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COLLEGE OF AGRICULTURE
Lexington, Kentucky 40546



COOPERATIVE EXTENSION SERVICE

Volume 4, Issue 5
May 1, 2000

University of Kentucky Wheat Science News

Considerations and Options Following Destruction of Wheat Affected by Wheat Streak Mosaic Epidemic

SPECIAL WHEAT STREAK MOSAIC ISSUE 2



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INTRODUCTION

Wheat streak mosaic virus, and in some instances a combination of that virus and wheat spindle streak mosaic virus, has devastated certain fields across southern Kentucky and perhaps elsewhere; the extent of the epidemic in the state is not fully known at this time. Background information on this virus disease and the vector that spreads it has been discussed in a recent Wheat Science Newsletter (Vol 4, Issue 4: April 25, 2000).

Farmers with severely diseased wheat crops are now considering which options they have and the ramifications, both current and future, associated with the decisions they make. There are, in fact, a great many considerations and concerns and these are addressed in this special issue. Authors for the various sections are listed under each sub-heading.

DISEASE CONSIDERATIONS

Don Hershman & Paul Vincelli
Extension Plant Pathologists

Overall, the news is relatively good here. Soybean is a non-host for both wheat streak mosaic virus (WSMV) and the wheat curl mite. Thus, no damage will occur to that crop if planted into a destroyed wheat crop. Sorghum is likewise not a significant host to either the wheat curl mite or the virus. Although corn can be infected by WSMV, our sources in Nebraska and Kansas, who deal with wheat streak mosaic on a regular basis, indicate damaging outbreaks of WSMV in corn are very rare, even when planted alongside infected wheat. Most corn hybrids grown in those regions are symptomless hosts for the virus, so even if infected, the virus is unlikely to damage yield or quality. We conclude that there is probably little risk for most Kentucky fields where corn follows wheat immediately. However, since we know there may be a small proportion of hybrids in our region that are sensitive to the virus, it may be wise to wait a week or two between destruction of the wheat and sowing of the corn crop. In Kansas and Nebraska, wheat streak mosaic can contribute to corn lethal necrosis when plants are doubly infected with maize chlorotic mottle virus and wheat streak mosaic. However, as far as we know, maize chlorotic mottle virus does not exist in the midsouth.

A much greater disease concern is in regards to future wheat crops. For example, if a producer should decide to plant wheat in a field next fall that was in a destroyed wheat crop this spring, there are certain disease “red flags” that are noteworthy. Firstly, if corn is planted following the destruction of wheat, and the hybrid used is late maturing, then another “green bridge” situation might be created which could encourage a new wheat streak mosaic problem in wheat. This, of course, assumes that corn was a carrier for the virus, which may or may not occur depending

upon how the corn crop was handled in relation to the old and new wheat crops.

Another possible problem is related to the fact that wheat would be in the same field in back to back years. This would significantly increase the risk of future disease problems caused by residue-borne pathogens, such as tan spot or soil-borne diseases, such as take-all. Risk of increased incidence of these problems exists regardless of whether corn, grain sorghum, or soybean was planted following the destroyed wheat crop this spring. The key is wheat being in the field during back to back seasons. This, of course, is only indirectly related to the original wheat streak problem.

The only other issue of a disease nature is in regards to stand establishment of any crop following destruction of wheat. In almost all cases, the replacement crop will be planted no-till and there will probably be an excessive amount of wheat residue to contend with when planting. This is primarily an agronomic problem, but a stressful environment for germinating seed could also result in increased problems with seed and seedling fungal diseases. For help in managing these diseases, you should consider planting seed which has been treated with a broad spectrum fungicide.

PLANTING INTO WHEAT INFESTED WITH WHEAT CURL MITE

Doug Johnson, Extension Entomologist

A number of questions have arisen concerning planting a new crop into wheat fields that are infested with wheat curl mite. This discussion will deal only with the likely affects of wheat curl mite and NOT any virus they might carry. To consider the possibility of disease movement see Don Hershman’s article.

The simplest and least risky alternative is to plant soybean into these fields. This is a non-

host plant and the mite will not be able to live on them. If you must plant corn, things get a little trickier.

If you wish to plant corn into wheat infested with wheat curl mites, there are several important points you need to consider:

- No one knows for sure exactly what will happen. This situation is largely unknown.
- Wheat curl mite will live on corn, but not nearly as well as on wheat.
- Corn infested with wheat curl mite will likely NOT suffer any yield damage.
- Corn infested with wheat curl mite will likely suffer from kernel red streak.
- Kernel red streak causes red streaking to nearly complete reddening of the pericarp.
- Kernel red streak is purely cosmetic and does not affect the grain quality, BUT is largely unknown to corn buyers in this area of the country. It is more common in the west.
- Kernel red streak is much more important in sweet corn, white corn and food grade corn.
- In order to rid a field of wheat curl mites, ALL of the wheat must be completely DEAD, NO GREEN TISSUE.
- Wheat curl mite will only live a day or so in the absence of live green tissue.

Here are your planting considerations as I see them at this time. If you want to do the most that you can do to avoid wheat curl mite (and hence kernel red streak) then the wheat residue you plant in to must be completely dead (described to me as crispy!) before any green corn tissue emerges. (See Jim Martin's article on choice of herbicides). If you are not concerned about kernel red streak, then the mites are not likely to cause you any yield or quality losses in field corn.

Remember, even if you do a good job of killing the wheat in your field, that field may

still be infested by wheat curl mites being blown in from surrounding areas. Of course, the numbers would be much smaller than planting into an infested field, so the risk would be much smaller.

My thanks to Dr.'s Phil Sloderbeck and Tom Harvey of Kansas State University, Dr. Gary Hein of University of Nebraska and Dr. Skip Nault of Ohio State University.

WEED MANAGEMENT CONSIDERATIONS

James Martin, Extension Weed Specialist

There are a number of factors to consider during the replacement of wheat with such crops as corn or soybeans. The following information discusses some of the weed management issues involved in this important process.

I. Rotational crop restrictions: Review the herbicides that have been applied to wheat to determine if there are any rotational crop restrictions that will limit the opportunities to rotate to corn or soybeans. The wheat herbicides that are commonly used in Kentucky generally are not a major concern in regards to this issue. For example, crops such as corn and soybeans require a rotational interval of 45 days following Harmony Extra applications. Although this point may seem insignificant, check the labels of all products that were applied to verify that there are no potential risks of carryover injury to the replacement crop.

II. Use burndown herbicides for no-till plantings: Gramoxone Extra, Roundup Ultra, and Touchdown 5 are examples of burndown herbicides that can be used to control wheat prior to no-till plantings of corn or soybeans. Control and degradation of wheat vegetation tends to be more rapid with Gramoxone Extra compared with Roundup Ultra or Touchdown 5. For this reason, Gramoxone Extra may be the preferred option for eliminating the "green bridge" in a timely manner. However, Roundup Ultra or

Touchdown is more effective and may be a better choice than Gramoxone Extra where difficult-to-control weeds such as marestalk, smartweed, annual fleabane, and giant ragweed are present.

GRAMOXONE EXTRA: Gramoxone Extra's effectiveness in controlling wheat will depend on many factors, including timing of application and tank-mix partners. As a general rule, a single application of Gramoxone Extra alone without a tank-mix partner is less consistent in controlling wheat that is in the jointing stage compared with earlier or later plant growth stages. Including a tank-mix partner, such as atrazine or Canopy, will improve the likelihood of success and is highly recommended when wheat is in the jointing stage of growth. Rainfall within a few days after treatment is often needed to ensure root uptake and maximum activity from the tank-mix partner.

Since most plants have developed beyond the jointing stage, the chances of controlling wheat with Gramoxone Extra at 2 to 3 pt/A are good. The lower rate of 2 pt of Gramoxone Extra/A should be sufficient when tank mixed with atrazine at 1.5 qt/A or Canopy 75DF at 6 to 8 oz/A. It is advisable to wait 7 to 10 days after application to determine if a second application is needed, particularly when Gramoxone Extra is applied alone. (Do not exceed a total of 4.8 pt of Gramoxone Extra/A per season.)

Since Gramoxone Extra is a "contact herbicide" good spray coverage will be essential to achieving optimum control of wheat. A minimum spray volume in the range of 15 to 20 GPA will probably offer better control than lower spray volumes.

ROUNDUP ULTRA and TOUCHDOWN 5 : Roundup Ultra and Touchdown 5 are translocated herbicides and generally do not need the help of a tank-mix partner to control wheat. Control with these products tends to be slow and will require several days, if not

weeks, before wheat is "completely dead". Although the unusually warm temperatures that has occurred recently will speed up the control from these herbicides, the process is substantially slower compared with the results from Gramoxone Extra.

Research indicates that wheat can be controlled when these herbicides are applied at rates ranging from 1 to 1.5 lb ai/A. These rates would be equivalent to Roundup Ultra at 2 to 3 pt/A or Touchdown 5 at 1.6 to 2.4 pt/A. In many instances, a volume of 10 to 15 GPA will probably be adequate for applying Roundup Ultra or Touchdown 5.

Antagonism can sometimes occur when Roundup Ultra or Touchdown 5 are tank mixed with other herbicides. Increasing the rate of the burndown herbicide usually helps overcome this antagonism. Including dry ammonium sulfate as an additive at 1 to 2 % by weight (8.5 to 17 lbs/100 gal spray mixture) may improve control, especially when tank mixed with certain residual herbicides. A nonionic surfactant at a rate of 0.25% v/v may be included with Touchdown 5, but should not be included with Roundup Ultra.

III. Forage Considerations: Removing the wheat for hay may be an option for growers who have the proper equipment. Before considering this option, growers should review the labels of all pesticides that were applied to the wheat to determine if restrictions limit the opportunity for this method. For example, wheat treated with Harmony Extra should not be harvested and fed as hay for livestock, however, straw may be used for bedding and/or feed.

The stubble that is left after removing the hay will likely develop new tillers that need to be controlled with a burndown herbicide (see previous comments on burndown herbicides). These herbicides need to be applied to actively growing vegetation to achieve optimum control. Therefore, allow time for 2 to 4 inches of new growth to develop,

particularly where stubble has been clipped short. Raising the cutter bar will leave more green vegetation for herbicide uptake and limit the need for regrowth. This strategy may be particularly beneficial where there are a lot of broadleaf weeds in the wheat.

IV. Weed Control in the replacement

crop: The method that is used in managing the wheat vegetation during the transition process can impact weed control in the replacement crop. Using no-till plantings into standing wheat vegetation that has been killed with a burndown herbicide can be beneficial for weed control in the replacement crop. Aside from the minimal amount of tillage that occurs during the no-till planting process, the soil is essentially left undisturbed and creates a stale seed bed. In addition, the wheat vegetation can provide shading and other possible benefits that limit emergence and growth of weed seedlings. Methods that involve tilling the soil or removing the vegetation for hay will probably provide a favorable environment for weeds by promoting germination of certain weed seeds and allow more sunlight for growth of young weed seedlings.

Herbicides will play an important role in the control of weeds in the replacement crop. In addition to the residual herbicides that can be applied with the burndown treatment or applied to conventionally tilled soil, there are numerous postemergence herbicide options available for corn and soybeans. Consult the University of Kentucky's Weed Control Recommendations (Extension publication AGR-6) for options.

AGRONOMIC MANAGEMENT CONSIDERATIONS

James Herbek
Extension Grain Crop Specialist

If the existing wheat crop has been severely damaged by Wheat Streak Mosaic, the best available option is to plant a replacement crop (corn, soybeans or even grain sorghum). Once the decision has been made to plant a

replacement crop, there are three options for removal/eradication of the existing wheat crop: 1) Tillage; 2) Utilize the wheat as a cover crop for no-till planting of the replacement crop; and 3) Remove wheat for a hay crop and no-till plant the replacement crop. Each of these three options has advantages and disadvantages.

It would be difficult for tillage to destroy 100% of the existing, tall wheat crop unless a moldboard plow was used. With today's conservation farming practices, a moldboard plow is rarely used. If the existing wheat crop is not completely destroyed, any surviving wheat plants would serve as a "bridge host" for the replacement crop and/or for next fall's wheat crop. Removal of the wheat as a hay crop and then using tillage for the replacement crop would likely have greater success in destruction of the existing wheat stubble. However, this would eliminate any residue cover for conservation planting of the replacement crop. Also, several costly tillage operations may be necessary, particularly if the wheat crop is not used for hay, to eradicate all, if not most, of the wheat crop. Tillage would be the least preferred method because of costly multi-tillage operations and also elimination of conservation farming practices.

Utilizing the wheat as a cover crop for no-till planting of the replacement crop would seem a logical option. A good "burndown" should be achieved because of the great vegetative mass of the wheat crop. It is suggested that the "burndown" occur at least a week prior to planting the replacement crop so that no green wheat plant tissue is present (to serve as a "bridge host") after the replacement crop has emerged. The chemically killed wheat cover crop would provide an excellent habitat cover for voles which, if present, would damage the replacement crop. We would not expect most wheat fields to have existing vole problems. However, wheat fields should be inspected to determine if voles are present. If they are, then removal of the wheat crop for hay or tillage may be preferred options.

The wheat crop could be removed and used for hay. (Review the labels of any wheat pesticides used to determine if there are restrictions for hay use). However, if the replacement crop is to be no-till planted into the remaining wheat stubble, there are important management considerations. If you plant immediately after removal of the wheat hay crop, you may not achieve a 100% “burndown” kill of the remaining wheat stubble because of less wheat vegetation remaining for reception of the “burndown” spray. If not killed, wheat regrowth (even if limited) would be a “bridge host” for wheat and mites for the replacement crop. To ensure a better “burndown” of the wheat stubble after the wheat hay has been removed, it would be best to delay planting of the replacement crop to allow some wheat regrowth so a better “burndown” could be achieved. The potential disadvantage is that the delayed planting may cause a yield reduction for the replacement crop if planting occurs after the optimum planting date.

What is the last planting date for optimum yield potential in Kentucky for each of the replacement crops before yield reductions occur? For corn it is mid-May; for soybeans it is mid-June; and for grain sorghum it is early June. Thus, if replacement crop planting is delayed, soybeans and grain sorghum allow more flexibility.

What is the best replacement crop to use? This will vary and be different for each producer. There are several things a producer should consider in choosing a replacement crop. These are: 1) Economic analysis of the replacement crop enterprise; 2) Susceptibility of the replacement crop as a host for the Wheat Curl Mite/Wheat Streak Mosaic; 3) Planting Date and its relation to yield potential for each replacement crop; and 4) How the replacement crop fits in the cropping system rotations for each field.

Should there be any change in variety maturity considerations for the replacement crops? No, not if these crops are planted at a

reasonable time and plantings are not greatly delayed. If corn is planted after June 1, early to medium maturity hybrids should be planted. For soybeans, use varieties from maturity groups adapted to your area for plantings made through the end of June.

FERTILITY CONSIDERATIONS FOR ANOTHER CROP

Lloyd Murdock, Extension Soils Specialist

The lime, phosphorus and potassium needs for planting of a full season crop of either corn or soybeans will already be sufficient if the fertility needs for the planned wheat and double-cropped soybean crops were sufficient by either a high soil test of the nutrients or by adding fertilizer and lime to a low or medium testing soil.

If the above is true, the only thing that will change will be the nitrogen recommendations. For soybeans, there would be no change since nitrogen is not needed.

The nitrogen recommendations for corn should be altered based on the amount of nitrogen added to the wheat crop. Not all of the nitrogen added to the wheat will be available for the corn. The nitrogen in the wheat, when it is destroyed, will not be available to the corn. Even though there is nitrogen in the wheat, research indicates that the wheat decomposes so slowly, due to a high carbon to nitrogen ratio, that much of the nitrogen will not be released in time for a planted corn crop. This is especially true since the stage of wheat growth is well advanced in this situation.

A safe and conservative way to credit the nitrogen for the coming corn crop would be as follows. First, we assume that the wheat crop presently contains about 50 lbs of nitrogen per acre. This is based on poor growth for a field and expected nitrogen uptake under these conditions:

- 1) **Split Spring Applications**
Credit no nitrogen from a fall application or

the February application and give full credit to the March application for the coming corn crop.

2) **One Spring Application in February**

If all the nitrogen was added in February, only credit 2/3 of that added in February above 50 lbs/ac. So, if 110 lb/ac was added in February, credit only 40 lbs/ac for the corn.

3) **One Spring Application in March**

If all the nitrogen was added in March, subtract 50 lbs/ac from that amount and credit the rest to the planted corn crop. So, if 110 lbs/ac was added in March, credit 60 lbs/ac for the corn.

**DESTROYING YOUR WHEAT CROP:
SOME ECONOMIC CONSIDERATIONS**

Dick Trimble, Extension Economist

If agronomic evaluation of your Wheat Streak Mosaic infected wheat crop has resulted in the decision to destroy the crop, there may be some other considerations that should be made. First, if there was a Crop Insurance Policy covering the crop, the agent or a responsible representative of the Company should be notified of the potential crop loss to determine if this loss is covered by the policy. If it is, then the agent or adjuster should be able to advise you of all the required documentation that must be made to provide required proof of economic loss from the disease. This must be done before the crop is destroyed.

Following the destruction of the existing wheat, the next decision to be made is which crop will be used to replace it. This decision may already have been made. If not, you may want to consider the potential costs and returns from the most likely replacement candidates: corn or soybeans. The easiest way to make this comparison might be through the use of an enterprise budget for each crop. If you have a computer and access to the Internet or World Wide Web (WEB), Kentucky Field Crop Enterprise Budgets are available at the following address:

http://www.uky.edu/Agriculture/AgriculturalEconomics/on_data.html#aec

These budgets can easily be downloaded and used to compare the cost and returns that might be expected from various potential crops that might be used to replace the destroyed wheat crop. If you do not have a computer or access to the WEB, your County Extension Agent should be able to help you with these enterprise budgets.

As you go about comparing any replacement crops, make certain to consider the implications from the wheat crop that was just destroyed. There may be adjustments that should be made to the seed, fertilizer, and pesticides requirements and resulting production costs for the replacement crop from those made in a "normal" enterprise budget. In particular, the fertility requirements of the replacement crop may be partially provided by the destroyed wheat crop. Also, the expected market prices of replacement crops may have changed since any enterprise comparisons may have been made earlier in the season. If so, these prices should also be changed to reflect this revised outlook information for the potential replacement crop.

The development of Wheat Streak Mosaic may have created a disaster for your wheat crop. However, as you strive to recover from this disaster, be sure you do not make some hasty, poorly thought through decisions that simply perpetuate the problem.

FEEDING CONSIDERATIONS

Roy Burris, Extension Beef Cattle Specialist

The affected hay is safe to feed. However, when wheat begins to mature, its nutritional value will decrease rapidly. Affected wheat hay should be cut as soon as possible now. Feeding value can be determined by forage analyses.

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