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ANNOUNCEMENT

The Kentucky Fertilizer and Ag Chemical Association Pesticide Applicator Workshop will be held on Tuesday, Feb. 15, 2000, at the Executive Inn in Louisville. The program will begin at 9:00 am and end at 3:00 pm. Approval for continuing education credit in Categories 1, 10, and 12 will be requested.

TOBACCO

TRAY SANITATION - A KEY STEP TO DISEASE MANAGEMENT IN FLOAT-TRANSPLANT PRODUCTION SYSTEMS
by William C. Nesmith

The majority (about 80%) of transplants used to set Kentucky's tobacco fields are produced in a float system, either in a greenhouse or outdoors. In the hydroponic system, plants are growing in soilless media contained in Styrofoam trays, that are constantly floating on water amended with fertilizers. This approach offers many advantages to tobacco producers. Unfortunately, a disadvantage of the float systems is that the potential for infectious diseases is very high once it becomes contaminated with the pathogens.

Infectious diseases in float production systems are becoming more common and serious with repeated use of the system. Direct loss of transplants, spread of diseases to the field via transplants, and predisposition of the plant to field diseases are involved.

Growers have very few legal options for disease control in the float system. The need for regular fungicide applications to the water, soil and foliage is very high, but few chemical companies are willing to label their chemicals for these systems due to fungicide-resistance concerns. Consequently, growing transplants in the float system requires a much greater level of supervision and management than is necessary with traditional plant beds. Especially critical is keeping the disease-causing organisms out of the system - sanitation.

A diligent sanitation program is essential! Everything entering or contacting the operation should be pathogen-free: this includes the trays, the water, the media, equipment, tools, and workers. That means either new trays must be used or reused trays must be properly washed and sanitized.

The sanitation options available to disinfect trays include: soap and water, moist heat (steam), methyl-bromide fumigation, chlorine-bleach, and quaternary ammonium chloride salts. None of these options has been totally effective in killing all the pathogens. Each has positive and negative points, which have been addressed in several previous Ky Pest News articles.

Best results are occurring with a combination of approaches, involving washing with soap and water followed by either fumigation (methyl bromide at three lbs / 1000 cubic feet or house-bleach) or steaming at 175 F for 30 minutes. If household bleach is used, it must be removed from the tray after the disinfecting event to avoid damage to seedings.

CORN

DO TODAY'S GMOS BENEFIT CONSUMERS?
by Ric Bessin

One comment that I've heard many times at commodity and county meetings is that consumer acceptance of GMO's will increase when new GMO crops are introduced that have direct benefits for the consumer. Well that may be true, but let's not forget that we already have a GMO crop that has a direct benefit for consumers.

A number of questions have arisen regarding the food safety of biotech crops. This is a very strong concern for many consumers. While our government regulatory agencies have assured us that there is not a GMO food safety issue, and there have been no reports of any health hazards from transgenic foods, there may still be a difference in food safety between some GMO and conventional produce. But it's not what you may think. Researchers at Iowa State University have shown that some Bt-corn hybrids that express the Bt protein in the kernel have a much lower incidence of ear rots. Many of these fungi produce hazardous mycotoxins. So, some Bt-corn may reduce mycotoxin contamination of corn and improve food safety.

A recent USDA Economic Research Service Agricultural Resource Management Survey provides new insight into the extent of adoption of genetically engineered cotton, corn, and soybeans. This survey compared yields and pesticide use for adopters and nonadopters of the technology. In 1997, the ERS / NASS survey observed that with Bt-corn there was an average of 0.30 insecticide-acre treatments and with all other types of field corn there was 0.36 insecticide-acre treatments. This does not measure the full extent of insecticide reduction. Many farmers are currently using the Bt-corn in their high risk late plantings that commonly require one or more insecticide treatments to control European and southwestern corn borer, and fall armyworm. Then why are farmers still using insecticide on Bt-corn? Farmers using Bt crops can reduce insecticide costs by discontinuing or decreasing applications of chemical insecticides targeting pests susceptible to Bt, such as European corn borer. However, Bt crops have no effect on the use of insecticides to treat other pests such as corn rootworm and cutworms.

The bottom line is that Bt-corn reduced insecticide use by 16.7% when compared to other corn hybrids. This is exactly what many consumers are asking for, so yes, some of today's GMOs do directly benefit consumers.

GMO's: Fact Vs. Fiction

The production of Genetically Modified Foods, commonly referred to as GMO's, continues to cause debate among organizations, both for and against. It also is causing uncertainty among producers as they try to predict what crops will pay top dollar next year. As with any controversial subject, there is almost as much misinformation as there is good. I will address what I see as the issues and non-issues surrounding the production of Bt-corn in Kentucky.

One of the key issues facing a producer that considers growing Bt-corn will be, is it economically favorable for MY farm. This issue really doesn't receive the attention that it deserves, especially now during a period of low grain prices. GMO crops have an added price tag, which is the premium charged for the seed. The European corn borer is not a serious problem every year and outbreaks are unpredictable. Populations generally follow an approximate 5-year cycle with an outbreak at the end of the cycle. The Southwestern corn borer, on the other hand, is more predictable. Producers in western Kentucky counties along the Ohio and Mississippi Rivers have seen consistent problems the last few years. In Kentucky, Bt-corn hybrids are most economically favorable when used for delayed planting. This is when the pest pressure is the worst.

Some people suggest that Bt-corn shows a yield drag, others suggest it out-performs conventional hybrids. Studies at UK have shown that Bt-corn does not have a yield drag, but it doesn't provide a yield boost either. It only protects against yield loss.

Another issue for producers is market acceptance.

For the 2000 growing season, generally grain handlers have stated that they will accept any type of grain that producers wish to grow, and that there will not be discounts for GMO's. But growers need to stay in close contact with their markets.

Some people are concerned that production of Bt-corn will harm monarch populations, as a preliminary study from Cornell indicated. Many other more involved studies in the Midwest have now indicated that, at the very worst, the impact on Monarch populations will be minimal. In fact, with reduced insecticide use due to reduced corn borer sprays, there may even be a positive effect on monarchs!

The development of resistance by either of the corn borer species is a serious issue. The challenge facing the Kentucky corn producers is to learn about resistance management and adopt and deploy effective resistance management strategies.

FRUIT

IS THE DEVASTATING PLUM POX VIRUS A THREAT TO KENTUCKY?
by John Hartman

Many of you are no doubt aware of recent reports of the discovery of Plum Pox Virus (PPV) in Adams County, Pennsylvania. This is a destructive disease of stone fruit and could be a threat to peach, plum, and cherry production in Kentucky. This virus has never been found in North America before, and now that it is here, we need to be aware of the findings surrounding this disease. In this article, basic information about PPV will be discussed. For more details visit the edifying web site on PPV, also called sharka disease, that is maintained by Pennsylvania State University (http://sharka.cas.psu.edu). This article is based on information obtained from the web site.

What was found? Plum pox virus (PPV) was positively identified in a relatively small region of Pennsylvania in October, 1999.

Where has the disease occurred before? PPV was first found in Bulgaria in 1915, spreading gradually through Europe, reaching France in 1970, soon after, to England, and by 1984, to Spain. Throughout Europe, plum pox is considered the most devastating disease of stone fruits, and it has been estimated that over 100 million European trees are infected. Plum pox continues to spread eastward in Eurasia and southward along the Mediterranean coast of Africa. In the 1990's PPV was brought to Chile and within a few years, large numbers of trees in the stone fruit-growing regions were infected. In North America, the only identified occurrence of plum pox is localized in 18 stone fruit blocks of 4 orchards in two townships in Adams County, Pennsylvania. Due to the localized nature of this infection, it is hoped that eradication may be successful in eliminating this isolated focus of infection from North America.

Host range. PPV infects not only plums but also all economically important stone fruit (Prunus) species including peach, nectarine, apricot, almond, and cherry. PPV is also known to have the ability to infect some wild Prunus species, and a large number of weed species under laboratory conditions. In Europe, it is believed that spread within orchards occurs from infected to healthy fruit trees. The role of alternate weed hosts, if any, in disease spread is not known, but needs further study.

Symptoms on Stone Fruit. Symptoms of PPV may vary considerably with the plant species, the cultivar, tree age, nutrient status, and environmental conditions. In addition, different strains or variants of PPV may vary in virulence, and thus disease severity. Some infected plants show no clear symptoms at all. Diagnostic symptoms on leaves may consist of light green discoloration bordering the leaf veins (vein banding) or chlorotic light green or yellowed rings on the leaf blades. These symptoms may be obvious or barely visible to the eye, depending on factors described above. Symptoms frequently are restricted to only a few leaves per shoot. Infected trees are not stunted and are difficult to identify.

Fruits of peach and apricot may develop lightly pigmented chlorotic rings or line patterns resulting from several rings coalescing together. Fruits may become deformed or irregular in shape, developing necrotic areas. The internal stone from an infected apricot fruit may show white to yellow or red colored rings on its surface when the flesh is removed. Plums are generally more severely affected and show more severe symptoms. For some plum cultivars, infected fruits drop prematurely from the tree. Infected plum fruits often develop darker rings or spots on the skin, are severely deformed, and develop a reddish discoloration of the flesh. Affected fruit can be low in sugars and tasteless.

PPV infection of fruit trees results not only in development of typical symptoms on leaves and fruits, but also eventually debilitates the tree, reducing its useful life. Unfortunately, many trees fail to show symptoms for the first few years following the initial infection of the tree. In the survey done this fall in Pennsylvania orchards, only 2 of the 18 infected peach blocks had trees showing obvious symptoms. Therefore, symptoms are not a good indicator of infection and cannot be relied upon to determine the incidence or range of the disease. When symptoms do occur, however, they are frequently very diagnostic and easily recognized.

The Plum Pox Virus. PPV is a virus, an infectious agent much smaller than the disease-causing fungi or bacteria we often encounter. To visualize PPV, one needs to use an electron microscope which can magnify objects to 100,000 times natural size. Plum pox virus is a virus species in the genus Potyvirus. Potyviruses are one of the largest families of plant viruses and representatives are found in Kentucky as potato virus Y, bean common mosaic virus, maize dwarf mosaic virus, tobacco etch virus, and watermelon mosaic virus, for example. These viruses are transmitted by aphids. Once PPV is inoculated to a plant by a vector aphid, the replicating virus can spread throughout the plant infecting all tissues, including leaves, fruits, flower parts, buds, young bark, and roots. Plum pox virus is known to occur in several different forms or variants called strains. The strain introduced into North and South America has been the PPV-D strain which appears to be more slowly spread by aphids in Europe, compared to other strains.

How does PPV spread in the orchard? In orchards, PPV is spread only by aphids. Aphids are small insects that feed through modified piercing-sucking mouthparts on internal phloem tissues of plants. One of the most efficient vectors, the green peach aphid (*Myzus persicae*) colonizes other stone fruits in Kentucky. Therefore, the potential exists for aphid spread of PPV here. The aphids transmit PPV in a non-persistent manner which means that once the aphid probes into an infected plant and acquires the virus, the virus can only remain infectious and be transmitted by the aphid for a short time (usually some minutes or an hour).

How can the virus move internationally, and how did it get here? Long-distance spread of PPV by aphids is highly unlikely. Usually, long-distance movement of tree fruit virus diseases is done inadvertently through commercial shipping of nursery stock or budding material, but that has been pretty well ruled out in this case. A hobbyist propagator, a person who travels the world looking for new varieties from other countries, could bring a disease like this into the U.S. How PPV was introduced into the U.S. is not known.

Control through exclusion. Once PPV becomes established in a geographical region, it is very difficult or impossible to completely eradicate. Therefore, it is important to prevent the introduction of PPV into the country. Under the Plant Quarantine Act of 1912, in the United States, this is the responsibility of the Animal and Plant Health Inspection Service (APHIS) of the USDA. All fruit nursery stock for importation is tested for a range of known fruit tree pathogens and especially for those that are not known to occur in the United States (exotic pathogens). Only pathogen-free material is released for commercial use. The occurrence of PPV in Pennsylvania serves to remind everyone of the importance and need of strict plant quarantine and testing procedures associated with imported nursery materials. In almost all cases, transoceanic dispersal of plant pathogenic agents is associated with human transfer of infected host materials. Therefore, careful regulation and inspection combined with education of importers and travelers could prevent reintroduction of exotic plant diseases threatening U.S. crops once they are eliminated.

Quarantine can be effective in preventing long-distance spread of PPV within a region, state, or country. If the disease is localized to a small area, it may be contained by local quarantines preventing movement of infected materials out of that area. Such a quarantine was implemented October 21, 1999, in Adams County, Pennsylvania, by the Pennsylvania Department of Agriculture (PDA). If implemented before movement of infected materials occurred, it will be effective in preventing spread of PPV. The objective of the quarantine is to exclude PPV from entering other fruit-growing areas. The inspection and testing of imported nursery material and plant breeding materials is the first line of defense against PPV. It is also essential for commercial growers and nursery propagators to purchase only certified virus-free planting stock that has been tested and verified to be free of PPV, as well as other fruit viruses.

Control through eradication. Now that the virus is in the U.S., and since diseased trees cannot be cured, the next control strategy is to eliminate the virus-infected materials as quickly as possible before the virus spreads. Intensive surveys are planned to identify the extent of PPV spread. Because of quarantine concerns, the USDA has stepped in to work with the PDA and together, with advice from European scientists, they will develop a plan of action to eradicate the problem. Although details of the eradication program are not available yet, preliminary discussions suggest that hundreds of acres of stone fruits including peaches, nectarines, plums and apricots will need to be destroyed. Scouting and surveys to detect PPV will probably continue for several years to verify the effectiveness of the eradication program. This will involve use of laboratory assays such as serological tests (ELISA), or nucleic acid probes for specific viral RNA sequences. Once infected trees are identified, the cure is simple and administered with a bulldozer, chain saw, or other equipment to completely remove the tree, including roots. The role of weeds or nearby wild prunus species in harboring the virus is not known. If weeds and wild hosts are found to be important refuges for the virus, then eradication may be nearly impossible.

Control through protection of trees from aphid vectors. Creating an insecticide barrier around healthy trees is not a practical means of preventing aphid transmission of PPV. Control of this type of transmission is difficult because the aphids are so mobile and need to probe for only a few seconds to acquire or transmit the virus, leaving little time for insecticide effects. Because aphids tend to lose the ability to transmit potyviruses if they land and test probe on a non-host plant before landing on the crop plant, decreased infection might result from surrounding Prunus with several rows of a non-host species such as apple.

Control through host plant resistance. If PPV becomes established in the U.S., then plant breeding and genetic engineering may become important. Unfortunately, little resistant germplasm has been identified in Prunus species. This means that few naturally occurring resistance genes are available for plant breeders to use in developing highly resistant fruit varieties. Genetic engineering of resistant Prunus species may be possible by insertion of specific genes from PPV into the plant, but this approach has only been demonstrated experimentally thus far.

Now that the disease is in Pennsylvania, can they get rid of it? At the moment there are many unanswered questions regarding how the virus arrived in Pennsylvania and exactly how far it has spread. To date, PPV has not been found outside of two townships in Adams county. These townships are under quarantine making it illegal to move Prunus trees or budwood from this area. The USDA Animal and Plant Health Inspection Service (APHIS) and the PDA Bureau of Plant Industry (BPI) are working to prevent this disease from spreading to other parts of the country if at all possible. The USDA has been successful in keeping PPV out of the country up until now since this is just the first report of PPV in North America, but with increased international travel and trade, this job becomes more difficult. Officials are hopeful that because the strain of PPV found here tends to spread slowly in nature total eradication of PPV from Pennsylvania is feasible. Presently, wild cherry, a common Prunus species growing in Eastern forests and fence rows, is also being tested to see if it is susceptible to PPV. If wild cherry proves to be a host, PPV may be difficult to stop. Within the quarantine area, home orchards and ornamental Prunus plantings are not excluded from PPV surveys and eradication, if found to be infected.

What are the implications of PPV for Kentucky? Assuming the disease is eradicated from Pennsylvania, there would be little economic impact here. Growers will probably not be able to obtain Prunus trees from nurseries located in the quarantine area. If PPV is not stopped, then ultimately production of peaches and other stone fruits would not be profitable here until resistant trees are developed. Use and maintenance of ornamental Prunus species in the landscape would also be compromised. We should hope that the disease will be eradicated and that it will not appear here.

HOUSEHOLD

THE NITTY GRITTY ON HEAD LICE
by Mike Potter

Most people associate winter with the end of their insect problems. In the case of head lice, nothing could be farther from the truth. Head lice are especially common this time of year, especially on children. Schools bring large numbers of children together in close, personal contact. Hats and coats are often shared or hung together in the same

closet, permitting transfer of lice from one child to another. Transfer of head lice can also occur by using infested combs and brushes, or resting one's head on upholstered furniture or pillows recently used by an infested individual.

Diagnosing the Problem- Head lice are bloodsucking insects that live exclusively on humans. They usually infest only the head, preferring the nape of the neck and the area behind the ears.

The first indication of head lice is itching and scratching caused by the bloodsucking habits of the louse. Examination of the hair and scalp will usually reveal the white or grayish crawling forms (about the size of a sesame seed) and yellowish white eggs (nits) attached to the hair shafts close to the scalp. The nits are sometimes mistaken for dandruff or residues of shampoo but will not wash off or be flicked off with a finger. Usually all life stages can be seen with the naked eye, although a flashlight and hand lens are helpful. Red bite marks or scratch marks are often seen on the scalp or neck.

People should be aware that there are many factors (other than lice) that may cause itching and irritation during the winter. Dry air alone can cause irritation, producing a condition known as "winter itch". As skin loses moisture, itching results. A skin moisturizer or home humidifier is often helpful in these situations. See ENT-50 *Invisible Itches: Insect and Non-Insect Causes.*

Elimination and Prevention- There are four key steps to eliminating head lice and preventing their return. Steps 1-3 should be performed at the same time in order to avoid reinfestation.

1. The child or infected person(s) should be treated with a pediculicide shampoo formulated specifically to control lice. Several different products, most containing permethrin or pyrethrins, are available through pharmacists and physicians. Follow the directions on the package. If one family member is infested, all others should be examined. More than half of lice-infested children have another infested family member at home.

2. Remove all nits using a fine-tooth louse comb. Although this step can be quite time-consuming, nit removal is critical to eradication. Louse control shampoos often do not kill all the nits, and surviving eggs will hatch within 7 to 10 days, continuing the cycle of reinfestation. Dead nits also tend to remain attached to the hair, causing uncertainty about reinfestation. Nits are most easily removed by combing while the hair is slightly damp; adding conditioner may make combing easier. Nits can also be picked out with fingernails or cut out with small safety scissors.

3. All personal articles that have been in contact with the patients's head should be deloused. Normal laundering with hot, soapy water (125 degrees F for 10 minutes), or dry cleaning will kill lice and nits on pillowcases, sheets, night clothes, towels, hats, and stuffed animals. Combs and brushes should be soaked for 10 minutes in a pan of very hot water.

Treatment of the premises or clothing with insecticides is generally not required or recommended for the control and prevention of head lice. This is because the lice cannot survive for more than a day or so off of their human host; nits lose viability within a week. As an added precaution, carpeting and furniture contacted by infested individuals may be vacuumed.

4. To reduce the chance of reinfestation, children should be instructed not to share hats, clothing or brushes with their classmates. Each child should have a separate storage space for their hats and other clothing at home and school to prevent contact with other garments. If this is not possible, coats should be hung on hooks so they do not touch, or on the backs of students' chairs.

Managing Persistent Infestations- Despite all of the above efforts, there are times when a head lice infestation seems to persist indefinitely. Persistent infestation may be due to various causes, one of the most likely being improper use of the pediculicide (e.g. insufficient time shampoo left on the hair, or failure to reapply after 7 to 10 days). Other times, not enough time was spent combing out the nits or no effort was made to concurrently treat other infested family members.

In rare, but increasing instances, the product in use may have lost its effectiveness. Head lice resistance to pediculicides has been documented recently in certain areas of the world, especially to permethrin. Resistance to pyrethrin / piperonyl butoxide formulations appears to be less common. If resistance is suspected to the pediculicide you have been using, consult with your physician.

Elimination of a head lice outbreak in a school, nursing home, or similar shared facility requires prompt, coordinated action and administrative support to prevent the spread of lice to uninfected individuals. Unless all affected persons are treated, the condition will continue.