

Delayed Cultivation to Supplement Chloroacetamide Herbicides in Sugarbeet

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Weed management in sugarbeet

- Limited POST control options
 - Herbicide resistance: glyphosate (SOA 9) and ALS (SOA 2)
 - Failure to re-register Betamix
- Chloroacetamides soil applied (layby)
 - POST to crop, PRE to weeds
- Renewed interest in cultivation

Objective: Evaluate cultivation's effect on weed control and emergence

- How effective is cultivation at removing emerged weeds?
- Will cultivation stimulate new weed emergence?
 - Does cultivation affect chloroacetamides?
- Does cultivation increase overall control?

Materials and Methods

- Four locations across ND and MN
 - Sugarbeet producer fields
 - Indigenous weed pressure
 - Data from two sites: Renville, MN and Wheaton, MN will be reported
 - Factorial split-block RCBD, six replicates
 - Cultivation and herbicide

Herbicide applied to 4-6 leaf beets

- Standard rates, volume, and pressure
 - Untreated control
 - Glyphosate
 - Gly + S-metolachlor
 - Gly + Outlook
 - Gly + Warrant



Cultivation occurred 2 weeks after spray application

- Equipment and procedures standard of sugarbeet producers in ND and MN
 - Single shank
 - 15-inch sweeps
 - 3-4 mph speed
 - 2 inches deep



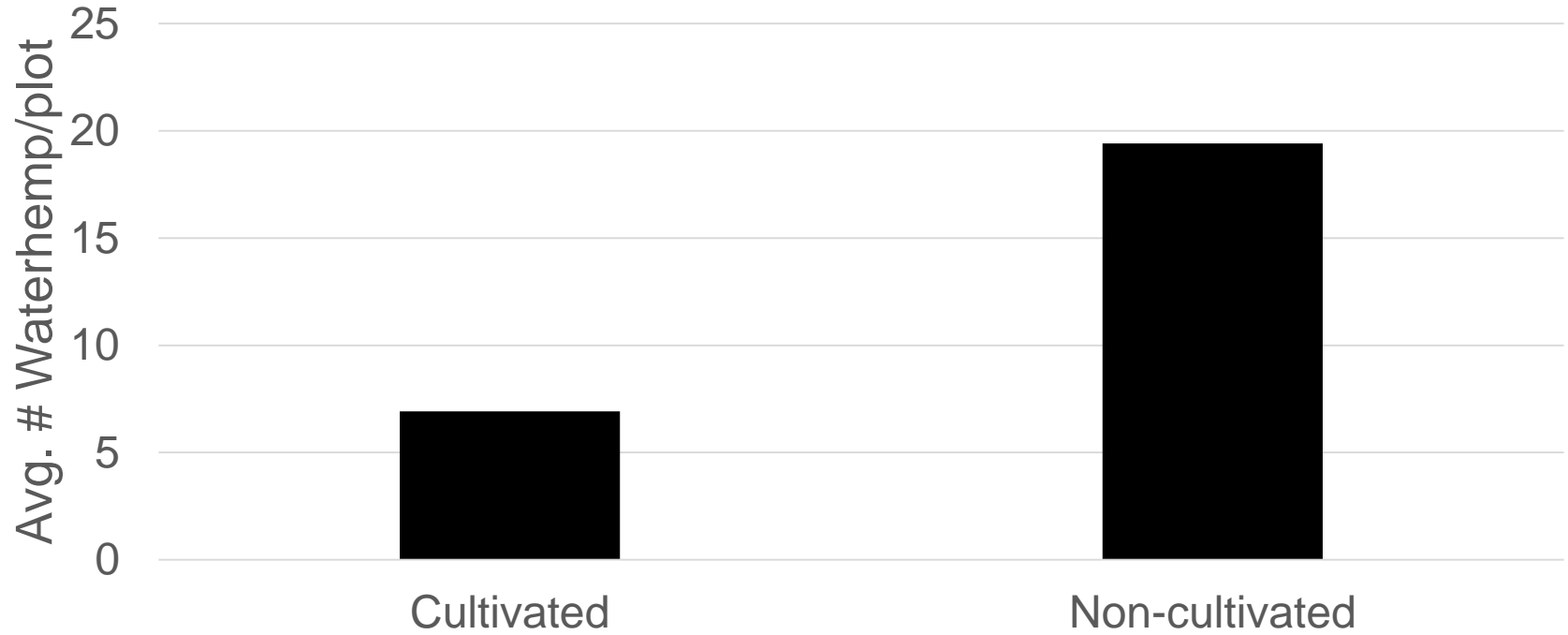
Cultivation near canopy closure



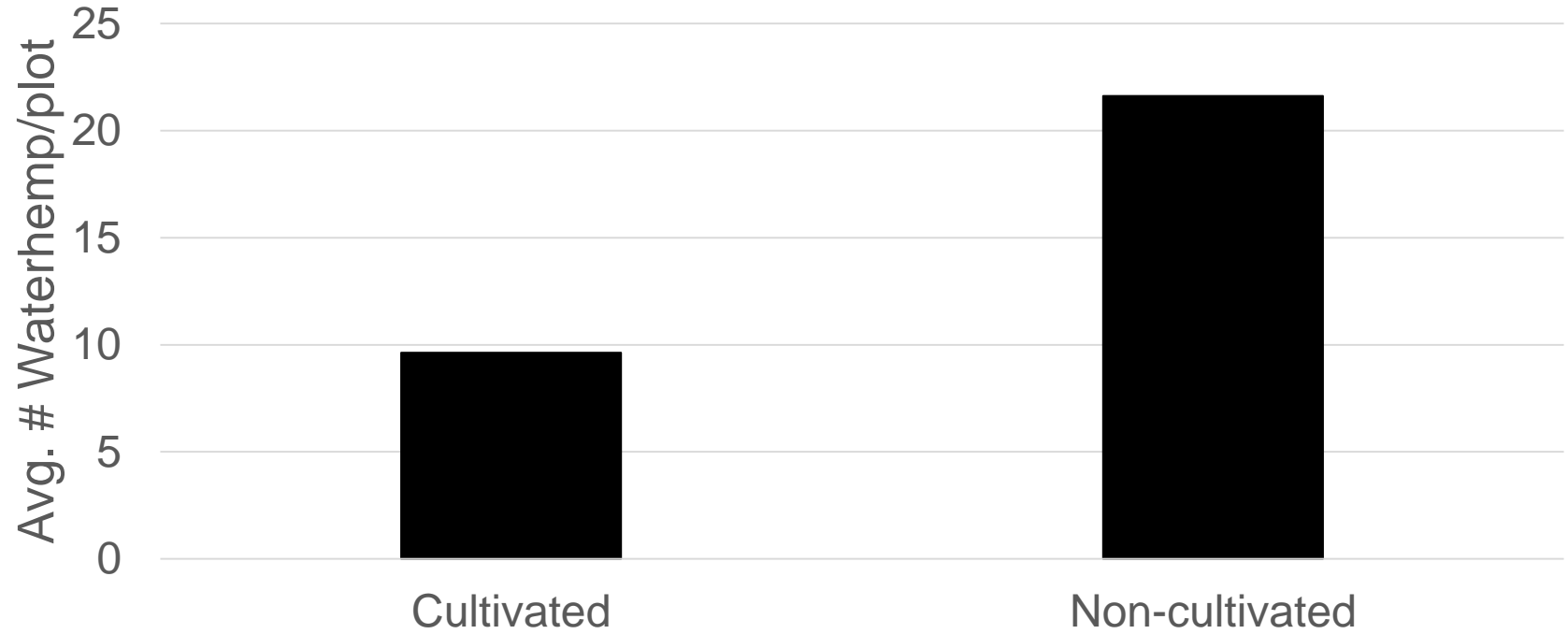
Evaluation methods

- 14 day intervals after cultivation
 - Number of waterhemp per plot
 - Percent control of new weed emergence
 - Percent overall visual control
 - 0-100 scale; 0 = no control, 100 = complete control

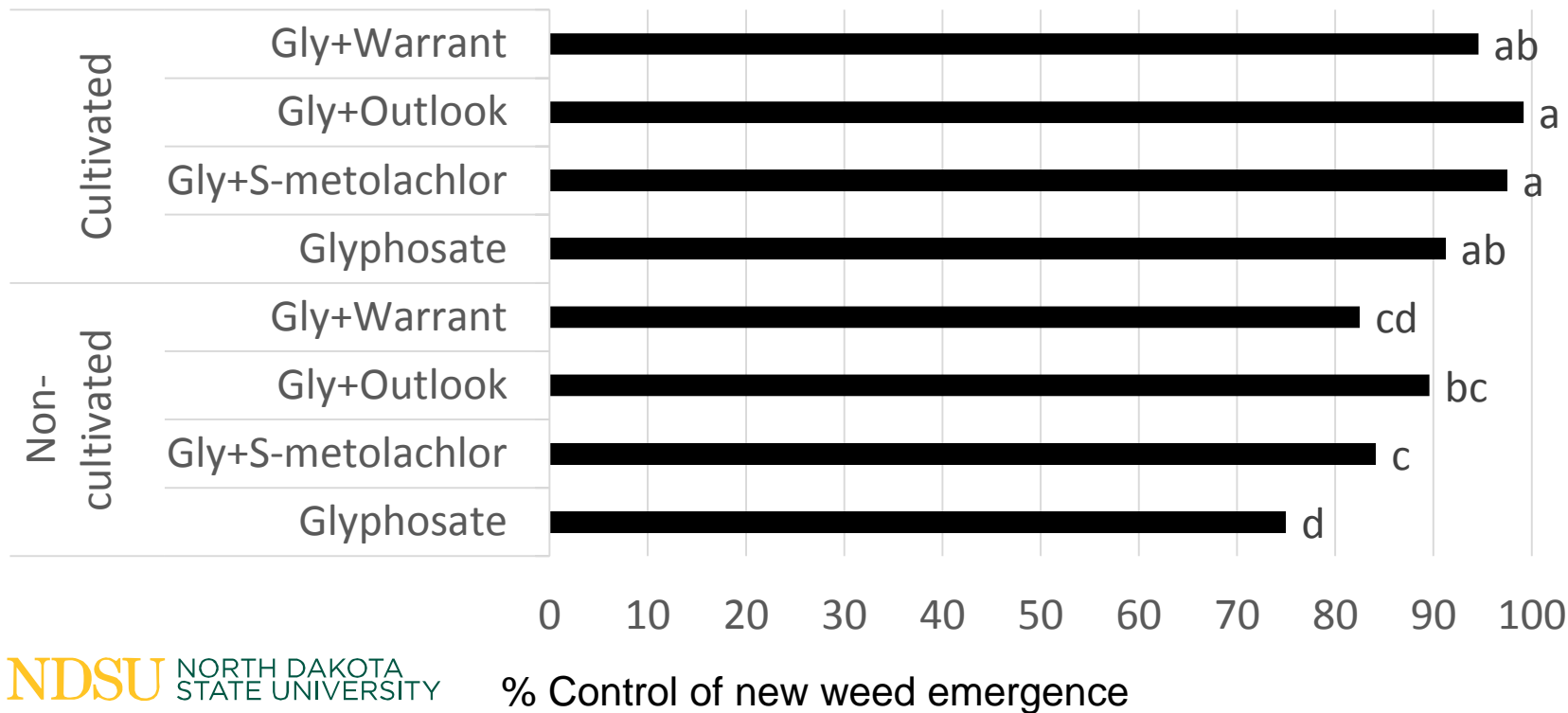
65% of waterhemp removed by cultivation, 14 DAT, averaged across locations, July 24, 2017



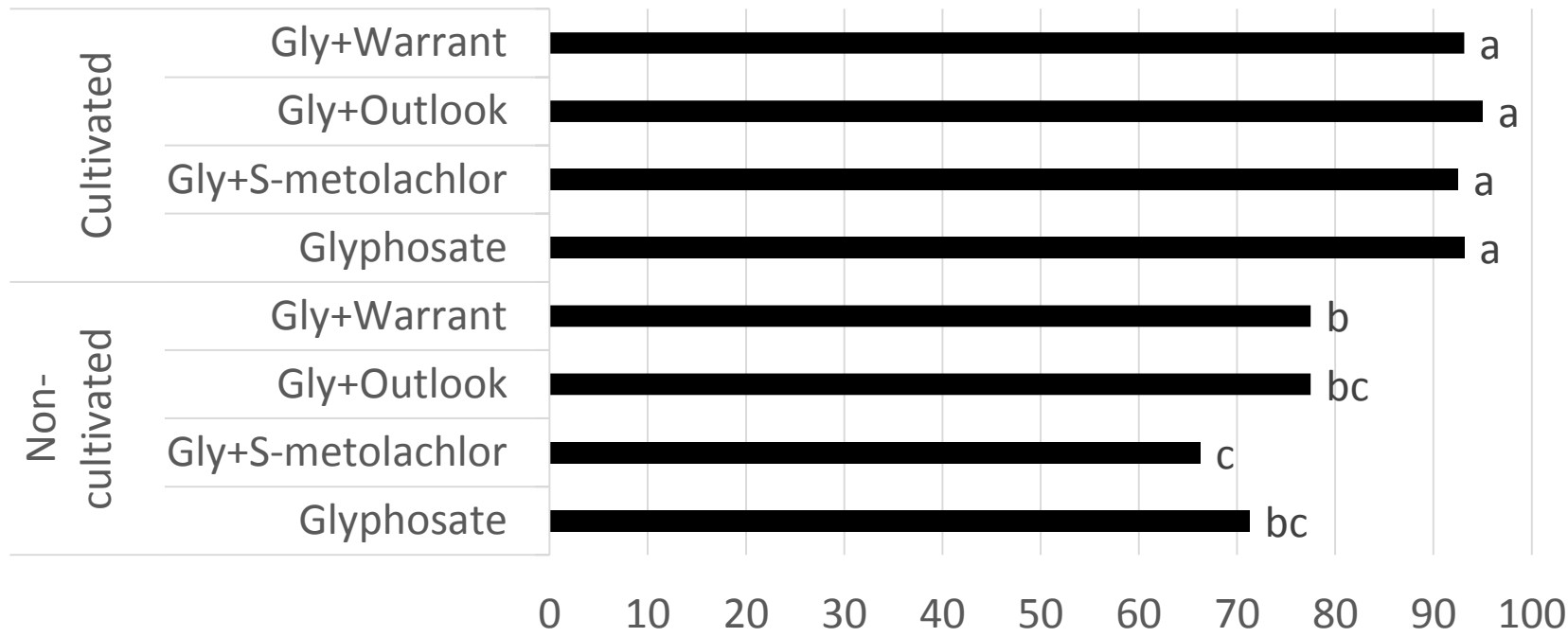
Cultivation plots had less waterhemp/plot 42 DAT, averaged across locations, August 24, 2017



Cultivated plots tended to have less weed emergence 14 DAT, across locations, July 24, 2017



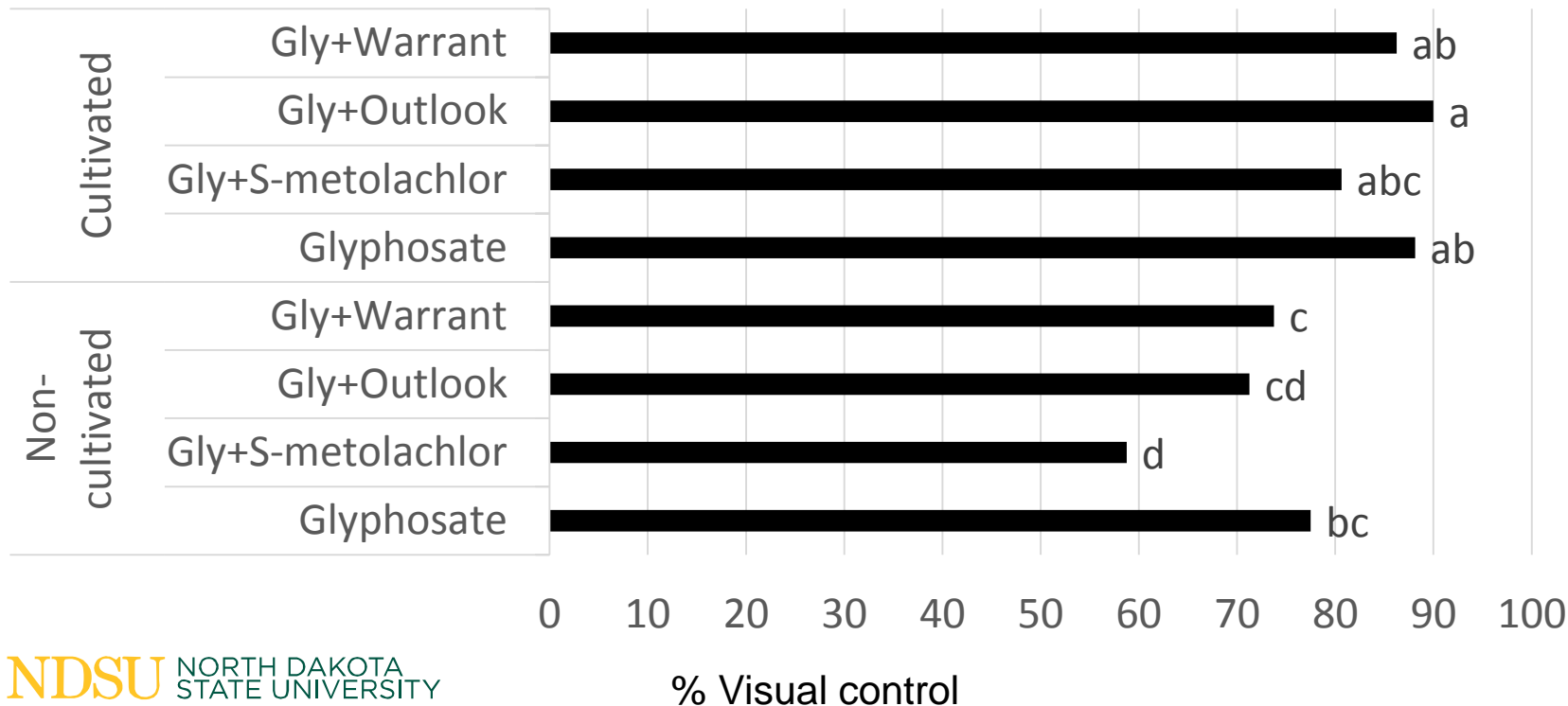
Less weed emergence 28 DAT, across locations, August 8, 2017



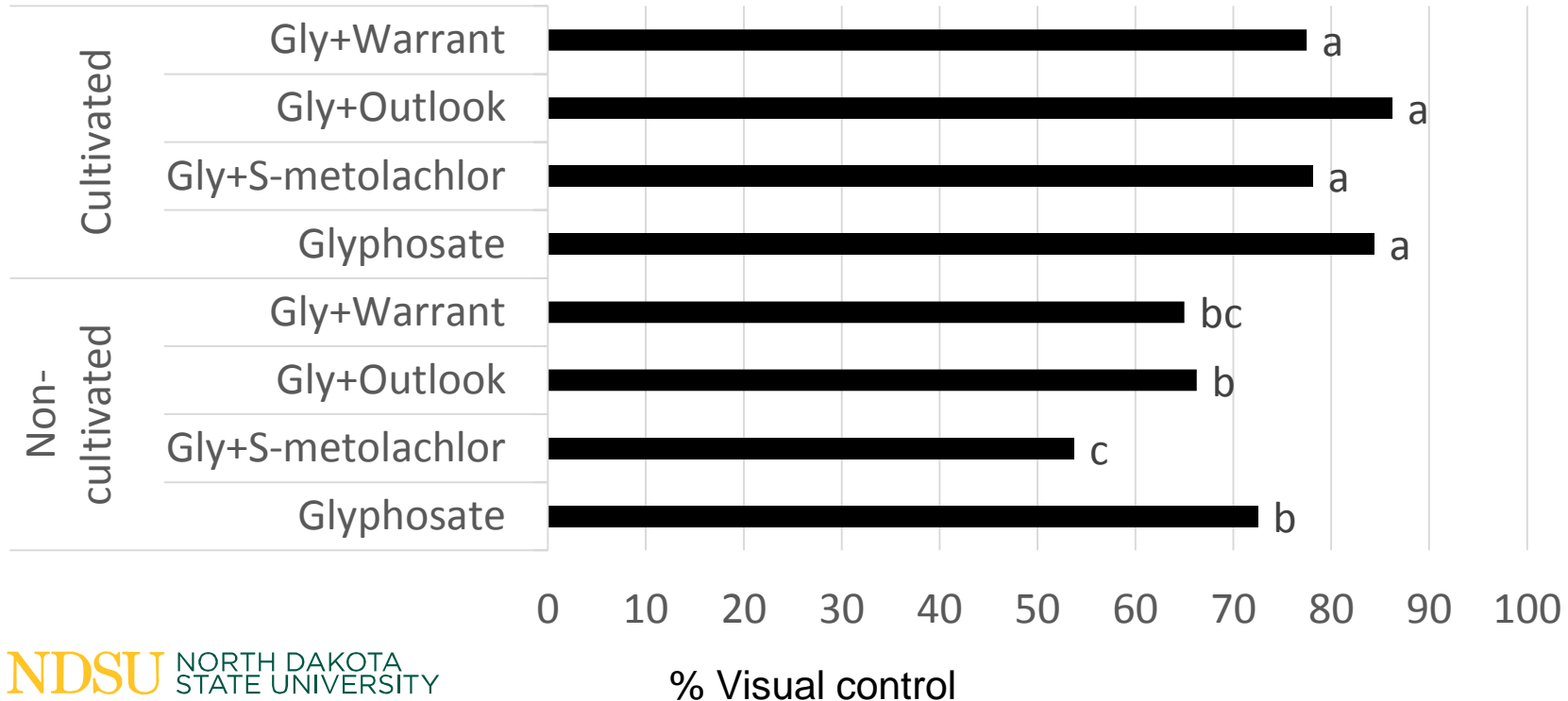
Percent new emergence control

- Cultivation did not stimulate new weed emergence
- Non-significant interaction between cultivation and herbicide
 - Herbicides were not affected by cultivation

Cultivation gave 10% better visual weed control 28 DAT across locations, August 8, 2017



Cultivated and non-cultivated plots have similar trends 42 DAT, across locations, August 24, 2017



Percent visual weed control

- Cultivated plots had significantly better weed control at all evaluation dates
 - Non-significant interaction between cultivation and herbicide
 - No particular herbicide seemed to do best
 - Possible antagonism with S-metolachlor
 - Weed emergence was not affected

Cultivation removed 65% of waterhemp from plots

- Average waterhemp was 4-6 inches tall at time of spray application
 - At harvest, waterhemp that escaped spray was >3 feet tall
- No yield data, but yield loss was likely reduced by removing large weeds early

Cultivation did not increase emergence of new weeds

- New flushes of weeds did not emerge after disturbance
- Tillage doesn't effect temperature or moisture in top inch of soil (Oryokot et al. 1997)
- Crop canopy is an effective weed suppressor
- Loosening of soil reason for less emergence?

Cultivation resulted in overall cleaner plots

- Control immediately after cultivation increased, 15-20%
- Positive effects were observed up to six weeks after cultivation
 - Cultivated plots were 10% better on average
- Herbicides with cultivation performed similarly

Cultivation appears to be a valid rescue treatment

- Cultivator was effective in removing 65% of emerged weeds
- Cultivation did not stimulate emergence of new weeds
 - Herbicide was not affected
- Cultivation results in overall better control

We did not see more Rhizoctonia pressure in cultivated plots

- No yield data, but visually cultivation appeared to have no effect
- Cultivation increases rhizoctonia pressure by pruning roots and moving soil closer to the crown
 - Crop stage and speed are factors

“Am I going to mess up my layby by cultivating?”

- Chloroacetamide half-life is 2-3 weeks
- Pigweed emergence is probably not affected by the cultivator
- Cultivation is a good tool to reduce potential weed seeds for next year

Future research

- This experiment will be repeated in 2018
 - Emphasis on heavy and more consistent waterhemp pressure
- Cultivation likely has a place in our future integrated approach

Questions?

- Thanks to the Sugarbeet Research and Education Board for funding this research
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