GROWING KNOWLEDGE®
AGRONOMIC SPOTLIGHT
A KEY SOURCE FOR LOCAL AGRONOMIC INFORMATION

Growing Knowledge®

25 June 2010

DEKALB.ca

Leaf Yellowing in Soybeans

Yellowing of leaf tissue occurs in the development of soybean plants. Nitrogen deficiency, manganese deficiency, potassium deficiency, soybean cyst nematodes, and yellow flash herbicide application have been shown to have a role in soybean leaves turning yellow.

Nitrogen (N) Deficiency

Soybeans go through a period when their leaves are a light-green colour before the nodules supply adequate nitrogen (N) and a dark-green colour returns. If proper nodulation and sufficient nutrients and moisture are present, soybeans will recover from this yellow phase fairly rapidly as the season progresses (Figure 1).

Figure 1. These soybeans are showing yellow leaves due to a temporary deficiency of nitrogen in the plant, caused by wet soil conditions and the lack of nodule formation.

Nitrogen deficiency is identified as a yellowing or chlorosis of the lower leaves in the canopy as N is remobilized to the new growth. There are two sources of N available to the plant, N fixation and soil. The soil is the first choice as a N source because this process requires less energy compared with N fixation. The plant can take N from the soil solution accounting up to 50% of the total N needed for growth.

Manganese (Mn) Deficiency

Symptoms of Manganese (Mn) deficiency are identified by interveinal chlorosis (yellowing) on the newest trifoliates. Manganese is immobile in the plant, so symptoms will generally appear on the younger leaves, although older trifoliates often show symptoms as well. Soil pH affects the availability of Mn. As soil pH increases, less Mn is available to the plant. Manganese deficiency is not generally found in soils with a pH below 6.2. The deficiency is most common on poorly-drained soils, especially clay and silt loam soils on eroded knolls where the pH is higher than the rest of the field. Manganese is less soluble in well-drained soils. Roots must reach Mn to absorb it. Wet soils, extremely dry soils, cool weather, soil compaction, root diseases, N deficiency and herbicide damage can limit root growth causing Mn deficiency symptoms to appear (Figure 2, next page).

Potassium (K) Deficiency

Potassium (K) deficiency symptoms develop because plants cannot extract adequate K from the soil. The symptom is yellowing of the leaf margins of the older leaves that usually begins at the leaf tip and extends down the margins toward the leaf base. With severe deficiency the leaf edges may become brown (the tissue dies) and affected plants will appear stunted, although the newest leaves may be normal. The most common reason for this is that soil-test K is lower than optimum for vegetative growth. Depending on its severity, yields may be reduced.

to pg. 2

Figure 2. Soybeans showing Mn deficiency in a low lying area. Also, note the evidence of compacted tillage tracks.

Soybean Cyst Nematodes (SCN)

Soybean Cyst Nematodes (SCN) are a growing pest problem in Ontario. Serious infestations of SCN cause soybean leaves to become yellow in somewhat circular patches of the infested areas. Plants will often be stunted in addition to the yellow leaf appearance. Symptoms may look similar to nutrient deficiencies, compaction or drought damage. In severe cases drought stressed plants may actually die.

Yellow Flash From Herbicide Application

Yellow flash can sometimes occur with the application of a high rate of glyphosate and when conditions are dry. These symptoms usually last for about a week and no yield declines have been reported.

Soybeans with yellow leaves are usually found at the ends of fields and/or at spray-overlapped areas where application rates were two to three times the intended rate. Normally, the leaves turn green within a week of application with little, if any, growth reduction. Almost always, soybeans in these fields were under an environmental stress (temperature or drought) at the time of glyphosate application.

Why do some soybean leaves briefly turn yellow?

A few days after glyphosate is applied, all leaves on the soybean plant remain green except the newest leaves — at the top — that were less than 0.5 inch long at the time of spraying. These leaves continue to grow and expand, but chlorophyll production is reduced, leaving a yellow color (carotenoid pigments become visible in the absence of chlorophyll) that lasts up to a week. In the case of yellow flash, glyphosate does not cause green leaves to turn yellow; rather, temporary yellowing is a phenomenon of leaf development when the soybean plant is under multiple stresses:

- If the soybeans were not properly growing due to any stress condition when glyphosate was applied, yellow leaves sometimes may not appear until 10 to 21 days later.
- If it is dry when yellow leaves appear, these leaves may stay yellow until the crop resumes growth after rain releases the crop from stress.
- Plants with temporary chlorosis on the top trifoliate leaflets have yielded the same as plants with normal green top trifoliates in side by side tests over the past several years.
- Yellow flash is largely environmentally induced, with only a very small genotype x environmental component (this is *not* a variety issue).

Please contact your DEKALB® Seed Agronomist for more information regarding yellow leaves in soybeans.

Sources:

Bohner, H., OMAFRA, Potassium Deficiency in Soybeans, 30 September 2007. www.omafra.gov.on.ca.

Bohner, H, OMAFRA, Soybean Cyst Nematode Becoming More Prevalent, 15 September 2005. www.omafra.gov.on.

Bohner, H., OMAFRA, Yellow Flash in Soybeans, 29 June 2006. www.omafra.gov.on.ca.

Pedersen, P., Iowa state University, Soybean Nutrient Requirements, 8/6/07. http://extension.agron.iastate.edu.

Mallarino, A, Iowa State University Potassium deficiency symptoms in corn and soybean: What can we do about them? www.ipm.iastate.edu.