National Fertilizer Solutions Association

FLUID FACTS

NFSA AGRONOMIC NEWSLETTER

WHEAT TOPDRESSING: A BMP FOR THE '90S

Many factors must be considered to produce a profitable wheat crop. While timing and labor requirements may prevent a grower from implementing many of the available best management practices (BMPs), topdressing can be an effective practice to squeeze maximum yield and profit out of the fertilizer dollar.

Here's a summary of BMPs for wheat fertility based on research from throughout the U.S.

GREAT PLAINS

According to Dr. Dwayne Westfall at Colorado State University, over 65 percent of the soils in the Western Great Plains are deficient in N for dryland winter wheat production. He found that spring application of N fertilizer was superior to fall-applied N in increasing yield and protein content using currently grown cultivars. "As producers increase the management intensity of dryland wheat, spring N fertilization may be economically advantageous," Westfall reports.

Benefits of spring application include the ability to evaluate the following variables contributing to harvestable yield potential:

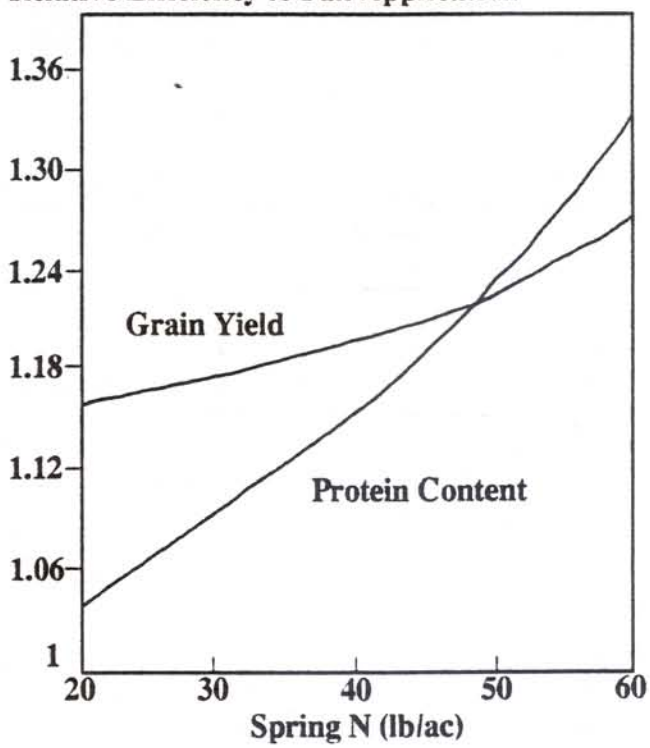
- Crop stand and effects of winter kill.
- Soil moisture conditions.
- Carryover nutrition from mineralization of crop residues and effects of overwinter leaching.

Although leaching is not common in the Great Plains, each field should be evaluated separately to determine spring fertilizer requirements.

Spring-applied N results in higher yields than equivalent amounts of fall-applied N. For example, 40 pounds of spring-applied N was as effective as 48 pounds of fall-applied N—a 20 percent increase in N efficiency simply through improved application timing!

This increased efficiency provides strong economic incentives for growers to apply the majority of N in the spring. For example, wheat with a 12.5 percent protein content may bring a premium of nine cents per bushel. Increased gross income of $19/ac has resulted from improved application timing in Colorado trials.

FIGURE 1
Relative Efficiency to Fall Application



TOPDRESSING BENEFITS

Spring application of N also helps reduce N-loss due to leaching or denitrification in waterlogged soils in more humid, soft winter wheat production areas. Research conducted at the University of Maryland and the University of Missouri indicates that spring topdressing of wheat is environmentally and economically attractive.

Results from the University of Missouri indicate that applying 80 to 120 pounds N/ac in a two-way split (one-third

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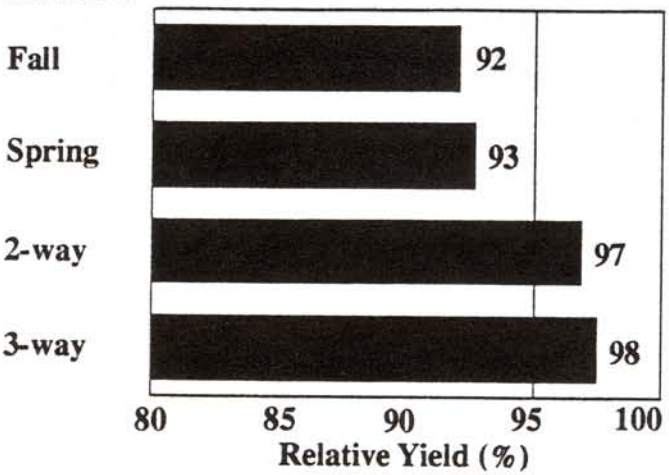
fall-applied and two-thirds applied as wheat breaks winter dormancy) is an effective BMP.

FIGURE 2



Effect of nitrogen timing on relative yield of winter wheat (2 year average over three sites).
Source: Buchholz, et. al., University of Missouri

It is possible to obtain 90-95 percent of the best possible yield for a location in a given year by applying N fertilizer in either the fall or spring. Split applying fertilizer N during fall or spring in either two or three applications can optimize chances for obtaining at least 95 percent of the best possible yield for that location. A five to eight percent yield increase often can be expected through split applications.

For yield goals greater than 100 bu/ac requiring more than 120 pounds N/ac, a three-way split (third application of one-third of N rate applied before appearance of the flagleaf) is recommended.

EASTERN U.S.

Researchers at the University of Maryland use past cropping rotations, yields, N rates, application method, soil type and weather records in a comprehensive nitrogen management program. At many locations, severe lodging can occur with N rates above 90 pounds/ac if the residual N is not considered in the total N-application.

Maximum economic yields cannot be reached by increased N rates alone. At most Eastern locations, highest maximum economic yields were obtained with a split application of 100 to 120 pounds N/ac along with fungicide(s) and/or a growth regulator. Without a growth regulator, high-yielding wheat varieties can be susceptible to lodging when high levels of N are present. Proper management of N in relation to the other nutrients required by wheat is important to produce a profitable, maximum economic yielding crop.

When planning wheat-soybean double-crop programs, it is very important not to delay wheat maturity. For each day of delayed soybean planting beyond the optimum planting date, yields can drop one bu/ac per day. Proper spring N management, however, can promote high yields and will not delay maturity.

In sandy soils, there is insufficient available NO_3-N to initiate spring growth, according to University of Maryland researchers. An initial application of 60 pounds N/ac as UAN dribbled onto the soil before greenup followed by an equal amount when the wheat stem is first elongating (Zadok's growth stage 31) averaged 85 bu/ac in sandy soil. These trials showed a trend toward higher yields with higher rates of N, particularly if N rates were split-applied. On finer textured soils, nitrate retention may be sufficient to allow a single spring topdress at the time of maximum N-uptake (Zadok's GS 30/31).

To take advantage of higher rates of N, Maryland research shows that applications must be made early (before greenup), as shown below:

N-RATE LBS N/AC	TIMING EARLY	MID	LATE
0	54.6d		
60	87.3bc	89.6bc	84.4c
80	87.8bc	87.2bc	89.4bc
100	93.4ab	88.4bc	88.2bc
60+60	97.3a	90.5bc	84.2c

Results averaged from three sites. Means followed by the same letter are not significantly different at the 5 percent level of probability. Approximate Timing Early: Mid- to late-February Mid: Early- to mid-March Late: Late-March to early-April Split application for early and mid treatments were performed at same time as late treatment applications at each site. Split applications for late treatments were performed 16-26 days after late treatment.
Source: Mulford, Kantzes and Bandel, University of Maryland

KNOWING THE SIGNS

Symptoms of nutritional deficiencies in small grains often are subtle. Stunted or uneven growth (frequently associated with loss of green color, lack of tillering and vigor, low yields and shrivelled grain) are common symptoms of nutrient deficiencies. Nutrient demand is greatest between tillering and heading, and this is when deficiency symptoms are most likely to be seen.

Excessive fall N may contribute to lush growth and result in frost injury. Also, diseases such as powdery mildew, septoria leaf and glume blotch, and take-all can be more severe if excessive N is available to the crop.

Topdressing wheat is one means to manage fertilizer N to avoid excessive fall N and provide growers with a valuable tool in reaching maximum economic yields (MEY).