

Wheat Science News

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Considerations for Managing Freeze Damaged Wheat and Alternative Plantings

WHEAT DAMAGE FROM COLD TEMPERATURES APRIL 6-9, 2007

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TEMPERATURE MEASUREMENTS

Minimum temperatures were taken inside of wheat canopies for the morning hours of April 6, 7, 8 and 9. The temperatures were taken at 1 inch above the ground and at 8 inches above the ground (head height). The official minimum reported air temperature taken 5 feet above the ground is also shown in the following table. The temperatures were taken in tilled and no-tilled wheat plantings and there was no difference in the measurements.

The temperatures were coldest at 8 inches above the ground. These temperatures are well below the 24 degrees and 28 degrees that would be expected to cause moderate to severe damage at the jointing (Feekes 6) and boot (Feekes 10) stages of growth, respectively. These temperatures likely will result in severe damage to the lower stems and the developing heads to wheat at the Feekes 6 stage of development or later.

Temperatures varied across the state and will also vary even within short distances. It would probably be a safe bet to expect the temperatures in your wheat field close to the ground to be at least 3 degrees and probably 5 degrees colder than the temperature reported at the weather station in your area.

Temperatures in Wheat Fields at Different Heights and Locations at Princeton, Ky on April 6-9, 2007				
	Temperature (F°)			
<u>Measurement Location</u>	<u>April 6</u>	<u>April 7</u>	<u>April 8</u>	<u>April 9</u>
1 inch above ground	30	24	18	22
8 inches above ground	24	20	16	18
Official air temp	31	25	19	26

"TYPICAL" FREEZE DAMAGE SYMPTOMS

It is usually difficult to get a definitive assessment of plant damage immediately after a freeze has occurred. By waiting 5-7 days after warmer temperatures have occurred for wheat growth to resume, a more definitive, visible damage assessment can be made between damaged and undamaged plant tissue.

Damaged stems will become progressively discolored, collapsed/flattened, rotting, splitting, and bent or lodged. A damaged wheat head will progressively lose its green color and become a pale white, cream or tan color, limp, dehydrated, and not developing in size. If severe damage has occurred, the above symptoms should become readily apparent in 5-10 days after the freeze.

OBSERVATIONS MADE ON APRIL 9

The recent freezing temperatures that occurred from April 6-9, 2007 have caused much concern regarding the extent of the damage to the wheat crop. Three basic conditions must be present for freeze damage to occur to the wheat crop. These are: 1) The wheat plant must be at a sensitive stage of growth (i.e. at least jointed); 2) Temperatures must drop to a certain critical level; and 3) The temperature must remain at the critical level for at least 2-3 hours. All of the above three criteria needed for freeze damage occurred during the period of April 6-9th. If wheat has jointed (Feekes stages 6-7), temperatures of 24°F or below for a period of 2 or more hours can kill the growing point and also cause stem damage.

We inspected wheat on the morning of April 9th, to determine what damage could be observed. There was obvious stem damage to wheat at Feekes stage 7 or later. The stems were very flacid, soft, and water soaked (indicating that the cells in the stem had ruptured). The growing point (developing wheat head) also seemed damaged. The developing wheat head also looked flacid and water soaked.

It was more difficult to assess if and to what extent damage had occurred on plants/tillers that were at Feekes stage 6. The stems seemed soft and flacid, but did not have the extensive water soaked appearance as plants/tillers that were at Feekes stage 7 or later. It was also more difficult to determine if and the extent of damage to the growing point (developing wheat head) at Feekes stage 6.

From initial observations made on April 9th to wheat plants/tillers at Feekes stage 7 or later, there appears to be very extensive stem damage which would result in large yield losses. It was more difficult to assess the extent of damage to plants/tillers at Feekes stage 6. A more definitive damage assessment could probably be made by waiting a few more days.

SUBSEQUENT PLANT DEVELOPMENT

If the plant heads or stems are severely damaged, then grain development for harvest will have to come mainly from small or newly formed tillers. This will reduce the yield and delay harvest, if the crop is kept. The yield reduction would be substantial. The amount of yield loss depends on many things and is only a guess but it could be 50% and possibly even more below the potential the crop had before the freeze. Successful tiller development depends in large part on the weather from this point through grain fill. In general, cooler temperatures will favor tiller and grain development, but this will also delay the maturity of the crop. Again, the added delay will vary and depends on several factors, but it could be as much as 7 to 14 days.

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NITROGEN DECISIONS

Lloyd Murdock—Extension Soils Specialist

Nitrogen availability is important to the plant in its recovery process from the freeze damage. The following guidelines may be helpful in making decisions on the use of Nitrogen during this process.

- 1) Nitrogen Uptake into the Wheat Plant Takes Place Mainly between Feekes 5 and Feekes 7.**
So most of the N was in the plant at the time of the freeze.

- 2) Wheat with little or no lower stem and head damage, but considerable leaf burn.**
In this case, the wheat needs nitrogen to be readily available to it for the regrowth of the leaves. If all the nitrogen has not been added, it should be added soon. The amount of nitrogen should be applied at the full recommended rate and sometimes an extra 10 to 15 lbs/ac. of N is helpful to the crop. If leaf burn is minimal, then the extra 10 to 15 lbs/ac. of N may not be needed.

- 3) Wheat with some lower stem and head damage, but still has a good yield potential.**
If nitrogen has not been added, it should be added soon at the full rate of recommended nitrogen. This would help recovery and the yield may be greater than the projected yield at this time. If all the nitrogen was added before the freeze, then an additional 30 to 40 lbs/ac of actual nitrogen would be needed to stimulate new growth and replace the nitrogen that will be released slowly.

- 4) Wheat with considerable lower stem and head damage.**
It would be questionable in most cases if this stand should be kept. If a farmer wants to gamble, nitrogen at the full rate could be applied soon to help recovery, realizing that this may be throwing good money after bad. If all the nitrogen was added before the freeze, then an additional 30 to 40 lbs/ac of actual nitrogen would be needed to stimulate new growth and replace the nitrogen that will be released slowly. The other possibility would be to delay any nitrogen application until a clear decision can be made on whether to keep the crop. The farmer may sacrifice yield because of a slower recovery, if the ultimate decision was to keep the wheat crop, but would reduce the economic risk of a bad decision.

- 5) Nitrogen applied to abandoned wheat for corn and soybeans.**

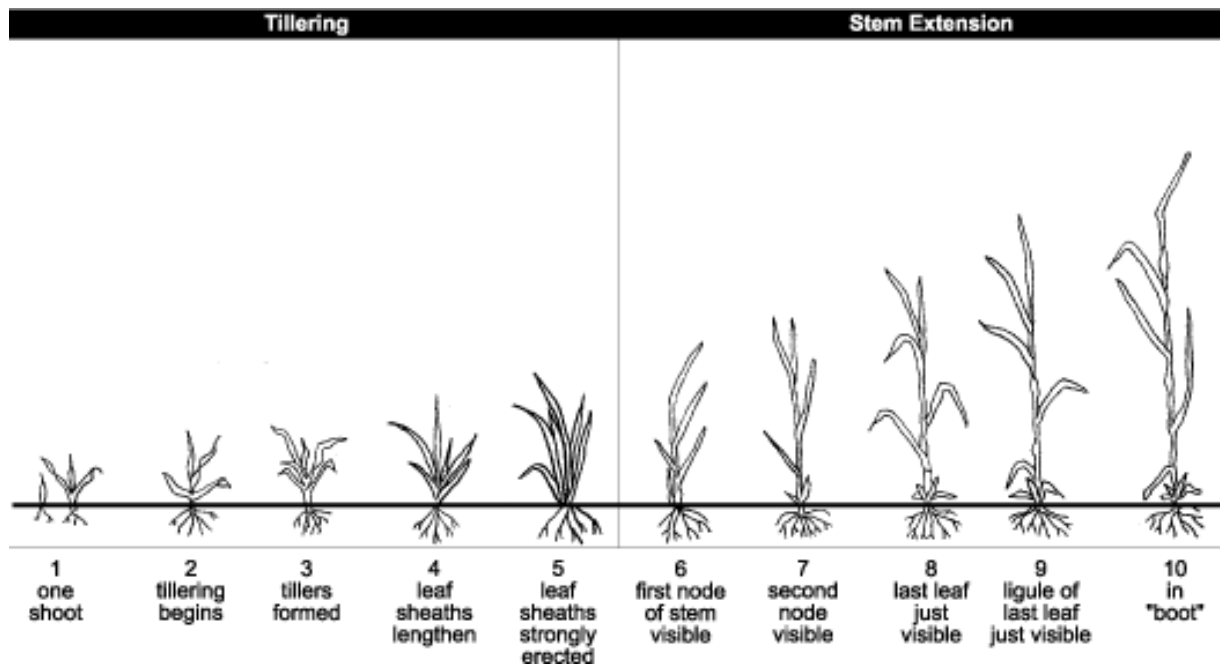
Corn:

Assuming there are no monsoon rain storms, one could possibly count on 50 percent of the N applied to the wheat to be available to the following corn crop. Most of this would be immediately available with some coming available with decomposition.

Soybeans:

Any nitrogen applied to the wheat should not be a consideration for the planting of soybeans. The soybean plant will compensate for any or no nitrogen previously added and it will have almost no effect on it except for a little faster growth the first 2 to 3 weeks after emergence.

Taken from: ID-125A Comprehensive Guide to Wheat Management in Kentucky
Figure 2-1. The Feekes scale of wheat development.



Corn and Soybean Planting Windows

Chad Lee and Jim Herbek—Extension Grain Crops Specialists

If a field of wheat must be destroyed, at least we are still in a good situation for planting corn or soybeans. Corn planting is recommended from April 1 to May 1 in central and western Kentucky. Corn planting in eastern Kentucky is recommended for April 15 to May 15. The first few weeks in April are ideal for far western Kentucky, but yield losses will be minor if corn is planted the last two weeks of April. Farmers in other regions of the state should be able to gain full yield potential from corn plantings.

The greatest challenge to planting corn will be finding seed, and the time to plant these acres in addition to your original planting intentions. Check the herbicide rotation restrictions and assume about 50% of the nitrogen applied to wheat will be available for corn.

Ideal soybean planting dates for full season soybeans begin at May 1 in the western half of the state and by May 10-15 in central and eastern Kentucky. Many producers had seed ordered for double crop soybean planting. They could use that same seed and plant earlier, as long as wheat herbicide labels allow it.

Notify County Office Losses due to Freezing Temperatures

Kentucky FSA Offices

Farmers have 15 days after the disaster occurrence to file a Notice of Loss under the current Noninsured Disaster Assistance Program (NAP) provisions. Producers who do not purchase NAP coverage should still file a Notice of Loss with the local County FSA Office.

If you have suffered a crop loss, please contact your local Farm Service Agency office for more information.

WHEAT CONTROL AND REPLANT OPTIONS

James R. Martin—Extension Weed Control Specialist

There are certain weed management decisions that will need to be made during the transition from damaged wheat to another crop.

The rotational-crop restrictions for herbicides applied to wheat are one of the first factors to consider. The issues will vary depending on the specific herbicide(s) used and when they were applied. The following table addresses rotational–crop restrictions of several wheat herbicides.

TABLE 1. ROTATIONAL INTERVALS BETWEEN APPLICATION OF WHEAT HERBICIDES AND PLANTING CORN, GRAIN SORGHUM, OR SOYBEANS.			
Wheat Herbicide	Rotational Crop Interval		
	Field Corn	Grain Sorghum	Soybean
Axial	120 days	120 days	120 days
2,4-D	7-14 days	3 months or until chemical has dissipated from soil.	7 - 30days
Buctril	30 days	30 days	30 days
Clarity	0 days May plant any time after application.	15 days	14 days Consult label for more details.
Finesse Grass & Broadleaf	Conduct field bioassay the following year.	Conduct field bioassay the following year.	9 months for STS soybean
Harmony Extra ¹	14 days	14 days	14 days
Harmony GT	0 days May plant any time after application.	0 days May plant any time after application.	0 days May plant any time after application.
Hoelon ²	*	*	*
Prowl	Not approved for the same year.	Not approved for the same year.	0 days May plant any time after application.
Osprey	12 months	10 months	90 days
Sencor	4 months	12 months	4 months
¹ Harmony Extra label was recently revised to allow a 14 - day interval for corn or soybeans ² No information available on Hoelon label			

Although wheat is damaged, it is not dead and will likely remain green and initiate new tillers. While these plants may not be as competitive relative to normal tillered wheat, they can compete for soil moisture and harbor voles and certain other pests. In order to control re-tillering wheat, it is desirable that plants have approximately 4 inches of actively growing vegetation in order to allow for optimum uptake of foliar-applied burndown herbicides such as glyphosate or paraquat. However, many of the damaged wheat tillers will not die back to allow for new tillers to emerge quickly.

The following are general comments on using paraquat and glyphosate for burndown treatments to control wheat for no-till plantings.

GLYPHOSATE:

- Since glyphosate is a translocated herbicide, a spray volume of 10 to 15 GPA may be adequate to achieve the desired spray coverage in most cases. Translocation of glyphosate from damaged tillers to newly developing tillers may be limited due to stem damage.
- Control is slow, particularly when temperatures are less than 50° F. Dead vegetation may degrade slowly. Because of the slow rate of control, problems with voles may be an issue.
- Addition of atrazine (for corn or grain sorghum) may reduce speed of control.
- The addition of dry Ammonium Sulfate at 1 to 2% by weight (8.5 to 17 lb/100 gal) or an equivalent amount of liquid AMS, may improve speed and level of control in such cases as when hard water is used as the carrier, or when tank mixing with certain herbicides.
- Rate ranging from 0.75 to 1.13 lb ae/A should be adequate for most cases. Consult label for rate of specific product.

PARAQUAT:

- Good spray coverage is important. A minimum spray volume in the range of 15 to 20 GPA will probably offer better control than a spray volume of 10 to 15 GPA. Spraying within the next few days will help control damaged tillers, but may not limit growth of newly developing tillers.
- Control may be erratic, particularly when wheat is in tillering stage.
- Plants decay rapidly. This may be an advantage where voles or certain insects are anticipated.
- Addition of atrazine at 1.5 to 2 lb ai/A (for corn or grain sorghum) often improves control, but rainfall within a few days after application is needed to ensure root uptake of the triazine herbicide.
- Rate ranging from 0.5 to 0.75 lb ai/A should be adequate for most cases. Consult label for rate of specific product.

A timely, but “somewhat” risky option would be to apply paraquat within the next few days to achieve rapid control of freeze - damaged tillers. Then plant Roundup Ready corn as soon as feasible and follow up with glyphosate to control any regrowth from newly developing tillers. Getting a good stand of corn in this environment can be challenging if voles or other pests are present before damaged tillers are completely dead.

It is likely that soil-residual or other foliar-applied herbicides will need to be included with glyphosate or paraquat depending on spectrum of weeds to be controlled. Consult labels for approved tank mixes.

For information related to insect problems when planting corn into destroyed wheat,
please refer to the next weekly issue of Ky Pest News at
<http://www.uky.edu/Ag/kpn/kpnhome.htm>

2007 University of Kentucky Wheat Field Day

May 15, 2007 8:30 - Noon (CDT)
University of Kentucky Research & Education Center
Princeton, KY

The topics presently scheduled may change due to the recent freeze damage which occurred.
If this happens, a notice with the new list of topics will be sent to you.

Registration starts at 8:30 am - Tours begin at 9:00 am

Welcome - Don Halcomb,
Board member of KySGGA & Wheat Producer

TOPICS:

- Wheat Variety Trials
Bill Bruening & Dave Van Sanford (40 minutes)
- Application Timing of Osprey and Nitrogen Fertilizer
Jim Martin & Charles Tutt (20 minutes)
- Uniform Eastern Winter Wheat Leaf & Glume Blotch Nursery
Don Hershman (20 minutes)
- Insecticide Seed Applied Treatment Study
Doug Johnson (20 minutes)
- Screening for Scab Resistance in Breeding Material
Nicki Mundell (20 minutes)
- Update on Automated Steering
Tim Strombaugh (20 minutes)
- N Fertilization of Wheat Using Polymer Coated Urea
Greg Schwab (20 minutes)
- Final Results of On - Farm No Tillage Trials
Lloyd Murdock & John Grove (20 minutes)

Lunch Provided by KY Small Grain Growers Association



CCA Credits Available:

**Pest Management 1.5
Crop Management 1.5**

Pesticide Credits Available:

**3 General hrs.
1 Category Specific hr
In 1a, 4, 10, 12, & 14**

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