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# Influence of Soil Temperature on Corn Germination and Growth

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# Influence of Soil Temperature on Corn Germination and Growth

## **Abstract**

We experienced June-like temperatures in March. Trees budded, spring flowers bloomed and fertilizer rigs crisscrossed fields. Soil temperatures matched what we normally experience in late April and early May, jumping well ahead of previous records.

Because of the unparalleled warm March weather, many wonder about planting corn. Perhaps some did plant. This year's warm spring temperatures encouraged early development of flowering trees and shrubs, as well as lawns, pastures and early weed-flushes in many fields - But wait until at least the April 11 crop insurance date to plant corn! Data from other scientists and Iowa planting date studies – suggests to plant corn after mid-April when soil temperatures are near 50 degrees Fahrenheit to maximize yield.

## **Keywords**

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## **Disciplines**

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## Influence of Soil Temperature on Corn Germination and Growth

By Roger Elmore, Department of Agronomy

We experienced June-like temperatures in March. Trees budded, spring flowers bloomed and fertilizer rigs crisscrossed fields. Soil temperatures matched what we normally experience in late April and early May, jumping well ahead of previous records.

Because of the unparalleled warm March weather, many wonder about planting corn. Perhaps some did plant. This year's warm spring temperatures encouraged early development of flowering trees and shrubs, as well as lawns, pastures and early weed-flushes in many fields - But wait until at least the April 11 crop insurance date to plant corn! Data from other scientists and Iowa planting date studies – suggests to plant corn after mid-April when soil temperatures are near 50 degrees Fahrenheit to maximize yield.

### Germination process and soil temperature

Seed absorbs about 30 percent of its weight in water; temperature does not affect that process. But temperature does affect growth of both the radicle (first root) and coleoptile (shoot). With soil temperatures below 50 F, seeds readily absorb water but do not initiate root or shoot growth. This opens up opportunities for insects and pathogens to attack seeds resulting in poor emergence especially if poor seedbed conditions are prolonged. Even though [soil temperatures](#) are above 50 F at the time I write this, they can quickly plummet with a cold spell. The odds for more cold weather and or snow are still high before mid-April. With that in mind, to minimize risk, begin planting when soils are 50 F or greater or are near 50 F and rising quickly after mid-April.

### Problems associated with corn in cold soils

Cool soil temperatures early in the season increase variability in final stands. We want to give every precious seed the chance of survival unless we intend to overplant to compensate for seed viability lost before emergence.

Cool soil conditions early in the season also lead to more unevenness in growth and development from one plant to another. In addition, once the seed begins to germinate, a significant change in soil temperature can cause problems for [mesocotyl growth](#). To maximize yield, manage corn to reduce plant-to-plant variability.

In addition to the effects of early planting on seed development and growth, early planting also exposes seeds and seedlings to increased potential for frost. We know that since a corn seedling's growing point is below ground until [V6 – the sixth leaf stage](#) – it can withstand freezing temperatures when plants have emerged until the V6 stage. Indeed that fact has saved a lot of replanting and the associated costs over the years.

What we don't always say – or for that matter understand – is that frost often affects individual plants differently resulting in more variability from one plant

to another. That variability can result in unequal interplant competition and lower yield potential. Depending on the potential date of replant though, keeping the surviving stand – albeit of variable plant heights and development – may still be the best option. (See: [Replanting Information](#))

In addition to the impact on seedlings, extreme cold snaps can refreeze soils down to seeding depths. This can and does kill seeds and growing points, reducing stands and forcing a complete replant.

*Roger Elmore is a professor of agronomy with research and extension responsibilities in corn production. He can be contacted by email at [relmore@iastate.edu](mailto:relmore@iastate.edu) or (515) 294-6655.*

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