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Diagnosing Stand Establishment Problems in Corn

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Stand establishment in corn does not simply refer to the success or failure of germination and emergence. Stand establishment also includes the critical initial formation of the nodal or permanent root system (see my related article on [root development](#)).

Until the nodal root system is well established, the corn crop is susceptible to various early season stresses that injure the seed, seed roots, and mesocotyl. These stresses include damage from below-ground insect feeding (wireworm, seedcorn maggot, grub), seedling blights, seed rots, fertilizer injury (starter fertilizer, anhydrous ammonia), excessively dry soils, excessively wet soils, and prying agronomists.

The establishment of a vigorous nodal root system is largely dependent on the initial nodal root growth from about the 2-leaf collar (V2) to 6-leaf collar (V6) stages of development. Severe stress during this time period can cause a corn field that emerged perfectly and initially looked great to go “down hill” (plant death or stunting) very fast over a few weeks’ time.

The reason that early stress can so severely impact an establishing stand of corn is that corn seedlings depend primarily on the energy reserves of the kernel until the nodal roots are established. These energy reserves are translocated from the kernel through the connecting mesocotyl “pipeline” to the young stalk and leaf tissues. If damage to the mesocotyl or seed occurs prior to substantial nodal root development, seedlings will either die or be severely stunted. Therefore, a healthy kernel, seed roots, and mesocotyl are vital until the nodal roots are well established. As the nodal roots develop, the importance of the seed reserves and the mesocotyl declines.

Two of the major interacting factors that influence the extent to which early season stress affects stand establishment are soil temperature and moisture content. Early-planted corn this year (what little of it there was) endured 4 to 5 weeks of sustained cool soils after planting that greatly slowed early corn development of corn seedlings. Much of that time, the soils were also saturated, if not ponded, which further stunted corn development. Whenever early nodal root development is significantly delayed, other stress factors (especially soil insects and diseases) simply have more time in which to damage the seed and mesocotyl and, ultimately, injure or kill young seedlings.

Seed quality and the hybrid's inherent seedling vigor also play an important role in determining the consequence of injury during stand establishment. Otherwise minor stresses during stand establishment can have major effects on overall plant health if seed quality is less than acceptable or if seedling vigor is simply average.

The bad news is that if stand establishment this year is crappy (an agronomic term meaning uneven), there is little you can do about it now. As you think about next year, there are a few things you can keep in mind to minimize the future risk of [crappy stands](#).

- Create as little surface compaction as you possibly can prior to planting.
- Avoid working wet ground and creating cloddy seedbeds.
- Don't go hog-wild with earlier than normal planting. Recognize that seed fungicide treatments only provide [10 to 14 days of protection](#) under "normal" conditions (*Illinois Pest & Crop Bulletin*, 15 May 1998).
- Plant your best-vigor hybrids first. (Requires homework on your part)
- Plant your best quality seed lots first. (Requires homework on your part)
- Plant your best-drained fields first.
- Consider seed-applied or planter-applied insecticide for protection against wireworm and seedcorn maggot if you are certain of their presence.
- If soil conditions are unusually dry at planting, aim for a seeding depth that maximizes soil moisture uniformity in the seed furrow.

Don't forget, this and other timely information about corn can be viewed at the Chat 'n Chew Café on the World Wide Web at <http://www.kingcorn.org/cafe>. For other information about corn, take a look at the Corn Growers' Guidebook on the World Wide Web at <http://www.kingcorn.org/>

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