

RESISTANCE TO SEPTORIA LEAF SPOT IN EASTERN COTTONWOOD

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ABSTRACT

Ten of 320 random clones of eastern cottonwood originating from stands along the Mississippi River from Memphis, Tennessee to Rosedale, Mississippi (34° 55' to 33° 45' N latitude) were resistant to Septoria leaf spot in a nursery near Greenville, Mississippi. None of 1,120 random clones originating from just north of Greenville, Mississippi, to Baton Rouge, Louisiana (33° 35' to 30° 30' N latitude) was resistant.

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Septoria leaf spot, which is caused by Septoria musiva Peck, is a potentially serious disease of eastern cottonwood (Populus deltoides) in nurseries and plantations in the lower Mississippi Valley. Lesions reduce photosynthetic area of leaves and cause premature leaf fall; the fungus also causes cankers on the stem (1).

During late summer 1975, incidence of Septoria leaf spot was high in a cottonwood clonal nursery at Huntington Point, near Greenville, Mississippi. Absence of leaf damage from Melampsora rust and insects made this an excellent opportunity to screen for clonal differences in resistance to Septoria leaf spot.

MATERIALS AND METHODS

Forty random clones from each of 36 one- to four-year-old stands along the Mississippi River from Memphis to Baton Rouge were collected in fall 1971 and maintained in a nursery at Stoneville, Mississippi. In 1975, cuttings from these trees were used to establish a nursery at Huntington Point. Clones from the 36 stands were arranged in a randomized complete block design with four replications. Each stand was represented by 10 different clones in each replication. A plot of 10 unrooted cuttings was planted from each clone at about 7- by 40-inch spacing.

When Septoria infection was first observed in the Huntington nursery on August 8, 1975, the infection was already well established. On September 9 all trees were examined for symptoms, and clones were easily separated into susceptible clones, which had many spots per leaf, and resistant clones, which had very few spots. On September 16 the spots were counted on 100 mature leaves growing 4 to 5 feet above the ground and selected at random throughout the nursery to determine the average number of spots per leaf. Spots also were counted on 10 leaves from each resistant clone.

The leaf spot associated with S. musiva is visually distinguishable from other leaf spots, so counts were made in the field. The reliability of field identification was verified by microscopic examination of 10 of the leaves from the 100-leaf random sample by using freeze microtome and hand sections.

RESULTS AND DISCUSSION

Only 10 of 1,440 clones were resistant, and all of them were from the eight northernmost stands in the study, which were located from Memphis to 30 miles north of Greenville. Trees of the same clone consistently had either severe leaf spot or had very few spots. The 100-leaf random sample from the nursery averaged 71.7 spots per leaf, and the number of spots ranged from 32 to 118. The resistant clones averaged only 2.3 spots per leaf; no leaf examined from the resistant clones had more than 10 spots (Fig. 1). There was no evidence of intermediate degrees of resistance. The leaf spots examined microscopically in the laboratory showed that the spots were caused by S. musiva.

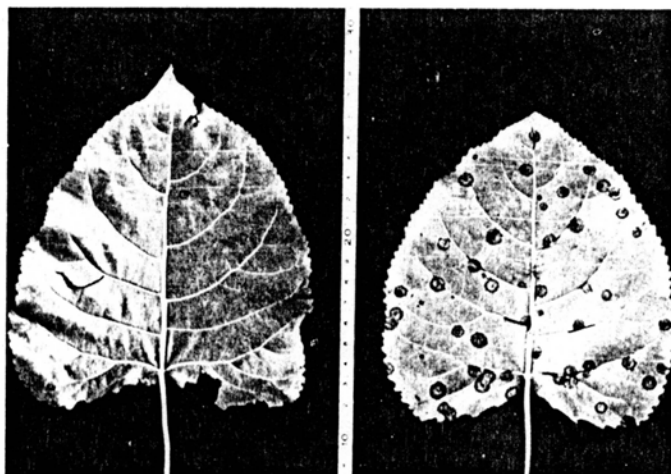


FIGURE 1. Leaf on the left is typical of leaves from eastern cottonwood clones that are resistant to Septoria leaf spot (Septoria musiva). Leaf on the right is typical of leaves from clones that are not resistant.

The clones were also examined in the Stoneville nursery where many lower leaves had been lost, and differences between resistant and nonresistant clones were not as distinct as at Huntington Point. The same 10 clones appeared to be resistant to Septoria leaf spot in the Stoneville nursery, however, and 8 of the 10 showed no evidence of Septoria cankers although the nursery was 4 years old and cankers were present on many clones.

The large number of stands and clones per stand included in this study represent the natural variability of cottonwood for nearly 500 miles along the Mississippi River, and the results indicate resistance to Septoria leaf spot in natural stands is infrequent. Cottonwood plantations in the South are normally propagated from cuttings; therefore, it would be possible to utilize the Septoria-resistant clones directly. Many other commercially important characteristics also occur at a very low frequency, however, and in materials that probably are not resistant. In addition, the resistant clones would have to be tested in other geographic areas before use to see whether they retain their resistance. Resistant clones from the present study should therefore be considered as valuable potential parents for use in breeding programs but not as candidates for immediate commercial use unless Septoria leaf spot becomes a very serious problem in cottonwood.

Literature Cited

1. FILER, T. H., F. I. McCRACKEN, C. A. MOHN, and W. K. RANDALL. 1971. Septoria canker on nursery stock of *Populus deltoides*. Plant Dis. Repr. 55: 460-463.
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