



Inside the ZONE™



Frozen and Immature Corn for Silage

It is only realistic to conclude that frost or freezing damage will come into play this year for our corn crop. Some fields planted for grain may not reach adequate maturity, and growers may attempt to salvage these crops by harvesting for silage. Also, many late June or early July fields planted for silage may have little to no grain by the time a killing frost arrives.

When are corn plants frozen?

The impact of an early freezing event depends on stage of corn growth, low temperature reached, duration of the low temperature period, and other factors such as cloud cover, humidity and wind.

- Corn leaf tissue can be killed by a few hours near 0°C, at temperatures below -2.2°C, leaf tissue can be frozen in a few minutes.
- Temperatures below 0°C for several hours would likely kill all the leaves and some stalk material, stopping ear development.
- If only upper leaves are killed, leaves lower in the canopy will remain photosynthetically active.
- Leaf tissue damage will be evident in one to two days as a water-soaked appearance, which will eventually turn brown. It is best to wait five to seven days before making an assessment of percentage leaf damage for purposes of estimating yield reduction.

What can I expect for yield losses?

Potential yield loss due to a freeze event depends on the stage of development of the corn as well as the severity of the freeze event.

- When only the leaves are killed, grain yield will continue to increase 7-20% since the plant is still able to convert stalk sugars to kernel starch.
- When plants are killed and ear development is stopped, grain yield losses can be as high as 40-55% at the soft dough or early dent stages of maturity.
- Corn silage yield losses will be proportionate to grain yield loss since leaf and stalk dry matter accumulation is at its peak by the time grain development occurs. In the first ten days after a frost, up to 10% of the plant dry matter (DM) can be lost.

How fast will corn dry down?

Corn for Silage

- Corn frozen prior to dent stage or 1/2 milk stage, will have a moisture content too high for proper ensiling. These plants may look drier, but stalk and grain moisture remains high, even after a frost.
- Frozen corn will not dry down any faster than unfrozen corn. Expect typical whole plant drydown rates of 0.5% per day.

Corn for Grain

- If a hard freeze occurs that stops corn development prior to grain maturity, field drying rates may be reduced. For example, corn frosted as early as the dough stage may require four to nine extra days to reach the same harvest moisture as corn not frosted. Also, late season drying rates tend to be lower since average daytime temperatures are low.
- Grain quality is also affected by an early, killing freeze. Subsequent harvest, handling, drying and storage of lower quality grain requires extra care to prevent further quality reductions.

When do I harvest frozen corn as silage?

- Frozen corn fields need to be monitored for whole plant (WP) moisture content and harvested as soon as the plants are below 68-70% moisture, depending on the silo structure you are filling. There will be a trade-off between WP moisture, yield and quality as damaged leaves fall off the plant.

Testing for Whole Plant Moisture

- Test with a microwave, Koster tester or NIR—most of these methods tend to predict moisture lower than what comes out of a chopper. Add two to three points of moisture to your test result.
- Grab Test method (Hicks, Univ. of Minnesota) using a handful of chopped plant material squeezed as tightly as possible for 90 seconds.
 - 75-85% moisture if juice runs freely or shows between fingers
 - 70-75% moisture if ball holds its shape and hand is moist
 - 60-70% moisture if ball expands slowly and no dampness appears on the hand

- Corn silage that is excessively wet (>70%) will leach from the silo and may lead to undesirable fermentation characteristics, lowering forage quality.
- Where large plant maturity variability exists in a field, harvest when the majority of the plants are at the desired moisture content for ensiling.

What forage quality can I expect from frozen and immature corn?

- Immature corn with some grain development can be a good quality forage source for livestock. Whole plant digestibility is slightly reduced, fiber content is higher and crude protein content is higher. The starch content will be lower for immature silage, but sugar content of the stalks is higher.
- Corn that is vegetative and has not reached the grain formation stage will have moderately high NDF levels, high crude protein content. These silages are best suited for lower producing animals or dry cows and heifers.

Will immature or frozen corn ferment?

- Frozen and immature corn silage will generally have a higher than normal moisture content. This increases the risk of high DM loss (shrink) during fermentation, aerobic stability (heating) at feedout and lower feed value.
- Frost damaged corn will have higher than normal sugars. While most of the sugars are used in fermentation process to create lactic acid, residual sugars will remain in these silages. These sugars can lead to silage that is prone to aerobic stability problems at feedout, supplying the energy for yeast and mold growth.
- While high nitrates in frozen corn is possible, the process of fermentation will reduce nitrate levels by as much as 50%. Always test your stressed forages for nutrient content, nitrates and mycotoxins prior to feeding to animals.

What inoculant do I use?

- You can protect your immature, frost-damaged corn silage with the best available inoculant from DuPont Pioneer. Due to the high sugar content of immature corn silage, we recommend using an *L. buchneri* product such as Sila-Bac® brand inoculant 11C33 or 11CFT to prevent excessive DM loss (shrink) during the initial fermentation phase and during feedout when aerobic stability (heating) problems arise.
- High moisture grain and snaplage is also susceptible to aerobic stability (heating) issues due to the large number of yeast and mold organisms. Treat these high moisture grain products with Sila-Bac® brand inoculant 11B91 during ensiling for best success.



Preserve & Protect

Corn Silage			High-Moisture Grain, Earlage, Snaplage	
11CFT	11C33	1132	11B91	1189
Contains <i>L. buchneri</i>	Contains <i>L. buchneri</i>		Contains <i>L. buchneri</i>	
<ul style="list-style-type: none"> • Improves silage feeding consistency and quality by rapidly lowering pH during the early stage of fermentation. • Increases starch digestibility in high-moisture corn, snaplage or earlage which helps improve feed efficiency and rate of gain. • Products containing <i>L. buchneri</i> strains significantly enhance bunklife during feedout. • 11CFT improves fiber digestibility with an enzyme produced by a novel <i>L. buchneri</i> strain. This product makes an excellent choice when feeding high forage diets to dairy and beef cows, allowing for reduction in concentrate and protein supplementation, helping reduce total feed cost. 				

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