

Low Temperature Stress and Chill Injury on Corn

Dr. Ronnie Schnell

Cropping Systems Specialist – College Station

Introduction

Planting early to avoid heat and drought stress common to Texas summers is a common practice. However, early planted corn may encounter temperatures that are not ideal for corn establishment. This is also possible with late cold fronts and late freeze events. Cold weather can affect newly planted, emerging or emerged corn in the Texas Panhandle. Low temperature stress can occur when soil temperatures are <50 °F during germination, emergence and early seedling stages. Three types of injury may be observed, depending on stage of growth. This includes imbibition injury, cold stress, and frost/freeze damage.

Imbibition Injury

Imbibition chilling occurs when cold soil temperatures, <50 °F, are encountered by germinating seed within 24-72 hours of planting. Imbibition injury is characterized by the rupture of cells in seeds after imbibing cold water. When seeds imbibe water, they swell. Cold water/soil can reduce the elasticity of cells making them prone to rupture. Seeds will appear swollen with no sign of germination, meaning the radicle and coleoptile abort.

Seedling Cold Injury

Cold stress affects earlier planted corn where germination began during warm temperatures but emergence was not complete when cold temperatures arrived. Symptoms of cold injury during emergence include stunting, death of seminal roots, deformed mesocotyl elongation (corkscrew), and leafing out underground. Soil compaction and other factors can result in similar symptoms.

Frost Freeze Injury

Frost or freeze injury can affect exposed leaf tissue and below ground tissue if temperature and duration of cold are sufficient. Frost damage is generally cosmetic for young corn plants. Temperatures below 28 °F can be lethal. The growing point remains below the soil surface until about V5 (5 exposed leaf collars), which provides some protection against frost and non-lethal freezes. Evaluation of the growing point after 3-5 days of warm weather will reveal if stand loss is likely. More information can be found at: http://publication.tamu.edu/CORN_SORGHUM/Frost-Freeze%20Damage%20Corn%20final.pdf

Assessing Damage

1. Determine planting date in relation to cold weather. Check fields planted on different days and with different hybrids.
 - a. Cold temperatures occur less than 72 hours of planting, imbibition injury possible.
 - b. Cold temperatures occur greater than 72 hours of planting, cold stress injury possible.
2. If injury is observed, make note of hybrid affected for future reference.
3. Give plantings 5-7 days of warm weather and evaluate seedling germination and emergence.
4. Final plant stands will determine if replanting is necessary. Check with insurance adjusters before replanting. Yield potential of current plant populations must be weighed against yield potential of later plantings.