FOCUS on South Plains Agriculture

Texas AgriLife Research and Extension Center at Lubbock
1102 E. FM 1294, Lubbock, Texas 79403

Wheat Freeze Injury

This update summarizes several issues regarding the current level of injury in the Texas South Plains regarding the freeze of March 27-28. Fields further to the north in the Amarillo region were not as far along and/or had more snow cover that insulated the wheat. In addition, many counties across the northern South Plains recorded lows down to 22 F on Monday, April 6, which might require another round of wheat freeze injury assessment, particularly for wheat that is further along.

If you need assistance in assessing wheat freeze injury in your crop contact your local county Extension office.

Upcoming meetings for assessing wheat freeze damage

Producers can bring their whole plant samples for freeze injury assessment to the following meetings. A few local fields will also be visited.

Monday, April 13, 8:30 AM, **Dimmitt**, meet in the parking lot of Subway sandwich shop, north U.S. 385 (further info., Castro Co. Extension office, 806.647.4115)

Monday, April 13, 11:00 AM, **Olton**, meet at Olton Grain Co-op on U.S. 70 (further info., Lamb Co. Extension, 806.385.4222 or Hale Co. Extension, 806.291.5267)

County Extension staff in **Bailey** (806.272.4584) and **Parmer** Counties (806.481.3619) have indicated they may schedule a crop injury assessment meeting the middle or late next week.

AgriLIFE EXTENSION
Texas A&M System

The information you need to have on hand

For help in assessing freeze injury in wheat obtain a copy of:

1) Freeze Injury on Wheat
2) Growth Stages of Wheat also may be helpful to understanding the general stages of growth

Copies are available through your local county Extension office.

The original cold weather that caused the freeze injury potential

After cold temperatures occur wheat needs to resume growth for up to a week or more to accurately examine the condition of the growing point, the floral parts, etc. for injury. In general, the temperatures below are regarded has having significant potential freeze damage on wheat if the duration is 2 hours or more. Air temperature, however, is usually cooler by a couple of degrees than in the canopy:

Jointing, 20-24 F
Boot stage, 28 F
Heading, 30 F
Flowering, the most sensitive stage, 32 F

We were certainly cold enough to have concerns. Here are some March 27 lows in the region: Plains, 22 F; Lamesa, 27 F; Lubbock, 22 F; Lockney, 22 F; Halfway, 21 F; Dimmitt, 18 F; Farwell, 18 F. Temperatures were below 28 for all of these stations except Lamesa for anywhere from 10 to 28 hours. Saturday morning, March 28 temperatures, were even below Friday lows at Dimmitt, Farwell, Lamesa (25 F).

As we learned in 2007, conditions for freeze injury don't always affect the plant the way we expect. In 2007 we had temperatures in the 20s for over 24 hours in some cases, but did not have the injury we feared. This year is different in part because the stage of growth is earlier, and we are looking at different parts of plant for indications of injury.

Early symptoms of injury on freeze damaged wheat (week of March 30-April 3)

Initial symptoms from several fields particularly in Lubbock and Hale Counties in the days after the freeze were broken stems at the node. Since then collapsed stems in many cases have become evident in the wheat. Across the region, however, foliage was burned back on the tops of plants, but this is more serious if it hits the flag leaf which can contribute 2/3 to 3/4 of the photosynthate to make grain. In general flag leaves were emerged only south of Lubbock, but in that region we are not seeing significant damage to stems or heads.

"It is never as bad as it appears"

Before we discuss the specifics of wheat freeze injury that we are currently seeing, this comment is from Extension agronomist Brent Bean, Amarillo, who has examined wheat freeze injury over two decade. In his experience wheat will almost always yield more grain after a freeze that what you think it will. Other tillers will compensate a lot plus new tillers will usually be added, especially this early in the season (though this is less likely the further south you are). Dr. Bean notes that he is always conservative in recommending that a wheat field be abandoned this early in the year.

Stems and Immature Heads

Current injury assessment in wheat includes observing lower stems. You may need to pull the leaf sheath off of the stem to see lower stems well. We want to look for stems that have collapsed, they often feel spongy or like a rubber worm, and particularly note if they are turning tan or brown. By now many of these stems that have discolored are starting to rot and the stem will die. Other stems that are discolored may not necessarily die as they can still translocate moisture and nutrients to the stem and still contribute to yield potential.

Stem on right is collapsed and bleached out below node and may die

Stem at bottom is collapsed and is turning tan and brown and shows indication of rotting and dying

Two stems in center are turning brown between stems and may die. Above is a small head healthy head (light green) on a different stem

For a wheat grain crop often the all-important question is the condition of the head. Our wheat freeze injury literature suggests that if the foliage is damaged then there is likelihood (even highly so) that the growing point is damaged. However, that growing point with the developing head may still have been far down in the canopy. Too, it is the WIND and its powers of desiccation that made some of this foliage look so bad. Early evidence of problems with the

growing point and developing head will be a tan or brown head which means the growing point is dead and the tiller and stem will grow no more (Figs. 5-7 in 'Freeze Injury on Wheat'). This takes time to slice the stem lengthwise with a razor blade to find the head, which might be hard to find on a small tiller, but perhaps ¼" on some heads, and up to 2" for wheat that is about to head out. Earlier wheat in the Lubbock area with larger heads is demonstrating a bleached water soaked appearance in some cases, and the heads look limp when you take them out of the leaf sheaths.

Small head about ¼" long that has changed from light green (healthy) to light tan, indicating the head and the growing point below it are dead

Larger head about 5/8" long that has died and is becoming tan to brown in appearance

Compensation of potential yield losses by other tillers and healthy heads

It takes patience to assess a wheat field for injury potential. Fields that might have 40% loss of stems and/or heads might have only a 20-25% loss in yield because as some tillers die or heads fail to develop 1) more water and nutrients are available for the remaining heads to grow, and 2) smaller tillers will now exhibit more growth and make a greater contribution to yield potential. Again, recall Brent Bean's comments above. It may be hard to trust a questionable wheat crop to still yield well, but experience shows it can do that. If you have a field with 70-90% damaged stems and tillers then the decision is much easier.

Is haying an option for freeze damaged wheat, or should I just terminate the crop and plant something else?

First, yes, haying is an option. Prices appear attractive for high quality wheat hay (see below). Remember if the head is dead in all likelihood so is the growing point. This means that tiller is history. It may stay green for awhile, but

it is eventually going to die. If a producer wants to hay the wheat then I would wait until the majority of the live tillers reach the boot or even early heading stage to maximize the yield. True, the damaged tillers will loose some of their quality but their dry matter will still add to the tonnage. And unless the farmer is getting paid on quality then tonnage is what is important. All the while, younger smaller tillers are going to compensate for the forage yield just like I noted above for grain.

The wheat should still be relatively good quality. Some farmers, however, may prefer to cut the wheat by May 1 to allow more time to prepare for planting cotton afterwards. The wheat stubble at the cutting height should still offer some protection from blowing sand and maybe wind. If water is not limiting, then current wheat stands especially if planting was not late, could readily yield 2 tons of dry matter by the end of the month.

Finally, if grain yield potential truly appears greatly reduced, killing the wheat with glyphosate for cotton cover crop protection could be very expensive cover especially if you have good growth already. You may wish to re-consider terminating stands and eating the cost you already have invested in your wheat crop.

Wheat hay pricing

The Weekly Texas Hay Report published by USDA/Texas Dept. of Agriculture out of Amarillo, noted its first wheat hay price quote on April 10 at $130-135/ton for 'good quality' delivered. No note was given on the stage of growth (which indicates relative quality). View the weekly newsletter, published on Friday's, at http://www.ams.usda.gov/mnreports/am_gr310.txt Local Extension staff prior to this week's report agreed that wheat hay certainly could be worth up to $100/ton.

Selected county reports

Southeast Counties: CEAs report little wheat was in good condition, and that the drought was driving wheat forward so some wheat is already headed. I didn't see any fields down there yesterday that grain production would still be expected.

Lynn and Dawson Counties: No reports of damage at this point though some injury might become evident for some wheat in the Lamesa area if the wheat was booted. Temperatures, however, might have remained high enough to minimize concerns.

Gaines County: Samples collected by Extension IPM agent Manda Catteneo on April 6 showed minimal if any damage on wheat. Samples of rye that were already headed out showed significant damage on heads where spikelets and whole heads were bleached out meaning tissue death and no seed production on those heads.

Lubbock and Floyd County areas: Early reports were major damage on some fields, mostly the breaking of stems at the node and collapsed stems within the internode (between nodes). Other stems had a 'collapsed' appearance between the nodes (note this in the section on 'Jointing Stage,' p. 5, in the Freeze Injury on Wheat guide sent Monday morning). These stems can still translocate water and nutrients so they may be OK. See more comments below on this condition below in the Hale section.

Most of the flag leaves in the fields sampled appear to be OK though some of the foliage was singed with cold (crisped) and was dead. A field in **Terry County**, I am told., lost nearly all flag leaves, and this could represent significant potential for yield reduction, forcing lower leaves to make up the difference as a healthy flag leave is responsible for 2/3 to 3/4 of the energy, carbohydrate, etc. that makes the grain.

More recent reports in Lubbock (4/9) do indicate some fields may have ~50% stem and head damage.

Hale & Lamb County areas: Most info. here from a crop consultant who has some fields, different varieties, in which he estimates as much as 70% broken or collapsed stems. He asked about haying these tests. My guess is that I wouldn't think of haying anything at this point because 1) undamaged stems, 2) those stems that can still keep growing, and 3) the compensation other stems and smaller tillers can offer can still produce that mass of growth for tonnage that you want in a small grains hay crop. I would be cautious to watch the collapsed stems, and we will expect that a few of them along with the broken stems will start to dry out. If most of the stems in the field appear damaged and the stems and leaves appear starting to dry out, then we think hay crop and soon.

From Hale, fields 5-14" tall, April 6. For the taller wheat we saw few broken stems, but many stems, over 50% in a couple of cases that were truly collapsed. The lower stem felt like a soft rubber worm. In several plants where we split the stem, we found the head was tan or brown in about 10-20% of cases. That means the head is dead, and will not produce grain. Other heads can compensate for this to some extent, but this is not good. My feeling is that heads and fields in this case need to about Monday April 13 or so then farmers are going to start assessing on what to do with the stand.

Several triticale fields in the have been hurt severely and much of the field is dead and has fallen down. These fields should be cut for forage soon.

Parmer and Bailey Counties: Extension IPM agent Monti Vandiver has been tracking numerous wheat fields with repeat visits. Late planted wheat due to delayed growth is in better shape, however, Monti reports that over 50% of stems and heads are damaged in numerous fields. Early reports suggest these two counties might have the highest potential for reduction in grain yield potential. CT

FOCUS on South Plains Agriculture

Fair use policy

We do not mind if others use the information in FOCUS for their own purposes, but please give the appropriate credit to FOCUS on South Plains Agriculture when you do. Images may or may not be copyrighted by the photographer or an institution. They may not be reproduced without permission. Call 806-746-6101 to determine the copyright status of images.

Editors

David Kerns and Patrick Porter, Co-editors

SEND US A COMMENT BY E-MAIL

Contributing Authors

Calvin Trostle, Extension Agronomist

Useful Web Links

Applied Research Reports (Goldmine)

Texas High Plains ET Network

Irrigation at Lubbock

IPM How-To Videos

Lubbock Center Homepage

Texas Agricultural Experiment Station Home

Texas Cooperative Extension Home

Plains Cotton Growers

County IPM Newsletters

Castro/Lamb

Dawson/Lynn

Crosby/Floyd

Gaines

Hale/Swisher

Hockley/Cochran

Lubbock

Moore

Nolan/Scurry/Mitchell/Jones

Parmer/Bailey

Terry/Yoakum

AgriLIFE EXTENSION
Texas A&M System

AgriLIFE RESEARCH
Texas A&M System