

Preliminary Apple Tree, Weed, and Soil Biological Responses to Zasso Electrical Weeding

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New York is a major fruit production state!



13,000 ha (3rd United States)



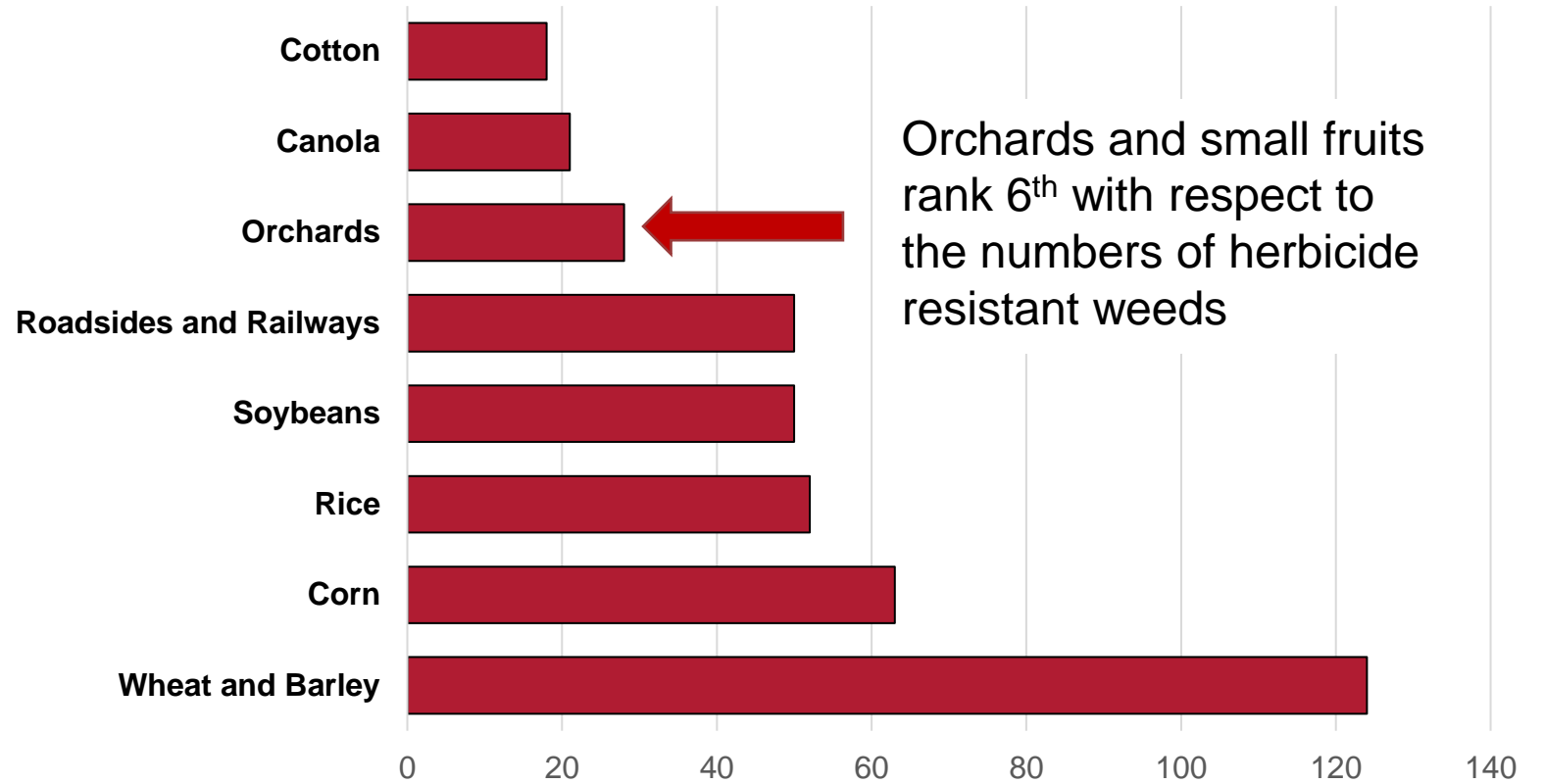
18,000 ha (2nd United States)

Weeds Compete with Crops for Resources, Harbor Pests and Pathogens, and Reduce Crop Yields.



Weed Management in Perennial Cropping Systems – Chemical Control





Herbicide Resistance

Organic Weed Management Tactics - Advantages

Physical disturbance

- Effective against a range of weeds
- Comparatively inexpensive

Mulching

- Adds organic matter (organic mulches)
- Helps retain soil moisture and regulate soil temperature

Organic herbicide application

- Effective against small, annual broadleaf weeds (BLWs)

Flame weeding

- Controls a wide range of weeds
- Does not physically disturb the soil

Hand weeding

- Very effective and precise

Organic Weed Management Tactics - Disadvantages

Repeated physical disturbance

- repeated physical disturbance to the soil can harm soil structure, stability, and health

Mulching

- Can be difficult to source
- Labor required to apply at scale
- Must be replaced

Organic herbicide application

- Expensive and non-systemic

Flame weeding

- Fire risk
- Less effective against grasses and perennial weeds

Hand weeding

- Time consuming
- Expensive due to labor requirements

**There is increasing interest in
novel weed management
technologies**



A



B



C



D

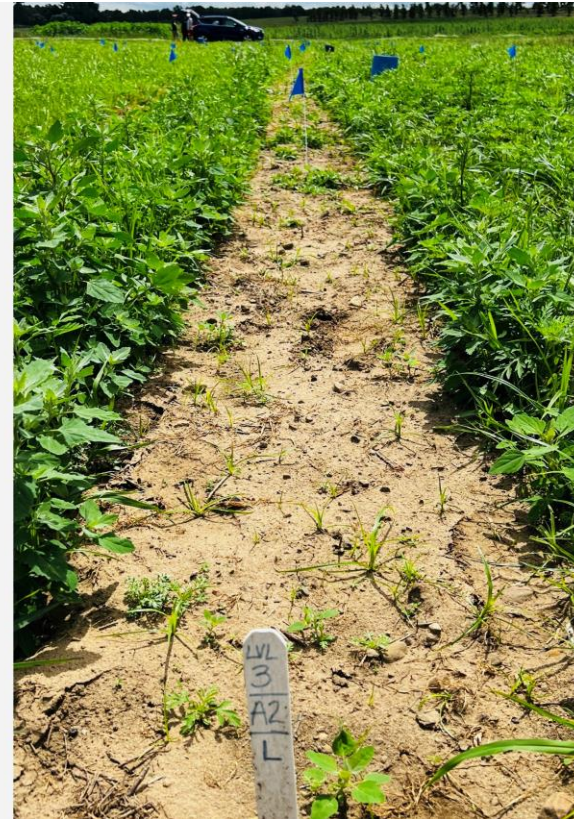
IT'S ELECTRIFYING!



Video credit: Dr. Lynn M. Sosnoskie

Zasso Weed Control 2 to 3 WAT

Weed control varied in response to amperage and travel speed



In 2023, field trials were conducted to evaluate the impact of EWC on weeds and soil biological characteristics.

Apple orchard trials

• Mature orchard trial

- RCBD with 3 reps
- Treatments – applied monthly
 - EWC
 - Cultivation
 - Organic herbicide

• Stacked tactics trial

- RCBD with 4 reps
- Treatments
 - EWC
 - Cultivation
 - EWC x Cultivation
 - Non-treated control (NTC)

Bare ground trials

- RCBD with 4 reps repeated in time across 2 fields
- Treatments
 - Unit Amperage Setting: 9.1 A, 19.5 A, 35.5 A
 - Speed: 1.85 km/h, 4.83 km/h
 - Non-treated control (NTC)
- Soil samples taken from treatment extremes

How well does the Zasso Electroherb perform compared to a commercial cultivating unit and organic herbicide use in organic apples?



Most Prevalent Weeds

Wild carrot



Grasses

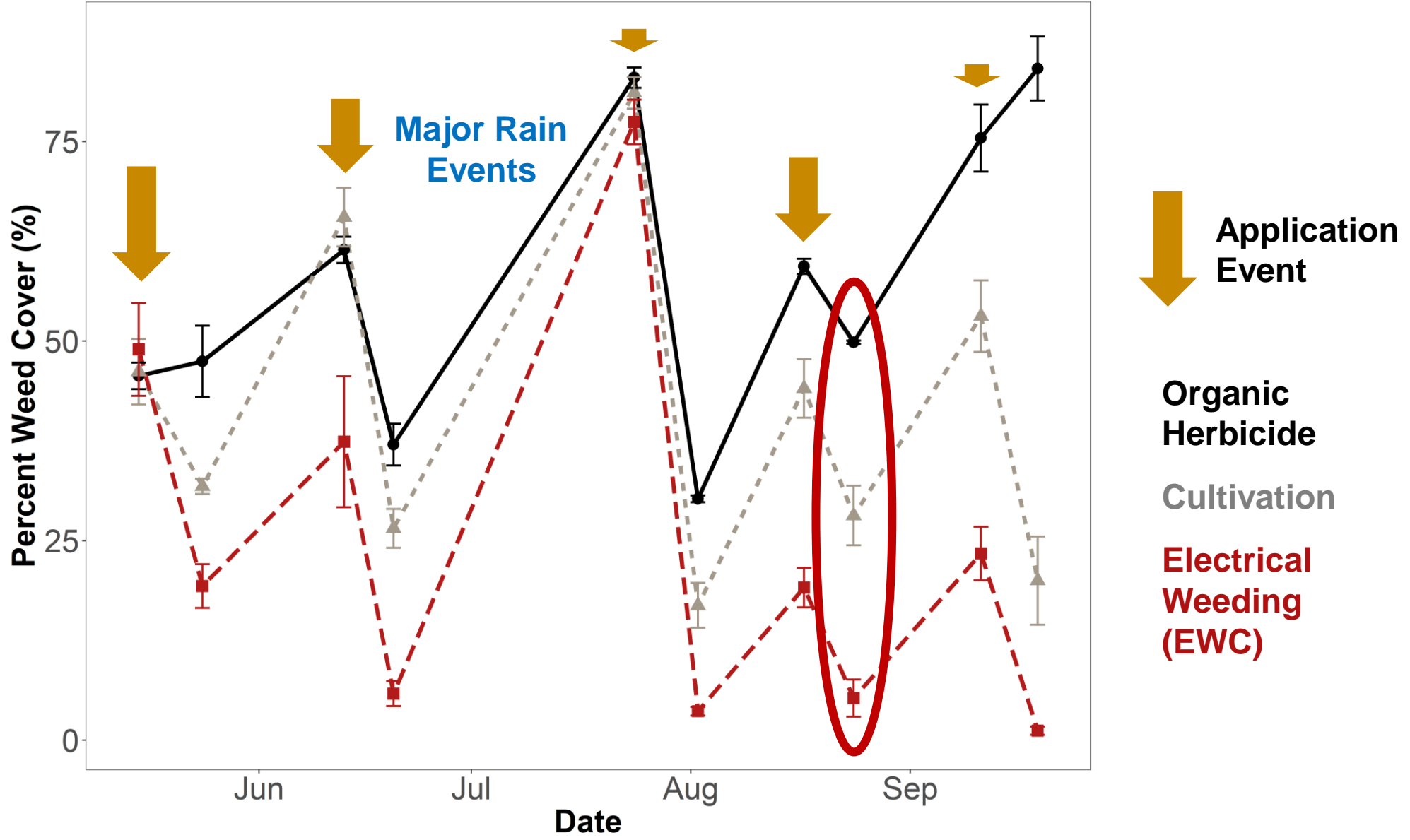


Dandelion



Curly dock

EWC significantly reduced weed cover compared to cultivation and organic herbicide use in an established orchard system.



Weed Cover – August 7 DAT

Organic Herbicide



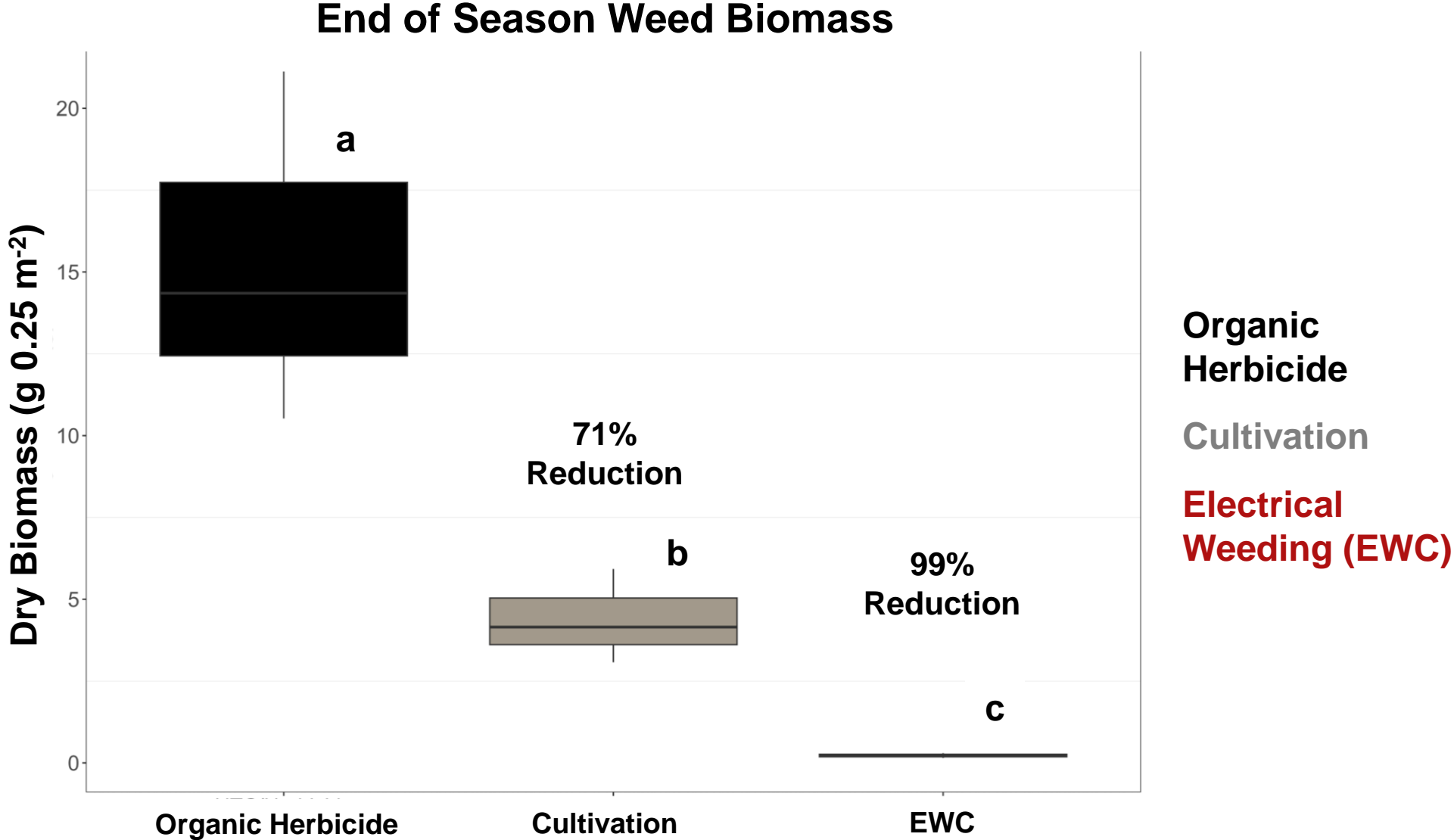
Cultivation



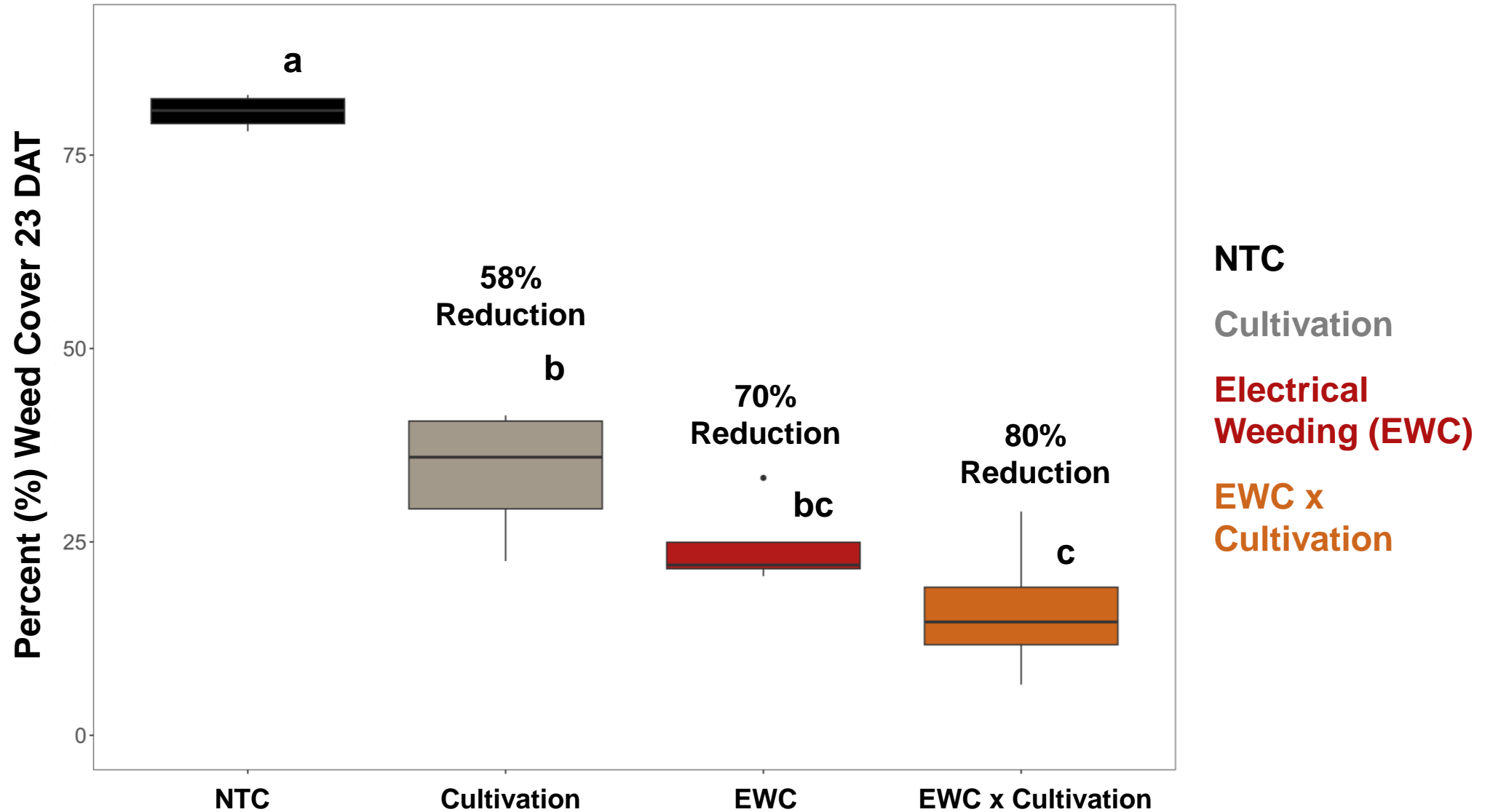
Electrical Weeding



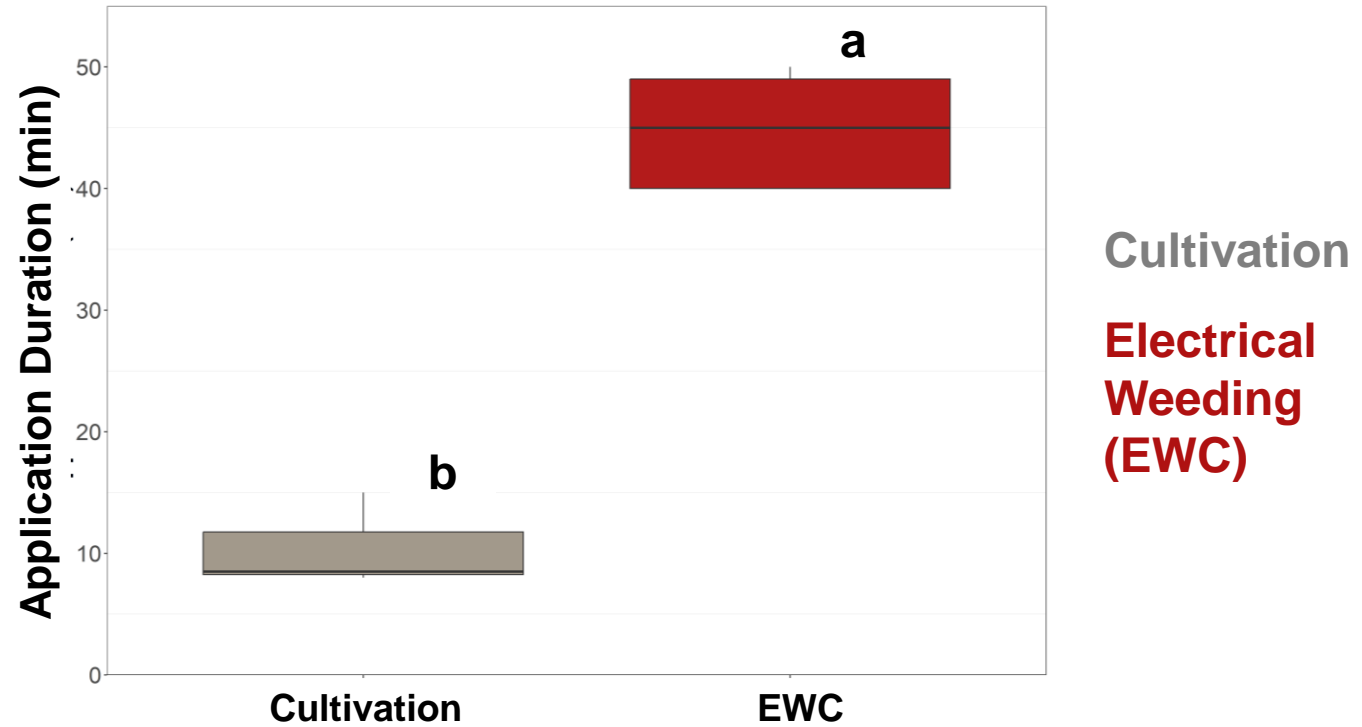
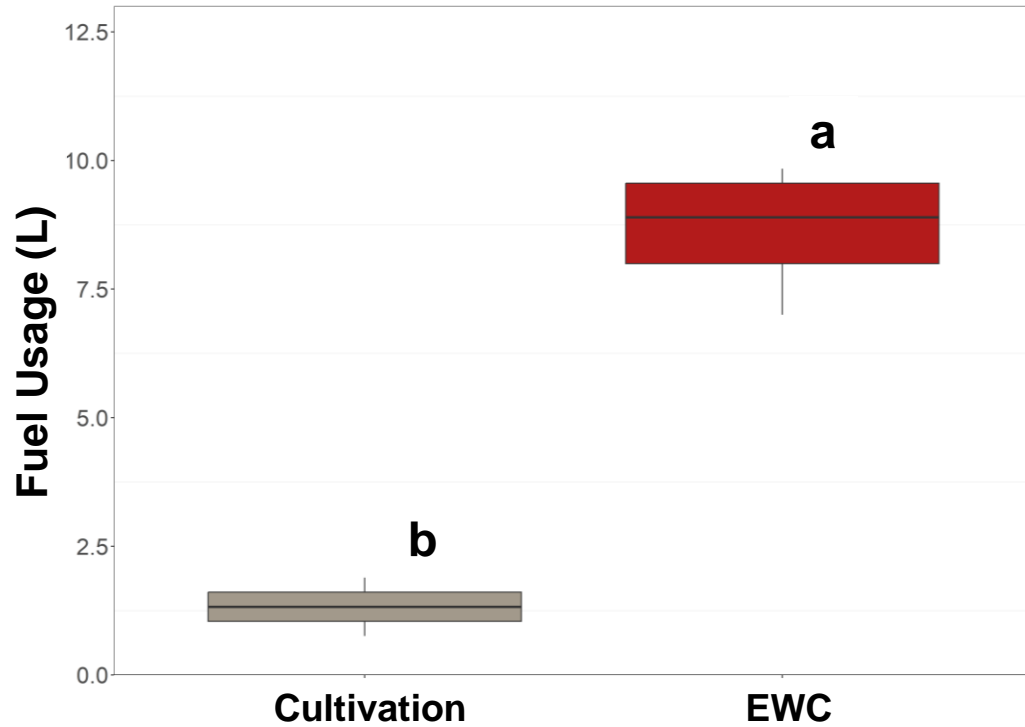
EWC significantly reduced weed biomass compared to cultivation and organic herbicide use.



EWC may be most effective when used with other weed control tactics!



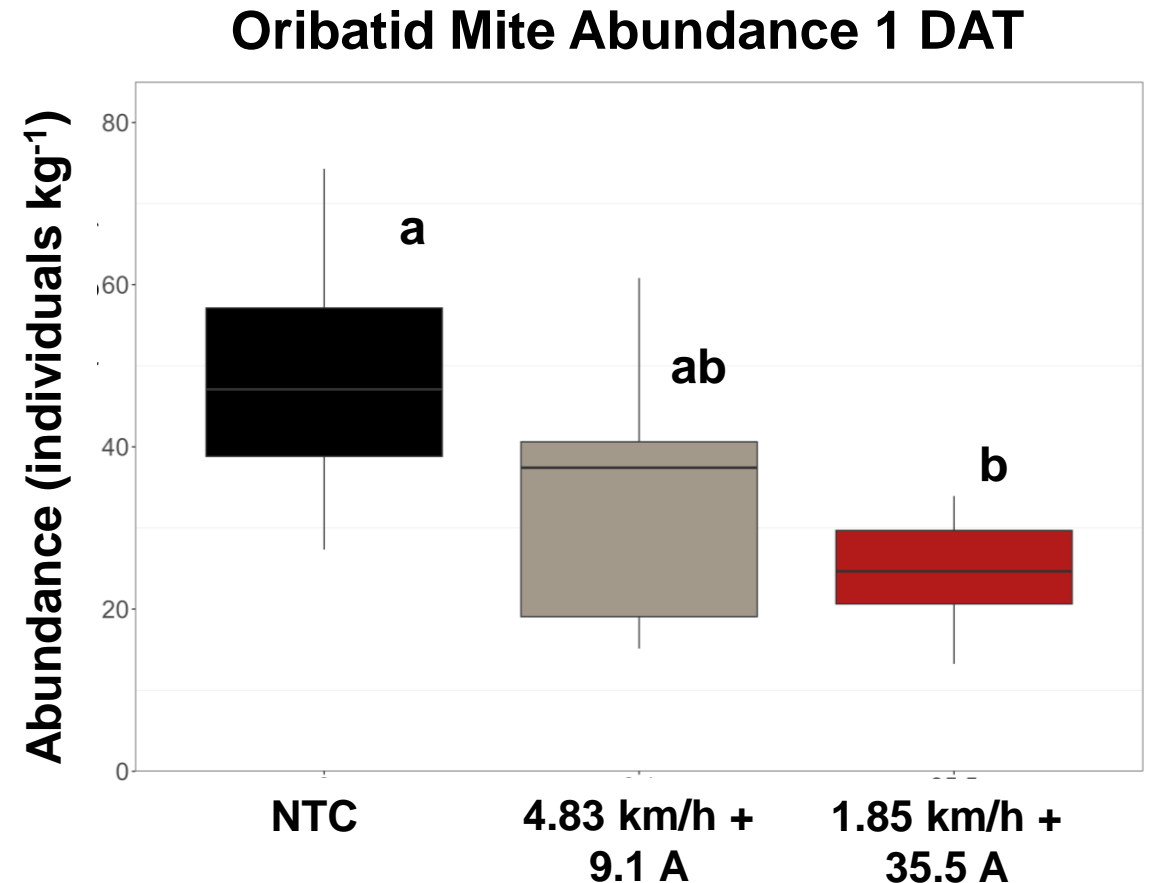
EWC used significantly more fuel and took more time to apply compared to cultivation.



What about soil biological characteristics?

Preliminarily, EWC had limited impact on soil microarthropod abundance and soil microbial activity shortly after treatment.

- No significant difference in total microarthropod, collembola, or mite abundance nor in the flush of soil microbial respiration
 - **Exception – reduced oribatid mite abundance in most intensive EWC application**
- In-depth analyses are being conducted to elucidate the impact of EWC on soil biological communities



Main Takeaways

- EWC effectively reduces weed cover and biomass
 - May be more effective when combined with other tactics
- EWC seems not to effect microarthropod abundance BUT further analysis is needed
- Compared to cultivation, EWC uses more fuel and takes more time to apply BUT possibly greater payoff over time.

Next Steps

- Repeat and expand these experiments in 2025.
- Assess the impact of EWC on weed pressure and crop health in a newly planted orchard compared to mulching and herbicide use.



Thank You!

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