

# SPRAY EQUIPMENT FACT SHEET

## NORTHERN, SOUTHERN AND WESTERN REGIONS

# WEATHER MONITORING EQUIPMENT FOR AGRICULTURAL SPRAYING OPERATIONS

### KEY POINTS

- There are legal requirements to measure and record the weather parameters at the site of application during spray operations.
- It may be useful to have more than one device to compare accuracy.
- Select equipment that can be easily operated and easily recalibrated.
- On-board weather stations offer 'on-the-go' monitoring to allow the operator to make better decisions about the suitability of conditions while spraying.

### The importance of weather data

The weather before, during and after a pesticide application can have a large impact on the outcome of a spray job.

It is a legal requirement of many product labels that records be kept of the weather conditions as measured at the site of application. These include the wind speed, wind direction, temperature and relative humidity during the spraying operation.

Accurate weather data allow us to compare and contrast individual spray jobs within a season and across a range of seasons. Access to good weather data for a property also helps us to develop an understanding of how factors such as wind direction and speed may vary at different times of the day or during different times of the year.

### Which weather parameters should be measured?

Wind speed and direction should be measured at 2m above the ground at the site of application, in an area free of obstructions that may impede air flow.



Permanent weather station  
Source: Eviondata Website

Daytime wind speed should be above 3km/h and less than 15km/h to 20km/h, according to the label.

Night time wind speed should be above 11km/h for the entire period between sunset and sunrise to avoid surface temperature inversions.

Temperature should be measured at a height of 1.25m above the ground in a shaded position (avoiding direct radiation from the sun onto the temperature and humidity sensors).

Relative humidity should be measured at 1.25m for record-keeping purposes, but should also be checked at the target to determine and compare Delta T values (temperature and humidity) for making decisions about droplet survival and target susceptibility.

Surface temperature inversions: Many product labels require that growers must not spray if a surface temperature inversion exists. There are no practical and cost-effective methods for directly measuring if a surface temperature inversion is present on-farm. This must be estimated from

visual and other observations. See the GRDC Fact Sheet *Surface Temperature Inversions* or *Weather Essentials for Pesticide Applications* for more information on how to identify if an inversion is likely.

### Common types of weather monitoring equipment

Weather monitoring equipment available to growers generally falls into four categories: permanent, portable, hand-held and on-board. Often it is useful to have more than one piece of equipment so that results can be compared, and when variations in measurements occur, equipment can be checked and recalibrated as required.

### Permanent weather stations

Permanent weather stations are those which are placed in a fixed location. Typically, they are useful for collecting long-term weather data for the farm, including rainfall, and are useful for making broader decisions about farming operations.

Many permanent weather stations are not located on farms appropriately to provide sufficient data to meet all legal record-keeping requirements, or for making decisions about the suitability of conditions for spraying in a paddock some distance away from where it is located.

Typically, permanent weather stations will only provide data that are legally relevant for a pesticide application if they are located at the site of application (within line of sight to where the sprayer is operating).

Weather stations situated more than 2km away from the area being sprayed, or those that may be obstructed by vegetation or landforms such as hills, would generally be regarded as not being at the site of application.

Many units can be fitted with mobile phone and UHF access and the ability to directly download data to remote websites. When

considering a purchase, ensure that you take into account the service requirements and the supplier's ability to provide the servicing. Often this will be the most important consideration for maintaining the station's accuracy.

### Portable weather stations

These are usually similar to permanent stations, but typically come with a portable stand that allows the station to be set up in the field that is to be sprayed. Portable stations are capable of meeting label requirements for weather parameters measured at the site of application.

Some are available with wireless links to monitors that can be situated in the sprayer cab and can also offer remote access through mobile or UHF.

While this type of weather station can be very useful for researchers, and should be considered by aerial contractors operating remotely, many growers find it awkward and time consuming to set up and pack away every time they spray.

### Hand-held weather meters

These units have proven to be the most popular with growers and spray applicators because of their portability and low relative cost.

There are a range of models available, varying in price depending on functionality.



*Portable weather station*  
Source: Davis Weather Shop Website



*Hand-held weather meter*  
Source: Kestrel-direct.com



*On-board weather station*  
Source: Specmeters.com

Basic units can measure wind speed, temperature and humidity. These require the user to determine and record wind direction, hence a compass is also useful when buying such a unit.

Some mid-range units can also display Delta T value on the screen and some have the ability to store data for later recording or transfer to a computer.

There are several units that now offer wind direction by incorporating a digital compass into the unit. These are the most useful for meeting all legal requirements.

### On-board weather stations

On-board weather stations are those that are fitted to the spray rig. Sensors are

located outside the cab, and monitors inside the cab, to provide weather data directly to the operator.

The most useful units are those which can utilise GPS to determine wind speed and wind direction, as well as temperature and relative humidity, while the machine is moving across the paddock.

Ideally, the sensor will be situated where it can receive clear airflow. Many operators mount the sensor on the roof of the cab. On some machines this can restrict airflow and create problems with measuring temperature and humidity when heat from the exhaust is directed towards the unit. Where the roof is found to be unsuitable, sensors should be mounted on a mast at the front of the machine away from excessive heat from the engine.

The Spectrum Watchdog Weather Station (above right), can be purchased with a monitor and logging capacity, or the components can be purchased separately. The units containing the sensors can be integrated into a Windows-based computer or PDA, and can be plugged into a Viper controller.

The ability to integrate such systems into the machine's existing controllers and recording systems is likely to increase in coming years. This should be discussed with your preferred GPS or machinery supplier for specific machines.

## FREQUENTLY ASKED QUESTIONS

### When should I measure conditions?

It is good practice to measure conditions at the start, during and at the completion of a spray job. Measurements during a daytime spray job should be at least every load. If spraying at night, and the operator is confident a surface temperature inversion is not present, measurements should be made at least every 15 minutes to ensure wind speed has not dropped below 11km/h, hence an on-board weather station is very useful.

### Where should measurements be made?

- ▶ Wind speed and direction, temperature and relative humidity should be measured and recorded at the site of application.
- ▶ Wind speed and direction should be measured at a height of 2m, in a position of clean airflow.
- ▶ Temperature and relative humidity should be measured at a height of 1.25m (avoiding direct radiation onto sensors).
- ▶ Delta T should be evaluated in the air and at the target.

### How long should records be kept?

Label requirements can indicate that records be kept for a minimum of two years. However operators should check state-based requirements and consider OH&S requirements, which typically require records to be kept for a longer period, often seven years.

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## MORE INFORMATION

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