



# Weather Stations

## Information & Use-Cases

### Weather Station Definitions

#### Vapour Pressure Deficit

The amount of water vapour that can be held in air until reaching saturation point under the same temperature; high VPD = increased transpiration rate = increases plant heat injury and leaf temperature.

#### Delta T

Change in temperature; an indicator of acceptable spray conditions; it is indicative of evaporation rate and droplet lifetime; ideally the Delta T should be between 2 and 8 degrees.

#### Grass Fire Index

Indicator of potential fire occurrences, spread and difficulty of suppression.

#### Evapotranspiration

Combined loss of water from the processes of (1) evaporation: movement from water surfaces or water bodies to the atmosphere, and (2) transpiration: loss of water vapor through the plant's stomata to the atmosphere.

#### Volumetric Ion Content

Salinity is commonly expressed in terms of electrical conductivity (dSm); electric conductivity (EC) measurements are reported in uS/cm and can be converted to dSm for a salinity classification of soil. Ex: 2400 VIC = 2400 uS/cm = 2.4 dS/m = non-saline to very slightly saline.

#### Normalized Difference Vegetation Index

Represents the amount of green/biomass within a field; NDVI is calculated from aerial or satellite multispectral imagery bands; the equation for NDVI is  $\frac{\text{INFRARED BAND} - \text{RED BAND}}{\text{INFRARED BAND} + \text{RED BAND}}$ ; NDVI ranges from -1 to 1; bare soil will typically read from 0.05-0.2, and very high biomass will read 0.7-0.95.

#### Volumetric Water Content

Ratio of volume of water to the unit volume of soil. Ex: WWC is 20% = 0.20 (ratio) or  $0.20 \times 12$  inches per foot = 2 inches per foot of soil.

#### Soil Water Tension

Measuring the soil water potential (suction) or how hard the plant has to work to get the moisture within the soil; the lower the measurement is the most saturated the soil is; reading of 0 centibars means the soil is completely saturated.

# Cultivated Crop Management Decisions & Weather Stations

	Temperature	Precipitation	Solar Radiation	Relative Humidity	Wind Speed & Direction	Barometric Pressure	Leaf Wetness	Growing Degree Days	Evapotranspiration	Vapour Pressure Deficit	Growth Stage	Soil Temperature	Soil Moisture	Soil Salinity
Crop Planning														
Crop Variety Selection	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insect/Disease Inputs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Fertilizer Inputs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cultivation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Seeding														
Seeding Rate (Germination)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Seeding Timing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fertilizer Placement	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pre-Seed Herbicide Applications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
In-Season Management														
Plant Population/ Germination	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Nutrient/Fertilizer Requirements	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pesticide, Fungicide & Herbicide Applications	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crop Ripening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Harvest Ability	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
General														
Equipment Activity/ Field Accessibility	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Soil Health (Compaction/ Microbe Activity)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Yield Predictions/Potential	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Treatment Efficacy	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Grain Quality	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scouting/Agronomic														
Scouting Frequency/Timing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>



# Weather Station Costs

Provider	Arable	METOS by Pessl	METOS by Pessl	RealmFive View	Farmers Edge	Weather INnovations	Weather Flow
Hardware	Mark 2	IMT 3.3	ECO D3	Davis Vantage Pro 2	Davis Vantage Pro 2	ADCON	Tempest
Platform	Arable	FieldClimate	FieldClimate	RealmFive View	FarmCommand	Decision Farm	Tempest
Equipment Type	Lease / Year	Own	Own	Own	Lease / Year	Own	Own
Initial Investment	\$0	\$4,100	\$6,005	\$1,650 (US)	\$0	\$11,168	\$415
Lease Cost*	\$800 (US) / Year	N/A	N/A	N/A	\$1,687.50 / Year	N/A	N/A
Platform Subscription	Included in Lease	\$0	\$0	\$25 (US) / month	Included in Lease	\$1,500 / year	\$0
Weather Forecast Subscription Cost	Included in Lease	\$265 / Year	\$265 / Year	Not Available	Included in Lease	Included	Included
IoT Connectivity Sim Card	Included in Lease	\$150 / Year	\$75 / Year	Included in Platform Subscription	Included in Lease	Included	N/A (WiFi connectivity)
Disease Model Cost	Not Available	Not Included	\$125 / Year	Not Available	Included in Lease	\$0	N/A

# Weather Station Array Sensors

Weather Station	Cost		Air Temperature	Relative Humidity	Dew Point	Precipitation	Air Pressure	Evapotranspiration	Leaf Wetness	Global Radiation	Growing Degree Days	Wind Speed & Direction	Wind Chill	Vapour Pressure Deficit	Spray Modeling	Soil Probe	Lightning detection	NDVI/ Chlorophyll Index	Growth Stage Modeling	Notes
	Own	\$\$\$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>Pessl/iMETOS IMT 3.3</b>	Own	\$\$\$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Double Tipping Spoon	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Ultrasonic	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Moisture Volumetric Ion Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Arable Mark 2</b>	Rent	\$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Acoustic Disdrometer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Ionic Anemometer & Potentiometer Vane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Moisture	<input checked="" type="checkbox"/> Sensor on Unit	<input checked="" type="checkbox"/>	Enhanced by Machine Learning Algorithms	
<b>RealmFive Vantage Pro 2</b>	Own	\$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Double Tipping Spoon	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Ionic Anemometer & Potentiometer Vane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
<b>Farmers Edge</b>	Rent	\$\$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Double Tipping Spoon	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Ionic Anemometer & Potentiometer Vane	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Satellite Image	<input checked="" type="checkbox"/>		
<b>Weather Flow Tempest</b>	Own	\$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Haptic Rain Sensor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Ultrasonic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	Enhanced by Machine Learning Algorithms	
<b>Weather INnovations ADCON</b>	Own	\$\$\$\$\$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Double Tipping Spoon	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Generator Anemometer & Vane Resistance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>		

Derived/calculated on platform     Sensor on unit taking direct measurements



