Pesticide Applicator Report

A Publication for Vermont Pesticide Applicators

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Vermont Agency of Agriculture Web Page - http://www.vermontagriculture/pid.htm
Extension Service Web Page - http://www.uvm.edu/extension/directory/yellow.htm

In This Issue:

Have questions or comments on this newsletter? Please contact Wendy Anderson at (802) 828-3475, or wha@agr.state.vt.us

News from the Vermont Agency of Agriculture, Plant Industry Division

PESTICIDE APPLICATOR CORE MANUAL COSTS TO INCREASE

The Core manual that all pesticide applicators and dealers utilize in preparing for their certification and licensing exams will be increasing in price, from $17.00 to $33.00. The development and production of the manual by Cornell University has, in the past, been heavily dependent on New York State funding. However, like Vermont, New York is experiencing budget cuts which will necessitate passing an increased percentage of manual development and duplication costs along to end users. At this time, the costs of category manuals remain unchanged.

PLANT INDUSTRY DIVISION ANNOUNCES NEW WEB SITE ON PLANT HEALTH RESOURCES

The Agency's new web site on Plant Health Resources is designed to be a resource for the public, industry professionals, home owners, land managers, farmers, foresters and other state agencies. The site provides information on plant health, invasive species, current information regarding pest survey and detection, nursery laws and licensing, and the import/export of agricultural products. We welcome you to give us feedback on this new website. Please contact Bonnie MacCulloch, Pest Survey Coordinator, at (802) 828-2431 or bmac@agr.state.vt.us.

NEW INSECT RESISTANCE LEARNING SITE AVAILABLE TO CORN GROWERS

The Insect Resistance Management Learning Center (IRMLC) is the first online site dedicated to informing corn growers about the basic, standardized principles and importance of insect resistance management (IRM). This resource has been created under the sponsorship of the U.S. National Corn Growers Association (NCGA) and is a pro-active effort by industry to provide corn growers with access to information and training on IRM, as well as integrated pest management (IPM) principles, plus the key corn pest insects targeted by the various strains of transgenic corn designed to resist them. The site is organized by several topics, including IRM, Compliance Assurance Program, Integrated Pest Management (IPM), Corn Borer, and Corn Rootworm. There is an option within each section to answer a series of questions to evaluate your knowledge of the topic. The site can be accessed at: http://ncga.com/biotechnology/IRMCenter/index.htm.

EPA CHOOSES N-METHYL CARBAMATES FOR CUMULATIVE RISK ASSESSMENT

EPA has identified the pesticides it will review together in a cumulative risk assessment on N– methyl carbamates. With the passage of the Food Quality Protection Act (FQPA)

(Continued on page 2)

News from the Agency of Agriculture, Plant Industry Division

in 1996, EPA was ordered to assess the cumulative toxic effects of pesticides that have common mechanisms of toxicity, paying special attention to providing adequate protection to infants and children. When performing a cumulative risk assessment, EPA considers all non-occupational exposures to pesticides through dietary sources, drinking water, home, garden and recreational uses, and pet care. Following the assessment, EPA determines if products need to be cancelled, specific use patterns eliminated, or label language amended to incorporate enhanced safety precautions needed to protect human health and the environment. The following chemicals will be reviewed:

- Aldicarb (Temik)
- Aldoxycarb (Standak)
- Carbaryl (Sevin)
- Carbofuran (Furadan)
- Formetanate HCl (Carzol, Dicarzol)
- Methiocarb (Draza, Mesurol)
- Methomyl (Lannate)
- Oxamyl (Vydate L)
- Pirimcarb (Pirimor, Rapid)
- Propoxur (Baygon, Blattanex)
- Thiodicarb (Larvin)

These products were selected because they display a common mechanism of toxicity (acetylcholinesterase inhibition), have current registrations, and are expected to have quantitatively significant exposure scenarios. The EPA decided to exclude two other types of carbamate chemicals - thiocarbamate and dithiocarbamate - because they act through a separate mechanism of toxicity. EPA plans to have the draft cumulative risk assessment report completed by spring 2005. You can follow EPA's pesticide-related activities by subscribing to the Agency's Pesticide Program Update (see below).

EPA PESTICIDE PROGRAM UPDATES AVAILABLE ON FREE LISTSERVE

EPA distributes its Pesticide Program Updates to external stakeholders and citizens who have expressed an interest in Office of Pesticide Program (OPP) activities and decisions. The Agency has established an electronic list serve for people who want to keep abreast of pesticide issues and decisions. This update service is part of EPA's continuing effort to improve public access to Federal pesticide information.

To subscribe to EPA's automated mailing list, visit: http://www.epa.gov/oppfead1/cb/csb_page/form/form.html (Note: there is an underscore between "csb" and "page".)

For general questions on pesticides and pesticide poisoning prevention, contact the National Pesticide Information Center (NPIC), toll-free, at: 1-800-858-7378, by E-mail at npic@ace.orst.edu, or by visiting their website at: http://npic.orst.edu

For information about ongoing activities in the Office of Pesticide Programs, visit the OPP homepage at: http://www.epa.gov/pesticides

CHROMATED COPPER ARSENATE (CCA) CAN NO LONGER BE USED TO TREAT LUMBER INTENDED FOR CONSUMER USE

Chromated copper arsenate (CCA) is used to protect wood from insect attack and decay and is the most widely used wood preservative. On February 12, 2002, the EPA announced a voluntary decision by the industry to discontinue the consumer uses of CCA by December 31, 2003. **The discontinued uses include wood (dimensional lumber) used in play structures, decks, picnic tables, landscaping timbers, residential fencing, patios, and walkways/boardwalks.**

While EPA has not concluded there is an unreasonable risk to the public from these products, EPA believes that any reduction in exposure to arsenic, a known human carcinogen, is desirable. Consumers wishing to reduce exposure to CCA in their residential environment from their deck or playset, can apply oil-based, semi-transparent stain on a regular basis (once every year or two depending on wear or weathering of the wood). The Agency is continuing its risk assessment of CCA and at the end of the risk assessment will make decisions about future use of CCA.

Two chemical alternatives to CCA are alkaline copper quaternary (ACQ) and copper boron azole (CBA) which are not widely used at the moment. These alternatives must also undergo risk assessment in the future. Wood treatment facilities will have to retool in order to use alternative chemicals and the phaseout will allow facilities to make the necessary changes in their operations.

After January 1, 2004, it became be illegal to treat wood intended for consumer use with CCA although wood treated legally before that date may continue to be sold to consumers until supplies are exhausted.

News from the Agency of Agriculture, Plant Industry Division

NO MORE IPECAC! AMERICAN ACADEMY OF PEDIATRICS ISSUES NEW GUIDELINES

Annie MacMillan, Agrichemical Toxicologist

Parents have long been told to keep a small bottle of syrup of Ipecac in the house to induce vomiting in case their children accidentally swallow a poisonous substance.

However, in a policy statement issued in the November 2003 issue of *Pediatrics*, the American Academy of Pediatrics (AAP) is recommending that parents don't use Ipecac any longer because it's not an effective treatment for poisoning.

"Research over the last 10 years has shown that when someone vomits, the stomach is not completely emptied," says Dr. Milton Tenenbein, a member of the AAP's Committee on Injury, Violence and Poison Prevention. And, he says, the material that tends to stay in the stomach is exactly the type of thing that needs to be expelled, such as pills.

Instead, the pediatric group is emphasizing poison prevention, and telling parents and caregivers to call their **local poison control center -- (800) 222-1222** -- if they suspect a child has ingested a toxic or poisonous substance. The committee does **NOT** recommend replacing Ipecac with activated charcoal.

What can consumers do to protect children from pesticide-related poisonings?

A survey by the U.S. Environmental Protection Agency regarding pesticide use in and around the home revealed almost half of all households with children younger than 5 had at least one pesticide stored in an unlocked cabinet, and less than 4 feet off the ground within reach of children. The survey also found 75 percent of households without children younger than 5 also stored one pesticide within reach of children. This number is especially significant because 13 percent of all pesticide poisonings occur in homes other than the child's. Adults should take the following steps to safeguard children from exposures to pesticides:

- Always store pesticides away from children's reach in a locked cabinet or garden shed.
- Read the label first, and follow the directions to the letter, including all precautions and restrictions.
- Before applying pesticides (indoors and outdoors), remove children and their toys from the area and keep them away until it is dry or as recommended by the label.
- Never leave pesticides unattended when you are using them - not even for a few minutes.
- Never transfer pesticides to other containers that children may associate with food or drink.
- Use child-resistant packaging properly by closing the container tightly after use.

Alert others to the potential hazards of toxic chemicals, especially grandparents and caregivers.

PLANT INDUSTRY DIVISION PESTICIDE CONTACTS

802-828-2431

http://www.vermontagriculture/pid.htm

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- **Cary Giguere** - Pesticide Research and Information Specialist, **828-6531**
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- **Douglas Johnstone** - Plant Industry Field Agent - Southeastern VT, **952-9245**
- **Jim Leland** - Agrichemical Program Supervisor, **828-3478**
- **Bonnie MacCulloch** - State Pest Survey Coordinator, **828-1246**
- **Annie MacMillan** - Agrichemical Toxicologist, Worker Protection Standards Program Coordinator, **828-3479**
- **Steve Parise** - Apiculturist and Plant Industry Field Agent, Southwestern VT, **948-2615**
- **Scott Pfister** - Plant Pathologist, **828-3481**
- **Andy Squires** - Plant Industry Field Agent - Northwestern VT, **434-2533**
- **David Tremblay** - Plant Industry Field Agent - Central Eastern VT, **496-7150**
- **Jon Turmel** - State Entomologist, **828-3490**

There once was a mayfly named Dave
Who emerged on the crest of a wave
Though hardy and stout
And admired by trout
He was squashed by an ignorant knave.

News from the University of Vermont Extension Service

HOW MUCH DO WE KNOW ABOUT CORN ROOTWORM IN VERMONT?

A Summary of The Vermont Corn Rootworm IPM Project

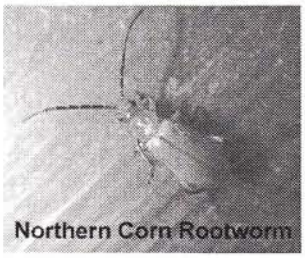
Sid Bosworth
Extension and Research Forage Agronomist
Plant and Soil Science Department
University of Vermont

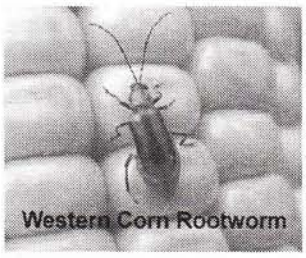
Over the past four years, the University of Vermont has been involved in a project to evaluate the presence and impact of the Western Corn Rootworm (WCR) and Northern Corn Rootworm (NCR) on field corn grown in Vermont. The objectives of the project were as follows:

1. Assess the population levels of WCR and NCR adult beetles;
2. Determine the acreage of field corn that is above economic threshold for corn rootworm;
3. Compare two scouting methods for assessing corn rootworm;
4. Provide information about IPM for corn rootworm to producers; and,
5. Assess attitudes of Vermont farmers concerning IPM methods for managing corn rootworm.

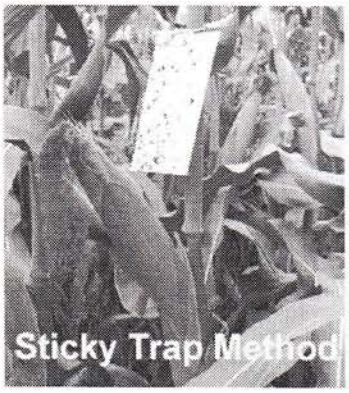
Objectives 1-2 - In order to assess population levels and determine how many fields were above economic threshold, data was collected over a four-year period (2000 to 2003) from over 90 fields in six counties (Addison, Caledonia, Chittenden, Franklin, Orange, and Windsor) by various independent and dealer crop consultants. All of these fields had been in corn for two or more years prior to evaluation.

What we found – Of the ninety fields monitored, only 15% were at or above economic threshold for corn rootworm (a population level that would warrant a pest management decision). Most of the fields were far below threshold. In addition, this low percentage seemed to be consistent every year across the various parts of Vermont in which we monitored.


Northern Corn Rootworm


Western Corn Rootworm

Most of the adult beetles we found were the Northern type. Less than 20% of the adults monitored were Western. This is good news since the Western species is more aggressive and usually causes greater injury than the Northern species. In fact, in the scouting procedures for determining threshold levels, we used what is called a WCR equivalence in which 1 WCR adult = 2 NCR adults.


Sticky Trap Method

Objective 3 - In 2000 and 2001, we evaluated two different scouting methods: 1) the standard "visual" method and 2) a sticky trap method. The standard method relies on visual assessment as you walk through the field. Normally, you start scouting when the corn begins silking (this is when the adults emerge as pupae from the soil) and you monitor the field approximately once per week for three or four more weeks (either until you reach threshold or, if below threshold, when the population peaks and starts to decline.) Typically, you try to look at up to 55 plants throughout the field and calculate an average number of beetles per plant to determine threshold. We used the threshold recommended by Cornell of 1 WCR or 2 NCR per plant. For large uniform fields, we used a modified method called "Sequential Sampling" which reduced the time needed in the field.

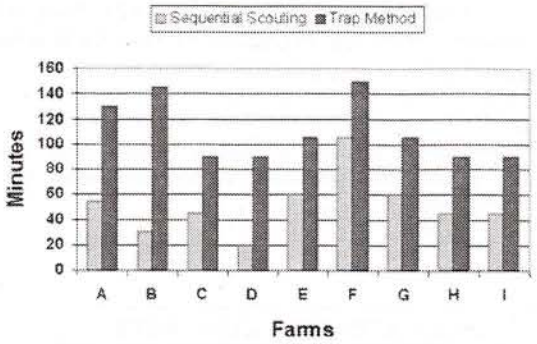
The second method we used is a sticky trap method in which yellow sticky traps are placed throughout the field just before silking and beetles are counted once per week for three or four weeks. We were interested in this method because it seemed to be more rapid and accurate. Also, since the beetles stick to the trap, it took less stealth than the visual method in which you have to "sneak" up to the plants or else the beetles drop to the ground as soon as they feel an unusual vibration. A typical 10 to 15 acre field would have 8 to 10 traps placed just above the ear. The threshold for this method was based on 20 WCR equivalence per trap per week.

What we found – We thought that once the traps were up, it would be quicker to move through the field counting beetles compared to the standard method. However, in many of the fields, traps had to be replaced

News from the University of Vermont Extension Service

after a week or two due to major rainstorms which washed away the sticky substance or when a lot of non-rootworm insects stuck and cluttered the traps making it difficult to count accurately. As a result, total scouting time was about twice as much using the sticky traps as compared to the Cornell Sequential Sampling method. Our conclusion was that, although the sticky trap method required less skill on the part of the scout, the increased costs due to both the purchase of the traps and the additional time to properly use them was too much compared to the visual method.

Total Time Required to Conduct Two Methods of Scouting for Corn Rootworms



Objectives 4 and 5 – During winter IPM meetings held throughout Vermont in February 2004, we assessed farmer awareness of these insects as well as their management practices. Generally, farmers were asked to answer a series of questions as part of a presentation concerning corn rootworm and other corn pests.

What we found – About 48% of the farmers responding to the survey indicated that they "scouted" their cornfields for either Northern and/or Western Corn Rootworm the previous year (representing approximately 27% of the corn acreage). Only 11% of the farmer respondents indicated that they had applied an insecticide the year before on some of their acreage (5% of the corn acreage represented in the survey received an insecticide for treating corn rootworm in 2003). Of the farmers that applied an insecticide, 57% based their decision on past symptoms in those fields (ie., goosenecking) and 43% also based their decision on scouting information of the previous year. For this coming season, 87% of the farmers surveyed stated that they would be scouting for goosenecking symptoms and 76% would be looking for adult beetles.

We know that one of the most effective and economical methods of controlling corn rootworms is crop rotation. These insects only have corn as a host and they lay their eggs at the base of the plant; therefore, planting another crop the next year breaks the cycle dramatically. Of the total acreage in the survey, about 18% is rotated each year. If extrapolated to the approximately 95,000 acres grown in Vermont, there are 17,100 acres rotated each year helping to break the corn rootworm life cycle.

BROWN ROOT ROT OF ALFALFA: A NEW DISEASE FOR VERMONT?

Ann Hazelrigg
Coordinator of the Plant Diagnostic Clinic & Pesticide Applicator Training *Program*
University of Vermont Extension

Brown root rot of alfalfa, caused by the fungus *Phoma sclerotiodes*, was detected this past growing season in the Miner Institute research plots across Lake Champlain in Chazy, NY. This disease has been reported in several northern states and Canada and has been associated with stand decline of alfalfa and other forage plants. Unfortunately, the fungus is very well adapted to the cold temperatures common in our Vermont winters and springs. Additionally, this pathogen not only attacks alfalfa but also infects red clover, sweet clover, white clover, bird's foot trefoil and alsike clover.

The pathogen overwinters on crop debris and can survive many years in dry soil. The root rotting fungus can be spread by wind, machinery or grazing animals. Symptoms of the disease do not usually appear until three (3) years after seeding. Infected plants begin growth in the spring but start to lose vigor as the time for the first cutting approaches. The first tissues to show discoloration and rot are the feeder roots and nitrogen fixing nodules. Symptoms vary from small circular dark lesions to large rotted taproots. Crowns and lower stem tissues can also be infected although the disease is mainly a root pathogen.

(Continued on Page 6)

News from the University of Vermont Extension Service

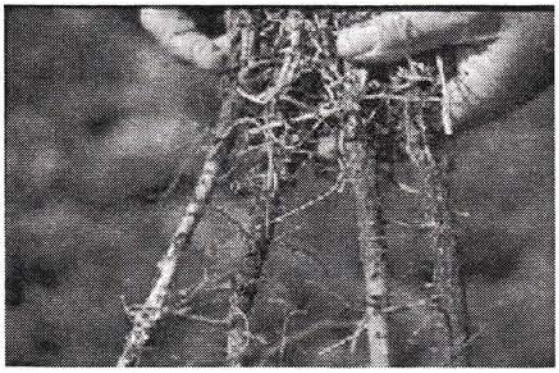


Figure 1. Three year-old roots showing severe rot of the tap and secondary roots caused by brown root rot.

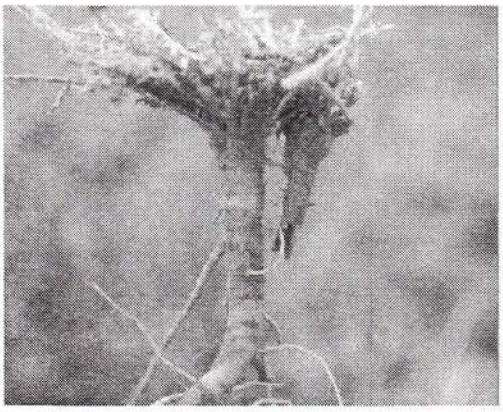


Figure 2. Three year-old plants affected by brown root rot. Plant on right is dead with tap root completely rotted. Plant on left has a dark brown girdling lesion on the tap root and was slow to produce spring growth. ***Photos: Fred Gray, University of Wyoming***

Fruiting bodies of the fungus may be present as tiny black dots on the root surfaces. Infection and decay take place in the late fall through early spring (most root infection likely occurs between 35-40 degrees F.) while the plants are dormant. The fungus slows its growth during the summer's warmer temperatures. Winterkill, a symptom of brown root rot that is generally noticed in early spring, can vary from slight to severe.

Positive identification of brown root rot usually requires microscopic observation and fungal isolation from infected tissue. Recently, a molecular test has been developed so researchers can determine if plants are infected within a matter of hours.

Managing the disease includes using crop rotation with non-susceptible crops, providing appropriate fertility, avoiding late cuttings and selecting varieties less susceptible to winter injury.

Brown root rot may already be an undiagnosed problem in Vermont alfalfa fields. In 2004, UVM Extension would like to do a systematic survey of fields to determine the presence of the pathogen and its potential impact on alfalfa stand decline. If you have noticed any of the symptoms of the disease or if you have fields with severe winter damage or stand decline, please contact Ann Hazelrigg at 656-0493 or ann.hazelrigg@uvm.edu. Cornell researchers have kindly offered to help with the diagnosis of Vermont alfalfa fields to see how widespread the disease may be. We will report the results of our testing in a future newsletter.

Send intact alfalfa roots with suspicious lesions to: Plant Diagnostic Clinic, Hills Building, 105 Carrigan Drive, UVM, Burlington, VT 05405. Include 8-10 plants with crowns in a zip-lock plastic bag with moist towels. Precise location of the field where you collected plants is essential information.

References:

Gray, F, C. Hollingsworth, D. Koch, R. Groose, T.Heald. 2004. *Brown Root Rot of Alfalfa*. Plant Sciences Timely Information No. 1, University of Wyoming.

UVM EXTENSION CONTACTS

http://www.uvm.edu/extension/directory/yellow.htm

This is a partial list. For information about specialists in your region, call 656-2630, or check the Extension on-line directory at the above web address.

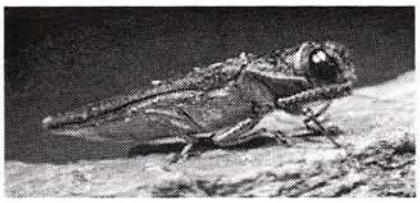
☎ MASTER GARDENER HOTLINE - 800-639-2230

- **Lorraine Berkett**, IPM Specialist 656-2630
- **Sid Bosworth**, Agronomist 656-0478
- **Jeff Carter**, Field and Forage Specialist 388-4969
- **Heather Darby**, Agronomist - Northeast Region 524-6502, X206
- **Elena Garcia**, Tree Fruit Specialist 656-2824
- **Vern Grubinger**, Berries and Vegetables Specialist 257-7967
- **Ann Hazelrigg**, Plant Diagnostic Clinic, PAT 656-0493
- **Bill Jokela**, Soils Specialist 656-0480
- **Rick LeVitre**, Dairy Specialist 773-3349
- **Leonard Perry**, Greenhouse and Nursery Specialist 656-0479
- **Margaret Skinner**, Entomologist 656-5440

Update on Ornamental Diseases and the Cooperative Agricultural Pest Survey

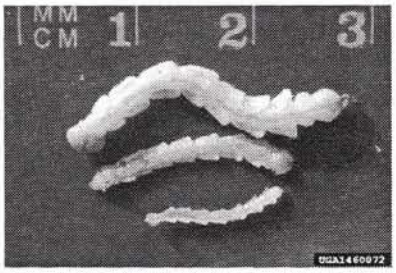
Bonnie MacCulloch, Pest Survey Coordinator
Vermont Agency of Agriculture, Plant Industry Division

EMERALD ASH BORER

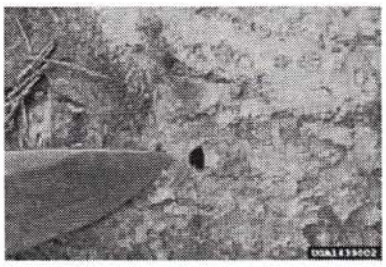


In the May 2003 issue of the *Pesticide Applicator Report*, we reported on a new exotic insect pest, the emerald ash borer. New information is now available on this aggressive invader including news of the expanded infestation and additional quarantine regulations. The Emerald ash borer (EAB), *Agrilus planipennis* Fairmaire, was first identified in Detroit, Michigan and neighboring Ontario, Canada in 2002. This insect is native to parts of Asia, China, Korea and Japan. Known hosts include many species of ash, *Fraxinus* spp.

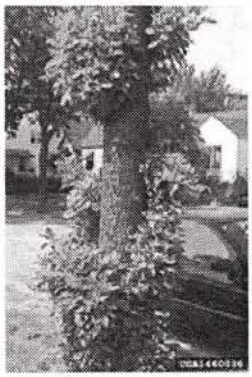
EAB adults are slender, elongate, metallic coppery-green beetles, no greater than ½ inch long. Larvae are white, flat, slender, and like all *Agrilus* species, have a pair of brown, pincer-like appendages on the last abdominal segment. The larval head is relatively small, brown, and retracted inside the enlarged prothorax.



Adults are active from mid-May to early August. Eggs are laid on the bark surface and/or inside bark cracks and crevices, usually from early June to late July. Larvae actively feed in the cambial regions of the trunk from mid-June to mid-October. EAB overwinters as fully grown larvae in pupal cells constructed in the outer sapwood or in the bark. Most larvae pupate the following spring during late April and May although some individuals may require two years to complete development. Adult emergence holes are typically D-shaped.



Signs and symptoms of EAB are difficult to detect during the first year of infestation. The D-shaped adult emergence holes appear along the trunk and main branches the summer following the initial attack. In the second year of attack, less foliage develops and crowns appear thinner, and the sapwood forms callus tissue around the larval galleries which can result in longitudinal bark splits.



Epicormic branching will often develop along the main trunk and on some branches. In the third year of attack many branches will have died, little foliage will be present, and exit holes will be found throughout the trunk. Bark splitting and epicormic branching is common.

In Michigan and Ontario, EAB has infested and killed ash trees in both open settings and inside woodlots. Tree death usually occurs in 3 years but trees could die in as little as 1 to 2 years. Infested trees can be as small as 4 cm in diameter and as large as a mature forest tree over 1 m in diameter.

In August 2003, the Michigan Department of Agriculture enacted an interior state quarantine on 13 MI counties: Livingston, Macomb, Monroe, Oakland, Washtenaw, Wayne, Genesee, Ingham, Jackson, Lapeer, Lenawee, Shiawassee and St. Clair. On 25 March 2004 this quarantine was expanded to include 8–outlier sites in 5 more counties (Berrien, Calhoun, Eaton, Kent and Saginaw). Under the quarantine, it is illegal to move ash trees, branches, lumber, firewood and other materials from the quarantined counties, unless the material is chipped to less than one inch in diameter. To date, EAB has killed or damaged almost six million ash trees in MI alone (www.michigan.gov/mda). During the summer of 2003, three more states reported finding EAB; Ohio, Maryland and Virginia.

For more information please visit us on the web:
http://www.vermontagriculture.com/CAPS/index.html

SUDDEN OAK DEATH

Sudden Oak Death is a recently recognized disease that is killing oaks and other plant species in the western U.S. First noticed in 1995, the disease has been confirmed in the coastal areas north and south of San Francisco, and in a relatively remote location in southwestern Oregon. The fungal pathogen responsible for the disease, *Phytophthora ramorum*, is also found in Germany and Denmark, where it is causing significant damage on

Update on Ornamental Diseases and the Cooperative Agricultural Pest Survey

Rhododendron and Viburnum. In the U.S. this disease has been found in California, Oregon and most recently in Florida. In the eastern U.S., at least two eastern oak species, northern pin oak (*Quercus palustris*) and northern red oak (*Quercus rubra*), are highly susceptible to the disease when lab-inoculated with the pathogen. Forest land managers nationwide should be aware of the symptoms of sudden oak death, and should contact a pest management specialist if they suspect that the disease is present in a new location.

There are two categories of hosts for *P. ramorum*: bark canker hosts and foliar hosts. The bark canker hosts are tanoaks and oaks that become infected on the trunks. Foliar hosts are bay laurel, rhododendrons, bigleaf maple, and several others, that become infected on the leaves and small branches. While the bark cankers often lead to mortality in tanoaks and oaks, foliar hosts only occasionally die from *P. ramorum* infection.

The USDA, Animal Plant Health Inspection Service (APHIS) currently recognizes 28 plant species as being natural hosts for *P. ramorum* and thus subject to federal regulation. This pathogen has also reportedly been isolated from several other plant species. To see a complete listing of known host species visit: **http://www.aphis.usda.gov/ppq/ispm/sod/.**

Symptoms on affected hosts vary considerably by species and it is difficult to differentiate *P. ramorum*-infected plants from those infected by other pathogens. Bark canker hosts have large cankers on the trunk or main stem accompanied by browning of leaves. Infected trees may be infested with ambrosia beetles, bark beetles and sapwood rotting fungus. Infection on foliar hosts is indicated by dark grey-to-brown lesions with indistinct edges. These lesions can occur anywhere on the leaf blade, in vascular tissue, or on the petiole. Petiole lesions are often accompanied by stem lesions. Some hosts with leaf lesions defoliate and eventually show twig dieback.

Update: March 26, 2004–The U.S. Department of Agriculture, APHIS recently announced that it is regulating the interstate movement of *Phytopthora ramorum* host and associated host plants from all California nurseries. Regulating *P. ramorum* is part of the APHIS detection and management program. Since it first appeared in coastal California in 1995, the disease is known to affect 59 different hosts and associated host species. Currently, 12 California counties are regulated for the disease.

COOPERATIVE AGRICULTURE PEST SURVEY (CAPS)

The Cooperative Agriculture Pest Survey (CAPS) program is a combined effort by Federal and State agricultural organizations to conduct surveillance, detection, and monitoring of introduced agriculture, forest, and natural resource pests. As part of the Vermont CAPS program, this summer we will be collaborating with the University of Vermont and the Agency of Natural Resources, Department of Forests, Parks and Recreation to conduct survey and detection activities for emerald ash borer and sudden oak death throughout the state. To learn more please visit us on the web:
http://www.vermontagriculture.com/CAPS/index.html

ADDITIONAL CAPS RESOURCES

UVM Plant Diagnostic Clinic - aids Vermont greenhouses, farms and orchards by assisting in the identification and control of pests and diseases. http://pss.uvm.edu/pd/pdc/

Vermont Master Gardeners- promote successful, safe, and environmentally prudent home horticulture practices through education and community activities. Hotline Number - 800-639-2230.
http://www.uvm.edu/mastergardener/

Invasive Plant Atlas of New England- a comprehensive web-accessible database of invasive and potentially invasive plants in New England that will be continually updated by a network of professionals and trained volunteers. http://invasives.eeb.uconn.edu/ipane/

USDA APHIS Plant Protection and Quarantine (PPQ) - The Animal and Plant Health Inspection Service (APHIS) is responsible for protecting and promoting U.S. agricultural health, administering the Animal Welfare Act, and carrying out wildlife damage management activities.
http://www.aphis.usda.gov/ppq/

Northeastern Area State and Private Forestry-leads and helps support sustainable forest management and use across the landscape.
http://www.na.fs.fed.us/index.htm

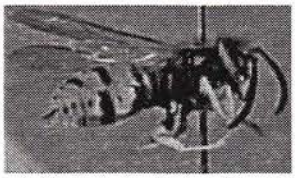
National Plant Board- members work cooperatively with a number of different organizations to prevent the entry of new pests and diseases into the country.
http://www.aphis.usda.gov/npb/

Wasp and Bee Control

Wasps and bees are beneficial insects, although they are generally considered to be pests because of their ability to sting. Wasps, in particular, can become a problem in autumn when they may disrupt many outdoor activities. While both social wasps and bees live in colonies ruled by queens and maintained by workers, they look and behave differently. It is important to distinguish between these insects because different methods may be necessary to control them if they become a nuisance.

APPEARANCE

Wasps have a slender body with a narrow waist, slender, cylindrical legs, and appear smoothed-skinned and shiny. Yellowjackets, baldfaced hornets, and paper wasps are the most common types of wasps encountered by people.

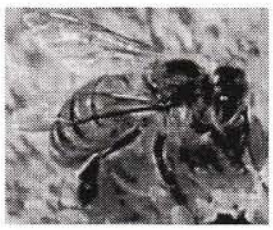


Yellowjacket

Baldfaced Hornet

Paper Wasp

Bees are robust-bodied and very hairy compared with wasps. Their hind legs are flattened for collecting and transporting pollen. Bees are important pollinators. Honey bees are responsible for more than 80% of the pollination required by most fruits, legumes, and vegetable seed plants as well as many ornamentals that are grown in our landscapes. Bumble bees are important pollinators of native prairie plants.



Honey Bee

Bumble Bee

NESTING SITES

Yellowjackets, baldfaced hornets, and paper wasps make nests from a papery pulp comprised of chewed-up wood fibers mixed with saliva. Yellowjacket and baldfaced hornet nests consist of a series of rounded combs stacked in tiers. These combs are covered by an envelope consisting of several layers of pulp. Paper wasps construct only one comb without any protective envelope.

Yellowjackets commonly build nests below ground in old rodent burrows or other cavities. They can also build nests in trees, shrubs, under eaves, and inside attics or wall voids. **Baldfaced hornets** commonly build nests in the open in trees as well as under eaves and along the sides of buildings.

Paper wasps build nests under any horizontal surface and are commonly found on limbs, overhangs, eaves of buildings, beams and supports in attics, garages, barns, sheds, and other similar places.

Honey bees make a series of vertical honey combs made of wax. Their colonies are mostly in manufactured hives but they do occasionally nest in cavities in large trees, voids in building walls, or other protected areas.

Bumble bees use old mice burrows, cavities in buildings, and other locations to make their nests. Like honey bees, bumble bees make cells of wax.

LIFE CYCLE OF WASPS AND BEES

Wasps and bumble bees have annual colonies that last for only one year. The colony dies in the fall with only the newly produced queens surviving the winter. The new queens leave their nests during late summer and mate with males. The queens then seek out overwintering sites, such as under loose bark, in rotted logs, under siding or tile, and in other small crevices and spaces, where they become dormant. These queens become active the following spring when temperatures increase. They search for favorable nesting sites to construct new nests. They do not reuse old nests.

Honey bees are perennial insects with colonies that survive more than one year. Honey bees form a cluster when hive temperatures approach 57° F. As the temperature drops, the cluster of bees becomes more compact. Bees inside this mass consume honey and generate heat so that those in the cluster do not freeze. As long as honey is available in the cluster, a strong colony can withstand temperatures down to -30° F or lower for extended periods.

Wasp and Bee Control

CONTROL OF NESTS

The first step in wasp or bee control is to correctly identify the insect and locate its nesting site.

WASP NESTS: The best time of the year to control wasps is in June after the queen has established her colony and while the colony is still small. But because nests are small, they are also harder to find. The best time of the day to control wasp nests is at night, when they are less active. At temperatures below 50° F, wasps have difficulty flying. **Never seal a wasp nest until you are sure there are no surviving wasps inside.** If a nest is not discovered until fall, control may be unnecessary as imminent freezing temperatures will kill the colony.

Mechanical control without insecticides is possible for small, exposed nests. At night, cover the nest with a large, heavy, plastic bag and seal it shut. Cut the nest from the tree and freeze it or let the bag sit in the sun, which will kill the wasps inside in a day or two. Use caution: there is more risk involved in this procedure than in spraying the nest.

When yellowjackets are found nesting in the ground, apply an insecticide dust to the nest opening. Be sure you use a product that is labeled for use on lawns or soil. Dusts are more effective than liquid insecticides because liquids do not always reach the nest. After you are sure all the wasps have been exterminated, cover the nest entrance with soil.

The most challenging nests to control are those that are concealed in voids behind walls or in attics. Often, the only evidence of the nest is wasps flying back and forth through a crack or hole in the home.

Aerosol insecticides usually do not work very well against hidden nests. The best method is to apply a small amount of insecticidal dust. You may need to drill small (about 1/8 inch) holes to deliver the insecticide into the nest area.

Concealed nests that are treated in the fall may force wasps into the home. If there is no immediate danger, it may be best to wait until freezing temperatures kill the nest. Do not seal the nest entrance until you are sure all wasps are dead. Closing the nest too early can force survivors into the home or structure. When the wasps are dead, seal the entrance with caulk or something similar to prevent a new wasp queen from using the same entrance to build a new nest the following year.

Wasp nests found during winter or early spring are old nests from the previous summer. There are no live wasps in the nest; they have already left the nest or died inside it. The nest can be safely removed and disposed of if desired. Old nests are not reused by wasps, so there is no risk if one is left. However scavengers, such as carpet beetles, are attracted to old nests and may become a nuisance if the nest is in your home.

HONEY BEE NESTS: Honey bees are normally housed in manufactured hives and managed by beekeepers. In some instances wild colonies of honey bees may nest in hollow trees or in wall voids. Wild colonies can be treated with the same insecticides and methods as described for exposed or concealed wasp nests. Combs inside buildings must be removed and destroyed to avoid problems with honey-stained damage to walls, secondary pest problems such as carpet beetles, and attracting bee swarms in the future. Never use honey or wax from colonies that have been treated with an insecticide (see "Removing Problem Honey Bees from Structures" below).

BUMBLE BEE NESTS: When a bumble bee nest is a nuisance, treat it with the same insecticides and methods as described for ground-nesting or concealed wasp nests.

Always read pesticide labels carefully before buying and again before using the product. The availability and use of particular pesticides may change from year to year. The label is the final authority on how you may legally use any pesticide.

REMOVING HONEY BEE SWARMS

In the spring and early summer, strong honey bee colonies will occasionally produce swarms. Swarming is precipitated by crowding and congestion in the nest as the colony rapidly expands its population. When colonies swarm, the old queen and 40-60 percent of the bees leave the parent colony and cluster on a tree limb or other convenient site. Colonies also may produce smaller secondary swarms which contain fewer bees and a newly emerged virgin queen. Honey bee swarms pose little hazard to humans unless the bees are profoundly disturbed. They have neither young nor food to protect, and their defensive instincts are minimal. Typically, a swarm will remain clustered where it lands for one to three days. During this time, scout bees will search for suitable nest sites. When a site is found, the swarm will move to the new nest site. While a swarm remains, do not operate vibrating equipment near them. Lawn mowers, weed eaters, chain saws and other power tools should not be used until the swarm has left or been removed.

If a swarm lands in a remote site, it should be left alone. When a swarm lands in a homeowner's yard or public place, a beekeeper can be called to remove the bees. Honey bee swarms are seeking a nesting site. A beekeeper can capture them by providing an empty

Wasp and Bee Control

beehive and shaking the bees onto the ground at the entrance. The bees will enter the hive body and begin nest construction in most cases. The beekeeper may need to leave the hive at the site until dusk to allow all of the bees to enter the hive.

If a beekeeper cannot be located, or if the swarm is in a high-traffic area, the bees can be destroyed, if necessary, by spraying them with a solution of one cup of liquid dishwashing detergent dissolved in a gallon of water. As the outside layer of bees falls away, the inner layers will need to be sprayed. Bees are rendered unable to fly as soon as they contact the solution. Soapy water kills the bees by suffocating them, and bees destroyed by this method do not become defensive. **Insecticides are not recommended to destroy a swarm because they can cause the bees to become defensive.**

REMOVING PROBLEM HONEY BEES FROM VOID SPACES IN STRUCTURES

The first step in dealing with a problem nest located in a void space in a structure is to be sure you have correctly identified the insect. Yellowjacket wasps also are cavity nesters and are frequently confused with honey bees.

Once you are sure you are dealing with a honey bee nest, the safest, quickest and easiest way to eliminate the problem is to destroy the nest prior to removal. It is important to exterminate a colony when all bees are in the nest (dawn or dusk). If colonies are destroyed during daylight, many foragers will be in the field and can return to cause problems. The best season to destroy problem nests is in the early spring when stored food reserves and colony population are lowest.

Apply an insecticide dust to the entry/exit areas. Carbaryl (Sevin®) dust is readily available and is labeled for destroying problem bees. In most cases, repeat applications of the insecticide will be necessary. Again, it is best to apply the product after dark to avoid being stung by returning foragers or nest members that respond to any disturbance. (While soapy water is effective on a swarm, it is not very effective in a nest as the wax combs prevent adequate penetration.)

Do not attempt to expose the nest until all, or nearly all, of the adult population are killed. Once you are sure all, or most, of the colony has been destroyed, expose the wax comb with its honey and remove it. Honey bee nests are often extensive and may contain 100 or more pounds of honey, pollen and beeswax. Without live bees present to control nest temperature, honey may leak from the comb and drip from walls or ceilings causing extensive structural damage. Dead bees and brood will decay and produce strong odors. Honey, pollen and wax combs will be an attractive food source for rodents, wax moths and a variety of other nuisance insects such as ants and dermestid beetles. If colonies are poisoned, do not use the honey or wax. Nest materials should be removed and burned or buried in a manner that does not allow other bees access to the poisoned materials.

Prevention and Maintenance: Following destruction of the colony and removal of the nest, it is important to fill the cavity with insulating foam or other appropriate materials to make the site inaccessible to future swarms. Although the nest itself has been removed, an old nest site will have odors that are highly attractive to other bees. In addition to filling the cavity, entry/exit areas and other cracks in the structure should be carefully sealed with caulk. Honey bees seeking a nesting site will not create a cavity or entrance; instead, they seek an existing cavity with an entrance. Preventive maintenance of structures will protect them from honey bee occupation. Remember - do not close or seal off entrances until the insects have been killed or they may be forced into the structure.

Responsibility for structural repairs should be agreed upon before the job of removing the hive has begun.

Sources:

- University of Nebraska, Lincoln, Cooperative Extension. 1996. Stinging Wasps and Bees. Fact sheet G88-891-A.
- University of Minnesota Extension Service. 1996. Wasp and Bee Control. Fact sheet PM-1671.
- University of Delaware Extension Service. 1996. Stinging Insect Control. Fact sheet HYG-06.
- Mid-Atlantic Apicultural Research & Extension Consortium. 2000. Stinging Insect Control. MAAREC Publication 4.4.

Questions About Prevention?
Questions About Poisons?
Poison Emergency?

POISON Help
1-800-222-1222

Prevention and Management of Pesticide Resistance

Pesticide resistance can become a problem when the same chemicals are used over and over to control a particular insect, weed or fungal pest. After a period of time, the pest may develop resistance to a chemical so that the chemical no longer effectively controls the pest at the same rate. Higher rates and more frequent applications then become necessary until, eventually, the chemical provides little or no control. Resistance to pesticides is not a new problem. The first report of insects resistant to insecticides was in 1908; of plant pathogens resistant to fungicides in 1940; and, of weeds resistant to herbicides (triazines) in 1968. Obviously, a loss of effective pesticide options could have important economic and environmental consequences to the agricultural and pest control industry. And, given the high costs associated with pesticide development and registration, the potential for the replacement of pesticides lost due to pest resistance decreases.

What is pesticide resistance and how does resistance develop in a pest population? Pesticide resistance is the inherited ability of an organism to survive a pesticide dose that kills the native population of that species. Basically, in any given pest population, there is a small number of individuals that posses the genetic material that allows them to survive when exposed to a pesticide. These survivors then reproduce, passing on their resistant genes to their offspring and resulting in ever larger populations of resistant pests. If the same pesticide continues to be applied in a given situation, the percentage of the pest population which is resistant to that product will increase.

The two most common mechanisms that result in pesticide resistance include: 1) altered sites of action, and 2) enhanced pesticide metabolism.

Altered sites of action: The specific location within a given insect, plant or fungal pest with which the pesticide interacts is known as the "site of action". When the pesticide binds to this site of action, which is usually a protein, some metabolic process essential to the pest's growth and development is disrupted, and the pest dies. Some pests achieve resistance by altering the site of action so that the pesticide can no longer bind to it and induce the metabolic change. (Examples of metabolic processes necessary for survival include photosynthesis (plants only), protein synthesis and lipid (fat) synthesis.)

Enhanced pesticide metabolism: The resistant pest may have the ability to inactivate the chemical, or break it down into less toxic compounds, before it can reach the site of action in toxic concentrations and interfere with a metabolic process. The target metabolic function remains unaffected and the insect is not harmed.

RESISTANCE MANAGEMENT

The best way to manage pesticide resistance is to focus on three strategies: avoidance, delay, and reversal.

1. **Avoid the development of pesticide resistance through the use of Integrated Pest Management (IPM) programs**, which reduce reliance on chemical control. If your pest control program relies solely on the use of pesticides, resistance can only be delayed, not avoided. Some non-chemical strategies for **agricultural situations** include: rotating crops to break the pest cycle; planting pest resistant crop varieties; utilizing mechanical weed control practices such as rotary hoeing and cultivation; and, cleaning tillage and harvesting equipment before moving from fields infested with weeds to those that are not. In **non-agricultural situations**, work with your clients to encourage: sanitation in landscaping and residential situations to remove the pest's food sources and harborages; proper maintenance to exclude pests from structures (screening, filling of cracks); and, the use of traps and vacuuming/manual removal of pests.

2. **Delay resistance by using pesticides wisely:**

- **Use pesticides only when needed** as indicated by monitoring, and when pests are at a susceptible stage.
- **Apply pesticides at the lowest effective labelled rate.**
- **Use pesticides with the shortest effective residual.** Pesticides that remain in the environment longer than needed continue to select for resistant individuals.
- When possible, **apply pesticides in localized areas** of pest pressure as opposed to making area-wide or broadcast treatments.
- **Use long-term rotations of pesticides with differing modes of action**. Pesticides in the same chemical class typically have the same mode of action. In other words, pesticides in the same class tend to have similar chemical structures and kill pests in the same way. So, if you were to switch from one pesticide to another in the same class, you would continue to select for the organisms that were resistant to the first product. By using a chemical from another class, you have a better chance at eliminating the pests that were resistant to the previous pesticide used. Pesticide classes include insecticides such as organophosphates, carbamates, pyrethroids, and chlorinated hydrocarbons; herbicides such as chlorophenoxy compounds (2,4-D), acetamides and analides, and fungicides such as substituted benzenes and thiocarbamates. [**Note** - Organophosphates and carbamates, although from different chemical classes, have similar modes of action and work in the same way. Therefore, avoid using both in a rotation schedule or tank mix (see below).] **The strategies used in rotations differ. For example, with fungicides, it is suggested that classes be rotated every application.**

Prevention and Management of Pesticide Resistance

With insecticides, it is suggested that long-term rotations be used. This means that a class of pesticide would be used for at least 6 to 8 weeks, depending on the target pest's life cycle and generation time, before rotating to a new class of materials. If insecticides are switched with every application, individuals are being selected by numerous pesticides, and multiple resistance is also being selected.

• **Use tank mixes of pesticides with differing modes of action** (if label directions permit!). Never combine two pesticides with the same mode of action in a tank mix (e.g., two organophosphates, or an organophosphate and a carbamate pesticide). Such a 'super dose' often increases the chances of selection for resistant individuals. In some cases, mixing pesticides from two different classes can provide superior control. ***However***, long-term use of these two-class pesticide mixes can also give rise to pesticide resistance, if resistance mechanisms to both pesticides arise together in some individuals. Continued use of the mixture will select for these multiple-pesticide-resistant pests.

• **Maintain complete and accurate records.** Accurate records will become critical if you are using long-term rotations of pesticides.

• If there is only one chemical that is effective against a pest and other available products are only marginally effective, a good strategy to follow is to use the marginally effective materials at times when pest pressure is less severe and to **reserve the effective material for those periods of time when control must be most effective.**

3. **Reversal of some resistance can occur** by allowing time between applications of a class of pesticide to permit resistant populations to become diluted through mating with pesticide-susceptible individuals. However, researchers suggest that the potential exists for resistance to render some chemicals useless for the foreseeable future. **THE EMPHASIS FOR MANAGING PEST RESISTANCE SHOULD ALWAYS BE ON PREVENTION** of resistance through adoption of integrated pest management techniques, rather than attempting to reverse resistance once it has occurred.

MAKE SURE YOU ARE REALLY DEALING WITH RESISTANCE

Pesticide applicators sometimes blame resistance for poor pesticide performance. However, if your pesticide application does not work, do not automatically assume the target pests are resistant. First, carefully review your pest control procedures:

• Did you identify the pest correctly?
• Did you apply the correct pesticide. Did you use any needed adjuvants?
• Did you apply the pesticide at the correct time and at the proper rate? Review the calculations you used to determine the pesticide rate and to calibrate your application equipment.
• Did the application method assure good coverage?
• Were the weather conditions conducive for maximum pesticide effectiveness. Was it too hot or windy? Was the application made shortly before a rain storm?
• Is the pesticide out-of-date? The shelf life of many pesticides is about 2 years. However, storage conditions can greatly increase or decease the shelf life of a product. Do not allow pesticides to become too hot or to freeze. Storage conditions are particularly critical for pesticides based on living organisms such as *Bacillus thuringiensis*. Labels will provide information on proper storage conditions.

If resistance appears to be likely, check for the following:
(The following guidance is provided for diagnosing herbicide-resistant weeds. However, the same approach can be taken when dealing with any pest.)

1. Are other weeds listed on the product label controlled satisfactorily? Usually, only one weed species will show herbicide resistance in any given field situation. Therefore, if several normally susceptible weed species are present, reconsider factors other than herbicide resistance.
2. Did the same herbicides from the same chemical class with the same site of action fail in the same area of the field in the previous year?
3. Do your records show extensive use of the same herbicide or herbicides from the same chemical class year after year?

If one or more of these three situations apply, it is possible that the weeds are resistant to the herbicide. If resistance is suspected, control the weeds with a labeled herbicide from another chemical class or use the appropriate non-chemical weed-control methods to prevent the weeds from going to seed.

Sources:

❧ *Herbicide Resistant Weeds*, J.L. Gunsolus. University of Minnesota Extension Service Publication 468, 1999.

❧ *Herbicide Resistance Update*, Bob Hartzler. Iowa State University, 1998.

❧ *Floriculture and Ornamental Nurseries: Managing Pesticide Resistance*. University of California at Davis, 2000.

❧ *Tips on Managing Insecticide Resistance in the Greenhouse*, Leanne Pundt. University of Connecticut Extension Service.

Respiratory Protective Devices for Pesticides

The November 2003 *Pesticide Applicator Report* contained an article titled "Wear and Use Personal Protective Equipment" which contained only general introductory guidance on respirators. "Respiratory Protective Devices for Pesticides" is intended as a companion article, to provide more comprehensive guidance on the proper selection, use, and maintenance of respirators. For copies of the "Wear and Use Personal Protective Equipment" article, please call (802) 828-3475.

For many toxic chemicals, including pesticides, the respiratory (breathing) system is the quickest and most direct route of entry into the circulatory system. From the blood capillaries of the lungs, these toxic substances are rapidly transported throughout the body. Therefore, it is essential to take all necessary precautions to protect against the inhalation of pesticides by wearing the appropriate respiratory protection.

The US Environmental Protection Agency (EPA) requires that pesticide manufacturers determine the respiratory protection required according to the anticipated hazards and risk of inhalation of a given pesticide, and to specify the required respiratory protection on the product label. EPA provides pesticide manufacturers with specific pesticide label statements for respiratory protection for 5 categories of pesticide formulation and application activity: 1) gases applied outdoors; 2) gaseous products used in enclosed areas; 3) solid products; 4) liquid products in Toxicity Category I (highly toxic; signal word = Danger); and, 5) liquid products in Toxicity Category II (moderately toxic, signal word = Warning). **The label is the law. You must wear the protective clothing and respiratory devices as indicated on the pesticide label.**

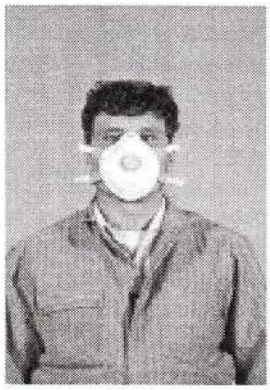
Select only equipment approved by the National Institute of Occupational Safety and Health (NIOSH). Select a respirator that is designed for the intended use, and always follow the manufacturer's instructions concerning the use and maintenance of that particular respirator.

There are several types of respiratory protective devices available for all tasks and they vary in design, use, and protective capability. There are two major categories of respiratory protective devices:

1. **Air Purifying.** This type of respirator removes contaminants from the air. It is only to be used where there is a sufficient oxygen supply. This category includes: a) mechanical filter; b) chemical cartridge; and, c) canister gas mask respirators.

2. **Air Providing.** This type of respirator provides air for the user in oxygen-deficient atmospheres, and includes a) supplied-air respirators, and b) self-contained breathing apparatus (SCBA).

I. AIR PURIFYING RESPIRATORY PROTECTION



a) Mechanical Filter Respiratory Protection Devices In the past, these devices were commonly known as dust masks. However, due to the use of improved certification tests by NIOSH, which have lead to the production of filtering materials that are more resistant to oils and are more efficient at removing very small particles (down to 0.3 micron), these devices are now referred to as **filtering facepiece respirators**. These simple filters commonly consist of a molded filter designed to cover the nose and mouth. The filter is held in place by one or two elastic straps that are stretched over the head. Some of these filters have an exhale valve in the center of the mask to make breathing easier in hot and humid conditions. When the filter becomes clogged, the complete unit is discarded. Sufficient levels of oxygen must be present in the air to be filtered.

Filtering facepiece respirators provide protection against particulate matter such as pesticide dusts, pesticide mists and welding fumes, but not the organic vapors associated with many pesticide applications. These respirators are designated as "N", not to be used with oil; "R", oil resistant; or "P", oilproof. Those designated R may be used for up to 8 hours with pesticides that contain oil. Those designated P may be used with pesticides that contain oil and may be able to be used longer than 8 hours. Of course, all three types may be used with pesticides that do not contain oil.

Following the letter designation is an efficiency number, either 95 (95%), 99 (99%), or 100 (99.97%), indicating the percent of particulates that are filtered out of the surrounding air. For example, "N95" indicates that the filter is not oil-proof and should not be used with pesticides that contain oil, and that the filter will remove up to 95% of the particulate matter in the air. "P100" means that the filter is oil proof, and can remove up to 99.97% of particulate matter in the surrounding air. Although there are 3 particle removal efficiencies for filters, most manufacturers are only marketing the 95 and 100 filters. If you previously used a high efficiency particulate air (HEPA) filter, a filter with the efficiency number of "100" would be comparable.

Respiratory Protective Devices for Pesticides

Filtering facepiece respirators are made of the same material that is used in pre-filters. Pre-filters are often used in combination with chemical cartridge respirators (see below) when you need protection against particulate matter as well as toxic vapors and gases.

b) Chemical Cartridge Respirators

Chemical cartridge respirators provide a higher level of protection than dust masks. A soft rubber-like (silicone) face piece covers the nose and mouth and contains valves to control air movement through the device. A full face respirator also includes an eye shield and covers the entire face and eyes.

Replaceable cartridges contain activated carbon that absorbs toxic vapors and gases. Pre-filters may be installed on the outside of the cartridges to filter particulate matter out of the incoming air, providing protection against both gases/vapors and particulate matter.

Chemical cartridge respirators are used only when exposure to high continual concentrations of pesticides is unlikely, such as when mixing pesticides outdoors. The user must anticipate the type of hazard to be protected against and purchase the correct cartridges. **No single type of cartridge is able to remove all kinds of chemical gases and vapors. A different type of chemical cartridge (or canister in the case of gas masks) must be used for different contaminants.** Sufficient levels of oxygen must be present in the air to be filtered.

Battery powered air-purifying respirators equipped with pesticide filters/ cartridges also are effective in filtering out pesticide particles and vapors. They are available as half-masks, full-face masks, hoods, and protective helmets, and are connected by a breathing hose to a battery powered filtration system. This type of filtration system has the additional advantage of cooling the person wearing it. But, like other air purifying devices, this system does not supply oxygen and must be worn only when the oxygen supply is not limited.

c) Gas Masks

Gas masks are designed to cover the entire face and protect the eyes. Gas mask canisters contain more of the poison-removing materials than do the chemical cartridge respirators. Therefore, they have a longer service life and allow longer working times in high levels of contaminants than typical respirators. The canister may be mounted on the face piece or at the end of a flexible hose to allow mounting at the user's belt. Sufficient levels of oxygen must be present in the air where gas masks are used.

NOTE: Chemical cartridge respirators and gas masks cannot provide adequate protection against toxic gases used for fumigation in enclosed spaces. Masks with a self contained air supply should be worn in these situations.

II. SUPPLIED-AIR RESPIRATORY PROTECTION

a) Supplied-Air Respirators

Supplied air respirators provide fresh air from a remote source or from pressurized tanks. The face pieces are similar to cartridge type respirators or gas masks. The air may be supplied by a portable air compressor or pressure tanks located up to 300 feet from the user. Compressors must be located in a clean air area.

Supplied-air respirators can be used in confined spaces where there is likely to be an inadequate level of oxygen or where high concentrations of pesticides are in the air.

b) Self-Contained Breathing Apparatus (SCBA)

Self-Contained Breathing Apparatus (SCBA) is a type of respirator that has full face coverage and an oxygen supply contained in a compressed air tank carried on the users back. It can be used in oxygen deficient areas and in hazardous atmospheres. SCBA is used in enclosed areas such as silos, grain storage, and other structures, and in manure pits.

RESPIRATORY EQUIPMENT SAFETY

Respiratory equipment can safeguard your health and save your life in any hazardous air condition you may encounter. However, without proper care and precautions when using such equipment, the device you rely on could be ineffective. Here is a list of guidelines and precautions every worker should follow when using protective equipment.

• Applicators should be completely familiar with their equipment's use, replacement, care, cleaning and storage.

• Applicators should test their equipment before every use. Follow the manufacturer's instructions for properly testing equipment.

Respiratory Protective Devices for Pesticides

• Make sure your respirator fits you properly. Leakage defeats the effectiveness of even the best respirator for the situation. Testing your equipment will assure a proper fit. A beard or large sideburns may prevent a good facial seal.

If you are using a respirator that has cartridges, you can use one of two methods to see if your respirator fits properly:

1) Positive Fit Check: Exhale while you cover the exhalation valve with the palm of your hand -- if you feel air against the skin of your face, there is a leak in the seal.

2) Negative Fit Check: Cover the cartridge(s) with your hands and inhale -- if the mask is drawn tightly to your face, there is no leakage.

• Clean and repair your respirator regularly and according to the manufacturer's instructions.

• Change filter cartridges and pre-filters regularly. If you are using **filter cartridges** and you notice a change in smell or taste or you begin coughing, then the hazardous material may be getting through the filter and it should be changed immediately. You should consider setting a regular filter replacement schedule if the contaminant cannot be noticed by the five senses. Typically, cartridges should be changed after every 8 hours of use unless the manufacturer specifies otherwise. If you are using a **pre-filter** for more than five or six hours a day, then you should change the pre-filter daily. It is important to change filter cartridges before breathing becomes difficult.

• Store protective equipment in a clean, dry place AWAY from work and chemical storage areas. Self-sealing plastic bags are ideal for storing clean respirators.

• Applicators must be fully capable of wearing protective equipment. Some conditions which could cause problems for individuals wearing respirators are: asthma, allergies, emphysema, high blood pressure, heart disorder, claustrophobia or minor facial abnormalities. Before you consider wearing a respirator, it is recommended that you have a medical examination to evaluate your ability to safely wear a respirator.

• Buy only certified respirators. Look for labels approved by NIOSH that show an approval number.

• If it is practical, assign respirators to individuals so they can assume responsibility for the care and maintenance of their equipment.

IN CASE OF EMERGENCY

Leave the hazardous area immediately and get to fresh air if you sense any of the following danger signs:

- You begin to smell or taste contaminants;
- Your eyes, nose, or throat become irritated;
- Breathing becomes difficult;
- The air you are breathing becomes uncomfortably warm; or,
- You become nauseous or dizzy.

If someone else is overcome by toxic gases:

1. PROTECT YOURSELF with a proper respirator before entering the hazardous area.

2. Remove the victim to fresh air.

Act QUICKLY but THOUGHTFULLY! A few minutes without oxygen can cause brain damage or death for the victim-but without thinking about your own safety, you could also become a victim.

CALL FOR HELP!

Sources:

- Penn State University. *1998. Respiratory Protective Devices for Pesticides.* Agrichemical Fact Sheet Number 1.
- Virginia Tech Cooperative Extension. Undated. *Respiratory Protection in Agriculture.* URL: http://www.ext.vt.edu/pubs/safety/respprotec/respprotec.html.
- Rutgers Cooperative Extension. 2002. *Respiratory Protection for Pesticides.*

Photos:

- Pesticidepics.com. URL: http://pesticidepics.ext.vt.edu/
  Virginia Tech. Personal Protective Equipment Album. (Filtering facepiece respirator and chemical cartridge respirator)
- Gemplers.com URL: http://www.gemplers.com/a/shop/catsafe.asp. (Battery powered air-purifying respirator)

Home Study Quiz - I. Prevention and Management of Pesticide Resistance

The following set of questions pertains to the ***Prevention and Management of Pesticide Resistance*** article on pages 12-13. Fill out the information on the back of the quiz and mail the completed quiz to the Vermont Agency of Agriculture to receive **one pesticide recertification credit.**

1. What is pesticide resistance?

2. Provide a brief description of how pesticide resistance develops within a pest population.

3. What are the two most common mechanisms that result in pesticide resistance?

   A.

   B.

4. Briefly **describe one** of the two pesticide resistance mechanisms you listed in question #3 above.

5. Why is the use of an integrated pest management program an effective way to **avoid** the development of pesticide resistance?

6. You have determined that you need to include the use of pesticides in your pest management program. Provide 4 examples of pesticide application strategies that you could use to **delay** the development of pesticide resistance.

   1.

   2.

   3.

   4.

7. The pesticide you are using has failed to control the target pest. What is the first thing you should do in order to determine if you are dealing with a case of pesticide resistance?

Fill out the following information and mail the completed quiz to the Vermont Agency of Agriculture to receive <u>one pesticide recertification credit.</u>

Name: _____

Signature: _____

Certificate #: _____

Address: _____

_____

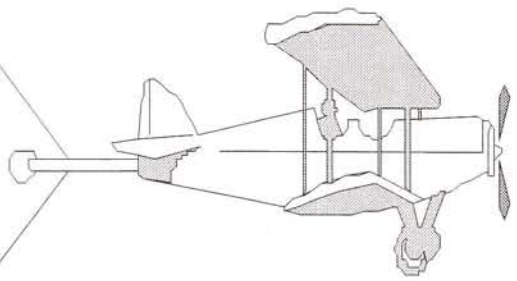
Company/Farm: _____

DATE: _____

Mail to:

Vermont Agency of Agriculture
Plant Industry Division
116 State Street, Drawer 20
Montpelier, Vermont 05620-2901

Attn: Wendy Anderson



Home Study Quiz - II. Respiratory Protective Devices for Pesticides

The following set of questions pertains to the ***Respiratory Protective Devices for Pesticides*** article on pages 14-16. Fill out the information on the back of the quiz and mail the completed quiz to the Vermont Agency of Agriculture to receive **one pesticide recertification credit**.

1. You should select and use respirators that have been approved by what National organization?

2. Describe the best way to store your respirator and other protective clothing.

3. What are some health conditions that would make it difficult for you to wear a respirator?

4. How often should you test your respirator for proper functioning?
   a) Weekly
   b) Monthly
   c) Before each use
   d) Semi-annually

5. Where will you find the information describing how you should test your respirator for proper functioning?

6. List the two methods you can use to test your respirator for a proper fit **AND** describe how you would perform each?

7. How often should filter cartridges be changed if the manufacturer does not provide specific guidance on the label?

Questions 8 - 10. Select the appropriate piece of respiratory protection equipment for each of the following scenarios:

8. Mixing an emulsifiable concentrate pesticide outdoors ——

9. Performing a fumigation in a greenhouse ——

10. Mixing a wettable powder ——

A. Supplied air respirator

B. Filtering facepiece respirator

C. Chemical cartridge respirator

Pesticide Applicator Report

May 2004

Vermont Agency of Agriculture, Food and Markets
Plant Industry Division
116 State Street, Drawer 20
Montpelier, Vermont 05620

Fill out the following information and mail the completed quiz to the Vermont Agency of Agriculture to receive <u>one pesticide recertification credit.</u>

Name: _____

Signature: _____

Certificate #: _____

Address: _____

_____

Company/Farm: _____

DATE: _____