Early Evaluation of Corn for Resistance to Brown Spot

C. E. Cress and D. L. Thompson

BROWN spot of corn, caused by *Physoderma maydis* Miyabe, frequently occurs in the southeastern United States. Although the disease is considered to be of minor importance, reductions in grain yields up to 25% (3) have been reported. Development of resistant hybrids is the only practical means of control.

Breeding for resistance can be accomplished successfully by inducing an epiphytotic among plants subject to selection. A successful inoculation technique which involves introducing a suspension of sporangia into the whorl when the plants are 3 to 4 feet tall has been used (8). The efficiency of this technique has been limited because symptoms do not develop in time for resistant plants to be identified until after flowering and pollination. Under these circumstances all plants must be pollinated to maintain the genotype and most will be discarded when the disease reaction becomes known. A technique which would provide identification of resistant plants before anthesis would offer definite breeding advantages.

The purpose of this study was to examine factors relating to inoculation procedures. Specific objectives included modifications which would permit the screening of large numbers of seedlings or would allow the identification of resistant plants at flowering time and thereby facilitate the use of resistant plants in the season the selections are made.

**REVIEW OF LITERATURE**

Tisdale (9) conducted the first comprehensive study of *Physoderma maydis* and delineated the areas of serious damage in the United States. Disease symptoms occur on the leaf blade, sheath, stalk and, in rare instances, ear husks. The brown spots, seldom larger than 1 mm. in diameter on the leaf blade, often form disks as large as 0.5 cm. in diameter on the leaf midrib and sheath. The brown color results from the mass of resting sporangia in the host tissue.

Hebert and Kelman (6, 7) reported that the cardinal temperatures for germination of the resting sporangia were 18°, 28°, and 36° C. During 12-hour periods of light at 28° alternated with 12-hour periods of darkness at 6 different temperatures ranging from 8 to 28°, a relatively high percentage of sporangia had germinated at all temperatures after 72 hours. Light and oxygen were found to be essential for sporangial germination. These results were in general agreement with those of earlier studies by Tisdale (9) and Voorhees (10).

The most important means of dissemination is wind-blown sporangia, although there may be other contributing factors. Apparently more vigorous plants sustain the most severe attacks (9). Broyles (2) observed more disease on plants alongside inoculated rows as compared to plants.