

Spot spraying in broadacre cropping systems

David Brownhill farms on the Liverpool Plains, NSW. He was so delighted with the 89% reduction in fallow herbicide achieved using a WeedSeeker that he secured its Australian distribution licence.

David Brownhill, Crop Optics Australia

Crop and weed sensing technology has existed as a research tool in Australia since 1984. The concept was originally developed by researcher Warwick Felton at the DPI Tamworth. However, the reliable application of automated spot spraying in broadacre agriculture has only recently been possible with the

commercial release of WeedSeeker selective application equipment by US based company N-Tech Industries.

Selective spot spraying technology was commercialised in the USA seven years ago and has found wide commercial application around the globe in all types of agricultural environments. Sensors can be used to selectively apply

herbicides, insecticides, fertilizers and fungicides to plants in a wide range of agricultural situations including cotton, broadacre, horticulture and viticulture.

Anywhere a product can be targeted to the plant and not bare soil, the WeedsSeeker can provide large savings and big environmental benefits.

Following my Nuffield Scholarship, I imported the first WeedSeeker sensors for broadacre use into Australia in 2002 using matching grant money provided by AFFA under the "Farm Innovation Program". Sixty four sensors were purchased and set-up on our 24m wide boomspray. The sprayer was a tow behind set-up and tramlines were the only guidance; an 89% saving in herbicide was achieved across our fallow paddocks. This level of saving paid for our investment in WeedSeeker within two years.

Table 2 Examples of herbicide savings when using WeedSeeker for weed control in fallow.

	Jamie Grant Dalby QLD	Peter Farrell Moree NSW
Field area	246 hectares	120 hectares
Weeds	Peachvine, milk thistle, fleabane, volunteer cotton	Volunteer cotton 30cm high
Herbicide	2.6L/ha Round up + 4L/ha Surpass®	1L/ha Starane® + 1L/ha MCPA
Actual area sprayed	11.88ha (4.5%)	18ha (15%)
Cost of blanket spray	\$7840	\$3360
Cost with WeedSeeker	\$353	\$504
Herbicide saving per field	\$7487	\$2865
Herbicide saving per hectare	\$30.43	\$23.80

We now run WeedSeeker sensors across a 27m, self propelled spray-rig with 2cm accuracy GPS guidance; with this we achieve the same savings in herbicide.

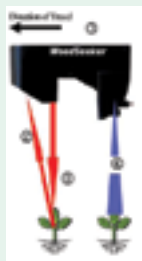
DPI research in Northern NSW has shown that average weed cover in fallow paddocks is as low as 20% of the paddock area. Therefore, 80% of the herbicide applied falls on bare soil and is wasted. This is inefficient,

How WeedSeeker works

WeedSeeker consists of an integrated light emitting diodes (LED), light detector and a spray nozzle controlled by a fast-fire solenoid valve.

1. The LED produces a combination of invisible infrared and visible red light, this is projected into the target weeds, approximately 60cm below the sensor.
2. The light reflected from the target is captured by the detector at the front of each WeedSeeker sensor. For 100% ground coverage sensors are spaced at 38cm across the boom.
3. Sophisticated circuits inside the sensor analyse the reflected light and determine when it matches the light reflected by green plants. The WeedSeeker circuitry is not able to differentiate between the intensity of green nor estimate biomass as is done by the GreenSeeker sensor.
4. When reflectance from green plants is identified, the sensor waits until the plant is under the spray nozzle and then triggers a fast-fire solenoid valve that sprays the plant.

In the cab WeedSeeker is controlled by a simple analogue control box. Controls include on/off, adjustment for weed size and calibration for herbicide rate and speed of travel.



expensive and environmentally unsustainable.

There are now 13 commercial spray-rigs across NSW and Qld operated by farmers and contractors using WeedSeeker. These are achieving large reductions in fallow herbicide use with savings of 80% and better. Cost examples of the possible savings using WeedSeeker for fallow weed control are found in Table 2.

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I believe there is a range of applications for WeedSeeker.

- 1) Broadacre fallow spraying
- 2) Shielded spraying in row crops
- 3) Application of fungicides, insecticides and fertiliser in horticultural crops
- 4) Spot spraying on irrigation channels
- 5) Viticulture and tree crops
- 6) Industrial uses including weeds on roads, railways, airports etc

WeedSeeker benefits

The reduction in herbicide cost due to target spot spraying is just one of the benefits gained



Consisting of a sensor and spray nozzle with fast-fire solenoid valve the WeedSeeker can accurately spot spray weeds reducing herbicide use and environmental impact.

from only applying herbicide to the weed targets. Others relate to management of herbicide resistance and reduced herbicide inputs with no-till, not to mention the environmental benefits of less spray drift and reduced potential for off-target impacts from drift and herbicide leaching.

For example, in relation to managing herbicide resistance WeedSeeker allows us to use mixtures of different herbicide groups eg Select® to control ryegrass in the fallow, Garlon® for melons etc, which may be currently too expensive to apply in a blanket application. This will help reduce resistance in weed populations and prolong the life of existing herbicides, greatly improving sustainability of cropping systems.

For more information

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