

Agronomic Library

POTASSIUM (K) Basics

Factors Affecting K Availability

Soil CEC: Plant-available soil K is in the ionic (electrically charged) form. This charge is positive, making K a cation, represented as K^+ . Cations are attracted to, and held by negatively charged colloids (primarily clay and organic matter) that make up the cation exchange capacity (CEC) of the soil. The larger the CEC, the more K that can be held by the soil and the higher the soil test needed to adequately feed plants.

Soil test K: Higher soil test K increases the available K, by increasing the amount and balance of K relative to other cations.

Cation Balance: Where there is a significant imbalance between available K and the other major cations (Primarily Calcium, Magnesium, and sometimes Hydrogen, Aluminum, or Sodium), it may affect the availability of K to the crop.

Soil Moisture: K is transported within the soil and is absorbed by plant roots in the soil water. Therefore a water deficiency results in less K absorption.

Soil pH: As the soil pH is reduced (increasing soil acidity) the availability of K is often reduced.

Soil Temperature: Cold soils often reduce the availability of K.

Soil compaction: Compacted soils often reduce the availability of K.

Soil Drainage/Aeration: As soil drainage is improved, K uptake typically improves.

Soil Salinity: Saline soils often have excess sodium (Na). One of the negative effects of excess Na is that it reduces the availability of K.

Deficiency Symptoms

The classic and almost universal leaf deficiency symptom is marginal chlorosis of the older plant leaves. However, yield losses typically occur before these symptoms are visible. For example, a crop with insufficient K is likely to wilt sooner in a dry spell. Also, insufficient K could express itself by causing the plants to suffer from more, or more severe disease problems. It might also show as a fruit crop that doesn't quite develop the proper quality or flavor. Possibly the most common and least understood symptom of K shortage is seen as N deficiency in soybeans. When soybeans suffer a K shortage, the plants produce fewer sugars, and have trouble transporting the limited amounts of sugar from the leaves to the roots. The nodulating bacteria depend on this sugar and when it is deficient, they produce less N for the soybean plant to use. All of these are symptoms of K shortages