

## Singin' From The Same Sheet of Replant Music

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Germination and stand establishment for mid-April planted corn in parts of Indiana and Ohio have been stressed beyond their limits this year as a result of cold temperatures, imbibitional chilling injury, excessive rainfall, saturated soils, dense surface crusting, and seedling diseases during the first four weeks after planting. Stand establishment problems have been particularly common for corn planted 4 to 5 days prior to the onset of the cold snap and heavy rains of late April. Consequently, estimates of the number of replanted acres are higher than normal and perhaps greater than any year in recent history.

Typically, the greatest challenge in making a replant decision is assessing the health and survival of the original stand of corn. Unfortunately, as in most years, some percentage of replanted fields will not return an economic gain to the grower because the replant “trigger” was pulled on the basis of emotion, peer pressure, or misinformation. The following points are intended to make sure everyone is “singing from the same sheet of music” when it comes to assessing troublesome stands of corn.

- Fields of otherwise healthy looking corn should not be replanted simply because of injury to the plants’ seminal (also called embryonic) root systems.
  - Having said this, it is true that assessing the true health of plants in some fields has been difficult at best. Growers have often been uncertain whether they are dealing with 20,000 healthy plants (and thus likely not economical to replant in mid-May) or 20,000 “wanna-be” “half-hearted” “weak-kneed” and otherwise less than vigorous plants that will never regain their potential glory to produce maximum sized ears. The adage “patience is a virtue” is very applicable to the need for growers to allow damaged stands time to demonstrate their ability to recover or not.
- Every field needs to be judged on its own merits (or demerits).
  - It is particularly irresponsible this planting season to be handing out blanket recommendations on replanting based on observations (or hearsay) from other fields, perhaps with totally different scenarios. Fields that initially looked equally troublesome during emergence have often become polar opposites in terms of their eventual stand establishment.
- The nutrient reserves in the kernel endosperm can completely sustain a young corn seedling from germination through about leaf stage V1 (one visible leaf collar) or V2 (Hochholdinger et al., 2004).

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- Consequently, prior to development of post-embryonic nodal roots from the crown area of the plant, good health of the kernel and mesocotyl is paramount for seedling survival and vigor.
    - A healthy kernel and mesocotyl can enable a seedling with damaged embryonic roots to survive until nodal roots begin developing from the crown area.
  - Significant disease development in the kernel and/or mesocotyl prior to nodal root development is usually considered to be the proverbial “kiss of death” for young seedlings.
    - The same prognosis holds true for severe insect injury (wireworms, seedcorn maggots, white grubs) or any other stress that damages the kernel or mesocotyl prior to nodal root development.
  - The importance of kernel and mesocotyl health to plant survival slowly diminishes as successive sets of nodal roots form from the crown of the plant (see below).
  - Health of the radicle and lateral seminal roots (aka embryonic roots) prior to nodal root development is desirable, but is not as critical for the survival of young seedlings as is the health of the kernel and mesocotyl.
    - Injury or death of embryonic roots due to fungal diseases is obviously not desirable, but does not impose a death penalty on the seedlings.
      - A return to cold and wet soil conditions, coupled with cloudy days not conducive for plant photosynthesis, would indeed favor the continued development of these seedling diseases and perhaps eventual seedling death or severe plant stunting.
      - Conversely, warmer and drier soils, coupled with plenty of sunshine for plant photosynthesis, would favor rapid corn root development plus would slow the progress of the disease organisms.
    - Loss of the radicle root, in and of itself, has no direct bearing on subsequent development or morphology of the corn plant.
  - Post-embryonic nodal roots begin to elongate from the first stalk node in the crown area of plants shortly after leaf stage V1 and are usually distinctly visible by V2.
    - Individual “rings” of nodal roots will continue to develop from subsequent stalk nodes over time, approximately at the same pace as the emergence of leaf collars, up to the 7<sup>th</sup> or 8<sup>th</sup> stalk node.
    - By the time a plant reaches approximately V4 (four visible leaf collars), three “rings” of nodal roots should be visible at the crown of the plants. Such plants are essentially independent from any further sustenance that the kernel may yet be able to furnish.

- While nodal root initiation usually does not occur beyond the 7<sup>th</sup> or 8<sup>th</sup> stalk nodes, lateral branching and dry matter accumulation of existing nodal roots continues throughout the growing season, although at an ever-decreasing rate once pollination occurs.
- The primary (harvestable) ear in corn is not initiated until approximately V5 (five visible leaf collars). Consequently, stress prior to V5 has no direct effect on ear size determination unless its eventual outcome is a severely stunted plant. The main consequence of stress from planting through the early leaf stages is the potential loss in effective plant population, one of several components that determine final grain yield.

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