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# Introduction for the FloraPulse Dashboard

The FloraPulse Subscription service includes access to online data visualization. This guide provides a walkthrough of the FloraPulse Dashboard along with tips and tricks on how to understand your water potential data and how it can be used effectively.


Figure 1: FloraPulse dashboard overview

The FloraPulse dashboard is an easy-to-use web-based app that allows you to view and interpret your crop's real time water potential data. It allows you to visualize midday SWP and 24/7 SWP as they are collected by your datalogger and microtensiometer sensors. Midday SWP data is conveniently plotted against baseline SWP to provide an easy way to view plant stress. The dashboard also allows you to manually input your pressure bomb values. Lastly, irrigation pressure switch data is viewable in the midday SWP chart to let you know how long your irrigation has been running.

## What is Water Potential?

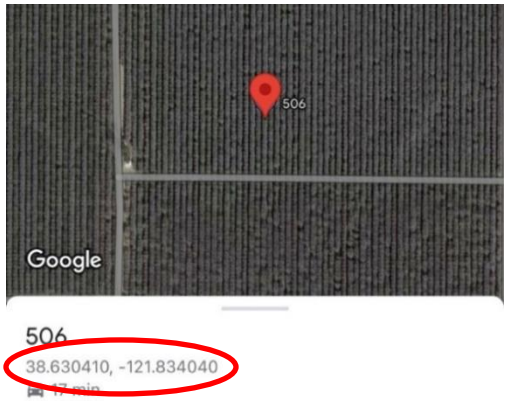
**Stem Water Potential (SWP)** is the amount of water tension (pressure) in the xylem, typically measured in bars or megapascals. Plants are able to transfer water from their roots and up through the leaves because of the tension in the stem. Water Potential is extremely useful for understanding water stress, because all aspects of plant performance (transpiration, uptake, plant growth, sugar and nutrient transport) are governed by the pressure in the stem.

Stem Water Potential fluctuates throughout the day in response to changes in temperature, humidity and light. So which value is most important when visualizing the data? The hottest, driest part of the day is the time frame where water stress is of most concern, and guidelines are often built around this. This data point is referred to as **Midday SWP**, as it typically occurs between 12-2 PM. The FloraPulse microtensiometer lags tree SWP by a couple hours, so to calculate midday we take the minimum water potential measurement recorded that day. This is reflective of the driest point of the day, and we've found that it correlates best with the pressure bomb.

To learn more about water potential, check out this article by Washington State University Professor Lee Kalcsits.

## Setting up your FloraPulse dashboard

Before setting up the dashboard, install the FloraPulse dataloggers in your desired locations (see install video and manual for instructions). For each location, keep track of the following details:




-Date of install
-Datalogger number
-Crop that you're installing into.
-Location name (what you want to call this location, i.e. South Block).
-Coordinates or installation street address.

Figure 2: Using Google Maps to get the location latitude/longitude

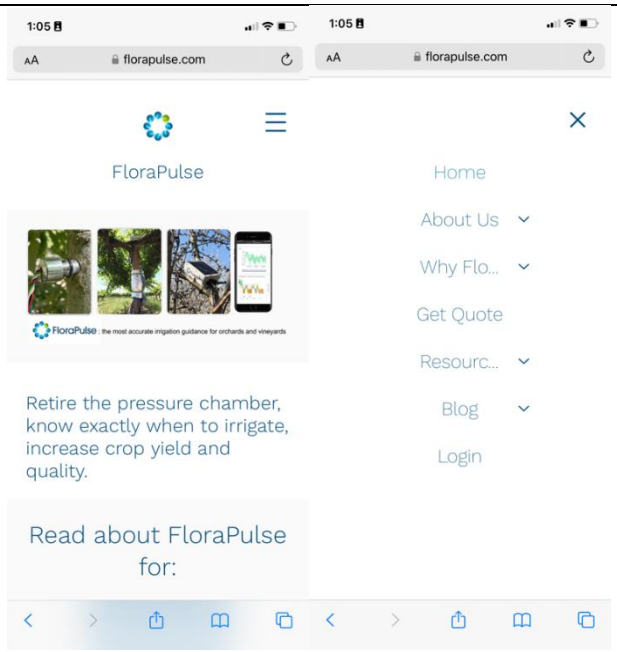
You can find the coordinates by dropping a pin on your phone (google or apple maps). Precise coordinates allow you to easily find the logger should it need to be serviced, as well as give accurate weather data.

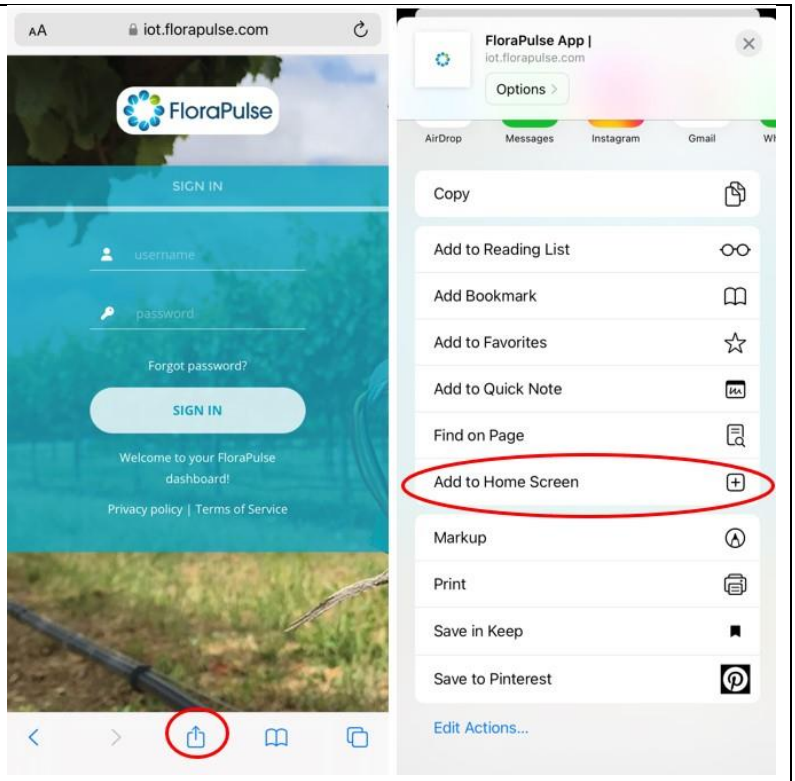
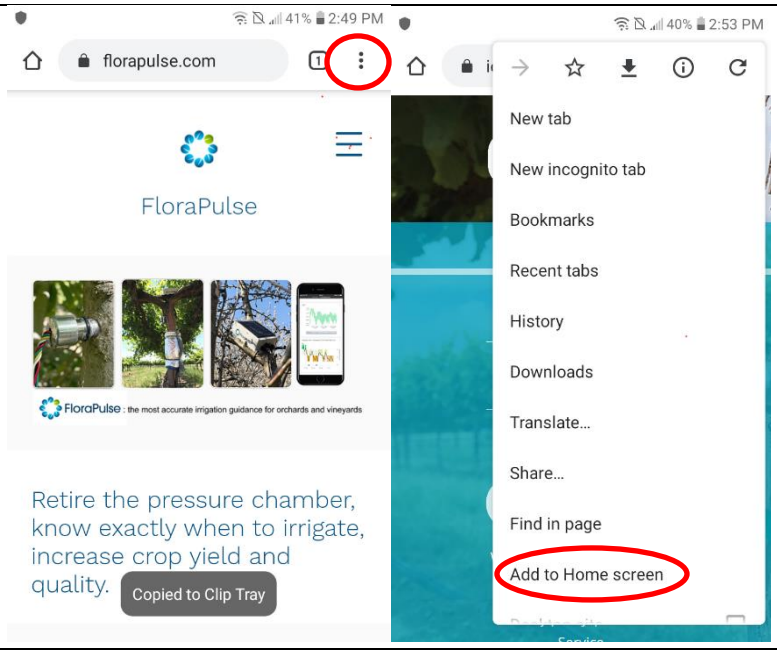
Send the information to admin@florapulse.com and we will set up the dashboard.

## Accessing the Dashboard

A magic link will be sent to your email, allowing you to sign in without a password. It will prompt you to set a password the first time you log in. After that, you can login at www.florapulse.com and click ‘Login’ on the menu.

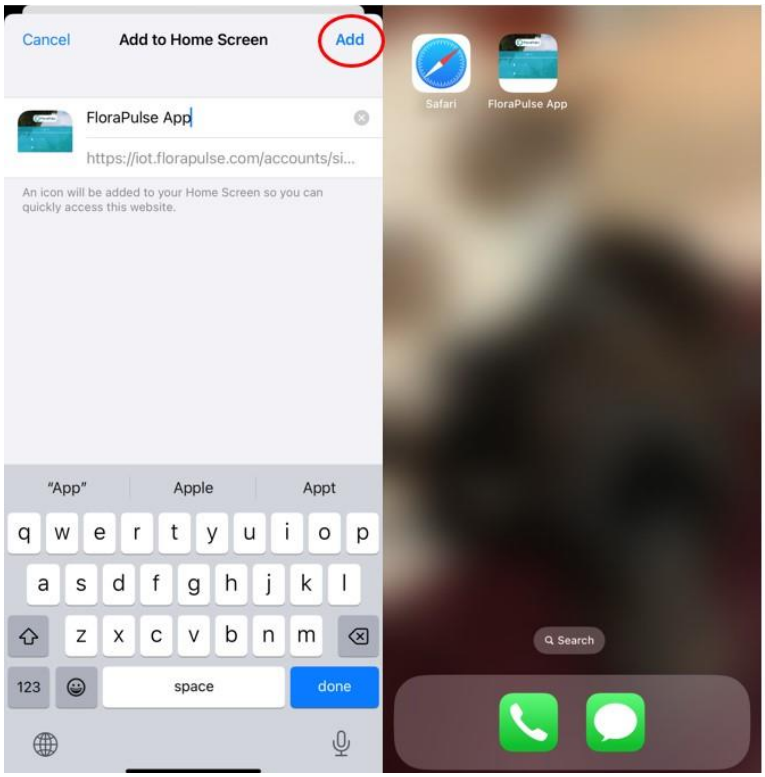
To save the web app to your phone, follow these instructions.

| | |
|---|---|
| Open Safari (IOS) or Chrome (Android) and go to www.florapulse.com<br><br>Click Login to sign into your dashboard.<br><br>Alternatively, click the magic link to automatically sign in to your dashboard. A password change will be prompted upon first sign in. |  |

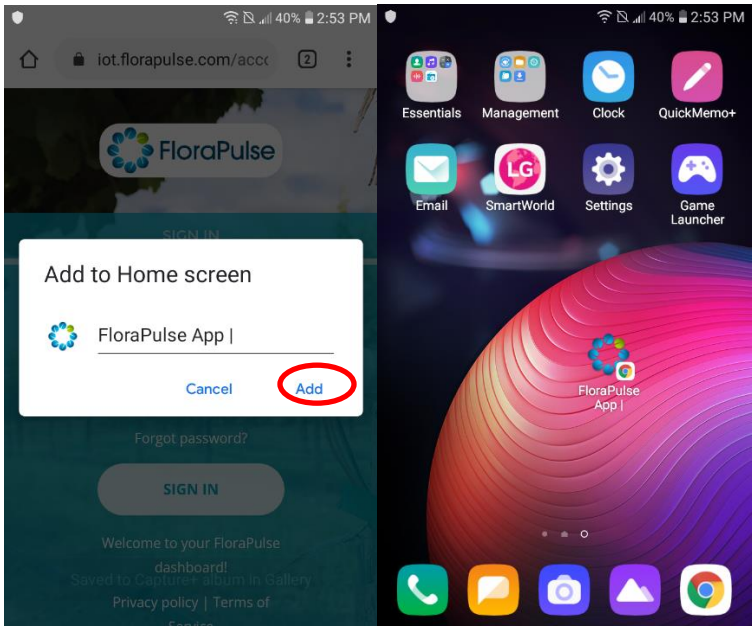
| | |
|---|---|
| After logging in, select the share button on the bottom of the screen and scroll down to “Add to Home Screen” |  |
| For Android, find the three dots in the top right hand corner of the screen. Scroll down and press “Add to Home screen”. |  |

Rename the Web App to ‘FloraPulse’, and press add. Your dashboard is now easily accessible on your phone!

IOS:




Android:



# Dashboard Description

## 24/7 plots

The 24/7 plot gives the realtime measurements from the sensors. Two sensors are installed for redundancy and it is normal for them to measure slightly different values. Data is collected every 20 minutes to give you a continuous curve that shows how the trees water levels are fluctuating throughout the day. This graph will also show you how your tree might be responding to irrigation events. When you irrigate, you'll be able to see in real time how the tree is responding.

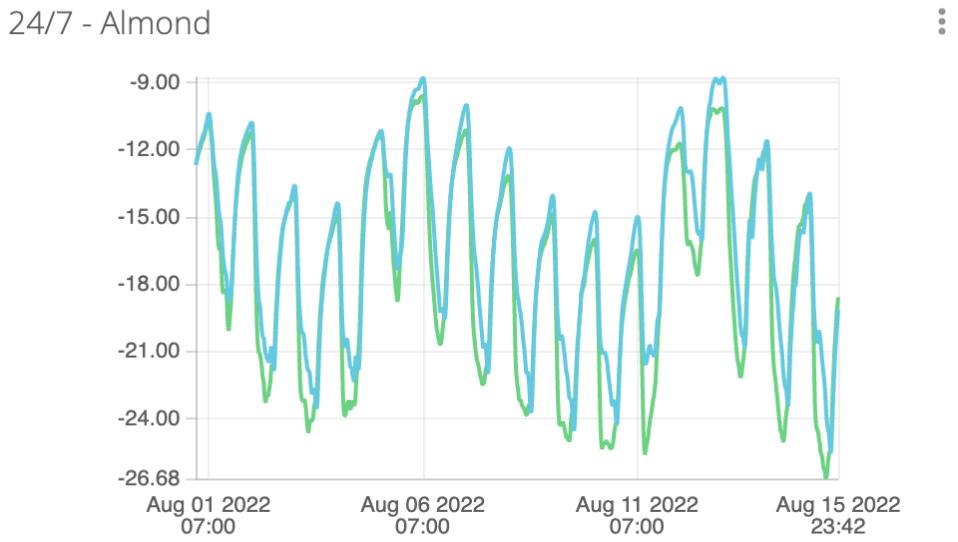



Figure 3: 24/7 SWP almond data for two sensors installed in the same tree (blue and green lines). Notice the tree SWP recovers on August 4 and August 11 after irrigation events, then begins dropping again.

24/7 data from the chart can be exported into a csv file. Just press the three dots on the upper right hand corner of the widget and press download. Ubidots will prompt you to provide your date range of interest and your email. A link will be sent to you when the file is ready to be downloaded.

## Interpreting 24/7 Data

Predawn and midday SWP refer to the maximum and minimum water potential respectively. The daily oscillations can be useful for gauging tree health. Each crop type has different stress ranges for optimal irrigation. The figure below shows suggested stress ranges for apple. Depending on your goals, you may decide, for instance, to irrigate before the apple tree gets to severe water deficit.

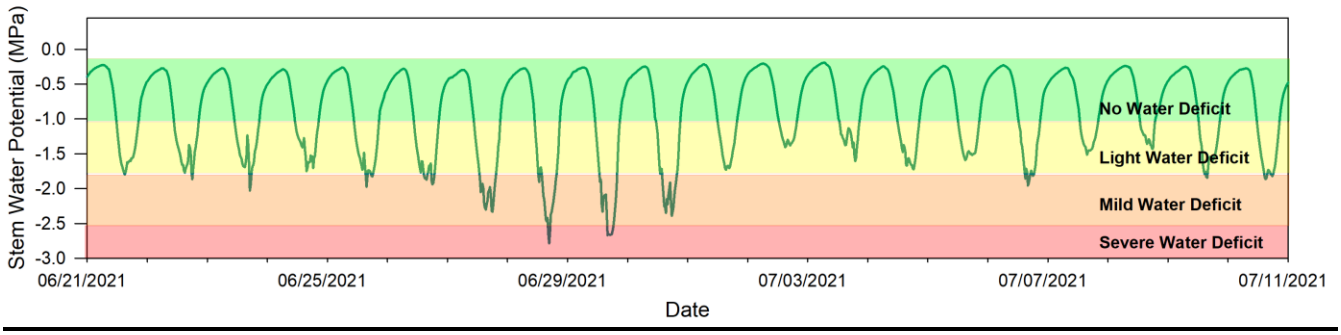



Figure 4: Water stress levels in apple (Blanco, 2023)

Although some crops do not yet have recommended stress levels, the data can still be useful to guide irrigation. Generally, wait until the tree water potential pattern begins to drop after an irrigation before irrigating again. This irrigation pattern prevents over-irrigation because you are waiting until the tree has used some of the water before putting more in.

## Midday plot

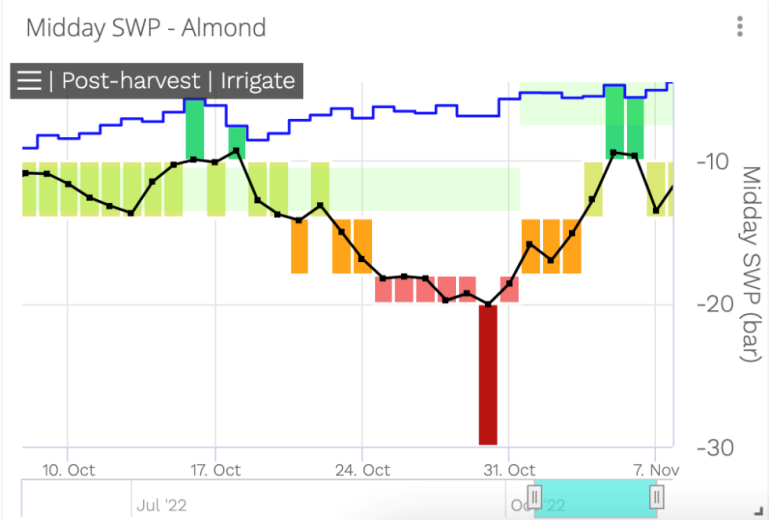



Figure 5: Raw Midday SWP graph.

The Midday SWP points are plotted by date. For specific crops, a stress legend is included for reference and stress ranges are presented in a color-coded manner for easy visualization. The upper left-hand corner of the plot shows the current season, and will instruct irrigation when the midday dips below the recommended stress range. The recommended range for that season is shown in the light green band. The Midday Plot can be viewed as raw data or relative to baseline.

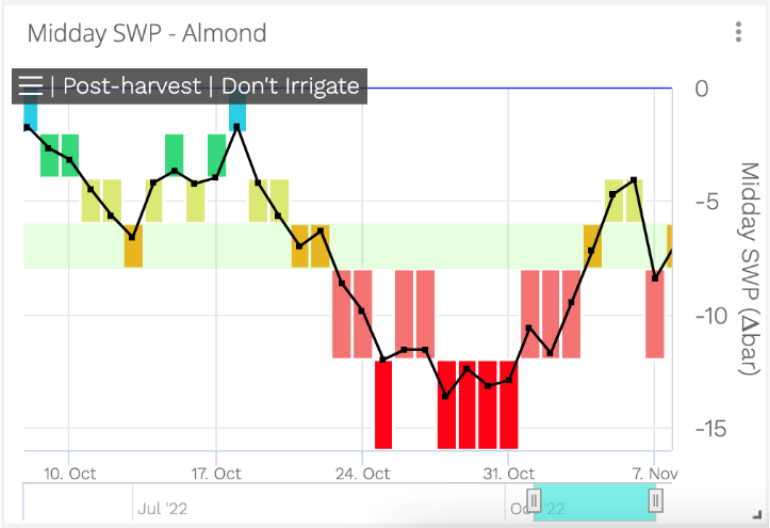



Figure 6: Midday SWP plotted relative to baseline

## Baseline

Baseline SWP is the predicted midday if the tree were to be fully irrigated. It is calculated using local temperature and relative humidity. It also depends on the vapor pressure deficit (VPD). Viewing data relative to baseline gives the difference in tension between baseline and midday, and thus a cleaner representation of plant stress. Sample baseline relative legend shown below. Comprehensive stress guidelines are available for almonds, grapes, and prune (more coming soon).

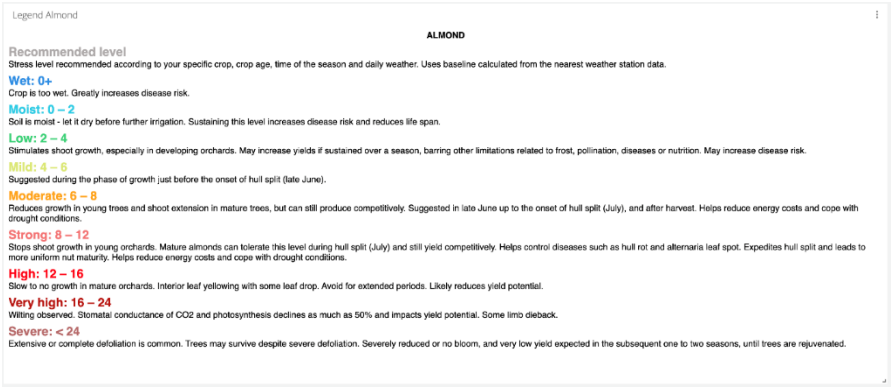



Figure 7: Stress legend for almond, relative to baseline.

## Plot view options

The plot view can be changed as needed. Using your mouse, hover over the plot top left symbol ‘≡’ to access the view menu. This shows the mote number, crop type and various toggle options. Click on ‘Export CSV’ to download the plot data to a csv file.


Figure 8: Midday SWP plot menu. Hover over the ‘≡’ symbol to show.

## Pressure Switch Data

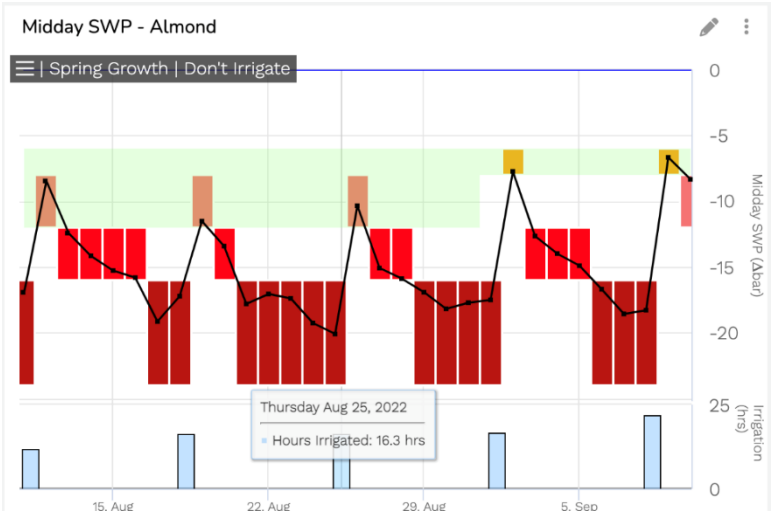



Figure 9: Midday SWP plot with irrigation data

Included in your FloraPulse subscription is a pressure switch. A pressure switch is connected to the main irrigation line with an inlet and automatically switches on when it detects water flow in the irrigation line. The switch keeps track of how long the irrigation was running, providing a convenient method of water management.

Pressure switch data can be viewed as “irrigation” on the Midday SWP plot. The above example illustrates how the tree responds to these irrigation events. Hover over the bars to view the time.

## Pressure chamber input box

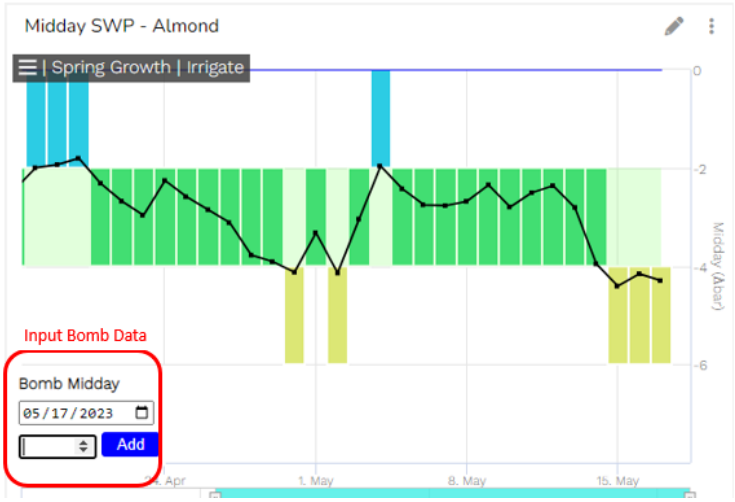



Figure 10: Midday SWP plot with box to input bomb data. Hover over the bottom left to show

If you still plan on taking weekly pressure bomb measurements in your orchard or vineyard, you can input them on the FloraPulse Dashboard. Hovering over the bottom left hand corner of the midday SWP plot reveals a button to input manual Midday SWP measurements. These measurements will appear on the Midday SWP chart as stars.

To add a measurement, select the date the measurement was taken and input the value in bars (make sure its negative). To delete a measurement, submit a blank entry for the date of the measurement you'd like to delete.


Figure 11: Midday SWP plot, including manual pressure chamber measurements (stars)

## How to contact us if you have issues

Issues may arise, but can easily be troubleshooted. Please, text or call our office phone at (530) 220 – 7668 or email admin@florapulse.com.