

# Illinois Soybean Diseases and Pests, Managed Research



## Green Stem Disorder

Laboratory for Soybean Disease Research

### Overview

Green stem is a disorder of soybean that causes stems to remain immature and moist after pods and seeds have fully ripened. Normally, soybean stems mature and dry down along with the pods and the seeds. Although the disorder has not been shown to affect soybean yields, it significantly increases difficulty in harvesting because green stem affected plants are much harder to cut. As a result, combine ground speed must be slowed to help the header knives cut the tough and pliable green stems while keeping the engine and cylinder speed high to reduce the risk of thresher clogging. This reduces the fuel efficiency in the combining operation. Furthermore, moisture can be transferred from moist stems to the seed during the threshing process, reducing the grade and storability of seed.

Green stem disorder was first reported in Kansas in 1974 and is now widely distributed throughout all soybean-growing regions. *Bean pod mottle virus* (BPMV) was once thought to be the main cause of the disorder, however, recent work indicated that the disorder is independent of BPMV infection. Because its cause is unknown, green stem referred to as a disorder rather than a disease. It is currently the most common type of delayed maturity found in Illinois and Wisconsin and is distinguishable from other types of delayed maturity by normal ripening of pods and seeds.

There are consistent differences among soybean cultivars for sensitivity to the disorder. Over 90% of plants may have green stem disorder in sensitive cultivars. Most soybean cultivars are insensitive to the disorder with less than 10% of plants developing symptoms.



Comparison of plants with green stem disorder symptoms (above left, both images) and plants with normal maturation of stems (right).

### Symptoms

The main diagnostic feature of green stem disorder is the presence of mature pods and seeds on moist, immature stems. This feature distinguishes green stem disorder from general delayed maturity and other reasons for plants remaining green at harvest time. Stem color may range from yellow to light green, green, and to purple. The common element is the immature, moist, and pliable stem tissue. One interesting feature is that stems of plants with green stem disorder appear to be relatively free of fungal stem diseases. Sometimes leaves or petioles may remain attached to plants with green stem disorder symptoms. The number of pods and seeds are not affected by the disorder. Only normal maturation of stem tissue appears to be affected. Plants affected with the disorder may be scattered or occur in patches or even large areas in the field.



Plants with green stem disorder scattered within a field of mature soybean.



A green stem disorder sensitive soybean cultivar showing a high incidence of plants with symptoms surrounded by insensitive cultivars in a UISVT test.

## Management

Until the cause or causes of green stem disorder are determined, no specific control recommendations can be offered. However, there are consistent differences in sensitivity to the disorder among soybean cultivars and this enables producers to select cultivars that are less prone to the disorder. Information on sensitivity is collected each year when several hundred commercial or pre-commercial soybean cultivars are evaluated for green stem disorder as part of the University of Illinois Soybean Variety Testing Program (UISVT) and the Variety Information Program for Soybeans (VIPS). The incidence or percentage of plants within a cultivar that have green stem disorder is estimated. Ratings are done in trials at three or more University of Illinois agricultural experiment stations. Summaries of the ratings are presented online at <http://www.vipsoybeans.org>. At present, choosing cultivars that are insensitive to the disorder is the only means available to soybean producers to manage the problem. Producers can also keep track of the history of green stem disorder in the cultivars they plant in their fields to identify sensitive and insensitive cultivars. The vast majority of soybean cultivars are insensitive with most having less than 10% of plants affected with green stem disorder.



Close up of a soybean cultivar sensitive to green stem disorder.

## Other Types of Delayed Maturity

There are other types of delayed maturity of soybeans that are often confused with green stem disorder. In the southern US and South America, there is a problem called “green bean syndrome” that is caused by stink bug feeding. This problem is different from green stem disorder because the maturity of the whole plant is delayed, including the pods and seeds. Other factors that can delay the maturity of the whole plant include late herbicide application, fungicide application, *Soybean mosaic virus*, *Bean pod mottle virus*, other viruses, haploidy (plants with only one set of chromosomes instead of two), male or female sterility, late plant emergence, or admixture (seed of different cultivars mixed together). Haploid or sterile plants remain green because they continue to attempt to produce seed even though they are unable to do so. Plants with these other delayed maturity problems are encountered much less frequently than plants with green stem disorder symptoms.



Left: the maturity of this plant was either delayed by virus infection, late emergence, or came from a seed of a late maturing cultivar that was mixed in with the planted seed (admixture). Right: delayed maturity and loss of pods caused by late application of glyphosate.

## Further Information

Hill, C.B., G.L. Hartman, R. Esgar, H.A. Hobbs. 2006. Field evaluation of green stem disorder in soybean cultivars. *Crop Science* 46: 879-885.

Hobbs, H.A., C.B. Hill, C.R. Grau, N.C. Koval, Y. Wang, W.L. Pedersen, L.L. Domier, and G.L. Hartman. 2006. Green stem disorder of soybean. *Plant Disease* 90: 513-518.

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Variety Information Program for Soybeans, <http://www.vipsoybeans.org>.

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