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Potassium deficiency symptoms in corn and soybean: What can we do about them?

Antonio P. Mallarino
Iowa State University, apmallar@iastate.edu

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Abstract
Potassium (K) deficiency symptoms are beginning to be observed on many corn fields and in some soybean fields. 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 (the tissue dies) and affected plants will appear stunted, although the newest leaves may be normal. For further information of symptoms, see ICM 7/1/2002 ("Corn leaf potassium deficiency symptoms") and ICM 7/1/2002 ("Is it iron or potassium deficiency?"). Questions usually arise at this time about reasons for a deficiency and what can be done to alleviate yield loss.

Disciplines
Agriculture | Agronomy and Crop Sciences

Crop Production

Potassium deficiency symptoms in corn and soybean: What can we do about them?

by Antonio P. Mallarino, Department of Agronomy

Potassium (K) deficiency symptoms are beginning to be observed on many corn fields and in some soybean fields. 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 (the tissue dies) and affected plants will appear stunted, although the newest leaves may be normal. For further information of symptoms, see ICM 7/1/2002 ("Corn leaf potassium deficiency symptoms") and ICM 7/1/2002 ("Is it iron or potassium deficiency?"). Questions usually arise at this time about reasons for a deficiency and what can be done to alleviate yield loss.

Potassium deficiency symptoms develop because plants cannot extract K from the surface soil. The most common reason is that soil-test K is lower than optimum for vegetative growth. Depending on its severity, yields may be reduced. Dense soil sampling and spotty deficiencies in many Iowa fields have indicated large soil-test K variability. However, K deficiency on soils with apparently adequate K levels can be induced by other factors. Symptoms can occur after a prolonged dry spell and usually are observed first in corn fields managed with ridge-tillage and no-tillage. When normal rainfall resumes, plants often recover with little or no yield loss.

Any soil or weather factor that stresses or limits root growth, such as soil-test K stratification, compacted soil, root pruning, dry and loose soil, seed furrow sidewall compaction, can limit plant K uptake. As growth continues during the season, K uptake may be increased or remain reduced depending on the subsoil K supply and moisture content. Plant pathogens and herbicide damage sometimes affect corn or soybean plants and can induce leaf K deficiency symptoms even in high-testing soils.

Unfortunately, because symptoms usually appear relatively late in the season, there is no certain economically effective corrective treatment for this year's crop.

Potassium (K) deficiency symptoms occur when plants cannot extract K from the surface soil. Symptoms for both corn and soybean are yellowing of the leaf margins, and in severe cases, leaf edges may become brown.

Iowa research has shown that foliar fertilization with a low-salt fluid fertilizer containing K can increase soybean yield only in some conditions and insufficient data is available for corn. The fact that deficiencies usually occur in small and isolated field areas limits the cost effectiveness of this treatment. If you see deficiency symptoms, the best practical thing to do is to prevent deficiency for future crops. Observation of plant 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 reason for deficiency symptoms is low soil-test K, the deficient areas at this time for targeted soil sampling after harvest can increase the efficiency of variable-rate fertilization. Deficient areas can be easily marked with hand-held global positioning receivers, and this information can be provided to a dealer having variable-rate fertilization capability. You should be aware that Iowa State University soil-test K interpretations recently were modified to recommend maintenance of 130 to 170 ppm for optimum crop production in most Iowa soils. For further information see ICM 10/20/2003 ("Use new potassium soil test and fertilizer recommendations") and Iowa State University Extension publication PM 1688 (*General Guide for Crop Nutrient Recommendations in Iowa*). Furthermore, these publications also explain that deep K placement for the next crop can go a long way at alleviating deficiencies in ridge-till and no-till systems. A starter fertilizer treatment at planting also will help. If the deficiency symptoms are induced by factors other than low soil-test K, your area extension crop specialist or local crop consultant can provide suggestions about other soil or crop management practices that can alleviate future problems.

A large research project developed at farmers' fields and research farms continue studying these issues by evaluating K fertilization rates, soil-test methods, and interactions between fertilizer placement method and tillage system. A new study is investigating interactions between K fertilization and soybean diseases. Results will be shared as they become available.

Antonio P. Mallarino is a professor of agronomy with research and extension responsibilities in soil fertility and nutrient management.

Insects and Mites

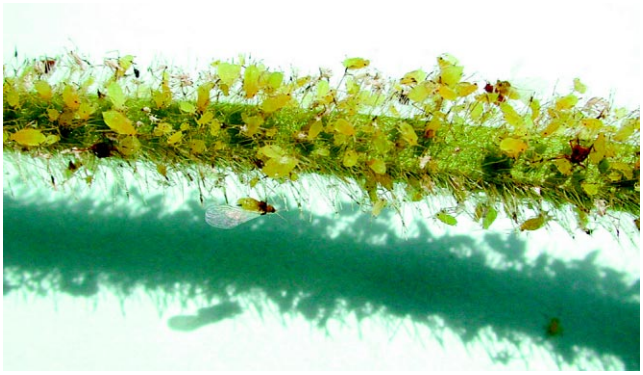
Soybean aphid counts highest in northeastern Iowa

by Marlin E. Rice, Department of Entomology

Scouting reports indicate that soybean aphid numbers are increasing in a few Iowa locations—most notably in northeastern Iowa. Brian Lang, extension field specialist, Decorah, notes that a field near Waukon averaged 30 to 40 aphids per plant with some plants more than 200 aphids per plant, but less than 50 percent of the plants were infested.

Brian notes that he has observed two general patterns so far. First, earlier emerged fields have a higher percent aphid infestation. Observations that help support this thought is that since the first week in June, he hasn't found any winged aphids on any soybeans, which suggests the aphids moved to the fields early. Second, fields in Allamakee and Winneshiek counties have a higher incidence of aphids then fields in counties south and west.

In central Iowa, John D. Holmes, extension field specialist, Clarion, has scouted soybean fields in Greene, Hamilton, Hardin, Humboldt, Marshall, Tama, Webster, and Wright counties. He has not found soybean aphids in any of these counties. However, soybean aphids have been found at the Field Extension Education Laboratory in Boone County, so they do occur in central Iowa. In eastern Iowa, Virgil Schmitt, extension field specialist, Muscatine, also reports finding aphids in Muscatine County.



Soybean aphids clustering on a soybean stem. ***(Marlin E. Rice)***

Field scouting for soybean aphids should begin either this week or the next. Information on scouting for soybean aphids can be found at **www.soybeanaphid.info**.

Marlin E. Rice is a professor of entomology with extension and research responsibilities in field and forage crops.