

Revisiting Starter Fertilizers for Corn

Purpose:

It has been long recognized that proper use of starter fertilizers can increase corn yields and net profits. Numerous options with regard to choice of product, placement and rate of starter fertilizers exist, with these choices having impacts on profits because of either the size of yield response and/or cost of application. Furthermore, the quantity of nitrogen (N) applied as part of a starter fertilizer program may be influenced by timing of bulk fertilizer application (i.e. Pre-plant or Side-dress). A multi-year study was initiated in 2008 designed to evaluate yield and economic response of corn to various starter fertilizer products, placement options and rates when bulk N fertilizer was either applied pre-plant or side-dress.

Methods:

In 2008, two field sites were selected on silt loam soils located near Elora and Hamilton. Soil-test P and K were in the medium to medium-low range for both sites, averaging approximately 12 ppm soil test P, and 60 ppm soil test K.

The experimental design at both sites was a strip block design with three replicates. Twelve starter fertilizer treatments which varied in product, placement (in-furrow vs. 2"x 2" band) and rate were randomly assigned to each replicate. A list of starter fertilizers applied, their rate and placement are presented in Table 1. Each replicate was split into two strips (i.e. front vs. back) to which 150 lb-N/ac of bulk N fertilizer was applied as either a pre-plant or side-dress application. Pre-plant N was applied as broadcast urea which was incorporated and side-dress N was applied as 28% (UAN) which was knifed mid-row when corn was at the 6-8 leaf stage. To focus the experiment on phosphorous impacts 200 lbs/acre of 0-0-60 was also applied pre-planting to all treatments.

Results:

There was no consistent effect of timing of bulk N fertilizer application on corn yield response to starter fertilizer across the two sites. Furthermore, the same general corn yield response to the various starter options occurred across sites. Therefore, the yield results presented in Table 1 are averaged across sites and bulk N application treatments.

Generally, the in-furrow fertilizers increased yield by 12 to 15 bu/ac, 75 to 150 lb/ac of MAP increased yield by 16-18 bu/ac and dry fertilizer blends that contained N, P and K increased yield by 24-27 bu/ac (see Table 1). In these trials, applying 10 gal/ac of 28% as a starter or in combination with another starter fertilizer, did not increase yield by more than 4 bu/ac compared to the treatments where the other starter fertilizer (i.e. none, 75 lb/ac MAP or 5 gal/ac in furrow 10-34-0) was applied alone. Grain harvest moisture was not affected by more than 1% by starter fertilizer (Table 1).

Net returns were increased by approximately \$15 to \$21/ac using just in-furrow fluid starters, \$30/ac using just 75 lb/ac of MAP and \$43 using custom blend starters that contained N, P and K. Net returns were not increased by applying 150 lb/ac of MAP over the 75 lb/ac rate. Use of 28%, either as a stand alone or in combination with other fertilizers, did not increase profits over what could be obtained if it was not applied. Also, combining a 5 gal/ac 10-34-0 in-furrow application in combination with 75 lbs/ac of MAP

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did not increase net returns over what could be obtained using these products separately. It should be noted that time and equipment costs were not included in these preliminary net return calculations. Some caution should be taken in interpreting these results as these sites were quite responsive to starter fertilizers and yields were quite high in 2008.

Table 1. Corn yield, harvest moisture and economic returns associated with various starter fertilizers. Average of 2 sites in 2008.

Starter Fertilizer Treatment	Rates (per acre)	Corn Yield (bu/ac)	Harvest Moisture (%)	Economic Returns (\$/ac)
Control	-	172	25.9	774
28% Only, 2x2	10 gal	175	26.1	765
Alpine 6-24-6, In-furrow	7.5 gal	187	25.4	789
10-34-0, In-furrow	5 gal	184	25.9	795
10-34-0, 2x2	5 gal	187	25.8	808
10-34-0 + 28%, 2x2	5 + 10 gal	176	25.8	732
MAP, 2x2	75 lbs	188	25.6	804
High Rate MAP, 2x2	150 lbs	190	25.4	771
MAP + 28%, 2x2	75 lbs + 10 gal	192	25.6	799
MAP, 2x2+ 10-34-0, In-furrow	75 lbs + 5 gal	193	25.8	793
8-32-16, 2x2	125 lbs	196	25.1	817
13-23-22, 2x2	175 lbs	199	25.2	817

Economic return calculations based on Gross Revenue less Starter Fertilizer Costs with corn at \$4.50/bu; 6-24-6 at \$7.19/US Gal.; 10-34-0 at \$6.99/US Gal.; MAP at \$0.56/lb; UAN at \$2.25/US Gal.; 8-32-16 at \$0.52/lb and 5-20-20 at \$0.40/lb. The net return calculation only considered cost of product and did not include costs associated with convenience, planting speed or equipment required.

Summary:

The first year of this study demonstrated that a wide range in yield responses and profits can be obtained based on choice and rate of starter fertilizers applied. The study to date has shown that on fields with medium to medium low soil P and K tests, profitable yield responses will occur when P and K based starters are applied. The profitability of the starter options (just considering cost of products) ranked as follows: 1) custom-blended starter formulations that contained N, P and K, 2) 75 lb/ac of MAP in a 2" x 2" band less and 3) in-furrow fluid starters.

Next Steps:

This is the first year of a three year project. Similar field trials are to be conducted in the 2009 and 2010 cropping years.

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Project Contacts:

Greg Stewart, OMAFRA, greg.stewart1@ontario.ca, 519-824-4120 ext. 54865.