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Best Management Practices for Corn Production in South Dakota: Seasonal Hazards—Frost, Hail, Drought, and Flooding

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CHAPTER 4
Seasonal Hazards – Frost, Hail, Drought, and Flooding

Frost

Corn is usually safe from frost until the 2-leaf stage (V2) because the growing point is below the soil surface. Soil temperatures can be different than air temperatures. Soil water content and residue cover affect soil warming and cooling. If frost damage is suspected, an assessment can be conducted by slicing the plant in half vertically. If the innermost part of the plant (the area with the newest growth) appears mushy or discolored (brown and/or black), the plant will likely not recover. Frost damage assessments should not be attempted until 3 days after the frost. Warm temperatures encourage the plant to resume growth, but cool temperatures will not. If an attempt at damage assessment is made before the plant has had time to recover, the assessment may not be accurate. Assessments conducted 3 to 10 days after frost are common. Frost damage can be spotty in a field, with the most-severe damage in low-lying areas of fields and little to no damage in higher areas.

Figure 4.1. Frost damage on corn

(Photo courtesy of Leon Wrage, South Dakota State University)

Figure 4.2. Corn seedling damage due to frost

(Photos courtesy of R.L. Nielson, Purdue University)

Hail

Hail can defoliate the crop and cause breakage or bruising of the stalk, creating entry sites for insects and diseases. The severity of the damage caused by hail is related to the size and duration of the hail. In most hail cases, the crop will recover; yield loss depends on the growth stage at the hail event and the severity of the damage. A hail event occurring when the growing point is belowground may only strip the emerged leaves. As the crop develops it becomes more vulnerable to leaf stripping. Damage to leaves and stalks can reduce yield if the movement of sugars from the leaves to the ears is restricted. Hail during ear development may result in a barren crop.

Figure 4.3. Hail damage to corn.

(Photos courtesy of R.L. Nielson, Purdue University)

Drought and Flooding

Water is essential to crop growth and development, but it must be available within an optimal range. Too much water can kill plants from lack of soil O_2 or can result in disease problems. As with frost, flooding may be site-specific in the low-lying areas. Drainage may be an option for frequently flooded areas. However, to determine the legality of drainage, local USDA-NRCS offices must be contacted prior to installing artificial drainage systems.

Drought also restricts corn yield. Dry conditions during silking will reduce kernel set and pollination. In a field that has both high and low landscape positions, drought will be noticed on hilltops and summits before the lower-lying areas are affected.

Figure 4.4. Corn growing in flooded conditions

(Photo courtesy of University of Nebraska)

Figure 4.5. Drought impact on corn

Above: Drought stress prior to silking (R2).

Normal ear (left) and ears from corn in late vegetative stages through grain fill that have suffered from drought stress.

(Photos courtesy of The Ohio State University)

Conclusion

Weather conditions such as frost, hail, flood, or drought can severely reduce yields. Effects from these events are manageable to a certain extent, but loss can be expected when these events occur. The degree of loss depends on the severity of the event. Crop insurance has become a common component of corn production in the U.S.; the insurance provides the producer economic protection for uncontrollable events. Producers should consider crop insurance based on the consequences of crop loss.

Additional Information and References

More information on South Dakota climate and weather information is available from the South Dakota Office of Climatology (http://climate.sdstate.edu).

Hall, R.G., T.P. Trooien, D.P. Todey, and D.E. Clay. 2009. "Seasonal hazards – frost, hail, drought, and flooding." Pp. 17–20. In Clay, D.E., S.A, Clay, and K.D. Reitsma (eds). Best Management Practices for Corn Production in South Dakota. EC929. South Dakota State University, South Dakota Cooperative Extension Service, Brookings, SD.

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