

Comparing Maturity of Pioneer® Brand Corn Products

Corn maturity ratings help growers compare and select corn products, manage risk, and spread out their harvest period. However, because there is no industry standard for these ratings, comparing corn product maturities between companies can be difficult and confusing. This *Field Facts* will explain corn maturation and the Comparative Relative Maturity (CRM) rating system for Pioneer® brand corn products.

Pioneer Comparative Relative Maturity (CRM)

By rating its corn products for silking, physiological maturity and harvest moisture, DuPont Pioneer provides information needed to accurately compare corn product differences and help make sound decisions. Pioneer CRM ratings are values to allow maturity comparisons between corn products. However, they do not represent actual days from planting or emergence. Because growers tend to talk in calendar days, the guidelines provided here will allow you to convert CRM or growing degree unit (GDU) differences between corn products to approximate calendar days. Varied climates or extreme conditions may alter some corn maturity comparisons.

Growing Degree Units (GDUs)

Growing degree unit ratings assigned to Pioneer brand corn products are based on the amount of heat unit accumulation measured from planting date to silk and physiological maturity (or zero kernel milk line), using the 50°F minimum / 86°F maximum accumulation method. The GDU formula to calculate daily accumulation is:

$$GDUs = [(minimum\ temp. \geq 50^{\circ}F + maximum\ temp. \leq 86^{\circ}F) / 2] - 50$$

GDUs, like relative maturity ratings, have no industry standard. Companies use different formulas or methods to calculate GDUs and evaluate their corn products in different locations, so comparisons between companies are usually difficult.

GDUs to physiological maturity (zero kernel milk line), are the best indicator to determine if a corn product can normally mature in an area based on comparison with long-term GDU accumulation records for the area.

Comparing Maturity Differences at Silking

Some growers like to spread the pollination period to help reduce risk. But planting corn products with different harvest moisture ratings (different maturities) may not always provide the desired difference. These general guidelines can help:

- At silking, a difference between Pioneer brand corn product ratings of 25 GDUs equals approximately one calendar day.
- Under normal planting conditions, a 5-day delay in planting date equals only a 2-day delay in silking date.

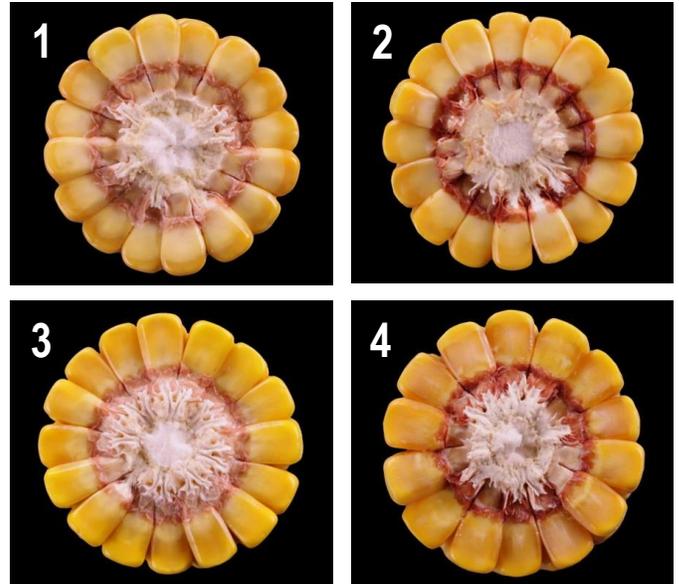


Figure 1. Progression of the milk line down the kernels as corn ears approach physiological maturity.

Example: Similar harvest moisture w/ different silking dates:

Hybrid/Brand ¹	GDUs to Silk	CRM
P0506 ^{AM1} ™ (AM,LL,RR2)	1310	105
P0533 ^{AM1} ™ (AM1,LL,RR2)	1210	105
<i>Difference</i>	100 GDUs	0 CRM
<i>Guideline</i>	25 GDU = ~1 day	1 CRM = ~1 day
<i>Calendar Day Difference</i>	4 days	0 days

Pioneer® P0533^{AM1}™ brand corn is about four days earlier to silk than Pioneer® P0506^{AM1}™ brand corn.

Example: Different harvest moisture but similar silking dates:

Hybrid/Brand ¹	GDUs to Silk	CRM
P0987 ^{AMX} ™ (AMX,LL,RR2)	1340	109
P1142 ^{AMX} ™ (AMX,LL,RR2)	1340	111
<i>Difference</i>	0 GDUs	2 CRM
<i>Calendar Day Difference</i>	0 days	2 days

Even though Pioneer® P1142^{AMX}™ brand corn is two days later to harvest moisture, Pioneer® P0987^{AMX}™ brand corn and P1142^{AMX}™ will silk at about the same time.

Research has documented that corn can adjust its growth and development, requiring fewer GDUs to reach maturity when planted later. For example, if P0987^{AMX}™ is planted on May 1 and again on May 20, then instead of an 8- to 10-day delay in silking, you may observe only a 4- to 5-day difference.

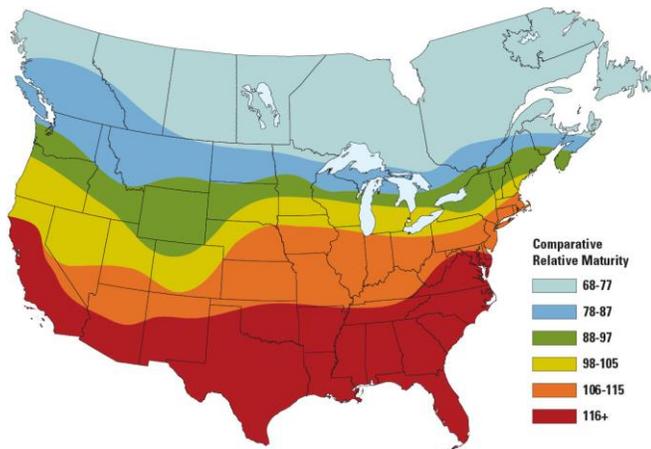


Figure 2. Dominant corn maturity zones.

Area Adaptation – To help determine if a new corn product fits your area, compare its silk rating to a corn product you know and consider these general guidelines:

- Earlier silking corn products generally move north of their adapted zone and more readily adapt to higher elevations.
- If moved too far north or up in elevation, late silking corn products may not reach physiological maturity before frost, or may have reduced yield potential if abnormally late silking exposes the crop to cooler temperatures during grain fill.

Early Irrigation Timing – Corn products that silk early should receive irrigation earlier than those that silk late. The first in-season irrigation of early corn products, planted south of their normal adapted zone for early harvest, should be based on their stage of development rather than traditional calendar dates that may be used for full-season corn products.

Stress occurring during the period of time two weeks before until two weeks after silking can result in large yield reductions since kernel number is determined during this stage. Severe moisture stress can delay silk emergence, reduce kernel set and cause incomplete pollination.

Comparing Differences at Physiological Maturity

A hard killing frost before physiological maturity will cause premature black layer, halt grain fill, and may result in poor grain quality and test weight. Frost-damaged corn is usually slower drying and additional losses may result due to delayed harvest. It is critical to select corn products that can normally mature before the first average killing frost date in your area.

The GDUs to Physiological Maturity rating is the best indicator to determine whether a corn product can safely be planted in an area. Compare the ratings of a new or unfamiliar corn product to one you are currently planting or one that is used successfully in your area.

General Guidelines:

- At physiological maturity (zero milk line), a difference between Pioneer brand corn product ratings of 15 GDUs equals approximately one calendar day.
- At physiological maturity (zero milk line), the grain moisture content will be approximately 30 percent for most corn products.

Example: Corn products with similar harvest moisture or CRM in the fall can reach physiological maturity at different times:

Hybrid/Brand ¹	GDUs to Phys. Mat.	CRM
P1151 ^{AM} ™ (AM,LL,RR2)	2580	111
P1197 ^{AM} ™ (AM,LL,RR2)	<u>2730</u>	<u>111</u>
<i>Difference</i>	150 GDUs	0 CRM
<i>Guideline</i>	15 GDU = ~1 day	1 CRM = ~1 day
<i>Calendar Day Difference</i>	10 days	0 days

Pioneer[®] P1151^{AM}™ brand corn will reach physiological maturity about 10 days earlier than Pioneer[®] P1197^{AM}™ brand corn.

Final Irrigation Timing – Late season stress can reduce yields due to premature death by reducing kernel weight and inviting stalk rot problems. Grain quality and test weight can also be significantly affected. Several different methods or models exist to calculate final irrigation needs. Comparing GDU differences between corn products for physiological maturity and checking for zero milk line development in the field can be helpful indicators of final water requirements.

Example: A corn product that reaches physiological maturity early shows that its kernel milk line is almost completely down and approaching black layer. If your field water-holding capacity is at 60%, further irrigation may not be required. However, a corn product that is 5 to 10 days later to physiological maturity may require an additional watering to mature properly, depending on field capacity or daily water use.

Comparing Maturity Differences at Harvest

By comparing harvest moisture (CRM) ratings, you can estimate the difference in moisture content between corn products and help plan a harvest schedule. A corn product with a CRM difference of 10 would be approximately 10 days later to reach a similar harvest moisture level (normally in the low 20's) if planted on the same date as the earlier corn product.

By using the general rule of thumb that one CRM equals ½ point of moisture, a corn product that is rated 10 CRM later would be approximately 5 points wetter if both corn products were planted and harvested the same day. In the field, however, this relationship can change depending on harvest timing, moisture at harvest and environmental conditions.



AM - Optimum[®] AcreMax[®] Insect Protection system with YGCB, HX1, LL, RR2. Contains a single-bag integrated refuge solution for above-ground insects. In EPA-designated cotton growing counties, a 20% separate corn borer refuge must be planted with Optimum AcreMax products. AMX - Optimum[®] AcreMax[®] Xtra Insect Protection system with YGCB, HXX, LL, RR2. Contains a single-bag integrated refuge solution for above- and below-ground insects. In EPA-designated cotton growing counties, a 20% separate corn borer refuge must be planted with Optimum AcreMax Xtra products. HX1 - Contains the Herculex[®] 1 Insect Protection gene which provides protection against European corn borer, southwestern corn borer, black cutworm, fall armyworm, western bean cutworm, lesser corn stalk borer, southern corn stalk borer, and sugarcane borer; and suppresses corn earworm. HXX - Herculex[®] XTRA contains the Herculex 1 and Herculex RW genes. YGCB - The YieldGard[®] Corn Borer gene offers a high level of resistance to European corn borer, southwestern corn borer and southern cornstalk borer; moderate resistance to corn earworm and common stalk borer; and above average resistance to fall armyworm. LL - Contains the LibertyLink[®] gene for resistance to Liberty[®] herbicide. RR2 - Contains the Roundup Ready[®] Corn 2 trait that provides crop safety for over-the-top applications of labeled glyphosate herbicides when applied according to label directions. Herculex[®] Insect Protection technology by Dow AgroSciences and Pioneer Hi-Bred. Herculex[®] and the HX logo are registered trademarks of Dow AgroSciences LLC. YieldGard[®], the YieldGard Corn Borer design and Roundup Ready[®] are registered trademarks used under license from Monsanto Company. Liberty[®], LibertyLink[®] and the Water Droplet Design are registered trademarks of Bayer. PIONEER[®] brand products are provided subject to the terms and conditions of purchase which are part of the labeling and purchase documents.