

## Getting back to spraying basics

By Graham Betts, ASK GB\*

A lot of attention is being paid to keeping up with spray application technology such as auto boom shut off and chemical injection. These are all very important but we may be forgetting how to get back to the basics of spray application. At the end of the day/night we are spraying products to improve the crop or manage pests.



Graham Betts.

### Planning is essential for good results

We should look at planning all spray jobs – such as nozzle selection, water rate and quality – when we plan our cropping, fertiliser and chemical programs. We may not achieve the best spray application outcome if we have not planned for the job.

### Water quality

It is a good idea to establish if water quality issues exist for the products you are likely to use. This will help when a limited supply of good quality water is available. We can utilise poor quality water for the products that are not affected and save good water for the products that are affected by water quality.

Water containing suspended solids, such as plant materials and dirt, may not be suitable for many products. The water pH, hardness and bicarbonates should be checked regularly. Bicarbonates can only be accurately checked by the laboratory analysis. Cold water can affect compatibility of chemical mixes.

### Timing

If spray timing is good, we can often get some things wrong, but still get a good spray application outcome. Conversely, we can do a lot of things right, but have a poor spray application outcome if our timing is poor. Good timing takes into account both the environmental conditions for spraying and the susceptibility of the target.

Factors that may reduce susceptibility include stresses (such as moisture or frost) as well as the physical properties of the target such as the cuticle, which generally reduce the susceptibility as the target gets larger.

### Targets

What targets are we spraying – crop, grasses, soil, broadleaf weeds, fungi or insects? Where do we need to apply the product – all over the plant or to a specific region? What does the leaf surface look like, fresh, waxy or hairy?

### Chemical group and mode of action

Mode of action generally refers to the sites within a

target where the product produces its biological activity. This is particularly important in resistance management and for rotating chemistry. From an application point of view we should also be very interested in what the product does when it hits the target. For example,

- Is it a contact product, which stays where it lands? Thorough and even coverage is required.
- Is it only partly systemic or partially translocated? For example some products may only move upward in the plant, so where we place the majority of the spray is very important.
- Is it fully systemic or fully translocated? The critical factor is not evenness of coverage, but enough active ingredient arriving at the target.

Good spray coverage is tied to the mode of action of the product being applied and the shape/size of the target. For example soil products may need a coarse to extremely coarse spray quality. Water rate may need to be increased as spray quality/droplet size is increased. What is the point of good coverage if a percentage of the product does not arrive at the target?

### Weather conditions, sensitive areas

Wind direction (record to or from), wind speed, temperature, humidity, delta T, dew, frost and cloud cover. All the above can affect the condition of the target and spraying conditions. If we don't control the movement of chemical – the regulators will. This may well make spraying more difficult in the future.

DRIFT is the affect, LOSS is the cause. There is no such thing as no loss/drift from a spraying event.

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Quick release nozzle gauge and tip tester.

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### Labels

Chemical labels are a legal document and you need to be familiar with the information section on application before spraying. The label contains practical spray application information on water rates, spray quality, drift and so on. But often the label information on which nozzles to use, pressure and speed is not so practical.

### Compatibility

Always check chemical compatibility. Have you given any thought to the compatibility of different products requiring different spray quality/droplet size for different targets? For example grasses (which may need a medium spray quality), and soil products (coarse to extremely coarse spray quality), may not be compatible in the same tank.

### Nozzle selection and calibration

The factors to consider here are speed (constant, minimum and maximum); width; litres per sprayed hectare; litres per minute per nozzle; nozzle pressure; and, spray quality/droplet size.

- When checking speed for manual or automatic systems it is a good idea to do the following: Check tyre pressure, at least three quarter fill the spray tank, mark out at least 100 metres in the paddock, fold the boom out and travel the test strip at the constant operating speed between the pegs.
- Width could be nozzle spacing, band width per nozzle, row spacing divided by the number of nozzles, boom width. Nozzle flow charts generally work on 0.5 metre nozzle spacing.
- Litres per sprayed hectare (band spraying) or litres per paddock hectare.

- Litres per minute per nozzle listed in the nozzle manufacturers' catalogues is with water only. This may change with different chemical mixtures.
- Check pressure at the nozzle as it can be different from the front to the back of the sprayer and may vary across the boom.
- Spray quality/droplet size at the target is very important and is established by the information on the chemical label, target, mode of action of the chemical, weather conditions and maybe travel speed.

One area of neglect when selecting and operating spray nozzles is that we may want to put out a given amount of litres per sprayed hectare – with the chosen nozzle at a given pressure and speed – but the operating pressure does not produce the spray quality/droplet size required.

If the pressure needs to be increased to achieve the correct spray quality/droplet size we need to increase the water rate and/or travel speed (or change orifice size).

If the pressure needs to be decreased to achieve the correct spray quality/droplet size, we need to decrease the water rate and/or travel speed (or change orifice size).

You can use one type of nozzle if you are prepared to make drastic adjustments to water rate and speed. The operators who are not prepared to change speed will need two or three sets of nozzles.

The calibration formulas are in every nozzle manufacturer's product book.

### Automatic rate controllers

Automatic rate controllers are only as useful as the information entered into them. The functions available must be understood for them to be setup correctly.

Minimum settings (speed, flow, pressure, litres per minute per nozzle) are very important. If the settings are correct, nozzles will not lose their spray pattern and non-drip check valves will not shut off when the spray operator slows down for obstacles such as trees, paddock corners, and gullies.

Correct minimum settings will give the correct spray pattern when turning the boom back on after turning around on a headland.

Service the flowmeter and regulating valve every year and then calibrate the flowmeter with water, keeping in mind the flow calculation figure may not be the same for different mixtures.

### Filtration

Remove all nozzle strainers; they can cause the build up of scum on the screen because of the turbulence they cause at the nozzle. The sprayer filters are not for the filtering of poor quality water pumped into the sprayer.

Centrifugal pumps require 16 to 30 mesh suction filters, 80 mesh pressure between pump and spray components and 100 mesh boom line filters (as close to the boom line as possible).

Diaphragm pumps require 50 mesh suction filters, 80 mesh pressure between pump and spray components and 100 mesh boom line filters (as close to the boom line as possible).



An example of manual boom recirculation plumbing.

Quick fill pumps may need a 120 to 140 mesh disc filter on the pressure side of the pump if the water source has very fine sand or other particles.

### Plumbing

It is a good idea to mount boom valves as close to the boom line as practical – most boom manufacturers mount them at the back of the sprayer. Use hose the same size or larger than the pump outlet to the boom valves, and mount the hose in as straight a line as practical to the boom valves with no restrictions.

### Record keeping

We need to keep records for legal reasons and that is important. But even more important is the need to keep records for better management. It is essential to have good records if we want to repeat a good spray application and we need good information to work out why a spray job is less than ideal.

Things that should be recorded include (but are not limited to) wind direction (to/from), wind speed, percentage cloud cover, temperature, humidity, delta T, water source/quality, litres per sprayed hectare, chemical rate and quantity used, chemical batch numbers, total litres used, total area sprayed, nozzle brand/type/spray angle/size.

### Herbicide resistance

Herbicide resistance is a real threat to modern farming systems. Poor application may not promote resistance, but it may delay our ability to recognise when a problem exist.

### Boom

Boom stability and nozzle height above the target or false target are important considerations. If you are spraying weeds in stubble or crop, the nozzle spray pattern should be a double overlap at the top of the stubble or crop, not the weed.

This is very important when using coarser spray quality/droplet sizes. If it is important to have the nozzle set at the correct height above whatever, it is extremely important that the boom is stable. It is no good having the boom dive into the crop on one side and up in the air on the other.

Some ways to prevent this happening would be to use a trailing boom, boom gauge wheels with their own suspension or automatic boom height sensors.

### Training and education

Training and education are an essential part of any business.

The value of the information and knowledge gained from good training in spray application will far outweigh the cost of that training. It will enable you to get the best out of each spray job and get your spray on target!

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This article has been reviewed by Bill Gordon. His very valuable assistance is appreciated. Contact Bill at Bill Gordon Consulting, E: bill.gordon@bigpond.com

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## Three Tips for Improved Profitability

### 1. Choose spray tips carefully and conduct regular maintenance

- Maximise efficacy by matching the spray tip to the application and conditions
- Understand your droplet size, coverage and drift avoidance needs
- Check spray patterns and flow rates regularly
- Reduce chemical waste by replacing worn or damaged spray tips

### 2. Choose precision over price

- Accurate and consistent performance across the boom is critical
- Poor spraying performance can result in expensive re-sprays and costly yield losses

### 3. Choose wisely: Turbo TeeJet®

Find just what you need for all your spraying operations in our extensive line of Turbo TeeJet nozzles.

- **Turbo TeeJet:** The industry standard for uniform coverage, minimal clogging and long wear life
- **Turbo TwinJet®:** Two identical 110° flat spray patterns ensure excellent coverage and canopy penetration
- **Turbo TeeJet Induction:** Large air-filled droplets provide the optimum balance of drift control and pattern uniformity across a broad range of spraying pressures



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