

Nutri-Facts

Nutri-Facts #3

Agronomic information on nutrients for crops

It's for Real — Potassium Is Required by Plants

POTASSIUM (K) is a mineral nutrient essential to both plants and animals. For example, it is the third most abundant mineral in our bodies, surpassed only by calcium (Ca) and phosphorus (P). More than 85 percent of K in the human body is found in major organs such as muscles, skin, blood, and the digestive tract. Neither animals nor plants can survive without adequate supplies of K. . . its effects are real.

Potassium in Crops

Plants require more K than any other nutrient except nitrogen (N). Agronomic crops contain about the same amounts of N and K, but K content of many high-yielding crops is even higher than that of N. Unlike other nutrients, K does not form compounds in plants, but remains free to 'regulate' many essential processes. . . including enzyme activation, photosynthesis, water use efficiency, starch formation and protein synthesis. **Table 1** shows K uptake by some of the common crops grown in North America.

Potassium is known to interact with almost all the other essential plant food nutrients. It is important for enzyme activation, efficient use of water, photosynthesis, transport of sugars, water and nutrient movement, protein synthesis, starch formation and crop quality.

Table 1. Potassium uptake by crops.

Crop	Yield level	K ₂ O taken up in total crop, lb
Alfalfa	8 tons	480
Coastal bermudagrass	8 tons	400
Corn	160 bu	213
Cotton	1,000 lb lint	85
Grain sorghum	8,000 lb	240
Oranges	540 cwt	330
Peanuts	4,000 lb	185
Rice	7,000 lb	168
Soybeans	60 bu	205
Tomatoes	40 tons	460
Wheat	60 bu	122

Note: To convert K₂O to K, multiply by 0.83.

Potassium in Soils

Most soils contain thousands of pounds of K. . . often 20,000 pounds or more per acre. However, only a small amount is available to plants over the growing season, probably less than two percent. Soil K exists in three forms.

- **Unavailable K** is found in soil minerals. It is released too slowly to be available to a growing crop in a particular year.
- **Slowly available K** is 'fixed' or trapped between layers of certain soil clays. Highly weathered soils (temperate areas) don't contain much of such clays.
- **Available K** is found in soil water plus that held in exchangeable form by organic matter and clays.

Potassium moves by diffusion in the soil, a slow process. Crop roots usually contact less than 3 percent of the soil in which they grow. This means soils must be well supplied with K to ensure availability and adequate supplies at every stage of growth, right up to harvest. **Figure 1** illustrates the way K 'diffuses' to plant roots.

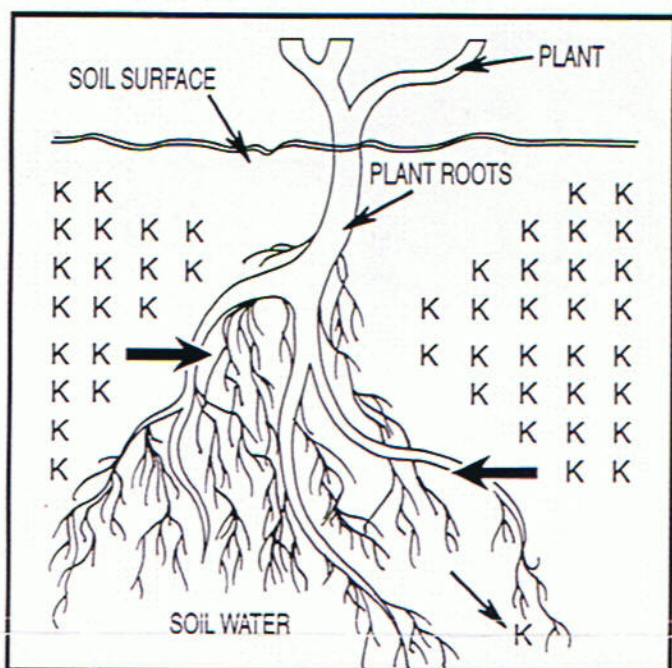


Figure 1. Potassium moves to plant roots by diffusion, a slow process.

Fertilizing Soils with Potassium

There is no best way to apply K fertilizers. Methods depend on several soil and crop conditions and other management practices . . . crop grown, tillage system, soil fertility, available labor and equipment, soil type, use of crop protection chemicals in combination with fertilizers and others.

Different methods of applying K fertilizers are variations of the two

extremes, banding (row placement) and broadcasting, usually with incorporation into the tillage layer.

Combining row with broadcast is often the best way to apply K. That combination gives a fast, early start and provides a season long reservoir. The important point is to provide adequate K nutrition that will last from planting to harvest.

There are several K fertilizer sources. Each has its advantages. The most commonly used is potassium chloride (KCl), or muriate of potash. However, special crop needs often warrant the use of the other sources, including potassium sulfate (K_2SO_4), potassium-magnesium sulfate ($K_2SO_4 \cdot 2MgSO_4$), potassium nitrate (KNO_3) and potassium thiosulfate ($K_2S_2O_3$). The source chosen should be based on soil crop needs, method(s) of application, price and availability.

Potassium Deficiency Symptoms

One of the most common K deficiency symptoms is scorching or firing along leaf margins, usually appearing on older leaves first. Potassium deficient plants grow slowly and develop poor root systems. Stalks are weak and lodging is common. Seed and fruit are small and shriveled; crops show lower resistance to disease and moisture stress.

Crop Response to Potassium

Potassium fertilization on responsive soils increases yields and is one of the vital income-earning inputs available to the farmer. Data in Table 2 illustrate the importance of K in increasing crop yields. Corn results are from Ohio; soybeans from New Jersey.

Table 2. Potassium increases corn and soybean yields.

K ₂ O rate, lb/A	Yield, bu/A	
	Corn	Soybeans
0	123	51
50	167	---
100	179	56
200	197	---

Potassium plays a vital part in essential processes of plant production. It's for real. ■

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