

Effect of NutriSphere-N[®] on Urea for Corn Silage Production

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Explanation of 2013 treatments

- All treatments were applied on tilled and no-till plots that have been in continuous treatments since 1997–98.
- Treatments were repeated on same or similar treatments in previous year.
- All plots received starter fertilizer (11-52-0) as a sideband providing 20 kgN/ha of nitrogen (N) and phosphate (MAP). Phosphorus (P) was applied in excess to requirement.
- All N rates indicated include the starter N.

Comparisons of interest

1. Urea was compared to urea treated with NutriSphere-N® (NN) at:
 - 2 rates: 180 kgN/ha and 260 kgN/ha (no-till and conventional tillage), which bracket the typical optimum N rate.
 - 2 tillage practices.
 - 2 methods of application: broadcast pre-seeding (no incorporation) versus side-dress at ~9 leaves as typical farm practice.
2. Applying most of the NN fertilizer at seeding time near the crop row.
 - a) Side-dress 4": all N banded at 4" from seed row just after planting using an offset disk.
 - b) Same as above but placed at 6" from seed.
 - c) Sideband includes 20 kg N as 11-52-0, 80 as NN (with the planter) and remainder applied at 4" using the offset disk.

Results and discussion

Results are shown in the Tables (1–5). It is evident that with broadcasting there was a consistent advantage for NN-treated urea over untreated urea by measures of total yield and grain yield (Tables 1 and 2). This was the case under both rates and both tillage practices but the advantage appeared to be greater for tilled treatment at the lower application rate. For N uptake, the difference was less consistent, with NN better under till and worse under no till at the low rate and no difference at the high rate (Table 4). In contrast, side-dressing gave lower yield and N uptake than broadcasting, which is somewhat surprising as this is the typical farm practice. There was little difference in yield and grain yield between the products for the side-dress application. N uptake was generally lower for side-dress application at the high rates but not at the low rate with little difference between the products.

A second part to the study was to determine if urea treated with NutriSphere-N would enable half of the N to be applied as a sideband or all the N near the seed close to the crop at seeding time. Banding all NN fertilizer at 6" at time of seeding gave yields and N uptake higher than the other spacing although the differences were quite small (Tables 1 and 4). Yields for the 6" treatment were higher than broadcast urea and N uptake was much greater for the 6" treatment. However, the placed NN was equivalent to the broadcast NN for total yield and grain yield. Interestingly N uptake was greater for the 6" treatment than the broadcast NN for both tillage treatments, and the difference was relatively large (Table 4). This suggests that more N was taken up later in the growing season from the side-banded treatment. Increased crude protein is of value for the livestock sector, and greater uptake of N is of significant environmental interest. The apparent recovery was 75% for the 6" spacing and only 58%–59% for the urea and NN applied by broadcasting.

Table 1. Mature Whole Corn Crop Dry Matter Yield 2013

Treatment	N Rate (kg/ha)	Tillage (mt/ha)	No-Tillage (mt/ha)	Avg (mt/ha)	
Control	20	6.2	7.7	6.9	E
NN-Urea					
Side-dress 4"	180	16.2	19.5	17.8	AB
Side-dress 6"	180	17.3	20.0	18.6	A
Sband/Sdress	180	18.5	18.4	18.4	A
Broadcast	180	17.5	15.4	16.5	BC
	260	18.5	17.2	17.9	AB
Side-dressed	180	16.4	14.9	15.6	CD
	260	18.3	17.4	17.9	AB
Urea					
Broadcast	180	16.2	14.6	15.4	CD
	260	18.2	18.8	18.5	A
Side-dressed	180	14.6	14.1	14.4	D
	260	15.9	18.2	17.1	BC
Average		16.1	16.3	16.2	

LSD 1.6

P < 0.10

Table 2. Mature Corn Grain Dry Matter Yield 2013

Treatment	N Rate (kg/ha)	Tillage (mt/ha)	No-Tillage (mt/ha)	Avg (mt/ha)	
Control	20	2.2	2.9	2.5	G
NN-Urea					
Side-dress 4"	180	7.0	8.8	7.9	ABCD
Side-dress 6"	180	7.3	9.6	8.4	AB
Sband/Sdress	180	8.2	8.9	8.6	A
Broadcast	180	7.3	6.4	6.8	EF
	260	7.8	7.5	7.7	BCD
Side-dressed	180	7.5	7.0	7.3	DE
	260	8.7	8.5	8.6	ABC
Urea					
Broadcast	180	6.9	5.5	6.2	F
	260	7.4	8.5	7.9	ABCD
Side-dressed	180	6.8	6.7	6.8	EF
	260	6.6	8.8	7.7	CDE
Average		7.0	7.4	7.2	

LSD 0.8

P < 0.10

Table 3. Mature Corn Tissue N 2013

Treatment	N Rate (kg/ha)	Tillage %	No-Tillage %	Avg %	
Control	20	0.58	0.69	0.63	F
NN-Urea					
Side-dress 4"	180	1.01	0.88	0.94	CD
Side-dress 6"	180	1.03	0.97	1.00	BC
Sband/Sdress	180	0.92	0.95	0.93	CDE
Broadcast	180	0.93	0.76	0.85	DE
	260	1.16	0.90	1.03	BC
Side-dressed	180	1.09	1.03	1.06	B
	260	1.11	1.09	1.10	AB
Urea					
Broadcast	180	0.95	0.71	0.83	E
	260	1.14	0.85	0.99	BC
Side-dressed	180	1.12	1.00	1.06	B
	260	1.22	1.19	1.20	A
Average		1.02	0.92	0.97	

LSD 0.10

P < 0.10

Table 4. Mature Corn N Uptake 2013

Treatment	N Rate (kg/ha)	Tillage (kg/ha)	No-Tillage (kg/ha)	Avg (kg/ha)	
Control	20	36	53	44	F
NN-Urea					
Side-dress 4"	180	161	171	166	BC
Side-dress 6"	180	177	194	185	AB
Sband/Sdress	180	170	173	171	BC
Broadcast	180	162	119	141	DE
	260	214	158	186	AB
Side-dressed	180	179	154	166	BC
	260	205	189	197	A
Urea					
Broadcast	180	152	103	127	E
	260	208	160	184	AB
Side-dressed	180	160	141	151	CD
	260	194	217	206	A
Average		168	153	160	

LSD 21

P < 0.10

Table 5. Mature Corn N Uptake Above Control 2013

Treatment	N Rate (kg/ha)	Tillage (kg/ha)	No-Tillage (kg/ha)	Avg (kg/ha)	
Control	20	0	0	0	F
NN-Urea					
Side-dress 4"	180	125	118	122	BC
Side-dress 6"	180	141	141	141	AB
Sband/Sdress	180	133	120	127	BC
Broadcast	180	123	74	99	DE
	260	178	105	142	AB
Side-dressed	180	143	101	122	BC
	260	173	132	152	A
Urea					
Broadcast	180	117	50	83	E
	260	172	107	140	AB
Side-dressed	180	123	89	106	CD
	260	162	159	161	A
Average		133	100	116	

LSD 21

P < 0.10



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