

# Pesticide Regulations and Safety 11

(updated October 2008)

The information on safe pesticide use is summarized from the BC Pesticide Applicator Course for Agricultural Producers. Study kits for the course are available from Office Products at 1-800-282-7955.

## Legislation

Laws protect applicators, bystanders, consumers and the environment. You can be fined for breaking the laws.

## Canadian Laws

### *Pest Control Products Act & Regulations*

Every pesticide used or sold in BC must be registered by Health Canada. Each label must have a PCP Act # on it. Using pesticides without a PCP Act # (from other countries) is against the law unless you have a pesticide [Own Use Import Program](#), which can be obtained through the Pest Management Regulatory Agency. Each label must also list the crops and pests the pesticide can be used on. Using pesticides for uses not on the label is against the law.

Pesticides are labeled as Domestic, Commercial or Restricted. Restricted products are more hazardous and have special restrictions on the label.

### *Agriculture and Agri-Food Administrative Monetary Penalties Act (AMPs)*

AMPs provides an enforcement tool which can be imposed when a person has violated the Pest Control Products Act (PCP), rather than pursuing prosecution under the PCP Act itself. It imposes monetary penalties (similar to court imposed fines, such as for speeding) through an administrative process with no criminal record or imprisonment.

### *The Food and Drugs Act*

All foods must be free of harmful amounts of substances. Health Canada sets levels of allowable pesticide residues on crops at harvest. These levels are called maximum residue limits or MRLs. The

Canadian Food Inspection Agency takes random samples of crops to test for pesticide residues at the time of sale. If residues are more than the MRL the crop may be seized. If you follow the label recommendations and wait the required days before harvest, residues should not be over the limit.

### *The Fisheries Act and Migratory Birds Regulations*

You can be charged if you kill or harm fish or migratory birds with pesticides. This applies to creeks, rivers, and lakes on your own property as well as on public land. It is illegal to introduce pesticides into waters either directly or indirectly through spray drift or run-off.

### *Transportation of Dangerous Goods Act*

Certain dangerous goods cannot be transported unless you use shipping documents, special labels, and vehicle signs. Ask your pesticide dealer if the product you have bought needs special transport procedures. Growers are usually exempt from this when they are transporting less than 500 kg of pesticide.

## British Columbia Laws

### *Integrated Pest Management Act and Regulations*

The BC Ministry of Environment also has rules about the sale and use of pesticides in BC. Rules that apply to farmers include:

1. Pesticides labeled Restricted or Commercial must be kept in vented and locked storage that has a warning sign on the door.
2. Anyone buying or using pesticides labeled Restricted must have an applicator certificate. Table 11.2 lists pesticides (referred to in this guide) that can be purchased and used only by certified applicators under the *Integrated Pest Management Act*.
3. An authorization such as a pesticide use licence, pest management plan or permit is required to apply pesticides to public land. Contact your local Ministry of Environment office for details.

4. Businesses selling pesticides must be licensed and their sales people must be certified.
5. Anyone applying pesticides in exchange for a fee must have an applicator certificate and a Pesticide Use Licence. But, if you spray your neighbour's crops you do not need a license as long as the work is done as a favor and no money is exchanged.
6. Everyone must dispose of containers and leftover pesticides safely.

### *WorkSafeBC (formerly the Workers' Compensation Board)*

[WorkSafeBC](#) Regulations for Occupational Health and Safety apply to farmers who must be registered by WorkSafeBC. If you are unsure whether they apply to you, call WorkSafeBC at 1-888-621-7233. [FARSHA](#) (Farm and Ranch Safety and Health Association) at 1-877-533-1789 can also provide information on WorkSafeBC regulations.

The WorkSafeBC regulations cover conditions of workplaces such as general safety procedures, hazardous substances, pesticides, confined spaces such as silos and storage bins, protective clothing and equipment, tools, machinery and equipment, and animal handling.

The regulations on pesticides outline requirements for pesticide applicator certification, emergency medical care, washing facilities, personal protective clothing and equipment, application equipment, pesticide application, posting warning signs, re-entry into treated areas, record keeping, drift prevention, and aerial application. Copies of the regulations are available from any WorkSafeBC office.

Their pesticide regulations state that workers must be over 16 years old and must have a valid pesticide applicator certificate from the Ministry of Environment if they mix, load or apply moderately or very toxic pesticides, or if they clean or maintain application equipment for these pesticides.

Table 11.2 lists which pesticides are moderately or very toxic and, identifies which pesticides can only be used by certified applicators. Anyone under the age of 25 years is considered a young employee and must complete a "new or young employee" orientation. FARSHA (1-877-533-1789) can help develop or present a program for your farm.

The WorkSafeBC re-entry requirements are listed in this chapter in the *Re-entry Restrictions* section. The record keeping requirements have been incorporated into the grower's spray record. Refer to the regulations for the rest of WorkSafeBC's requirements.

## Pesticide Toxicity

Some pesticides are more poisonous or toxic than others. The categories of pesticide toxicity used in this guide are listed in Table 11.1. The categories indicate short-term toxicity and are based on the LD<sub>50</sub> of the active ingredient. The LD<sub>50</sub> values are only a guide to the toxicity of a pesticide to humans.

<b>Toxicity</b>	<b>Oral LD<sub>50</sub></b> (mg/kg)	<b>Dermal LD<sub>50</sub></b> (mg/kg)
Very Toxic	0 to 50	0 to 200
Moderately Toxic	51 to 500	201 to 1,000
Slightly Toxic	over 500	over 1,000

## Hazard Shapes and Symbols

Shapes and symbols on pesticide labels indicate how harmful a pesticide can be. The shapes indicate how hazardous the product is. The symbols inside the shapes tell you the type of hazard. If symbols are not on labels, the pesticide has very low hazard.

## Exposure










Pesticides can enter your body through the skin (dermal), the mouth (oral), the lungs (inhalation), or the eyes. The skin is the most common route of poisoning for pesticide applicators. Skin contact may occur from a splash, spill or drift. Your skin is most likely to get contaminated when mixing and loading pesticides.

## Hazard

The hazard of using a pesticide depends on both its toxicity and the amount of exposure. Reduce hazards by selecting pesticides with low toxicity and by reducing exposure. Wear protective gear and follow safety guidelines.

**Figure 11.1: Pesticide Warning Symbols**

Pesticide warning symbols identify product hazards. The symbols you may see are:

 <p><b>DANGER POISON</b></p> <ul style="list-style-type: none"> <li>• very poisonous</li> <li>• (oral LD<sub>50</sub> less than 500)</li> <li>• always wear a respirator</li> <li>• always wear eye protection</li> </ul>	 <p><b>WARNING POISON</b></p> <ul style="list-style-type: none"> <li>• moderately poisonous</li> <li>• (oral LD<sub>50</sub> 500 to 1000)</li> <li>• wear a respirator in confined spaces</li> <li>• always wear eye protection</li> </ul>	 <p><b>CAUTION POISON</b></p> <ul style="list-style-type: none"> <li>• slightly poisonous</li> <li>• (oral LD<sub>50</sub> over 1000)</li> <li>• wear a respirator in confined spaces</li> <li>• could be an eye irritant, eye protection advisable</li> </ul>
<p><b>most flammable</b></p>  <p><b>DANGER EXTREMELY FLAMMABLE</b></p>	 <p><b>WARNING FLAMMABLE</b></p>	<p><b>less flammable</b></p>  <p><b>CAUTION FLAMMABLE</b></p>
<p><b>most corrosive</b></p>  <p><b>DANGER EXTREMELY CORROSIVE</b></p>	 <p><b>WARNING CORROSIVE</b></p>	<p><b>less corrosive</b></p>  <p><b>CAUTION CORROSIVE</b></p>

## Poisoning and First Aid

### Symptoms of Pesticide Poisoning

Know the poisoning symptoms of the pesticides you use. Read pesticide labels for symptoms. Effects from pesticide poisoning vary from person to person and are often hard to recognize. Some poisoning symptoms are headache, fatigue, nausea, dizziness, irritation of the skin or nose or throat, blurred vision, tiny pupils, trembling, perspiration, difficulty breathing, vomiting, and unconsciousness.

Call the Poison Control Centre or a doctor immediately if you suspect poisoning, and follow their instructions.

Poison Control Centres are open 24 hours a day. They give first aid information and treatments for

poisoning. The phone number of the Poison Control Centre (1-800-567-8911) can be found in the front of the phone book under Emergency Numbers.

### First Aid

Make sure you, and other people on the farm, know what to do in case of an emergency. Consider taking a first aid course and CPR course.

If someone has been poisoned:

1. Protect yourself.
2. Move the victim from the area of contamination.
3. Check if the victim is breathing. If breathing has stopped or is very weak, clear the airway and begin artificial respiration. Continue until the victim is breathing normally or until medical help arrives. When doing mouth-to-mouth

resuscitation, use a plastic mask to protect yourself from poison.

4. Call the Poison Control Centre (1-800-567-8911) or ambulance. Be ready to tell them the pesticide name, active ingredient, and the PCP Act registration number.
5. Unless the Poison Control Centre or doctor tells you otherwise, follow the procedures listed below, then transport the patient to the nearest hospital.

If a pesticide contacts the eyes put on waterproof gloves and hold the eyelids open and rinse with clean water for 15 minutes or more. Do not use an eye cup. Do not use chemicals or drugs in the wash water.

If pesticide contacts the skin, put on waterproof gloves, remove the contaminated clothing, and wash the affected area of the skin with lots of soap and water. Cover burned areas with a loosely applied, clean cloth. Do not apply any drugs or medications to the burned area. Do not use ointments, greases, creams, lotions or other drugs. If the victim is in shock, keep the person lying down and warm until medical help arrives.

If pesticide was breathed in, take the victim to fresh air as quickly as possible, loosen tight clothing and watch for signs of unconsciousness or convulsions. Keep the airway open and begin resuscitation if breathing has stopped or is difficult. Use a plastic facemask to protect yourself. To prevent chilling, wrap the patient in blankets but do not overheat. Keep patient as quiet as possible.

If a pesticide is swallowed:

- If a person is conscious and able to swallow, give them ½ to 1 glass of milk or water. Larger quantities may cause vomiting.
- Do not induce vomiting.
- Call the Poison Control Centre at 1-800-567-8911 for further advice.
- If the patient is retching or vomiting, place the patient face down with their head lower than their body in the recovery position. This prevents vomit from entering the lungs and causing more damage. Do not let the patient lay on their back. Clean the vomit from the patient and collect some in case the doctor needs it for chemical tests.
- When medical advice cannot be obtained, check and follow the pesticide label for directions.

- The doctor may recommend to administer activated charcoal to adsorb pesticide still in the stomach. Follow the doctor's instructions. Activated charcoal should be administered only with the advice of a medical attendant or doctor.

## Protective Clothing and Equipment

Wear protective clothing and equipment to minimize exposure to pesticides. Remember to wear safety equipment during mixing and loading, application, and clean-up. Always wear coveralls, waterproof boots, waterproof gloves, and a proper hat. You may also need to wear eye or face protection, and a respirator, waterproof apron, waterproof pants and jacket. The equipment you wear depends on the pesticide and type of application. Therefore, follow the safety recommendations on the pesticide label.

**Coveralls** - Wear long-sleeved coveralls over full-length pants and long-sleeved shirts. Make sure the coveralls are closed at the neckline and wrists. Remove your coveralls as soon as you have finished your pesticide activities. Remove them immediately if they become wet through with pesticide. Wear waterproof clothing if you might get wet during pesticide application.

Some disposable coveralls are suitable for pesticide use. Check with your supplier to see which ones can be used for pesticide application. When removing disposable coveralls, take care not to contaminate the inside if you will wear them again. Between wearing, hang them in a well-ventilated area away from other clothing.

Do not launder disposable coveralls but do wash clothing worn under disposable coveralls as you would other clothing worn during pesticide use. Replace with a new coverall when severe pilling (balls on the surface), rips or holes appear. To discard, place in a plastic garbage bag and take to a landfill site. Do not burn used coveralls.

**Gloves** - Always wear gloves when handling pesticides. Many glove materials are available. Use unlined waterproof gloves unless the pesticide label recommends a specific material. Do not use gloves made of leather, cloth, or natural rubber, or gloves with cloth linings. Make sure the gloves have no holes or leaks. Keep your coverall sleeves over the gloves and fold down the tops of the gloves to make

cuffs. Wash your gloves before removing them and after each use.

**Boots** - Wear waterproof, unlined knee-high boots of rubber or neoprene when you load, mix or apply pesticides. Wear your pant legs outside of your boots. Do not wear boots made of leather or fabric. Wash the outside of your boots after each use.

**Goggles and Face Shields** - Wear goggles if there is a chance of getting pesticide spray or dust in your eyes. Do not use goggles with cloth or foam headbands. Do not wear contact lenses when handling pesticides. Face shields provide extra protection when mixing and loading toxic pesticides. Wash goggles and face shields after use.

**Hats** - Wear a waterproof hat when pesticides may be splashed or when you could be exposed to drift. Wear a wide brimmed rubber rain hat when you will get wet with spray. Do not wear baseball caps, fabric hats, or hats with leather or cloth inner bands.

**Aprons** - Wear a waterproof apron when you pour and mix concentrated pesticides.

**Respirators** - Wear a respirator when the label says to wear one; or when the label says to avoid inhalation of dust, vapour, or spray mist; or if there is a danger poison symbol on the label; or if you are applying pesticides in an enclosed space. Make sure your respirator fits. Men should shave before using a respirator as facial hair prevents a proper fit.

Full-face respirators give more protection and may be more comfortable than a half facemask and goggles.

Do not use dust masks when applying pesticides. They do not protect you from the fumes.

Specially designed, enclosed tractor cabs fitted with air-purifying devices can protect you from pesticide vapours. A regular enclosed cab is not adequate protection if a respirator is required.

Special respirators must be worn when using a highly toxic fumigant such as methyl bromide. Check the label for details.

Respirators must be approved by NIOSH or an agency sanctioned by WorkSafeBC. The cartridges remove toxic fumes from the air. Cartridges labeled for organic vapours or pesticides are needed for most pesticides. Filters remove dust and mist. Both filters and cartridges must be replaced regularly for the respirator to work.

When you use your respirator:

1. Check the intake and exhaust valves.

2. Make sure there are no air leaks around the facemask. Do an inhalation or exhalation test.
3. Change the dust filter after 4 hours of use or more often if breathing becomes difficult.
4. Change the cartridges after 8 hours of use or sooner if you can smell the pesticide. Replace cartridges at least once a year and more often if you use them frequently.

## Protective Equipment for Fumigants, Smoke Bombs and Foggers

Use a full-face gas mask with correct canister when applying very toxic pesticides indoors. Keep a spare canister on hand as they can lose their effectiveness. A self-contained breathing apparatus that supplies clean air is recommended for indoor work with gases or extremely toxic compounds.

Wear a full-face mask when lighting smoke bombs and when airing the house. Light the bomb farthest from the door and work toward the door. If smoke bombs are placed in more than one path, they should be lit at the same time by a separate person in each path.

When using fogging machines, wear complete protective clothing, including hat, jacket, pants or coveralls, waterproof gloves and full-face mask.

## Cleaning Protective Clothing and Equipment

After application, wash your gloves, boots, goggles, faceshield and apron. Wash your respirator face piece with soap and warm water. Then rinse it with clean water and dry it with a clean cloth. Keep the cleaned respirator in a plastic bag in a clean, dry place. Store the respirator and protective clothing away from pesticides and spray equipment.

Discard clothing that has been soaked with a pesticide.

Launder all your clothing after each day of applying pesticides. Wash protective clothing separately from the rest of the laundry. Do not touch contaminated clothing with bare hands. Use rubber gloves. Pre-rinse clothing using the presoak cycle. Use a high water level and the hottest water setting on your machine. Use a heavy-duty detergent.

If clothes are heavily contaminated, run through two complete cycles. Hang clothes outside to dry in the sunlight if possible. Clean the washing machine by running it through a full cycle with detergent and no clothes to remove any pesticide residue.

## Personal and Environmental Safety Guidelines

### Buying Pesticides

- Make sure the pesticide is registered for your specific use (crop and pest).
- Only buy what you can use up in a year.

### Transporting Pesticides

- Never transport pesticides with food, feed, fertilizer, clothing, or household goods.
- Lock up the pesticides if you leave your vehicle.
- Never transport pesticides in the passenger section of any vehicle.
- Ask the supplier if you need shipping papers and vehicle warning signs.

### Storing Pesticides & Shelf Life

Pesticides vary in their stability and response to storage conditions. Try to only purchase quantities of pesticides that can be used up in one growing season. However, under proper storage conditions most pesticides can be used after at least one year of storage.

Follow these guidelines for storage:

- The law says Commercial and Restricted pesticides must be kept in locked and vented storage that has a warning sign on the door.
- Store pesticides in their original container with the original label. If a label is illegible or missing, label it with the trade name, active ingredient, quantity in the container and PCP number. Then obtain a replacement label from your dealer or the PMRA website.
- Never keep pesticides near livestock, food, feed, fertilizer, seed, wells, water supplies, or in your home.
- Pesticide storage should be 30.5 metres from any well.
- Keep herbicides separate from other pesticides.

- Return pesticides to storage when not in use.
- Keep a list of the pesticides in storage.
- Protect the pesticides from extreme temperatures. Freezing destroys some liquid pesticides.
- Close containers when not in use.
- Dispose of unwanted, unmarked and damaged containers.
- Keep containers above floor level to protect from dampness and flooding.
- Post emergency numbers nearby.
- Keep a fire extinguisher, broom and shovel, absorptive material, and protective clothing near-by in case of emergencies.

### Mixing and Loading Pesticides

- Wear protective clothing and equipment.
- Read and follow label directions.
- Choose a mixing and loading site away from people, livestock, pets, wells, and water bodies.
- Measure accurately.
- Do not rip open paper pesticide bags. Slit them open with a sharp knife.
- Mix pesticides in still or low wind conditions. Stand upwind of the pesticide.
- Hold the container below eye level when measuring or adding pesticide into the spray equipment.
- Only use mixing equipment for pesticides and return it to locked storage when not in use.
- Triple rinse pesticide containers as soon as they are empty. Rinse measuring and mixing equipment. Put rinse water into the sprayer.
- Use clean water. The pH of the water should be from 5.0 to 7.0, and the alkalinity should be below 60 to 80 ppm.
- Prevent overflow. Don't leave the tank unattended.
- Prevent contaminating the water supply by leaving at least a 15 cm air gap between the end of the filler hose and the water in the spray tank. You can also use a backflow preventer valve.

### Applying Pesticides

- Read and follow label directions.
- Use calibrated application equipment.
- Use the label or production guide rate.

- Wash before eating, drinking, smoking, or using the toilet.
- Have fresh water and emergency supplies on hand.
- Make sure the area to be treated is clear of people and animals.
- Don't work alone when handling very toxic pesticides.
- Post warning signs if necessary to keep people out of treated areas.
- Use separate equipment for applying herbicides.
- Cover or remove animal food and water containers near the treatment area.
- Wear gloves to replace or clean plugged nozzles. Do not blow out a plugged nozzle or screen with your mouth. Use a soft brush or toothpick.
- Shut off the spray nozzles when you turn and stop the flow of granulars at the end of rows.
- Pesticides must be registered for chemigation before they can be applied through irrigation systems. Therefore, only apply pesticides through the irrigation system when the label has instructions for chemigation. If chemigation is used, follow *Chemigation Guidelines for BC*. This publication is available from the Irrigation Association of BC.
- Use and maintain the tractor speed chosen during calibration.
- Prevent pesticides from contaminating non-target areas. Leave an untreated area around lakes, streams, ditches, and wells. Spray down wind from sensitive areas.
- Minimize drift by:
  - not spraying in strong winds or dead calm. There is usually less wind in the early morning and late evening.
  - not spraying when temperatures are >30°C.
  - using boom sprayers with as low pressure as possible, the correct nozzles, large volumes of water, and setting the boom as near to the ground as possible to still get uniform coverage.
  - using a drift control agent.
  - using drift guard or other specialty nozzles that reduce drift.

## After Applying Pesticides

- Clean equipment away from water supplies.

- Remove and clean protective clothing and equipment.
- Shower.
- Keep records of every application.

## Disposal of Unwanted Pesticides

- Calculate the amount needed so none is left over.
- Do not re-spray an area to get rid of leftover spray.
- Apply left over material according to label directions on another site or crop listed on the label. Do not put unwanted pesticides into sewers, down drains, or on the land.
- Contact the regional office of the BC Ministry of Environment or Ministry of Agriculture and Lands for information on the disposal of unwanted pesticides.

## Disposal of Containers

- Drain the container into the spray tank for at least 30 seconds or shake out the bag.
- Triple or pressure rinse drums, glass bottles, plastic and metal containers. Single rinse plastic and paper bags.
- Put the rinse water into the spray tank.
- Crush, puncture or damage empty containers so they cannot be re-used.
- Return the containers to your pesticide storage until you can take them to a public dump, back to the supplier, or to a collection site. Containers can be buried on your land 0.5 metres below the surface. The burial site must be flat, not a bog, gravel or sandy soil and at least 200 metres from wells, lakes, rivers, streams or ponds.
- Do not burn pesticide containers.

## Re-entry Restrictions

Poisoning may occur when people work in treated areas too soon after pesticides have been applied. Such poisoning may be from breathing pesticide fumes or handling treated plants. Warn farm workers of areas recently sprayed. Some pesticide labels state when treated areas can be re-entered. Follow these directions.

When there are no re-entry times on a pesticide label, follow the WorkSafeBC regulations, which state that people may not enter a treated field until they have waited the following re-entry or restricted entry intervals:

- 24 hours for a slightly toxic pesticides,
- 48 hours for moderately or very toxic pesticides, and
- the total of the re-entry intervals for tank mixes of moderately and very toxic pesticides.

Table 11.2 indicates whether a pesticide is slightly, moderately, or very toxic. Use the re-entry interval on the label if it is longer than the WorkSafeBC intervals. If a person needs to enter a treated area before the re-entry period is over, wear protective gear. Farmers must post a sign that informs workers when they can enter a field. The sign must state the application date and the re-entry time. Signs can be obtained from FARSHA.

## Grazing Restrictions

If animals are to graze a treated area, check the pesticide label for grazing restrictions. Wait the required time before grazing.

## Special Environmental Precautions

### Buffer Zones

Many pesticide labels now contain buffer zone information. Buffer zones are strips of land next to sensitive areas that cannot be treated with a pesticide (see Figure 11.2). The purpose of the buffer zone is to protect sensitive areas from pesticide drift.

Applicators are required to leave a buffer zone when the label says to. A buffer zone only needs to be left between the end of the spray boom and the downwind sensitive area. Labels will tell you what sensitive areas must be protected and the size of the buffer zone. Labels may require protection of water bodies (aquatic) or planted areas (terrestrial).

## Protecting Fish and Other Wildlife

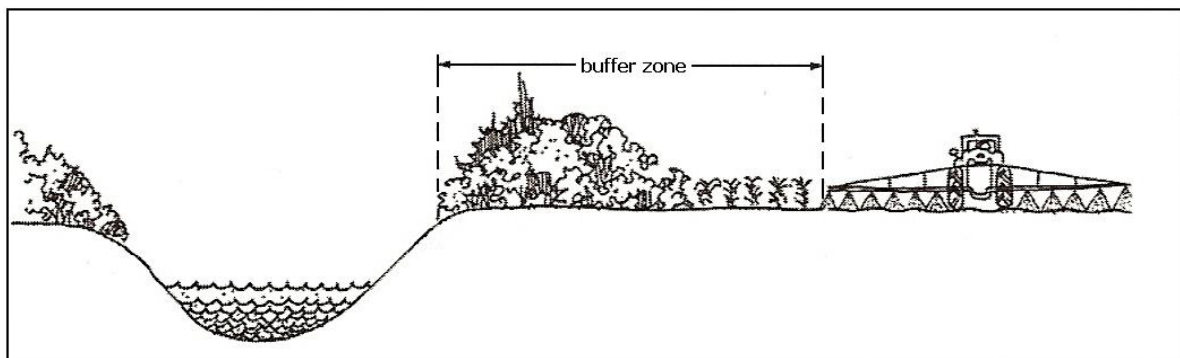
All insecticides, as well as some fungicides and herbicides, are very toxic to fish. Insecticides are toxic to birds and wildlife. Exposure to trace amounts of these pesticides may kill fish or birds. Destroying the vegetation along fish-bearing water harms fish by removing food and shelter.

Although migratory birds may be pests and damage crops, it is an offence under the Migratory Birds Convention to release any substance that may harm them. Responsible pesticide use helps to protect migratory birds.

Protect fish and wildlife from pesticide poisoning by following label precautions, safety guidelines in the guide, and the guidelines below:

- Use pesticides only when necessary.
- Select the least toxic and least persistent pesticides.
- Follow label directions regarding the size of buffer zones from downwind bodies of water to keep pesticides out of the water.
- Do not destroy vegetation along fish bearing waters and do not spray with pesticide.
- Incorporate granular insecticides.
- Use precautions to prevent drift, leaching and run-off to areas outside the treated area.
- Store treated seed where it cannot be eaten by animals.
- Place baits in covered bait stations.

**Figure 11.2: Schematic of Pesticide Buffer Zones**



## Protecting Bees and Beneficial Insects

Bees and other pollinating insects are essential for the production of many crops. Some other insects control pests. Many pesticides, particularly insecticides, are very toxic to honeybees, wild bees, and beneficial insects. Protect these insects from pesticide poisoning by:

- Telling nearby beekeepers about your spray program.
- Not applying pesticides near hives.
- Not applying pesticides toxic to bees when plants are in bloom.
- Selecting formulations least harmful to bees. Microencapsulated formulations are very hazardous; dusts are more hazardous than sprays; wettable powders are more hazardous than EC and liquid formulations; granulars are least hazardous to bees.
- Reducing drift.
- Timing applications carefully. Evening sprays are less hazardous than morning sprays. Both are safer than midday.

## Protecting Groundwater

Groundwater is the source of water for wells and springs. It is very difficult to clean contaminated groundwater. The solution to groundwater contamination is prevention.

Groundwater contamination is most likely to occur where soils are gravelly or sandy, the water table is close to the soil surface, there is high rainfall or extensive irrigation, or the pesticide is injected or incorporated into the soil. Pesticides that are persistent in the soil, are weakly absorbed and leach quickly, or are highly soluble may contaminate groundwater.

Remember to avoid spills, drift, and irrigation run off and to properly dispose of unwanted pesticides and empty containers. Never store pesticides near wells or pumphouses and guard against leaking containers.

Well construction, maintenance and location can be factors in contamination. Maintain proper seals between pump and pump base, as well as seals between well casings.

## Streamside Protection

Protecting stream bank or riparian habit is an important part of environmental health, fish protection, and water quality.

There are numerous laws relating to the protection fo fish habitat, wetlands, and streamside areas. A few of the laws that farmers must comply with include the *Water Act*, the *Fisheries Act*, and the *Integrated Pest Management Act and Regulations*. Farmers and producers are expected to exercise due diligence to ensure that they are conforming to regulations. They should also recognize that voluntary actions help to protect the environment.

Growers are encouraged to:

1. identify fish habitat, wetlands, and streamside areas on their farms,
2. assess whether any farming practices could harm these areas, and
3. modify practices to ensure they do not harm fish habitat, wetlands, and streamside areas.

The BC Agriculture Council's (BCAC ) [Environmental Farm Plan Program](#) (EFP) will facilitate these activities. Contact your grower association or the BCAC for more information on the program. EFP materials include a riparian management guide that will help to assess streamside areas.

The federal *Fisheries Act* prohibits the deposit of deleterious substances into streams. This includes farm products such as pesticides, fertilizers or wastes. The *Fisheries Act* also prohibits harmful alteration, disruption or destruction of fish habitat. This includes changes in fish habitat that reduces its capacity to support fish (i.e. removing streamside vegetation).

The provincial *Integrated Pest Control Act and Regulations* prohibits the use of a pesticide in a way that would cause an unreasonable adverse effect.

## Emergency Response

- Keep the phone numbers for the Poison Control Centre, doctor, ambulance, and Provincial Emergency number for dangerous goods spills nearby (1-800-663-3456). The Poison Control Centre phone number is in the front section of the telephone book.

- Have protective gear and equipment easily available.
- Keep absorptive material, a container for contaminated waste, tools to pick up contaminated material, bleach, and hydrated lime available.

## Spills

- Protect yourself.
- Keep bystanders away.
- Don't eat, smoke or drink during clean up.
- Work upwind of the spill.
- Contain the spill. Surround and cover it with absorbent material.
- Clean up the spill.
- Decontaminate the area using bleach or detergent. Absorb excess liquid with absorbent material.
- Put contaminated absorbent material in the special waste container and seal it.
- Remove and wash protective gear. Shower.
- If you need help, call the Provincial Emergency number (1-800-663-3456).

## Fires

Fires involving pesticides can be very dangerous. Burning pesticides may release toxic fumes that are poisonous to firefighters, bystanders, and animals, or that may contaminate the environment. Pressurized containers can explode. Pesticides can spill out of containers damaged by the fire. Runoff from fighting a fire can contaminate a larger area.

Ahead of time, give your fire department a list of all pesticides in storage (brand names, active ingredient, PCP #'s and quantity remaining). Update the list each year.

In case of a fire, call the fire department and tell them there is a fire involving pesticides. Keep people and animals away from the fire.

For more information on practices to reduce the potential of fires and dealing with fires involving pesticides see the Ministry of Agriculture and Lands [Pesticide Wise](#) website.

## Tank Mixing Pesticides

It is often both economical and convenient to apply a mixture of two or more pesticides when more than one pest is to be controlled. However, if the

pesticides are not compatible, applying the tank mix may result in damage to the application equipment, poor pest control, or plant injury.

Many pesticide labels contain a list of compatible pesticides. Some labels even contain directions for mixing the product with other pesticides. Compatibility charts are also available on the Internet. This information is useful in determining whether two pesticides are compatible, but the pesticide user should still take additional precautions when trying new pesticide mixtures.

The compatibility of the mix should be tested by mixing the pesticides in a small volume of water in the relative proportions the grower plans to use them.

The components should mix well when the mixture is stirred or shaken. The mixture should not separate nor should components settle out rapidly upon standing. New mixtures should also be applied initially on a small scale.

In general, it is riskier to mix two different types of formulations, for example wettable powders with emulsifiable concentrates. When using emulsified concentrates, always read the warnings on the manufacturer's label. When two or more chemicals are combined in the tank, the solution should be applied promptly to reduce the risk of crop injury or a decrease in effectiveness.

Spray injury can also arise from a variety of other causes. Improper operation of sprayers, excess dosage of chemicals, sudden weather change during or following spraying, sprays applied at low volume, or spraying during extremely hot periods, (32°C or higher) may cause either fruit or foliage injury.

## Pesticides Registered for Floriculture Use

### Pesticide Names, Relative Toxicity and Certification Requirement

Most pesticides have three different names, which include the chemical, trade, and common names. The common and trade names are most frequently used when referring to a particular pesticide. The common name is an acceptable abbreviation of the chemical name (= active ingredient). The manufacturer or formulator assigns the pesticide trade name. There can be multiple trade names for one active ingredient. For example, Dithane, Manzate and Penncozeb are all trade names of

insecticides containing the active ingredient mancozeb. The first letter of a trade name is always capitalized (e.g. Dithane), whereas the first letter of the common name is lower case (e.g. mancozeb), with the exception of abbreviated common names (e.g. MCPA).

The toxicity data are based on tests with rats and rabbits and are considered relevant to all mammals including humans.

The principal sources of information for the tables are *Farm Chemicals Handbook* (1999), *The Pesticide Manual* (12<sup>th</sup> Edition, 2000) published by the British Crop Protection Council, and product MSDS reports. Table 11.1 lists the toxicity categories used in this guide.

Products labeled RESTRICTED require pesticide applicator certification under the *BC Integrated Pest Management Act* (IPMA). All products that are very or moderately toxic, either orally or dermally, require pesticide applicator certification under WorkSafeBC (WSBC) regulations. If either regulation requires certification, the pesticide applicator must have the certificate.

To obtain a certificate you must pass the provincial Pesticide Applicator Exam. Courses are offered at some community colleges and through the United Flower Growers Co-operative Association to prepare applicants for the exam. For more information on how to apply to write the Pesticide Applicators or Dispensers Exam in your area, refer to Appendix F of this guide.

**Table 11.2: Acute Toxicity, Chemical Class and Certification Requirements of the Pesticides Registered for use on Floriculture Crops**

Trade Name	Active Ingredient	Group <sup>1</sup>	Acute Relative Toxicity		Certification Required	
			Oral	Dermal	IPMA <sup>2</sup>	WSBC <sup>3</sup>
<b>ALGAECIDES &amp; DISINFECTANTS</b>						
KleenGrow	didecyl dimethyl ammonium chloride	QA		M	N	Y
<b>FUMIGANTS</b>						
Basamid	dazomet	I-16	S	S	N	N
Vapam	metam-sodium	-	S	S	N	N
<b>FUNGICIDES</b>						
Acrobat 50 WP	dimethomorph	F-5	S	S	N	N
Aliette Ornamental & WDG	fosetyl-aluminum	F-U	S	S	N	N
Banner MAXX & 130EC	propiconazole	F-3	S	S	N	N
Captan 50-WP, 80-WP, 80WDG	captan	F-M	S	S	N	N
Compass 50WG	trifloxystrobin	F-11	S	S	N	N
Copper Spray 50%	copper oxychloride	F-M	S	S	N	N
Copper 53W	tribasic copper sulphate	F-M	S	S	N	N
Daconil 2787F & Ultrex	chlorothalonil	F-M	S	S	N	N
Decree 50 WDG	fenhexamid	F-17	S	S	N	N
Dithane DG, M-45, WSP 80WP	mancozeb	F-M	S	S	N	N

**Table 11.2: Acute Toxicity, Chemical Class and Certification Requirements of the Pesticides**

Registered for use on Floriculture Crops (continued)						
Trade Name	Active Ingredient	Group <sup>1</sup>	Acute Relative Toxicity		Certification Required	
			Oral	Dermal	IPMA <sup>2</sup>	WSBC <sup>3</sup>
<b>FUNGICIDES cont.</b>						
Eagle WSP & T&O	myclobutanil	F-3	S	S	N	N
Lime Sulphur 22%	sulphide sulphur	F-M	M	S	N	N
Maestro 80DF	captan	F-M	S	S	N	N
Manzate DF & PRO-STICK	mancozeb	F-M	S	S	N	N
Meltatox	dodemorph-acetate	F-5	S	S	N	N
MilStop	potassium bicarbonate	-	S	S	N	N
Mycostop	<i>Streptomyces griseoviridis</i>	-	S	-	N	N
No-Damp 3.2%	oxine benzoate	-	S	S	N	N
Nova 40W	myclobutanil	F-3	S	S	N	N
Penncozeb 80 WP	mancozeb	F-M	S	S	N	N
Phyton 27	copper, as elemental	F-M	S	S	N	N
Prestop	<i>Gliocladium catenulatum</i>	-	S	S	N	N
Quintozene 75WP	quintozene	F-14	S	S	N	N
Rhapsody ASO	<i>Bacillus subtilis</i>	-	S	S	N	N
Rootshield G & WP	<i>Trichoderma harzianum</i>	-	S	-	N	N
Senator 70WP	thiophanate-methyl	F-1	S	S	N	N
Subdue MAXX	metalaxyl-M and S-isomer	F-4	S	S	N	N
Sulphur	sulphur	F-M	S	S	N	N
Truban 25EC & 30WP	etridiazole	F-14	S	S	N	N
<b>HERBICIDES</b>						
Amitrol 240	amitrole	H-11	S	S	N	N
Bonanza 400	trifluralin	H-3	S	S	N	N
Casoron G-2 & G-4	dichlobenil	H-20	S	S	N	N
Dacthal	chlorthal	H-4	S	S	N	N
Devrinol 2-G, 10-G, 50-DF	napropamide	H-15	S	S	N	N
Dual II Magnum	s-metolachlor	H-15	S	S	N	N

**Table 11.2: Acute Toxicity, Chemical Class and Certification Requirements of the Pesticides Registered for use on Floriculture Crops (continued)**

Trade Name	Active Ingredient	Group <sup>1</sup>	Acute Relative Toxicity		Certification Required	
			Oral	Dermal	IPMA <sup>2</sup>	WSBC <sup>3</sup>
<b>HERBICIDES cont.</b>						
EcoClear	acetic acid	-	S	S	N	N
Gramoxone Ⓜ	paraquat	H-22	M	M	N	Y
Kerb 50 WSP	propyzamide	H-15	S	S	N	N
Princep Nine-T	simazine	H-5	S	S	N	N
Reglone Ⓜ	diquat	H-22	M	M	N	Y
Rival EC	trifluralin	H-3	S	S	N	N
Roundup Ultra2, Transorb HC, Original 360	glyphosate	H-9	S	S	N	N
Simadex Simazine F, Simanex, Simazine 480	simazine	H-5	S	S	N	N
Treflan EC & G	trifluralin	H-3	S	S	N	N
Venture L	fluazifop-P-butyl	H-1	S	S	N	N
<b>INSECTICIDES</b>						
Ambush 50EC	permethrin	I-3	M	S	N	Y
Avid 1.9% EC	abamectin	I-6	S	S	N	N
Citation 75WP	cyromazine	I-17	S	S	N	N
Confirm 240F	tebufenozide	I-18	S	S	N	N
Conserve 480 SC	spinosad	I-5	S	S	N	N
Cygon 480-ORN	dimethoate	I-1B	M	M	N	Y
Decis 2.5EC & 5EC	deltamethrin	I-3	M	S	N	Y
Diazinon 50 W, 500 E, 50 EC	diazinon	I-1B	S	S	N	N
Dimethoate 480 EC	dimethoate	I-1B	M	M	N	Y
Dimilin 25% WP	diflubenzuron	I-15	S	S	N	N
Dipel WP & 2X DF	<i>Bacillus thuringiensis</i>	I-11	S	S	N	N
Distance	pyriproxyfen	I-7	S	S	N	N
Dursban T	chlorpyrifos	I-1B	M	S	N	Y
Dylox 420 L & 80% SP	trichlorfon	I-1B	M	S	N	Y

**Table 11.2: Acute Toxicity, Chemical Class and Certification Requirements of the Pesticides Registered for use on Floriculture Crops (continued)**

Trade Name	Active Ingredient	Group <sup>1</sup>	Acute Relative Toxicity		Certification Required	
			Oral	Dermal	IPMA <sup>2</sup>	WSBC <sup>3</sup>
<b>INSECTICIDES cont.</b>						
Dyno-Mite	pyridaben	I-21	S	S	N	N
Endeavor 50WG	pymetrozine	I-9B	S	S	N	N
Endosulfan 400EC ♂	endosulfan	I-2A	V	M	N	Y
Enstar II	kinoprene	I-7	S	S	N	N
Entrust 80 W	spinosad	I-5	S	S	N	N
Forbid 240 SC	spiromesifen	I-23	S	S	N	N
Intercept 60 WP	imidacloprid	I-4	M	S	N	Y
Insecticidal Soaps – Opal 47%, PRO 25%, Safer’s 50.5%	salts of fatty acids	-	S	S	N	N
Lagon 480 E	dimethoate	I-1B	M	M	N	Y
Malathion 25W, 85EC, 500 E, 50, Gardex 50%	malathion	I-1B	S	S	N	N
Merit 60 WP	imidacloprid	I-4	M	S	N	Y
Nemasys	<i>Steinernema feltiae</i>	-	S	S	N	N
Nemasys H & L	<i>Heterorhabditis megidis</i>	-	S	S	N	N
Orthene 75% SP	acephate	I-1B	S	S	N	N
Sanmite	pyridaben	I-21	S	S	N	N
Sevin Liquid, SL, T&O, XLR PLUS, 50W	carbaryl	I-1A	M	S	N	Y
Success 480 SC	spinosad	I-5	S	S	N	N
Thiodan 4EC ♂, Thionex EC ♂ & 50 W ♂	endosulfan	I-2A	V	M	N	Y
Trounce	salts of fatty acids and pyrethrins	I-3	S	S	N	N
TriStar 70 WSP	acetamiprid	I-4	S	S	N	N
<b>MITICIDES</b>						
Apollo SC	clofentezine	I-10	S	S	N	N
Avid 1.9% EC	abamectin	I-6	S	S	N	N
Dyno-Mite	pyridaben	I-21	S	S	N	N
Floramite SC	bifenazate	I-25	S	S	N	N

**Table 11.2: Acute Toxicity, Chemical Class and Certification Requirements of the Pesticides Registered for use on Floriculture Crops (continued)**

Trade Name	Active Ingredient	Group <sup>1</sup>	Acute Relative Toxicity		Certification Required	
			Oral	Dermal	IPMA <sup>2</sup>	WSBC <sup>3</sup>
<b>MITICIDES cont.</b>						
Forbid 240 SC	spiromesifen	I-23	S	S	N	N
Kanemite 15 SC	acequinocyl	I-20B	S	S	N	N
Kelthane 50WP	dicofol	I-3	S	S	N	N
Sanmite	pyridaben	I-21	S	S	N	N
Shuttle 15 SC	acequinocyl	I-20B	S	S	N	N
Vendex 50W	fenbutatin-oxide	I-12	S	S	N	N
<b>PLANT GROWTH REGULATORS</b>						
A-Rest	ancymidol	-	S	S	N	N
B-Nine WSG	daminozide	-	S	S	N	N
Bonzi	paclobutrazol	-	S	S	N	N
Cycocel	chlormequat chloride	-	S	S	N	N
Dazide 85 WSG	daminozide	-	S	S	N	N
Piccolo	paclobutrazol	-	S	S	N	N
Sumagic	uniconazole	-	S	S	N	N
<b>RODENTICIDES</b>						
Hombre ☞	difethialone	-	S	S	N	N
Just One Bite ☞	bromadiolone	-	V	S	N	Y
Ramik Brown ☞	diphacinone	-	V	V	N	Y
Ratak ☞	brodifacoum	-	V	V	Y	Y
Rodent Pellets ☞	zinc phosphide	-	V	S	N	Y
Terminator ☞	bromethalin	-	V	M	N	Y

<sup>1</sup>Pesticides are categorized into different **Resistance Management Groups** based on their target site/mode of action. It is important to rotate pesticides of different groups to manage against the development of pest resistance.

<sup>2</sup>Ministry of Environment's *Integrated Pest Management Act*

<sup>3</sup>WorkSafeBC