NECROTIC RING SPOT - A PATCH DISEASE OF KENTUCKY BLUEGRASS IN MICHIGAN

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In spite of the progress over the last few years in determining the cause of the disease previously known as "the Fusarium blight syndrome", much confusion still exists in the diagnosis of patch diseases of turfgrasses. Much of the confusion is due to the name Fusarium blight, which has been generally and indiscriminately given to anything causing "frog-eye" or patch symptoms on Kentucky bluegrass.

Fusarium blight was originally named for the abundant presence of Fusarium species associated with the final stages of patch diseases. In the late 70's several scientists began collecting evidence to suggest that other fungi producing ectotrophic mycelium on plant roots may be the cause of this disease. It has been reported from northeastern, northwestern, and other midwestern states that both Leptosphaeria korrae and Phialophora gramninicola may cause patch disease symptoms of Kentucky bluegrass (1,2,3). In the past year we have determined L. korrae to be present and a cause of patch disease symptoms on Kentucky bluegrass in Michigan.[4]

Diagnosis of Necrotic ring spot and differentiation of this disease from other patch diseases such as dollarspot, red thread, pink patch, yellow patch and summer patch, depends on recognition of the symptoms and signs of this disease in the field as well as isolation and identification using specialized techniques by trained diagnostic labs.

Necrotic ring spot is characterized by irregular sunken patches of dead grass often with tufts of healthy grass growing in the center of the patch, giving the characteristic "frog-eye" appearance. Occasionally the disease may appear in more of a serpentine pattern across a lawn. Closer inspection of infected plants in the patch area will show entire leaves straw-colored, often with reddish to purple leaves interspersed, especially during cool weather. NRS can thus be distinguished from dollarspot, pink patch and red thread by a lack of the discrete dollarspot leaf lesion, and the absence of the pink to red fungal tissue on leaf surfaces which is typical of red thread and pink patch.

Next, examination of individual plants under a dissecting microscope will show the characteristic dark brown mycelium running along the roots, rhizomes and in severe cases even the crown and sheath. These runner mycelia are characteristic of several closely related fungi including Gaeumannomyces, Phialophora, and Leptosphaeria spp.

Observation of infected plants under high power of a light microscope may give further information in identification based on the presence of specialized infective structures known as hyphopodia, present on lower stems, leaf sheaths and roots. Leptosphaeria generally produces hyphopodia in masses on the plant to differentiate it from the other two genera.[5] Occasionally the fungi will produce fruiting bodies in nature which will enable positive identification to the species level. In the absence of such a structure isolation of the fungus onto artificial media will further help in

identification, and fruiting bodies may then be induced to form using specialized techniques.

Through the use of these diagnostic techniques we were able to confirm the presence of a Leptosphaeria korrae - like fungus from several diseased lawns in Michigan. Following isolation of the fungus, pathogenicity tests were performed on Fylking Kentucky bluegrass seedlings to determine the virulence of these isolates.

Two of the L. korrae - like fungal isolates, one from a condominium lawn site in Novi, MI, the other from a lawn in Okemos, MI were grown on sterile wheat seed. Three such seeds, infested with the fungus were placed beneath the roots of four replicates of three week old Fylking Kentucky bluegrass transplants in sterile soil and held at three temperatures, 15, 24 and 28 C. After 4-5 weeks stunting and necrosis of plant tops relative to the control was observed at all three temperatures for the Novi isolate and at 24 C for the Okemos isolate. Stunted plants displayed dark brown ectotrophic mycelium running along roots, rhizomes and up onto crown and sheath in severe infections. In addition, a severely stunted root mass accompanied stunting and necrosis of the tops of plants. Re-isolations yielded L. korrae in all cases.

Symptoms were also induced under greenhouse conditions using wheat seed inoculum of both isolates. Symptoms included reddened leaf blades, necrosis of entire plants and dark brown runner mycelium on roots.

In May 1985 an inoculation study was laid out on a block of Fylking Kentucky bluegrass at the Hancock Turf Research Center. Three types of inoculum, wheat seed, colonized agar disks, infected grass plugs and two isolates of L. korrae were used. By late August 1985 the first symptoms began to appear in the locations where wheat seed and agar were used as inoculum. By mid-October nearly 100% of the spots inoculated with wheat seed and PDA plugs showed symptoms of disease. Fifty percent of the spots inoculated with grass plugs infected with the Novi isolate showed patch symptoms by 10/17/85. This indicates the possibility of spread of this disease by power raking, aerating and cultivating.

L. korrae has been observed to cause disease symptoms under a range of environmental conditions. Patches may occur in cool spring/fall periods but disease spread has also been noted in hot/dry summer periods in some areas. It is not known if patch symptoms during these periods are due to heat and drought stress on previously infected and damaged plants or to new infection taking place.

An inoculation study was begun in November 1985 on blocks of Baron/Bristol/Victa Kentucky bluegrass at the Hancock Center to test the effect of several factors on development of Necrotic ring spot.

1. Irrigation level (water potential of soil)
2. Type of sod
   a. Muck sod
   b. Mineral sod
   c. Seeded
3. Isolate of L. korrae, and the effect of P. graminicola isolates

placed 6 inches distant from the L. korrae.

Environmental conditions will be measured with a hygrothermograph to measure air temperature. Soil temperature and rainfall will also be measured. This study will help delineate the environmental factors affecting the spread of L. korrae as well as the effect of sodding vs. seeding, and the relationship between P. graminicola and L. korrae in Kentucky bluegrass patch disease.

Field studies have also shown that nitrogen applications are important in slowing the spread of disease symptoms, perhaps by allowing the plants to out-grow the fungal pathogens. Excessive nitrogen, promoting lush growth should be avoided. Moderate levels of a balanced fertility program is the ideal.

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