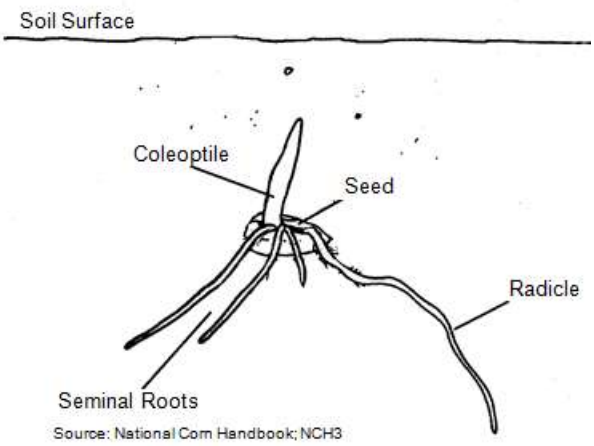
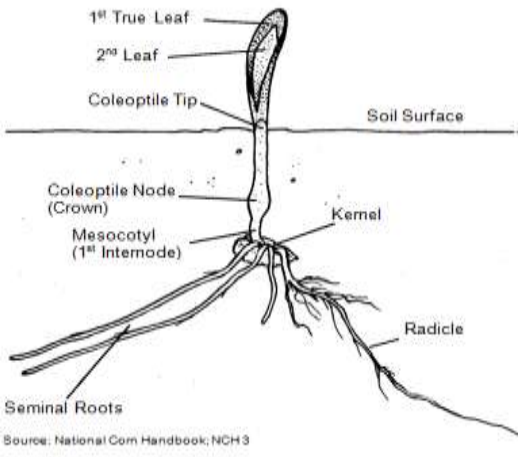
Corn Growth & Development
Germination & Early Growth

Germination through early seedling establishment is a critical period for the corn plant. Walking fields during the early part of the growing season is important to evaluate stand emergence and early growth. A good understanding of normal corn growth helps establish a reference point for comparison and to help in making the best management decisions.

Germination: After planting, the seed will begin the germination process. It will absorb about 30% of its dry weight in water to start the chemical processes for germination. The absorbed water activates enzymes that breakdown food reserves to initiate growth in the embryo. Endosperm starches are converted to sugars, which are available to the embryonic plant. From the swollen seed, the radicle is the first to emerge and elongate, followed by the coleoptile with the enclosed plumule or embryonic plant, and then the seminal roots. Under favorable moisture and temperature conditions with good seed to soil contact, germination takes place within about four to six days after planting.



A cloddy seedbed, soil and sidewall compaction, a partially open furrow, residue in the furrow, etc., along with cooler soil temperatures can cause poor seed to soil contact and will limit water absorption resulting in slow or uneven germination and emergence. Slower germination can increase the potential for seed decay and insect feeding.

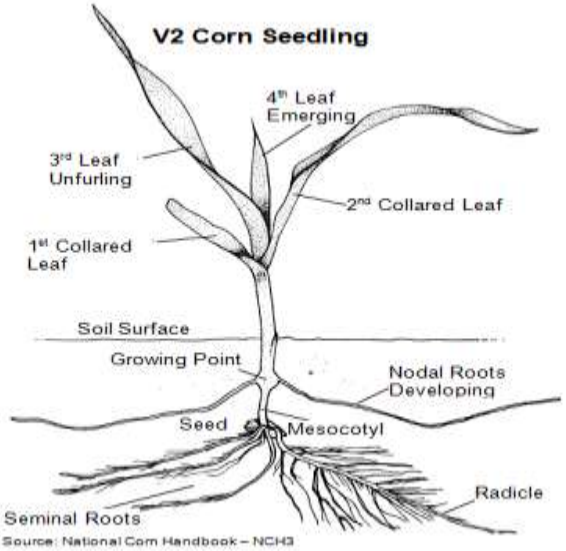


Emergence: Due the combined growth of the coleoptile and mesocotyl (first internode) elongation, emergence is accomplished. The coleoptile pushes up through the soil until it reaches light, at which point the coleoptile tip opens and the first true leaves grow through it. Planting depth affects growth of both the coleoptile and the mesocotyl. The mesocotyl is between the kernel and the coleoptile node or crown where the growing point is located and from which the nodal or permanent root system will develop. At a planting depth of 1½ to 2 inches, the crown will be located about ¾ to 1 inch below the soil surface and elongation of the coleoptile and mesocotyl are equally responsible for emergence.

At greater planting depths, the mesocotyl will elongate more to help the coleoptile reach the surface for emergence. If the kernel is planted deeper than the mesocotyl can elongate or if the coleoptile tip opens under the soil surface, emergence will not occur. A cloddy seedbed can cause the coleoptile tip to open prematurely with leaves unfurling below the surface.

Under favorable growing conditions, emergence normally takes place 8 to 12 days after planting and requires about 100 to 125 growing degree units (GDUs). Time from planting to emergence is influenced most by soil temperature. A temperature range of 60 to 65º F (55º minimum) is considered favorable for the germination process and emergence to occur within a reasonable time frame. Cooler soil temperatures can delay or lengthen the time for germination and emergence. In addition, soil tilth, moisture, compaction, crusting, planting depth, residue cover, seedbed condition, etc., can also affect time from planting to emergence.

Seedling Establishment: As the embryonic leaves grow through the coleoptile tip, the above ground plant starts to develop. The first leaf to emerge and unfurl has a round tip while all succeeding leaves will have pointed tips. At V1, the first leaf is fully developed with a collar between the leaf blade and sheath. Leaves are now supporting plant growth with photosynthesis and the seed as a food source is no longer necessary. The nodal roots are developing from the crown below the soil surface and are taking over the uptake of moisture and nutrients for the developing plant. By V2, two fully collared leaves have developed with others emerging and growing from the whorl. The time between leaf stages is about 65 to 80 GDUs or four to five days. It takes about 20 to 24 days or about 200 GDUs after planting to reach this stage.



Walking Fields In preparation for walking fields review and consider the following points.

- Review the growing season to date to see how it has affected corn germination and seedling establishment. What are the temperature and moisture distribution patterns?
- If you are walking fields at or near emergence, dig up a few seeds or seedlings to evaluate their health, condition and growth. Do they look right or normal?
- V2 (two collared leaves) is a good time to evaluate seedling establishment and health. Stage crop development to evaluate it compared to normal and the calendar date.
- Take stand counts and evaluate uniformity of plant spacing within the rows. Is the emerged population at or near the desired stand? Are plants uniform in size and growth? Are they evenly distributed down the row or are there skips or gaps?

 Date: April 2013 Author: RAK