Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA
Protect Grow Innovate

DPIRD Research Scientists in front of the XPower electric weed control machine. Image: DPIRD.

Protecting WA crops

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Contents

Electric weed control found to be a viable alternative to herbicide options

At a glance:

- The effectiveness of electric weed control varies between weed species.
- Electric weed control does not affect soil biology.
- Broadleaf weed control was more effective at higher operation speeds compared to grass weed control.
- Electric weed control can be effective in moist soils with appropriate application speeds.

The three-year electric weed control project, led by the Department of Primary Industries and Regional Development (DPIRD) and in collaboration with CNH, concluded in July 2024. Co-funded by the Grains Research and Development Corporation (GRDC), Wine Australia, and the Cotton Research and Development Corporation (CRDC), the project also received in-kind support from AHA Viticulture and the West Australian Local Government Association (WALGA). The project's goal was to help primary industries and community land managers develop sustainable, non-chemical weed control methods.

In a first-of-its-kind project in Australia, DPIRD employed the XPower electric weed control machine, which uses Zasso™ technology, to deliver an electric current to weeds via electrodes mounted at the front or rear of a tractor. This electrical current disrupts the plant's cell walls, leading to either the death of the plant or the suppression of its growth.

More information on how electric weed control works can be found in DPIRD's October 2022 Protecting WA Crops newsletter.

Trials conducted at Muresk, near Northam, revealed that electric weed control was more effective on broadleaf weeds than on grass weeds at higher operational speeds. This difference in effectiveness may be due to the larger surface area of broadleaf weeds contacting the machine's electrodes, as well as other morphological features, including root structure. However, grass weed control was equally effective as herbicide applications when the machine operated at a slower speed of 1 to 2 km/hr, compared to 4 km/hr for broadleaf weeds. Additionally, electric weed control effectively controlled glyphosate-resistant populations of annual ryegrass.

For more information on controlling glyphosate-resistant annual ryegrass with electric weed control, refer to DPIRD's October 2023 Protecting WA Crops newsletter.

Further trials with electric weed control assessed the machine's effectiveness in wet soil conditions. In 2023 trials at Wongan Hills, electric weed control was more effective when the volumetric soil water content was 9% (dry soil), compared to 16% (wet soil exposed to simulated rainfall), at operation speeds higher than the recommended rate. It is likely that wet soil, having lower resistance than dry soil, increased the likelihood of the electric current dissipating out of the roots into the surrounding soil (similar to electric "spray drift"). However, weeds in wet soil, with greater emergence and faster growth rates, recovered better compared to those in dry soil. Slowing down the machine's application speed delivers a higher dose of electric current to the plant, improving its effectiveness in killing or suppressing weed growth for plants in wet soil.

This project's trials have also shown that electric weed control does not affect soil biology. While evaluating the effectiveness of electric weed control on annual ryegrass populations at a trial site in Muresk, levels of Rhizoctonia solani AG8 (the fungal agent for root rot) were monitored as an indicator of potential changes in soil biology due to the electric current. Even when using the lowest speed of 1.4 km/h, which delivers the highest dose of electricity, one, two, and three sequential applications of electric weed control were applied without impacting the *R. solani* fungus.

Although electric weed control technology was not originally designed for inter-row weed control in broadacre crops, research from this project suggests it could be a viable option. The machine was tested under conditions meant to maximize potential crop damage, such as when crops were at the anthesis growth stage, and the soil surface was moist. Despite these conditions, no damage was observed in the neighbouring crop rows, nor was there any impact on yield or grain quality. It is believed that inter-row electric weed control, when applied to younger plants using technology specifically designed for this purpose, could be a safe and effective in-crop weed control method. However, further research is needed to confirm these findings.

While no fire risk was observed from the Zasso machine during winter and spring trials, using it in summer or autumn would present too great a fire risk due to the potential for completely dry residue to ignite. Therefore, it is not recommended for weed control during these seasons.

Overall, the project found electric weed control was highly effective at controlling a range of weed species in different scenarios. As machinery development progresses with multiple international companies, this new technology is likely to have a place within Australian systems.

For more information on electric weed control refer to DPIRD's:

- October 2022 Protecting WA Crops newsletter issue
- October 2023 Protecting WA Crops newsletter issue
- What is the best fit for electric weed control in Australia? 2024 Final project report.
- Exploring the potential of electric weed control: a review.

Meet Crop protection team member – Danae Warden

Danae Warden working in the Northam DPIRD glasshouse. Image: Christiaan Valentine, DPIRD.

Danae joined DPIRD in 2023 as part of the Entomology team in Crop Protection, based in Northam. She enjoys her role and values her team, especially her work on the Canola Allies project in collaboration with CSIRO, which focuses on beneficial insects in canola. She's also involved in the DPIRD and GRDC co-funded Seasonal status of pests and diseases delivered to growers project. After a 16-year break to focus on motherhood, working as an education assistant at a local primary school, and spending a couple of years as an Environmental Officer, Danae is thrilled to be back conducting scientific research.

This is Danae's second position with DPIRD, having completed a Bachelor of Environmental Biology with Honours at Curtin University and beginning her career at the Department of Agriculture in 2001, where she worked in Plant Pathology and Virology. Despite the break, she recognises a few familiar faces in the agricultural research community and is enjoying meeting new people.

Driven by a love for adventure, in 2004 Danae joined a Youth Ambassador Program that took her to Laos, where she spent eight months collaborating with CSIRO on researching rodent management in rice paddies and local farms. Upon returning to Western Australia, she began working with CSIRO in Plant Pathology, focusing on the benefits of endophytes in wheat crops.

Danae loves swimming and the outdoors, which has led her to sign up for the Rottnest Channel Swim once again this summer, after weather conditions cut short last year's attempt. This year, she'll be part of a team with her husband and 2 sons.

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