

AGRONOMIC Spotlight



Uneven Early Season Growth in Corn

Several factors can contribute to uneven corn emergence and growth early in the season. Replanting is not often justified due to uneven stands; however, understanding why uneven emergence occurred can help minimize the risk in the future. Additionally, consideration should be given to how uneven early growth can affect the implementation of some management tools the rest of the growing season.

Potential Causes of Uneven Growth

Soil Moisture Variability in Seed Zone. A corn kernel imbibes approximately one third of its weight in water during germination³. When kernels within a row are exposed to different amounts of soil moisture, the rate of germination and emergence can vary from plant to plant, resulting in uneven emergence and early growth, or possibly stand loss. Small differences in soil moisture within a row can lead to considerable differences in germination and emergence. Planting deeper to reach uniform soil moisture, managing residue to minimize trash getting wedged into the seed trench, and reducing additional loss of soil moisture can help achieve more uniform emergence and early growth. Tillage completed ahead of planting can rapidly decrease soil moisture, versus no-till fields. Therefore, in dry situations, no-till fields may have more even emergence and early growth compared to fields tilled in a dry spring.

Cool Temperatures. It takes approximately 120 growing degree units (GDU) for corn to emerge. It can take several days to accumulate 120 GDUs with cool temperatures. Once a seed germinates, it can survive for approximately 14 days if it only has access to energy via the endosperm⁴. Ideally the kernel would develop a root system and emerge within much less than 14 days, reducing the dependency on the endosperm. Minor differences in the microenvironment directly around the seeds can magnify the effect of cool temperatures on small seedlings, resulting in uneven early growth in corn.

Sidewall Compaction. Planting into damp soils can result in poor seed-to-soil contact in the furrow and thus, uneven emergence and early growth.

Surface Crusting. Soil conditions that result in crusting can inhibit emergence and contribute to plant-to-plant variability.

Other Potential Causes. Insects, such as white grub or wireworm, or diseases, such as pythium, can result in uneven early corn growth. Herbicide injury is also a potential cause for uneven corn.

Effect on Yield Potential

Emergence delays of 10 days or more usually translate to



Figure 1. Plant-to-plant variability is common in fields that experience unfavorable conditions during emergence.

growth stage differences of two leaves or more¹. Yield potential will be affected where larger plants are competing with smaller plants for light, water, and nutrients. A 1.5 week delay between corn plants within a row may result in a 5 to 8% decrease in yield¹. Examined from a leaf stage perspective, a 4-leaf difference in corn plant stage could result in yield losses of 8 to 10%¹. While uneven emergence in corn is detrimental to yield potential, generally it does not justify replanting in most scenarios². When two plants differ by two leaves or more, the younger, smaller plant is more likely to be barren or produce small ears (Figure 2).

Management Considerations

Most uneven stands do not justify replanting². When dealing with uneven stands throughout the growing season, it is important to use recommended herbicide application rates to avoid injuring corn. Apply herbicide based on the most advanced leaf stage in the field.

Sources: ¹ Carter, P. et. al. *Uneven emergence in corn.* North Central Regional Extension Pub. No. 344. <http://learningstore.uwex.edu>. (verified 4/23/12).

² Elmore, R. and L. Abendroth. 2006. *Yield effect of uneven corn heights.* Integrated crop management newsletter. Iowa State University Extension. <http://www.agronext.iastate.edu/> (verified 4/17/2012)

³ Gardner, F. P. et. al. 1985. *Physiology of crop plants.* Iowa State University Press. Ames, Iowa. 225.

⁴ Abendroth, L.J. et. al. 2011. *Corn growth and development.* Iowa State University Extension. PMR 1009.



Figure 2. Later emerging plants often have small ears and incomplete pollination.

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