



BALANCED CROP NUTRITION

Next-Generation Seed Requires New Approach to Fertility

BY TOM FRY

The Mosaic Company



Seed industry leaders Dow AgroSciences, Monsanto, Pioneer Hi-Bred and Syngenta have all set aggressive goals to increase corn yields. Doubling yields by 2030 is an admirable and daunting goal that plant breeding and biotechnology are sure to play a huge role in achieving. However, in addition to these new technologies, new management practices also will be required to optimize yields.

This season, 47 percent of U.S. corn acres were planted to stacked-trait, insect-resistant hybrids, but little is known about the effect of technology on corn nutrient uptake and the exact nutrition needed to optimize yields. That's why researchers at the University of Illinois—Urbana-Champaign are comparing the nutritional needs of these hybrids to their non-resistant counterparts. Preliminary research results show the nutrient uptake of resistant hybrids is significantly greater than their non-resistant counterparts.

Intact roots absorb nutrients more efficiently

"CRW-resistant hybrids change everything," says Dr. Fred Below, professor of Plant Physiology, University of Illinois. "Because rootworm larval feeding is suppressed, and therefore the root system protected from damage, the corn plant absorbs nutrients more efficiently and ultimately realizes a higher yield potential."

More efficient nutrient uptake suggests higher levels of nutrients are needed to achieve that added yield potential. In the University of Illinois trials, CRW-resistant hybrids yielded 205 bu/acre, while the non-resistant hybrids yielded 179 bu/acre, a 14 percent difference.

"Results of our initial trials show that the per-acre removal rates of nutrients [N, P, K, S, Zn] are from 14 to 27 percent greater for hybrids with the rootworm-resistant gene," adds Below. "In fact, both the yield and the concentration of nutrients in the grain were higher for the transgenic hybrids."

"As we look at these results, we see very large increases of zinc (Zn) and P removal, in particular, which means soil test levels of these nutrients may rapidly

decrease," Below points out. "As corn rootworm-resistant hybrids become increasingly popular and are planted every year, it will be important to take these trends into account as nutrient management plans and fertilizer recommendations are formulated."

With nearly half of U.S. corn acres planted to transgenic hybrids costing as much as \$100 to \$140 per acre for seed, it is important growers apply the nutrition needed to optimize yields and generate a good return on these genetics.

Table A.
Increased Yield of Rootworm-Resistant Hybrids Removes More Soil Nutrients

CRW-RESISTANT vs. NON-RESISTANT	DIFFERENCE %
Yield increase	14 %
N removal	14 %
P removal	24 %
K removal	19 %
S removal	17 %
Zn removal	27 %

Champaign, IL 2008; average of two hybrid pairs



Innovation in Fertilizer Technology

The Mosaic Company is working to bring farmers innovative fertilizer products and information to provide better understanding of balanced crop nutrition. To this end, the company surveyed farmers, fertilizer dealers and university soil scientists across Asia, South America and North America, investigating their needs and wants for fertilizers and plant nutrition services.

"Overwhelmingly, the results showed farmers wanted to go beyond existing N, P and K fertilizers to products that offer balanced nutrition," says Dean Fairchild, assistant vice president of Agronomy for The Mosaic Company. "Their priorities were products to help manage needs for nutrients such as sulfur, zinc and also boron," relates Fairchild.

After intensive research, Mosaic scientists and engineers developed a patented process to manufacture a fertilizer granule that incorporates nitrogen, phosphorus, sulfur and zinc.

The product is MicroEssentials® SZ,TM and it is a major breakthrough in dry-fertilizer technology. The unique chemistry of this phosphorus-based product delivers a balanced ratio of essential nutrients for better nutrient uptake by plants. In addition, by including all nutrients in one granule, distribution is uniform, so every plant receives the correct amount of each nutrient.

The MicroEssentials family of products delivers sulfur and phosphorus in the proper ratio for most crops, so these two nutrients are more available and easier for plants to use. Nitrogen is provided in the readily available ammonium form to help get young plants off to an early start. Finally, MicroEssentials includes sulfur in both the elemental and sulfate forms for season-long availability.

Studies show MicroEssentials fertilizer enhances plant uptake of phosphorus up to 30 percent and improves zinc uptake by up to 45 percent as compared to a typical blend. These improvements in nutrient utilization mean a better return on the investment in fertilizer. For more details, visit www.microessentials.com.