

IPM NEWSLETTER

Update for Field Crops and Their Pests

No. 5

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Wheat Freeze Damage Update (Chris Main, Cotton and Small Grains Specialist)

It has been a busy week for wheat calls. All of Tennessee experienced record low temperatures sometime from April 5 thru April 10. Table 1 below indicates the actual temperatures for several locations from April 6 thru April 9. Record low data was not available for Fayetteville. All areas of the state received temperatures low enough to cause moderate to severe wheat loss during this period. In general for west Tennessee areas south of I-40 were less hard hit than areas to the north.

Table 1.

Location	Low Temperature				High Temperature				Record Low Set			
	4/6	4/7	4/8	4/9	4/6	4/7	4/8	4/9	4/6	4/7	4/8	4/9
Brownsville	30	25	21	33	47	42	51	56	N	Y	Y	N
Dyersburg	37	28	24	35	46	42	51	55	N	Y	Y	N
Fayetteville	32	24	23	33	46	41	48	53	NA	NA	NA	NA
Memphis	35	30	28	44	50	45	52	58	N	Y	Y	N
Paris	27	25	20	26	44	41	49	57	Y	Y	Y	Y

The most important thing to remember about our situation is to not rush your judgment. It may be over the weekend or as late as next (4/16-4/21) week before we can get an accurate assessment of the situation. I plan to make several field visits on 4/12 and 4/13 to get an early idea of the severity of the damage.



Figure 1. Varietal difference.



Figure 2. Beginning of lodging.



Figure 3. Flag leaf damage from the same field.



Figure 4. Head damage from freezing.

Assessing Wheat Damage. Wheat damage at different growth stages can vary to some extent. The following are some guidelines as to what to look for from our colleagues at **Texas A&M University**.

Jointing Stage. Leaves of freeze-injured plants show loss of chlorophyll, but the most serious injury occurs to the growing points. The growing points can be located by splitting stems longitudinally with a sharp blade. A normal, uninjured growing point is bright white to yellow-green and turgid; freeze injury causes it to become white or brown and water soaked in appearance. Growth of stems in which the growing points are injured stops immediately. A chlorotic or dead leaf may appear in the whorl, indicating that the growing point is dead. Growth from later uninjured tillers may obscure damage. Partial injury at this stage may cause a mixture of normal tillers and late tillers and result in uneven maturity and some decrease in grain yield. If plants are large and the stems collapse, small tillers can be killed due to

lack of light as larger tillers collapse on them. Stem injury does not appear to seriously interfere with ability of wheat plants to take up nutrients from the soil and translocate them to the developing grain. Lodging (falling over) of plants is the most serious problem following stem injury. Wind or hard rain can easily lodge the plants, decreasing grain yields and slowing harvest. With severe stem injury, splitting of stems and collapse of internodes is common.

Boot Stage. Freeze injury at this stage, when the heads are enclosed in the sheath or the flag leaves, causes a number of symptoms. Freezing may trap the head inside the boots so that they cannot emerge normally. When this happens, the heads will remain in the boots, split out the sides of the boots, or emerge base-first from the boots. Sometimes spikes emerge normally from the boot after freezing, but remain yellow or even white instead of their usual green color. When this happens, the heads have been killed.

Heading Stage. Symptoms of freeze injury at this stage are sterility, leaf desiccation or drying. Lesions on lower stems have symptoms that are similar to those at earlier growth stages. The most apparent symptom, however, is usually chlorosis or bleaching of the awns ("beard") so that they are white instead of the normal green color. Freezing temperatures that injure the awns will usually kill the male flower parts. A light green or white "frost ring" may encircle the stems one to two inches below the heads several days after exposure to freezing temperatures. This area of yellowed chlorotic tissue marks the juncture of the stems and the flag leaves at the time that the freeze occurred. The frost ring may be present on injured plants as well as on plants that show no other injury symptoms. It does not seem to interfere with movement of nutrients from the plant to the developing grain. As the plants

mature, the heads may break over at the frost ring. That is most likely to happen to heads that are well filled, particularly during windy conditions.

When freeze injury is only partial and alternate management practices might disrupt established rotation systems or when good alternate uses of crops are not available, then the best management practice might be patience. Except in the most severe cases, wheat that has been injured often produces yields that exceed harvesting and hauling costs. This might be offset somewhat by the possibility of lodging caused by lower stem damage. Lodged plants slow harvest and increases shattering losses. Grain produced by wheat injured after the flower stage frequently is of poorer quality than usual. Test weight may be low, kernels may be shriveled or discolored, and the grain may be a mixture of kernels of different sizes and maturities.

Hay or Ensilage. Producers should evaluate the field for total freeze loss before abandoning the crop. The degree of freeze injury varies greatly with elevation in a given field. In many cases, low lying areas in a field may have severe injury, while the upper end of the same field may have little apparent injury. Strategic use of a hot wire may allow a significant amount of grain harvest, while utilizing freeze injured wheat as forage. This requires careful scouting. If damage is wide spread enough that haying is the only option, producers need to harvest as soon as possible to retain the forage quality. Freeze damaged wheat degrades very rapidly. If adequate livestock are not available to utilize forage rapidly, haying may be a better option, if weather will allow. Cutting freeze-injured wheat for hay or ensilage may be the most economic and practical use if the feed is needed and equipment is available. The feed quality of hay or ensilage is good through the soft dough stage, and salvaging the crop this way gives it a use that it might not otherwise have. Moreover, it might be necessary to kill freeze-injured wheat plants so that they will not become weeds if the land is replanted to other crops. It is also usually desirable to remove the wheat vegetation instead of directly working it into the soil to prevent excessive soil moisture loss. The nitrate content of wheat used for hay or ensilage after freezing should be checked to avoid toxicity to livestock. Late freezing usually injures only certain parts of the wheat head and rarely kills the whole plant, plants may continue to absorb nitrate from the soil but do not have any developing grain to utilize the nitrogen. Nitrate might accumulate under those conditions and poison livestock unless the feed is diluted with adequate quantities of low-nitrate feed.

Reference: B. E. Warrick and T. D. Miller. Freeze Injury on Wheat. SCS-1999-15.
<http://lubbock.tamu.edu/othercrops/pdf/wheat/freezeinjuryonwheat.pdf>

Corn Update (Angela Thompson, Extension Corn and Soybean Specialist)

Freeze Damaged Corn. Prior to this week, I don't believe any of us ever experienced this much widespread freeze damage to corn. After checking several fields in west Tennessee and talking with folks across the state who have scouted fields this week, the amount of brown, melted corn is sobering (pictured right). With few exceptions, the living tissue above ground got hammered, along with stem tissue down to and below the soil line. Earlier this week, we could find live growing points with potential to recover, and the best advice I could give was to wait a few more days and check for regrowth. We expected much warmer temperatures (these



haven't materialized) and rain (luckily we got this!) which has caused mixed results. Some corn is trying to recover while a few fields now show high numbers of dead growing points and will need to be replanted. Fields that appear to be most vulnerable to stand loss are conventional tillage corn (including corn planted on beds and no-till where row cleaners were used heavily) particularly when seed were planted less than 1.5 inches deep. The residue cover of no-till may have slowed heat loss from the soil and contributed to a higher moisture content which may have insulated the growing point better. I am still concerned about early March planted corn because of its larger size at the time the freeze occurred. Larger corn utilized much of its seed energy for growth, meaning less energy is available now to help the plant regrow.

Well over 200,000 acres of corn were planted in March. It is still too early to guess how much may have to be replanted. We still need to give fields with healthy growing points and potential to recover another week to see what they will do. After new leaves become visible, we can get a better idea of stand quality and decide whether to salvage a lower population or replant.



What is An Acceptable Stand? As everyone knows, we have little replant corn seed available, and replanting large areas back to corn is not an option for us. This may mean keeping fields with less than optimal populations, lowering our yield expectations and managing for a lower yield potential crop. If you are a fortunate grower who planted half your corn in March and have seed left – use it to replant poor stands. For others, consider keeping any field with a uniform stand and a minimum of 20,000 plants per acre (this number is a judgment call depending on how high your yield expectations remain for this crop). Hybrids with a flex ear may perform better in lower population environments. It would be better to keep a uniform lower population of a solid performing hybrid than to try to replant with a poor quality replacement. To estimate stand, count emerged plants with one or more new leaves that appear to be unrolling normally.

Row Length Method Useful For Estimating Crop Population

For This Row Width (Inches)	Count Plants in This Row Length (equiv. to 1/1000 th of an acre)
20	26 ft 2 inches
30	17 ft 5 inches
36	14 ft 6 inches
38	13 ft 9 inches
40	13 ft 1 inch
Count stand in at least 5 representative locations in the field and multiply average number counted X 1000 for stand in thousands of plants per acre.	

Long Term Effect on Corn Crop. I don't think anybody knows the answer to this one. Common sense would tell us that we will be producing a crop with fewer total leaves following significant early season stress and there has to be some impact. This crop will need to be protected from further stress

by providing adequate fertility, timely weed control and hopefully Mother Nature will send the rain. From everything that I have read, the smaller the corn at time of freeze the less likely there will be a yield impact later on. Right now, I just want to see corn out of the ground again and we can ponder this more as the season progresses.

Herbicide Considerations for Replanting Frozen Wheat (Larry Steckel, Assistant Professor)

It appears now that the freeze has destroyed at least some wheat fields. The question is now what crop should I replant these fields to and what herbicides should I use before replanting. The first consideration before replanting is to burndown what wheat is remaining. I have seen freeze damaged wheat before and shortly after lodging it will retille. If the field will be planted to corn then atrazine + Gramoxone Inteon or glyphosate will destroy what is left of the wheat. If the field is to be planted to cotton or soybeans then glyphosate would be a good option though control could be spotty due to poor coverage from dead foliage. A follow up application of Gramoxone Inteon maybe needed in some cases.

Recrop Intervals for Common Wheat Herbicides

<u>Herbicide</u>	<u>Grain Sorghum</u>	<u>Corn</u>	<u>Cotton</u>	<u>Soybean</u>
Express	14 days	14 days	14 days	14 days
Harmony Extra XP	14 days	14 days	14 days	14 days
Harmony GT	0 days	0 days	7 days	0 days
Osprey	10 months	12 months	90 days	90 days
Axial	120 days	120 days	120 days	120 days

Forage, Feed and Grazing Restrictions for Common Wheat Herbicides

<u>Herbicide</u>	<u>Days</u>
Express	Do not forage or feed
Harmony Extra XP	Do not forage or feed
Harmony GT	Do not forage or feed
Osprey	45
Axial	50

Corn Weed Control After the Freeze: What Now? Many this next week will be assessing how well the corn is recovering from last weekends freeze. A few early reports from some of the northern Tennessee counties is that at least some of the conventional till corn fields may have lost enough stand to the freeze that they will need to be replanted. In some cases all the corn stand may have been lost to the freeze, in others just a part of the stand. In the case where some of the first planting remains it will have to be taken out now or it will be a weed to the new planting. An application of Roundup will provide good control of the corn that survived the freeze. In Roundup Ready corn the answer is not as easy. Dr. Thompson has conducted some research and found that Gramoxone Inteon at 40 to 48 oz/A and metribuzin at 3 oz/A, or 0.5 lb of Lorox has provided 95% control of Roundup Ready corn. Another option that did not work quite as well is to substitute 1 lb of atrazine for the metribuzin or Lorox. Both metribuzin and Lorox are in short supply. Atrazine maybe the only option one can obtain on short notice.

Soybean Fungicide Seed Treatments for 2007 (Melvin Newman, Professor)

Several plant pathogenic fungi attack soybeans in the early seedling stages of growth VE to V4. In wet, cool soil *Phytophthora sojae*, *Pythium spp.* and *Rhizoctonia solani* can be very destructive to seed and seedlings. Symptoms of *Phytophthora* and *Pythium* infection may include soft decay of the seed, missing seedlings in the row, chlorotic and wilting leaves followed by necrosis with leaves remaining attached. *Rhizoctonia* may cause reddish-brown lesions on the taproot, hypocotyls and lower stems, wilting and death of the leaves and stunting of the whole plant.

Some soybean varieties may have full or partially resistance to *Phytophthora* and that may help, but there are many races of this fungus. There is no research available in Tennessee on resistance to *Phytophthora*. So, fungicide seed treatments are important. Especially useful are the products with the fungicides metalaxyl or mefenoxam (apron) as a premix with other fungicides (see table below).

It is recommended that all soybean seed be treated with a fungicide for best yields, especially when planting early into no-till or into killed wheat debris. Follow recommended rates stated on the labels. But remember that treated seed can not be sold for feed or food. So, treat only enough for planting purposes for this year.

Examples of Fungicide Seed Treatments

<u>Active Ingredient</u>	<u>Trade names (company)</u>
Azoxystrobin + <i>metalaxyl</i>	SoyGard (Gustafson LLC)
Carboxin + PCNB + <i>metalaxyl</i>	Prevail (Trace Chemicals LLC)
Carboxin + thiram + <i>metalaxyl</i>	Stiletto (Trace Chemicals LLC) Stiletto-Moly (Trace Chemicals)
Chloroneb + <i>metalaxyl</i>	Delta-Coat AD (Agrilience) Catapult XL (Agrisolutions) Nu-Flow AD (Wilbur-Ellis)
<i>Mefenoxam</i> + fludioxonil	ApronMAXX RTA (Syngenta) ApronMAXX RTA + Moly (Syn.)
PCNB + <i>metalaxyl</i> + <i>Bacillus subtilis</i> GB03	System 3 Seed Treatment (Helena)
Thiram + <i>metalaxyl</i>	Protector-L-Allegiance (Trace Chemicals LLC)

Insect Issues (Scott Stewart, IPM Specialist)

Wheat. Insect issues in wheat are not a consideration given the current status of the crop. It is almost impossible to justify spraying insecticide or fungicide on wheat at this time. Fortunately, we did not have the widespread greenbug problem that forced us to spray many acres prior to the freeze.

Corn. There have been no significant insect problems reported, but a few calls were coming in about cutworms before the freeze. The truth - the recent freeze acted very much like cutworms, destroying the above ground vegetation. The difference is that cutworms will have likely survived the cold

weather, and if present, would continue to cause damage even to larger plants, potentially killing the growing point (and sometimes feeding below ground, killing the growing point before it has emerged). Corn plants are essentially starting back at ground zero, and there is still a threat that cutworms or other insects can reduce stands as the plants re-emerge. Some of the corn has been planted for several weeks, and thus, pyrethroid applications for cutworms were also made some time ago. Most fields have been devoid of vegetation for several weeks, with the exception of emerging corn plants. But it is possible cutworms had a start on this small corn and are still present and waiting to attack seedling plants as the recover from the freeze. It is important to scout emerging and re-emerging corn for cutworms. However, I don't think it will be necessary to re-spray cutworms in the vast majority of fields. The effectiveness of seed treatments has also diminished over time. The cold weather gives insects a longer opportunity to feed. The good news - if corn was already up to a healthy stand before the freeze, you already a good indication that soil insects were not a major problem.

Soybean. I wanted to make a quick comment about insecticide seed treatments in soybean. The standard options and rates are thiamethoxam (Cruiser 5F at 1.28 oz /100 lb seed, CruiserMaxx at 3 oz/100 lb seed) and imidacloprid (Gaucho 600 at 1.6 oz/100 lb seed). Both treatments will control or suppress several early season pests including thrips, bean leaf beetle, grape colaspis, seedcorn maggots, white grubs and three cornered alfalfa hoppers. CruiserMaxx also contains fungicidal seed treatments. The data from Tennessee has not shown a consistent yield response to insecticidal seed treatments in soybean. Although data from nearby states such as Arkansas and Mississippi has been somewhat more encouraging, we have observed less than a one bushel increase in yield when averaged across many tests and locations in Tennessee. However, there are a couple of instances of a 3-5 bushel positive response. A more consistent response has been observed when planting early (before May 10th). I would encourage you to try an insecticidal seed treatment on early planted beans, but I think it is jumping the gun to go hog wild.

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