Poly-coated Urea as a Seasonlong Nitrogen Source for Sweet Corn

Dr. Ron Goldy, Carly Andres, and Virginia Wendzel
Southwest Michigan Research and Extension Center
Benton Harbor, Michigan

Objective

The purpose of this trial was to determine if one application of poly-coated urea prior to planting can provide seasonlong nitrogen to sweet corn while maintaining yield of number, weight, and ear characteristics comparable to split urea applications.

Summary

One 150-pound per acre application of poly-coated urea (ESN) gave similar yield and quality as other 150-pound per acre nitrogen applications as either split applications of straight urea or split applications of urea plus ESN. Traits measured included plant height four times prior to harvest, aboveground plant weight at harvest, ear weight, length and diameter, and total yield in number of ears and weight.

At $1.16 per pound of nitrogen for ESN compared to $0.80 per pound of nitrogen for urea, urea was less expensive even when considering labor and equipment costs of the second application. Lower rates of ESN may be possible while maintaining adequate yield and quality and will be investigated in 2016.

Methods

Fertilizer Treatments

Prior to planting, 150 pounds of 0-0-61, 25 pounds of sulfur, and 2 pounds of actual boron were broadcast and worked into the soil. Nitrogen was supplied at a rate of 150 pounds/acre as standard urea (46-0-0), ESN poly-coated urea (44-0-0), or a combination according to the following treatments:

1. 150 lbs. as ESN prior to planting.
2. 25 lbs. as urea plus 125 lbs. as ESN prior to planting.
3. 25 lbs. as urea plus 100 lbs. as ESN prior to planting and 25 lbs. as urea as a sidedress when plants were 18 inches tall.
4. 50 lbs. as urea plus 100 lbs. as ESN prior to planting.
5. 50 lbs. as urea prior to planting and 100 lbs. as urea as a sidedress when plants were 18 inches tall.

Applications prior to planting were worked into the soil by disking. Sidedressing was done July 21 with a push style lawn fertilizer broadcast spreader and then irrigated in.

Planting

The soil type was Selfridge loamy sand with 0 to 3% slopes. Cabo (Syngenta Seed Company) sweet corn was planted June 17, 2015, in rows 30 inches apart and 6 inches in the row (34,848 plants to the acre) using a Monosem vacuum seeder. Plots consisted of six rows, 75 feet long surrounded by 10-foot alleyways between plots. The two best of the interior four rows were

chosen as data rows. Plots were set up and analyzed as a completely randomized design with four replications.

Weed Control

After planting, weeds were controlled by applying Dual Magnum 7.6E and Aatrex 4L at a rate of 1.5 pints and 1 quart per acre, respectively.

Plant Care

The planting was irrigated as needed with overhead sprinklers. One application of Asana XL was applied to control European corn borer (*Ostrinia nubilalis*) and corn earworm (*Helicoverpa zea*).

Harvest and Data Collection

Data on plant height was collected on July 10, 22, and 30 and on August 5. At harvest on September 1, aboveground plant weight (including the ear); marketable ear number from 50-feet of row; and the weight, length, and diameter of ears were determined.

Results

No significant differences were found between the traits measured for any treatment evaluated (Table 1). Research trials are generally conducted to determine differences between treatments; however, this trial was conducted to determine if different treatments would result in the same outcome.

Treatment number 5 (50 lbs. urea prior to planting followed by 100 lbs. urea as a side dress) was considered the control treatment and is the approach many growers would follow if they were using only urea. Treatments 2, 3, and 4 combined regular urea with ESN and were designed with the idea that regular urea provides an initial nitrogen boost and ESN provides a more consistent, seasonlong nitrogen level. Treatment 1 (ESN only) was to determine if a single application of poly-coated product prior to planting could provide the needed nitrogen for the entire season.

The benefit of a one-time nutrient application is labor and equipment savings of the sidedress application. ESN for this trial was $1.16/pound of nitrogen while urea was $0.80/pound. A 150 lb./acre application of ESN cost $174, while urea cost $120 — a $54 difference. Labor and equipment costs for a second application are estimated to be between $40 and $50/acre.

So urea is slightly less expensive from the standpoint of product and application. For some producers, there may be a benefit in a “once and done” approach. It is also possible ESN rates lower than 150 lbs./acre may provide a similar performance as 150 lbs./acre regular urea.

Table 1. Growth and yield characteristics of Cabo sweet corn in response to five nitrogen treatments at the Southwest Michigan Research and Extension Center, Benton Harbor, Michigan. Plant spacing was 30 inches between rows and 6 inches in the row (34,848 plants/acre)..

Treatment	Ht 1 (inches)	Ht 2 (inches)	Ht 3 (inches)	Ht 4 (inches)	Stalk Weight (pounds)	Ear Length (inches)	Ear Diameter (inches)	Ear Weight (ounces)	Ears/acre	Weight/acre (tons)
1	9.3	20.9	36.0	52.4	2.9	8.89	2.15	11.6	25,788	9.3
2	9.2	21.8	36.6	52.3	3.2	8.93	2.10	11.5	23,261	8.4
3	8.9	22.1	36.8	53.9	3.4	8.76	2.12	11.6	23,958	8.7
4	9.2	22.5	37.8	55.1	3.6	8.72	2.16	11.5	26,746	9.6
5	8.9	22.1	38.3	55.6	3.4	9.17	2.12	11.8	23,958	8.9
Lsd.05	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

1. 150 lbs. as ESN (controlled-release nitrogen 44-0-0) prior to planting.
2. 25 lbs. as urea (46-0-0) plus 125 lbs. as ESN prior to planting.
3. 25 lbs. as urea plus 100 lbs. as ESN prior to planting and 25 lbs. as urea as a sidedress when plants were 18 inches tall.
4. 50 lbs. as urea plus 100 lbs. as ESN prior to planting.
5. 50 lbs. as urea prior to planting and 100 lbs. as urea as a sidedress when plants were 18 inches tall.

Figure 1. Sweet corn nitrogen trial at the Southwest Michigan Research and Extension Center on August 10, 2015. Tasseling differences are most likely due to slight soil type differences across the field. Plant population was 34,848 plants per acre.