

Potassium Deficiency — How to Identify It, How to Address It

Premature Senescence Syndrome (PSS)

Identifying the problem

Premature senescence syndrome (PSS) is a potassium-related disorder in cotton that causes premature aging and/or defoliation of cotton leaves. The disorder is most often caused by the interaction of high boll load production and plant stress factors. PSS can strike regardless of the supply and availability of potassium in the soil.

Potassium provides strength to the plant cells. But cells deficient in potassium will weaken and become susceptible to secondary pathogens that can attack the plant. Secondary pathogens are key contributors to premature defoliation.

Today's cotton varieties are bred to support heavy boll loads. Bolls take in approximately 60 percent of the plant's available potassium. When potassium is not sufficient to meet boll demand, the younger, topmost leaves are likely to degrade to feed the developing bolls. Barren plants and those with a smaller boll load may appear unaffected because they demand less potassium and other nutrients.



Premature senescence syndrome gives the upper canopy a very unhealthy appearance, with foliage exhibiting a combination of red, orange and bronze discoloration, including interveinal yellowing.



Although premature senescence syndrome can negatively impact yield and fiber quality, typically the effect is not as serious as the crop may look.

Stressful conditions

Multiple conditions can contribute to potassium deficiency in cotton, even when potassium is readily available in the soil. Heavy boll loads demand high levels of both nutrients and carbohydrates for development, which, when combined with other stress factors, may result in the onset of PSS. Other factors may include:

- Soils low in potassium
- Soil compaction (Compact soils can make nutrient uptake difficult for roots.)
- Waterlogging (Too much water can reduce root development.)
- Very dry conditions with low soil solution activity
- Inadequate nitrogen

Looks bad, but no need to panic

PSS gives the upper canopy a very unhealthy appearance, with foliage exhibiting a combination of red, orange and bronze discoloration, including interveinal yellowing. In addition, the associated secondary fungal pathogens (*Alternaria*, *Cercospora* and *Stemphylium*) cause leaf spotting and necrotic lesions. Although PSS can negatively impact yield and fiber quality, typically the effect is not as serious as the crop may look. However, the earlier PSS occurs, the more it could affect performance. Typically, the most severe cases of PSS are seen in earlier maturing cotton varieties because of the high demand for boll fill in a shorter period of time.

Solutions and preventive steps

Once PSS occurs, there is little cotton growers can do to remedy the condition during the current season. There are, however, steps that can be taken to minimize PSS from returning next season.

Preplant soil samples should be taken to determine potassium fertility levels and supplemental fertilizer needs. Soil sampling is the first step in developing a strong cotton nutritional program and identifying suspect fields. Even though soil test results may indicate adequate amounts of potassium, fields with a past history of developing PSS should be noted. Many growers have found foliar potassium applications effective in minimizing the development of PSS. Generally, a foliar potassium spray regimen is most effective when initiated at the first bloom stage, followed by two to three subsequent applications spaced 10 to 14 days apart.

It is important to understand characteristics of different cotton varieties and local field conditions. As a rule, mid- to full-season varieties are less likely to develop PSS, while short-season varieties may be more susceptible.

Learn more

For more information on PSS and possible in-season foliar potassium application recommendations, contact your state Extension cotton specialist. As always, your PhytoGen cotton development specialist is available to discuss options. To find contact information, go to PhytoGen.com.

Premature Senescence Syndrome at a Glance

- Potassium-related disorder in cotton can result in unhealthy leaves and secondary fungal pathogen infection, resulting in premature senescence and defoliation.
- Even when potassium is readily available in soils, heavy boll loads in combination with other stress factors (weather, soil compaction, waterlogging and inadequate nitrogen) can exacerbate PSS.
- Plants suffering from PSS are not pretty, but the condition is not devastating to plant development or yield, and there are no remedies once it occurs.
- Consult with Extension cotton specialists or PhytoGen cotton development specialists about possible foliar potassium applications.