

## HOW COLD TEMPERATURES AFFECT CORN EMERGENCE

### SITUATION

In northern areas of the Corn Belt, frost and variable soil temperatures can place corn under significant stress after planting.

### FACTORS TO CONSIDER

- Planting date
- Soil temperature
- Planting depth
- Damaged seedlings

### ACTION PLAN

- 1. Understand how cold temperatures impact seedlings.** Cold-temperature stress, including **frost** and variable soil temperatures, affects the growth of young seedlings. Seedling stress can depend on whether the seed has absorbed water and started to grow or has emerged above the soil surface. Those that have emerged are relatively resistant to cold weather if air temperatures stay near or above 30 F and as long as the growing point is below the ground until the V6 stage of development.<sup>1</sup>
- 2. Understand the importance of soil temperature.** The time required for radical emergence is directly related to soil temperature. The optimal soil temperature for constant corn growth is 86 F. Corn seedlings have little growth at soil temperatures below 60 F.
- 3. Determine appropriate planting depth.** Consideration should be given to ample depth for vigorous root development. Planting seeds at a depth of 1½ to 2½ inches ensures seedlings are exposed to appropriate soil temperatures for optimum emergence.
- 4. Monitor for discoloration of leaves.** Corn seedlings exposed to early stress, wet conditions, restricted root development and lack of phosphorus can develop a purple hue. Restricted root growth resulting from cold soils can cause a buildup of sugars in the corn leaf, producing anthocyanins, which cause the purple leaf color. Cool and/or compacted soils along with shallow planting also can create the opportunity for purpling in the seedlings' leaves. After a few days of warm weather the corn seedling will recover from the purplish color and in most cases yield potential is not affected.<sup>1</sup>
- 5. Learn the symptoms of cold-stress injury.** If a seed is swollen but not **germinated**, it may be damaged. Also, deformed growth of the **mesocotyl** (corkscrewing appearance) or visibly damaged areas on the coleoptiles are other symptoms of an injured seed. Check for rot by splitting open the seed and looking for dark, water-soaked tissue. A healthy seedling will have a relatively firm, cream-colored growing point.



Deformed growth of the mesocotyl, a corkscrewing appearance or visibly damaged areas on the coleoptiles are symptoms of an injured seed.

### SUMMARY

To maximize yield potential and avoid **replanting**, wait until the soil temperature is above 60 F. Be sure to think about current and future weather conditions to avoid freezing young seedlings. Consider planting seeds 1½ to 2½ inches deep to promote vigorous root development and monitor for injury or rotting seeds if temperatures drop below freezing. For more information, contact your local Mycogen Seeds customer agronomist or trusted agronomic adviser.

## AgronomyServices

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<sup>1</sup>Iowa State University Agronomy Extension, "Early season cold stress"

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