

Electrical Weed Control for Weed Management in Carrots: 2026 Trials

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Background

Weed management is a major challenge in carrot production. Carrots emerge slowly and have a long growing season, creating extended opportunities for weeds such as pigweed (*Amaranthus* spp.) to establish and compete with the crop.

Herbicide options in carrots are limited. Current programs commonly rely on **pendimethalin** for residual weed control, followed by postemergence herbicides such as **Lorox, Tricor, or Caparol**, which are all photosystem II (PSII) inhibitors (HRAC Group 5). Repeated use of herbicides with the same mode of action can increase the risk of resistance.



Electrical weed control (EWC) is a non-chemical weed management approach that could help reduce reliance on herbicides and complement existing practices such as cultivation. Integrating EWC into carrot production may provide additional options for managing weeds while supporting more diverse weed management programs.

Objective

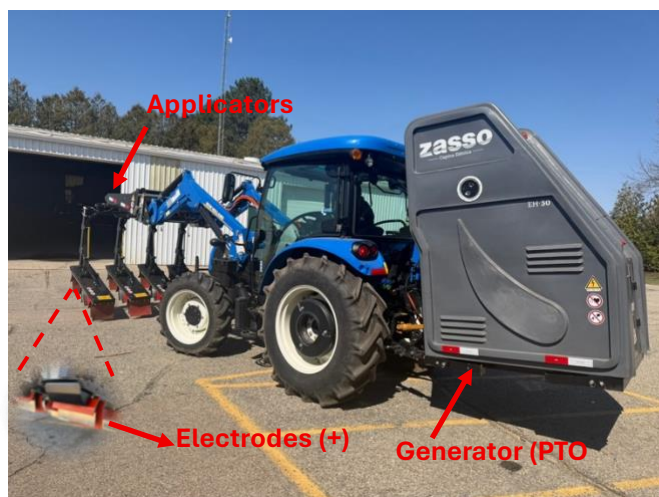
Evaluate EWC in carrots and determine how herbicide programs, operating speed, and repeated passes affect weed control, crop safety, and labor requirements.

Experimental setup

The trial used a 3 x 3 x 3 factorial design with factors: preemergence herbicide, operating speed, and number of passes. This resulted in 27 treatment combinations.

Factor	Level 1	Level 2	Level 3
Herbicide (PRE)	Prowl @ 2 pt/a	Dual @ 1 pt/a	Prow + Dual
Speed (mph)	0.75	1.5	3
No. of Passes	1 (2 LS)	2 (2 + 5 LS)	3 (2 + 5 + 10 LS)

Equipment used



Data collected

Weed control (0-100%), crop injury (0-100%), weed counts (between and in-row), weed biomass (between and in-row), hand-weeding time, and yield.

Preliminary results

Do more EWC passes improve weed management?

Yes. Repeated EWC applications improved weed suppression.

- One pass resulted in the greatest in-row weed biomass.
- Two and three passes reduced in-row biomass by approximately 40–45% compared with one pass.
- Additional passes also reduced the amount of hand weeding required. Hand-weeding time decreased from 5 hr/acre with one pass to 2.9 hr/acre with two passes and 2.4 hr/acre with three passes.
- Weed control generally improved with repeated applications.

How fast can EWC operate?

Slower speeds provided better weed suppression.

- Between-row weed biomass was similar at 0.75 and 1.5 mph.
- Biomass increased when operating at 3 mph, indicating reduced EWC effectiveness at the highest speed.

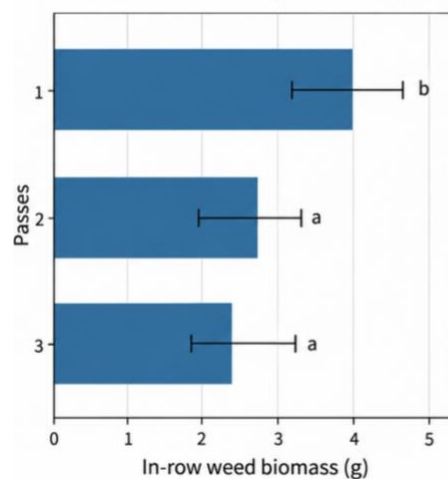
What about the PRE herbicide?

PRE herbicide program also influenced hand-weeding requirements. Prowl resulted in less hand-weeding time than Dual or Prowl + Dual (*data not shown*).

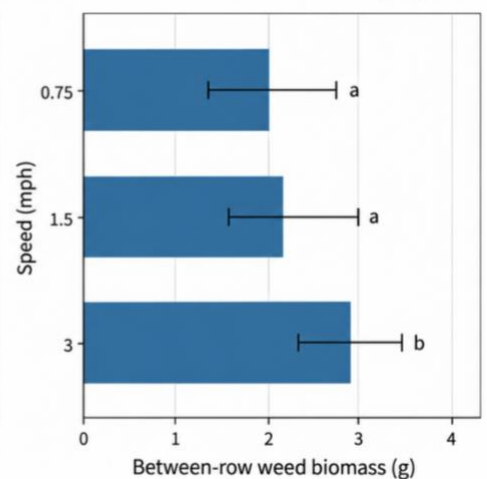
Take-Home Message

- More passes helped, while going too fast reduced EWC performance.
- Two to three EWC passes substantially reduced weed biomass and hand-weeding requirements. Operating at 1.5 mph provided weed suppression similar to 0.75 mph, while increasing speed to 3 mph reduced control.
- Because the electrodes must avoid contact with carrot plants, the current system is best suited for between-row weed control. A practical future approach could use EWC at 1.5 mph between rows, combined with a precision technology such as laser weeding, spot spraying, or precision electrical weeding to control weeds within the crop row.

In-row weed biomass by number of passes



Between-row weed biomass by speed



Hand-weeding time by number of passes

