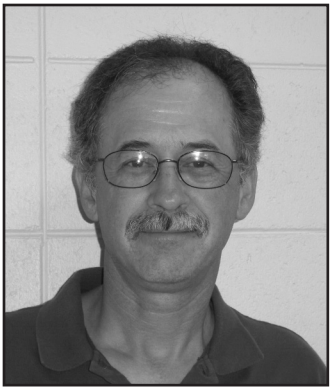

PECAN ANTHRACNOSE AND OTHER UNUSUAL DISEASES: LEARNING FROM AN UNUSUAL YEAR

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With the exception of a dry spell in June, 2009 will be remembered as a year of frequent rain starting in early spring and in many areas continuing through harvest. Fig. 1 shows the daily rainfall events recorded in Tifton from April through October, and some areas were wetter than this. Weather such as this always brings disease problems on pecans, and this year was no exception. In addition to the increased infection periods, it also makes it much harder to stay on a timely spray schedule. The combined effects lead to serious scab issues as well as outbreaks of more minor diseases like downy spot.

Another disease that made an appearance this year was anthracnose, caused by *Glomerella cingulata*. Anthracnose has been a problem for growers in the southeastern United States as far back as the early 1900's. It frequently occurs on nonsprayed or poorly managed trees and can contribute to premature defoliation. In well managed orchards it is usually a minor disease and has not been the cause of major yield losses. However, in wetter years it can be a significant issue even in better maintained orchards. Last year was one of those years when it was observed all over the state. Early symptoms were observed on leaves in

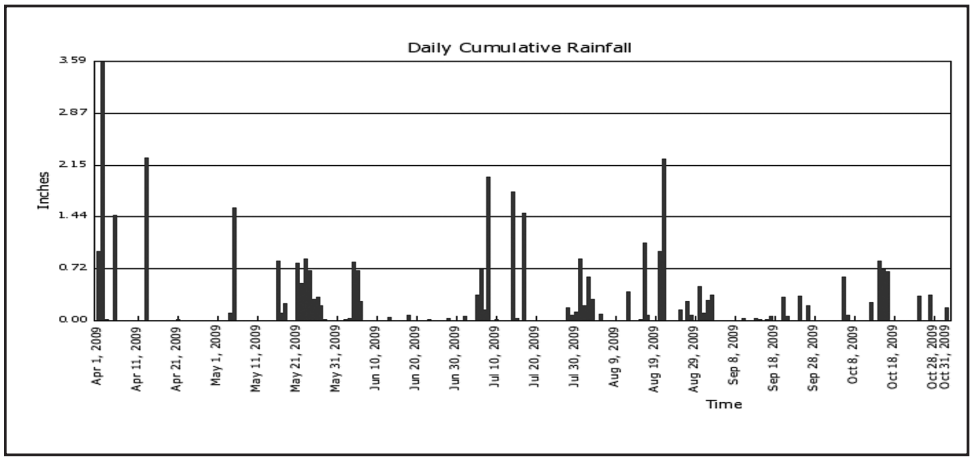

Fig. 1. Daily Rainfall in Tifton from April – October, 2009.
Source: Georgia Automated Weather Network

July, and there was a lot of defoliation associated with infected trees (Fig. 2). The worst cases were on Desirable but symptoms were found on many cultivars. Since this disease is normally not evident this early in the year it caused a lot of concern among growers. These symptoms (Fig. 3) were similar to those first observed in 1914 by F. V. Rand who described the leaf lesions as "irregular, reddish to grayish brown blotches varying greatly in size and eventually often covering the whole leaf". Symptoms were also found later on shucks (Fig. 4).

When reconstructing the events of 2009, the leaf and shuck infections presumably occurred during the wet periods of April-May and July-August, respectively. However, it is important to remember the potentially long latent period of the pathogen, ie. the long delay that can be experienced between the time of infection and symptom development. This can make it more challenging to identify critical infection periods. Another factor to consider is the apparent relationship between symptom development and stress factors during this latent period. The extreme heat last June would have been such a stress related to development of leaf symptoms, and simple senescence can be a stress factor later in the season on nuts. This late season stress is magnified in situations of heavy crop load which places additional demands on the tree.

Many of the orchards where anthracnose was found had been sprayed to

Fig. 2. Severe defoliation of Desirable trees that were regularly sprayed in a well managed commercial orchard (July 29, 2009).

varying degrees, although in some cases the managers had trouble getting in on time due to the very wet conditions in the spring. Foliar lesion development slowed after the initial observations, but additional symptoms including lesions on the shucks occurred later in the season. Yield losses from early leaf drop are well documented, and there were no doubt losses from the later-season shuck symptoms as well. Loss from symptoms on shucks is less well quantified, but observations in the orchard and preliminary studies showed it is significant. In fact there were many Desirable orchards in 2009 with significant late season shuck decline that no doubt adversely affected the crop. There are a number of issues related to late season shuck decline that may have been involved as well, but anthracnose was no doubt a significant part of this mix.

To better understand the potential loss from this disease, samples of Desirable nuts were collected from the University of Georgia research plots in Tifton. A total of 177 nuts were evaluated near harvest that exhibited anthracnose symptoms ranging from 0-100% coverage of the shuck. These nuts were hand picked, dried, and shelled to determine the nut quality and color. The number of nuts per pound and the percent kernel associated with each category of shuck disease are shown in Figure 5. Correlations were also determined between these parameters and the shuck symptoms. Pearson correlation coefficients between anthracnose severity and percent kernel, weight of nuts, and weight of the kernels were all highly significant ($P<0.0001$) and negative (ranging from -0.49 to -0.61), indicating that increased shuck symptoms were in fact associated with poor nut fill and quality. There was also a significant negative correlation between shuck symptoms and the percent of lighter color kernels.

Studies on fungicide control of anthracnose were less definitive, in large part due to the unpredictable occurrence of the disease. We established two mid-season trials in locations where there was a lot of anthracnose already present on leaves. The treatment applied was a combination of Headline (7.0

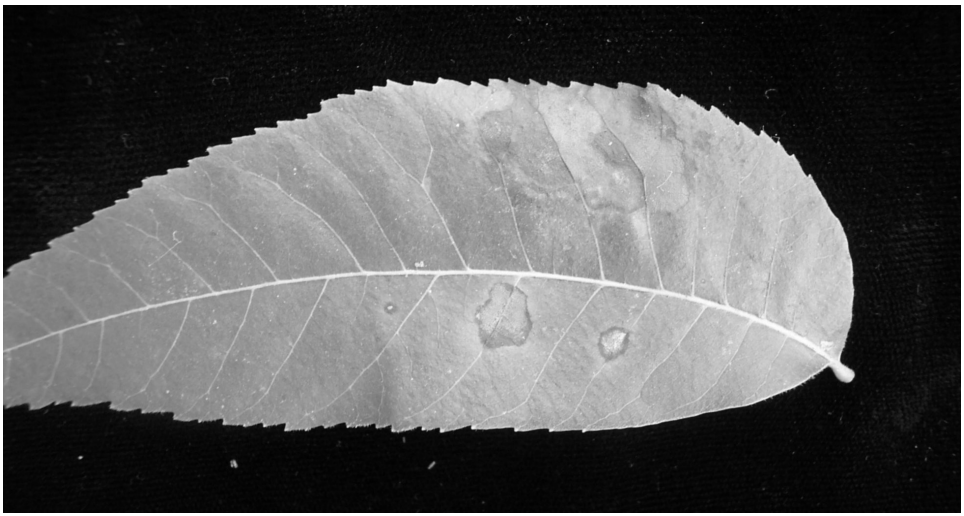

Fig. 3. Anthracnose lesions on pecan leaves (Irwin County, 2009).

Scab versus Anthracnose

Fig. 4. Late season scab symptoms on left characterized by scattered black lesions, versus the large, solid necrotic area spreading upward from the base of the nut on right, which is typical of anthracnose. Note also the salmon-colored spores on the anthracnose lesion.

oz/A), a strobilurin, and Kphite (2.0 qt/A), a phosphorous acid based material. Two applications were applied in late August – early September as other fungicide sprays for scab were ending. This combination of chemistries has shown good activity against anthracnose on other crops, and both are labeled for use on pecans. The Headline has also shown good post-infection control of other diseases. However, the benefit of these sprays this late in the season was highly speculative. The main concern was preventing infection of the shucks, presumably as a result of inoculum produced on the numerous leaf lesions already present in both orchards. Anthracnose incidence on leaves in mid to late October was reduced by this treatment in both tests ($P<0.05$). There was not a significant reduction in shuck symptoms at either location, but we were unable to rate shucks in the tree tops where much of the disease occurred. There was some reduction in nut scab, and also consistent improvement in nuts/lb and the % fill, but these differences were not statistically significant.

It is essential to understand all the diseases that threaten consistent production of a quality crop. Clearly more work needs to be done on the epidemiology and control of anthracnose. Most years it is not a major problem for growers in Georgia, but in years like 2009 it can cause losses. Even in "normal" years, it

is a component of several late season problems that compromise the health of shucks and nuts. Better understanding the dynamics of this disease will help us avoid surprise epidemics such as 2009 by identifying critical infection periods and the best materials to use for control. It will also give us a better understanding of late season shuck health.

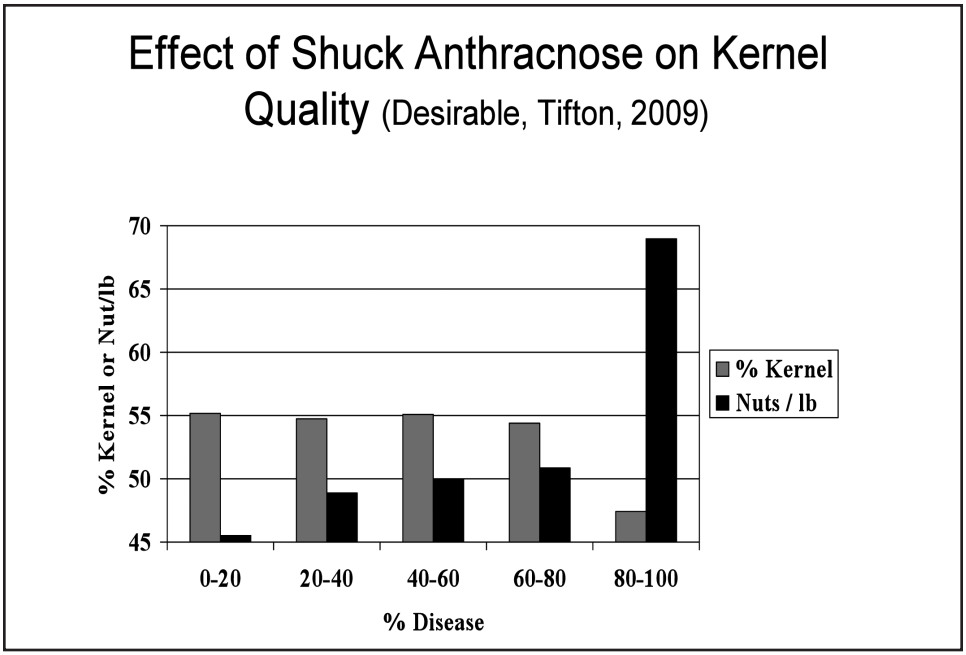

Fig. 5. Effect of various severities of pecan shuck anthracnose on nut quality (Desirable, 2009).