

MSU Extension specialist offers fertilizer management information

May 4, 2017 -- MSU News Service

BOZEMAN – With commodity prices at about a 10-year low, Montana State University [Extension](#) soil fertility specialists suggest steps for small grain producers to optimize fertilizer dollars. These include determining correct rates and selecting the appropriate fertilizer source, time of application and placement to optimize fertilizer use.

"When commodity prices are low, it is a good time to take a close look at fertilizing practices," said Clain Jones, soil fertility specialist with MSU Extension and the MSU College of Agriculture's [Department of Land Resources and Environmental Sciences](#).

"Protein content can become even more important when grain prices drop, and we encourage producers to not skimp on nitrogen, especially when there is a high penalty for low-protein grain, called a protein discount," Jones said.

Based on regional research by MSU scientists, including Jones and Perry Miller, MSU professor of cropping systems, fertilizing at the full suggested nitrogen rate is more important for the bottom line when protein discounts are high rather than low.

MSU Extension's web-based economic [nitrogen rate decision tool](#) for small grains can help producers determine the amount of nitrogen to apply for maximum net revenue, according to Jones. The calculator is available for winter wheat, spring wheat and barley produced after fallow. Users enter yield goal, soil nitrate level and organic matter, as well as anticipated wheat price, nitrogen fertilizer cost and protein discount and premium.

Past yields are a good indication of future performance and are valuable for selecting a realistic yield goal, Jones said. The MSU [variety selection tool](#) suggests regionally appropriate varieties. Jones recommends using a conservative yield estimate for the pre-plant nitrogen rate and applying in-season nitrogen if the growing season shows potential for high yields.

Yield and grain protein from prior years can be useful to evaluate past nitrogen management and adjust nitrogen rates if needed, according to Jones.

"For example, if a farm is consistently getting discounted (losing money) for low grain protein, it's likely that yield has also been hurt by low nitrogen fertilizer rates," Jones said.

MSU fertilizer guidelines are based on spring soil nitrate levels. Because getting timely spring soil samples can be difficult, Jones suggests producers compare fall with spring test results a few times to see patterns of loss or gain for given fields, then adjust future fall test results accordingly. Depending on soil characteristics, fall soil tests will often over- or under-estimate spring soil nitrate values, he said.

Urea (46-0-0) is the most common nitrogen fertilizer used in our area, according to Jones. It is, however, susceptible to both ammonia loss to the air and nitrate leaching, he said.

"Proper application method and timing minimize these losses," Jones noted. "Ammonia-based fertilizer (e.g., urea) applied shortly before plant growth and urea incorporation with adequate water, tillage or banding greatly increases the amount of fertilizer dollar that reaches the crop," Jones said. "Adding a urease inhibitor to urea decreases ammonia loss to the air, and nitrification inhibitors can reduce nitrate

leaching. Another option is to use urea ammonium nitrate (32-0-0; 28-0-0) or calcium ammonium nitrate (27-0-0), which have lower ammonia loss potential.”

Legume pulse or cover crops in rotation are an excellent source of nitrogen, but are not a quick fix, Jones said. Yet, depending on the legume management and location, MSU studies have shown legumes as cover and grain crops can provide similar or higher net returns than fallow wheat, while maintaining or increasing soil organic matter.

Other nutrients such as sulfur, phosphorus and potassium should not be ignored, according to Jones.

“Adequate sulfur is important for nitrogen uptake,” he said. “If the prior crop showed sulfur deficiency, then sulfate before or at seeding could be a wise investment. Elemental sulfur needs time to break down and should be applied in the fall or with a prior crop.”

A small amount of starter (pop-up) phosphorus can get plants off to a strong start, Jones added. He reminded producers to build phosphorus during good times or when fertilizer cost is low, to rely on soil banks during lean times.

Jones has found that potassium and micronutrient deficiencies are the exception, not the rule, in most Montana soils.

"Potash at seeding generally takes care of grain potassium and chloride needs," said Jones.

“Micronutrients should only be used if there is economic benefit to the producer.”

Jones suggested strip trials in the field as an excellent tool to determine potential economic return.

The MSU Extension soil fertility [website](#) has many resources, including bulletins and presentations that provide detailed information on how to determine correct fertilizer rates and management practices to ensure the fertilizer gets to the plants, rather than into the air or ground water. There are also links to online fertilizer rate calculators and a recent talk on fertilizing in a down market, posted under "presentations."

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