

Dual Herbicide Sprayer: Economic summary

The Dual Herbicide Sprayer (DHS) was developed to reduce dependency on Photosystem II inhibiting (PSII) herbicides by enabling growers to substitute their use with knockdown herbicides. Development of the DHS has been funded by the Department of Environment and Heritage Protection. This report examines the economic viability of the DHS.

Dual herbicide sprayer

The DHS is constructed by modifying the spray bar of an existing Irvin boom; whereby a 12-volt low pressure/low volume spray tank is retro-fitted to allow two herbicide solutions to be applied simultaneously. In particular, the spray bar of the DHS enables application of knockdown herbicides, such as Glyphosate, to be directed into the inter-row via a centre air-inclusion nozzle, while two wing nozzles direct a residual blend into the stool area.

Image 1: Dual Herbicide Sprayer.



(A. Blair, 2013)

Compared to a conventional Irvin boom, the DHS enables growers to:

- Decrease weed control costs by using lower cost herbicides in the inter row
- Strategically target weeds
- Decrease residual use and improve their ability to comply with regulation

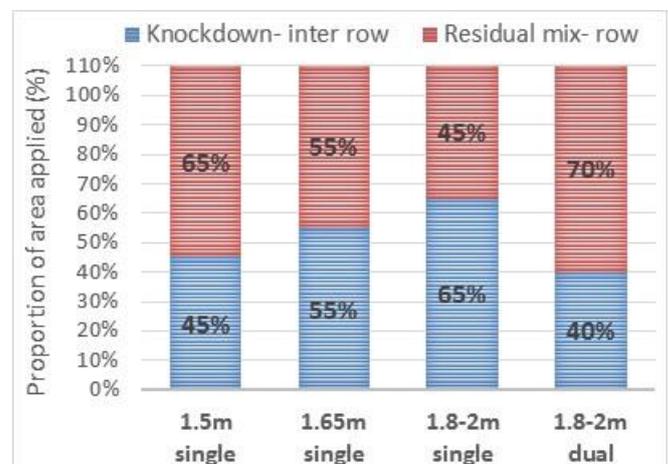
Image 2: Spray bar - DHS.



(A. Blair, 2013)

As the DHS is band-spraying, the amount of residual chemicals being applied is reduced by around half, depending on row width (see Figure 1). On farms with relatively wider row spacing, a greater proportion of the paddock area is sprayed with knockdowns only.

Figure 1: Proportion of paddock sprayed with residual or knockdown herbicides.



Economic analysis

The objective of the economic analysis is to investigate two questions including:

1. What are the herbicide cost savings from using the DHS instead of a conventional Irvin boom?
2. Based on these savings, how long will it take to recoup the initial investment?

Herbicide costs

Table 1 examines a spray blend popular for weed control in ratoon cane. More specifically, it presents the herbicide usage and costs when spraying with a standard Irvin boom and compares them with the DHS on a cane farm with 1.8m row spacing. The DHS substitutes spraying Bobcat Combi® and Gramoxone® 250 onto the inter-rows with Glyphosate, which decreases herbicide costs from \$27.50 to \$19 per hectare (by \$8.50 or around one-third).

Table 1: Usage and cost¹ of herbicides

Herbicide	USAGE (kg or L/ha)		COSTS (\$/ha)	
	Irvin boom	DHS	Irvin boom	DHS
Bobcat Combi®	0.9	0.4	\$17.70	\$7.90
Gramoxone®250	1.5	0.7	\$8.50	\$3.80
BS1000®	0.2	0.1	\$1.30	\$0.60
Glyphosate 540	-	1	-	\$6.60
Total			\$27.50	\$18.90

Payback period

The cost to modify a conventional 4-row Irvin boom² to the DHS is estimated at between \$1,200 and \$1,600³ if a grower has already fitted a 12-volt low pressure/low volume spray tank or between \$2,500 and \$3,000 if both the spray bar and tank are required.

Table 2 shows the period of time required to recoup the modification costs under several equipment use scenarios – spraying (once) between 40 and 500 hectares per year. For example, when \$3,000 is invested to modify the Irvin boom and 200 hectares is sprayed per year, costs are recouped within 2 years.

¹ Costs are based on 2017 herbicide prices.

² New 4-row Irvin boom sprayers generally cost between \$12,000 and \$20,000 depending on options and suppliers.

³ At least two companies can carry out the required modifications to the Irvin boom including Irvin Farm and Ian Ritchie Pty Ltd.

Table 2: Payback period, years (discounted⁴)

DHS usage (ha/yr)	Cost savings (\$/yr)	Payback period (years)			
		Modification costs			
		\$1200	\$1600	\$2500	\$3000
70	\$596	2.2	3.1	5.1	6.4
100	\$851	1.5	2.1	3.4	4.2
150	\$1,276	1.0	1.4	2.2	2.7
300	\$2,552	0.5	0.7	1	1.3
500	\$4,254	0.3	0.4	0.6	0.7

Alternative herbicide blends

Given farmers need to target different weeds, Table 3 shows the herbicide cost savings from several different spray combinations. For example, growers might apply Balance® or Flame® instead of Bobcat Combi®, while Glyphosate might be switched for Basta®⁵ or Gramoxone® 250 in the inter row.

Using Balance® instead of Bobcat Combi® (at 0.15 kg/ha) provides similar savings when using the DHS. In this case, herbicide costs are \$9 per hectare lower when compared to spraying with a conventional Irvin boom.

Table 3: Herbicide cost savings, \$/ha.

		Residual blends		
		Bobcat Combi®	Balance®	Flame®
Knock downs	Glyphosate 540	\$8.50	\$9.20	\$3.30
	Gramoxone®250	\$8.70	\$9.50	\$3.60
	Basta®	-\$2.40	-\$1.70	-\$7.60

In conclusion, the DHS can provide herbicide cost savings and may improve the range of options available to growers to better target troublesome weed populations. It is essential to follow the correct equipment operating procedures when using the DHS as minor yield losses may cause the investment to be economically unacceptable.

⁴ A discount rate of 7% was used for the analysis.

⁵ Trials since 2016 have shown that Basta® (Glufosinate ammonium) works well on inter-row weeds containing a high vine population.