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Septoria Brown Spot in Soybeans

Albert Tenuta, Field Crop Plant Pathologist, OMAFRA, Ridgetown

The most common foliar disease on soybeans to date has been Septoria brown spot. Varieties differ in susceptibility so if you have multiply varieties make note of the differences in their response to the disease.

Figure 1. Septoria Brown spot in soybeans

Symptoms appear first on the primary unifoliate leaves shortly after trifoliolate leaves have developed. In some cases depending on the amount of rain and splashing that has occurred the trifoliate leaves may have more lesions then the unifoliates. Disease symptoms begin as small, dark brown, irregular spots, 1-2 mm in diameter with or without a yellow halo which develop on upper and lower surfaces of lower leaves. Initial infections on primary leaves and cotyledons produce secondary inoculum that infects upper leaves as they develop. The fungus produces a toxin that contributes to yellowing.

Lesions may enlarge and coalesce, and frequently they are concentrated along the leaf veins or at the leaf margin (Fig. 1). The disease is more cosmetic then anything but development early in the season can lead to significant defoliation o very susceptible varieties but in most cases as the weather turns warmer and drier symptoms often disappear. Symptoms may be difficult to distinguish from those of bacterial blight, soybean rust and downy mildew. As is always the case a good rotation with non-host crops such as wheat and corn will lower disease levels.

The Impact of Cool plus Wet plus Compacted Adds to a Different Math in Corn and Soys

Dr. Dave Hooker, Field Crop Agronomist, U of G, Ridgetown Campus

What a cool, wet spring on many fields in 2009! Many acres of corn and soybean were planted into soils that were not quite fit for equipment because of frequent and excessive rainfall in May. Some of those acres may have been planted on time according to the calendar, but the resulting destruction of the soil physical condition to support crop growth is now apparent with poor uneven growth. This year, early growth of corn and soybean seems less than satisfactory in some no-till fields compared to conventional-tilled neighboring fields. Should we be drawing some conclusions regarding tillage? Back to conventional? Nope! Even in many conventional fields that have been plowed and worked twice before planting, corn and soybean have stunted growth in areas where wheels once travelled. Sorry folks, but some of these "ugly fields" (see Figure 1) will produce "ugly yields" inspite of the blanket optimism in recent articles that the ugly symptoms will be forgotten at harvest. Allow me to explain. But before I do, let's review some complexities in explaining crop response at the soil interface.

Crop response to tillage is related to four soil physical factors: soil temperature, soil-water potential (the power needed for roots to take water from the soil matrix), mechanical impedance (the ability of a root to penetrate through a soil mass), and oxygen availability. These soil factors are altered by tillage. If one factor is changed, then at least one other factor is affected. For example, during periods of excessive wet weather, crop growth may be affected by the lack of oxygen (not favorable as water consumes air-pore space in the soil matrix). As well, soil temperatures may be cooler (not favorable to the crop), but the mechanical impedance of roots to force their way through the soil matrix is reduced with higher soil moistures (favorable). So what is the resulting crop response? More than one factor needs to be considered when assessing crop response. One factor "yes/no" "with or without" responses are simple to explain, but the plant sees an integration of many factors. Investigating the effect of multiple factors simultaneously continues to be my focus in crop research.

In the past, very little attention has been directed at the effects of excessive soil moisture early in the growing

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season. Based on my Ph.D. work with Dr. Tony Vyn at the University of Guelph in the 1990s, excessive soil moisture and low air-filled porosity during the month following planting delayed corn and soybean development, reduced dry matter accumulation, and reduced root length. There is a strong correlation for these effects to carry through to grain/seed yield. Other research from Michigan State University supports similar findings on air-filled porosity and early growth in corn and the carry-through impact to harvest (see Lizaso and Ritchie, 1997).

Remember that the growth rate of crop plants is the result of an integration of multiple soil and weather factors. The work in the 90's demonstrated the impact of excessive soil moisture (actually low air-filled porosity) on early crop growth (approx 6 weeks after planting). The spring of 2009 resulted in some soils that were worked too wet which caused compaction in the root zone. This compaction limited air pore space within the soil matrix, and then excessive rainfall reduced the pore space even further. Here is the catch: further work from the 1990s showed that cool temperatures exacerbated the effects of low air-filled porosity on early crop growth (see Figure 2), which produced lower yields compared to environments of higher air-filled porosity and warmer soil temperatures (data not shown). This impact on crop growth and development can occur regardless of tillage, but no-till systems may be more susceptible because of cooler soil temperatures inherent in the system compared with conventional tillage systems (Figure 2).

Figure 1. Ugly corn in conventional tillage caused by cool soil + excessive wetness + compaction.

Soil temperatures and air-filled porosities may be increased in no-till systems with the deployment of fall strip-tillage, no-till coulters, row cleaners, or the use of vertical tillage ahead of no-till planters. For example, our SMART soybean project with Horst Bohner (OMAFRA) shows some good responses to vertical tillage this year (see Figure 3).

Another excellent example of crop growth effects in unfavorable conditions has been demonstrated this year at the long-term tillage rotation study on the Ridgetown Campus. Figure 4 shows the impact of soil health on corn between two crop "rotations" ("rotations" is in quotes because the rotation on the left is continuous corn and the other on the right is a corn-soybean rotation – it can be argued that neither can be

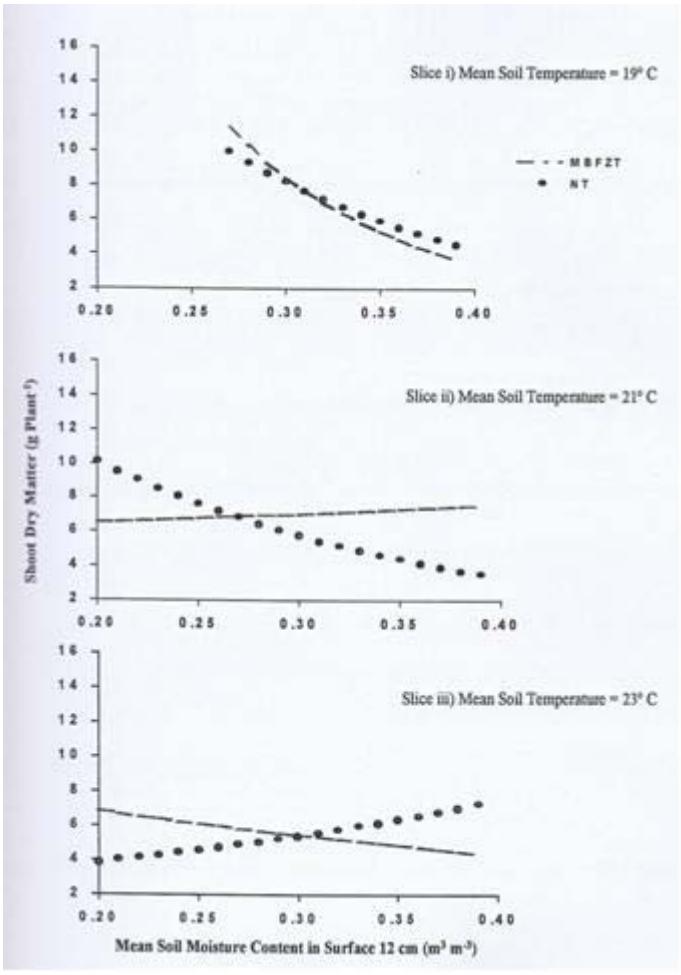

Figure 2. Corn shoot response to soil moisture contents (from low to high) at three average soil temperatures (19 to 23 C) in conventional tillage and fall zone till systems (dashed line) compared to corn planted using no-till (dotted line).

Figure 3. Soybean stands with (top photo) and without (bottom photo) vertical tillage ahead of the no-till planter on a SMART soybean trial at Belmont in 2009.

considered a crop rotation). Anyway, which "rotation" produced the greatest early crop response? The difference is obvious. The kicker is that the better looking corn was no-tilled, and the less vigorous, yellow corn was produced using conventional tillage. With the support from all three commodity groups, we are currently using these trials at Ridgetown, along with other long-term experiments in Guelph and those on farm fields, to develop a soil health test for Ontario.

Much of the corn and soybean crops may be looking better now (July 2) than a month ago on many fields, and that yields on those fields may be higher than first expected. However, we cannot become complacent and overlook the impact of management on yield potentials. Crop responses to the environment are complex and not simple, and therefore, the causes of unsatisfactory crop responses must be carefully drawn. There is good evidence that the combination of cool temperatures and wet conditions do not add perfectly like 1 + 1 = 2, but rather 1 + 1 = 3. Is no-till to blame like some are suggesting? Nope! Compaction in conventional tillage and/or poor soil health can have the same impact.

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Figure 4. Soil health effects on early growth in continuous corn under conventional tillage (left) compared to a corn-soybean rotation under no-till (right) in the long-term rotation tillage project on the Ridgetown Campus in 2009. Rotations were established in 1995.

2009 Ontario Weed Tour Highlights July 14, 15 &16

Join University Researchers and Extension Personal to learn about new control strategies to manage weeds in various cropping systems.

9:00 am – 12:00 noon **Tuesday, July 14** **Woodstock**
Self guided tours: You will see weed control in corn / soybeans / wheat and tolerance of winter wheat to tank-mixes of herbicides plus fungicides.

1:00 Pm – 4:00 PM **Tuesday, July 14** **Exeter**
Self guided tours: You will see crop tolerance and weed control in winter wheat / spring barley / durum / oats / corn / sweet corn / soybean / edible beans and the effect of late emerging weeds on glyphosate tolerant corn yield and the speed of glyphosate weed control on glyphosate tolerant corn yield.

9:00 am – 12:00 Noon **Wednesday, July 15** **Harrow**
Field plots: You will see the use of living mulches and reduced herbicide rates on weed control in sweet corn and does hail damage affect POST herbicide tolerance in sweet corn / processing tomato / field corn / edible beans? Will a fungicide application within 24-hr of hail damage decrease potential injury?

Self guided tours: Crop tolerance and weed control in carrots / sweet corn /tomato /field corn / seed corn / soybean / edible beans / sugar beet /pumpkin and weed management during the transition from conventional

1:00 Pm – 4:00 PM **Wednesday, July 15** **Ridgetown**
Field plots: You will see a new mode of action for weed control in corn: Saflufenacil, new Guardian tankmix options using Dual II Magnum, Frontier, Prowl or Flumioxazin for 1-Pass burndown weed control in soybeans and Kixor tolerance in vegetables.

Self guided tours: Crop tolerance and weed control in vegetables / field corn /soybean / edible bean and winter wheat, management of cover crops using a roller / crimper for production of organic cucumber and squash, predicting weed emergence using soil temperature and moisture to improve herbicide timing in red beet, biologically effective rate of saflufenacil / dimethenamid-p and effect of time of day on herbicide efficacy in soybean.

9:00 am – 12:00 Noon **Thursday, July 16** **Elora**
Field plots: Libery Link soybeans for 2010.

Self guided tours: Weeds team training plots / herbicide ID plots, weed management options for nutsedge, EcoFilm, application demonstration, plant to plant variability, the role of PRE and POST herbicides and crop

For enquiries and/or directions to locations, please contact:
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Weather Causes Weed Challenges

Kristen Callow, Weed Management Program Lead—Horticulture, OMAFRA Ridgetown

Cool, wet conditions have resulted in weed management challenges for most producers. The first challenge has been getting on the field to spray. Delays have resulted in producers spraying in less than optimum weather conditions and / or crop / weed growth stage conditions, resulting in less than adequate weed control and crop phytotoxicity which results in subsequent yield loss. We have also seen a lot of herbicide drift onto sensitive horticulture crops.

The second challenge has been common weeds emerging later than normal, which again causes difficulties with spray timing (ie. the crop is passed the safe stage for application).

The third challenge has been higher densities of weeds that perform well in cool / wet conditions; such as, barnyard grass and chickweed.

The fourth challenge has been slower burn down or visual weed control, which leads producers to believe that their herbicide has not worked. Typically, the herbicide is working just slower than normal. This issue tends to result in an increased number of herbicide applications, causing the potential for more resistance management issues in the future if products are not rotated.

Remember, weeds are extremely adaptive and prolific. You will never have exactly the same weed problems in your fields each year. In cool, wet conditions plant metabolism slows, until conditions improve making herbicide uptake and coverage difficult.

If we were having a hot, dry year the problems would be different. In drought conditions weeds grow thicker cuticles which serve as a barrier to herbicide absorption and harden off with thick stems and deep root systems competing with the crops for moisture. And in extreme heat plant leaves roll up to minimize moisture loss, again making herbicide coverage and uptake difficult.

Timely weed control is even more important when crops are stressed because the weeds are competing for limited resources – nutrients in wet solids and water in drought conditions.

The best thing producers can do is monitor the growth stages of both their weeds and their crop, apply herbicides when the weeds are actively growing and small to ensure good control when weather conditions are less than optimal.

12th Annual

Eastern Ontario Crop Diagnostic Day

Tuesday, July 21, 2009

8:30 a.m. - 3:30 p.m.

at the

Winchester Research Station

University of Guelph Kemptville Campus

Baker Rd., Winchester, ON

A co-operative effort between:

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