PRACTICAL TIPS FOR SPRAYING FACT SHEET

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Practical tips to reduce spray drift

Photo: Bill Gordon

Spray drift is taken very seriously in areas where there are sensitive crops, such as grapes or cotton.

KEY POINTS

- Make the most of favourable weather conditions, especially wind speed.
- Use the coarsest spray quality that will provide acceptable efficacy.
- Maintain boom height to achieve double overlap, but no higher.
- Reduce travel speed.
- Utilise unsprayed areas and downwind vegetative buffers.

Introduction

All spraying has the potential to produce some spray drift. Operating a well set up sprayer, using larger spray quality and traveling slowly during the daytime with low-moderate winds (unstable conditions) and acceptable temperature and relative humidity, is likely to result in minimal spray drift.

Most drift that does occur in this situation is likely to either be rapidly bought to ground or diluted in the atmosphere.

As such, the risk of drift leading to adverse off-target damage is lower than under less suitable application conditions.

Spraying at night, and especially during stable conditions, significantly increases the potential for pesticides to move off the application site.

P Level 4, 4 National Circuit, Barton ACT 2600 | PO Box 5367, Kingston ACT 2604
T +61 2 6166 4500 **F** +61 2 6166 4599 **E** grdc@grdc.com.au

Spray during favourable weather conditions

WIND SPEED IS CRITICAL

Air movement is needed to ensure that mixing occurs in the air. This helps to deposit airborne droplets. Mixing of the air happens when air movement is more turbulent, especially while the sun is heating the ground.

Day-time spraying – once the sun is up – when the wind speed is consistently above 4 to 5 kilometres per hour is usually safer than night-time spraying – between sunset and sunrise.

Generally wind speeds at night above 11km/hr reduce, but do not eliminate, the likelihood of a hazardous inversion occurring.

Wind speeds for both day and night application should be below 15 to 20km/h as measured at the site of application, depending on the label instructions.

TEMPERATURE AND HUMIDITY (DELTA T)

Delta T values indicate evaporative potential. High values can reduce droplet survival in the air and at the target.

Airborne droplets will rapidly decrease in size when the delta T value of the air exceeds 8 to 10.

For example, if released at 50cm above the catching surface, a 200 micron droplet would generally be expected to fall to the target surface after leaving the

Photo: Evan Collis

Increasing boom height increases drift risk.

nozzle. Under high delta T conditions, this droplet may rapidly reduce to 150 micron or less, and potentially be subsequently suspended in the atmosphere.

If spraying needs to be undertaken with delta T between 10 to 12, only use nozzles that produce very coarse (VC) or larger droplets. Avoid spraying at Delta T values above 12.

Low Delta T values (below 2) encourage droplet survival, which can increase the risk of spray drift.

Using the coarsest droplets that will provide efficacy will reduce the driftable airborne fraction and increase droplet survival times.

SPRAY QUALITY

Spray quality is a useful guide for determining the amount of chemical that could remain in the air after the spray has been released from the nozzle.

Coarser spray qualities reduce risk by reducing the driftable airborne fraction.

Each time spray quality is changed to a larger classification (for example from medium to coarse), the amount of spray that exists as droplets capable of moving off target is approximately halved.

Table 1: Fine spray deposition

Spray quality	Approximate percentage of spray volume below 150 micron.
Fine (F)	40 to 50 per cent
Medium (M)	Less than 20 per cent
Coarse (C)	Less than 10 per cent
Very coarse (VC)	Less than 5 per cent
Extremely coarse (XC)	Less than 2 per cent
Ultra coarse (UC)	Less than 1 per cent

Where product efficacy permits, select nozzles and operating pressure that deliver large droplets (VC or larger) when operating upwind of sensitive areas and/or spraying in marginal conditions. Choice of nozzle is one of the easiest, and simplest, tools that can be implemented to assist in reducing spray drift.

Boom height and speed

NOZZLE HEIGHT

Nozzle height should not be more than that required for double overlap at the top of the stubble or crop/weeds canopy (whichever is taller).

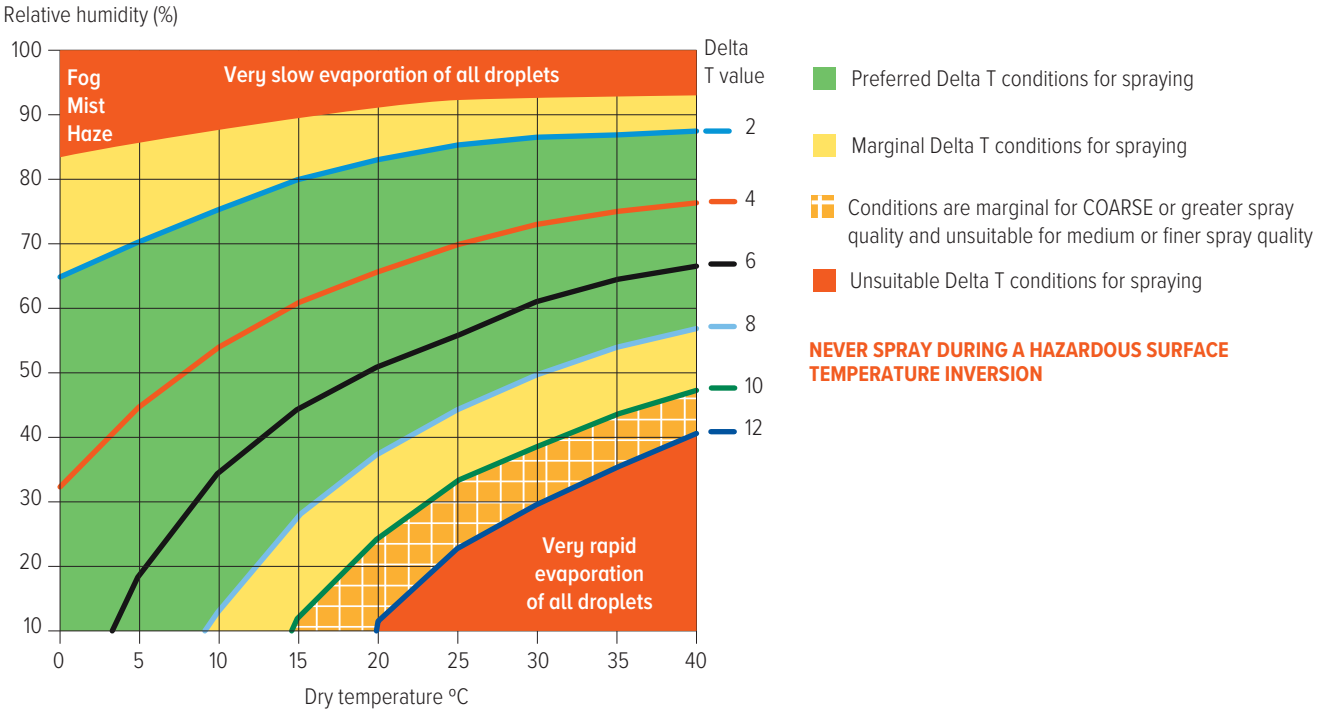
Consider using auto-height control, suitable touch-down wheels, or lower travel speeds to improve boom stability and to assist with minimising boom height.

Increasing height from 50 centimetres above the target to 70cm can increase the amount of chemical left in the air by up to 4 times.

Increasing height from 50cm to 1 metre can increase the driftable airborne fraction by up to 10 times.

The desire to operate with a high boom height clearance so as to allow fast travel speeds is one of the primary causes of pesticide drift.

Figure 1: The relationship of Delta T to relative humidity and temperature.
A common spray guideline is to spray when Delta T is between 2 and 8; with caution below 2 or above 10.



For the estimation of evaporation potential of the aqueous component of pesticide droplets the rate can be considered to be constant for a given Delta T.

Source: Adapted By Graeme Tepper (2012) originally sourced from Nufarm's Spraywise Decisions Chart (2012)

TRAVEL SPEED

Increasing travel speeds will increase the amount of chemical left in the air. This can be due to detrainment at the nozzle (escape of small droplets from the pattern) or aerodynamic affects around the sprayer itself.

Increased travel speeds interact with increased wind speeds.

A Canadian study, conducted by Dr Thomas Wolf of the Saskatoon Research Centre, showed that high travel speeds combined with higher wind speeds (20km/h) almost doubled the amount of chemical left in the air when compared to low travel speeds (8km/h).

In the same study, when the wind speed was around 7 to 8km/h (under day-time conditions), the drift potential was similar at high or low travel speeds.

Other studies have shown that at night the airborne fraction can be up to 5 times greater than that occurring during the day at similar wind speeds.

Avoid high spraying speeds, particularly when ground cover is minimal. Spraying speeds more than 16 to 18km/h with trailing rigs and more than 20 to 22km/h with self-propelled sprayers greatly increase losses due to effects at the nozzle and the aerodynamics of the machine.

Vegetative and unsprayed buffers

Leaving an unsprayed, downwind buffer between the treated area and sensitive areas can reduce the risk of damage from direct droplet deposit and may be a requirement on some labels.

Porous vegetative buffers, such as *Casuarina* species, that are more than 1.5 times the release height can reduce risk when the air flow is turbulent. However, under hazardous surface temperature inversion conditions vegetation may simply divert airborne droplets, rather than filtering them out.

Many labels now provide mandatory buffer zones to downwind sensitive areas. Always follow label directions. When spraying around sensitive areas, ideally wait until the wind is blowing away from these areas. If application must be undertaken upwind of sensitive areas then observe labeled buffer zones; slow down (ideally below 16 km/hr), choose a nozzle that delivers very large droplets (VC or greater) and increase water rates to compensate for coverage.

FREQUENTLY ASKED QUESTIONS

When is the best time to spray?

Usually during daylight hours, when the wind speed is consistently above 4 to 5km/h, predictable in direction, and is less than the permissible wind speed on the product label. Delta T value should be above 2 and the target plants or weeds not stressed. If considering spraying at night, be aware many product labels state: “DO NOT spray under hazardous surface temperature inversion conditions”, which have been shown to occur most nights.

USEFUL RESOURCES

Spray drift resources
grdc.com.au/resources-and-publications/resources/spray-drift

Hazardous surface temperature inversion
grdc.com.au/resources-and-publications/all-publications/factsheets/2022/hazardous-inversion

Weather essentials for pesticide application – Grower edition
grdc.com.au/resources-and-publications/all-publications/publications/2022/weather-essentials-for-pesticide-application

Meteorological principles influencing pesticide application – A technical Manual
grdc.com.au/resources-and-publications/all-publications/publications/2022/meteorological-principles-influencing-pesticide-application

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