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Comparison between the Evaposensor, soil Probes and weather stations

Evapotranspiration involves precipitation (rain), evaporation from the soil or growing medium and transpiration from the leaf and is referred to as ET. The rate of ET is affected by solar radiation, humidity, wind and temperature.

In irrigation ET is important as it estimates how much water a crop is using and allows the grower when to irrigate and how much to apply.

In propagation, cuttings take up water slowly and easily suffer from stress. ET is important as it regulates mist or fog bursts to a level that cuttings can tolerate without causing excessive watering.

There are a number of different methods of measuring water loss and most popular are:

- 1) Solarimeters
- 2) Humidity sensors
- 3) Vapour pressure deficit sensors
- 4) Weather stations
- 5) Soil sensors

All have limitations and cannot produce a composite signal that can be used without some form of interfacing and dedicated software to an existing computer. To be balanced, the Evaposensor requires interfacing but does not require dedicated software or a computer.

Solarimeters. Measure radiation only and do not take into account the other driving factors of evapotranspiration. Correct positioning is important, requires guesswork in the control algorithm to incorporate the other drivers of evapotranspiration.

Errors such as a grey day with strong winds, the radiation would be low but plant transpiration would be high due to the high wind. Or a hot humid day radiation would be high but transpiration would be low.

Humidity sensors. Measure two of the driving factors, humidity and temperature.

Does not take account of radiation or wind movement. Extensive software to compensate for the effects of radiation and wind, plus additional software to compensate for the change in measured RH for a change in temperature.

Vapour pressure deficit is the difference between the amount of moisture in the air compared to the amount of moisture the air can hold when saturated. Saturation point is affected by water. Effectively measures two of the driving factors of evapotranspiration. Extensive software to compensate for the effects of radiation and wind.

Weather station consists of a temperature sensor, humidity sensor, anemometer and radiation sensor. All four signals require hardware processing and extensive software processing normally for one dedicated computer. Very costly when compared to the unique but inexpensive ETS ES4 pt100 interface.

Soil sensors, work by measuring the soil moisture by change in pressure kpa or by electrical means using frequency (Delta T) or by conductance (Watermark). The main drawback with soil probes is the necessity of distributing a number of sensors around the area to be controlled to obtain an average. To be balanced, once the different areas have been assessed, one sensor could be utilised and a compensation factor be used to adjust irrigation accordingly. However this could only be accurately applied to a monocrop. Affects of changing levels of conductance due to levels of feed will affect some sensors (Watermark) whilst settings of the Delta T could lead to miss readings, such as soil selection type. Errors can also occur by positioning the sensor either too deep or too shallow. When in the field, normally no display of soil wetness.

ETS ES4 pt100 sensor is a simple, easy to use, responsive, highly accurate and inexpensive requiring very little maintenance. Placed at crop height It measures all the driving factors of evapotranspiration; radiation, humidity, temperature and wind and combines the drivers into one composite signal which when connected to the EvapoMister or EvapoIrrigator displays evapotranspiration in real time. It can be used for both protected and external crops. There is no necessity for complicated hardware or extensive software algorithms. The EvapoMister accurately and precisely controls misting and the EvapoIrrigator will turn a simple time clock into an intelligent controller or calculates when to run an irrigation controller/computer. All the hardware and software is contained in one simple to use cost effective controller.