

Shielded sprayers: Do they shape up?

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The Roundup Ready glyphosate label stipulates that shielded sprayers must be used to apply the herbicide to Roundup Ready cotton varieties. But after the 2001-02 season, some growers as well as the CRDC, reported yield losses up to 30 per cent when Roundup Ready cotton older than four-leaf was sprayed with glyphosate or when shields were incorrectly set up. Spray droplets escaping from between shields and from the back of shields onto the cotton foliage were considered the major suspects.

But no research has been published on how variation in travel speed, shield height from the ground and nozzle type (spray quality) affects the quantity of spray leakage. With support from the CRDC, our recent laboratory and field research has investigated the optimum nozzle types, spray quality, shield designs, operating condi-



Aaron Gardner laying out strings for spray leakage assessment in the field.

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tions and sprayer setup which will overcome spray leakage problems.

This article presents our preliminary laboratory and field research findings.

The key findings

- Shield height has the greatest influence on leakage between shields (Figure 1A). Leakage increased over 50 times when shield height was raised from 2.5 cm to 10 cm — this height change can occur over an eight metre boom driven at 15 kph up even the most 'groomed' inter-rows.

- An increase in the low speed range of a ground rig (from five to 10 kph) showed minimal change in leakage. But an increase from 10 to 20 kph increased leakage by 25 times (Figure 1B). So booms should only be operated within acceptable speed limits. Note that a relative speed of 20 kph is achieved by driving at 10 kph into a 10 kph wind. The recommended travel speed for shielded sprayers is usually less than 12 kph.

- Spray quality changes — according to BCPC and ASAE S572 international standards — from Fine to Medium had minimal affect on leakage. But a change from Medium to Very Coarse reduced leakage by about 10 times (Figure 1C). This supports the wind tunnel study, indicating that the use of larger droplets can substantially decrease leakage from shielded sprayers.

- Using larger droplets may affect coverage and efficacy at lower application volumes and may increase the application rate above that recommended on the label.

- Minor adjustments to application volume can be made by adjusting travel speed, but increasing travel speed can dramatically increase leakage. Take care selecting the setup and operating system for the shield sprayer. Seek expert advice.

- At high enough application volumes (litres per sprayed hectare) with glyphosate, you can achieve equivalent efficacy with a range of nozzle setups and configurations. But be aware of label and water quality limitations at higher volumes.

WHAT DO THESE RESULTS TELL US?

Shielded sprayers when setup correctly do 'shape up'. Shields can be a valuable asset to applying herbicides that would otherwise damage cotton. An incorrectly setup

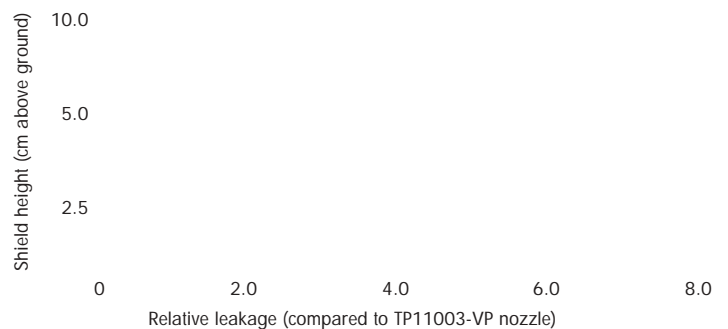
shielded sprayer (or one operated in unsuitable meteorological conditions) will increase leakage of chemical onto foliage up to 150 times that of a correctly setup sprayer.

Taking the time and energy to select the correct nozzle, operate the shields at the correct spraying height and maintain a suitable travel speed will minimise leakage of chemical onto the crop. Checking the output of the nozzle in reference to the recommended application volume

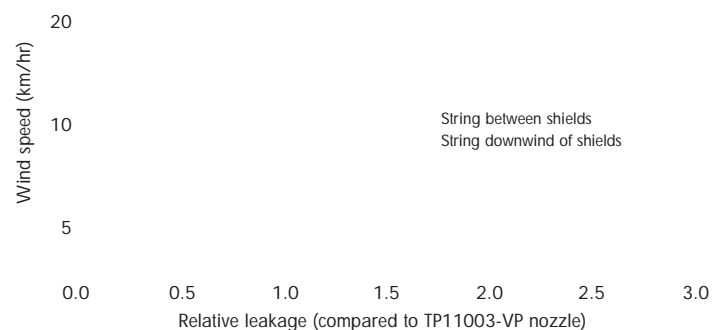
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FIGURE 1: Effect of shield height (1A), wind speed (1B) and spray quality/nozzle selection (1C) on relative spray leakage

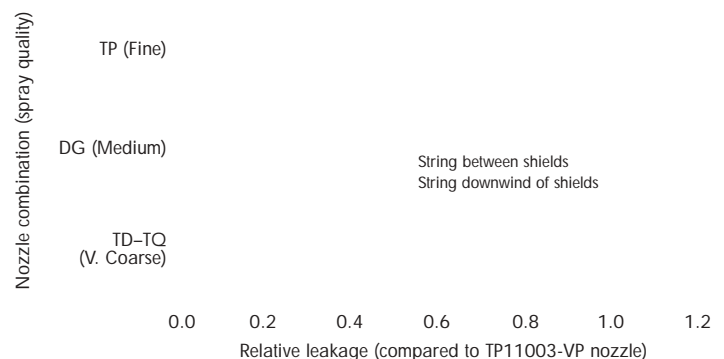
1A: Effect of shield height (Red Ball Shields; DG9503E-VS nozzle; 10 kph wind speed)



1B: Effect of wind speed (Red Ball Shields; DG9503E-VS nozzle; 2.5 cm shield height)



1C: Effect of spray quality (Red Ball Shields; 2.5 cm shield height; 10 kph wind speed)



RAPID ADOPTION OF NEW SPRAYING TECHNOLOGY

Shielded sprayers have been widely and quickly adopted for weed control in the inter-row. The large increase in Roundup Ready cotton area over the past three seasons has been the main reason for this rapid adoption of shielded spray technology.

The Roundup Ready glyphosate label stipulates the use of shielded sprayers when growing Roundup Ready varieties. Within three years of their release, Roundup Ready varieties now account for around 40 per cent of the total area planted to cotton in Australia.

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is important, as increasing spray quality will increase application volume, if travel speed is maintained.

To minimise the likelihood of drift from shielded sprayers:

- A Very Coarse spray quality nozzle can be used;
- The distance between the shield and the ground



CFI's Edwina Dreverman and spraying consultant Graham Betts adjusting the Palombo shields during field trials at Milo, near Moree.

should be minimised (and certainly kept below five cm); and,

- Keep travel speed below 20 kph — commercial practice is less than 12 kph.

Using this setup and in the trial conditions experienced, crop yield and the control of the weeds (peachvine/cowvine, bladder ketmia and noogoora burr) using glyphosate on Roundup Ready cotton was shown to be unaffected by increasing spray quality from Fine/Medium to Very Coarse. But the application volume was either above or below that specified on the herbicide label.

These trials were not carried out to determine which was the best shield on the market. But it was generally the case that greater influences to leakage were made by changes to the setup and operation of the shield being tested, rather than any one manufacturer's shield consistently outperforming another.

For a copy of the full research report on the CFI/CPAS efficacy and leakage field and laboratory studies (*Shields Ain't Shields*) contact Jamie Nicholls (phone 07 5460 1292 Email: jamie.nicholls@uq.edu.au). Further information can also be obtained from Mike Burgis (CFI, Toowoomba), Graham Betts (Ask GB) and John Rochecoste (MaurRoche Agriculture, Toowoomba).

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