



Frequently Asked Questions

What is K-Mag?

K-Mag® brand of fertilizer, langbeinite, potassium magnesium sulfate, and sulfate of potash magnesia all refer to a unique 3-in-1 combination of highly available sulfur, potassium and magnesium product. Present in the water-soluble sulfate form, these three plant nutrients are essential for plant growth and are vital to profitable crop production.

Where does K-Mag come from?

K-Mag is mined and processed near Carlsbad, New Mexico, from the world's largest and purest deposits of langbeinite ore. Langbeinite, an evaporite mineral, is one of the most soluble salts in the ocean. Millions of years ago, in part of what was an isolated lake of ocean water, langbeinite was one of the last minerals to be precipitated as the water evaporated over time. As a result, ore beds are now located about 1,000 feet below the earth's surface.

What is the salt index of K-Mag?

In the following chart, the relative salt index is compared with those of several fertilizer materials. The salt index of K-Mag is relatively low.

Fertilizer Material	Relative Salt Index
Potassium Chloride	116.2
Ammonium Nitrate	104.7
Sodium Nitrate	100.0
Potassium Nitrate	73.6
Ammonium Sulfate	69.0
Potassium Sulfate	46.1
K-Mag	43.2
Monoammonium Phosphate	34.2
Diammonium Phosphate	29.9

What is the advantage of the low chloride content of K-Mag?

Many crops have a low tolerance of high chlorides in the soil and in fertilizers. Sensitive crops, such as

tobacco and many fruits and vegetables, have lower quality and shorter shelf life when excessive chloride is present. Using K-Mag, especially when high rates of potassium are required, provides a low chloride source of potassium. In many cases, the quality of the fruit and vegetables is enhanced, while tobacco has a much higher quality cured leaf.

What are the different grades of K-Mag?

Grade	% K ₂ O	% Mg	% S	SGN	UI
PREMIUM	21.5	10.5	21	265	55
GRANULAR	22.0	10.8	22	260	36*
STANDARD	22.0	10.8	22	85	15

*K-Mag contains less than 2.5% chloride (Cl) maximum, and 0.14% water (H₂O). The pH is neutral (7.0). *UI is 36 for GRANULAR while K-Mag PREMIUM is higher, making it ideal for blends.*

Is a neutral pH an important characteristic of K-Mag?

K-Mag is a neutral salt and does not affect the soil pH, regardless of the amount applied. Many fertilizer materials do contribute to the acidity of the soil. Since most crops grow best in soils that are slightly acidic to slightly alkaline, a neutral salt such as K-Mag does not contribute to reducing the soil pH below the desired range.

Is K-Mag water soluble?

Using the standard chemical analytical procedures for determining the solubility of fertilizer compounds, K-Mag has been determined to be nearly 100% water soluble. Two primary factors determine the solubility of a compound: the chemical nature of the compound and its particle size. Due to the chemical nature of K-Mag, it is slightly denser when compared to muriate of potash; thus, it has a slower rate of solubility. Yet, it is nearly 100% water soluble.



Both are water-soluble, neutral salts in the sulfate form and have a low salt index. Potassium sulfate contains two essential plant nutrients, potassium and sulfur (50% K₂O and 18% S). SOP does not contain magnesium.

Do the nutrients in K-Mag leach?

Once K-Mag has dissolved in soil moisture, the three nutrients are subject to the typical behavior of the individual nutrients and the soil processes. In most soils, the sulfur in K-Mag will move much like nitrate nitrogen (NO₃). Only in very sandy soils do potassium and magnesium leach to a limited degree. In less sandy soils that contain more clay (usually CEC greater than 5), little or no leaching losses will occur from an application of K-Mag. Because K-Mag dissolves gradually, it resists leaching.

Can K-Mag be used in fertigation?

K-Mag is not normally recommended for use in fertigation or general application through an irrigation system. Although K-Mag is water soluble, its rate of solubility is slower than muriate of potash. Also, there are usually small traces of naturally-occurring phosphates in water. In some cases, phosphate fertilizers are added to irrigation water. Magnesium in water, with even small amounts of phosphates present, may react and form a gel that will clog nozzles of the irrigation equipment.

Most crops require more potash than sulfur.

How do I get a proper fertilizer blend using K-Mag?

Generally, K-Mag is not used as a source for the total potash requirement. For most field crops, K-Mag will be recommended at a rate to supply most, if not all, of the magnesium and sulfur fertilizer requirements. Then, muriate of potash (KCl) would be used to provide the remaining potash needed. In high-cash-value crops - where quality is critical for marketing, chloride sensitive crops are grown, or when low salt index is required - K-Mag can be used in combination with potassium sulfate or potassium nitrate to provide the remaining potash.

I am not aware of a sulfur need. How do I determine if K-Mag should be utilized to provide sulfur?

All plants need sulfur. Typically, a wide range of crops use 15 to 50 pounds per acre of sulfur (S) depending on the type of crop and yield. Experience is the best indicator for sulfur fertilizer need. Sandy soils, low in organic matter in high rainfall areas, will invariably be low in sulfur. Because sulfur availability

is impacted so greatly by environmental conditions, many universities and research organizations make a blanket recommendation for sulfur of 10 to 20 pounds per acre. The degree of soil deficiency, plus crop requirements, help define the amount of K-Mag to apply to meet the sulfur requirement. Soil testing for sulfur is not as reliable for predicting sulfur availability throughout the growing season as for other nutrients. Therefore, plant tissue analysis can help build an experience base.

What is the function of sulfur in plants?

One of the 16 essential elements for plant growth and development, sulfur is a component of some of the amino acids that are the building blocks of proteins. Soil tests for sulfur are not always reliable. Sulfur exists in several oxidation states in the soil. Only sulfate (SO₄) is available to plants, so soil test correlations are difficult since its mobility in the soil is similar to nitrate nitrogen. Sulfur recommendations often are based on crop removal data. Some state crop specialists suggest an application of 20 pounds per acre annually as a STANDARD practice. If alfalfa or another high-oil crop is grown, a rate of 30 pounds per acre annually is needed. In plant tissue, a 1:1 phosphorus-to-sulfur ratio is required. When the nitrogen-to-sulfur ratio is greater than 15:1 in plant tissue, low sulfur levels are indicated. Deficiency symptoms include the following:

- Young upper leaves tend to turn light green to yellow.
Even though sulfur is mobile in the soil solution, it is NOT mobile in the plant.
- Small spindly plants with short slender stems develop
- Plant and fruit maturity is delayed

What is the function of magnesium in plants?

Magnesium is one of the 16 essential plant nutrients for plant growth and development. It is the central atom in the chlorophyll molecule and is responsible for the plant leaf trapping sunlight. This is important in energy transfer, a central function of plants. Lighter soils with low cation exchange capacity may not hold adequate magnesium where it is needed. However, soils derived from parent materials void of magnesium also may be deficient. In these situations, a readily available, water soluble source of magnesium may be needed. The deficiency symptoms can be identified as follows:

- Weak stalks with long-branched roots
- Leaves curved upward along margins
- General loss of green color seen in bottom leaves
- Leaf veins remain green as discoloration occurs between veins
- Pre-harvest fruit may drop

Water Solubility of Magnesium Compounds

Material	Formula	Water Solubility (gm/100 ml H ₂ O)
Magnesium Hydroxide	Mg(OH) ₂	0.0009
Magnesium Oxide	MgO	0.00062
Magnesium Carbonate	MgCO ₃	0.0106
Magnesium Chloride	MgCl ₂	54.25
Epson Salt	MgSO ₄ ·7H ₂ O	71.00
K-Mag	K ₂ SO ₄ - 2MgSO ₄	28.00

(Sulfate of Potash Magnesia)

What is the difference between Mg and MgO in K-Mag?

The magnesium content of K-Mag is expressed as 11% in elemental magnesium (Mg) and about 18.5% when expressed as magnesium oxide (MgO). From the early days of chemical analysis, the traditional way of expressing chemical content was to do so in the oxide form, e.g., MgO. Mathematically, the 11% of magnesium in K-Mag is 66% greater when the weight of oxygen (O) is added to the Mg. This does not change the amount or percent of elemental magnesium (Mg) present. MgO is simply another mathematical way of expressing the same thing.

What is the difference between S and SO₄ in K-Mag?

Sulfur (S) and sulfate sulfur (SO₄) differences are explained just like Mg and MgO. The sulfur (S) content of K-Mag is 22%. When it is expressed in the oxide form, oxygen's presence increases the sulfate sulfur content to between 63-66% as SO₄. As with magnesium, the actual content is not changed by using different mathematical methods of expressing it.

What are the advantages of K-Mag as a fertilizer source?

- A naturally-occurring mineral
- Contains a unique 3-in-1 combination of potassium, magnesium and sulfur
- Essentially chloride-free at 3.0% maximum
- Sulfate source of all three nutrients
- Neutral salt that does not change the soil pH at any application rate
- Nearly 100% water soluble
- Blends or mixes well with most common fertilizer materials
- Economical when two of the three nutrients are needed
- Very economical when all three nutrients are needed

Can K-Mag be used when soil Mg levels are high?

K-Mag can be added to soils high in magnesium, if there is justification for applying potassium and sulfur in the sulfate form. The typical range for K-Mag application rates is 200 to 300 pounds per acre. At these rates, 42 to 63 pounds per acre of actual Mg is being applied. This amount is trivial in soils that are testing 500 to 1,000 pounds per acre already. Also, high levels of magnesium are not toxic to plants. In rare cases, a problem may potentially exist when the magnesium soil test level exceeds that of calcium.

What is the difference between K-Mag and gypsum?

While K-Mag contains three essential plant nutrients, gypsum contains only two, calcium and sulfur. Calcium is typically present in adequate quantities in most soils to meet the plant's nutritional needs. Both nutrient sources are in the sulfate form and are neutral salts, which do not affect the soil pH.

When are K-Mag and dolomite lime used?

K-Mag works best to supply sulfur, potassium and magnesium when the soils are deficient or the fertilizer is desired for other reasons. Dolomite lime-stone, contains 12% or less magnesium in a form that has low water solubility. It is applied to soils when the soil pH is lower than desired. K-Mag can be used any time magnesium is needed. Dolomite provides magnesium only when applied to raise the soil pH. The magnesium availability to the crops is slow and only at the same rate that the lime reacts to raise the soil pH. Therefore, K-Mag is recommended on low pH soils along with dolomite, so the crop will have a readily available source of magnesium before the dolomite lime releases magnesium.

Are K-Mag and elemental sulfur equal sulfur sources?

K-Mag has three nutrients in the sulfate, water-soluble form and does not affect the soil pH. Sulfate sulfur from K-Mag is readily available. Elemental sulfur is not very water soluble. Soil microorganisms must digest the elemental sulfur to convert it to a sulfate form for crop uptake. This can be a slow process. Another characteristic of elemental sulfur, in many cases a strong disadvantage, is the acidifying effect it can have on the soil pH.

How does K-Mag compare with potassium sulfate (SOP)?

K-Mag and potassium sulfate are similar in chemical nature.

What are the other sources of magnesium?

Material	Magnesium Percent	Water Soluble
K-Mag	10.5-10.8%	Yes
Magnesium Sulfate	10-16%	Yes
Dolomitic Limestone	6-12%	No
Magnesium Oxide	56-60%	No
Magnesium Hydroxide	40%	No

How much K-Mag is available to crops the year it is applied?

Since K-Mag is nearly 100% water soluble, its nutrients will be in the form available to the crop in one to three weeks when the soil moisture and temperature are suitable for plant growth. Nearly all of the K-Mag applied will be dissolved and its nutrients available for the plant to use during the growing season.

Why use K-Mag instead of ammonium sulfate?

The agronomic disadvantage of ammonium sulfate as a sulfur source is that it's highly acidifying and it lowers the soil pH. In high pH soil, ammonium sulfate may provide a useful function in addition to providing sulfur as a nutrient. However, this is a strong disadvantage in most cropping situations. When soils are inherently acidic or low in pH, using ammonium sulfate intensifies this situation. K-Mag has none of these negative characteristics.

Can K-Mag be used to protect cattle from grass tetany?

Researchers have determined that the condition is linked to a shortage of magnesium and calcium in forages. However, their work shows that grass tetany is more than simply a magnesium deficiency. Without sufficient phosphorus, grass tetany may result even if soil magnesium is adequate.

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Phosphorus promotes the uptake of magnesium and calcium as its levels are increased and the two nutrients move to the leaves. In a three-year research study of phosphorus influence on phosphorus, potassium, calcium and magnesium concentrations in ryegrass and Coastal Bermudagrass, applied phosphorus increased tissue magnesium concentrations. Applying phosphorus and magnesium may not completely alleviate the potential for grass tetany, but applications of both nutrients may help correct the problem.

The first step in preventing grass tetany is to use a balanced fertility program, which starts with a soil test. Establish the fertility status of the soil and then determine the desired yield level. Apply a water-soluble fertilizer such as K-Mag to provide the needed magnesium.

What crops are best suited for using K-Mag?

K-Mag is suited for use with any crop, providing one or more of the three nutrients contained in K-Mag are deficient or low in the soil. In addition, specialty crops or high-cash-valued crops are particularly suited because of the importance of quality in the harvested portion of the crop. The sulfate, low-chloride form of these nutrients is important in imparting quality as well as quantity to the harvested portion of the crop when they are needed.

How much sulfur, potassium and magnesium do typical crops use?

The following table gives the amounts of K₂O, Mg and S used in the above-ground portion of various crops for a particular yield level. This information can serve as a useful guide in determining the crop's requirement for these three nutrients.



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