WHEAT PRODUCTION NEWSLETTER

Oklahoma State University Small Grains Extension
www.wheat.okstate.edu

November 27, 2006
Volume 3, Issue 5

Winter arrives in Oklahoma!

By Jeff Edwards
OSU Small Grains Extension Specialist

At the time of writing this article, it appears that winter will soon be upon the state of Oklahoma. Temperatures are expected to dip into the teens in northwestern Oklahoma, which is quite a contrast to record highs near 80 ^{0}F experienced over the weekend. So, the question of the day is *what effect will this have on wheat?*

In my experience, wheat freeze damage occurs most often from cold temperatures followed by a brief warm up and then cold temperatures again, as opposed to a rapid cool down in the fall. Therefore, wheat with 2-3 good tillers and adequate growth will likely escape the freeze with little long-term effect on yield. Damage will largely be cosmetic and short-term in nature and we should see recovery begin.

Rain, snow, and even ice will be be best friends of small, drought stressed wheat, as any of these will act as insulation for the crown and root system of the plant. It looks as though we may get the needed precipitation, albeit in the form of ice. If the growing point of the plant and the root system remain insulated, we will probably dodge the bullet this time. Another issue, however, will be the ability of these plants to regrow damaged aboveground tissue after they have already used most of their reserves to germinate and survive until this point.

All in all, I believe the Oklahoma wheat crop will weather this cold snap okay and my greatest concern is still the ongoing drought and its effects on our wheat production. For those of you who are more interested in the "why" of things, I am including the following paragraphs from an article that I wrote last December on this same subject.

What causes winterkill?

One of the best references I could find on this subject was an Agronomy Journal article written by Kansas State University professor S.C. Salmon in 1917. Dr. Salmon proposed that probable causes for winterkill could easily be divided into four groupings 1.) heaving from freeze/thaw action of the soil, 2.) smothering from standing water or heavy snow, 3.) physiological drought, and 4.) direct effect of low temperature on plant tissue and protoplasm. Due to our lack of soil moisture and snow cover, any winterkill resulting from the recent cold temperatures will likely be categorized under groups 3 or 4. Therefore, let's discuss these topics further.

Cold weather and drought stress

Just as the low humidity and cold temperatures increase the evaporative demand on your skin and cause dry skin, these environmental conditions also increase the evaporative demand of the plants. When

extremely cold conditions occur, the increased evaporative demand can be accompanied by the freezing of plant-available water in the rooting zone and freezing of plant xylary tissue.

This situation would be comparable to the water pipes in your house freezing (xylary tissue) at the same time as your well freezing up (plant-available soil moisture). When the weather warms back up, your aboveground plumbing may thaw, but that does little good if your below-ground plumbing doesn't thaw or is damaged beyond repair.

The plant is still intercepting light

Without getting too technical, it is important to remember that the plant is still intercepting light during cold temperatures, and this light is still providing the energy requirements for photosynthesis. The problem here is that if plants are drought stressed, then plant stomata are likely closed and carbon dioxide is not entering the plant. So, there is a lot of energy available, but nowhere to use it. This is a bad situation for the plant tissue and can result in severe damage or tissue death.

Drought stress may not be all bad

The higher the concentration of solutes in the plant cells, the lower the freezing temperature of the cell's protoplasm or "fluid contents". If we have mild to moderate drought then sugars produced during photosynthesis and other solutes have less fluid to be contained in within the plant. Think of this in terms of antifreeze in your car radiator. Antifreeze works because the solutes contained within the antifreeze lower its freezing point below that of water. If you have a higher ratio of antifreeze to water in your car's radiator, the freezing point will be lowered (i.e. you will be better protected against low temperatures). Finally, it has been shown that a small degree of drought stress improves plant hardening off and can be equivalent to temperature-based hardening off.

Damage vs. recovery

Even though aboveground plant tissue may be destroyed, this does not mean that the plant is dead. I have personally witnessed complete tissue desiccation of wheat plants, followed by complete recovery with minimal yield impact. Environmental conditions must be favorable for this to happen, though, and sufficient root reserves of carbohydrates must exist for the plant to be able to regenerate the aboveground tissue. For small wheat that has little aboveground growth, seed reserves will likely have to be the source of carbohydrate reserves for re-growth, so larger seed of good vigor would be beneficial in this situation. You may think of the ability to regenerate plant tissue after a freeze as being comparable to deep pockets in a farming operation and how sufficient financial reserves affect the ability to recover from a bad crop year.

Wait and see

This may seem like a way of avoiding the question, but the best recommendation right now is to wait and see. There are likely no critical decisions regarding your wheat crop that must be made at this time. It is likely that we will be able to fully assess the extent of winterkill prior to having to pull the trigger on top-dress nitrogen and other crop inputs. I am wagering that the majority of our wheat that had a good root system survived the recent cold snaps with little damage. My bigger concern right now is the overall lack of moisture, but that is another article.

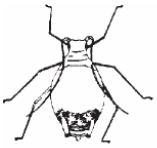
Greenbug scouting made easy!

By Tom Royer
OSU Extension Entomologist

Get your own copy of the Greenbug Expert System CD, and the laminated set of Glance 'n Go forms for greenbugs in winter wheat. The Glance n' Go scouting forms were updated last year so that a field scout can assess the activity of the parasitic wasp when making a decision to treat or not treat a field for greenbugs.

Mummy (Parasite)
Tan, bloated body

The Greenbug Expert System, a computer program that was developed by the USDA-ARS, SST Technologies, and OSU has also been extensively revised and is available as a CD, or can be accessed at http://entoplp.okstate.edu/gbweb/index.htm



Bird Cherry-Oat Aphid
Olive-green with red patch on back of body

Updates for the Expert System include:

- Revision of the pesticides registered for use in wheat in the Pesticide Selector.
- Changes in the Greenbug calculator that suggest using a threshold of **1 greenbug per plant for seedling wheat.**
- A set of revised Glance 'n Go sampling forms.

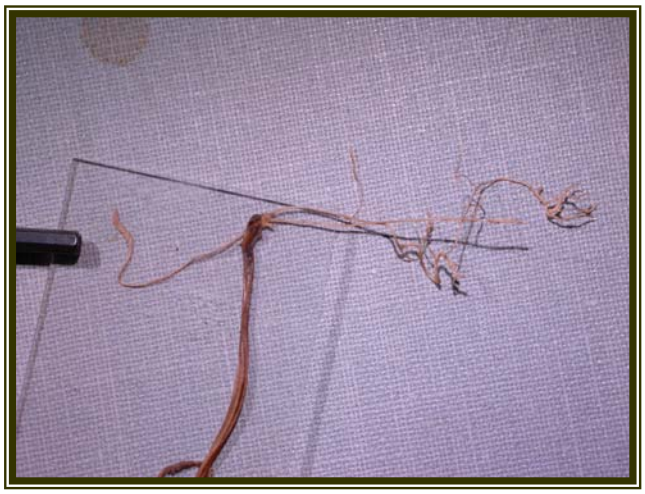
Greenbug
Green with dark stripe down back

Either of these products can be obtained by contacting your County Extension Agricultural Educator, or requesting a copy via my e-mail address: rtom@okstate.edu. Include your name, mailing address and phone number with your request. If you have any questions about using Glance 'n Go or the Expert System, check out the following OSU Current Report: **CR 7191**, *The Cereal Aphid Expert System and Glance 'n Go Sampling for Greenbugs: Questions and Answers* which can be accessed at http://entoplp.okstate.edu/gbweb/index.htm

Wheat disease update

By Bob Hunger
OSU Extension Plant Pathologist

Reports of wheat diseases were mostly lacking in September and most of October, but over the last couple of weeks there have been a couple of reports in which you may be interested including seedling root rots (and possibly nematodes), and leaf rust.



Wheat leaf rust: Although I have not noticed any leaf rust on wheat around Stillwater, just this week I received a report of fairly severe leaf rust in Grady County. Southern Oklahoma has received more moisture than northern Oklahoma, so I

would suspect that this is not an isolated occurrence in southern Oklahoma. This was in a field of early planted (about September 1) Jagger, which is susceptible to leaf rust. For the most part, controlling leaf rust on wheat in Oklahoma in the fall is of questionable economic return and is not recommended. Grazing will help to reduce the level of rust spores (inoculum) in the field, and as colder temperatures set-in, spread of the rust from infected to healthy (new) leaves will be greatly slowed. As the older leaves die and new infections are inhibited, there should be a break in the infection cycle and a significant lowering of the rust incidence. The major concern here is that with a mild winter and sufficient moisture, the rust will survive through the winter and inoculum will be present in fields to start the disease in the spring. Hence, monitoring of these fields next spring is recommended to see if application of a fungicide to control the rust is indicated.

Seedling root rot: Seedlings of wheat from a field near Marshall, OK were examined about two weeks ago that showed symptoms of common root rot as indicated by darkening of the sub-crown internode. The fungus that causes common root rot was isolated from this diseases tissue. Swollen and stubby roots also were common on these samples, which could indicate low pH or possibly nematodes. However, low pH has been ruled-out so nematodes may have been a problem in this field.

Elsewhere around Oklahoma: Rick Kochenower (Agronomy Area Research & Extension Specialist) indicated that he has not seen any indications of rust or other diseases on wheat in the panhandle, which agreed with Roger Gribble's (Area Extension Agronomy Specialist) assessment of wheat across north-central Oklahoma. Mark Gregory (Area Extension Agronomy Specialist) across southern/south central Oklahoma also indicated no major disease occurrence, but did indicate that with the greater moisture across southern Oklahoma he was not surprised that some rust was beginning to be seen.

For a copy of this update with photos, please go to: http://www.entoplp.okstate.edu/pddl/advisory.htm and look at volume 5, number 21 for 2006, which should be posted within 1-2 days of receiving this message.

Subscription Information

The *Wheat Production Newsletter* is published in electronic format on an as needed basis throughout the year. To receive an electronic copy in pdf format, send an email with **subscribe** as the subject line to jeff.edwards@okstate.edu

Want more information?

Visit our web site at:

www.wheat.okstate.edu

Dr. Jeff Edwards
Small Grains Extension Specialist, Oklahoma State University

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, James Trapp, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at no cost to the taxpayer.