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Plant Nutrition TODAY
Better Crops, Better Environment...through Science

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HOW TO CHOOSE AN ENHANCED-EFFICIENCY FERTILIZER

Fertilizers form part of the environmental footprint of farming. A footprint is the sum of all resources used and impacted in producing something. If producers can enhance the efficiency of fertilizers, they can shrink the footprint of farming while boosting profits.

Many products to enhance fertilizer efficiency have become available. Slow-release forms and inhibitors have been around for decades, and the advent of nanotechnology promises to put an even wider array of products into the market. How does a producer choose the right one? Here are six key questions you can ask to help make the right decision.

1. Do you know the mode of action, and is it relevant to your crop, soil, and climate? Any product designed to enhance efficiency acts on the processes that can limit the availability of a nutrient from a particular fertilizer source, under particular circumstances. You can be confident in a product that has a relevant mode of action published in the scientific literature. If it doesn't, it's an experimental material in which you wouldn't want to invest a lot until you've done a few years of well-replicated on-farm testing.

2. How has the product performed in fields like yours? Field testing is necessary even if the mode of action is well-defined, because not all modes of action address issues that truly limit efficiency. Ask to see the field testing data. Not just a few examples, because efficacy varies from one field to another, depending on soil, crop, and weather. You need crop response data from a range of sites and a range of years. Also ask whether the data are from all situations tested, or selected for particular circumstances or types of situations.

3. How does the product perform in your fields? Your specific conditions—soil, crop rotation, tillage management, etc.—influence the efficiency of uptake of plant nutrients and the efficacy of specific products designed to enhance that efficiency. That's why field testing on your own farm is important. Split fields are ineffective tests – two halves of any one field rarely yield the same. Replicated strips are necessary to sort out random noise from true effects. Crop advisers can help ensure the right decisions are drawn from your data.

4. Does the product enhance your ability to plant at the optimum time? Determining how the product fits in with the rest of your field operations is important. Look closely at the rate, timing, and placement recommendations specific to the enhanced-efficiency product.

5. Do you have opportunity to improve? Measure your efficiency, and compare to industry norms. For example, in recent years, North American corn producers have been getting about 1.2 bushels of grain per pound of N fertilizer applied, on average. Since this average includes fields with manures applied and preceding perennial legumes, not every field can attain this level. But how do yours compare? If you know the nutrient analysis of the crops you are harvesting, you can also calculate a nutrient balance as another decision aid. If you already remove as much nutrient as you apply, it's hard to improve efficiency.

6. What opportunities exist for innovation? Innovative use may offer new opportunities to boost crop yields. For example, a recent study in Nebraska showed that controlled-release urea could boost the N uptake of soybean without slowing its biological N fixation, raising the yield ceiling in intensive irrigated production.

Enhancing efficiency has many benefits. Getting answers to the six questions above will guide your expectations for the opportunity to shrink your environmental footprint with enhanced-efficiency products. If you can cut losses of ammonia and nitrate, reduce greenhouse gas emissions, improve yields, boost quality, and save trips across the field, you can truly reduce your environmental footprint—and increase your profits sustainably.

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Abbreviations: N = nitrogen.

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