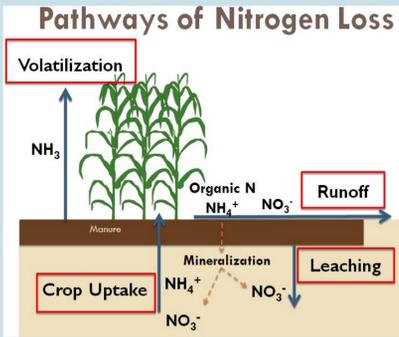


Impacts of fall manure application method and timing on nitrogen conservation for a winter annual and subsequent corn crop

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Introduction

Dairy farmers are typically limited to 6 months of manure storage requiring them to apply manure throughout the spring and fall. In the fall, there is a higher risk of water quality impairment when manure is applied to bare ground.



Objective

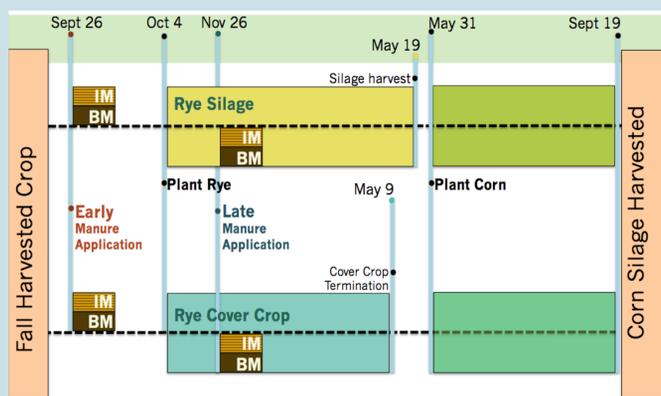
Evaluate different field management strategies that will conserve nitrogen from fall-applied manure for corn (*Zea mays*) silage when cereal rye (*Secale cereale*) is planted in the fall before corn.

Methods

In a three factor factorial experiment arranged in a randomized complete block design, treatments were replicated six times. Research was conducted at the PSU Agronomy Research Farm in Rock Springs, PA and all treatments were fertilized with only a fall manure application and no N amendment in spring.

Compared liquid dairy manure slurry at 54 Mg ha⁻¹

- Applied to a winter rye cover crop vs rye silage
- Injected (IM) vs. broadcasted (BM)
- Applied Early (Sept.) vs Late (Nov) in the fall



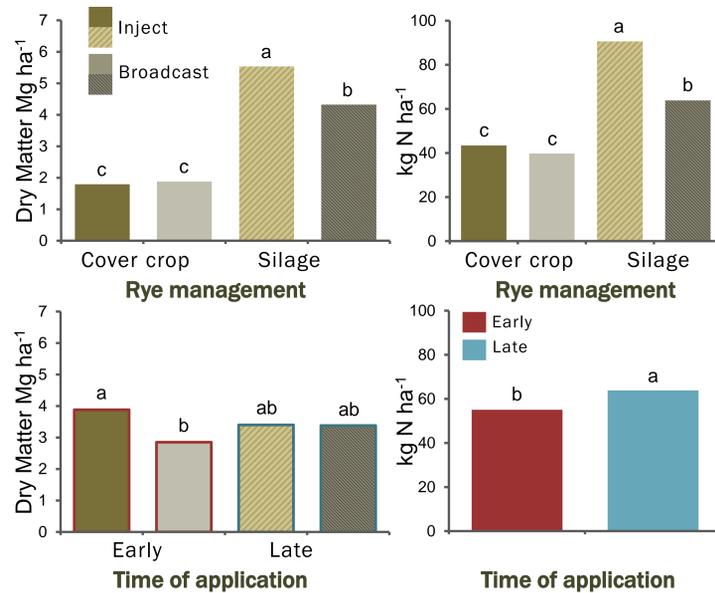
a) Manure injected and broadcasted in September 2013

b) Manure injected and broadcasted in November 2013



Results

2014 Rye production and nitrogen uptake

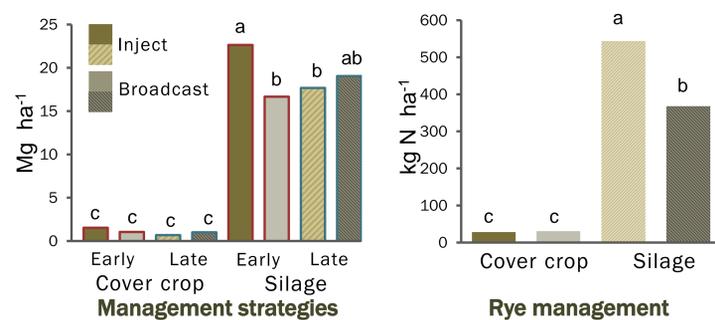


* Letters indicate differences at the 0.05 alpha level



c) Rye managed as a cover crop and harvested for silage in 2014.

2015 Rye production and nitrogen uptake



* Letters indicate differences at the 0.05 alpha level

d) Rye damage after replanted on 10/27/2014 and injected manure application 17 days later.



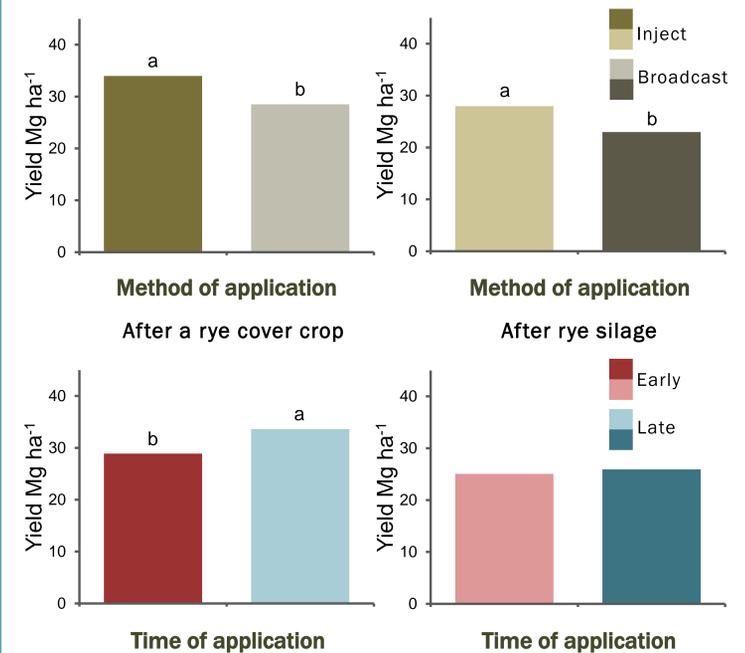
2014 and 2015 Rye silage partial budget (\$/ha)

	Injected	Broadcasted
Custom hire	\$75	\$50
Production costs- Fixed and variable costs/year	\$476	\$476
2014 Ensiling costs (\$33/Mg)	\$562	\$444
2014 Revenue @ \$80.32/Mg	\$1367	\$1080
2014 PROFIT	\$254	\$109
2015 Ensiling costs (\$33/Mg)	\$2083	\$1546
2015 Revenue @ \$80.32/Mg	\$5577	\$4138
2015 PROFIT	\$2943	\$2066



e) Corn silage yields measured in 2015 follow the same trends as 2014.

2014 Corn yields after a rye cover crop and rye silage



* Letters indicate significance at $\alpha=0.05$. Early application of manure was applied on 9/26/2013 and late manure application was applied on 11/26/2014.

Conclusions

Managing rye

- No difference in cover crop growth or total N content when manure was injected or broadcasted
- Higher rye silage yields and total N content when manure was injected
- After an early application of manure, more rye produced and N conserved when injected.
- 2014, after a late application of manure, rye produced and N uptake did not differ based on method of application
- 2015, after a late application of manure, rye was damaged by injecting manure soon after a late replanting. Although reduced rye stands, N uptake was greater than when manure was broadcasted.

Managing corn silage

- Corn yields were higher after the rye cover crop than rye silage
- Corn yields after the rye cover crop, were higher when manure was injected and applied later in the fall.
- Corn yields after rye silage, were higher after manure was injected. The timing of fall manure application did not significantly affect corn yields.

Recommendations

- More N is conserved for corn silage when manure is injected later in the fall to a cover crop.
- When harvesting rye for silage, plant rye as soon as weather and time permits; and inject manure after planting to conserve more N for the rye silage crop.
- To produce greater total forage on farm with less fertilizer inputs, inject manure in the fall for double cropped rye and corn silage.

Funding:



References

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