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TOBACCO

VIRUS COMPLEX UNDER CONTROL
by William Nesmith

As growers make variety decisions for next year they should not underestimate the value of their current variety in the control of the virus complex. Until very recently, the virus complex (the aphid-borne potyviruses: tobacco vein mottling virus, tobacco etch virus, and potato virus Y) was second only to black shank in the amount of crop damage sustained over a 20-year period from infectious diseases in Kentucky's burley crop. However, losses due to the virus complex have declined sharply in the past four years. Why?

The vast majority of burley tobacco varieties planted in recent years have resistance to the most common strains of the viruses associated with the virus complex. This has played a key role in minimizing losses from outbreaks of the aphid-borne virus complex in burley tobacco. The difference is clearly evident again this year in variety tests scattered about the state.

One weakness of the virus-resistant varieties is that they do not carry as much resistance to black shank as do some of the varieties susceptible to the virus complex. Following the severe epidemic of black shank this year, some growers will be considering shifting varieties. As those decisions are made, be very carefully to fully appreciate the merits of each variety, especially as to its benefit in control of diseases other than just black shank. After all, there are other tools (4 R's Program) to couple with resistance for the management of black shank, but resistance is about the only workable tool available for controlling the virus complex. It is especially important to carefully consider these issues with crops to be planted after June 1, because they face a much greater risk of being damaged by viruses than do the earlier planted crops.

WHEAT

CAN APHID CONTROL REDUCE BARLEY YELLOW DWARF INCIDENCE IN WHEAT?
A case study (Caldwell Co., KY 1998-99)
by Doug Johnson and Lee Townsend

Pioneer 2510 wheat was planted using a no-till planter on 22 Oct 1998 following a corn crop on the University of Kentucky Research and Education Center in Caldwell Co. KY. The 4' by 15' plots were arranged in a randomized complete block design with five replications. Fertility was applied as 100 lbs of nitrogen on 26 Feb 99 (Feekes GS 3-4). The treatments included three different insecticide application dates and an untreated control. Two treatments consisted of single applications of Warrior ® (lambda-cyhalothrin) at 3.2 fl. oz. per acre, made with a backpack sprayer in 26 gal of spray per acre, on 24 Nov 98 (Feekes GS 2-3) or 17 Feb 99 (Feekes GS 3). The third set of plots were treated on both dates. These were compared to an untreated control. Regular aphid counts were not made but plots were checked for aphids just before applications were made. Plots were rated for BYD on 5 May 99 (Feekes GS 10) by randomly selecting 50 individual plants and examining them for symptoms. Percent of plants displaying BYD symptoms were analyzed for differences using the SAS GLM. procedure.

Significant differences in percentages of plants displaying BYD symptoms, as related to insecticide treatments, were detected (F (3,12 df) = 3.83, Pr>F =0.039) (Table 1). Although very few aphids were seen before the final insecticide application; they were widespread and numerous during the spring.

Table 1. Mean percentages (± s.e.) of wheat plants showing BYD symptoms in plots treated with Warrior insecticide on selected dates to control aphid vectors of barley yellow dwarf virus.

Time of Application	% of plants showing BYD Symptoms ± SE[1]
No Insecticide	13.2 ± 5.0 a
24 Nov 98	5.6 ± 1.0 ab
24 Nov 98 and 17 Feb 99	1.6 ± 0.4 b
17 Feb 99	3.2 ± 1.2 b

[1] Means followed by the same letter are not significantly different. p = .05. Ryan-Einot-Gabriel-Welsch Multiple range test.

Variations in plant stands among plots due to establishment problems prevented valid yield comparisons. The variation due to stand difficulties would not have allowed a fair comparison of the yield effects.

The November treatment, often made as an 'insecticide only' application, costs about $11.00 per acre. The February insecticide application is often made in conjunction with other inputs, so the application cost may be saved. Therefore, in this location and in this year, the fall, winter, and combination treatments would have cost $11.00, $ 6.00 and $17.00 respectively.

Assuming the entire difference in percentage of plants showing BYD symptoms was a result of insecticide timing, and that a damaged plant would have about a 20% yield loss, we can compare the relative merits of treating -vs- not treating.

No Insecticide Treatment

Using an estimate of 13.2 % damaged plants with a 20% yield reduction for each damaged plant, the effective yield loss was calculated to be 2.64%. If this were 100 bu / acre wheat, the resulting loss would be 2.6 bushels. At a price of $2.50 / bushel, the untreated acre of wheat would bring about (97.4 bu at $2.50 / bu) $243.50 or a loss of $6.60 per acre due to this aphid-vectored disease.

24 Nov & 17 Feb Insecticide Treatment

The best insecticide treatment (two applications) contained an average of 1.65 % damaged plants. This indicates that about 88% of the loss to BYD was prevented by the two treatments. As calculated above, this is a 0.3% yield loss per acre. For 100 bu / acre wheat, this loss would be 0.3 bushel, leaving a per acre yield of 99.7 bushels. At $2.50 / bu the resulting loss would be $0.75, bringing a per acre return of (99.7 bu at $2.50 / bu) $249.25. However, this level of protection was obtained by making two insecticide applications, at a cost of about $17.00 per acre. Reducing the per acre return by this cost leaves a net return of ($249.25 - $17.00) $232.25.

24 Nov. Only Insecticide Treatment

The 24 Nov. treatment had 5.6% damaged plants. Assuming the standard plant yield loss, this is the equivalent of a 1.1% yield loss per acre. For 100 bu / acre wheat, this loss would be 1.1 bushels, leaving a per acre yield of 98.9 bushels. At $2.50 / bu the resulting loss would be $ 2.75, bringing a per acre return of (98.9 bu at $2.50 / bu) $247.25. However, this level of protection was obtained by making an insecticide applications which would cost about $11.00 per acre. Reducing the per acre return by this cost leaves a net return of ($247.25 - $11.00) $236.25.

17 Feb. Only Insecticide Treatment

The incidence of damaged plants in the 17 Feb. treatment was 3.2 %. For 100 bu / acre wheat, this loss would be 0.6 bushels, leaving a per acre yield of 99.4 bushels. At $2.50 / bu the resulting loss would be $1.50 bringing a per acre return of (99.4 bu at $2.50 / bu) $248.50. However, this level of protection was obtained by making an insecticide applications which would cost about $6.00 per acre. Reducing the per acre return by this cost leaves a net return of ($248.50 - $6.00) $242.50.

Summary

Under these test conditions, the insecticide applications did cause statistically significant differences in BYDV symptom expression. However, it is clear that the assumed associated protection of yields resulting from this level of symptom reduction was not cost effective. If all other things are equal, the cost of the insecticide applications was greater than the reduction in damage (Table 2).

Table 2. Net return ($/ac) from plots treated at selected times with an insecticide application to control aphid vectors of BYDV in Caldwell County, KY, 1999

Treatment	No-Insecticide	24 Nov & 17 Feb	24 Nov	17 Feb
Net Return / Ac	$243.50	$232.25	$236.25	$242.50

The circumstances and yield potential on your farm will alter these figures. As prices and yields decline and treatment costs increase, the insecticide treatments will look even less appealing. However, a rise in prices and yields coupled with a lower treatment costs will make the returns from insecticide applications look much more favorable.

Choosing a 100 bushel per acre yield as a basis for comparison may be misleading. 'Intensive Wheat Management' has used 100 bushels as a benchmark; however, many fields will not support this level of production. When yields change so do the level of expenses that can be supported. Using the percent damage estimates, and assumed costs of control from the previous examples we have calculated the necessary value of a bushel of wheat needed to support the three treatments at various yield levels, using the BYD intensity seen in the 1998 experiment (Table 3).

Table 3. The value ($) of a bushel of wheat required to offset the costs of various insecticide treatments.

Potential Yield (Bu/AC)	Fall Treatment @ $11.00 / Acre	Winter Treatment @ $6.00 / Acre	Fall & Winter Treatments @ $17.00 / Acre
100	7.23	3.00	7.35
90	8.03	3.33	8.17
80	9.04	3.75	9.19
70	10.33	4.29	10.49
60	12.06	5.00	12.23
50	14.47	6.00	14.66
40	18.09	7.50	18.47
30	24.12	10.00	24.64

There is no consistently successful strategy to reduce losses to BYD virus by trying to control their aphid vectors with insecticidal sprays. While sprays may kill many aphids and reduce the percentage of infected plants, potential yield savings may not pay for the chemical and application. There are many other factors that impact the relative effect of BYDV infections.

BYDV infections developed very late in the 1998-1999 crop, probably because of very low aphid numbers during the fall. The aphids that were present did not arrive until December. The late aphid flight probably resulted from the late summer-early fall drought that affected Kentucky. The lateness of the aphid / BYDV infections is illustrated by the fact that the late winter (Feb. 17) application was just as effective at reducing BYDV symptoms as either of the other two applications (Table 1.). A larger than "normal" portion of the infections occurred after Feekes GS 3. Because of this, the data presented in Table 3 must be used very carefully. If you consider only Table 3, it appears that the most appropriate time to make an insecticide application is in the late winter. While this was true in 1998-99, this may not be the case in most years. If both aphids and BYDV had been present very early in the fall, the percentage of infected plants and the relative damage to each would have been much greater. While late infections may be important in a year of good prices and low costs, an early fall infection is always a more important consideration.

Acknowledgments

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Dr. Dick Trimble (Ag-Economic) in proofing and challenging our economic arguments.

SOYBEAN

CHARCOAL ROT WIDESPREAD
by Don Hershman

A soil-borne fungal disease, charcoal rot, is very widespread and will cause significant yield losses in many soybean fields throughout Kentucky this season. Charcoal rot, caused by Macrophomina phaseolina, is favored by mid to late season drought stress which, obviously, has been a serious problem state-wide this summer. This disease was also very damaging last year because of the late season drought stress which existed during the latter part of the growing season.

Macrophomina phaseolina is present in many of Kentucky's agricultural soils at rather high populations. However, because drought stress is not a problem in soybean in most years, charcoal rot is not an annual problem. In fact, it is unusual to have back-to-back years where charcoal rot is a problem, but that has been the case for the 1998-99 seasons.

Charcoal rot is evident at this time as dead plants scattered throughout the dryer portions of a field or it may be evident field-wide. Confirmation that the plants were killed by charcoal rot is based on cutting into the surface of the lower stem and upper taproot area and finding a gray discoloration with many extremely small black specks embedded throughout the tissue. Leaves generally die and remain attached to plants rather than falling to the ground.

Unfortunately, in a dry year there is no control for charcoal rot if irrigation is not an option. All soybean varieties are susceptible and no management practices will be of much help where soil conditions are highly conducive to charcoal rot development. My purpose in writing this article is simply to inform you that low yields in many soybean fields will be the result of more than just drought conditions.

FRUIT CROPS

BITTER ROT OBSERVED IN SOME ORCHARDS
by John Hartman

Where drought has not spoiled the crop, apples are being harvested now throughout Kentucky. Bitter rot disease, caused by *Colletotrichum gloeosporioides*, or *C. acutatum*, has been observed on fruits submitted to the Plant Disease Diagnostic Laboratory in recent weeks. Once established in the orchard, bitter rot is one of the more difficult apple diseases to manage.

Symptoms and spread. Light brown, circular, sunken lesions can be observed on the apple surface. Bitter rot causes a brown, cone-shaped, fairly soft decay in the flesh of affected apples. Under moist conditions, concentric circles of creamy to pink-colored spore masses of the causal fungus may be observed on the lesion surface. The fungus produces enormous numbers of spores which are readily disseminated by wind and rain, and which can cause new infections under warm, humid weather conditions. The fungus survives in dead or weakened branches and in mummified fruits.

Management. In winter, prune out diseased branches and remove mummies from the tree and from the ground. The fungicides captan, ziram, thiophanate-methyl, and benomyl are all moderately effective for protection of apple fruits against bitter rot. Follow pesticide labels for proper rates and timing.

VEGETABLES

SANITATION, THE FIRST AND LAST STEP FOR INSECT CONTROL
by Ric Bessin

Production from many commercial vegetable farms and home gardens may have ended with the long summer drought and the fall weather beginning to set in, but to many of the arthropod pests that you have battling throughout the summer, your fields or gardens can still be a pest paradise. Although we have taken most of what we consider to be the edible portions of these plant, these insect pests can still find food and shelter among the aging plants and weeds. Many insects pests are able to complete development in these crop residues long after the last fruits are picked. Some acquire disease causing organisms that they can used to infest young plants next year. Rank weed growth after harvest can also attract certain pests which may create problems for next season.

Several of the more serious insect pests such as European corn borer, squash vine borer, squash bug, squash beetle, diamondback moth, tobacco hornworm, cabbage looper, and imported cabbageworm are able to continue development on crop residues regardless if the plants are still producing vegetables. Other pests such as flea beetles can find food and shelter from weeds as well as crop residues throughout the winter. The two-spotted spider mites continue to feed on weeds after the crops have withered. Raised plastic beds also provide shelter for pests by giving them a protected place to spend the winter.

Wireworm, common stalk borer, and some cutworm infestations begin in the fall on rank weed growth, but problems aren't recognized until the following spring when crops are planted. Fortunately, rank weed growth has not been a problem due to the dry soil conditions. With common stalk borer and wireworms, there are no effective controls available when damage begins to appear in the spring.

Destruction of crop residues shortly after harvest is recommended to discourage these pests from completing their fall development. Many insects need to attain a certain size or stage in order to survive the winter. Removal of crop residues may also reduce pest survival by exposing some of them to the winter elements. These weeds and crop residues will insulate these pests from frosts and freezes.

Destruction of cucumber and melon residues not only reduces food and shelter for cucumber beetles, but also reduces the acquisition of the bacterial wilt disease organism by the overwintering beetle generation. It is the bacteria that causes bacterial wilt that is stored in the gut of cucumber beetles this winter that will start the disease cycle next year.

A thorough fall cleanup should help to discourage some of the pests that may cause problems next year. Commercially, fields can be disked to destroy crop residues. Home gardeners can compost or till these residues into the soil. It is important to keep in mind that this should not be just a fall practice to destroy crop residues, as soon as a crop has been harvested for the last time, clean up should begin, even if that is early summer for spring crops.

CUCURBIT DOWNY MILDEW FORECAST IS ON THE WEB
by William Nesmith

A new tool is available to help commercial growers of cucurbit vegetables deal with downy mildew, a very destructive disease. The North American Plant Disease Forecast Center at North Carolina State University (NCSU) is providing current forecasts for cucurbit downy mildews, similar to what they have been doing with tobacco blue mold. I will be providing them with information on the status of cucurbit downy mildew in Kentucky, as are my pathology colleagues in many other states. The team of plant pathologists and meteorologists at NCSU will evaluate that information and weather events to release timely information on the occurrence of downy mildew on cucurbits in the United States and to forecast future movements of inoculum (pathogen spores). The status reports are updated several times per week as warranted by the situation.

We have established a direct link to the current forecast page for cucurbit downy mildews from the Kentucky Blue Mold Warning System to aid Kentucky users:
http://www.uky.edu/Agriculture/kpn/kyblue/kyblue.htm
Bookmark it and check it often. Another Kentucky link has been made through http://www.uky.edu/Agriculture/Horticulture/Veglinks.htm, to better serve those already contacting us through the vegetable links.

Our reasons for placing the primary link through the tobacco blue mold page are two-fold: First, we have for many years been using tobacco blue mold outbreaks in Kentucky as the best clue to predict where and when downy mildew of cucurbits will develop in the Commonwealth. Our position has been that from July-September, when blue mold of tobacco is present or advisories are posted, watch and protect against the development of downy mildew of cucurbits in Kentucky. This has not been a perfect predictor, but it has served us well because there are strong similarities between cucurbit downy mildew and tobacco blue mold. Blue mold of tobacco is a downy mildew disease and both diseases develop under similar weather conditions and long distance movement of airborne spores is significant in the epidemiology of both diseases. Secondly, the Blue Mold Web Page (which is linked to Kentucky Pest News) is used regularly by a large audience, including our County Extension Agents and many in ag business, increasing the likelihood that this information will be found and used this season.

Control information for cucurbit downy mildew is also available from this site, and in general it fits Kentucky's situation. However, we urge Kentucky vegetable producers to also consult ID-36 " Commercial Vegetable Crop Recommendations" before using any new chemical control to insure the control is legal in Kentucky. ID-36 is also available from this website in either PDF or HTML format.

HOUSEHOLD

THE YELLOWJACKETS ARE COMING
by Mike Potter

If you haven't already begun receiving calls about yellowjackets, you will shortly. During late-summer and fall, yellowjacket colonies are nearing maturity and huge numbers of workers are out foraging for food for the developing queens. With insect prey (their usual diet) becoming scarce, yellowjackets scavenge widely for other sources of nutrition. They’re particularly fond of sweets, e.g., fruit, soft drinks, ice cream, beer, but will also feed on meats, potato salad, and just about anything we eat. The persistent foraging of yellowjackets at picnics and other outdoor activities prompts many calls from homeowners and businesses, wanting to know what can be done to alleviate the problem. Here are their options:

1. **Sanitation -** The best way to reduce the threat of foraging yellowjackets is to minimize attractive food sources. People eating outdoors should keep food and beverages covered until ready to be eaten. Spills and leftovers should be cleaned up promptly. Trash cans should be equipped with tight-fitting, preferably, self-closing lids. Similar sanitation recommendations should be made to commercial establishments, including ice cream parlors, outdoor cafes, and produce stands. Whenever possible, trash cans and dumpsters should be located away from serving tables, doors, and other high-traffic areas. Trash cans should be equipped with a plastic liner and emptied and cleaned frequently.

Maintaining high levels of sanitation throughout the summer will make areas less attractive to yellowjackets later in the fall. This strategy is especially useful for parks and other outdoor recreation areas. Apples and other fallen tree fruits should be raked up and discarded.

2. **Avoidance -** Combined with sanitation, avoidance is the best advice in most situations. Yellowjackets foraging away from their nests are seldom aggressive and usually will not sting unless provoked. People should resist the temptation to "swat" at the wasps; most stings occur when foragers are slapped or trapped against skin. *Be extremely careful when drinking from beverage cans into which a foraging yellowjacket may have crawled. Swelling resulting from a wasp sting inside the mouth can be life threatening.*

Avoidance may also be the best advice if a yellowjacket, hornet, or bumble bee nest is located in a tree or other out-of-the-way location. Yellowjacket colonies die off on their own in late autumn with the onset of cold weather. Abandoned nests are not reused and soon disintegrate.

3. **Repellents -** Standard mosquito repellents will not deter yellowjacket foraging, or reduce the chances of being stung. A dilute solution of ammonia and water (approximately 6 oz of ammonia per gallon of water), sprayed in and around trash cans and sponged onto outdoor eating tables will help to mask food odors and minimize attraction to these areas. Use household ammonia, not Clorox (bleach).

4. **Traps -** Yellowjacket traps of varying designs are sold at many lawn and garden shops. When properly baited and maintained, these traps (much like Japanese beetle traps) often attract and capture large numbers of yellowjackets. Unfortunately, the nests often contain thousands of foraging individuals and trapping a few hundred seldom results in a noticeable reduction in activity. If traps are used, position them around the periphery of the area you wish to protect; otherwise, you may attract more wasps than are trapped.

5. **Insecticides -** Elimination of yellowjackets is best accomplished by locating and destroying the nests. *However, with foraging yellowjackets this is often impractical since the nest, or nests, may be located several hundred yards away.* People still should inspect the area around their homes for nests. The best time to do this is during the daytime, when yellowjackets are entering and exiting the nest opening.

If the nest entrance can be located — typically underground in an abandoned rodent burrow, beneath rocks or landscape timbers, or in a stone wall or wall of a building — it often can be eliminated by applying an aerosol-type wasp and hornet spray into the nest opening. Dust formulations (such as Sevin, Ficam or Drione) also are effective, provided that a hand-held duster is used to puff the insecticide into the nest opening. A dry, empty liquid detergent bottle filled no more than halfway with dust and shaken before dispensing works fairly well in lieu of a commercial duster. A few pebbles or marbles added to the bottom of the bottle prevents the dust from caking. Dusts tend to be more effective than aerosols when the nest itself is located some distance from the entrance hole, as often occurs when yellowjackets construct nests in wall voids or deep within abandoned animal burrows.

Treatment should be performed at night, when most of the yellowjackets are in the nest and less active. Pinpoint the nest opening during the daytime, so you will remember where to direct your treatment after dark. Approach the nest slowly and do not shine the beam of your flashlight directly into the nest entrance as this may startle the wasps; instead, cast the beam to the side to illuminate the nest indirectly. If possible, place the light on the ground rather than in your hand. As with hornets, yellow-jackets are extremely aggressive when the nest is disturbed. It's often prudent to refer homeowners to a professional pest control firm, particularly when access to the nest is difficult.

Wasp, hornet and yellowjacket stings can be life-threatening to persons who are allergic to the venom. People who experience extensive swelling, hives, dizziness, difficulty breathing or swallowing, wheezing, or similar symptoms of allergic reaction should seek medical attention immediately. Itching, pain and localized swelling can be reduced with antihistamines and an ice pack.

VELVET ANTS
by Ric Bessin

One unusual insect that is occasionally seen running around open areas in the yard during July, August, and September is the velvet ant. Velvet ants look like large hairy ants, but they are actually wasps. They differ from ants in having only a slight constriction between the thorax and abdomen and having straight rather than elbowed antennae. They may be seen in lawns or pastures, or occasionally wandering into buildings. These solitary wasps, as the name implies, are densely covered with short hair.

The males have two pairs of transparent black wings. The females are wingless, and are sometimes confused with ants. Ants, however, have elbowed antennae, and a "hump" in the constriction between the thorax and abdomen. Velvet ants are brightly colored. They are shades of yellow and brown or red and black. Velvet ants are not aggressive and will try to escape when encountered, but females have a very painful sting if handled. Females use a long, needle-like stinger at concealed at the tip of the abdomen. Many of the velvet ants can produce a squeaking sound when diusturbed.

Adult velvet ants feed on nectar and water. The immature stages are external parasites of bees and wasps that nest in the ground. A few species parasitize some flies and beetles. Consequently, there are no identifiable nests to treat. Velvet ants prefer pastures and fields with sandy soil where their prey are most likely to be found. There is no effective control measure for them. If they are particularly abundant in an area, it may be helpful in the long run to overseed to get a better grass cover. This would discourage the ground nesting bees and wasps on which velvet ants feed. Because velvet ants are uncommon and do not cause any damage, no chemical control is recommended.

One velvet ant that is commonly submitted for identification is the ‘cow killer.’ The cow killer is the largest of the velvet ants in Kentucky, nearly an inch in length. It earned its name by the reputation of the female’s sting. It is said that the sting is so painful that it could kill a cow. The female is mostly red with some black, the male is half red and half black with dark wings. Females seek out bumble bee nests and lay eggs inside the wax cups. After bees or wasps have formed cocoons, adult female velvet ants enter the host nest by digging through the soil or breaking through nest walls. The cow killer larvae feed on the bumble bee larvae and pupae band will pupate inside the bumble bee nest. This bumble bee is ultimately killed.

DIAGNOSTIC LAB - HIGHLIGHTS
by Julie W. Beale

Diagnostic samples have begun to slow down after our busy summer. We are continuing to see a few samples of tobacco with lower stem problems, which we are testing for black shank. This late in the season, it becomes increasingly difficult to separate out the many pathogens which may be involved in a stem rot complex, particularly when identifying the primary causal agent.

Some other interesting samples we have seen this week have included Phomopsis gall on dogwood; popped kernel in popcorn (resulting from hot, dry conditions) with Fusarium moniliforme and a species of Aspergillus moving in on the exposed internal tissues; scab and codling moth damage on peach; black root rot on holly; and powdery mildew on pumpkins.

INSECT TRAP COUNTS
UKREC, Princeton, KY

August 27-September 3

Fall Armyworm	01
European corn borer	0
Southwestern corn borer	417
Corn earworm	0

September 3 - 10

Fall armyworm	1
European corn borer	0
Southwestern corn borer	247
Corn earworm	0

Lee Townsend

Lee Townsend, Extension Entomologist