University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

Wheat Science News

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Research & Education Center

Special Freeze Issue

What's inside

The 2017 Winter Wheat Freeze Events—Plural!

Dr. Carrie Knott — Extension Grain Crop Specialist, Princeton

Unseasonably warm winter temperatures have resulted in Kentucky's winter wheat being about 3 to 4 weeks more advanced than typical years. Much of Kentucky's wheat began jointing (Feekes 6; Figure 1) in mid-February to the beginning of March, depending on the area. At jointing, the developing wheat head is above the soil surface, which makes it susceptible to any damage, including freeze damage.

There have been several freeze events since our wheat crop has jointed (Table 1). The first freeze event was in late February and was a very hard freeze event. However, given that temperatures had been very warm in the days leading up to the freeze there was no real freeze damage. This is most likely due to warm soil temperatures that were able to mitigate temperatures near the soil surface. In the late February freeze event, most of Kentucky's wheat crop was just beginning to joint; therefore, the developing wheat head was very near that warm soil surface.

The next few freeze events occurred in a very short period of time (Tables 1 & 2). In these freeze events the soil surface remained warmer than the 3-feet air temperature for the March 11/12 and March 15/16 events. However, for much of the wheat crop the developing wheat head was likely about 6-inches above the soil surface. Temperature at the 6-inch height was cooler than the soil surface and air temperature at 3-foot (Table 2). Many weather stations record temperature at least 3 foot above the soil surface. Therefore, much of our wheat is likely damaged by these freeze events, even if weather stations do not report temperatures within the damaging range: ≤24°F for two continuous hours at jointing growth stage.

The most important thing now is to assess for damage, paying particular attention to the growth stage of the main stem and primary and secondary tillers. The

fastest method to assess freeze damage is to dissect out developing wheat heads. A minimum of 5 to 7 days with high temperatures ≥40°F are necessary. Otherwise you will not accurately identify the degree of damage.

Detailed instructions on dissecting developing wheat heads are at: https://youtu.be/oaPiOU-s-Ro.

It can take several weeks before widespread, visual symptoms of wheat damage are observed in the field (Figure 2). Therefore it is very important to be able to dissect and examine developing wheat heads to allow timely management decisions to be made.

Figure 1. Wheat plant at Feekes 6, jointing, growth stage. The developing wheat head is above the soil surface and is susceptible to damage beginning at this growth stage.

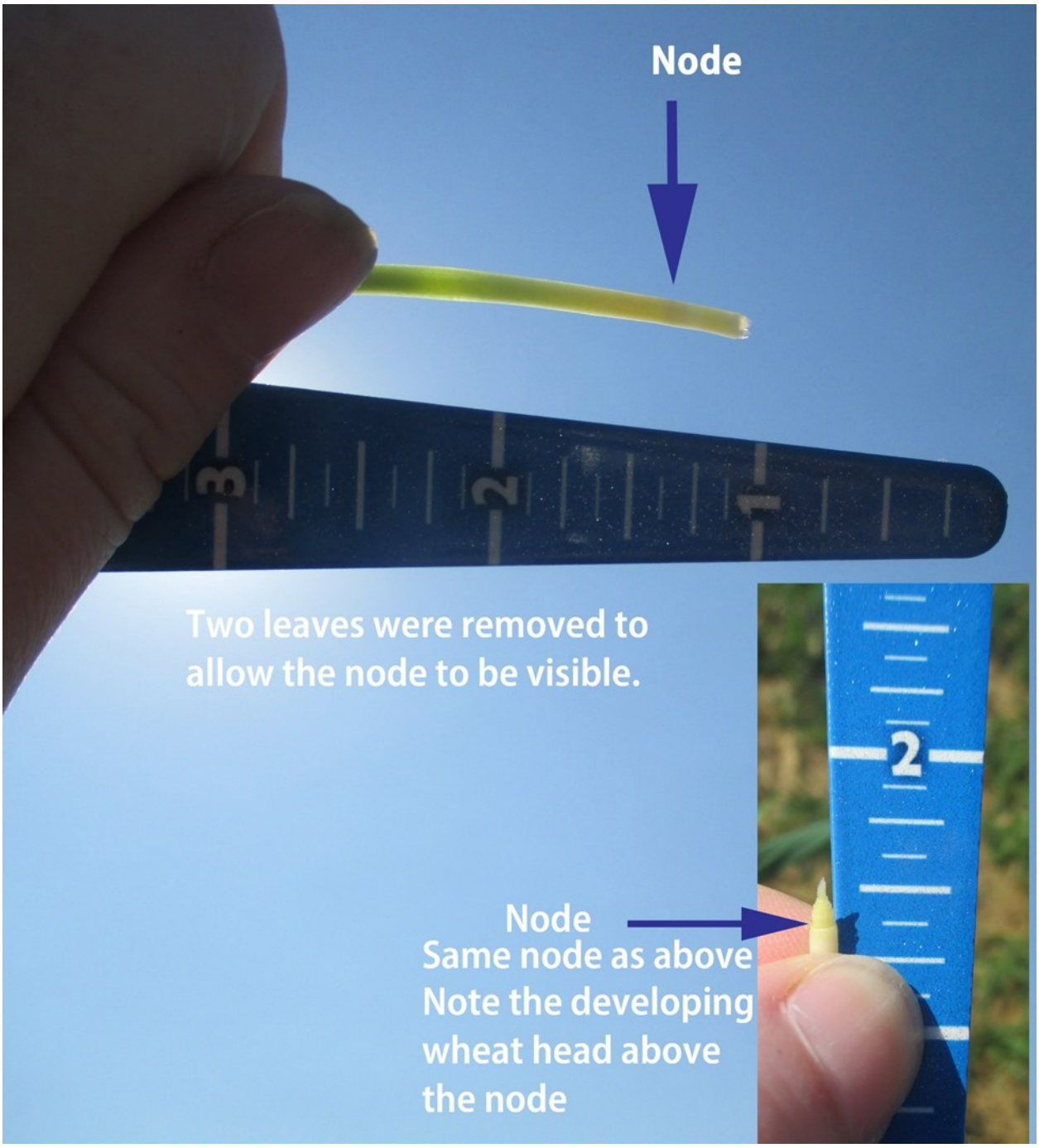

Table 1. Low temperature and the duration of temperature less than or equal to 24°F, the critical temperature that damage will occur to wheat at the jointing (Feekes 6) growth stage, for four freeze events in 2017 at selected Kentucky counties. Data provided by Matt Dixon, UK Ag Weather Center.

	Kentucky County				
	Christian	Fayette	Hardin	Henderson	Warren
Feb 25 to 26, 2017					
Low Temp (°F)	24	23	17	17	20
Duration ≤24°F (hrs)	0.1	2.5	6.5	6.0	4.0
March 11 to 12, 2017					
Low Temp (°F)	23	21	25	27	28
Duration ≤24°F (hrs)	1.0	3.0	0.0	0.0	0.0
March 14 to 15, 2017					
Low Temp (°F)	18	18	21	21	-
Duration ≤24°F (hrs)	10.0	12.0	6.0	5.0	-
March 15 to 16, 2017					
Low Temp (°F)	15	16	21	18	19
Duration ≤24°F (hrs)	10.0	8.0	6.0	9.0	7.0

Table 2. Low temperature and duration of temperature less than or equal to to 24°F, the critical temperature that damage will occur to wheat at the jointing (Feekes 6) growth stage, for temperature sensors placed on the soil surface, 6-inches above the soil surface, and 3-feet above the soil surface, Princeton, KY.

	Temperature Sensor Location		
	Soil Surface	6-inches above Soil Surface	3-feet above Soil Surface
March 11 to 12, 2017			
Low Temp (°F)	31	21	23
Duration ≤24°F (hrs)	0.0	3.0	0.8
March 14 to 15, 2017			
Low Temp (°F)	19	17	20
Duration ≤24°F (hrs)	8.5	8.3	6.3
March 15 to 16, 2017			
Low Temp (°F)	19	13	17
Duration ≤24°F (hrs)	10.5	13.0	10.3

Figure 2. Declining wheat stands following the 2007 spring freeze event. Photo: Bill Bruening.

Carrie Knott, Extension Grain Crops Specialist

Mark Your Calendar - More Details Coming!

USEFUL RESOURCES

Wheat Science Group

http://wheatscience.ca.uky.edu/

Kentucky Pest News

https://kentuckypestnews.wordpress.com/

UKAg GRAIN CROPS Grain Crops Update

http://graincrops.blogspot.com

College of Agriculture, Food and Environment

Potential Nitrogen Contribution from Terminated Wheat

Dr. Edwin Ritchey — Extension Soils Specialist, Princeton

Dr. Lloyd Murdock — Professor Emeritus—Extension Soils Specialist, Princeton

Dr. John Grove — Professor & Director, Princeton

Moderate to severe wheat yield reductions can occur when air temperatures drop below 24^{o} F for two hours or more at jointing (Feekes 6-7) due to killing of the growing point. This scenario recently occurred in many parts of Kentucky and surrounding states. Other articles will address potential yield damage and whether the wheat grower allows secondary tillers to develop so as to harvest the crop for grain, or terminates the crop and plants either full season soybean or corn.

Before making any management decision after a wheat freeze, producers should fully evaluate the extent of the damage to make sure they are not terminating a crop that still has decent yield potential, or are not trying to save a crop that has a low yield potential. If the decision is made not to harvest the wheat field for grain, perhaps to terminate the wheat crop, other factors should be considered, including pesticide label restrictions and residues that can impact following crops or alternative uses for the wheat. These restrictions include crop plant back intervals and restrictions on grazing or the feeding of wheat hay to animals. Remember, the pesticide label is the law.

Once the decision to terminate the crop is made and assuming next crop plant back restrictions, the decision is whether to plant corn or full season soybean. This decision can be influenced by the amount of nitrogen (N) applied to the wheat crop. If only the first of two split N applications has been made, then there is probably little N that will be made available to the next corn crop. However, if a single large N application, or both of the split N applications, has been made there is potential for a fairly significant amount of that N to be credited against the fertilizer N need of the following corn crop.

Some N may still be present in the soil, not yet taken up by the wheat. The N that has not been lost to denitrification will be available to the following corn crop, but the amount lost can vary with environmental conditions. For the N taken up by the wheat, a general rule of thumb is that roughly 50% of the N in the wheat tissue will be made available to the subsequent crop. This percentage depends on several factors, including the wheat tissue's carbon to nitrogen (C:N) ratio, N loss via leaching from the frozen (now dead) plant material, and the length of time between wheat termination and planting of the following crop. To be on the safe side, assume that about 30% of the total spring N applied to the wheat will be made available to the following corn crop.

Regardless of the decision made, make sure that decision is well informed. Proper evaluation of the situation will help ensure that wheat producers make the best of this bad situation.

Herbicide Label Restrictions for Feeding and Planting Rotational Crops

Dr. Jim Martin — Emeritus Professor—Extension Weed Control Specialist, Princeton

There are certain label issues that should be considered when transitioning from wheat managed for grain to hay or grain crops such as corn or soybeans.

If wheat has been treated with any of the following herbicides, then it is important to consider label restrictions for feeding and planting rotational crops.

Table 1. Feeding and Rotational Crop Restrictions for Wheat Herbicides [1]

Herbicide	Preharvest Interval for Forage	Rotational Crop Interval	
		Field Corn	Soybean
Anthem Flex	7 days for grazing or feeding	0 day	0 day
Axial XL	30 days	90 days	90 days
Axiom	30 days for grazing	0 day	0 day
2,4-D	2 weeks	7-14 days	7-30 days
Clarity	37 days for lactating animals	0 days	14 days Consult label for details.
Finesse	0 day for grazing	18 months	- 4 months for BOLT soybean - 6 months for STS soybean - 18 months for non-STS soybean
Finesse Grass & Broadleaf	0 day for grazing. Observe label for additional comments.	Conduct field bioassay the following year.	9 months for STS soybean
Harmony Extra SG	-Allow 7 days before grazing. -Allow 30 days for hay. -Harvested straw may be used for bedding or feed.	14 days	7 days
Harmony SG	-Allow 7 days before grazing. -Allow 30 days for hay. -Harvested straw may be used for bedding or feed.	0 days	0 days
Metribuzin	Do not graze within 14 days.	4 months	4 months
PowerFlex	-7 days for grazing -28 days for hay	9 months	3 months when applied in February or later. See additional comments.
Prowl	-11 days for forage -28 days for hay	Next Cropping Season.	0 days
Quelex	-21 days for hay -Do not graze for 7 days -Do not compost plant material	3 months	3 months
Osprey	-30 days for forage -60 days for hay	90 days	90 days
Valor SX	Do not graze until wheat reaches 5 inches	7 to 30 days depending on rate & tillage system	0 day
Zidua	7 days for forage and hay	0 day	0 day

[1] CONSULT LABEL TO CONFIRM RESTRICTIONS

Burndown of Wheat Following Freeze Injury

Dr. Jim Martin — Emeritus Professor—Extension Weed Control Specialist, Princeton

Although wheat is damaged by the freezing temperatures, it is not dead and will likely initiate new tillers. While these plants may not be as competitive relative to normal tillered wheat, they can compete for soil moisture and be a concern during a dry spring. In order to control re-tillering wheat, it is important 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. This may require waiting several days for wheat to regenerate new growth.

The following are general comments on using glyphosate or paraquat for burndown treatments for no-till plantings.

Glyphosate:

- Since glyphosate is a translocated herbicide, a spray volume of 10 to 15 gallons GPA may be adequate to achieve the desired spray coverage in most cases.
- Control is slow, particularly when temperatures are less than 50^0 F. Dead vegetation may degrade slowly. Because of the slow rate of control, problems with voles may be an issue.
- Glyphosate at the rate of 1.13 lb ae/A (e.g. Roundup PowerMax at 1 qt/A) should be adequate for most cases. Consult label for rate of specific product.
- The addition of atrazine at 1.5 to 2 lb ai/A (e.g. AAtrex 4L at 1.5 to 2 qt /A) (for corn) may reduce speed of control.
- The addition of dry Ammonium Sulfate 8.5 to 17 lb/100 gal (or equivalent in liquid formulation) may improve control in such cases as when hard water is used as the carrier, or when tank mixing with certain herbicides.

Paraquat:

- Good spray coverage is critical to achieve maximum control with paraquat. 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.
- Control may be erratic, particularly when wheat is in tillering stage.
- Plants decay rapidly.
- Paraquat at the rate of 0.75 lb ai/A (e.g. Gramoxone 2S at 3 pt/A) should be adequate for most cases. Consult label for rate of specific product.
- Addition of atrazine at 1.5 to 2 lb ai/A (e.g. AAtrex 4L at 1.5 to 2 qt /A) (for corn) often improves control, but precipitation after application is needed to ensure root uptake of the triazine herbicide.

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 in preplant or delayed burndown treatments. Consult labels for approved tank mixes.

Considerations for Utilizing Frosted Small Grains for Forage

Dr. Chris Teutsch — Extension Forage Specialist, Princeton

Dr. Carrie Knott—Extension Grain Crop Specialist, Princeton

Dr. Roy Burris—Extension Beef Cattle Specialist, Princeton

If the level of damage to a small grain stand is severe enough to warrant termination of the grain crop, one option to glean some value from the small grain is to utilize it as forage. Frost damaged small grains can be mechanically harvested as hay or silage or grazed by cows and/or calves.

Special Considerations

Nitrate toxicity. Nitrates can accumulate to toxic levels in commonly grown forages, including small grains. This most often occurs when heavy nitrogen fertilization is followed by drought or any factor that slows plant growth. As plant growth slows nitrates are taken up by the plant, but not assimilated into amino acids and protein. After plant growth resumes, nitrates are normally in the safe range in 5-7 days. In cattle, nitrate is converted to nitrite in the rumen, and the nitrite is absorbed into the blood stream. Nitrite interferes with the blood's ability to carry oxygen. Symptoms of nitrate poisoning include trembling, staggering, rapid and labored breathing, rapid pulse, frequent urination followed by collapse, coma, and death. The onset of symptoms and death is rapid and usually occurs within one to two hours. Most often, animals are simply found dead. In animals affected by nitrate poisoning, the blood will take on a brownish chocolate color, giving the non-pigmented skin and mucus membranes a muddy brown color. Forages that are high in nitrates should not be harvested or grazed. Nitrates are stable in dry hay and can kill livestock months after harvest. Ensiling forages will reduce nitrate levels 40-60%. If high nitrates are suspected, ALWAYS test the forage before grazing or harvesting.

Pasture bloat. Pasture or frothy bloat can occur when grazing legume or lush grass pastures, including small grains. It occurs when a stable foam is formed in the rumen. This foam prevents the animal from eructating gases formed during normal rumen function. Interruminal pressure builds and the left side of the rumen becomes distended. As the interruminal pressure increases, the ability of the animal to breath is restricted, followed by heart failure, and death. When hungry animals are given unrestricted access to lush pasture, bloat can occur in less than one hour, but a more common time frame is one to three days. Hungry animals should never be given unrestricted access to small grain pasture. Animals should be filled up with a high quality dry hay before being introduced to small grain pasture. Once grazing small grain pasture, animals should have access to a high quality dry hay at all times. Poloxolene, an antifoaming agent, is effective at preventing frothy bloat. It can be mixed with grain supplement or drinking water, drenched, or fed as a pasture block. However, its effectiveness is dependent upon daily intake. Therefore, mixing it with supplemental feed that is palatable tends to be more effective than supplying it in a pasture block. Animals that chronically bloat on high quality pasture should be culled.

Grass tetany. Grass tetany or hypomagnesemia is associated with low levels of magnesium in the blood. It most commonly occurs with cows and ewes in early lactation, that are grazing lush perennial pastures, annual ryegrass, and small grains in late winter or early spring. Grasses fertilized with moderate to high levels of nitrogen that are growing on soils that are low in magnesium are most commonly associated with grass tetany. In this case, potassium is taken up instead of magnesium, resulting very low levels of magnesium in the plant. Pastures with soils low in magnesium should be limed with dolomitic lime and excessive fertilization with potassium and nitrogen should be avoided. Providing a palatable free choice mineral that is high in magnesium (15%) is the best approach to preventing grass tetany when grazing small grain pastures.

Harvesting for Hay or Silage

Frosted small grain can be harvested as hay or silage. Ideally, the small grain should be allowed to reach the boot-stage. This optimizes the combination of forage quality and yield. In a normal year, wheat should reach the boot-stage around mid-April. If lodging is an issue, small grain could be harvested before the boot-stage. In this case, the estimated yield should be assessed to determine if there is enough biomass to justify mechanical harvest. To estimate yield, determine the average height of the small grain stand, subtract your mowing height, and multiple the lb DM/A/ in of sward (Table 1). For example the if the average height of a small grain stand is 18 inches, the cutting height is 3 inches, and are small grain stand is in fair condition. So 18 in - 3 in = 15 in x 150 lb DM/A/in = 2250 lb DM/A.

Table 1. Approximate pounds of forage per inch of sward.

Species	Stand Condition			
	Poor	**Fair**	**Good**	**Excellent**
	lb DM/A/in of sward			
Small Grain	100	150	200	250
Annual Ryegrass	100	200	300	400

Adapted from Southern Forages, Third Edition.

Small grains can be harvested as dry hay, but curing may be difficult due to poor drying conditions and a heavy crop. The following best management practices will help to enhance field curing.

- Evaluate small grains for nitrates. Small grains can accumulate nitrates when plant growth is slowed, especially if moderate or high levels of nitrogen fertilizer have been applied. Nitrates in dry hay do NOT decrease over time and can kill livestock months later.
- *Mow early in the day*. Mow as soon as the dew is gone. This will maximize drying time.
- *Use a mower-conditioner*. Crushing the stems will allow moisture to escape and shorten curing time.
- *Adjust mower-conditioner for maximum swath width*. Making the mower swath as wide as possible will increase the surface area of forage exposed to the air and radiant energy from the sun.
- *Ted or rake hay at 50% moisture*. This will expose green hay below to air and radiant energy from the sun.
- *Bale hay at 18% moisture*. Baling at 18% moisture will minimize mold growth and heating in the bale.
- Store under cover and off the ground. Small grain hay harvest at the boot-stage can be very high in nutritive value. Storing it under cover and off the ground will maintain that quality by reducing storage losses.

A better option for conserving small grains is silage or balage. This option allows small grains to be mowed one day and chopped or baled the next, greatly reducing the chance of rain damage. The following best management practices will help to optimize the ensiling process.

- Evaluate small grains for nitrates. Small grains can accumulate nitrates when plant growth is slowed, especially if moderate or high levels of nitrogen fertilizer have been applied. Nitrates in silage or balage are decreased during fermentation by approximately 40 to 60%. If nitrates area concern, always evaluate silage before feeding and adjust the ration so that nitrates are in the safe range.

- *Mow early in the day.* Mow as soon as the dew is gone. This will maximize wilting time.
- *Use a mower-conditioner.* Crushing the stems will allow moisture to escape and shortening wilting time.
- *Adjust mower-conditioner for maximum swath width.* Making the mower swath as wide as possible will increase the surface area of forage exposed to the air and radiant energy from the sun.
- *Rake and bale/chop forage at 50-60% moisture*. Wilted forage can be chopped at 60% moisture, but baling should be delayed until 50%.
- *Chop at correct theoretical cut length.* Haylage should be chopped to a TLC of 3/8". This will aid in silage compaction and exclusion of oxygen.
- *Fill silo rapidly and compress.* Filling silos rapidly limits exposure to oxygen. Compressing silage in bunker silos or bags help to exclude oxygen and enhance fermentation.
- *Seal silos carefully.* Care should be taken to properly seal silos once filled. This excludes oxygen and enhances fermentation.
- *Do NOT open silos for at least 2 weeks.* Fermentation takes approximately 14 days until a stable pH is reached.
- *Consider using an inoculant.* Under less than ideal ensiling conditions, inoculating silage with a homofermentative lactic acid bacteria can increase the rate of pH decline and final stable pH. Inoculants are best applied at chopping or baling in a liquid form.
- *Make dense and uniform bales.* Slowing ground speed during baling will result in a denser bale. High density bales exclude oxygen and promote fermentation. Uniform bales allow for uniform wrapping and less air space between bales when using a tube wrapper.
- *Use either plastic twine or netwrap when baling.* Do NOT use treated sisal twine when making balage. The chemicals that the twine is treated with interact with the ultraviolet inhibitor in the plastic film causing it breakdown prematurely.
- *Wrap bales the same day as baling.* Never bale more hay than can be wrapped that day. Allowing bales sit overnight will result in squatting, making them more difficult to wrap.
- *Wrap bales at final storage location.* If possible always wrap bales where they will be stored. Handling and moving wrapped bales often results in damage to the plastic film, allowing aerobic deterioration to occur.
- *Use high quality plastic film designed for bale wrapping.* Plastic film used for balage contains ultraviolet inhibitors that keep the plastic from being broken down by sunlight. Since the entire ensiling process is dependent on excluding oxygen from the bale, do NOT skimp on film quality.
- *Apply at least 4 layers of plastic.* Four layers of plastic film is the absolute minimum that should be applied. Six layers is preferred and if the bales will be maintained for a longer period, use eight layers.
- *Inspect bales at least weekly and patch any holes immediately.* One air is introduced into a wrapped bale, aerobic deterioration starts almost immediately. It is very important to check bales for holes or tears regularly and to patch those holes immediately with special tape designed for silage wrap. Unlike duct or packaging tape, this tape that contains an ultraviolet inhibitor.
- *Feed balage by the next growing season.* While round bale silage can produce a quality feed for both beef and dairy cattle, it is not the ideal ensiling package due to its high surface area to volume ration. In addition, the plastic film does NOT completely exclude oxygen. Over time, oxygen diffuses through the plastic film, albeit very slowly.

Graze Out Small Grain

Frosted small grain can be grazed, especially if fields are fenced and a water source is available. Generally speaking, grazing is the least expensive way to harvest forage. Light weight calves grazing small grains would be expected to gain approximately 1.5 to 2.0 lb per day. In addition, small grains that may be marginal for having enough biomass to justify mechanical harvest, could be grazed. The following best management practices will help to efficiently and safely graze small grains.

- *Evaluate small grains for nitrates.* Small grains can accumulate nitrates when plant growth is slowed, especially if moderate or high levels of nitrogen fertilizer have been applied. Do Not graze small grains high in nitrates. Allow plant growth to resume and recheck nitrate levels in 5-7 days.

- *Fill animals up with a high quality dry hay before grazing small grains.* Never allow hungry animals unrestricted access to small grain pasture. The abrupt introduction of large quantities of a very quality forage can cause bloat.

- *Allow animals access to a high quality dry hay at all times.* Access to dry hay will help to prevent nutritional disorders.

- *Supply high magnesium mineral mix.* Grazing small grain pastures can result in grass tetany or low blood magnesium (hypomagnesemia). This is best prevented by allowing cattle free access to a high quality mineral mix that contains approximately 15% magnesium.

- *Stock small grains at appropriate density.* The amount of available forage per acre can vary greatly and should be considered when setting a stocking density. Spring stocking densities normally range from 1 to 2-500 lb calves per acre or 0.5 to 1 mature cows per acre. Higher stocking densities are sometimes desired if forage is to be grazed out in a relatively short period of time.

- *Subdivide or strip graze small grain pastures.* Increasing the animal density per unit area improves forage utilization and nutrient distribution. Strip grazing can be accomplished by starting at the water source and allocating a new strip of forage every one to three days.

- *Supply supplemental forage when forage availability is below 1200 lb DM/A.* When forage availability is low, dry matter intake decreases and animals are unable to meet their nutritional needs, even when forage quality is high.

- *Avoid grazing small grains during wet periods.* When soil moisture is high, grazing animals can cause pugging and surface compaction. Simply removing livestock from small grain pastures during wet periods will minimize soil damage.

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Freeze Effects on Aphids and their Parasitoids under the Mild Winter Conditions of 2017

Dr. Raul Villanueva — Extension Horticulturist, Princeton

Kentucky and the north eastern US has experienced a mild winter in 2017. To survive the low temperatures of the winter insects enter in diapause at a specific life stage (adult, larva, pupa or egg). Diapause is a process where insects slow their metabolism almost to a stop, or thick their body fluids to keep the water from forming ice. Water transformed on ice expands its volume; this process can rupture cell membranes, causing cell death and the subsequent death of insects. This physiological adaptation on insects is dependent on the temperature and the shortening of day lengths starting in the fall.

However, a mild winter for insects present in wheat fields can create conditions that might be bad in two different ways. Firstly, many insects (pests and natural enemies) can survive the winter; and secondly, and early high abundance presence of insects such aphids. Aphids have a high reproductive rate and short generations that can benefit from the early warmer temperatures experienced in February and March in Kentucky when temperatures were above 50° F and even reached 70° F. In addition, aphids might have been transmitting viruses like the barley yellow dwarf virus during all this time. The latter can reduce crop yields if resistant varieties were not planted.

In contrast, the freezing temperatures experienced in Kentucky from March 10th to 17th, 2017, after periods of warm days may have affected the survival of many insect species that were already active. In this case, natural enemies of aphids such as parasitoids might have been severely affected in comparisons to their aphid hosts. Parasitized aphids with developing wasps under warmer temperatures followed by a sudden frost and thawing most likely were not "well equipped" (not enough time to enter into diapause), and may have been killed.

The decline on parasitic wasps can affect the natural control of aphids in wheat. For example, in the absence of the parasitic wasp *Aphidius rhopalosiphi* in Belgium, the English cereal aphid population were greater than when the wasp was present (Figure 1).

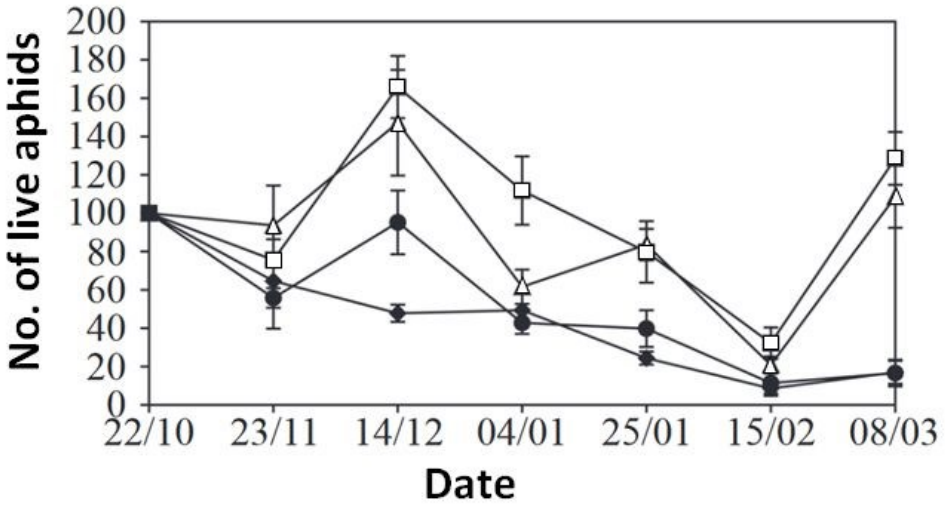

Figure 1.

Two strains of the English grain aphid (*Sitobion avenae*) populations in absence (Δ and □) or presence of two strains of the aphid parasitoid *A. rhopalosiphi* (● and ♦). Adapted from: Legrand et al. 2007. Autumn, winter and spring dynamics of aphid *Sitobion avenae* and parasitoid *Aphidius rhopalosiphi* interactions**.**

A precise science to predict insect populations following a warm winter, is not fully developed, but under the conditions described above, wheat producers and consultants need to pay attention and dedication to monitor the presence of aphids in their fields. Insecticide spray should only be completed if the aphid populations are above the established threshold of more than 10 aphids per foot row.

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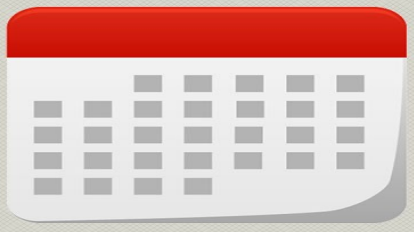

UPCOMING EVENTS

Wheat Production Field School: A Hands-On Training

Dates: April 26, 2017 (Prior to Wheat Heading)

September 13, 2017 (Pre-Plant)

Wheat Field Day—May 9, 2017—UKREC Princeton

Corn-Soybean-Tobacco Field Day—July 27, 2017