Slashing time and weeds with the dual herbicide sprayer

Adrian Darveniza
Sugarcane farmer – 380ha
South Johnstone, Wet Tropics
Testing the dual herbicide sprayer

The business goal

Adrian Darveniza wanted to find a cheap, fast way to control problem weeds such as nut grass, sour grass and guinea grass in sugar cane. These weeds have traditionally been difficult to manage as the most effective herbicides used against these weeds are also toxic to sugar cane.

What is being done differently?

Adrian was interested in trying a new dual herbicide spray bar developed by the Queensland Department of Agriculture, Fisheries and Forestry (DAFF) staff Allan Blair and Jack Robertson in conjunction with local growers.

The dual herbicide spray bar replaces the standard spray bar on an Irvin type sugar cane sprayer. It allows the herbicides to be "split" without the need for shields, hoods or other devices. Residual and pre and post emergent herbicides are applied through the wing nozzles to the row and non-residual glyphosate to the inter row. The sprayer has the ability to reduce residual and PSII herbicide application by an average of 50%. The dual herbicide sprayer (DHS) was developed from grower requests. It is not intended to be a replacement for shielded or hooded sprayers.

The DHS was evaluated on a couple of blocks of cane on Adrian's farm under an Australian Pesticides and Veterinary Medicines Authority (APVMA) permit in 2013 and found to have no phytotoxic effect on cane. Adrian believes it will become a vital piece of equipment for managing weeds on the farm. It cost only $2000 to retrofit the new sprayer to his Irvin type boom spray.

Allan Blair and Adrian Darveniza with the dual herbicide sprayer.

How does it help the farm?

From a technical viewpoint, the DHS allows growers to spray for almost twice the time without refilling in comparison with conventional practice. The low volume glyphosate tank which sprays about 50% of the area allows the sprayer to operate for twice as long without refilling. This is a particular advantage in the wet tropics as it allows more application time under optimal conditions.

"*I reduce my spraying time by about 30%, the amount of residual herbicides by 50% and control difficult weeds*" Adrian says.

The spray bar showing centre air induction nozzle for glyphosate

What does this mean for the bottom line?

An economic analysis of the DHS was recently completed by DAFF economists. The analysis examined the economic implications from substituting a standard directed spray with the DHS while assuming yields are held constant. It was undertaken using the Farm Economic Analysis Tool (FEAT) as well as investment and payback-period analyses. Calculations were based on 1.8m row spacing and specific herbicide rates using a standard directed herbicide spray (Irvin Legs) versus herbicides applied with the DHS.

The DHS was found to reduce herbicide application costs as a result of substituting Velpar K4® with Glyphosate applied upon the inter-row. Furthermore, savings to herbicide cost were found to increase with the use of the DHS over a larger paddock area enabling the investment outlay on the DHS to be recouped.

Table 1 presents the number of years required to recoup a grower's initial investment assuming several scenarios of DHS usage (ha/yr) and initial investment ($). For example, if a grower uses the DHS over 70 hectares of cane per year and the initial investment on the DHS was $2000, then the grower could potentially recoup their money in 2.5 years. In addition, the time required to recoup the investment is decreased when using Balance® instead of Velpar® with the DHS. This is due to the higher relative cost of Balance®. Interestingly, the herbicide costs when using Balance with the DHS are lower than using Velpar with a standard directed spray due to the replacement of Balance® with glyphosate in the inter row.

Table 1: Period required to recoup investment. DAFF 2013

DHS usage *(ha/yr)*	Herbicide cost savings *($/yr)*	Period required to recoup investment (years)			
		Initial investment (DHS)			
		$1,000	*$1,200*	*$2,000*	*$2,500*
200ha	$2,564	0.4	0.5	0.8	1
150ha	$1,923	0.5	0.7	1.1	1.4
100ha	$1,282	0.8	1	1.7	2.2
70ha	$897	1.2	2	2.5	3.2
40ha	$513	2.2	2.6	4.7	6.1
20ha	$256	4.7	5.9	11.7	17

How does it help water quality?

PSII and other residual herbicides are applied to both the row and inter row of sugar cane paddocks under conventional spraying systems. Recent research by James Cook University demonstrated that a significant proportion of applied diuron can be transported from the inter row zone. The dual herbicide sprayer only applies residual/PSII herbicides to the row reducing the amount applied by 50% and minimising the risk of these chemicals moving from the inter row area to drains, creeks and streams.

What's next

A user's manual and engineering drawings for the DHS will be made available to other growers once a permit for non-shielded application of glyphosate is obtained from APVMA.

In the longer term DAFF hopes to test, develop and adapt weed sensing hardware and software to the DHS. This will allow growers to switch off the centre glyphosate nozzle when weeds are not present. This will further reduce the amount of herbicides used and reduce costs to growers. A win-win situation.

Weedy ratoon Q230 1.8 metre rows

Dual herbicide sprayer operating. Note front glyphosate tank. Pink colouring is UV tracer used in calibrating the sprayer.

Result after 8 days. Some nut grass still dying in inter row.

Herbicides used:
Wing row nozzles: Diurex® 500g/ hectare plus Paraquat at 1.25 litres per hectare (sprayed area)
Centre Air induction inter row nozzle: Glyphosate 450 at 2.15 litres per hectare (sprayed area) plus wetter.

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