Why is soybean yellowing prematurely?

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Abstract
After mid-August, many soybean fields had patches of yellow plants. These plants exhibited yellowing of the top leaves, often followed by brown margins on the leaves. My colleagues and I received many questions on why soybean turns yellow prematurely and whether top dieback, a disease caused by the fungi *Phomopsis* and *Diaporthe*, is the cause. Visits to problematic fields and examination of samples submitted to Iowa State University Plant Disease Clinic revealed three factors that can stress soybean, consequently causing leaf yellowing.

Keywords
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After mid-August, many soybean fields had patches of yellow plants. These plants exhibited yellowing of the top leaves, often followed by brown margins on the leaves. My colleagues and I received many questions on why soybean turns yellow prematurely and whether top dieback, a disease caused by the fungi *Phomopsis* and *Diaporthe*, is the cause. Visits to problematic fields and examination of samples submitted to Iowa State University Plant Disease Clinic revealed three factors that can stress soybean, consequently causing leaf yellowing. The majority of plant samples submitted to the clinic showed top dieback or pod and stem blight.

First, yellowing may be the result of damage by soybean cyst nematode or by soybean aphid. Often, these yellow soybean plants are short and aggregated into patches. Numerous cysts of soybean cyst nematode can be found on the roots if yellowing is the result of soybean cyst nematode damage. Reports of this type were common from regions where damage by soybean cyst nematode is relatively new or has not been previously reported. In northeastern Iowa, severe damage by soybean aphid also has been associated with symptoms similar to those of top dieback. When severe damage occurred, soybean leaves were covered with aphids.

Second, premature yellowing may be due to fungal root rot caused by *Fusarium*, *Rhizoctonia*, or *Phytophthora*. Such soybean plants are stunted and aggregated in patches in lower areas of fields. The plants have poor root systems with a discolored tap root due to fungal infection. Like plants damaged by soybean cyst nematode and soybean aphid, plants affected by these fungi will remain stunted for the rest of the growing season.

Third, the majority of premature yellowing this season was caused by the *Phomopsis*-Diaporthe complex. The fungi can cause pod and stem blight and top dieback, as shown by studies in the 1980s. When pod and stem blight occurs, dark lesions are found on the pod, petioles, and nodes of the stem. The upper portion of an infected plant turns yellow and dies. If pod infection is severe, seed decay (after harvest) by the fungi may occur. Cool summer temperatures and delayed planting are favorable for this disease.
Pod and stem blight caused by *Phomopsis-Diaporthe* complex.

Top dieback showed up after mid-August in some fields that were apparently healthy earlier in the growing season. Initial symptoms of yellowing by top dieback occur in new growth of leaves. Symptoms are similar to those caused by potassium (K) deficiency. After the new growth dies, the leaves in the upper plant canopy show discoloration of internodes. Plants die prematurely when the disease is severe. Symptomatic plants are often in rows with normal height.

Diseases caused by *Phomopsis-Diaporthe* complex can be seedborne. If pod and stem blight or top dieback is severe in a seed field, seed testing should be conducted to determine seed quality. Also, keep in mind that sometimes several potential disease-causing factors occur in the same field, which complicates disease identification.

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