# *Helminthosporium* Leaf Spot and Crown Rot of Kentucky Bluegrass

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Kentucky bluegrass, including its improved varieties, is the premier lawn-type turfgrass in the northern half of the United States. Bluegrass is hardy, attractive and widely adapted. The development of improved, disease-resistant bluegrasses capable of producing a denser, more dependable turf under conditions of close mowing would make this species of even greater value to the golf course superintendent. The first requirement of such improved varieties should be a high degree of resistance to leaf spot and crown rot caused by *Helminthosporium vagans* Dreschs. This disease produces purplish or brown spots with straw-colored centers on leaf blades, sheaths, and crowns. When severe, the disease drastically thins and weakens bluegrass turf, a condition referred to as "melting-out." Most turf experts consider this to be the most destructive disease of closely-mowed bluegrass in the Northeastern region of the United States.

### Seasonal Development

Under New Jersey conditions, *Helminthosporium* leaf spot initiates infections with the advent of cool, moist, cloudy weather in October and November. Large numbers of spores are produced during the late fall, winter and spring months. Highly susceptible varieties frequently become nearly 100 per cent brown from disease by early March. Subsequent spring regrowth is also subject to considerable infection during periods of cool, moist, cloudy weather. The fungus virtually ceases to pro-

*Kentucky bluegrass showing leaf spots with dark borders and light centers.*

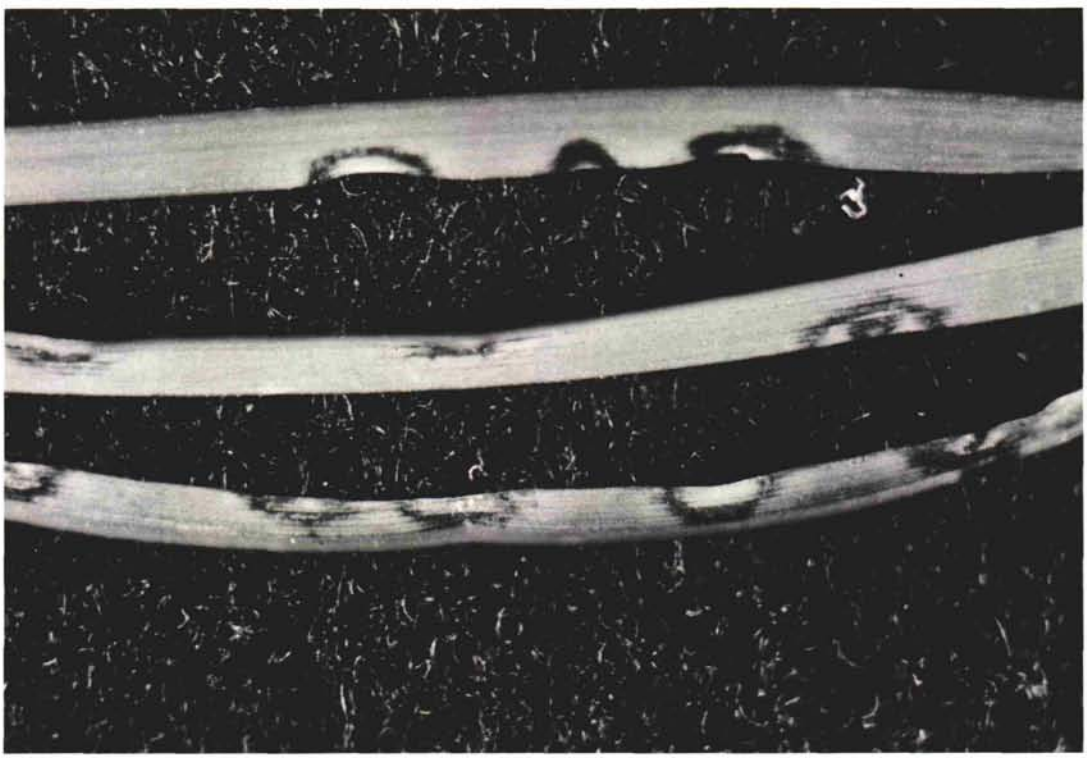


Table 1. Relation of turf loss due to melting-out by *Helminthosporium vagans* and weed invasion in Kentucky bluegrass varieties.

| Bluegrass Variety | Turf loss caused by melting-out (%) May | Broadleaved weeds per 100 sq. ft. (no.) October |
|---|---|---|
| Anheuser Dwarf | 1 | 5 |
| Pennstar | 5 | 4 |
| Merion | 7 | 6 |
| Cougar | 25 | 31 |
| Newport | 27 | 61 |
| Delta | 43 | 34 |
| Park | 65 | 104 |
| LSD at 5% | 6 | 31 |

duce spores during the warmer season of May to October.

However, infections already present continue to progress causing a peak of destruction in late May and early June. Defoliation and melting-out of bluegrass turf results in unsightly patches of bare ground subject to easy colonization by both crabgrass and broadleaved weeds (Table 1). Subsequent recovery of the bluegrass depends on the level of food reserves present in the plant, the environmental conditions favoring recovery, and the extent of weed invasion. This disease is normally of minor consequence during the bright, sunny weather of late summer and early fall. The occasional spots present on leaves produce very few spores during this warm season of bright sunshine.

## Management Factors

The severity of this disease is greatly influenced by certain management factors. Disease injury is considerably greater under close mowing in contrast to higher mowing. Close mowing tends to deplete carbohydrate food reserves, thereby weakening the grass and making it more subject to damage and less capable of recovery. Turf receiving low levels of nitrogen fertilizer often shows greater numbers of leafspot lesions compared with highly fertilized turf when examined in March or April.

However, observations made during late May and early June, when the crown rot phase of the disease is most severe, have shown that turf receiving high rates of nitrogen fertilizer suffers the greatest permanent damage. As shown in Table 2, turf mowed at 2½ inches and maintained at moderately low fertility showed little damage from melting-out and was virtually free of crabgrass. On the other hand, turf mowed at ¾-inch and heavily fertilized showed 63 per cent turf loss in early summer resulting in 33 per cent crabgrass cover by the end of the summer.

## Varietal Resistance

Turf mowed high and fertilized lightly may not suffer as greatly from leaf spot, but neither does it possess the rich green color, density and neat appearance desired by most people. Varieties with a high level of disease resistance are therefore essential for the production of high quality turf. The outstanding success of Merion Kentucky bluegrass can be attributed primarily to its inherent resistance to leaf spot. Unfortunately, Merion is not well adapted to all areas and is subject to certain other weaknesses, such as susceptibility to the stripe smut disease. New varieties presently coming on the market such as Fylking, Pennstar, and Warren's A-20 have good resistance to both leaf spot and

Table 2. The effect of cutting height and fertility level on loss of Common Kentucky bluegrass turf from melting-out by *Helminthosporium vagans* and subsequent weed invasion.*

| Fertility level** | Cutting Height 2½ inches % | 1½ inches % | ¾ inch % |
|---|---|---|---|
| 0 pounds | 5 (1) | 8 (2) | 16 (1) |
| 30 pounds | 22 (3) | 24 (12) | 43 (18) |
| 60 pounds | 34 (7) | 50 (22) | 63 (33) |

*Percent crabgrass invasion given in parenthesis.

**Fertility applications consisted of applying 10-6-4 fertilizer in 10 lb/1000 sq. ft/application as follows:

0 = none; 30 = early April, May and September; 60 = early April, late April, May, September, early October, and late October.

stripe smut. They should be of considerable value to those who enjoy quality turf (Table 3).

Table 3. Reaction of Kentucky bluegrass varieties to *Helminthosporium vagans* in New Jersey under turf maintenance. 0 = best resistance.

| | | | |
|---|---|---|---|
| *Good Resistance* | | | |
| NJE P-104 | 0.7 | *Merion | 1.0 |
| NJE P-23 | 0.7 | *Pennstar | 1.2 |
| NJE P-16 | 0.7 | PSU K107 | 1.2 |
| NJE P-1 | 0.8 | *Fylking | 1.2 |
| NJE P-56 | 0.8 | NJE P-84 | 1.2 |
| Anheuser Dwarf | 0.8 | NJE P-59 | 1.4 |
| NJE P-101 | 0.9 | NJE P-115 | 1.4 |
| NJE P-5 | 0.9 | NJE P-69 | 1.4 |
| NJE P-72 | 0.9 | NJE P-35 | 1.4 |
| *Warren's A-20 | 1.0 | *Warren's A-34 | 1.5 |
| NJE P-106 | 1.0 | NJE P-57 | 1.6 |
| NJE P-27 | 1.0 | NJE P-29 | 1.7 |
| *Moderate Susceptibility* | | | |
| Belturf | 3.0 | *Delft | 4.8 |
| *Windsor | 3.6 | *Newport | 4.8 |
| Campus | 4.0 | *Newport C-1 | 4.8 |
| *Prato | 4.2 | *Cougar | 5.2 |
| *High Susceptibility* | | | |
| Primo | 6.0 | *Kenblue | 7.0 |
| *Delta | 6.5 | *Common | 7.0 |
| *S-21 | 6.8 | *Park | 7.0 |
| *Geary | 7.0 | *Nu Dwarf | 7.0 |
| *Arboretum | 7.0 | *Troy | 8.5 |

*Varieties commercially available in the United States.

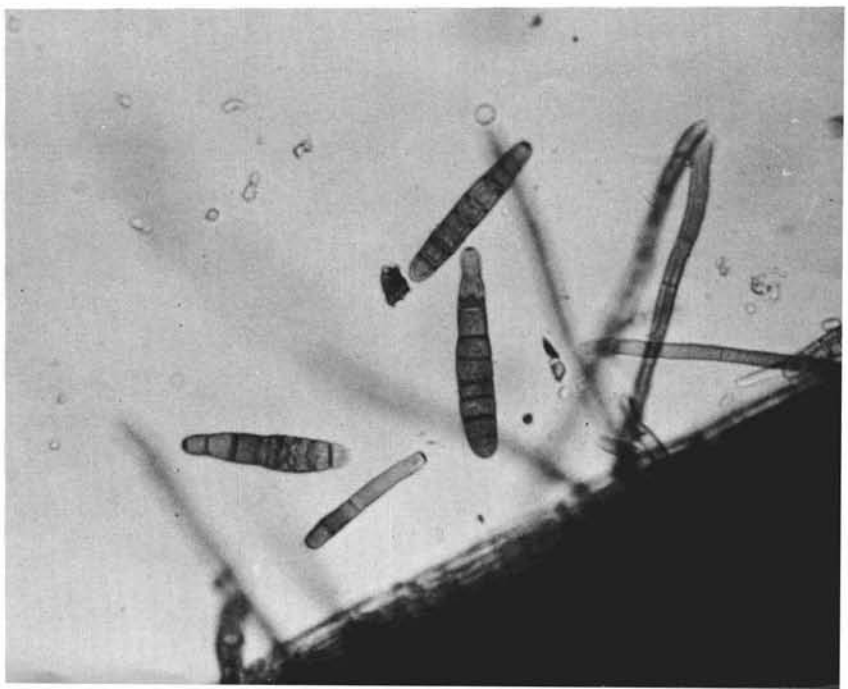
## Chemical Control

The control of leaf spot and crown rot in Kentucky bluegrass usually involves a combination of disease resistance, proper management practices, and chemical control measures. Since none of the resistant varieties is immune to this disease, and since disease severity is often accelerated by uncontrollable environmental factors such as cloudy weather, the use of fungicide applications is often desirable. An excellent selection of non-mercurial, low-toxicity chemicals that are highly effective against this disease is available to the golf superintendent today. These include Daconil, Dyrene, Fore, Tersan and Captan. Additionally, granular formulations of PCNB also are very effective. Recent work in Pennsylvania has shown that 2-3 high dosage applications of chemical at 3-week intervals during spring are often adequate for controlling this disease in bluegrass turf.

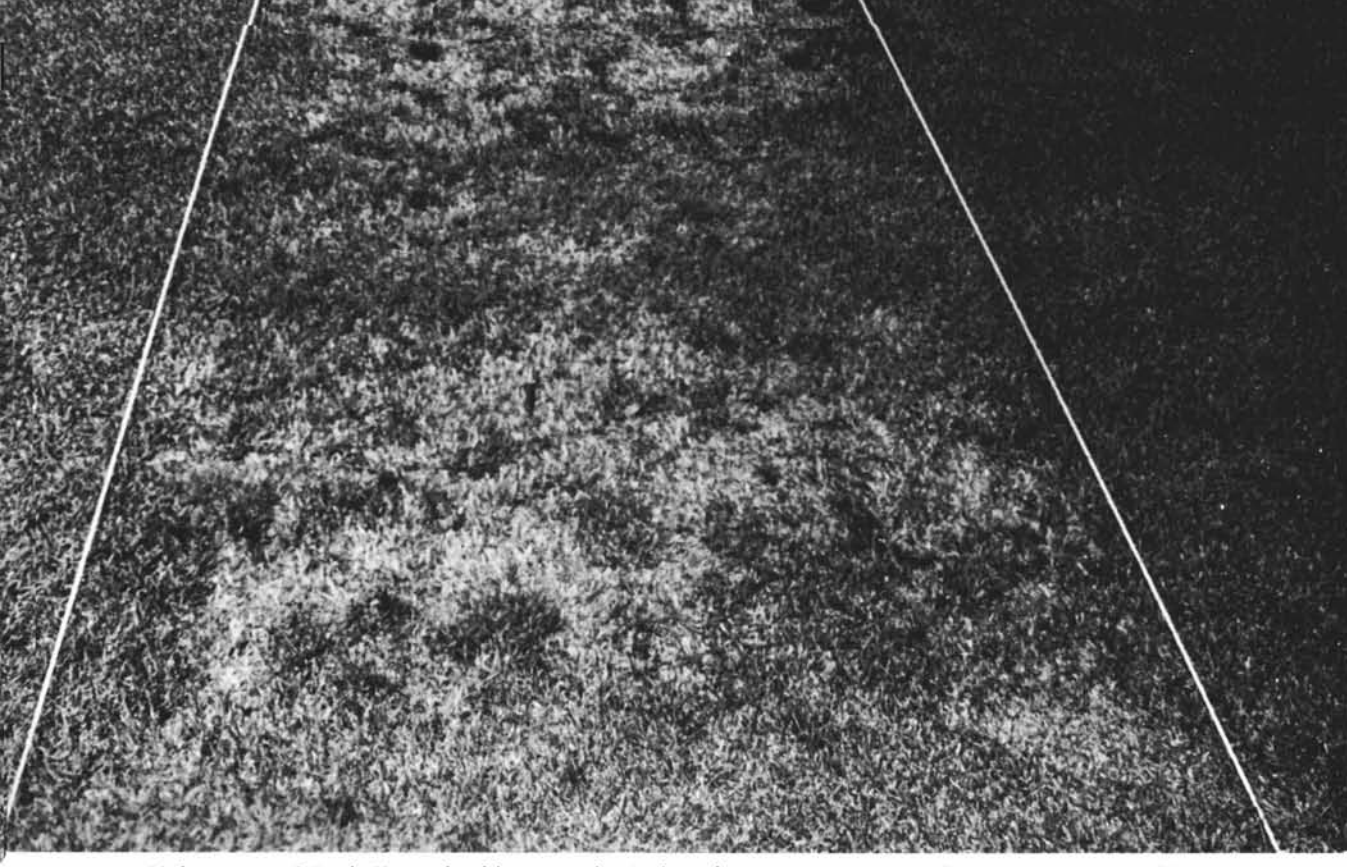
## Breeding Resistant Varieties

When the turfgrass breeding program was started at Rutgers in 1962 the number of leaf-spot resistant bluegrasses was very limited. They included Merion, Fylking, Pennstar, Warren's A-20, and Anheuser Dwarf. An extensive collection of over 6,000 bluegrasses made by Rutgers during 1962 and 1963 provided a few additional resistant bluegrasses including NJE P-1, NJE P-23, NJE P-59, NJE P-62, NJE P-107, NJE P-115, and NJE P-123. It was soon apparent that bluegrass plants with adequate leaf spot resistance were very rare in old turf areas.

In making the collection of the 6,000 plants thousands of other bluegrass had been rejected because of obvious deficiencies at the time of



*Spores of* Helminthosporium vagans *which spread the disease.*



*Melting-out of Park Kentucky bluegrass by* Helminthosporium vagans. *Resistant varieties Merion and Fylking show very little damage.*

field selection. Many of the resistant plants were also strikingly similar to each other such as NJE P-59, NJE P-107, NJE P-115, and NJE P-123 or similar to bluegrasses already on hand, such as Anheuser Dwarf, Merion or Fylking. Like present varieties, all showed some weaknesses in seed production or other aspects.

Because of the difficulty of obtaining elite and novel plants possessing all desired characteristics from field collections, a hybridization approach was initiated at Rutgers. Hybridization allows the breeder to recombine the best characteristics of two or more parents into one elite variety if progenies of adequate size are evaluated. With apomictic reproduction, the improved plant will breed true to type and can become the foundation of a new turfgrass variety. As a result of seven years of hybridization work, over 100 bluegrass selections showing good leafspot resistance have been obtained with dozens of others being produced each year. These selections are all moderately low-growing, turf-type bluegrasses. The more promising hybrids are currently being evaluated for resistance to other diseases, apomictic reproduction, area of adaptation and seed production potential. The outlook for improved disease resistant bluegrass is bright.

## References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