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Abstract

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Soybean Top Dieback Shows Up in Iowa Again

By XB Yang, Plant Pathology Department, John Saywer, Agronomy Department

Extension field agronomists report the occurrence of soybean top dieback in northeastern Iowa soybean fields this week. Soybean top dieback symptoms have shown up occasionally since it was first reported by Jim Fawcett and Jerry Long in Cedar County a few years ago. Last year it was also found in eastern and central Iowa.

Despite repeated occurrences, there is no consensus on the cause among pathologists or agronomists. Some consider it an agronomic issue and some call it a fungal disease. This article summarizes what we know about development of top dieback.

Symptoms

The initial symptoms occur early to mid August as bright yellowing and tissue death on outer leaf margins on leaves in the upper portion of the plant canopy (Photo 1). These symptoms are similar to potassium deficiency, but occur on the upper plant rather than the lower leaves.



Top dieback close view. XB Yang.

This is followed by discoloration at nodes. Edges of affected leaves turn brown, dead tissue falls out leaving a ragged appearance, and eventually the whole leaf dies. Plants under stress will have more severe symptoms. Plants die prematurely when development is severe. Affected plants often follow row patterns (photo 2) or areas of fields (photo 3). At maturity, seeds are small and shriveled on severely affected plants. Differences in varieties have been observed. In most fields where the top dieback occurs, soybean cyst nematode (SCN) can be found, which complicates the problem and diagnosis.



Top dieback in rows. George Cummins.



Top dieback in field areas. John Sawyer.

Possible causes

Because we lack systematic studies, no certain conclusion has been made regarding the cause of this problem. According to the literature, the earliest report was made by a pathologist in Ohio about 30 years ago, years before

occurrence of SCN. He reported that fungi *Phomopsis* and *Diapothera* were the causal agents. However, that finding has not been confirmed by other pathologists, even 30 years after its initial report. This is likely due to lack of interest as there has been only minor occurrence over time.

It has been speculated that potassium deficiency may be associated with top dieback symptoms because leaf symptoms on affected soybean plants resemble those of potassium deficiency. Commonly, potassium deficiency occurs first on lower leaves. Dr. Antonio Mallarino told us that he has seen potassium deficiency on top leaves of plants growing on K deficient soils in his research plots. Several years ago in southern Iowa it was observed that symptom development ceased in problem fields after an application of potassium.

A study in Mississippi demonstrated that potassium application reduced the fungal infection by *Phomopsis*. That study also showed that the severity of symptoms were correlated with amount of potassium applied; the more potassium, the less severe the symptoms. However, adding to our confusion, some reports on top dieback suggest there were adequate levels of potassium in fields where the disease was found.

What to do

With our current knowledge, no simple answers can be given and one can try several things if top dieback is severe.

- First, take soil samples to test for potassium level and SCN to ascertain the involvement of SCN or potassium deficiency. This sampling should be in affected and non-affected field areas.
- If soil tests indicate a low level of potassium, consider fertilizing with potassium for the next crop year(s).
- If SCN is a problem, determine the best course of action for dealing with that pathogen.
- Development of top dieback has been related to soybean variety, consider changing soybean varieties for the next soybean growing season. We know varieties make a difference, but do not know which ones are less likely to show the symptoms. The option is to find germplasm that is significantly different from the one currently being grown in the field.
- Do not save seed from fields with severe top dieback because the pathogens associated with top dieback can be seedborne.

XB Yang is a professor Plant Pathology with research and extension responsibilities on soybean diseases. John Sawyer is a professor of agronomy with research and extension responsibilities in soil fertility and nutrient management.

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