

Factors affecting the outcome of spray jobs

They are the still the same whether you use a boom sprayer or a *WeedSeeker*[®].



Factors affecting spray jobs

Efficacy

- Timing (conditions & stress)
- Rate of product
- Water Volume
- Adjuvants (& water quality)
- Nozzle Type (spray quality)
- Nozzle Height
- Speed (more effect on finer spray qualities)

Drift

- *Timing (conditions)*
- *Nozzle type (spray quality)*
- *Nozzle Height & Speed*
(more effect on finer spray qualities)
- *Rate of Product*
- *Adjuvants*
- *Water Volume*

Timing

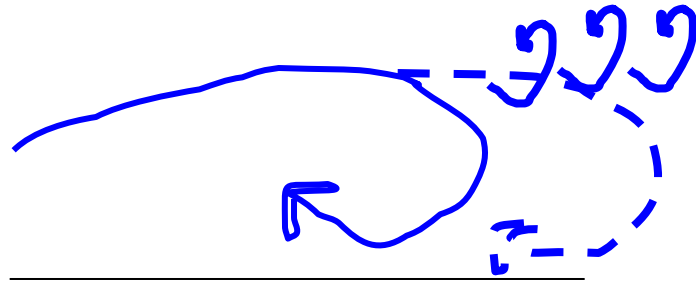
Efficacy

- Growth Stage
- Plant Stress
 - Soil Moisture
 - Frost
 - Previous sprays
- Conditions during spraying (droplet survival, evaporation)
- *Conditions after spraying (e.g. rainfall)*

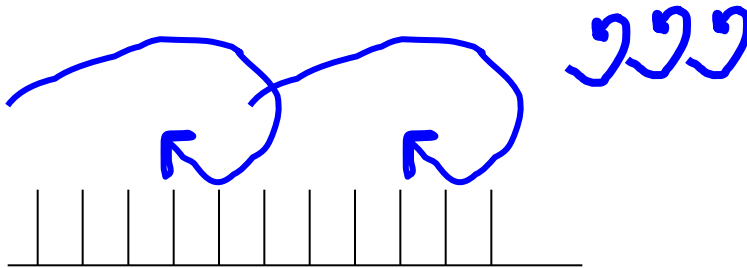
Drift

- *Conditions during spraying :-*
- *Wind Speed*
 - *Minimum (3-4 km/h)*
 - *Maximum (20 km/h, but always check label)*
- *Temperature and Relative Humidity*

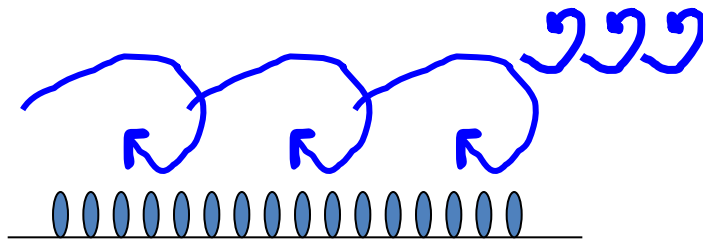
Wind Movement Over Different Surfaces



FALLOW GROUND



HEAVY STUBBLE



IN CROP SITUATIONS

- Monitor and record conditions at least every load.
- **More often at night ...if the wind stops, STOP spraying**



- Avoid spraying through the hour/s just before sunrise, and do not start spraying again until the wind picks up.

- If you night spray you must know what sensitive crops are being grown in lower parts of the catchment.

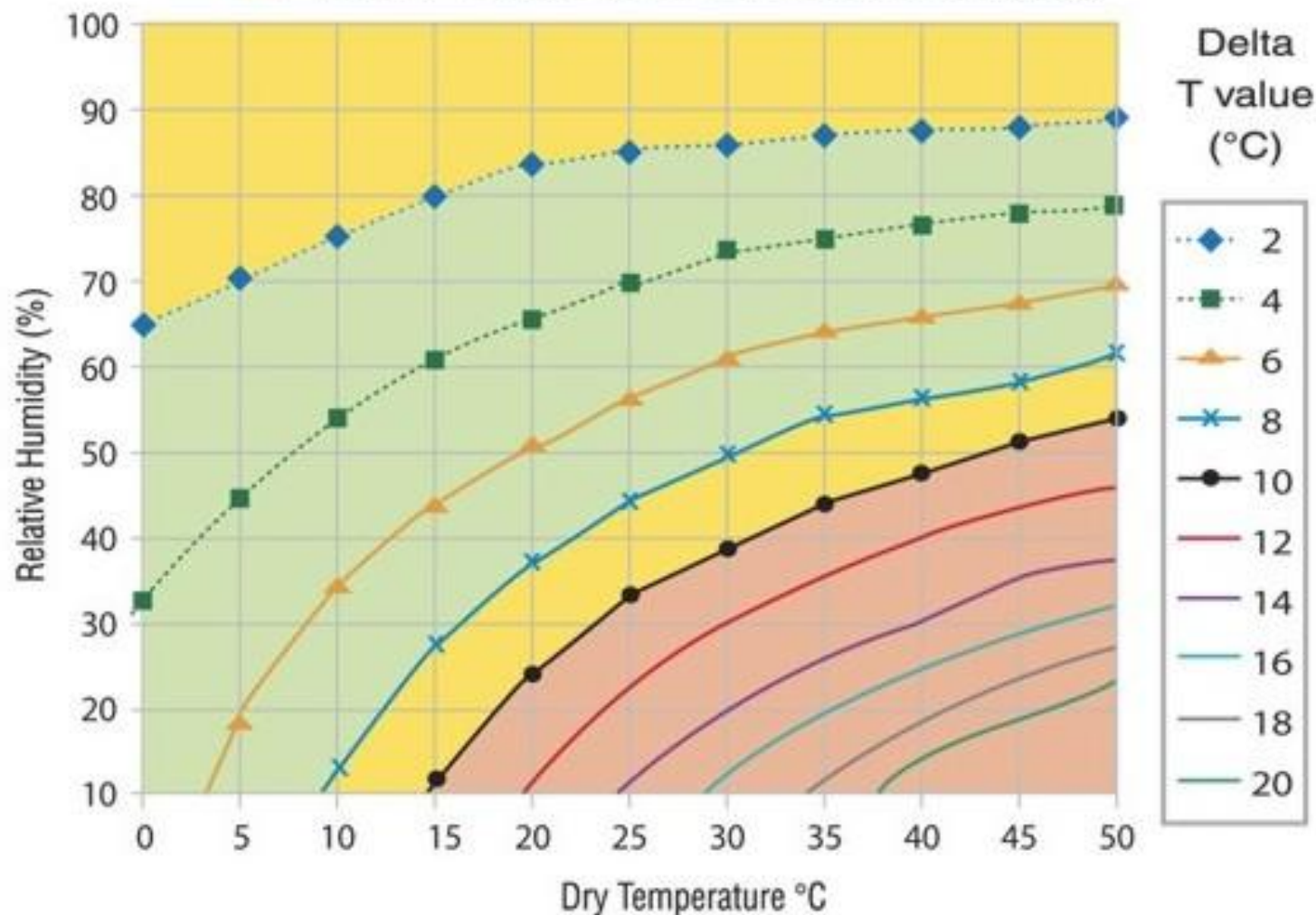
At night, if the wind speed drops you probably need a buffer of more than 2-3km for each hour of low wind Speed (3 hours low wind = 9km buffer).



Image courtesy of Nufarm

SELECTING THE RIGHT DELTA T CONDITIONS FOR SPRAYING.

- preferred delta T conditions for spraying
- delta T conditions marginal
- delta T conditions unsuitable for spraying



Rate of Product

Efficacy

- An appropriate amount of product will depend on;
- Maximum label rate
- Plant / target size
- Stress or conditions prior to spraying
- Droplet size (if bigger than coarse use robust rates)
- Water rate (for higher rates)
- **MIX THE CORRECT AMOUNT**

Drift

- *The higher the rate of product (more concentrated the droplets), the greater the potential for damage, if drift occurs.*
- *Total amount of product applied over a given area is also important for the potential level of damage.*

nozzle angle and height affect sprayed width on the weed seeker (which affects applied rate)



$$L/ha = L/min/nozzle \times 600 \div \text{speed (km/h)} \div \text{width (m)}$$

Weedseeker Rates (L/Ha) using TP 65 even nozzles

sprayed width (m)

0.6

nozzle size	pressure (bar)	flowrate (L/min/nozzle)	speed (km/h)				
			12	14	16	18	20
0 3	2	0.96	80	69	60	53	48
	2.5	1.08	90	77	68	60	54
	3	1.18	98	84	74	66	59
0 4	2	1.29	108	92	81	72	65
	2.5	1.44	120	103	90	80	72
	3	1.58	132	113	99	88	79
0 5	2	1.61	134	115	101	89	81
	2.5	1.80	150	129	113	100	90
	3	1.97	164	141	123	109	99

Water Volume

Efficacy

- Always consider the target and the products' mode of action - some situations (stubble), products and targets need more water.
- Consider the impact of water quality on the product (more water can mean more problems (e.g. if water quality is not suitable)).

Drift

- *Increasing water rates can dilute droplets, and reduce damage due to spray drift.....*
- *Provided that higher water rates are achieved through larger orifices instead of increased pressure.*

Adjuvants & Water Quality

Efficacy

- Adjuvants such as wetters and oils are a critical part of getting the product onto, or into, the target.
- Treating poor quality water will be critical for some products.
- More water often means additional adjuvants are required.

Drift

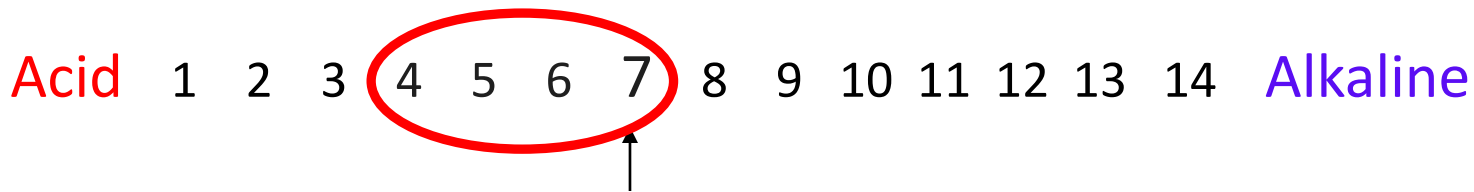
- *Main reason to use adjuvants is to improve efficacy.*
- *Non ionic wetters usually increase drift potential.*
- *More can be done to reduce drift with nozzles than adjuvants.*
- *In a sensitive situation, adjuvant choice becomes more important.*

Things to consider with water quality

- **pH** (solubility, alkaline hydrolysis, stability)
- **Hardness** (Calcium, Magnesium, Bicarbonates)
- **Turbidity** (suspended solids)
- **Salt** (EC)
- **Temperature**

pH

- pH is a Logarithmic scale (10 x between units)



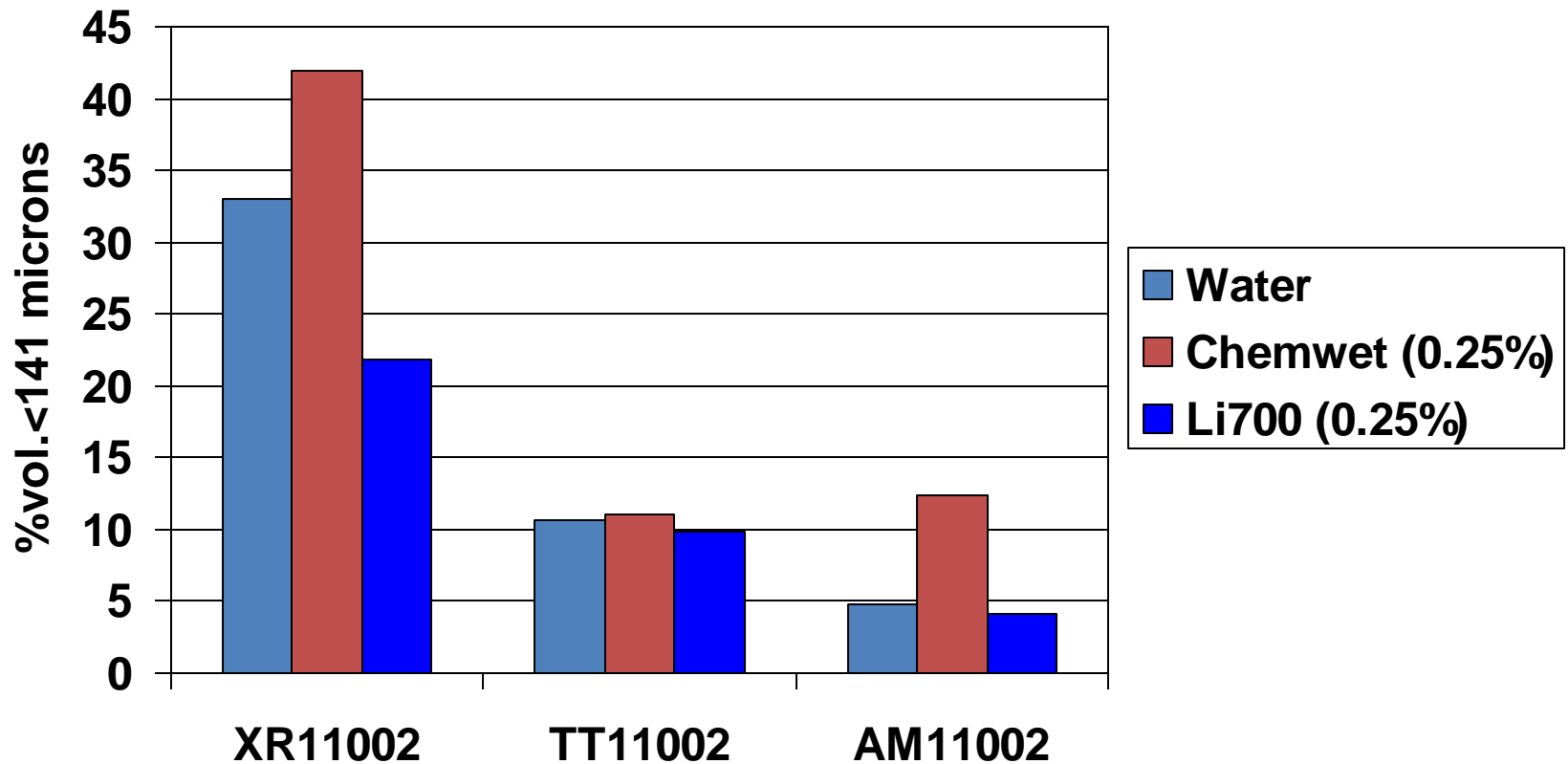
Unstable
Tank Mixes

neutral

Alkaline Hydrolysis
Low solubility
Poor droplet contact angle

- High pH's, due to the lower solubility of most things tends to make problems with hardness even worse.

- In sensitive areas – where possible avoid using wetters that increase the drift potential (such as non-ionics)



Nozzle Type

Efficacy

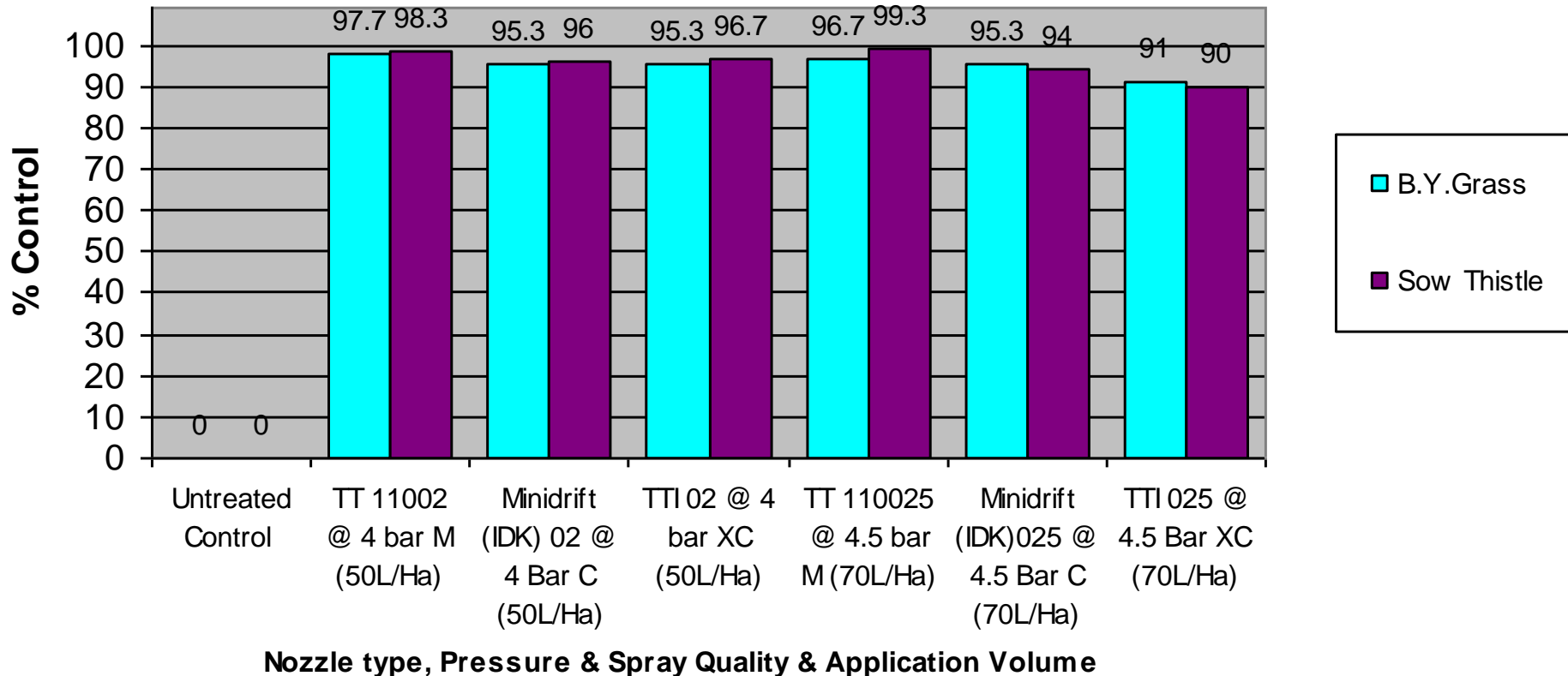
- If timing, rate of product, and water volume are good, nozzle type will be less important for efficacy.
- However, it is always advisable to follow label and manufacturers recommendations.

Drift

- *Spray quality is a major factor in drift potential (a change from coarse to medium doubles the drift potential)*
- *Always use the coarsest spray quality that will provide efficacy.*

- Use the coarsest nozzle that will provide efficacy.

Percentage control of barnyard grass (4 tillers-flowering) and sowthistle (4-8 leaf) using 800mL/ha Roundup CT in 50L/Ha or 70 L/Ha @ 20 km/h



Nozzle Height

Efficacy

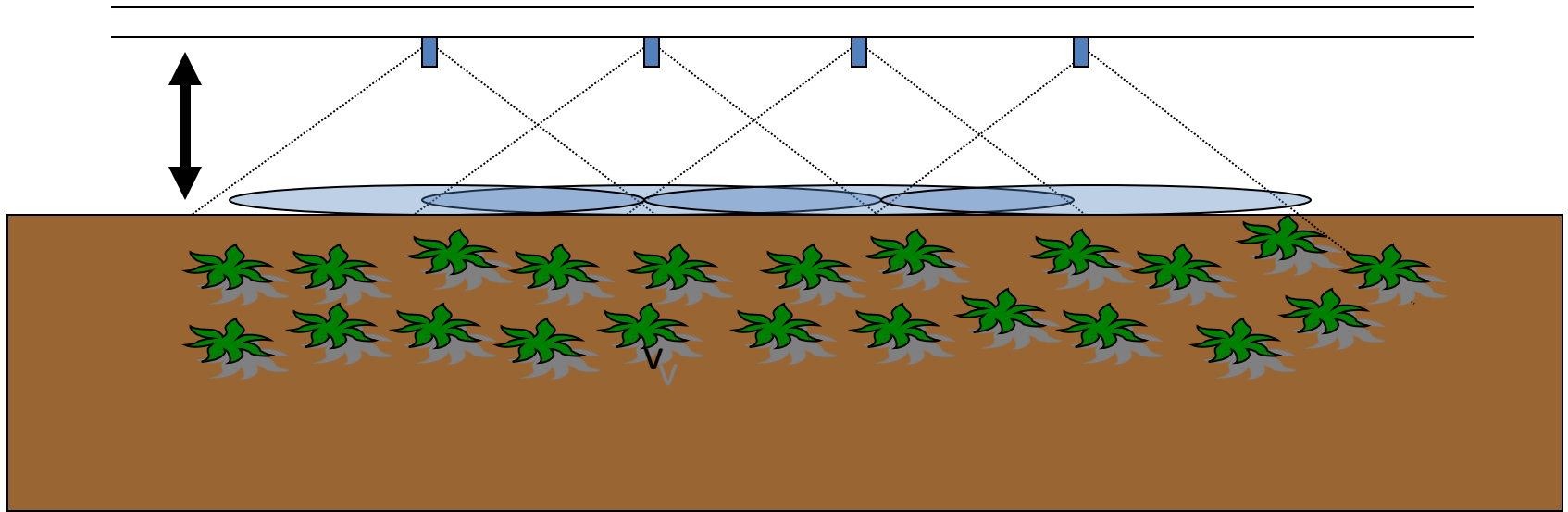
- Consider overlap or sprayed width
- Increasing the nozzle height with weed seeker reduces effective rate.
- Increasing height above the target will always result in less spray landing on the target (small droplets slow down, big droplets accelerate).

Drift

- Increasing boom height dramatically increases the amount of chemical that can stay in the air
- 50cm to 70cm **x 4**
- 50cm to 1m **up to x 10**

Preferred height for a boom sprayer

Double Overlap (at target or top of stubble)



Speed

Efficacy

- Increasing speed with fine or even medium droplets will reduce the amount of chemical that can land.
- Increasing speed increases wheel tracks and dust issues

Drift

- Increased speed reduces downward velocity of fine droplets.
- Together with boom height, higher speeds increase drift potential.

USE COMMON SENSE – if it seems risky, it probably is !

- ask yourself - would you want your neighbour spraying during unsuitable conditions if your crops were at risk ?



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