

MEASURE AND MANAGE

Nitrogen Management for Corn in 2007

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What a difference only a few months can make in a corn market and what a difference it can make to Nitrogen recommendations using the Ontario N Calculator.

Ontario N Calculator

Year	Yield Goal	Previous Crop	N rec preplant	N rec Sidedress
2006	150	Soybeans	103	92
2007	220	Corn	212	191
2007	220	Soybeans	185	166
2007	180	Corn	181	163
2007	180	Soybeans	154	139

In the spring of 2006 using a yield goal of 150 bushels the N recommended was 92 lbs / acre at sidedress time using the Ontario N calculator. (\$2.25 / bus for corn and \$0.40 cent N). This field had a PSNT test that recommended 150 lbs actual N/ acre and resulted in a yield of 220 bushels per acre. The N calculator for next year (2007) with different pricing of corn poses an interesting dilemma. (\$4.35 for corn and \$0.50 N). What yield goal do we use and are we growing second year corn?

The impact on N rates is significant if we use last years actual yield. The N rate at sidedress time is 191 lbs actual an increase of over 127% of last years 150 N application and an increase of 207% over the Ontario N calculator recommended rate from 2006. The corn yield in 2006 which actually ended up yielding 220 bus using 150lbs N that was recommended from the PSNT.

Using this past year's actual yield results, the Nitrogen Use Efficiency of commercial N was 117%. More N was taken up than applied. The resulting crop removal of N in the grain was 176 lbs of N per acre. The total N up take was 330 lbs of N. Simple math suggest that another 180 lbs of N must have been available to obtain this yield. Where does it come from?

Soil Organic Matter

This field on average has 3.8% Organic Matter. This level of organic matter equates to 76,000 lbs of organic matter per acre. Organic matter is 5% Nitrogen. Therefore the estimate total N from organic matter is 3800 lbs per acre. In any given year 2 to 5 % of this will mineralize into plant available nitrogen supplying a range of 76 to 190 lbs per acre.

The amount that is mineralized from organic matter is dependant on weather and soil conditions. The same conditions that promote desirable corn growth also promote rapid and large releases of available N. This pool of organic N, tops up the Nitrogen requirement of corn. Is this sustainable? If you can maintain or increase organic matter, it is sustainable. The additions and deletions become important to understand.

In any given year 2 to 3 % of organic matter, in particular the carbon portion is lost. Therefore in this example we would expect a loss of 1520 to 2280 lbs per acre. A corn crop puts back in the form of stover almost the same weight as grain yield. At 220 bus per acre we would anticipate an addition of 12,000 lbs of organic material at 15% moisture. Approximately 75% of this will be respired and be lost as carbon dioxide during microbial breakdown over the next season resulting in an addition of 3000 lbs of organic matter, enough to cover the loss of 1500 to 2280 lbs per acre per year. A corn crop of 150 bushels adds a net of 2100 lbs. There isn't another crop we can grow that adds this much organic matter. The stover also contains approximately 1.6% Nitrogen resulting in approximately 192 lbs of N/ acre to be returned to the soil nitrogen pool.

Pre-Sidedress Nitrate-Nitrogen Soil test (PSNT)

PSNT ppm	Nitrogen Recommendation Lbs Actual N/ acre	Delta Yield Bushels/ acre	Fixed Application PSNT cost \$ / acre	Total N cost \$ / acre	% Return on Nitrogen
20	29	9	13.50	28.00	39
15	78	26	13.50	52.50	115
10	127	48	13.50	77.00	171
5	176	76	13.50	101.5	225

PSNT Pre-Sidedress Nitrate Soil Test

Delta Yield is the expected yield gain over using no nitrogen

Fixed Applicator Cost includes an estimated \$9.00 per acre application cost plus cost of zone mapping, PSNT sampling and lab analysis.

Total N Cost is the cost of recommended N @\$0.50 per pound actual plus fixed applicator cost.

% Return On Nitrogen is calculated at $\$4.35$ per bushel of corn x delta yield – Total cost of Nitrogen divided by the Total cost of Nitrogen x 100

This table shows the economic return based on the Delta yield concept or the yield response obtained from the applied Nitrogen versus not applying nitrogen. As the sidedress test results increase the need for additional Nitrogen to obtain maximum yield declines.

Regardless of the price of corn the response stays the same. The economics of corn production have changed dramatically, due to sharp price increases in corn. The significance in using the PSNT test relative to the Ontario N calculator requires an understanding of response to Nitrogen on a site specific basis versus a regional approach based on anticipated yield levels.

The use of the **PSNT** provides a level of prediction in so far as the amount of response can be determined independently from yield. No one knows in the month of May at planting time what the size of the crop will be. But we can with reasonable assurance determine the size of the response to N applications based on the PSNT. Contrasted with the past 3 years of long term averages in the 150-170 bushel range and obtaining actual yields in excess of 200+ bushels per acre begs the question what yield goal will you choose in 2007?

Fully realizing the economics of a 10 bushel increase in yield is worth $10 \times \$4.35 = \43.35 / acre and covers an application of 86 lbs of Nitrogen at $\$0.50$ / lb. A yield increase of 75 bushels is worth $\$326.00$ and covers an application of 652 lbs of N (Which nobody will do). So rationalizing N rates based on economics is no better. Calibration of N rates based on soil testing and related management factors is a far more prudent practice. If maximum yields can be obtained at 150 lbs of N why put on 190?

Getting the Job Done in 2007

Job number 1 in the spring is planting the crop. The fall season of 2006 was a long drawn out affair with less than stellar field conditions. Prolonged wet periods forced many farmers into performing field operations in less than ideal conditions. Some of the fields have been left with ruts and compacted soils. Very little fall tillage was performed in some locations. This may increase the work load in the spring to perform primary tillage to bury residue and repair ruts.

Early planting of corn has paid dividends and now early planted soybeans are crowding the planting window. Reducing planting delays will likely be a high priority in 2007. Convenience decisions that speed up planting will be required if both corn and soybean yields are to be optimized. This may lead to the use of liquid starters and sidedressing of Nitrogen or multitasking to reduce the number of trips over the fields. Preplant N applications, “weed n feed” on some fields by custom application may very well increase as there is limited sidedress equipment available to rent at a retail level. Corn acres are sure to increase, custom planting demands are likely to rise as well.

We learned to tighten our belts with \$2.25 corn and went into survival mode. We learned that we can get along with less to a point. Mining of soil nutrients P and K was tolerated on high testing soils, not so much on medium and low testing soils. As the economics of corn growing improve we can afford to implement sound agronomic principals of replacing what has been removed, especially on potassium fertilization. Soil testing should be a high priority once again. Soil test results assist in making knowledge based decisions on directing nutrient resources where they will do the most good.

The spring of 2007 will require careful planning of all aspects of crop production with high priority to activities that allow early, timely planting. Remember \$4.50 corn price should be telling you to sell some corn not just plant more.