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Better Crops, Better Environment...through Science

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CROP NUTRIENT ECONOMICS: PRICE RATIOS

"Agriculture is beset by uncertainty, especially as regards weather and prices." (C.A. Black, 1993)

Fertilizer prices shot up in early 2008. Crop prices surged and retreated, and with uncertainty in global financial markets it's hard to predict where they are going. So what does it mean for the way you manage crop nutrients?

The concept of price ratio has been an integral part of the theory of fertilizing for optimum profit since fertilizer marketing began. As fertilizer prices increase relative to those for crops, optimum rates decline, and vice versa when crop prices increase—so the theory goes. Based on the law of diminishing returns, the influence of price ratios can be illustrated quite nicely with figures showing crop response curves. A host of mathematical techniques have been devised to do the calculations.

However, there are several problems with the theory of price ratios. Key pieces of information needed to apply the theory may be missing. The price the producer will receive for the crop may be unknown. A long time may transpire between the fertilizer purchase and its payback from the sale of the crop. And the exact nature of the crop response function to the nutrient in question may be unknown.

First, how well can you know the price of a crop at decision time for fertilizer? Futures markets allow a price to be locked in. But it isn't wise to sell the whole expected crop on the futures market, since weather may drive production below expectations. Assuming that an April futures price for December delivery will hold until harvest is dangerous—and frequently leads to overestimating crop prices.

Second, how long will it take to sell the crop? For producers with storage, the optimum time of sale is rarely at harvest, and may vary from late winter to just before the next crop comes off. This could mean as much as two years between the fertilizer decision and the payback. Some producers may even prefer to look at price ratios a different way: compare the price received for last year's crop to the price of fertilizer for this year's. While as a practical rule of thumb it may control overspending by avoiding dangerous assumptions on prices, it doesn't fit the theory for applying the law of diminishing returns to the fertilizer investment. It's the price of the crop that responds that counts.

Third, let's deal with crop responsiveness. How well can a producer know how much the crop will respond, and how much to apply to get that response? Decades of research have led to many ways to estimate this response function, which are built into sound agronomic recommendations. The precision of the estimate depends on getting as much information as possible to predict soil nutrient supply and fertilizer use efficiency, set a realistic yield goal, and balance nutrient inputs and removals. When all this information is available, even the best recommendation systems are only capable of addressing half of the variability around the average true optimum rate for a crop.

The take-home message is that every tool in the box needs to be used to ensure that amount applied is as close as possible to the amount the crop needs. Take advantage of every information source that fits into your local recommendation system. This may include soil testing, analysis of local trends to predict attainable yield, plant analysis of previous crops, remote sensing, chlorophyll sensing, past response trials, previous crop history, and rates and analysis of manures applied.

The theory of price ratios, despite its weaknesses, is still valid. It rarely calls, however, for large changes in application rates. When prices increase, first ensure the agronomy behind your management of plant nutrients is sound. Are you using every tool available to choose the right product, to predict the right rate, to apply it at the right time, and to place it where it's most effective? Price ratio theory can help fine-tune rates, but only after the fundamentals of sound agronomic recommendations have been applied.

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