Walking Your Fields®

Welcome to the fourth issue of *Walking Your Fields*® newsletter for the 2013 growing season. On behalf of your DuPont Pioneer Agronomy team, you will be receiving this newsletter on a monthly basis through October. For more detailed agronomic information please feel free to contact your local Pioneer Hi-Bred sales representative or check out ***www.pioneer.com***.

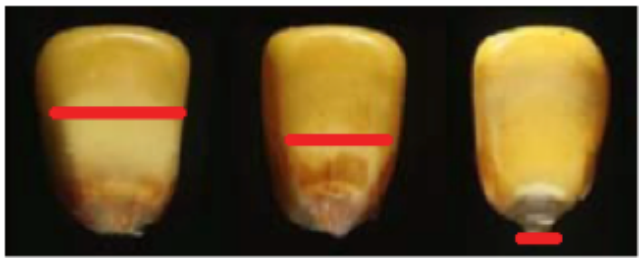
CORN SILAGE HARVEST CONSIDERATIONS

Many factors affect a producer's ability to maximize corn silage production. It starts with selecting and planting the right hybrid(s) for the right acre, helping those hybrids grow to maturity and finally harvesting and storing the silage crop. If the correct hybrids are chosen and a producer's management practices are sound throughout the growing season, then the next crucial steps are: (1) timing of corn silage chopping, (2) selecting chop length and kernel processing, (3) deciding whether to utilize a silage inoculant and (4) ensuring proper silage packing and coverage.

1. Timing – Moisture and Maturity

Determining when to chop your corn silage is one of the most important and impactful management decisions. As the corn plant matures its moisture drops and starch deposition increases. The goal in determining when to chop is how long you can allow the plant to deposit starch before the plant has reached the critical chopping moisture. Optimum moisture for highest quality silage is 65-70% in horizontal bunker silos. Lower whole plant moisture may mean more starch but may also cause packing problems leading to a host of issues. Silage that is packed too wet can result in the leeching out of valuable soluble nutrients. A good indicator to use for when to start testing whole plant moisture is milk line (figure 1). As the kernel nears 50% milk line this is generally when the plant moisture is nearing the optimum zone for chopping (however this will vary by hybrid). Please keep in mind that that if your crop has been affected by drought or frost this can significantly impact your chopping decisions. A normal crop will lose 0.5-1.0% moisture/day. Crops that have experienced a killing frost will not be able to continue to lay down starch and will lose moisture at a much faster rate. A crop that has experienced extreme drought will lose moisture slower as there is less grain present to help pull moisture from the plant.

Figure 1:



50% milk line *75% milk line* *black layer*

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2. Chopping

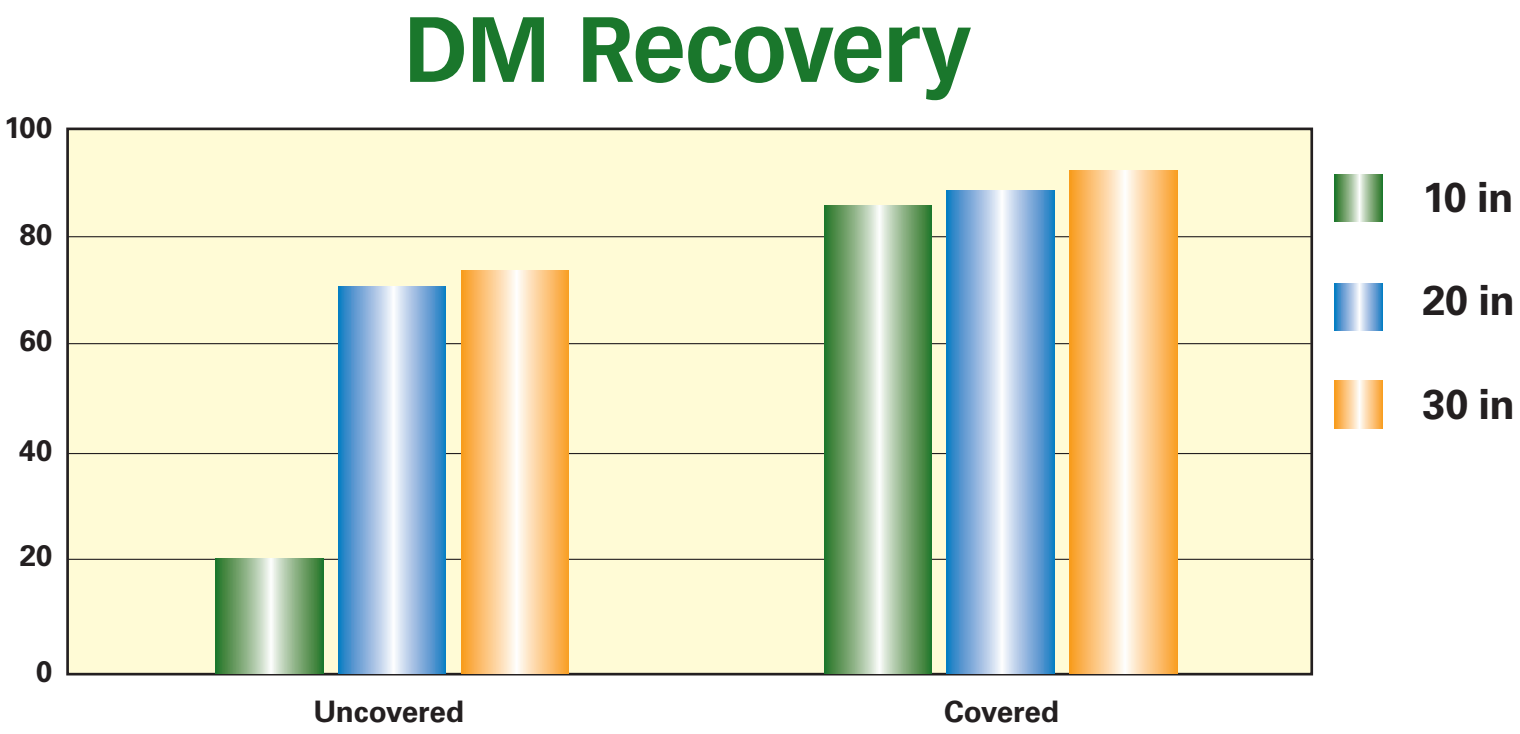
Two important considerations once corn silage chopping has begun are (a) chop length and (b) kernel processing. Standard chop length is 3/4". If forced to chop your crop above 70% moisture, consider a longer chop length. This will reduce the surface area for leakage. If harvesting below 65% a shorter length of chop allows for a better pack. A shorter chop length allows for greater surface area resulting in better digestion to a point as a certain length of chop is also required to prevent silage from moving through the rumen too quickly. Kernel processing is another important controllable factor that affects silage quality. A typical rule of thumb is that every kernel should have some level of mechanical damage. This allows rumen bacteria more surface area to access kernel starch. If your chopper is not equipped with a kernel processor consider chopping earlier, or shorten chop length to cause more kernel processing at the cutting head. Talk to your Pioneer Hi-Bred sales representative to see about getting a monitoring cup to assist in checking for proper kernel processing.

3. Silage Inoculant

The use of a high quality proven silage inoculant is instrumental in preserving your silage. There are many silage inoculant products that perform a variety of functions such as: hasten the ensilage process, reduce dry matter loss, increase bunk life and even increase fiber digestibility. Talk to your Pioneer Hi-Bred sales representative on which SILA-BAC® silage inoculant is right for your farm. Remember, silage inoculants cannot make bad silage better. The goal of an inoculant is to preserve the product you put in the silage pit.

4. Packing and Covering

Packing and covering your silage are the last steps that a producer can control in the silage making process. Packing requires the right amount of down force to allow for proper air removal. This is extremely important because silage requires an anaerobic environment (no oxygen) for proper fermentation and preservation. Lack of proper pack can lead to loss of nutrients, increased dry matter loss, increased heating, and an increase in non-desirable organisms such as yeasts and molds. Too much pack (often seen from over packing the top layer) can cause spoilage by causing plant material to breakdown and release moisture and nutrients. A calculation to determine the amount of packing weight required is: "X" tons/hr x 800 = TOTAL PACK WEIGHT. An example is: 100 ton/hr x 800= 80,000lbs of pack tractor. Another key to ensuring proper packing is to only add 6" layers at time and to keep the slope to a 30° angle in the silage bunker. Covering your silage with proper silage plastic can reduce spoilage by up to 66% in the top 1 foot across the entire surface area of your pit.



Inoculants

What are forage inoculants?

Forage quality is greatly impacted by silage preservation. Most quality changes occur during the fermentation process caused by bacteria, yeasts and molds that occur on plant material used for silage. To reduce spoilage of silage, which can result in quality and dry matter losses, low pH and an oxygen free environment are required. Forage inoculants are organisms (bacteria) that become active when added to silage. When added, these organisms function to help break down plant sugars into acids. Lactic and acetic acid are both produced during naturally during fermentation. Lactic acid is more effective in reducing the pH of the silage, so most inoculant use is aimed towards more effective and stable rate of transition of sugars to lactic acid. The increased production of lactic acid reduces the time it takes for the silage to become stable during the fermentation period. Lactic acid in the silage can be fermented by microorganisms in the rumen and contains energy similar to the original sugars in the crop. The bacteria found in microbial inoculants are selected to be the dominant bacteria during fermentation. The most common bacteria found in an inoculant are *Lactobacillus planetarium*, *Pediococcus* species, *Enterococcus* species and *Lactobacillus buchneri*.

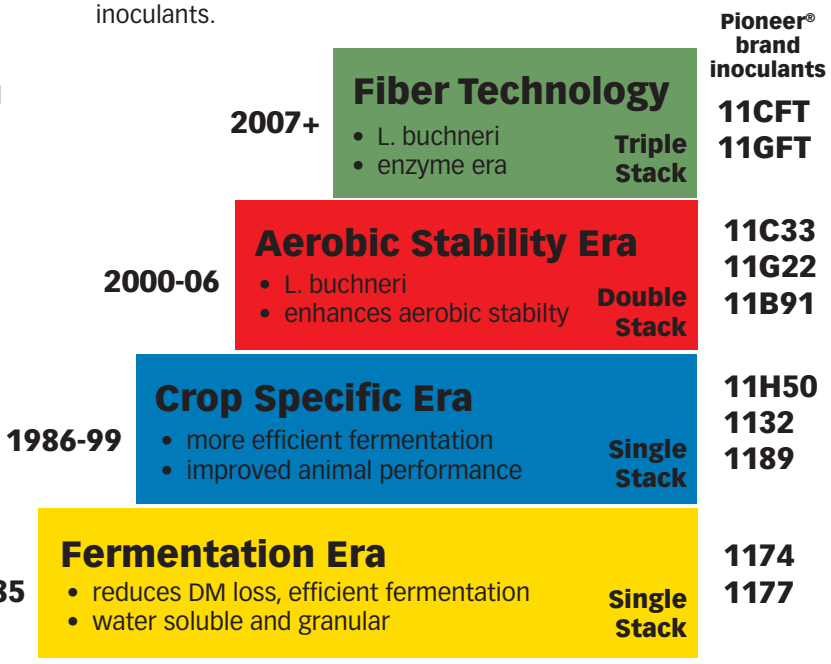
The increase in lactic acid results in a lower pH and temperature within the silo or bunker and thus creates a stable storage state. In the stable state, the silage will store anaerobically without spoilage until oxygen is introduced into the system again. The improved storage of the silage results in reduced losses of dry matter and energy as well as reduced protein solubilization. Overall, inoculant use can result in higher animal performance and longer bunk life. With the increased production of lactic acid and the corresponding reduced production of acetic additional benefits of an increase in animal feed efficiency is found, since the animals are more efficient at utilizing the lactic acid than the acetic acid.

When choosing an inoculant, it is important to understand that not all bacteria will function the same way on every crop. Crops differ in the level of sugars found in the crop, the buffering capacity of those sugars as well as the exposure to soil contaminants. Because there is an interaction between the crop and the inoculant, optimum results from your inoculant will be achieved if you chose a product that is specific to the crop that you are harvesting.

A key to the success of your inoculant will be proper placement. The bacteria in the inoculant are not mobile so they will grow where they are placed, therefore uniform coverage will be critical for maximum efficiency of the inoculant.

The advancement of SILA-BAC® brand inoculants from DuPont Pioneer.

DuPont Pioneer has been researching and manufacturing bacterial inoculants since 1978. Over the last several decades, advancements in inoculants have helped to deliver significant improvements in silage such as reduced silage pH and conserving of sugars, reduced heating on large silage faces, reduced dry matter loss and therefore reduced grain supplementation costs, improved consistency and palatability of silage. In 2000, DuPont Pioneer commercialized Pioneer® inoculant 11C33 which was the first product to contain *Lactobacillus buchneri* (heterofermenter) as well as homofermenter (just produce lactic acid) bacteria strains. Heterofermenter bacteria produce lactic acid, acetic acid or ethanol and carbon dioxide. Through the combination of homofermentative and homofermenter strains, the inoculant was able to increase the rate of pH decline and improve bunk life. The addition of the *Lactobacillus buchneri* results in metabolites of the bacteria that were able to inhibit yeast growth. Most recently (2007) DuPont Pioneer has introduced a unique strain of *Lactobacillus buchneri*. This unique strain is able to produce enzymes that help uncouple lignin resulting in an increased rate of fiber digestion and thus more metabolizable energy and increased microbial protein yield in the silage. The advantage of the increased fiber digestion is the enhanced nutritive value and thus the reduced need for additives. The Fiber Technology products such as Pioneer® inoculant 11CFT and 11GFT contain this *Lactobacillus buchneri* strain. It is important to remember that not all bacteria strains are the same. There are significant genetic differences between *Lactobacillus* strains and are not all equally as effective as inoculants.



Canola Swath Timing

As canola swathing approaches the temptation is to get going to start harvest. However the decision can be an onerous task especially with a multi stage crop, never mind a uniform crop. This article will highlight some tips and guidelines in assisting in making a swathing decision for your operation.

The Canola Council of Canada suggest swathing can occur up to 50% seed colour change on the main stem to maximize yield while minimizing losses from shelling. However, based on plant stands with lower plant populations that contain plants with multiple branching, swathing may have to occur later as the main yield will be on the branches and not the main stem of the plant.

So what do we define as colour change? To start, canola plants mature from the bottom upwards and from the center outwards. The last formed pods typically are the farthest out pods from the center of the plant. Colour change is the physiological indicator the seed is mature. Colour change can range from a yellow band to a mottled affect. (See Figures 1 & 2) Typically, seed colour change advances about 10% every three days under normal conditions, however under hot conditions, this can be more rapid and slower when cooler conditions persist.

Figure 1: Brown mottled seed. Picture courtesy of Doug Moisey, DuPont Pioneer.

Figure 2: Banded canola seed. Picture courtesy of Doug Moisey, DuPont Pioneer.

Staging the crop

In assessing swath timing, you need to determine whether the crop is uniform or not and whether the plant stand exhibits normal plant populations (6-10 plants/ft^2) or contains lower plant populations with multiple branches. Stand on the back of your truck box, side of the road, fence line or a high vantage point looking for color variation of the plants in the field. Although straw colour is not an indicator of maturity of the seed it can lend some insight into stages of the crop. Look from many directions as sunlight can change the appearance of the field. Once you have made mental notes, travel to those sections of the field using whatever means to start the assessments. Sample at least 5 to 10 plants in each area. Take the plants and strip branches away from the main stem and set aside. Take the main stems and start looking for seed colour change in the pods. Keep in mind that one pod may have a majority of seeds showing colour change and the next pod may have none or only a few seeds showing color change. Go to the middle pod on the main stem, open the pod and look for seeds with color change. Open pods below the middle pod again assessing the color change. If you see seed color change throughout those pods you are near the 50% seed colour change. Take the seed from the top pods and roll them between your thumb and fore finger and see if it's firm. Once you have an estimate of percentage change on the main stem, examine the seeds in the pods on the side branches. Seed from the side branches of those plants should be firm to roll with no onion skin flaking occurring (See Figure 3). You may have some seed potentially exhibiting some seed colour change in the side branches.

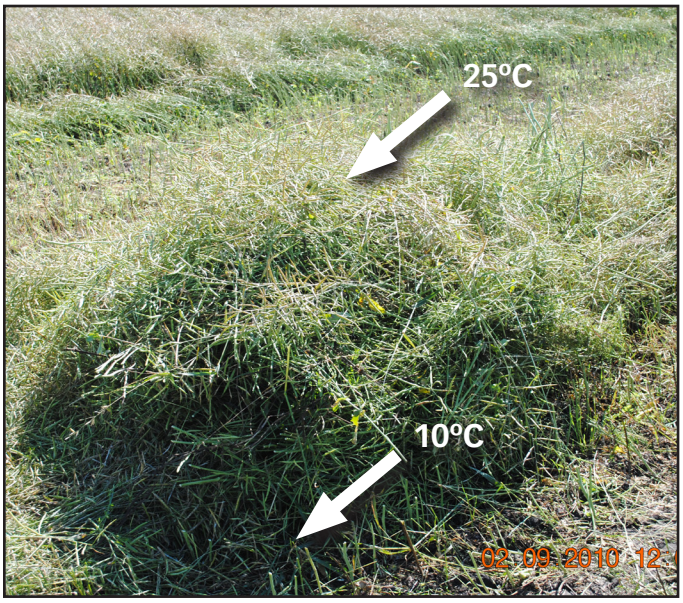


Figure 3: Using a bearing sensor top of swath was 25˚C, the lower portion was below 10˚C at 2:00 pm. Pictures courtesy of Doug Moisey, DuPont Pioneer.

Swathing a multi stage crop or a low plant population crop too early can result in both yield and quality losses.

If the field in question is uneven or contains variable plant populations it is important to determine the percentage of the field contains the most yield, the stage of the crop as well as the stage of the other areas. Go in and sample those areas to determine colour change. In order to maximize quality and yield swathing may have to be delayed which may mean shelling in some spots and being a touch early in others.

Hot and Dry vs. Hot and Humid

Because canola cannot completely close the stomata it can be prone to rapid desiccation if swathed in the heat. There is an enzyme in the canola plant that clears chlorophyll that works when seed moisture is above 20%. If the timing of swathing is in the warmer temperatures of August, it is critical to ensure good colour change especially if air temperatures are in the mid 20's or higher. Swathing during hot dry weather can contribute to locking in green seed, and swathing should be done at night. If the weather is hot and humid and the ground is wet or shows heavy dews, swathing can occur during the day with caution.

If it is September, frost is forecasted, and the grower has a lot of acres to knock down, colour change can be looked at as the banding seen on the seed (see figure 2). You still want firm seed throughout the plant. It is important to know that you need 3 good drying days after swathing prior to a frost in order to minimize the risk of green seed. This is because seed moisture needs to be below 20% in order to not damage the enzymes that clear chlorophyll.

Questions concerning staging? Please contact your Pioneer Hi-Bred sales representative or your local DuPont Pioneer agronomist.

Safe harvest!

Managing Your Crops Doesn't End at Harvest

Proper management of harvested grain in storage is critical to ensure that the returns on your investments in those crops aren't sacrificed due to spoilage. Here are some things to keep in mind as you make plans for conditioning and storing your grain.

Factors that can increase the risk of spoilage:

Heat and moisture. Higher temperature and/or moisture content in harvested grain increases the risk of deterioration in storage, through increased enzymatic and biological activity in the freshly harvested seed. This activity can lead to mould growth and hot spots causing heat damage and spoilage. The combinations of temperature and moisture required to ensure safe storage over several months vary considerably one crop to another, with oilseeds generally requiring lower levels. The graph (Figure 1) demonstrates this for canola. Allowing a point or two below the curve is advised to allow for variation throughout the bin. Based on this chart, canola at 20°C would need to be below 9% moisture to store for 5 months. By contrast, corn which is higher in starch and lower in oil content would need to be at or below 15% moisture at the same temperature.

Dockage and grain quality. It is important to monitor and record the quality of each load of grain as it is unloaded into storage, since poor quality seed or high dockage can sometimes cause storage issues. For example, chaff, weed seeds or insect parts will often have moisture levels three to four percentage points higher than canola seed. If dockage concentrates in areas of the bin, it can create a medium for mould growth leading to heating and spoilage. For coarser grains like corn and soybeans, cracked kernels or fines can restrict airflow and provide a substrate for insects and moulds. Immature or green seeds also tend to deteriorate more readily in storage.

Bin size. Bigger bins mean increased compaction of stored grain, particularly when bins are tall and relatively narrow. They also mean slower cooling of core grain temperatures in the absence of aeration or turning of the grain.

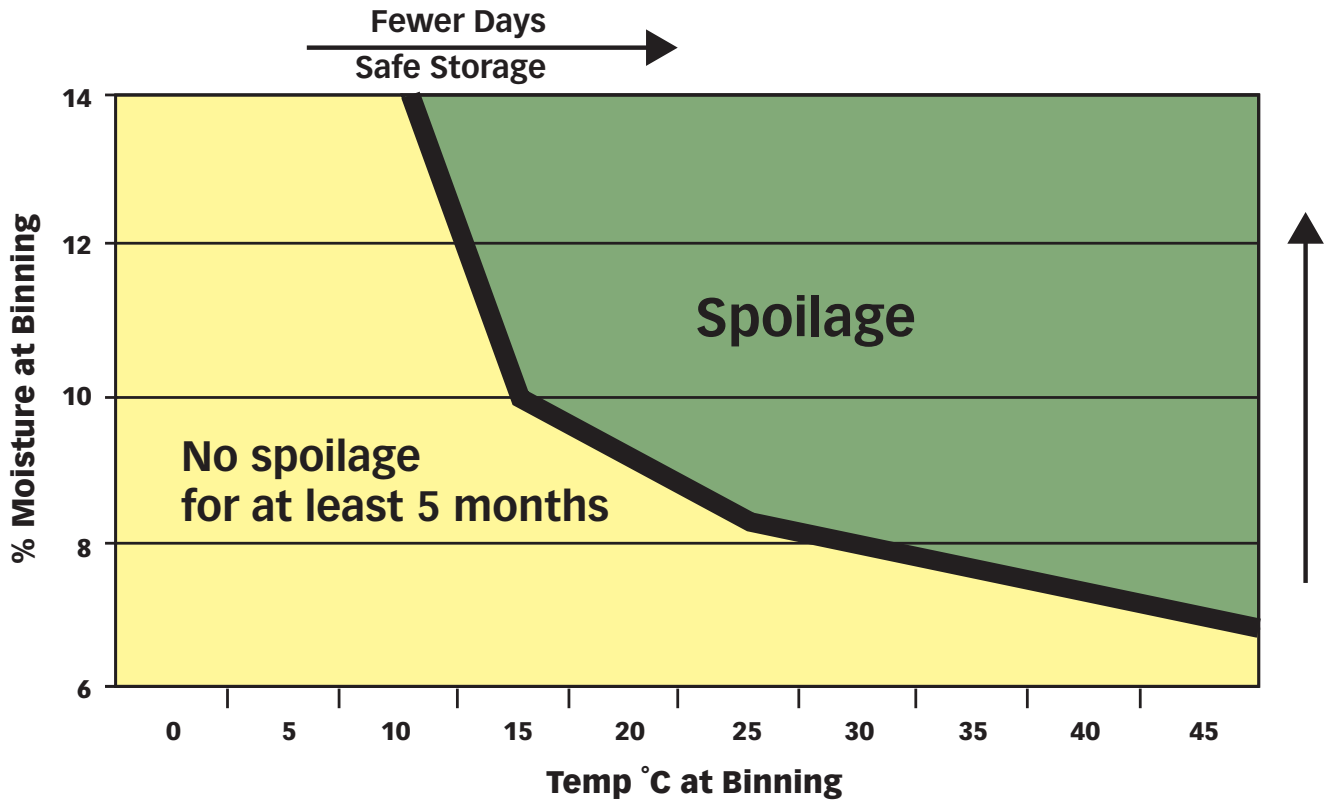


Figure 1: Factors that affect the risk of spoilage. Courtesy of the Canola Council; http://www.canolacouncil.org/canola-encyclopedia/storage-management/storage-of-canola/#seed-moisture

Management Tips for Maintaining Grain Quality:

Harvest at a reasonable moisture content. What is reasonable will depend on the crop and on your capacity for aeration and grain drying. For a later maturing crop like corn, the best option will often be to harvest at moistures between 20% and 27% and dry it from there, rather than trying to wait for it to dry to 15% in the field. For soybeans the optimal moisture for harvesting is between 13% and 15%. Above 18% beans are easily crushed or bruised, and below 13% splits and shattering losses increase. Canola can usually be harvested dry (below 10%) but aeration is still generally recommended to condition the grain for storage, especially if temperatures are high.

Don't overestimate aeration capacity. The cubic feet per minute (CFM) that your system can move through the bin and the temperature and humidity of the outside air will affect the speed of natural air drying and the equilibrium moisture content that can be achieved. The type of grain will also be a factor in the CFM of air movement. A smaller seed size like canola leaves smaller pore spaces in the grain creating more static pressure in the bin requiring larger fan horsepower to achieve similar air movement.

Know the recommended conditions for heated air drying. Crops vary in their sensitivity to high temperatures and movement during heated air drying. As an example, the high oil content of canola makes it more susceptible to "cooking" during heated air drying, so continuous flow or re-circulating batch dryers that keep the grain moving are favourable. Maximum temperatures recommended for drying of commercial grain are 82°C for tough and 71°C for damp (≥12.5%), and are reduced 11% if grain is not being continually mixed. Contrast this with soybeans where max air temperatures for commercial beans are 130°C to 140°C but dryers that recirculate or stir grain constantly are not ideal due to susceptibility of the beans to physical damage.

Finally, **monitor grain in storage regularly!** Temperature differentials between outside air and core grain temperatures can lead to moisture migration over time, allowing hot spots to develop. Properly anchored bin monitoring cables can help in larger structures where probing through access points is less likely to be effective. But nothing beats pulling a load or two out of the bin to check for temperature or odours that may signal the start of heating or spoilage!

Reference: http://www.canolacouncil.org/media/516634/canola_storage.pdf

Contact your Pioneer Hi-Bred sales representative

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Avonlea/Ogema (306) 868-7791

Biggar Grain Sampling
Biggar (306) 948-2953

Kun Ag Services
Bruno (306) 369-2728

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