Carbon Robotics LaserWeeder

IMPLEMENTED 2022 ONWARDS · AGRICULTURE AND FOOD · UNITED STATES · BAND C · PARTLY PROVED
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Carbon Robotics sells tractor-drawn machines that use cameras and deep learning to tell crops from weeds and kill the weeds with lasers. A peer-reviewed Cornell and Rutgers trial found laser weeding matched common herbicides on East Coast vegetables; the cost savings are the company's own claims.

ABOUT THIS SYNOPSIS

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NOTICE WORDING LAST UPDATED 16 NOVEMBER 2026

AT A GLANCE

AI-native company: built around AI from the start and attempting transformational change. It claims band A; MarLuc grades it on what is evidenced.

AI used: Computer vision with deep learning to identify weeds, guiding lasers on a tractor-drawn machine.

Implemented: 2022 onwards. Grade: band C, Process change, Partly proved.

Headline result, as reported: Laser weeding matched or beat three common herbicides in a peer-reviewed field trial, published June 2025; the company claims weed-control costs cut by 80%

1 · The case

The facts, as reported by the 5 sources listed at the end. Where a source is silent, the field says "Not reported".

Organisation

Carbon Robotics. Seattle-based maker of AI-guided laser weeding machines, founded in 2018. More than $185 million of venture funding by February 2026, per TechCrunch. Machines operate on farms in 15 countries, by the company's account. Canvas block: 4. Operations and process. Also 6. Data and technology, 3. Customers and proposition.

Business challenge

The challenge. Growers control weeds with herbicides, which can injure the crop and cut yields, or with hand weeding, which is slow and labour-intensive, per Cornell. Many specialty crops have few or no approved herbicides, and herbicide-resistant weeds are spreading, per Rutgers.

How it was addressed. The machine passes over crop rows taking photographs, a deep learning program tells weeds from crops, and lasers kill the weeds. Deliveries began in 2022. In February 2026 the company released the Large Plant Model, trained on 150 million labelled plant images gathered by its own fleet, which it says lets a machine recognise a new weed without retraining; growers can tailor it by uploading a few images. [1] [2] [3] [4] [5]

Who implemented it

In-house (In-house): Carbon Robotics: designs and builds the machines and the AI models.
Cornell University and Rutgers University (University or research lab): Ran the independent peer-reviewed field trials.
Investors named in the sources, including BOND and NVIDIA's NVentures, are not implementation partners.

Technology (SEAM pillar E)

SEAM types: T5 Custom / fine-tuned models, T9 AI in physical systems. Deployment: Not reported. Vendors and products: Carbon Robotics, LaserWeeder, Carbon AI, Large Plant Model.

Where it was built in: Cameras on the machine photograph crop rows, a deep learning program separates weeds from crops, and lasers kill the weeds; growers tailor the model by selecting two or three images in a tablet app.

What changed

Before: herbicides or hand crews. After: laser passes, two or three about ten days apart in the trial. The trial found laser weeding as effective as or better than three common herbicides, with less crop injury. Adoption: about 100 machines sold by June 2025, per Cornell; more than 175 units in over 100 crops by February 2026, by the company's account. [1] [2] [3] [4] [5]

What it cost

Machines carry a price tag of up to $1.5 million each, per Cornell; prices start around $500,000, per Rutgers.

What it saved

Weed-control costs cut by 80%, by the company's account. Independent cost figures: Not reported. [1] [2] [3] [4] [5]

Governance and control

In the trial the machine was run by a trained technician, and growers choose what to target and protect, by the company's account. Laser safety rules and any regulatory approvals: Not reported.

S2 · Accountable owner · Not reported
Not reported.

A1 · Safe use · Not reported
Not reported.

A2 · Human in the loop · Evidenced
In the university trial the machine was operated by a trained technician and was not fully autonomous, per Rutgers. [2]

A3 · Monitoring and assurance · Evidenced
Independent field trials in New Jersey and New York measured weed cover, weed density, biomass, crop emergence and crop damage against herbicides and untreated controls, per Cornell. [1]

A4 · Vendor AI · Not reported
Not reported.

A5 · Agent controls · Claimed
Farmers tell the machine what to kill and what to protect by selecting photos in the interface, by the company's account to TechCrunch. [4]

A6 · Standards and regulation · Not reported
Not reported.

What worked, what did not, what is unproven

WORKED

– Weed control as effective as or better than three common herbicides in pea, spinach and beet trials, per Cornell.

– Crop safety: weeds half a centimetre from crop seedlings were killed with no laser damage to the crops, per Rutgers.

– Faster adaptation: retraining for a new weed used to take about 24 hours each time, the chief executive told TechCrunch.

DID NOT

– Lasers were less effective against purslane and annual grasses, whose growing points are below ground, per Cornell.

– The machine works best on small weeds, needs several passes in wetter conditions and is expensive, per Rutgers.

UNPROVEN

– The company's claim that weed-control costs fall by 80%.

– Yield and profit effects at commercial scale.

– Whether use spreads beyond specialty and high-value crops.

Timeline

2018 Carbon Robotics founded in Seattle [3]

2022 First machines shipped [4]

Jul 2024 Company says its fleet has eliminated more than 10 billion weeds since 2022 [3]

Oct 2024 Raises $70 million, taking total funding to $157 million [3]

Jun 2025 Cornell and Rutgers field trial published in Pest Management Science [1]

Feb 2026 Launches the Large Plant Model, trained on 150 million labelled plant images [5]

2 · Grade and SEAM assessment

MarLuc's opinion, made on the evidence above. How cases are graded: marluc.co.uk/case-studies/how-we-rate

Level of change and impact

Claimed: A. Grade: C, Process change. Proof: Partly proved. Level of change: Process change.

Process change (Level 2, band C), claimed as transformational (band A). The weeding process changes for growers that adopt it; a change across the sector is not shown.

Graded C, claimed A. Growers that adopt the machine replace herbicides or hand weeding with laser passes, a redesigned weeding process, and independent trials support the weed control. The company and an independent editorial describe a potential transformation of weed control; with roughly 100 to 175 machines in use, that transformation is unproven.

The SEAM view and lessons learnt

The result comes from a combined machine: cameras, a deep learning program and lasers on a tractor-drawn platform. The AI's part, telling crop from weed at close range, is essential, but it cannot be costed separately from the hardware, and the independent trial proves weed control in plots rather than the economics. Before buying, a farm's leadership should test cost per acre against its own herbicide and labour bills, and ask for trial data on its own crops and weeds.

1. Ask for independent trial data on your own crops and weed species.
2. Model the cost per acre, including passes and operator time.
3. Treat supplier cost-saving figures as claims until your own records confirm them.

Evidence

Score 2 of 4. Independent for weed control: a peer-reviewed university field trial. Self-reported for adoption, cost savings and model performance.

Evaluation method. Independent evaluation for weed control: peer-reviewed field trials by Cornell and Rutgers in 2024, with four treatments including untreated controls, herbicides, lasers alone and lasers with herbicides. Adoption, cost and model figures are self-reported.

Sources disagree. Cornell gives a price of up to $1.5 million per machine; Rutgers says prices start around $500,000. TechCrunch reports more than 100 farms in 15 countries in February 2026, while the company told Fruit Growers News of more than 175 units in over 100 crops.

Status. Ongoing: machines in commercial use; the Large Plant Model released to existing customers by software update in February 2026.

3 · Original sources

Read these in full. To challenge a fact or a grade, use the contact form at marluc.co.uk or the link on https://marluc.co.uk/case-studies/carbon-robotics-laserweeder

[1] Cornell Chronicle: Lasers match common herbicides at zapping East Coast weeds (June 2025)
https://news.cornell.edu/stories/2025/06/lasers-match-common-herbicides-zapping-east-coast-weeds

[2] Rutgers University: Artificial intelligence-guided technology could replace herbicides on East Coast farms (October 2025)
https://www.rutgers.edu/news/blast-them-rutgers-scientist-uses-lasers-kill-weeds

[3] The Robot Report: Carbon Robotics brings in $70M to scale LaserWeeder (October 2024)
https://www.therobotreport.com/carbon-robotics-brings-in-70m-to-scale-laserweeder/

[4] TechCrunch: Carbon Robotics built an AI model that detects and identifies plants (February 2026)
https://techcrunch.com/2026/02/02/carbon-robotics-built-an-ai-model-that-detects-and-identifies-plants/

[5] Fruit Growers News: Carbon Robotics unveils its AI-driven Large Plant Model (2026)
https://fruitgrowersnews.com/article/carbon-robotics-ai-laser-weeding-large-plant-model/

Carbon Robotics website: https://carbonrobotics.com

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VERSION HISTORY

v1.1 25 November 2026 Method update: technology type updated to T5 and T9 (AI in physical systems) and controls re-checked against sources; no safety limit outside the AI is reported, so controls are below the T9 minimum.
v1.0 17 November 2026 First published