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## PHYTOPHTHORA ROOT AND STEM ROT IN SOYBEAN

This past week I received confirmation from the UNL Plant Pathology lab of soybeans that were infected with the soil borne oomycete fungus *Phytophthora sojae* which causes *Phytophthora* related soybean diseases. This is one of the most destructive soybean pathogens in the U.S. and not anything new. This fungus has great genetic diversity and is identified as different biotypes or races. What is new is we have observed a shift in the diversity of *Phytophthora* in Nebraska, with more areas having biotypes which are not affected by common resistance genes in soybean varieties.

The pathogen survives primarily as "resting" spores in wet soils with infested crop debris. The disease started showing up after the extreme dry conditions this year changed to very hot and excess rain. The symptoms being observed is the taproot turns dark brown and the entire root system may be rotted. Leaves on older infected plants become chlorotic between the veins followed by general wilting and death. The petioles tend to stay on the wilted plants. Plants may be killed in pockets in the field or large areas may be affected.

It's the disease triangle or 1) susceptible host; 2) favorable weather; and 3) inoculum present in the soil. Disease development is most rapid at soil temperatures above 60 degrees F and optimal at 77 to 86 degrees in wet soils. It is most common in low areas of a field, on poorly drained or compacted soils, and in soils with high clay content, although it is not limited only to these sites or conditions. It may also occur on well-drained hillsides during wet growing seasons. You will see higher incidence of disease on field edges, in high trafficked areas from fall harvest, near pivot or sprayer tracks and where cattle congregated in grazed fields. After the heavy rains there was higher incidence where water flowed through fields.

Planting soybeans after soybeans can increase the soil borne organism and increase inoculum in your soil. Crop rotation helps but does not rid you of the soil organism. Increasing soil drainage and reducing compaction when you can helps, but our main tool for disease resistance is the resistance package in your soybean varieties. Using resistant varieties is the most effective way to manage *Phytophthora* root and stem rot of soybean. Genetic resistance in the host is expressed in terms of Rps ("*resistant to Phytophthora sojae*") genes. The race-specific genes offer complete resistance to a specific race of *P. sojae* and genes are denoted as "c" or "k" in your seed books. In a resistant reaction, the plant survives infection; susceptible varieties are killed when infection occurs. Race-specific resistance is effective in the early stages of germination.

The other parameter on which soybean varieties are rated is partial resistance (also called field resistance or tolerance). Soybean varieties with high levels of partial resistance can become infected with *P. sojae* but the symptoms are not as severe as highly susceptible varieties. In field research trials conducted in Nebraska, good partial resistance performed as well as varieties with resistance genes and partial resistance. In fields where the *P. sojae* biotype is aggressive against the resistance genes available in commercial varieties, this is the only choice for management with genetics. If possible, a combination of good partial resistance and an Rps gene is recommended. Partial resistance alone will not be as effective during early growth stages or under high disease pressure.



Seed treatment fungicides containing ethaboxum, mefenoxam or metalaxyl should be used in fields with a history of this disease. Note that many products require increased rates for activity against Phytophthora. For this year if the disease is active in your field, nothing else can be done except how the irrigation water is managed. Definitely rotate and carefully select your soybean variety when you plant the field again. For more information and a picture of what I am talking about go to: <http://extensionpublications.unl.edu/assets/pdf/g1785.pdf>

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