K-Mag AGRI FACTS

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Balanced Fertility And K-Mag For Profitable Wheat Production

Maximum economic wheat yields are being achieved by an ever-increasing number of growers from coast to coast. These top growers all have one thing in common — they have all put together a complete package of production inputs, tailored to meet their specific needs. A well-balanced fertility program is an extremely important component of the overall production plan for high yields of quality wheat. And K-Mag can play a very important role in such a fertility program. This naturally-occurring mineral (langbeinite) contains three nutrients essential for the growth of all plants — potassium (22% K_2O), magnesium (11% Mg), and sulfur (22% S). These nutrients are very important for the production of high quality wheat.

Potassium

Potassium performs many beneficial roles in plant growth. Adequate K nutrition has a considerable beneficial effect on the water balance of plants. Transpiration loss of water from leaves is reduced as K concentrations increase. Plants are better able to withstand periods of drought. The effect of K in increasing stem diameter and strength of stems of many plant species has been well documented. Wheat plants low or deficient in K are thus much more susceptible to "lodging." In addition, K plays an important role in the translocation of photosynthates produced in leaves, to the kernels, during the grain-filling development period of wheat.

Wheat has a relatively high requirement for K. Most varieties require about as much K as nitrogen (N). An 80-bushel crop will typically absorb a total of about 180 pounds K_2O. Table 1 shows results of field trials in Kansas with six wheat varieties. Potash applications increased yields from 3 to 21 percent, the average increase being 12 percent. Average kernel weight was consistently increased by K. Also, K applications consistently reduced the incidence of leaf rust an average of 27%. Increased disease resistance in wheat due to applications of K has been observed by many researchers.

Table 1. K Increases Yield And Disease Resistance In Wheat. Kansas.

K_2O Rate (lb/A)	Yield (bu/A)	Kernel Weight (Mg)	Disease Rating %
0	65.3	29.6	30
40	72.9	31.4	22
80	72.5	31.7	22

Magnesium

This is an often overlooked, but very important nutrient in wheat fertility programs. Magnesium is a part of chlorophyll, the green coloring matter of plants. Magnesium is thus essential for the process of photosynthesis, the process by which plants produce carbohydrates from carbon dioxide and water. Wheat plants low or deficient in Mg, do not produce optimum amounts of carbohydrates for translocation to the developing kernels, and many different growth processes are adversely affected.

Two factors that have a considerable effect on Mg nutrition of wheat are: a.) level of potash fertilization; and, b.) soil temperature. It has been shown in many experiments that as potash application rates increase, plant absorption of Mg decreases. A deficiency of Mg can be induced by

application of potash fertilizers on soils that are relatively low in Mg. It is important to maintain a proper balance between K and Mg in soils and plants. The use of K-Mag in a well-balanced fertility program is a cost-effective way to do this.

Also, low temperatures in the rooting zone (often encountered early in the spring growth cycle) has been shown to depress absorption of Mg. It is especially important to maintain optimum levels of Mg in the rooting zone during this period. An 80 bushel wheat crop will absorb about 17 lb. Mg, which is equivalent to the amount of Mg in 150 lb. of K-Mag.

Sulfur

Sulfur is also a very important nutrient for optimum production of high-quality wheat. Sulfur is a component of several amino acids, the "building blocks" of proteins. This nutrient is therefore very important with respect to the quality of wheat. Many experiments have shown that S fertilization increases percent protein in wheat.

Field studies in Arkansas have shown that applications of 5 lb. S per acre increased wheat yields nearly three-fold (Table 2).

Table 2. Wheat Response To Sulfur. Arkansas.

Treatment	Yield bu/A	Percent S In Tissue
Control, 0 S	15.3	0.11
5 lb. S/acre, as K_2SO_4	44.4	0.25
20 lb. S/acre, as K_2SO_4	35.7	0.42
40 lb. S/acre, as K_2SO_4	36.0	0.50
40 lb. S/acre, as elemental S	29.3	0.11
26 lb. K/acre, as KCl	18.5	0.07
52 lb. K/acre, as KCl	18.8	0.08

The greatest response here was obtained with 5 lb. S per acre as potassium sulfate (K_2SO_4). This is a very low rate of application, and most S recommendations for wheat would fall in the range of 20-30 lb. S per acre. It is quite possible that in this soil, S was present at very low levels in the upper soil profile, and S levels increased with depth in the profile. The 5 lb. S rate could have been just sufficient to promote early root growth down through the profile to where S levels were adequate for optimum growth. The response to K_2SO_4 was due to the S component and not to K, as evidenced by the lack of response to KCl applications. Also, elemental S did not become available quickly enough in the trial to affect yields.

Use Of K-Mag In Wheat Fertility Programs

K-Mag is used to supply the Mg and S requirements of wheat. Application rates depend on soil analysis results, but are typically in the range of 150-200 lb. per acre. These rates will supply 16-22 lb. Mg and 33-44 lb. S. Since K-Mag contains 22% K_2O, this will also result in the application of 33-44 lb. K_2O. However, recommendations for K_2O often exceed this amount, and this additional K_2O should be supplied as muriate of potash (MOP - 60% K_2O). For instance, if application rates call for 35 lb. S and 100 lb. K_2O, these amounts could be supplied as follows:

160 lb. K-Mag	=	35 lb. K_2O	+35 lb. S (+ 17 lb. Mg)
110 lb. MOP	=	65 lb. K_2O	
Total	=	100 lb. K_2O	+35 lb. S (+ 17 lb. Mg)

In summary, the use of K-Mag in a well planned, balanced fertility program offers the following benefits:

- A highly water-soluble, plant-available source of K, Mg and S.
- A non-acidifying source of plant nutrients — K-Mag has no effect on soil pH.
- Helps increase protein content and disease resistance.
- Helps maintain a proper balance between K and Mg.