on the ecology and physiology of the fly. In addition, we have gained invaluable knowledge from areas that have been invaded.

Soil health is becoming a very hot topic within agriculture. The effects of soils and orchard floor management on pest and disease management are obvious. For example, the breakdown of apple leaves on the orchard floor during winter determines the severity of apple scab during the following season and the presence of diverse cover crops in orchards allow

for the biological control of mites. Soil health could be defined as the study of soil ecology, thus making it a very complex subject.

The development and application of methods to measure life in soils is a priority. Significant progress has been made locally in using nematodes and soil microorganisms as biological indicators. The variables involved in cover crops and orchard floor treatments such as the application of mulch and compost are daunting.

There are a number of research projects on soil health, again the results are encouraging and in some cases are being applied in the industry. External funding has also been raised for a soil health research project in which soils in organic and conventional orchards will be compared. The project involves a number of international and local researchers. The research is relevant

as a number of methods will be used simultaneously to measure soil health thus allowing us to develop an understanding of soil health and the management thereof.

Lastly, the people involved in the crop protection programme are vital. It is great to be able to announce that Dr Nomakholwa Stokwe has been appointed as a lecturer in the Department of Conservation Ecology and Entomology. Nomakholwa entered the University as a Masters student having completed a BSc at the University of Fort Hare. She went on to do her Ph D on the biological control of woolly apple aphid with Dr Antoinette Malan. Nomakholwa is a very much needed and welcome addition to the Integrated Pest Management team at the University, and will ensure capacity within the nematology group.

FruitLook

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at different places in the blocks based on growth differences established with FruitLook. They tried to harvest the grapes separately in different blocks where possible. Distell aimed at harvesting a block as soon as the Maselli index indicated that the grapes were optimally ripe. Their blocks are generally homogeneous, but sometimes strong and weak growth areas evident. They want to experiment with making different wines from this separately harvested grapes and to establish how growth differences affect wine quality for different cultivars.

Dirk Sutherland from Omnia says FruitLook is also very useful to identify weak areas in blocks when it comes to soil health, if used together with other applications and measurements. "It is becoming increasingly important to evaluate soil health. We combine a physical, chemical and biological assessment to determine why growth in a certain area is weak and compare it with assessments from better sections in the block.

He marks these "weak spots" with GPS and combines it with other applications used by Omnia. It is very interesting how soil life differs between the weak spots and the better ones, he says. In this experience FruitLook helps a lot with taking accurate samples with much less effort when it comes to applying fertilisers in

general. It also gives you an idea of how water moves through the block.

He uses FruitLook to identify two GPS points per block that he considers as being representative when he does his sampling. This enables him to revisit the same places next year to do follow-up measurements. "This enables me to say with greater certainty whether or not the fertiliser program I employed worked or not, seeing that my sampling can be standardised."

Sutherland believes FruitLook's technology, when integrated with other technology and information, enables farmers to manage water, fertilisers and pest control in an economically more sustainable manner. "I believe FruitLook will enable producers to micro-manage on a bigger scale."

When it is used in collaboration with other technologies and information that producers have access to, including their current knowledge of their farm and production units, it also unlocks more possibilities to use and manage available resources more efficiently.

Snyman also adds that FruitLook is especially valuable to producers given that it is independent, available for free and also updated weekly. "It offers a fantastic way to look at a block or orchard in an entirely new way," he says.