### Number 974 January 27, 2003

#### ANNOUCEMENTS

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<tr>
<th><strong>UPCOMING PESTICIDE TRAINING MEETINGS</strong></th>
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<td>These meetings start at 9 am local time and end about 3 pm</td>
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<td><strong>Feb 5</strong> – Mayfield, Graves Co Extension Office (4 gen + 2 specific) 1a, 1b, 10, 12 No test</td>
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<td><strong>Feb 7</strong> – Burlington, Boone Co Extension Office (6 general hours) 3, 10, 12, 18, 19, 20, Testing</td>
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<td><strong>Feb 10</strong> – Lexington, Fayette Co Extension Office (4 gen + 2 specific) 1a, 1b, 10, 12 No test</td>
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#### LIVESTOCK

- Winter clean out good for litter beetle management

#### STORED GRAIN

- Don’t forget your stored grain!!

#### ANNOUNCEMENTS

- Upcoming pesticide training meetings
- Random checks of private applicator pesticide records and WPS compliance

#### TOBACCO

**RIGOROUS SANITATION VERY IMPORTANT TO SUCCESSFUL TOBACCO TRANSPLANT PRODUCTION USING THE FLOAT SYSTEM**

by William C. Nesmith

Keeping pesticide records is good business practice and has numerous benefits! Here are a few examples:

- **Saves money** - Accurate pesticide records will enable you to know and buy the correct amount of pesticides for each growing season.
- **Shows what is working** - Good records will help you determine how a pesticide application achieved the best results or why a pesticide may have performed poorly and prevent future repeated failures.
- **Documents correct use** - Should a question arise concerning pesticide use, your records may provide liability protection. **Improves management decisions** - Since some pesticides have restrictions on what can be planted the following year in the same field, good records can help you plan your crop rotations.

**GREENHOUSE**

- Tomato spotted wilt and impatiens necrotic spot viruses and their vector, western flower thrips- threats to ornamental production in the greenhouse

**HUMAN**

- Head Lice

**TOBACCO**

- Rigorous sanitation very important to successful tobacco transplant production using the float system

by William C. Nesmith

Hopefully, after last season more of the tobacco industry appreciates that having healthy, disease-free transplants is an important first step to controlling diseases in the field and having a profitable tobacco crop. Most tobacco transplant production in our region uses containerized-transplants, by way of the float system in either greenhouse or outdoor locations. In this system, cells of styrofoam trays are filled with a soilless medium, seeded...
with a pelleted seed, and floated in a shallow bay of water from germination until ready for the field. The cells in the styrofoam trays are perforated in the bottom to allow water and nutrient uptake, but a portion of the tray (0.25 to 2.0 inches) is submerged plus “water-roots” grow into the liquid medium. This keeps much of the root system under constant saturation on most farms, and in poorly managed situations portions of the lower stem are constantly wet, too. Moreover, the trays of plants are taken to the field and typically reused, providing an ideal mechanism for cycling and new introduction of pathogens into the system.

High plant density and high moisture conditions are often also present in these systems providing extended periods of stem and leaf wetness. Where fertilization is not managed well, succulent plant tissue and/or nutrient starved conditions favor development and spread of seedling diseases. In addition, certain diseases that may not be a problem in outdoor soilbeds become a problem in greenhouses. The most common diseases found in tobacco float systems are Pythium diseases (damping off, root rot and stem rot), Rhizoctonia diseases (damping off, stem rot, and target spot), Bacterial Blackleg/bacterial soft rot, Sclerotinia collar rot, Fusarium diseases (root rot, stem rot), and black shank.

Infectious diseases in transplant production have become increasingly important and last year they caused major losses in both the transplant sites and later in the field. I urge all to appreciate that the current transplant production methods being used are highly conducive to disease development once the pathogens have been introduced. Therefore, the key to controlling these diseases is to keep the pathogens out of the system. A diligent sanitation program is how you keep them out!

The pathogens causing such diseases are entering the system through contaminated trays, in contaminated soil, contaminated water, through vents, on workers’/visitors’ hands and shoes, on tools, on animals, etc. Therefore, the keys to managing diseases in the float system are to keep the pathogen out of the system and manage environmental conditions to keep humidity low and float water temperature cool. However, that is easier said than done, especially where trays are reused. Note that several of the above diseases are field pathogens, so all precautions should be taken to ensure that field soil or used media does not enter the system.

Everything used in the system needs to be free of pathogens, and if not free, at the lowest population levels feasible. The media and water being used should be pathogen-free. All equipment and tools that come in contact with the system should be pathogen-free. That means either new trays must be used or re-used trays must be properly washed and sanitized.

**Tray Sanitation:**

What is available to disinfect trays? Steam, methyl-bromide fumigation, chlorine-bleach, and quaternary ammonium chloride salts are available in Kentucky. None of these materials have been totally effective in killing all the pathogens and exactly how to best use them at the farm-level is not fully understood. Each has positive and negative points, which have been addressed in several previous Ky Pest News articles.

**STEAMING TRAYS:** In our studies, aerated-steam (and other forms of wet heat) have been the most effective disinfectants - does the best job of killing the range of pathogens we are facing in Kentucky. But its cost is high and some items are damaged by steaming. Moreover, most growers do not have it available. Our studies with heavily contaminated trays have demonstrated that the trays need to reach at least 160°F to 175°F for 30 minutes (timing starts once the desired temperature is reached, not total time), but lower temperatures at much longer times have been effective in other research. Some commercial transplant producers are successfully using steam, the temperature/times being used mainly depends upon the assessment of risk potential.

**FUMIGANTS:** Methyl bromide with 1% chloropicrin has been almost as effective as steam in some of the tests. It provides excellent control of Rhizoctonia and other fungi on the surface of the tray. It will also greatly reduce the level of Pythium, but has not been as effective as steam or proper bleaching in reducing Pythium, probably because a significant amount of Pythium is found embedded in the tray. We find great variation in the amount of control provided within the lot of trays, also. It is important to us an air-tight plastic seal, to pre-wet the trays, and to avoid large stacks of trays. Methyl-bromide is heavier than air, so it sinks, therefore best results occur with long, short stacks rather than tall, deep stacks. We have found little control is provide at the low rates, so use the maximum labeled rates (3 lbs/1000 cubic feet or about 500 trays, stacked criss-crossed). Temperatures need to be above 50°F and the fumigation event needs to last at least 24 hours, with a least 48 hours of aeration before using. Do not fumigate inside a greenhouse. Certain types of styrofoam trays appear to be more easily damaged with this chemical. Pay special attention to ALL label precautions related to safety.

**CHLORINE BLEACH:** Just dipping trays in bleach will not provide satisfactory results with contaminated trays. However, properly used this material can provide a significant level of sanitation for the small grower unable to manage either steam or fumigation. Chlorine bleach solutions have given a high level of control in our tests with highly contaminated trays but, over-all, are not as effective as either steam or properly conducted fumigation. We have found little benefit to using more than 10% solution, plus there is increased phytotoxicity potential. Without proper aeration and post-washes, salt residues can cause serious problems, especially with older trays that tend to soak up more materials. Bleaches work...
best when the trays are washed with soapy water, then
dipped several times into clean 10% solution, followed by
covering them with tarp to keep them wet over-night with
the bleaching solution. Afterwards, the bleach solutions
should be washed from the trays with clean water or
water plus a Q-salt listed below, followed by aeration -
to eliminate the chlorine and salts of chlorine. Worker safety
issues are also important with bleach. It is important that
the bleach solution remain below pH 6.8 and that new
solution be made up every 2 hrs or whenever it becomes
dirty, which ever comes first. Organic matter will remove
the active ingredients quickly.

Q-SALTS (Quaternary ammonium chloride salts): These
are marketed under such names as Greenshield, Physan,
and Prevent as solution containing 20% ammonium
chloride. Many growers are using them, but the effects are
not as positive as some believe, based on our testing. I
believe there greatest benefit is in the final wash and on
exposed surfaces in the greenhouse. In all our test, they
have always provided some control, as compared to using
soap washes only, but have always been inferior to any of
the above mentioned methods.

Additional Sanitation Steps:
- Use new media and never reuse media. If carry-over
media is used, be certain that it has not become
contaminated during the off-season.
- Discard trays from previous disease outbreaks, rather
than attempting to sanitized them. Also, discard old trays
and replace them with new trays.
- If TMV was involved, Using TSP (trisodium phosphate)
as the soap.
- Use water from approved drinking water treatment
systems to greatly reduce the introduction of plant
pathogens such as Pythium, Fusarium, and Phytophthora.
Several serious disease outbreaks have been connected to
pond water and contaminated well water.
- Mowers that are used to clip plants should have their
under-carriages washed and then sanitized with a 50%
bleach solution at least between every clipping and
preferably more frequently. To avoid serious rust
problems, rinse the bleach solution off no earlier than 30
minutes after it was applied.
- If disease does appear to be developing, remove trays
that show any symptoms of disease. Bury or burn the
contents of those trays and store the trays in an enclosed
area away from the greenhouse.
- Never dump old trays, old media, infected plants, and
clippings around greenhouses.
- No tobacco products should be used or allowed in
greenhouses.
- Workers who need to step into water beds should first
wash and sanitize their boots to prevent pathogenic
organisms from being carried into the water.
- Walkways should be constructed of gravel, asphalt, or
concrete to be easily washed.
- It is also important to clean work areas (flat filling,
seeding, etc.) daily. Storage areas for trays should be kept
clean.
- Never allow weeds to develop in the greenhouse.
- Growing vegetable and bedding plants in tobacco
greenhouses greatly increases the chances of virus
diseases in tobacco, especially, if they are allowed to
flower while tobacco is in the house.
- Keep stray animals out of the greenhouse.

CORN

KITS FOR TESTING GRAINS
FOR MYCOTOXINS
by Paul Vincelli

This past autumn, occasional questions were raised about
testing for mycotoxins in corn. The possibility of
contamination with aflatoxins and fumonisins was of
concern.

Sampling
The “weakest link” in quantifying mycotoxin levels is in
sampling. There can be quite of bit of natural variation in
mycotoxin test results from sample to sample pulled from
a grain lot, even when good sampling procedure is used.
The variation can be even worse when sampling is not
sound. For stationary shelled corn, sample using a grain
probe (sometimes referred to as a trier). Don’t collect a
sample just from the most convenient place, like the top of
the truck or storage bin. The odds are good that this will
give a misleading result, since mycotoxins are distributed
very unevenly in a lot of corn. Take a minimum of 4-5
probefuls (preferably 10 probefuls) and collect 10 lb of
corn. For a moving stream of grain, use a diverter-type
mechanical sampler; if one is not available, cautiously
grabbing fistfuls can also be suitable; take care to avoid
personal injury.

If the test is not to be performed within 12-24 hours, dry
the corn to below 16% moisture. If high-moisture corn is
held for an extended period of time before testing, the test
results may not be accurate, as mycotoxin-producing
fungi can continue to grow and produce mycotoxins in
the sample.

Grind the aggregate sample and mix it very well. A one
or two pound subsample should be drawn from that; a
riffle divider is the best way to obtain a representative
subsample. Blend this subsample by lifting or rolling the
ends of the bag to the opposite side and repeating at least
ten times. A final subsample can be withdrawn from this
for testing. Be sure to thoroughly clean grinding and
sampling equipment between samples. Remember you
are working with potentially toxic materials. For personal
protection, wear a dust mask when grinding, mixing, and
dispensing the sample. Minimize dust and exposure to it
at all times.

Test Kits
Test kits have commercially available for several years for
testing grain for certain mycotoxins, including aflatoxins
and fumonisins. A list of commercial mycotoxin kits of

which I am aware can be found at <http://www.ca.uky.edu/agcollege/plantpathology/PPAExten/PPFSHtml/ppfagc3.htm>

The chemical basis of most of these test kits is technically called a “competitive, heterogeneous ELISA”. The details of what this means is beyond the scope of this newsletter, but a consequence of this is that such techniques have more potential for a “false positive” (a positive test result where no mycotoxin is actually present) than more sophisticated laboratory procedures. Thus, a positive test result with an ELISA-based test kit is not an absolute guarantee that the mycotoxin is actually there in a given sample. However, I suspect this problem is uncommon because research studies which I have seen show relatively good agreement between the ELISA kits and more sophisticated lab procedures. Thus, I see no reason not to use these kits for routine screening purposes of grain. Several of these kits are approved for mycotoxin detection by the USDA Grain Inspection, Stockyard, and Packers Administration.

Laboratories where grain samples may be tested for mycotoxins are listed at <http://www.ca.uky.edu/agcollege/plantpathology/PPAExten/PPFSHtml/ppfagc3.htm>.

**STORED GRAIN**

**DON’T FORGET YOUR STORED GRAIN!!**

by Doug Johnson

I know it’s cold, and yes, that is a good thing for storing grain ... for the most part. However, don’t let the low temperature lull you into a false sense of security and ignore your bins. The low temperature stops insect movement and reproduction and will probably kill a few. But, bins do not always have uniform temperature and if a large insect (or fungal) infestation was in place before the temperature dropped, your grain could still be at risk.

Insects can, by their own living processes, produce some heat. If enough insects are gathered together in a small group and some moisture is present, you could have a big problem when spring comes. In addition, with the number of rain / snow fall events we have had recently, it is entirely possible that the grain surface could be wet. Although nothing is happening while it is below freezing, those wet spots are a prime location for problems with insects, fungi, and sprouting as the temperatures warm.

If nothing else, take a buddy and take a look and a sniff at the roof hatch of your bins. Often just the early discovery of a musty smell, a warm spot or a wet spot will pay off greatly.

Be very careful, do not go alone. It is cold and slippery up there!!

**LIVESTOCK**

**HOG LICE AND MANGE MITES**

by Lee Townsend

Hog lice and mange mites are two external parasites that can become serious swine pests during the winter. Cold temperatures favor the development of lice while bunching of animals increases contact and allows ectoparasites to spread quickly throughout the herd. Hog lice use piercing, sucking mouthparts to feed on blood. Heavy infestations can be especially serious for young pigs. In combination with other winter stresses, lice can harm large animals, too.

A hog louse lives about 5 weeks and spends its life cycle on the animal. Single eggs or nits are glued to hair shafts and hatch in 2 to 3 weeks. Lice feed on tender areas of skin- inside ears or in folds of skin on the neck. The slate blue lice can blend in with the skin and be overlooked, even though adults are about 1/4" long. The good spots get taken up, so lice may move and settle around upper inside areas of legs and around the tail of a heavily infested animal.

Lice feed frequently and produce a persistent and annoying itching sensation. Severe infestations cause the animal’s skin to show measle-like bumps. “Lousy” animals repeatedly rub against feeders, posts, and other objects. This produces hair loss and cracked skin.

Lice can be seen with the naked eye but mange mites are much smaller. Positive diagnosis requires microscopic examination of skin scrapings. Mites burrow into skin-literally digesting their way through it. The life cycle takes about 2 weeks. As with lice, the feeding produces severe itching and causes the animals to rub. Mange lesions can start anywhere but usually occur first on the head, typically around the ears, eyes or nose. They are not exposed like lice so control with contact insecticides is tougher.

Mange mites burrow within the skin of the animal. Strong digestive enzymes dissolve the tissue producing a liquid upon which the mites can feed. Infestations cause severe itching and infested animals rub frequently to get some relief. Scabs usually show up first on the head, especially around the eyes, nose, and ears. Mites present in the ears may be missed during examination or treatment and can result in a resurgence of the problem.

Do not make a hasty diagnosis. Skin lesions do not automatically mean lice or mites. Check animals carefully. Infestations do not have to be “either - or” - both lice and mites can occur on the same animal.

Options for lice and mange control include sprays, dusts, pour-ons, injection, or feed-through (See ENT-23, Insect Control on Swine). When using sprays, remember where these pests are on the animal and treat thoroughly. Spray pressure must be sufficient to be effective against mites.
The most common and dramatic problems of greenhouse ornamentals in Kentucky have been due to INSV. This virus is usually the one causing problems on impatiens, New Guinea impatiens, begonias, petunias snapdragons, cyclamen, cineraria and gloxinia. Both viruses are transmitted from plant to plant by western flower thrips. An adult thrips can infect a plant with virus after feeding for only 30 minutes. TSWV is very damaging to tobacco, tomatoes, and peppers, but it also attacks some ornamentals, most often dahlias imported from overseas, and chrysanthemums and (rarely) ivy geraniums. Both viruses have a very wide host range and both are vectored by thrips, especially western flower thrips.

Virus Disease Symptoms. TSWV/INSV causes a wide variety of symptoms including wilting, stem death, stuntling, yellowing, poor flowering; and sunken spots, etches, or ring spots on leaves. Symptoms are not very specific or consistent, and merely tell the grower that there is something wrong with the plant. Many other diseases and plant problems can cause symptoms that resemble TSWV/INSV. Virus symptoms may depend on time of year, type of plant, age of plant, plant physiological state, growing conditions at the time of infection, and strain of virus. Positive diagnosis is made by submitting a plant to a plant disease clinic that uses either inoculation of special indicator plants or chemical tests to determine if the virus is present. In the U.K. Plant Disease Diagnostic Laboratory, separate tests are used to look for both TSWV and INSV. A plant may have either or both viruses.

Managing INSV and TSWV on greenhouse ornamentals.
• Inspect incoming plant material for signs of thrips feeding injury, or for symptoms indicative of TSWV or INSV infection. Most plant materials coming from suppliers are not guaranteed to be disease free; thus your inspections are most important. Insist on good thrips control from your plant suppliers.
• Isolate incoming plants from all other plants in the greenhouse until certain they are free of the viruses.
• Separate cutting crops from seedlings. The disease frequently enters the greenhouse within vegetatively propagated plant material. Hanging baskets of infected cutting crops over seedlings can lead to bedding plant losses, since the young seedlings are highly susceptible.
• Immediately discard plants showing distinctive TSWV/INSV symptoms. Early destruction of a few infected plants may prevent an epidemic through all the susceptible plants in the greenhouse. If in doubt, throw them out. Infected plants cannot be cured.
• Do not vegetatively propagate infected plants. The virus can still be maintained in a crop through vegetative propagation even in the absence of western flower thrips.
• Plants may act as reservoirs of the virus. Flowering pot plant crops such as cyclamen can serve to carry the disease over from the fall to the following bedding plant season, as might weeds left under the benches. Eliminate weeds in and near the greenhouse which may harbor thrips and/or the virus.
• Consider using petunia plants as indicators to monitor

and the animal must be wetted thoroughly. Treat on a warm, sunny day so animals will dry rapidly. Dusts are generally less effective than sprays but can be used for louse control if only a few animals need treatment or conditions do not allow spraying. Pour-ons and bedding/pen treatments are effective against lice and are recommended in cold weather when spraying is prevented. Lice and mites can only survive off of the animal for 2 to 3 days. They will not infest humans, pets, or other livestock. Follow up on treatments to check on results. A few mites or lice can survive to continue the infestation.

WINTER CLEAN OUT GOOD FOR LITTER BEETLE MANAGEMENT
by Lee Townsend

The lesser mealworm (litter beetle and darkling beetles - some of the kinder alternative names) can build to overwhelming numbers in broiler house litter. The insect is relatively intolerant of temperatures below freezing and a winter litter clean out can expose and kill large numbers of them with minimal chance of invasions of nearby buildings or home.

The dark brown to black, ½-inch long adults and the light yellow to brown wireworm-like larvae tend to congregate in the older, deeper litter. They accumulate under anything lying on or just below the litter surface, such as floor feeders or caked litter. They tend to avoid very wet or very dry situations. Spot litter removal can be helpful if the whole house cannot be cleaned. Spread the litter on fields where it (and the beetle adults and larvae) is exposed to freezing temperatures. Spread of beetle-infested litter when temperatures are above about 50o F can result in some spectacular movement of the adults to lights and invasions of homes or buildings.

More information on litter beetles is available in Entfact 507, available on-line at www.uky.edu/Agriculture/Entomology/entfacts/livestc/ef507.htm

GREENHOUSE

TOMATO SPOTTED WILT AND IMPATIENS NECROTIC SPOT VIRUSES AND THEIR VECTOR, WESTERN FLOWER THRIPS-THREATS TO ORNAMENTAL PRODUCTION IN THE GREENHOUSE
by John Hartman

Diseases caused by tomato spotted wilt virus and impatiens necrotic spot virus can cause losses in Kentucky greenhouse ornamentals and to vegetable and tobacco transplant operations. Although the virus and thrips (the disease vector) are common, growers can avoid crop losses by aggressively controlling thrips and the viruses it spreads. Tomato Spotted Wilt Virus (TSWV) and Impatiens Necrotic Spot Virus (INSV) are two different but closely related viruses causing similar symptoms.
for TSWV/INSV and thrips feeding injuries; 'Calypso', 'Super Blue Magic' or Summer Madness' petunias may all be used as indicators of TSWV/INSV. Use a yellow (NON-sticky) card to help attract the thrips to the petunias.

- Losses have been greatest with gloxinia, double flowered impatiens, New Guinea impatiens, begonia and cyclamen crops. Be particularly careful to keep these crops isolated from potential sources of virus.
- Be aware that vegetable and tobacco transplants are also susceptible to these viruses and can serve as reservoirs of infection or become infected from the ornamental sources.
- Manage the Western Flower Thrips (Frankliniella occidentalis). See the U.K. Plant Pathology fact sheet, PPFS-GH-2, entitled: Control of Tomato Spotted Wilt Virus and Impatiens Necrotic Spot Virus and Their Vectors, Western Flower Thrips, in Greenhouse Crops, written by John Hartman, Monte Johnson and Ric Bessin.

Perennial plant growers need to aggressively attack TSWV and western flower thrips in both greenhouse and outdoor plantings, and must be aware that plants originating from greenhouse production but now planted outdoors may carry the virus. Even if the thrips do not overwinter in Kentucky, vegetatively propagating infected plants will maintain and spread the virus. Garden center operators must also be aware of the biology of TSWV and western flower thrips, especially if they keep herbaceous plants all year. Many perennials are susceptible to the virus and attractive to thrips. An infected perennial will retain the virus until that plant dies.

**HUMAN**

**HEAD LICE**

by Mike Potter

Head lice outbreaks 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 reinestation.

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 reinestation. Dead nits also tend to remain attached to the hair, causing uncertainty about reinestation. 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 patient's head should be depilated. 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 reinestation, 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.

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.