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## Upper Soybean Leaves Began Showing Potassium Deficiency Symptoms Since Early August in Some Iowa Fields

### Abstract

Since early August, soybean in several fields began showing typical potassium (K) deficiency symptoms on leaves located in the middle to upper canopy. This is not surprising in fields or portions of fields with soil-test values in the very low or low K soil-test interpretation categories that did not receive adequate preplant K fertilization. Potassium deficiency symptoms are well-known and very common in older leaves during early growth stages. Due to poorly understood reasons, during the last couple of decades K deficiency symptoms in upper soybean leaves also have become common at middle to late reproductive stages. Moreover, K deficiency symptoms can develop in upper leaves in well-fertilized soybean when no deficiency was observed at early stages, mainly when drought conditions develop during late spring or summer.

### Disciplines

Agricultural Science | Agriculture

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Integrated Crop Management

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August 23, 2019

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In low-testing or draughty soils, K deficiency symptoms may develop from the V3 stage to more advanced vegetative stages mainly in the older leaves, but with severe deficiency, symptoms may progress to the upper leaves. Figure 1 shows typical soybean K deficiency symptoms at early growth stages. The symptom is yellowing of the leaflet margins with mild deficiency that becomes brown or necrotic with extreme deficiency. The symptoms of these leaves often remain until the reproductive stages, but may not be seen because the leaves have been shed or partially decomposed. The reason symptoms are observed mainly on older leaves at early vegetative growth stages is because K is very mobile within the plant and K is translocated from older leaves to new leaves.



**Figure 1. Soybean potassium deficiency symptoms at early vegetative growth stages.**

The K deficiency symptoms at early vegetative stages should not be confounded with soybean iron deficiency chlorosis (IDC), which often occurs in high-pH (calcareous) soils. In contrast to chlorosis or necrosis of leaf margins associated with K deficiency, IDC symptoms are yellowing of the interveinal area of mainly entire young leaflets. With extreme iron deficiency, browning and necrosis may also occur in leaf margins. The ICM News article “[Is It Iron or Potassium Deficiency?](#)” describes IDC symptoms in soybean.

The K deficiency symptoms in soybean during middle to late reproductive stages are similar to those observed earlier in the season on older leaves. Figure 2 shows typical examples. The physiological reasons for late-season development of deficiency symptoms during the last couple of decades are not entirely clear. Reasons might be that with increasing soybean yield potential there is more K translocation from the middle or upper leaves to developing pods and grain.



**Figure 2. Soybean potassium deficiency symptoms during the reproductive growth stages.**

Observations over many years have shown that severe K deficiency can advance soybean maturation. Therefore, it is not surprising to see senescing soybean, with most leaves yellow or brown, in low-testing field areas a few days before plants in other parts of a field. Figure 3 shows an example of this in research plots. Keep in mind that deficiency of other nutrients or conditions such as excessively wet or dry soil can also advance soybean senescence.



**Figure 3. Potassium deficiency advances soybean senescence.**

Several soybean diseases can also produce yellowing of upper leaves, which also may advance senescence. Sometimes, the disease symptoms and K deficiency symptoms occur at the same time. This is not surprising because Iowa research has demonstrated that K deficiency aggravates the incidence or severity of several soybean leaf diseases. Part of this research was summarized in the proceedings article for the 2016 Integrated Crop Management Conference “Watch potassium management - It also affects corn response to nitrogen and soybean diseases”. Additional field observations suggest possible interactions with soybean cyst nematode (SCN) and aphid infestation levels. Potassium deficiency symptoms in soybean can develop or be worse in field areas associated with SCN or aphids.

Sometimes it is difficult to distinguish between K deficiency and disease symptoms in upper soybean leaves during reproductive stages unless the plants or leaves are submitted to a plant pathology lab for analysis. Soil and leaf K testing of apparently normal and affected field areas also may help identify the cause for the symptoms. Recently published interpretations for K tissue testing are useful for soybean plants at the V5 to V6 vegetative growth stages or for upper leaves at the R2 to R3 reproductive growth stages, but not for later growth stages because leaf K concentrations decline. Tissue test interpretations are

available in publication CROP 3153 "[Phosphorus and Potassium Tissue Testing in Corn and Soybean](#)".

**Category:** [Crop Production](#) [Soils](#) [Soil Fertility](#) [Soil Management](#)

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**Crop:**

[Soybean](#)

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