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Potassium deficiency symptoms in corn

John E. Sawyer

Iowa State University, jsawyer@iastate.edu

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Potassium deficiency symptoms in corn

Abstract

The dry conditions this spring have resulted in corn plants expressing potassium (K) deficiency symptoms the past 2 weeks. This phenomenon has appeared in previous dry spring seasons and is back again this year, especially in southern Iowa. Areas of the state that received adequate rainfall are generally not showing K deficiency symptoms. Symptoms can appear even though soil K is adequate for crop production. How can this occur? Uptake of K by plants requires an active root system, especially in the soil zone where plant-available K is located.

Keywords

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Disciplines

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INTEGRATED CROP MANAGEMENT

Potassium deficiency symptoms in corn

The dry conditions this spring have resulted in corn plants expressing potassium (K) deficiency symptoms the past 2 weeks. This phenomenon has appeared in previous dry spring seasons and is back again this year, especially in southern Iowa. Areas of the state that received adequate rainfall are generally not showing K deficiency symptoms.

Symptoms can appear even though soil K is adequate for crop production. How can this occur? Uptake of K by plants requires an active root system, especially in the soil zone where plant-available K is located. When this soil zone is dry, uptake is limited. Anything that exerts additional stress or limits root growth--compacted soil layers, root pruning, dry soil, side-wall smearing--further reduces K uptake, especially when root growth is restricted in the zones of highest available K. Also, if the subsoil supply of K is low, and this is the zone with most active roots, K uptake is reduced relative to plant need as growth continues. Corn in ridge-till and no-till systems is historically the first to show K deficiency symptoms, but they can occur in other tillage systems as well.

Why don't the symptoms appear earlier? Potassium uptake accelerates rapidly after about the V6 growth stage (approximately 4 to 6 weeks after corn planting). Therefore, when the K demand becomes large, effects of reduced uptake become visible.

What do the symptoms look like? Potassium deficiency symptoms in corn appear first on the lower leaves because K is easily moved within the plant from older to younger leaves. Leaf symptoms are a yellowing to necrosis (tissue death) of the outer leaf margins. These symptoms begin at the leaf tip and progress down the margin toward the leaf base. Potassium deficiency symptoms should not be confused with nitrogen deficiency, which first appears as yellowing on the lower (older) leaves, but is located from the leaf tip down the midrib in a V shape. In past years, dry weather-induced K deficiency symptoms have sometimes appeared on leaves in the middle of the plant, with the leaves first turning yellow at the tip and then the entire leaf eventually turning yellow (newly emerged leaves are a normal green). If K deficiency persists (true soil deficiency), then the lower leaves die back, leaf symptoms progress up the plant, plant growth is reduced, and later in the season stalk lodging may occur.



Potassium-deficient plots in Ames, Iowa in 1999.

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On soils with adequate K levels, when rainfall occurs the plants resume growth and would be expected to yield well; however, the existing leaf symptoms remain. If the soil lacks adequate K, then symptoms can increase and yield will be reduced as a result of inadequate K levels, not just dry weather. Soil tests from good and affected field areas can help discern true soil deficiency effects from climatic effects. Unfortunately, there is no corrective action that can be taken this year. Fall banding K in ridge-till and no-till has helped on soils that historically exhibit K uptake problems. Disrupting planting and tillage compaction zones also should be beneficial.

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[1] <http://www.ent.iastate.edu/imagegal/plantpath/corn/kdeficiency/kdeficames1999.html>

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