

PRUNING OF LONGLEAF PINE SEEDLINGS IN NURSERIES PROMOTES BROWN-SPOT NEEDLE BLIGHT

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A massive brown-spot infection occurred on pruned longleaf pine seedlings. The spores were apparently spread both by heavy rains and by coulter blades used for pruning.

Brown-spot needle blight, caused by *Scirrhia acicola* (Dearn.) Siggers, is common in nurseries throughout the range of longleaf pine (*Pinus palustris* Mill.). Symptoms may develop on fascicled needles at any time of the year but are most common from May through October (1) because extended and repeated periods of warm humid weather are required for infection (2, 5). The fungus is normally disseminated by water splash and is known to enter seedlings through the stomata (4, 7, 8). However, under certain conditions, the fungus may also enter through wounds (2, 6).

The Problem

Nurserymen routinely clip longleaf pine seedlings to a height of 8 or 9 inches during the growing season to facilitate application of fungicides, to prevent toppling and subsequent seedling mortality, and to expedite lifting and handling of stock. The seedlings are normally pruned horizontally in the nursery beds with coulter blades attached to a tractor. The practice has not previously been reported to contribute to brown-spot needle blight.

However, during winter 1975-76 three million seedlings at the Ashe Nursery, Brooklyn, Miss., became infected with brown-spot after pruning. They had been planted in November 1974 and were given customary applications of fertilizer and bimonthly applications of Ferbam¹ (ferric

dimethyl dithiocarbamate) during the growing season. The seedlings were pruned in July 1975, and the cut needle tissue was left in the alleyways of the beds. All beds were root pruned on October 1, in preparation for lifting. Another clipping was made on November 3 and was followed by applications of Bordeaux mixture (mixture of hydrated lime and copper sulfate) on November 5 and 17.

Brown-spot symptoms were first noted throughout the nursery on December 1; on January 13, *S. acicola* was isolated from infected needle tissue. Followup inspections of the nursery on January 22, February 11, and April 7 showed progressive increases in the severity of infection. All seedlings in the nursery showed evidence of infection; infection on individual seedlings ranged from 1 to 10 percent of the needle tissue. Only 2 percent of all seedlings were severely infected. Most infections were near the cut portions of fascicled needles.

The Theory

Optimal climatologic conditions for brown-spot infection occurred in southern Mississippi throughout 1975; in that year rainfall at the nursery was the heav-

iest recorded (77.32 inches) since 1946. A total of 6.32 inches was recorded in August, 7.82 inches in September, and 7.00 inches in October. These heavy rainfalls, combined with unseasonably warm temperatures, extended the period of susceptibility of the pine seedlings to infection. These conditions also stimulated sporulation, dissemination, and infection by the pathogen.

Apparently seedlings became naturally infected with brown-spot throughout the beds during spring and summer 1975. The July pruning disseminated some spores over the nursery beds and deposited infected needles in alleyways, thus providing inocula for further infections. Numerous heavy rainfalls probably helped spread infection in the beds by disseminating inocula. The second pruning (November 3) further disseminated the spores, which were apparently picked up and carried on the coulter blades. All cut needles were discarded in alleyways.

Thus, the uniform infection noted in December 1975 can probably be traced to two sources of inocula: (a) spores from infected seedlings within beds were transported throughout the nursery on coulter blades, and (b) spores from infected plant material in beds and alleyways were picked up and disseminated by rainfall. Consequently, infection and tissue mortality on each seed-

¹The use of a trade name in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the USDA of any product or service to the exclusion of others that may be suitable.

ling occurred near the cut. This nursery infection was the first recorded example of tissue being inoculated through wounds.

Recommendations

The conclusions discussed above were based on observation and were not the result of formal experimentation. The following recommendations should prevent brown-spot in nurseries:

1. Avoid pruning during rain or any time seedlings are wet.
2. Spray with registered fungicides² the day before and immediately (the same day) after pruning.
3. Swab cutting blades with denatured alcohol or a 10 percent solution of sodium hypo-

chlorite periodically during pruning.

4. Remove clipped needles from nursery bed areas.
5. Maintain fungicidal spray schedules bimonthly until lifting (3).²
6. Spray with fungicide immediately before lifting.

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² Fungicides for use against brown-spot are Chlorothalonil (Bravo), Bordeaux mixture, and Ferbam.

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SEED PROCESSING EQUIPMENT CATALOG AVAILABLE

A catalog, "Equipment for Processing Small Seed Lots," is now available from the Equipment Development Center in Missoula, Mont. The catalog presents in text and photos a representative sample of small seed lot processing equipment and where to obtain it. Names and addresses of more than 100 manufacturers are included and eight categories of equipment are discussed: Kilns and extractors; separators; specific gravity separators; vibratory separators; vibratory feeders; and a miscellaneous category.

The catalog resulted from a

Center survey of Federal nursery equipment needs. Since nurseries are processing more and more small lots of tree seed, survey questions focused on equipment for this work. Findings revealed that many nurserymen are unaware of much commercially available equipment. The Center also queried nurserymen to learn the average size of their small seed lots, the number processed each year, and the species. In addition to the catalog, survey findings were published in the report, "Investigation of Small Seed Lot Processing Equipment."

The Center is now analyzing

data gathered from a survey of Federal, State, and private nurseries to determine equipment and methods used in 26 nursery practices such as cone harvesting, seed processing, general cultivation and ground preparation, irrigation, frost protection, and shipping and outplanting. "Investigation of Equipment Needs in United States Nurseries" reports survey results and discusses common problems identified by nurserymen.

Requests for the Catalog should be addressed to: Forest Service Equipment Development Center, Missoula, MT. 59801