



The University of Georgia
Cooperative Extension
College of Agricultural and Environmental Sciences



Georgia Cotton

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“Out damned spot”	1
Cotton Leafspots Due To Potassium Deficiency	3

“Out damned spot!” (Lady Macbeth, William Shakespeare) (Bob Kemerait and Jason Brock) Most, if not all, of the cotton crop across the Coastal Plain is affected this season by leaf spots that may affect not only the foliage, but the bracts and bolls as well. In mild cases, the disease spots are a curiosity in the field; in severe cases complete defoliation may occur across large areas of a field. This rapid and extreme defoliation will certainly impact yield and loss of leaves may keep numerous bolls from opening. However, some defoliation may help to reduce boll rot this year by increasing the air flow within the canopy.

The University of Georgia Cooperative Extension has received numerous calls from consultants and growers regarding management of foliar diseases of cotton this season. Understandably, many are frustrated that we do not have more definitive answers to their questions. However, everyone must recognize the following.

- A. Much of the disease this year is very likely the result of interaction between weather conditions, nutrient uptake, and fungal pathogens. Managing such a situation is difficult at best.
- B. The 2008 season has been the most dramatic for leaf spots on cotton over the nine seasons that I have been at the University of Georgia. Although leaf spots will occur in cotton fields, outbreaks of this severity and scope are sporadic and thus difficult to adequately study.
- C. Although the leaf spots are of significant concern to growers, especially when the spots spread to the bolls, it is not clear how much yield loss is attributable to any but the most severe cases that lead to significant defoliation.
- D. Headline (pyraclostrobin) is a very effective fungicide that has been shown to effectively reduce severity of diseases such as *Ascochyta* blight and *Aereolate* mildew in some studies. Still, there is limited data documenting control of *Stemphylium* leaf spot (the most common disease this season) or link between disease control and significant increases in yield. Also, there is minimal data to help recommend use of a fungicide such as Headline once disease has progressed throughout a field.

Below are questions commonly asked this season about leaf spots on cotton:

Question 1. What is causing the leaf spots?

Answer 1. The most important factor this season seems to be a link between weather conditions and potassium nutrition in the cotton plant. Insufficient potassium leads to weakened cell walls in the leaves that are more easily breached by fungal pathogens. We have identified the following types of leaf spot:

- A. Stemphylium leaf spot (most common by far, linked to nutrient deficiencies)
- B. Alternaria leaf spot (fairly common, sister disease to Stemphylium leaf spot, also linked to nutrient deficiencies)
- C. Cercospora leaf spot (fairly common, also linked to stress and nutrient deficiencies)
- D. Ascochyta wet weather blight (uncommon this season).

Question 2. Why is the leaf spot so bad this season?

Answer 2. Although we do not have all of the answers, the best answer seems to be tied to the link between our weather during the season and potassium levels in the soil and ultimately in the foliage. This part of the puzzle is best addressed by our soil scientist. The rainfall that we have seen from storms like Fay and Gustav created condition favorable for further spread of fungal disease.

Question 3. Will the build-up of fungal spores in a field (especially Stemphylium) predispose the same field to problems in 2009?

Answer 3. Although the spores will likely survive until next season amongst the leaf litter and debris, I don't feel that this inoculum will greatly increase chances of severe outbreak in 2009. Spores of Stemphylium are ubiquitous in the environment and will be plentiful every year. If potassium levels are low in the cotton plants in 2009, we will likely see another severe outbreak of disease; if not, we will likely not have so much disease.

Question 4. What will be the impact of the spots that spread from the leaves to the bracts and the bolls?

Answer 4. The pathogens linked to the leaf spots this year (e.g. *Stemphylium*, *Alternaria*, and *Cercospora*) are NOT boll rot pathogens and at best create superficial blemishes on the cotton bolls. However, under the right conditions (i.e. high rainfall or canopy moisture) it is possible that these superficial wounds could be colonized and exploited by more aggressive pathogens resulting in boll rot.

Question 5. How can Headline be used to control the foliar diseases we have seen this season?

Answer 5. Headline is a very effective fungicide and it may indeed be shown to play a role in management of diseases such as Stemphylium leaf spot in the future. However, at this time it is unclear whether a fungicide, no matter how good a fungicide, can have a significant impact on a disease whose cause is an underlying nutritional problem. Also, even if a fungicide is effective to one degree or another, it MUST be in place to protect the crop before the disease becomes widespread in a field. Therefore, growers should consider the following:

- A. If disease that is linked to a nutritional problem, such as Stemphylium leaf spot, occurs in a field, there is no guarantee that a fungicide will provide effective control.

- B. If a grower wants to test the efficacy of a fungicide, I STRONGLY advise leaving untreated areas in the field with which to compare disease control and yield to areas that have been treated.
- C. If a grower wants to test efficacy, he should make a fungicide application BEFORE disease becomes established in the field and be prepared to follow with additional applications within 2-3 weeks after initial application.
- D. Once disease becomes widespread in the field, it is unlikely that a fungicide would have any efficacy at all and the grower would be better served to save this money and use it elsewhere.

Question 6. What about applying a foliar fertilizer to improve nutrition in the leaves in order to control disease?

Answer 6. I will let our soil scientist address this; however I believe the IF a foliar application of fertilizer could ELIMINATE or greatly reduce the nutritional deficit before disease occurs, then it might be a viable management strategy. Otherwise, the foliar fertilizer would likely have no benefit in disease control.

Cotton Leafspots Due To Potassium Deficiency (Harris) Dr. Kemerait quotes Shakespeare. My first thought was to quote the dog in the children's book "Put me In The Zoo" that can put his spots anywhere and even juggle his spots ! Kidding aside, apparently all the conditions were right this year for potassium deficiency to cause massive outbreaks of cotton leafspot disease, including Stemphylium. The high price of potassium fertilizer at planting time... coupled with widely scattered dry weather early... followed by a week of clouds and rain by the meandering tropical Storm Fay, all contributed to what may be the worse outbreak of this problem in recent history.

This is not a new problem. The first outbreaks of Stemphylium were detected in 1995 and 1996 where up to 20,000 acres of Georgia cotton were estimated to be infected. Better fertilization, better weather and better cotton varieties seemed to alleviate this problem for the most part until this year. DPL 555 is thought to have a more extensive root system that can explore more soil volume and almost "scavenge" more soil K than many other varieties. However, the conditions this year as mentioned above may have been too much even for the mighty 555.

So what do we do now? Unfortunately, it is probably too late to correct potassium deficiency in most fields except maybe some late, "June-planted" cotton. Therefore, below is a list of points to consider both now and in the future. Most of these were taken from an article I wrote titled "Potassium Deficiency in Cotton Linked to Leafspot Disease" published in *Better Crops with Plant Food*, 1997. No2. by the Potash and Phosphate Institute (PPI, now known as IPNI).

1. Potassium deficiency is the primary problem, causing the secondary problem of leafspot. Trying to treat the leafspot with fungicide is often like treating the symptom not the cause.
2. Soil testing and soil-applying the recommended potassium fertilizer at planting is the first and best defense to avoid potassium deficiency

3. Foliar potassium should be considered on deep sands, where you had low soil K at planting, and/or under high-yield irrigated conditions – even when the recommended K rate is applied to soil at planting.
4. Split applications of soil applied potassium should be considered on deep sands (no subsoil clay in the top 16 inches of soil) but not on “Tifton-type” soils. Research in 1998 on a Tifton soil showed that the best K fertilization strategy was the combination of the recommended soil-applied K at planting followed by foliar K during the peak bloom period (first 4 weeks of bloom).
5. Severe potassium deficiency is most likely to occur around the fourth week of bloom with short-season varieties or high-yielding irrigated cotton.
6. Foliar feeding K after the fourth week of bloom will not improve severely affected cotton. Obviously, if a crop defoliates due to severe potassium deficiency it can not be foliar fed.
7. Even when adequate levels of potassium are present in soil, potassium deficiency can occur during dry weather. Much like calcium nutrition on vegetables, if water is not present to move the nutrient, in this case potassium, into the plant, deficiencies can occur.
8. Foliar feeding K during dry periods, especially during the peak bloom period, may be beneficial as long as the cotton is not drought stressed (rule of thumb = wilted by noon).

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Your local County Extension Agent is a source of more information on these subjects.

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