CERTIFIED CROP ADVISER

Foliar Nutrition: Does it work? How can a grower make the right decision?

by Mike Bakker *CCA-ON*

Agriculture is a changing business, from increased use of precision farming technology, new crop protection products, and new corn varieties. One of the biggest changes that is starting in the USA is the concept of foliar feeding a crop in season to supplement the crop as the season progresses. Growers that are winning yield contests for corn and soybeans are using foliar feeding as a key tool to ensure that a potential bin buster crop isn't limited on any kind of nutrient (micro or macro), in order to extract every bushel possible. One macro nutrient that growers use to push yield is nitrogen. Nitrogen is unique in that it works through mass flow which relies on the movement of water to make its way into the plant. Once nitrate is in the plant, it then moves through the xylem and into the leaves and finally the chlorophyll. Small amounts of nitrogen can also be taken in by the leaves of the plant, but if used at too high of a rate, burning can occur.

One of the greatest examples of the efficiency of foliar feeding was done in the 1950's by two scientists (Dr. H.B. Tukey and Dr. S.H. Wittwer at Michigan State University). Using radioactive isotopes of known plant nutrients, they found that nutrients were absorbed by plant foliage and translocated throughout the plant. Tukey and Wittwer also reported that foliar feeding could provide about 95% efficiency of nutrient use versus only about 10% efficiency of nutrient use from a soil application. This was confirmed again by Chris O'Dell, an extension agent at Virginia Tech, in the early 2000's.

In 2016, Mike Bakker and his team, in conjunction with a third party laboratory, did some work looking at nitrogen, and the impact of foliar feeding with a controlled release nitrogen product. A key part of this work was to look at both soil and tissue tests at two key times: V5/V6 and early tassel. At each stage they did three tests: soil, tissue, and soil nitrate. To keep the trial manageable, it was conducted in an area from Varna to Mitchell and as far north as Ripley with four different growers. Each of the different sites had a very similar nitrogen program of 170 to 200 units of nitrogen applied up-front. Each site had a balanced foliar nutrient program and two gallons of a controlled release foliar nitrogen applied at tassel with a fungicide.

The first sample at V5/V6 provided results which would be expected, nitrate levels in the low to mid 30 ppms and the tissue samples showed that plants were high to excessive for key nutrients; nitrogen was no exception. The second round of samples is where it became very interesting, especially from a nitrogen standpoint. As much of the spring of 2017 has been continually wet, the summer of 2016 was the exact opposite and growers were praying for rain.

When the soil and tissue samples were done just prior to tassel, each of the different sites had significant amounts of nitrate in the soil. In fact, one site had in excess of 60 ppms! (which is about twice the required amount at that time of year). Still, the tissue test showed a different story. Just because the nitrate is present in the soil, doesn't mean it's getting into the plant. At the time, just prior to tassel, the tissue test showed that three of the four sites were at best medium on nitrogen, yet the soil nitrate told a different story. In the case where the soil nitrate test was off the charts, the tissue test showed it was only at a medium nitrate requirement. The key here is that even with excessive nitrogen, for nitrate to move into the plant you need water. This was a key learning – having nitrate in the soil does not mean the plant can get at it, it needs moisture to move into the root. The opposite of this was also true as in 2015 when it was very wet, the nitrogen moved out of the root zone due to excess moisture. Ultimately, when it comes to nitrates, soil moisture is a key factor in terms of availability in the plant and using foliar feeding products can help to manage the last 10-15% of units to maximize corn yield potential.

Overall, we saw a yield advantage 75% of the time, and this matched the rain fall data for the period. This re-enforced the power of foliar nutrients to help spoon feed the crop at critical times. Doing this intensive trial further re-enforced our trial work from the past three years, that in most cases there is a benefit of later season foliar nitrogen applications with an average yield increase of eight bu/ac. Another key learning we had was that once you see a nutrient deficiency, especially in a luxury nutrient consumer like corn, you are likely to have already lost some yield potential. One key fact remains, foliar nutrition does not and is not intended to replace a solid base plan of soil nutrition. It is meant to bring us to a higher level of production that is limited by soil nutrient amounts and the plant's ability to extract them. As I like to tell the growers that I work with, foliar applications will help to better manage the last 10% to 15% of yield, which with lower prices can make the difference between a profit and potential loss.

Note: The data noted in the article above is based on four sites, occurring in one year only.

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