Water Use and Plant Stress Monitoring Comparison Chart

	tule Actual ET Sensors	Reference ET Stations	Weather Stations	Soil Moisture Sensors	Sap Flow Sensors	Dendrometers	Pressure Chambers	Porometers	Aerial Imaging	Crop Models	"Look & Feel"
Basic Operation	Measures Actual Evapotranspiration in your field.	Uses weather measurements to estimate evapotranspiration of a well-watered grass field.	Measures atmospheric conditions.	Measures soil water availability.	Estimates movement of water through trunk.	Measures the width of trunks, petioles, and fruit.	Measures leaf and stem water potential.	Measures stomatal conductance.	Estimates plant water status from reflected radiation.	Simulates crop water use and water stress based on theoretical field.	Physically look at plant appearance or feel soil.
Provides Quantitative Measurement	✓	✖	✖	No (unless rigorously lab calibrated)	No (unless rigorously calibrated)	No (unless rigorously calibrated)	✓	Yes (calibration required)	✖	✖	✖
Measures Plant Water Status	✓	✖	✖	✖	✓	✓	✓	✓	✓	✖	✖
Measures Plant Water Use	✓	✖	✖	✖	No (unless rigorously calibrated)	✖	✖	✖	✖	✖	✖
Data Transmission	Automatic	Automatic	Automatic	Manual or Automatic	Automatic	Automatic	Manual	Manual	Automatic	Automatic	Manual
Monitoring Frequency	Daily	Hourly	Hourly	✓	Hourly	Hourly	Weekly or less	Weekly or less	Weekly or less	Weekly	Daily or weekly
Measurement Zone	1 to 10 acres	Not your field	Many acres	2" horizontally from each probe depth	Single Plant	Single plant or plant part	Single plant	Single leaf	Many acres	Many acres	Single plant
Replacement & Maintenance	None	None	Annual calibration required	3-4 years, some require annual removal	Included	Included	Minimal	Daily calibration required	None	Minimal	None
Challenges	Measures only the field where the sensor is located.	Reference ET is not estimated in the grower's actual field. Reference ET requires a crop coefficient, which can be unreliable. Does not measure crop stress.	Weather alone does not report crop water use or status. Reference ET calculated from local weather data provides inaccurate estimates for actual crop fields.	Does not measure crop water use or status. Only a single point in the soil is monitored.	Not applicable for all crop types. Only a single plant is monitored.	Trunk diameter provides a relative measure of stress. The grower knows if the plants are more stressed than they were yesterday, but not the amount of stress. Only a single plant is monitored.	Labor intensive. Measurements highly influenced by weather conditions. Measurements can only be taken during narrow time windows. Only a single plant is monitored.	Measurements highly influenced by weather conditions. Only a single plant is monitored.	Optical water stress signals occur after growth has already slowed and yield has been compromised. Imaging alone cannot report the water use of a crop.	Only as accurate as the data put into the model. Recurring in-field measurements required to confirm model is on track.	Visual signs of stress occur after growth has already slowed and yield has been compromised. Judgements cannot be exactly replicated year after year.