

Fusarium Blight

continued

PERENNIAL RYEGRASS

The development of improved turf-type perennial ryegrass (*Lolium perenne* L.) varieties such as 'Manhattan,' 'Pennfine,' 'Citation,' 'NK200,' 'Eton,' 'Derby,' 'Yorktown,' 'Diplomat,' and 'Omega' has made this species of considerable usefulness to the turf industry. These improved ryegrasses are substantially superior to common perennial ryegrass for many turf purposes. Like all ryegrasses, the new turf-types are quick and easy to establish and are adapted to a wide range of soil types and uses. When properly managed in their area of adaptation, these ryegrasses can be durable, persistent, and attractive. Instances have been reported where turf-type ryegrasses have given good performance on turf areas where Kentucky bluegrass has been seriously damaged by *Fusarium* blight. The turf-type ryegrasses appear to produce much less thatch than bentgrass, Kentucky bluegrass, and the Chewings-type fescues. A number of golf course superintendents in summer heat stress areas such as Washington, D.C., are having very promising success with overseeding established bermudagrass with blends of improved turf-type ryegrasses such as Manhattan, Pennfine, and Citation. Continued breeding efforts should lead to further improvements in mowing quality, summer performance, winter hardiness, and resistance to crown rust (*Puccinia coronata*), brown patch (*Rhizoctonia solani*), and leaf spot (*Helminthosporium siccans*). Improved resistance to *Pythium* is also needed for good summer performance of ryegrass in the humid summer heat stress region.

Techniques for Determination of Fusarium Blight Susceptibility in Kentucky Bluegrass

by William A. Meyer
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Fusarium blight is now recognized as a major disease problem of Kentucky bluegrasses and some other cool-season turfgrasses in the northeastern and midwestern sections of the United States (1,6) and in California (2). *Fusarium roseum* and *F. tricinatum* are the two species of fungi found by Couch and Bedford (1) to be the incitants of this disease.

Disease symptoms seldom appear until a turf stand is two or more years old. Occasionally, symptoms may appear during the first year of turf establishment. The severity of this disease may vary greatly from year to year, depending upon such environmental factors as heat and moisture stress. It is usually very difficult to get a uniform distribution of *Fusarium* blight throughout a replicated turf plot area. In the development of new Kentucky bluegrass varieties, it is important to establish their degree of susceptibility to *Fusarium* blight as well as other major diseases before they are released. Because of the time required for this disease to develop

consistently in turf plots, rapid screening techniques are needed. The following paper will describe techniques which were developed to aid in the screening of Kentucky bluegrass cultivars for *Fusarium* blight susceptibility.

TILLER-PUNCTURE TECHNIQUE

With the tiller-puncture technique (4), 14 Kentucky bluegrass varieties were propagated from individual tillers and grown in 2-inch pots in the greenhouse for 50 to 75 days. They were then transferred to a growth chamber (14-hour day at 29° C, 24° C night; 4,000 foot candles; and 70 percent relative humidity) for three days prior to inoculation. A small sound (2 mm long) penetrating to the youngest enclosed leaf was made in each of two healthy tillers per pot between the crown area and third leaf. Mycelium pieces of *Fusarium tricinatum* isolate MSU1 or of *F. roseum* isolates UI2 or KC1 were then placed in the wounds. Wet sterile peat moss was used to cover the wounded area of each inoculated tiller. Other tillers were wounded but noninoculated to serve as controls. In all, 60 tillers of each variety were inoculated with the MSU1 isolate, 36 tillers with the UI2 isolate, and 12 tillers with the KC1 isolate. All pots were then returned to the growth chamber and the peat moss was kept moist.

Foliar lesions could be seen on the emerging leaf two to three days after inoculation. In many tillers the initial fungal infections in the new and old leaves would advance down into the crown area of the plant and eventually cause death. Some tillers were killed within seven days on the most susceptible varieties. After two weeks all pots were removed from the chamber and rated for severity of infection. The MSU1 isolate was the most virulent isolate followed by UI2 and KC1. Leaf and crown lesions caused by the three isolates were similar on all of the varieties. The experimental variety WTN-I-13 had the smallest percentage of crown-rotted and dead plants. Eighteen percent of the WTN-I-13 tillers were crown rotted or dead with the MSU1 isolate, 8 percent with UI2, and none with KC1. WTN-I-2 and Belturf were ranked next with slightly higher percentages of dead or diseased plants. The varieties P104, WTN-J79, and Fylking were the most severely affected.

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continued

had the highest percentage of dead or crown-rotted plants with 85, 68, and 42 percent, respectively, for the three isolates. The varieties A-20, WTN-H-7, A-34, Merion, and WTN-A-20-6 were intermediate in their reaction to the three isolates.

FIELD STUDIES

Field studies were developed in an attempt to determine the usefulness of laboratory tests such as the tiller-puncture technique for the determination of the susceptibility of Kentucky bluegrass varieties to *Fusarium* blight. One study was conducted on a golf course fairway in central Illinois that had a history of severe *Fusarium* blight. Eight-inch plugs of nine Kentucky bluegrass varieties were placed in a severely diseased portion of the fairway in November, 1973. Three healthy plugs were placed together in each of three replications for each variety. These were allowed to root down and were mowed and maintained like the rest of the fairway.

In the summer of 1974 *Fusarium* blight was not severe; all of the plugs were easily recognized and healthy except for Baron and Fylking, which were slightly thinned. During the summer of 1975 *Fusarium*

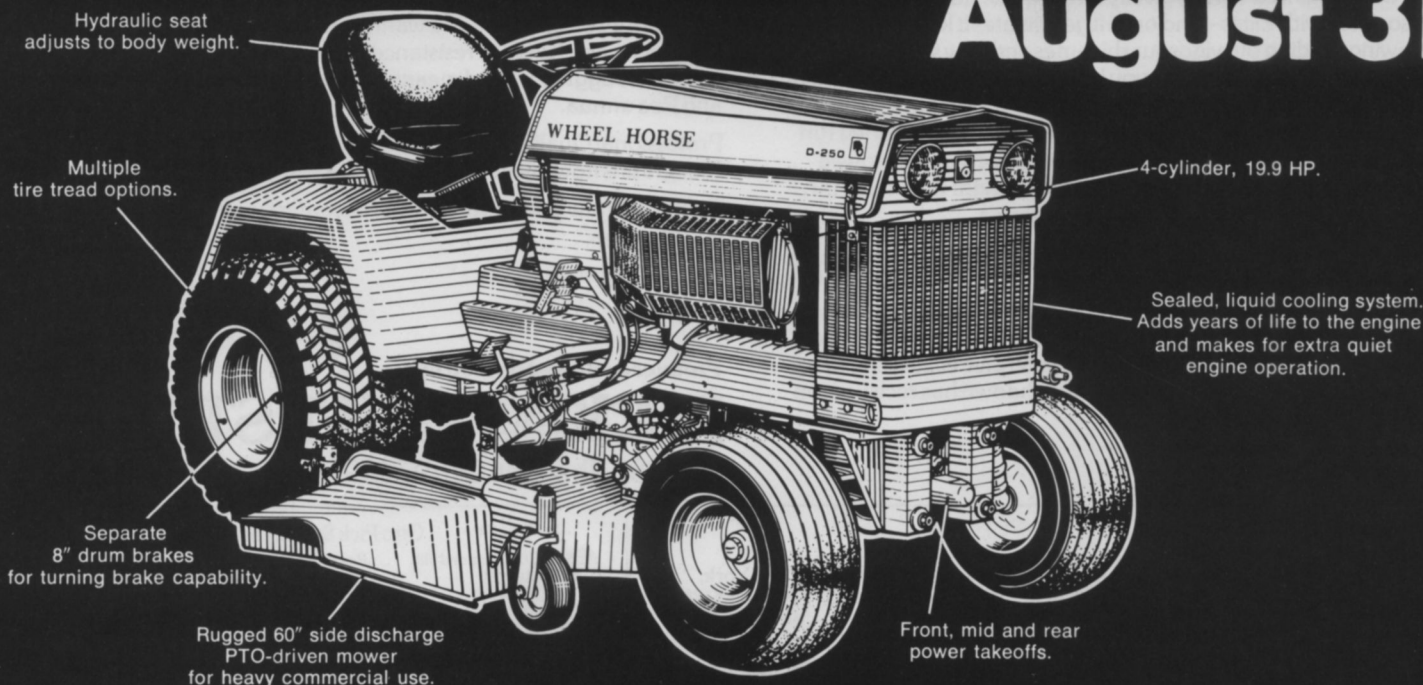
blight was severe, and the varieties Fylking and Baron were severely damaged, as was the surrounding turf. The variety WTN-I-13 showed the least amount of damage with the varieties WTN-H-7, WTN-A-20-6, A-20, and WTN-I-2 ranking close behind. After two years the varieties WTN-I-13 and WTN-H-7 had grown laterally from the original 8-inch plugs, while the percentage of cover on the plugs of the other varieties had decreased in diameter. These changes, along with the difficulty in differentiating some of the plugs from the original fairway turf, made rating more difficult.

Another field study was initiated in the fall of 1974 in an area severely infested by *Fusarium* blight at the University of Illinois turf plots. In this test an 18-inch sod cutter was used to remove diseased sod to a depth of approximately 2 inches. Soil from a nearby field was used to fill these 18-inch strips back to the original grade and infested turf was left intact on both sides of the strips. Seed of 32 varieties, including most of the above-mentioned varieties, was then used to plant 3 replicated plots for each variety in plots 3 feet long in the 18-inch strips. *Fusarium* blight was severe in the turf surrounding the 18-inch strips, but the new seedlings remained free of *Fusarium* blight during the 1975 growing season.

DISCUSSION

The variation in the virulence of the three isolates in the tiller-puncture test is similar to the variation

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reported by other workers (3) with different *Fusarium* isolates. A limitation with the tiller-puncture test is that each inoculation is made with a single strain of the pathogen. Since the *F. roseum* and *tricinctum* species vary greatly in nature, a larger number of isolates need to be included in tests to increase their validity.

None of the varieties in the tiller-puncture test remained completely healthy. WTN-I-13 was the least severely affected variety in both the tiller-puncture and the field study. Other tests are needed in different locations with this variety to verify its degree of susceptibility to *Fusarium* blight. Some of the varieties that ranked intermediate in the laboratory tests also ranked intermediate in the field test. It should be noted that Merion was not the most susceptible variety in the test. The high degree of susceptibility of Fylking to *Fusarium* blight has been reported in different locations (5). The susceptibility of the variety WTN-J-79 at a level similar to Fylking is an indication that this variety may perform poorly in areas where *Fusarium* blight is severe. The tiller-puncture test with a limited number of isolates may be most useful as a method to detect a high degree of susceptibility in a variety before it is released. Many experimental and commercial Kentucky bluegrass varieties besides the 14 reported in this paper have been inoculated with the MSU1 isolate, using the tiller-puncture technique. To date, no variety has remained free of infection. It is hoped that this technique will at

some time aid in detecting a source of germ plasm that has a high degree of physiological resistance to *Fusarium* blight.

LITERATURE CITED

1. Couch, A. B., and E. R. Bedford. 1966. *Fusarium* blight of turf-grasses. *Phytopathology* 56:781-786.
2. Endo, R. M. R. Baldwin, S. Cockerham, P. F. Colbaugh, A. H. Cain, and V. A. Gileault. 1973. *Fusarium* blight, a destructive disease of Kentucky bluegrass, and its control. *Calif. Turfgrass Culture* 23:1-2.
3. Fulton, D. E., H. Cole, Jr., and P. E. Nelson. 1974. *Fusarium* blight symptoms on seedling and mature Merion Kentucky bluegrass plants inoculated with *Fusarium roseum* and *Fusarium tricinctum*. *Phytopathology* 64:354-357.
4. Meyer, W. A. 1973. Tiller-puncture technique to artificially screen Kentucky bluegrass cultivars to *Fusarium* blight. Proc. of 2nd International Congress of Plant Pathology, 1975.
5. Turgeon, A. J., and W. A. Meyer. 1974. Effects of mowing height and fertilization level on disease incidence in five Kentucky bluegrasses. *Plant Dis. Repr.* 58:514-516.
6. Vargas, J. M., and C. W. Laughlin, 1972. The role of *Tylenchorhynchus* in the development of *Fusarium* blight of Merion Kentucky bluegrass. *Phytopathology* 62:1311-1314.

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