

DELAYED SENESCENCE IN SOYBEANS

According to the article [Delayed Senescence in Soybean: Terminology, Research Update, and Survey Results from Growers](#) that was published in Vol. 17 of Plant Health Progress in 2016, the terms used to describe symptoms of delayed senescence in soybean are inconsistent and do not adequately describe the varied symptoms observed in the field. The following sections review these terms and their definitions as presented in that and other articles.

Green Stem Syndrome. This term is used to describe soybean plants that have green or immature stems at maturity, along with nonsenesced leaves and petioles. Affected plants also have fewer pods per node, and smaller seed.

Green stem syndrome (labeled as a disease by some) in soybeans occurs when stems stay green after the pods mature. Conditions associated with this syndrome can result in delayed harvest, reduced harvest speed, and contamination of harvested seed with green plant material.

This syndrome has been attributed to fungal and viral diseases, insects (mainly stink bugs), and environmental (mainly drought) stresses. All of these maladies typically result in a reduced number of pods, and alter the source-sink ratio in favor of the source or vegetative tissue.

An article entitled “[Depodding Causes Green-Stem Syndrome in Soybean](#)” in Crop Management reports on finding the cause of green stem syndrome. The article, written by Dennis Egli and William Bruening of the University of Kentucky, is a summary of results from experiments conducted for two years at Lexington, KY.

Experimental plots were irrigated to minimize drought stress. Treatments of 25% and 50% pod removal were applied at beginning seedfill to minimize additional pod set after pods were removed.

The delay in time to brown stems was dramatic with depodding. The delay for MG III and MG IV varieties averaged greater than 2 weeks in the 25% depodded treatment and greater than 4 weeks in the 50% depodded

treatment. Stem maturation was not complete in some treatments when frost occurred 30 to 50 days after the controls were mature.

Green stems resulting from depodding were associated with higher stem concentrations of sugars, starch, and nitrogen. Starch and nitrogen are normally translocated from stems to seeds during seed filling, and this movement is limited with a reduction in the number of seeds.

Their results indicate that green stem syndrome in soybeans is caused by a reduction in number of pods. This may provide an explanation for the many proposed causes of this problem. Any agent (disease, insect, environmental stress) may result in green stem syndrome indirectly by reducing the number of pods.

Considerable varietal variation in green stem syndrome occurred in their study. This may occur in a producer environment in response to the cause of pod reduction. Some varieties may be more susceptible to a particular pathogen or insect, and thus suffer more pod loss as a result of the infestation by the causal agent. This difference in susceptibility of varieties to damage from the causal agent should result in a different level of depodding, and thus a different level of green stem occurrence.

Importantly, delays in the development of mature pods or seeds drying down on depodded plants were much smaller (usually <7 days) than the delays in stem maturity. This indicates that pod and seed maturation do not require maturation of the vegetative plant, and that green stem and green bean syndromes in soybeans may be unrelated.

Green Bean Syndrome. This term has been used primarily in the southern US to describe the condition in which maturity of the whole plant, including pods, is delayed. It is likely that this condition is related to direct damage by an agent such as stink bugs that disrupts the normal plant maturation process.

When this condition occurs, plants cannot be efficiently harvested until a harvest aid is applied. Even then, seeds

within pods of affected plants may remain immature, which results in “green beans” that will contaminate harvested seed. This condition is often associated with stink bug feeding, but other associations have been implicated. Yields and seed quality are often reduced, and the presence of green beans can lead to [dockage](#).

Green Plant (or Stem) Malady. Symptoms of this condition usually include green leaf retention, green stems, and delays in seed maturation that results in poor seed quality. The primary symptom of this condition is stems remaining green after pods mature. Results from studies in Louisiana determined that this condition was primarily associated with cultivar, with stink bug damage and Headline (pyraclostrobin) fungicide application also contributing. Application of paraquat as a harvest aid is relatively ineffective in alleviating this condition.

Green Stem. This term has generally been used as a catch-all term for delayed senescence because it also refers to plants with or without leaves still attached and with pods turning brown or remaining green.

Green Stem Disorder. This term defines plants with non-senescent stems that have mostly unattached petioles and mature pods and seed that are normal at maturity. This disorder is not associated with viruses or feeding by insects. In fact, research results suggest this disorder may be associated with lack of fungal parasitism. Results from research also indicated that there was no correlation between green stem disorder and yield. There is variability among varieties in sensitivity to this disorder.

Greening Effect. This term has been used to describe the greening effect that is often associated with the application of strobilurin foliar fungicides. The result of this malady is a delay in the natural maturing process, which causes plants to maintain green leaf longer. However, once the plant has reached full maturity, it dries down normally. This normal drying down process of the entire plant at maturity delineates this condition from that of green stem disorder, where plants do not usually retain leaves and do not delay pod and seed maturity even though stems remain green.

Take-Home Message. 1) In the southern US, the two above maladies most likely to occur or be identified as occurring are green stem syndrome and green bean syndrome. 2) Some pests of soybeans, both disease and insect, can cause green stem syndrome by causing pod loss. 3) Some pests, mainly insects and especially stink bugs, can cause both green stem and green bean syndrome by causing both pod loss and damage to immature seed. 4) Green stem syndrome and green bean syndrome are likely two separate maladies of soybeans. 5) Check preferred varieties for ratings (both originating company and variety trial data) associated with the above maladies. 6) The remedy for both green stem and green bean syndromes of soybeans is to select less susceptible varieties, and monitor and control environmental stresses and disease and insect infestations to prevent pod loss and damage to seed.

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