



The slight smell of burnt vegetation lingering in the still-frosty Southland air after the LaserWeeder goes through a paddock of carrots.

Zapping weeds in Southland

In late winter, emerging from a carrot paddock near Woodlands, the sight of bright lights, faint zapping sounds and puffs of smoke might turn a few heads; but it is just Matthew Malcolm's "killer robot" at work.

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WHEN SO SWEET MANAGING Director Matthew Malcolm saw a similar model working in the Salinas Valley in California two years ago, when he was part of the Callaghan Innovation delegation to FIRA USA 2023, he knew then he wanted to buy one.

The Carbon Robotics G2-200 LaserWeeder from the United States is the first of its kind in New Zealand.

Its six-metre width made it impossible to get through Southland gateways and it would need a pilot vehicle on the roads. Plus, it came with a six-metre width price tag.

However, his visit to California was followed with a visit by Carbon Robotics to Southland.

“The guy saw all our fences and understood straight away,” Matthew says.

“Later he rang me and said they were developing a two-metre modular laser weeder. And it came with a two-metre price tag. So we bought one.”

It arrived in mid-July 2025 with a technician. After a day and a half of unpacking and setting up, Matthew and son Jesse, who now looks after it day-to-day, went to a paddock of carrots planted in April, set it to carrot mode and away it went.

“For Jesse it’s an exciting opportunity to combine modern agri-tech solutions with the knowledge and care passed down through generations before him.”

Working in the right paddock, where weeds are just emerging, the expected speed is a kilometre per hour.

“However, it is going super slow because of the size of the weeds from winter. It’s not really made for this but it’s still making an impact.”

The weeder comes in metre modules so can be two, three, four, six or more metres wide. There is one working in California that’s 16 m wide.

It identifies weeds using high-resolution cameras linked with AI. If it’s not sure what the cameras have taken a photo of, it uses its Starlink connection to check in with the other Carbon Robotics weeders working around the world for an AI discussion (So Sweet’s weeder is number 134).

The precision lasers aim at the centre of the weed, with sub-millimetre accuracy, and a bright light and a puff of smoke later, the weed’s cell walls are destroyed.

“It works best when the weeds are just emerging, even too small for us to see,” Matthew says.

The carrots are left untouched and the soil undisturbed. There is just the slight smell of burnt vegetation lingering in the still-frosty Southland air.

By halfway through the day, it has killed 155,000 weeds. Matthew expects it would take out six million in the 2 ha paddock of carrots when it had finished.

“That’s a lot of hand weeding.”



ABOVE The precision lasers aim at the centre of the weed, with sub-millimetre accuracy.



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MATTHEW MALCOLM
SO SWEET
SOUTHLAND

The electricity it needs is from a generator on the diesel tractor’s front PTO, which also works as a counterweight for the two-tonne weeder. The upper two thirds of the white box contain coolant for the lasers and the Starlink aerial is at the top.

There is an annual licence fee, except the first year which is free, for the continual upgrades to the software. The next upgrade, expected soon, will automatically control the speed of the tractor to suit the weed burden – the only thing the tractor driver must now worry about. They’re completely left out of the AI discussion happening in the background on what is a weed and what is a carrot. Matthew says one day the tractor won’t even need a driver.

“I’ll just sit at my desk in my office and will be able to see where it is.”

Once planting gets underway in Southland, it’ll be working around the clock.

“The only thing that stops it is rain. It just gets too muddy. But it’s okay in wind and in frost.”

So Sweet use a four-year rotation for its carrots and parsnips with the ground brought back from pasture each time. The stale seed bed technique will still be used with an LPG flame burning off weeds after cultivation two or three times in the one to two months before planting. The last time is just before the carrots and parsnips strike.

LEFT Matthew Malcolm, director at So Sweet in Southland, imported the Carbon Robotics G2-200 LaserWeeder from the United States.

Besides for cultivation between rows, in the past it has been hand weeding with mostly university students on holiday lying face down on a bed behind the tractor.

“It can be quite relaxing although some of the students do call it ‘soul destroying,’” Matthew says.

“I don’t think any of them will miss it. They’ll do harvesting instead, which they find a lot more enjoyable.”

But it’s not just about freeing up staff. So Sweet aims to have all its carrots and parsnips, whether organic or not, spray free.

“We want to eliminate all herbicide usage from the food we produce.”

Matthew has long watched what herbicides do to the health and growth rate of his carrots.

“Of course we never use fungicides or insecticides on our organic carrots, but we have never needed to either. By not using herbicides, and using the robotic weeder instead, we hope to be completely spray free.

“And we’ve been told to expect a yield increase of about three percent.”

He’s also going to trial the robot on thinning carrots. The carrots are precision drilled so in theory they don’t need thinning, another job which in the past could only be done by hand.

But weather, bird and animal damage take out some of the sparsely planted carrots when they emerge. Denser planting, followed by robotic thinning, could solve the problem and increase yield even further.

“The weeder doesn’t mean we’re going to expand the number of hectares we use. It may decrease them because we will be able to grow more carrots on less land, so that’s good for the water and the soil.”

He’s looking forward to when So Sweet can put spray free on their supermarket packaging, hopefully in autumn 2027.

“I did see sweet corn packaged in the States recently as robotic weeded.”

And as for the curious Southlanders looking over the fence, Matthew says a dairy farmer has already asked if he could use the robotic weeder for ragwort in his paddocks. ☺