ESN Controlled Release Fertilizer on Corn and Spring Wheat

Purpose:

To evaluate the economic benefits of ESN® Controlled Release Fertilizer, or Environmentally Smart Nitrogen use in corn and spring wheat production in eastern Ontario.

Methods:

At each field location, the equivalent nitrogen rates of ESN Controlled Release Fertilizer and urea were applied at planting. Grower standard nitrogen rate and ½ grower standard rates were applied and replicated twice at each site. The ½ grower standard rates were included to measure any potential residue soil nitrogen effect, which may not show up in the standard grower nitrogen rates. In the 2010 crop year, a blend of Urea:ESN coated urea was applied (see plot data for blend ratio). At harvest, plots were weighed and measured for moisture and test weights. In addition, spring wheat samples were collected and the grain analyzed for protein and quality. The nitrogen products were applied with either a Gandy Fertilizer Applicator (Figure 1) or a field broadcast spreader in strips.

Figure 1: Used Gandy Fertilizer Applicator to get accurate product rates:

Table 1: ESN on Corn 2010 On-farm Site Information

Site	Oxford Mills		Spencerville	Pakenham	Prescott	Edwards
Planting Date	06-May-10		04-May-10	21-Apr-10	28-Apr-10	25-Apr-10
Previous Crop	Spring Wheat		Corn	Spring Wheat	Soybeans	Soybeans
Harvest Date	09-Nov-10		09-Nov-10	08-Nov-10	29-Oct-10	10-Nov-10
Nitrogen Applied - Date	30-Apr-10		04-May-10	21-Apr-10	04-May-10	04-May-10
Nitrogen Applied	Incorporated just before Planting		Incorporated just before Planting	Incorporated just before Planting	Broadcast Immediately after Planting	Broadcast Immediately after Planting
Hybrid	Pioneer 38N85			Pioneer 38M58	Pioneer 38M59	Pioneer 38M58
Plot Sampled	0-6' composite	0-6" composite from sandy knoll	0-6"composite	0-6" composite	0-6" composite	
pH (BpH)	6.7	7	7.4	6.5	6 (6.4)	
Organic Matter	4	4.5	4.3	5.4	3.6	
P (ppm)	26	32	10	33	77	
K (ppm)	110	108	106	230	162	
Mg (ppm)	443	429	414	709	143	
Ca (ppm)	1814	1408	2444	4609	1360	
Texture	C	C	C	M	C	
Cation Exchange (MEQ/100g)	14.3	12.1	17.1	30.7	10.9	
K% *	2	2.3	1.6	1.9	3.8	
Mg% *	25.9	29.6	20.1	19.2	10.9	
Ca% *	63.7	58.2	71.3	75	62.6	
H% *	8.4	9.9	7	3.9	22.6	
K/Mg Ratio *	0.2	0.3	0.3	0.3	1.1	

***** Base Saturation

Results:

Table 2: 2010 ESN on Spring Wheat – On-farm 2 strip comparison blend of 50:50 Urea:ESN as compared to 100% Urea.

Site	Treatment	Diff. Yield @14.5% (bu/ac)	Diff. Protein %	Diff. Residue Nitrogen - Post Harvest
Arnprior	40 lbs N/ac rate 50:50 Urea:ESN	1.9	0.1	-16.7
Panmure	40 lbs N/ac 50:50 Urea:ESN	-0.4	-0.1	2.0
	Average	**0.8**	**0.0**	**-7.3**
Arnprior	80 lbs N/ac rate 50:50 Urea:ESN	0.6	0.1	3.4
Panmure	80 lbs N/ac 50:50 Urea:ESN	4.5	0.4	15.0
	Average	**2.5**	**0.2**	**9.2**

Table 3: ESN on Spring Wheat, at 3 Nitrogen Rates from small plot, 4 replication, research trial at the Winchester Research Farm, Kemptville Campus – University of Guelph

N Actual Rate (Kg/ha)	Product	Protein %	*	Yield (bu/ac)	*
0	0	14.0	d	60	c
45	Urea	14.6	c	72	ab
45	50:50 Urea:ESN	14.7	c	67	b
90	Urea	14.9	bc	75	a
90	50:50 Urea:ESN	15.0	abc	75	a
135	Urea	15.3	ab	76	a
135	50:50 Urea:ESN	15.3	a	76	a

**Average with same letter are Not Statistically Different*

Summary:

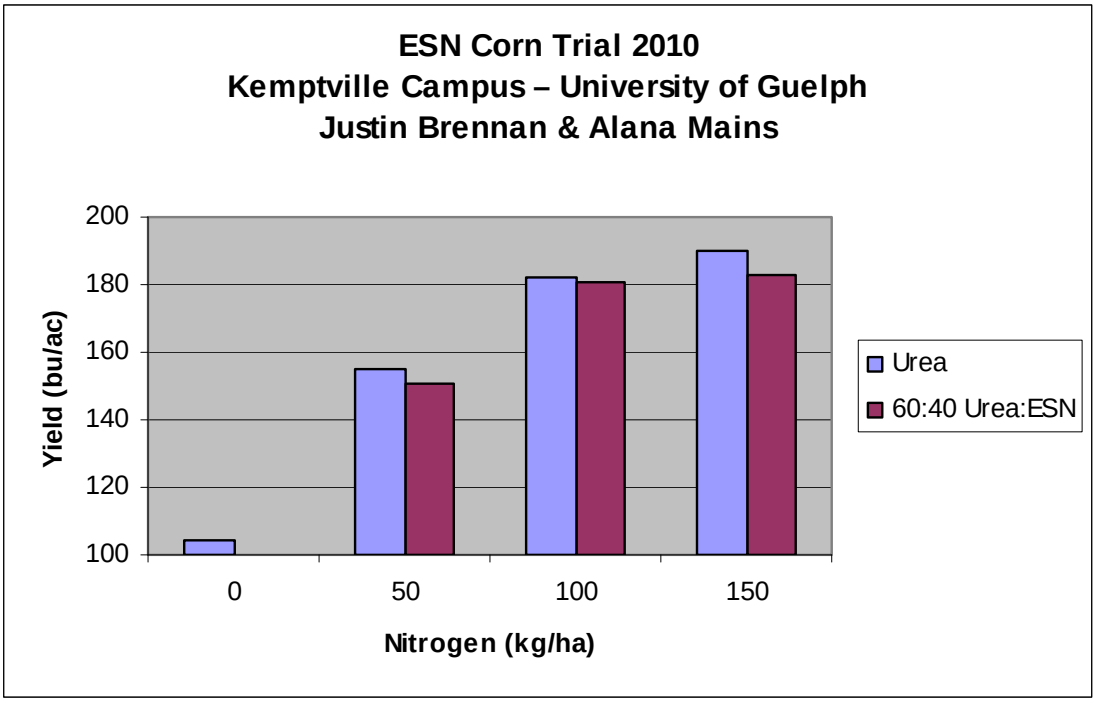
In 2010 there was no increase in spring wheat yields at the Arnprior on-farm site (Table 2) or at the small plot, 4 replication research trial at the Kemptville Campus – University of Guelph (Table 3) site. At the Panmure site (Table 2), the average spring wheat yield showed an increase when using the ESN:Urea blend as compared to straight urea at the full rate of 2.5 bushels per acre (bu/ac), however, this was not statistically significant due the variation within the plot. There was a small (0.2) of a % increase in protein in the spring wheat with the full rate ESN:Urea blend. It should be noted that all wheat plots were 14% or greater, above the maximum protein premium of 12.5% for spring wheat.

Table 4: 2010 ESN on Corn – On-farm 2 strip comparison of the blend of Urea:ESN as compared to 100% Urea.

Site	Nitrogen Application	Nitrogen Rate Actual (lb/ac)	Product	Yield Difference (bu/ac)	Difference in Available Soil Nitrogen at mid-June (kg/na)
Edwards	Broadcast	55	40:60 Urea:ESN	-8.7	n/a
Spencerville	Incorporated	55	40:60 Urea:ESN	-14.4	-23.5
Prescott	Broadcast	55	40:60 Urea:ESN	-0.8	-7.2
Pakenham	Incorporated	55	50:50 Urea:ESN	3.1	22.5
Oxford Mills	Incorporated	55	40:60 Urea:ESN	-0.9	22.5
			Average	**-4.3**	**3.6**
Edwards	Broadcast	110	40:60 Urea:ESN	-1.2	n/a
Spencerville	Incorporated	104	40:60 Urea:ESN	-21.0	10.4
Prescott	Broadcast	104	40:60 Urea:ESN	9.3	-8.2
Pakenham	Incorporated	110	50:50 Urea:ESN	2.9	-15.8
Oxford Mills	Incorporated	110	40:60 Urea:ESN	4.7	-19.7
			Average	**-1.1**	**-8.3**

Nitrogen Application - Incorporated or Broadcast Immediately after Planting

Figure 2: Yield response from a blend of 60:40 Urea:ESN as compared to 100% Urea at 3 Nitrogen Rates from small plot, 4 replication, research trial at the Kemptville Campus – University of Guelph.



No statistical differences between the treatments.

In the corn, on average there was no yield advantage to the ESN:Urea blend when compared to straight urea in the on-farm strips (Table 4). This is consistent with other on-farm trials, where some sites resulted in a yield increase while other sites resulted in a yield decrease. Soil nitrogen samples taken in early to mid-June had variable levels of available nitrogen, therefore no nitrogen loss could be determined. The small plot, 4 replication research trial at Kemptville Campus – University of Guelph (Figure 2) also showed no additional yield to the ESN:Urea blend.

Next Steps:

2010 is the second year of a three project. 2011 is the final project year and a summary of the results of the years will be reported.

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Location of Project Final Report:

This is an interim report.