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Potassium Use in Field Crops

by Jonathan Zettler, CCA

Above average potassium prices over the past two years has lead many growers to reduce usage. This article will revisit the role potassium plays in the plant and provide insight into potassium management.

Potassium Role in Plants

As plants take up potassium the majority of it remains in the plant solution, with a minor amount becoming part of the plant material. Potassium deficiency appears first on the older leaves as it remains mobile within the plant. The appearance is often described as necrosis or yellowing of the margins. The deficit will first appear on the older leaves as it moves to new plant growth.

Plant functions that potassium plays a critical role;

- Builds structure components such as lignin and cellulose, which play a major role in stalk strength and lodging resistance.
- Influences the respiration of the plant regulating the stomatal openings on the leaves.
- Effects water uptake by providing a mass flow gradient (will affect uptake of other macro and micro nutrients).
- Influences starch and sugar content (cell integrity), enhancing storage quality in vegetables and fruits. Aids in disease and insect resistance.



Have you had diseased plants or heavy insect infestations? Both issues are affected by potassium availability in the plant. While there are many factors affecting disease and insect pressure, infestations tend to favour plants with poor plant health. ie. Soybean Aphids. Potassium levels have also been shown to affect seed quality in soybeans. Phomopsis Seed Rot has been shown to reduce with applications of potassium on soils with a deficiency.

When considering a potassium source there are more considerations than price alone;

- Availability is affected by the type of potassium you are spreading. Sulfate sources tend to be more readily available than chloride sources as they are more water soluble.
- Chlorides in Muriate of Potash are toxic to high use potassium crops that have chloride sensitivity.
- Excessive amounts of potassium can induce magnesium deficiency.
- With the *Clean Air Act* and general green movement, sulfur applications may be required for high sulfur use crops.
- Sodium content if using base saturation as a method of crop/soil test recommendation.

Sources:

Soil Fertility Handbook, Publication 611. OMAFRA, Queen's Printer for Ontario, 1998.

Kinsey, Neal and Walters, Charles. Hands-On Agronomy. Acres USA, 1999;

Sij, J.W. et al. "Suppression of Anthracnose and Phomopsis Seed Rot on Soybean with Potassium Fertilizer and Benomyl." Agronomy Journal 1985 77:639-642

Murrell, Dr. T. Scott. Phosphorus and Potassium Best Management Practices for Soybeans. Potash and Phosphate Institute, AgriBriefs Fall 2005 No. 4

- Soil type, pH and Cation Exchange Capacity (CEC) are all factors in affecting potassium availability.

This fall soil test your fields to develop your potassium plans.

Questions to ask include:

- Where are you planting high potassium use crops?
- Are your soil test levels low in these field?
- Has there been past history with lodging, insects or disease?

Scout your fields this summer for signs of deficiency and make note of the areas. Take soil tests from both good and poor areas. Deficiency can also result from non-fertility factors that affect potassium uptake. Examples include soil compaction, early no-till use on heavy soils, and dry weather conditions on sandy soils.

Sources of Potassium Used in Field Crops

Muriate of Potash (0-0-60 or 62) is the most common form of Potassium applied in Ontario. The product is readily available at dry fertilizer suppliers, cost effective and has a high analysis. Chloride content can be a concern with product in chloride sensitive crops. To avoid chloride injury on sensitive crops, consider applying this product in the fall. White potash does not have any agronomic advantages to Red potash, which contains iron, giving it the red pigment.

Sulfate of Potash (0-0-50) provides 50 lbs of K₂O and 18 lbs of S per 100 lbs of product applied. Sulfate of Potash is an excellent source of potassium when concerned about sulfur requirements and water solubility of potassium. This product tends to be used in horticulture rather than field crops due to the greater cost per lb of K₂O.

Potassium Magnesium Sulfate (0-0-22-22 S- 11Mg) is a source of potassium, sulfate and magnesium. The langbeinite ore is highly water soluble, making it more readily available than other potassium sources. This product has a lower salt index relative to other sources of potassium, making it very safe for starter fertilizers. Potassium Magnesium Sulfate is generally recommended when Magnesium levels are less than crop requirements.

This fall is the perfect time to start planning your following year's cropping requirements.

A Certified Crop Advisor can assist you in asking the right questions with their toolbox.

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This industry driven program helps ensure that Ontario crop producers are well served by those providing their crop production advice. This article was written by one of those CCA's.