Application of Automated "Spot Spray" Technology in the Upper North

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Key messages

- Summer weed control is proven to increase yield, but is becoming a major cost and some summer weeds are difficult to control.
- Cost savings of 20-90% were achieved across 20 paddocks using the WEEDit™.
- A major benefit of using spot spraying technology was the ability to use high rates of chemical targeted on hard-to-kill weeds such as Stinkweed.

Summer Spraying – Zero Tolerance is the key

The recently completed GRDC funded National Water-Use Efficiency (WUE) Project highlighted overwhelmingly that summer weed control is the single most important management practice which improves crop WUE. UNFS were a part of this 5 year project, with research sites at Quorn and Pt Germein, and two soil types at Morchard were characterised and used for simulation modelling to demonstrate the benefits of summer weed control. The average additional yield benefit across 15 sites in SA, NSW and Vic was 0.9t/ha, ranging from 0.2 to 1.7t/ha. Additional yield was primarily due to more moisture (average 33mm) and nitrogen (average 38kg/ha) available for subsequent crops following summer weed control. Summer weed control has other benefits such as improved trash flow for seeding equipment, and increased pre-emergent herbicide efficacy due to more product hitting the ground.

Background

A number of commercial companies now produce optical sensing devices that can be utilised to detect plants by measuring the near infrared reflectance (NIR) caused by chlorophyll being exposed to a light source (Figures 1 and 2). When combined with a solenoid that switches a spray nozzle on and off, this technology can be used to "spot spray" weeds. At this stage the optical sensing technology does not discriminate between crops and weeds, so is used when there is no actively growing crop present, namely in summer, in autumn before the crop is sown, spray-topped pastures in late spring and for chemical fallow. In other regions, herbicide use has been proven to be dramatically reduced by 50-90% during these periods of the cropping cycle by using this technology. In February/March this year I had the opportunity to hire a small 12m demonstration unit for 4 weeks to trial the technology on our farm.

Figure 1. How weed seeking sensor technology works

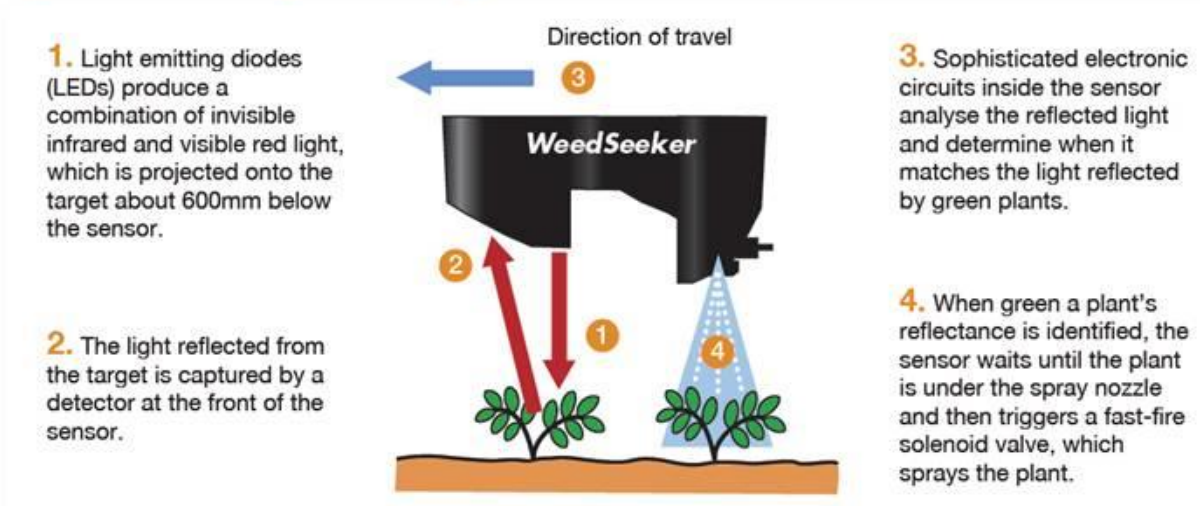

Figure 1: Source - http://www.cropoptics.com.au/weedseeker.html

Figure 2. Optical sensing technology such as the WEEDit™ system can dramatically reduce summer spraying costs and help control "hard to kill" summer weeds by using higher doses of herbicide and/or more expensive products. Photo: Ed Cay

Results

This is an impressive piece of technology that worked very well. In summary,

- Cost savings of 20-90% (average 70%) were achieved in 20 paddocks.
- It could detect small weeds, about the size of a 20c piece.
- Weeds with blue-coloured leaves (e.g. Annual Saltbush, Jersey Cudweed, Stemless Thistle) were detected.
- It could detect weeds that were half-dead from a previous spray, so ideal for double knocking hard-to-kill weeds.

Does it pay?

Although impressive, the technology is expensive. Cost will depend on whether you are retrofitting a current boom or buying a complete unit off the shelf. My calculations below are based on the following assumptions,

- The cost for a basic 24m unit with a 3000-4000L tank is approximately $140,000.
- Save 70% on summer spraying.
- Currently spending $30/ha on summer spraying, therefore saving $21/ha with a WEEDit™.

Annual savings obviously depends on the scale of your operation;

- 1000ha = $21,000
- 2000ha = $42,000
- 4000ha = $84,000
- 8000ha = $168,000

Using the calculations above, one of these units could easily pay for itself on a medium/large farming operation within 2-3 years. After this, substantial profits could be obtained from cost savings and/or improved weed control translating into increased production.

Commercial Information

There are currently two companies in Australia that import the technology from overseas. Crop Optics Australia import the WeedSeeker™, and Hawkeye Precision import the WEEDit™ spray system. These two companies have distribution networks across Australia. Local agents in the Upper North are AgTech Services (Michael Zwar, WeedSeeker™) and Flinders Machinery (Croplands, WEEDit™).

Further Investigations

UNFS aims to continue this work in 2014 and to hold a demonstration on this technology.