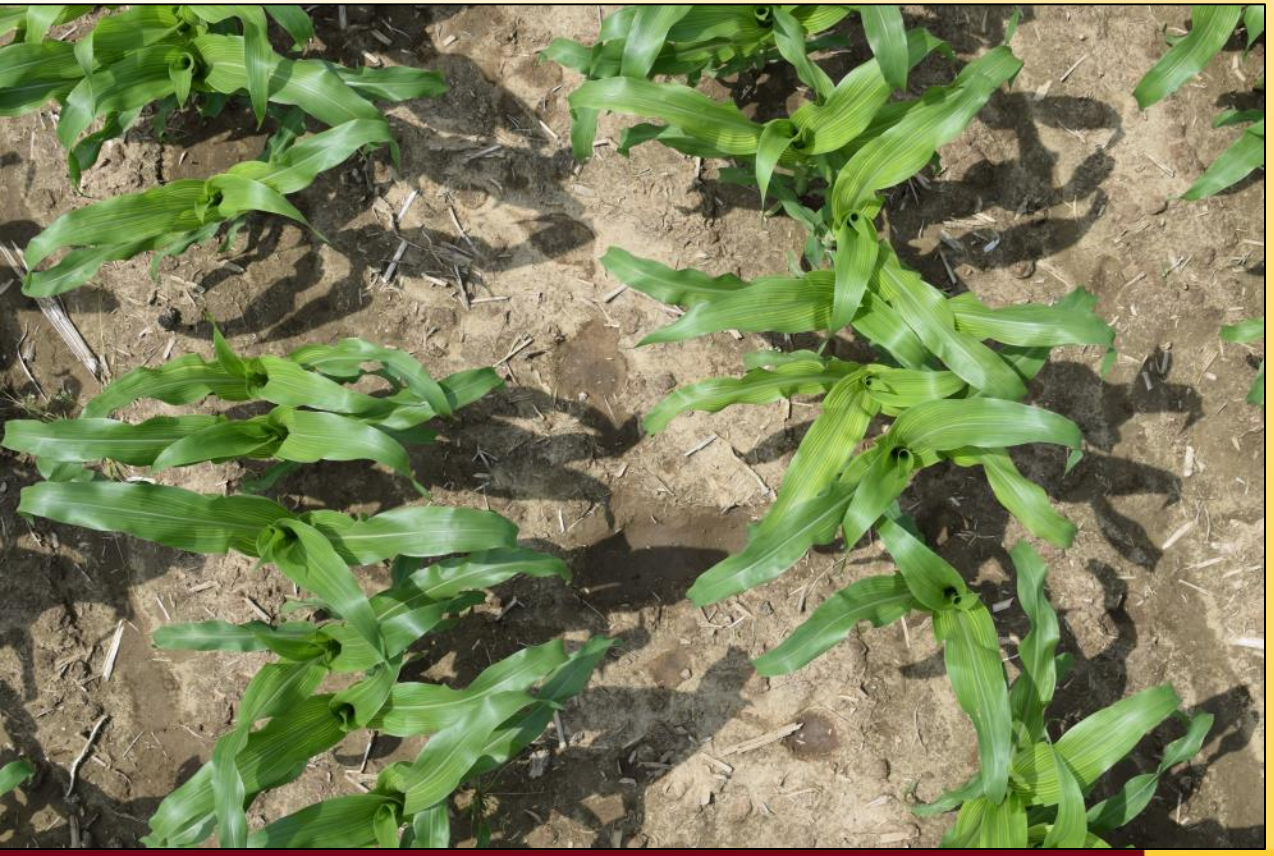
Comparison of ATS placement methods to enhance yield of continuous corn



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Fluid Forum

Sulfur in Minnesota

- Increased prevalence of deficiencies in corn
  - More common for soils with limited S supply (organic matter content <3.0% 0-6”)
- Increases in corn grain yield with as little as 10 lbs of sulfate-S broadcast
- Producers are still concerned about fall application of sulfate-S on Med-Fine textured soils
- Some producers considering application of sulfur with the planter


June 21, Waseca
193 bu/A, 21%
209 bu/A, 16%
0 gal/A 10-34-0
0 gal/A UAN
0 gal/A ATS
4 gal/A 10-34-0 In-
8 gal/A UAN S. ba
4 gal/A ATS S. ba

Starter P and S for Continuous Corn - Yield

Rochester 2010	Waseca 2010	Rochester 2011	Waseca 2011
---------- bu/ac ----------			
APP (10-34-0) in-furrow			
208a	214a	***195b***	194a
210a	214a	***199a***	198a
UAN (28-0-0) surface dribble band			
209a	216a	197a	195a
209a	212a	198a	197a
ATS (12-0-0-26) surface dribble band			
209a	***209b***	***194b***	196a
209a	***218a***	***196b***	197a
210a	***215a***	***202a***	196a

Minnesota's Agricultural Fertilizer Research & Education Council

J. Vetsch – U of M SROC

Renville, MN
June 2014

2014

- No S No Fe
  - 155 bu/ac
- + S No Fe
  - 168 bu/ac
- + S + Foliar Fe
  - 171 bu/ac

2015

- No Fe
  - 223 bu/ac
- + 3-6 GPA Redline
  - 221 bu/ac


Becker, MN 2014


Red Wing, MN 2015


Red Wing, MN 2015


Renville, MN 2015
No Striping
Leaf Striping

Research Questions

- Minnesota has maintained an efficiency factor for banded sulfur application
  - Reduce rate by 50%
- ATS is part elemental S and part sulfate-S
  - Is a rate reduction warranted?
- Some growers are utilizing ATS with pre-emerge herbicides
  - Is this a good idea?

Research Objectives

1. Determine if a surface band application of S as ATS is more efficient than broadcast application of ATS or AMS
2. Determine if pre-emerge broadcast application of ATS is as an effective source of applying S compared to AMS broadcast at or before planting in continuous corn.

Materials and Methods

- 2 locations per year in continuous corn
  - 1 location where soil organic matter is <3.0%
  - 1 location on poorly drained soil (>3.0%)
- Sulfur Source x Timing
  - AMS applied at or before planting
  - ATS surface dribble band with the planter
  - ATS applied on the soil surface
- Sulfur Rate
  - 0, 2.5, 5, 10, and 20 lbs S/ac

Locations: 2015

	Soil		Soil Test (0-6")						0-2’
Location	Series	County	P	K	SO_4-S	OM	pH		SO_4-S
			--------ppm------			-%-			-lb/ac-
New Richland	Clarion	Waseca	20	134	7	2.9	5.7		42
Waseca	Webster	Waseca	13	165	6	5.5	6.3		33

P, Bray-P1 phosphorus; K ammonium acetate potassium; SO_4-S, mono-calcium phosphate extractable sulfate sulfur; OM, organic matter loss on ignition; pH, 1:1 soil:water.

Ear Leaf %S at R2

	New Richland†				Waseca†			
S Rate	AMS-Br	ATS-Br	ATS-Ba	Avg.‡	AMS-Br	ATS-Br	ATS-Ba	Avg.‡
lb S/ac	----------%----------							
0	0.15	0.15	0.14	0.14b	0.14	0.17	0.16	0.16b
2.5	0.14	0.15	0.14	0.14b	0.16	0.13	0.16	0.15b
5.0	0.16	0.13	0.14	0.14b	0.16	0.14	0.16	0.15b
10.0	0.14	0.16	0.15	0.15ab	0.16	0.15	0.15	0.15b
20.0	0.16	0.16	0.15	0.16a	0.18	0.18	0.17	0.18a
Avg.‡	0.15	0.15	0.15		0.16	0.15	0.16	

† Sulfur source: ATS-Ba, Ammonium thiosulfate banded; ATS-Br, ammonium thiosulfate broadcast; AMS-Br, ammonium sulfate broadcast.

‡ Avg., treatment mean; within rows and columns, numbers followed by the same letter are not significantly different at the P≤0.05 probability level.

**Increase in leaf S concentration for the uppermost fully developed leaf at V10 at Waseca

Corn Grain Yield Data

	New Richland†				Waseca†			
S Rate	AMS-Br	ATS-Br	ATS-Ba	Avg.‡	AMS-Br	ATS-Br	ATS-Ba	Avg.‡
lb S/ac	---------- bu/ac ----------							
0	222	225	229	225	212	213	204	210
2.5	221	241	216	226	204	215	206	209
5.0	218	242	228	229	213	213	212	213
10.0	231	218	216	222	210	221	209	213
20.0	225	233	227	228	220	216	214	216
Avg.‡	223b	232a	223b		212	216	209	

† Sulfur source: ATS-Ba, Ammonium thiosulfate banded; ATS-Br, ammonium thiosulfate broadcast; AMS-Br, ammonium sulfate broadcast.

‡ Avg., treatment mean; within rows and columns, numbers followed by the same letter are not significantly different at the P≤0.05 probability level.

Preliminary Conclusions

- Tissue S concentration increased with increasing S rate
  - No variation among the sources (all supplied equal amounts of sulfur)
- Corn grain yield was inconsistently impacted by sulfur rate and source
  - Broadcast ATS resulted in higher grain yield than ATS banded and AMS Broadcast at one site; reasons for the response are unclear
  - Would not expect a major variation in the impact of sulfur source on corn grain yield

Thank You
Questions?

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Fluid Fertilizer Foundation