EVALUATION OF OBSOLETE VARIETY COLLECTION FOR RESISTANCE TO VERTICILLIUM WILT

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Abstract

Breeding cotton (*Gossypium hirsutum* L.)for tolerance or resistance to Verticillium wilt (*Verticillium dahliae Kleb.*) is at best a formidable task. Whether resistance or tolerance exists in current cultivars may be difficult to define. Most cultivars, where applicable, are described as being tolerant and exhibit symptoms yet produce an "acceptable yield". Two major problems have hampered the development of cultivars highly tolerant or resistant to Verticillium wilt. One problem is the difficulty in screening germplasm. In the field, problems with pathogen distribution and environmental interactions compound the interpretation of germplasm performance. Traditional techniques used in screening for Verticillium wilt resistance may circumvent potential resistance mechanisms or may result in an overwhelming challenge to the plant in terms of inoculum density. Another major problem is the lack of germplasm for use as a source of high resistance (perhaps even immunity) or tolerance. Variability in response ranging from complete defoliation and death to delayed symptom expression, however, does exist and is currently exploited in breeding programs addressing this disease problem. The search for more tolerant or resistant germplasm must continue in order to reduce the annual losses attributed to the Verticillium wilt pathogen.

The Obsolete Cotton Variety Collection, maintained by the USDA, ARS in College Station, TX , was initiated to conserve varieties from early history and to make them available for use in cotton breeding programs. Fiber quality information is available for many of the entries, however, little if any information is available concerning their potential value as a source for pathogen or insect resistance. The lack of superior germplasm for breeding for resistance to Verticillium wilt pathogen led to the development of a systematic approach for evaluating the Obsolete Variety Collection. The first 500 entries were evaluated during the 1996 growing season. The test was located on a private farm near Walls, MS having a long history of severe Verticillium wilt disease. Entries were planted in one row plots 6 m in length on a 1 m row spacing. The test was 24 rows wide and 26 tiers or blocks deep. Seeding rate depended on the amount of seed received from the collection (about 8 seed/m). A common check entry (Deltapine 50) was planted every fourth row to access disease variability within the test. Number of plants with any foliar symptoms was recorded for each plot on two dates. Entries were also rated on a scale of 1 (green plant/minimum symptom expression) to 4 (defoliation/death) prior to chemical defoliation.

Pathogen distribution in the field as indicated by the check was quite uniform. Percent infection based upon the average of each block ranged from 53% to 82% with a grand average of 68%. Approximately 96% of the Obsolete entries were equal to or greater than the check for percentage of infected plants. Only two entries or 0.4% of the 500 examined were free of any visual foliar symptoms. One entry exhibited a 6% infection level. All three of these entries were red plants. Detecting visual symptoms on red plants is more difficult compared to green plants. These entries will be further evaluated in the greenhouse to confirm their apparent resistance to the pathogen. Entries also differed in the rate of disease development as observed by the two dates of observation.

The number of entries in the 1997 field test will be cut in half and the plot length increased to 12 m allowing increased plant spacing to facilitate visual observations. A susceptible Obsolete entry, as identified in the 1996 field test, will replace Deltapine 50 as the susceptible check. The three most resistant entries will also be further evaluated along with next set of Obsolete entries.

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