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ANOTHER LOOK AT THE IMPACT OF PRICES

Over the past several years we have spent lots of time talking about the effect of prices on crop production practices. In the late 1990s, we were addressing what seemed to be chronic low commodity prices. Then in the early 2000s, natural gas price dramatically increased with N fertilizer prices quickly following. The prevailing question in these circumstances was: “Just how much do shifts in commodity and/or fertilizer prices affect optimal rates of fertilizer applications?” Or, put another way: “How much should I adjust my fertilizer application in response to changing prices and costs?”

A lot has changed over the past few months. Due to the biofuels frenzy and other factors, the grain price situation has significantly improved. However, fertilizer prices are in general at near record levels. Therefore, now is a good time to again review some of the basic principles of fertilizer economics.

There are four primary factors affecting profitability: crop price, production costs, yield level, and crop quality (as it affects price). Typically, producers are price takers and thus have little control over prices. However, they do have control over variable costs, which directly impact yield and quality. In this sense, yield level is a controllable factor influencing profit. Once a decision has been made to plant a certain crop, it becomes a matter of making the most of the opportunity. This requires planning an efficient program designed to produce maximum returns per acre...in other words, to produce yields that maximize profit.

Greater profits come from higher yields since costs are spread over more units (bushels, bales, pounds, etc.), resulting in lower cost per unit of production. Efficient and profitable production involves lowering unit cost to a point of maximum net return. Analysis of a long-term irrigated corn study conducted in western Kansas has demonstrated the relationships among yield, cost per unit of production, and profit. In this study, several N fertilizer rates were evaluated with (40 lb P₂O₅/A) and without P fertilization. When averaged over 30 years, the profit maximizing N rate (or economic optimum N rate) where P was applied was approximately 147 lb N/A (assumes \$0.45/lb N and \$3.50/bu corn). The yield produced at this level of fertilization was slightly lower than the maximum yield that required 167 lb N/A. Phosphorus fertilizer increased profit by about \$170/A at the optimum N rate (assumes \$0.50/lb P₂O₅). Cost per unit of production was near minimum at the optimum N rate where P fertilizer reduced cost by \$0.58/bu.

Crop and fertilizer prices have a lesser effect on optimum levels of fertilization than one might anticipate. This is because in determining profitability, yield level tends to have an overshadowing effect on crop and fertilizer price. An Excel budgeting tool created by economists at Kansas State University demonstrates this effect. For irrigated corn (220 bu/A yield goal) where N is \$0.45/lb, the difference in the optimum N rate when corn price goes from \$3/bu to \$4/bu is 22 lb (from 233 to 255 lb N). Similarly, if corn price is \$3.25 and N price ranges from \$0.30 to \$0.50, the optimum N rate differs by only 20 lb N/A (from 255 to 235 lb N/A). Many other assumptions (defaults) were made in this analysis. In addition to corn, this tool has options for analyzing other crops and is available online at this URL: >www.agmanager.info/crops/budgets/proj_budget/decisions<.

Balanced and complete crop nutrition is critical to system profitability, even with higher fertilizer prices. Best management practices for application of right nutrient rate, source, time, and placement are especially important in today's environment. Keeping soil test information up-to-date, identifying profitable fields or field areas, using all nutrient sources available, and adopting nutrient management practices grounded in proven scientific principles assure the greatest chances for success.

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Abbreviations in this article: N = nitrogen; lb = pounds; bu = bushels; A = acres.

Note: *Plant Nutrition TODAY* articles are available online at the IPNI website: www.ipni.net/pnt