

Nitrogen Efficiency Fertilizer Trial

As promised in our 2015 newsletter, Carolina Eastern-Crocker (CEC) and Krenzer Farms of Scottsville, NY participated in subsequent Nitrogen Efficiency Fertilizer (NEF) Treatment ventures to further explore the effectiveness of the NEF treatments presently on the market. In 2015, based on the harvest reports, it was concluded that there were apparent financial advantages to protecting the applied nitrogen against environmental loss despite the added upfront cost of the various products applied as summarized in Table 1 below.

Table 1. Summarized 2015 Plot Results

Treatment	Avg Moisture %	Avg Test Wt. lbs.	Avg Yield Dry Bu./Ac.	Return Advantage/Acre @ \$4.00/bu Corn
Guardian DF	19.8	57.0	184.09	\$56.32
SuperU	19.9	56.9	179.55	\$30.45
30 % Untreated Urea/ 70 % ESN	19.7	57.5	179.02	\$33.08
Agrotain Dri-Maxx	19.6	57.2	177.30	\$33.98
Untreated Urea	19.8	57.2	166.25	0

Note: The return advantage per acre is after the additional cost of the NEF treatments

2016 Trial

In April of 2016, CEC agronomist Jeff Williard and Genesee Valley Educational Partnership intern Andrew Duyssen, established a product test plot on 67 acres of Ontario Loam soil with 3-8% slope located in Scottsville, NY operated by Krenzer Farms. The soil had an average pH of 6.8 with an average organic matter content of 1.4%.

The entire plot was planted on April 24th 2016 using Pioneer P0157AMX hybrid corn seed at a seeding rate of 35,000 seeds per acre on 30-inch row spacing. Six NEF treatments (urea treated with N-Bound[®], urea treated with N-Bound[®] and N-Yield[®], urea treated with Dicyandiamide[®], urea treated with Nutrisphere[®], a 60% ESN[®] / 30% urea treated with N-Bound[®] blend, and UAN treated with N-Bound[®] and N-Yield[®]) along with untreated UAN and untreated urea were compared in a random block design with each treatment replicated four times.

Each urea treatment received 500 pounds per acre of 26-0-26 pre-plant broadcast dry fertilizer using an Air-Flow self-propelled field applicator to provide the future grain corn crop with 130 units of nitrogen and potassium per acre. The surface applied fertilizer was incorporated within 24 hours of application. In addition, 22 gallons per acre of liquid starter (18-18-0-3.2sulfur with boron and zinc) was placed in a 2x2 band at the time of planting, providing an additional 45 units of nitrogen per acre for a total of 175 units of nitrogen per acre.

Each UAN treatment received 217 pounds of potash (0-0-60) pre-plant broadcast dry fertilizer using an Air-Flow self-propelled field applicator to provide 130 units of potassium per acre. In addition, 22 gallons per acre of liquid starter (18-18-0-3.2sulfur with boron and zinc) placed in a 2x2 band at the time of planting, providing 45 units of nitrogen. The remainder of nitrogen was supplied by 36.5 gallons per acre of 32-0-0 side dress surface applied liquid fertilizer on June 13th 2016 using a John Deere R4038 self-propelled sprayer with drop tubes to provide the grain crop with a total of 175 units of nitrogen per acre.

The corn was allowed to mature and harvested on November 8th 2016 at an average moisture 18.5% and an average test weight of 59.3 pounds per bushel. Each replicated treatment was harvested and

weighed. All weights were averaged for all four replications of the six NEF treatments and untreated urea and UAN. The results have been summarized in Table 2 below based on plot yield data and 2016 fertilizer prices.

Table 2. Summarized 2016 Plot Results

Treatment	Avg Moisture %	Avg Test Wt. lbs.	Avg Yield Dry Bu./Ac.	Return Advantage/Acre @ \$4.00/bu Corn
36.5 gal/ac UAN w/N-Bound + N-Yield	18.3	59.5	161.8	\$92.55
Urea w/Dicyandamide-DCD	18.6	59.4	161.7	\$90.59
40% Urea w/N-Bound + 60% ESN	18.7	59.3	163.4	\$90.52
36.5 gal/ac UAN untreated	18.7	59.5	151.3	\$65.87
Untreated Urea	18.6	59.4	148.9	\$49.14
Urea w/Nutrisphere	18.1	59.3	149.2	\$43.83
Urea w/N-Bound + N-Yield	18.4	59.7	147.0	\$27.79
Urea w/N-Bound + N-Yield	18.2	59.3	145.1	\$26.20
45 gal/ac UAN untreated	19.0	58.6	137.7	\$0.00

Note: The return advantage per acre is after the additional cost of the NEF treatments

Based on the harvest reports, there were again apparent financial advantages to protecting the applied nitrogen against environmental loss in most cases despite the added upfront cost of the products available. In this trial, 36.5 gallons of UAN treated with N-Bound® for leaching and N-Yield® for volatilization produced the greatest return on investment this was followed by dry urea treated with dicyandiamide (DCD) for leaching and then a blend of 40% dry urea treated with N-Bound® and 60% ESN slow release nitrogen. Due to untreated urea blending difficulties in 2016, urea treated with Nutrisphere®, N-Bound® + N-Yield®, and N-Bound® alone could not be compared to untreated urea so these products were compared to untreated UAN.

2017 Trial

In April of 2017, CEC agronomist Jeff Williard re-established a product test plot on the same 67 acres of Ontario Loam soil located in Scottsville, NY operated by Krenzer Farms.

The entire plot was planted approximately a month later than the 2016 plot on May 21th 2017 using the same Pioneer P0157AMX hybrid corn seed at a seeding rate of 35,000 seeds per acre on 30-inch row spacing. Six NEF treatments (urea treated with N-Bound®, urea treated with N-Bound® and N-Yield®, urea treated with Dicyandiamide®, a 60% ESN® / 40% untreated urea blend, a 60% ESN® / 40% urea treated with N-Bound® blend, and UAN treated with N-Bound® and N-Yield®) along with untreated UAN and untreated urea were compared in a random block design with each treatment replicated four times.

All urea and UAN treatments received 250 pounds per acre of 0-0-60 in the fall of 2016 to provide 150 units of potassium per acre. All treatments received 22 gallons per acre of liquid starter (18-18-0-3.2sulfur with boron and zinc) was placed in a 2x2 band at the time of planting providing 45 units of nitrogen.

Each urea treatment received 283 pounds per acre of 46-0-0 and every urea/ESN® blend treatment received 290 pounds per acre of 44.8-0-0 pre-plant broadcast dry fertilizer using an Air-Flow self-propelled field applicator to provide the future grain corn crop with an additional 130 units of nitrogen per acre for a total of 175 units of nitrogen per acre. The surface applied fertilizer was applied on May 20th and was incorporated within 24 hours of application.

Each UAN treatment received 40 gallons of 32-0-0 UAN that was surfaced applied on June 21st, 2017 using a 24 row drop tube unit to provide the future grain corn crop with an additional 142 units of nitrogen per acre for a total of 187 units of nitrogen per acre.

The corn was allowed to mature and harvested on November 17th 2017 at an average moisture 21.3% and an average test weight of 56.1 pounds per bushel. Each replicated treatment was harvested and weighed. All weights were averaged for all four replications of the six NEF treatments and untreated urea and UAN. The results have been summarized in Table 3 below based on plot yield data and 2016 fertilizer prices.

Table 2. Summarized 2017 Plot Results

Treatment	Avg Moisture %	Avg Test Wt. lbs.	Avg Yield Dry Bu./Ac.	Return Advantage/Acre @ \$3.75/bu Corn
40 gal/ac of 32-0-0 UAN w/N-Bound + N-Yield	21.6	56.3	190.4	\$105.72
46-0-0 Urea w/N-Bound	21.8	56.0	184.8	\$83.12
46-0-0 Untreated Urea	21.4	55.9	174.3	\$54.63
46-0-0 Urea w/Dicyandamide-DCD	21.3	55.7	176.7	\$49.35
44.8-0-0 40% Urea w/N-Bound+60% ESN	20.8	56.2	178.1	\$47.78
40 gal/ac of 32-0-0 UAN untreated	21.1	56.6	164.0	\$18.10
46-0-0 Urea w/N-Bound + N-Yield	21.6	56.0	166.9	\$10.06
44.8-0-0 40% Untreated Urea+60% ESN	21.0	56.3	164.2	\$0.00

Based on the harvest reports, there were again apparent financial advantages to protecting the applied nitrogen against environmental loss in most cases despite the added upfront cost of the products available. In this trial, 40 gallons of UAN treated with N-Bound[®] for leaching and N-Yield[®] for volatilization produced the greatest return on investment this was followed by dry urea treated with N-Bound[®] for leaching. Due to lower market values for grain corn in 2017, certain protection product combinations did not yield a financial advantage over untreated nitrogen in 2017.

Summary

Based on the combined harvest data of 2015-2017, there were several apparent patterns that surfaced. First, there were apparent financial advantages, in both dry and wet growing years, to protecting the applied nitrogen against environmental loss in most cases despite the added upfront cost of the products available.

Secondly, out of all the treatments, incorporated urea treated with some form of dicyandiamide (DCD) protection for leaching (N-Bound[®], Guardian DF[®], or N-Gard[®]) finished in the top 2 for greatest return on investment all 3 years.

Thirdly, out of all the treatments applied in 2016-2017, surfaced applied side dress UAN treated with N-Bound[®] (DCD) for leaching and N-Yield[®] (NBPT) for volatilization finished 1st for greatest return on investment in both years that it was part of the trial.

Special thanks go to Krenzer Farms of Scottsville, NY for participating in this extensive 3-year Nitrogen Efficiency Fertilizer (NEF) Treatment venture to explore the effectiveness of the NEF treatments presently on the market. It was and is Carolina Eastern-Crocker's desire to continue to partner with our customers in these types of ventures to provide valuable data to our producers. These types of trials assist Carolina-Eastern Crocker in providing the most cost-effective products on the market to our

customers to maximize their profits. Stay tuned for future trials. Please contact us with any questions at 585-345-4141.