

# 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



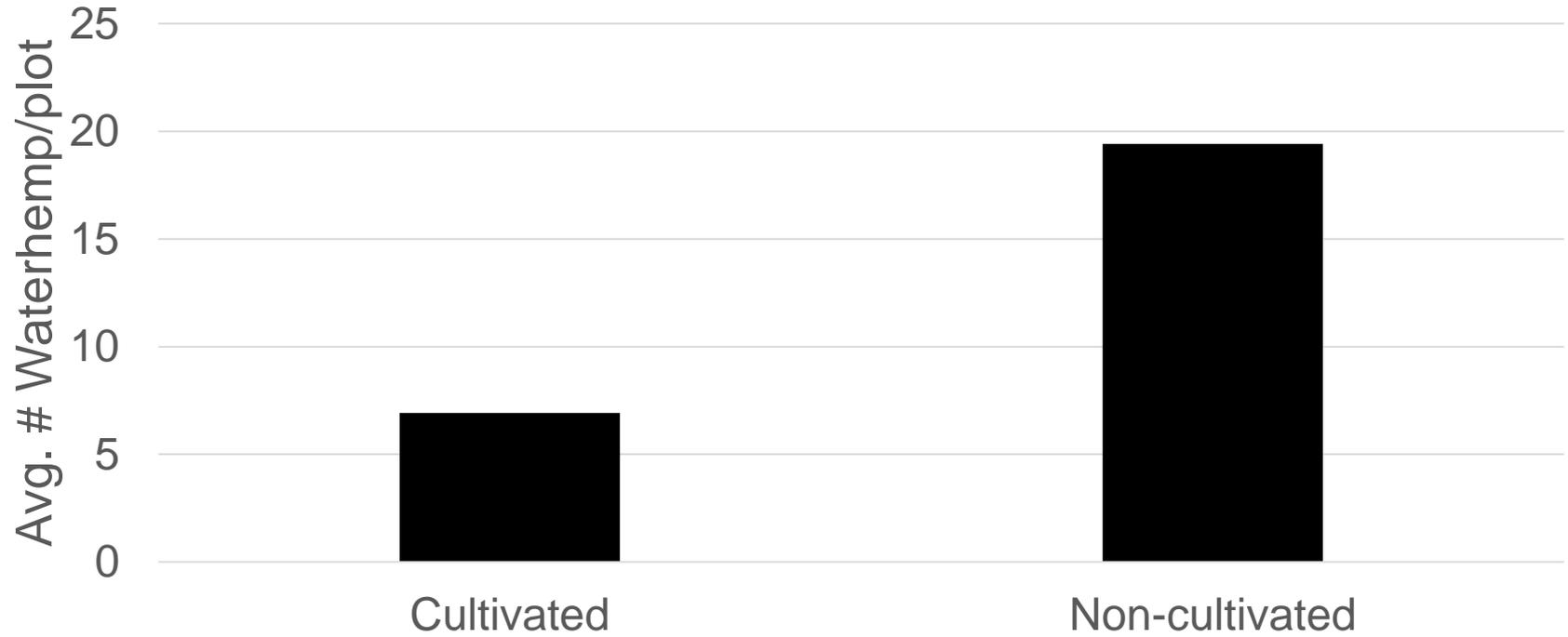
# Cultivation near canopy closure



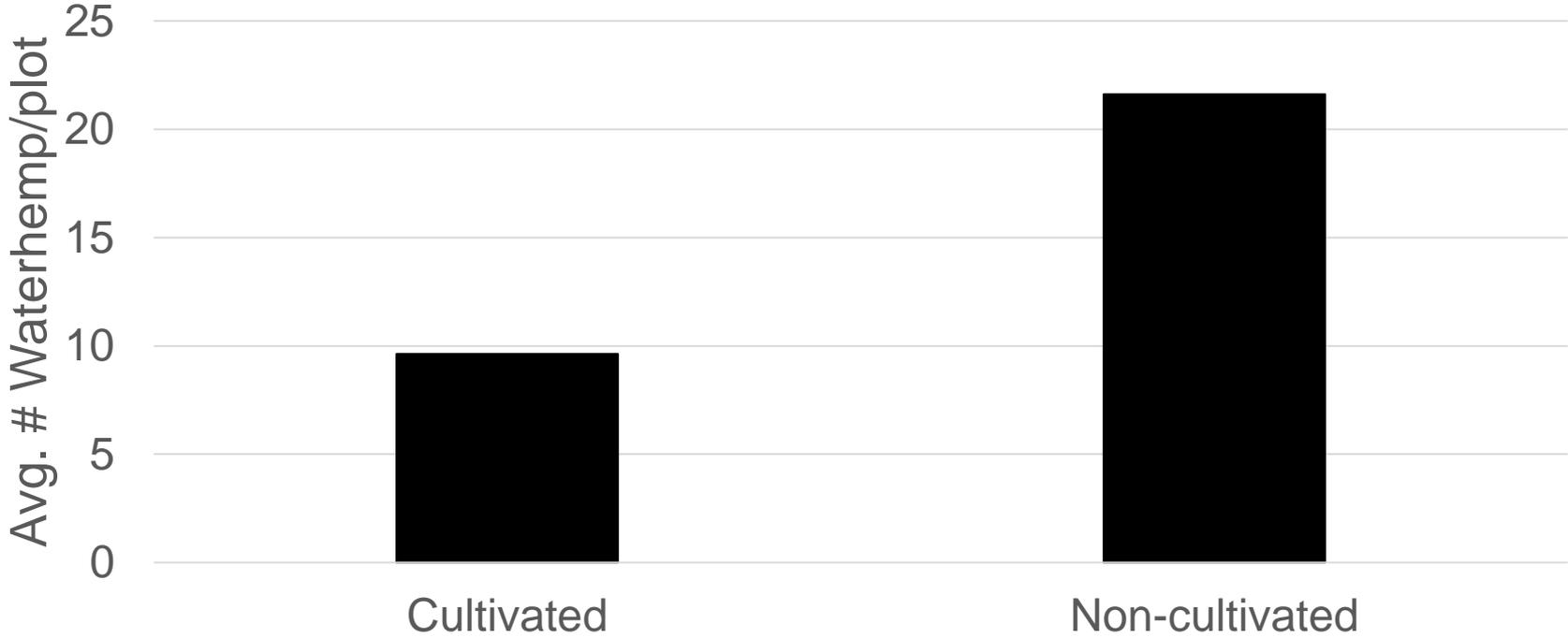
# Evaluation methods

- 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

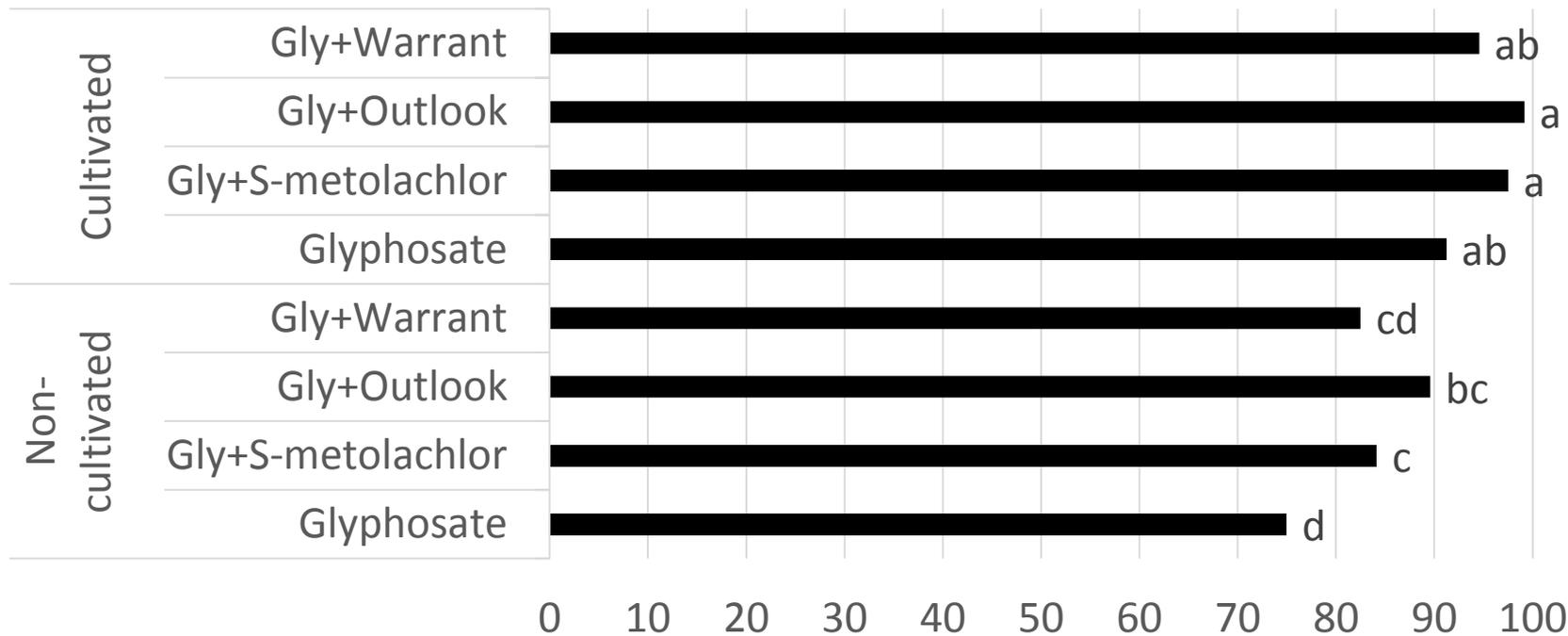
# 65% of waterhemp removed by cultivation, 14 DAT, averaged across locations, July 24, 2017



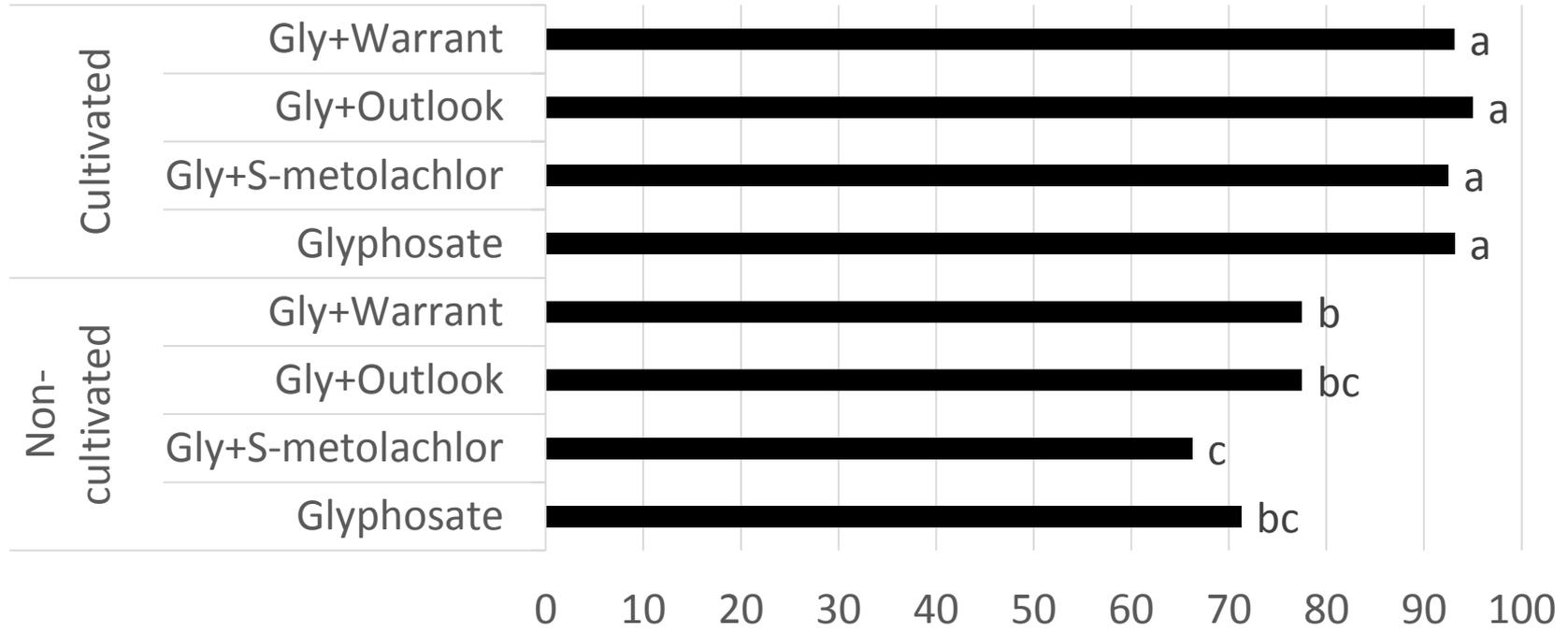
# Cultivation plots had less waterhemp/plot 42 DAT, averaged across locations, August 24, 2017



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



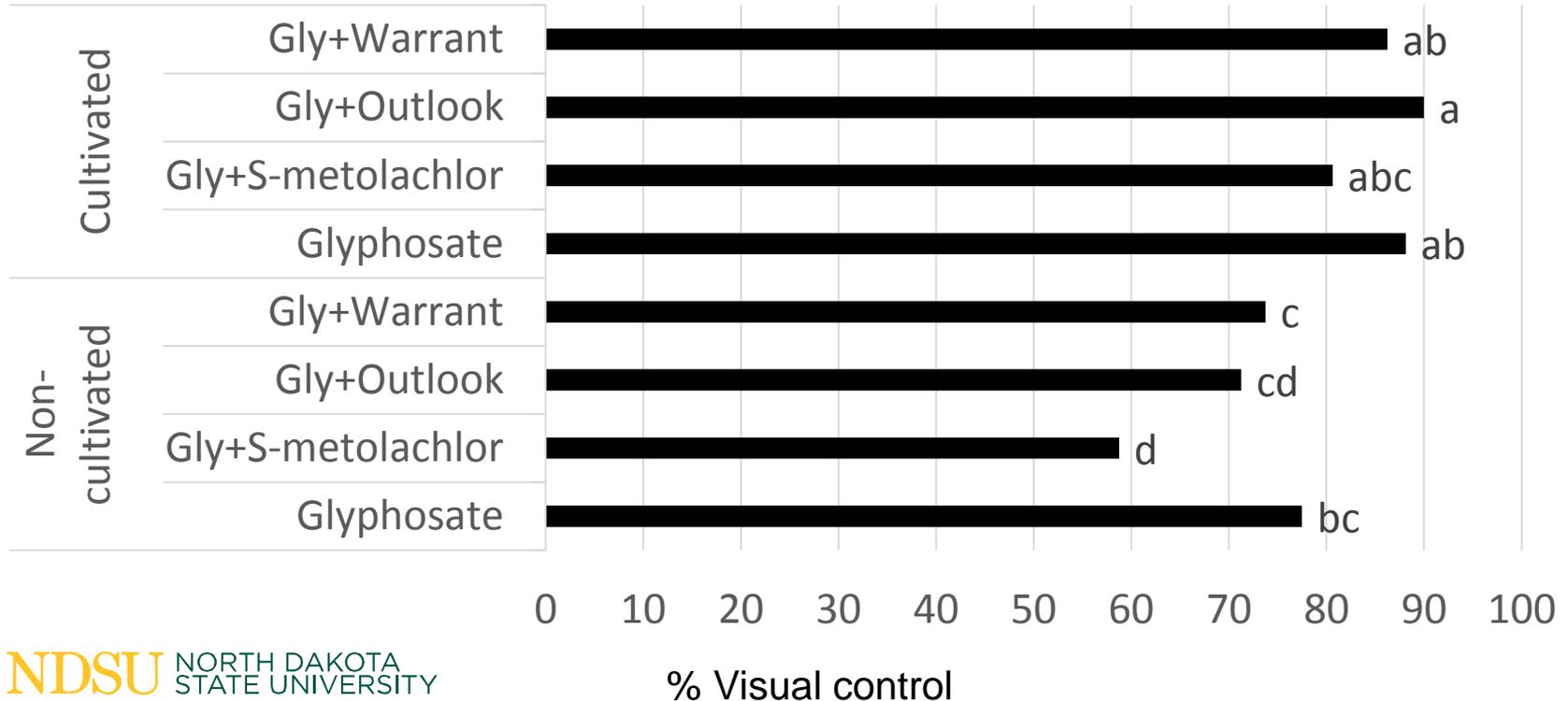
# Less weed emergence 28 DAT, across locations, August 8, 2017



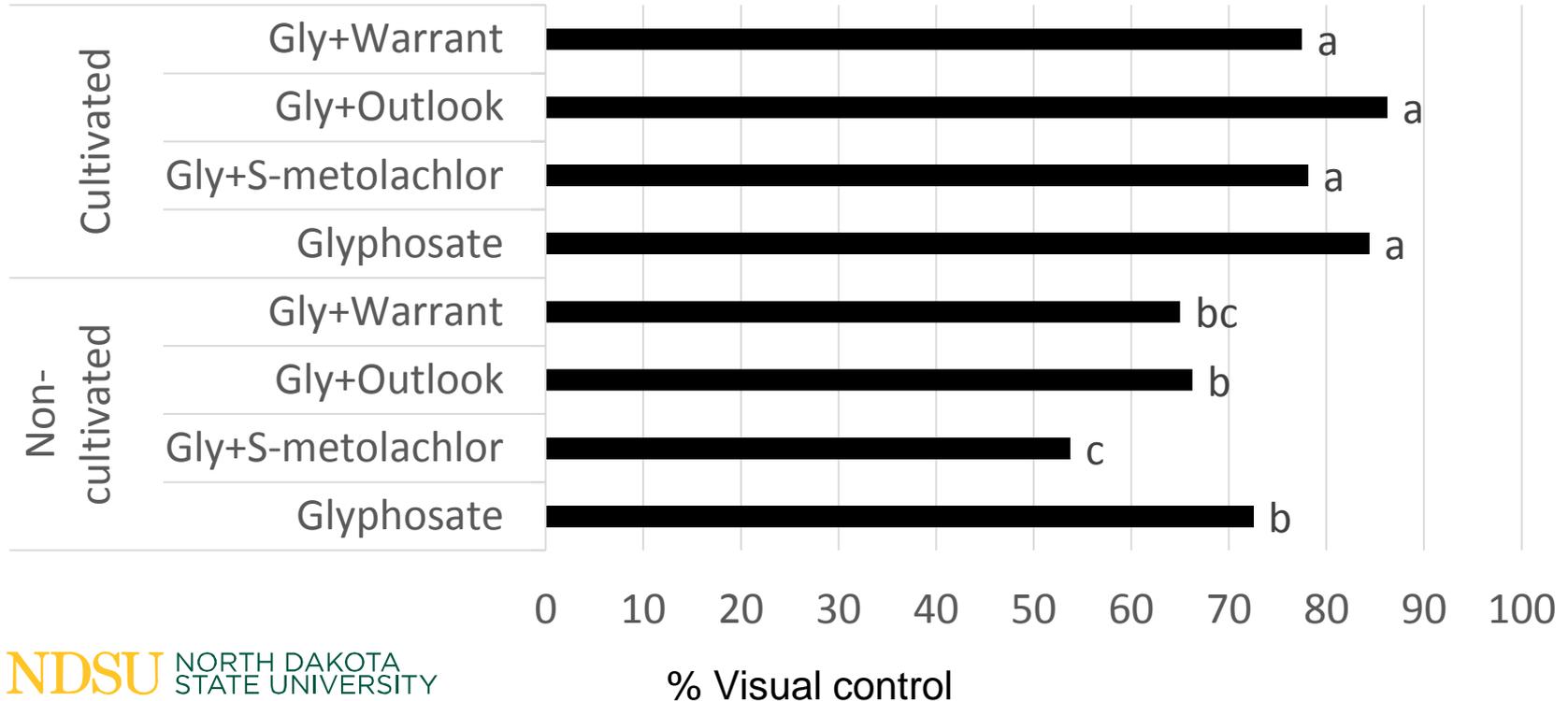
# Percent new emergence control

- 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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