



KEEPING INFORMED

PRIDE SEEDS

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SARA MEIDLINGER
519.917.2225
smeidlinger@prideseed.com
@meidlinger09

GRAIN FILL STAGES

Our summer seems to be absolutely flying by and we're already in mid-August. The corn crop has entered the grain fill (reproductive) phase of growth and has shifted it's focus to seed production. Over a 2-month span the corn plant will go through the 6 stages of grain fill to reach physiological maturity. For our corn silage friends, the corn plant will only go through about 5 and a half stages – more to come as you read.

6 Stages of Grain Fill

R1: SILKING STAGE

Silking begins immediately following tassel emergence and it is critical to the yield potential. Most fields in Western Canada begin pollination (grain fill) mid-July to early August. To understand the importance of R1, it is important to know how pollination works, so here's a quick summary:

1. A corn tassel sheds several million pollen grains over five to eight days, with peak pollen shed occurring on day three.
2. Once the tassel has begun to shed pollen, silks will emerge from the tip of the ear husks. One silk from each ovule (unfertilized kernel) on the ear will emerge. Pollen will land on a silk, germinate, and develop a pollen tube to penetrate the silk and elongate to the ovule. Silks will continue to grow until the kernel has been fertilized.
3. The pollen tube carries half of the genetic material and will allow for fertilization of ovule, resulting in a fertilized immature kernel.
4. Once the ovule is fertilized, the silks will detach from immature kernel, turn brown and die off.

During R1, corn plants are extremely sensitive to stress. Extreme heat and drought can cause silks to dry out quickly and reduce pollen viability resulting in poor pollination leading to less kernels per ear, ultimately reducing yield.

R2: BLISTER STAGE

During R2, kernels are accumulating starch and appear white with a clear fluid. The kernels look like blisters you might get on your hands or feet. Silks are turning brown and rapidly drying out following fertilization. Resources from the leaves are beginning to be relocated to the developing ear. Blister stage occurs 10-12 days following silking. Stress during R2, can result in kernel abortion, negatively affecting yield.

R3: MILK STAGE

At R3, kernels are yellow with a white, milky filling due to starch accumulation in the kernel. Good plant health and active photosynthesis during R3, sustains potential for kernels to have good size and test weight. Rapid grain fill is occurring during the stage. Kernels that have been aborted or failed to be fertilized will be apparent at this stage and the number of kernels per

ear is set for the most part. Stress during the following stages may reduce carbohydrate accumulate. R3 occurs approx. 20 days after silking.

R4: DOUGH STAGE

During R4, the white milky kernel filling is becoming thicker and pasty as kernels continue to accumulate starch. Kernels are gaining consistency and size and the outer edges of the kernel are becoming firm. At the end of the R4 stage a few dents may appear in the kernel crown. A killing frost during R4 may cause 25-40% yield loss. The cob has now developed its red-pinkish colour. R4 stage begins approx. 26-30 days after silking and the end of R4 stage commonly has a few dents in the kernel crown.

R5: DENT STAGE

During R5, many kernels will have formed a dent on the kernel crowns. Each kernel crown has developed their characteristic shiny, darker yellow mature kernel colour. A hard white layer of starch is apparent at the top of the kernel – this is commonly referred to as the milk line. The milk line separates the solid starchy area of the kernel (beginning at the crown) from the liquid

6 Stages of Grain Fill Continued

milky area of the maturing kernel. During R5 the milk line will progress towards the base of the kernel. R5 begins 38 days after R1.

Silage Harvest: Optimal silage harvest is usually occurs in the later half of the R5 stage – R5.5 to R5.8 - depending on the hybrid and conditions. At R5.5 the milk line is approx. 50% compared to R5.8 where the milk line is closer to 75% of the way to the kernel base. Harvesting when whole plant moisture is approximately 65% (35% dry matter) allows for greater success for packing, ensiling and storage. Corn silage harvest can be estimated by adding 42-47 days from silking date.

R6: PHYSIOLOGICAL MATURITY

R6 has been reached once the kernel has filled with starch and a black layer has formed at the base of the kernel. Once the black layer has developed, kernels have achieved maximum dry weight. Kernel moistures will range between

30-35%. Moisture loss from kernels will continue to allow for suitable harvest threshing and lower kernel moistures. Severe stress at R6 will have little impact on grain yield but can affect stalk integrity and harvest ease. R6 occurs approximately 60 days after silking.

Once physiological maturity is reached, further kernel drydown is required for maintaining kernel quality at harvest and for safe storage. Kernel drydown is dependent on environmental conditions and hybrid characteristics. Drydown rates are higher when conditions are warm, sunny, low humidity and windy, resulting in kernel moisture drop as high as 0.8 to 1% per day. Alternatively, when conditions are cool, cloudy, and rainy, drydown may be minimal or zero. Early fall, kernel drydown tends to range from 0.75 to 1% in ideal drying conditions, while later fall dry down rates drop to 0.25 to 0.5% or less.

15-15.5% kernel moisture is considered the safe maximum moisture level for storing corn long term. Kernel moisture at physiological maturity is 30-35% - double (or more than double) the safe maximum grain storage moisture level. However, you are not going to wait until kernel moisture is 15 - 15.5% to harvest grain corn. It is recommended to harvest grain corn beginning at 24 to 25% kernel moisture to prevent stalk lodging, ear drop, ear rots and insect feeding. Grain harvested at 24 to 25% moisture can be stored short term, but will need to be dried using a grain dryer.

The rate of development included in this newsletter is an approximation and is the normal under standard conditions. Development may be faster or slower than the suggested timeline with higher or lower temperatures, extended overcast conditions (smoke) or drought stress.

August CHU (Corn Heat Unit) Update

May 1 – Aug 15, 2021	MANITOBA		SASKATCHEWAN		ALBERTA	
	Carman	2002	Weyburn	1992	Barnwell	1971
	Brandon	2008	Saskatoon	1954	Oyen	1939
	Altona	2140	Moose Jaw	1954	Red Deer	1757

> [MB CHU Resource](#)

> [SK CHU Resource](#)

> [AB CHU Resource](#)

Additional Reading

- > [Identifying Corn Reproductive Growth Stages and Management Implications](#)
- > [Grain Fill Stages in Corn](#)
- > [Field Drydown of Mature Corn Grain](#)
- > [Corn drydown: What to expect?](#)