COOL, WET WEATHER REDUCES MYCOTOXIN RISKS
by Paul Vincelli

The cool, wet weather that prevailed for much of the growing season in most areas was good news from the standpoint of mycotoxins. Although typically mycotoxins are not a serious and widespread problem in Kentucky, there are instances where they can cause unacceptable levels of contamination in corn. Mycotoxins are toxic substances produced by fungi.

Aflatoxins are probably the most well-known mycotoxin, because they have been regulated by the US. Food and Drug Administration for the longest period of time. Aflatoxins are quite rare in Kentucky corn as it comes out of the field. When they occur in the field, they do so only in crops that were exposed to sustained drought stress and high temperatures during grain fill. Given the weather experienced this growing season, we would not expect to find aflatoxins in the 2003 corn crop. However, aflatoxins, like other mycotoxins, can accumulate in corn in storage, if environmental conditions permit, even if the corn was not contaminated with aflatoxins in the field. Spores (microscopic fungal “seeds”) of the aflatoxin-producing fungus can be present on the outside of kernels as the grain is harvested and stored. By themselves, the spores do not produce significant levels of aflatoxins. However, when warm, moist conditions develop in storage, the spores can germinate and infect the harvested grain, which can then result in contamination with aflatoxins. There was a case from western Kentucky this past summer of milk that had to be dumped because of aflatoxin contamination for the 2002 crop. Thus, always be sure to store corn properly to reduce the risk of mycotoxin buildup in storage.

Fumonisins are another type of mycotoxin of occasional concern to Kentucky producers. This is probably the most common mycotoxin in Kentucky corn crops, although most corn crops are free of significant levels of fumonisins, even in a high-risk year. Hot, dry weather and drought stress prior to and during silking, followed by period of high humidity, have been associated with many outbreaks of fumonisin contamination in corn. Kernel damage and breakage can also enhance the risk of Fusarium ear and kernel rot, which can lead to fumonisin contamination. The weather that many areas of Kentucky experienced in 2002 was much more conducive to pre-harvest fumonisin contamination than the 2003 growing season. Thus, I expect very few problems with fumonisins in corn coming out of the field this year. However, as always, proper storage is important. The kernels of many, many corn crops are contaminated with the spores of fumonisin-producing fungi. Like aflatoxin, the spores of fumonisin-producing fungi do not produce enough fumonisin to ever cause significant contamination. However, if the stored corn is held under moisture contents above 18%, this allows spores to germinate and grow into the corn. It is this growth that can result in high levels of fumonisins.

Several Extension resources are available on these complex subjects. For more information, see the following:
Moldy Grains, Mycotoxins, and Feeding Problems. 
<http://www.oardc.ohio-state.edu/ohiofieldcropdisease/Mycotoxins/mycopage default.htm>

Aflatoxins in Corn. 
<http://www.ca.uky.edu/agc/pubs/id/id59/id59.pdf>

Fumonisin, Vomitoxin, and Other Mycotoxins in Corn Produced by Fusarium Fungi. 
<http://www.ca.uky.edu/agc/pubs/id/id121/id121.pdf>

Various Extension publications on grain storage are available at <http://www.bae.uky.edu/ext/Publications/pubs_Grain.htm>.

MAKING SEED AND SEED TREATMENT CHOICES FOR CORN
by Ric Bessin

Many growers are needing to make their seed and seed treatment choices in the next few weeks as they place the seed orders for 2004. There are new types of Bt corn on the market this year that control various pests. Seed treatment choices include Gaucho, Prescribe, Cruiser, and two rates of Poncho. Unless these treatments are ordered with the seed, they cannot be applied on farm or at the dealership. These seed treatments are systemic and move through the seedling. Each of these will provide different levels of insect soil control at greatly varying out of pocket expense. While these do provide excellent levels of control of particular pests, it is driving up the cost of insect control. So how do growers decide what they will need in April 2004?

First, consider the seed treatments what pests are controlled with the different products on the market. The seed treatments differ in the level of control and possibly in the duration of control. For example, the Gaucho and Prescribe have the same active ingredient and both control corn flea beetle, but the higher rate with Prescribe provides control through the 5th leaf stage while Gaucho control flea beetles only through the 1st leaf stage of corn growth. All of the seed treatments should provide good control of wireworms, white grubs, and seedcorn maggot, but they different in control of cutworms and corn rootworm. The Poncho 1250 will provide the highest level of control among the seed treatments, but its price is comparable to a standard soil insecticide treatment. But for growers that do not have the equipment to make liquid or granular insecticide applications, this may be an effective alternative.

<table>
<thead>
<tr>
<th>Seed Treatment</th>
<th>WW</th>
<th>WG</th>
<th>FB</th>
<th>SCM</th>
<th>BCW</th>
<th>CRW</th>
<th>Cost/acre(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaucho</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>$3 to $5</td>
</tr>
<tr>
<td>Prescribe</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>Cruiser</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>Poncho 250</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>-</td>
<td>$4 to $5.50</td>
</tr>
<tr>
<td>Poncho 1250</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>$14 to $17</td>
</tr>
</tbody>
</table>

1 WW = wireworms; WG = white grubs; FB = flea beetle; BCW = black cutworm; CRW = corn rootworm.
2 These are only cost estimates, costs may vary considerably among seed suppliers and when using different seeding rates.
3 ‘-’ = minimal control; ‘+’ = controls light to moderate populations or only for a short period of time; ‘++’ = good control of moderate pest populations.

Cost per acre for many of the soil insecticides are determined by the rate of application per 1000 row feet and row spacing. Cost per acre with the seed treatments will vary with seeding rates. In other words, insect control costs with seed treatments will increase by 10 percent when seeding rates are changed from 28,000 to 30,800 kernels per acre. Using soil applied insecticides, the costs would remain the same per acre. Advantages with the seed treatments include reduced time to calibrate equipment and load insecticide boxes/tanks and the reduced potential exposure when handling insecticides.

Now lets look at the Bt corn alternatives available. Each of these provides high levels of control of the targeted pests, either corn borers, corn rootworms, or corn borers and corn rootworms. Herculex will control black cutworm, while the
others do not. As with the seed treatments, the cost varies with the level of pest protection and with the particular seed rate. Higher seeding rates result in high insect control costs.

<table>
<thead>
<tr>
<th>Bt corn type</th>
<th>ECB¹</th>
<th>SWCB</th>
<th>BCW</th>
<th>FAW</th>
<th>CRW</th>
<th>Cost per acre²</th>
</tr>
</thead>
<tbody>
<tr>
<td>YieldGard Corn Borer</td>
<td>++³</td>
<td>++</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>$7 to $9</td>
</tr>
<tr>
<td>Herculex</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>$10 to $12</td>
</tr>
<tr>
<td>YieldGard Rootworm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>$14 to $16</td>
</tr>
<tr>
<td>YieldGard Plus</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>+</td>
<td>++</td>
<td>?</td>
</tr>
</tbody>
</table>

¹ ECB = European corn borer; SWCB = southwestern corn borer; FAW = fall armyworm; BCW = black cutworm; CRW = corn rootworm.
² These are only cost estimates for the differential cost in comparison to similar hybrids without these traits, costs may vary considerably among seed suppliers and when using different seeding rates.
³ ‘-’ = minimal control; ‘+’ = controls light to moderate populations or only for a short period of time; ‘++’ = good control of moderate populations.

These Bt corn types and new seed treatments work well and can control a large number of insect pest problems to ensure uniform plant stands. But the important question to ask is what level of protection is needed for particular fields. Another way of stating the question is do you control all pests that you can control, or do you control only what you need to control? What level of risk can you tolerate, and what level of control can you afford to use? Both of the Bt and seed treatment strategies are preventive, growers need to select and use these often before they know what the level of pest pressure is (the exception is with corn rootworm where good scouting and threshold information is available). Growers that are able to select and use only those tools that are needed will be the most profitable. Every corn field in the state will not need Bt hybrid seed treated with a systemic soil insecticide.

**WHEAT**

**FALL INSECTS IN WHEAT**

by Doug Johnson

We are past wheat planting time for all but the very unlucky. It appears that we have escaped the onslaught of fall armyworm, although many folks establishing new fescue seedings did have a hard time. We should be past the date when Hessian fly adults are still laying eggs. However, we have not had sufficient cold weather to deal with aphid populations.

In my few field visits and in my plots I have seen very few aphids this fall. However, those that are present have not had much cold weather to deal with. Anytime the temperatures are above 50°F these creatures are able to feed, move about and reproduce. So if you have wheat, especially if you have early planted wheat, you should be scouting for this pest.

In some areas of the state a great deal of wheat was planted on the early side. This is generally before the “fly free date” which varies by location from Oct 10 to the 15th. If you planted before the “fly free date” you are at increased risk to problems associated with aphids.

Aphid feeding itself is not the problem, it is the movement of the virus complex that cause Barley Yellow Dwarf that is the risk. When wheat is planted too early we find:

& Aphids infesting at an early date,
& Aphids infesting at an younger growth stage,
& Larger numbers of aphids during the fall,
& More time for the virus to develop in the plants.

All of these factors lead to larger number of plants infected with BYD and much greater damage to each infected plant.

The onset of cold weather will slow down both the aphids and BYDV. But until that happens you are advised to check your fields for aphids on a routine basis. You may want to refer to the publication: Aphids and Barley Yellow Dwarf (BYD) in Kentucky Grown Wheat. You can find it on the web at:

http://www.uky.edu/Agriculture/Entomology/entfacts/fldcrops/ef121.htm
GREENHOUSE & LANDSCAPE ORNAMENTALS

BLACK ROOT ROT OUTBREAK IN PANSIES
by John Hartman

This past week, we observed dozens of pansy specimens with black root rot, caused by the fungus *Thielaviopsis basicola*. This disease has been appearing on bedding plant specimens in the Plant Disease Diagnostic Laboratory more frequently in recent years, especially in spring, and often again in fall. This recent epidemic is being observed in fall-planted pansies in flower beds in many Kentucky locations. It is likely that plants growing poorly now in flower beds were already infected at the time of planting. It is not unusual for poorly growing plants in flower beds to have evidence of black root rot on roots in the original soil ball of the transplant. Not all batches of transplants from the same greenhouse are infected with the fungus - some batches are clean while others are infected. This soilborne fungus also attacks other bedding plants such as begonia, geranium, petunia, primula, snapdragon, sweet pea, verbena, viola and many other plants. Other greenhouse crops such as cyclamen and poinsettia are also very susceptible. This is also a major disease of tobacco in Kentucky.

Symptoms and disease spread. Diseased roots may have black lesions or blackened root tips. Since the fungus begins by only rotting scattered roots throughout the root system, symptoms in the top of the plant may not appear until the plant is placed under stress. With the combination of root rot and stress, infected plants may show yellowing, stunting, dead areas on the leaves, and occasionally wilting or death. If plants are provided with excellent growing conditions (temperature, water, drainage, fertility), they may thrive and not show foliar symptoms despite having roots infected with the black root rot fungus.

The fungus develops highly resistant chlamydomespores, and as such is capable of prolonged survival in this resting spore stage and as a saprophyte in the absence of susceptible plants. Unfortunately, this fungus survives so well, that once it becomes established in the flower bed (or greenhouse), it is extremely difficult to eliminate. The fungus can be spread in water, in soil, by infected (or infested, but not necessarily diseased) plants, or vectored by soil-inhabiting insects such as fungus gnats and shore flies.

Disease management. A combination of cultural practices and avoidance of susceptible plants will be needed to reduce black root rot.
- Use only pathogen-free plants and plant into disinfested pots and trays containing pathogen-free growing medium or sterilized soil.
- Grow plants in well-drained growing medium or soil that is slightly acid (pH 5.5-6.0) and at warm temperatures.
- Use sanitary measures such as removing and destroying diseased plants in the greenhouse and when transplanting to flower beds.
- This fungus responds well to a two-year rotation to grass so where feasible in the landscape design, convert problem bed sites to grass for two years. Otherwise, rotate planting beds in the flower garden. Avoid susceptible plants such as alfalfa, astilbe, bean, begonia, catalpa, chickpea, cineraria, citrus, clover, cotton, cowpea, cyclamen, dianthus, elm, flax, fuchsia, gaillardia, geranium, gerbera, ginseng, holly, horseradish, jimson-weed, lentil, lilac, black locust, lupine, nightshade, okra, onion, oxalis, pansy, pea, peanut, peony, petunia, phlox, poinsettia, pothos, sesame, snapdragon, soybean, sweetpea, tobacco, tomato, verbena, vetch, vinca and watermelon.
- Avoid unnecessary stresses in growing the plants.
- In the greenhouse, drench the soil of new plantings with fungicides to prevent black root rot. Suggested fungicides include Banner, Chipco 26019, Cleary’s 3336, Domain, Duosan, Medallion, Terraguard, or Zyan. There are no chemical “cures” for black root rot; chemical drenches in outdoor beds are mostly ineffective and impractical.

SOME PREPLANT SANITATION CONSIDERATIONS FOR DISEASE CONTROL IN VEGETABLE GREENHOUSES
by William Nesmith

Sanitation is a very important part of greenhouse aspects of vegetable production. During on-farm visits to operations during the past two years, I have noticed that many of Kentucky’s growers are not giving this issue the attention it deserves - both new and established growers. Here are some preplant sanitation points that each should be considering, in my opinion.

First, transplant production is the most common use of small greenhouses in vegetable operations in Kentucky. Producing your own transplants is wise from the disease control standpoint, but only if one has sound disease control programs. Transplant production requires the highest level of sanitation, because failures result in major production problems in the field. I urge vegetable growers to use new trays/flats and new sterile media. Producing a disease-free transplant is extremely important to meeting market windows, quality and yield objectives.

Transplants should be produced in a separate
greenhouse from ongoing crop production to minimize worker contact with these plants and potential insect vectors. Never, never produce any stage of vegetable transplants in houses containing flowering plants. We have seen some very serious production problems with virus diseases that resulted from just a one week overlap of tomatoes and peppers with either hanging baskets, rooted cuttings, or perennials. Isolation of transplants at all stages will reduce the likelihood of disease spread.

Train workers not to utilize plants that encounter potential contamination and to think carefully about what they are doing. Last year, I encountered two severe epidemics of Pythium root rot in melon transplants that occurred as follows. In one case, the trays were seeded in one area then moved to their own greenhouse, except for a brief period when the trays were set on concrete which had become contaminated with soil from workers shoes. In another case, using plug-in-transfer, the germination trays became contaminated when they were carried on a cart recently used to carry dirty bricks to the steamer. In each of these cases, a readily available clean plastic sheets inserted between the contamination and trays could have prevented these disasters from Pythium.

Transplants should not be produced at ground level, but placed a foot or more above the soil level. This greatly reduces accidental contamination.

Some growers are trying to plant a second crop in the same media, especially the bag culture systems. That will most likely ultimately result in major problems.

At the end of any previous production, remove as much of the previous crop debris, media, and tray material as possible. Sweep brome-clean all fallen plant debris, media, etc. Do not discard it just outside the door (a very commonly observed mistake) as it will serve as a major source of pathogen inoculum. Instead, get is as far away from the greenhouse as feasible. Prior to production, treat all surfaces that will come in contact with media, irrigation, plants, etc with commercial disinfectants appropriate for the equipment involved, as well as tools used for pruning, media transport, pollinating etc. Remember, microbes have means to survive in dried soil on tools and surfaces between crops, as well as in irrigation equipment. Some disinfectants can damage sensitive equipment so check equipment manuals for a recommended disinfectant. Trough and trays should be thoroughly disinfested prior to being refilled.

Passive solarization can be very helpful in sanitizing greenhouses during the noncropping period in summer, if proper materials have been used in their construction. Structures can be closed completely after wetting media, surfaces etc, then allowed to heat up each day. We have recorded temperatures reaching 130-140 F during sunny periods of July and August in central Kentucky. Such temperatures over a period of several weeks can greatly assist in the eradication of pathogens and other pests in the production area. However, we have also observed greenhouses where all the pipes and electrical systems were damaged by this heat where growers built their own using materials not designed to withstand such heating.

Greenhouses should be maintained such that water and soil cannot wash or splash into the house. Weeds should not be allowed to grow within the house. Land adjacent to the greenhouses should be maintained to avoid pathogen build up adjacent to the house. Bare ground is not advisable, but gravel above fabric covers is acceptable. Well mowed grass without clover and weeds is acceptable but it should be frequently mowed with clippings discharging away from the house. I encountered a serious epidemic of Rhizoctonia in tobacco transplants (could have been a vegetable) related to blowing grass clippings into the house! Appropriate weed control is critical, never allowing populations of vegetable or tobacco weeds, or relatives of tobacco transplants (could have been a vegetable) to grow within 100 feet of the house.

The media preparation area must be kept sanitized, with careful attention to re-contamination during operation. If media is to be reused, it should be sterilized. New media should be mixed upon disinfested surfaces to avoid contamination. In-ground (soil) production of vegetables in the greenhouse also requires sterilization between cropping seasons. In several cases, we have traced serious contamination problems to growers mixing old bags of media poorly maintained in the off-season with new media.

We have not encountered many cases of the irrigation water being the initial source of the pathogens, because most growers are using urban water supplies. Where they have been the sources of contamination, growers were using cisterns, shallow wells, springs, or ponds. Water from well-maintained, deep wells (>75 ft. deep.) and city water are usually free of most plant pathogens. Contamination of the irrigation water with soil during handling operations is often a source of contamination. During wet periods, high water tables often contaminate poorly constructed greenhouses with pathogens from seeping water and splash.
**HOUSEHOLD**

**THERE’S A HOLE IN MY SWEATER!**
by Mike Potter

Now is the time when clients begin calling about ‘bugs’ infesting clothing, blankets, etc., unpacked from storage. These are probably clothes moths or carpet beetles. Besides damaging fabric, these insects will feed on any item composed of animal fibers, e.g., wool, fur, silk, feathers, felt or leather. Items commonly infested include wool sweaters, coats, blankets, carpets, down pillows and comforters, upholstered furniture, toys and animal trophies. Cotton and synthetic fabrics such as polyester and rayon are rarely attacked unless blended with wool, or if they are heavily soiled with food stains or body oils. Serious infestations of clothes moths and carpet beetles can develop undetected inside a home, often causing irreparable damage to clothing, bedding, rugs, and other articles.

**THE CULPRITS**

- **Carpet beetles** - Carpet beetles are common in buildings, and can infest many items in addition to fabrics. Larvae are about 1/8 to 1/4-inch long, tan to brownish in color, and densely covered with hairs or bristles. This is the life stage likely to be encountered now, since only the larvae feed on fabrics and cause damage. Oftentimes only the shed (molted) skins of the larvae are present on the damaged item. Adult carpet beetles feed mainly on flowers and are usually discovered indoors during the springtime. The adult beetles are small (1/16 to 1/8-inch) and oval-shaped, ranging in color from black to various patterns of white, brown, yellow and orange. Large numbers may be spotted around light fixtures and windows, indicating that an infestation is present somewhere within the home.

- **Clothes moths** - Clothes moths are small, 1/2-inch, buff-colored moths with narrow wings fringed with hairs. Like carpet beetles, they damage fabric only in the larval stage. Adult clothes moths are seldom seen because they avoid light, preferring to hide in dark places such as the backs of closets. Clients who report seeing tiny moths in the kitchen and other well-lighted areas are probably seeing grain moths originating from stored foods, e.g., cereal, dried fruit, nuts, or pet food. Clothes moth larvae spin silken feeding tubes or patches of webbing as they move about on the surface of fabrics. They also deposit tiny fecal pellets similar in color to the fabric.

**THE SOLUTION**

- **Current infestations** - Controlling an existing fabric pest problem requires a thorough inspection to locate all infested items and locations. The source may be an old woolen scarf at the back of a closet, a fur or felt hat in a box, an unused remnant of wool carpeting, or an abandoned bird or squirrel nest up in the attic. Larvae prefer to feed in dark, undisturbed areas where susceptible items are stored for long periods. Larvae also may be found living beneath the edges of carpeting (use needle-nose pliers to lift the outer edge of the carpet from the tack strip along baseboards), underneath and within upholstered furniture, or inside heat ducts and floor vents where they often feed on accumulations of lint, pet hair and other organic debris. Occasionally, infestations may originate from bird or animal nests or carcasses in an attic, chimney, or wall void. Carpet beetles, in particular, will also feed on pet food, bird seed, and grain/cereal products associated with the kitchen, basement or garage.

Infested items should be laundered, dry-cleaned or thrown out. Laundering (hot cycle) or dry-cleaning kills any eggs or larvae that may be present. Vacuuming floors, carpets, and inside heating vents effectively removes larvae as well as hair and lint which could support future infestations. Be sure to vacuum along and beneath edges of carpets, along baseboards, underneath furniture and stored items, and inside closets and quiet areas where carpet beetles and clothes moths prefer to feed.

Insecticides, applied to infested areas such as carpets, may be helpful as a supplement to good housekeeping. Products containing active ingredients labeled for flea control (e.g., permethrin), or with fabric pests listed on the label are effective. Sprays may be applied to carpets, especially along and beneath edges adjacent to baseboards, underneath furniture, and other likely areas of infestation where prolonged contact with humans is unlikely. Infested clothing or bedding should not be sprayed with household insecticides and should instead be laundered or dry cleaned.

**Avoiding future problems** - The best way to avoid future problems with fabric pests is through prevention. Woolens and other susceptible items should be dry-cleaned or laundered before being stored for long periods. Cleaning kills any eggs or larvae that may be present, and also removes perspiration odors that tend to attract pests. Articles to be stored should then be packed in tight-fitting containers. Customers choosing to use moth balls or flakes should be encouraged to read and follow label directions. The vapors from these materials are only effective if maintained at sufficient concentrations. Effective concentrations can best be achieved by sealing susceptible items (with the manufacturers’ recommended dosage of moth crystals) in large plastic bags, and then storing the bagged articles.
in tight-fitting trunks, boxes or chests. Contrary to popular belief, cedar closets or chests are seldom effective by themselves because the seal is insufficient to maintain lethal or repellent concentrations of the volatile oil of cedar.

Conventional household insecticides should not be used to treat clothing. Moth-proofing solutions, however, may be applied to susceptible clothing by professional dry cleaners. Valuable garments such as furs can further be protected by cold storage — a service offered by some furriers and department stores.

Additional tips on fabric pest prevention, control, and repair of damaged items can be found in the publication IP-50, Fabric Insect Pests. Elimination of widespread, persistent infestations of carpet beetles and clothes moths in a home or business may require the services of a professional pest control firm.

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.