

## Shielded sprayer a boost to weed control

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Inter-row spaying using a shielded sprayer is paying weed control and financial dividends for Swan Hill farmer Leigh Bryan.

The sprayer, which Leigh designed and built, is the most recent refinement of his continuous-cropping stubble-retention, controlled-traffic farming system in which he produces wheat, barley and canola plus legumes including lentils and peas, all on 450 mm row spacing.

He crops almost 2,500 ha year.

Leigh began exploring shielded inter-row spraying with the idea of using it in his canola and legume crops but has since changed direction and now uses it almost exclusively in cereal crops, with the resultant improvement in weed control reducing weed pressure in the legume crops.

He decided to build his own sprayer because he initially wasn't sure whether the system would work for him and didn't want to pay the 'prohibitive' prices asked for the commercial machines available at that time; some of which he didn't like the design of anyway.

"Initially we had the idea of using it in the legumes but now we see it more as a tool to keep weeds down in the cereal phase, which takes the pressure off the legumes, where we can use other



THIS STRIKING IMAGE LEAVES NO ROOM FOR DOUBT ABOUT THE EFFICACY OF LEIGH BRYAN'S SHIELDED SPRAYER, WHICH OPENS THE WAY FOR USE OF BROAD-SPECTRUM KNOCKDOWNS TO ELIMINATE IN-CROP WEEDS BEFORE THEY CAN SET SEED TO ADD TO THE WEED SEED BANK.

chemical groups to control in-crop weeds if necessary.

"However, it could have a role in some legumes in some situations. It might work in lentils and would work well in faba

beans, but with most legumes the previous year's cereal stubble is likely to be an issue.

"The spray heads are designed to follow the path of least resistance, so in most legume paddocks they are likely to be positioned by the previous year's cereal stubble, not the current year's legume crop, which would put the nozzles over the crop row, not in the inter-row space.

"Rolling the paddock to flatten the cereal stubble onto the surface might overcome that, but you'd need to be careful."

Leigh has been battling herbicide resistance for more than a decade and most of his weed populations are now resistant to Group A chemicals. He turned to inter-row spraying as a means of tackling the resistance issue.

"I needed another control option that didn't rely on pre-emergent chemicals or use of another chemical group.

"The shielded sprayer allows me to use non-residual contact herbicides in crop, which has helped with the rotation



A CLOSE-UP OF ONE OF THE SHIELDS, WHICH CONTAINS TWO SPRAY NOZZLES, IN WORKING POSITION IN THE INTER-ROW SPACE.

because it means I'm not limited by the residues of Group B chemicals, which I'd probably have to use if I didn't have this machine.

"Using Group Bs would have led to development of weeds with Group B resistance and restricted my cropping options because of the extended plant-back periods needed to avoid issues with the soil residues of many Group B chemicals.

"The shields give me a different tool, so I don't have to rely on the same chemicals or on controlling weeds at the seedling stage ahead of seeding."

Leigh's current shielded sprayer, which he built in 2012 in 'a bit over a month' at an estimated cost of \$20,000 – about \$4,000 for materials and \$15,000 for the old spray boom he built it on – is an improved but lower-tech version of one he built four years ago. On the first one, which he estimates cost 'more than \$30,000 and a month out of my life', the shields were camera-guided. The current model relies on the growing crop to keep the shields positioned between the crop rows.

The camera guidance was good in some situations, he said, but the new machine allows him to spray later in the season.

"With the camera-guided machine I used to go in at about mid tillering, but if we got rain after that and another strike of weeds we couldn't get back in because the cameras couldn't accurately distinguish



THE DUAL NOZZLES IN EACH OF THE SHIELDS ENSURE VERY FEW WEEDS ESCAPE BUT THE SHIELDS DO AN EXCELLENT JOB OF PROTECTING THE CROP.

## FARM-MADE SPRAYER SIMPLE AND EFFECTIVE

The fully-enclosed shields on Leigh Brian's shielded sprayer are mounted so they 'follow the path of least resistance' down the inter-row space and are positioned by the rows of crop.

The walls of the cylindrical shields, each 200 mm deep, are cut from 400 mm diameter heavy-duty pvc sewage pipe. The sections of pipe are cut using a curved profile so that, when they are mounted on the machine, the side edges are at or on the soil surface but the leading and trailing edges are elevated by 50 mm.

This configuration provides maximum protection for the crop while allowing the shield to pass down the row and over weeds without the leading or trailing edge digging into the soil surface.

Each shield is capped with a curved plate of light-weight stainless steel carrying two 80o flat-fan nozzles positioned near the outer edge. The curve of the metal cap angles the nozzles inward towards the centre of the line of travel of the sprayer to maximise spray coverage on the weeds.

Each shield is suspended from the spray boom by two lengths of galvanised chain that run from a bracket mounted above the spray boom to the front of the shield. The chain fixes the height of the shield above the soil surface but allows the shield to shift enough to stay 'on track' between the crop rows.

The 'tracking system' for each shield comprises a metal arm that extends forward from the spray boom down the line of the centre of the inter-row space, with a lighter horizontal arm extending from the end of the angled arm back to the shield, which is positioned under the line of the boom.

The top of the angled arm is locked in position on the bar with a 'U' bolt, with a pivot at the lower end enabling the shield to track between the rows of crop.

the inter-row space from the crop.

"With this version, which relies on the crop for tracking and has greater clearance than the first machine, I have to wait until the crop stiffens up and usually go in just before head emergence. This means I take out all the weeds including any later-germinating ones, which consistent use of pre-emergents and in-crop sprays seems to be selecting for.

**We can get in and clean up weeds at almost any stage of the growing season.**

"Being able to control weeds in crop means I can keep paddocks clean, which reduces the weed pressure and frees me up to grow whatever crop I want after a cereal.

"With a shielded sprayer I'm not limited by weeds because I know I can take them out. If I see weeds in a crop that I decide need attention I can go in and spray at any stage once the crop is stiff enough to guide the shields."

Being free to grow whatever crop he chooses without having to take account of weed populations is a significant management benefit, but the shielded sprayer has also produced direct financial gains by opening the way for use of low-cost contact chemicals such as gramoxone.

"Gramoxone costs about \$5.50 a hectare, which is a lot cheaper than the more than \$30 a hectare for many of the current-generation pre-emergents.

"And contact herbicides like gramoxone are less persistent than a lot of pre-emergents, so they are better for the environment.

"I've used mainly gramoxone so far but put some glyphosate through it last season and that worked well.

"I'll probably use more glyphosate in future, because it worked better than gramoxone late in the season; possibly because it is translocated so it is not quite as important to get full coverage, which can be an issue with big weeds."

Leigh is confident his current machine could be 'down-scaled' for use in systems



A DRIVER'S VIEW OF THE SHIELDED SPRAYER IN OPERATION.

with narrower rows by using smaller-diameter shields and changing the spacing of the shields along the boom to match the row spacing.

“The shields are self-aligning so you could reduce the shield size and spacing and it would work just as well.

“However, because the tracking of the shields is controlled by the crop, it is important to have permanent wheel tracks so you don't run over the crop ahead of the spray boom.”

He has seen very few weed escapes and little evidence of crop damage from chemicals applied with the shielded sprayer, other than on headlands where he has to turn across crop rows.

“Even if there is a little bit of damage it's not enough to affect yield. In 2012 we grew 3.45 t/ha of barley on 124 mm of growing-season rainfall in paddocks where we used the shielded sprayer and the paddocks were easier to harvest because they were so clean.”

Leigh's 450 mm row spacing means the shielded sprayer applies chemical to 92% of the total paddock area, which he calculates controls 95% of the weeds in the paddock.

“The only weeds not sprayed are any

actually in the crop rows, and they are usually pretty well crowded out anyway.”

Operating speed varies with paddock conditions, but Leigh has achieved good results with the shields at speeds up to 19 km/hr.

“It is no problem to work at that speed provided the surface is smooth and there are no clods, stones or bumps. There is certainly no difference with drift out the back or anything because the nozzles are

fully enclosed.

“I usually manage to spray about 120 ha a day.

“We probably inter-row spray about a third of the farm in most years. I wouldn't try to use the shielded sprayer over the whole area. It's more a tool to use where I might have previously used a Clearfield variety, I suppose.

“If a paddock is clean you don't need to use it.

**The shields give me a different tool, so I don't have to rely on the same chemicals or on controlling weeds at the seedling stage ahead of seeding.**

“In some paddocks that are at the end of the rotation we will plan an in-crop shielded spray ahead of seeding because we know they have a lot of weeds.

“In other paddocks we won't use the shielded sprayer unless we notice a problem during the growing season; then we'll go in and clean it up before the weeds can set seed and make it worse.

“With this technology we can get in and clean up weeds at almost any stage of the growing season.”

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