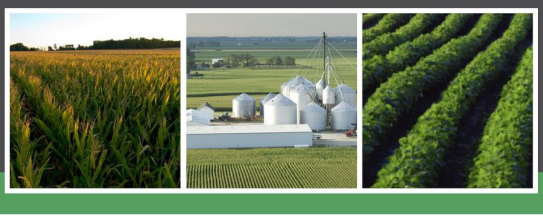

Agronomic Spotlight

Late Corn Planting Options

- Late corn planting shortens the growing season, which may cause growers to consider switching to an earlier-maturing corn product.
- The decision to switch to an earlier-maturing corn product can be difficult due to variations in growing seasons relative to available growing degree units, first fall frost dates, and fall drying conditions.

Delays and the Subsequent Growing Season

Figure 1. A flooded field delaying corn planting.

Corn planting may be delayed due to a number of factors, but it is often a result of unfavorable weather conditions. Heavy precipitation may lead to planting into wet soils (Figure 1), which can cause uneven stand establishment, poor root development, and sidewall compaction. Delayed planting can also cause a shift in insect and disease pressure, which may result in earlier pesticide application timing. Yield potential for late-planted corn can vary greatly, depending on the growing season that follows.

Growing Season Length

The number of "days" a corn plant needs to grow from emergence to maturity is often refered to as growing degree units (GDUs). Corn growth and development can be measured by calculating the number of GDUs the crop has accumulated. GDUs are calculated by averaging the daily high (Tmax) and low (Tmin) temperatures minus the base temperature (Tbase), which is set at 50 °F for corn development. Tmax and Tmin are limited to 86 °F and 50 °F, respectively, as the maximum corn growth rate is reached at 86 °F and minimum, if any, corn growth occurs below 50 °F. Daily GDU accumulation can be calculated with the following formula:[1]

GDU = (Tmax + Tmin)/2 - Tbase

Examples:

- Tmax = 84 °F and Tmin = 53 °F (84 + 53)/2 - 50 = 18.5 GDUs
- Tmax = 90 °F and Tmin = 65 °F (86 + 65)/2 - 50 = 25.5 GDUs
- Tmax = 83 °F and Tmin = 48 °F (83 + 50)/2 - 50 = 16.5 GDUs

By using these values, the approximate number of GDUs needed to reach certain growth stages can be estimated to help determine crop development (Table 1).

Table 1. Approximate GDUs required to reach different growth stages of a corn crop (planted at the normal time, with a corn product that requires 2,700 GDUs to reach maturity).

Growth Stage	GDUs
VE - Emergence	115
V6 - 6 Leaf Collars	555
V12 - 12 Leaf Collars	945
VT - Tassel	1350
R1 - Silk	1400
R3 - Milk	1925
R5 - Dent	2450
R6 - Maturity	2700

Source: Nafziger, E. Corn. University of Illinois Extension. Illinois Agronomy Handbook. http://extension.cropsciences.illinois.edu/.

Maturity and GDU Accumulation

GDU accumulation required for corn growth stage development varies with corn product maturity (Table 2). In general, corn products that require most of the growing season to mature have the highest yield potential. However, if the growing season is shortened due to delayed planting, an earlier maturing product may be needed to avoid having immature grain at the end of the season.

Table 2. Corn product maturity classification.

Maturity	Days	GDUs
Early-season	85-100	2100-2400
Mid-season	101-130	2400-2800
Full-season	131-145	2900-3200

Source: Neild, R.E. and Newman, J.E. 1990. Growing season characteristics and requirements in the corn belt. Purdue University. National Corn Handbook, NCH-40.

When to Switch Maturities

Careful consideration of several factors should be given prior to switching to an earlier product, including:

Late Corn Planting Options

- Full-season corn products for a given area typically have the highest yield potential.
- Daily GDU accumulation is minimal during the planting season when compared to flowering and drydown periods.
- As planting is delayed, corn product maturities move closer together.
- A primary reason for switching to an earlier-maturing corn product is not due to increasing yield potential, but to reduce the risk of immature and wet grain in the fall.

Deciding to plant an earlier-maturing corn product may depend on corn grain prices and grain drying costs.[2] With high grain prices and low drying costs, planting an earlier-maturing corn product may not be necessary due to the possible reduction in yield potential. Often, the increased yield potential of full-season corn products can outweigh the costs of drying in the fall. The intended use for the corn crop can also impact maturity selection. If the corn is being planted for silage or high moisture grain, then the cutoff date to plant an earlier maturing corn product can be later than the cutoff date for corn grain.

Historical GDU accumulation data can help estimate how many GDUs are left in the growing season. Knowing how many potential GDUs are available can help with deciding on what maturity to plant and whether or not the corn product should mature before a killing frost (Figure 2). Switching to an earlier-maturing product should only be considered when there is concern with not having enough GDUs left in the growing season. Therefore, the decision to switch to an earlier product should not be made quickly.

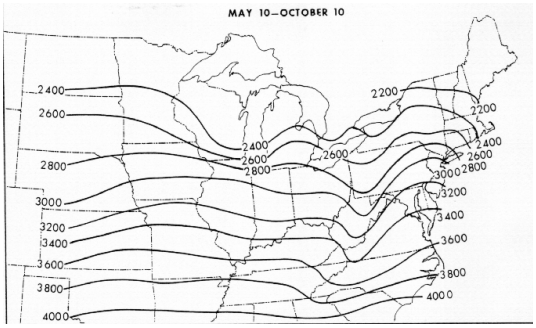

Figure 2. Estimated normal growing degree days.
Source: Neild, R.E. and Newman, J.E. 1990. Growing Season Characteristics and Requirements in the Corn Belt. Purdue University Extension. National Corn Handbook, NCH-40.

Managing Late-Planted Corn

Once corn planting is delayed, the yield potential of the crop varies with the rest of the growing season. Insect pressure, especially from late generations of European corn borer, corn ear worm, and fall armyworm, can significantly damage a late-planted corn crop. Planting a B.t. corn product can greatly reduce this risk.[3] Plant population should reflect yield expectation and it is important to be very timely with fertilizer applications and weed control as a late-planted corn crop will accumulate heat units faster than an earlier-planted corn crop.

Delayed corn planting may also increase the chance of heat and drought stress two weeks prior to silking and during pollination. It is important to minimize the risk of adverse weather conditions during critical growth stages. Planting corn products that range in GDU requirements for flowering and physiological maturity can help reduce the chance that the whole corn crop flowers during a period of high heat or is damaged by frost later in the season (Figure 3). Earlier flowering products within the same maturity may be available to help reduce damage from an early frost.

For more information about historical GDU data and planting recommendations, access one of the links below or contact your local agronomist or county Extension office.

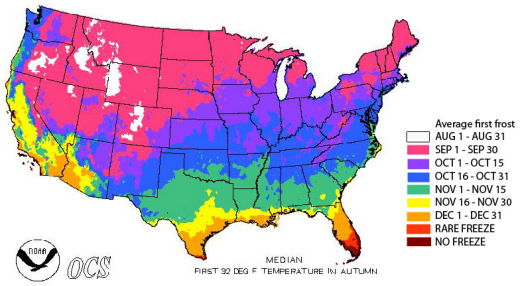

Figure 3. Median first frost (32 °F) dates for the continental United States.
Source: National Oceanic and Atmospheric Administration. Median first 32 deg F temperature in autumn. http://www.ncdc.noaa.gov/.

Colorado: http://waterquality.colostate.edu/cornbook.shtml

Iowa: http://www.agronext.iastate.edu/corn/

Illinois: http://extension.cropsciences.illinois.edu/handbook/pdfs/chapter02.pdf

Indiana: https://www.agry.purdue.edu/ext/corn/

Kansas: http://www.bookstore.ksre.ksu.edu/pubs/c560.pdf

Minnesota: http://www.extension.umn.edu/agriculture/corn/

Missouri: http://extension.missouri.edu/main/DisplayCategory.aspx?C=21

Nebraska: http://cropwatch.unl.edu/corn

New York: https://fieldcrops.cals.cornell.edu/corn

Ohio: http://agcrops.osu.edu/specialization-areas/corn

Pennsylvania: http://extension.psu.edu/plants/crops/grains/corn

South Dakota: http://pubstorage.sdstate.edu/agbio_publications/articles/ec929.03.pdf

Wisconsin: http://corn.agronomy.wisc.edu/

Sources

[1] Gibson, L.R. 2003. Grain and forage crops. Iowa State University. http://agron-www.agron.iastate.edu/. [2] Corn Agronomy. 2014. Corn late-planting. University of Wisconsin. http://corn.agronomy.wisc.edu/. [3]Heiniger, R. 2004. Management for late planted corn. North Carolina State University. https://www.ces.ncsu.edu/.
Web sources verified 05/05/16. 160502132006