Corn Yield Response to Starter Fertilizer

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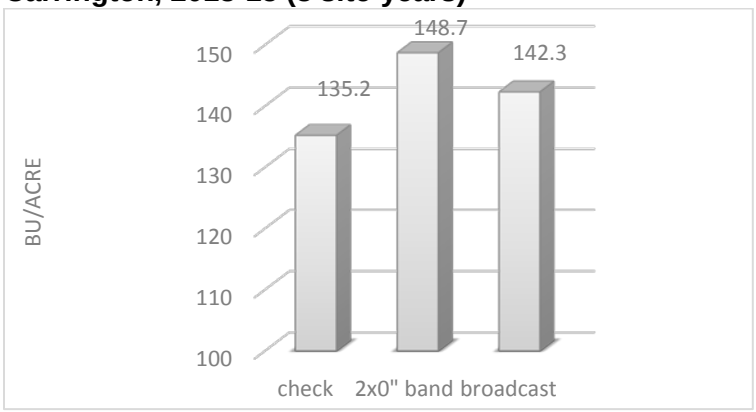
North Dakota State University recommends the use of phosphorus (P) starter fertilizer for optimizing corn growth and grain yield. Field trials have been conducted at the NDSU Carrington Research Extension Center during the past decade (since 2007) to examine corn response to selected liquid starter fertilizer application strategies. This report will summarize grain yield from selected fertilizer treatments conducted across multiple trials.

The dryland trials were conducted on loam soil, generally testing medium or less for P, using either strip or conventional tillage systems. P application rates were based on NDSU corn fertilizer recommendation tables. The standard starter fertilizer treatments were 10-34-0 applied in a 2- by 0-inch band (2 inches horizontally placed from planted seed) or in-furrow (directly placed with planted seed). Best management practices were used for corn production including providing adequate levels of plant nutrients besides P.

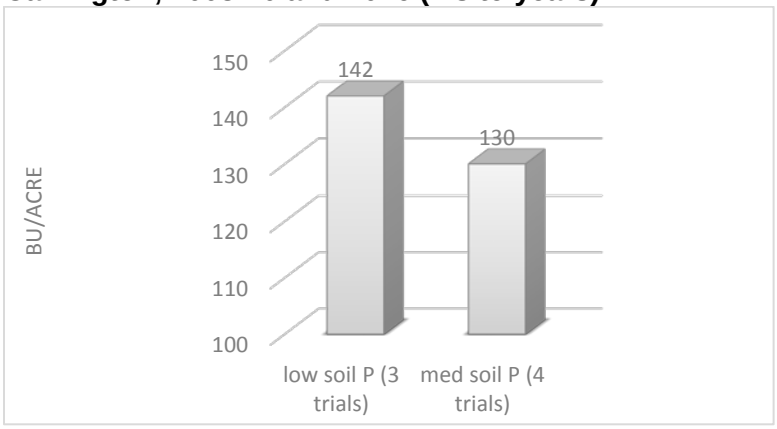
Averaged across three trials (site-years), yield increased with banded 10-34-0 compared to the untreated check and tended to increase compared to broadcast application (Figure 1). Banded fertilizer rate was one-third less compared to the broadcast rate. Yield response tended to be greater with banded fertilizer on low- versus medium-P soils (Figure 2). Yield was similar with banded and in-furrow applied 10-34-0 (Figure 3). Yield increased with 3- and 6-gpa of in-furrow applied 10-34-0 compared to the untreated check (Figure 4). Although statistically similar, yield tended to improve with 6- versus 3-gpa of 10-34-0. Averaged over three trials, there was not a yield advantage with split-rate application of 10-34-0 as a band plus in-furrow versus only band or in-furrow application at the full rate (Figure 5). At similar actual P application rates, yield averaged across three trials was similar with in-furrow applied 10-34-0 and the low-salt fertilizer 6-24-6 (Figure 6).

Figure 1. Corn grain yield among 10-34-0 application methods, Carrington, 2013-15 (3 site-years)*



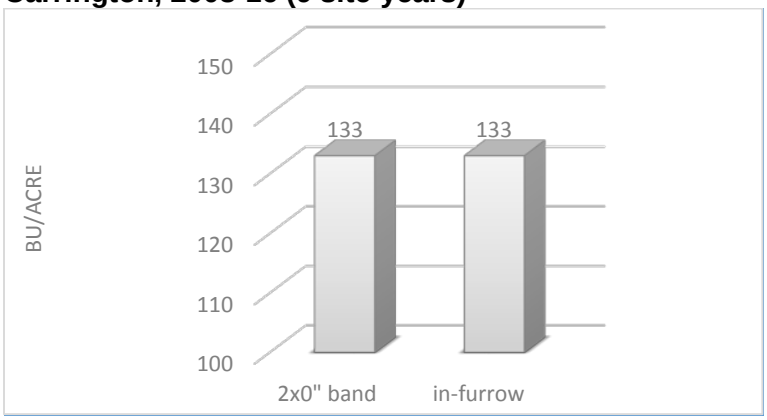
*soil P: 3-5 ppm (very low to low). 10-34-0 broadcast application: 2013 = PRE, 2014-15 = PPI; rate (gpa): 2013 = 18, 2014 = 17.4, 2015 = 9. 10-34-0 band application rate (gpa): 2013-14 = 12, 2015 = 6.

Figure 2. Corn grain yield with banded 10-34-0 between soil P levels, Carrington, 2008-10 and 2016 (7 site-years)*



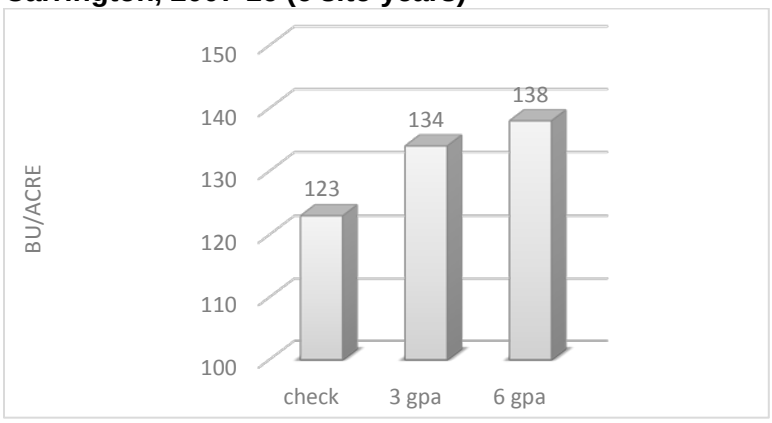
*soil P (Olsen test): low=7 ppm; medium=9-11 ppm. 10-34-0 applied at 5-6 gpa in 2x0" band or in-furrow.

Figure 3. Corn grain yield between 10-34-0 application methods, Carrington, 2008-16 (9 site-years)*



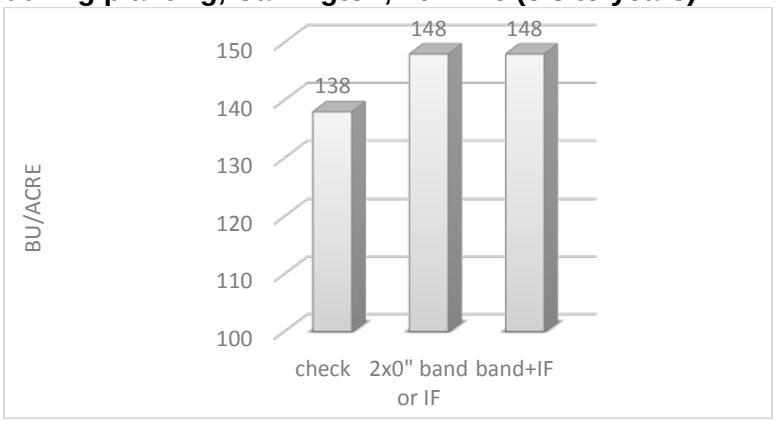
*10-34-0 application rate (gpa): 2.5-6.

Figure 4. Corn grain yield among rates of in-furrow applied 10-34-0, Carrington, 2007-16 (6 site-years)*



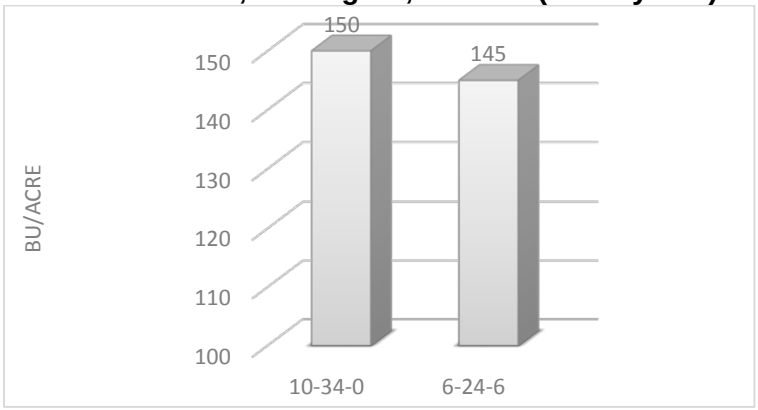
*Soil P: 3-10 ppm (very low to medium).

Figure 5. Corn grain yield between 10-34-0 fertilizer placement methods during planting, Carrington, 2014-16 (3 site-years)*



*Soil P: low. 2014 rates (gpa): band = 12 and band+IF =6+6; 2015-16 rates (gpa): band or IF = 6 and band+IF = 3+3. Early season plant stand similar among treatments.

Figure 6. Corn grain yield between in-furrow 10-34-0 and 6-24-6 fertilizer sources, Carrington, 2014-16 (3 site-years)*



*Soil: P=5-7 (low); K = high. 2014: 6 gpa 10-34-0 and 9 gpa 6-24-6; 2015: 3 gpa 10-34-0 and 4.5 gpa 6-24-6. Plant stand similar between treatments.