



KENTUCKY PEST NEWS

ENTOMOLOGY • PLANT PATHOLOGY • WEED SCIENCE

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TOBACCO

CURRENT BLUE MOLD STATUS

by William Nesmith

Although several disorders and infectious diseases are present in tobacco transplant production systems, I am aware of no cases of blue mold in Kentucky. The extreme eastern sections of Kentucky may have received spores from the North Carolina activity early last week. Centers of active blue mold are established in Florida, Georgia, North Carolina, and Texas.

Kentucky tobacco producers are urged to maintain weekly fungicide applications of either Dithane or Ferbam in all transplant production systems until all plants from the site have either been transplanted or destroyed. This is needed to control blue mold and anthracnose. Do not allow abandoned transplant sites to become harboring sites for blue mold.

Transplanting is underway in Kentucky, which will greatly increase the potential for a blue mold spore blowing into the state to land on a tobacco plant. Acrobat MZ, Dithane DF, Ridomil Gold, and Ultra Flourish are labeled for use in the field. Ridomil Gold and Ultra Flourish will only control strains sensitive to mefenoxam/metalaxyl. Dithane DF has only protectant activity. Acrobat MZ has both protectant and systemic activity; furthermore, it is a very strong antisporeulant. Therefore, Acrobat MZ is the fungicide of choice in dealing with blue mold.

As of press time, the plant inducer Actiguard still had not been labeled. Labeling is anticipated soon, however.

Quadris is not labeled for tobacco and labeling is not anticipated this year. It is my understanding that Messenger recently received an Experimental-Use label for tobacco. I have no other information about its status or efficacy, however.

WHEAT

DISEASE CONSIDERATIONS FOLLOWING DESTRUCTION OF WHEAT AFFECTED BY WHEAT STREAK MOSAIC

by Don Hershman and Paul Vincelli

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. Growers with wheat crops having a high proportion of stunted plants are likely to destroy those fields and plant another crop.

Farmers with severely diseased wheat crops must consider which options they have and the ramifications, associated with the decisions they make. There are, in fact, a great many agronomic and economic considerations and concerns, but overall, the disease news is not bad relative to planting a replacement crop. 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) and closer to home indicate damaging outbreaks of WSMV in

corn are very rare, even when planted alongside infected wheat. Most corn hybrids are not affected or are symptomless hosts for the virus, so even if infected, the virus is unlikely to reduce yield or quality. We conclude that there is probably little risk for most Kentucky fields where corn follows wheat immediately. However, there may be a very small proportion of hybrids in our region that are sensitive to the virus, so it may be wise to wait a week 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.

One final word. Wheat spindle streak mosaic is still very common throughout Kentucky. Many farmers are erroneously confusing that virus disease with wheat streak mosaic. And in some cases, both viruses are present. We even had one field that was positive for wheat barley yellow dwarf, in addition to wheat streak mosaic and wheat spindle streak.

Although symptoms associated with a serious wheat streak mosaic problem (i.e., one that would justify crop destruction) are fairly distinctive, mild infections of both viruses can look pretty similar. As a practical matter, neither virus will do much damage when it appears late in crop development. However, more damage is likely to occur when wheat streak is involved. The only real way to be certain which virus is

involved is to test tissue by ELISA. This test is available though the UK Plant Disease Diagnostic Laboratories, as well as some private sources. In the field, a positive diagnosis cannot be made. However, if plants do NOT show any virus symptoms in the lower plant canopy, but symptoms are evident in the upper leaf or two, then the disease is most likely wheat streak mosaic. Wheat spindle streak is almost always evident in the lower plant canopy, especially if symptoms are can still be seen at heading. In addition, the leaf streaks associated with wheat spindle streak mosaic often, but not always, have a spindled shape with a green island in the center of the spindles. But my experience is that this is not always the case. As a result, the “streaks” associated with wheat spindle streak and wheat streak mosaic can look similar. Again, positive identification/differentiation requires a specific ELISA test.

PLANTING INTO WHEAT INFESTED WITH WHEAT CURL MITE

by 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 effects 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 probably will 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 into 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. 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 by 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 5 is more effective and may be a better choice than Gramoxone Extra where difficult-to-control weeds such as marehail, 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 by James Herbek

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**

by 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.
- **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 by 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 by 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.

VEGETABLES

HOME GARDEN DISEASE MANAGEMENT by John Hartman

This time of year, backyard gardens are being planted all over Kentucky. Garden vegetables are vulnerable to diseases, many of which can lead to a loss of the crop. Experienced gardeners are aware that how they grow their vegetables will influence the diseases that appear in their crop. Thus, Kentucky gardeners will want to use growing practices which will deter diseases.

A most important principle of gardening is not to let diseases get started. Cultural practices need to be integrated to: a) keep pathogen populations low, b) slow the disease spread and development, c) improve the plant's resistance or tolerance to diseases where possible, and 4) reduce disease-favorable environments. The following principles of plant disease management can be used in the vegetable garden.

Resistance. There are many vegetable varieties that are resistant to diseases. For example, gardeners can plant VFN tomatoes resistant to Verticillium and Fusarium wilts and to root knot nematode. Virus resistant beans, bacterial wilt resistant sweet corn, and bacterial wilt resistant cucumbers are available. Host plant resistance is an economical and dependable way to manage diseases.

Exclusion or avoidance. Begin the garden planting season with certified, disease-free seeds and transplants. Buy seeds and transplants from a reputable grower. At the garden center selling transplants, inspect the plants to be sure that they are not also carrying diseases. Some gardeners, in an effort to preserve heirloom varieties, will save seed from one season to the next. Before using such seeds this year, ask the question: Were these seeds harvested from healthy plants? Diseases can also be avoided by choosing a garden site with well-drained soil to avoid root rot diseases and by choosing a site that is in full sun to avoid diseases favored by the high humidity of a shady site.

Eradication. One form of eradication is crop rotation. By planting a crop different from the previous year's crop in a

part of the garden, the pathogens of the previous crop may die out for lack of a suitable host plant upon which to feed. Crop rotation probably reduces losses from more diseases than any other single cultural practice. With crop rotation, it is important to not plant crops from the same group in consecutive years because crops from the same group are susceptible to the same diseases. Grouping vegetables for crop rotation: a) potatoes, eggplant, tomatoes, and peppers; b) peas, snap beans, lima beans, and edible soybeans; c) cabbage, cauliflower, kale, collards, Brussels sprouts, broccoli, kohlrabi, turnips, rutabaga, Chinese cabbage, and mustard; d) pumpkins, squash, watermelons, cucumbers, and muskmelons; e) sweet corn; f) chives, garlic, leeks, onions, and shallots; g) beets, Swiss chard, and spinach; f) carrots, parsley, celery, celeriac, and parsnips; and g) endive, salsify, and lettuce.

Sanitation. If it wasn't done last fall, be sure to clean up the residue from last year's garden before planting. Clean up tools and garden equipment. Leftover garden residue and dirty tools can be sources of diseases.

Protection. Many home gardens don't need chemicals for protection of the crop from plant diseases, especially if good cultural practices are used. If spraying is to be done, however, one needs to know what fungicides to use and the best timing for application. Be aware that complete spray coverage is essential to protect plants from fungal and bacterial infections. Repeat applications may also be needed.

Insect and Weed Control. Weeds are a source of many vegetable diseases especially those caused by viruses; for example bean yellow mosaic virus may be found in clovers growing near the garden. Weeds in and near the garden must be managed to reduce diseases. Insects vector several bacterial and viral diseases of vegetables; for example cucumber beetles carry the bacterial wilt pathogen to cucumbers and cantaloupe. Managing insect vectors will also reduce spread of diseases in the garden.

LAWN & TURF

FUNGICIDAL CONTROL OF GRAY LEAF SPOT by Paul Vincelli

Gray leaf spot caused by the fungus *Pyricularia grisea* has emerged in recent years as an extremely destructive diseases of perennial ryegrass. Epidemics typically do not begin until early August or later in Kentucky, and then only during periods of warm, humid weather. However, now is a good time to begin planning a spray program for the disease. A well-managed spray program is a rather costly investment, and this may require that superintendents work with their greens committees now to build a consensus in support for this expense.

Table 1 provides my judgement of the efficacies of labeled products against gray leaf spot, based on all of the research data available to me to date. More complete information on the basis for these ratings will be published in an article in the June issue of *Golf Course Management*.

An Example Spray Program for Kentucky

Unfortunately for superintendents, the most effective fungicides against gray leaf spot (Table 1) are also the most

costly to apply (Table 2). Thus, superintendents have an economic incentive to use the most effective products in the wisest way possible.

Besides cost, another factor to consider in designing a spray program is to avoid overuse of products with a significant risk of resistance development. As a pathogen of rice, *P. grisea* is notoriously adaptable to new control strategies. I may be overly pessimistic, but I expect *P. grisea* to be genetically quite capable of developing resistance to all of the systemic fungicides currently labeled against it. The question in my mind is not *whether* this fungus will develop resistance to these fungicides but *when*.

Thus, one's spray program should integrate at least three objectives: acceptable preventive control, reasonable cost, and resistance management. Given all these issues, one reasonable approach for Kentucky courses for the upcoming season would be to begin by spraying the Banner MAXX/Daconil Ultrex tank-mix sometime around July 15-20. This provides a good level of protection so that superintendent can sleep soundly should the disease begin activity.

Two weeks later, when disease pressure has the potential to increase greatly, select Heritage, Spectro 90WG or Cleary's 3336 for the second application, since these would be expected to provide the best control should high disease pressure develop. Because of the high disease potential at that time of year, the third spray would ideally still be selected from among these or related products, but the systemic component would have a different mode of action than the previous spray. For example, if one chose to spray Spectro 90WG or Cleary's 3336 (both of which contain thiophanate-methyl) for the second application, then choose a strobilurin like Heritage for the third application. Having made these sprays should carry a superintendent through until about Labor Day.

After Labor Day in Kentucky, fungicide protection is still often needed, but not necessarily so. In an epidemic year like 1998, aggressive disease progress can occur in Kentucky even in the latter half of September in mature turf. In years like that, fungicidal protection is necessary in established swards through the entire month. However, even then, it should be possible toward the latter half of the month to use products or tank-mixes that are not necessarily in the highest efficacy group listed in Table 1. In other seasons, it is possible to withhold fungicide sprays sometime after Labor Day if the overall disease pressure has been low to moderate and the weather turns cool and dry.

Additional Comments

In the example spray program outlined above, three applications would provide protection from mid-July through Labor Day, with a very strong emphasis on resistance management. Each application used a different systemic fungicide, representing different fungicide groups with distinct biochemical modes of action (see the Extension publication PPA-1, Chemical Control of Turfgrass Diseases 2000, for more information on fungicide groups). In two of the three applications, the systemic fungicide was in mixture with chlorothalonil, a multisite inhibitor with essentially no significant risk of resistance.

Scouting for the disease may enhance one's timing of

fungicides, but there are several reasons why I would not use scouting as a substitute for a preventive spray program, at least in the period of highest disease pressure from August through early September. For one, several studies show that a spray schedule based on calendar date currently can be as effective as initiating sprays when lesions are first detected. Second, it is extremely difficult to positively identify gray leaf spot without a laboratory analysis. Third, the very rapid rate of disease progress under ideal conditions for disease development presents another complication, and once a substantial amount of blighting has occurred, a curative spray program may provide unsatisfactory results. Unfortunately, at this time we do not have a predictive system that can reliably identify periods when fungicide protection is necessary, although perhaps one will be available in the future.

Finally, minimize disease pressure through cultural practices to the extent possible. While these alone will not control the diseases, they will reduce the chance of a resistant strain by reducing the size of the pathogen population. If fertilizing during the period from June through August, foliar feed with no more than 0.1 to 0.25 lb soluble nitrogen/1000 ft² during that period. Schedule irrigations near sunrise and avoid evening irrigation.

Table 1. Efficacy of Fungicides Against Gray Leaf Spot

Efficacy Category	Product	Rate	Interval (Days)
Excellent under <i>high</i> disease pressure	Heritage 50WG	0.4 oz	21
	Cleary's 3336 50WP	6-8 oz	14
	Fungo	6-8 oz	14
	Spectro 90 WDG	8 oz	14
Good under <i>high</i> disease pressure	Compass 50WG	0.2 oz	14
	Banner MAXX + Daconil Ultrex	1 fl oz 3.7 oz	14
Good under <i>light</i> to <i>moderate</i> disease pressure	Daconil Ultrex	3.7 oz	7-10
	Banner MAXX	2 fl oz	14
No efficacy	Chipco GT Prostar 70WP		

Table 2. Fungicide Costs for Gray Leaf Spot

Product	Rate	Spray Interval (days)	Cost per Application (\$/1000 sqft)*	Treatment cost per day
Daconil Ultrex 82.5WDG	3.7 oz.	10	20.60	0.21
Compass 50WDG	0.2 oz	14	3.38	0.24
Banner MAXX 1.24MEC	2 fl oz	14	3.82	0.27

Banner MAXX 1.24MEC + Daconil Ultrex 82.5WDG	1.0 oz 3.7 oz	14	3.97	0.28
Heritage 50WG	0.4 oz	21	8.62	0.41
Cleary's 3336 50WP	6 oz	14	7.44	0.53
Spectro 90WDG	8 oz	14	8.75	0.63

* Based on prices in Lexington in April, 2000.

HOUSEHOLD

IS YOUR HOME ATTRACTING TERMITES?

By Mike Potter

In a recent survey of 674 Kentucky households, 93 percent expressed concern over finding termites in their homes. The entomology department receives many calls from people wanting to know what can be done to protect their largest investment – or if a certain practice or condition is likely to cause termite problems. Homeowners can reduce the risk of termite attack by following these suggestions.

1. Eliminate wood contact with the ground. Many termite infestations result from structural wood being in direct contact with the soil. Earth-to-wood contact provides termites with easy access to food, moisture, and shelter, as well as direct, hidden entry into the structure. Wood siding, porch steps, latticework, door or window frames, posts and similar wood items should be at least six inches above ground level. Eliminating wood-to-ground contact may require regrading or pulling soil or mulch back from the foundation, cutting the bottom off of siding, or supporting steps or posts on a concrete base. Posts or stairs embedded in concrete are also vulnerable to termites since they usually extend all the way through the concrete to the soil. Wood that has been pressure treated is not immune to termite attack; termites will enter pressure-treated wood through cut ends and cracks, and will also build tunnels over the surface.

2. Don't let moisture accumulate near the foundation. Termites are attracted to moisture and are more likely to “zero in” on a structure if the soil next to the foundation is consistently moist. Water should be diverted away from the foundation with properly functioning gutters, down spouts and splash blocks. Leaking faucets, water pipes and air conditioning units should be repaired, and the ground next to the foundation should be graded (sloped) so that surface water drains away from the building. Homes with poor drainage may need to have tiles or drains installed. Lawn sprinklers and irrigation systems should be adjusted to minimize puddling near the foundation.

3. Reduce humidity in crawl spaces. Most building codes call for 1 square foot of vent opening per 150 square feet of

crawlspace area. For crawlspaces equipped with a polyethylene vapor barrier (see below), the total vent area often can be reduced to 1 square foot per 300 to 500 square feet of crawl space area. One vent should be within 3 feet of each exterior corner of the building. Shrubs, vines and other vegetation should not be allowed to grow over the vents since this will inhibit cross-ventilation. Moisture and humidity in crawl spaces can further be reduced by installing 4-6 ml polyethylene sheeting over about 75 percent of the soil surface.

4. Never store wood or paper against the foundation or inside the crawl space. Firewood, lumber, cardboard boxes, newspapers, and other cellulose materials attract termites and provide a convenient source of food. When stacked against the foundation they offer a hidden path of entry into the structure and allow termites to bypass any termiticide soil barrier that is present. Vines, trellises, and other dense plant material touching the house should also be avoided. Dead stumps and tree roots around and beneath the building should be removed, where practical, along with old form boards and grade stakes left in place after the building was constructed.

5. Use mulch sparingly, especially if you already have termites or other conducive conditions. Any cellulose-containing material, including mulch, can attract termites. Termites are especially attracted to mulch because of its moisture-retaining properties which, of course, is one of its fundamental benefits to landscape plants. Where mulch is used, it should be applied sparingly (2-3 inches is usually adequate), and should never be allowed to contact wood siding or framing of doors or windows. Since the moisture associated with mulch is probably as much or more of a termite attractant than the wood itself, it makes little difference what type of mulch is used, e.g., cypress, pine bark, etc. Crushed stone or pea gravel improves drainage and has no nutritional value to termites, and therefore may be less attractive – though cosmetically unappealing to most homeowners. These materials will also reduce problems with pests such as millipedes, pillbugs, earwigs and crickets.

6. Consider having the structure treated by a professional pest control firm. While the measures outlined above will make a house less attractive to termites, the best way to prevent infestation is to treat the soil around and beneath the building with a termiticide. Buildings have many natural openings through which termites can enter, most of which are hidden. Soil treatment makes the ground around the foundation repellent and/or toxic to termites so that they will not penetrate through the treated layer. Baits may also be installed to eliminate termites foraging in the vicinity of the structure (See Entfact-644, *Consumer Update: Termite Baits*, and ENT-65, *Termite Baits: A Guide for Homeowners*).

Preventively treating a home for termites is a reasonable investment, especially if the structure has no prior history of treatment. If the building was previously treated by a pest control firm, it's a good idea to maintain the service agreement by paying the annual renewal fee. Should termites re-infest the building (which can happen even if the initial treatment was performed correctly), the company will return and retreat the affected area at no additional charge.

Whether or not a person chooses to have their home treated,

they should know the signs of termite infestation:

! pencil-wide mud foraging tubes extending over the surfaces of foundation walls, piers, sills, joists, etc.

! presence of winged “swarmer” termites, or their shed wings in window sills and along the edges of floors.

! damaged wood hollowed out along the grain and lined with bits of mud or soil.

Detecting hidden infestations requires a trained eye. (Less than 10 percent of householders in our previously mentioned survey were familiar with the telltale signs of termites.) Most pest control firms perform termite inspections free of charge and will alert the homeowner to any conditions they uncover that are conducive to termite attack.

DIAGNOSTIC LAB HIGHLIGHTS **by Julie Beale and Paul Bachi**

We are seeing many wheat samples in the Diagnostic labs recently, with virus problems being the most common and including barley yellow dwarf, wheat streak mosaic and wheat spindle streak mosaic. Powdery mildew has also been seen on wheat and on brome grass. On tobacco, we continue to see Pythium root rot, Rhizoctonia damping-off, target spot and Sclerotinia crown rot.

On fruits and vegetables, diagnoses have included peach leaf curl on peach and nectarine; orange rust on blackberry; fire blight on pear; Fusarium crown rot on asparagus; and Sclerotinia on lettuce.

On ornamentals, we have seen leaf spot (Heterosporium) on iris; rust on hollyhock; Botrytis blight on peony; leaf spot (Entomosporium) on photinia; black spot and rose rosette on rose; spot anthracnose on dogwood; and leaf spot (Drechslera) on tall fescue.

INSECT TRAP COUNTS

UKREC, Princeton, KY - April 21-28, 2000

Black cutworm	7
True armyworm	85
Corn earworm	0
European corn borer	0

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COOPERATIVE EXTENSION SERVICE

NOTE: Trade names are used to simplify the information presented in this newsletter. No endorsement by the Cooperative Extension Service is intended, nor is criticism implied of similar products that are not named.