Red Root Rot in Corn

- Roots and basal stalk tissue infected with red root rot characteristically have reddish-pink, rotted roots.
- Stalks are weakened and susceptible to lodging.
- Premature plant death is common and can occur quickly and yield losses can be as high as 15-20%.
- Genetic resistance to red root rot is uncommon and breeding for disease resistance is difficult.

Red root rot is caused by a complex of soil fungi, of which *Phoma terrestris* is the primary pathogen. It is a late season disease of corn. The disease was initially discovered in the Delmarva region of the eastern United States; it has more recently been reported as a problem in Colorado, Nebraska, Missouri, and Oregon. Red root rot has been reported to cause corn yield reductions of 15 to 20% in localized areas of the Delmarva. Genetic resistance has been difficult to find and management options are limited.

**Symptoms**

Red root rot symptoms typically appear just before senescence. Roots and basal stalk tissue (lower 3 internodes) infected with red root rot have a reddish-pink discoloration (Figure 1). Roots become a deeper red color as the disease progresses (Figure 2). The reddish coloration can be confused with Fusarium or Gibberella stalk rots, but red root rot has a darker red color.

The root tips and roots may be shredded or frayed, similar to insect damage. The root mass can be small, making severe lodging more likely. Combining may be difficult because the entire root ball may be pulled up as plants are harvested. The small root mass, compromised root system, and lodging contribute to yield loss.

During the late stages of ear filling the disease can cause rapid, premature death of the plant. Foliar symptoms can occur over a 4 to 5 day interval and plant death of the most susceptible plants can occur within a week. Other above ground symptoms include a grayish green discoloration of leaves and stalks or a wilted appearance, which is also characteristic of other stalk rot diseases.

**Conditions Favoring the Disease**

Red root rot can survive in the soil for many years across a wide range of soil types, soil temperatures, and soil pH. The optimal temperature range for disease infection is 70 to 80°F around the time corn begins to senesce. There are reports that infection may occur as early as mid-silking. High plant populations, high fertility, and irrigation can be common ingredients in infected fields. Recent research indicates that early infection by *Pythium* species (and others) can cause root damage that enables *Phoma terrestris* to invade corn roots more successfully.

*Phoma terrestris* produces dark, thick-walled microsclerotia resting structures in the roots of infected plants. The microsclerotia allow the fungus to overwinter, survive in the soil for many years, and are the primary source of inoculum.

**Management**

Management options are limited. Crop rotation with a non-host such as soybean can provide some control. Genetic resistance has been difficult to incorporate into corn products, although the rate of disease development varies greatly between corn products. Research on inheritance of disease resistance indicates that it is a polygenic trait with additive gene action, which has complicated breeding efforts. Environmental stress during the season may contribute to disease infection and severity.

**Sources:**