

How much N do we need for first year corn? How do we account for sod N credits?

Nitrogen prices and environmental concerns have caused many of us to rethink our current N management practices and guidelines. With nitrogen prices continuing to climb – but at a slower pace (only up 8% since last year), farmers are increasingly concerned that they get a return on their fertilizer investment. Return on investment has led more of the profitable farms to focus on tightening their rotation. This has given them more yield of higher quality at a lower cost than the sequential monoculture many had been practicing. As they move to a two year corn, four year hay rotation, the first year of corn occurs more frequently. The question arises of how much nitrogen do I need for first year corn? It is common for producers to apply significant amounts of fertilizer N (beyond a starter fertilizer) to 1st and 2nd year corn fields (corn that follows grass/alfalfa sod in the rotation) as an insurance practice. Previous research data has shown that you only need 30 lbs of starter nitrogen. You can check your own fields at http://nmsp.css.cornell.edu/nutrient_guidelines/.

What about our newer, higher yielding varieties? Is Cornell too conservative? We want the most corn but if we get good growing conditions, will there be enough nitrogen to support a higher than normal yield? Can I justify extra manure on first year corn so I can be assured of enough N. Should I have some nitrogen applied with the herbicide “just to be sure?” These are all very legitimate questions of farmers wanting to maximize the profitability of their operation. Marvin LaGrange of Albany County asked these same questions for a field that had run out alfalfa (30% legume). It was close to the barn so it would be a favorite target for receiving manure immediately before sod plowdown. The soil was a well drained Hamlin silt loam (the best in the state). It was immediately across the road from a series of wells that supply the town of New Scotland. Thus environmental N management was a critical issue along with maximizing farm profitability.

Fortunately, their questions, and a research project at Cornell looking at N on sod fields coincided. The Nutrient Management Spear Program: Quirine Ketterings, Greg Godwin, Karl Czymmek, in cooperation with Cornell Cooperative Extension staff and various others worked together to determine corn N needs for first year corn (from grass/legume sods) and to test the performance of a new nitrogen predicting system that determines if extra N is needed and the end of season tests in identifying when too much N is applied.

Located in Fuera Bush, Albany County, Marvin, Doug, and David LaGrange were happy to have the researchers use a small piece of this land to test their farm’s nitrogen needs. The sod had been fall killed in early October. There is a growing supply of evidence that killing the sods earlier – in September – when the soils are warmer, leads to a loss of the majority of the N that normally would hold over the winter for the next crop. Thus we do not recommend September killing of sods.

Cornell’s nitrogen recommendations are much more comprehensive than many commercial and other university recommendations. The yield potential of the soil is where the recommendation starts. This is what the top 10 farmers would harvest the best 2 years out of 5. For this field the yield potential was in excess of 26 tons/acre (155

bu/a). It would normally need 186 lbs of N in order to maximize the yield potential of the crop.

This amount is reduced by the amount of N available from the soil under normal cropping practices. All soils release some nitrogen as part of the normal breakdown of organic matter. This was recently re-discovered in a Midwestern state as a significant source of the crops N. Cornell soil tests have been accounting for it for years. This field normally would release 80 lbs of N from the soil itself. Based on previous New York research, the sod was predicted to release 138 lbs of N for the first year.

Only the Cornell recommendations take the extra step of calculating the efficiency that the plant can use the N added in the soil. For example a well drained Bernardston soil has a 75% efficiency level. For every pound of N added to the soil only 0.75 of a lb is available for the plant. The rest is broken down, denitrified, and lost. For the less than well drained Pittstown soil that lays in the swales between the Bernardstons, only 65% of the N is available and so a corresponding higher amount of added N is needed to achieve the same results. For LaGrange's field, the soil was 75% efficient in utilizing N. When the calculations were all made, it showed a surplus of N and so no additional response was expected over the 30 lbs of starter N in the band.

The year of research at the LaGrange farm, as it was for many of the farms in the region, produced above average yields. This gave a real test to the system. Yields averaged over 22 tons/acre for the harvested area. As you can see in the table, there was **NO RESPONSE TO ADDED SIDEDRESS NITROGEN**. The sod residue supplied all the nitrogen needed to grow this tremendous crop. The photos show that the corn reached its maximum potential regardless of the amount of added nitrogen.

The results of this trial will be combined with results from the 18 other N rate studies conducted elsewhere in New York to generate a more complete picture of N needs following sod. A full report of all sites is pending

Plans for 2006

We hope to continue this project in 2006 with trials on the same locations (so 2nd year corn), as long as LaGranges keep the manure off of the site. We will use the same trial setup and build on our experience from 2005 with regards to field site standardization across a large number of sites and collaborators. The 2005 trials were initiated to tell us if extra N was needed for first year corn. Given a decent growing season next year, the 2006 trials will tell us how much N is needed for 2nd year corn.

We thank the LaGrange farm for offering their field for the test and for putting up with our activities while securing the critical data we need. We are looking forward to working with them again in 2006!

N Sidedress Rate	Corn Silage Yield	Stand Density at harvest
	Tons/acre (35% DM)	Plants/acre
0 lbs	22.1 a	29398 a
50 lbs	22.2 a	28500 a
100 lbs	23.0 a	28897 a
150 lbs	22.4 a	29504 a

† Average values with different letters (a,b,c) are statistically different ($\alpha = 0.05$)

Photo 1



Plot 301: 150 lbs N

Plot 302: 0 lbs N

Plot 303: 50 lbs N

Plot 304: 100 lbs N



Photo 2: LaGrange test field for nitrogen on first year of corn was in a critical environmental area. Immediately across the field were the town of New Scotland's water wells. Accurate nitrogen application are critical to preventing environmental contamination.



Photo 3: Determining the amount of nitrogen on first year corn is typical of the NY applied research the Field Crops and Soils department at Cornell uses to base their recommendations. Here Dr Ketterings (on right) and graduate assistant Greg Godwin process some of the many samples from the plots. The only complaint was from LaGrange and his custom harvester from the large pile of cut corn (because the yields were so high!)