

# PRE-SEASON SPRAYER CHECKS FACT SHEET

## NORTHERN, SOUTHERN AND WESTERN REGIONS

# PRE-SEASON SPRAYER CHECKS AND CALIBRATION TIPS

### KEY POINTS

- Always start with a clean machine.
- Prepare a spray plan and check sprayer performance against this.
- Check and record controller settings.
- Use the self-test or test speed function to check the machine for leaks, restrictions and uniform output.
- Check the machine's output against the spray plan.
- Recheck settings and performance.

### Start with a clean machine

Before performing any calibration or replacing worn nozzles, ensure the machine has been thoroughly decontaminated. This will ensure operator safety and make it easier to discover leaks and replace worn nozzles.

### Prepare a spray plan

Document the parameters that are going to be required for the next application. These should include:

- desired L/ha;
- spray quality;
- average or constant speed and likely speed range;
- boom width;
- nozzle spacing (m);
- number of nozzles;

- flow rates of selected nozzles at various pressures; and

- the expected total flow rate through the boom at various pressures.

Preparing a spray plan requires that the operator has access to nozzle charts, manufacturer catalogues or online nozzle selection tools for the nozzles available or selected.

### Check and record the current controller settings

The settings that should be checked and recorded include;

- flow calibration;
- speed calibration;
- section widths; and
- minimum hold (or lower limit setting).

If you are not familiar with checking or adjusting these settings, refer to the manufacturer's instruction manual for the rate controller model your machine is fitted with and make sure you know how to access and adjust them before proceeding.

Do not change or adjust settings until you have recorded them in a safe place (such as the controller manual).

### Check sprayer performance against the spray plan

Check that the section widths entered into the controller actually match the machine. This may require measuring the nozzle spacing and multiplying the nozzle spacing by the number of nozzles on each section (do not assume this has been entered correctly for every machine). If they have been entered incorrectly, the rate and pressure will never be correct.

Use the automatic rate controller's **self-test, test speed, simulated speed** or **nozzle flow check** to enter a simulated travel speed. By entering the desired L/ha and test speed, the operator allows the machine to operate at the simulated speed while the machine is stationary in 'manual' or 'auto' mode (some machines that utilise the GPS for determining travel speed may need to switch off the mapping capabilities to be able to use the simulated speed function).

An example of a single output from the [ispray.com.au](http://ispray.com.au) website nozzle selection tool for a spray job based on input parameters of 70L/ha, medium droplets, a 24m boom, at an average speed of 22km/h.

Pressure at nozzle (Bar)	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
VC	VC	VC	VC	C	C	C	C	C
Litres per minute at nozzle	0.830	0.838	0.900	1.050	1.187	1.289	1.400	1.520
Total Flow L/min (Roundoff)	28.8	44.8	46.1	33.4	34.0	51.6	67.2	73.8
Minimum Suggested Field (On Spray Controller)								

**Table 1 Common controllers and their minimum hold functions**

Controller brand and/or model	Function in the controller
Controllers that use total flow rate through the boom (L/min)	
RAVEN	Low flow limit
Micro-Trak	Minimum flow
Controllers that use minimum speed (km/h)	
Hardi 5500 and 6500	Minimum speed
Controllers that use flow rate through a single nozzle (L/min)	
Topcon X 20	Nozzle limits minimum
Controllers that use minimum spray pressure (bar)	
John Deere	Minimum spray pressure
Teejet 844E (and other models)	Minimum pressure

NOTE: Not all manufacturers, or all available models, have been included in this table. Some manufacturers have models that allow the minimum hold or minimum setting to be entered in more than one way (for example, as minimum speed or as minimum pressure). Some other models from various manufacturers do not have the minimum hold function available. It is always advisable to check with the supplier or manufacturer about the functions that are available in the various models before purchasing the equipment.

Source: Bill Gordon Consulting

### Steps and checks

- Enter the desired L/ha and a simulated average speed into the controller.
- Check pressure at the nozzle compared with where the operator reads it, and for each boom section to ensure even pressure.
- Check nozzle flow rates and replace nozzles that are worn or producing poor patterns.
- Check that the total flow rate through the boom is in L/min and the pressure matches the spray plan for the speed being simulated. If they match, continue checks. If flow rate does not match the plan, check flow meter calibration. If pressure is different then check pressure gauges and filters.
- Reduce the test speed to the minimum acceptable pressure (or below) on the spray plan and check the nozzle pattern and performance. If required, adjust the test speed to ensure the nozzle pattern is acceptable and the nozzles are working appropriately.
- Once you are satisfied that the nozzle pattern is performing adequately, record the minimum speed, pressure and total flow rate through the boom and the flow rate of individual nozzles. This will be used to set the minimum hold or lower limit for this nozzle at this volume. Note that changing volume or nozzle type may require that the minimum hold or lower limit be adjusted.

### Setting the minimum hold or lower limit function

The minimum hold or lower limit function should only be used in situations where overdosing will not interfere with the cropping program by causing crop damage or increased plantback periods. Operators must also ensure that the nozzle type selected is suitable for the range of operating speeds and L/ha used.

It is always advisable to minimise the potential for overdosing by utilising larger headlands, or by increasing the application volume to reduce times where the minimum hold engages.

Different brands of controllers have different ways of entering the minimum hold function. Some common examples are shown in Table 1.

### Using the spray plan and test speed to check other functions

The spray plan identifies what the total flow rate (L/min) through the boom should be at a given speed, application volume (L/ha), nozzle spacing or section width (m) and pressure.

It is good practice to have the total flow rate through the boom displayed on the screen while operating the sprayer. It is an excellent diagnostic tool.

*Pre-orifice*



*Pre-orifice*



*Low pressure air induction*



*Low pressure air induction*



*High pressure air induction*



### Checking the flow meter

If the total L/min through the boom and the pressure at the nozzle match the spray plan for the test speed (or operating speed), then the flow meter should be working correctly.

In situations where the flow meter is not accurately measuring the total flow rate through the boom in L/min (using the test speed), the flow meter calibration factor or number may be incorrect. Most flow meters should have the flow calibration factor stamped onto the meter or a tag attached to it. Check this number against the figure in the controller, and adjust as required.

Never adjust the flow meter calibration factor or number to match the tank volume for a job unless the tank has been filled with a calibrated flow meter. As many tanks are notoriously inaccurate, it may also be that section widths are incorrect or the speed input is wrong.

### Checking the input speed and tank volume

If the flow meter has been proven to be accurate using a simulated speed, and the section widths are entered correctly, tanks should run out when expected unless the tank size or speed inputs are not correct (allowing for some overdosing if setting the minimum hold function).

Tank size and increments can be checked by using a calibrated in-fill meter or by weighing the contents using a weigh bridge.

Speed input is best referenced against an accurate GPS using the distance travelled function, or by comparing travel speeds. Where the distance travelled (or speed) on the GPS is different to the sprayer input, the speed calibration factor can be adjusted according to the method outlined in the controller manual.

### Summary

- ▶ Preparing a spray plan assists with nozzle selection, controller inputs and systems checks.
- ▶ It is critical to read the controller manual to ensure you are familiar with the functions available.
- ▶ Always record any setting before making adjustments. **Do not assume** that the settings in it are correct or appropriate for the nozzle you may want to use.



*Bill Gordon checking nozzle outputs at an application and drift management workshop in central Queensland.*

*Extended range flat fan*



*Twin jet*



*Air induced twin jet*



*Hybrid nozzle*



*Hybrid nozzle*



*Streaming nozzle*



## FREQUENTLY ASKED QUESTIONS

### When I slow down, the nozzle fan patterns tend to collapse. How can I stop this without switching to manual pressure?

This occurs when the pressure at the nozzle is too low for the type of nozzle fitted. The use of the minimum hold function in the automatic rate controller can prevent this from happening, but will result in overdosing when it engages. It may be best to use the minimum hold in conjunction with larger headlands and small increases in total application volume (L/ha).

### Why do some of my tank loads seem to run out faster than others?

The output of the boom is a function of the speed input, section widths, flow meter output and the extent that the minimum hold function is engaged.

For some tank mixes, particularly where products have high specific gravity such as foliar fertiliser, the flow meter may need to be recalibrated to ensure it is accurately measuring the output (this is more likely with impeller-type flow meters than electromagnetic types).

In other situations it may be that the minimum hold function engages too often due to regular decreases in speed (e.g. contours and banks). In those areas where it engages too often, a small increase in application volume is usually the best solution.

### When I accelerate at the start of a spray run, the machine seems to take a while to get up to operating pressure. Why does that happen?

If this is occurring all of the time, it may be that a setting in the controller such as valve type or a valve calibration factor may need adjusting, which is best to discuss with the supplier or manufacturer.

If the problem appears to get worse the longer you operate, it may be an issue with hydraulic flow to the pump which may need to be adjusted. Again discuss this with the supplier or manufacturer.

However, the most likely cause is that the **minimum hold or lower limit is not set correctly.**

## USEFUL RESOURCES

### GRDC Back Pocket Guide

Nozzle selection for boom, band and shielded spraying  
[www.grdc.com.au/GRDC-BPG-NozzleSelection](http://www.grdc.com.au/GRDC-BPG-NozzleSelection)

### Summer fallow spraying Fact Sheet

[www.grdc.com.au/GRDC-FS-SummerFallowSpraying](http://www.grdc.com.au/GRDC-FS-SummerFallowSpraying)

### Ground Cover Direct

Free Phone: 1800 11 00 44  
[ground-cover-direct@canprint.com.au](mailto:ground-cover-direct@canprint.com.au)

### Your spray controller manual

### Nozzle selection tool

[www.lspray.com.au](http://www.lspray.com.au)

### Nozzle manufacturer websites

[www.Teejet.com](http://www.Teejet.com)  
[www.Hardi.com.au](http://www.Hardi.com.au)

### Spray equipment manufacturer websites

[www.Deere.com](http://www.Deere.com)  
[www.CaselH.com](http://www.CaselH.com)  
[www.Goldacre.com.au](http://www.Goldacre.com.au)  
[www.Ravenprecision.com](http://www.Ravenprecision.com)  
[www.Farmscanag.com](http://www.Farmscanag.com)

## MORE INFORMATION

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