

Dr. Ron Heiniger

In Search Of The Right Starter Combinations To Optimize Corn Yields

North Carolina studies look at best blend of nutrients, best rate, and the impact of additives.

Studies in North Carolina have shown that high plant populations lead to increased yield. Because ear size is determined by V6, good early growth is essential to obtain maximum ear size and yield. Recent research has shown that by combining a starter or popup fertilizer with management practices that increase early root growth, a larger root system can be developed that enhances early plant growth, resulting in larger ear size, better stress tolerance,

SUMMARY

Our studies support previous work that shows, in most cases, a clear benefit from using starter fertilizer on corn. In all three studies where there was a non-starter check, data show a significant yield increase from at least one of the starter materials. There were no differences in yield response among the different blends tested in these trials. At rates of 20 gal/A or more the trend in data tended to favor materials with higher concentrations of N, supporting our current recommendation favoring starters (such as 19-19-0) that deliver more N relative to the amount of P applied. None of the tests allowed us to measure the impact of additional K. Overall, use of an additive (Avail® in this study) with the starter increased yield by 3 to 12 bu/A. It appears the additive was more effective under certain conditions, such as at Pamlico County where cool, very wet

soils were a factor after planting and at Perquimans County where the additive apparently resulted in more available P in a situation where the soil concentration was low. When using a 2 x 2 band, the optimum rate across these studies ranged from 10 to 20 gal/A. Again, an examination of the total amount of N applied versus the yield response showed that rates should be adjusted to deliver at least 20 lbs/A.

less lodging, and greater yield.

However, there are no clear answers as to the best blend of nutrients for starter fertilizer or the best rate of starter to use.

Even more questions have been raised as to the values of fertilizer additives.

The studies reported here were de-

signed to answer these questions.

Yields by County

Pamlico & Currituck. When data were combined across these two locations there were significant location, starter treatment, and starter rate effects.

The Currituck County site had a slightly greater yield (200.6 vs. 193.7 bu/A in Pamlico County) as shown in Figure 1. The plots at the Pamlico site were flooded by heavy rain shortly after emergence, resulting in the presence of the disease "Crazy Top." This



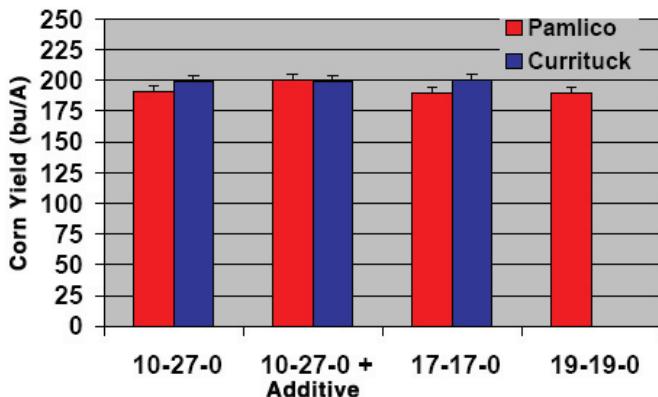


Figure 1. Corn yield response to starter treatments at Currituck and Pamlico County locations.

contributed to the yield differences between locations. Differences among treatments with an additive added to 10-27-0 were small with only a 3 bu/A increase in yield.

The key difference among starter treatments occurred at the Pamlico location where 10-27-0 plus an additive resulted in a significantly higher grain yield compared with other treatments. Yield was increased by 10 bu/A when an additive was added to 10-27-0. The impact of the additive may have been enhanced by the cool, wet conditions at this site.

When the data were combined across locations, there were differences in yield among application rates for starter materials (Figure 2). The check treatment (no starter) had the lowest yield while the highest grain yield was achieved when 10 gal/A or more of the starter material was applied.

Davidson. The only significant differences at this site occurred among the control treatment and the high rates of 17-17-0 with or without an additive (Figure 3). While the two starter materials with potassium (K) did not improve yield, they did reduce the amount of stalk lodging observed in the field. The use of these materials in the furrow did impact the rate of plant emergence and this

probably resulted in the lack of yield response observed with these materials.

Perquimans. A significant yield increase was observed between the plots receiving 12-12-4 alone and those where an additive was mixed with the 12-12-4 (Figure 4). The 11-bu/A yield increase observed at this location was similar to that observed in Pamlico

County. This site (Perquimans) had the lowest soil test index for phosphorus (P) of any of the sites tested (P index of 37) and the starter material had less P compared to materials used at the other locations. The use of an additive in this situation may have increased the amount of P avail-

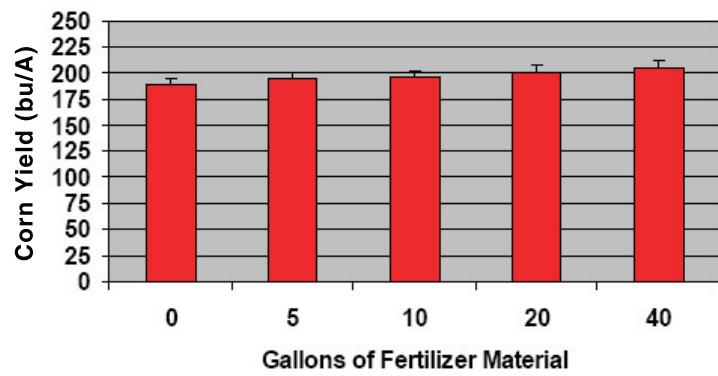


Figure 2. Effect of amount of starter fertilizer on corn yield. Data combined for the Currituck and Pamlico County locations.

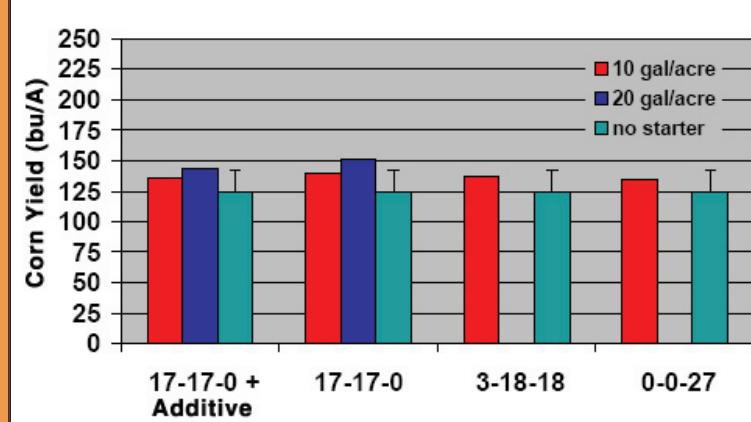


Figure 3. Corn yield response to starter fertilizer treatments in Davidson County

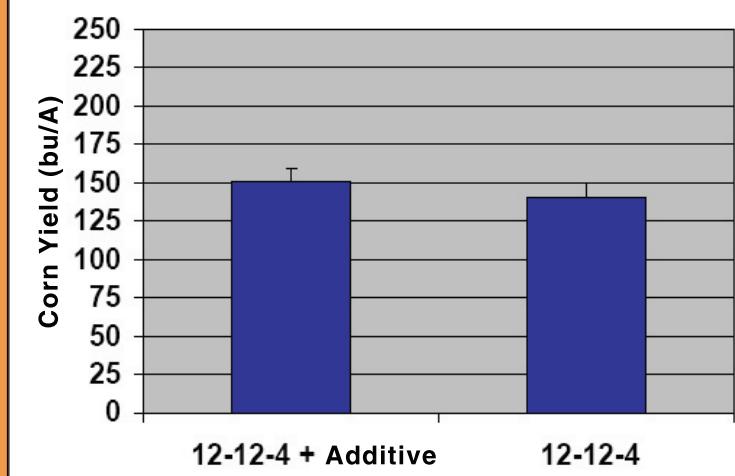


Figure 4. Corn yield response to starter fertilizer treatments in Perquimans County.

able to the crop.

Treatments by County

Pamlico and Currituck. Main treatments were 10-27-0, 10-27-0 plus an additive, 17-17-0, and 19-19-0 (at Pamlico location only). Each of these materials was applied using four application rates: 5, 10, 20 and 40 gal/A in a 2 x 2

band with the exception of the 19-19-0, which was applied in a deep band 8 inches below and 2 inches to the side of the seed.

Davidson. Main treatments were 17-17-0, 17-17-0 with an additive, 3-18-18, and 0-0-27. The 17-17-0 and 17-17-0 plus an additive were applied at 10 and 20 gal/A in a 2 x 2 band, while the 3-18-18 and 0-0-27 were applied at 10 gal/A in a furrow.

Perquimans. Main treatments were 12-12-4 and 12-12-4 plus an

additive. These were applied at 20 gal/A in a 2 x 2 band.

At all locations 30 percent UAN was applied at layby at rates adjusted within each starter treatment to provide an N total of 180 lbs/A.

Dr. Heiniger is professor of crop science and cropping systems, College of Agriculture, North Carolina State University.