Leaf Spot and Foot Rot of Bluegrass

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Leaf spot of Kentucky bluegrass is a widely distributed disease, apparently occurring to some extent wherever this grass is found in the United States. Often, to be sure, it is present so sparingly that considerable search may be necessary to discover even one of the few poorly developed, scattered lesions. At other times the foliage is liberally peppered with the dark blotches characteristic of the trouble. These blotches in their earlier stages are uniform; later, however, they exhibit a straw-colored central region representing a mass of killed tissue. The disease can be found in fields where the grass is allowed to grow up without interference from human agencies, as well as in pastures and lawns subjected to grazing or cutting.

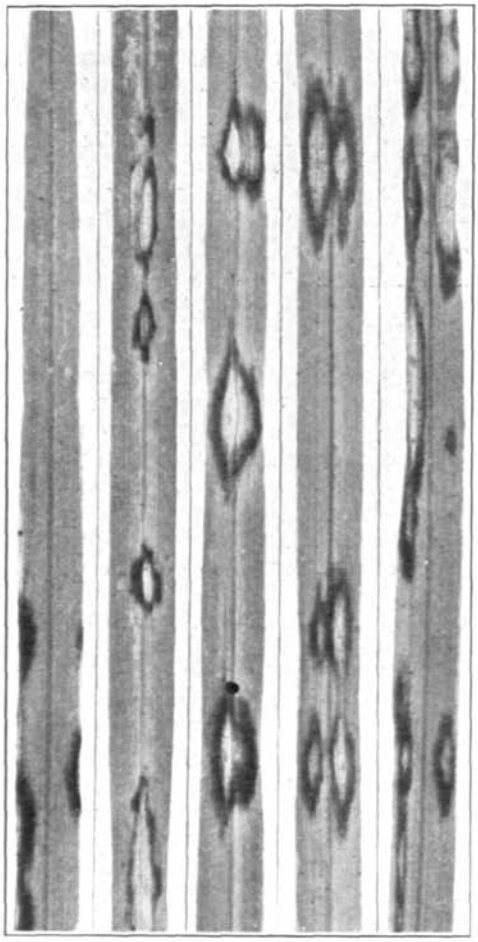

Fig. 1.—Portions of Kentucky bluegrass affected with leaf spot, collected in an undisturbed stand in the District of Columbia, April 30, 1929. The symmetrical disposition and paired arrangement of lesions resulting from infections occurring while the leaves were still folded, are illustrated in all the specimens except the one on the left. Photographed three times actual size

An unusually severe outbreak of the disease occurred in and about the District of Columbia in 1929 after the middle of April. In undisturbed stands, infection preceded the unfolding of the larger leaves. Since the folded structure is permeated by the causal fungous parasite very much as if the fold consisted of only a single thickness, the leaf blades upon flattening out frequently bore lesions arranged symmetrically with respect to the midrib, the symmetry being evident whether the lesions were present singly in a median position on the leaf, or in pairs farther toward its margins. Examples of both kinds of arrangement are shown in Figure 1. It should be mentioned that pairing and bilateral symmetry of lesions arise not only when infection occurs early in the season but whenever at any time lesions develop on the leaf blades before these have begun to flatten out. Since on golf courses repeated cutting forces the plant to continue putting forth new leaves, symmetrical arrangement of spots persists in some measure throughout the season.

The main features of the leaf-spot disease were set forth in two articles in the Bulletin (Vol. 4, pages 172-173, 1924; Vol. 5, pages 198-199, 1925) recording severe outbreaks in fairways of golf courses, the first occurring in Pennsylvania and New Jersey in 1924,

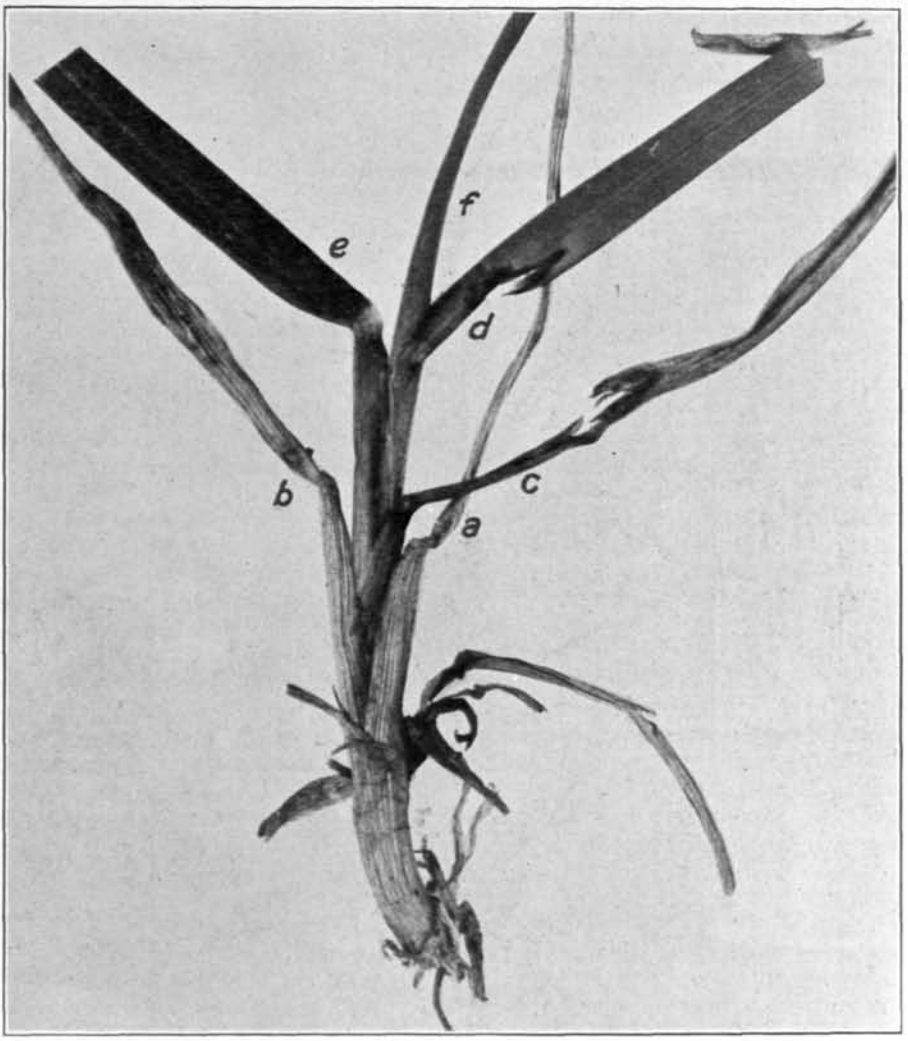

Fig. 2.—A plant of Kentucky bluegrass affected with foot rot, collected in a closely cut fairway in Washington, D. C., April 30, 1929. The three leaf blades "a," "b," and "c" had withered as a result of being interrupted by broad lesions near their respective bases, while a fourth, "d," appeared destined for a similar end with further enlargement of the one lesion present. Two other leaves, "e" and "f," appeared free of infection. Photographed three times actual size.

and the second in and about the District of Columbia the following year. Undoubtedly the early outbreak of 1929 was more severe than any hitherto reported, fairways in the vicinity of Washington, D. C., showing numberless brown patches usually several square feet in extent within which the turf survived only in scattered plants or isolated stools. The large majority of the bluegrass plants in the badly affected areas were killed to the ground, evidently not so much

through the multiplication of lesions on the blades generally as through the development of the somewhat different and more destructive type of infection commonly known by the term "foot rot." The latter form of the disease is manifested in one phase by the

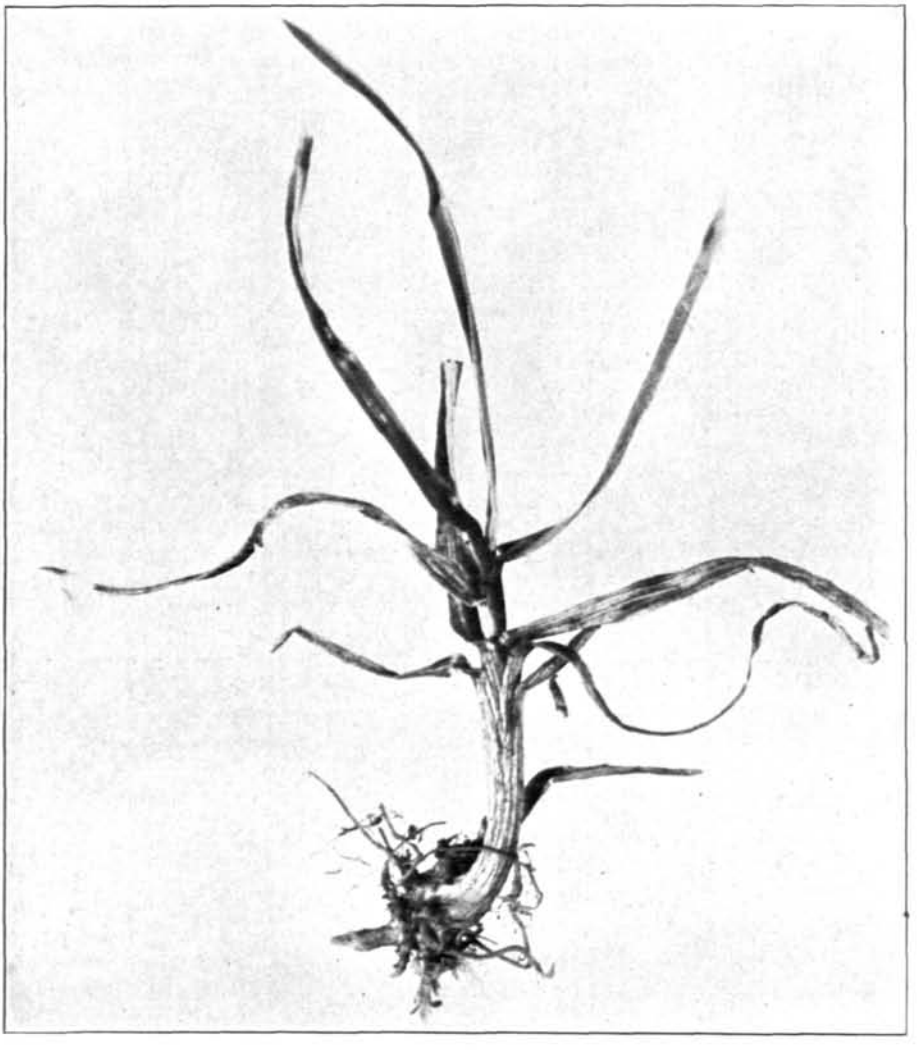

Fig. 3.—A plant of Kentucky bluegrass affected with foot rot, collected in a closely cut fairway in Washington, D. C., April 30, 1929. All except the uppermost three leaves were dead at the time of collection, and these were beginning to wither as a result of infection extending entirely through the discolored parts of the stem. Though this plant was from the same fairway as the specimen shown in Figure 2, it was collected in an area more closely cut than that in which the sturdier plant originated, and revealed a more destructive type of foot-rot infection. Photographed three times actual size.

eventual withering of the leaf blade as a whole, due to its being interrupted usually near its base by a lesion broad enough to extend across its entire width. In Figure 2 is shown a plant of which the lower three leaf blades, *a*, *b*, and *c*, were found withered evidently because of such interruption. A fourth leaf blade, *d*, would apparently soon have been overtaken by a similar fate, since the large

lesion borne on it would after some little additional enlargement have extended over the remaining narrow isthmus of sound tissue through which the upper part was supplied from below.

Although the injury from the loss of numerous individual leaves was fairly serious, a more destructive phase of foot rot resulted from the thoroughgoing infection of the axial part (stem) of the plant, consisting, in closely clipped turf, mostly of compactly arranged leaf sheaths together with the younger emerging leaves enfolded by them. Such axial infection was followed as a rule by the death of all leaf parts then visible—a consequence from which the plant generally failed to recover. In Figure 3 is shown an affected specimen of which the upper three leaves, the only ones remaining alive, reveal signs of general withering, brought about presumably by infection of the discolored axial elements.

The patches exhibiting severe injury from foot rot corresponded usually to areas in the fairways subjected to especially rigorous mowing. Adjacent areas protected from excessively close cutting because of slight topographical inequalities showed less injury, while bluegrass in the rough nearby showed practically no injury from foot rot but appeared on the whole to be in very satisfactory condition in spite of an abundance of leaf-spot lesions present on the foliage. It is evident, therefore, that the miniature habit of growth imposed by close cutting renders bluegrass markedly subject to damage from foot rot. The individual plants somewhat resemble seedlings in the small dimensions of all leaf parts, and since these parts are mostly of new growth, it is probable that the resemblance extends also to the condition of the tissues as regards their own delicateness. The foot-rot phase of the disease might, therefore, be regarded as comparable to the damping-off troubles often affecting seedlings of various crop plants, being severe as long as the plants remain small, but persisting only in the form of localized infections as the plants gain in sturdiness.

The direct effect of close leaf pruning deserves consideration in this connection. Most of the dry material used in building up the tissues in roots, stems, and leaves is not drawn from the soil, as is sometimes supposed, but is manufactured in the green leaf, the raw materials being water obtained through the roots and carbon dioxide obtained from the air. When an excessive proportion of foliage is removed, the capacity of the plant for renewed growth or for replacing elements destroyed by disease is naturally reduced. Kentucky bluegrass, because of its erect growth, is, of course, pruned much more severely by close mowing than are grasses with a prostrate habit, such as creeping bent. It is therefore suggested that, during outbreaks of the disease, Kentucky bluegrass fairways be spared excessively close cutting.

The quantity of water required to keep a putting green in good condition depends on a number of factors, such as kind of soil, surface drainage, subdrainage, elevation, exposure to circulation of air, length of day, temperature, and prevalence of wind. No set rule can therefore be formulated for the quantity of water to apply to putting greens. Each green must be studied by itself and careful observations made as to the condition of the soil and the turf under applications of water in varying quantities.