Irrigation in citrus aims for achieving high yields and desirable fruit size and sugar level\(^1\). Irrigation coefficients are commonly used to determine water application, however, they do not take into account variability between years caused by difference in crop load, light interception and more. This can be resolved by having real-time plant feedback\(^2\). Dendrometers are direct tree sensors proven to assist in irrigation optimization in citrus\(^2,3\).

**TIMING FOR WATER STRESS**

**SPRING**

Water stress during spring induces flower drop and has the **strongest negative effect on yields**.

**SUMMER**

Water stress leads to a decrease in fruit size. This is a temporary effect which can be reversed if irrigation is increased.

**AUTUMN**

Some water stress has a positive effect on fruit quality\(^4\).

**THE PHYTECH SOLUTION**

- Sensors on selected trees continuously measure changes in stem diameter, which are translated into plant stress indications.

- Phytech identifies yield reducing stress and immediately alerts growers on mobile and web platforms.

- Sensors on **selected fruits** continuously monitor fruit development.

- Supporting parameters included in the system: irrigation monitoring, soil moisture monitoring, climate data and satellite image analysis.

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Learn more at [www.phytech.com](http://www.phytech.com)
HOW DOES IT WORK?

A trunk of a citrus tree shrinks during the day as a response to lowering water levels. The more it is stressed, the more it contracts, before replenishing again at night. Phytech’s algorithms utilize this shrink-swell mechanism as a tool to quantify water stress.

“IT’S LIKE AN AUTOMATIC PRESSURE BOMB..”

Stem water potential measurements (SWP), manually taken with a pressure bomb, are proven to assist in citrus irrigation. However, acquiring the measurement is time and staff consuming. Phytech uses the dendrometers, which are correlated with citrus SWP, to create its’ plant status stress indicator.

Phytech automatically transforms reading into stress alerts. The plant status indicator takes into account both the daily water stress level (MDS) and the plant growth, resulting in a more accurate algorithm.

THE ART OF BALANCING GROWTH

Balancing vegetative (trunk) growth and fruit growth is an important aspect of growing citrus. Strong trunk growth during the fruit growth stage is unwanted, as shoots forming at this stage are unlikely to form fruit, and resources invested in them can come at the expense of fruit growth. Phytech allows easy monitoring of both trunk and fruit growth to reach the best irrigation practice. Best practice is to irrigate to the amount where fruit growth is positive, while trunk growth is close to zero.

To demonstrate, here are the results of an irrigation trial held in California during September 2016.

<table>
<thead>
<tr>
<th>Irrigation</th>
<th>Fruit growth</th>
<th>Trunk growth</th>
<th>results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficit irrigation</td>
<td>24% of ET</td>
<td>0.06 mm/day</td>
<td>No trunk growth</td>
</tr>
<tr>
<td>Best Practice</td>
<td>60% of ET</td>
<td>0.17 mm/day</td>
<td>No trunk growth</td>
</tr>
<tr>
<td>Over Irrigation</td>
<td>90% of ET</td>
<td>0.12 mm/day</td>
<td>Positive trunk growth</td>
</tr>
</tbody>
</table>

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