Requirements for Uniform Germination and Emergence of Corn

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- Successful germination & emergence requires adequate moisture, temperature and seed-to-soil contact.

Rapid, uniform germination and emergence of corn helps set the stage for maximum grain yield at the end of the season. Without such a successful start to the season, the crop is behind the proverbial ‘eight-ball’ right from the beginning. The good news is that there are only three simple requirements for uniform germination and emergence of corn. The bad news is that one or more of the requirements are often missing from one field to another.

*Adequate and uniform soil moisture at the seed zone.* Adequate soil moisture is most simply defined as not too dry and not too wet. Uneven soil moisture in the seed zone can be caused by soil characteristics, tillage patterns, unusual weather conditions and uneven seeding depth control. Uneven soil moisture in the seed zone is the primary cause of uneven emergence, the results of which can be yield losses ranging from 10 to 20 percent.

*Adequate and uniform soil temperature at the seed zone.* Adequate soil temperature is most simply defined as being greater than 50°F at the 2-inch depth. Corn will not germinate or emerge quickly or uniformly when soil temperatures are less than 50°F. When soils warm to...
the mid-50° F or greater, emergence will occur in seven days or less if soil moisture is adequate.

Uneven soil temperature can be caused by soil characteristics, uneven residue cover in reduced tillage systems and uneven seeding depth control. Temperature variability is most critical when average soil temperatures are barely within the desired minimum 48 to 50° F range for corn germination.

**Useful Tip:** Dark-colored soils will typically warm more quickly than light-colored soils. If soils dry differently across the field, the drier areas will typically warm faster than the wet areas. Uneven residue cover in reduced tillage systems causes significantly lower soil temperatures under the heavier cover than under barer spots in the field. Uneven seeding depth exposes deeper planted seeds to slightly cooler seed zones than seeds placed shallower.

**Adequate and uniform seed-to-soil contact.** In order for the kernel to absorb moisture quickly and uniformly, soil must be firmed around the kernel completely. Seed-to-trash contact results from ‘hair-pinning’ of surface trash into the seed furrow during no-till planting when soil and/or trash are too wet for adequate coulter cutting action. Seed-to-clod contact results from planting into cloddy fields created by working soil too wet. Seed-to-rock contact is, needless to say, not good for proper germination either. Seed-to-air contact results from open planter furrows when no-till planting into excessively wet soils. Germination of kernels lying in open planter furrows is dependent on rainfall keeping the open furrow environment moist.

**Seed Size Considerations.** Small sized seed require less total water to germinate than larger sized seed, thus possibly offering an advantage in drier soil conditions. On the other hand, larger sized seed (especially more dense seed) may have an advantage in poor growing conditions where a slowly developing seedling may depend on seed reserves longer than normal.

University of Wisconsin data documented the stand establishment difficulty that small rounds could have under early plantings or no-till conditions. Vigor of large rounds, particularly from butt of ear, can also be low due to rewetting occurrences of the ear and handling damage during seed processing.

For other information about corn, take a look at the Corn Growers Guidebook on the World Wide Web at [http://www.kingcorn.org](http://www.kingcorn.org)
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