

Manure Nitrogen Management with a Winter Rye Cover Crop

On-Farm Trials in Minnesota

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Abstract

In nineteen on-farm trials in central and southern Minnesota, we planted a winter rye cover crop after harvest of corn silage or soybeans, and later injected liquid swine or dairy manure into the cover crop and no-cover crop treatments. We found the following results:

- At spring termination, there was less soil nitrate under the cover crop treatment than the no-cover crop check
- On average, the yield of the subsequent corn silage or grain crop was not impacted by the cover crop.

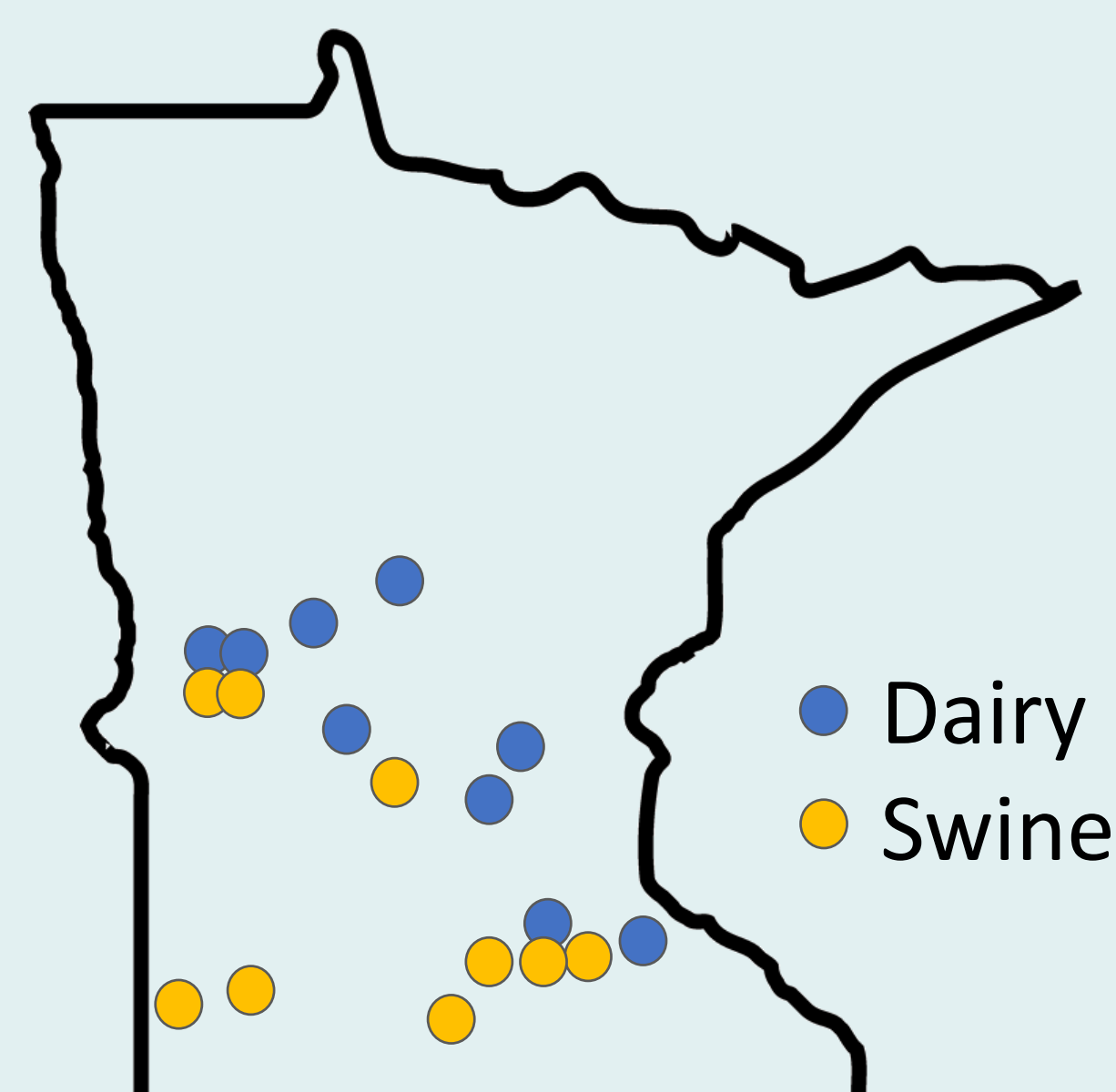


Injecting manure into a winter rye cover crop.

Methods

This experiment was conducted at nineteen on-farm sites across central and southern Minnesota over 2 crop years.

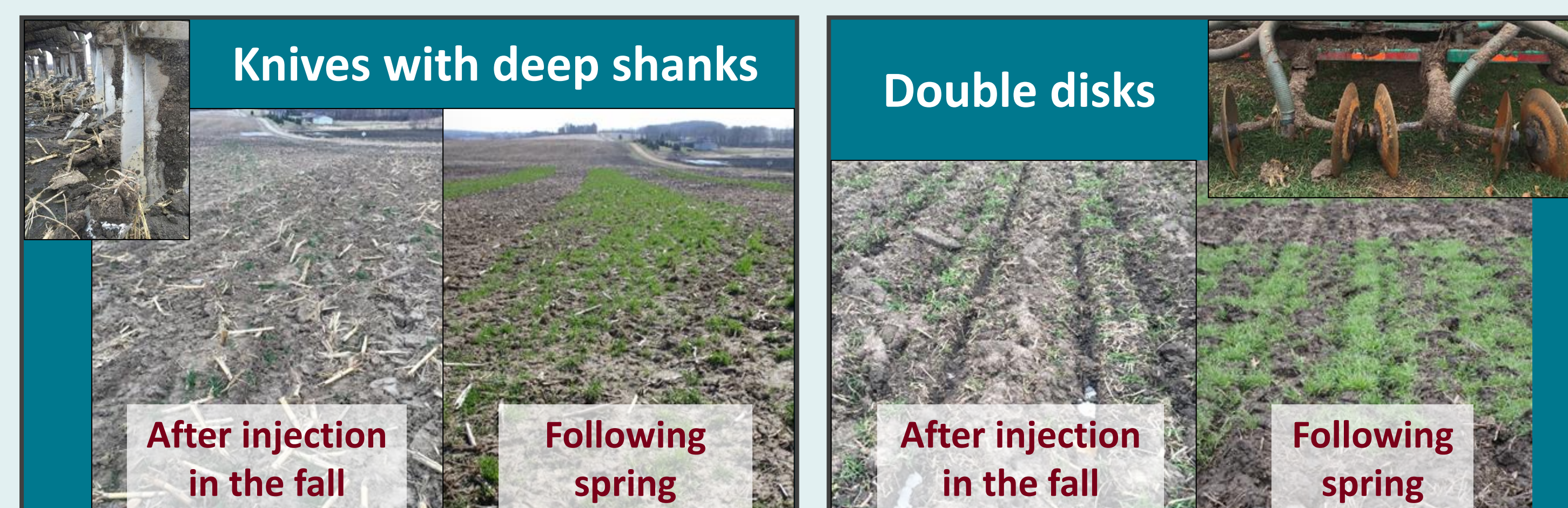
1. Planted winter rye cover crop after harvest then injected with liquid dairy or swine manure.
2. Terminated rye in spring.
 - Measured soil nitrate in top 24 inches of soil.
3. Harvested following corn grain or silage next fall.
 - Measured corn yield.



Field sites where dairy and swine manure were applied.

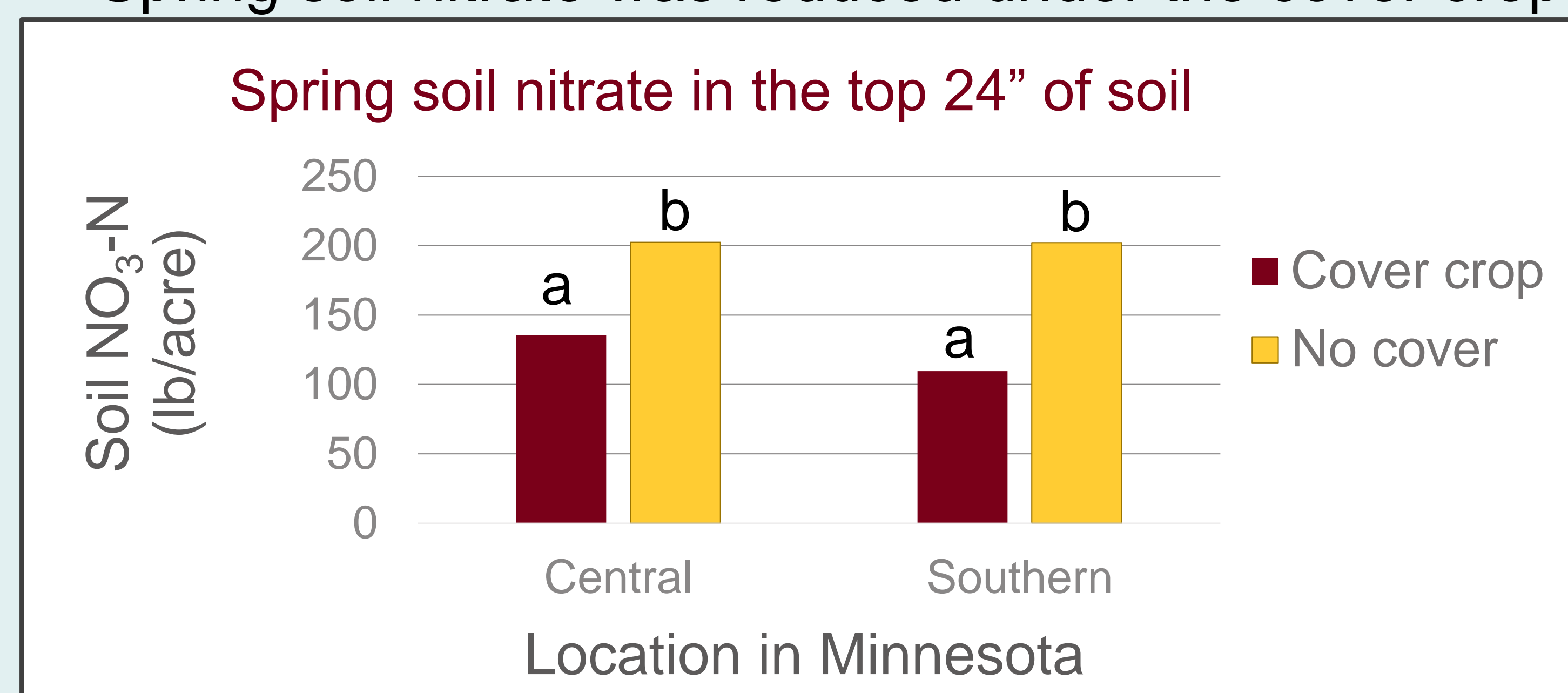
Results

- The type of manure injection equipment is important when injecting into a living cover crop.
 - Injectors with minimal disturbance, like small sweeps on narrow shanks, seemed to perform best



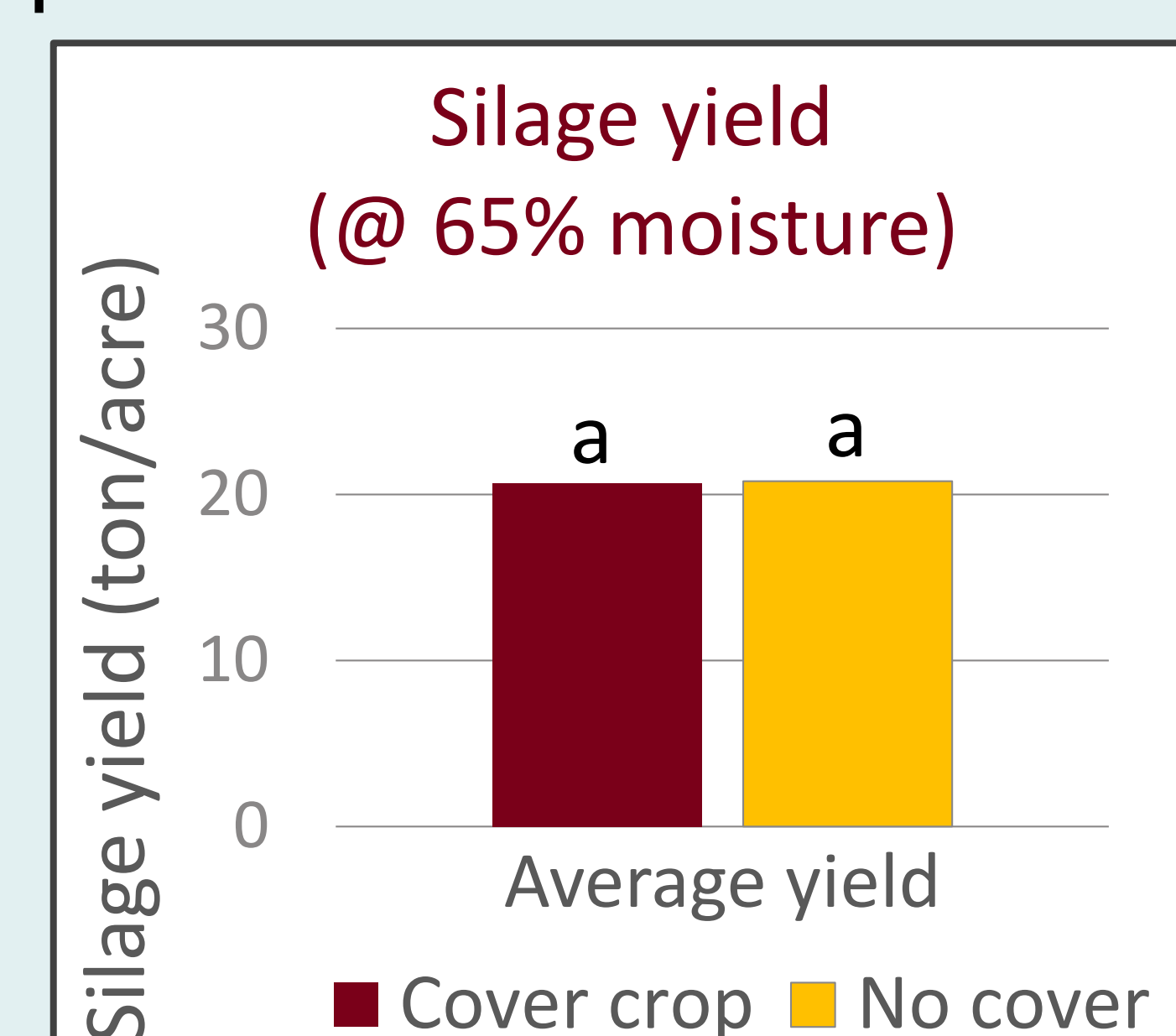
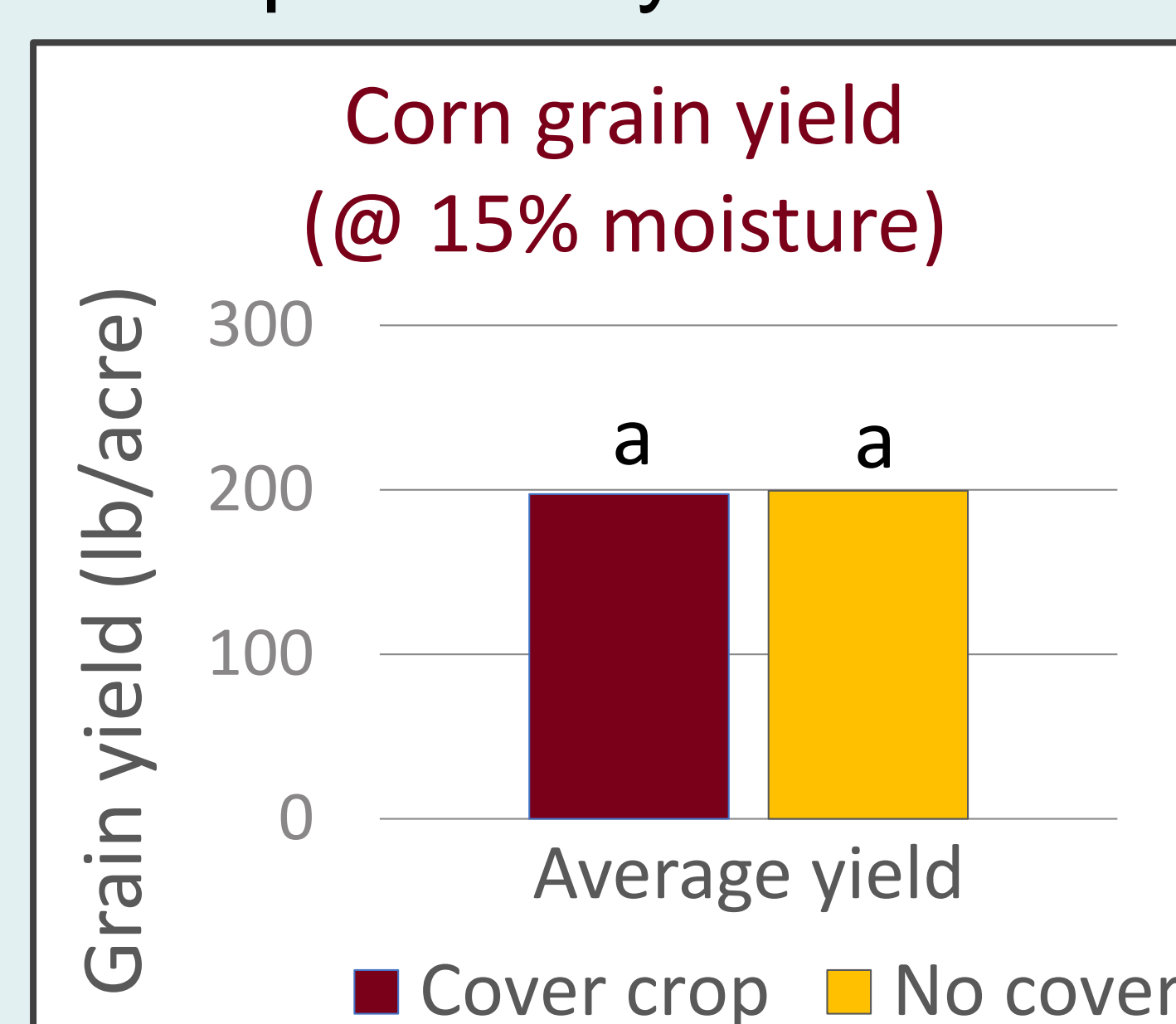
Injectors with high disturbance greatly impacted rye growth.

- Spring soil nitrate was reduced under the cover crop



Bars with different letters are significantly different at $P \leq 0.05$.

- Statistically, corn grain and silage yields were not impacted by the cover crop.



Bars with different letters in each graph are significantly different at $P \leq 0.05$.

Lessons learned

When planning on-farm research:

- Expect to lose a location or two to field conditions, operator error, weather, etc., so plan extra sites.
- Inspect the trials regularly and map areas to be excluded from harvest; i.e. ponding, equipment failure.
- Expect variability in farmer equipment and try to document it; i.e. injection equipment on cover crop stands.