Agricultural Pesticide Safety

William J. Becker and Freddie A. Johnson

Safety with pesticides should be a concern of everyone involved with these chemicals. For although pesticides provide real benefits, they can also be dangerous if mishandled or misused. An accidental death from pesticides is a rarity, but skin disorders and health problems are not. Additionally, improper handling or use of pesticides can result in harmful effects to the environment.

Pesticide safety begins with the selection of the proper product and proceeds through the transportation, storage, mixing, loading, application, and disposal of the pesticide and its container. Read the label.

DETERMINE THE NEED FOR PESTICIDES

Before purchasing a pesticide, determine if you have a pest problem, and if so, what control will be most efficient, cost effective, and safe. You may not need a pesticide, since alternatives are often available. These may be resistant varieties or species, rotation and soil sterilization, management practices and housekeeping, environmental and cultural controls, proper watering and fertilization, or even mechanical or biological controls. These alternatives may be as efficient and cost effective as pesticides. Indiscriminate use of pesticides should be avoided.

PURCHASING THE PESTICIDE

Once you are sure you have a pest problem and have determined that a pesticide is the best solution, you still have decisions before you can make a well-thought-out purchase. Certainly, more than quantity and price should be considered.

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For most pest problems there are usually at least two pesticide products on the market. In addition, each product may be available in different dry or liquid formulations (dusts, wettable or soluble powders, emulsifiable concentrates, granules, baits, etc.), in different concentrations (less than 1% chemical concentration to more than 90%) and in different sizes and types of containers (eight-ounce box, one-gallon plastic container, 30-gallon drum).

**UNDERSTANDING THE LABEL**

Reading and understanding the label before purchase is the first consideration. The product name provides recognition. It is generally designed to attract you (so you will make a purchase) and to promote product identification. It helps you to find the product when you return to make additional purchases. Figure 2 shows examples representing a typical label. Note the types of items it contains - the name of the product, directions for its use, storage and disposal, and other information.

The terms "active ingredient" and "percent" give you more precise information. The active ingredient is the material which controls the pest. Should product "A" have two percent active ingredient, and product "B" four percent, product "B" has twice the amount of actual pesticide and it will be twice as strong. Likewise, if product "C" has two pounds of active ingredient per gallon, it has twice the active ingredient of product "D" if it contains only one pound per gallon. Remember, this comparison applies only when two products have the same active ingredient. Other factors, however, may determine the concentrate of the product best suited for your needs.

There are many other items of information to study on the pesticide label before you can make an intelligent purchase.

**EPA Registration Number**

Look for this number on every product. It is your assurance that the product has been approved by the U.S. Environmental Protection Agency (EPA) and should be safe and effective when used as directed on the label. This means you must read the rest of the label before making your purchase.

**Directions for use**

Before you buy any pesticide make sure the product is labeled for use against the pest, on the plants or animals, in the environment where you plan to use the product. A product may be labeled to control a pest on nursery plants, but not for the same pest on fruits, vegetables, or house plants in the home.

**Precautions**
Pesticides carry one of three precautionary words or phrases. The products most toxic to humans will be labeled "DANGER-POISON" and display a skull and crossbones (Figure 3). These products are extremely toxic in the form found in the container, before they are diluted. Only a few drops could cause severe burns, serious health problems, or even death. Products labeled "WARNING" are less toxic to humans, but extreme care must be exercised in their use, particularly before they are diluted. The word "CAUTION" will appear on those pesticides that are the least harmful when used as directed. These products, however, can still cause serious injury or health problems, and even death. You will notice that pesticides carrying even the least toxic message, the word "CAUTION", often carry the statement "KEEP OUT OF REACH OF CHILDREN."

LD or lethal dose value is another term used in describing pesticide toxicity. An LD/50 indicates the amount of active ingredient in the pesticide formulation that would be lethal to 50 percent of a population of test animals. The LD amount is expressed in milligrams of toxic product per kilogram of body weight. Thus, a pesticide with an LD/50 of 50mg/kg is ten times more toxic than a pesticide with an LD/50 of 500mg/kg.

Many pesticides have two LD values: one LD/50 value for oral ingestion of the product (Table 1), the other for dermal absorption (through the skin) of the pesticide. Normally the oral LD/50 value of a pesticide is lower, thus more toxic, than the dermal LD/50 value of the product. However, since we are more apt to get the product on our skin than we are to swallow it, dermal exposure may be a much more common problem.

The "precaution" portion of the label will give additional advice on the safe use of the product. It might require that people and animals be kept out of treated areas, that the product not be used in enclosed areas, that special clothing and protective equipment be worn, that treated fruits, vegetables or other products not be handled or eaten for a period of time, that care be followed not to have the product drift onto or be sprayed on other plants or find its way into surface or ground waters.

The precautionary statements may be few or many, but the potential purchaser of the pesticide must heed this information. Failure to do so can be extremely hazardous and is in violation of federal law.

**Statement of practical treatment**

This is information about first aid and can be limited or detailed. It may give advice on what to do if the product is accidentally swallowed, inhaled, or gotten into the eyes or onto the skin. The statement may tell you that you need to purchase additional equipment and supplies before you can use the product safely and be able to deal with accidents effectively.

You need to know what to do if someone is accidentally poisoned by the pesticide. Be sure you understand the Statement of Practical Treatment. Have materials available to administer first aid. Always call a doctor or emergency room immediately

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**Table 1. Classes of Pesticide Toxicity and their Oral Lethal Doses.**

<table>
<thead>
<tr>
<th>Signal Word</th>
<th>Toxicity</th>
<th>Lethal (Oral) Dose (160 lb man)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger Poison*</td>
<td>Highly toxic</td>
<td>Few drops to 1 teaspoon</td>
</tr>
<tr>
<td>Warning</td>
<td>Moderately toxic</td>
<td>1 teaspoon to 1 Tablespoon</td>
</tr>
<tr>
<td>Caution</td>
<td>Low toxicity</td>
<td>1 ounce to more than 1 pint</td>
</tr>
</tbody>
</table>

* Skull and crossbones symbol included.

** Less for a child or person weighing less than 160 lbs.
if an accident occurs. Make sure the doctors are given the pesticide label; it will help the doctor prescribe immediate correct treatment. Emergency telephone numbers, including that of the nearest poison control center, should be posted near all telephones.

**Storage and disposal**

Don’t purchase the pesticide if you cannot store it properly or dispose of unwanted quantities safely. Seek an agreement with the dealer that unopened, unused quantities can be returned for credit. Purchasers of large quantities of pesticides might even obtain an agreement on the return of empty pesticide containers.

**Classification statement**

Some pesticides are classified as "restricted use." These pesticides can be purchased and applied by state-certified licensed applicators only. Restricted use pesticides are identified by a prominent restricted use statement located above the brand name on the front of the label (Figure 4). Pesticides that are not classified as restricted use are considered unclassified and can be purchased and used in accordance with the label by the general public.

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**RESTRICTED USE PESTICIDE**

For retail sale to and use only by certified applicators or persons under their direct supervision, and only for those uses covered by the certified applicator’s certification.

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Figure 4. Restricted Use Statement.

You can make intelligent purchases of pesticides by completely reading and understanding the label. A product you have chosen wisely will do the job economically and safely. It is the user’s legal responsibility to thoroughly read and follow label instructions. Remember, by reading the directions and warnings before you purchase the pesticide you can protect yourself, your family and the environment from serious accidents.

**ENTRANCE INTO THE BODY**

There are three ways for pesticides to enter the body: by breathing it (inhalation), by swallowing it (also called ingesting), or by contact through the skin or eyes (absorption). All three methods can cause immediate danger.

Inhaled pesticides are absorbed rapidly into the body through the thin membranes of the lungs. Wearing a properly-fitted respirator with the proper cartridge or canister is very important. Replace the canister or cartridge after every few hours of use, or whenever the odor or taste of the pesticide is detected, or when breathing becomes difficult. Working upwind of the pesticide dust, mists, and vapor, and not smoking pesticide-contaminated cigarettes are other safety practices to follow.

Although breathing pesticides is the most rapid way for them to enter the blood stream, most acute poisonings are the result of swallowing pesticides. It happens more often. Swallowed or ingested, they are absorbed more slowly and less completely than by breathing. Establishing good work habits, including washing hands before eating, and not eating, smoking, or drinking while working with pesticides will reduce the chances of ingesting pesticides. It must be emphasized that pesticides should never be stored in anything other than their original containers. Putting pesticides in containers that originally held food or drink has resulted in many accidental poisonings.

All pesticides may enter the body by absorption through the skin and eyes, the most common method of accidental poisoning. The eyes, stomach, groin, arms, hands, and forehead are the likely areas for absorption. Most absorption is through the hands and forearms during the handling, mixing, and loading operations.

The importance of protective gloves and long sleeves can not be overemphasized. Be extremely careful to see that open wounds, sores, or blisters are not exposed to pesticides. Wearing the proper protective clothing and equipment, changing and laundering immediately after working with pesticides, and showering thoroughly with detergent or soap will reduce the danger of absorption. **Should pesticide spill onto your body, the next two minutes are critical. Immediate removal of your clothing and a long soapy shower are required.**
THE CHOLINESTERASE INHIBITOR FACTOR

Mixers, loaders, and others working with concentrated pesticides, or applicators who are exposed to diluted pesticides for many hours should be particularly aware of the dangers of organophosphate and carbamate pesticides as cholinesterase inhibitors. Cholinesterase is an enzyme in the blood. It affects the red blood cell and plasma ChE levels. Organophosphate and carbamate pesticides affect this enzyme and cause lower red blood cell and plasma CDhE levels.

Affected individuals may exhibit pesticide poisoning symptoms such as fatigue, listlessness, and headaches. Severe exposures can result in death. Users of these pesticides should be in a cholinesterase testing program. Consult your medical doctor.

SYMPTOMS OF PESTICIDE POISONINGS

Many of the early symptoms of mild pesticide poisoning are similar to the symptoms of the flu, heat stroke, exhaustion or the common cold. However, if these symptoms occur while working, or shortly after you have been working, with pesticides contact your supervisor, nurse, or doctor. Symptoms that may occur are shown in Table 2.

Table 2. Symptoms of Pesticide Poisonings.

<table>
<thead>
<tr>
<th>Mild Poisoning</th>
<th>Moderate Poisoning</th>
<th>Severe Poisoning</th>
</tr>
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<tbody>
<tr>
<td>Fatigue</td>
<td>Unable to Walk</td>
<td>Unconsciousness</td>
</tr>
<tr>
<td>Headache</td>
<td>Weakness</td>
<td>Severe constriction of pupil</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Chest discomfort</td>
<td>Muscle twitching</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>Constriction of pupil of eye</td>
<td>Secretions from mouth and nose</td>
</tr>
<tr>
<td>Excessive sweating and salivating</td>
<td></td>
<td>Coma</td>
</tr>
<tr>
<td>Nausea, vomiting</td>
<td></td>
<td>Death</td>
</tr>
<tr>
<td>Stomach cramps or diarrhea</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TRAINING

The Occupational Safety and Health Administration (OSHA) Hazard Communication Standard requires that all employees be apprised of all hazards, including pesticides, to which they are exposed. This includes all handlers, mixers, loaders and applicators of pesticides. See Appendix A for more details.

The Environmental Protection Agency (EPA) requires that restricted use pesticides can only be purchased by and applied by trained and state-certified, licensed applicators or others under their close supervision. In Florida, educational programs for certified pesticide applicators are provided by the cooperative extension service county office and the license is issued by the Department of Agriculture and Consumer Services.

TRANSPORTATION AND STORAGE

Whether you are a homeowner, farmer, grower, rancher, or commercial applicator, proper transportation and storage are important aspects of safe pesticide use.

Transportation

Pesticides should never be transported inside the passenger compartment of an automobile or truck cab; put them in the trunk or in the back of the truck. Never transport them where they could come in contact with people, groceries, livestock feed, or other products which might become contaminated.

When transporting pesticides in a truck, see that they are secured to prevent spillage or loss due to sudden stops, turns, etc. Should there be an accident or spill immediately inform the local police and fire officials of the quantity and name of the pesticide involved. Even small spills or releases, particularly of extremely hazardous pesticides, must be reported to the State Emergency Response Commission (SERC) (904-488-1320) and your Local Emergency Planning Committee (LEPC). See Appendix B.

Commercial transporters of pesticides must meet special requirements: vehicles must carry placards, bills of lading, labels of the product, etc. Consult the Florida Department of Transportation regarding these requirements.
**Storage/Mixing/Loading Facilities**

Nationally, nearly three-fourths of all pesticide accidents occur to non-users of the materials. Many of these accidents involve children. In addition, each year there are several cases of livestock and pet poisonings from contacts with improperly stored pesticides. These accidents not only cause human suffering and economic losses, but improper storage is contrary to federal regulations. READ THE LABEL: IT IS THE LAW.

**Storage**

Whether you are a homeowner, producer or applicator of pesticide, there are basic safe storage rules to follow.

- Keep pesticides, other poisons, and related materials locked in a cabinet, room, or separate building designated solely for the storage of these materials. Metal storage cabinets, such as discarded school lockers, provide excellent storage for homeowners or other users of small amounts of pesticides.
- Post the cabinet, room or facility with a sign, "PESTICIDES-POISONS, KEEP OUT", or similar signs.
- Control access to this facility to only one, two, or three highly trusted, responsible and informed individuals.
- Never store pesticides where food, feed, seed, fertilizers or other products can become contaminated.
- Store pesticides in their original containers. It's the law.
- The facility should be reasonably fireproof and well-ventilated. Temperatures should be kept between freezing and 100 degrees F.
- Sealed concrete floors with no floor drains, concrete block walls, and metal shelves are recommended instead of wooden structures.
- With shelf storage, store dry pesticides on the top shelves, liquids on the lower shelves.
- Electrical fixtures should be of the dust - and explosion - proof type.
- Provide adequate space for the secure storage of empty pesticide containers until proper disposal of them is possible.

Those businesses with large quantities of pesticides to store should have a separate building for this purpose. In addition to the above features, this facility should also include the following characteristics.

- Have a concrete mixing/loading pad adjacent to the storage facility. This pad should be roofed to keep rainwater out and the pad should be sloped to capture spilled material.
- When feasible, the facility should be downwind and downhill from sensitive areas such as homes, play areas, feedlots, animal shelters, gardens, and ground water sources.
- The facility should be located in an area not subject to flooding.
- A water supply should be furnished not only for mixing, loading, tank rinsing and cleanup, but for showers and cleanup for the persons who mix, load and apply the pesticides.
- Fire detectors and fire-fighting equipment should be available.
- A telephone should be convenient, with all emergency numbers posted.
- A current inventory of all materials in storage, along with a label of all materials, should be maintained in a secure area away from the storage area. The local fire department and the Local Emergency Planning Committee (LEPC) should be provided with an updated copy of this inventory, along with a Material Safety Data Sheet (MSDS) for each extremely hazardous pesticide you have in storage.
- Equip the storage area with the needed personal protective equipment and materials to prevent accidents and to handle accidents and spills. Activated charcoal, absorptive clay, vermiculite, clay-granule cat litter, or sawdust are good materials to absorb liquid spills.
- Date and identify all pesticides when they are placed into storage, and store no more than will be needed for one season. Establish a policy of
first-in first-used so that pesticides do not become outdated.

- Have your fire insurance carrier inspect your pesticide storage facility periodically. It is intelligent management, and may reduce your insurance premium.

Many pesticide storage facilities are inadequate, dangerous, and lack security. Figure 5 is a plan for constructing a safe pesticide storage building (shown in the printed document). Copies of this plan (EX6346 Pesticide Storage Building) are available from the Cooperative Extension Service. Figure 6 has a line drawing for a pesticide mixing/loading facility (shown in the printed document). The publication *Pesticide Mixing - Loading Facility* (SS-AGE-20) is also available from the Cooperative Extension Service.

**Mixing and Loading**

Mixing and loading pesticides are among the most dangerous tasks with these products, because it is at this time that people are working with open containers of concentrated pesticides.

For this reason, individuals employed to perform this activity should be well-informed of the dangers involved, and work under the close supervision of a properly certified, licensed applicator whenever handling restricted-use pesticides.

Mixing and loading should never be done without a full understanding of the pesticide label and should always be done with the use of all recommended personal protective equipment (Figure 7). The label will identify the dangers involved and the precautions to follow. It may indicate the signs and symptoms of poisoning, and recommend first aid practices should one be exposed to the product.

Before you begin to mix, load, and apply pesticides, and after you understand the label directions, make certain you have taken the following precautions.

- Have detergent or soap and an adequate supply of water available.

- Know the early symptoms of poisoning for the pesticide you are using.

- Know the first aid procedures and make certain that materials and supplies are available.

- Be certain the materials are available to handle spills.

- Make certain that all equipment is functioning properly.

- Do not work alone; be sure help is available if you get into trouble.

- Have all the recommended protective clothing and equipment. Double-check that the respirator fits properly and has the correct canister or cartridge.

- Never eat, drink, smoke or go to the bathroom while working with pesticides without first washing your hands.

You are now ready to begin mixing and loading. Follow these suggestions. Reread the label and follow the directions; pay special attention to the warnings and precautions.

- Make sure only authorized mixers, loaders and/or supervisors are in the mixing and loading area. No other people or animals should be in the area.

- Work only in a well-ventilated, well-lighted area.

- Pesticide containers should be in a secure position when being opened to prevent any spillage. Be sure everyone is wearing the proper personal protective equipment.

- Mix and pour concentrated pesticides down low, preferably below waist level (Figure 8). Never pour pesticides at eye level. A spill or splash could be disastrous. Always remove clothing and wash yourself and your clothing thoroughly, immediately (within two minutes), if pesticides are spilled or splashed on you.

- Stand with your back to the wind - upwind - so that any fumes or dusts are blown away from you.

- Pour the pesticide into water, never water into the pesticide.

- If stirring is necessary use a stir stick, never your hands.
Figure 5. Safe Pesticide Storage Building.
Figure 6. Pesticide Mixing-Loading Facility.
Mixing and loading is best done on a concrete slab, where spills can be contained more effectively. If mixing and loading must be done in a field or grove, never mix or load near a well-head or surface water. Stay at least 100 feet away. Do not mix and load in the same location repeatedly. Change locations and clean up all spills.

- Never pour pesticide directly into a spray tank. Always mix and dilute in a pail or container.
- When pouring, stand with your head well above the spray tank to prevent pesticides from splashing in your face. Protect your eyes with splash-proof goggles.
- Never overflow a spray tank. The cleanup could be an all-day/all-night task and could be costly and dangerous.

After the mixing/loading task has been completed your responsibility continues.

- Securely close pesticide containers immediately after use. Return unused pesticide to its proper storage.
- Clean up all spills, no matter how small the amount.
- Wash mixing and loading pails, measuring devices, and stirring equipment or tools in strong detergent water, rinse in clear water, and store to air-dry.
- Wash your personal protective equipment in detergent, rinse, and hang to air-dry.
- The wash and rinse water used in the above steps can best be disposed of by pouring it into the spray tank. Don’t overfill the spray tank. Otherwise there will be no room for the rinse water.
- Remove your clothing and launder separately with heavy-duty liquid detergent and hot water. DO NOT USE BLEACH, as it could cause a dangerous chemical reaction. Line-dry the clothing where it is exposed to sunlight.
- Take a hot shower using a detergent type soap. Don't forget to wash your hair. Put on clean clothing.

APPLICATION

When applying pesticides, applicators are not exposed to the same high concentration of pesticide as they are during the mixing and loading operation. However, the time-length of exposure is much longer,
thus the cumulative exposure may be equal to or greater than that during the mixing/loading operation.

Pesticide applications are made with everything from hand sprayers and dusters, to irrigation equipment, to large airblast grove sprayers and aircraft. Whatever equipment is used, many of the safety precautions are the same.

- Read and follow the label. Applications made that vary from label requirements are violations of federal law.

- Use the correct equipment and make sure it is properly maintained and adjusted. Screens, strainers, and nozzles should be clean and functioning properly. Nozzles should be of the right type and properly adjusted and all lines, valves and seals should be checked for leaks.

- The application equipment should be accurately calibrated on a regular basis. Whenever you have any suspicion that the equipment is applying an inaccurate amount, recalibrate the equipment. Your operator's manual should provide information on calibration of the equipment. Additional information is available through your county's Cooperative Extension Service.

- Wear the proper protective clothing and equipment.

- Check the weather forecast frequently to determine if conditions will be favorable for the application and effectiveness of the pesticide. The National Weather Service provides a continuously updated weather forecast for Florida via VHF/FM channels WX1 (162.550 MHz), WX2 (162.400 MHz) and WX3 (162.475 MHz).

- Avoid spraying near sensitive areas where drift could damage neighboring crops or the environment. When spraying must be done in these areas, attempt to spray when the air is still, humidity is high, and any potential drift will be away from sensitive areas.

- Lower pressures, proper boom and nozzle adjustments, larger nozzle size and drift-reducing additives (if the label permits) will reduce drift.

- Do not make field adjustments to the sprayer in a recently sprayed, still wet area. Move to an unsprayed area.

- Never attempt to clean a nozzle, screen, or hose by blowing or sucking on it with your mouth. Use small, soft-bristle brushes and/or an air pressure bulb for these purposes.

- Always empty a tank by spraying the entire contents onto the vegetation or other area for which it was intended. Never drain a spray tank onto the ground. Never mix more than you need!

PESTICIDE AND PESTICIDE CONTAINER DISPOSAL

Major problems exist in the disposal of pesticides and pesticide containers. These are: the disposal of excess quantities of mixed pesticides, disposal of rinsates, the disposal of unwanted quantities of obsolete, deteriorated or unwanted pesticides, and the disposal of containers.

Mixed Pesticides

Excess mixed pesticides can be used only for a use which is approved on the pesticide’s label. The best solution to this problem is to not mix more than needed. However, there are times when the spray job is complete and a quantity of spray remains in the tank. If it can’t be saved until the next time it is needed, what can be done? The best solution is to find another field, lawn, or garden where the material can be applied and is needed, and where the use is in accordance with label instructions. Another solution would be to spray the material on another area where no damage can be done and the application is in accordance with the label.

What should not be done? Don’t go back into a sprayed area and spray on a second application. This could prove toxic to the crop and/or cause problems with excess residue on the harvested product. Do not dump the excess; the pesticide could end up in surface water as a result of run-off, or in ground water as a result of percolation through the soil. Do not dump the excess into a drain; it could cause septic tank or sewage system problems.

Excess Pesticides

To prevent the problem of excess pesticides, don’t purchase more than will be used. This is the best and easiest solution. Disposal of old, out-dated and unneeded pesticides is a major problem, and there is no simple solution. If possible, use the product for the purpose it was purchased. If you can’t, maybe a
neighbor, friend, or other business can. However, if a use cannot be found, or if the product has deteriorated or has been banned, what are the alternatives?

- Contact the manufacturer or the marketer of the product. They may have a program designed for taking these products off your hands.
- Contact your county’s Cooperative Extension Service. They might be able to provide information on proper disposal of your pesticide.
- Contact the Department of Environmental Regulation (1-800-342-0184) for a solution to your problem. This agency has the responsibility for the proper disposal of hazardous wastes in Florida.

There are certain things you NEVER do with excess pesticides.

- Never attempt to burn the product.
- Never bury the product.
- Never dispose of the product in the garbage.
- Never dump it down a drain.

Florida’s water supply is highly susceptible to contamination. Improper disposal of pesticides by only a few individuals or businesses could result in serious, persistent and costly consequences.

**Pesticide Containers**

Unless properly handled, most pesticide containers are hazardous waste products, just like pesticides. Always follow label instructions for the proper disposal of the container.

Empty pesticide containers should be handled with the same care as full containers. The same safety precautions that apply to mixers and loaders should be followed when working with containers. Wear protective equipment, avoid contact, inhalation or ingestion of any of the materials. Avoid eating, drinking and smoking, and practice all aspects of personal hygiene.

Proper decontamination procedures for most empty pesticide containers can change them from hazardous waste products to solid waste products. Disposal of solid waste products are much less complicated. There are a few acutely toxic pesticides, however, which come in containers that are difficult to decontaminate. Follow the disposal procedures on the label of these pesticides carefully.

Pesticide containers should be properly decontaminated immediately after they are emptied or, certainly, before the end of the day. Both treated and untreated empty pesticide containers should be stored in a secure location. Pesticide containers should never be used for any other purpose.

There are several types of pesticide containers, including combustible bags and boxes (with or without plastic liners), and metal, glass and plastic containers. Combustible bags and boxes should first be emptied by shaking the bag or box as completely as possible. If these containers have a plastic liner they can be triple-rinsed or cleaned by jet-rinsing, which is equivalent to triple-rinsing. Paper bags and boxes without plastic liners, or with plastic liners that you have properly rinsed, can now be considered solid wastes, not hazardous wastes, and may be disposed of by burning, burying or disposal at a sanitary landfill.

Florida has strict regulations on open burning. Check with local authorities before burning any empty pesticide containers. If the local authorities permit burning, state regulations still must be followed. Waste pesticide containers may be burned in open fields by the owner of the crops, the owner’s authorized employee or caretaker, or by commercial pesticide applicators hired by the owner or caretaker. Open burning is subject to all of the following conditions.

- Plastic containers (liners) must be the original containers provided by the pesticide manufacturer or formulator as end-user conveyance for the specified product, not reused containers designed for other products.
- Containers must bear label instructions stating that small quantities of the containers may be burned in open fields by the user of the pesticide when such open burning is permitted by state and local regulations.
- The quantity of containers to be burned each day per parcel treated shall not exceed the amount accumulated during one day’s use of pesticide. No more than 500 pounds of pesticide containers shall be burned per day at any specific location.
If more than one fire is to be set in any area, each specific burning location shall be at least 1,000 yards from each other location at which burning will occur concurrently.

Containers that are to be disposed of by open burning shall be completely empty and free of residual material pursuant to the following criteria.

- Plastic containers, including inner liners, shall be triple-rinsed with the same kind of solvent used to dilute the spray mixture in the field. The rinse liquids from the containers shall be added to the spray mixture in the field.
- Paper containers shall be emptied by a final shaking and tapping of the sides and bottom to remove clinging particles. All loosened particles shall be added to the spray mixture for application in the field.
- The open burning shall meet the following conditions.
  - The open burning does not produce smoke, soot, odors, visible emissions, heat, flame, radiation or other conditions to such a degree as to create a nuisance.
  - The open burning is 200 feet or more away from any farm workers or occupied buildings, and is 100 feet or more away from any public road.
  - The fire is ignited after 9:00 A.M. and is extinguished one hour before sunset of the same day.
  - The person responsible for the burning is in attendance at an upwind location from the fire for the entire period of the burn (until all flame and smoke have dissipated).
  - The open burning is not prohibited by any local, county, municipal or other governmental rule, regulation, law or ordinance.
  - Prior authorization is obtained from the Division of Forestry, unless the open burning is enclosed in a noncombustible container or ground excavation covered by a metal grill.

The metal, glass and plastic containers should be triple-rinsed or jet-rinsed, with the exception of aerosol cans. The triple-rinse procedure is illustrated in Figure 9.

Several proven closed-system, "jet-rinse" devices that spray water into a pesticide container under pressure and transfer the rinse into the spray tank are marketed. These are adequate if the directions for use are followed.

After triple-rinsing or jet-rinsing replace and tighten the closures on 30-gallon and 55-gallon drums that are to be returned to the manufacturer or to a drum recycling company. Do not reuse these drums for any other purpose. They should be kept in secure storage until shipment.

Other metal containers and glass and plastic containers should be punctured or crushed after they are triple-rinsed to prevent reuse. These containers are now solid waste and can be transported to a state-approved sanitary landfill. The sanitary landfill may require you to complete an indemnification agreement to verify that the containers have been triple-rinsed or jet-rinsed. Do not attempt to triple-rinse or puncture empty aerosol cans. They should be buried or disposed of at a sanitary landfill.

Empty pesticide containers may be buried on the property where used. They are not to be transported to another property for burial unless it is a state-approved sanitary landfill. Farmers can bury triple-rinsed containers on their own property. They should be buried a minimum of 18 inches deep but well above the ground water table, and never in wetlands or sinkholes. Permission should be obtained from the landowner before burying containers on rented property. Non-farmers who bury empty pesticide containers on their own property must notify their local Department of Environmental Regulation of such burial.

**Rinsewater**

One final problem exists. All the mixed pesticides and pesticide containers have been disposed of properly. Now what do you do with the wash water from the final cleaning of the sprayer tank, boom, nozzles, and from washing down the external surfaces of the sprayer and personal protective equipment?

Do not allow this rinse water to contaminate the soil or enter a water supply. The best solution is to wash down the equipment, capture the rinse water, and place this rinse water into the spray tank. This
can best be done on a concrete mixing/loading pad. Next, refill the spray tank with water (this mix will have an extremely low concentration of pesticide material) and spray this material onto an area for which the pesticide is labeled, such as in the field just sprayed.

**ACCIDENTAL SPILLS**

Accidental spills can happen in transport, in storage, or in the mixing, loading, or application activities. Many labels describe what actions should be taken should a spill occur; if the label contains such directions, follow them.

If the spill or release is a pesticide classified as an extremely hazardous substance (EHS) and exceeds the reportable quantity (RQ) you must follow the procedures detailed in Appendix B. SARA TITLE III, the Community Right-to-Know Law, requires that these spills or releases be reported immediately - within fifteen minutes - to the local fire department and the Local Emergency Planning Committee (LEPC) or the State Emergency Response Committee (SERC).

The following are practices to follow with all spills.

- Secure the accident scene.
- Keep people and animals away.
- Equip the clean-up personnel with protective equipment.
- Keep the spill from spreading.
- Control the spill by banking with soil, or by absorbing the liquid.
- Never hose down a contaminated area.
- Notify the local fire department immediately.

If the spill is liquid then activated charcoal, absorptive clay, vermiculite or sawdust should be used to soak up all the material. Sufficient absorbent material should be used to soak up the liquid. The material should then be swept up and/or shoveled into a leakproof drum. Saturated soil should also be placed into drums.

It may be necessary to neutralize the area. Again, check the label. Hydrated lime, lye, ammonia, sodium hypochlorite and detergents are frequently recommended.

Supplies of absorbent and neutralizing materials should be available in the storage or mixing/loading area at all times, along with the tools and other supplies necessary for a clean-up.
The contaminated materials may be hazardous wastes. In many cases they are not usable and must be shipped to an incinerator or sanitary landfill approved for disposal of hazardous wastes. This type of disposal is costly, therefore, it is important to follow all safety precautions to prevent spills.

**SUMMARY**

Pesticides are a necessary and integral element of modern agriculture. Appropriate use of them benefits all segments of society. But pesticides can be dangerous if they are handled inappropriately or applied indiscriminately. Pesticide applicators have a major responsibility to assure that pesticides are handled and applied safely.

**APPENDIX A HAZARD COMMUNICATIONS STANDARD**

The purpose of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard purpose is to ensure that information concerning the hazards of chemicals used in the workplace is transmitted to employers and employees. This includes developing and maintaining a written hazard communication program, a listing of the hazardous chemicals present, provisions for labels on containers of chemicals, a system to make material safety data sheets (MSDS) available to employees, and training and information programs for employees exposed to chemicals.

Employers must develop, implement, and maintain at the workplace a written, comprehensive hazard communication program that includes provisions for container labeling, material safety data sheets, and an employee training program. It must also contain a list of the hazardous chemicals in each work area and the means the employer will use to inform employees of the hazards associated with such chemicals. If the workplace has multiple employers on site (for example, a contracted harvesting crew) the rule requires that information regarding hazards and protective measures be made available to these employers on site where appropriate. The written program must be available to employees and/or their designated representatives.

**Material Safety Data Sheets**

Copies of the MSDS for hazardous chemicals are to be readily accessible to employees at each work site. As a source of detailed information on hazards, they must be located close to workers and be readily available to them during each workshift.

Material Safety Data Sheets should be provided whenever you purchase hazardous chemicals. If they are not, demand them from your supplier. They are required by law to provide them.

Each MSDS must be in English and include information regarding the specific chemical identity of the hazardous chemical(s) involved and the common names. In addition, information must be provided on the physical and chemical characteristics of the hazardous chemical, known acute and chronic health effects and related health information, exposure limits, whether the chemical is considered to be a carcinogen, precautionary measures, emergency and first-aid procedures, and the identification of the organization responsible for preparing the sheet.

**Labels and Other Forms of Warning**

In the workplace, each container must be labeled, tagged, or marked with the identity of hazardous chemicals contained therein, and must show hazard warnings appropriate for employee protection. The hazard warning can be any type of message, words, pictures, or symbols that convey the hazards of the chemical(s) in the container. Labels must be legible, in English (plus other languages if desired) and prominently displayed.

**Employee Information and Training**

Employers must establish a training and information program for employees exposed to hazardous chemicals in their work area at the time of initial assignment and whenever a new hazard is introduced into their work area. At a minimum, the discussion topics must include the following:

- The existence of the Hazard Communication Standard and the requirements of the Standard.
- The components of the hazard communication program in the employees’ workplaces.
- Operations in their work area where hazardous chemicals are present.
- How and where the employer will make the written hazard communications program, lists of hazardous chemicals, and the required MSDS forms available to all workers.
- How the hazard communication program is implemented in that workplace, how to read and interpret information on labels and the MSDS, and how employees can obtain and use the available hazard information.

- The hazards of the chemicals in the work area.

- Measures employees can take to protect themselves from the hazards.

- Specific procedures put into effect by the employer to provide protection, such as work practices and the use of personal protective equipment.

- Methods and observations - such as visual appearance or smell - that workers can use to detect the presence of a hazardous chemical to which they may be exposed.

**Medical Emergency**

The employer must immediately disclose the specific chemical identity of a hazardous chemical to a treating physician or nurse when the information is needed for proper emergency or first-aid treatment.

For more information contact your County Extension Service county office and ask for the Special Series Report SS-AGE-914 entitled *OSHA Hazard Communication Standard* or contact one of the area offices of the Occupational Safety and Health Administration in Florida. They are located in Ft. Lauderdale (305) 527-7292, Jacksonville (904) 791-2895 or Tampa (813) 228-2821.

**APPENDIX B SARA-TITLE III COMMUNITY RIGHT-TO-KNOW**

The Emergency Planning and Community Right-to-Know Act is also known as Title III of the Superfund and Reauthorization Act (SARA) (see Fact Sheet FRE-100, Right-to-Know Law). This law requires communities to plan for chemical emergencies and gives citizens the right to know the location of hazardous chemicals in their community.

If any business has Extremely Hazardous Substances (EHSs), there are 150 to 200 pesticides so classified, at or above the Threshold Planning Quantity (TPQ) on their property at any time they must inform the State Emergency Response Commission (SERC) and their Local Emergency Planning Committee (LEPC) of this fact. The TPQ of an EHS can range from a low of ten pounds to as high as 10,000 pounds of active ingredient.

Anytime there is a spill or release of an EHS which meets or exceeds the reportable quantity (RQ) for that chemical it must be reported immediately, within 15 minutes if possible, to the proper authorities. In most communities this means calling 911 or SERC at (904) 488-1320 to report the spill or release, the product and location. The RQ of an EHS can be as low as one pound or as high as 1,000 pounds of active ingredient.

Any agribusiness that has more than the TPQ of an EHS on their property must register with the SERC and the LEPC. This program is supported by a fee system in Florida. These fees are paid by the users of extremely hazardous substances. The fines for non-compliance with SARA-TITLE III the Community Right-to-Know law are substantial.

For more information on SARA-TITLE III, to determine if you must comply and how to comply, write or call the State Emergency Response Commission and request that they send you a copy of their SARA-TITLE III Community Right-to-Know Compliance Handbook. Their address and telephone number follows:

State Emergency Response Commission
2740 Centerview Drive
Tallahassee, Florida 32399-2149
(904) 488-1472 or (800) 635-7179