

Spray applications for cotton

By **BILL GORDON & GRAHAM BETTS**



Bill Gordon.



Graham Betts.

Calculating banded sprays

Often people want to know the actual application rate and how much chemical to put in the tank (based on green ha or sprayed ha), how far a tank will go (based on paddock ha) and what rate to put in the spray controller. Others want to know what nozzles they should use to achieve a recommendation they have received from their advisor.

There are often big differences between the consultant's recommendation, the applicator's instincts and what the machine can actually do with the nozzles available.

The main reason for a banded application is to place the recommended rate of the product onto an area smaller than the whole field (this way we use less chemical over the whole field, but still apply the equivalent rate/ha to the actual target area).

To work out the true application rate we need to know the sprayed width, or average sprayed width for each nozzle, this allows us to calculate the litres per sprayed ha (L/sprayed ha sometimes called L/green ha). Label rates are always given as L/sprayed ha. Advisors should always give recommendations as L/sprayed ha.

To apply the correct L/sprayed ha there are two main things to work out:

- **How much chemical to put in the tank**, which is based on L/sprayed ha.
- **What to put into a controller**, which is based on

BE AWARE OF

- Even the most experienced operators can be concerned about the accuracy of banded applications.
- Advisors should always give recommendations as L/sprayed ha.
- Ensure the right rates go to the target.

paddock ha per tank, (unless you want to play around with section widths).

Formula

(the following are a selection, there are many that work)

- Band width in metres: eg **0.7m band** ÷ 1 m row spacing = band width (m) ÷ row spacing (m).
- Sprayed width per nozzle (m): = **band width (m) ÷ number nozzles per band** (eg 3 nozzles per 70% band of a 1 m row = 0.7 m ÷ 3 = 0.23m).
- The application rate = **L/sprayed ha: L/sprayed ha = L/min/nozzle x 600 ÷ speed (km/h) ÷ sprayed width per nozzle (m).**

L/sprayed ha applies to each band (row), whether you spray 1 band (row), or many rows, whether it is a solid plant, single skip or double skip.

- Number of sprayed ha per tank = **Tank size (L) ÷ L/sprayed ha.**
- Amount of chemical to add per tank = **Sprayed ha per tank x chemical rate/ha.**
- Paddock ha per tank (solid plant): = **Sprayed ha per tank ÷ band width (m).**
- Paddock ha per tank (Skip Row Configurations): eg Double Skip on 1m row spacing (only planted 1 out of every 2 rows), this would be the same as only spraying 12 x 1m rows with a 24m boom.
Paddock ha per tank (skip) = Sprayed ha per tank ÷ the band width (m) x width of boom ÷ row width (m) ÷ number of planted rows under the boom.
- Rate to put in the Controller: = **Tank Size (L) ÷ Paddock ha per tank**
*this works if you don't want to change the section widths in the controller.

Selecting the correct nozzle size for a particular job

To work out what size nozzles you need to get a particular L/sprayed ha, you need to know what the required flow rate of each nozzle (L/min/nozzle) should be.

If all nozzles are the same size this is relatively easy, as the flow rate will be the same for each nozzle. For example the average sprayed width per nozzle if you had 5 nozzles per 1 m row at 100% band would be 1m ÷ 4 = 0.2m.

If you had 4 nozzles per 1m row and a 70% band, then

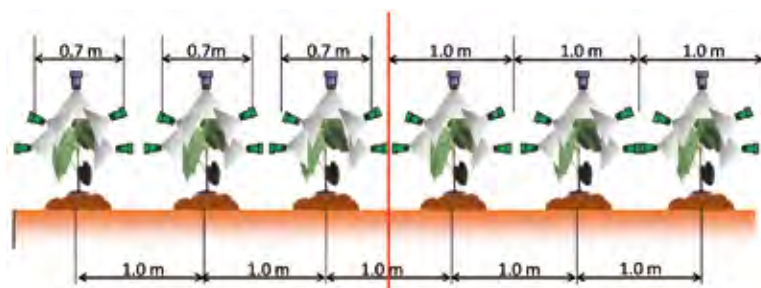


Diagram courtesy of Graham Betts.



myBMP for Growers
powered by Research

myBMP
Best Practice

“ I am impressed with the new myBMP, it's very easy to use and exceedingly practical. The ability to quickly look up the best practice on issues such as Human Resources is very valuable especially with all of the attached resources ”

– Hamish Johnstone

Go to www.mybmp.com.au
or Call 1800cotton

the average sprayed width would be $0.7\text{m} \div 5 = 0.14\text{m}$. To calculate the required flow rate of each nozzle, the formula you need to use is:

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

If you are using different combinations of nozzle sizes, you can still use the same formula, but it helps to work out the total flow rate for each band (or row), to do this, change the average width per nozzle to the band width or spray width per band (row) to get the total flow required per band (or row) and select nozzles with flow rates that add up to that total (all at the same pressure).

Once you have calculated the required L/min/nozzle use a nozzle flow chart to identify appropriate nozzle sizes and pressures, and don't forget to check the spray quality produced to ensure it is consistent with the product label.

For further information, there is an easy-to-follow publication (by Graham Betts – “banded spraying” booklet) that has all the necessary diagrams and tables to make banded application easy – it will take you through many situations explaining the calculations and how to choose nozzles for different jobs.

To purchase a copy of the publication, contact Graham Betts at ASK GB Mobile 0427 622 214 <mailto:askgb@bigpond.com>

Bill Gordon has worked closely with the cotton and grains industry for many years and runs workshops for farmers and trainers. Contact Bill Gordon Consulting 0429 976 565 <mailto:bill.gordon@bigpond.com>

The information on the following pages is courtesy of NuFarm Australia Ltd: 03 9282 1000, www.nufarm.com.au

Boom Spray Hygiene Cleaning procedure

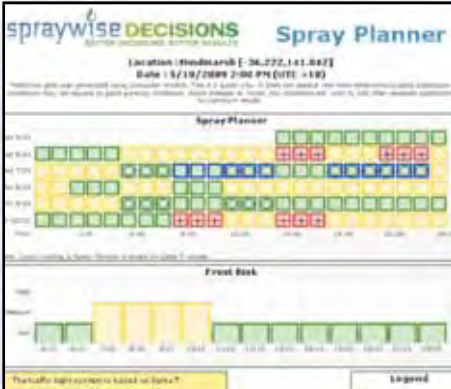




GROUP	CHEMISTRY	PRODUCTS	CLEANING PRODUCT
A	Dims	Sequence	Tank and Equipment Cleaner
	Fops	Nugrass	
B	Imidazolinones	Midas® Arsenal Xpress, Spinnaker Intervix®, Raptor®	Small amount of Tank and Equipment Cleaner or water
	Sulfonyl Ureas	Associate®, Lusta®, Monza® Nugran®, Sempra	Chlorine Beach
C	Triazines	Nu-Trazine 900 DF Convoy® DF Diuron 900 DF	
		Flowable Diuron, Flowable Simazine	
		Nu-Tron 900 Df, Prometyrn 900 DF, Simazine	
	Benzonitriles	Bromicide 200	
D	Dinitroanilines	TriflurX, Rifle 440	
F	Phenoxy nicotinilides	Paragon, Nugrex	
G	Diphenyl Ethers Triazolines	Striker, Affinity®, Hammer®	Alkaline Detergent 'Omo'® or 'Spree'®
I	Benzoic Acids	Kamba 500, Comet 200, Conqueror	Tank and Equipment Cleaner
		Invader 600	
	Phenoxy Acetic Acids		
	Mcpa (Dimethylamine)	Agritone 750	Cloudy Ammonia followed by Tank and Equipment Cleaner
	Mcpa (Ethyl Hexyl Ester)	Bromicide MA, Nugrex, Paragon	Tank and Equipment Cleaner
	Mcpa (Iso-Octyl Ester)	Broadside, Agritone LVE	
	Mcpa (Potassium Salt)	Trooper®	Cloudy Ammonia followed by Tank and Equipment Cleaner
	2, 4-Db	Buttress®	
	2, 4-D (Dimethylamine And Diethanolamine)	Surpass 475, Amicide 625	Tank and Equipment Cleaner
	2, 4-D (Dimethylamine)	Baton®, Kamba M, Surpass 475	
	2, 4-D (Ethyhexyl Ester)	Estercide Xtra	Tank and Equipment Cleaner
	Pyridines	Archer	
J	Thiocarbamates	Avadex® Xtra	Small amount of Tank and Equipment Cleaner or water
K	Chloroacetamides	Bouncer	
L	Bipyridls	Revolver, Nuquat 250	Water
M	Glyphosate	Roundup, Roundup Biactive Roundup CT Roundup PowerMAX®, Roundup Ready Herbicide with PLANTSHIELD, Weedmaster Duo	
Q	Triazoles	Amitrole, Illico®	Small amount of Tank and Water Equipment Cleaner or water
Z	Arylamino propionic Acids	Mataven 90	

A first rinse with cloudy ammonia will clean hard deposits in filter and lines. After flushing the tank, a second rinse with Tank and Equipment Cleaner should be used as a follow up.

Spray drift is a major concern in most agricultural areas today. The presence of sensitive areas located within close proximity to the spray target area introduces the possibility of off-target deposition. It is more important than ever that the agricultural industry demonstrates responsible chemical usage to reduce the need for severe application restrictions.

For further information on chemical application or involvement in a Spraywise training course, please contact your local Nufarm Sales Manager at www.nufarm.com.au.

	<p style="text-align: center;">Plan</p> <ul style="list-style-type: none"> • Utilise tools such as www.spraywisedecisions.com.au to plan the most appropriate application windows. • Spraying in a cotton area? Check www.cottonmap.com.au for neighbouring fields prior to application. • Read the product label. • Communicate with neighbours. • Upskill by attending a Nufarm Spraywise training course or one run by specialist application consultants such as Bill Gordon, Graham Betts, Craig Day. • Remember the 6 P's = Perfect Planning Prevents Poor Pesticide Performance.
	<p style="text-align: center;">Boom Height/False Target</p> <ul style="list-style-type: none"> • Boom height needs to be adjusted to the height of the false target (stubble height) or the height of the target – whichever is greater. • Keep boom height to a minimum (ie 50cm above target/false target for 110° nozzles at 50cm nozzle spacing). • Increasing the boom height from 50cm to 70cm may increase the amount of driftable fines up to 4 times, and a boom height increase from 50cm to 100cm multiplies them up to 8 times!!
	<p style="text-align: center;">Spray Quality</p> <ul style="list-style-type: none"> • A COARSE to VERY COARSE spray quality must be used when applying 2,4-D products – EXTREMELY COARSE may be warranted if night spraying. • Choose the nozzle producing the coarsest spray quality without compromising efficacy. Refer to Nufarm's Boom Spray Application Guide for a full range of recommended water rates and spray qualities for all Nufarm products. • If needed, include drift-reducing adjuvants such as LI 700®, Activator® or Bonza®. • Use nozzles at appropriate pressure: conventional noozles 1.5-3 bar, pre-orifice nozzles 2-4 bar, Low-pressure air induction nozzles 3-5 bar, high-pressure air-induction nozzles 4-8 bar.



Inversions

- DANGER – DO NOT spray when a low-level inversion exists.
- During those inversions distinct, isolated layers of air have formed close to the ground. As a result driftable fines are not subject to dilution with the atmosphere.
- Low-level inversions frequently form in the late evening and strengthen overnight - they are strongest near sunrise.
- Use visual indicators such as moisture, smoke or dust to determine if a low-level inversion is present.
- Rule of thumb: the greater the difference between daily maximum and minimum temperatures, the stronger the low-level inversion.



Night Spraying

- The advent of GPS self-steer and a desire to work within appropriate Delta Ts has seen an increasing trend towards night spraying, particularly during the summer months. Spraying at night dramatically increases the chance of applying product in adverse conditions.
- Night spraying can strongly favour conditions that can trap and move the applied product far from the target area (see inversions). Be particularly vigilant 1 hour either side of sunrise.
- Be aware that the rainfast period will be longer.
- Obtain forecast and monitor for still or low-level inversion conditions.



Wind Speed and No-Spray (Buffer) Zones

- It is best to apply pesticides when the wind is blowing away from sensitive areas and crops. Wind speed must be steady between 3 km/h and 15 km/h.
- If the wind stops blowing at night – stop spraying immediately (see inversions).
- Always read the label to see if a mandatory wind speed requirement exists, or if a No-spray zone is required for any of the products you plan to use.
- Rule of thumb: most directional wind changes in Australia will occur in an anti-clockwise direction.



Spray Weather Summary

- Avoid calm, variable or gusty wind (calm conditions give no positive indication of droplet displacement).
- Be aware of local topographic and convective influences on wind speed and direction.
- At night the cool (heavier) air behaves like water and drains to lower points (waterways, frost-prone paddocks) taking any fine droplets suspended in the air with it as well.
- Record on-site weather conditions at the start and finish of every pesticide application.

* Courtesy of 'Weather for Pesticide Spraying' Bureau of Meteorology pamphlet. Nufarm acknowledges input from Graham Betts, Bill Gordon and Graeme Tepper.