INCIDENCE AND DESCRIPTION OF SEED ROT

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Abstract

Seed rot was first observed in cotton fields in Hampton County, SC, during the last week of July 1999. Growers and crop consultants monitoring insect feeding and boll maturity detected poorly developed and discolored,"rotting" seed in bolls of several varieties. "Seed rot" was observed in apparently healthy fields which had high yield potentials 3 to 4 weeks after the initiation of flowering. Bolls containing seed rot exhibited no outward symptoms of seed rot or any other problem. Symptoms were most visible when bolls were cut open transversely. Affected seed were poorly developed and often hollow, while less affected seed were pinkish in color and partially hollow. Some seeds exhibited thickening or uneven development of the seed coat. Bolls in which seed rot occurred did not mature normally and often were hard-locked, i.e. unharvestable with a mechanical picker. Significant yield losses occurred where the incidence of seed rot was high. Fields with boll exhibiting "seed rot" symptoms were reported in North Carolina, South Carolina, Georgia, Florida, Alabama, and the Coastal Bend region of Texas in 2000. South Carolina survey data detected seed rot in all 23 cotton producing counties examined in South Carolina in 1999 and 2000. Seed rot was found in all 45 varieties examined. Seed rot was detected in conventional varieties and varieties with either the Bromoxynil, Boll Guard and/or Roundup Ready genes. No correlations between the occurrence of either supernumerary carpels or insect feeding and the presence of seed rot was noted. No specific weather event or pattern was tightly linked to the occurrence of seed rot. The possibility that poor development of the seed was due to incomplete pollination and/or fertilization was also examined.

Description of Symptoms

Seed rot symptoms are shown in Fig. 1. Symptoms of seed rot were first observed in bolls approximately three weeks of age. Seed rot symptoms were not observed in bolls younger than three weeks of age. During the early stages of seed rot, the outside of affected bolls and their associated bracts appeared green and normal in color. As the season progressed, the outside carpel walls of some affected bolls turned a pale green to greenish-yellow color, and the bracts became necrotic. In some instances, the stylar canal and boll walls were discolored and necrotic inside affected bolls. Early symptoms included a slight discoloration of seed coats of seeds of one or more seeds in unopened bolls. All seeds did not begin to display this symptom simultaneously. The seed coat discoloration appeared to proceed from a light pink to tan to dark-brown necrosis. In many cases, there was very little actual rot or soft rot, and symptoms were often limited to the seed, with little distinct symptomology on the adjoining lint. The seeds which were cut open often appeared to be slightly moist, and it was this initial observation that led to the term "seed rot," since it superficially resembles a soft rot. Later stages of seed rot were characterized by dead and necrotic embryos in fully elongated seeds. The most obvious symptom of seed rot was the pinkish tint of the integuments and a hollow appearance of the seed when bolls were cut open transversely. Seed also appeared to be developing slower than other seed at the same position within a locule or among locules in the same boll. Some seed coats appeared to have an uneven thickness, with some areas appearing to be darker and thicker than other areas. Some seed appeared to develop fewer linters than normal. Mature bolls opened, but did not fluff properly. Lint was often gray, yellow, or tan in appearance, and seed were poorly developed (especially in the apical positions in the locules).

Preliminary data suggest that symptoms proceeded acropetally, with the seed rot symptoms in the bolls at lower nodes being more severely affected than the upper nodes. Seed rot was also found to be more severe on first position sympodial bolls than on second position bolls. Seed rot symptoms appeared similar to rots caused by insect feeding; however, symptoms were distinguished from that associated with insect feeding in that there were no feeding scars or punctures, and seed from several carpels within a boll were typically affected rather than only the seed within the carpel or carpels that showed probing by insects.

Seed Rot Surveys

In order to determine the extent of the seed rot problem, surveys were conducted in South Carolina in 1999 and 2000, and in North Carolina in 2000. County extension personnel and consultants collected bolls in August each year. South Carolina county agents collected bolls from at least five different communities in their respective counties. Each sample consisted of 25 selected bolls from each field. These bolls were the oldest bolls on a plant that were unopened or undamaged and were removed from plants without damaging the bolls (i.e. peduncle remained attached to the bolls). Two transverse cuts were made in each boll resulting in 3 approximately equal length sections. Each section was then manually split along the sutures, and the lint was removed from each locule to observe insect feeding. Each boll was visually inspected for the occurrence of abnormal seed, supernumerary carpels, and insect feeding, and the data recorded by boll and locule. South Carolina survey results are shown in Table 1. North Carolina samples consisted of 25 bolls from the bottom third, middle third and top third of the canopy from each field. Seed rot was rated in a similar manner as the South Carolina survey. North Carolina survey results are shown in Table 2.

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Table 1. South Carolina Seed Rot Survey Results - Percentage of bolls exhibiting seed rot symptoms.

	1999	2000
County	**% Seed Rot Bolls**	**% Seed Rot Bolls**
Aiken	27	8
Allendale	25	23
Bamberg	31	15
Barnwell	15	10
Calhoun	13	17
Chester	---	25
Chesterfield	8	---
Clarendon	—	6
Colleton	13	27
Darlington	9	9
Dillon	8	21
Dorchester	21	18
Edgefield	2	10
Florence	13	—
Hampton	40	28
Kershaw	21	—
Lee	9	21
Lexington	—	15
Marion	7	—
Marlboro	10	18
Newberry	17	40
Orangeburg	27	24
Richland	—	0
Saluda	18	—
Sumter	12	36
Williamsburg	11	19
York	—	10

Table 2. North Carolina Seed Rot Survey Results - Percentage of bolls exhibiting seed rot symptoms.

	Bottom	Middle	Top
County	**% Seed Rot Bolls**	**% Seed Rot Bolls**	**% Seed Rot Bolls**
Duplin	8	25	4
Hyde	0	8	0
Jones/Craven	4	8	4
Northhampton	5	—	—
Robeson	16	4	4
Wayne	0	0	0
Wilson	0	20	0

Figure 1. Boll exhibiting seed rot symptoms. Hampton County, SC, 1999.