




SAFE | Transport,
Storage and
Disposal of
Pesticides

MICHIGAN STATE
UNIVERSITY
EXTENSION

Adapted for Michigan by:
Rebecca Hines, Pesticide Education Program,
Michigan State University, and
Allen Krizek, MSU Extension,
Michigan Groundwater Stewardship Program



Most accidental pesticide poisonings occur when pesticides are mishandled. Young children are often the victims. Pesticide accidents can be prevented by careful planning, using a secure storage location, adopting safe handling methods during transport, and following proper disposal guidelines for both product and containers.

The first step in preventing accidental poisonings and environmental contamination is to use good judgment when buying pesticides.

- Buy only the amount that can be used in a reasonable length of time.
- Don't be tempted by "sale prices."
- Buy pesticides in quantities that you will use in the near future. Some pesticides should not be stored for long periods of time, allowed to freeze or stored in direct sunlight because they may become less effective.

Always keep pesticides in their original containers. Using any other container is illegal and could cause an accidental pesticide poisoning or harm the environment.

Adapted with permission from *SAFE Transport, Storage and Disposal of Pesticides* written by Clyde L. Ogg, Pesticide Education Specialist, Larry D. Schulze, Extension Pesticide Coordinator, Shripat T. Kamble, Professor of Entomology, and Edward F. Vitzthum, Associate Director of the Water Center, University of Nebraska Cooperative Extension EC 01-2507, University of Nebraska, Lincoln, Nebraska, 2001.

Transporting Pesticides

Certain precautions should be taken when transporting pesticides. Traffic accidents can happen even when you travel only a short distance, and improperly loaded pesticide containers can fall off your vehicle or become punctured or torn. Because pesticides are transported on public roads, the potential damage from such accidents is great.

Never transport pesticides with food, livestock feed or minerals. Also, transport pesticides separately from seed, grain or consumer goods.

Keep a hazardous materials spill kit in your vehicle at all times. A spill kit commonly contains chemical-resistant gloves, coverall and goggles; sorbent pads and absorbent material (such as kitty litter); and a plastic temporary storage container.

In case of a pesticide spill follow the three "Cs": control, contain, and cleanup. **Control** the spill immediately to prevent further spillage. **Contain** the spill. Dike the spill with absorbent material or sorbent pads to keep it out of water and prevent environmental contamination. **Clean up** the spill. Use absorbent material to soak up the spill, then shovel contaminated material into a plastic storage container for disposal. Additional information is available by calling the Michigan Department of Agriculture's Agriculture Pollution Emergency Hotline at 1-800-405-0101.

What Vehicle to Use

The safest way to transport pesticides is in the back of a truck or pickup. Never carry pesticides in the passenger compartment of a vehicle. If you use a flatbed truck, it should have side and tail racks. If the truck has a wooden bed, insert an impervious liner such as plastic or a truck bed liner before loading pesticides. Nonporous beds are preferred because they can be easily decontaminated in case of an accidental spill. Make sure your truck is in good operating condition to help reduce the chance of an accident (see *Vehicle Maintenance Checklist*).

Loading Pesticides

Wear work clothing and chemical-resistant gloves even when handling unopened pesticide containers, in case the container should leak. Also, carry protective clothing and equipment in the passenger compartment of the vehicle. You will need protective equipment if a spill or other pesticide-related accident should occur.

Thoroughly inspect all containers at the time of purchase before loading. Accept them only if the labels are legible and firmly attached. Check all caps, plugs, or bungs and tighten them if necessary. If leakage has occurred, do not accept the container. Request another container.

When loading containers, handle them carefully; don't toss or drop them. Avoid sliding containers over rough surfaces that could rip bags or puncture rigid containers. Know safe handling procedures when using fork lifts. Secure all containers to the truck to prevent load shifts and potential container damage. Protect containers made of paper, cardboard, or similar materials from rain or moisture.

Unloading Pesticides

Never leave pesticides unattended. You are legally responsible if people are accidentally poisoned from pesticides left unattended in your vehicle. Move the pesticides into your storage facility as soon as possible. Inspect the vehicle thoroughly after unloading to determine if any containers were damaged or any pesticide leaked or spilled.



Always carry an emergency spill kit and carefully secure all pesticide containers.

Transporting Hazardous Pesticides

The U.S. Department of Transportation (DOT) has designated many chemical compounds, including some pesticides, as hazardous materials (hazmat). If you transport any of these materials on public roads in commerce you are required to comply with DOT hazmat regulation 49 Code of Federal Regulations (CFR) parts 100-185. To determine which pesticides are classified as hazardous, refer to hazmat tables (HMT) I and II (49 CFR part 172.101). To be in compliance, you may be required to:

- Carry shipping papers in your vehicle: including an emergency response phone number and material safety data sheets (MSDS) for the pesticides in transport;
- Receive training concerning DOT hazmat regulatory requirements;
- Be sure that packages are properly labeled and/or marked;
- Placard your vehicle if transporting a bulk container or 1,000 pounds or more of a pesticide from HMT II or any amount of a pesticide from HMT I and,
- Obtain a Commercial Driver's License (CDL) when required.

Shipping Papers. When you transport any hazardous pesticide, carry the proper shipping papers in the passenger compartment of the vehicle. While you are driving (belted and operating vehicle), the

papers must be within your reach and readily recognizable by emergency personnel or placed in a door pouch. These papers provide information about the chemical that can be used to prevent further damage or injury in case of an accident. Your pesticide dealer will help you obtain the proper papers. Also carry the Material Safety Data Sheet (MSDS) for each hazardous pesticide or an emergency response guidance manual that cross references a chemical's shipping name with emergency response information.

Hazardous Materials (Hazmat) Training. The DOT hazmat training increases your awareness of safety considerations involved in loading, unloading, handling, storing, shipping paper preparation, marking, labeling, placarding, and transportation of hazardous pesticides. It also improves emergency preparedness for responding to transportation accidents. Hazmat training includes general awareness training, function-specific training, and safety training.

DOT Training is Available. The DOT Office of Hazardous Materials Safety has prepared training modules that meet the requirements for general awareness hazmat training. These modules are available on-line (<http://hazmat.dot.gov/mod.htm>) or on an interactive CD-ROM. (For more information, phone: 202-366-2301 or 800-467-4922 ext. 3 or email: training@rspa.dot.gov.) A list of training opportunities for the function-specific and safety training sections is available on-line (<http://hazmat.dot.gov/training.htm>) or can be obtained by contacting the DOT Office of Hazardous Materials Initiatives and Training (Phone: 202-366-4900 or email:

training@rspa.dot.gov). Specialized training is available from the DOT Transportation Safety Institute as well (405-949-0036 ext. 374).

Labeling and Marking. Always check each package (e.g., cardboard box, metal drum) to be sure it is properly labeled and/or marked. Labeling means a prescribed hazard warning notice (usually diamond-shaped) on the outer package. Marking means the required words are written on the side of the outer package including shipping name, identification number, specifications or UN marks, plus other required information, instructions or cautions.

A Accessing the Regulations

Two sources of the hazardous materials regulations are available:

The U.S. Code of Federal Regulations is available on-line at <http://www.access.gpo.gov/nara/cfr/cfr-table-search.html>

The print version is for sale from the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9828. It is published by the "Office of the Federal Register National Archives and Records Administration" as a Special Edition of the Federal Register.

Placarding. For most hazardous pesticides (HMT II) in non-bulk, you will need to placard your vehicle when you transport as little as 1,000 pounds of the chemical. When transporting hazardous pesticides (HMT II) in bulk (over 119 gallons) or any amount from HMT I, placarding is required at all times. Place placards, which are available from your pesticide dealer, on all four sides of your vehicle.

Commercial Driver's License. Contact the hazardous materials coordinator at the Michigan State Patrol (517-336-6605) or the 911 emergency operator for more information on training, shipping papers, labeling, marking, and placarding. For more information on the CDL, contact the Michigan Secretary of State at 517-322-1460 or your local driver's license examiner.

Farmer Exception

Farmers have been granted exceptions from the DOT hazmat regulations, if they are a private motor carrier transporting pesticides within the state of Michigan. Farmers can transport *DOT-defined hazardous pesticides* (other than compressed gases) between fields of the same farm over any roadway EXCEPT the interstate highway system. Farmers also have had emergency response information and hazmat employee training requirements waived when they were transporting agricultural pesticides to or from their farm (within 150 miles of the farm).



Check all shipping containers for proper DOT labeling and marking.

Storing Pesticides

As soon as pesticides arrive at their destination, they should be properly stored and the area immediately secured. This not only helps discourage theft, but also prevents access to the materials by pets, children, and other persons not trained to use pesticides. Always keep personal protective equipment (PPE) and a hazardous material spill kit readily available in or near the pesticide storage area. These include chemical-resistant gloves, coverall and goggles; sorbent pads and absorbent material such as kitty litter; a plastic temporary storage container, and a rated fire extinguisher.

When storing pesticides on shelving, place liquid formulations on lower shelves and dry formulations above them. If a liquid formulation container leaks, the dry formulations will not be contaminated. Keeping the liquid containers on lower shelving also helps reduce the risk of accidental spills if the container is knocked off the shelf.

To prevent contamination or accidental use of the wrong chemical, store herbicides, insecticides and fungicides in separate areas within the storage unit. Dry formulations of insecticides or fungicides can become contaminated if stored with certain volatile herbicides and may cause plant injury when used. Treated baits (for rodents, insects, and birds) should not be stored near other chemicals because they can absorb odors and become repellent to the pest.

Always store pesticides in the original container with the label intact. Once a container is opened, the shelf life is considerably reduced. Never store pesticides, for even a short time, in any container other than the original. **Doing so is a violation of the law.** Pesticides in soft drink bottles, fruit jars, milk cartons, margarine tubs or glasses are a common cause of accidental poisonings. Store pesticides away from food, pet food, feed, seed, fertilizers, veterinary supplies and plants.

Check all stored pesticide containers (see *Pesticide Storage Checklist*) for any existing or potential problems, including leaks or spills. Transfer the contents of any leaking container into a container with exactly the same original formulation and label. When this is not possible, put the leaking container with the pesticide into a liquid-proof container and dispose of it at a Clean Sweep site as discussed under disposal of excess pesticides, page 9. If necessary, contact either the pesticide manufacturer or CHEMTREC (800-424-9300) for specific directions.

The pesticide storage location should be a cool, dry, well-ventilated area away from sources of heat or flame. See the pesticide label for specific storage recommendations. Some pesticides can be reduced in effectiveness if they are frozen or overheated. Expansion of pesticides caused by freezing or heating can cause containers to crack or break, resulting in potentially dangerous leaks or spills. Heat expansion of a liquid pesticide also may result in contents that are under pressure. When the container is opened, the pressure may cause an overflow and/or contamination of the user or storage site. Excessively high temperatures (120° F or higher) can also change the effectiveness of a pesticide and may produce dangerous fumes, making the storage area unsafe.

To prepare for pesticide applications, remove the pesticide containers from storage and take them to an open area. Always measure and mix pesticides in a well-lit, well-ventilated location. Regardless of whether they are partially or completely emptied, never leave pesticide containers open or unattended while the pesticide is being applied. Return all containers to storage prior to application to prevent accidental spills, ingestion, or exposure to people, pets, livestock or wildlife.

Mixing and applying pesticides requires detailed attention to label instructions, along with common sense and good judgment. So, too, does pesticide storage. **Being careless or using improper storage procedures is an open invitation to disaster.** While all pesticide labels have a section on their storage and disposal, the guidelines do not answer every question. If you have questions on pesticide storage, contact your local Michigan State University county Extension office.

Be Prepared for Pesticide Spills

Despite all safety precautions, accidents can happen. If a pesticide spills in a storage area, quick action is imperative. **Have a pesticide spill kit on hand** (similar to the hazardous pesticide spill kit described earlier). If a pesticide spill occurs on a public right-of-way, contact the Michigan Department of Agriculture's Agriculture Pollution Emergency Hotline at 1-800-405-0101.

If a pesticide is spilled on a person's body or clothing, the person should leave the area immediately. All contaminated clothing should be removed as

quickly as possible — this is no time for modesty! Wash affected areas of the body thoroughly with detergent or soap and water. In any pesticide contamination incident, follow the instructions given in the label's first-aid treatment guidelines. If the label is not available or if there are further questions, seek medical attention. If necessary, contact Poison Control at 1-800-222-1222.

If toxic fumes are present at the spill site, evacuate persons and animals from the immediate area. In addition, secure the area until qualified rescue personnel, with proper protective equipment, arrive at the scene. Except for a small, properly equipped cleanup crew, don't allow anyone to enter the area until it is thoroughly decontaminated.

Spilled pesticides must be contained. If the pesticide starts to spread, contain it by diking with soil or sorbent materials, if this can be done safely without contacting the pesticide or breathing the fumes. Never hose down a contaminated area. This will cause the pesticide to spread and infiltrate into the soil, possibly reaching ground water. If the spill is liquid, use activated charcoal, absorptive clay, vermiculite, pet litter, or sawdust to cover the entire spill area. Sufficient absorbing materials should be used to completely soak up the liquid. The material then should be swept or shoveled into a leakproof drum. Dispose of this material as you would the pesticide involved.

Always refer to the product label and, if necessary, contact either the Michigan Department of Agriculture's Agriculture Pollution Emergency Hotline at 1-800-405-0101 or the chemical manufacturer for information about the appropriate neutralizing materials to be used following a pesticide spill. As a precaution, it is wise to read all product labels thoroughly at the time of purchase and/or delivery to be able to deal quickly and safely with any pesticide emergency.

Pesticide Storage and Spill Reporting

The Superfund Amendments and Reauthorization Act (SARA) amended the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). One part of the provisions, the Community Right-to-Know Act (Title III), established new lists

of "Extremely Hazardous Substances" (EHS) and "Toxic Chemicals" for additional notification and reporting requirements. It also added new reporting requirements for the CERCLA list of "hazardous substances." Michigan State University Extension Bulletin E-2575, Emergency Planning for the Farm, helps farmers comply with SARA Title III.

SARA Title III established threshold planning quantities (TPQ). Any facility that produces, uses or stores these Extremely Hazardous Substances (EHS) in amounts equal to or in excess of the threshold planning quantities has reporting and notification obligations under section 302 of SARA Title III (40 CFR Part 355). If the facility produces, uses or stores hazardous chemicals or Extremely Hazardous Substances exceeding the designated amounts (10,000 pounds for hazardous chemicals and either 500 pounds or the threshold planning quantities, whichever is lower, for Extremely Hazardous Substances), they must submit specific information to state and local officials as defined in sections 311 and 312 of the Act (40 CFR 370).

In addition, owners and operators of most business facilities must report spills or releases of CERCLA hazardous substances and Extremely Hazardous Substances to state and local authorities (section 304, 40 CFR 355). If the spill occurs while in transport, the notification can be made either by the owner or the operator of the motor vehicle. Report spills and releases to the Michigan State Patrol (517-336-6605) or the 911 emergency operator.

Pesticide Storage Site Selection

Several points must be considered when selecting the site for pesticide storage. One of these factors is well location. Pesticide storage sites must have an isolation distance of 150 feet from wells and 200 feet from surface water (Michigan Clean Water Act). Locating storage facilities away from dwellings and livestock facilities will minimize possible contamination.

The site also should be in an area where flooding is unlikely. It should be where runoff can be diverted and drainage from the site cannot contaminate surface or ground water.

The drainage system for a pesticide storage facility must not be connected to the wastewater sewer or septic tank. Pesticides that may be present in tank rinsate, spills, seepage from storage, and heavy runoff must be controlled in the event of fire or flooding. Dikes, collecting pools, and washing slabs with sumps provide a proper drainage system. All of the collected runoff water should be treated as a surplus pesticide and disposed of properly.

Storage Area

Depending on inventory size, a separate building, room or enclosure may be best for pesticide storage. If the inventory is not large enough to warrant a separate facility, enclose the storage area on the first floor of an existing building. In either case, store pesticides and pesticide containers in a fire-resistant structure having good ventilation and a sealed, concrete floor that drains into secondary containment.

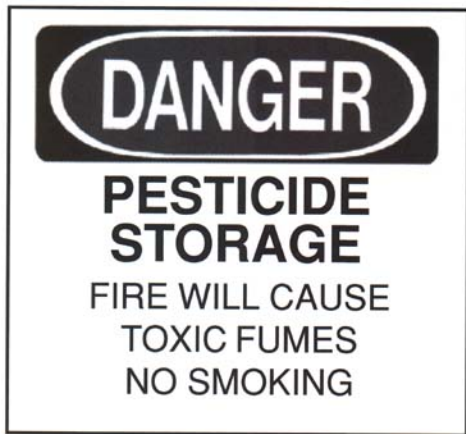
Weatherproof signs, stating "Danger - Pesticides - Keep Out - No Smoking" or a similar warning, should be posted on each door and in any windows of the facility. In some cases, it may be advisable to post the warning signs in one or more languages in addition to

English. The name, address, and phone number of an emergency contact person also should be posted at the primary entrance of the storage area. Regardless of whether it is a cabinet, room or an entire building, the pesticide storage area should be lockable to prevent unauthorized entry and should only be used for pesticides and pesticide equipment.

An electrically shielded exhaust fan may be needed in a confined storage area to reduce the temperature and concentrations of toxic fumes. The fan should be installed so that fumes can be vented outdoors without endangering people, animals, or plants in the area.

Whenever large quantities of pesticides must be stored, it is strongly recommended that fire detection sensors and fire-fighting equipment be provided. It is also a good idea to provide the local emergency response coordinator with a floor plan, records related to the storage location, and an annual inventory of the pesticides and containers in storage.

Wooden pallets or metal shelves must be provided for storing granular and dry formulations packaged in sacks, fiber drums, boxes or other water-permeable containers. If metal pesticide containers are stored for a prolonged period, they should be placed on pallets, rather than directly on the floor, to help reduce potential corrosion and leakage.



Danger! Pesticide storage sign.

Disposing of Excess Pesticides and Pesticide Containers

Despite one's best efforts to avoid accumulating excess pesticides, it is sometimes necessary to dispose of leftover chemicals. And, occasionally it may be necessary to dispose of pesticide wastes, such as materials collected while cleaning up a spill. Pesticide wastes are as hazardous as the pesticide itself. These guidelines should be followed in handling both excess pesticides and pesticide wastes.

In addition, empty pesticide containers need to be disposed of properly. Empty containers that have been properly rinsed may be recycled. Other containers are refillable and may be returned to the supplier unrinsed. Empty containers that have been properly rinsed may be disposed of in a sanitary landfill if allowed by state and local laws. In Michigan, it is illegal to burn pesticide containers on site.

Types of Pesticide Containers

There are several types of pesticide containers. A common agricultural pesticide container is the 2.5 gallon plastic jug. Many liquid agricultural pesticides are also sold in bulk containers (mini-bulks, shuttles, shuttle juniors, etc.) that are intended to be returned and reused by the supplier. Liquid, dry, and granular pesticides are often sold in various sizes of plastic containers and some granular pesticides are sold in bags. Another type of pesticide container is the pressurized can, which is commonly used for indoor pesticides.

Some containers are designed to be returned to the supplier upon emptying without rinsing. These containers are commonly referred to as "refillables". Refillable containers must not have the seal broken or the container opened. They should never be rinsed.

Removing Pesticide Residues From Nonrefillable Liquid Containers

Proper rinsing of nonrefillable liquid pesticide containers is easy to do, saves money, is required by state and federal regulations, and is a good, sound management practice that helps protect the environment. Even during a busy season, the few extra min-

utes it takes to properly rinse empty pesticide containers is time well spent. Here are some rinsing guidelines:

Unless the container is rinsed immediately, the remaining residue may dry and become difficult to remove. An unrinsed pesticide container is typically considered hazardous waste, but once rinsed, the same container is usually considered solid waste. Rinsing containers also removes a potential source of pesticide exposure to people, pets, livestock, wildlife, and the environment.

The rinse solution (rinsate) should be added directly into the sprayer tank. This action eliminates the need to store and later dispose of the rinsate.

Proper Rinsing

Two commonly used procedures are effective for properly rinsing nonrefillable liquid pesticide containers: pressure-rinsing and triple-rinsing.



Pressure-rinsing a pesticide container.

Pressure-rinsing

Pressure-rinsing is usually faster and easier than triple-rinsing. A special nozzle, generally available from your pesticide supplier, is attached to the end of a pressure hose and used to wash the remaining pesticide from the container. The hydrant or water source should have an anti-siphon valve or a back-flow protection device attached.

1. Remove cap from the pesticide container. Empty pesticide into the spray tank and allow the container to drain for 30 seconds.
2. Insert the pressure-rinser nozzle by puncturing through the lower side (not the bottom) of the pesticide container.
3. Hold the pesticide container upside down over the spray tank opening so rinsate will run into the spray tank.
4. Rinse for length of time recommended by the manufacturer (usually 30 seconds or more). Rotate the nozzle to rinse all inside surfaces.
5. Rinse caps in a bucket of water for at least one minute and pour this rinse water into the spray tank.
6. Return container to supplier or pesticide container recycling site or dispose of the pesticide container according to label directions. Plastic caps and containers are usually made from different materials, and often are recycled separately. For more information on pesticide container recycling sites, contact your local Michigan State University Extension office.

Triple-rinsing

Triple-rinsing can be done as follows:

1. Remove cap from the pesticide container. Empty all remaining pesticide into the spray tank, allowing the container to drain for 30 seconds.
2. Fill the container 20% full of water or rinse solution (i.e., fertilizer solution).
3. Secure the pesticide container cap.
4. Swirl the liquid within the container to rinse all inside surfaces.
5. Remove the cap from the container. Add the rinsate from the pesticide container to spray tank and allow to drain for 30 seconds or more.
6. Repeat steps 2 through 5 **two more times**.
7. Return container to supplier or pesticide container recycling site or dispose of the pesticide container according to label directions. Plastic caps and containers are usually made from different materials and usually are recycled separately. For more information on pesticide container recycling sites, contact your local Michigan State University Extension office.

When Rinsing is not Possible

It is not possible in certain situations to triple- or pressure-rinse pesticide containers. Thorough removal of the pesticide material packaged in bags or pressurized cans may be done as follows:

Bags

1. Empty bag contents into spray tank.
2. Shake the bag to remove as much product as possible.
3. Cut the sides and folds of the bag to allow it to fully open; add remaining product to the tank.
4. Dispose of the empty bag in a sanitary landfill if allowed by state and local laws/regulations. Some labels may allow alternate disposal methods.

Pressurized cans

1. Spray any remaining contents according to label instructions. Be sure to use it on the proper site and to use it at the correct rate, as listed on the label.
2. Dispose of the empty container according to label directions in a sanitary landfill or recycle the container following state and local laws and regulations.

Excess Pesticide Waste Disposal

The best way to dispose of small amounts of pesticide is to apply it to a label-permitted site (specific plant, animal, structure) for which the product is registered. Always double check the product label to be certain that the site is listed and that the maximum application rate will not be exceeded.

Large quantities of stored excess pesticides may be hazardous. When disposing of large quantities of such materials, contact the Michigan Clean Sweep Program at (517) 355-6529 for specific disposal instructions.

The Michigan Department of Agriculture occasionally sponsors disposal programs for excess or unwanted pesticides.

Preventing accidental poisonings and damage to the environment requires pesticides to be transported, stored, and disposed of in a safe manner. Read and follow the label carefully. It tells you how to use pesticides, provides information about special hazards and gives proper storage and disposal methods.

Vehicle Maintenance Checklist

Cab Interior

- Clean cab—no food wrappers or trash
- Extra change of clothes
- Post emergency phone numbers:
Poison Center — 800-222-1222
(for aid in human poisonings)
- MDA Agriculture Pollution
Emergency Hotline — 800-405-0101
(for help involving spills, leaks and fires)
- Michigan State Patrol — 517-336-6605
(to report vehicle accidents)
- Record of on-board pesticides
- Label and MSDS available
- First aid kit
- Pesticides NOT stored in cab
- Pesticide application equipment NOT present

On-board Pesticide Containers

- Lockable pesticide storage compartment
- Containers properly sealed and secured
- Legible labels on all containers
- Keep pesticides in original containers
- Adequate amount of pesticides for day's use
- Empty containers properly rinsed and positioned
for removal at end of day. **Never reuse
pesticide containers!**

Spill Control

- Absorbent materials and rags on board
- Shovel, broom, plastic bags on board
- Hazardous materials spill kit

Equipment Check

- Sprayers NOT pressurized
- Supplies in moisture-proof containers
- Lids fit securely on pesticide tanks
- Spray hoses and fittings in good condition
- Pressure gauges operable
- All application equipment cleaned
- Water containers labeled

Personal Protective Equipment

- Goggles or other eye protection
- Chemical resistant gloves
- Boots, apron, hat—if required by label
- Respirator—stored in sealed plastic bag
- Other—as directed by the label

Tires

- Proper pressure
- Tread wear acceptable
- No cuts and cracks
- Spare tire inflated properly

Lights

- High beam headlights
- Low beam headlights
- Turn signals
- Running lights
- Emergency flashers
- Tail lights
- Brake lights
- Backup lights

Wipers

- Wiper blades in good condition
- Washer fluid dispenser filled
- Washer fluid pump in working order

General Vehicle Maintenance

- Horn in good working order
- Seat belts in good working order
- Brakes in good working order
- Windshield free of obstructions
- Truck bed free of debris

Vehicle ID _____

Notes _____

Inspected by _____

Date _____

Pesticide Storage Checklist

Safety is the key in proper pesticide storage. If you answer "no" to any of the statements below, you should correct your storage facility immediately.

Enter date of each inspection: _____

	Yes	No	Yes	No	Yes	No
General Information						
Clean, neat pesticide storage site	_____	_____	_____	_____	_____	_____
Current, on-site pesticide inventory	_____	_____	_____	_____	_____	_____
Emergency phone numbers posted	_____	_____	_____	_____	_____	_____
Labels and MSDS available	_____	_____	_____	_____	_____	_____
Accurate storage inspection log maintained	_____	_____	_____	_____	_____	_____
Pesticide Containers						
Containers marked with purchase date	_____	_____	_____	_____	_____	_____
Insecticides, herbicides, and fungicides segregated	_____	_____	_____	_____	_____	_____
Pesticides stored in original containers	_____	_____	_____	_____	_____	_____
Dry formulations stored on pallets	_____	_____	_____	_____	_____	_____
Feeds stored separately from pesticides	_____	_____	_____	_____	_____	_____
Used containers rinsed and drained	_____	_____	_____	_____	_____	_____
Rinsed and unrinsed containers separated	_____	_____	_____	_____	_____	_____
Liquid formulations stored below dry formulations	_____	_____	_____	_____	_____	_____
Spills and Disposal						
Storage area free of spills or leaks	_____	_____	_____	_____	_____	_____
Shovel and absorbent materials available	_____	_____	_____	_____	_____	_____
Sealed Floors	_____	_____	_____	_____	_____	_____
Floor drains closed off (if present)	_____	_____	_____	_____	_____	_____
Curb or secondary containment	_____	_____	_____	_____	_____	_____
Safety Information						
No smoking signs posted	_____	_____	_____	_____	_____	_____
Personal protective equipment available	_____	_____	_____	_____	_____	_____
Fire extinguisher in good working order	_____	_____	_____	_____	_____	_____
Storage room locked, limited access to keys	_____	_____	_____	_____	_____	_____
Storage room posted: <i>Pesticides — Keep Out!</i>	_____	_____	_____	_____	_____	_____
Storage site well lit and ventilated	_____	_____	_____	_____	_____	_____

Adapted from *Pesticides and Commercial Vehicle Maintenance*, Purdue University.

Mapping Your Farmstead

Complete two maps for each site (farmstead site and aerial)

1. Map the farmstead site (or other part of the farm where chemicals are stored) and label all of the following:

◆ Buildings/structures location

Barns, houses, shops, outbuildings, silos, grain bins, manure storage/pits, etc. Indicate sizes and locations of doors.

◆ Land features

Roads and crossroads, driveways and lanes, fences and gates. Wells and/or municipal water supply, hydrants, ponds, streams, rivers, lakes, and wetlands.
Septic tanks, wastewater systems, cisterns. Drainage ditches, culverts, surface drains. Slope of land (drainage direction).

◆ Chemical/fertilizer storage

Identify where chemicals and fertilizers are stored.

◆ Fire concerns

Use these symbols to show location for each building, also.

G Main gas shutoff

E Main electrical shutoff

AST Aboveground fuel storage tank

UST Underground fuel storage tank

LP Liquid propane

CG Compressed gas (oxygen, acetylene)

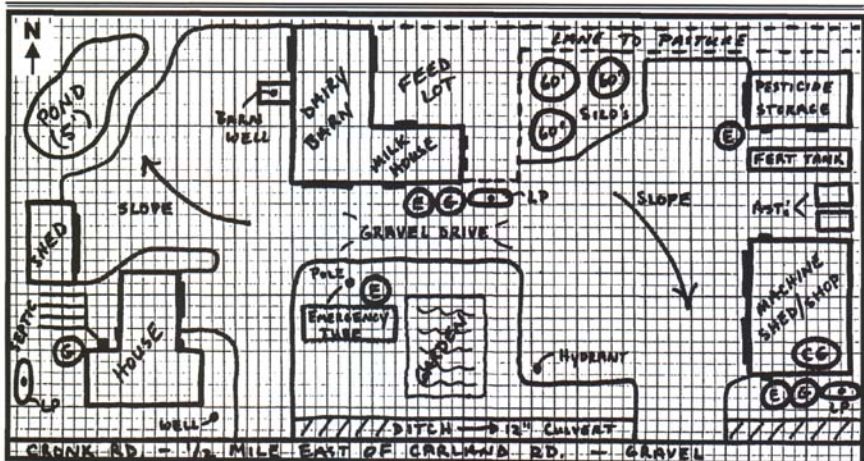
◆ Livestock or special concerns

◆ Michigan Emergency Tube site

2. Aerial view map

Identify nearby off-property buildings, land uses and sensitive areas (e.g., churches, parks, day cares, etc).

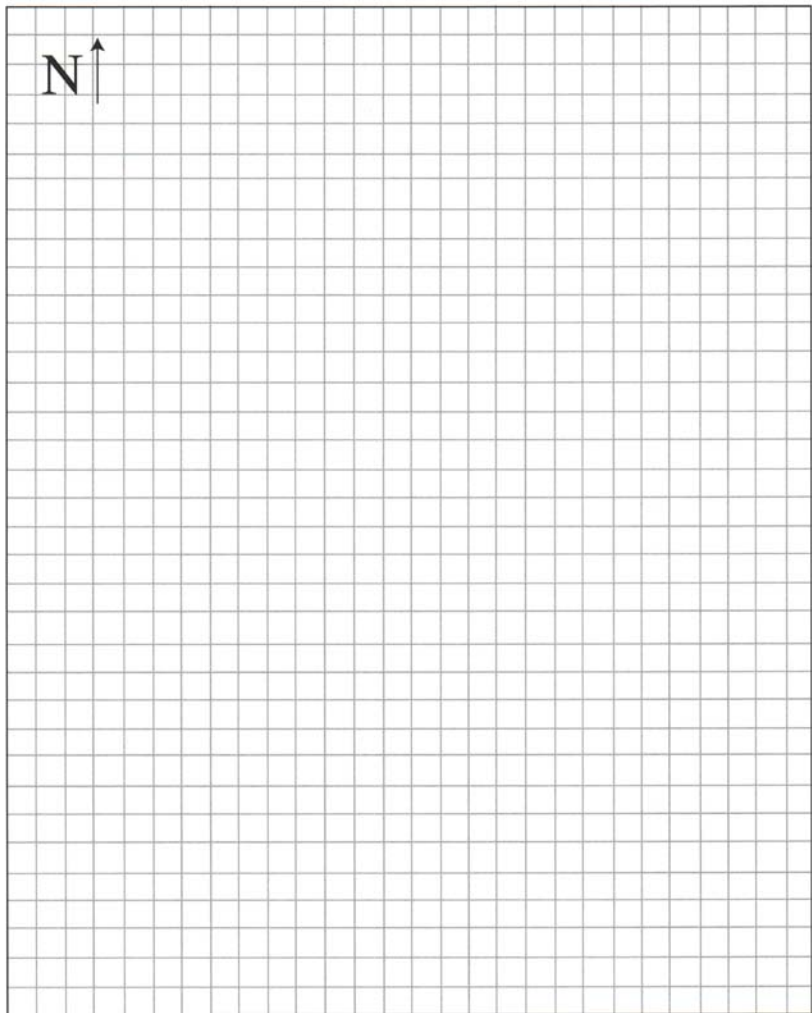
Farmstead site example:



Farmstead site map

Date: _____

Site address: _____





PESTICIDE EMERGENCY INFORMATION

For any type of an emergency involving a pesticide, immediately contact the following emergency information centers for assistance.
Current as of February 2002



Human Pesticide Poisoning

POISON CONTROL

From anywhere in the United States, call

1 - 8 0 0 - 2 2 2 - 1 2 2 2

Special Pesticide Emergencies

Animal Poisoning

Your veterinarian:

Phone No.

or

Animal Health Diagnostic
Laboratory (Toxicology)
Michigan State University:
(517) 355-0281

Pesticide Fire

Local fire department:

Phone No.

and

Fire Marshal Division,
Michigan State Police:
M-F: 8-12, 1-5
(517) 322-1924

Traffic Accident

Local police department or
sheriff's department:

Phone No.

and

Operations Division,
Michigan State Police:
***(517) 336-6605**

Environmental Pollution

District Michigan
Department of
Environmental Quality
(MDEQ) Office Phone No.

Phone No.

and

MDEQ Pollution
Emergency Alerting
System (PEAS):
***1-800-292-4706**
also

***1-800-405-0101**

Michigan Department of
Agriculture Spill Response

Pesticide Disposal Information

Michigan Clean Sweep, Michigan
Department of Agriculture Environmental
Stewardship Division.
Monday - Friday: 8 a.m.-5 p.m.
(517) 335-6529

National Pesticide Information Center

Provides advice on recognizing
and managing pesticide poisoning,
toxicology, general pesticide
information and emergency response
assistance. Funded by EPA, based at
Oregon State University
7 days a week; excluding holidays
6:30 a.m.-4:30 p.m. Pacific Time Zone
1-800-858-7378
FAX: 1-541-737-0761

* Telephone Number Operated 24 Hours

A Cornell Cooperative Extension Publication

Insert to Information Bulletin 207

2001 Pest Management Guide for the Production and Maintenance of Herbaceous Perennials

The information contained in this bulletin was developed for use in another state. It may contain recommendations for pesticides that are not registered for use in Michigan or practices that are not recommended for use in Michigan. Always consult the label before using any pesticide. If you are unsure about whether a recommended treatment is appropriate, contact your county Extension agent. If you need information about whether a recommended pesticide is registered in Michigan, consult the Michigan Department of Agriculture Pesticide Division at: (517) 373-1087.

Every effort has been made to provide correct, complete, and up-to-date pest management information for New York State in this publication, which was released for printing December 2000. Changes in pesticide registrations, regulations, and guidelines that occur after publication are regularly available in county Cornell Cooperative Extension offices and from the Pesticide Management Education Program web site, <http://pmep.cce.cornell.edu>. A revision of the printed document is issued annually.

These guidelines are not a substitute for pesticide labeling. Read the label before applying any pesticide.

CONTENTS

	Page
Pesticide Information	1
Tables	
1. Selected diseases and effective controls	3
2. Fungicides for control of diseases of herbaceous perennials	4
3. Preplant nematicides/soil sterilants for use in ornamentals production	9
4. Trade names, common names, formulations, and EPA registration numbers for fungicides and nematicides used on herbaceous perennials and listed in this publication	10
5. Pesticides registered for control of specific insect and mite pests	11
6. Insecticides for control of insect and mite pests of perennials	23

The following information, presented in tabular form for easy reference, is intended to provide growers with information on the fungicides, nematocides, insecticides, and miticides currently registered for application to herbaceous perennials. For an understanding of how to use cultural (nonchemical) methods for the suppression of pests affecting herbaceous perennials, the reader is referred to the publication *Herbaceous Perennials: Diseases and Insect Pests*, 1601B207.

PESTICIDE INFORMATION

Use Pesticides Safely

All pesticides are regulated by state and federal laws to protect the user and consumer. Read labels carefully. Follow instructions.

Most pesticides are poisonous to humans and animals, but when properly used, they are not harmful. Handle them with care. Store them in closed, plainly labeled original containers, out of the reach of children and animals. Keep pesticides in locked storage facilities.

When handling, do not allow pesticides to come in contact with the skin. Do not apply on a windy day. Do not smoke while handling pesticides. Do not inhale dusts, sprays, or vapors. After handling pesticides, wash hands and face before eating or smoking.

To avoid accidental injury to susceptible plants, avoid drift of sprays and dusts. Use separate equipment for applying hormone-type herbicides such as 2,4-D.

Dispose of empty containers so that children cannot play with them.

Please refer to New York State Department of Environmental Conservation circular 865, part 325, *Rules and Regulations Relating to the Application of Pesticides*, for further information relating to the use of pesticides in New York State.

Protecting Honey Bees from Insecticides

Honey bees, wild bees, and other insects are important for proper pollination of many vegetables. Vine crops, for example, must be pollinated because they have male and female flowers, and pollen must be transferred from the male to female flowers if fruit is to set. Poor pollination results in small or odd-shaped fruit as well as low yields. Each flower must be visited eight or more times for adequate pollination to occur.

To avoid harming bees with insecticide treatments, remember these points: do not spray crops in bloom; mow blooming weeds before treatment or spray when the blossoms are closed; avoid application during the time of day when field bees are most numerous; make application in the early morning or evening; and always read the label before use.

If pesticides that are highly toxic to bees are used in strict accordance with label directions, little or no harm should be done to bees. Label statements on pesticides that are highly toxic to honey bees may carry a caution statement such as the following: "This product is highly toxic to bees exposed to direct treatment or residues on crops or weeds. Do not apply or allow to drift to weeds in bloom on which an economically

significant number of bees are actively foraging. Protective information can be obtained from your Cooperative Extension Service."

Pesticide Control Legislation

In accordance with New York State legislation, pesticides that are highly toxic or that are persistent and accumulative are placed on a restricted-use list and may be sold to and used only by certified applicators. Restricted-use pesticides recommended in this publication are identified by an asterisk (*). The list is subject to annual review; consult your Cornell Cooperative Extension agent if you have questions about the status of a pesticide.

CERTIFICATION: Commercial applicators of pesticides as well as private applicators who use restricted-use pesticides must be certified. Certification exams and recertification credits are given throughout the state; consult your Cornell Cooperative Extension agent or regional pesticide specialist if you have questions concerning certification.

Pesticide Recordkeeping/Reporting for New York State

Manufacturers and importers. Requires annual reports from manufacturers and importers of all sales within the state of each restricted-use pesticide product, including EPA registration number; container size; and number of containers sold to New York purchasers. Records would have to be maintained for at least three years.

Commercial applicators. Requires annual reports from commercial applicators of pesticide use, including EPA registration number; product name; quantity of pesticide used; date applied; and location of application by address, including 5-digit zip code. Records would be maintained for at least three years and would also include the dosage rates, methods of application and target organisms.

Reporting at point of sale. Requires every person who sells or offers for sale restricted-use pesticides to private applicators to report annually each sale of a restricted-use pesticide or general-use pesticide used in agricultural crop production to such applicator, including EPA registration number; product name of pesticide purchased; quantity purchased; date purchased; and location of intended application by address, including 5-digit zip code, or if address is unavailable, by township and 5-digit zip code.

Recordkeeping by private applicators. Requires private applicators to maintain, for a minimum of three years, restricted-use pesticide records, including pesticide purchased; crop treated; method and date of application.

For more information, contact the NYS Department of Environmental Conservation (518-457-3542).

EPA Worker Protection Standard (WPS) for Agricultural Pesticides

The Worker Protection Standard contains requirements designed to reduce the risks of illness or injury resulting from occupational exposures to pesticide handlers and agricultural workers. Accidental exposure of agricultural workers and other persons to pesticides used in the production of agricultural plants on farms, nurseries, greenhouses, and forests are included under these regulations. They include the following:

- Restricted-entry intervals (REIs) for most pesticides
- Personal protective equipment (PPE) for handlers and early-entry workers
- Decontamination supplies and emergency assistance
- Pesticide safety training and posting
- Revised labeling that includes specific WPS instructions

For more complete information on reentry and farmworker protection standards, please contact your local Cornell Cooperative Extension office or the Pesticide Management Education Program, 5123 Comstock Hall, Cornell University, Ithaca, NY 14853, 607-255-1866, web site: <http://pmep.cce.cornell.edu>.

FIFRA 2(ee) Recommendations

Certain limited variations from the use directions specified on pesticide labels are authorized under FIFRA Section 2(ee).

These "2(ee) recommendations" allow

1. Use at any dosage, concentration, or frequency less than specified on the labeling.
2. Use against any target pest not specified on the labeling.
3. Methods of application not prohibited on the labeling.
4. Mixtures with fertilizer, unless prohibited on the labeling.

In New York State, all 2(ee) recommendations must be approved in writing by the New York State Department of Environmental Conservation with the exception of those pesticides applied for agricultural purposes at less than label rate and mixtures with fertilizer (item 4 above).

No fee is required for a request for a 2(ee) recommendation. Requirements:

1. Anyone receiving approval of a 2(ee) recommendation is responsible for distributing the recommendation to **all users of the product pursuant to the approved recommendation.**

2. Any user must have the 2(ee) recommendation in his or her possession at the time of application, e.g., "Cornell Guidelines."

Information required for submission of 2(ee) recommendations:

1. Requests for approval of 2(ee) recommendations must be made in writing by recognized research institutions, certified crop advisers, manufacturers (registrants), or organizations representing individual users. Individual users may **not** request approval of 2(ee) recommendations.
2. Requests must be accompanied by data demonstrating that the use will be effective.

Trade names used herein are for convenience only. No endorsement of products is intended, nor is criticism of unnamed products implied.

The 2001 *Pest Management Guide for the Production and Maintenance of Herbaceous Perennials* was prepared by K. C. Bennett and John P. Sanderson, Department of Entomology; and Margery L. Daughtrey, Department of Plant Pathology.

Abbreviations Used in This Publication

A = acre	W = wettable
AI = active ingredient	WDG = water dispersible granules
D = dust	WP = wettable powder
DF = dry flowable	* = restricted-use
DG = dispersible granule	pesticide; may be purchased and used only by certified applicators
E = emulsion, emulsifiable concentrate	# = 2(ee) recommendation based on an efficacy statement
F = flowable	## = 2(ee) recommendation based on quantitative efficacy data
G = granular	
L = liquid	
P = pellets	
S = soluble	
SP = soluble powder	
ULV = ultra-low volume	

Table 1. Selected diseases and effective controls

<i>Problem</i>	<i>Effective materials^a</i>
bacterial blight, leaf spots	copper hydroxide, copper hydroxide plus mancozeb, copper salts of fatty and rosin acids, copper sulphate pentahydrate
Botrytis	azoxystrobin, chlorothalonil+, chlorothalonil plus thiophanate-methyl, copper hydroxide, copper hydroxide plus mancozeb, copper sulphate pentahydrate, fludioxonil, iprodione, mancozeb, mancozeb plus thiophanate-methyl, maneb with zinc, thiophanate-methyl+, vinclozolin
damping-off	A: Rhizoctonia: azoxystrobin, etridiazole plus thiophanate-methyl, fludioxonil, iprodione, mefenoxam, PCNB, thiophanate-methyl+, triflumizole B: Pythium: etridiazole, etridiazole plus thiophanate-methyl, metalaxyl
downy mildew	azoxystrobin, copper hydroxide, copper hydroxide plus mancozeb, fosetyl-Al+, mancozeb, mancozeb plus thiophanate-methyl
leaf spots (fungal)	azoxystrobin, chlorothalonil+, chlorothalonil plus thiophanate-methyl, copper hydroxide, copper hydroxide plus mancozeb, copper salts of fatty and rosin acids, fludioxonil, mancozeb, maneb with zinc, myclobutanil, thiophanate-methyl+, triadimefon+, triflumizole
nematodes	*chloropicrin, *dazomet, metam-sodium, *methyl bromide with *chloropicrin
powdery mildew	azoxystrobin, chlorothalonil+, chlorothalonil plus thiophanate-methyl, cinnamaldehyde, copper sulfate pentahydrate, fenarimol, horticultural oil, hydrogen dioxide, kresoxim-methyl, mancozeb plus thiophanate-methyl, myclobutanil, neem oil, piperalin, propiconazole, thiophanate-methyl+, triflumizole, triadimefon+
root and stem rots	A: Rhizoctonia and Sclerotinia: azoxystrobin, etridiazole plus thiophanate-methyl, fludioxonil, iprodione, mancozeb plus thiophanate-methyl, PCNB, thiophanate-methyl+, triflumizole, vinclozolin B: Pythium and Phytophthora: etridiazole, etridiazole plus thiophanate-methyl, fosetyl-Al+, mefenoxam, metalaxyl, propamocarb
rust	azoxystrobin, chlorothalonil+, chlorothalonil plus thiophanate-methyl, mancozeb, maneb with zinc, myclobutanil, propiconazole, triadimefon+

^a Restricted-use material, to be applied by certified applicator only.

+ Proprietary products containing the active ingredient are available for homeowner use.

* Common names; see Table 2 for products with these active ingredients and information regarding formulation, application, and the crop uses for which the material is registered.

Table 2. Fungicides for control of diseases of herbaceous perennials

<i>Common name</i>	<i>Commercial application information</i>	<i>Effective against</i>	<i>REI</i>
azoxystrobin	Spray Heritage 50W at 1–4 oz./100 gal. Repeat in 7–28 days.	Alternaria, anthracnose, Botrytis blight, Cladosporium leaf spot, downy mildew, Fusarium spp., iris leaf spot, Phytophthora shoot blight, powdery mildew, rust, Rhizoctonia, Sclerotium rolfii	12
Conduct small-scale tests for species not mentioned on label.			
chlorothalonil+	Spray PathGuard 90DF using 0.8 lb./100 gal., or use PathGuard 6DF at 1 3/8 pt./100 gal. Use 20–150 gal. spray per acre. Repeat at 7- to 14-day intervals.	Alternaria, anthracnose, Botrytis, Cercospora, Cercosporidium, Curvularia, Didymellina, Fusarium, Mycosphaerella, Phyllosticta, Phytophthora leaf blight, powdery mildew, Ramularia, Rhizopus, Rhizoctonia web blight, rusts, Sclerotinia, Septoria, Stagonospora	12
Registered for use in greenhouse and field on carnation, chrysanthemum, crocus, daffodil, daisy, geranium, gladiolus, hollyhock, hydrangea, iris, lily, narcissus, phlox, statice, and tulip			
chlorothalonil+	Spray 2 pt. Daconil 2787F/100 gal. or 1 1/2 lb. Daconil 2787 75% WP or 1 1/4 lb. Daconil 2787 90% WDG or 1 1/4 lb. Daconil Ultrex 82.5%/100 gal. or 1 1/4 pt. Daconil Weather Stik Flowable Fungicide 54EC/100 gal. at 7- to 14-day intervals.	Botrytis, Alternaria, Cercospora, Curvularia, Volutella, Septoria and Didymellina leaf spots, Mycosphaerella ray blight, rust, anthracnose, Rhizoctonia web blight, powdery mildew	48
Registered for use on chrysanthemum, daisy, gladiolus, gypsophila, hollyhock, iris, lily, pachysandra, phlox, statice, and tulip			
chlorothalonil plus thiophanate-methyl	Apply Spectro 90WDG according to label.	Alternaria, anthracnose, Ascochyta, Botrytis, Cercospora, Didymellina, Phytophthora blight, powdery mildew, Ramularia, Rhizoctonia web blight, rust, Septoria	24
Registered for use on aster, carnation, chrysanthemum, daffodil, daisy, gladiolus, gypsophila, iris, lily, narcissus, pansy, phlox, statice, and tulip			
cinnamaldehyde	Spray Cinnamite at 64–100 fl. oz./100 gal.	Powdery mildew	4
Registered for use on greenhouse- and field-grown flowers.			
copper hydroxide	Spray 1.0 lb. Champion 77% WP/100 gal. Repeat in 7–14 days as needed.	Botrytis, Septoria leaf spot	48
Registered for use on chrysanthemum			
copper hydroxide	Spray 0.75 lb. Kocide 2000 T/N/O per 100 gal. Repeat in 7–14 days as needed.	Alternaria leaf spot, bacterial spot, Botrytis, Cercospora, downy mildew, Septoria	48
Crops listed on the label include chrysanthemum, dahlia, dianthus, echinacea, gladiolus, iris, pansy, peony, plantain lily (hosta), and verbena. Label cautions grower to conduct small-scale tests on other ornamentals not listed on the label for signs of phytotoxicity before commercial use.			
copper hydroxide plus mancozeb	Spray 1.5 lb. Junction/100 gal. water (1/2 Tbsp./gal.) Repeat at 7- to 14-day intervals.	Alternaria leaf spot, anthracnose, bacterial leaf blight, Botrytis, Cercospora, downy mildew	48
The pH of the spray solution should be less than 6.5 to avoid phytotoxicity. Label cautions grower to test this product for safety to plants not listed on the label. Listed plants include dahlia, gladiolus, pansy, peony, and tulip.			
Note: Trade or brand names in this summary are given with the understanding that endorsement is not intended or criticism implied for those products not mentioned. Other labeled formulations may also be available for use. Read label carefully before using any of these chemicals.			
+ Proprietary products containing the active ingredient are available for homeowner use.			
^a This fungicide is no longer being registered for ornamental uses. However, previously purchased product with ornamental uses on the label may be used legally.			
^b Not for greenhouse use.			

Table 2. Fungicides for control of diseases of herbaceous perennials (continued)

<i>Common name</i>	<i>Commercial application information</i>	<i>Effective against</i>	<i>REI</i>
copper salts of fatty and rosin acids	Spray 3–5 tsp./gal. Camelot (= 3–5 pt./100 gal.) at 7- to 10-day intervals.	Bacterial blight on chrysanthemum, scab on iris	12
Do not mix with products containing diazinon, thiophanate-methyl, or fosetyl-Al. Registered for use on chrysanthemum and iris.			
copper sulphate pentahydrate	Spray 1.5–2.5 oz. Phyton 27 21.36%/10 gal.	Bacterial leaf spots, Botrytis, powdery mildew	24
Registered for use on aster, chrysanthemum, clematis, hydrangea, peony, and potentilla			
etrizadiazole	Drench containers with 3–10 oz. Terrazole 35WP/100 gal./400 sq. ft. For bedding plants (2- to 3-inch soil depth) drench with 4–6 oz. Terrazole 35% WP/100 gal./800 sq. ft.	Pythium, Phytophthora	12
Registered for use on aster, chrysanthemum, dahlia, dianthus, foxglove, gypsophila, salvia, statice, and stokesia			
etrizadiazole	Drench 3–10 oz. Truban 30WP/100 gal., the area to be covered varying with depth of soil treated. Repeat in 4–12 weeks.	Pythium, Phytophthora	12
Registered for use on aster, dahlia, dianthus, foxglove, gypsophila, salvia, statice, and stokesia			
etrizadiazole	Drench 3–8 oz. Truban 25EC/100 gal., the area to be covered varying with depth of soil treated. Repeat in 4–12 weeks if needed.	Pythium, Phytophthora	12
Registered for use on ajuga, chrysanthemum, dahlia, dianthus, phlox, and salvia			
etrizadiazole	Incorporate 10 oz. Terrazole 5G ² /cu. yd. of growing mix.	Pythium, Phytophthora	12
Registered for use on aster, dahlia, dianthus, foxglove, gypsophila, salvia, and verbena			
etrizadiazole	Incorporate 5–10 oz. Truban 5G/cu. yd. of growing mix depending on container depth. For broadcast and sidedress applications, see label.	Pythium, Phytophthora	12
Registered for use on aster, chrysanthemum, dianthus, foxglove, gypsophila, salvia, stokesia, and verbena			
etrizadiazole plus thiophanate-methyl	Drench 4–12 oz. Banrot 40WP/100 gal./400–800 sq. ft. at 4- to 12-week intervals. Rates vary according to container depth.	Rhizoctonia, Pythium, Phytophthora stem and root rots	12
Registered for use on ajuga, aster, chrysanthemum, dahlia, delphinium, fern, gypsophila, lobelia, phlox, salvia, and statice			
etrizadiazole plus thiophanate-methyl	Mix 8–16 oz. Banrot 8G/cu. yd. soil mix, depending on container depth. See label for broadcast and sidedress applications.	Rhizoctonia, Pythium, Phytophthora, and Fusarium damping-off and stem rots	12
Registered for use on ajuga, aster, chrysanthemum, dahlia, delphinium, gypsophila, phlox, and statice			
fenarimol	Spray 3–5 oz. Rubigan 12.5 EC/100 gal. at 10- to 14-day intervals.	Powdery mildew	12
Registered for use on chrysanthemum, dahlia, delphinium, and phlox			

Note: Trade or brand names in this summary are given with the understanding that endorsement is not intended or criticism implied for those products not mentioned. Other labeled formulations may also be available for use. Read label carefully before using any of these chemicals.

+ Proprietary products containing the active ingredient are available for homeowner use.

² This fungicide is no longer being registered for ornamental uses. However, previously purchased product with ornamental uses on the label may be used legally.

³ Not for greenhouse use.

Table 2. Fungicides for control of diseases of herbaceous perennials (continued)

<i>Common name</i>	<i>Commercial application information</i>	<i>Effective against</i>	<i>REI</i>
fludioxonil	Spray Medallion 50WP using 1–2 packets/100 gal. for Alternaria, Septoria, and Rhizoctonia. For Botrytis, use 8 packets/100 gal. Repeat at 7-to 14-day intervals. For soilborne disease, drench Medallion 50WP using 1 pack/100 gal. Make only one application to a seedling crop; drench transplants at 21- to 28-day intervals.	Alternaria leaf spot, Septoria, Botrytis, Rhizoctonia web blight Rhizoctonia, Myrothecium, and Thielaviopsis root rot	12 12
The label lists aster, bleeding heart (foliar application), chrysanthemums, coreopsis (foliar), dahlia (foliar), daisy (foliar), pansy, salvia, sunflower (foliar), and verbenas and suggests that growers should test unlabeled plants for phytotoxicity before widespread use. For greenhouse use only.			
fosetyl-Al+	Spray Aliette WDG at 2.0–5.0 lb/100 gal. at one-month intervals or drench at 0.4 to 0.8 lb/100 gal./400 sq. ft.	Downy mildew, Phytophthora, Pythium	12
Registered for use on ornamentals in nursery and greenhouse			
horticultural oil	Spray 1–2 gal. Ultra-Fine Oil/100 gal. from midsummer to early fall every 2–4 wk. Use only 1 gal./100 gal. rate in greenhouses.	Powdery mildew	4
Test on ornamental species other than aster, monarda, phlox, and helianthemum before large-scale application. Do not use on stressed plants, when humidity is high, or when temperature is below 50° F.			
hydrogen dioxide	Apply ZeroTol 27%.	Powdery mildew, algae control, disinfectant	0
Registered for use in prevention and control of horticultural diseases in commercial greenhouses, garden centers, landscapes, nurseries and interiorscapes on bedding plants, flowering plants, roses, poinsettia, ornamentals, nursery stock, cut flowers, bulbs, cuttings, seedlings, and seeds.			
iprodione	Spray 1–2 lb. Chipco 26019 50WP/100 gal. at 10- to 14-day intervals.	Alternaria, Ascochyta ray blight, Botrytis, ink spot, Rhizoctonia web blight	12
Registered for use on ajuga, artemisia, aster, chrysanthemum, columbine, dahlia, delphinium, dianthus, gypsophila, heuchera, iris, lilies, monarda, pachysandra, periwinkle, phlox, poppy, salvia, statice, and violet			
iprodione	Drench 0.4 lb. Chipco 26019 50WP/100 gal. at 14-day intervals after transplant. A corn dip is registered for control of Fusarium corn rot of gladiolus.	Rhizoctonia	12
Registered for use on ajuga, artemisia, aster, chrysanthemum, columbine, dahlia, delphinium, dianthus, gypsophila, heuchera, iris, lilies, monarda, pachysandra, periwinkle, phlox, poppy, salvia, statice, and violet			
kresoxim-methyl	Spray Cygnus 50W at 1.6–3.2 oz./100 gal. to drip.	Powdery mildew	12
For greenhouse use. Test on a sample of the crop to be treated. Not for use in Nassau or Suffolk Counties.			
mancozeb	Spray 1 1/2 lb./100 gal. Dithane T/O or Dithane T/O Rainshield or Fore T/O, or use 1.2 qt./100 gal. Dithane WF T/O or Fore Flowable XL T/O as a dilute spray at 7- to 10-day intervals as needed.	Botrytis, rust, Cercospora and Didymellina leaf spots, foliar Phytophthora blight (peony)	24

Test on a small sample before large-scale application to ornamentals not listed on the labels. Adding Latron B-1956 spreader-sticker is recommended for improved performance.

Note: Trade or brand names in this summary are given with the understanding that endorsement is not intended or criticism implied for those products not mentioned. Other labeled formulations may also be available for use. Read label carefully before using any of these chemicals.

+ Proprietary products containing the active ingredient are available for homeowner use.

^aThis fungicide is no longer being registered for ornamental uses. However, previously purchased product with ornamental uses on the label may be used legally.

^bNot for greenhouse use.

Table 2. Fungicides for control of diseases of herbaceous perennials (continued)

<i>Common name</i>	<i>Commercial application information</i>	<i>Effective against</i>	<i>REI</i>
mancozeb + copper hydroxide	Spray 1.5–3.5 lb/A Junction DF at 7- to 14-day intervals as needed	Alternaria, anthracnose, bacterial leaf spot, Botrytis, Cercospora, downy mildew, fungal leaf spot, Phytophthora blight, powdery mildew, Septoria leaf spot	24
Test on a small sample before large-scale application to ornamentals not listed on the label. Do not apply in a spray solution with pH lower than 6.5. Incompatible with fosetyl-AI or thiophanate-methyl materials.			
mancozeb	Spray 1½ lb. Protect T/O/100 gal. at 7- to 10-day intervals.	Alternaria, anthracnose, Ascochyta and Botrytis blights, Cercospora, Didymella, downy mildew, Mycosphaerella, Phyllosticta, Phytophthora dieback, Rhizoctonia web blight, rusts, and Septoria leaf spots, Volutella blight	24
Registered for use on Boston ivy, chrysanthemum, columbine, dahlia, delphinium, dianthus, English ivy, geranium, gladiolus, gypsophila, iris, lily, lirioppe, lobelia, pachysandra, pansy, peony, periwinkle, phlox, santolina, salvia, senecio, shasta daisy, static, strawflower, and verbena			
mancozeb plus thiophanate-methyl	Spray 1½ lb. Zyban/100 gal. at 7- to 10-day intervals. Or use 24 oz. (2 bags) Duosan/100 gal. at 7-day intervals.	Anthracnose, Botrytis, downy mildew, leaf spots, powdery mildew	24 24
Registered for use on aster, chrysanthemum, dahlia, lirioppe, mondo grass, pansy, phlox, and verbena			
maneb with zinc	Spray 0.8–1.2 qt/A Pentathlon 37F in 100 gal. water at 7- to 10-day intervals.	Alternaria leaf spot, anthracnose, Botrytis, Cercospora, Curvularia, Didymella, Myrothecium, narcissus smoulder, Phytophthora blight of peony, rust, Septoria, Siemphylium	24
Registered for use on aster, carnation, chrysanthemum, dahlia, gladiolus, hollyhock, iris, lily, narcissus, pansy, peony, static, and tulip			
mefenoxam	Use Subdue MAXX through irrigation, as a drench, a soil surface spray, or incorporate into mix. Note that rates are lower than for Subdue 2E. Rates for Subdue MAXX start as low as 0.13 fl oz./100 gal. for drench at seeding.	Phytophthora, Pythium	0
Registered for use on ornamentals, including bedding plants and flowers. Label cautions the user to conduct tests for safety to plants not mentioned on the label before widespread use. To minimize the potential for insensitivity, use mefenoxam or metalaxyl in alternation with other active ingredients for Pythium and Phytophthora control.			
mefenoxam	Apply Quell 25.1% at 0.13–1.0 fl. oz./100 gal. using 1 pt./sq. ft. for growth media depths of 4 in. or less and 1½–2 pts./sq. ft. for depths greater than 4 in.	Phytophthora, Pythium	12
Registered for use on container-, bed-, and bench-grown ornamental plants in greenhouses, shadehouses, nurseries, fields, landscapes, and interiorscapes. To minimize the potential for insensitivity, use mefenoxam or metalaxyl in alternation with other ingredients for Pythium and Phytophthora control.			
Note: Trade or brand names in this summary are given with the understanding that endorsement is not intended or criticism implied for those products not mentioned. Other labeled formulations may also be available for use. Read label carefully before using any of these chemicals.			
+ Proprietary products containing the active ingredient are available for homeowner use.			
* This fungicide is no longer being registered for ornamental uses. However, previously purchased product with ornamental uses on the label may be used legally.			
* Not for greenhouse use.			

Table 2. Fungicides for control of diseases of herbaceous perennials (continued)

<i>Common name</i>	<i>Commercial application information</i>	<i>Effective against</i>	<i>REI</i>
metalaxyl	Drench at rates of 0.25-2 fl. oz. Subdue 2E/100 gal. depending on container size. Reapply in 1-2 months. Subdue II is available in a drench-pac product from W. A. Cleary, packaged with 3336 in water-soluble bags. Subdue GR is a granular formulation that may be incorporated in a mix or applied to the soil surface.	Phytophthora, Pythium	0
Registered for use on ornamentals, including artemisia, aster, baby's breath, chrysanthemum, columbine, delphinium, foxglove, gaillardia, pansy, phlox, pinks, primrose, salvia, sedum, sempervivum, Shasta daisy, and verbenas. Label cautions user to conduct tests for safety to plants not mentioned on the label before widespread use. To minimize the potential for insensitivity, make no more than three applications per season. Use mefenoxam or metalaxyl in alternation with other Pythium/Phytophthora controls.			
myclobutanil	Use 2 oz. (1 pouch) Systhane WSP/50 gal. and apply at 10- to 14-day intervals.	Cercospora leaf spot, powdery mildew, rust	24
Registered for use on greenhouse or field ornamentals, including achillea, anemone, angelica, aster, bellflower, chrysanthemum, columbine, dahlia, delphinium, dianthus, gaillardia, geranium, hollyhock, hydrangea, iris, phlox, salvia, and sunflower. Systemic. Not for use in Nassau or Suffolk Counties.			
neem oil (clarified extract of)	Use 1:200 to 1:100 concentration (0.5%–1.0%) Triact 70EC at 7- to 14-day intervals.	Powdery mildew and other diseases	4
Registered for use on landscape, greenhouse, and nursery ornamentals. Test for safety on your crops.			
PCNB	Drench 6–12 fl. oz. Terraclor 400 40F/100 gal. to cover 400–800 sq. ft., or Defend 75 WP or Terraclor 75WP to cover 800 sq. ft., at seeding or transplanting. Preplant, broadcast Terraclor 400 40F or Defend 75WP or Terraclor 75WP or apply Defend 10G according to label.	Rhizoctonia, Sclerotinia, and Sclerotium stem rots	12
Registered for use on bedding and flowering plants			
piperalin	Spray 1/4 pt. Pipron 82.4 LC/100 gal.	Powdery mildew	12
Registered for greenhouse use only on chrysanthemum, dahlia, and phlox. May be used on other greenhouse ornamentals not listed on the label (growers should test first for safety).			
propamocarb	At seeding or transplant, drench 3 fl. oz. Banol/10 gal., applying 3 qt./10 sq. ft.	Phytophthora, Pythium	12
Registered for use on aster, chrysanthemum, dahlia, and salvia			
propiconazole ^a	Spray with 5–12 oz. Banner MAXX/100 gal. as needed for some diseases, every 30 days for others.	Ascochyta ray blight, powdery mildew, rust and leaf spots (including Heterosporium leaf spot on iris)	24
Registered for use on ornamentals, including chrysanthemum, delphinium, iris, monarda, and phlox.			
sulfur	Apply Microthiol Special 80W at 3–10 lb/A; repeat at 5- to 10-day intervals.	Leaf spots, powdery mildew	24
Registered for use on ornamentals, including those grown in greenhouses. Also effective against two-spotted spider mite.			
thiophanate-methyl+	Spray 10 oz. of Cleary's 3336 46.2% F or Fungo Flo 46.2%/100 gal. or use Fungo 50 WSB in water-soluble bags according to label every 10–14 days.	Botrytis, powdery mildew	12
Registered for use on greenhouse and field ornamentals			

Note: Trade or brand names in this summary are given with the understanding that endorsement is not intended or criticism implied for those products not mentioned. Other labeled formulations may also be available for use. Read label carefully before using any of these chemicals.

+ Proprietary products containing the active ingredient are available for homeowner use.

^a This fungicide is no longer being registered for ornamental uses. However, previously purchased product with ornamental uses on the label may be used legally.

^b Not for greenhouse use.

Table 2. Fungicides for control of diseases of herbaceous perennials (continued)

<i>Common name</i>	<i>Commercial application information</i>	<i>Effective against</i>	<i>REI</i>
thiophanate-methyl+	Spray 12 oz. of Cleary's 3336 50WP or 8–16 oz. of Fungo 50 WSB or 20 oz. of Cleary's 3336 46.2F/100 gal. every 10–14 days.	Anthracoze, Ascochyta, Cercospora, leaf spots, Phomopsis, powdery mildew	12
Registered for use on greenhouse and field ornamentals			
thiophanate-methyl+	Drench 8–16 fl. oz. of Cleary's 3336 46.2% F or 20 fl. oz. Fungo Flo 46.2%/100 gal. at 2- to 4-wk. intervals, or drench with 3 packets/200 gal. of Cleary's 3336 WP or 8–16 oz. Fungo 50WSB.	Botrytis, Cylincladadium and Thielaviopsis root rots, Fusarium, Rhizoctonia, Sclerotinia stem, crown, and root rots	12
Registered for use on herbaceous perennials. See label for preplant dip treatment. 3336 is also available in a drench-pak from W.A. Cleary, packaged with Subdue II in water-soluble bags.			
triadimefon+	Spray 2–4 oz. Strike 25% Ornamental Fungicide/100 gal.	Cercospora, Didymellina leaf spots, powdery mildew, rust	12
Registered for use on aster, canna, chrysanthemum, dahlia, delphinium, dianthus, hollyhock, iris, pansy, phlox, salvia, sedum, and sunflowers			
triflumizole	Spray Terraguard 50W at 4–16 oz./100 gal. at 7- to 14-day intervals.	Alternaria leaf spot, powdery mildew, Rhizoctonia aerial blight	12
Registered for use on bedding and flowering plants			
triflumizole	Drench Terraguard 50W at 4–12 oz./100 gal. at 3- to 4-wk. intervals, or soak cuttings at 12–16 oz. for 10 min.	Cylindrocladium, Rhizoctonia, and Thielaviopsis root rot	24
Registered for use on bedding and flowering plants grown in enclosed structures			
vinclozolin	Spray 0.5–0.75 lb. Vorlan 50DF or Vorlan 50EG	Botrytis, Sclerotinia, Stromatinia	12
Registered for use on ajuga, artemisia, aster, bleeding heart, chrysanthemum, columbine, coral bells, delphinium, dianthus, geranium, gladiolus, gypsophila, hyacinth, iris, liatris, lily, lupine, monarda, narcissus, phlox, poppy, primrose, salvia, saxifraga, scilla, shasta daisy, statice, tulip, and violet. May be applied via thermal fogger.			

Note: Trade or brand names in this summary are given with the understanding that endorsement is not intended or criticism implied for those products not mentioned. Other labeled formulations may also be available for use. Read label carefully before using any of these chemicals.

[†] Proprietary products containing the active ingredient are available for homeowner use.

^{*} This fungicide is no longer being registered for ornamental uses. However, previously purchased product with ornamental uses on the label may be used legally.

[‡] Not for greenhouse use.

Table 3. Preplant nematicides/soil sterilants for use in ornamentals production

<i>Common name</i>	<i>Commercial application information</i>	<i>REI</i>
*chloropicrin[†]	Use *Chlor-O-Pic or other formulation preplant, according to label, when soil temperature is at least 60° F.	NA
Effective against nematodes, weeds, and soil fungi		
dazomet	Apply Basamid Granular 99% pre-plant as a soil fumigant according to label. Ideal soil temperature for treatment is 55–69° F. May not be applied to crops.	24 hours plus ventilation criteria
Effective against nematodes, weeds, and soil fungi		
metam-sodium[†]	Use Vapam or other formulation preplant, when soil temperature is at least 60° F.	NA
Effective against nematodes, weeds, and soil fungi		
*methyl bromide with *chloropicrin	Use *Brom-O-Gas preplant, according to label, when soil temperature is at least 50° F.	NA
Effective against nematodes, weeds, and insects		

[†] Restricted-use material, to be applied by certified applicator only.

^{*} If used within a greenhouse, the structure must be empty of plants.

Table 4. Trade names, common names, formulations, and EPA registration numbers for bactericides, fungicides, and nematocides used on herbaceous perennials and listed in this publication

<i>Trade name</i>	<i>Common name</i>	<i>Formulation</i>	<i>EPA reg. no.</i>
Aliette	fosetyl-Al+	80 WDG	264-515
Banner MAXX	propiconazole	14.3% MEC	100-741
Banol	propamocarb	66.5%	45639-88
Banrot	etridiazole plus thiophanate-methyl	40 WP	58185-10
Banrot	etridiazole plus thiophanate-methyl	8 G	58185-23
Basamid Granular	dazomet	99%	7969-99
*Brom-O-Gas	*methyl bromide with *chloropicrin	98% + 2%	5785-42
Camelot	copper salts of fatty and rosin acids	58% EL	1812-381
Champion	copper hydroxide	77% WP	55146-1
Chipeco 26019	iprodione	50 WP	359-685
*Chlor-O-Pic	*chloropicrin	96.5%	5785-17
Cleary's 3336 F	thiophanate-methyl+	46.2% F	4581-352
Cleary's 3336 WP	thiophanate-methyl+	50 WP	1001-63
Cygnus	kresoxim-methyl	50 WP	7969-124
Daconil 2787	chlorothalonil+	40.4% F	50534-9
Daconil 2787	chlorothalonil+	75 WP	50534-4
Daconil 2787	chlorothalonil+	90% WDG	50534-195
Daconil Ultrex	chlorothalonil+	82.5% SDG	50534-202
Daconil Weather Stik	chlorothalonil+	54 F	50534-209
Defend WP	PCNB	75 WP	5481-419
Defend 10G	PCNB	10 G	5481-444
Dithane T/O	mancozeb	75 W	707-180
Dithane T/O Rainshield	mancozeb	75 W	707-180
Dithane WF T/O	mancozeb	37 WF	707-156
Fore T/O	mancozeb	80 W	707-87
Fore Flowable XL T/O	mancozeb	80 WF	707-156
Fore WSP T/O in pouches	mancozeb	—	707-240
Fore WSP Rainshield T/O	mancozeb	—	707-240
Fungo Flo	thiophanate-methyl+	46.2% F	58185-33
Fungo 50 WSB	thiophanate-methyl+	50 WSB	58185-30
Heritage	azoxystrobin	50 WSB	10182-408
Junction	mancozeb plus copper hydroxide	61.1% DF	1812-360
Kocide 2000	copper hydroxide	53.8 DF	1812-358
Medallion	fludioxonil	50 WP	100-769
Microthiol Special	sulfur	80%	4581-373
PathGuard	chlorothalonil	6 F	60063-7-499
PathGuard	chlorothalonil	90 DF	60063-10-499
Pentathion	maneb with zinc	37% F	1812-251
Phyton 27	copper sulphate pentahydrate	21.36%	49538-2
Pipron	piperalin	82.4% LC	1471-58
Protect T/O	mancozeb	80 W	4581-357
Quell	mefenoxam	25.1% EC	55146-73-400
Rubigan	fenarimol	12.5% EC	1471-146
Spectro	chlorothalonil plus thiophanate-methyl	90 WDG	1001-72
Strike	triadimefon+	25%	3125-318
Subdue MAXX	mefenoxam	21.3% MEC	100-796
Subdue	metalaxyl	2 E	100-619
Subdue GR	metalaxyl	0.97% G	100-794
Subdue II	metalaxyl	25 WP	100-717
Systhane WSP	myclobutanil	40%	707-253
Terraclor	PCNB	75% WP	400-399

* Restricted-use material. To be applied by certified applicator only.

+ Proprietary products containing the active ingredient are available for homeowner use.

Table 4. Trade names, common names, formulations, and EPA registration numbers for fungicides and nematocides used on herbaceous perennials and listed in this publication (continued)

<i>Trade name</i>	<i>Common name</i>	<i>Formulation</i>	<i>EPA reg. no.</i>
Terraclor 400	PCNB	40 F	400-454
Terraguard	triflumizole	50 W	400-433
Terrazole	etridiazole	35 WP	400-416
Terrazole	etridiazole	25% E	400-417
Terrazole	etridiazole	5 G	400-419
Triact 70	neem oil	70 EC	70051-2-59807
Truban	etridiazole	30 WP	372-43
Truban	etridiazole	25% EC	372-44
Truban	etridiazole	5 G	58185-13
Ultra-Fine Oil	horticultural oil	98.8%	862-23-499
Vapam	metam-sodium		10182-150
Vorlan DF	vinclozolin	50WDG	07969-00085-58185
Vorlan EG	vinclozolin	50EG	07969-00085-58185
ZeroTol	hydrogen dioxide	27%	70299-1
Zyban	mancozeb plus thiophanate-methyl	75%	372-48

* Restricted-use material. To be applied by certified applicator only.
 + Proprietary products containing the active ingredient are available for homeowner use.

Table 5. Pesticides registered for control of specific insect and mite pests*

<i>Insect or mite problem</i>	<i>Control</i>
ANTS	
acephate	Orthene 97, Orthene TT & O, #Pinpoint 15G
bifenthrin	*Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
lambda-cyhalothrin	Topcide, Topcide O/S
permethrin	*Astro
pyrethrins	Pyreneone Crop Spray, 1100 Pyrethrum TR
APHIDS	
abamectin	Avid 0.15EC
acephate	Address T/O, 1300 Orthene TR, Orthene 97, Orthene TT & O, #Pinpoint 15G
azadirachtin	Azatin XL, Neemix 4.5EC, Neemix 0.25EC, Ornazin 3% EC
Beauveria	BotaniGard, Naturalis-L
bendiocarb	*Closure 76WP
bifenthrin	Attain TR, *Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
chlorpyrifos+cyfluthrin	Duraplex TR
cinnamaldehyde	Cinnamite

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
APHIDS (continued)	
cyfluthrin	Decathlon 20WP
diazinon	*Knox Out GH
dichlorvos	DDVP
dimethoate	Dimethoate 4 EC
endosulfan	Gowan Endosulfan 3EC, Gowan Endosulfan 50WSB, Phaser, *Thiodan 3EC, Thiodan 50WP, Fulex Thiodan Smoke
fenoxycarb	Preclude TR
fenpropathrin	*Tame 2.4EC
fluvalinate	*Mavrik Aquaflow
horticultural oil	Ultra-Fine Oil
imidacloprid	Marathon 1G, Marathon 60WP, Merit 75WP
insecticidal soap	I.S. 49.52CF (Olympic), M-Pede
kinoprene	Enstar II
lambda-cyhalothrin	Topcide, Topcide O/S
malathion	Gowan 8, Malathion 5EC
methiocarb	*Mesurol
naled	Dibrom 8E
neem oil	Triact 70
nicotine	*Nicotine Smoke
permethrin	*Astro
phosphorodithioate	*Di-Syston 15%
pyrethrins	1100 Pyrethrum TR, Pyrenone Crop Spray
pyriproxyfen	Distance
sulfotepp	*Fulex Dithio, *Plant Fume 103
BETLES	
acephate	Orthene TT&O
azadirachtin	Azatin XL
Beauveria	Naturalis-L
bifenthrin	Talstar F, *Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
fenpropathrin	*Tame 2.4EC
fluvalinate	*Mavrik Aquaflow
insecticidal soap	I.S. 49.52 CF
isofenphos (for Japanese beetle larvae)	*Oftanol 2
lambda-cyhalothrin	Topcide, Topcide O/S

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
BEETLES (continued)	
malathion	Gowan 8, Malathion 5EC
permethrin	*Astro
pyrethrins	1100 Pyrethrum TR, Pyrenone Crop Spray
spinosad	Conserve SC
BLACK VINE WEEVIL	
acephate	Orthene 97, Orthene TT & O
azadirachtin	Azatin XL
Beauveria	Naturalis-L
bifenthrin	*Talstar Nursery
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
fenpropathrin	*Tame 2.4EC
fluralinate	*Mavrik Aquaflow
lambda-cyhalothrin	Topcide, Topcide O/S
permethrin	*Astro
Steinernema feltiae	ScanMask
CATERPILLARS	
acephate	1300 Orthene TR
azadirachtin	Azatin XL, Neemix 4.5EC, Neemix 0.25EC, Ornazin 3% EC
Bacillus thuringiensis aizawai	Agree, BioBit HP, XenTari
Bacillus thuringiensis kurstaki	Dipel 2X, Javelin WG
Beauveria	Naturalis-L
bendiocarb	Closure 76WP
bifenthrin	Attain TR, *Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
chlorpyrifos+cyfluthrin	Duraplex TR
cyfluthrin	Decathlon 20WP
diflubenzuron	Dimilin 25W
fluralinate	*Mavrik Aquaflow
horticultural oil	Ultra-Fine Oil
insecticidal soap	I.S. 49.52 CF, M-Pede
lambda-cyhalothrin	Topcide, Topcide O/S
malathion	Gowan 8, Malathion 5EC
permethrin	*Astro, *Pounce 3.2EC
pyrethrins	1100 Pyrethrum TR, Pyrenone Crop Spray

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

Restricted-use material, to be applied by certified applicator only.

2(ee) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
CATERPILLARS (continued)	
pyrethrins+rotenone	Pyrellin EC
spinosad	Conserve SC
trichlorfon	*Dylox 80
CYCLAMEN MITE	
dicofol	Kelthane
endosulfan	Gowan Endosulfan 3EC, Gowan Endosulfan 50WSB, Phaser, *Thiodan 3EC
EARWIGS	
bifenthrin	*Talstar Nursery
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
insecticidal soap	I.S. 49.52CF (Olympic), M-Pede
pyrethrins	Pyrenone Crop Spray
FUNGUS GNATS	
acephate	Orthene 1300TR
azadirachtin	Azatin XL, Ornazin 3% EC
<i>Bacillus thuringiensis israelensis</i>	Gnatrol
bifenthrin	Attain TR, *Talstar Nursery
chlorpyrifos	Duraguard ME
chlorpyrifos+cyfluthrin	Duraplex TR
cyfluthrin	Decathlon 20WP
cyromazine	Citation
diazinon	*Knox Out GH
diflubenzuron	Adept
fenoxycarb	Precision
horticultural oil	Ultra-Fine Oil
insecticidal soap	I.S. 49.52 CF
kinoprene	Enstar II
nematodes	Nemasys, ScanMask
pyrethrins	Pyrenone Crop Spray, 1100 Pyrethrum TR
pyriproxyfen	Distance
GALL MIDGES	
carbaryl	Sevin 80WSP, Sevin SL
spinosad	Conserve SC

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
GRASSHOPPERS	
bifenthrin	*Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
pyrethrins	Pyrenone Crop Spray
LACE BUGS	
acephate	1300 Orthene TR, #Pinpoint 15G
bifenthrin	*Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
dimethoate	Dimethoate 4 EC
fenpropathrin	*Tame 2.4EC
horticultural oil	Ultra-Fine Oil
insecticidal soap	I.S. 49.52 CF (Olympic), M-Pede
lambda-cyhalothrin	Topcide, Topcide O/S
malathion	Malathion 5EC
permethrin	*Astro, *Pounce 3.2EC
phosphorodithioate	*Di-Syston 15%
pyrethrins	Pyrenone Crop Spray
LEAFHOPPERS	
azadirachtin	Azatin XL
Beauveria	Naturalis-L
bifenthrin	*Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
dimethoate	Dimethoate 4 EC
fenpropathrin	*Tame 2.4EC
fluralinate	*Mavrik Aquaflow
insecticidal soap	I.S. 49.52 CF (Olympic), M-Pede
lambda-cyhalothrin	Topcide, Topcide O/S
malathion	Malathion 5EC
neem oil	Triact 70
permethrin	*Astro, *Pounce 3.2EC

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

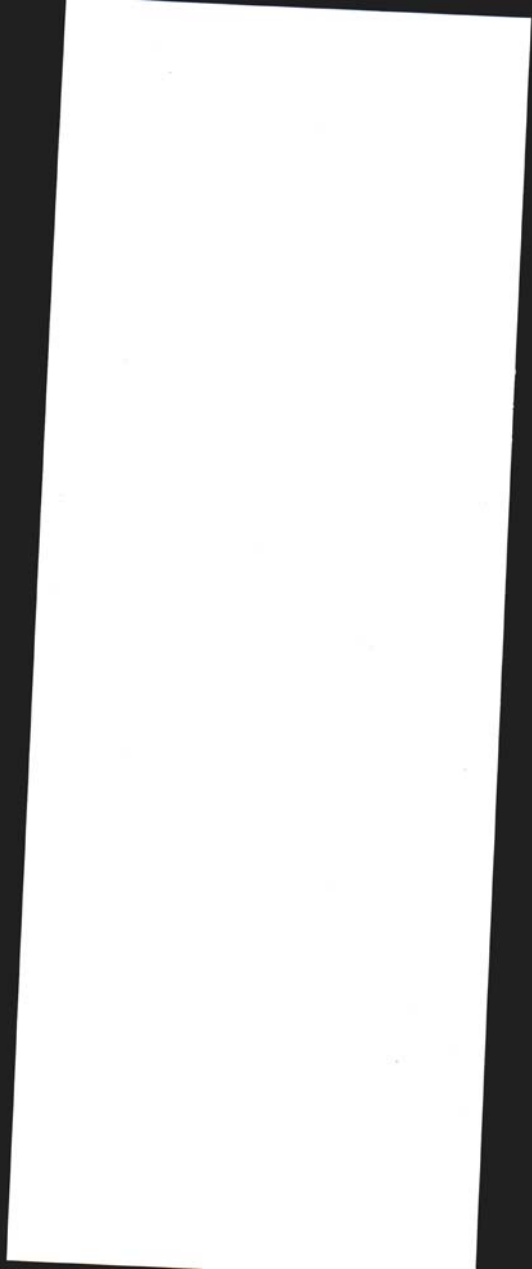
<i>Insect or mite problem</i>	<i>Control</i>
LEAFHOPPERS (continued)	
phosphorodithioate	*Di-Syston 15%
pyrethrins	Pyrenone Crop Spray, 1100 Pyrethrum TR
pyrethrins + rotenone	Pyrellin
LEAFMINERS	
abamectin	Avid 0.15EC
acephate	1300 Orthene TR
azadirachtin	Azatin XL, Neemix 4.5EC, Neemix 0.25EC, Ornazin 3% EC
bendiocarb	Closure 76WP
bifenthrin	*Talstar Nursery
carbaryl (for azalea leafminer)	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
cyromazine	Citation
diazinon	*Knox Out GH
fenoxycarb	Precision
fenpropathrin	*Tame 2.4EC
horticultural oil	Ultra-Fine Oil
lambda-cyhalothrin	Topcide, Topcide O/S
permethrin	*Astro, *Pounce 3.2EC
pyrethrins	Pyrenone Crop Spray
pyrethrins+rotenone	Pyrellin
spinosad	Conserve SC
trichlorfon	*Dylox 80
LEAFROLLERS	
acephate	1300 Orthene TR, Orthene TT & O, Orthene 97
azadirachtin	Azatin XL
<i>Bacillus thuringiensis kurstaki</i>	Dipel 2X, Javelin WG
bifenthrin	Attain TR, *Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
lambda-cyhalothrin	Topcide, Topcide O/S
naled	Dibrom 8E
permethrin	*Astro, *Pounce 3.2EC
pyrethrins	Pyrenone Crop Spray
pyrethrins+rotenone	Pyrellin

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

**Pesticide-contaminated
clothing must be
laundered carefully.**



Tips for Laundering Pesticide-Contaminated Clothing

Air

Hang garments **outdoors** to air.

Prerinse

Use one of **three methods**:

1. Hose off garments outdoors.
2. Rinse in separate tub or pail.
3. Agitate in automatic washer.

Pretreat (heavily soiled garments)

Use heavy-duty liquid detergent.

Washer Load

Wash garments **separate** from family wash. Wash garments contaminated with the **same** pesticide together.

Load Size

Wash only a **few** garments at once.

Water Level

Use **full** water level.

Water Temperature

Use **hot** water, 140°F or higher.

Wash Cycle

Use **regular** 12-minute wash cycle.

Laundry Detergent

Use a **heavy-duty detergent**.

Use amount recommended on package or more for heavy soil or hard water.

Rinse

Use a **full warm** rinse.

Dry

Line drying is preferable, to avoid contaminating dryer.

Clean Washer

Run complete, but empty, cycle.

Use **hot water and detergent**.

Rewash

Rewash contaminated garments **two or three times** before reuse for more complete pesticide removal.

Do not remove from book.

Tips for Laundering Pesticide-Contaminated Clothing

Air

Hang garments **outdoors** to air.

Prerinse

Use one of **three methods**:

1. Hose off garments outdoors.
2. Rinse in separate tub or pail.
3. Agitate in automatic washer.

Pretreat (heavily soiled garments)

Use heavy-duty liquid detergent.

Washer Load

Wash garments **separate** from family wash. Wash garments contaminated with the **same** pesticide together.

Load Size

Wash only a **few** garments at once.

Water Level

Use **full** water level.

Water Temperature

Use **hot** water, 140°F or higher.

Wash Cycle

Use **regular** 12-minute wash cycle.

Laundry Detergent

Use a **heavy-duty detergent**.

Use amount recommended on package or more for heavy soil or hard water.

Rinse

Use a **full warm** rinse.

Dry

Line drying is preferable, to avoid contaminating dryer.

Clean Washer

Run complete, but empty, cycle.

Use **hot water and detergent**.

Rewash

Rewash contaminated garments **two or three times** before reuse for more complete pesticide removal.

Detach and hang in laundry room.

Other Tips

Remove contaminated clothing **before** entering enclosed tractor cabs.

Remove contaminated clothing **outdoors** or in an entry. If a granular pesticide was used, shake clothing outdoors. **Empty pockets and cuffs.**

Save clothing worn while handling pesticides for that use only. Keep separate from other clothing **before, during, and after** laundering.

Wash contaminated clothing after **each** use. When applying pesticides daily, wash clothing **daily.**

Clean gloves, aprons, boots, rigid hats, respirators, and eyewear by scrubbing with detergent and warm water. Rinse thoroughly and hang in a clean area to dry.

Take these **precautions** when handling contaminated clothing:

- Ventilate area.
- Avoid inhaling steam from washer or dryer.
- Wash hands thoroughly.
- Consider wearing chemical-resistant gloves.

Prepared by Charlotte Coffman, Department of Textiles and Apparel, telephone: 607-255-2009.



**Cornell
Cooperative
Extension**

*Helping You
Put Knowledge
to Work*

Cornell Cooperative Extension provides equal program and employment opportunities.

Produced by Media Services at Cornell University
8/86, rev 9/90, 11/94 PVC40218

Other Tips

Remove contaminated clothing **before** entering enclosed tractor cabs.

Remove contaminated clothing **outdoors** or in an entry. If a granular pesticide was used, shake clothing outdoors. **Empty pockets and cuffs.**

Save clothing worn while handling pesticides for that use only. Keep separate from other clothing **before, during, and after** laundering.

Wash contaminated clothing after **each** use. When applying pesticides daily, wash clothing **daily.**

Clean gloves, aprons, boots, rigid hats, respirators, and eyewear by scrubbing with detergent and warm water. Rinse thoroughly and hang in a clean area to dry.

Take these **precautions** when handling contaminated clothing:

- Ventilate area.
- Avoid inhaling steam from washer or dryer.
- Wash hands thoroughly.
- Consider wearing chemical-resistant gloves.

Prepared by Charlotte Coffman, Department of Textiles and Apparel, telephone: 607-255-2009.



**Cornell
Cooperative
Extension**

*Helping You
Put Knowledge
to Work*

Cornell Cooperative Extension provides equal program and employment opportunities.

Produced by Media Services at Cornell University
8/86, rev 9/90, 11/94 PVC40218

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
MEALYBUGS	
acephate	Address T/O, 1300 Orthene TR, Orthene TT & O, Orthene 97, #Pinpoint 15G
azadirachtin	Azatin XL, Neemix 4.5EC, Neemix 0.25EC, Ormazin 3% EC
Beauveria	BotaniGard, Naturalis-L
bendiocarb	Closure 76WP
bifenthrin	Attain TR, *Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
chlorpyrifos+cyfluthrin	Duraplex TR
cyfluthrin	Decathlon 20WP
diazinon	*Knox Out GH
dichlorvos	DDVP
fenpropathrin	*Tame 2,4EC
horticultural oil	Ultra-Fine Oil
imidacloprid	Marathon 1G, Marathon 60WP, Merit 75WP
insecticidal soap	I.S. 49.52 CF (Olympic), M-Pede
kinoprene	Enstar II
malathion	Gowan 8, Malathion 5EC
naled	Dibrom 8E
neem oil	Triact 70
permethrin	*Astro
phosphorodithioate	*Di-Syston 15%
pyrethrins	1100 Pyrethrum TR, Pyrenone Crop Spray
pyrethrins+rotenone	Pyrellin
sulfotepp	*Fulex Dithio, *Plant Fume 103
MILLIPEDES	
bifenthrin	*Talstar Nursery
chlorpyrifos	*Dursban Pro
malathion	Gowan 8, Malathion 5EC
pyrethrins	Pyrenone Crop Spray
MITES	
abamectin	Avid 0.15EC
acephate	Orthene 1300TR
Beauveria	Naturalis-L
bifenazate	Floramite
bifenthrin	Attain TR, *Talstar Nursery

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
MITES (continued)	
chlorpyrifos	Duraguard ME, *Dursban 50W, *Dursban Pro
chlorpyrifos-cyfluthrin	Duraplex TR
cinnamaldehyde	Cinnamite
diazinon	*Knox Out GH
dichlorvos	DDVP
dicofol	Kelthane
dimethoate	Dimethoate 4 EC
fenbutatin	Vendex 50WP
fenpropathrin	*Tame 2.4EC
fluvalinate	Mavrik Aquaflow
hexythiazox	Hexygon
horticultural oil	Ultra-Fine Oil
insecticidal soap	I.S. 49.52CF (Olympic), M-Pede
lambda-cyhalothrin	Topcide
methiocarb	*Mesurol
naled	Dibrom 8E
necm oil	Triact 70
oxythioquinox	Joust
phosphorodithioate	*Di-Syston 15%
propargite	Omite 30WS, Ornamite
pyrethrins	Pyrenone Crop Spray, Pyrethrum 1100TR
pyrethrins+rotenone	Pyrellin
pyridaben	Sanmite
sulfotepp	*Fulex Dithio, *Plant Fume 103
NARCISSUS BULB FLY	
dimethyl phosphonate	Proxol 80 SP
trichlorfon	*Dylox 80
PLANT BUGS	
acephate	Orthene 97, Orthene TT & O, Naturalis-L
bifenthrin	Attain TR, *Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
fluvalinate	*Mavrik Aquaflow
insecticidal soap	I.S. 49.52 CF (Olympic), M-Pede
lambda-cyhalothrin	Topcide, Topcide O/S

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ee) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
PLANT BUGS (continued)	
malathion	Gowan 8, Malathion 5EC
permethrin	*Astro
pyrethrins	Pyrenone Crop Spray
pyrethrins+rotenone	Pyrellin
trichlorfon	*Dylox 80
SAWFLIES	
azadirachtin	Azatin XL
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
horticultural oil	Ultra-Fine Oil
insecticidal soap	I.S. 49.52 CF (Olympic), M-Pede
lambda-cyhalothrin	Topcide, Topcide O/S
spinosad	Conserve SC
SCALE	
acephate	1300 Orthene TR, Orthene TT & O, Orthene 97
azadirachtin	Ornazin 3% EC
bendiocarb	Closure 76WP
bifenthrin	Attain TR, *Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
chlorpyrifos +cyfluthrin	Duraplex TR
cyfluthrin	Decathlon 20WP
diazinon	*Knox Out GH
dimethoate	Dimethoate 4 EC
fenoxycarb	Precision, Preclude TR
horticultural oil	Ultra-Fine Oil
insecticidal soap	I.S. 49.52 CF, M-Pede
kinoprene	Enstar II
lambda-cyhalothrin	Topcide, Topcide O/S
malathion	Gowan 8, Malathion 5EC
neem oil	Triact 70
phosphorodithioate	*Di-Syston 15%
pyrethrins	1100 Pyrethrum TR
pyriproxyfen	Distance
sulfotepp	*Fulex Dithio, *Plant Fume 103

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests* (continued)

<i>Insect or mite problem</i>	<i>Control</i>
SHORE FLY LARVAE	
azadirachtin	Azatin XL, Ornazin 3% EC
chlorpyrifos+cyfluthrin	Duraplex TR
cyromazine	Citation
diazinon	*Knox Out GH
diflubenzuron	Adept
fenoxycarb	Precision
pyriproxyfen	Distance
SLUGS, SNAILS	
iron phosphate	Sluggo
metaldehyde	Deadline Granules
methiocarb	*Mesurol
SOWBUGS	
bifenthrin	*Talstar Nursery
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
malathion	Gowan 8, Malathion SEC
pyrethrins	Pyrenone Crop Spray
SPITTLEBUGS	
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
cyfluthrin	Decathlon 20WP
lambda-cyhalothrin	Topcide, Topcide O/S
SPRINGTAILS	
bendiocarb	Closure 76WP
carbaryl	Sevin 80WSP, Sevin SL
malathion	Gowan 8, Malathion SEC
pyrethrins	Pyrenone Crop Spray
THRIPS	
abamectin	Avid 0.15EC
acephate	Address T/O, 1300 Orthene TR, Orthene TT & O
azadirachtin	Azatin XL, Neemix 4.5EC, Neemix 0.25EC, Ornazin 3% EC
Beauveria	BotaniGard, Naturalis-L
bendiocarb	Closure 76WP
bifenthrin	Attain TR, *Talstar Nursery

* See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(e) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests^a (continued)

<i>Insect or mite problem</i>	<i>Control</i>
THRIPS (continued)	
carbaryl	Sevin 80WSP, Sevin SL
chlorpyrifos	Duraguard ME, *Dursban 50W Nursery, *Dursban Pro
chlorpyrifos+cyfluthrin	Duraplex TR
cyfluthrin	Decathlon 20WP
diazinon	*Knox Out GH
dimethoate	Dimethoate 4 EC
fenoxycarb	Precision, Preclude TR
fluvalinate	*Mavrik Aquaflow
imidacloprid	Marathon
insecticidal soap	I.S. 49.52 CF (Olympic), M-Pede
lambda-cyhalothrin	Topcide, Topcide O/S
malathion	Gowan 8, Malathion 5EC
methiocarb	*Mesuroil
nicotine	*Nicotine smoke
phosphorodithioate	*Di-Syston 15%
pyrethrins	Pyrenone Crop Spray
pyrethrins+rotenone	Pyrellin
spinosad	Conserve SC
sulfotepp	*Fulex Dithio, *Plant Fume 103
WHITEFLIES	
abamectin	Avid 0.15EC
acephate	Orthene 97, 1300 Orthene TR, Orthene TT & O
azadirachtin	Azatin XL, Neemix 4.5EC, Neemix 0.25EC
Beauveria	BotaniGard, Naturalis-L
bendiocarb	Closure 76WP
bifenthrin	Attain TR, *Talstar Nursery
chlorpyrifos	*Dursban 50W Nursery, *Dursban Pro
chlorpyrifos+cyfluthrin	Duraplex TR
cyfluthrin	Decathlon 20WP
diazinon (suppression)	*Knox Out GH
dichlorvos	DDVP
dimethoate	Dimethoate 4 EC
endosulfan	Gowan Endosulfan 3EC, Gowan Endosulfan 50WSB, Phaser *Thiodan 3EC, Fulex Thiodan Smoke
fenoxycarb	Precision, Preclude TR
fenprothrin	*Tame 2.4EC

^a See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(c) recommendation based on an efficacy statement.

Table 5. Pesticides registered for control of specific insect and mite pests^a (continued)

<i>Insect or mite problem</i>	<i>Control</i>
WHITEFLIES (continued)	
fluvalinate	*Mavrik Aquaflow
horticultural oil	Ultra-Fine Oil
imidacloprid	Marathon 1G, Marathon 60WP, Merit 75WP
insecticidal soap	I.S. 49.52 CF (Olympic), M-Pede
kinoprene	Enstar II
lambda-cyhalothrin	Topcide, Topcide O/S
malathion	Gowan 8, Malathion 5EC
naled	Dibrom 8E
neem oil	Triact 70
oxythioquinox	Joust
permethrin	*Astro, *Pounce 3.2EC
phosphorodithioate	*Di-Syston 15%
pyrethrins	1100 Pyrethrum TR, Pyrenone Crop Spray
pyrethrins+rotenone	Pyrellin
pyridaben	Sanmite
pyriproxyfen	Distance
sulfotepp	*Fulex Dithio, *Plant Fume 103

^a See Table 6 for information regarding formulation, application, specific pests and the crop uses for which the material is registered. This table does not indicate the crop and setting for which the pesticides are registered.

* Restricted-use material, to be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials

<i>Trade name</i>	<i>Common name</i>	<i>EPA reg. no.</i>	<i>REI</i>	<i>Chem. class</i>
Address T/O	acephate 75%WP	70506-1-707	24	OP
Registered against: aphids, mealybugs, thrips				
For use in shadehouses and greenhouses on field-grown ornamentals and foliage plants. Apply as foliar spray. Has translaminar properties. Do not apply more than 16 fl. oz. or less than 8 fl. oz. per acre. For resistance management, make no more than six applications per cropping cycle. Do not use more frequently than at seven-day intervals. Rotate with products that have different modes of action. See label for complete plant list, rates, and specific instructions.				
Adept	diflubenzuron 25% WP	400-469	12	IGR
Registered against: armyworms, fungus gnat larvae, shore fly larvae				
For use in enclosed commercial structures only. Apply as soil drench or coarse spray to soil surface for control of certain soil-inhabiting insects. For control of certain foliar-feeding insects apply as foliar spray. See label for specific rates and instructions.				
Agree	Bacillus thuringiensis subsp. aizawai 3.8%WP	100-733	4	Bacteria
Registered against: lepidopterous larvae (caterpillars)				
Labeled for use on spearmint, peppermint, herbs, and spices. See label for specific rates and instructions.				
*Astro	permethrin 36.8% EC	279-3141	24	P
Registered against: adult root weevils, ants, aphids, armyworms, bagworms, Japanese beetles, lace bugs, leaf-feeding caterpillars, leafhoppers, leafminers, leafrollers, lygus bugs, mealybugs, plant bugs, root weevils, whiteflies				
For ornamental use. Apply when insects appear or feeding is noticed. Leaf burn may occur on salvia and Pteris fern. See label for specific rates and instructions.				
Attain TR	bifenthrin 0.5% aerosol	499-306	WPS ventilation requirements must be met	P
Registered against: aphids, armyworms, bagworms, caterpillars, fungus gnats, mealybugs, mirids, mites, omnivorous leafroller, plant bugs, scale, thrips, whiteflies				
For use in greenhouses. Greenhouse temperatures should be between 60° and 80° F for best results. See label for specific rates and instructions.				
Avid 0.15EC	abamectin	618-96	12	ML
Registered against: aphids, leafminers, spider mites, thrips, whiteflies				
For use on shadehouse, greenhouse, field-grown ornamentals, and foliage plants. Apply as foliar spray. Not recommended for use on ferns and Shasta daisies. See label for specific rates and instructions.				
Azatin XL	azadirachtin 3% EC	62552-10	4	IGR
Registered against: aphids, armyworms, bagworms, beetles, cankerworms, caterpillars, chafers, cutworms, flies, fungus gnats, grubs, leafhoppers, leafminers, leafrollers, mealybugs, psyllids, sawflies, shore flies, thrips, weevils, whiteflies				
Can be used indoors and outdoors. Controls insect larvae when they ingest or come in contact with it. Interferes with insect's ability to molt. See label for specific rates and instructions.				
BioBit HP	Bacillus thuringiensis subsp. aizawai	275-131	4	EB
Registered against: caterpillars				
For use on flowers, bedding plants, ornamentals, and greenhouse crops. May be used to control small immatures; apply when eggs start hatching and larvae are small. Must be ingested to be effective, so thorough coverage is essential. See label for specific rates and instructions.				
BotaniGard 22WP	Beauveria bassiana 20%WP	65626-10	4	M
Registered against: aphids, mealybugs, thrips, whiteflies				
For use on ornamentals and vegetables in indoor and outdoor nurseries, greenhouses, shadehouses, commercial landscapes/interiorscapes, and on turf. Designed for application without additional wetting agents and spreaders. Acts by contact: spores must attach to cuticle of target insect to be effective, so thorough coverage is essential. Most effective when used early, before high insect populations develop. Typically it takes three to seven days for insects to die and 7 to 10 days after first spray to see a reduction in an insect population. Do not tank mix with fungicides. See label for plant list, rates, and specific instructions.				

* Restricted-use material. To be applied by certified applicator only.

2(e) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

<i>Trade name</i>	<i>Common name</i>	<i>EPA reg. no.</i>	<i>REI</i>	<i>Chem. class</i>
BotaniGard ES	Beauveria bassiana Strain GHA 11.3%	65626-8	12	M
Registered against: aphids, mealybugs, thrips, whiteflies				
For use on ornamentals and vegetables in indoor and outdoor nurseries, greenhouses, shadehouses, commercial landscapes/interiorscapes, and on turf. Designed for application without additional wetting agents and spreaders. Acts by contact: spores must attach to cuticle of target insect to be effective, so thorough coverage is essential. Most effective when used early, before high insect populations develop. Typically it takes three to seven days for insects to die and 7 to 10 days after first spray to see a reduction in an insect population. Do not tank mix with fungicides. See label for plant list, rates, and specific instructions.				
Cinnamite	cinnamaldehyde 30%EC	58866-12-65626	4	BOT
Registered against: aphids, mites				
Can be used on herbs and spices, bedding plants, flowers (greenhouse and field), greenhouse ornamentals and vegetables, bare root stock, container stock, fresh-cut flowers, ornamental starts, roses, vegetable and fruit starts, shade trees, and nursery trees. Product kills primarily by contact so complete coverage is essential. All applications should be preceded by a phytotoxicity check to ensure that the material is safe for that particular plant variety. It is recommended that no more than two consecutive applications of product be used; after two applications rotate to alternative chemicals for at least two applications. Product works best in a pH range of 3.5 to 7.5; use outside this range may cause product degradation. See label for complete plant list, rates, and specific instructions.				
Citation	cyromazine 75% WP	100-667	12	IGR
Registered against: larvae of dipterous leafminers, fungus gnats, and shore flies				
For use on indoor and outdoor ornamentals. For use on shore fly larvae only on greenhouse ornamental crops and in interiorscapes. Rotate with insecticides with different modes of action for leafminer control. See label for specific rates and instructions.				
Closure 76WP	bendiocarb 76% WP	58185-18	12	C
Registered against: aphids, caterpillars, leafminers, mealybugs, scale, springtails, thrips, whiteflies				
For use in greenhouses, saran or shade houses, and on nursery ornamentals. Do not use on cardoon, coleus, espiscia, and gloxinia because plant injury may occur. See label for complete plant list, rates, and specific instructions.				
Conserve SC	spinosad 11.6% SC	62719-2914	4	fermentation product
Registered against: beetles, caterpillars, gall midges, leafminers, sawflies, thrips (exposed)				
For use on ornamentals in nurseries, lath houses, shadehouses, or growing outdoors. Fermentation-derived insect control agent; because of its unique mode of action, can be used in resistance management programs in rotation with any other class of products. See label for specific rates and instructions.				
DDVP	dichlorvos smoke	1327-36	WPS ventilation requirements must be met	OP
Registered against: aphids, mealybugs, mites, whiteflies				
Fumigant, for use in greenhouses only. Greenhouse temperatures should be between 70° and 90° F during application. See label for specific rates and instructions.				
Deadline Granules	metaldehyde 4% bait	64864-2	12	Molluscicide
Registered against: slugs, snails				
For use in ornamental greenhouses, on ornamental plantings, commercial ornamental nurseries, and ground covers. For best results apply in the evening. Especially beneficial if applied following rain or irrigation. See label for specific rates and instructions.				
Decathlon 20WP	cyfluthrin 20% WP	3125-430	12	P
Registered against: aphids, armyworms, bristly rose slugs, budworms, crickets, cutworms, flea beetles, fungus gnats, grasshoppers, Japanese beetles (adults), June beetles (adults), lace bugs, leaf-feeding caterpillars, leafhoppers, leafrollers, leaf skeletonizers, mealybugs, midges, pillbugs, plant bugs, sawfly larvae, scale (crawlers), sowbugs, spittlebugs, thrips, whiteflies				
For use on ornamentals in nurseries and greenhouses, outdoor landscaped areas, and interior plantscapes. See label for specific rates and instructions.				

* Restricted-use material. To be applied by certified applicator only.

2(ee) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

<i>Trade name</i>	<i>Common name</i>	<i>EPA reg. no.</i>	<i>REI</i>	<i>Chem. class</i>
Dibrom 8E	naled 58% EC	59639-15	24	OP
Registered against: aphids, leafrollers, mealybugs, spider mites, whiteflies (adults)				
For use in greenhouses as a vapor treatment of roses and other ornamentals. Avoid overtreatment and direct application to plants; corrosive to metals. See label for specific rates and instructions.				
Dimethoate 4 EC	dimethoate 44.8%	5905-493	48	OP
Registered against: aphids, iris borer, lace bugs, leafhoppers, mites, scale, thrips, whiteflies				
Can be applied to ornamental plantings. Use only on ornamental plants listed on label. Can be applied as foliar spray, soil drench, or soil injection. See label for specific rates and instructions.				
Dimilin 25W	diflubenzuron 25% WP	400-469	12	EB
Registered against: caterpillars (beet armyworm)				
For use on field- or greenhouse-grown chrysanthemums. See label for specific rates and instructions.				
Dipel 2X	Bacillus thuringiensis subsp. kurstaki 6.4% WP	275-37	12	IGR
Registered against: armyworms, caterpillars, leafrollers, loopers				
For use on indoor and outdoor ornamentals. Larvae of targeted insect pest must ingest deposits of product to be affected. Treat when larvae are young. See label for specific rates and instructions.				
Distance	pyriproxyfen 11.23%	59639-96	12	EB
Registered against: aphids (suppression only), fungus gnats, scale, shore flies, whiteflies				
For use on indoor (greenhouse, lath, and shadehouse and interiorscapes) and outdoor ornamentals, including flowering and foliage crops, ground covers, and shrubs and on nonbearing fruit and nut trees. Will not control adult insects, and it is recommended to be used in combination and/or rotation with other IPM materials. Apply no more than two times per cropping cycle or no more than two times per six months. Do not apply to Boston fern, coral bells, ghost plant, salvia, or schefflera. Do not apply to poinsettias after bract formation. See label for complete plant list, rates, and specific instructions.				
*Di-Syston 15%	phosphorodithioate 15%	3125-172	48	OP
Registered against: aphids, lace bugs, leafhoppers, leafminers, mites, scale, thrips, whiteflies				
For outdoor use only. For use on ornamental flowers and groundcovers and on shrubs and trees. Granular product is a systemic and should be thoroughly incorporated in the soil. See label for specific rates and instructions.				
Duraguard ME	chlorpyrifos 20% ME	499-367	12	OP
Registered against: ants, aphids, beetles, caterpillars, centipedes, crickets, cockroaches, flies, fungus gnats, Japanese beetles, leafhoppers, leafminers, mealybugs, mites, plant bugs, scale, thrips				
For use on indoor and outdoor ornamentals. See label for plant list, specific rates, and instructions.				
DuraPlex TR	chlorpyrifos 8% + cyfluthrin 1.6%	499-405	12	OP
Registered against: aphids, caterpillars, fungus gnats, mealybugs, mites, scale, shore flies, thrips, whiteflies				
Labeled for use in greenhouses and commercial garden centers only as a total release spray. May be used on bedding plants, cut flowers, hanging baskets, foliage plants, flowering plants, and ornamentals. See label for specific rates and instructions.				
*Dursban 50W Nursery	chlorpyrifos 50 WP ¹	62719-255	12	OP
Registered against: adelgids, ants, aphids, armyworms, beetles, borers, caterpillars, cutworms, earwigs, grasshoppers, lace bugs, leafhoppers, leafminers, leafrollers, mealybugs, mites, plant bugs, psyllids, sawflies, scale, sowbugs, spittlebugs, thrips, weevils, whiteflies				
Use on ornamentals growing outdoors or in outdoor nurseries. See label for specific rates and instructions.				
¹ New end-use products containing chlorpyrifos may be restricted or cancelled. Check the registration status before purchase and use.				

* Restricted-use material. To be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

Trade name	Common name	EPA reg. no.	REI	Chem. class
*Dursban Pro	chlorpyrifos 22.5% EC ¹	62719-166	NA	OP
Registered against: adelgids, ants, aphids, armyworms, beetles, black vine weevil, caterpillars, cutworms, earwigs, grasshoppers, lace bugs, leafhoppers, leafminers, leafrollers, mealybugs, millipedes, mites, plant bugs, psyllids, sawflies, scale, sowbugs, spittlebugs, thrips (exposed), whiteflies				
For use on outdoor ornamentals not grown for sale or commercial production. See label for specific rates and instructions.				
¹ New end-use products containing chlorpyrifos may be restricted or cancelled. Check the registration status before purchase and use.				
Dylox 80	trichlorfon 80% WP	3125-184	NA	OP
Registered against: armyworms, caterpillars, cutworms, dipterous leafminers, lygus bug, narcissus bulb fly				
For use on landscape ornamentals and narcissus. Not for use on plants being grown for sale or other commercial use. Phytotoxicity has occurred on certain varieties of carnations and zinnias. See label for specific rates and instructions.				
Enstar II	kinoprene	55947-82	12	IGR
Registered against: aphids, fungus gnat larvae, mealybugs, scale, whiteflies				
For use in greenhouses and interiorscapes on ornamentals. Apply before bract formation in poinsettia. Some varieties of roses show delayed damage. See label for specific rates and instructions.				
Floramite	bifenazate 50% WP	400-481	12	CAE
Registered against: mites				
For use in greenhouses, shadehouses, and nurseries and on field, interiorscape, and outdoor ornamentals. Product should be applied as soon as mites appear and will provide residual control for up to 21 days. Primarily active on the motile stages of mites but also has ovicidal activity against spider mites. Do not use product in successive applications. Make only one application of product before rotating to products of an alternative chemical class, and use at least two alternative products between treatments of product. See label for complete plant list, rates, and specific instructions.				
*Fulex Dithio Smoke	sulfotepp	1327-38	WPS ventilation requirements must be met	OP
Registered against: aphids, brown soft scale, mealybugs, mites, thrips, whiteflies				
Fumigant for use in greenhouses only and only on azaleas, carnations, chrysanthemums, geraniums, poinsettia, roses, and snapdragons. Greenhouse temperatures should be between 70° and 90° F during application. Do not apply when foliage is wet. See label for specific rates and instructions.				
Fulex Thiodan Smoke	endosulfan 15% smoke	1327-35	WPS ventilation requirements must be met	CH
Registered against: aphids, whiteflies				
For use in greenhouses only. Greenhouse temperatures should be between 70° and 85° F during application. See label for specific rates and instructions.				
Gnatrol	Bacillus thuringiensis subsp. israelensis	275-52	4	EB
Registered against: fungus gnat larvae				
For use in ornamental and nursery plantings in greenhouse or potting soil mixtures. Use as a soil drench. Larvicide—must be applied when larvae are present. See label for specific rates and instructions.				
Gowan 8	malathion 79% EC	10163-21	12	OP
Registered against: aphids, beetles, caterpillars, leafhoppers, mealybugs, millipedes, plant bugs, scale, sowbugs, springtails, thrips, whiteflies				
For use on ornamentals. Avoid using on ferns and Crassula. See label for specific rates and instructions.				
Gowan Endosulfan	3EC (34% EC)	10163-110	24	CH
	or 50WSB (50% WP)	10163-130	24	CH
Registered against: aphids, cyclamen mites, leatherleaf fern borer, rose chafer, whiteflies				
For use on commercially grown ornamentals in greenhouses and outdoors. On chrysanthemums best results will be obtained before plants flower. Certain varieties of chrysanthemums may be injured; see label. See label for specific rates and instructions.				

^{*} Restricted-use material. To be applied by certified applicator only.

[#] 2(ec) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

<i>Trade name</i>	<i>Common name</i>	<i>EPA reg. no.</i>	<i>REI</i>	<i>Chem. class</i>
Hexygon	hexythiazox 50% WP	10163-208	12	TH
Registered against: mites (eggs and immatures)				
For use on outdoor ornamentals; not for use in greenhouses. Activity is predominantly ovicidal/larvicidal, thus must be applied before adult mite buildup. See label for specific rates and instructions.				
I.S. 45.52 EC	potassium salts of fatty acids 49.52%	36488-31	12	Soap
Registered against: aphids, beetles, caterpillars, crickets, earwigs, fungus gnats, lace bugs, leafhoppers, mealybugs, mites, plant bugs, sawflies, scale and scale crawlers, thrips, whiteflies				
For use on ornamentals. Kills by contact so complete coverage is essential. Apply when temperatures are below 85° F. Do not apply to nasturtium, sweetpea, violet, or newly planted cuttings. See label for specific rates and instructions.				
Javelin WG	Bacillus thuringiensis subsp. kurstaki 7.5%	55947-136	12	EB
Registered against: caterpillars, leafrollers				
For use on flowers and ornamentals outdoors and in the greenhouse. See label for specific rates and instructions.				
Joust	oxythioquinox 38% EC	3125-437	24	Dithiocarbonate
Registered against: mites, mite eggs, whiteflies				
For use on ornamentals—outdoor use only. For best results apply before insect pests are present in high numbers and before any foliar symptoms appear. See label for specific rates and instructions.				
Kelthane T/O	dicofol 50% WP	707-229	12	CH
Registered against: mites				
For use in nurseries, on flowers and ornamentals. Spray to ensure penetration of dense foliage and to give uniform and thorough coverage of upper and lower leaf surfaces. To prevent or delay mite resistance, alternate product with a miticide that has a different mode of action. See label for specific rates and instructions.				
*Knox Out GH	diazinon 23% ME	4581-379	12	OP
Registered against: aphids, fungus gnat larvae, leafminers, mealybugs, mites, scale, shore fly larvae, thrips, whiteflies (suppression)				
For use on ornamentals indoors and outdoors. Treat when insects appear. Can be used as a foliar spray or soil drench. See label for list of ornamental plants and specific rates and instructions.				
Malathion 5EC	malathion 57%	19713-217	12	CH
Registered against: aphids, beetles, caterpillars, lace bugs, leafhoppers, leafminers, mealybugs, millipedes, plant bugs, scale, sowbugs, spider mites, springtails, thrips, whiteflies				
For use on ornamentals and flowers, in and around greenhouses and gardens. Injury may occur on ferns, Crassula, and lantana. See label for specific rates and instructions.				
Marathon 1G	imidacloprid 1% G	3125-452	12	CN
Registered against: aphids, mealybugs, whiteflies				
For use on ornamental plants in commercial nurseries and greenhouses. Systemic insecticide: must be placed where roots of the plant can absorb the active ingredient. Apply when root systems are well established. See label for specific rates and instructions.				
Marathon 60WP	imidacloprid 60%	3125-492	12	CN
Registered against: adelgids, aphids, mealybugs, thrips (suppression), whiteflies				
For use only on greenhouse and nursery ornamental plants. For application as a soil treatment only; is a systemic insecticide. Apply when root systems are well established. See label for specific rates.				
*Mavrik Aquaflow	fluvalinate 22%	55947-101	12	P
Registered against: aphids, beetles, caterpillars, leafhoppers, mealybugs, mites, plant bugs, thrips, weevils, whiteflies				
For use on ornamentals. Spray water should be buffered to pH 5–7. Can also be used as a dip for flower and foliage cuttings. See label for specific rates and instructions.				

* Restricted-use material. To be applied by certified applicator only.

2(ee) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

<i>Trade name</i>	<i>Common name</i>	<i>EPA reg. no.</i>	<i>REI</i>	<i>Chem. class</i>
Merit 75WP	imidacloprid 75% WP	3125-439	NA	CN
Registered against: aphids, mealybugs, whiteflies				
For use on ornamentals in commercial and residential landscapes and interior plantscapes—not for use in greenhouses and nurseries. For use as a foliar or broadcast application. See label for specific rates and instructions.				
*Mesuroil	methiocarb 75% WP	3125-288	24	C
Registered against: aphids, mites, slugs, snails, western flower thrips				
May be used on nursery and greenhouse ornamentals. Do not apply in conjunction with foliar fertilizers. Make up to four applications per season. See label for specific rates and instructions.				
M-Pede	potassium salts of fatty acids 49% EC	53219-6	12	Soap
Registered against: aphids, caterpillars, earwigs, grasshoppers, lace bugs, leafhoppers, mealybugs, mites, plant bugs, sawflies, scale, spittlebugs, thrips, whiteflies				
For use on ornamentals. Kills by contact so complete coverage is essential. See label for specific rates and instructions.				
Naturalis-L	Beauveria bassiana	53871-9	4	EF
Registered against: aphids, beetles, caterpillars, lygus bugs, leafhoppers, mealybugs, mites, psyllids, thrips, weevils, whiteflies				
Insect-specific fungus. See label for specific rates and instructions.				
Neemix 0.25EC	azadirachtin .25% EC	70051-5	12	IGR
Registered against: aphids, caterpillars, leafminers, mealybugs, thrips, whiteflies				
For use on plants in and around commercial nurseries, greenhouses, and interiorscapes. Most effective when applied two to three times in succession. Insect growth regulator—will not kill adult insects. pH sensitive; should be used within several hours of preparation for maximum effectiveness. See label for specific rates and instructions.				
Neemix 4.5EC	azadirachtin 4.5% EC	70051-9	12	IGR
Registered against: aphids, caterpillars, leafminers, mealybugs, thrips, whiteflies				
For use on plants in and around commercial nurseries, greenhouses, and interiorscapes. Most effective when applied two to three times in succession. Insect growth regulator—will not kill adult insects. pH sensitive; should be used within several hours of preparation for maximum effectiveness. See label for specific rates and instructions.				
Nemasys	Steinernema feltiae	NA	NA	Nematodes
Registered against: fungus gnat larvae				
Can be used on ornamental plants in nurseries, greenhouses, landscapes, and interiorscapes. Naturally occurring, insect-parasitic nematode that seeks out fungus gnat larvae, enters their natural body openings, and releases symbiotic bacteria that kill the pests. Can be used as a preventive or curative control. Apply as soon as possible after potting or placement in the greenhouse. Apply solution to moist soil or growing media.				
*Nicotine Smoke	nicotine 14% smoke	1327-41	WPS ventilation requirements must be met	BOT
Registered against: aphids, thrips				
For use in greenhouses only. Greenhouse temperatures must be between 70° and 85° F during application. Do not fumigate violets. See label for specific rates and instructions.				
*Oftanol 2	isofenphos 22% EC	3125-342	NA	OP
Registered against: Japanese beetle larvae				
For use on outdoor ornamental areas and outdoor container-grown ornamentals only. Apply as a coarse spray or a drench. See label for specific rates and instructions.				

* Restricted-use material. To be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

<i>Trade name</i>	<i>Common name</i>	<i>EPA reg. no.</i>	<i>REI</i>	<i>Chem. class</i>
Omite 30WS	propargite 30% WP	400-82	7 days (or after 48 hours if early entry PPE [listed on label] is worn)	OS
Registered against: mites				
For use on field-grown roses. Packaged in water-soluble bags. Not compatible with alkaline materials. Complete coverage of upper and lower leaf surfaces is necessary for effective control. See label for specific rates and instructions.				
Ornamite	propargite 30% WP	400-426	7 days (or after 48 hours if early entry PPE [listed on label] is worn)	OS
Registered against: mites				
For use on field and nursery ornamentals, including field-grown roses. Packaged in water-soluble bags. Not compatible with alkaline materials. Complete coverage of upper and lower leaf surfaces is necessary for effective control. See label for specific rates and instructions.				
Ornazin 3% EC	azadirachtin	5481-476	12	IGR
Registered against: caterpillars, fungus gnat larvae, leafminers, mealybugs, scale, whiteflies				
For greenhouse, lath, and shadehouse use. For use on bedding plants, cut flowers, foliage plants, and flowering plants. Product is an insect growth regulator that prevents the development of the immature insects. Product will not control adult insects. Apply no more than two times per cropping cycle or no more than two times per six months. See label for complete plant list, rates, and specific instructions.				
Orthene 1300TR	acephate 3% total release	499-369	24	OP
Registered against: aphids, cabbage loopers, cankerworms, caterpillars, fungus gnats, lace bugs, leafminers, leafrollers, lygus bugs, mealybugs, mites, scale, thrips, whiteflies				
For use in commercial greenhouses. Greenhouse temperatures should be between 65° and 85° F for best results. See label for specific rates and instructions.				
Orthene TT & O	acephate 75% WP	59639-26	24	OP
Registered against: ants, aphids, black vine weevil, Japanese beetles, leafrollers, lygus bugs, mealybugs, scale (crawlers), thrips, whiteflies				
For use in greenhouses, outdoors, and on ground covers. See label for specific rates and instructions.				
Orthene 97	acephate 97% pellets	59639-91	24	OP
Registered against: ants, aphids, black vine weevil, leafrollers, mealybugs, plant bugs, scale (crawlers), whiteflies				
May be used on container-grown nursery stock, outdoor floral crops and ground covers, and greenhouse floral and foliage plant crops. Application of product on poinsettias after bract formation may result in phytotoxicity on certain varieties. Do not apply to chrysanthemums and roses with open flowers. Some phytotoxicity has been observed on certain foliage plants and some chrysanthemum varieties. See label for specific rates and instructions.				
Phaser	endosulfan 50% WP	8340-14	24	CH
Registered against: aphids, cyclamen mites, leatherleaf fern borer, rose chafer, whiteflies				
For use on commercially grown ornamentals—greenhouse and outdoors—and on leatherleaf fern. On chrysanthemums best results will be obtained before plants flower. Certain varieties of chrysanthemums may be injured; see label. See label for specific rates and instructions.				
#Pinpoint 15 G	acephate 15% G	59639-87	12	OP
ants, aphids, azalea lace bug, mealybugs				
For use on container-grown azalea, holly, pyracantha, photinia, crape myrtle, and poinsettia. Granular product must be uniformly distributed over soil surface. Do not apply to freshly rooted cuttings. See 2(e) bulletin for lower rates in smaller pots. Applicator must have 2(ee) request in his or her possession at time of application if using lower rates. See label for specific rates and instructions.				
*Plant Fume 103	sulfotepp	8241-10	WPS ventilation requirements must be met	OP
aphids, brown soft scale, mealybugs, mites, thrips, whiteflies				
For use on greenhouse ornamentals only. Do not apply when foliage is wet. See label for specific rates and instructions.				

* Restricted-use material. To be applied by certified applicator only.

2(ee) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

Trade name	Common name	EPA reg. no.	REI	Chem. class
*Pounce 3.2EC	permethrin 38.4% EC	279-3014	24	P
Registered against: bagworms, beet armyworm, cabbage looper, caterpillars, lace bugs, leafhoppers, leafminers, leafrollers, whiteflies				
For field-grown ornamental nursery stock and chrysanthemums. Apply when insects appear or feeding is noticed. Avoid spraying blooms of chrysanthemums. Leaf burn may occur on salvia and Pteris fern. See label for specific rates and instructions.				
Precision	fenoxycarb 25% WP	100-750	12	IGR
Registered against: fungus gnat larvae, lepidopterous leafminers, shore fly larvae, soft scales, thrips, whiteflies				
For use on ornamentals in greenhouses and outdoors. Apply as a spray or drench for control of fungus gnats and shore flies. Do not apply to poinsettia after bract formation. See label for specific rates and instructions.				
Preclude PT 1200TR	fenoxycarb 0.6% total release	499-375	12	IGR
Registered against: aphids, scale, thrips, whiteflies				
For use in greenhouses. Greenhouse temperatures should be between 65° and 80° F for best results. See label for specific rates and instructions.				
Pyrellin EC	pyrethrins (0.6%) + rotenone (0.5%)	30573-2	12	BOT
Registered against: aphids, caterpillars, leafhoppers, leafminers, leafrollers, mealybugs, mites, plant bugs, thrips, whiteflies				
May be used on greenhouse and outdoor ornamentals, herbs, and spices. May be combined with other insecticides for a quicker and more complete kill where insect resistance may be a problem, and as an insect "exciter" to flush insects out of hiding and into contact with other spray residues. If use of a spreader/sticker spray adjuvant is desired, use a natural vegetable oil product. See label for specific rates and instructions.				
Pyrenone Crop Spray	pyrethrins (6%)	4816-490	12	BOT
Registered against: ants, aphids, beetles, caterpillars, earwigs, fungus gnats, grasshoppers, lace bugs, leafhoppers, leafminers, leafrollers, mealybugs, millipedes, mites, plant bugs, sowbugs, spittlebugs, springtails, thrips, whiteflies				
May be used on greenhouse and outdoor ornamentals, herbs, and spices. May be combined with other insecticides for a quicker and more complete kill where insect resistance may be a problem, and as an insect "exciter" to flush insects out of hiding and into contact with other spray residues. If use of a spreader/sticker spray adjuvant is desired, use a natural vegetable oil product. See label for specific rates and instructions.				
Pyrethrum TR 1100	pyrethrins 0.5% aerosol	499-243	12	BOT
Registered against: ants, aphids, beetles, cabbage worm, caterpillars, centipedes, cockroaches, crickets, fleas, flies, fungus gnats, leafhoppers, mealybugs, mites, rose chafer, rose slug, scale, weevils, whiteflies				
For use in greenhouses, garden centers, hobby greenhouses, and nurseries. For best results apply when greenhouse temperatures are 65° to 80° F. See label for specific rates and instructions.				
PYRIGRO	pyriproxyfen micro-encapsulated flowable	499-439	12	IGR
Registered against: fungus gnat larvae, scale, whiteflies				
For greenhouse, lath, and shadehouse use. For use on bedding plants, cut flowers, foliage plants, and flowering plants. Insect growth regulator that prevents the development of immature insects thus will not control adult insects. Apply no more than two times per cropping cycle or no more than two times per six months. See label for complete plant list, rates, and specific instructions.				
Sanmite	pyridaben 75% WP	7969-106	12	PDZ
Registered against: mites (broad mites, European red mite, two-spotted mites), whiteflies				
Labeled for use in greenhouses on ornamental plants. Do not use in successive miticide applications in the same greenhouse. See label for specific rates and instructions.				
ScanMask	Steinernema feltiae	NA	NA	Nematodes
Registered against: black vine weevil, fungus gnat larvae				
Can be used on ornamental plants in nurseries, greenhouses, landscapes, and interiorscapes. Product is a naturally occurring, insect-parasitic nematode that seeks out fungus gnat larvae, enters their natural body openings, and releases symbiotic bacteria that kill the pests. Can be used as a preventive or a curative control. Apply as soon as possible after potting or placement in the greenhouse. Apply solution to moist soil or growing media.				

* Restricted-use material. To be applied by certified applicator only.

2(ec) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

<i>Trade name</i>	<i>Common name</i>	<i>EPA reg. no.</i>	<i>REI</i>	<i>Chem. class</i>
Sevin 80WSP	carbaryl 80% WP	264-526	12	C
Registered against: ants, aphids, armyworms, azalea leafminer, blister beetle, caterpillars, cutworms, flea beetles, Fuller rose beetle, gall midges, grasshoppers, Japanese beetle, June beetle, lace bugs, leafhoppers, leafrollers, mealybugs, orange tortrix, plant bugs, psyllids, rose chafer, rose slug, sawflies (exposed), scale, sowbugs, springtails, thrips, webworms				
For use on ornamentals. Do not use on Boston Ivy, Virginia Creeper, or maidenhair fern because injury will result. See label for specific rates and instructions.				
Sevin SL	carbaryl 41% EC	264-335	12	C
Registered against: ants, aphids, armyworms, azalea leafminer, blister beetle, caterpillars, cutworms, flea beetles, Fuller rose beetle, gall midges, grasshoppers, Japanese beetle, June beetle, lace bugs, leafhoppers, leafrollers, mealybugs, orange tortrix, plant bugs, psyllids, rose chafer, rose slug, sawflies (exposed), scale, sowbugs, springtails, thrips, webworms				
For use on ornamentals. Do not use on Boston Ivy, Virginia Creeper, or maidenhair fern because injury will result. See label for specific rates and instructions.				
Sluggo	iron phosphate 1%	67702-3-54705	none	Other
Registered against: slugs, snails				
For use in greenhouse and outdoor ornamentals. For terrestrial use only. See label for complete plant list, rates, and specific instructions.				
Talstar F	Bifenthrin 7.9% flowable	279-3105	12	P
Registered against: ants, aphids, black vine weevil, beetles, caterpillars, centipedes, earwigs, fungus gnats, grasshoppers, lacebugs, leafhoppers, leafminers, leafrollers, mealybugs, millipedes, mites, plant bugs, scales, sowbugs, thrips, whiteflies				
For use in greenhouses and on interiorscapes. Use of an alternate class of chemist in a treatment program is recommended to prevent or delay pest resistance. See label for complete plant list, rates, and specific instructions.				
*Talstar Nursery	bifenthrin 7.9% flowable	279-3155	12	P
Registered against: ants, aphids, bagworms, black vine weevil, centipedes, crickets, cutworms, earwigs, flea beetles, fungus gnats, grasshoppers, Japanese beetle (adults), lace bugs, leafhoppers, leafminers, leafrollers, mealybugs, millipedes, mites, plant bugs, scale, sowbugs, thrips, weevils, whiteflies				
For use on landscape ornamentals and in greenhouses. See label for specific rates and instructions.				
*Tame 2.4EC	fenpropathrin 30.9% EC	59639-77	24	P
Registered against: aphids, black vine weevil, Japanese beetles, lace bugs, leafhoppers, leafminers, mealybugs, mites, whiteflies				
For use on ornamentals indoors only in New York State. To aid in preventing insect resistance, products from other chemical classes should be included with or alternated with this product in a spray program. See label for specific rates and instructions.				
*Thiodan 3EC	endosulfan 33.7% EC	279-2924	24	CH
Registered against: aphids, cyclamen mite, leatherleaf fern borer, rose chafer, whiteflies				
For use on ornamentals outdoors and in greenhouses, also for use on leatherleaf fern for leatherleaf fern borer. See label for specific rates and instructions.				
Thiodan 50WP	endosulfan 50% WP	279-1380	24	CH
Registered against: aphids, cyclamen mite, leatherleaf fern borer, rose chafer, whiteflies				
For use on ornamentals outdoors and in greenhouses, also for use on leatherleaf fern for leatherleaf fern borer. See label for specific rates and instructions.				
Topcide	lambda-cyhalothrin 10% WP	10182-379	24	P
Registered against: ants, aphids, armyworms, bagworms, beetles, black vine weevils (adults), caterpillars, cockroaches, crickets, cutworms, lace bugs, leafhoppers, leafminers (adults), leafrollers, mealybugs, midges, mites, pillbugs, plant bugs, root weevils, sawflies, scale, spiders, spittlebugs, thrips, whiteflies				
For use on ornamentals grown in greenhouses and shadehouses. See label for specific rates and instructions.				

* Restricted-use material. To be applied by certified applicator only.

2(e) recommendation based on an efficacy statement.

Table 6. Insecticides for control of insect and mite pests of perennials (continued)

Trade name	Common name	EPA reg. no.	REI	Chem. class
Topcide O/S	lambda-cyhalothrin 10% WP	10182-417	24	P
Registered against: ants, aphids, beetles, black vine weevils (adults), caterpillars, lace bugs, leafhoppers, leafminers, leafrollers, pillbugs, plant bugs, sawflies, scale, spittlebugs, thrips, whiteflies				
For use on ornamentals in nurseries. Packaged in water-soluble bags. Applications should be started before establishment of high pest populations; apply at seven-day intervals if retreatment is necessary. See label for specific rates and instructions.				
Triact 70	neem oil 70%EC	70051-2	4	BOT
Registered against: aphids, leafhoppers, mealybugs, mites, scale, whiteflies				
For use on plants in and around commercial nurseries, greenhouses, and interiorscapes. Most effective when applied 2-3 times in succession. pH sensitive; should be used within several hours of preparation for maximum effectiveness. See label for specific rates and instructions.				
*Turcam	bendiocarb 76% WP	45639-59	12	C
Registered against: aphids, azalea leafminer, black vine weevil, lace bugs, mealybugs, scale, thrips, whiteflies				
Labeled for use on outdoor ornamentals. For control of black vine weevil larvae in container production, use as a soil drench. See label for specific rates and instructions.				
Ultra-Fine Oil	refined petroleum distillate 98.8%	862-23-499	4	Hort Oil
Registered against: aphids, caterpillars, fungus gnats, lace bugs, leafminers, mealybugs, mites, sawflies, scale (immatures), whiteflies				
For use on greenhouse ornamentals and outdoor flower and foliage plants. Kills by contact only so adequate coverage is essential. See label for specific rates and instructions.				
*Vendex 50WP - T/N/O	fenbutatin 50%WP	1812-413	48	OP
Registered against: mites				
For use on greenhouse and outdoor ornamentals. To achieve best results apply when mite populations are just beginning to build. Product performs best when the daily temperature averages above 70° F. Do not add oil to spray solution. Under greenhouse conditions, foliage and flowers of certain species may demonstrate sensitivity to repeat applications. See label for complete plant list, rates, and specific instructions.				
XenTari DF	<i>Bacillus thuringiensis</i> subsp. <i>aizawai</i> 10.3%	275-104	4	EB
Registered against: lepidopterous larvae (caterpillars)				
For use in greenhouses or the field. Treat when larvae are young and actively feeding. Product must be ingested to be effective, so thorough coverage is essential. See label for complete plant list, rates, and specific instructions.				
XenTari WDG	<i>Bacillus thuringiensis</i> subsp. <i>aizawai</i>	275-85	4	EB
Registered against: caterpillars				
For use on greenhouse, shadehouse, and outdoor nursery crops. May be used to control small immatures; apply when eggs start hatching and larvae are small. Must be ingested to be effective, so thorough coverage is essential. See label for specific rates and instructions.				

* Restricted-use material. To be applied by certified applicator only.

2(ee) recommendation based on an efficacy statement.

Note: Trade or brand names in this summary are given with the understanding that endorsement is not intended or criticism implied for those products not mentioned. Other labeled formulations may also be available for use. Read label carefully before using any of these chemicals.

A suitable spreader-sticker might improve efficacy on perennials having glossy or waxy leaves. However, be sure to follow label directions/precautions, and test for phytotoxicity on a few plants before extensive use.

Chemical classes: BOT = Botanical	M = Mycoinsecticide
C = Carbamate	ML = Macrocyclic lactone
CAE = Carboxylic Acid Ester	N = Nematodes
CH = Chlorinated Hydrocarbon	OC = Organochlorine
CN = Chloronicotiny	OP = Organophosphate
Cyclo = Cyclodiene	OS = Organosulfur
EB = Entomopathogenic Bacteria	P = Pyrethroid
EF = Entomopathogenic Fungus	PDZ = Pyridazinone
IGR = Insect Growth Regulator	TH = Thiazolinone

Pesticide Emergency Numbers

Pesticide Spills and Accidents

CHEMTREC

1-800-424-9300

Pesticide/Information Emergencies

National Pesticide Telecommunications Network

1-800-858-7378

Report Oil and Hazardous Material Spills

NYS Department of Environmental Conservation

(in NY) 1-800-457-7362

(from outside NY) 1-518-457-7362

Agricultural Nurse Program

Western New York 1-800-388-6536

Central New York 1-800-343-7527

Eastern New York 1-518-436-5511

Information on Symptoms and Treatment

You can obtain prompt and up-to-date information about the symptoms and treatment of cases resulting from exposure to toxic agricultural chemicals by telephoning any of the centers listed below and asking for "Poison Control Center."

When you are unable to reach a Poison Control Center or obtain the information your doctor needs, the office of the NYS Pesticide Coordinator at Cornell University may be able to assist you in obtaining such information: 607-255-1866.

Poison Control Centers

Western New York 1-800-888-7655

Eastern New York 1-800-336-6997

Finger Lakes Region 1-800-333-0542

New York City 1-212-340-4494

Central New York 1-800-252-5655

Long Island 1-631-542-2323

Additional copies of this publication may be purchased from Cornell University, Media and Technology Services Resource Center, 7 Cornell Business & Technology Park, Ithaca, NY 14850. Phone: 607-255-2080. Fax: 607-255-9946. E-mail: resctr@cornell.edu

A free catalog of Cornell Cooperative Extension publications and audiovisuals is available from the same address, or from any Cornell Cooperative Extension office. The catalog also can be accessed at the following World Wide Web site: <http://www.cce.cornell.edu/publications/catalog.html>

This publication is issued to further Cooperative Extension work mandated by acts of Congress of May 8 and June 30, 1914. It was produced with the cooperation of the U.S. Department of Agriculture, Cornell Cooperative Extension, New York State College of Agriculture and Life Sciences, New York State College of Human Ecology, and New York State College of Veterinary Medicine, at Cornell University. Cornell Cooperative Extension provides equal program and employment opportunities. D. Merrill Ewert, Director.

Alternative formats of this publication are available on request to persons with disabilities who cannot use the printed format. For information call or write the Office of the Director, Cornell Cooperative Extension, 365 Roberts Hall, Ithaca, NY 14853 (607-255-2237).

© 2000 Cornell University
Produced by Media and Technology Services at Cornell University
Printed on recycled paper
160PMRHP 9/13/1035 1/01 8C CR MTS00229