

Effects of Flooding or High Rain Events on Corn Diseases

Flooding or high rain events can negatively impact corn in many ways. Rain events that occurring after planting through early emergence can increase the risk of seed or seedling diseases. If the events occur prior emergence, soil crusting can occur reducing emergence and ultimately the final stand. Either event can cause nitrogen leaching leading to reduced yield potential or the need to apply more nitrogen. Temporary flooding or high rain events during this vulnerable time period can result in plant diseases that manifest themselves later. Prolonged submersion can result in plant death.

*What diseases could result if the plant is temporarily submerged?*¹

Assuming the plant is not killed, the most common disease associated with temporary submersion is called crazy top. While the disease seldom causes wide-spread losses, injury to plants in localized areas of the field can be substantial. The critical period for infection is between germination and the V4 growth stage. This fungus can infect corn as well as over 100 species of grasses, including both weeds and cultivated crops. The fungus requires a host plant for reproduction and is maintained in agricultural fields, in the absence of corn, on grassy weeds. The optimal temperature window for development is between 53° and 63°F. The major symptom of crazy top is the proliferation of the leafy tissue in place of the tassel (Figure 1). Other symptoms may include the lack of an ear and elongated and leafy ear shoots, stunted growth with narrow leaves and excessive tillering. Management tactics include improving field drainage and controlling grassy weeds.

The corn is in the V4 growth stage, what is the risk of root rot under extremely wet soils for several days?

Under extreme soil saturation, the lack of oxygen results in stress on the plant that may predispose the roots to infection by *Pythium*, *Fusarium*, and *Exserohilum*. At the V4 growth stage and until V6, the nodal roots have yet to provide the seedling with all the nutrition it needs. The seed is connected to the seedling by the mesocotyl and it is through this tube that the seedling obtains nutrients from the endosperm. If the mesocotyl is damaged or infected it can stunt the developing seedling and in some cases, result in plant death.



Figure 1. Proliferation of leafy tissue in corn caused by crazy top fungus.

The infection and subsequent rot of the mesocotyl in the earlier growth stages can also lead to stalk and crown rot during later development. Seed treatments may help control or suppress these diseases, but efficacy can decrease after two to three weeks after planting.

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What stalk rots can become an issue under these conditions?^{2,3}

While we most often think of stalk rots as occurring after pollination and during grain fill, *Pythium* stalk rot can infect corn between V2 through R6 growth stages. Extreme and extended wet conditions when temperatures are above 90°F are ideal for infection. Fields that retain water are most susceptible. In most cases, the infection is limited to the first internode directly above the soil surface. The stalk can be easily collapsed at the site of infection and the tissue within the stalk is discolored (Figure 2). It can be confused with bacterial stalk rot which has very similar symptoms; however, plants infected with bacterial stalk rot will have a very foul odor.

What if the plant is not submerged, but the whorls have been filled with water for a few days because of excessive rainfall?⁴

This might lead to *Physoderma* brown spot and/or *Physoderma* stalk rot. Corn in the whorl stages of V5 to V9 are most susceptible when water from rainfall or irrigation fill the whorl for an extended time. *Physoderma* brown spot is characterized by yellow-brown bands across the leaf. Small oval dark purple lesions can be found on the midrib of the leaf and may also occur on leaf sheaths and ear husks (Figure 3). The purple spots can be confused with purple leaf sheath. Purple leaf sheath is non-pathogenic and is a result of wild yeasts feeding on the accumulated pollen in the leaf sheaths.

Physoderma stalk rot can occur when nodes six or seven become infected, this is usually at about ground level. If the node is infected it snaps and breaks very easily when pushed. There is a discoloration around the node, but usually the intervascular tissue appears normal. If the plant does not lodge, then yield potential can still be very good on infected plants.



Figure 2. *Pythium* stalk rot in corn.



Figure 3. *Physoderma* brown spot on corn leaf.

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Sources

- ¹ RPD No. 207 - Crazy Top of Corn. 1988. University of Illinois Extension. <http://ipm.illinois.edu/diseases/series200/rpd207/>.
- ² Freije, A., Wise, K., and Nielsen, R. 2016. Stalk rots. Purdue University Extension. <https://www.extension.purdue.edu/>.
- ³ Bacterial stalk rot of corn. Crop Protection Network. <https://cropprotectionnetwork.org/resources/articles/diseases/bacterial-stalk-rot-of-corn>.
- ⁴ Robertson, A. 2015. Physoderma brown spot and stalk rot. Iowa State University Extension. <https://crops.extension.iastate.edu/cropnews/2015/07/physoderma-brown-spot-and-stalk-rot>.



Figure 4. *Physoderma* stalk rot.

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.

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