AGRONOMIC ALERT

Technology Development & Agronomy by MONSANTO

Green Stem Syndrome in Soybeans

Green stem syndrome occurs when soybean pods and seeds mature but the stem remains green. When producers proceed to harvest according to seed moisture content, the green stems can make for a slow and difficult harvest. However, delaying harvest until the entire plant turns may increase harvest efficiencies, but result in reduced yields due to lower seed moisture and a higher potential for shatter.

What is Green Stem Syndrome?

As normal soybean plants mature and near harvest the leaves drop and the stems lose their green color, but green stem syndrome can prevent normal plant drydown. There is not an exact cause to green stem syndrome, but some factors that may influence the problem include environmental conditions, viruses, and germplasm.

Figure 1. Two soybean plants growing side-by-side in the field. Plant on the left has mature pods and stem; whereas, the plant on the right has mature pods and green stem (green-stem syndrome). *Photo courtesy Shaun Casteel, Purdue University.*

The environmental conditions of this past growing season may be a contributing factor to green stem syndrome apparent in certain fields. In some regions, pods and/or seeds may have been aborted by soybean plants during the very warm, dry conditions this summer. When pods and/or seeds are aborted, the plant

Figure 2. Soybean seed was aborted due to drought stress. *Photo courtesy Shaun Casteel, Purdue University.*

redistributes sugars and nutrients or photosynthate. This redistribution may increase the concentration of photosynthate in the stem causing it to retain green color longer.

According to a study conducted by the University of Kentucky, when 25 to 50% of pods were removed from a soybean plant, pod maturation was not delayed, but stem maturation was delayed from as few as four days to a month or longer. Green stem symptoms were more pronounced when a higher percentage of pods were removed.

Figure 3. Arrested seed fill (upper pods) contributed to the green stem even with mature pods. *Photo courtesy Shaun Casteel, Purdue University.*

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Contributing Factors

Soybean viruses and insect damage can also result in green stem symptoms. Stress caused by bean pod mottle virus, soybean mosaic virus, tobacco ringspot virus, bean leaf beetle and green stink bug can increase the occurrence of green stem. Symptoms may occur in isolated or irregular shaped patches. These viruses may also produce discolored and distorted seed, which can be diagnosed at harvest.

Fall drydown conditions could also be contributing to green stem. In some regions, low humidity coupled with warm temperatures has sped up grain drydown but not given stems enough time to dry, due to a potential increase in photosynthate.

Any number of pod reducing stresses may be responsible for green stem at harvest. It may be assumed that high-yielding varieties may be more prone to late-season pod abortion, as these plants would produce higher number of pods early in the season.

Harvest Considerations

Harvesting soybeans with symptoms of green stem syndrome may be a challenge. Green stems are difficult to cut and are known to plug up combines. When harvesting soybean plants with green stems, the combine should be in good operating condition, properly adjusted with sharpened cutting knife sections, and operators should proceed with caution at slow speeds.

Waiting to harvest until after a killing frost may be necessary, depending on the severity of the green stem problem and the condition of the seeds and pods. However, waiting for a frost or for the stems to drydown may increase the risk of yield loss from pods shattering in the field or during harvest. Fields should be monitored and harvested according to moisture content and combine settings should be adjusted accordingly.

One option growers may want to consider if waiting on frost is not a viable option is the use of Gramoxone Inteon® (paraquat) as a harvest aid. Although some other herbicides are labeled for harvest aids in soybean, Gramoxone Inteon® generally has the quickest speed of activity and is therefore ideal for green stem desiccation. Because it is a contact herbicide, good spray coverage is essential for effective "dry down." Please see the box below for specifications of use for Gramoxone Inteon®. Two important things to take into account if considering using a chemical harvest aid is the cost and the variability of maturity in your fields. It is imperative to closely monitor your fields as yield may be diminished if your fields are not as mature as required by the label.

Gramoxone Inteon® Usage Instructions:

- Use rate is **8 to 16 fl oz/A**.
- Non-ionic surfactant (NIS) at 0.25 percent v/v or crop oil concentrate (COC) at 1 percent v/v must be applied with Gramoxone Inteon®.
- Application timing is when **at least 65% of the soybean** (indeterminate varieties) **pods are mature brown** (seed moisture less than 30 percent).
- **DO NOT** apply Gramoxone Inteon® within 15 days of harvesting soybeans.
- **DO NOT** graze or harvest for forage or hay.
- Gramoxone Inteon® is a **restricted use pesticide**, so a private or commercial pesticide applicator's license is required for use of this product.

Sources:

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