



JANUARY 2019

Soil Wealth
NURTURING CROPS



**Integrated
Crop Protection**
PROTECTING CROPS



TECHNOLOGY FOR CONTROLLING WEEDS

KEY MESSAGES

- ✓ Most new technology for controlling weeds will be a positive step forward for soil health and the environment.
- ✓ Technology will play an important role in our fight against herbicide resistant weeds.
- ✓ Some technologies will reduce and/or eliminate herbicide use.
- ✓ In-crop weed control is a major focus with many advances coming; timing and conditions will likely be critical for success.
- ✓ Some weed control technology will operate safely and accurately day or night. Inversions are irrelevant with robotic mechanical weeding.

A few have been on the market for many years with constant improvements being made, and other technology is newly emerged. We have grouped them into three segments:

- I. Non- selective fallow paddocks
- II. Selective In-crop weed control
- III. Delivery technology

The team has given each technology a Soil Wealth and an ICP rating on a scale of 1-5 with "5" being the best. The Soil Wealth rating is focused on the technology's impact on the soil in terms of toxic residues, nutrients, soil biology, and the ICP rating is based on reduced chemical use, effect on the environment, and minimising risks to the current crop and crop rotations.

I. NON-SELECTIVE FALLOW PADDOCKS

WeedSeeker and WEEDit weed management have been

GLOBAL SCAN AND REVIEW

How do you know if information is reliable?

Tired of searching the internet to find the answer to that problem? Our global scan and review series provides leading, research-based information from around the world to Australian vegetable growers and advisors.

successfully used in broadacre cropping and the companies are now focusing more on horticulture. The technology uses near infrared (NIR) to detect weeds, only spraying when present – saving on chemical and water and reducing resistance problems.

Weedtechnics saturated steam weed control is used selectively in some wide row crops similar to shielded spray, but with more safety than herbicides.

As with all technology, drones are improving and becoming more useful and affordable every day. Yamaha was one of the first to apply herbicides, now many others have started to compete in this space.



Figure 1. Use of GPS guided drones for precision spot spraying are on the increase. IMAGE: Adobe stock

TECHNOLOGY FOR CONTROLLING WEEDS

JANUARY 2019

Soil Wealth
NURTURING CROPS



Integrated Crop Protection
PROTECTING CROPS

NAME	PURPOSE	HOW IT WORKS	BENEFITS	DRAW-BACKS	SOIL WEALTH RATING (1 = POOR 5 = GOOD)	ICP RATING (1 = POOR 5 = GOOD)	LINK TO FURTHER INFORMATION
Saturated steam weed control SW3800 (Weedtechnics)	Organic, non-pesticide control of weeds	Hydro-thermal, steam kill	95% kill on all weed seedlings at 2 – 4 leaf stage. Safe environmentally.	Slow speed – 1 km/hr or 0.3 ha/hr	5	5	www.weedtechnics.com/
WEEDit (Croplands)	Identifies weeds in a fallow paddock and applies herbicide directly onto them	Near infrared technology detects chlorophyll in living plants by reflectance. Sold with boom and tank as one unit	Reduces chemical and water use, reduces resistance by spraying weeds with high rates	Fallow paddocks and potential for between wide row and tree crops	4	4	www.youtube.com/watch?v=b-yTRpyYiRE
WeedSeeker (Trimble)	Identifies weeds in a fallow paddock and applies herbicide directly onto them	Near infrared technology detects chlorophyll in living plants by reflectance on fallow paddocks. Can be fitted to most boom sprays	Reduced chemical and water use. May be more adaptable to fit onto existing spray boom	Fallow paddocks and potential for between wide row and tree crops	4	4	www.sprayerbarn.com.au/spray-equipment/controllers/spray-control/WeedSeeker
Drones	Spot spray areas with precision	Software uses GPS guidance to program drone for spraying specific areas. WEEDit / WeedSeeker technology could be added to drones in future	Aerial – field conditions irrelevant, no compaction, minimal labour involved, excellent coverage can be achieved	Very small payload. Regulation to increase significantly. Some technology literacy required	5	4	www.nationaldrones.com.au/agriculture/

Watch these videos for a closer look at the technology

Weedtechnics video: www.youtube.com/watch?time_continue=103&v=ucWylrpX33k

WEEDit video: www.youtube.com/watch?v=b-yTRpyYiRE

WeedSeeker video: www.youtube.com/watch?v=tGQyQAbIEO4

Drones: www.youtube.com/watch?v=BUWlxd_N9hY



II. SELECTIVE IN-CROP WEED CONTROL

While mechanical cultivation in crops has been employed by growers for centuries, new designs, sensors, and artificial intelligence have taken in-crop weed control to another level. As with most weed control technologies, timing is critical, but for growers that get it right the potential savings on herbicides, power and labour are huge.

NAME	PURPOSE	HOW IT WORKS	BENEFIT	DRAW-BACKS	SOIL WEALTH RATING (1 = POOR 5 = GOOD)	ICP RATING (1 = POOR 5 = GOOD)	LINK
Blue River Technology	Spot spray weeds in-crop with herbicides	Artificial intelligence recognises the crop, sees and sprays only weeds	Excellent crop safety, and huge savings on herbicides used	No immediate disadvantages	4	4	www.bluerivertechnology.com/
Robovator	Mechanically cultivate or hoe small weeds out in-crop	Sensors identify crop and hoe to side and in-between plants	Removes 95% weeds, low power usage, easy to operate, works day and night	Timing and conditions critical; need small weeds, dry top soil	3	5	www.robovator.com/
Garford	Mechanically cultivate or hoe small weeds out in-crop	Precision guided hoe; sensors identify crop to circle with hoe	8 mm accuracy, used in organics	Timing and conditions critical; need small weeds, dry top soil	3	5	www.garford.com/products/robocrop-inrow-weeder/
Steketee IC	Mechanically cultivate or hoe small weeds out in-crop (figure 2).	Cameras identify crop and knives cut weeds out	95% + weed control, works on uneven terrain, operate day or night	Timing and conditions critical; need small weeds, dry top soil	3	5	www.steketee.com/en/steketee-ic-weeder/
Finger weeder	Mechanically cultivate small weeds out in-crop	Rubber fingers rotate in a circle down both sides of row crop	VERY inexpensive, easy to use	Timing and conditions critical, less precise than sensor and camera guidance	3	5	www.store.suttonag.com/weeding-equipment/finger-weeders.html

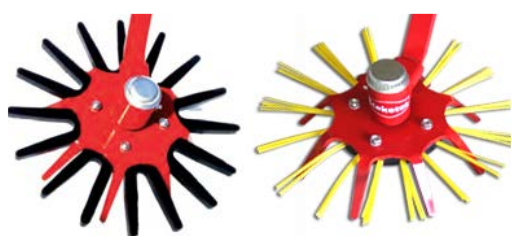


Figure 2. Steketee finger weeding implements: standard polyurethane (left) and brush type (right) for more delicate crops.

PHOTO: Steketee/Sutton Agricultural Enterprises

Watch these videos for a closer look at the technology

Blue River Technologies video: www.youtube.com/watch?time_continue=4&v=XH-EFtTa6IU

Robovator: www.youtube.com/watch?v=xID0crbuaho

Garford: www.youtube.com/watch?v=qaxwJQ0_FwM

Steketee IC: www.youtube.com/watch?v=dR9BDyTv-tc

KULT finger weeder: www.youtube.com/watch?v=6LtAKTV9Mt8

III. DELIVERY TECHNOLOGY

Delivery technology is constantly evolving and particularly in the fields of air induction nozzles, air bag booms, twin fan low drift (TFLD), twin outlet angled spray, shielded spray, and adjuvants. Water rates,

droplet size and velocity into canopy for coverage balanced with drift risk, evaporation, and sometimes stubble tie-up all need to be considered. There is one emerging technology from our global scan we would like to highlight.

NAME	PURPOSE	HOW IT WORKS	BENEFIT	DRAW-BACKS	SOIL WEALTH RATING (1 = POOR 5 = GOOD)	ICP RATING (1 = POOR 5 = GOOD)	LINK
Quantum Mist RECAPTURE GenZ	Mist coverage PLUS recaptures droplets	Covers with suction fans return droplets to spray tank (fig.3).	Save money on chemical, much safer to environment and workers	Currently trialling 5 machines in Australia (grapevines)	4	3	www.genztechnology.com/ www.youtube.com/watch?v=x-NnedbpCmTI



Figure 3. GenZ Smart Sprayer with hood that recaptures and recirculates excess spray reducing the risk of chemical drift.
PHOTO: GenZ Technology.