



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>



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Have questions or comments on this newsletter? Please contact
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News from the Vermont Agency of Agriculture, Plant Industry Division

VERMONT DEPARTMENT OF AGRICULTURE BECOMES AN AGENCY

Jason Aldous, Communications Coordinator
Vermont Agency of Agriculture

On May 27, Governor Jim Douglas signed into law a measure raising the Vermont Department of Agriculture, Food and Markets to Agency status and making the Commissioner of Agriculture a Secretary and a formal and permanent member of the Governor's cabinet.

At the signing ceremony at the Vermont State House,

Governor Douglas said that emphasizing the importance of agriculture has been one of the top priorities of his administration and the elevation of the Department to Agency status is just the latest step in that process. He said by making the Secretary of Agriculture a cabinet-level position, agricultural interests will now be represented at the earliest stages of policy formation and for discussion of economic development issues.

"Agriculture is a multi-billion dollar industry in Vermont and a major economic driver," Douglas said, "and this will help ensure that agriculture has an even stronger voice in Montpelier and is part of Vermont's overall economic development strategy."

DEFINING "DIRECT SUPERVISION"

Pesticide program staff are often asked what constitutes "direct supervision". The most common situation presented to us is when an uncertified worker is sent out into the field with a cell phone so he can call the certified applicator back in the office (usually a number of miles away) if he's having trouble with the pesticide application. Unfortunately, that doesn't quite fit the bill. According to the *Vermont Regulations for the Control of Pesticides*, direct supervision is defined as "on-site supervision of pesticide applications by a certified applicator who is capable of calibration of equipment, prescribing pesticides, calculating volumes of pesticides to be applied, and dealing with emergency situations which might occur." So, what does this mean in practical terms? Following are just a few examples.

When private or commercial applicators are making an application to agricultural fields, the certified applicator must remain on the same farm as the uncertified applicator. However, this does not mean the certified applicator can jump in the truck and drive a couple of miles down the road to another piece of non-contiguous land that the farmer happens to be renting.

When commercial or non-commercial applicators are making applications to lawns or landscape plantings, or when making pesticide applications in or around a structure, the uncertified and certified applicators must be within viewing distance of one another. (Cont'd. on page 12)

News From The University of Vermont, Extension Service

A YEAR IN REVIEW FOR FIELD CROP PRODUCTION, QUALITY AND PESTS

*Sid Bosworth, Extension Forage Agronomist, UVM Extension;
Heather Darby, Agronomist and Nutrient Management
Specialist, UVM Extension; and, Carl Majewski, Extension
Educator, UNH Cooperative Extension*

As in most years in Vermont and New Hampshire, weather was quite challenging this year. First, in the northwestern part of Vermont, a harsh winter brought many reports of winter injury in alfalfa fields. Some fields recovered while others were so badly damaged they were plowed under.

An exceptionally cold, wet spring delayed tillage and planting of corn by two to several weeks depending on soil texture and drainage. In the Champlain Valley, most farmers were done planting by early June although there was still some corn being planted late into June. Conditions were generally the same in the Connecticut River Valley, even though some farms were able to start planting by early May as usual. Cool weather through June slowed corn growth considerably. In northwestern Vermont, there were several reports of off-color corn (yellow and purple) presumably from the cool weather the corn crop was experiencing. These conditions were alleviated when warm weather arrived at the end of June. Besides these problems, most corn stands were uniform and there was little early season insect or disease injury.



Weed control was generally acceptable, with plenty of rain to move pre-emergence herbicides into the soil profile. The biggest challenge was for custom sprayers who had a much narrower window of time to spray due to delayed planting. Some of the weeds reported as being a problem this year include many of the usual suspects (burcucumber, triazine resistant (TR) lambsquarters, field bindweed, quackgrass). Horsenettle is also being reported as a problem in corn and in fields rotated to alfalfa. Of course, bedstraw is a continual problem in many perennial hay fields. Fields being continuously planted to herbicide resistant corn and sprayed with Roundup should be carefully monitored for possible invasions of Roundup tolerant weeds.

Insect pressures were generally low with the usual reports of scattered cutworm and wireworm problems. Armyworm was monitored in Cheshire, Coös, and Strafford counties of New Hampshire, but few or no adult moths were found in any of the traps and there was no evidence

of feeding by caterpillars.

In Franklin and Grand Isle Counties, there was severe corn rootworm damage (goosenecking and lodging) reported on some continuous cornfields. However, intensive scouting in Addison and Washington Counties showed only 3 of 23 fields to be above a critical threshold for corn rootworm. Of these fields, only 16% of the adults counted were found to be the Western species. The rest and large majority were Northern corn rootworms. This was not the case in the southern Connecticut River Valley where the majority of the corn rootworm equivalents (two Northern equals one Western) were found to be Western; however, overall populations were below threshold.

First cut hay harvest got off to a slow start this year with wet conditions hindering harvest. The first cut of haylage was primarily finished by the end of June. Alfalfa maturity was delayed somewhat; however, grass quality declined at its normal rate. Quality measurements collected from research trials in East Montpelier and South Burlington showed that orchardgrass, reed canarygrass and timothy all reached 55% fiber (an upper limit for high quality grass) by the end of May, whereas alfalfa did not reach its maximum fiber content (40 to 45%) until the second week of June. Regrowth of alfalfa after first cutting was strong; however, hot temperatures and dry soil slowed grass growth tremendously. There was some reported alfalfa weevil damage on second cut in Franklin County but not above the economic threshold. In southern areas, a few alfalfa stands showed damage from potato leafhoppers, but these were predominantly late-harvested fields with tender regrowth in mid-July.



Hay crop first year seedlings had a tough time this year. The fluctuation from cool wet weather to dry to wet soil conditions appeared to put stress on new seedlings and even caused death. Stress and disease caused by weather conditions were presumably the reason for poor stand establishment. Some seedlings were never cut this year.

Despite the weather, this year's corn silage production was said by many farmers to be the best they can remember in a long time. For a look at some of the corn problems, insects and weeds discussed above, go to the Vermont Crops and Soils WebPage at <http://pss.uvm.edu/vtcrops/>.

News From The University of Vermont, Extension Service

HELP US WELCOME HEATHER DARBY!

Heather Darby has just joined the University of Vermont Extension Service as the Agronomist and nutrient management specialist for the Northwest Region. Heather grew up on a dairy farm in Alburg, VT. She completed a B.S. in Agronomy at the University of New Hampshire, and received a M.S. in Agronomy at the University of Wisconsin. Her research focused on the management of cultural practices to improve corn silage yield and quality. Recently, Heather completed a Ph.D. at Oregon State University in the Horticulture Dept. where she worked on developing integrated management strategies for farmers to control a devastating root rot of corn. Her research focused on better understanding how cropping systems affected the disease incidence and severity. Heather is located at the St. Albans Extension Office at 278 S. Main Street. She can be contacted by phone (802) 524-6501, ext 206, or email (heather.darby@uvm.edu).

PEST AND PEST MANAGEMENT RESOURCES FOR VERMONT FIELD AND FORAGE CROPS

Publications:

• **IPM Field Corn Pocket Guide.** An excellent booklet with information on weeds, insects, diseases, nutrient deficiencies and other management info for field corn. Available from NRAES, Cooperative Extension, 152 Riley-Robb Hall, Cornell University, Ithaca, New York, 14853-5701.

• **Weeds of the Northeast.** This book covers close to 300 weed species using color photographs, line drawings and tables. It is available from Cornell University Press in paperback or hard cover. Address: Cornell University Press, P.O. Box 6525, Ithaca, New York 14851-6525. Phone: (607) 277-2211.

• **Steel in the Field.** A good resource for information concerning cultivation and other non-herbicide weed control methods. Order from Sustainable Agriculture Publications, Hills Building, University of Vermont, Burlington, VT 05405. Phone: (802) 656-0471.

Websites:

• Pest Management Section of the Vermont Crops and Soils Homepage-

<http://pss.uvm.edu/vtcrops/>

• UVM Plant Diagnostic Clinic -

<http://pss.uvm.edu/pd/pdc/index.htm>

• Vermont Agency of Agriculture, Food and Markets,

Plant Industry Division -

<http://www.vermontagriculture/pid.htm>

• Penn State Weed Management -

<http://weeds.cas.psu.edu/default.html>

• New England Pest Management Resources Online (PRO New England) - <http://www.pronewengland.org>

• Virginia Tech Weed ID Guide -

www.ppws.vt.edu/scott/weed_id/rightsid.htm

• Weed Identification from University of Illinois -

<http://web.aces.uiuc.edu/>

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
- George Cook, Maple, Farm Safety
888-4972, X102
- 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

UPCOMING TRAINING EVENTS

✓ **Commercial Pesticide Applicators' Meeting for Field and Forages** - January 21, 2004, Randolph, VT.

✓ **Private Applicators' Meeting for Field and Forages** - February 10-13, 2004, Sheldon, Middlebury, St. Johnsbury and Springfield (exact dates and locations are not set yet).

✓ **Initial Certification Training Workshop** - April 13, 2004, VT Interactive Television, 8 sites around the state, TBA.

Meeting brochures will be sent out for these events. If you have any questions, please contact Ann Hazelrigg at (802) 656-0493.

Bat Control: It's All About Exclusion, Exclusion, Exclusion

While there are approximately forty species of bats found in the United States, the Little Brown Bat (*Myotis lucifugus*) and Big Brown Bat (*Eptesicus fuscus*) are the species most often encountered in Vermont. Originally, bats roosted in natural shelters such as caves and hollow trees. Many still do, but others have found human dwellings much to their liking. Attics, wall voids and unused areas in upper stories of buildings all make good roosting sites for bats. Although they often cause fear and alarm in the humans they are sharing the dwelling with, bats are actually a very beneficial and valuable part of our ecosystem and should not be needlessly destroyed. Bats are very efficient predators of insects; a single bat may consume as many as 2,000 insects every night.



GENERAL BIOLOGY

Because flying insects are not active during the winter months, bats must either hibernate or migrate to survive the winter. The Little Brown Bat will normally migrate to warmer caves for the winter and return to the same home or structure in the spring. The Big Brown Bat will often overwinter in homes because they can withstand the colder temperatures of uninsulated attics. Hibernating bats survive on a very small amount of stored fat during the five to six month hibernation period. Bats arouse from hibernation during March and migrate to their summer roosts in April. If bats are living in your attic during the spring or summer, chances are it is a maternity colony founded by pregnant females seeking sheltered roosts for their pups. Each bat gives birth to one to two pups in late May and early June. By mid-July, the pups are able to fly and begin hunting insects on their own. The females, however, continue to nurse their pups until they are able to adequately feed themselves.

MAKING SURE YOU HAVE A BAT COLONY

Correct identification of the offending pest is always the first step in solving the problem. Squirrels and mice in the attic make scurrying and squeaking noises that sound like bats, and chimney swifts look like bats when they fly out at night. The best way to tell if a structure is hosting a bat colony is to look for roosting bats or their droppings. Bat droppings are black, about the size of a grain of rice, and accumulate in piles below areas where the bats roost. (Mouse droppings look similar, but they would be scattered in small amounts throughout the attic.) Bat droppings are very dry (the moisture evaporates rapidly due to the heat of the attic) and do not usually contribute to structural deterioration or wood rot unless present in large quantities.

BAT PROOFING: IT'S ALL ABOUT EXCLUSION, EXCLUSION, EXCLUSION!

1. Locate Bat Entrances

The first step in bat-proofing a structure is to locate the holes and cracks that bats use to enter and exit the structure. **Bats can enter structures through cracks as small as 1/4 inch in diameter.** Bats commonly enter at points where joined materials have warped or pulled away from one another, such as louvered vents with loose screening, the roof peak, and areas where flashing has pulled away from the building. To identify which of these areas provides access, look for bat droppings on the side of the house below a suspicious crack or crevice. Entrances that have been used for a long time may have a slight brown discoloration at the edges caused by dirt and oil from the bats' fur. Inside the attic, bat droppings often accumulate below bat entrances and exits. During the day, turn off the attic lights and look for openings where outside light is visible.

Staging a bat watch can also help you locate bat entrances. At dusk, station a person on each side of the building and watch as the bats exit the building. Once the first bats are seen leaving, focus on that area of the building and watch for other exiting bats until you have pinpointed their exit(s).

2. Seal Entrances

Once the bat entrances have been located, the next step in bat-proofing is to seal these openings. Use window screening or hardware cloth to cover louvered vents or large gaps and cracks in the building. To fill smaller cracks, use expanding foam insulation or caulking compound. After hardening, these can be trimmed or painted. Unlike mice, bats will not gnaw new holes in the building, so sealing the existing holes will keep them out. Most bat-proofing materials can be obtained in local hardware or building supply stores.

3. Timing of Bat-Proofing

One important aspect to consider before bat-proofing your building is the timing of the procedure. **Because pups remain confined in the roost until they are old enough to fly, bat-proofing should never be completed from late May through mid-July. Otherwise the young, flightless bats would be trapped inside the building.** Bat-proofing during these months would result in potential health risks and obvious odor problems as the young bats die and decay inside the building. Also, the pups may enter human living areas in search of a way out, and females may frantically attempt to reenter the building to rejoin their young.

Bat Control (cont'd.)

The best time for bat-proofing is in the spring, before bats enter the roost, or in the fall, after the bats have left. If bat-proofing must be done while bats are inhabiting the building, it should be done by **installing a one-way door after mid-July when the pups are able to fly**. One-way doors (see below) are designed to allow bats to leave but not re-enter a building.

One-Way Doors

One-way doors are pieces of mesh fastened over a bat entrance to form a long sleeve or tent. These doors allow bats to exit at night but prevent their re-entry at dawn.

Installing One-way Doors:

1. Choose 1/4 to 1/2 inch mesh (wire or plastic) to cover the bats' points of entry. Cut the screening so that it covers the width of the hole and extends approximately 3 feet below the hole. The screening should project 3 to 5 inches clear of the hole, so that the bats can crawl between the screen and the building and exit at the bottom.
2. Secure the mesh at the top and sides with duct tape or staples and leave the bottom open.
3. Leave the door in place for at least three to four days, or until you are sure that all bats have left the building, then remove the one-way door and permanently seal the opening.
4. Again, never use a one-way door from May through August, or young bats will be trapped inside and die.

STEPS IN BAT-PROOFING:

- January–April: Seal entrances before bats return to the building.
- May–August: Watch bats to identify entrances. **Do not seal the openings.**
- August–October: Install one way door(s).
- November–December: Seal entrances once bats have left the building. (If you suspect bats are hibernating in the building, install a one-way door in September or October)

NOTE: Toxic chemicals should *never* be used for bat control because they cause dead and dying bats to be scattered throughout the building, yard, and neighborhood, thus increasing the chance of contact between bats and people, particularly children. **Currently there are no pesticides registered for bat control in Vermont.** Naphthalene, also called moth balls or moth flakes, is registered as a bat repellent. This repellent may be useful when bats are in very confined areas such as crawl spaces or between walls, but is not very useful in large open areas such as attics. Also, bats will re-colonize a building once the repellent wears off. **Exclusion is the only reliable method to achieve long-term bat control.**

For information on the **conservation of bats and their habitat**, visit the Organization for Bat Conservation at <http://www.batconservation.org>.

★PUBLIC HEALTH CONCERNS★

The Vermont Department of Health recommends the screening/testing of all bats found in a room with a sleeping individual or an unattended child, and bats that make physical contact with people. The bat should be safely collected following the procedure outline below and frozen or refrigerated until a game warden can be reached via Vermont state police. Bats will be sent to the state health lab in Burlington. The rabies hotline 1-800-4-RABIES (800-472-2437) can help callers sort out what needs to be done, or for animal or human exposure assessment, the Vermont Dept. of Health can be reached at 1-800-640-4374 (802-863-7240) during normal business hours.

How to safely capture a bat

Put on leather work gloves! When the bat lands, approach it slowly, and place a small box or coffee can over it. Slide a piece of cardboard under the container to trap the bat inside.

If actual or suspected human contact has occurred:

Tape the cardboard to the container securely. You should freeze or refrigerate the specimen, and submit it for testing following the procedures above.

If no human contact occurs:

If you have a bat in your home, and you are **sure** that no human contact has occurred, confine the bat to the room by closing all doors leading from that room, and opening the windows. The bat will probably exit through one of the windows. If not, you can catch the bat using the procedure describe above.

To release a captured bat, place the container (facing away from you) on a secure surface **above the ground**—such as on a ledge, or against a tree—and slide away the cardboard. The bat will not fly right away, so releasing it above the ground keeps it safe from predators until it has its bearings. Also, unlike birds, most bats must drop from a perch and catch air under their wings before they can fly.

★ If you are bitten by the bat, immediately wash the bite with hot, soapy water and call a physician. If there is any possibility that you have been infected, the physician will recommend rabies shots.★

Sources:

- Bats. Pennsylvania State University, 2001. <http://pubs.cas.psu.edu/FreePubs/pdfs/uh080.pdf>.
- Bats. University of Vermont Extension Service, Fact Sheet WL 4.
- Bats. University of New Hampshire Wildlife Information Series #1.
- Effective Control of Bats. Health Canada. <http://www.bat-control.ca/bat-control.html>



Protecting Wildlife from Pesticide Risks: The Ecological Risk Assessment

Many plant and wildlife species can be found in or near cities, agricultural fields, and recreational areas where pesticides are used. Therefore, they are often at risk for exposure to pesticides. As a result, before a pesticide can be registered with the Environmental Protection Agency (EPA), the Agency conducts ecological risk assessments to determine what risks are posed by a pesticide and whether changes to the proposed use(s) of the product are necessary to protect human and wildlife health and the environment.



pesticide is to plants, how the pesticide affects a seed's ability to germinate and emerge, as well as how healthy and vigorous the plant grows up following exposure.

Toxicological testing and scientific measurements are conducted under strict guidelines and approved methods. Exacting standards are necessary for consistency in evaluations of pesticide safety and for comparisons among chemicals.

Environmental Fate Studies

Environmental fate studies measure the interaction of pesticides with soils, air, sunlight, surface water, and ground water. Some of the basic questions that must be answered in these studies are: (1) **How fast, and by what means, does the pesticide degrade?** (2) **What are the breakdown chemicals?** (3) **How much of the pesticide or its breakdown chemicals will travel from the application site, and where will they accumulate in the environment?** These tests include how the pesticide breaks down in water, soil, and light; how easily it evaporates in air; and how quickly it travels through soil. EPA uses these tests to develop estimates of pesticide concentrations in the environment.

PUTTING THE PIECES TOGETHER

To evaluate a pesticide's environmental risks, EPA scientists look at all the data together. **The process of comparing a pesticide's toxicity information, and the amount of that pesticide a given organism may be exposed to in the environment, is called "risk assessment".**

A pesticide can be toxic at one exposure level, and have little or no effect at another. Thus, the risk assessor's job is to determine the relationship between possible exposures to a pesticide and the resulting harmful effects.

If the ecosystem will not be exposed to levels of a pesticide shown to cause problems, EPA concludes that the pesticide is not likely to harm plants or wildlife. On the other hand, if the ecosystem exposure levels are suspected or known to produce problems, EPA will then work to better understand the risks and reduce the risks to acceptable levels. Risk is often managed by including precautionary instructions on the product label under the "Environmental Hazards" section. See below for examples of these precautionary statements.

WHAT IS AN ECOLOGICAL RISK ASSESSMENT?

In an ecological risk assessment, EPA evaluates the likelihood that exposure to one or more pesticides may cause harmful ecological effects. The effects can be **direct** (i.e., fish die from a pesticide entering waterways), or **indirect** (i.e., a hawk becomes sick from eating a mouse dying from pesticide poisoning).

EPA determines the likelihood of harmful effects based on data submitted by the product manufacturer in support of registration regarding the potential hazard that a pesticide may pose to non-target fish and wildlife species. Risk assessments are prepared by scientists trained in wildlife ecology, population dynamics, physiology, and environmental chemistry. In some cases, EPA may require additional data to resolve questions which arise during the initial evaluation. The final step is a decision to approve or deny registration. The ecological risk assessment is only one of several tools EPA uses to evaluate new pesticides and re-evaluate old ones.

WHAT KIND OF STUDIES DOES EPA LOOK AT TO DETERMINE ENVIRONMENTAL RISKS?

The studies EPA uses in its ecological risk assessments define the chemical properties of the pesticide, how the pesticide behaves in the environment, and its impact on plants and animals not targeted by the pesticide.

Wildlife/Plant Toxicity Studies

Toxicology studies are carried out on plants and animals that have been chosen for testing because they broadly represent non-target organisms (living things the pesticide is not intended to kill). The animals and plants are exposed to different amounts of pesticide to determine short- and long-term responses to varying concentrations. Some of the impacts the Agency looks at on animals are the short- and long-term effects of varying amounts of pesticide exposure to insects and other invertebrates, fish, and birds. For plants, EPA looks at how poisonous the

Protecting Wildlife from Pesticide Risks: The Ecological Risk Assessment

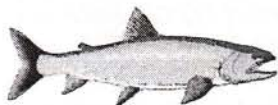
If the risk assessment indicates a high likelihood of hazard to wildlife or phytotoxicity to non-target plants, EPA may require additional testing, require that the pesticide be applied only by certified individuals (i.e. making it a restricted use pesticide), or decide not to allow its use. Decisions on risk reduction measures are based on a consideration of both pesticide risks and benefits.

EPA's decision to register a pesticide is based on the determination that use of the product according to label directions will not cause unreasonable harmful effects on wildlife or the environment.

SAMPLE PRECAUTIONARY LABEL STATEMENTS

Statements regarding hazards posed to wildlife can be found on the label under the "Environmental Hazards" section. In addition to reading and following the label directions, pesticide applicators must also be familiar with the state pesticide regulatory requirements. Following are some sample statements from commonly used pesticides, along with some pertinent regulatory restrictions.

☛ "This product is toxic to birds and fish. Fish and other aquatic organisms in water treated with this product may be killed. You must consult your State Fish and Game Agency before applying this product to waters or wetlands. Do not contaminate water by cleaning of equipment or disposing of waste."



[NOTE: According to the **Vermont Regulations for the Control of Pesticides**, before applying any pesticide to waters of the State (including wetlands) an Aquatic nuisance permit must be obtained from the Department of Environmental Conservation, Water Quality Division.]

☛ "This pesticide is highly toxic to aquatic invertebrates, fish and wildlife. Birds in treated areas may be killed. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not apply when weather conditions favor drift from treated areas. Runoff and drift from target areas may be hazardous to aquatic organisms in adjacent aquatic sites. Do not contaminate water when disposing of equipment wash waters. This product is extremely toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment areas."

[NOTE: According to the **Vermont Regulations for the Control of Pesticides**, in order to prevent destruction of pollinating insects and contamination of honey crops, all persons are prohibited from spraying pesticides on flowering crops without prior notification of apiculturists who have established apiaries on the premises. Apiculturists who are notified of spraying operations shall remove their bees from the area or cover the hives to prevent exposure.]

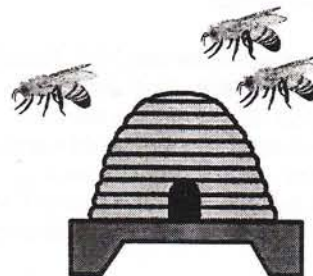
☛ "Herbicide X is a contact herbicide that desiccates all green plant tissue. Herbicide X is toxic to non-target crops and plants if off-target movement occurs. Extreme care must be taken to ensure that off-target drift is minimized to the greatest extent possible. Do not apply under conditions involving possible drift to food, forage or other plantings that might be damaged or the crops thereof rendered unfit for sale, use or consumption."

[NOTE: According to the **Vermont Regulations for the Control of Pesticides**, pesticide applicators shall minimize the potential for pesticide drift by using pesticides and conducting operations under conditions known to minimize contamination of non-target land and water areas.]

Remember - it's always a good idea to use the least toxic pesticide for the job. If a product you intend to use has warnings about toxicity to wildlife and non-target plants, try to find a comparable product that does not have adverse effects on those organisms.

Source:

Ecological Risk Assessments. US Environmental Protection Agency, Office of Pesticide Programs, 2003.
<http://www.epa.gov/pesticides/ecosystem/ecorisk.htm>



USING AND CALIBRATING A BACKPACK SPRAYER

Ann Hazelrigg
Pesticide Education and Safety Program
UVM Extension

Many of us use backpack sprayers. They are inexpensive, lightweight, easy to use and perfectly suited to small jobs on the farm or in the landscape. In some situations, such as spot spraying, calibration of the sprayer is not necessary. This is true when a label directs using the pesticide at a specific dilution and method of coverage (i.e. until wet.) In other cases, where a specific amount of active ingredient must be applied to a given area, calibration is essential. Like larger sprayers, backpack sprayers need to be calibrated to deliver the right amount of pesticide, to minimize pesticide waste, to decrease potential for surface and groundwater contamination, for personal safety and to save time and money.

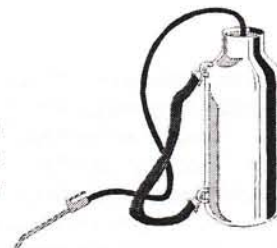
Every backpack sprayer consists of three parts: a tank to hold the spray mix (usually around 4-6 gallons), a pump to provide pressure, and a nozzle and wand to apply the chemical in the desired spray pattern. Some higher quality backpack sprayers have built in pressure regulators. These allow the sprayer to operate at a constant pressure. Having a pressure regulator is desired but not necessary as long as you keep the sprayer at a fairly constant pressure by walking and pumping at a steady pace. It is important to achieve a uniform broadcast application.

A simple and quick test to determine if you are achieving a uniform application is to spray an area on a paved surface with water in the same way you would spray a pesticide on a target area (i.e., turfgrass, crops, etc.) If you do this on a warm day, it should only take a few minutes for the drying pattern to reveal your distribution pattern. Fast drying areas indicate low application rates while slow drying areas received high amounts of spray. Uniform drying without streaks indicates uniform application. Practice this exercise until the spray pattern is distributed evenly.

Backpack sprayers should be calibrated by the applicator. Depending on the size of the person, the swath width could change, changing the amount of pesticide delivered. Be sure to recalibrate if nozzle types or applicators are changed. The total volume of the spray tank must be known in order to determine the area that can be covered per tankful.

Select the proper nozzle for the job! Nozzles come in various shapes and sizes and are carried by most agricultural chemical dealers. The newer nylon nozzles are lighter, more resistant to abrasive damage, and will not corrode. For spot applications, hollow or solid cone nozzles work well, but only even-flat-fan or flood-jet types should be used for single-nozzle band or strip applications.

These nozzles will deliver a relatively narrow, even pattern and constant application rate across the band.



- ⇒ **Flat-fan nozzle** - makes a narrow, oval pattern with tapered edges.
- ⇒ **Even flat-fan nozzle** - makes a uniform pattern across its width; used for band or strip spraying.
- ⇒ **Flood nozzle** - also used for band or strip spraying a wide, uniform pattern.
- ⇒ **Hollow cone and solid cone nozzles** - both produce a circular pattern, but the hollow cone makes finer, smaller particles than the solid cone. These nozzles are used for hand held spot applications or row crop sprayers.

Nozzle output is measured in gallons per minute (GPM) at different pressures. Nozzles with low delivery rates (less volume per minute) are best for small sprayers, since more acreage can be covered with less carrier (water, oil, etc.)

NOTE: Be sure to inspect and replace all worn nozzles on a regular basis. Recalibration checks should be done at regular intervals throughout the season.

THE 1/128 METHOD: A SIMPLE WAY TO CALIBRATE SMALL VOLUME & HAND HELD SPRAYERS

This method works because one gallon equals 128 ounces and the test area to be sprayed is 1/128th of an acre, so ounces collected equals gallons/acre (GPA).

MATERIALS NEEDED FOR CALIBRATION:

- ⇒ Area markers (Markers or flags)
- ⇒ Measuring tape
- ⇒ Water
- ⇒ Backpack sprayer
- ⇒ Watch with second hand or stopwatch
- ⇒ Container with volume marks
- ⇒ Bucket

STEP 1 - Set up the Backpack Sprayer to be Used in the Test: Start with a clean backpack sprayer, set up exactly how it will be used.

USING AND CALIBRATING A BACKPACK SPRAYER

STEP 2 - Set up the Test Area: Measure out an 18½ x 18½ foot block in an area similar to the one you will be spraying (approximately 1/128th of an acre, or 340 square feet).

STEP 3 - Determine the Time Required to Spray the Test Area: Add water to your tank and, in a uniform manner, spray this area with water and record the number of seconds it takes. Repeat this 2 or 3 times, making sure that you keep your pattern and pressure constant. Take the average of the 2 or 3 recorded times.

STEP 4 - Determine the Amount of Water Required to Cover the Test Area: Measure the amount of water delivered to this area by spraying into a bucket for the same amount of time that was required to spray the test area (or the average time you recorded in Step #3). Be sure to keep the sprayer's pressure the same as when you sprayed the test area.

STEP 5 - Determine the Sprayer's Output: The amount of water collected in fluid ounces equals the output or gallons per acre (GPA).

FOR EXAMPLE:

STEP 3

Time Required: If it took 51 seconds to spray the 18 ½ by 18 ½ foot test area;

STEP 4

Volume Applied: And the amount of water collected when re-sprayed into the bucket for 51 seconds was 40 ounces; then,

STEP 5

Ounces Applied: You applied 40 gallons of material per acre.

☛ **To determine how much pesticide to add to the spray mixture:**

If the label recommends applying 1 quart of pesticide per acre:

☛ You know the sprayer is applying 40 gallons per acre, therefore, you will need to add 1 quart of pesticide to each 40 gallons of water. If your sprayer holds 1 gallon of spray how much pesticide will you need to add to the gallon of water?

☛ 1 quart (32 ounces) divided by 40 gallons = 0.8 ounces of pesticide is needed per gallon of water.

☛ 1 fluid ounce = 2 Tablespoons, therefore you will need 1.6 T of pesticide per gallon of water.

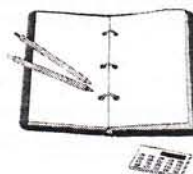
☛ 1 fluid ounce also equals 29.57 milliliters (ml) therefore, if measuring in ml, you would need 0.8 ounces X 29.57 ml per ounce = 24 ml per gallon of water.

Solutions may need to be converted to a smaller unit in order to measure the pesticide accurately. The following conversions will help simplify this problem.

CONVERSIONS:

Volume

gallon x 128	= fluid ounces (fl oz)
pints x 16	= fluid ounces (fl oz)
fl oz x 29.57	= milliliters (ml)
gallon x 4	= quarts (qts)
quarts x 2	= pints (pts)
fl oz x 2	= Tablespoons (tbs)
tbs x 3	= teaspoon (tsp)
tsp x 5	= milliliters (ml)



Weight

pounds x 16	= weight ounces (wt oz)
wt oz x 28.35	= grams (g)
grams x 1000	= milligrams (mg)

Calibration is essential to a successful pesticide application.

Following these simple steps will ensure your money and time are not wasted on an application that does not give the desired outcome.

Sources:

☛ *Calibrating Hand-Held and Backpack Sprayers for Applying Pesticides.* S.M. Zedaker, Extension Specialist and Professor, Forestry, Virginia Tech. Publication number 456-502, Posted 1997.

☛ *Calibration of Hand Sprayers for Herbicide Application.* Eric Nordland, District Specialist, Community and Natural Resource Development and Randall Heiligmann, Extension Specialist, Forestry. Ohio State University Fact Sheet, F-20.

☛ *1/128 Method of Calibration, Calibrating Hand Sprayers and High Pressure Hand Guns.* M.A. Ferrell, UW Cooperative Extension Pesticide Coordinator. University of Wyoming Pesticide Education Program Fact Sheet, MP-93.4



Wear and Use Personal Protective Clothing and Equipment!

As reported in the November 2002 issue of the *Pesticide Applicator Report*, the lack of compliance with the use of personal protective equipment (PPE) as required by the pesticide product label was the most common reason enforcement actions were taken by the Vermont Agency of Agriculture against pesticide applicators. The need for the use of label-recommended PPE cannot be stressed enough. It is necessary for your personal protection against injury from pesticides, and it is the law! To provide you with a refresher on PPE and its appropriate use, the following article is being reprinted, in its entirety, from the August 2003 issue of *Pennsylvania Pesticide Highlights*, produced by Penn State University. Information on respirators was reproduced from the National Ag Safety Database which can be found at <http://www.cdc.gov/nasd>



Pesticides can enter the body through contact with the skin (dermal, which includes contact with the eyes), or through inhalation or ingestion (orally). Dermal exposure accounts for about 97 percent of human exposure to pesticides. While the applicator cannot control the pesticide's toxicity, the applicator's exposure to the pesticide can be controlled. To significantly reduce exposure to pesticides, applicators must wear protective clothing and equipment (PPE).

Every pesticide product label contains specific information about the necessary PPE to wear while mixing, loading and applying that pesticide. This information can be found under the "Precautionary Statements" section. Remember, the label is the law. Therefore, using a pesticide without using the specified PPE is illegal.

GLOVES: Because 85 percent of dermal exposure occurs on the hands and forearms, wearing unlined chemical resistant gloves can significantly reduce this mode of exposure. Do not use gloves, boots, or hats that are made of, or lined with, absorbent material such as cotton, leather or canvas. These materials are not chemically resistant and are impossible to clean after a pesticide gets on them. If the pesticide label does not specify a glove material, select a barrier laminate, butyl, or nitrile glove. To avoid secondary exposure, thoroughly wash the gloves with soap and water before removing them. After removing the gloves, wash hands and forearms thoroughly with soap and water.

Wear gloves that reach at least to the elbow. Shirt sleeves should be worn over the gloves with the cuffs fastened. If

applying pesticides overhead, put shirt sleeves inside gloves and turn up the cuff of the glove to catch any material that may run down your arm.

BODY PROTECTION: When working with low toxicity pesticides (with a signal word of "Caution"), jeans and a long sleeve cotton shirt are recommended for minimum protection. Wearing coveralls over regular work clothes will further reduce exposure. Disposable coveralls are popular due to ease of use and low cost. They are more resistant to spray than cotton, although they are not waterproof. Disposable coveralls are not washable, and should be discarded at the end of each workday.

Cotton or cotton-blend coveralls are comfortable to wear because the materials "breathe". Cotton and cotton/polyester fabrics are very strong but absorb moisture quickly, so they are used primarily for protection against granular or dry pesticide formulations (before being mixed with water). Woven cotton and cotton/polyester are re-usable but must be laundered immediately after each use and replaced yearly because residues will remain in the fabric after laundering. If the pesticide is highly or moderately toxic (with a signal word of "Danger", "Danger/Poison" or "Warning"), chemical resistant coveralls will provide the most protection. Be careful when wearing these items, as you may become hot, which can lead to heat stress. (Refer to the May 2003 issue of the *Pesticide Applicator Report* for more information on avoiding heat stress when making pesticide applications.)

PROTECTIVE APRONS: Aprons offer protection from spills of concentrate during mixing and loading of products or when cleaning equipment. Aprons are always worn over regular work clothes and, perhaps, coveralls. They should be coated on both sides and the edges should be sealed to guard against absorption of pesticides.

FOOTWEAR: As mentioned above, canvas and leather absorb pesticides, are impossible to clean adequately, and should not be worn as foot protection. Wear chemical resistant footwear for spill protection, which can be shoes, shoe covers or boots. Pant legs should not be tucked into the boots but should be worn on the outside so that pesticides cannot be funneled into the boot. Remember to clean the footwear before removal to reduce contamination from pesticides.

HEAD AND NECK PROTECTION: To protect the head and neck from exposure to pesticides, wear a chemical-resistant, wide-brimmed hat or hood. Hoods provide the best protection as they cover the sides of the face, ears, and most of the neck. Some chemical resistant jackets or coveralls have an attached protective hood. If the hood is not used, tuck the hood inside the neckline to keep it from collecting pesticides.

Wear and Use Personal Protective Clothing and Equipment!

PROTECTIVE EYE WEAR: Although pesticide contact on the face typically occurs less frequently than contact on the hands, the health consequences of facial contact are potentially more serious, especially for the eyes. Selecting the proper eye protection depends on exposure conditions and pesticide formulation. Excluding the full-face respirator, three basic types of protective eye wear are available: shielded safety glasses, chemical splash goggles, and face shield.

Safety glasses are designed to protect the eyes from direct impact and heat. Safety glasses with the full side shields provide the greatest protection from flying objects but only minimal protection from chemical dust or splash. Even though some pesticide labels permit use of safety glasses, chemical splash goggles would provide better protection from pesticides. Goggles should fit tightly against the face. Face shields provide protection to the entire face. Face shields that are cupped inward toward the throat provide better protection than straight face shields.

RESPIRATORS: [NOTE: The following information on respirators is general guidance. A more in-depth informative article on respiratory protection will appear in the next issue of the *Pesticide Applicator Report*.] Selection of the proper respirator for a given exposure is critical. Dusts, fumes, gases or vapors, and temperature extremes can penetrate and damage your respiratory system. Dust and fumes can irritate your nose and throat, and in some cases, your lungs. Gases and vapors can be absorbed from your lungs into your bloodstream, where they have the potential to damage your brain and internal organs.

If the pesticide you are exposed to is an irritant to your eyes, nose or throat, a full-face respirator should be worn. For air-purifying respirators, the air-purifying filter or cartridge must be approved by NIOSH/MSHA for use against a specific hazard. ***Pesticide product labels are the primary source of information on which type of respiratory protection is necessary for use with the product.***

While in use, respirator filters may need to be replaced frequently. The filters and prefilters should be replaced:

- When the filter element is damaged or torn.
- When the respirator manufacturer or the pesticide label requires it. If their recommendations are different, use the most frequent interval recommended.
- At the end of each day's work, if no other instructions are available.

Regular cleaning and inspection prolongs the respirator's useful life and assures you that it is working as efficiently as possible. When not in use, respirators should be stored to prevent conditions that can deform the face piece, and to protect it from excessive exposure to dust, sunlight,

extreme temperatures, excessive moisture or damaging chemicals. Plastic containers with lids can provide adequate storage for respirators. All respirators should be inspected before each use to ensure cleanliness and that all components are present and operable.

Breathing through a respirator may require more effort than normal breathing. This effort can be difficult for some individuals, for various reasons. If you have a medical limitation that may interfere with your wearing a respirator, be sure to inform your supervisor. You may be required to have an examination by your physician to determine if you are physically able to perform the work while wearing a respirator.

Respirators cannot adequately protect a worker from all contaminants under all conditions. In general, the typical half-face air-purifying respirator can be used for protection in environments of up to 10 times the Permissible Exposure Level (PEL). However, the cartridges or canisters of air-purifying respirators have a limited capacity to protect against toxic gases and vapors in the air. If you detect an odor or taste, or if your eyes or throat feel irritated, leave the hazardous area immediately and go to a safe area. The cartridge or canister on the respirator should be changed. [Air-purifying respirators (canisters or cartridges) do not provide oxygen. They should not be used in situations where the oxygen content in the air is questionable.]

Make sure the respirator fits snugly on your face! Only a secure and snug fit protects you, so make sure you have the right size respirator for your face. The shape of your face, facial hair and condition of your skin can affect your fit. Try various sizes until you find one where air does not leak in around the edges. You can test the respirator fit by placing the palms of your hands over the cartridges and breathing in for 10 seconds. If fit properly, the mask should suck in tightly around your face.

SUMMARY:

Risk = Toxicity X Exposure

Applicators may have little or no control over the toxicity of pesticide products or the toxicity of the specific formulated products. However, applicators can control their exposure, and therefore their risk, which can be significantly reduced or nearly eliminated by using PPE.

READ THE PESTICIDE LABEL: The label provides information on the correct PPE to use for that specific chemical. However, label requirements are minimum... you can always wear more PPE to increase your level of protection.

News from the Vermont Agency of Agriculture, Plant Industry Division (Continued from Page 1)

DEFINING "DIRECT SUPERVISION"

(cont'd. from page 1)

When in doubt, ask yourself, can the uncertified applicator signal the certified applicator either verbally or through hand signals to indicate that assistance is needed, and can the certified applicator make it to the site of application in time to prevent an accident from occurring? If your answer to this question is "yes", then you are probably meeting the definition of direct supervision. If your answer is "no", either do the job yourself or get your employee certified.

Remember - it is always the certified applicator's responsibility to train the uncertified applicator in the proper and safe use of pesticides. The certified applicator is ultimately responsible for all applications made by the uncertified applicator under his or her direct supervision.

IPM ONLINE HOMESTUDY COURSES

If you want to spend some time this winter brushing up on your knowledge of Integrated Pest Management (IPM), visit the University of Connecticut IPM website at <http://www.hort.uconn.edu/IPM/homecourse/coursinfo.htm>. This website has a great collection of IPM online homestudy courses. While these courses are non-credit, they present useful information on IPM for structural pests to ornamental and turfgrass pests. There is also a set of weed identification flash cards to keep all you turfgrass pest managers on your toes. Completing the accompanying quizzes is optional, but a good way to check your knowledge of the material presented.

NEW FACT SHEETS AVAILABLE FROM THE AGENCY

• **New and Emerging Plant Pests of Concern for Vermont Nurseries.** Bonnie MacCulloch, the Agency's new State Pest Survey Coordinator, has developed a fact sheet on potential invasive plants, plant diseases and plant insect pests that we need to keep a sharp look-out for here in the Northeast. While this fact sheet has been designed for nursery operators, it is an equally valuable tool for anyone performing landscaping services. Colored photos are provided for identification, along with a detailed description of each pest.

• **Nuisance Insects that Overwinter in our Homes/Structures.** Two fact sheets, one designed for homeowner use, the other for pest control operator use, review the most common nuisance insects that invade structures in late Summer to early Fall (multicolored Asian lady beetles, cluster flies, boxelder bugs, western conifer seed bugs, and elm leaf beetles). Color photographs are

provided for identification along with management strategies for their control.

✉ If you would like copies of any of these fact sheets, please call Wendy Anderson at (802) 828-3475.

IT'S RENEWAL TIME AGAIN!

Pesticide applicator certificate and company license renewals will be in the mail by the second week in December. If you haven't received your package by the end of December, please call the Plant Industry Division to request a copy. Private applicators will receive a renewal form only if their exams are expiring at the end of 2003. (Exams remain valid for a 5-year period.)

PLANT INDUSTRY DIVISION PESTICIDE CONTACTS

802-828-2431

<http://www.vermontagriculture/pid.htm>

✉ Phil Benedict - Division Director

- ✉ Robert Achilles - Agricultural Engineer, 828-6510
- ✉ Wendy Anderson - Pesticide Certification and Training Program Coordinator, 828-3475
- ✉ Jeff Comstock - Soil Scientist, 828-3473
- ✉ Bethany Creaser - Plant Industry Field Agent - Northeastern VT, 873-3028
- ✉ Cary Giguere - Pesticide Research and Information Specialist, 828-6531
- ✉ Dominique Golliot - Plant Industry Field Agent - Southwestern VT, 247-0201
- ✉ 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

Home Study Quiz - I: Using and Calibrating a Backpack Sprayer

The following set of questions pertains to the ***Using and Calibrating a Backpack Sprayer*** article on pages 8 - 9. 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. When is it **NOT** necessary to calibrate a backpack sprayer?

2. List 4 important reasons for calibrating backpack sprayers.

3. What are the 3 main parts of a backpack sprayer?

4. If you had a 10-gallon tank and your sprayer delivers 50 gallons per acre (GPA) and you want to apply herbicide at 2 quarts per acre, how much pesticide do you need for a full tank?

5. Why is it necessary for the applicator to calibrate the backpack sprayer herself?

6. What type of nozzle is typically used in band spraying?

7. If your tank was 6 gallons and your sprayer delivers 40 gallons per acre (gpa) and you want to apply fungicide at one (1) pound per acre, how much pesticide do you need for a full tank?

8. How could you check to see if you were delivering an even spray pattern? Why is it important to do this?

9. Why is it important to choose a backpack sprayer with a pressure regulator?

10. What should you do if your sprayer does not have a pressure regulator?

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

Name: _____

Certificate #: _____

Address: _____

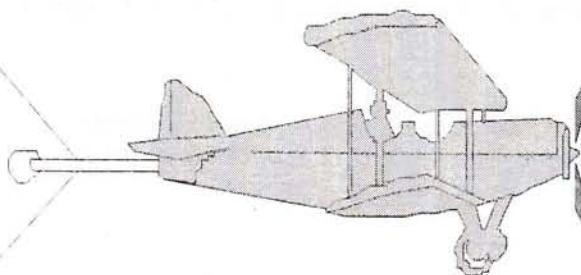
Company/Farm: _____

DATE: _____

Mail to:

Vermont Department of Agriculture
116 State Street, Drawer 20
Montpelier, Vermont 05620-2901

Attn: Wendy Anderson



Home Study Quiz - II: Wear and Use Personal Protective Clothing and Equipment!

The following set of questions pertains to the ***Wear and Use Personal Protective Clothing and Equipment!*** article on pages 10 - 11. 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 are the three ways in which a pesticide can enter the body?
2. What is the most common way in which people are exposed to pesticides?
3. Where would you find label information on what personal protective equipment (PPE) needs to be worn when making a pesticide application?
4. If the pesticide label does not specify what type of protective gloves to wear, what types of gloves should you choose?
5. If you are making an on-the-ground pesticide application, how should your shirt sleeves be worn - **inside or outside of your gloves?** If making an overhead application, how should your shirt sleeves be worn - **inside or outside of your gloves?** What additional precautions should be taken when making an overhead application?

On-the-ground application:

Overhead application:

6. What type of coveralls should be worn if you are working with a pesticide bearing the signal words of "Warning", "Danger", or "Danger/Poison"?
7. If you are making an overhead application of pesticides, what should you wear to protect your head and neck?
8. Why is it dangerous to have your pant legs tucked into your boots when making a pesticide application?
9. Even if a pesticide label only requires you to wear safety glasses, what would be an easy way to increase the amount of protection for your eyes?
10. If you are wearing an air-purifying respirator, and you begin to detect odors or smells, what should you do?

Pesticide Applicator Report

November 2003

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

NONPROFIT U.S. POSTAGE PAID MONTPELIER, VT 05620-2901 PERMIT No.74

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

Name: _____

Certificate #: _____

Address: _____

Company/Farm: _____

DATE: _____