IAS Intelligent Soil Moisture Probe

Irrigation Automation systems has developed a new intelligent soil moisture probe designed to be used in large scale agricultural applications and small applications. Knowing how important soil moisture measurements are in agriculture, IAS set out to develop a probe that would be easy to use, accurate, repeatable, with no maintenance. The probe is used either with an RF90 remote sensor for telemetry base measurements or the ISM 100 meter for manual readings.

The scale presented in Harvestwatch™ is 0% to 100%. This represents the full-scale range of the probe. Some soil types will generate a full-scale range, others may saturate at a different point on the scale or conversely not reach 0 when no water is present in the medium. The user is advised to determine saturation points for their specific medium and locations. See soil structure for further discussion.

In chart 1, percent water is presented as measured by weight in a soil sample. 100% equals soil saturation and 0 percent is no liquid water remaining at all in the soil sample. In chart2, the same sample and method was applied to a probe that may be familiar to many farmers, a tensiometer (LT). The benefit of the IAS probe is there are no pressure fluctuations due to heating from the sun or maintenance required.

Chart 1

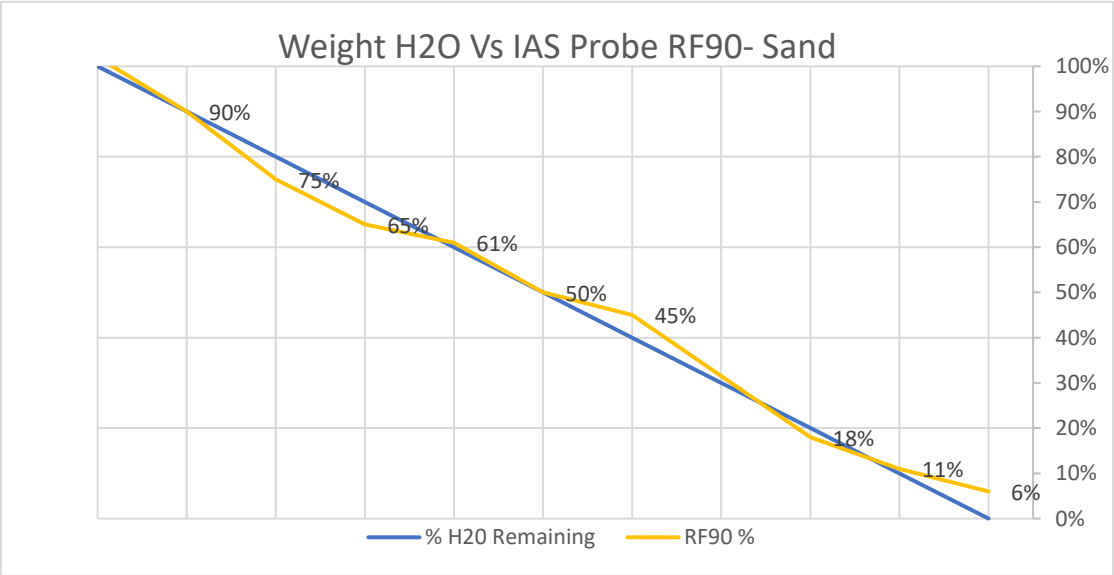


Chart 2

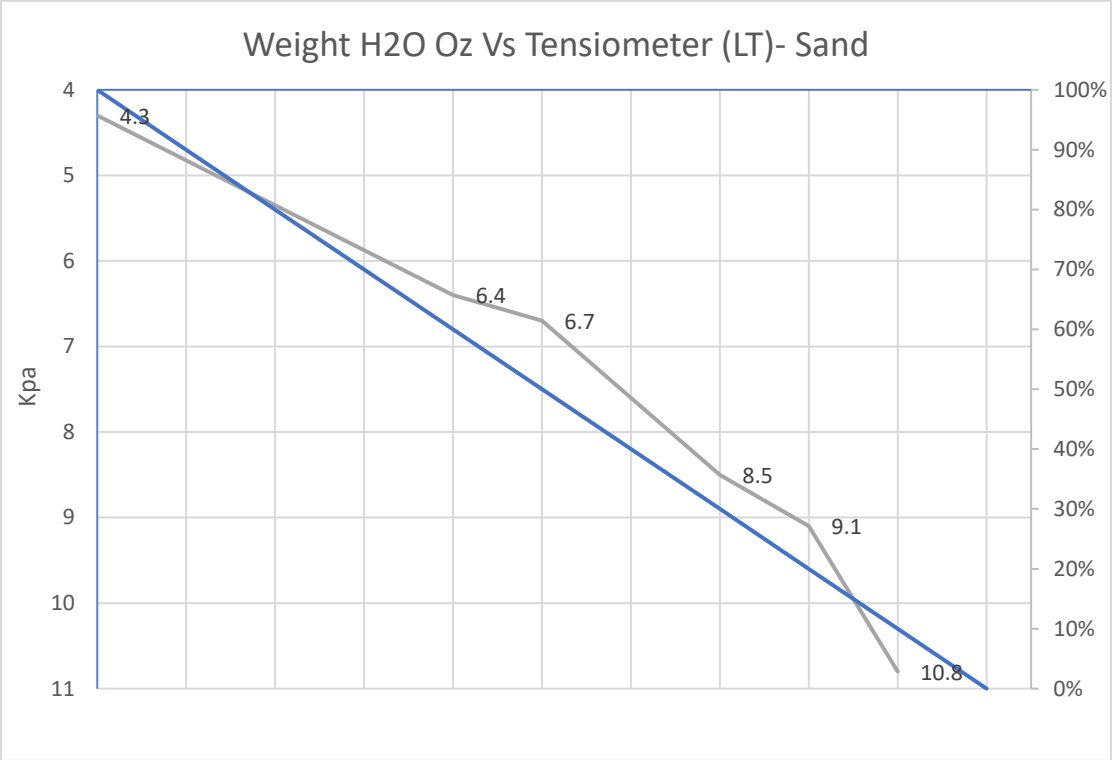
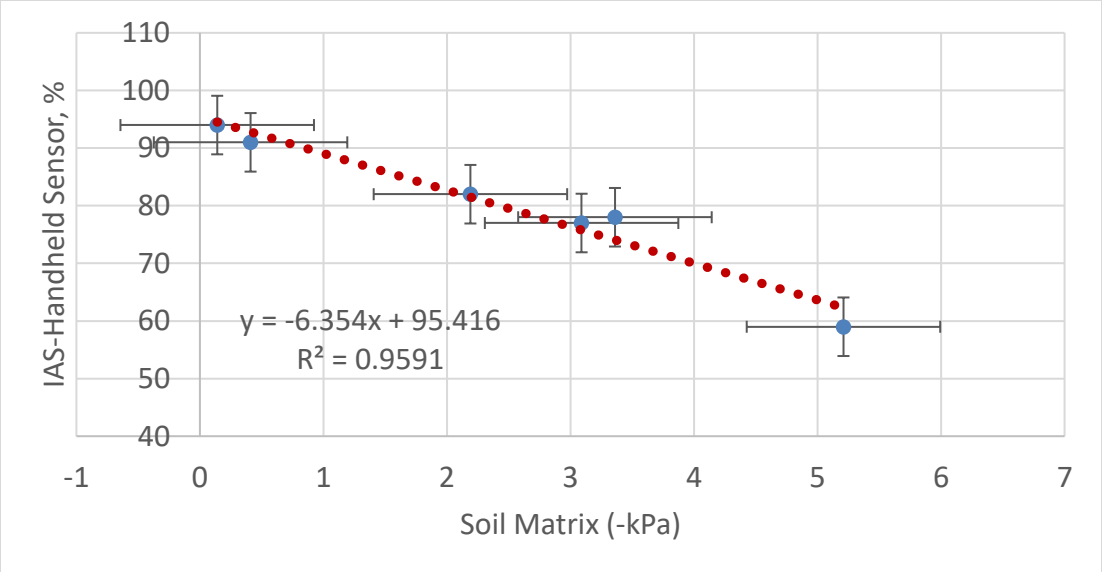


Chart 3



Independent correlation study to a tensiometer in sand

An RF90 with IAS Intelligent Soil Moisture Probe as displayed from Harvestwatch™

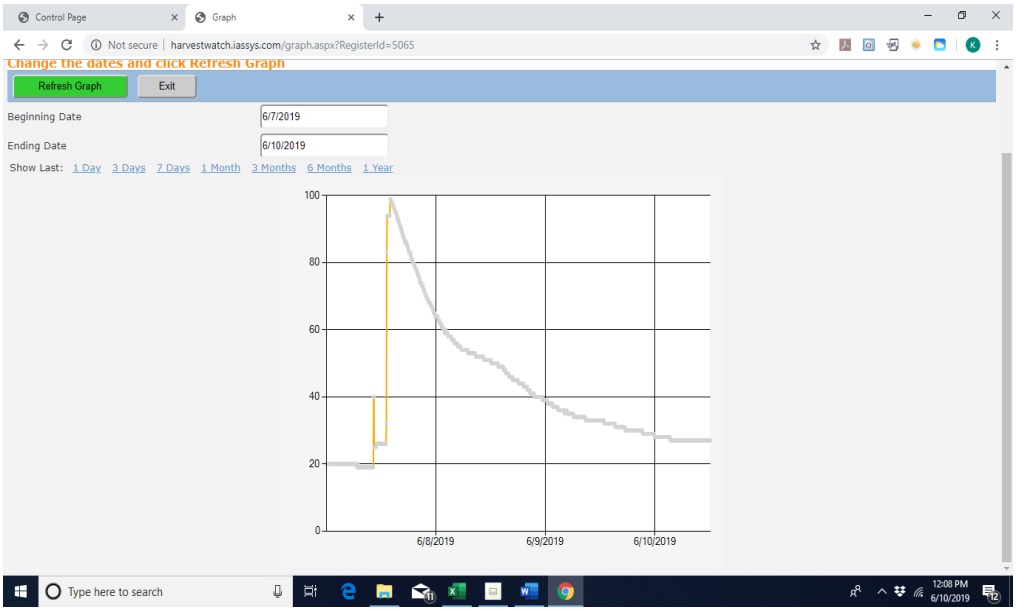
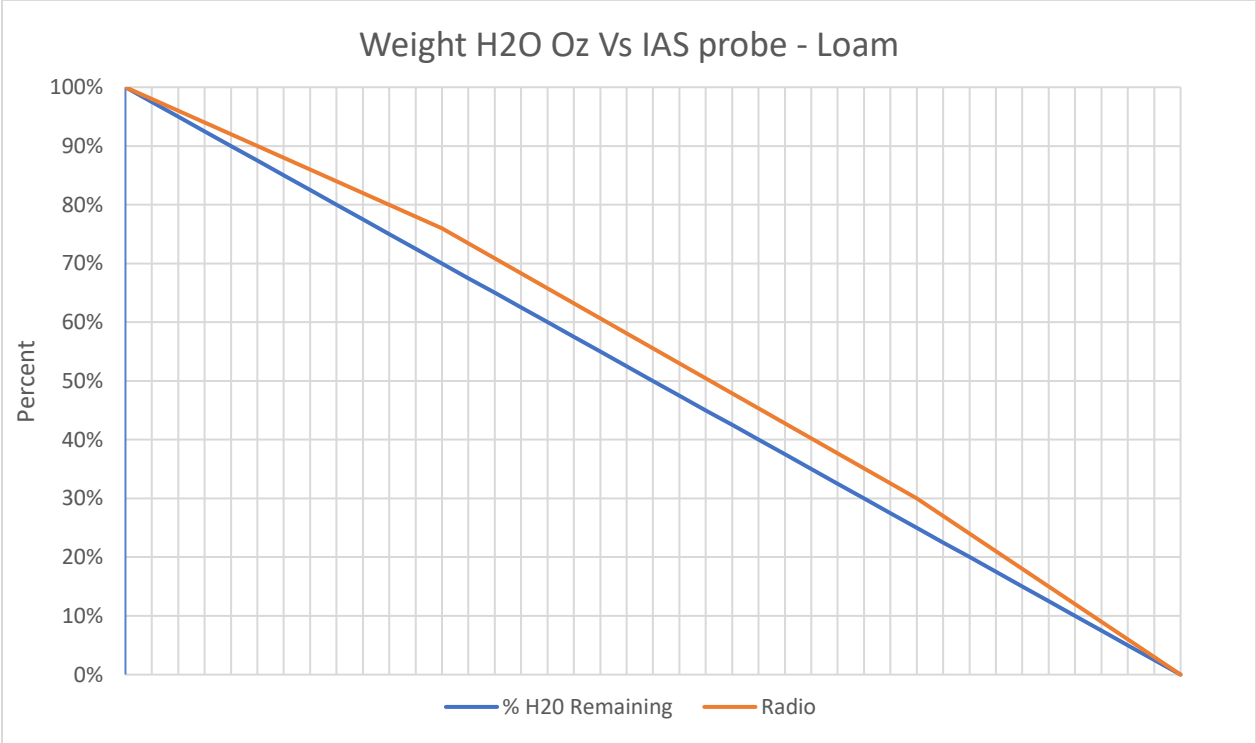
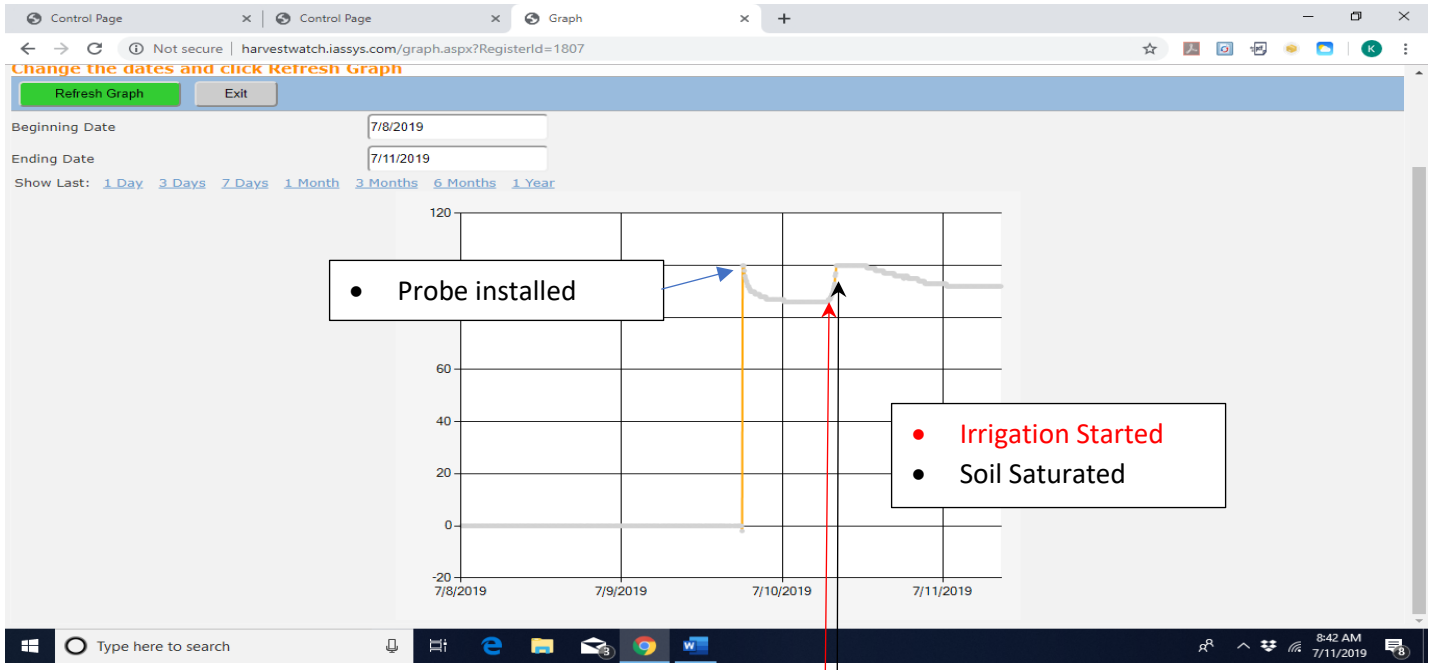


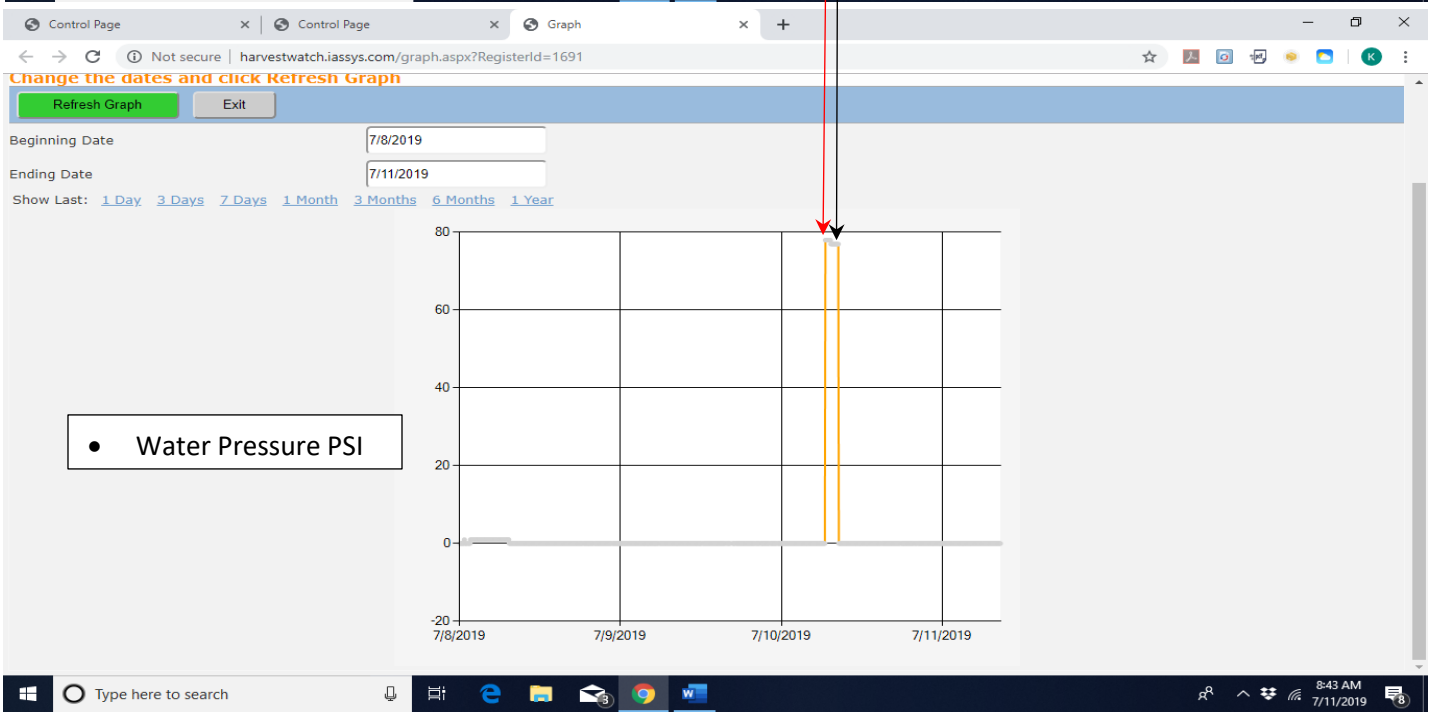
Chart 4, is validation of the probe in sandy loam

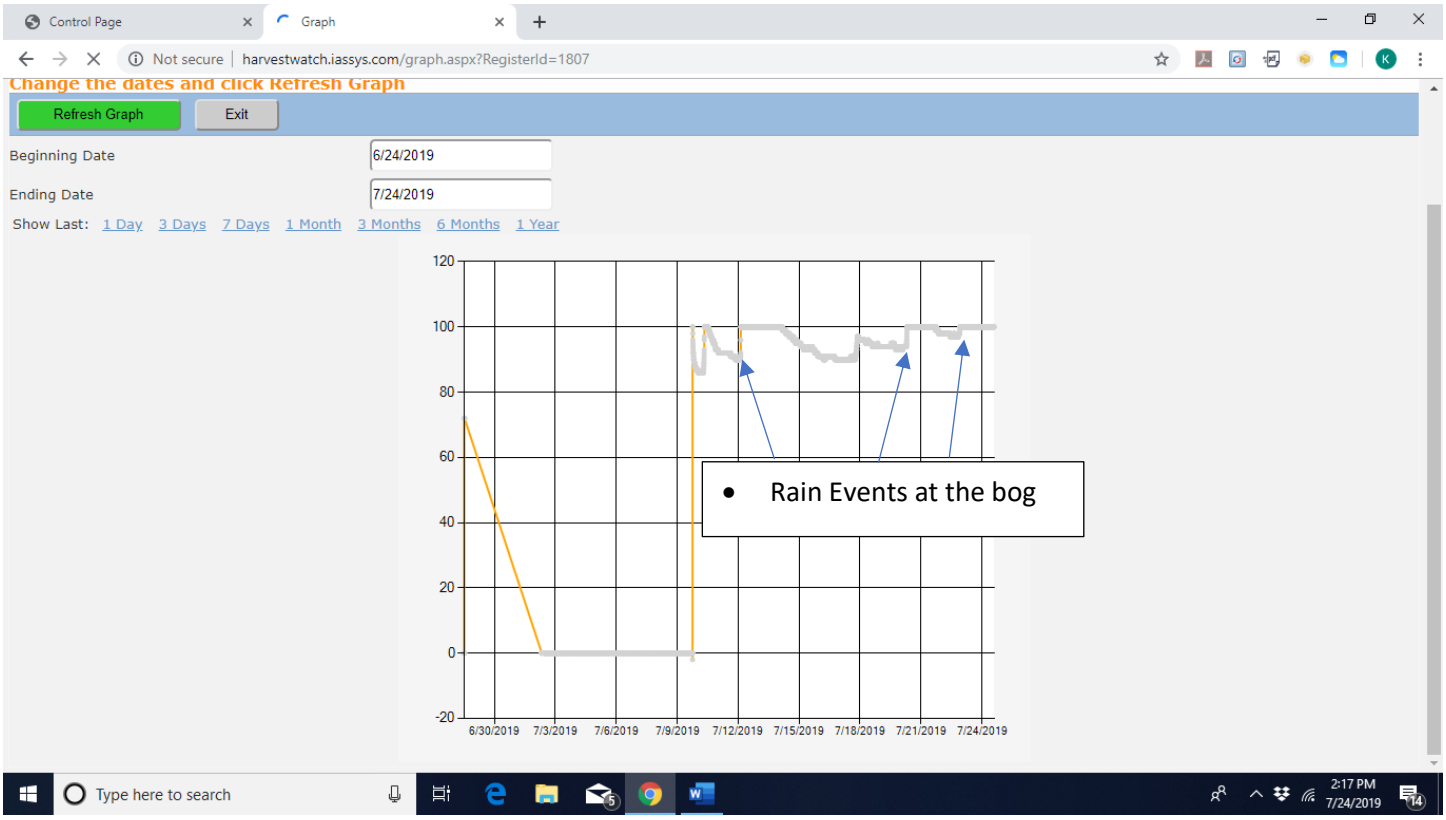
Chart 4



Field Validation of Intelligent Probe Operation in a sandy cranberry bog.



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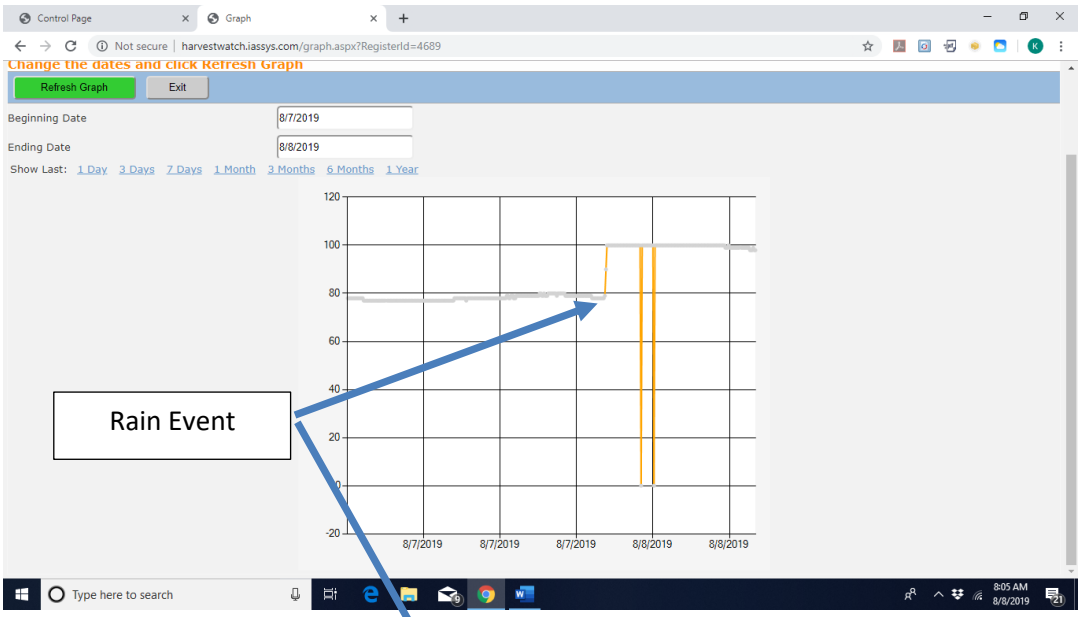
An example of one RF90 and Soil Moisture probe in a home garden with typical loam.
In this example, there are 2 radios with 2 probes.
This picture is of the one with the probe about 6" into the surface of the soil.
The second (not seen) is buried in the ground about 10" to 12".

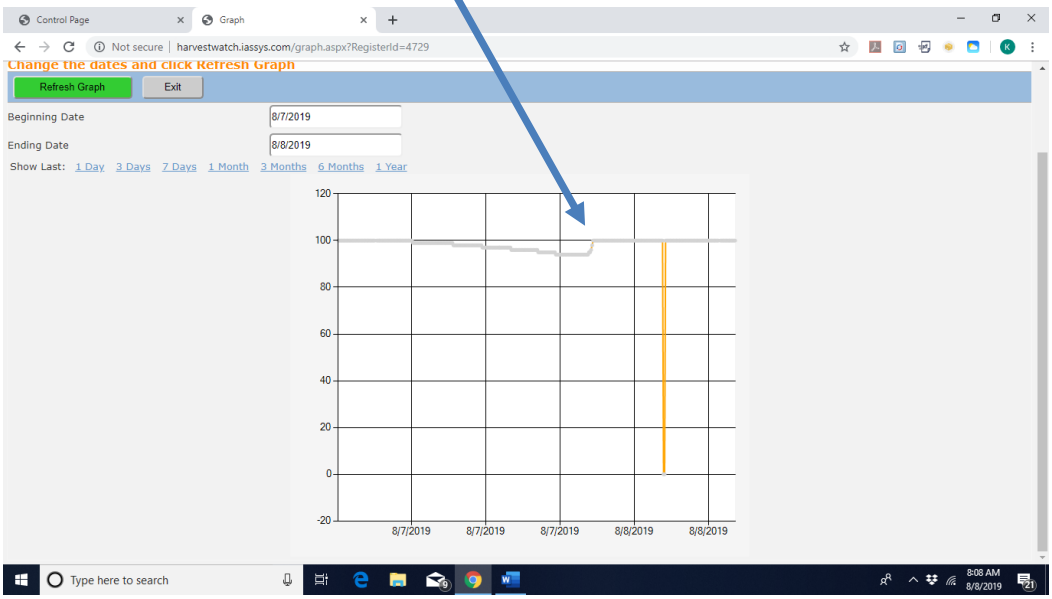
In the following graphs of the readings from these 2 probe we can see the effect of a recent rain storm passing through the area. Both probes reach approximately 100% saturtion sometime after the rain begins. Approximately 12 hours later, the surface probe shows a decrease, with that last reading being 98%. The second probe shows the subsurface still at 100% saturation.

Probe 1

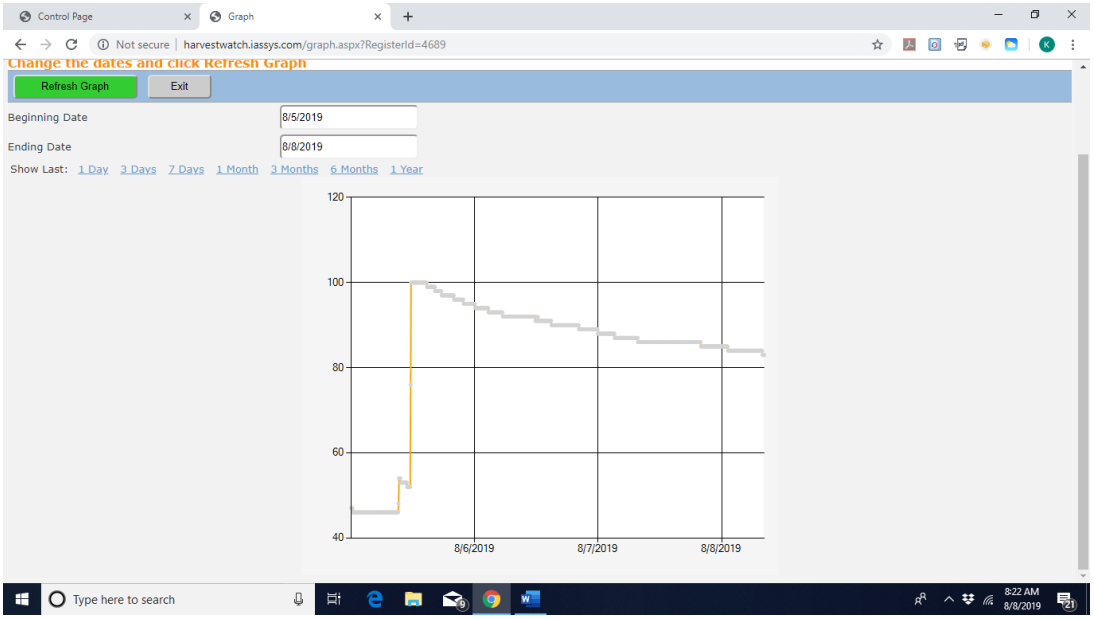


Rain Event

Probe 2



Here is an example of a potted plant from a local garden shop that uses a potting soil mixture. In the graph we can see how the plant was watered one day and saturated to 100% (excess water drained through bottom) and over about a 3-day period has dropped to about 83%.

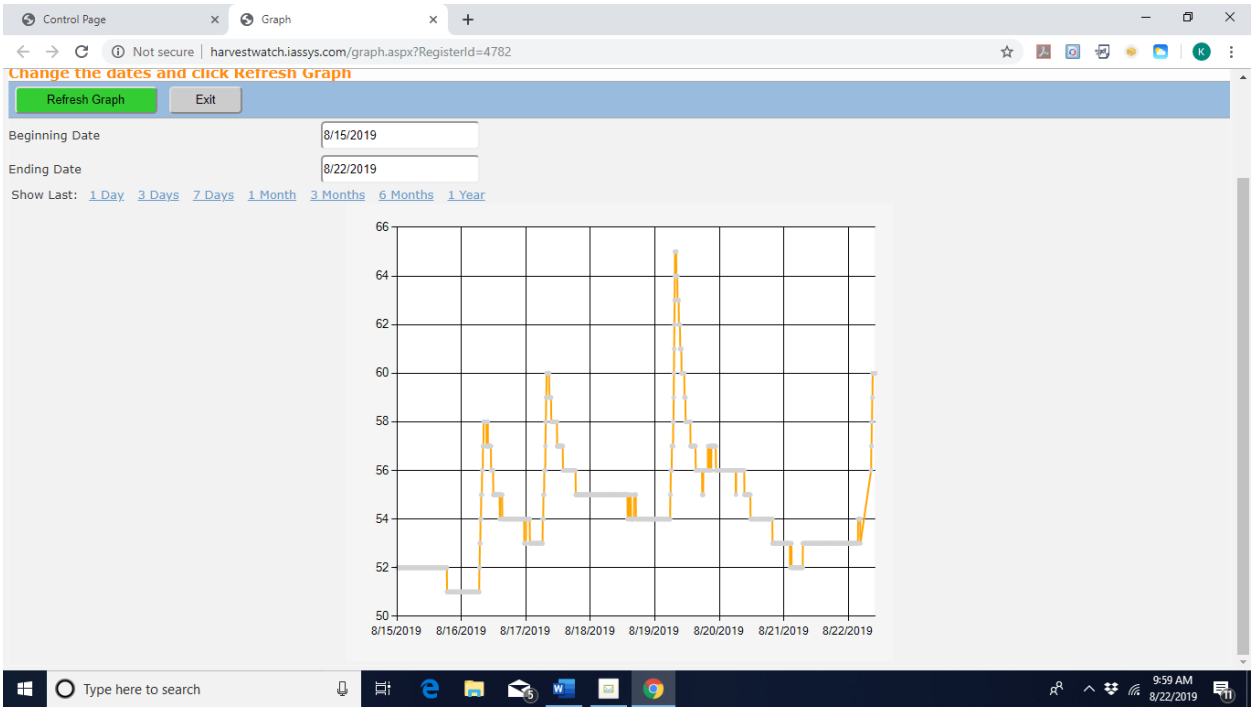


Soil Structure

The examples given here all have soil structures that retain relative higher amounts of water volume and ultimately scale to 100%. Not all soil types are going to behave in this manner. Any soil structure may have a grainier structure, a tighter structure, greater drainage or other factors that will affect the volume of water in a given volume of soil. The probe will accurately report relative change from saturation to dryness regardless of most soil types.

Reaching 100% full scale is not the objective. The user will learn the saturation point. Saturation is the point where the soil pore spaces are fully occupied, there is no more volume to fill and any additional amount simply drains away. What you will see after a short period of time is the wetting and drying cycles will be measured accurately and repeatably. The user is advised to determine saturation points for their specific medium and locations.

The following graph is an example of saturation is somewhere in the 65% to 70% range for this customer. This customer is very pleased with the repeatability of the measurement during irrigation cycles or rain and so can determine proper watering cycles for each location.



To further highlight the benefit, after a heavy rainstorm, we can see in chart x, the rise of some locations reaching 100% while others may only reach 60% or 80% approximately. The grower has determined where the low readings reside and will then irrigate once this has been reached. For now, irrigation has been suspended until these low readings are reached.