2024 Research Updates

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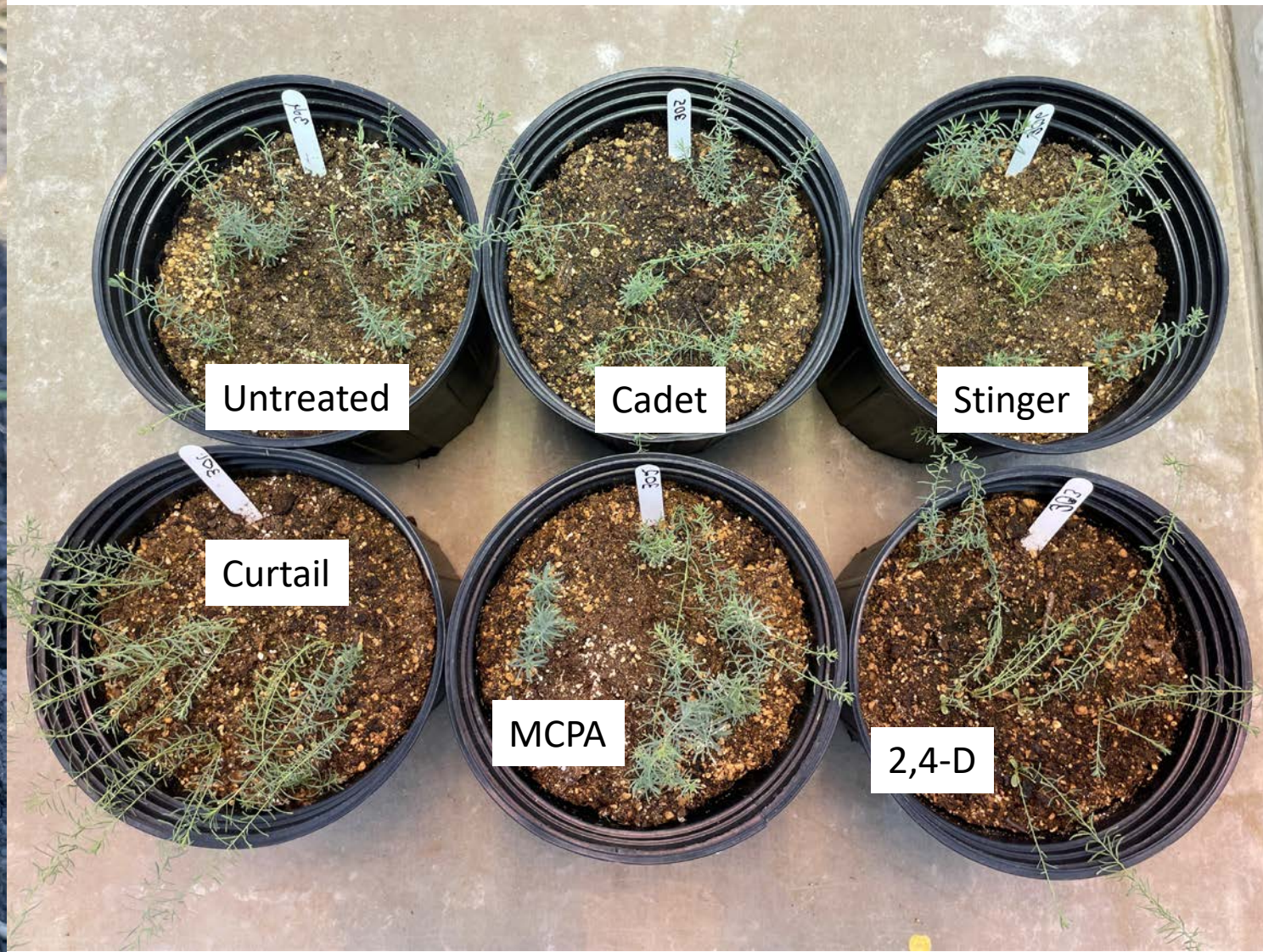
NDSU Department of Plant Sciences
Wild World of Weeds Workshop
January 21, 2025

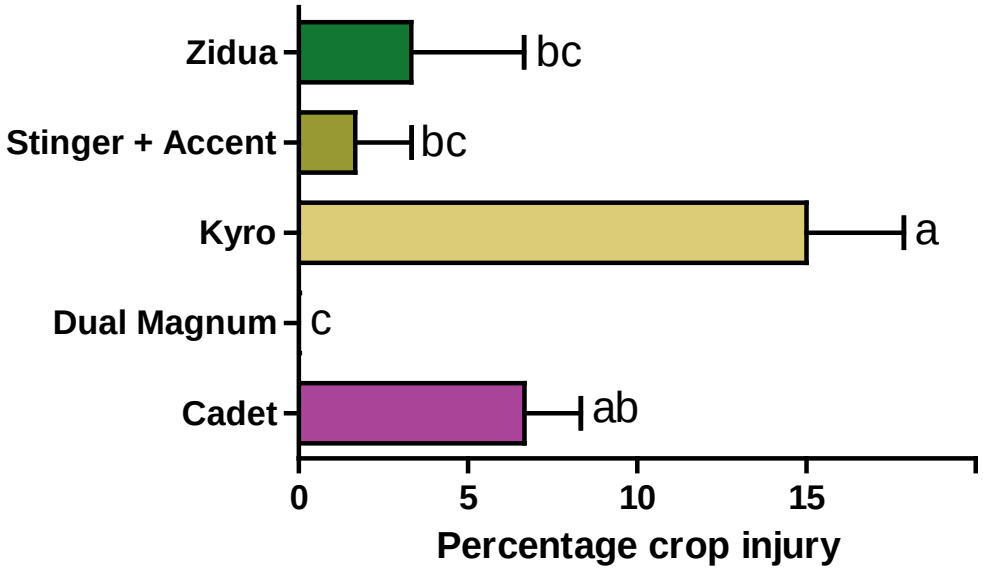
Herbicide Safety in Perennial Flax Greenhouse and Field Treatments

Greenhouse Experiment	Field Experiment
POST Stinger HL (clopyralid, 34.1 g ae ha^{-1})	PRE Zidua SC (pyroxysulfone, 128 g ai ha^{-1})
POST Cadet (fluthiacet-methyl, 7.2 g ai ha^{-1})	PRE Dual Magnum (S-metolachlor, 2,140 g ai ha^{-1})
POST MCPA ester 280.1 g ae ha^{-1}	POST Stinger + Accent (clopyralid, 160 g ae ha^{-1} + nicosulfuron, 36.8 g ai ha^{-1})
POST 2,4-D Amine 1064.8 g ae ha^{-1}	POST Cadet (fluthiacet methyl, 6 g ai ha-^{1})
POST Curtail M (clopyralid, 88.2 g ae ha^{-1} + MCPA 493.7 g ae ha^{-1})	POST Kyro (acetachlor, 1095 g ae ha^{-1} + topramezone 18 g ae ha^{-1} + clopyralid, 97 g ae ha^{-1})

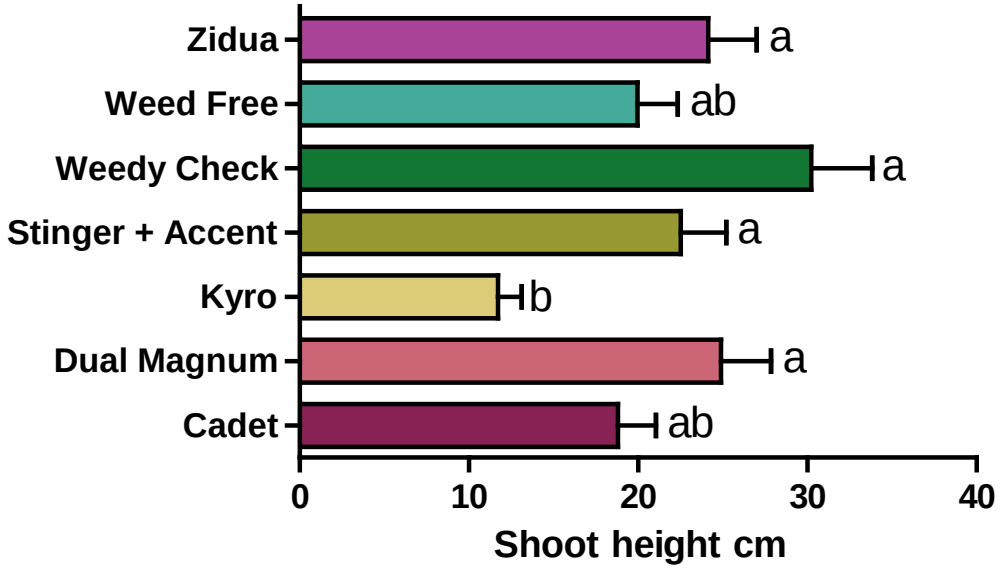
Lewis flax in the field and greenhouse



Field Results



At 14 DAT, Kyro caused greater Lewis flax injury compared to Zidua, Stinger + Accent, and Dual Magnum.



At 56 DAT, Kyro was associated with main shoot stunting compared to Zidua, Dual Magnum, and Stinger + Accent.

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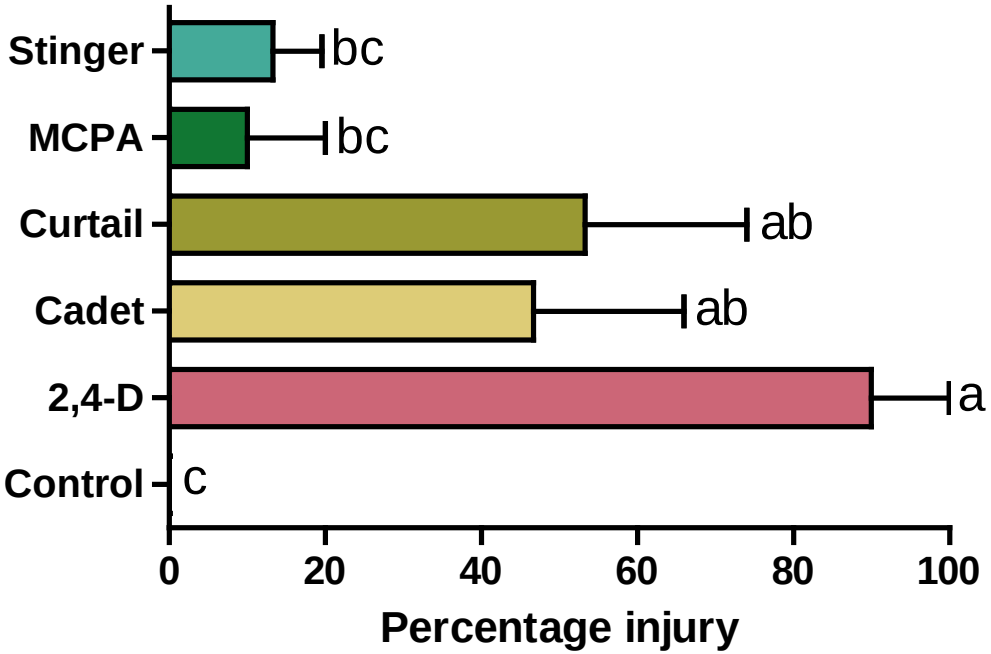
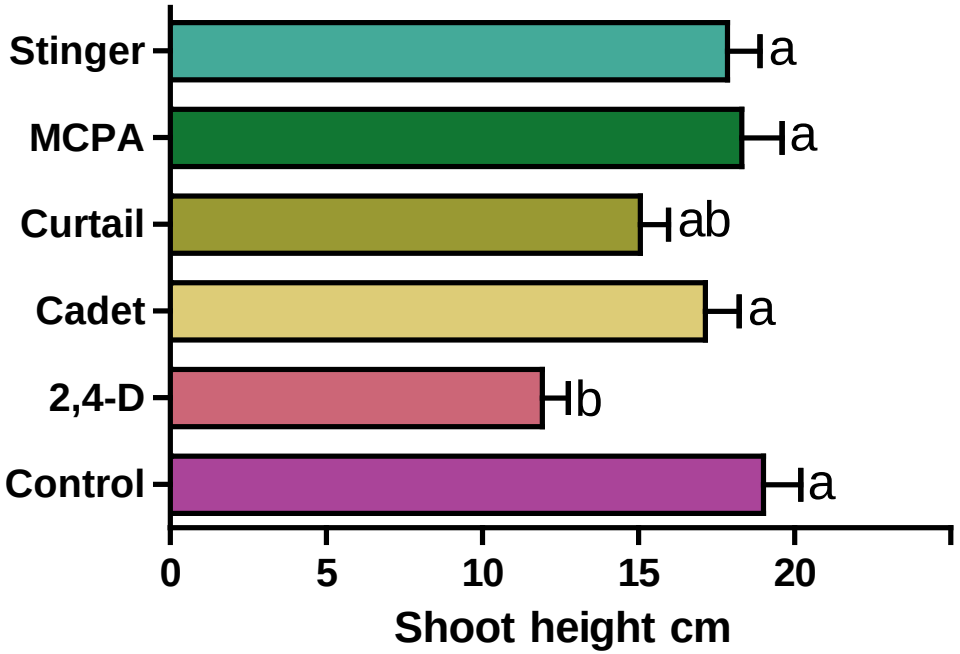
Greenhouse results





At 7 DAT, Lewis flax exposed to 2,4-D displayed greater injury (epinasty or twisting) compared to Curtail and Cadet.

At 21 DAT, Lewis flax exposed to 2,4-D was stunted compared to Stinger, MCPA, and Cadet.

Future Directions

- Possible field studies planned (pending funding) to assess IWM approaches for Lewis flax production over five years)
- Continued effort to explore herbicides for use in Lewis flax, with focus on crop safety and assessing long-term impacts
- Others are working on variety testing and understanding genetic resources for this crop

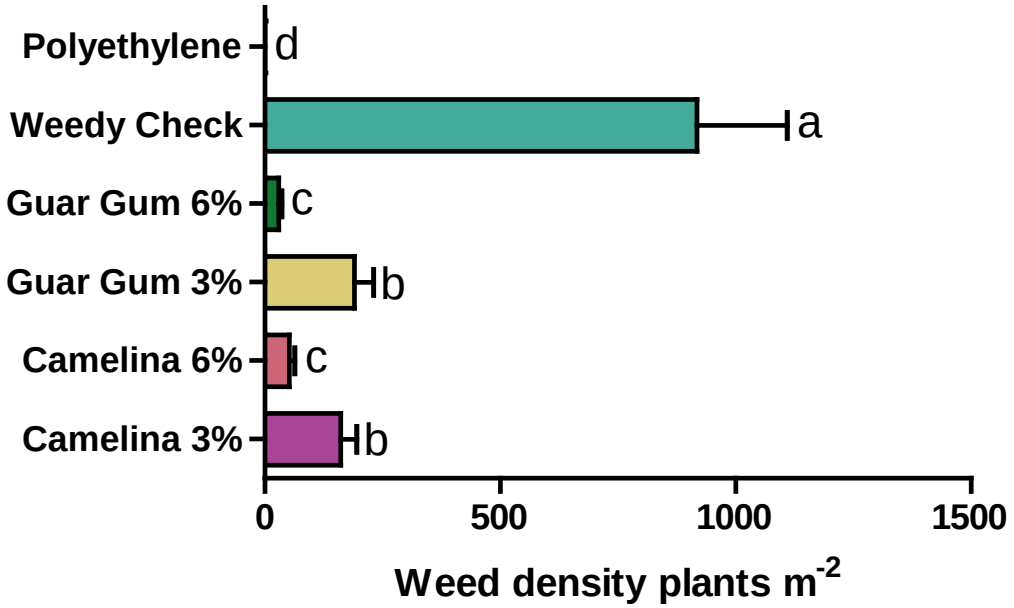
‘Mulch H_2O: Biodegradable Composite Hydromulches for Sustainable Organic Horticulture’

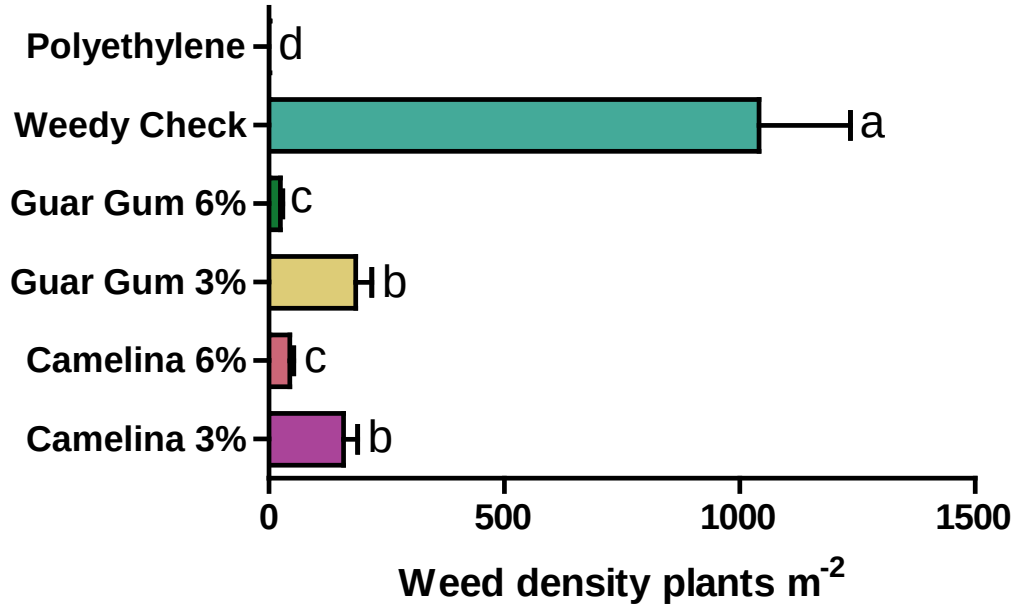
- USDA-NIFA Organic Research and Extension Initiative, grant # 2021-51300-34909
- Conducted in partnership with USDA-ARS in Morris, MN; MSU; WSU; OSU
- Objective: Develop alternatives to plastic mulch for use in organic horticultural production systems
- Testing mulches in strawberry, blueberry, broccoli, and onion
- Also assessing soil health outcomes and economics (ARS and WSU)

MulchH_2O: Biodegradable Composite Hydromulches Led by Waqas Ahmad, PhD Graduate Student

- Broccoli trial at two sites: Absaraka and Fargo
- RCBD, 4 reps, 7 treatments
  - W/B PE mulch, 3% camelina meal, 3% guar gum, 6% camelina, 6% guar gum, weedy check, weed-free check
- Mulches applied (two passes) at 5,765 kg ha^{-1};
- Broccoli seedlings planted into wet mulch on 04/24 at Absaraka and 04/25 at Fargo
- Granular fertilizer 100 lbs N ac^{-1}; drip fertigation
- Conditions were very wet during early season

Weed density

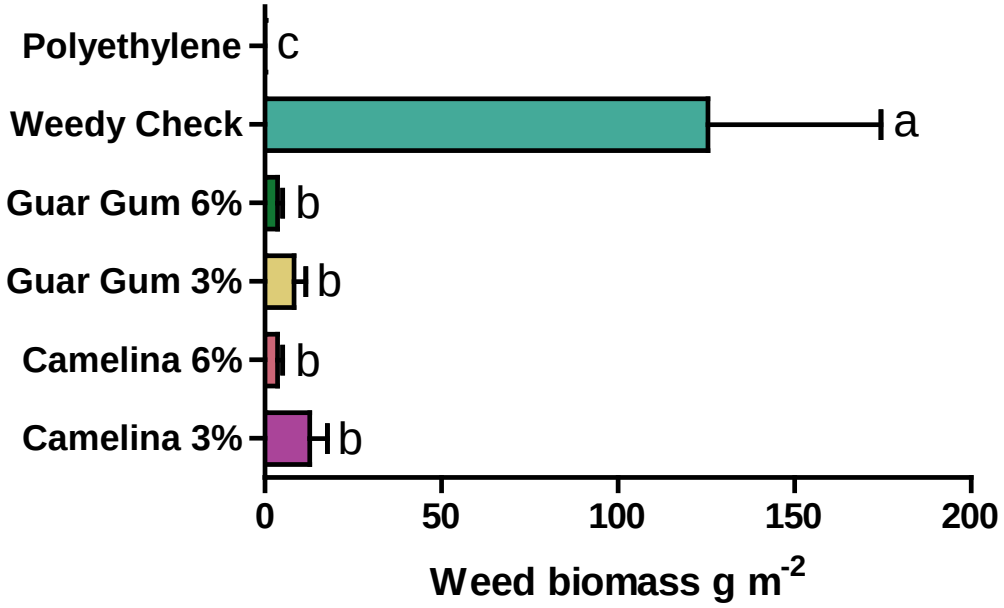


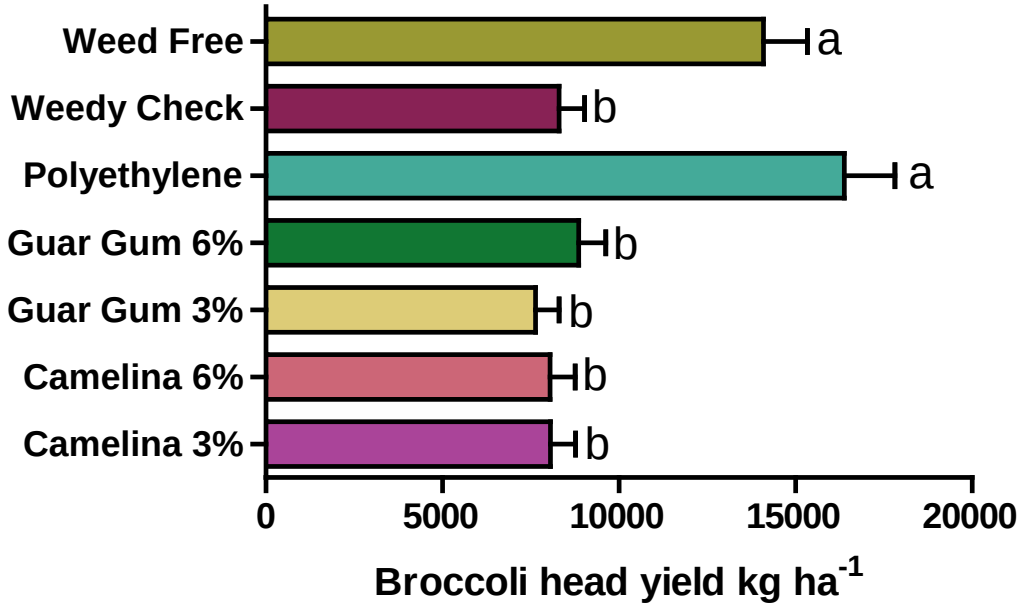


Peak emergence, quantified 06/24 and 06/26, sites pooled

Quantified at crop harvest 07/15 and 07/17, sites pooled

Weed biomass and crop yield

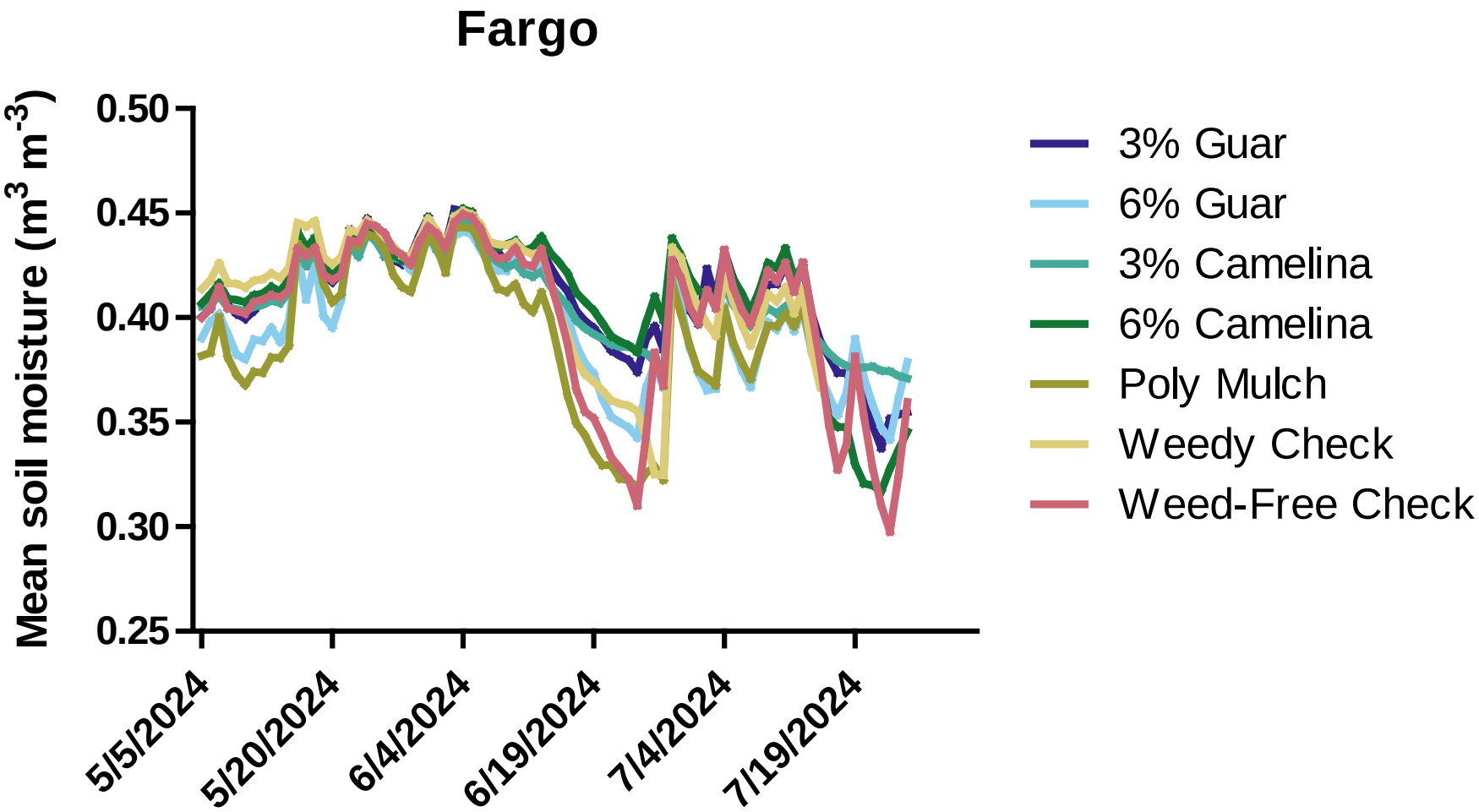




Weed dry biomass, quantified 07/15 and 07/17, sites pooled

Broccoli head yield, quantified 07/15 and 07/17, sites pooled

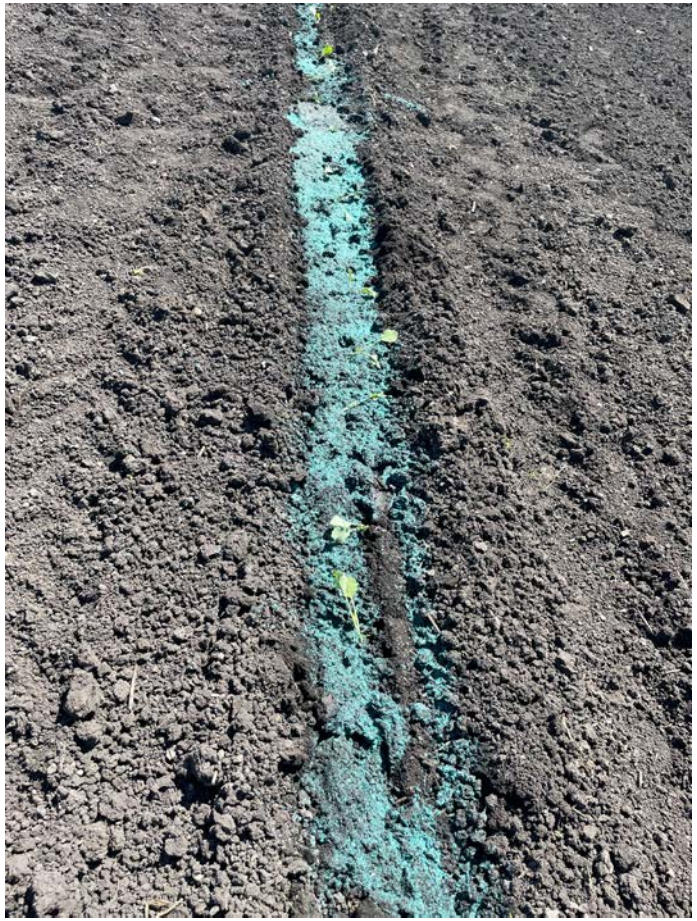
What explains broccoli yield loss?



Application Issues to Solve

- Needed to apply HM in 2 (ND) or 3 (WA) passes to achieve coverage
- Applying before planting may not be ideal for some crops
- Soil surface roughness affects mulch coverage and thus efficacy
- Proximity to bare soil may promote small seeds dispersing via wind onto the TOP of mulch

HM Application: Before vs. After Planting



Future Directions?

- Funded project continues until 2026
- 2025: evaluating HM incorporation impacts on onion performance in ND
- Measurements to quantify soil impacts from HM incorporation will continue
- Economic analyses to compare costs
- Industry (e.g., Naturipe Farms, Profile) have expressed interest – need to work on scaling up and testing under commercial production
- HM formulation and application still need more refinement and development

MONTANA STATE UNIVERSITY

WASHINGTON STATE UNIVERSITY

NDSU NORTH DAKOTA STATE UNIVERSITY

YouTube video about project: More info here!