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water spouts

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Is Your Irrigation System Ready for Winter?

Fall is always a busy time of the year and sometimes it is easy to forget about getting the irrigation system ready for winter.

Here is a checklist to help you prepare your irrigation system for the coming winter.

- ❑ Pump out or drain any buried pipelines.
- ❑ Chlorinate the well.
- ❑ Plug all holes in electrical control boxes to keep out rodents.
- ❑ Check all motor openings to see if they are properly screened, again to keep out rodents.
- ❑ Drain water from pumps.
- ❑ Remove pump intake pipe from surface water sources.
- ❑ Check gearboxes on center pivot towers for water accumulation. Drain water and replace with oil.
- ❑ Remove and clean the end cap on the center pivot.
- ❑ Park the center pivot pointing in either a southeasterly or a northwesterly direction.
- ❑ Check the condition of the gaskets in portable aluminum or PVC pipes.
- ❑ Loosen the belts on belt-driven pumps.

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Harvesting High-Moisture Corn

The cool weather in June, plus the unusually cool weather in August, has placed corn maturity behind schedule. The cool weather has slowed corn maturity to the point that a normal frost date likely will produce a considerable amount of immature corn. An early frost date would increase the problem.

Frost damage before physiological maturity will affect corn in a number of ways. First, it will reduce yields, increase dockage because of harvest damage, lower test weight, reduce harvest efficiency because of wetter-than-normal corn and increase drying costs.

During corn harvest, wet kernels will be harder to thresh from wetter-than-normal cobs. The tougher shelling will cause more damage to kernels and more broken cobs, and increase the load on the cleaning sieves of the combine.

When kernel moisture content is above 30 percent, combine cylinder or rotor speeds above those recommended by the manufacturers will be needed to improve shelling efficiency. However, excessive threshing revolutions per minute are the main cause of kernel damage and cob breakup and lead to poor separation on the combine-cleaning shoe. It is best to keep cylinder or rotor speeds as low as possible to get the threshing done. It is usually best to first narrow concave spacing to increase threshing capability and then increase cylinder or rotor speed as a last resort. As the crop dries during the harvest season, reduce the cylinder speed as much as possible and when the cylinder speed has been reduced to the normal range, then widen the concave spacing as much as possible.

Corn harvest during "unusual" circumstances also will require an awareness of corn head adjustments. Immature corn may have smaller ears and stalks. To prevent ear loss and excessive shelling at the header, both the snapping rollers and stripper plates will need to be closer together for the smaller ears. The spacing between the stripper plates should be slightly wider at the back, usually by one-eighth to one-fourth inch. This helps move stalks between the snapping rollers while minimizing the amount of foreign material going through the combine. Corn producers also should maintain the correct forward speed on the gathering chain and snapping roller. Attempting to speed up because of low yields or to slow down because of lodged corn should not be done without an appropriate speed change to the corn head drive shaft.

A producer also may consider harvesting a corn/cob mix silage (sometimes called "earlage") if a buyer can be found. This would allow greater hauling distances as compared to whole-plant silage. The combine could be used with a high cylinder speed to break up the ears and crack the corn kernels. Usually combine manufacturers have these recommendations in their operator's manual. The sieves need to be removed from the combine to allow for flow of large cob pieces through the machine. This also would knock down the stalks so less snow would be collected in the field and a disc-type no-till drill could be used for seeding next spring.

If corn is immature at the first hard frost, a producer should consider chopping the crop for silage. Be sure to chop the plant at the correct moisture content to make good silage. Corn that is too wet or too dry will not make good silage. In those parts of the state with large corn acreage and low cattle numbers or long hauling distances, chopping for silage may not be economical. If a corn crop is so immature that it isn't worth running through a combine and silage is not an option, the field may best be worked down. Corn stalks can be chopped with a stalk chopper, but this would best be done after the stalks dry down. Chopping stalks and allowing them to over-winter should allow planting the next crop with a hoe-type air seeder without additional soil preparation. If a producer uses a disc-type no-till drill, leaving the stalks upright may be the best option. A grower should consider the extra snow standing stalks might collect, which may delay planting next spring.

Another method of destroying stalks is with a heavy tandem disc. This will cause soil disturbance and bury some stalks, but still will provide some cover on the soil to prevent erosion.

Producers also must consider the fertilizer value of the crop that is being destroyed. It should not be considered a total loss because of the fertilizer value to the soil. It will be difficult to determine the fertilizer value of a corn crop that has been incorporated into the soil until it decomposes during the next season, but a good portion of the decomposed residue will be available for next year's crop. Soil testing this fall or next spring will not give an indication of the crop's fertilizer value.

Chopping stalks or working a crop down is a last resort, but a producer must consider the cost of combining, drying and storage and the low value of a possible poor crop. A corn crop with low test weight is going to have little value except for livestock feed, and if a grower considers the cost of harvesting and drying, destroying a crop may be the best alternative.

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Nitrogen Contribution of Frosted Corn

Many cornfields north of North Dakota Highway 200 will be abandoned because of frost and the strong possibility that they will not mature. If the corn is cut and incorporated within the next few weeks, I would anticipate a contribution of nitrogen to next year's crop from a plowed-under nature-induced corn green manure crop of about 30 pounds of nitrogen per acre. This number comes from a study by John Lamb in Minnesota, where sugar beets followed sweet corn (an early harvested crop, harvested while the stalks and leaves are green), compared with normal field corn harvest. Certainly there is a lot of nitrogen in the plants, but there also is a large amount of carbon compounds in the plants. Therefore, additional breakdown of corn residue will be relatively slow and a higher amount of the nitrogen will be cycled into the soil as organic matter than will be released for general crop consumption next season.

In addition to the 30 pounds of nitrogen credit, it is likely that more nitrogen may become available late next season as decomposition continues. This likely will not be a factor in determining yield potential, but might have a role in either increasing or decreasing crop quality, depending on the crop seeded in 2005. Slow-release nitrogen can be beneficial to wheat because nitrogen release late next season can result in higher protein without risk of problems such as lodging. However, barley seeded after any of these plowed-under crops could be a problem. Late-season release or a particularly good residue nitrogen mineralization year could result in higher protein than the malting industry might accept. For that reason, choosing barley after an aborted corn crop would be a poor decision.

Another crop that I would be reluctant to seed following plowed-under corn, soybeans or dry beans would be sugar beets. Again, late-season nitrogen release would not be a benefit; it would be a liability with a possible reduction in sugar content and beet quality. Putting beets on small-grain ground that was harvested for grain or another harvested-for-grain crop would be a better plan.

A final recommendation would be delaying fall soil sampling after aborted crops until late in the fall. This usually is not a recommendation I would support following an early grain harvest. However, green manures are different than harvested grain residues, so a delay in soil testing for residual nitrate would be wise.

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Harvest and Storage Tips for Frozen or Late Maturing Corn

Corn frozen during the milk stage has a low yield potential. Ears are difficult to pick and shell, kernel tips may stay on the cobs, and grain will be very chaffy. Therefore, green chopping or ensiling whole plants may be the only reasonable harvest options. Corn silage should be harvested at 60 percent to 70 percent moisture. The length of cut should be about one-half inch long with not more than 10 percent to 15 percent being 1 inch or longer. A bunker or horizontal silo should be crowned in the center, have a wall slope from 1-to-6 (1 foot horizontal to 6 feet vertical) to 1-to-8, and be covered with 6-mil polyethylene. To be effective, the plastic must be held down over the entire area. Four days after the pile has been covered with the plastic, the temperature in the pile 2 feet below the surface should not be above 120 degrees Fahrenheit. If the temperature is greater than 120 degrees after four days, it indicates that excess air is getting into the silage.

For corn frozen in the dough stage, the test weights will be much less, probably 40 to 45 pounds per bushel. Although corn eventually will dry to an acceptable harvest moisture, it will take at least a week longer than mature grain. Ear molds likely will develop if warm ambient temperatures follow the frost. Mold growth can be stopped by drying the grain or ensiling.

Standing corn in the field may dry 0.75 to 1 percentage point per day during warm, dry fall days with a breeze. Normally about one-half percent per day is expected in North Dakota. Immature, frosted corn can mold on the stalk.

A hard freeze in the dent stage will result in shriveled kernels with lower test weight.

Shelled corn can be stored in a grain bin at moisture contents up to about 25 percent if it is kept below 30 degrees using aeration. Corn kernels above about 25 percent moisture may freeze into a clump that causes unloading problems.

Shelled corn should be at 25 percent to 30 percent moisture for anaerobic (without oxygen) high-moisture storage in silos or silo bags. Any tears in the plastic bag must be repaired promptly to minimize storage losses. Whole shelled corn can be stored in oxygen-limiting silos, but a medium grind is needed for proper packing in horizontal or conventional upright silos. Wet grain exerts more pressure on the silo than corn silage, so conventional concrete stave silos may require additional hoops or the silo must not be filled completely. Check with the silo manufacturers for their recommendations.

Grain dryers will operate more hours than usual, so examine them carefully and perform needed maintenance before harvest. Use the maximum allowable drying temperature in a high-temperature dryer to increase dryer capacity and energy efficiency. Be aware that high drying temperatures result in a lower final test weight and increased breakage susceptibility. In addition, as the drying time increases with high-moisture corn, it becomes more susceptible to browning. Use in-storage cooling instead of in-dryer cooling to reduce fuel use and boost the capacity of high-temperature dryers. Cooling corn slowly in a bin rather than in the high-temperature dryer also will reduce the potential for stress cracks in the kernels.

In-storage cooling requires a positive-pressure airflow rate of about 0.20 cubic feet per minute/bushel or 12 cfm/bu-hour of fill rate. Cooling should be started immediately when corn is placed in the bin from the dryer. Dryer capacity is increased 20 percent to 40 percent and about 1 percentage point of moisture is removed during corn cooling.

Dryeration will increase the dryer capacity about 50 percent to 75 percent and remove about 2 to 2.5 points of moisture. (0.25 percent for each 10 degrees the corn is cooled.) With dryeration, hot corn from the dryer is placed in a dryeration bin with a perforated floor, allowed to steep for four to six hours without airflow, cooled and then moved to a storage bin. There will be a tremendous amount of condensation during the steeping and cooling process, so the corn must be moved to a different bin for storage or spoilage will occur along the bin wall and on the top grain surface.

Natural air and low-temperature drying should be completed as much as possible in October because the drying capacity is extremely poor during the colder temperatures in November. Corn above 21 percent moisture should not be dried using natural air and low-temperature drying to minimize corn spoilage during drying. An airflow rate of 1.25 cfm/bu is recommended to reduce drying time. Adding heat does not work for drying wetter corn and only slightly increases drying speed. The primary effect of adding heat is to reduce the corn moisture content.

Energy cost for high-temperature drying corn will be about $0.016 per bushel per point of moisture removed using 70-cents-per-gallon propane, $0.020 for 90-cent propane, $0.025 for $1.10 propane and $0.029 for $1.30 propane. Total drying cost includes capital and fixed costs such as depreciation, repairs and insurance. This cost will vary depending on dryer cost and the amount of grain dried. This might be 10 cents to 15 cents per bushel. It costs about $8 for energy to remove 5 percentage points of moisture from 100 bushels of corn using 70-cent propane. This is equivalent to a field loss of 3.5 bushels if corn is $2.25 per bushel.

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Moisture shrink is the reduction in weight as the grain is dried 1 percentage point. Moisture Shrink Factor = 100 ÷ (100 – final moisture content). The shrink factor of drying corn to 15.5 percent is 1.1834. The shrink in drying corn from 20.5 to 15.5 would be 5 x 1.1834 = 5.92 percent.

Moisture meters will not provide accurate readings on corn coming from a high-temperature dryer. The error will vary depending on the amount of moisture removed and the drying temperature, but the meter reading may be about 2 percent lower than true moisture. Check the moisture of a sample, place the sample in a closed container for about 12 hours, and then check the moisture content again to determine the amount of error. Moisture meter errors increase as corn moisture contents increase, so readings above 25 percent should be considered only estimates.

Normally, corn test weight increases about 0.25 pound for each point of moisture removal during high-temperature drying. However, there will be little increase in test weight on immature or frost-damaged corn.

More fines are produced when corn is wet because more aggressive shelling is required, which causes more kernel cracking and breaking. There also is more potential for stress cracks in kernels during drying, which leads to more breakage potential during handling. In addition, immature corn contains more small and shriveled kernels. Fines cause storage problems because they spoil faster than whole kernels, they have high airflow resistance, and they accumulate in high concentrations under the fill hole unless a spreader or distributor is used. Preferably, the corn should be screen-cleaned before binning to remove fine material, cob pieces and broken kernels.

Immature corn has a shorter storage life than mature corn. Therefore, cooling the grain in storage to about 20 to 25 degrees for winter storage is more important than for mature corn. More frequent checking of the storage is recommended, and immature corn is not recommended for long-term storage.

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