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CONTROLLED RELEASE NITROGEN ON SWEET CORN FOR IMPROVED WATER QUALITY

Matt Ruark – Soil Science
Nick Bero – Soil Science
A.J. Bussan - Horticulture
Birl Lowery – Soil Science

INTRODUCTION

- Nitrogen application on sandy soil typically has low use efficiency.
- There are products available that can improve this efficiency, but not widely tested on sweet corn.

COATED, SLOW-RELEASE N

Polymer-coated

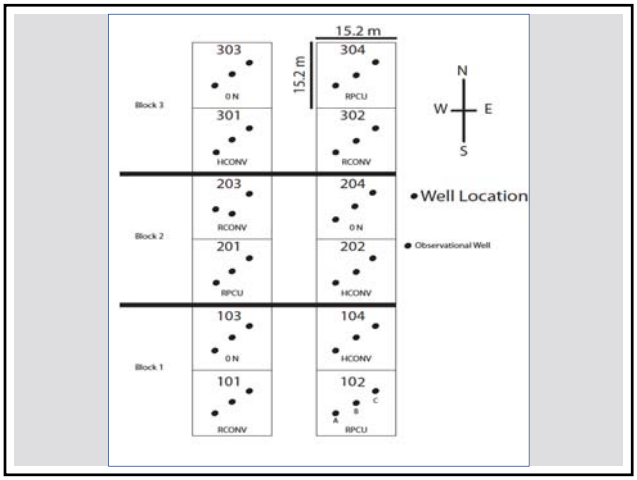
- Urea is coated with special polymer coating – special to each manufacturer.
- Water moves in through coating to dissolve urea
- N diffuses out through porous polymer membrane

OBJECTIVES

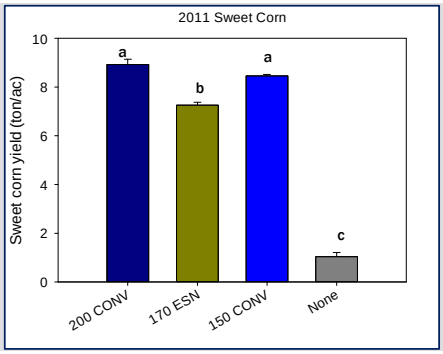
- Determine the effect of N source and rate on sweet corn yield (fresh weight and kernel)
- Evaluate nitrate-N concentrations in groundwater below sweet corn
- Develop a nitrogen budget for sweet corn

EXPERIMENTAL DESIGN 2011 & 2012, HANCOCK, WI

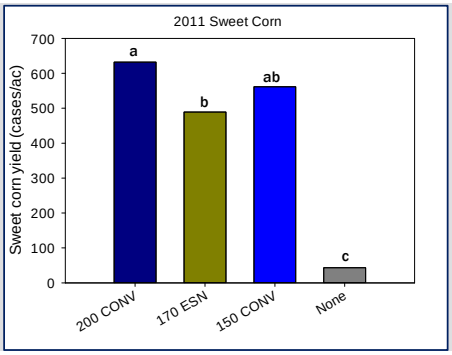
1. **200 lb/ac** conventional fertilizer (CONV)
   - 20 lb/ac in starter
   - 50 lb/ac of AS at V5
   - 100 lb/ac as urea at V8
   - 30 lb/ac as urea at tassel
2. **170 lb/ac** of ESN
   - 20 lb/ac in starter, 150 lb/ac at planting
3. **150 lb/ac** conventional fertilizer (CONV)
   - 20 lb/ac in starter
   - 50 lb/ac of AS at V5
   - 50 lb/ac as urea at V8
   - 30 lb/ac as urea at tassel



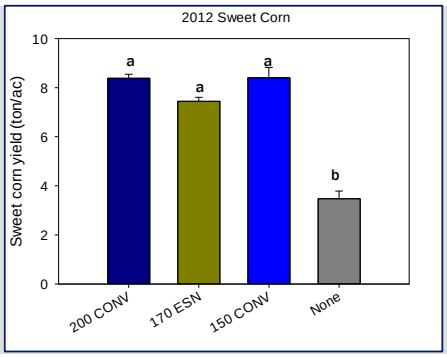
2011 YIELD



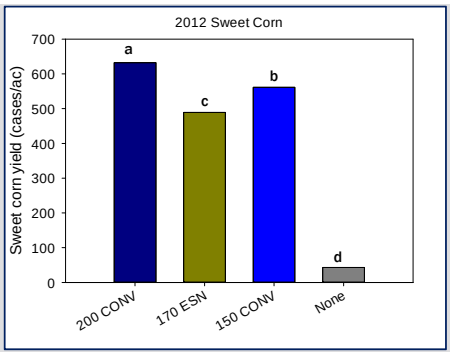
2011 YIELD



2012 YIELD



2012 YIELD



THOUGHTS

- Why didn't ESN work?
- Why the difference between 150 and 200 lb/ac of N?

AVERAGE CORN YIELDS (2003-2005) HANCOCK, WI

Treatment	Yield (bu/acre)
ESN preplant	185
Am. Sulf. Prepl.	171
AS +NI preplant	178
Urea preplant	159
ESN pre & 4wk.	189
Am. Sulf., 4wk	179
AS, 4wk & 6wk	189
Urea, 4wk	171

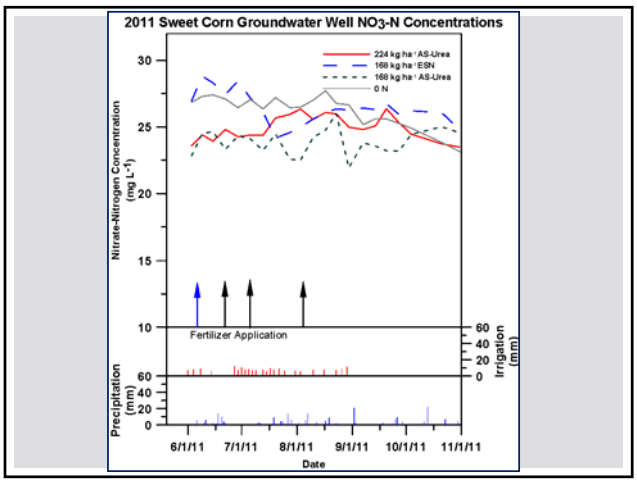
150 VS. 200 LB/AC OF NITROGEN

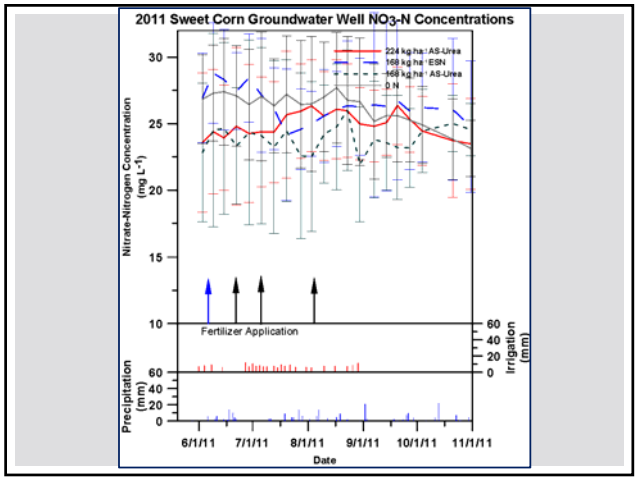
2011

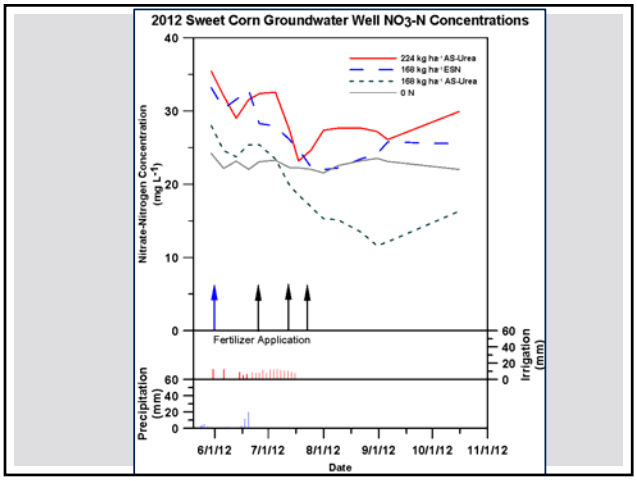
- 5.5% increase in grower yield (with 200 vs. 150)
- 12.6% increase in processor yield

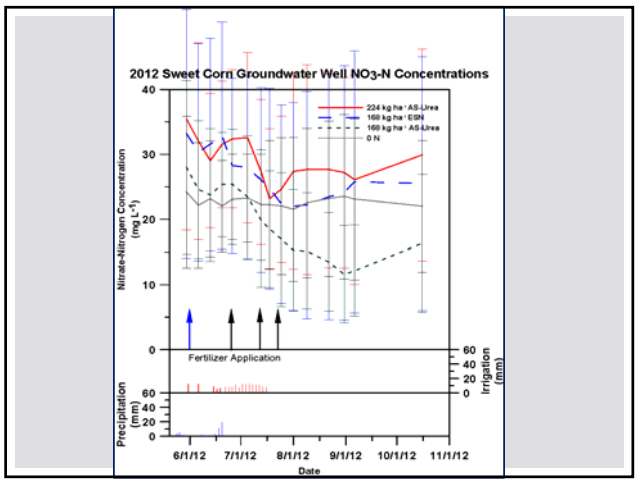
2012

- 0% increase in grower yield
- 6% increase in processor yield

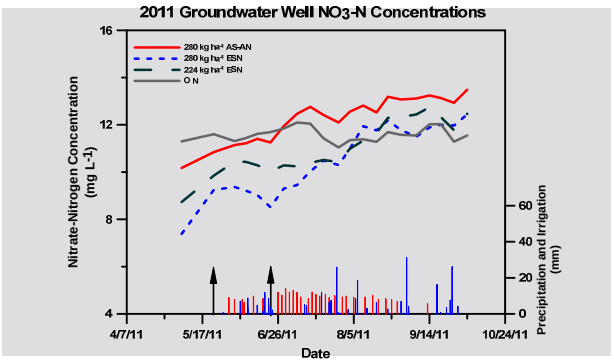






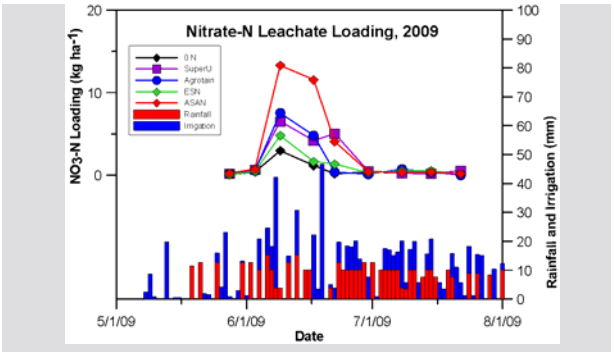


POTATO DATA

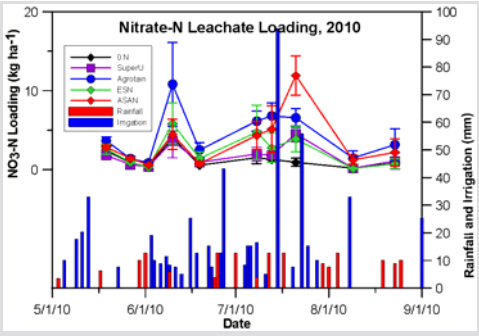


PAN LYSIMETER METHOD

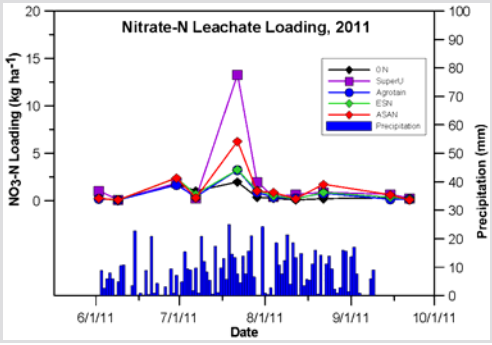
2009 HANCOCK, WI



2010 HANCOCK, WI



2011 HANCOCK, WI



NITROGEN USE EFFICIENCIES

- Partial nutrient balance (PNB)
  - N removed / N applied
- Nitrogen uptake efficiency (NUE)
  - [N uptake w/ fertilizer – N uptake w/out fertilizer] / N applied

2011 NITROGEN USE

Treatment	PNB	NUE
200 CONV	0.30	0.62
170 ESN	0.30	0.48
150 CONV	0.38	0.79

PNB only looks at the fraction of the N that was applied and removed from the system in the ears

NUE looks at the fraction of the N taken up by the crop that was from the applied N

CONCLUSIONS

- Applying ESN at full rate at planting does not appear to be the ideal N management plan.
- Unsure what made the other treatments outperform ESN (split application, application at tassel?).
- Monitoring groundwater over the short term is not an effective way to evaluate impacts of N management on water quality.

CONCLUSIONS

- I think we still have a lot to learn about efficient N management on sweet corn on irrigated sands.

COMMENTS? QUESTIONS? CONCERNS?