



KENTUCKY PEST NEWS

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WHEAT

APHIDS AND BARLEY YELLOW DWARF (BYD) IN KENTUCKY GROWN WHEAT by Doug Johnson and Lee Townsend

Insect-disease interactions pose difficult problems for growers. While it may take the feeding of many insects to damage a healthy plant, only one insect carrying a pathogen can severely stunt or kill a plant.

- BYD is a virus disease that is moved from grasses and some crops to and within wheat fields by aphids. Severity of the disease varies from year to year because of a complex interaction between aphids, weather, the virus, and plants. There are no management tactics to attack the virus directly.
- **Planting date** is the most important factor that determines the intensity of aphid infestations, and consequently, BYDV levels in fields. This approach is not fool-proof but it is more effective than a preventive spray program in minimizing yield loss to the disease.

APHID - BYDV INTERACTIONS

Healthy plants can become infected only after being fed upon by aphids that are carrying BYD virus. Aphids pick up the virus as they feed on the sap of infected plants. After a few hours, they can inject it into other plants. Once infective, aphids carry the virus for the rest of their lives. There is no other

means of spread.

APHID BIOLOGY

Aphids are small insects with soft, pear-shaped bodies and piercing sucking mouthparts. A pair of tubular structures, (cornicles) project like tail pipes from the end of their bodies. Adult aphids may or may not have wings. Large colonies are often seen on tender new plant foliage. Once they find a good host, nymphs and wingless adults tend to stay in one place.

APHID MOVEMENT

Aphid movement can be categorized as flying, flitting, or walking. These are based on the method and relative distance traveled. Each type benefits the aphid in specific ways but also results in a specific type of BYDV spread.

Generally most adult aphids in a colony will be wingless. However, a small number in each generation will have wings. This allows for continual population expansion. Environmental factors such as poor weather, over-crowding and reduction in food quality cause a greater number of them to have wings so the colony can escape unfavorable local conditions.

WAYS APHIDS MOVE

- Some will fly long distances. Individuals can move from one field to another field or to a weed host. Most fly in the fall. In general, they are moving from drying summer grasses to young fall grasses, including small grains. This movement brings BYDV into a wheat field.
- Some will make short flights, just a few feet to to a few yards. This moves BYDV to new spots in a field.
- Aphids often walk from plant to plant. This gradually expands the area of an existing population and produces circular spots of infected plants if the virus is present. The earliest infected plants are near the center and the most recently infected ones are near the edges. The spots expand in size over time.

LIFE CYCLE

Aphid life cycles are very complicated and vary considerably between species and even between individual populations of the same species. The following is a very abbreviated description intended to help understand what is going on in Kentucky's small grain fields.

In Kentucky wheat fields aphids reproduce asexually. That is to say all the aphids you see are female and all of their offspring are born female. Very few if any males are present and play little roll in the BYD incidence. Aphids overwinter as juveniles and adults. At present we do not believe that eggs play any roll as they would further north. However, temperature is very important. In general the warmer the temperature the more aphids can survive, move and reproduce. Conversely, colder temperatures result in lower survival rates, fewer offspring and less movement. As a rule of thumb it needs to be about 50° F for aphids to be active and temperatures below 30° F result in increased aphid mortality. However, even at very low temperatures some aphids will survive. A warm and dry winter will aid aphid survival and BYDV spread while a cold and wet winter will reduce aphid survival and movement.

MOST IMPORTANT SPECIES

The bird cherry-oat aphid (BCOA) is the most common one found in wheat in the fall and winter and our most important vector of BYDV. This dark

green aphid with a rounded body has antennae that are nearly as long as the body. Cornicles (tubes) at the end of the abdomen are green with black tips. The area surrounding and between the cornicles is red or orange. Legs are green with black joints.

The corn leaf aphid (CLA) is a bluish green insect with a 'velvety' or 'fuzzy' appearance. It's body is flatter and longer than the bird cherry oat aphid. The black antennae are and about 1/3 as long as the body. The cornicles are short, and black and the area around them is often darker than the rest of the body.

These aphids are common on corn or grain sorghum just as these plants begin to form a tassel. CLA can be found on wheat in the fall but disappear as temperatures drop.

The English grain aphid (EGA): is bright green but may vary to brown or pink. The antennae are as long as or longer than the body. The long black cornicles reach past the end of the body. The legs also are long and completely black. They give the aphid an appearance of being perched over the leaf surface. This is a very common spring species in KY. They are often found in the heads during grain filling time.

Greenbugs (GB) are light green with a very distinct dark green band down the middle of the back. The mostly black antennae are shorter than the body. The relatively short cornicles have black tips. Legs are green with the joints and ends black.

Greenbugs can be found in KY but rarely reach damaging levels. Unlike the other grain aphids in KY, GB injects a toxin into the plant causing that tissue to die. For this reason GB damage is very easy to diagnose and it is potentially a serious pest.

APHID / BYDV PEST MANAGEMENT

There are relatively good guidelines for managing aphids as plant pests. These insects use their piercing-sucking mouthparts to feed on plant sap and, as long as numbers of aphids don't reach levels that stress the plant, little damage is done. Typically, it takes several aphids per plant so there is plenty of time to detect them and make a management decision.

The picture changes if the insect is carrying BYDV. In this case, a single aphid can infect and stunt many plants. In turn, these infected plants can

provide the virus to other aphids and quickly increase the disease level in the field. Under the right conditions, a very small number of aphids can have a major impact on crop yield.

It would be nice to know what proportion of aphids arriving in a wheat field carry the virus in a given year but this cannot be determined easily. However, it is risky to attempt to reduce the incidence of BYDV in fields entirely through aphid control. There are no simple steps to follow for success.

- Delayed planting (using the Hessian Fly Free Date) is the single most important and reliable management tool available to the farmer. This date is based on the first hard frost, which kills large numbers of soft-bodied insects like aphids and Hessian Flies. This leaves fewer to fly into crop fields. In addition, temperatures are

generally cool enough to greatly reduce movement and reproduction of those aphids that do arrive in the field.

Research shows that fields planted later in the fall have small aphid populations which take longer to grow and spread. The lack of research information on aphid flights in the fall keeps us from providing a specific date. However, in general planting after the Hessian Fly free date is a good bench mark.

- The risk of BYD infection varies from year to year. Table 1. Shows BYD was at epidemic levels in the 1992-93 season, while the 1993-94 season BYD incidence was very low. 1994-95 proved to be an intermediate year. BYD was almost non-existent in the 1995-96, 1996-97 and 1997-98 crops.

Location	Harvest Year					
	1993	1994	1995	1996	1997	1998
Princeton	59	19	35	Trace	Trace	Trace
Keysburg	70	4	23	2	Trace	

- Wheat varieties do not respond equally either in yield loss or symptom expression. You need to know how your variety selections respond to the BYDV.
- The most important time for controlling aphids to prevent BYD is the first 30 days following emergence. The second most important time is the second 30 days following emergence. Generally, an insecticide applied after the wheat reaches Feeke's 4.0 probably does little good. Current research data support the following treatment guidelines.

Table 2. The number of aphids per foot of wheat row required to support an insecticide application for management of BYD.

Crop Age	Aphids/Foot of Row
30 Days post emergence	3
30 to 60 days post emergence	6
More than 60 days post emergence	10

FACTORS TO CONSIDER WHEN DECIDING ON USING AN INSECTICIDE TO SUPPRESS APHIDS AND BYDV.

1. Factors that **REDUCE** the potential of return from applying an insecticide to control aphids and to reduce BYD infection.

- Hot, dry preceding summer.
- Non-intensive management of factors such as fertility.
- Use of BYDV tolerant varieties.
- Planting after Hessian fly free date.
- An early hard frost followed by a cool fall
- Aphid numbers remain below treatment guidelines.
- Cold, open winter.
- Late, cool following spring.
- Wheat development beyond Feeke's stage 4.0

2. Factors that **INCREASE** the potential of a return from applying an insecticide to control aphids and to reduce BYD infection.

- Normal summer temperatures with adequate rainfall
- Intensive wheat management, high fertility, etc.
- Use of BYD susceptible varieties
- Planting before Hessian fly free date.
- Late, warm fall.
- Aphid numbers greater than treatment guidelines
- Mild winter or snow cover.
- Early warm following spring.
- Wheat development has not reached Feeke's stage 4.0

THINGS TO CONSIDER

- Aphid numbers alone do not give a clear answer. The percentage of aphids carrying the virus is unknown. There can be many aphids on the crop but only a very low percentage carrying the virus. However, small numbers of infective aphids can cause a very serious disease problem.
- Follow treatment guidelines to avoid an application that is too early.

In seasons of warm weather, large aphid populations, high yields, and good prices be prepared to make more than one application.

In years of low aphid populations, low prices, or low yields, be prepared to accept some BYD

symptom expression, as sprays may not pay for themselves.

POTENTIAL OUTCOMES

- In epidemic years, sprays may pay for themselves but will PROBABLY not protect the maximum yield potential.
- In years of slight BYD, sprays will cost the producer.
- In intermediate years, sprays may pay for themselves and a larger percentage of the potential yield will be protected.
- Planting after the Hessian fly free date is worth one spray, and possibly two.
- Although there is some effect of spring infection/movement, fall effects appear to be far more important.
- In the long term, obtaining the ability to predict, or at least estimate disease severity, will be the most important management tool for producers.

GREENHOUSE & LANDSCAPE ORNAMENTALS

BLACK ROOT ROT BECOMING MORE PREVALENT by John Hartman

This past week, we observed several more 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 last spring, and again this fall. Most commonly, we observe the problem in greenhouse plants or in annual garden bedding plants (recently obtained from the greenhouse). It is not unusual for poorly growing plants in flower beds to have evidence of black root rot on the original soil ball of the transplant. Besides pansy, this soilborne fungus 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.

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 chlamydospores, and as such is capable of prolonged survival as a saprophyte in the absence of susceptible plants. Unfortunately, this fungus survives so well, that once it becomes established in the 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. 1) Use only pathogen-free plants and plant into disinfested pots and trays containing pathogen-free growing medium or pasturized soil. 2) Grow plants in well-drained growing medium or soil that is slightly acid (pH 5.5-6.0) and at warm temperatures. 3) Use sanitary measures such as removing and destroying diseased plants in the greenhouse and when transplanting to flower beds. 4) Rotate planting beds in the flower garden. 5) Avoid unnecessary stresses in growing the plants. 6) 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, Terraguard, or Zyban. There are no chemical "cures" for black root rot; chemical drenches in outdoor beds are ineffective and impractical.

HOUSEHOLD

HOW TO PEST-PROOF YOUR HOME

By Mike Potter

According to a statewide poll of Kentucky householders, 93% expressed concern over finding insects inside their home. More than half indicated that a *single* cockroach, cricket, or spider would prompt them to use a can of bug spray or call an exterminator. What many people do not realize, however, is that most pests discovered indoors have flown or crawled in from outdoors.

One of the best ways to limit unwanted intrusions by insects, rodents, birds, squirrels and other pests is to deny them entry—a procedure known as *pest proofing*. Many pests seek refuge in homes and buildings in response to changes in weather, such as extended periods of rain or drought, or the onset of cooler autumn temperatures. Taking steps to block their entry *before they end up inside* can greatly reduce the chances of future sightings.

Outlined below are six useful tips for pest proofing one's home or place of business. Steps 1-3 will also conserve energy and increase the comfort level during winter and summer. Equipment and materials mentioned can be purchased at most hardware or home improvement stores.

1. *Install door sweeps or thresholds* at the base of all exterior entry doors. While laying on the floor, check for light filtering under doors. Gaps of 1/16" or less will permit entry of insects and spiders; 1/4"-wide gaps (the diameter of a pencil) are large enough for entry of mice; ½" gaps are adequate for rats. Pay particular attention to the bottom corners as this is often where rodents and insects enter.

Apply caulk (see #3 below) along bottom outside edge and sides of door thresholds to exclude ants and other small insects. Garage doors should be fitted with a bottom seal constructed of rubber (vinyl weatherstripping seals poorly in cold weather). Gaps under sliding glass doors can be sealed by lining the bottom track with ½ to ¾ inch-wide foam weatherstripping.

2. *Seal utility openings* where pipes and wires enter the foundation and siding, such as around outdoor faucets, receptacles, gas meters, clothes dryer vents, and telephone/cable TV wires. These are common entry points for rodents, ants, spiders, yellowjackets and other pests. Holes can be plugged with caulk, cement, urethane expandable foam, steel wool, copper mesh, or other suitable sealant.

3. *Caulk cracks around windows, doors, fascia boards, etc.* Use a good quality silicone or acrylic latex caulk. Although somewhat less flexible than pure silicone, latex-type caulks clean up easily with water and are paintable. Caulks that dry clear are often easier to use than pigmented caulks since they don't show mistakes.

Buy a good caulking gun. Features to look for include a back-off trigger to halt the flow of caulk

when desired, a built-in "slicer" for cutting the tip off of new caulking tubes, and a nail for puncturing the seal within. Hardware stores sell guns with these features for less than \$10.00. Prior to sealing, cracks should be cleaned and any peeling caulk removed to aid adhesion. For a professional look, smooth the bead of caulk with a damp rag or a moistened finger after application.

4. *Repair gaps and tears in window and door screens.* Doing so will help reduce entry of flies, gnats, mosquitoes and midges during summer, and cluster flies, lady beetles, and other overwintering pests in autumn. Certain insects, in particular leafhoppers and hackberry psyllids, are small enough to fit through standard mesh window screen. The only way to deny entry of these tiny insects is to keep windows closed during periods of adult emergence.

5. *Install 1/4-inch wire mesh (hardware cloth) over attic, roof, and crawl space vents* in order to prevent entry of birds, bats, squirrels, rodents, and other wildlife. Be sure to wear gloves when cutting and installing hardware cloth, as the wire edges are razor sharp. Invest in a chimney cap to exclude birds, squirrels, raccoons and other nuisance wildlife.

6. *Consider applying an exterior (barrier) insecticide treatment.* While sealing is the more permanent way to exclude pests originating from outdoors, comprehensive pest-proofing is labor-intensive and sometimes impractical. For clients requiring an alternative, pest proofing can be supplemented by an exterior treatment with an insecticide. Homeowners will get the most for their efforts by applying longer-lasting liquid formulations containing synthetic pyrethroids (e.g., Spectracide Bug Stop™, Ortho Home Defense System™) or microencapsulated, slow-release Dursban, sold at hardware/lawn and garden shops.

Apply with a pump up sprayer, hose end sprayer, etc., treating at the base of all exterior doors, garage and crawl space entrances, around foundation vents and utility openings, and up underneath siding. It may also be useful to treat around the outside perimeter of the foundation in a 2 to 6-foot-wide band along the ground, and 2-3 feet up the foundation wall.

Clients who choose not to tackle these activities may wish to hire a professional pest control firm. Many firms now offer pest proofing as an adjunct to other services. When all else fails, a vacuum cleaner or broom is often the best response to the occasional bug that wanders in from outdoors.

HACKBERRY PSYLLIDS

by Ric Bessin

With the onset of cooler fall weather, several insects become accidental invaders of homes. One of the most common is the hackberry psyllid. This annoying insect clusters on window and door screens and sides of homes in September and October. The insect is so small that it can crawl through most screens. While these insects can be very annoying, they are harmless, and will disappear within a few days. These insects do not feed on humans or pets and will not attack house plants, stored products, or furnishings.

Hackberry psyllids are small aphid-like insects that resemble miniature cicadas. Also called jumping plant lice, these 3/16" long insects have lightly colored wings mottled with dark spots and hind legs that allow them to jump and fly away quickly. Normally, adults spend the winter in cracks and crevices of tree bark. They can be very annoying as they land on people or cars, or attempt to enter buildings in search of a protected areas. They may enter through window screens or small cracks and crevices.

There is one generation each year. Psyllids develop on hackberry trees and shrubs, causing distinct raised galls or swelling on the leaves. Once development is complete, adults leave the galls to pass the winter. This is when they can be a temporary but very aggravating annoyance. Dursban, Orthene, and Sevin are labeled to control this insect on hackberry before the onset of gall formation but effective chemical control is difficult to achieve. If chronic problems occur, removal of the source plants may be worthwhile. See ENTFACT-413, "Hackberry psyllid", for more information.

BOXELDER BUGS

by Lee Townsend

Boxelder bugs are 1/2" long black insects with three narrow red stripes on the segment behind the head and a red "V" on the front wings. These insects move to sheltered areas in the fall and remain there during the winter. Sweep up and discard those that enter the house. These insects will not infest any household articles- they are only a nuisance or accidental invader. They produce an odor and stain when crushed. Check door sweeps and places outside the house that may allow them to get inside. Exclusion is important in reducing numbers that get

indoors.

These insects feed on boxelder leaves, twigs, and seeds, as well as maple, ash, and some fruits. Removal of female boxelder plants should be considered if the pests are a significant problem year after year. Other alternatives include controlling insects while they are on the boxelder plant or direct sprays of congregations of the insects on outside walls. Insecticidal soap provides a safe control alternative but must be sprayed directly on the insects to be effective. These insects will become active in the spring and will move back outdoors to resume their life cycle on boxelder.

MILLIPEDES

by Lee Townsend

Millipedes or "thousand-leggers" are common in moist, shaded areas such as around mulched flower beds or foundations, under rocks or decaying wood, in grass with a heavy buildup of thatch, or in accumulations of leaf litter. They have chewing mouthparts and are scavengers that aid in the "recycling" of dead, decaying plant matter. If present in large numbers in flower beds, they may feed on small root hairs and damage small bedding plants. Millipedes neither bite nor sting but some may produce a foul odor.

Usually millipedes are only occasional nuisances or accidental invaders. However, large numbers may wander into houses in wooded areas following prolonged or heavy rains. They require humid conditions, so many die soon after entering a building. The simplest solution is to sweep or vacuum up and discard those inside. Direct spray of a household insecticide will eventually kill a millipede but the insecticide is slow to penetrate the hard outer covering. Exclusion is the best way to reduce millipede problems in houses.

Millipedes require decaying organic matter and shaded, moist areas. Reduction of chronic millipede problems requires removing mulched areas and allowing sunlight and ventilation to keep the area around foundations as dry as possible. Sevin bait, scattered along the foundation, may provide some control. A barrier spray of Sevin (carbaryl) or Dursban (chlorpyrifos) from the foundation to about 10 feet out from the house or building may help with some temporary control but will not solve the problem.

Cultural controls to reduce millipede problems

1) dethatch the lawn to remove accumulations of thatch- an excellent breeding area 2) mow the lawn closely to promote quick drying- millipedes need moisture 3) remove heavy mulch, accumulations of leaves, etc. around houses to reduce hiding places.

PESTICIDE NEWS & VIEWS

FLINT - A NEW FUNGICIDE LABELED FOR CUCURBITS

by William Nesmith

Flint is a new broad spectrum fungicide marketed by Novartis. It recently was labeled for the control of powdery mildew and downy mildew on a large number of cucurbit crops, including: chayote, Chinese waxgourd, citron melon, cucumber, gherkin, edible gourds, muskmelon, pumpkin, summer squash, winter squash and watermelon. Flint may be applied up to the day of harvest with a maximum limit of 4 applications per season and no more than 16 oz of product per acre per season.

Flint is one of the strobilurins and these fungicides have a single-site mode of action. Single-site mode of action fungicides carry a very high risk of the target fungi developing resistance to them. Therefore, fungicide-resistance management is a major concern. To address this problem, spray application rates and timing, as well as other restrictions are spelled out, so consult the label carefully for these and other specific instructions. I urge you to read and understand these sections of the label.

By the way, Flint is a fungicide with similar chemistry to that of Quadris, which is also labeled for controlling these same diseases on most cucurbits. Fungi developing resistance to one will likely be resistant to the other. Therefore, it will be necessary to rotate Flint and Quadris with other fungicides having different chemistry to minimize the risk of developing fungicide resistance. For example, do not use the maximum number of applications of Flint per season then shift to Quadris. Instead, consider the maximum rate for one as the maximum for this class of chemicals and use other fungicides found in U.K. Extension publication ID-36 as rotation partners.

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Lee Townsend
Lee Townsend, Extension Entomologist