



FruitLook April 2015: You can help us!

Dear Mr. Doe,

The last month of monitoring for the 2014-15 season has begun. We hope you have a successful harvest and this season's efforts are paying off. In this newsletter we have our regular parameter discussion, focussing on Biomass Water Use Efficiency. However, we first update you on FruitLook and ask for your support in understanding the impact of FruitLook on efficient water use better. We also further introduce FruitSupport, an additional service offered to FruitLook subscribers which will be available on the website soon.

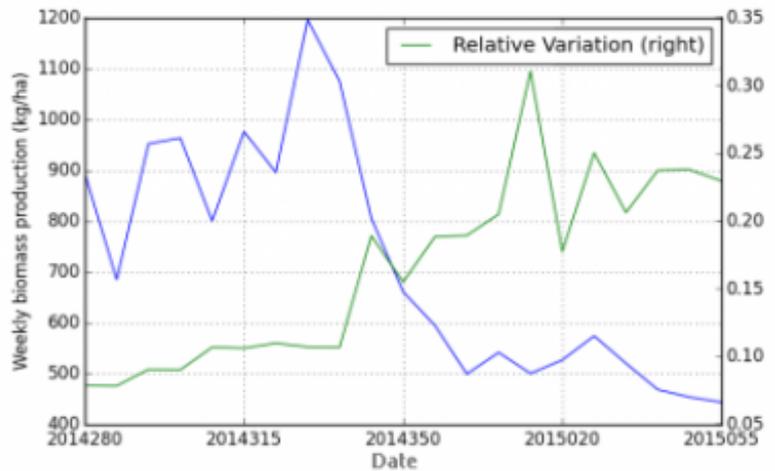
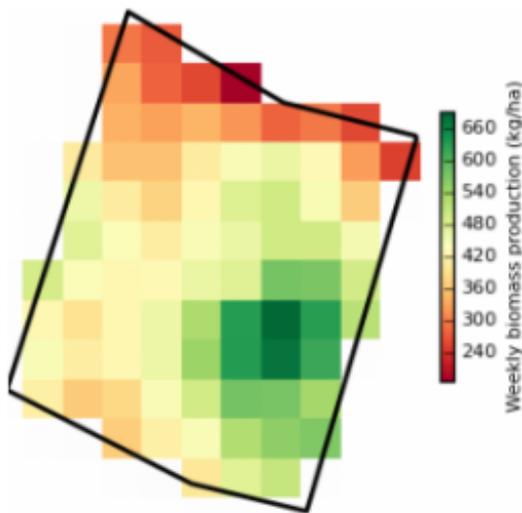
FruitLook Questionnaire: FruitLook is funded by the Western Cape Department of Agriculture to support fruit production. Efficient management of water resources is invaluable for perseverance and future growth of the fruit and wine production industries. We believe that FruitLook is a valuable tool for producers and the fruit industry as a whole on the road to sustainable resource management. Frequent FruitLook users strongly support this view: that FruitLook indeed helps to improve resource management. Examples of data uses have been presented on the [FruitLook poster](#) and [FruitLook newsletters](#) for everyone to see and try.

The use of FruitLook in the Western Cape fruit production sector has exponentially grown over the past seasons. Almost 4,000 orders for data have been received for the FruitLook 2014-15 season. These orders represent 33,000 hectares of satellite monitored irrigated agriculture every single week. FruitLook is becoming an accepted and widely used service for observation and evaluation of water use and crop development. An important question remaining however is: *what is the impact of FruitLook on water use?* In other words, *does FruitLook indeed help the fruit production sector to become more water efficient as a whole?*

A (short) questionnaire will be disseminated later this month via info@fruitlook.co.za. We kindly ask you to take part in this survey to help FruitLook help you in the future.

FruitSupport Update: The [January 2015 newsletter](#) announced the future introduction of FruitSupport. The development of this additional service is nearing completion. In this section we shed some light on what FruitSupport can do for you.

You can think of FruitSupport as an electronic watch dog guarding your crop's development. Based on statistical analysis of the FruitLook dataset FruitSupport will warn you if something goes wrong or changes drastically in a field. In order to do so FruitSupport keeps track of the temporal and spatial development of the Actual Biomass Production and the Vegetation Index. These parameters directly correspond to crop health/development.



A spatial overview of the variation within weekly Actual Biomass Production in a selected field is depicted on the left. FruitSupport tracks this variation throughout the growth season, depicted in the graph on the right. The development of variation through time is depicted in green. As can be seen this blocks shows a strong increase in relative variation from the middle of the growth season onwards, which might indicate a growth issue. This is even more likely considering the drop in biomass production, depicted on the left axis, which occurs simultaneously to this increase in variation.

The Actual Biomass Production is a direct reflection of the current state of crop, impacted by the condition of the soil and climate. High variability in Actual Biomass Production within one field can therefore be a strong indicator of (parts of) the block not performing optimally. This might indicate drought, disease or other issues influencing crop development which will possibly affect crop yields. The Vegetation Index is an indicator of crop vigour and used to follow the general block development. A decreasing Vegetation Index within the entire block could indicate a general problem with block management/development.

FruitSupport will monitor these factors week after week throughout the FruitLook monitoring period. Subsequently FruitSupport will inform you via email when growth deficiencies are detected. The goal is to have a fully functioning FruitSupport framework in place at the start of the FruitLook 2015-16 season. The FruitLook newsletter will inform you as soon as the service is available!

FruitLook Parameter Discussion: Biomass Water Use Efficiency: In this section a FruitLook parameter is evaluated. Three questions are covered: 1) What is it?, 2) What can you expect?, 3) How can you use it? It is important to note that although we will describe the data products separately, they are related and of influence to each other. For example, a strong increase in evapotranspiration deficit will lead to a *reduction* in biomass production due to water stress.

The [January 2015 newsletter](#) focused on the Vegetation Index and in the [February 2015 newsletter](#) the Biomass Production was discussed. The [March 2015 newsletter](#) described the use of the Actual Evapotranspiration and Evapotranspiration Deficit. This month we focus on the **Biomass Water Use Efficiency**:

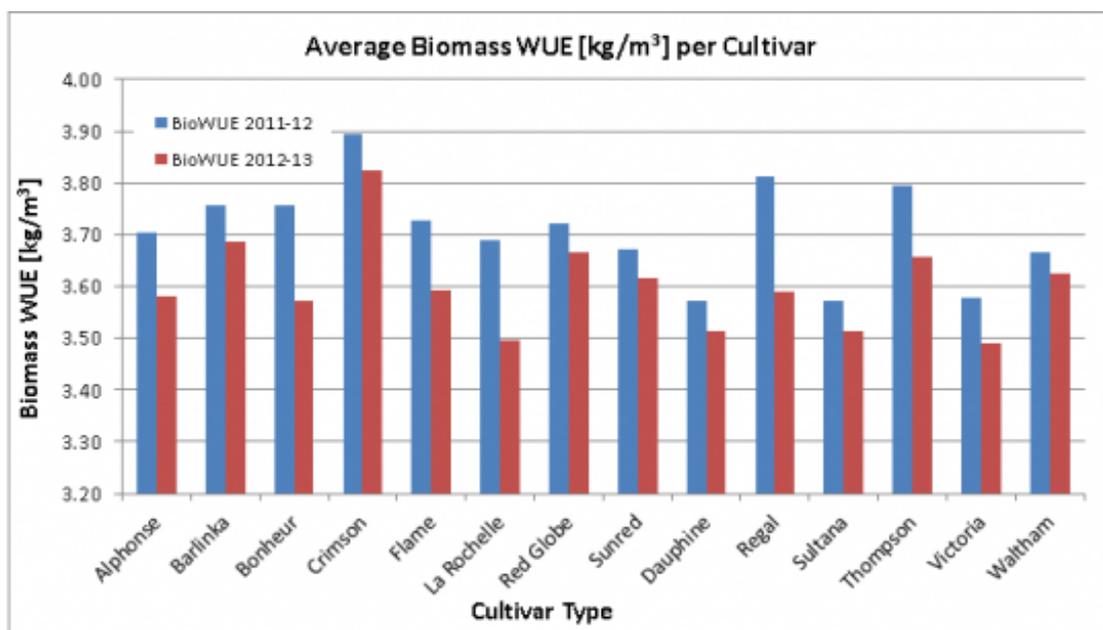
Biomass Water Use Efficiency: What is it? The Biomass Water Use Efficiency (Biomass WUE) is the actually produced biomass per unit (cubic meter) of water consumed by evapotranspiration. A high Biomass WUE is an indication of efficient water use. While the Actual Biomass Production describes the amount of biomass produced per unit of land (kg/ha), the Biomass WUE describes the amount of biomass produced per unit of water (kg/m^3). The biomass produced is the dry matter increase of your crop per week, including roots, shoots, fruits, twigs, leaves and all in between. Higher Biomass WUE can be achieved when less water is used to produce equal biomass or when biomass production increases while total water consumption remains equal. The Biomass WUE does not tell you how much water has been used to produce a specific amount of crop yield.

What can you expect? The Biomass WUE can vary between no production up to $7 \text{ kg}/\text{m}^3$. Typically Biomass WUE values for deciduous fruits grown in the Western Cape were found to fluctuate between 2 and $5 \text{ kg}/\text{m}^3/\text{week}$. A higher value means more efficient water use by the crop. The Biomass WUE of a mature block often is relatively low at the start of the season, followed by a prolonged stable period and ending with a sharp increase at the end of the season (courtesy of Prophyta). An example of such a curve is depicted below (top image). The lower Biomass WUE at the start of the season is often due to more soil evaporation in relationship to transpiration and growth. A younger block tends to show a slightly increasing biomass WUE over the season. An example of such a curve is depicted

below (bottom image).

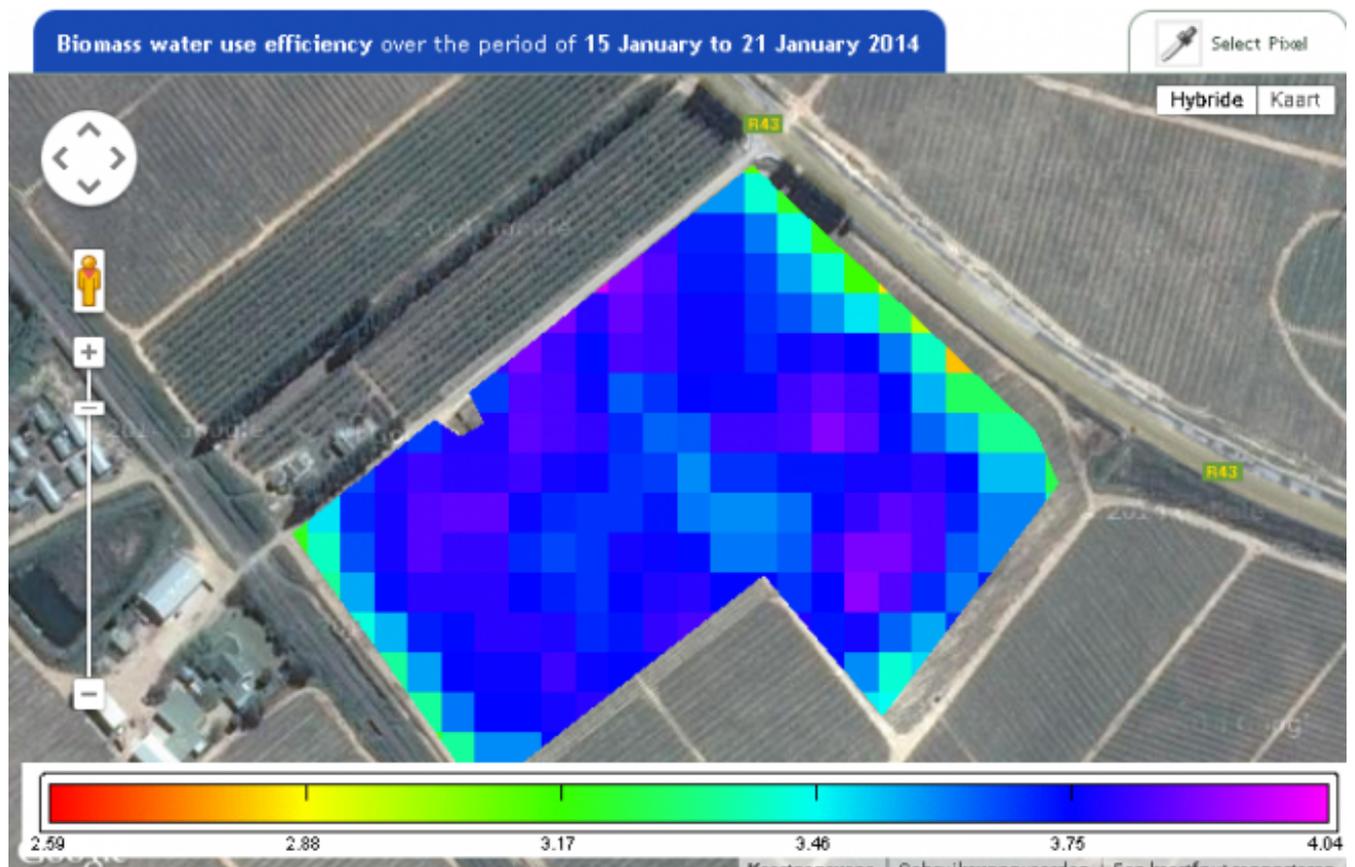


Variations to these curves however are plentiful. The Biomass WUE is influenced by crop type, variety, crop age and soil and is hence affected by site specific factors. This is also reflected in the image below. The graph represents the average seasonal Biomass WUE (based on FruitLook data) calculated for a number of table grape cultivars grown in South Africa. The variation is clearly visible; between seasons and between cultivars. Based on this data some cultivars seem to produce more biomass per cubic meter of water and can be considered more water efficient. Remember however this variation in Biomass WUE is not directly linked to the actual fruit production (= yield). This means it is not necessarily so that the high Biomass WUE cultivars also produce more yield per cubic meter of water used.



How can you use it? *Spatial Overview:* Variations within one irrigation block might indicate part of the irrigation water is not efficiently used. For example, areas of low Biomass WUE might indicate water logging, possibly due to drainage problems. In general the Biomass WUE is a tool to evaluate and optimize your irrigation system: where does your irrigation functions optimal? And where not? What is the difference between these spots? And can you

improve your system to use your water more accurately? For example in the image below a block is visible with clear variation in Biomass WUE. The lower Biomass WUE in this example relates directly to areas with lower biomass production. In general the best use of the Biomass WUE information can be gained by relating it to the Actual Biomass Production and ET Deficit parameters. Apart from on field level the Biomass WUE can also be used to compare the efficiency of water use between blocks, e.g. on farm level.



Temporal Overview: You can use the temporal profile to easily see if your blocks show continuous development throughout the growth season. A one-week drop in Biomass WUE could be caused by meteorological conditions. However, if a strong prolonged decline is visible it might indicate over-irrigation. Especially if no Evapotranspiration Deficit can be identified and Actual Evapotranspiration, compared to surrounding irrigation blocks, peaks. However, it needs careful consideration to conclude whether or not a block suffers over-irrigation or not.

Thank you for taking time to read this newsletter. We hope you will take a moment to fill in the FruitLook questionnaire which will be disseminated later this month. If you have any questions/remarks about this newsletter or FruitLook in general, feel free to contact us via info@fruitlook.co.za. We wish you a pleasant autumn and see you soon on FruitLook!

Best regards,

The FruitLook Team



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