

## Leaf Yellowing in Soybeans

Yellowing of leaf tissue can occur in soybean plants. Nitrogen deficiency, manganese deficiency, potassium deficiency, soybean cyst nematodes, 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 color before the nodules supply adequate nitrogen (N) and a dark-green color returns. If proper nodulation, sufficient nutrients, and moisture are present, soybeans can recover from this yellow phase fairly rapidly as the season progresses (Figure 1).

Nitrogen deficiency can be identified as a yellowing or chlorosis of the lower leaves in the canopy as N is remobilized to the new growth. The two sources of N available to the plant are the soil and N fixation. The first choice for a N source is the soil. This process requires less energy compared with N fixation. The nitrogen taken from the soil can account for up to 50% of the total nitrogen needed for growth.<sup>1</sup>

### 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. 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 of potassium deficiency 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.<sup>2</sup> 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, yield potential may be reduced.<sup>3</sup>



**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.

### Soybean Cyst Nematodes (SCN)

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 an application of a high rate of glyphosate and environmental conditions are dry. The symptoms generally last for about a week and no decreases in yield have been reported.<sup>4</sup>

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. Generally, soybeans in these fields were under an environmental stress (temperature or drought) at the time of glyphosate application.

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

### 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.
- Yellow flash is largely environmentally induced, with only a very small genotype x environmental component .

#### Sources:

- <sup>1</sup> Pedersen, P., Iowa State University, Soybean Nutrient Requirements, 8/6/07. <http://extension.agron.iastate.edu>. (viewed 7/25/11)
- <sup>2</sup> Mallarino, A, Iowa State University Potassium deficiency symptoms in corn and soybean: What can we do about them? [www.ipm.iastate.edu](http://www.ipm.iastate.edu). (viewed 7/25/11)
- <sup>3</sup> Bohner, H., OMAFRA, Potassium Deficiency in Soybeans, 30 September 2007. [www.omafra.gov.on.ca](http://www.omafra.gov.on.ca). (viewed 7/25/11)
- <sup>4</sup> Bohner, H., OMAFRA, Yellow Flash in Soybeans, 29 June 2006. [www.omafra.gov.on.ca](http://www.omafra.gov.on.ca).

**Individual results may vary**, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

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