

SAFE HANDLING OF AGROCHEMICALS A MODULE FOR FARM FAMILIES



**Brought to Canadian Farming Families by Partners in
Agricultural Health and Safety:**

*The Agricultural Health and Safety Network of the
Centre for Agricultural Medicine
University of Saskatchewan,
Agriculture and Agri-Food Canada,
Saskatchewan Agriculture and Food,
Saskatchewan Association of Rural Municipalities (SARM)*

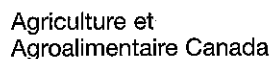


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Posting Signs for Spraying

- ✓ Slip plastic posting sign over cardboard.
- ✓ Fill in the chemical name and safe re-entry time. (A number of chemicals are available on the enclosed Fact Sheet.)
- ✓ Attach to fence posts or on stakes in fields BEFORE spraying.
- ✓ When field safe for re-entry, remove sign. Wear rubber gloves to take sign down and enclose it in a garbage bag and dispose of according to manufacturer's directions.

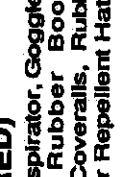
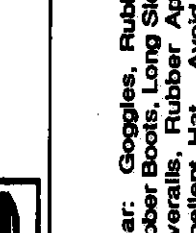

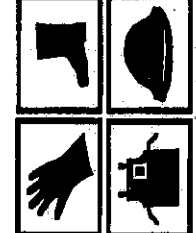

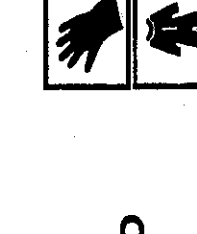
Have a safe spraying season!



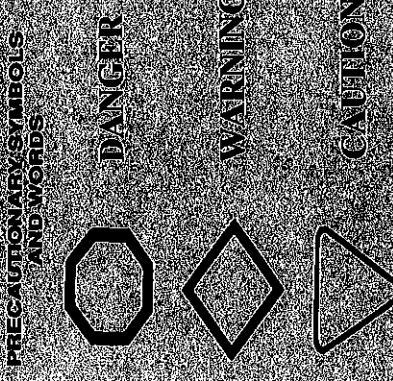
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A FARMER'S GUIDE TO PESTICIDE LABEL INTERPRETATION

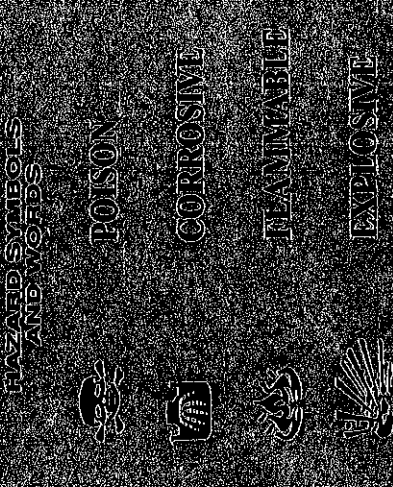
INTERPRETATION OF SYMBOL COMBINATIONS	PERSONAL PROTECTIVE EQUIPMENT
 Danger Poison	<p>HIGH HAZARD</p> <p>(MINIMUM REQUIRED)</p> <p>Wear: Respirator, Goggles, Rubber Gloves, Rubber Boots, Long Sleeved Coveralls, Rubber Apron and Water Repellent Hat.</p> 
 Warning Poison	<p>MODERATE HAZARD</p> <p>Wear: Goggles, Rubber Gloves, Rubber Boots, Long Sleeved Coveralls, Rubber Apron, Water Repellent Hat. Avoid fumes and spray mist. (Respirator Advisable in confined areas).</p> 
 Caution Poison	<p>LOW HAZARD</p> <p>Wear: Rubber Gloves, Rubber Boots, Long Sleeved Coveralls, Rubber Apron and Water Repellent Hat. Avoid fumes and spray mist. (Respirator advisable in confined areas).</p> 

PRECAUTIONARY SYMBOLS AND WORDS



DANGER
WARNING
CAUTION

HAZARD SYMBOLS AND WORDS



POISON
CORROSIVE
FLAMMABLE
EXPLOSIVE

POST NEAR WHERE YOU MIX OR HANDLE CHEMICALS



 Agriculture and Agri-Food Canada

Agriculture et Agroalimentaire Canada



SAFE HANDLING OF CHEMICALS: THE BALANCE

With modern technology, chemical compounds have become a part of everyday life in the home and at our workplaces. We use many "chemicals" and rarely think about them. The information and safety precautions discussed in this document applies to chemicals used in the home (such as oven cleaners), lawn and garden products as well as agrochemicals (such as fuels, fertilizers and pesticides).

Our challenge is to reduce risk by effective management and safety practices. When is the last time that you read a product label and followed its instructions? What does it say about possible health effects? What equipment should you wear in order to protect your eyes, your lungs or your skin?

*The best
source of information for any product
is
its label.*

THE RISK OF USING ANY SUBSTANCE IS
A COMBINATION OF THE DEGREE OF
EXPOSURE AND THE TOXICITY OF THE CHEMICAL.

R I S K = TOXICITY x EXPOSURE

- RISK:** the potential of negative health effects from using a substance
- TOXICITY:** the degree to which a substance is harmful or poisonous
- EXPOSURE:** the length of time exposed to a substance and how it is absorbed into the body

Home and garden chemicals usually come in a ready to use format and don't require mixing or other preparation. Agrochemicals often come in a concentrated powder or liquid and must be diluted with water for field application.



Most accidents occur when the operator is mixing or loading the pesticides.



Agrochemicals are designed for field use and should not be used in the yard or garden.

Classes of Chemicals:

Agrochemicals fall into several classes and are used in traditional farming methods. Within organic farming, fertilizers and pesticides come from a variety of natural sources. Be aware of any possible health effects regardless of the source.



Fuels: if spilled on clothing can soak through to skin; also an explosive hazard if working near open flame or sparks.

Solvents: used for degreasing equipment; if gloves not used, natural protective properties of the skin are broken down.

Fertilizers: anhydrous ammonia damages human tissue by freezing due to its low boiling point and because it is a strong alkali. NEVER ATTEMPT TO REMOVE CLOTHING THAT IS SOAKED WITH ANHYDROUS AMMONIA. It may be frozen to the skin and removal will cause added damage. Mild exposure can cause irritation of eyes, nose and lungs while prolonged exposure can cause suffocation. Always have a minimum of 5 gallons (20 liters) of water available when applying anhydrous ammonia. If eyes or skin have contact with anhydrous begin flushing area with water and continue for at least 15 minutes. **Immediately seek medical attention!**

Growth regulators: within crop production, used to stop stalk growth prior to heading time; decreases crop loss from lodging.

Veterinary supplies: can be injected (such as growth regulators or antibiotics) or used as dips to rid animals of external pests. The most common type of injury is due to operator self-injection. Facilities must be set up properly to control animals and operators must be aware of animal behaviours.

Cleaners and sanitizers: used in horticulture application, dairy operations, beef and pork operations.

Pesticides: is a general term that includes a number of subclasses. Herbicides are used to control weeds; insecticides (grasshoppers, moths), fungicides (fungus), rodenticides (rats, mice, gophers). Many insecticides work by affecting the central nervous system of insects. Due to this mechanism of action, humans are more vulnerable to this type of pesticide.

Desiccants: are used to stop plant growth prior to harvest. Desiccants are hazardous to the respiratory system and can cause irreversible damage and produce chemical burns on the skin.

HOW CHEMICALS ENTER THE BODY

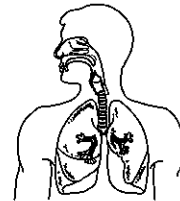
• Absorption:

- ☞ entering through the skin, eyes, or ear canals
- ☞ the most vulnerable areas of the human body include the eye, the scrotal area and ear canal
- ☞ the eye and the groin absorb **10x** faster than the forearm
- ☞ chemicals can be absorbed through healthy skin. Cuts and abrasions increase the amount of absorption as does moist, sweaty skin
- ☞ 90-95% of chemical is absorbed through the skin

Body part	Amount Absorbed
Eye	100%
Scrotal Area	100%
Ear canal	47%
Scalp	32%
Abdomen	19%
Foot	14%
Palm of hand	12%
Forearm	8.6%

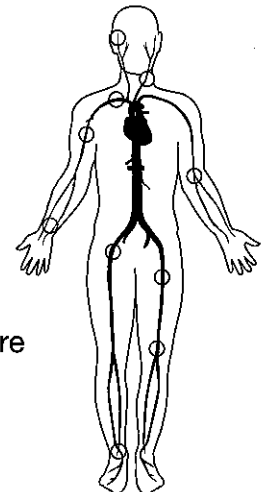
• Inhalation:

- ☞ breathing in dusts, powders, mists or fumes
- ☞ passes quickly into the bloodstream



• Ingestion:

- ☞ entering through the mouth (licking lips, smoking cigarettes, eating without washing hands well or blowing out nozzles)



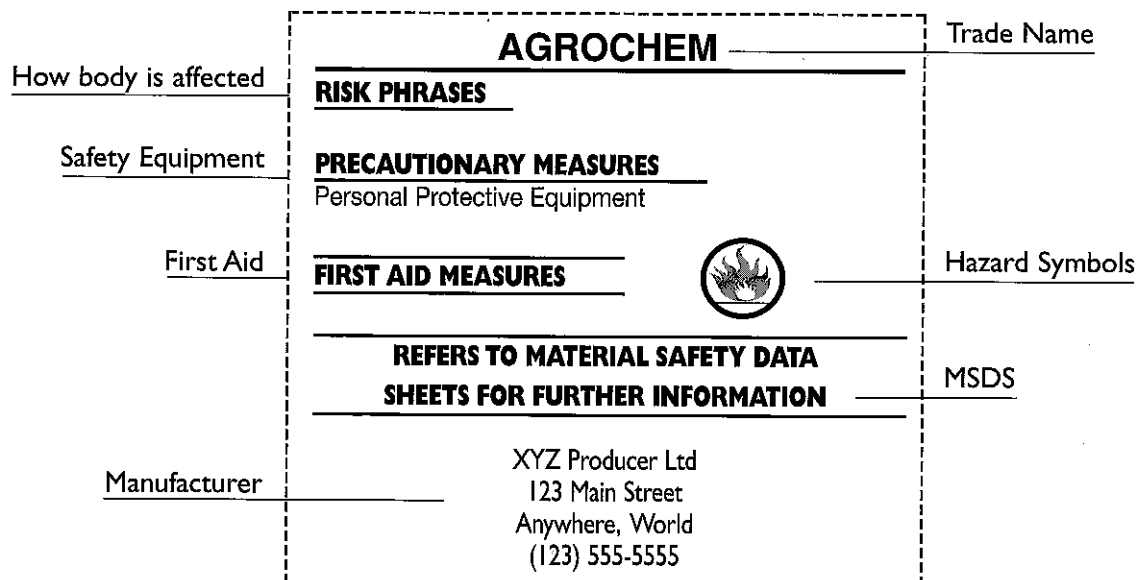
• Injection:

- ☞ by veterinary needles, staples, nails or wire punctures or more rarely by fluids forced under the skin by high pressure leaks

Safety first: Where to begin

- ① Read the label.
- ② Understand what the hazard symbols mean.
- ③ Identify the safety equipment required to do the job.
- ④ Obtain a Material Safety Data Sheet (MSDS) if more information is wanted. A MSDS is a sheet that contains more detailed information than the information found on labels. It should be available from the dealership where you purchased your chemicals.
- ⑤ Obtain additional information from agricultural extension officers or directly from manufacturers. Contact numbers are found on labels or containers.
- ⑥ Always keep a supply of at least 5 gallons of clean water on hand at the mixing site and on the sprayer.

What does a label say?



W A S H !!!

W A S H !!

W A S H !



- ✓ *Before eating*
- ✓ *Before smoking*
- ✓ *Before using the bathroom*

Hand washing is important in decreasing exposure to chemicals,
for both you and your family!

SAFETY
EQUIPMENT

(that may be recommended):

Gloves (*unlined rubber or neoprene*)

Goggles or Face Shield (*rubber or plastic strap*)

Ear muffs (*protects the ear canal from splashes*)

Rubber boots (*knee length and unlined*)

Hat (*water resistant*)

Apron (*protects the vulnerable groin area*)

Coveralls (*Cloth or disposable*)

Respirators (*NIOSH approved*)

Special Precautions:

1. Always take protective clothing to the field in case of application problems. Store outside of the vehicle or tractor cab in a covered container.
2. Layers of clothing are best in preventing chemicals from penetrating to the skin. For example, wearing cloth coveralls or a disposable plasticized coverall over regular clothing is advised.
3. Wear a water resistant hat. **No baseball caps, leather or cloth gloves, leather belts and leather boots** when spraying. Chemicals easily penetrate these items of clothing and can not be cleaned adequately. Each time these items are worn, exposure is increased.
4. Choose a lapped zipper on coveralls (like zippers on jeans) rather than open zippers. Open zippers allow chemicals through more readily.
5. Wear tightly woven clothing. (Hold it up to the light. How much light can you see?)
6. **ALWAYS** pull sleeves over the top of the gloves and pant legs over rubber boots to prevent splashes and spills from entering.
7. Wash clothes daily.
8. Apply a soil or water repellent finish to increase the resistance of clothing to chemical penetration.
9. Always store personal protective equipment outside the chemical storage area.
10. Gas permeable or soft contact lenses should not be worn. Lenses can absorb chemical fumes or vapours.
11. Shower immediately after spraying. Shampoo hair and clean under fingernails. Put on clean clothes.



SAVE HUGS FROM FAMILY MEMBERS
UNTIL AFTER
YOUR SHOWER!

Respirators:

Always consult a physician before choosing a respirator if you have lung or heart problems. Choose a NIOSH approved respirator and cartridges based upon product label recommendations. Disposable dust masks are generally not effective protection against chemical mists and fumes. Dust masks are designed to catch dust particles. **Test your respirator every time you wear it.** Dirt, body oils, perspiration and time cause respirator seals to lose their effectiveness. If your respirator does not seal completely, mists and fumes can be inhaled. A respirator may not fit properly if you:

- wear dentures
- have facial scarring
- are not clean shaven (even a five o'clock shadow)
- have had a broken facial bone or have had facial surgery.

Negative Fit Test:

1. Place mask over mouth and nose; adjust straps so that the mask fits snugly.
2. Place hands over cartridge so that no air can enter.
3. Breathe in and hold your breath.
4. The mask should suck in against the face and stay there for 10 seconds after the wearer has stopped breathing in.
5. If the mask does not collapse against the face or immediately releases, readjust the straps and repeat steps 1-4.
6. If you cannot maintain a tight seal as described, try a different size, make or model of respirator until you find one that does seal.

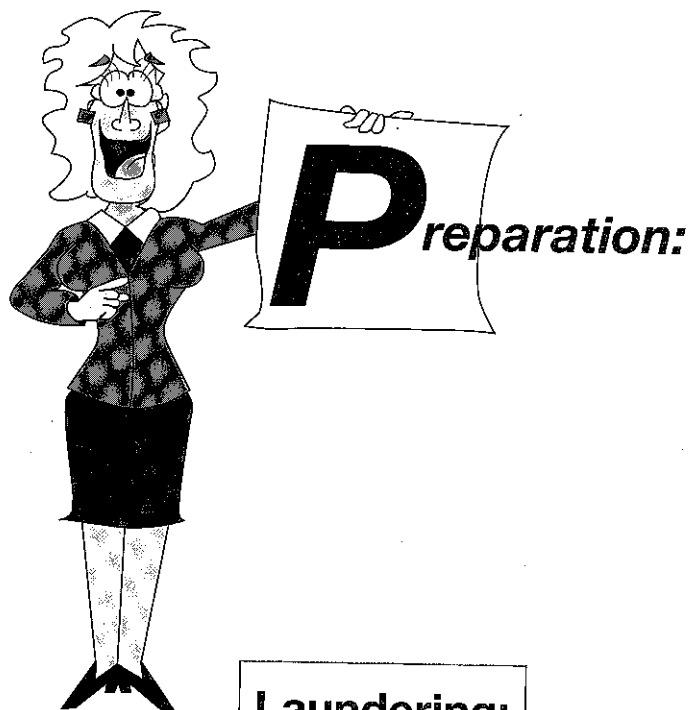
Respirator Fit Tests:



Asthma and exposure to insecticides

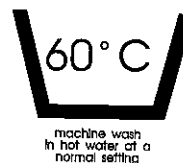
People with asthma may be sensitive to the class of insecticides known as cholinesterase inhibitors. Exposure to these insecticides may cause reactions in people with asthma that can range from mild wheezing to a severe asthma episode. If family members have asthma, spray around the farmyard carefully so that drift does not occur over the yard and home. If you or a family member have severe asthma, discuss with your physician about carrying an emergency kit for severe allergy reactions particularly during the aerial spraying season.

Daily Laundering Instructions:



1. Wash pesticide contaminated clothing separately from family clothing.
2. Use hot water (60C/140F); full water level; normal wash cycle.
3. Do not overcrowd clothes; wash 1 or 2 items at a time. Use one and a half times more heavy duty detergent than the product recommends.
4. Re-wash clothing 2-3 times.
5. Line dry the clothing to avoid contaminating the dryer. Sunlight helps to break down pesticide residue.
6. Run the empty washer through a full wash and rinse cycle with detergent added.

1. Read the pesticide label for information.
2. When applicable, remove pesticide granules from cuffs and pockets outdoors in the field.
3. Discard any garment contaminated with full-strength chemical according to product instructions.
4. Handle soiled clothing with chemical resistant gloves (such as unlined neoprene, polyethylene or rubber).
5. Use disposable plastic garbage bags for temporary storage of pesticide-soiled clothes before washing.
6. Pre-rinse pesticide-soiled clothing:
 - on presoak cycle of automatic washer OR
 - presoak in a suitable container (dump water on field) OR
 - spray/hose the garment outdoors (away from people, pets, and water sources).
7. Pre-treat heavily soiled areas. If an oil-based formulation has been used, treat with a laundry stain removal product intended for oil stains.



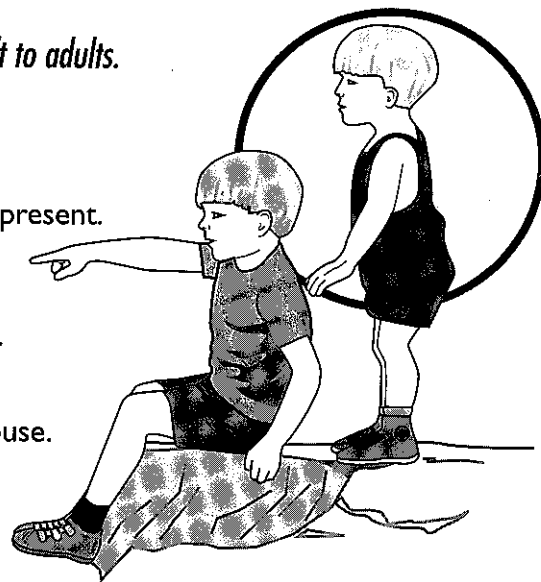
Children

Take extra precautions around children.

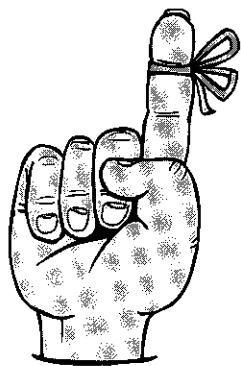
Children are naturally curious and love to help.

Applying chemicals in any form is a task best left to adults.

- ◆ Store all chemicals out of reach of small children.
- ◆ Spray gardens and flower beds when children are not present.
- ◆ Keep children away from sprayed areas for the period of time recommended on the label.
- ◆ Never pick up children when wearing clothes used for working with chemicals.
- ◆ Be aware of wind direction when spraying near the house.



Women who are pregnant, breastfeeding, or suspect that they are pregnant, should avoid handling chemicals.



Cleaning Protective Equipment

**Shower and change
into clean clothes !!**

While wearing your gloves:

- Wash your hard hat or waterproof hat, goggles, face shield, aprons and boots with hot soapy water then rinse and dry.
- Wash your respirator facepiece only. Before cleaning remove the cartridges. Wash the respirator in warm soapy water, rinse and air-dry. Check seals and valves for signs of damage or wear. Store the respirator and cartridge in a sealed plastic bag.
- Wash your gloves with hot soapy water, rinse and dry.

Pesticide Poisoning:



Signs and symptoms of poisoning are similar for products from the same chemical family but there is a wide range of severity. Two families of chemicals, the organophosphates and the carbamates, act by inhibiting an enzyme in the body called **cholinesterase**. If proper safety equipment is not worn or if it is not functioning properly, cholinesterase levels may decrease with each exposure to the insecticides until symptoms occur. It is important to know that symptoms may also occur from just one exposure. Once symptoms occur, individuals must completely avoid these insecticides until cholinesterase levels return to normal.

Symptoms of Pesticide Poisoning:

Mild symptoms may resemble influenza (the "flue"). Symptoms may progressively worsen to include: Headache, fatigue, muscle weakness, excessive sweating, nervousness, nausea, blurring of vision, excessive salivation, tightness in chest, difficulty breathing, confusion, diarrhea, vomiting, twitching of eyelids, joint and muscle pain, slow heart rate, constricted pupils, general muscle twitching, loss of bladder and bowel control, convulsion, coma, respiratory failure, **cholinesterase inhibition**.



Cholinesterase Testing:

Cholinesterase is an enzyme in the body that is essential to the proper functioning of the central nervous system. Insecticides such as the organophosphates and carbamates can interfere with the production of cholinesterase. Without an adequate amount of cholinesterase, acetylcholine (another enzyme) builds up in the body, and depending upon the level, the symptoms discussed above can occur. **Symptoms of weakness or breathing difficulty require immediate medical attention.**

If you use cholinesterase inhibiting insecticides more than 1 or 2 days a month, discuss cholinesterase testing with your physician. The following protocol is recommended:

1. **BASELINE** test: Obtain 30-60 days **before** the spraying season begins.
2. **PERIODIC** followup: If you have continuous exposure during the spraying season, testing is recommended monthly for cholinesterase levels. **EXCEPTION:** If a new worker has started, obtain a followup **within the first 10-14 days** to ensure the effectiveness of the protective measures.
3. **ACCIDENTAL EXCESSIVE EXPOSURE:** See your physician immediately if you have an accidental exposure such as a spill on clothing **OR** if you experience symptoms such as headache, dizziness, weakness, nausea, sweats, diarrhea, blurred vision or tightness in the chest.

First Aid

Training

First aid training gives individuals the skills needed to respond in an emergency situation. It is recommended that farm family members take a recognized first aid course and recertify regularly as advised.



In addition, a first aid kit may also contain items for use in case of accidental poisoning. Consult your doctor or local poison control centre before stocking these items in your first aid kit. (See inside back cover for list of main Poison Control Centres.)

First Aid Kit

- First aid kits are available in a variety of sizes from pharmacies, safety supply stores, cooperatives, St. John's Ambulance or make your own. Check your local phone book in the yellow pages under First Aid or First Aid Supplies.
- Each motorized vehicle on the farm should have a small first aid kit. Check the kit regularly to ensure all contents are usable and sealed.
- Larger first aid kits should be kept in the home and machinery shop.

Accidental Poisoning Kit:

- syrup of ipecac
- a one teaspoon measure
- activated charcoal
- two one quart containers of clean water
- disposable gloves
- tongue depressors (for mixing)
- two small empty jars with lids (One for drinking water and the other to collect a sample of vomit.)
- can of evaporated milk (If an individual has been poisoned by mouth with a corrosive substance, **DO NOT** induce vomiting.)
- can opener



ALWAYS CONTACT A DOCTOR OF POISON CONTROL CENTRE BEFORE USING THESE ITEMS. HAVE THE CHEMICAL LABEL READY FOR REFERENCE WHEN YOU MAKE YOUR PHONE CALL. IF USED INCORRECTLY, YOU MAY MAKE THE PERSON WORSE!

Spill Response:

Be prepared! When mixing or applying large quantities of chemical, be prepared for a spill or unexpected leak. A quick response protects the environment!

BEFORE MIXING OR APPLYING A CHEMICAL CHECK THE LABEL FOR RECOMMENDED SPILL CLEANUP.

1. Duct or electrician's tape: to seal leaks that could develop in hoses
2. Washer headed screws
3. Caulking or sealant
4. Extra hoses
5. Hose clamps
6. Absorbent materials (such as kitty litter, sawdust, sand at least 25 pounds): to absorb large spills before chemical seeps into ground
7. Shovel: to be used **ONLY** for spill cleanup
8. Plastic tarps or bags: to enclose absorbent material and contaminated soil

Buy the quantity of chemicals that will be used in the season. Avoid storing chemicals over winter unless you have a temperature controlled environment. Some chemicals breakdown when frozen or exposed to heat.

Chemical Storage



NEVER STORE AGRICULTURAL CHEMICALS IN THE HOUSE.

- Store agricultural chemicals and treated seed in **locked, well marked** areas.
- Store well away from human or animal feed and other chemicals.
- Choose an area at least 150 feet from wells and 200 feet from surface water.
- If flooring is of an absorbent material, lay down a water resistant tarp or a sheet of plastic to prevent chemicals from soaking into the flooring.
- **ALWAYS** store chemicals in original containers. If you must transfer chemicals to another container, choose one that is similar. Transfer the chemical name and the safety information from the label to the new container.
- Many agro chemicals resemble juices and soft drinks. Never store in beverage containers as children may be tempted to sample.
- Choose an area away from children's play areas and farm animals.
- **Personal protective equipment** should be stored outside the storage area.
- Have a fire extinguisher readily available.

✓ Checklist before spraying

- ✓ Advise neighbours if aerial spraying will be occurring near homes.
- ✓ Post “no entry” signs indicating fields have been recently sprayed.
- ✓ Always check re-entry times on the chemical container label.
- ✓ If aerial spraying is to occur near farmyards, consider picking all vegetables that are ready, cannot be peeled or are not protected by outer layers (such as cabbage and corn).
- ✓ Keep windows closed while spraying occurs.
- ✓ Spray on days in which the wind velocity is low to minimize chemical drift.
- ✓ Do not hang laundry outside.
- ✓ Children should play inside.
- ✓ If possible, leave for the day.

Check chemical label for safe re-entry times or harvest intervals.

- ▶ Re-entry times vary from 24–48 hours depending upon the chemical. If you must enter before that time is up, wear all the recommended personal protective equipment.
- ▶ If harvest is to occur before the safe interval is up, reconsider application or decide if you can delay harvesting.



Posting Land

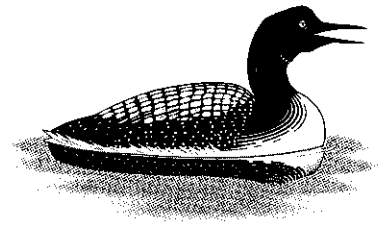
Farmers and applicators can ensure the safety of utility and municipal workers and others by posting a sign indicating that land has recently been sprayed. The Centre for Agricultural Medicine has developed a bright yellow disposable posting sign that serves this purpose. Printed on yellow polyethylene, the bag is easy to slip over a sheet of cardboard and nail to a stake or a fence post.

Post

- ▶ Prior to spraying.
- ▶ Remove after the safe re-entry time has passed.
- ▶ Wear gloves to remove the sign.
- ▶ Enclose it immediately into a garbage bag.
- ▶ Dispose of according to manufacturer's directions.

Environmental Precautions

- Triple rinse pesticide containers and pour into the sprayer tank.
- Take empty pesticide containers to designated collection sites.
- Clean machinery away from surface water and alternate the site at least yearly.
- Check into recycling programs for used oils, antifreeze and other products. Never pour on the ground.
- When storing agrochemicals and fuels ensure that accidental runoff will not contaminate water sources or animal shelters.



Other Options

- ⇒ Companion planting: using selected plants that have some repellent properties to help in the garden. Basil is believed to secrete oils that interfere with insect hormones. Garlic, mint, onion and celery and members of the chrysanthemum family (such as marigolds) may also help.
- ⇒ Crop rotation: varying the spot from year to year in which certain crops are planted.
- ⇒ Weeding: allows vegetable plants to grow stronger with decreased competition for nutrients and removes vegetation that insects such as slugs like to use for cover.
- ⇒ Choose plants that resist insects and disease. New varieties are being developed.
- ⇒ Use physical barriers such as netting, cheese cloth to protect plants from insects.
- ⇒ Try removing pests with forceful streams of water.
- ⇒ Remove areas of standing water to decrease some insects' hatching grounds.
- ⇒ Check with local horticulture departments or extension divisions of universities for information on sources of natural insecticides such as *Bacillus thuringiensis* (effective against caterpillars and beetles without harm to wildlife or humans.)

Minimizing Exposure

- ✓ Choose fruit and vegetables with undamaged skins.
- ✓ Wash fruits and vegetables well under running water.
- ✓ Peel fruits and vegetables to remove residues from the surface. If you want to eat the peelings scrub the produce well. In cabbage and lettuce, peel and throw away outer leaves.
- ✓ Trim fat and skin in animal products to avoid pesticide residues.
- ✓ After using a chemical control product on a garden, wait the recommended interval before harvesting.
- ✓ Choose a wide variety of fruits and vegetables.

Pesticide applicator safety courses are available in every province across Canada. Farmers, their families and employees are urged to take these courses to increase awareness of safe handling of chemicals.

AVAILABLE RESOURCES

Farm Safety Audit: A Management Tool for Farmers

Fact Sheet for Farmers on Insecticides for Wheat Midge,
Bertha Armyworm and Diamondback Moth Infestation

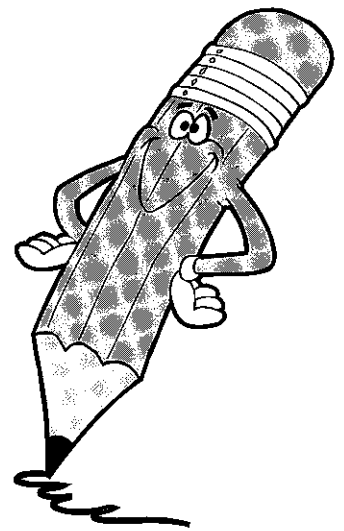
Pesticide Posting Signs (No entry)

How to launder clothing used while spraying agricultural chemicals.

Contact:

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Saskatchewan Labour, Fact Sheet on Cholinesterase Testing.

Main Poison Control Centres

ALBERTA

Calgary (403)670-1414
TOLLFREE: 1-800-332-1414

BRITISH COLUMBIA

Vancouver (604)682-5050
TOLLFREE: 1-800-567-8911

MANITOBA

Winnipeg (204)787-2591

NEW BRUNSWICK

Saint John (506)648-6222

NEWFOUNDLAND AND LABRADOR

St. John's (709)722-1110

Moncton (506)857-5555

NORTHWEST TERRITORIES

Yellowknife (403)920-4111

Calgary (403)270-1414

NOVA SCOTIA

Halifax (902)428-8161

ONTARIO

Toronto (416)598-5900
TOLLFREE: 1-800-268-9017

Ottawa (613)737-1100
NATIONAL TOLLFREE: 1-800-267-1373

PRINCE EDWARD ISLAND

Charlottetown (902)894-2250
TOLLFREE (to Halifax): 1-800-565-8161

QUÉBEC

Québec City à Québec: (418)656-8090
ailleurs au Québec: 1-800-463-5060

SASKATCHEWAN

Regina (306)766-4545
TOLLFREE: 1-800-667-4545

Saskatoon (306)655-1010
TOLLFREE: 1-800-363-7474

YUKON

Whitehorse (403)667-8726

Vancouver (604)682-5050

Canadian Association of Poison Control Centres: 1-800-267-1373
POST ALL EMERGENCY NUMBERS NEAR THE PHONE!

- FIRE
- POLICE
- AMBULANCE
- POISON CONTROL
- SPILL CONTROL CENTRE

For children who can't read yet, glue a picture beside an emergency number that they can call!

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**Safe Handling of Agrochemicals: A module for
Farm Families**