

WHY ARE POTASSIUM DEFICIENCY SYMPTOMS SHOWING NOW IN CORN AND SOYBEANS?

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Some corn and soybean fields, mainly in eastern and southern Iowa, are showing potassium (K) deficiency symptoms, even when growth stages range from V3 to V8. The symptom for both crops is yellowing of the leaf margins of the older leaves that usually begins at the leaf tip and extends down the margins toward the leaf base. With severe deficiency the leaf edges may become brown and necrotic, although the newest leaves usually have normal coloration. For further information of symptoms, see "Corn leaf potassium deficiency symptoms" (ICM 7/1/2002), "Is it iron or potassium deficiency?" (ICM 7/1/2002), and ISU Extension and Outreach publication "Nutrient Deficiencies and Application Injuries in Field Crops" (IPM 42).

The current symptoms may reflect low soil-test K and deficient pre-plant fertilization. In several fields the soil-test K level and pre-plant fertilization were adequate, however, so the deficiency most likely is caused by dry topsoil due to low rainfall during late May and early June. Any soil factor that limits root growth and water uptake can limit K uptake and induce a deficiency even with adequate soil K levels. For example, these include dry, too loose, or compacted soil; root pruning by insects or infection by diseases; and seed furrow sidewall compaction. Plants in the end-rows often don't show symptoms, mainly in no-till fields where the end-rows area is tilled. This is a clear indication that the problem may be an induced deficiency and not a low soil-test K level. Observation of plant nodal roots, physical soil conditions, and soil sampling and testing for K in adjacent areas with or without symptoms can provide clues about the reason for the deficiency and possible action. If the induced deficiency is not extreme, plants often recover when normal rainfall resumes, showing no deficiencies in new leaves and with little or no yield loss.

What can be done for the current crop?

Unfortunately, there is no certain economically effective corrective treatment for this year's crop, because the best way to prevent K deficiency is to apply adequate amounts of fertilizer before planting and avoid the soil conditions that induce deficiency even with adequate soil-test K levels. Also, deficiencies often occur in small and isolated field areas, which limit the cost-effectiveness of treatment.

Iowa research in many fields has shown that foliar fertilization with fluid fertilizer containing K can increase soybean yield in some conditions. Insufficient data is available for corn, but research in other states has shown that a response also is possible. Use of low-salt fluid fertilizers is safer (with no potassium chloride or potassium sulfate, for example) because the K concentration can be higher and the rates applied can be higher than with other products. Application rates for corn or soybean using these types of fluid fertilizers of up to 12 lb K₂O/acre did not damage foliage, although good responses also were observed with about one-half this rate.

The post-planting soil application of fluid or granulated K fertilizer broadcast or banded between the rows as a rescue treatment may, or may not, be more effective than foliar fertilization. This application will be inefficient when rainfall continues to be deficient or when a K deficiency is induced by the soil and root problems mentioned above. On the other hand, higher rates than with a foliar spray can be applied, and if the deficiency is due to low soil-test K the applied K will begin to increase soil-test K levels for the next crop. For the current crop, however, an application to the soil will not be effective if sufficient rainfall is not received soon.

How can you prevent this type of deficiency for future crops?

If you see deficiency symptoms this spring, you need to think about how to prevent deficiency in future crops.

If the reason for deficiency symptoms is low soil-test K, the deficient areas can be targeted for post-harvest soil sampling, testing, and appropriate fertilization. Deficient areas can be easily marked with hand-held global positioning devices, and this information can be provided to a dealer having variable-rate fertilization capability. Deep-band K placement for the next crop, mainly with ridge-till, strip-till, or no-till, can go a long way toward alleviating K deficiencies. A planter-band (starter) fertilizer treatment at planting also will help, but in-furrow K starter is not recommended for soybean and low rates should be applied for corn. For further information see "Use new potassium soil test and fertilizer recommendations" (ICM 10/20/2003), Iowa State University Extension and Outreach publications "Take a Good Soil Sample to Help Make Good Decisions" (PM 287), and "General Guide for Crop Nutrient and Limestone Recommendations in Iowa" (PM 1688).

If the deficiency symptoms are induced by soil or root issues other than low soil-test K, your area extension Field Agronomist or local crop consultant can provide additional suggestions about soil or crop management practices to help alleviate future problems.