

FESABILITY OF USING SLOW RELEASE NITROGEN FERTILIZER FOR REDUCING NITROGEN RATES

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Situation:

Most nitrogen based fertilizers are produced from ammonia which is manufactured from natural gas. Because of this, fertilizer prices have skyrocketed in recent years due to worldwide shortages of natural gas. Combine this with an increasing demand for fertilizer from emerging growth countries throughout the world; the end result is a constant need for growers to cut production costs where possible. Subsequent profitability is always the driving force for most agricultural crops. The overall purpose of this study is to evaluate newer types of slow release nitrogen products for sweet corn production. One theory with controlled release fertilizers is that their usage might result in less nitrogen loss from leaching. One hypothesis tested in this study is to see if this improved fertilizer efficiency could result in growers being able to reduce fertilizer rates.

Study Objectives:

- 1) Evaluate the efficiency of slow release nitrogen fertilizers for growing sweet corn using reduced nitrogen rates.
- 2) Determine the effect of liquid slow release nitrogen fertilizers applied after either high or low rates of pre-plant incorporated nitrogen fertilizer.
- 3) Continue to study the usefulness of the DRIS index in predicting sweet corn yields.
- 4) Study the value of added micronutrients, namely manganese and zinc in conjunction with slow release nitrogen.
- 5) Utilize tissue testing to determine the effectiveness of both slow release nitrogen and micro-nutrients in combination.

Experimental Design:

The study was performed as two randomized complete block design studies. Double rows were planted at 20 foot lengths with row spacing at 7 to 8 inches between seeds. One part of the study utilized a low rate of pre-plant nitrogen at 40 pounds per acre and was planted with the sweet corn variety Cameo. The second part of the study utilized a high rate of re-plant nitrogen at 80 pounds per acre and was planted with the variety Providence. The studies were conducted at the Rutgers Agriculture and Research and Extension Center located in Centerton, New Jersey. Standard farm practices were used for insect control, tillage and irrigation. Fertilizer treatments were applied as liquid materials with an electric backpack sprayer.

Three different formulations of slow release nitrogen were utilized in this study. The first product was a 28-0-0, with 20.2% slow release nitrogen and 7.8% quick release urea nitrogen. The second product was a 20-0-0, which contained 50% slow release nitrogen and 50% quick release urea nitrogen. The third product was a 20-3-3 that contained 1.3% ammonical/nitrate nitrogen and 14.7% urea nitrogen. This formulation also contained 3% P and 3% K.

Three different micronutrient materials were used in this study containing wither zinc, manganese or a complete trace element mix.

Results:

Traditionally, in this type of research, yields are normally given in crates per acre as the unit of measurement used to determine efficacy. In an effort to make results more meaningful to growers and others, I have taken a new approach for explaining results. Instead of simply reporting yields, I have developed a method to report results from the standpoint of economic returns. What I have done is to evaluate results comparing the cost input of each fertilizer treatment against the “Marginal Value” or the increase (or decrease) in value of the actual sweet corn harvested compared with either an untreated check or against a standard commercially common fertility program. The following charts give the yield improvements and economic benefit for each treatment in the study utilizing low (40 pounds per acre) of pre-plant nitrogen.

TABLE 1

Profitability Analysis #1

Treatment	Rate	Input Cost	*Marginal Yield	+Marginal Value
Check	-	-	69	0
28-0-0	40 gallons	\$72	+247	\$1976
28-0-0	20 gallons	\$37	+198	\$1584
20-0-0	50 gallons	\$67	+157	\$1256
20-0-0	25 gallons	\$34	+157	\$1256

* Crates of 50 ears per acre

+ Dollar return compared to check

TABLE 2

Profitability Analysis #2

Treatment	Rate	Input Cost	*Marginal Yield	+Marginal Value
20-3-3	50 gallons	\$87	+209	\$1672
20-3-3	25 gallons	\$44	+122	\$976
Micro Mix	6 ounces	\$36 + 7	+279	\$2232
Mn	3 ounces	\$36 + 7	+261	\$2136
Zn	3 ounces	\$36 + 7	+244	\$1952

* Crates of 50 ears per acre

+ Dollar return compared to check

In Table 3, you can see the effect of various fertility treatments on both average ear weight and average ear length.

TABLE 3

EAR CHARACTERISTICS

Treatment	Average Ear Weight	Average Ear Length
Urea	.55 pounds	8.25 inches
28-0-0	.49 pounds	7.75 inches

Discussion:

The slow release nitrogen treatments in the low rate of pre-plant incorporated nitrogen (40 pounds of nitrogen per acre) trial resulted in marginal values of between \$1,256 and \$1,672 greater than the check treatments. Both Micro Mix and Mn treatments in combination with high rates of 28-0-0 produced the highest marginal profits of \$2,232 greater than the check. However, when used alone, 28-0-0 resulted in the production of \$696 less than the standard urea treatment in the second phase of the study. Remember however, the rates of slow release nitrogen used in this study were intentionally lower than our standard recommended rates for nitrogen.

Conclusion:

Slow release nitrogen did produce markedly higher sweet corn yields than the untreated checks.

Slow release nitrogen material did not produce yields or economic returns equal to the standard urea treatment.

More research is needed to test higher rates of slow release nitrogen.

Micronutrients show great promise in this study for producing higher sweet corn yields and have a very favorable marginal return relative to their cost.