Maximizing the Effectiveness of Cultivation on Your Farm

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Image: gopro.com

Row cultivation

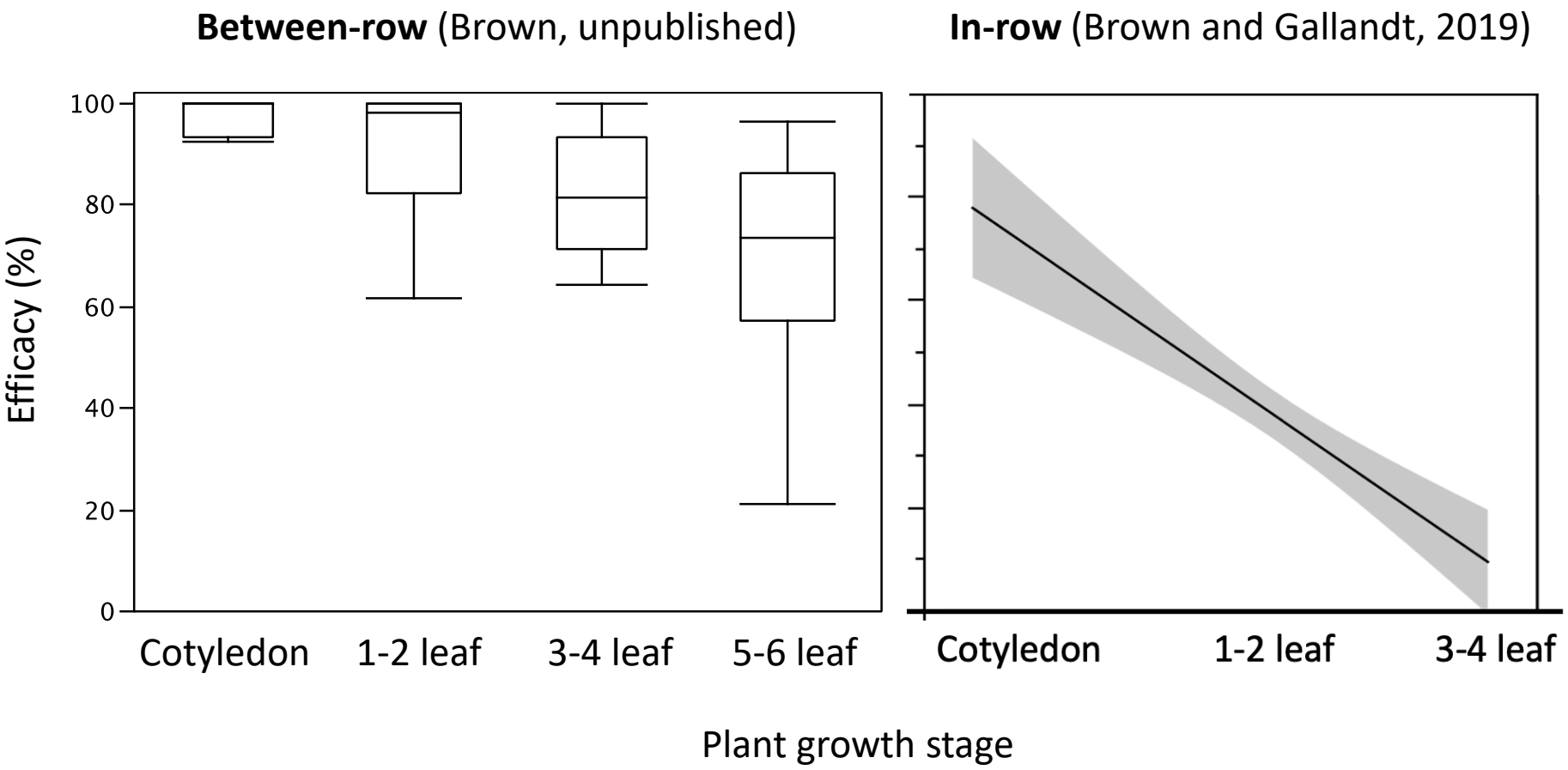
Adjustment is important

Which weeds are susceptible to cultivation?

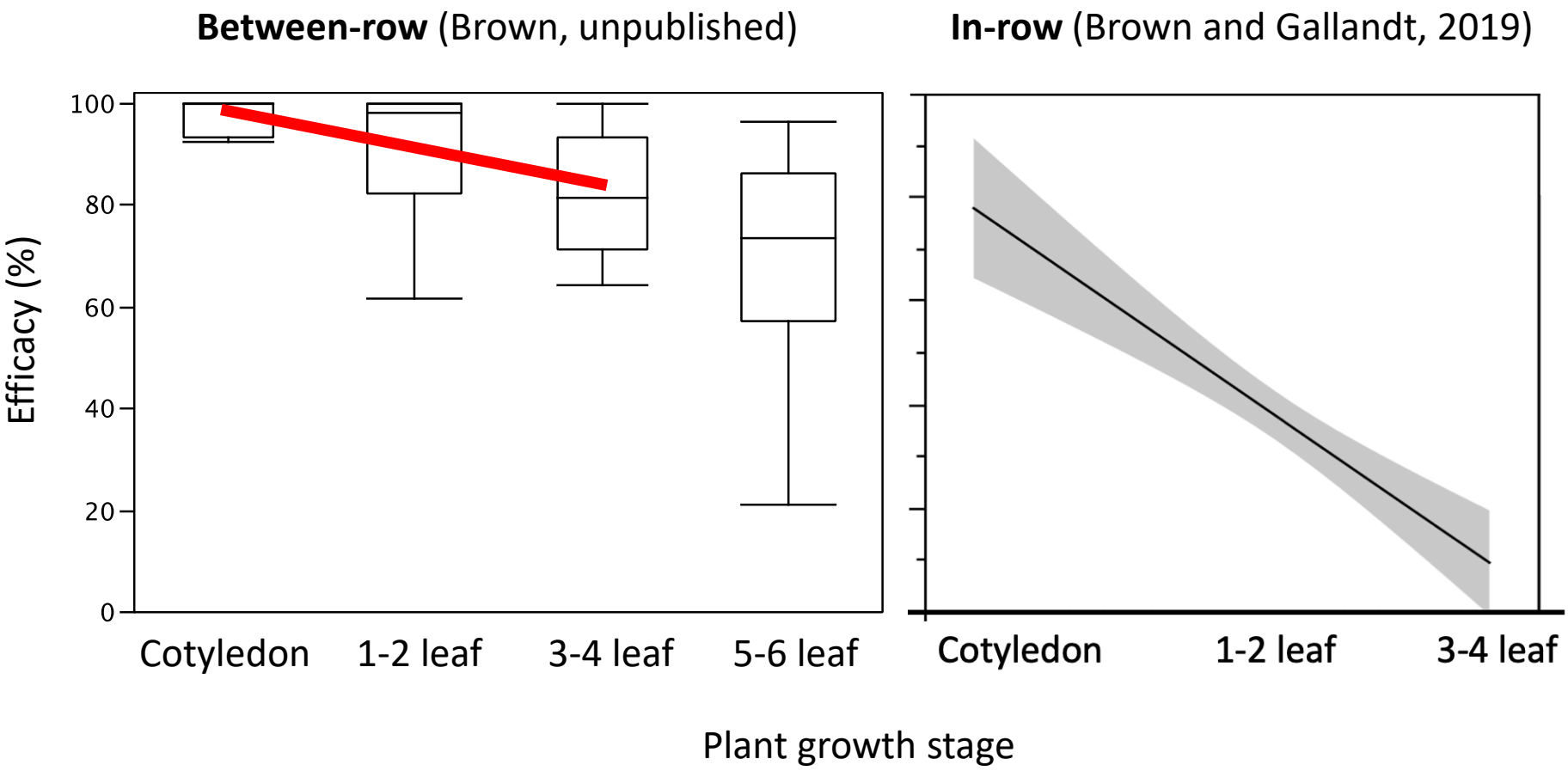
Ranked:

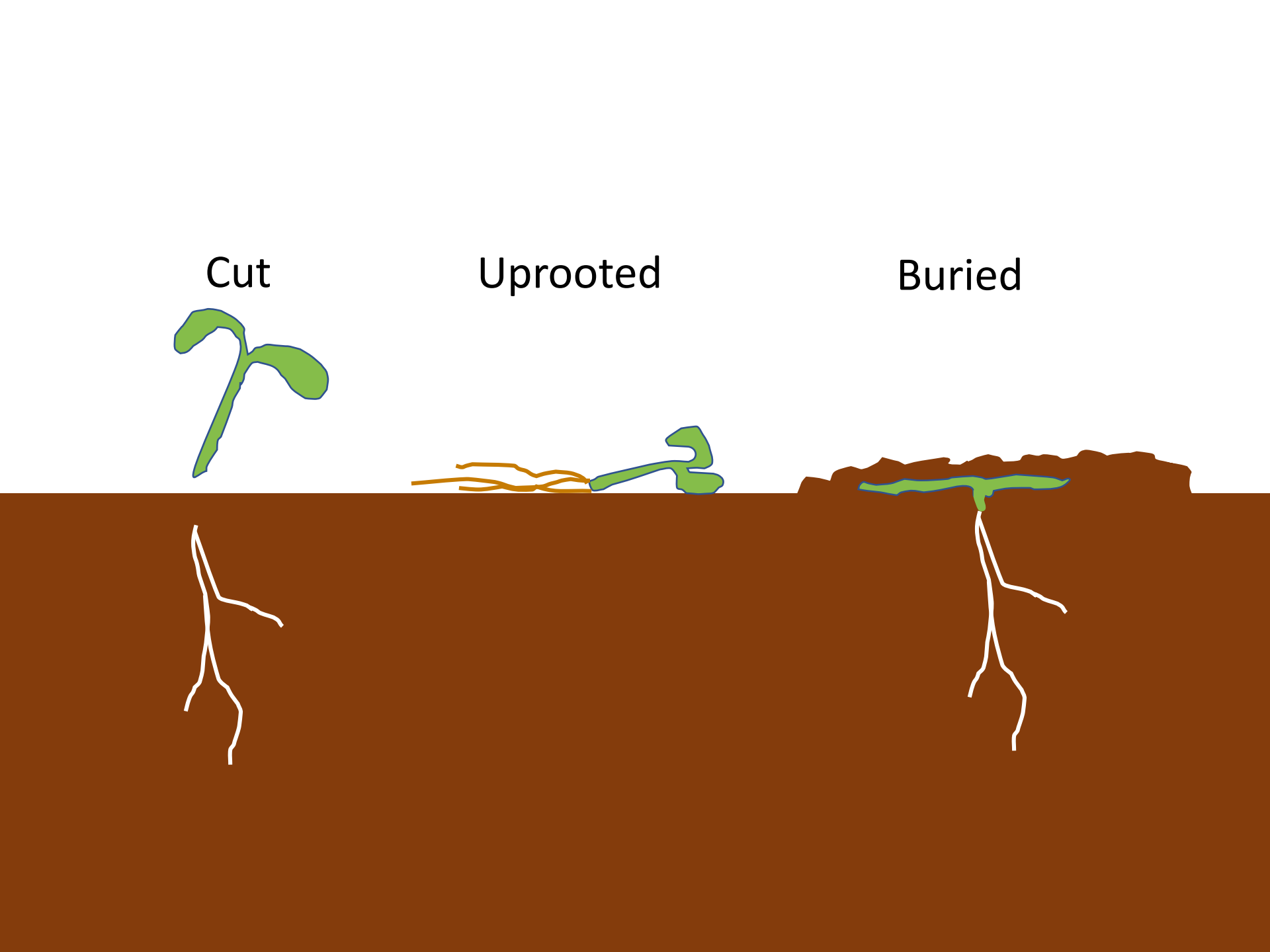
- Cotyledon stage weeds
- Small annual broadleaves
- Small annual grasses
- Young perennials
- Large annuals and established perennials will likely reroot or resprout

Timing is important



Timing is important




Cut
Uprooted
Buried

Cultivation basics

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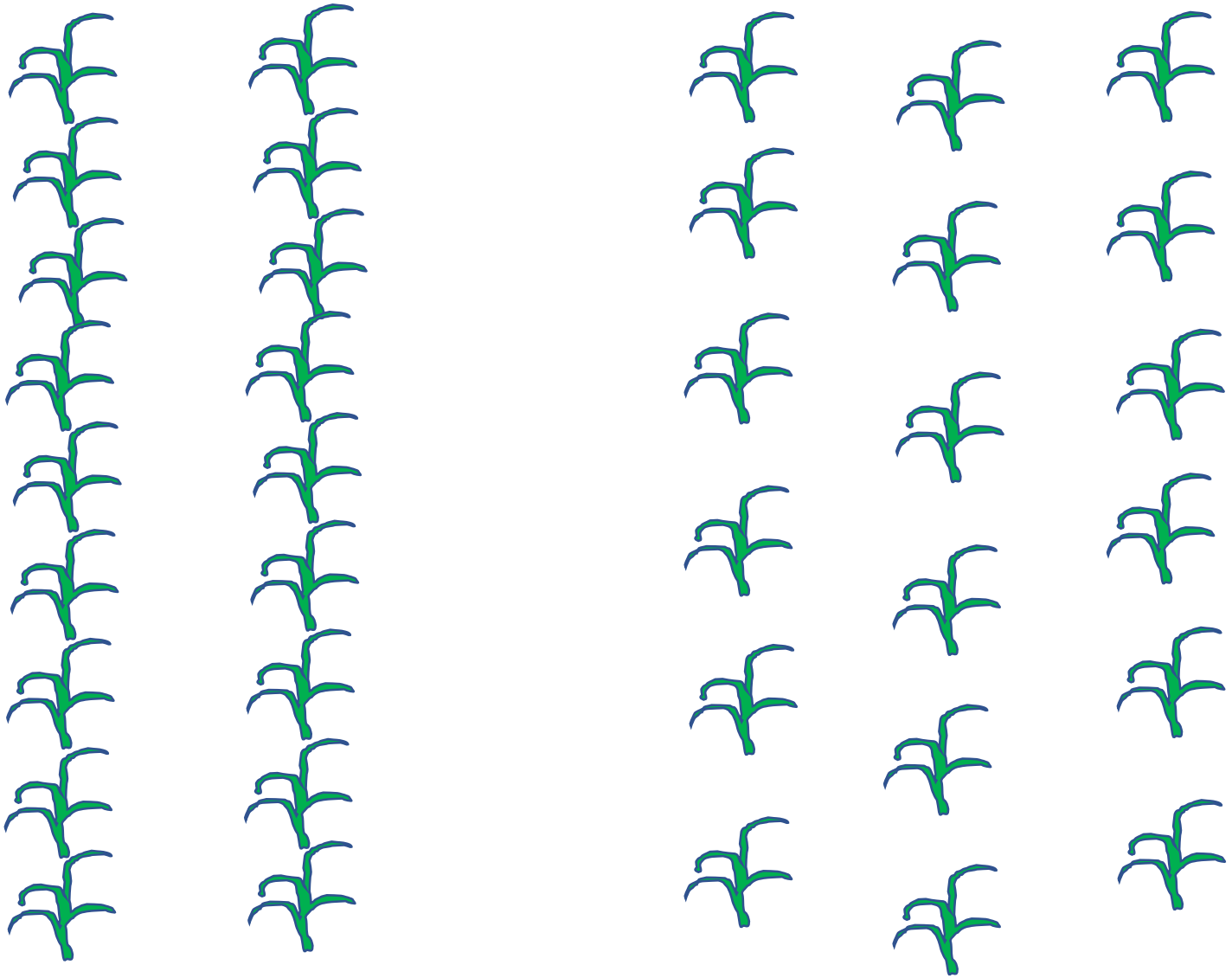
Ideal conditions:

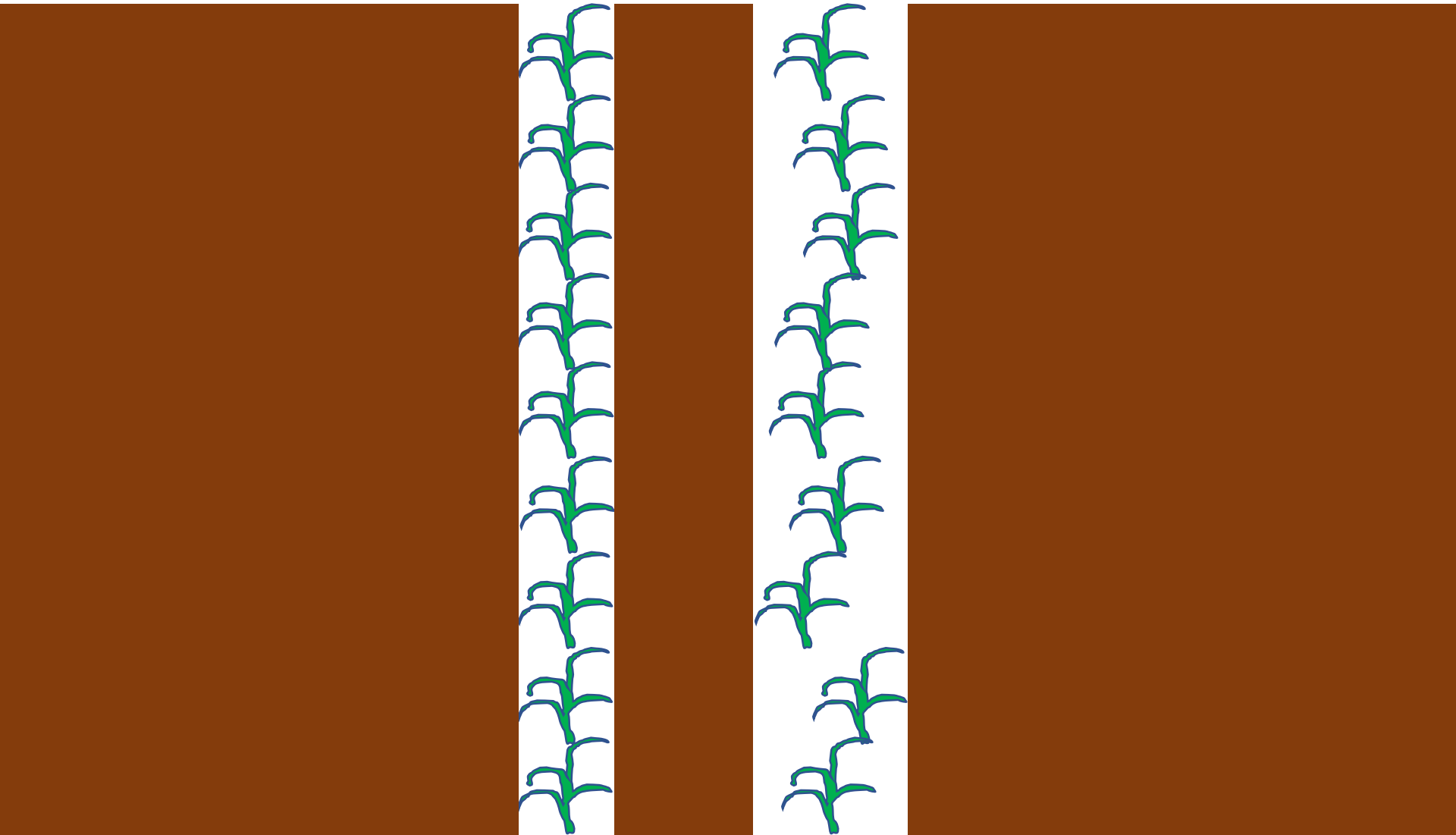
- Very small weeds
  - till/flame/herbicide immediately prior to planting
  - transplant
  - reduce seedbank ahead of planting
- Level, loose soil
- Minimal stones
- Hot, sunny day


In-row zone often missed

Adjustments to row spacing



Straight rows shrink the in-row zone



Adjusting speed for soil throw


Spring tine harrow

“Stacked” cultivation

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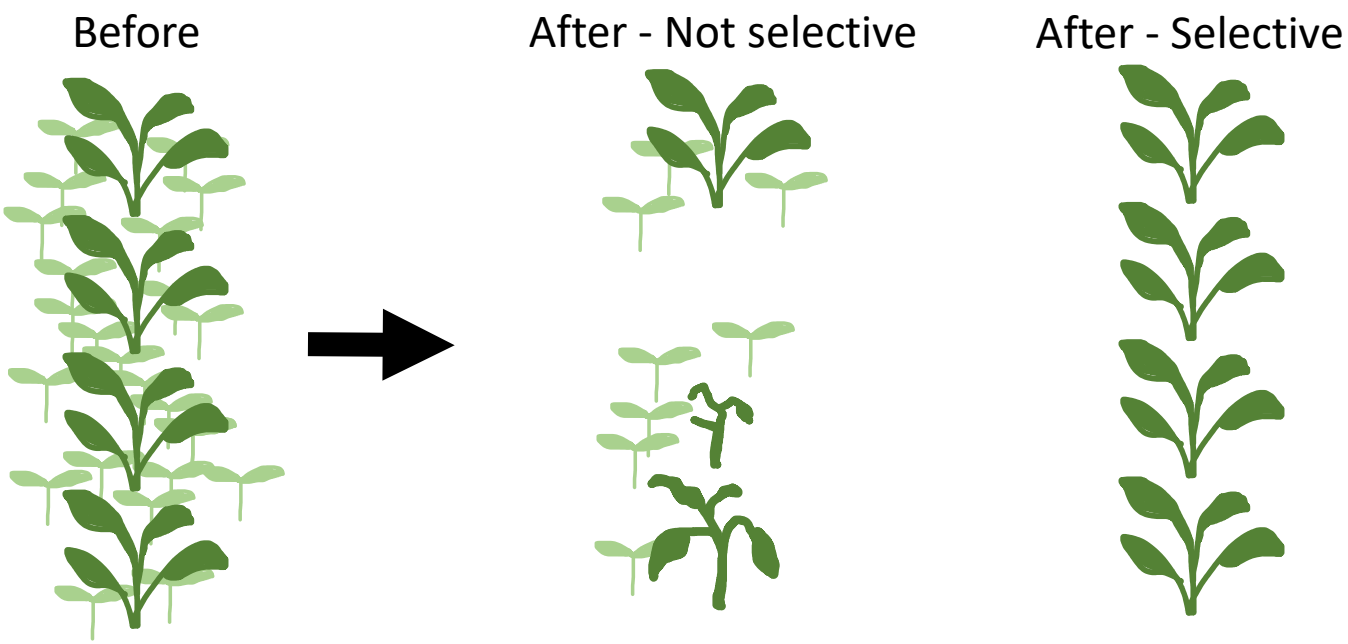
Row harrow

Finger weeders

Torsion weeders

Cultivator selectivity



In-row cultivation trials

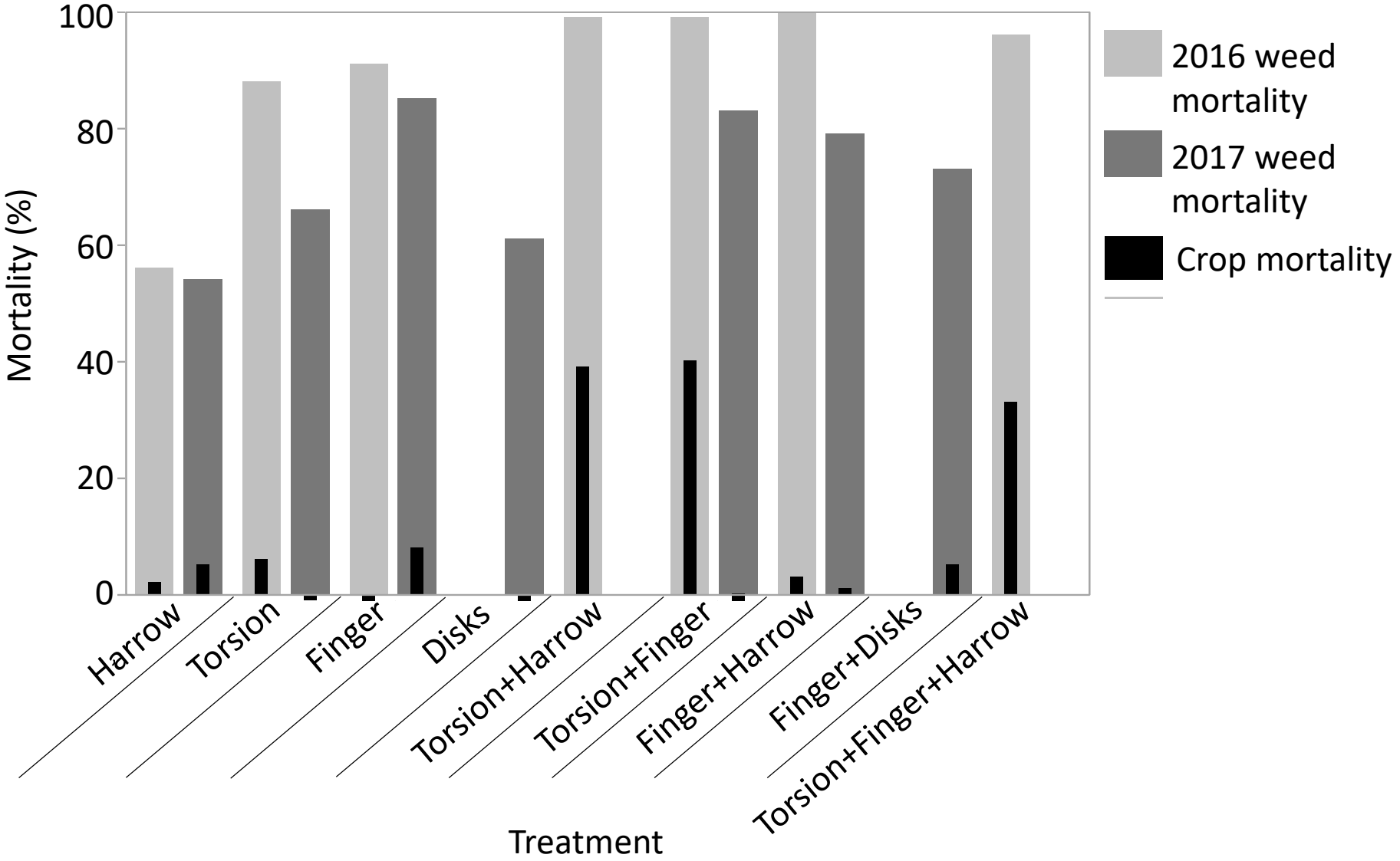
Sweeps

Fingers

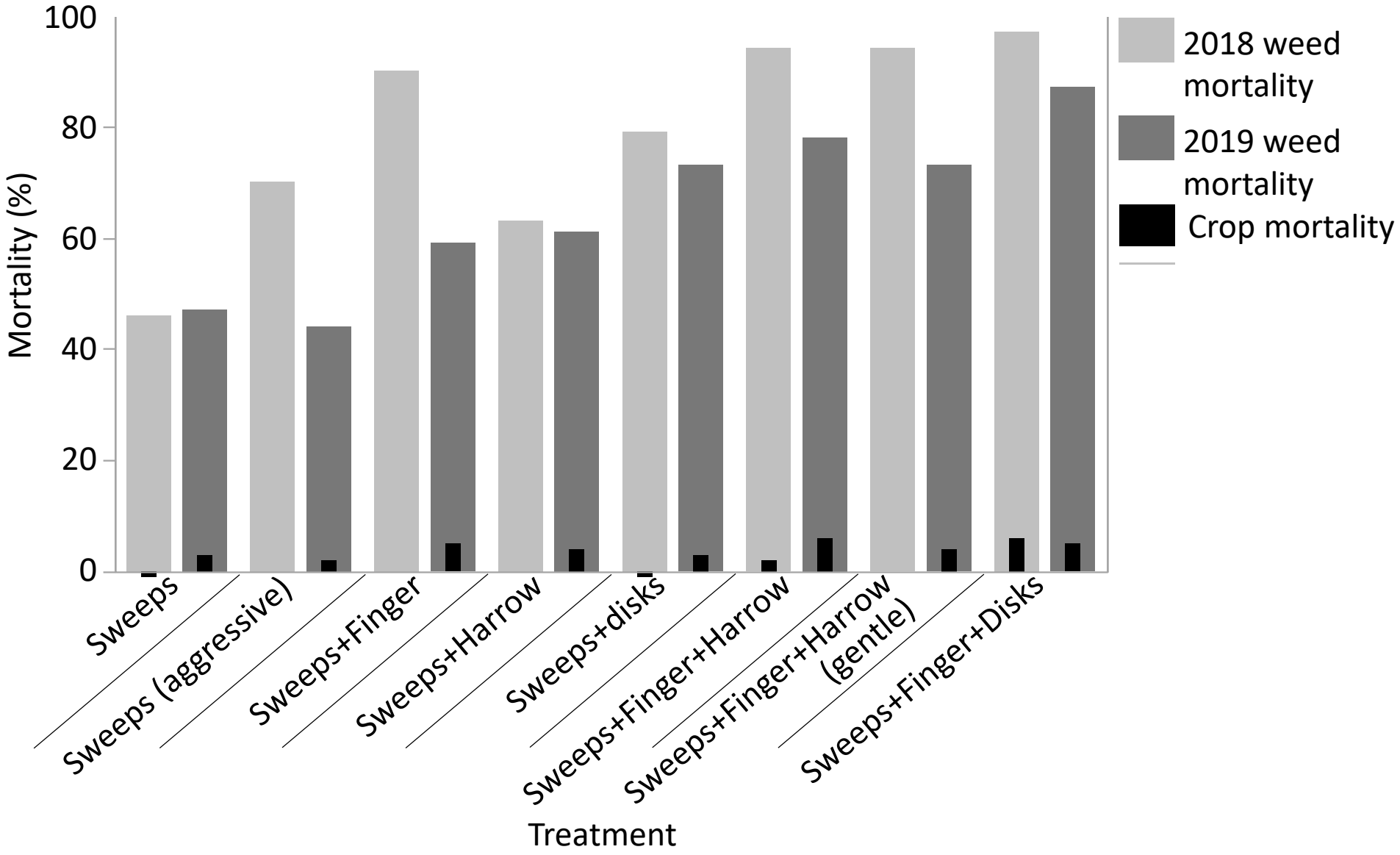
Row harrow

Disks

Trials in Michigan snap beans



Trials in New York snap beans



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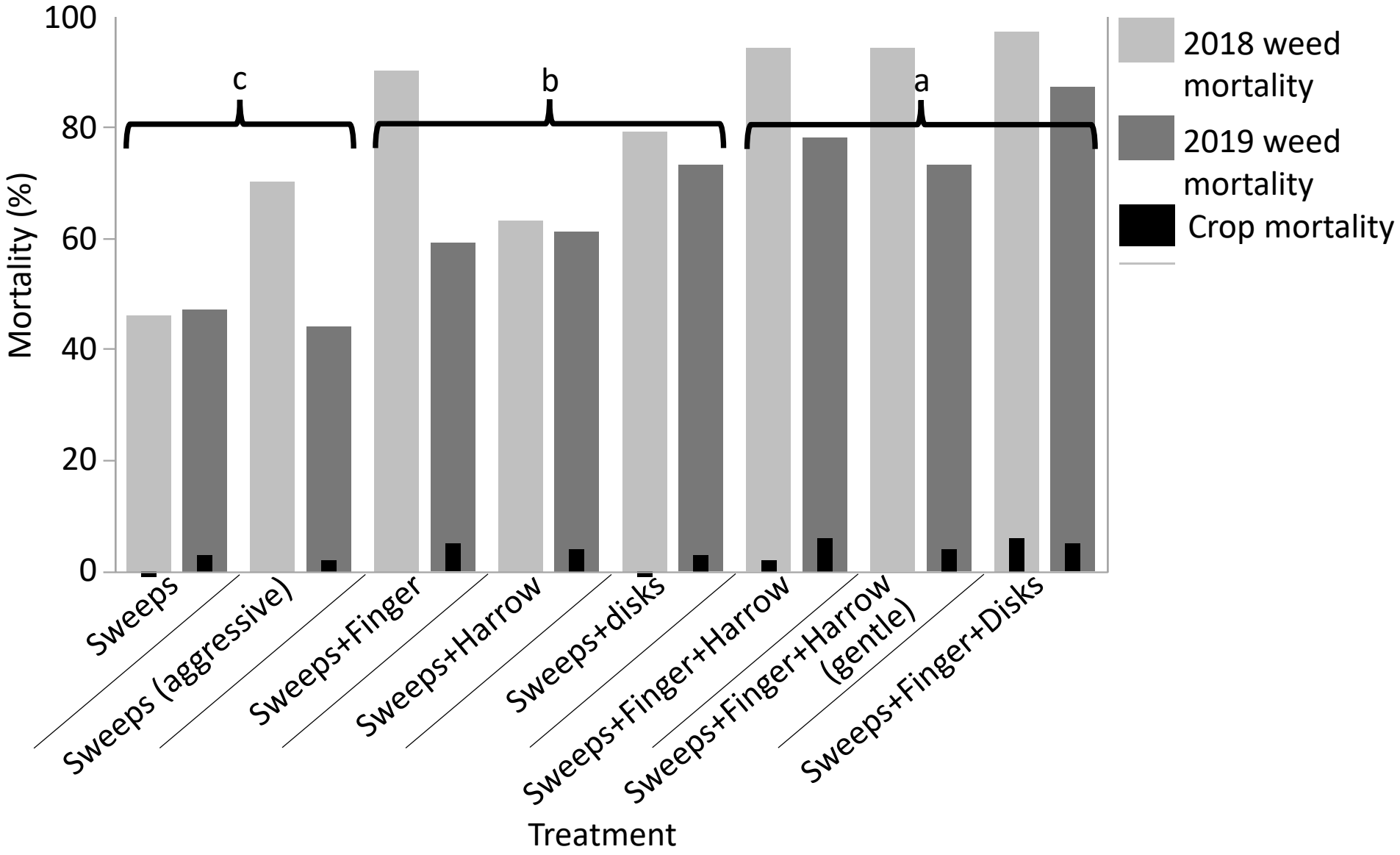
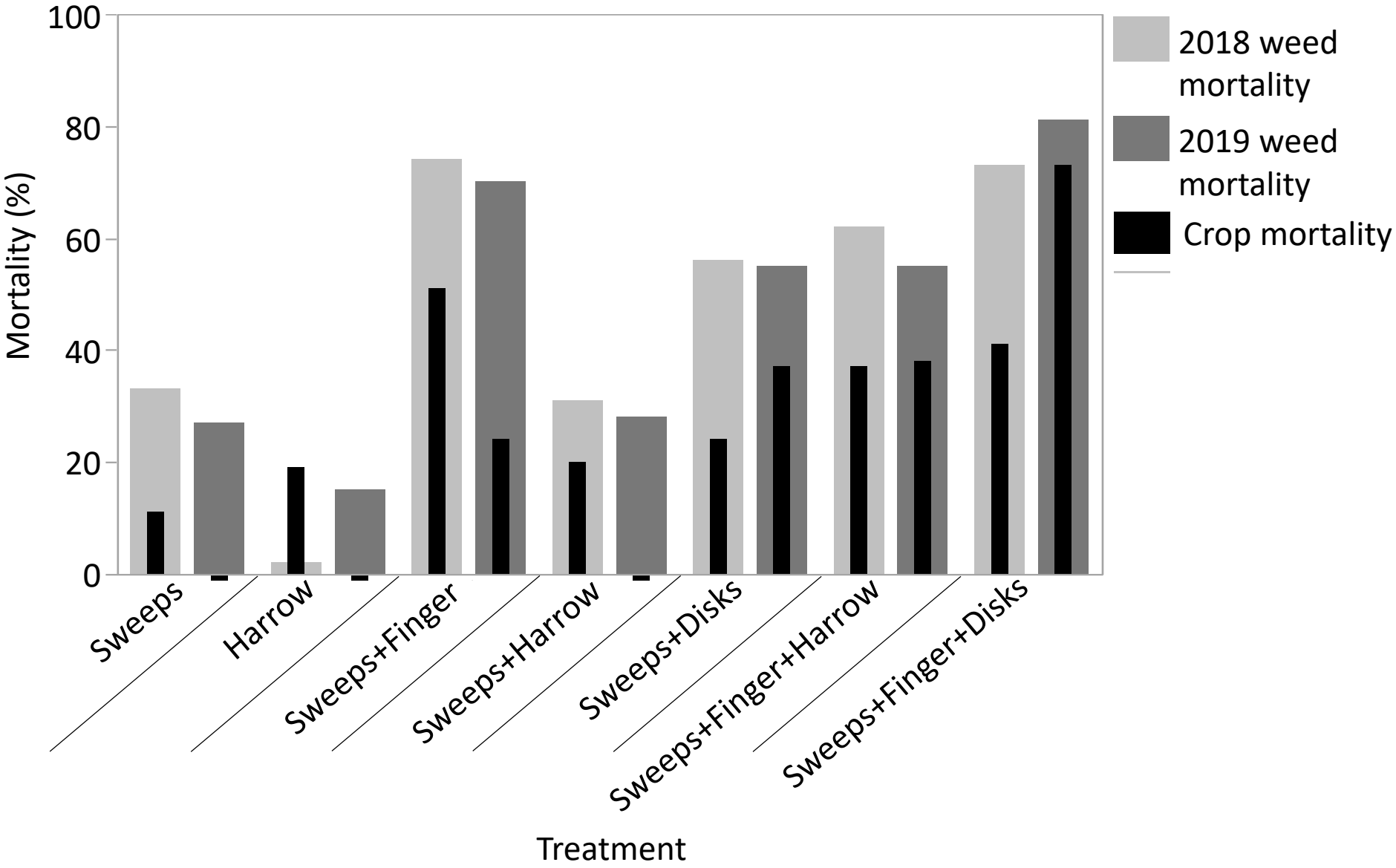
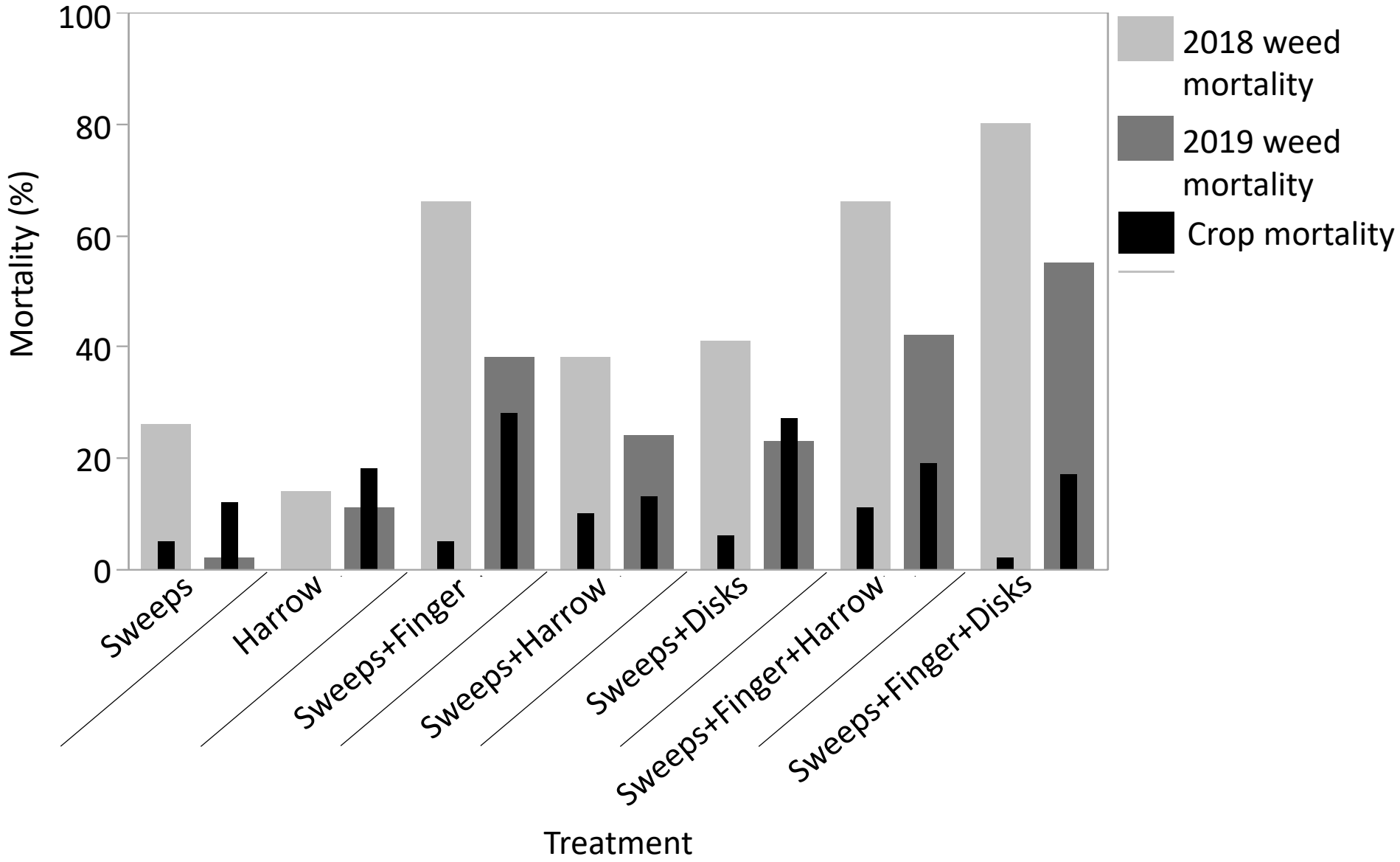


Trials in a more challenging crop: beets

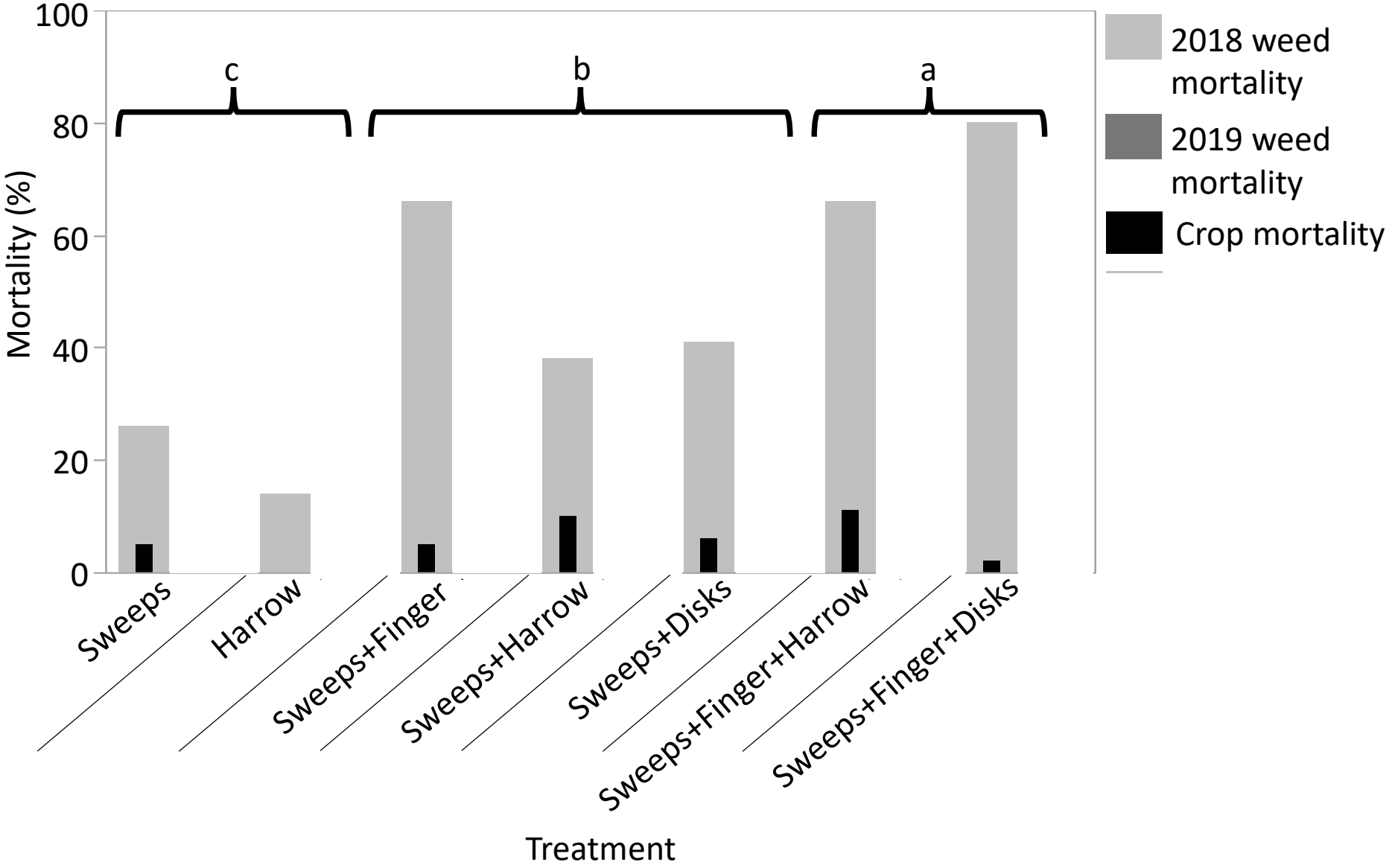
Trials in New York beets (2-leaf stage)



Trials in New York beets (4-leaf stage)



Trials in New York beets (4-leaf stage)



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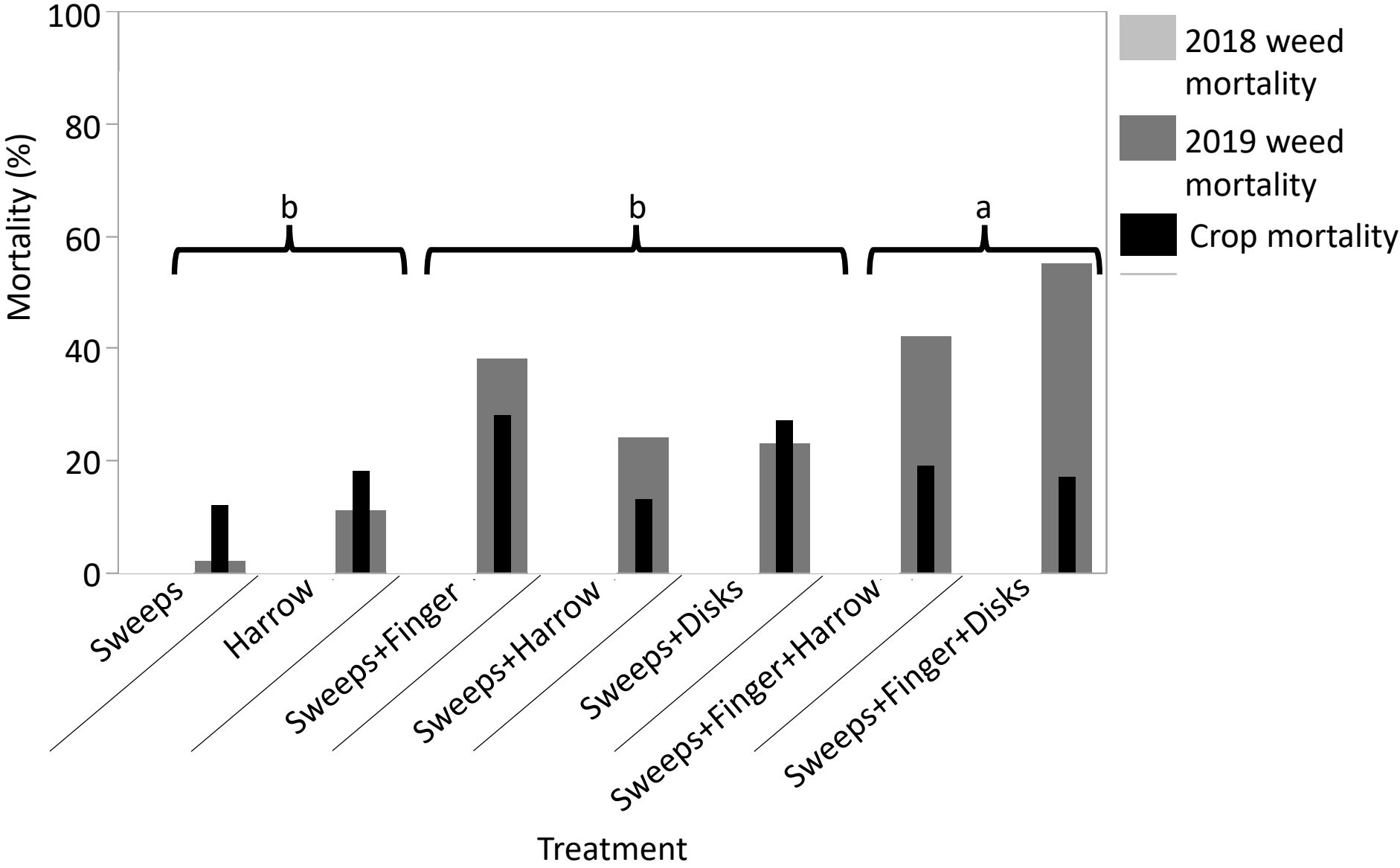
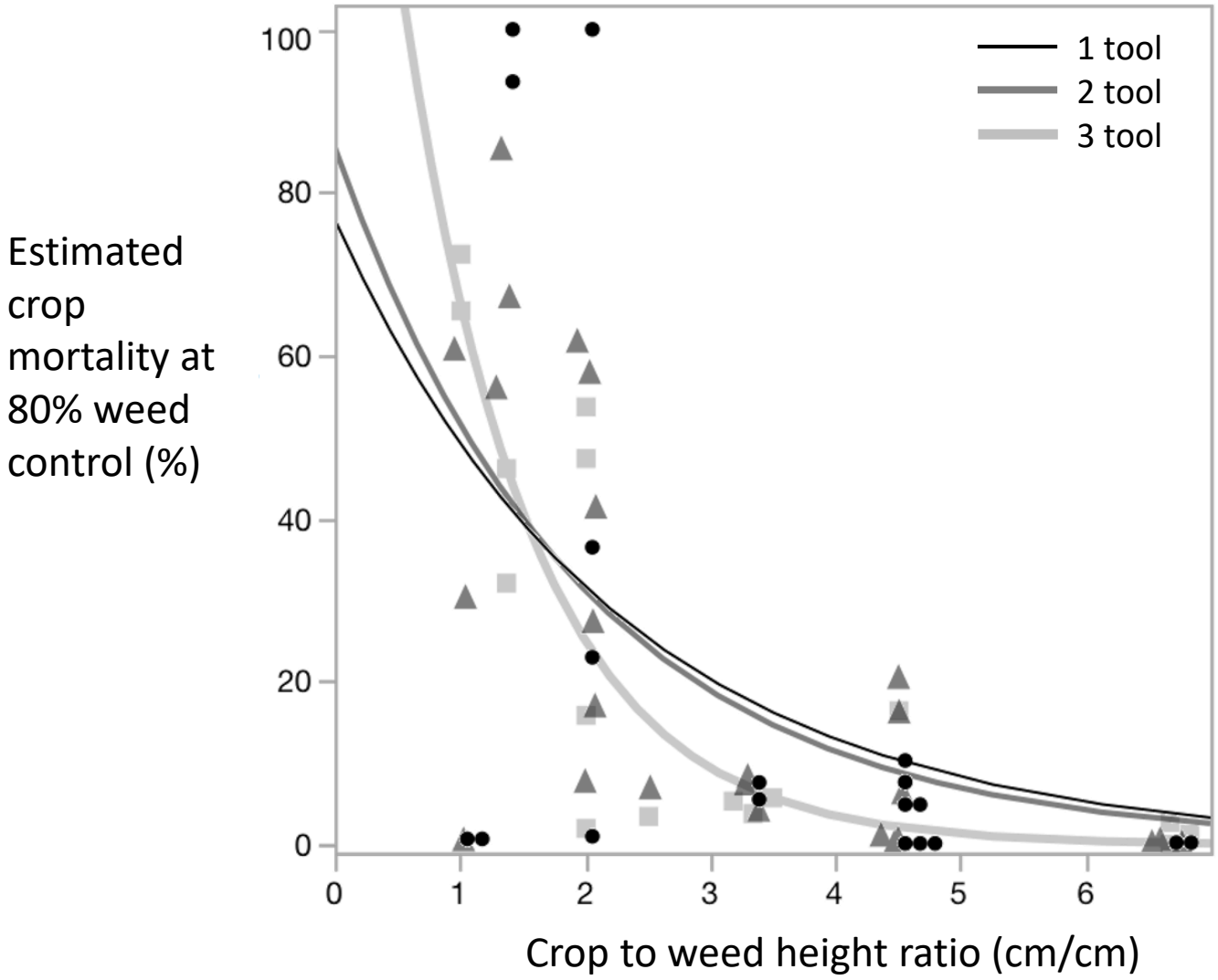


Selectivity driven by crop:weed size difference



Slow-mo: sweeps, fingers, disks

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Close up cultivation

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Using existing equipment


“I added tines behind the side knives and it works so much better now”
-Mark Guzzi

Conclusions about “stacking”

- Three-tool combinations were the most selective
- Best when tools can disturb in-row zone from a distance
- Need accurate guidance

Guidance systems

- Front-mounted cultivators

Guidance systems

- Cultivating tractors with belly-mounted tools

Guidance systems

- Seat for rear cultivator steering

Guidance systems

- Camera guidance

Guidance systems

Cultivator Type	Typical Cost	Best Use
Front mounted cultivator	$5,000-15,000	Small scale
Cultivating tractor with belly-mounted tools	$30,000	Small scale, tractor-limited
Tractor-pulled cultivator with seat for rear steering	$5,000-15,000	Small-medium scale. Requires 2 people
Camera guidance	$25,000 plus cultivator	Large acreage row crops

Cultivation in darkness

- Light is one of the factors affecting germination
- Darkness reduced emergence by 0-50%
- Highly light sensitive (like pigweeds) and light insensitive weeds are unaffected
  (Ascard 1993; Mohler et al., 2021)

Overall view of cultivation

Benefits

- Weed control
- Delay herbicide resistance
- Soil aeration
- Nitrogen mineralization
- Disturb soil-dwelling pests

Drawbacks

- May require new equipment
- Can damage crops
- Contributes to soil erosion
- Can degrade soil health
- Can stimulate weed germination

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USDA United States Department of Agriculture National Institute of Food and Agriculture

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