3. The relationship between sensors

Understanding differences among sensors is important for understanding if sensors are reading correctly, for making irrigation control decisions, and for ensuring that sensor placement is correct and/or meaningful for use in irrigation control.

Small differences in volumetric water content reading can be due to natural variability. However, sensors in the same irrigation zone can have different volumetric water content readings for reasons that can impact irrigation control and management decisions.

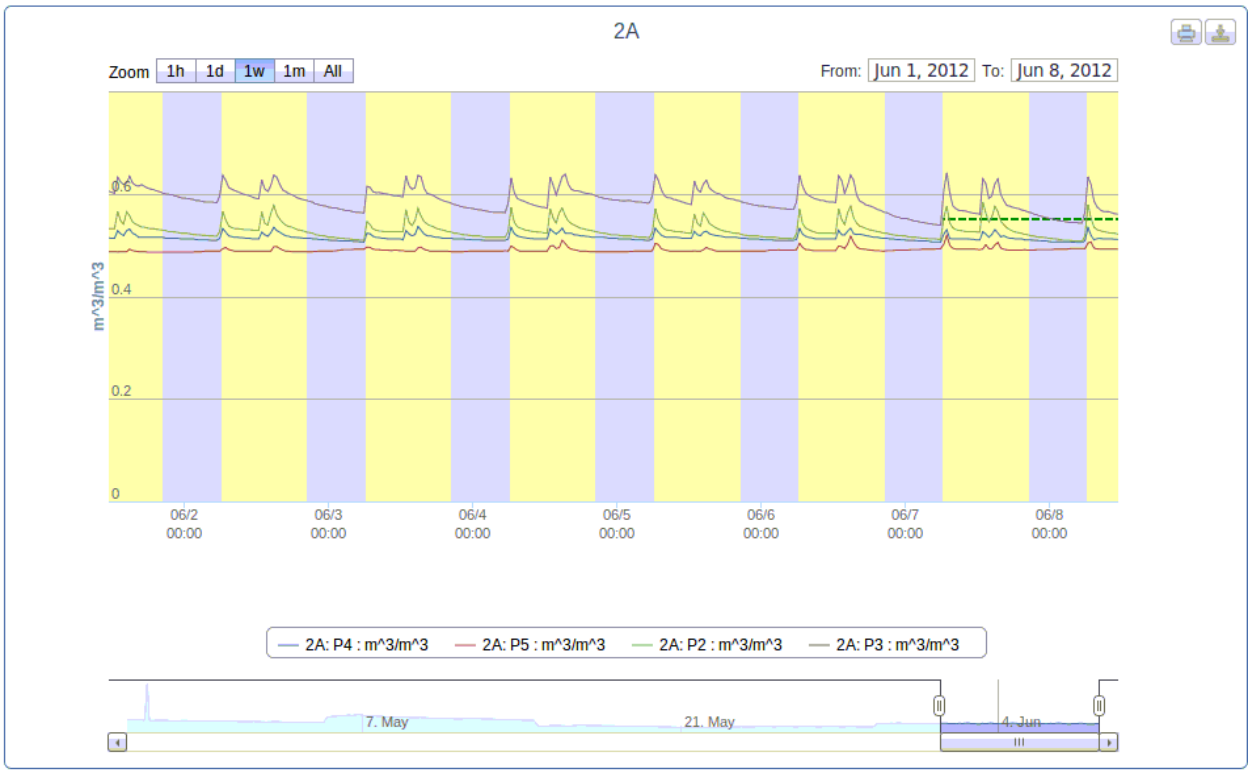

Figure 5. All sensors are reading similarly, with similar responses to irrigation events. Sensor placement in a container can lead to differences among sensors. Water content gradients exist in containers with substrates generally being driest at the top and wetter at the bottom. It is important when inserting sensors into containers that they are inserted roughly in the same area of the substrate, especially with larger containers. And sensors should be placed in a part of the container with active roots. Sensor placement in an irrigation zone can lead to variability among sensors, especially if irrigation uniformity is an issue. When installing sensors in an irrigation zone, care should be taken to ensure that sensors are not placed in pots in areas that are known to be wet or dry as this could lead to over or under irrigation of the crop as a whole. To minimize such

problems, it is important to make sure that the irrigation uniformity as good. For more information on irrigation uniformity, please see the learning modules on irrigation system design and irrigation system audits.

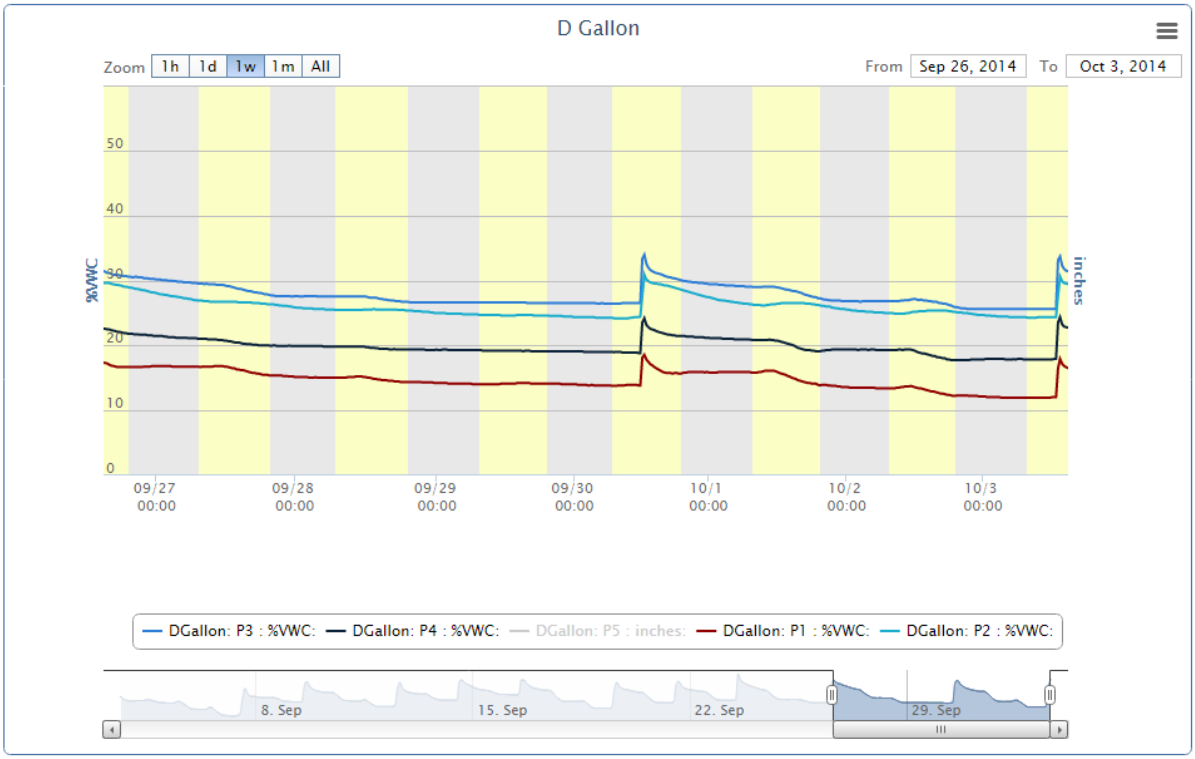

Figure 6. This graph shows that sensor readings can differ, but follow similar patterns due to sensor placement in the pot, pot placement in the irrigation zone, or differences in plant size. In this figure, sensor readings follow a similar trend, however, sensor 2 and 3 (blue lines) read consistently higher and sensor 1 (red line) reads consistently lower than sensor 4 (black line). There are multiple possibilities for why this is occurring:

1. *The blue line represents plants in a wetter area of the irrigation zone while the red line represents a plant in a drier area (variability in irrigation due to uniformity).*
2. *There is variability in sensor placement in the pots.*
3. *The red line might represent a larger plant, which uses more water and thus has a drier substrate.*

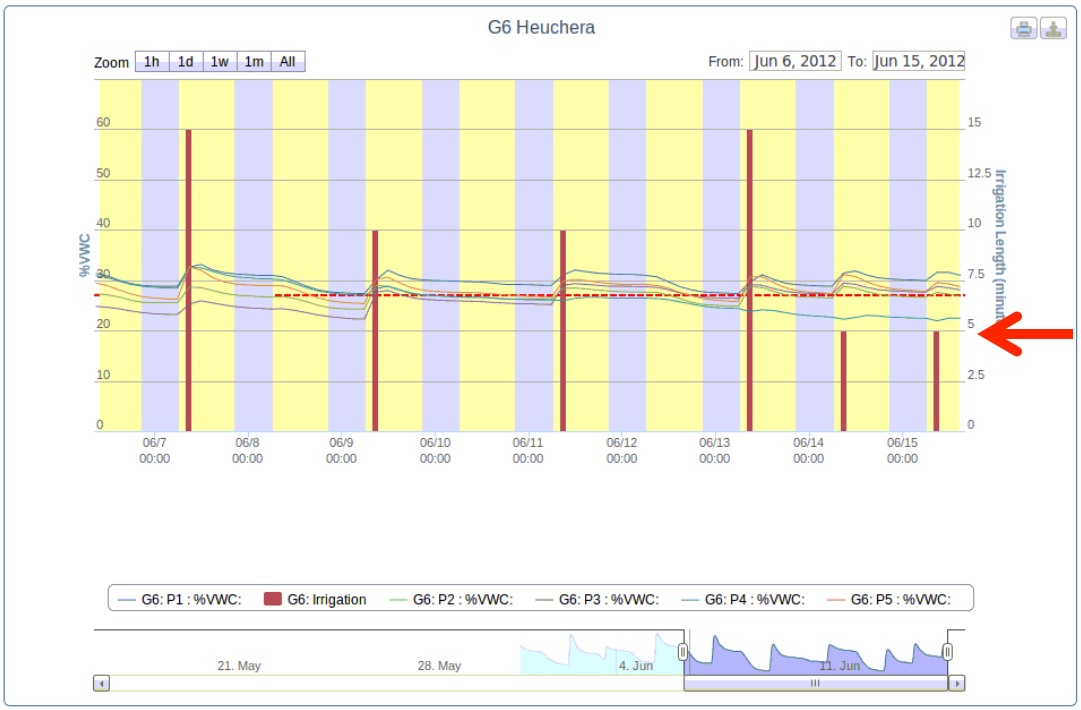

Figure 7. Sometimes one sensor may deviate from the others. This can include responses such as higher peaks, a flat line or small peaks, or an increasing or decreasing trend.

Readings from the sensor represented by the blue line (sensor 2) begin decreasing and do not respond to irrigation similarly to other sensors. This trend is particularly clear during the second half of the period shown. This can happen because this plant may be in a spot with poor irrigation coverage.