WHEAT RESEARCH UPDATE FROM UK SPECIALISTS

Vol. 2, No. 2 March 1998

***Articles in this Issue*:**

(This issue is delayed due to the fact that we wanted to include information regarding the recent cold temperatures resulting in freeze damage to wheat. However, we have decided to have a special issue addressing the freeze damage. This will be forthcoming in the next five days.)

Special Local Need (24C) Registration Approved for Tilt Fungicide

Donald Hershman, Extension Plant Pathologist

On March 13, 1998, the Kentucky Department of Agriculture, Division of Pesticides, approved a Special Local Need (24C) application from Novartis for the use of Tilt 3.6E Fungicide on wheat up to and including Feeke's growth stage 10.5 (full head emergence) for the control of leaf and slume blotch. Then on March 24th, Novartis issued a section 2(ee) recommendation which allows later applications of Tilt to be made for the control of leaf rust through Feeke's stage 10.5. Prior to these labeling developments, Tilt had to be applied to wheat prior to complete flag leaf emergence (Feeke's 8). Research and experience in Kentucky (Table 1) indicated that this early period of application often did not provide acceptable control of late-season diseases, especially leaf and glume blotch, but also leaf rust. The 24C label gives farmers the flexibility to use Tilt when it is most needed, usually during the period of crop head emergence. Of course, crop scouting may indicate that an application earlier than heading is needed, and the Tilt label still provides for such a use. Alternately, crop scouting may indicate that no fungicide application is warranted, and this expanded label helps in that regard also.

Under the federal label, Tilt often had to be applied to wheat before the full extent of the disease situation was known. This frequently resulted unnecessary applications of Tilt, because yield-limiting levels of disease failed to develop. Farmers with high yield potential crops had little choice but to pursue this course of action since the crop needed to be protected, but later applications were prohibited. With the 24C Tilt label, farmers now have the opportunity to assess disease conditions much later into crop development and apply Tilt when needed, but only when needed. This, in fact, is the most desirable use of any fungicide; protective strategies must sometimes be employed, but reactive fungicide use strategies are more desirable for both economic and environmental reasons.

Table 1. The importance of proper timing of fungicide application under moderate disease pressure on Clark wheat - Caldwell County - 1993

Treatment	When applied	% leaf blotch+ F	% leaf blotch+ F-1	% glume blotch +	% leaf rust (F)	Yield (bu/A)
Non-treated	—	4.5	33.3	15.7	4.1	61.0
Tilt 3.6E	Flag leaf emergence (Feeke's 8)	2.2	17.7*	9.6	2.4*	66.0
Tilt 3.6E	Heads emerging (10.3)	1.2*	8.3*	6.6*	0.4*	69.5*

+ Stagonospora nodorum leaf and glume blotch
F= flag leaf; F-1 = second leaf from top
*Significantly higher than non-treated values at P=0.05.

The 24C label for Tilt was made possible because of new residue data which showed that an application of 4.0 fl oz/A of Tilt 3.6E, made up to Feeke's stage 10.5 and 40 or more days before harvest, did NOT result in illegal residues in harvested grain or grain fractions. Label restrictions are as follows: 1) do not apply Tilt after Feeke's growth stage 10.5, 2) do not apply more than 4 fl. oz. of Tilt per acre per season, 3) do not apply within 40 days of harvest, 4) do not cut the green crop for hay or silage. After harvest, the straw from treated crops may be used for bedding purposes. **The 24C label must be in the possession of the user at the time of application.**

Now that wheat producers have a new fungicide tool to manage late-season fungal diseases, they must still decide if and when to apply Tilt. This is an especially important question considering the recent freeze damage to so many wheat fields in Kentucky. Generally speaking, the lower the yield potential of a field, the less benefit will be realized by using a fungicide. There may be a point where the cost of controlling disease exceeds the yield benefit achieved. I cannot tell you for certain where that cut-off yield potential is, but many plant pathologists say it's around 50 bu/A. You will need to make that yield determination for your own specific situation.

Once you have established that a sufficient yield potential exists, crop scouting must be used to answer the remaining fungicide use questions. First, you must remember that wheat fungicides will only control certain diseases. Specifically, powdery mildew, Septoria tritici leaf blotch, Stagonospora nodorum leaf and glume blotch, leaf rust, and tan spot. Other diseases will not be affected by fungicide use. If crop scouting indicates that one or more of the target diseases has reached threshold, then spraying may be appropriate. Exceptions may be where: 1) the variety is moderately resistant to the disease(s) in question, 2) weather conditions are predicted to turn hot and dry, or 3) other non-target diseases or conditions are threatening crop yield. If one or more of these situations exist, then you must use some good old common sense in deciding whether or not to spray. Also note that there is often a point in disease/crop development where waiting too late to spray can compromise the results. In other words, even though Tilt can be applied through complete head emergence, it is possible that maximum disease control will be achieved with an earlier application. The key is to use crop scouting to determine if a disease threshold has been reached. Consult UK Cooperative Extension Service Publication ID-125 "A Comprehensive Guide to Wheat Management in Kentucky" for a detailed description of crop scouting requirements and fungicide use thresholds. ID-125 is available through your local county Extension office.

Spring Insecticides for Control of Barley Yellow Dwarf

Doug Johnson, Extension Entomologist

Over the course of the last week I have been called by several individuals in Kentucky and received e-mail from my counterparts in Missouri and Tennessee. There were two central points TO THEIR QUESTIONS: 1. How can consultants in Kentucky guarantee an 8 bushel increase in yield if an insecticide application is made this late in the year? 2. What is the advisability of a spring insecticide application to kill aphids in an effort to control the spread of Barley Yellow Dwarf virus?

Consultant Claims

I cannot comment on what consultants may or may not have claimed. No such claim has been presented to me and I did not hear the information directly. I would have to make comments based on hearsay.

In my opinion, when producers are confronted with a claim they should:

1. Leave several test strips if they do spray. These should be used to check not only changes in symptoms, but also for yield estimates. Symptoms often do not reflect actual yield changes.

2. Require that data used to convince you of a need to treat is: a) from a properly designed experiment with replication of the treatments and b) that the results were properly tested (for statistical significance). Beware of comparing means alone. The means of the treatments should have standard errors that indicate the precision of the value. For example, means for a treated and untreated plot may differ by 10 bushels, but the variation in the experimental results may show that they are not statistically (OR RELIABLY) different.

3. Require that recommenders increase your NET RETURN, not just gross return. For example, if it costs you $10 per acre to apply a control and you see a yield increase of 3 bushels per acre at a value of $3 per bushel then you have increased the yield but lost a dollar!! It is not enough for an application just to increase yield. The use of any application must increase the yield more than the cost of making the application.

Spring Sprays

Several facts are clear from existing research. We know that the older the plant is, the harder it is to infect. Also, the older plants are when they become infected, the less impact there is on yield. However, older plants still will express symptoms so fields can look bad. Both of these factors tend to reduce the benefit of a spring spray.

We also know that the important BYDV vectoring aphids do not suddenly appear from nowhere. If they are in your fields now they have been there from the fall migration. The real problem then is what has gone on up until this time? Generally speaking, the temperatures need to be 50^{o}F or greater for aphids to walk much and must be above 54^{o}F for flight (this would be local movement) to occur.

If you look at Figure 1, you will see that temperatures have been relatively mild this winter. Certainly in the fall, and at least two times in the winter, temperatures have been warm enough to allow aphid movement. Any BYDV spread was going to occur probably already has! Additionally, you will notice that we also saw some quite low temperatures, certainly low enough to kill aphids. One of those times was right at the end of November, but there were additional cold snaps with temperatures low enough to reduce aphid populations in December, January and February.

While symptoms have not yet been seen in wheat, they certainly have in oats. I have seen an early planted oat field with nearly 100 percent infected plants, many of which have already died. No doubt this is from early fall infection. It does, however, tell us that in the absence of proper management, BYDV spread has already occurred and on a massive extent. The infestation in this oat field was severe because it was planted too early. As a result, it was 1) exposed to more of the fall aphid migration, 2) generated a great deal of top growth to protect the infesting aphids, and 3) the pests were not managed (detected and controlled) in the Fall. Even with the absence of symptoms, if something similar to this has occurred in your wheat, spring treatment is a waste.

In my opinion, if your fields contain aphids now and have not been properly managed in the fall and winter, BYDV is already spread and symptoms will begin showing up soon. If you had proper fall management, there should be few aphids in your crop and thus little need to spray. Only in the very few cases where proper fall management was applied and aphids still managed to reproduce but not move around spreading the virus, would a spring application be likely to succeed.

You might expect some return from a spring spray if:

1. The BYDV pressure is epidemic,
2. The winter has been cool enough to keep aphids from spreading but not cold enough to kill most of them,
3. You are managing fields with a potential yield near 100 bushels per acre,
4. Aphids have over wintered in the field,
5. Symptoms are not visible yet,
6. You have prevented fall infection.

Why recommend sprays when the chance of success is small? Actually, that is relatively simple. The treatment cost is relatively small while the short term cost (to the recommender) of appearing to be wrong is relatively great.

If we assume your recommender tells you to spray, then the following outcomes are possible.

1. Recommender says Don't spray and BYD appears. Recommender gets the blame even though the infection could have occurred anytime before the insecticide application and the application would have done nothing to help the situation. This is an extremely great fear of recommenders.
2. Spray and BYD appears. At least you tried and you may have saved something.
3. Spray and BYD does not appear. See!! I told you this would work! Even though there was probably no infection in the first place.
4. Don't spray and BYD does not appear. How comfortable would you be making this recommendation?

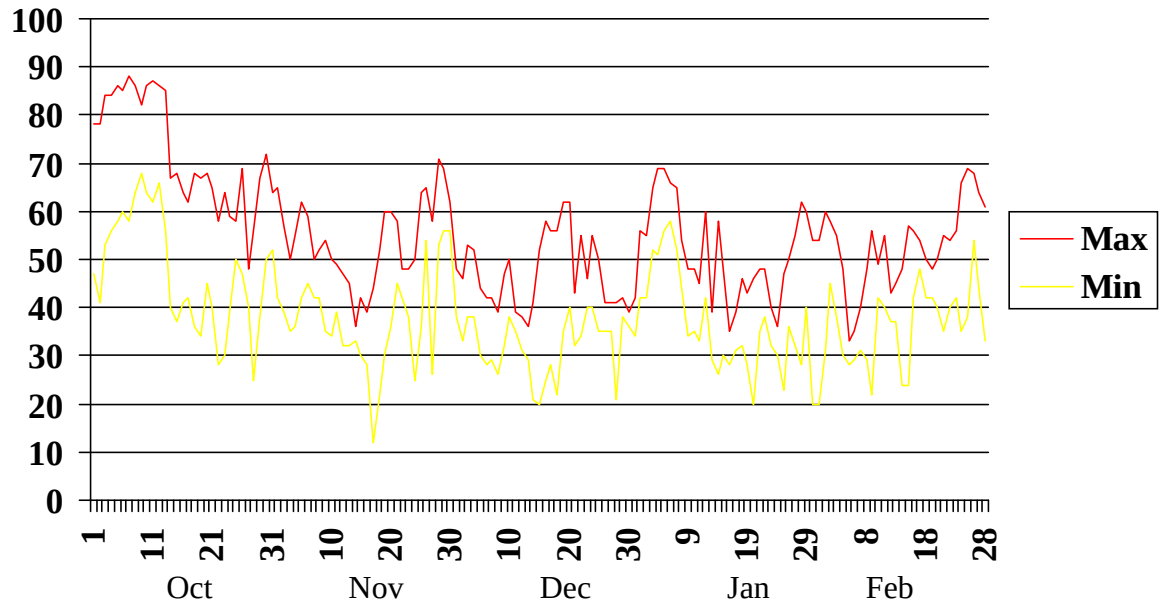


Figure 1. Average Daily Max and Min Temperatures for Princeton, KY during Fall and Winter 1997-1998.

If you spray wheat this spring, leave several unsprayed test strips in fields, not just one. Then you can look for visual clues as to whether or not an infection was avoided. Remember, this is not foolproof. The strips will aid in showing if an infection was prevented, but they do not necessarily indicate eventual yield savings. Some varieties show symptoms very strongly, but do not suffer much yield loss; others show symptoms very weakly, but suffer great yield loss. The presence or absence of symptoms alone will not tell you if the spray was warranted. Only taking yield estimates, where everything but the insecticide spray is the same, can do that.

IT is possible for a spring spray to have an effect on BYDV, but IT IS very unlikely and certainly not guaranteed. It will be very difficult to convince me that 8 bushels per acre can be saved by an application at this time without strong, appropriately tested data.

Timing of Herbicide Applications Relative to Wheat Growth Stage

J.R. Martin, Extension Weed Scientist

This unseasonably mild winter has caused wheat growth to be well ahead of schedule. Because of these unique circumstances, growers should check wheat growth stage before applying herbicides. The following table summarizes the recommended growth stages for selected herbicides.

Wheat injury from such herbicides as 2,4-D and Banvel can occur, particularly as wheat advances in its growth. As a general rule, wheat is most tolerant to 2,4-D when plants are fully tillered.

Table 1. Timing of Herbicide Application Relative to Wheat Growth Stage.

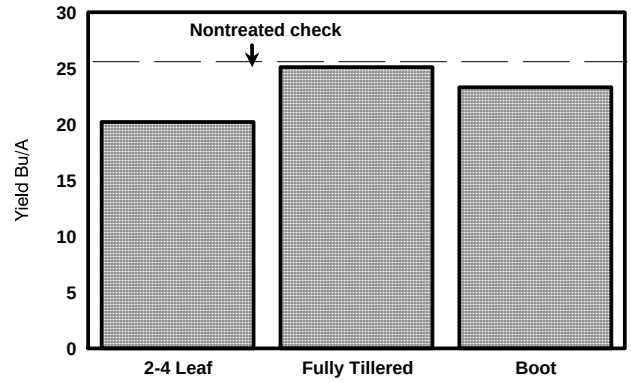
Herbicide	Recommended Wheat Stage*
Banvel	Feekes 3 - 5
Buctril	Feekes 1 - 9**
2,4-D	Feekes 3 - 5
Harmony Extra	2 leaf to Feekes 7**
Hoelon	Feekes 1-5
Sencor	3 tillers to Feekes 5

** Most of these stages are presented in Feekes scale. Consult label(s) for specific directions.*

*** Poor weed control may occur when applying Buctril or Harmony Extra at the later recommended stages.*

Research results from Nebraska help support this statement (See Figure 1). According to these data, wheat yield was reduced by more than 20% when 2,4-D amine was applied in the fall to wheat with 2 to 4 leaves. A 10% reduction occurred when 2,4-D was applied in the boot stage. Applying 2,4-D to fully tillered wheat did not result in a significant loss in grain yield. The risk of injury when applying 2,4-D after tillering may be slightly greater with the ester formulations than the amine formulations. This may explain why label directions for many of the ester formulations caution growers to apply after wheat is fully tillered (Feekes growth stage 5), but not forming a joint or node in the stem (Feekes growth stage 6). Regardless which formulation, it is especially critical to NOT apply 2,4-D when wheat plants are in the boot stage.

FIGURE 1. Winter Wheat Yield in Response to 2,4-D Amine Applied at 3 Growth Stages in Absence of Weeds



Source: Nebraska Guide G88-863

Banvel applications MUST be made prior to jointing stage. General observations indicate that the risk of significantly reducing yield when applying after wheat develops a joint tends to be greater with Banvel than with 2,4-D.

A **Southern Tier Wheat Field Day will be held Thursday, May 14, 1998 at Don Halcomb's Walnut Grove Farm in Logan County**. University of Kentucky specialists will talk about no-till wheat in regards to seeding rates, nitrogen rates, herbicides, pest control and seed treatments, as well as information on harvesting and storage of wheat and economics of different management systems. Farmers will have an opportunity to tour research trials on nitrogen rates, herbicides, pest control, seed treatment, drill comparisons, as well as conventional and no-till wheat variety trials.

Registration begins at 9:00 AM (CST)
with tours beginning at 9:30 AM.

Lunch will be provided.

For more information, contact Dottie Call.

Wild Garlic and Related Species in Wheat

James R. Martin - Extension Weed Scientist

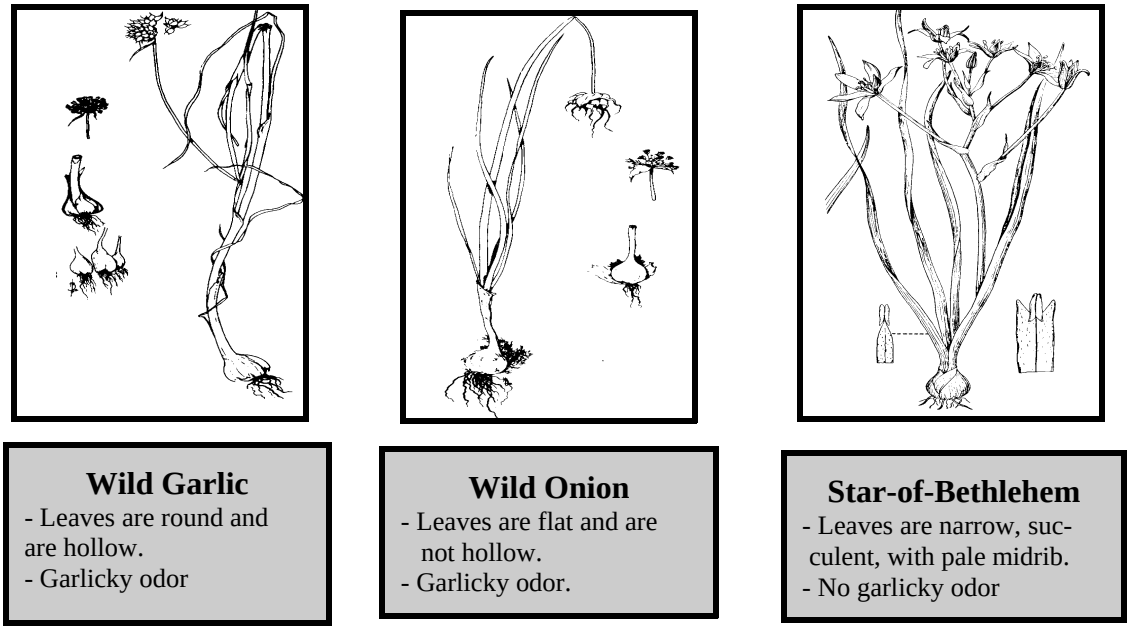
Wild garlic (*Allium vineale*) occurs frequently in wheat in Kentucky and surrounding states. Isolated problems with star-of-Bethlehem (*Ornithogalum umbellatum*) also occur in wheat and appear to be increasing in number each year. There have also been reports of wild onion (*Allium canadense*) in wheat, yet it is very minor compared with wild garlic and star-of-Bethlehem. These three weeds are closely related and look very similar. Illustrations and key vegetative characteristics of these three species are shown in Figure 1.

Wild garlic begins to appear in the fall and will continue to emerge throughout the winter and early spring. Wild garlic usually mature May through June, with some plants producing aerial bulblets. Although it is not considered a competitive weed, wild garlic can cause economic loss from its aerial bulblets that contaminate wheat during the harvesting process.

Depending on weather conditions, star-of-Bethlehem emerges in February and March. Although star-of-Bethlehem has a very aggressive growth habit initially, it dies early and is not present at wheat harvest. The period of competition from star-of-Bethlehem is relatively short, consequently, a uniform dense stand of wheat often survives with minimal affects from this weed.

Control: The fact that wild garlic occurs more frequently than its relatives may be good news for Kentucky farmers. Harmony Extra applied at the rate of 0.5 oz/A will usually control wild garlic. Control may be less than optimum if wild garlic plants are stressed from freezing temperatures.

Herbicides that are currently used in wheat in Kentucky do not offer consistent control of star-of-Bethlehem. However, applying Harmony Extra at the high rate of 0.6 oz/A may sometimes suppress star-of-Bethlehem. Banvel may have some activity on star-of-Bethlehem, yet its rate structure for applications to wheat is not sufficient to offer consistent control.



Wild Garlic
- Leaves are round and are hollow.
- Garlicky odor

Wild Onion
- Leaves are flat and are not hollow.
- Garlicky odor.

Star-of-Bethlehem
- Leaves are narrow, succulent, with pale midrib.
- No garlicky odor

Figure 1. Identifying Characteristics of wild garlic, wild onion, and star-of-Bethlehem.

The U.K. Wheat Breeding Program

Dave Van Sanford and Sandy Swanson

Overview

The objective of the wheat breeding program is to develop wheat varieties that will make more money for Kentucky wheat farmers. We approach this by focusing on traits related to profitability: yield potential, test weight, early maturity, disease resistance, and lodging resistance, to name a few.

The variety development process begins in the greenhouse, where we make crosses using superior wheat varieties and advanced breeding lines. These parents come from our breeding program and from other successful breeding programs in the region. In general, we cannot find all of the traits of interest in just two parents. Instead, after crossing two parents to make an F1 hybrid, we must cross a third parent onto the F1, to bring in the traits that we couldn't find in the original two parents. These so-called 3 way F1's (we make about 600 / year) are increased in the greenhouse to produce F2 seed, the first generation that we grow in the field. In the F2 we screen plants on visual characteristics like height, maturity, and disease resistance. Individual heads are harvested and the seed is planted back the next year as F3 headrows (about 25-35,000 /year). This process is continued until the F5 when we plant yield plots at two locations: Lexington and Schochoh, in Logan county. So it is not until 5 years after the cross that we actually measure grain yield in a line. From that point on, until F10, it is a matter of testing, selection and purifying. By F11, we should have 5-10 bushels of Breeder Seed to turn over to the Kentucky Foundation Seed Project. From that seed, certified seed will eventually be produced for the farmer to grow.

Varieties

We recently released 'oster', a high yielding, disease resistant soft red winter wheat. Foster was released exclusively to Agripro Seeds, Inc., due to a lack of interest among seed producers in marketing and promoting a public variety.

We currently have another variety under increase which will be released this spring. The variety has not yet been named. Exclusive marketing rights to the variety have not yet been awarded. The trend toward exclusive release has been seen throughout the country, and is a response to the changing dynamics of the seed industry. Our primary commitment is still to deliver superior varieties to the Kentucky wheat farmer by the most effective means possible.

Other research

Head Scab: Fusarium head blight, or head scab, is a devastating disease that can completely eliminate the profitability of growing wheat. Kentucky farmers felt the severe effects of this disease in 1991, and every year since then, at least part of the state has been hit hard with head scab. We are now screening adapted varieties, advanced breeding lines, and exotic wheats for resistance or tolerance to scab. This work takes place in the field, under sprinkler irrigation, and in the greenhouse in a moisture chamber. We are looking for: (1) resistance to initial infection, and (2) resistance to spread throughout the head. This sort of research is occurring throughout the eastern wheat region and the northern and southern great plains. There is a national effort to secure money from Congress to combat this serious problem.

No-Till Variety Trials: The KSGGA has adopted the goal that 75% of Kentucky's wheat acreage should be planted no-till by 2005. With that in mind, we are beginning to look at comparative variety trials planted under no-till and conventional conditions. The wheat breeding program at the University of Kentucky is generously supported by checkoff funds awarded by the Kentucky Small Grain Growers Association and the Kentucky Small Grain Promotion Council.

For More Information, Contact:

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