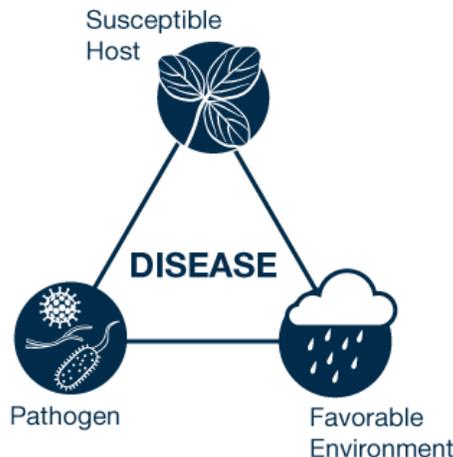




The Benefits of Tillage: Managing Fall Residue for Disease Management in Corn

Corn is vulnerable to infection by plant pathogens throughout the growing season, particularly when environmental conditions favor: seed rots and seedling blights soon after planting, foliar disease in mid-season, and stalk, stem, and ear rots toward the end of the growing season. Many of these diseases are caused by pathogens that survive in crop residue as well as in the soil. The risk of increased disease severity is higher when corn follows corn. The disease triangle (Figure 1) on the right describes the three factors needed for disease to develop. When the disease organism is present and you have a susceptible host, you still need the right environment to drive the development of disease.

Figure 1. Disease Triangle



Seedling diseases

Seed rot and seedling blight fungal species that can cause disease in corn include *Fusarium*, *Rhizoctonia*, *Pythium*, *Diplodia*, *Penicillium*, and *Trichoderma*. All these fungi are common microbial inhabitants of corn fields. They survive on infected crop residue and in the soil. Cool (<55°F), wet soils favor the development of seedling diseases. Seedling susceptibility to infection increases the longer the seed sits in the seed trench, and the more stress germinating corn undergoes. Although several of the seedling pathogens can attack both corn and soybean, there are others that are specific to corn and their populations increase under continuous corn production. Corn followed by corn where crop residues are left on the surface will be more prone to seedling disease due to higher inoculum pressure and cooler, wetter soils. Seed treatments will continue to be necessary to ensure a healthy stand.

Foliar diseases

The most common foliar diseases in corn include Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, common and southern rust, and eyespot. Both common and southern rust are windblown from southern

areas of the United States each growing season. Research has shown that disease severity is directly associated with the amount of surface residue. The inoculum pressure will be considerably greater in corn followed by corn fields, especially in those fields where foliar diseases were a problem the previous season. Under moist conditions, the fungi produce spores that are either rain splashed or blown by wind onto susceptible corn leaves and infection occurs. Scouting for foliar diseases will be critical to ensure that fungicide applications are applied in a timely manner, and the ear leaf and leaves above the ear are protected from infection. Leaf diseases are often accompanied by stalk rot; therefore, it is important to monitor stalk quality and plan for a timely harvest if leaf diseases occur. Incorporating infected residue into the soil will help reduce future risk by speeding the deterioration of infected stalk residue. Selecting corn products with good tolerance/resistance to many of these diseases along with the use of fungicides will help in reducing risk from many foliar diseases.

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Stalk rots

Common stalk rots include Anthracnose stalk rot, Fusarium stalk rot, Gibberella stalk rot, Diplodia stalk rot, and charcoal rot. These fungi survive on infected crop residue or in the soil. They have several pathways to stalk infection, including the root systems. Any stressful conditions that reduce photosynthesis and the production of carbohydrates during grain fill will predispose corn to stalk rots. Stressful conditions include drought, foliar disease, hail damage, inadequate nutrition, soil compaction, and insect damage. Most of these pathogens are specific to corn and their populations will build up in infected residue and in the soil in fields where corn is followed by corn. The presence of corn residue in the field increases the risk of some stalk rots; additionally, the likelihood of an extended harvest increases the risk of stalk rots developing. Tillage can reduce the risk of future infection by expediting the deterioration of infected stalk residue.

Ear rots

The common ear rots include Fusarium ear rot, Gibberella ear rot, and Diplodia ear rot when normal to above normal rainfall occurs from silking to harvest. Aspergillus ear rot favors hot, dry conditions. These diseases also reside on infected crop residue on the soil surface and in the soil. The possibility of disease increases when corn is followed by corn. Incorporating infected stalk residue into the soil with tillage can help reduce the possibility of infection by causing the infected stalks to deteriorate. Scout and schedule harvest when it is determined that 10% or more ears are infected. Getting grain below 15% moisture as quick as possible will deter the spread of these diseases in the grain bin.

Fall tillage considerations for corn disease management

Tillage is one option for managing infected corn residue and incorporating the residue into the soil where microbes will increase decomposition rates. Another advantage is that less of the residue remains above the soil surface that, if left untilled, could delay spring planting due to delayed soil warming and drying.

Tillage is an effective way to help manage many of the above-mentioned corn seedling, foliar, and stalk and ear rot diseases. As indicated in the disease triangle, removing or reducing the pathogen inoculum will help reduce future risk of disease.

Sources (verified 7/23/19)

Managing corn residue in corn production. Michigan State University Extension, http://www.canr.msu.edu/news/corn_residue_management_begins_in+the_fall

Potential disease problems in corn following corn. Iowa State University Extension and Outreach. <http://crops.extension.iastate.edu/potential-disease-problems-corn-following-corn>

Legal Statements

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields. ©2019 Bayer Group. All rights reserved. 8004_S1

