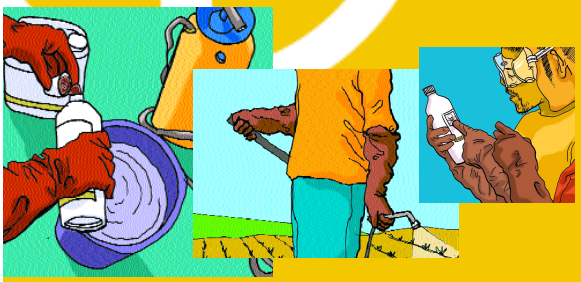
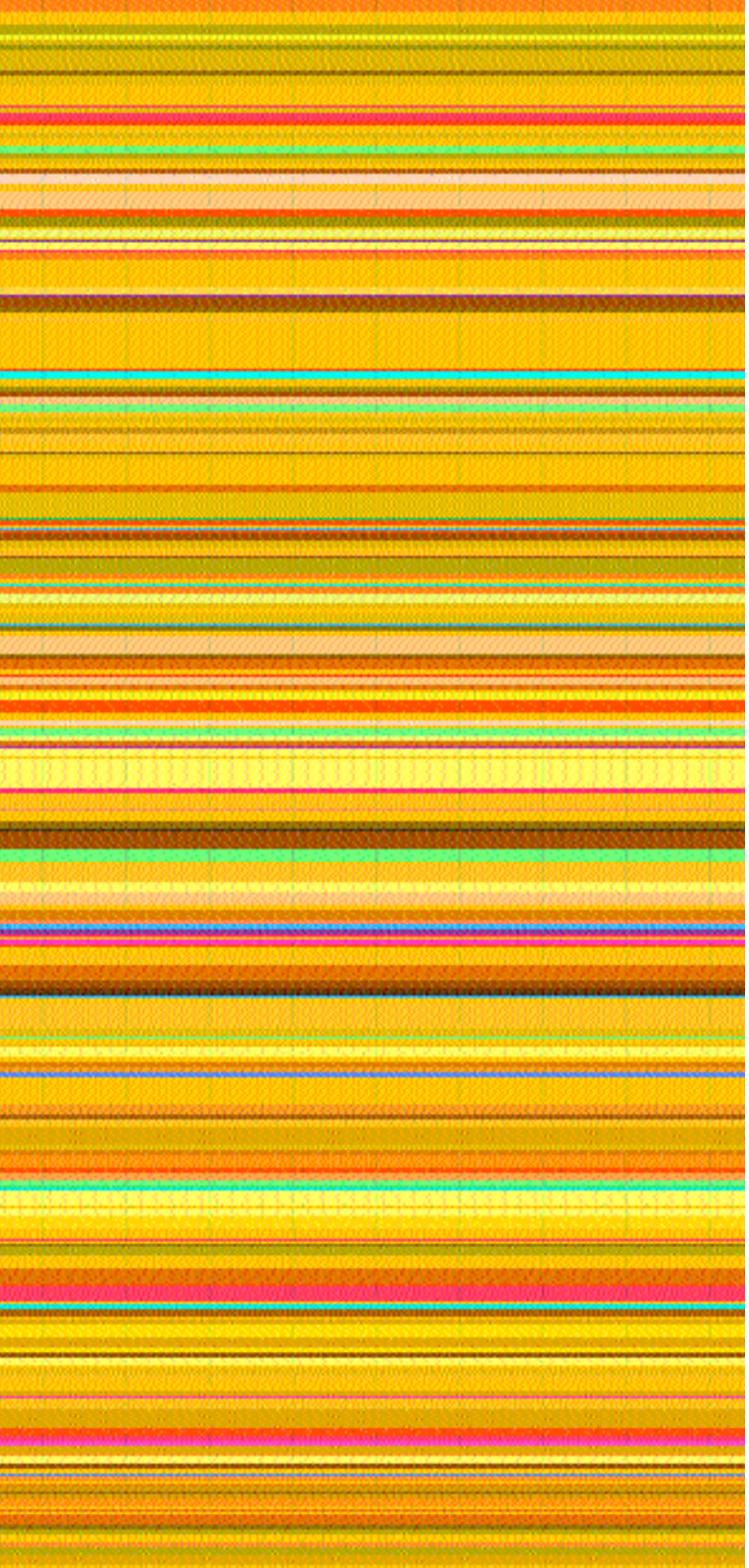
CropLife

Representing the Plant Science Industry

Guidelines

for
the safe
and **effective use**
of crop protection
products





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and **effective use**
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products

These guidelines are intended to complement the requirements of any local and national laws and regulations, as well as the FAO International Code of Conduct on the Distribution and Use of Pesticides.

The information contained in this booklet is accurate to the best of the knowledge of CropLife International, but no liability whatsoever can be accepted in respect of the use of this information nor in respect of any advice contained herein.

FOREWORD

CropLife International places great importance on the safe and effective use of crop protection products. In recognition of this, and to support in-field training programmes for farmers, a series of guidelines were published by GIFAP and GCPF (CropLife International's predecessor organisations) on the handling, distribution, use and disposal of crop protection products. These guidelines bring together advice and recommendations in a simplified form. In 2004, CropLife International recognised the need to update and reprint the guidelines; this publication incorporates lessons learnt from their use in the field for more than 10 years.

The guidelines are for use by farmers, trainers and other agricultural workers using crop protection products. The effort to improve the knowledge and advice in this area is very much in the spirit of the FAO International Code of Conduct on the Distribution and Use of Pesticides and I recommend these guidelines to all concerned with the safe and effective use of crop protection products.



C. Verschueren
Director General,
CropLife International

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INTRODUCTION

Crop protection product use

Crop protection products is the general name used to cover the group of products that includes insecticides, acaricides, molluscicides, rodenticides, nematicides, anthelmintics, plant growth regulators, fungicides and herbicides.

They are biologically active chemicals or other agents, used to manage pest organisms which have been thoroughly tested for safety and usefulness before they are released for agricultural use.

In order to be used safely and effectively, crop protection products **must** be handled and used in accordance with the manufacturer's recommendations.

If not used correctly, according to their label instructions, they may be harmful to people, animals and the environment.

These guidelines summarise how to use crop protection products effectively and safely. They address mainly agricultural advisers, researchers and managers, but should be of interest to everyone concerned with crop protection products. They are designed to assist in making the use of crop protection products safe and worthwhile.

In these guidelines, the word '**must**' is used to indicate minimum standards acceptable, and the words'should' and 'recommended' indicate proven good practices.



Whenever this sign appears it indicates bad practices, which should be avoided.
A glossary, on page 58, defines technical terms used in the text.

1. CHOICE OF CROP PROTECTION PRODUCT

Identification of problem – Advice

Prospective users of crop protection products **must** identify their pest problem and, if necessary, seek experienced advice from agricultural officials, research stations or company advisers. Crop protection products should be used as one option within an integrated pest management strategy (see CropLife publication 'IPM: the way forward for the plant science industry'). Crop protection products shouldonly be applied when necessary; there may be circumstances where the use of crop protection products is not appropriate, and where non-chemical control methods may prove more effective.

Information

Where the use of a crop protection product is considered necessary, information **must** be obtained on, for example:

- recommended products, dose rates, dilutions, timing and frequency of application, etc.
- method(s) of application
- precautions to be taken.



Seek advice on pest problems and crop protection products

Training

When a crop protection product is being introduced into an area for the first time, or when there is a significant change in techniques, user training should be organised, ideally in cooperation with official bodies, trade or farmers' organisations, or similar groups. Such training **must** essentially cover the topics listed above, emphasising their practical operation by the ultimate users, and should take into account their educational level.
This booklet provides a summary of the training that should be given.

Suppliers also have a responsibility to ensure that their sales staff and retailers are adequately informed and trained to demonstrate and give advice on the safe use and handling procedures of crop protection products. Specific advice and guidance should be given on the handling, minimisation and disposal of residual wastes and contaminated containers arising from the use of crop protection products.



Users must be trained

2. PURCHASE, TRANSPORT AND STORAGE

Purchase

Stock up on time

To be sure that everything is ready at the correct time for application, storekeepers and users **must** ensure that supplies of crop protection products, application equipment and spare parts are ordered and collected in good time. This is particularly important in remote areas and in areas where transport can be delayed due to bad weather. Only the amount of product that will be needed immediately should be purchased; the build up of unnecessary stocks that will be stored 'on-farm' **must** be avoided.

Buy the correct product

Buyers **must** ensure that the crop protection product purchased is the one they have been recommended to use. Crop protection products are clearly labelled by the manufacturers with trade names or code numbers, and also bear chemical names.

Buy products that are in their original manufacturers' containers. Do not buy products that have been decanted into smaller and/or unlabelled containers.

Do not buy damaged packs

Packs **must** be carefully examined before purchase, and buyers should refuse to purchase packs that are damaged or leaking, have had seals tampered with, or lack original labels. All details on labels **must** be legible.



Do not buy damaged packs

Transport

Obey laws and regulations

In many countries, the transportation of crop protection products is subject to laws and regulations. Their purpose is to make such operations as safe as possible, and to deal effectively with accidents, if they occur. Where no such regulations exist, the following procedures are recommended.

Keep crop protection products away from passengers, livestock and foodstuffs

Wherever possible, do not load crop protection products onto vehicles carrying passengers, livestock, foodstuffs and other materials for human or animal consumption or use. If this is unavoidable, then keep the products separated in a different compartment to avoid contamination of the passengers and the remainder of the load. Always clean the vehicle after unloading.

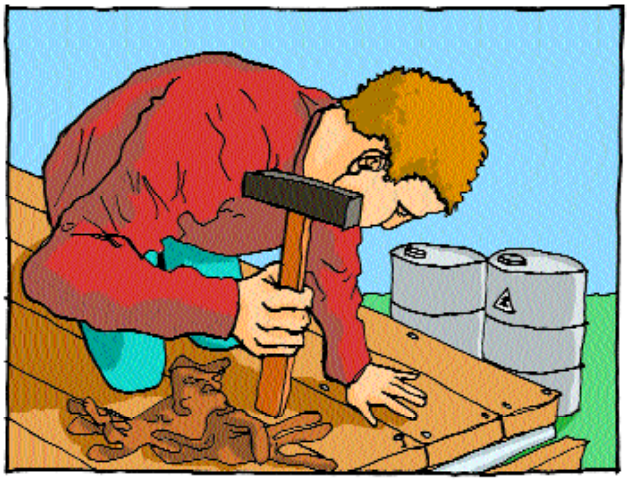


Keep crop protection products away from passengers and foodstuffs

Load carefully

Do not eat, drink or smoke when loading and unloading.

Load and unload product packages with care. Never place them under other heavy items, which may crush them, nor allow them to drop from a height. Protruding nails, metal strips and wood splinters on vehicles can puncture packages and cause leakage - hammer them flat before loading. Ensure other people and animals are kept well away from the loading area to avoid accidents.



Hammer down nails and splinters before loading

Deal with spillage

If spillages or leaks do occur:

- Keep people and animals away
- Do not smoke or use naked lights near the spillage
- Wear protective clothing during clean-up operations
- Remove damaged packages and place them on a non-absorbent surface or bare ground, away from dwellings and water supplies
- Use soil or sawdust to absorb liquids, sweep up carefully and dispose of appropriately (see 'Disposal of waste' on page 18) so that there is no possibility of contamination of wells and waterways
- Thoroughly wash down all contaminated parts of the vehicle, away from wells and waterways, dispose of the wash water appropriately (see 'Disposal of waste' on page 18).



Keep people and animals away.
Absorb spillage with soil or sawdust



Wash contaminated parts of vehicle with water



Wash contaminated skin and clothing

If a person gets contaminated:

- Remove and wash affected clothing
- Thoroughly rinse contaminated skin areas with clean water and then wash with soap and water
- When in doubt, seek medical advice.

If any foodstuffs get contaminated:

- Dispose of in an approved facility for hazardous material, if available
- If there is no appropriate facility for disposal, and local regulations permit, burn or bury contaminated foodstuffs (see the CropLife International 'Guidelines for the avoidance, limitation and disposal of crop protection product waste on the farm').

CONTAMINATED FOODSTUFFS **MUST NEVER** BE EATEN OR FED TO ANIMALS.

Storage

Crop protection products are valuable products, which may deteriorate and become useless and perhaps hazardous if they are not stored under proper conditions. Consult the label for advice on storage, and avoid storing in extreme temperatures. Plan purchases carefully, in order to reduce storage time and to avoid surpluses.

Obey laws and regulations

In countries where laws and regulations concerning the storage of crop protection products exist, they **must** be complied with. Where no laws exist, recommended procedures are as follows.

Store securely

DO NOT STORE CROP PROTECTION PRODUCTS WITH FOOD OR ANIMAL FEEDS.

Crop protection products **must always** be stored securely in locked stores to ensure that they are kept away from children and unauthorised persons, as well as animals, foodstuffs and water supplies.



Store crop protection products separately

Warehouses

Guidelines on bulk storage of crop protection products covering such aspects as hygiene and safety, receipt and dispatch, access, stacking heights and segregation of products, are given in a separate CropLife International booklet, 'Guidelines for the safe warehousing of crop protection products.'

Smaller stores and shops

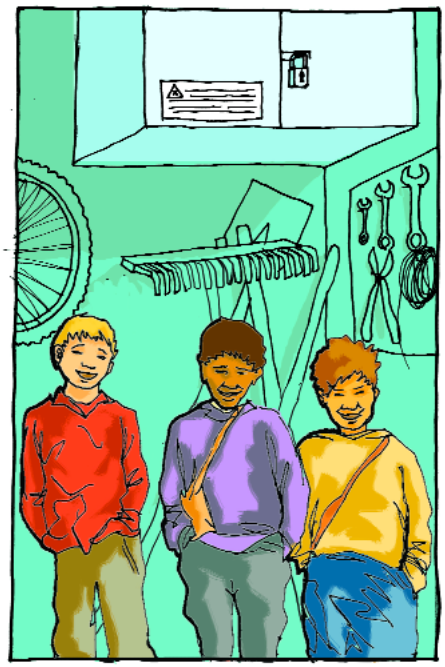
Store separately

Store crop protection products separately, preferably in a separate locked building, but certainly keep away from foodstuffs and other goods. There **must** be neither a possibility of contamination, nor of a crop protection product package being mistaken for some other product.

Food or drink containers **must never** be used to store crop protection products. Particular care **must** be taken to ensure that seed treated with crop protection products is not used as food or feed. Herbicides should be stored separately from other crop protection products.

Damage

Inspect packages regularly for signs of damage and leaks. Operating a 'first-in/first-out' system of storekeeping reduces the risk of damage due to deterioration. Remove leaking and damaged packages and containers and dispose of as described below (see 'Disposal of waste' on page 18). Clean up spillage/ leakage residues with a suitable absorbent material for separate disposal.



Keep crop protection products out of the reach of children

On the farm

- Never store crop protection products for farm use in living quarters
- Always keep them in their original containers
- Keep them out of children's reach, preferably locked in a separate cupboard or box, and never place them where they might be mistaken for food or drink
- Keep them dry, but away from fires, and out of direct sunlight
- If packs are damaged and the contents are in good condition, they can be repacked, but only into containers bearing **original labels** and never into empty food or drink containers.

Disposal of waste

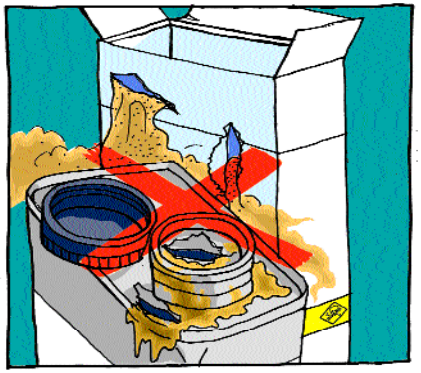
Spillage residues, absorbents and other contaminated non-recoverable materials **must** be disposed of according to local laws. If there is no law or appropriate system of removal and destruction, they should be incinerated by a hazardous waste company. In the absence of appropriate disposal facilities, small amounts of farm waste can be incinerated in a well-ventilated area away from people, animals or crops, or safely buried where there is no possibility of contamination of wells or waterways. Recommendations for incineration or burying can be found in the CropLife International 'Guidelines for the avoidance, limitation and disposal of crop protection product waste on the farm.'

3. FORMULATIONS, PACKS, MEASURING AND MIXING

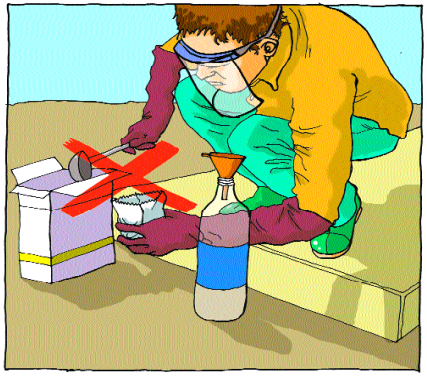
Formulations

Crop protection products are formulated (made up into usable products) by manufacturers to optimise the activity and safety of each crop protection product and to accommodate the ways in which it is to be used.

There are many different types of formulation - liquids and solids - most requiring to be diluted, usually with water, before use, although some are used without dilution. The most common are shown in Appendix 2 (pages 56-57), which also gives a general indication of the associated problems and hazards of which users **must** be aware.



Do not buy packs with broken seals



Do not re-pack crop protection products into other containers



Always read the label before using a crop protection product

Packs

Packaging varies according to the type of formulation, the chemical properties of the ingredients, the quantities being sold, and the conditions the packs will be subjected to during transportation between the manufacturer and user.

When purchasing, select pack sizes to suit the area to be treated, and avoid buying excessively large packs.

All packs are securely sealed by the manufacturer to prevent leakage and loss, and to make it evident to the purchaser should the packs have been tampered with in any way.

Examples of such seals are:

- 'Tear-off' plastic rings around screw-caps
- Pressed-in metal seals under screw-caps
- Foil seals under tin lids.

Buyers **must** carefully examine such seals, and **must not** purchase packs with broken seals.

Unauthorised packaging

Dealers **must not** break manufacturers' packages down into smaller quantities or re-pack for sale into bottles, bags or tins; buyers should never buy re-packaged products or packs without proper labels.

Instructions for use

Basic instructions for use **must always** be available in a locally understood language on the label of each pack. The type of information given on a label is presented on the following pages. Additional information may be given in an accompanying leaflet - buyers should ask if such leaflets are available, and if they are, they should be kept at hand for reference throughout the period of use of the crop protection product.

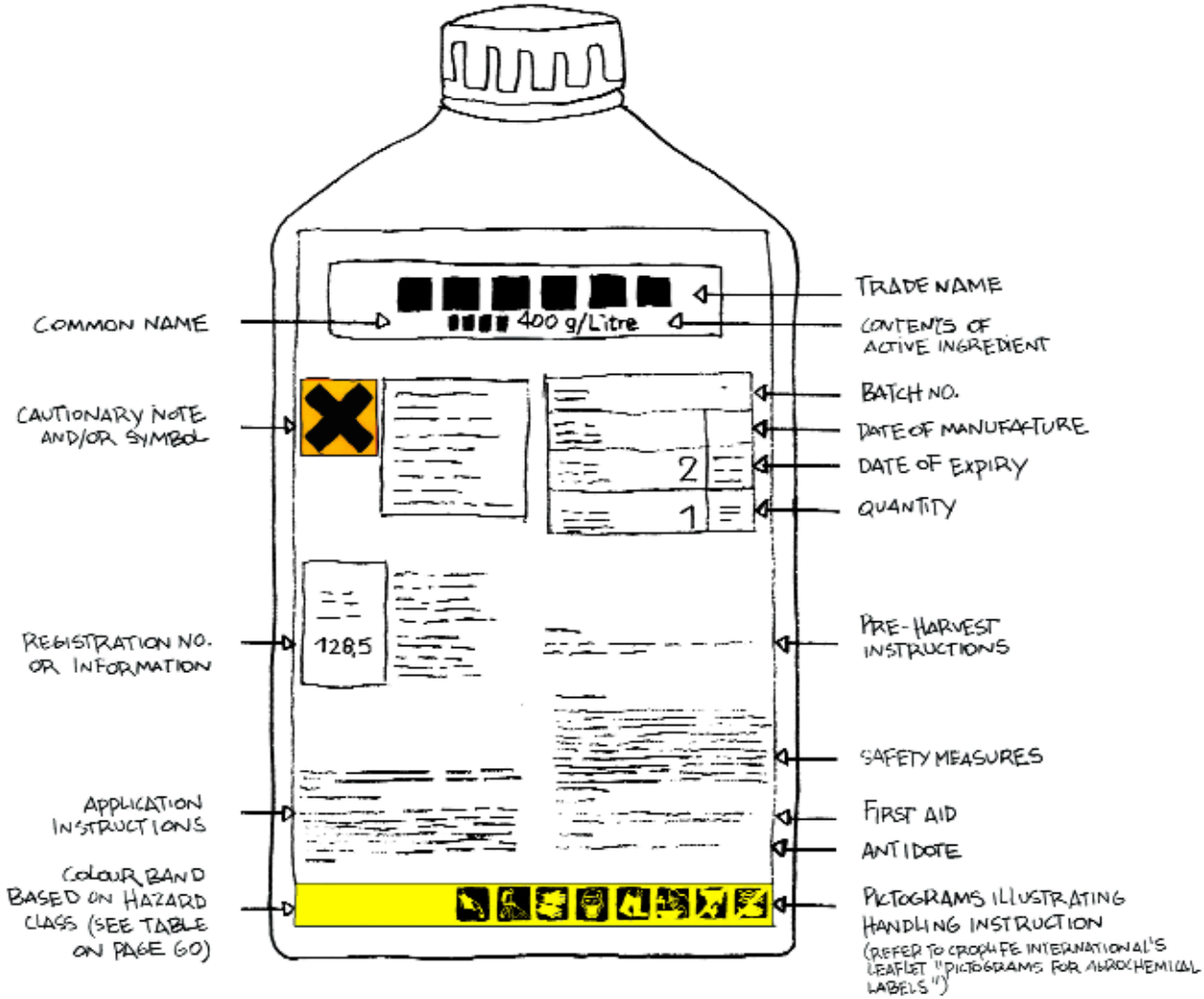
ALWAYS READ THE LABEL, AND SEEK INSTRUCTION BEFORE USING ANY CROP PROTECTION PRODUCT.

Prior to application of a crop protection product, the user must check:

- If the crop protection product is suitable for the intended purpose
- What safety precautions need to be observed (see pages 38 to 49 for details).

Label information can include:

1. Trade Name
2. Common names of active ingredients
3. Contents of all active ingredients as a percentage or as g/kg or g/l
4. Name & address of licence holder/manufacturer
5. Date of manufacture
6. Information for use, pre-harvest interval, shelf-life of the product
7. Adequate warning and precautionary symbols, first aid and antidote information
8. The word 'Registered' to indicate that the pesticide is registered
9. Hazard colour coding



Measuring and mixing

According to the instructions on the label, select the dose rate and mixing instructions appropriate for the area to be treated and the application equipment to be used.

ALWAYS ADHERE TO THE RECOMMENDED DOSE RATES AND DILUTIONS. HIGHER DOSES WILL NOT PRODUCE BETTER EFFECTS. LOWER DOSES WILL BE LESS EFFECTIVE.

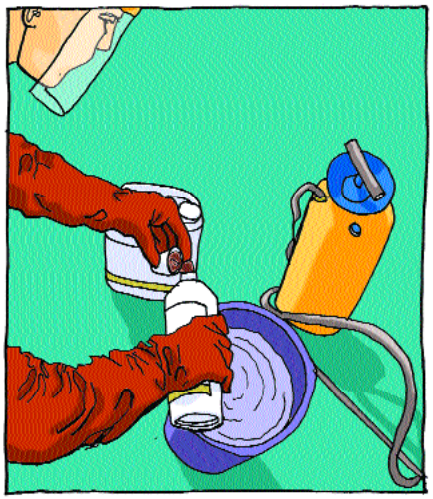
The methods adopted for measuring and preparation for use will vary according to the product and the scale of use.

Ready-to-use solid products, such as dusts and granules, can be tipped or scooped from their packs directly into the hoppers of the application equipment. Similarly, ready-to-use ULV sprays can be poured directly into the sprayer containers.

Concentrates, which mix easily with water, can be measured out and then poured directly into sprayer tanks partly filled with water. Wettable powders should be premixed ('creamed') with a little water before pouring into a partly-filled sprayer tank. The tank should then be filled with water to the correct level, and mixed well.

NEVER USE HANDS FOR MIXING.

Only fill sprayers when they are placed firmly on the ground.



Use the recommended dose, and wear recommended protective clothing



Keep children and animals away

Do not fill sprayers too full - they may leak during use. Clean splashes or spills from the sprayer.

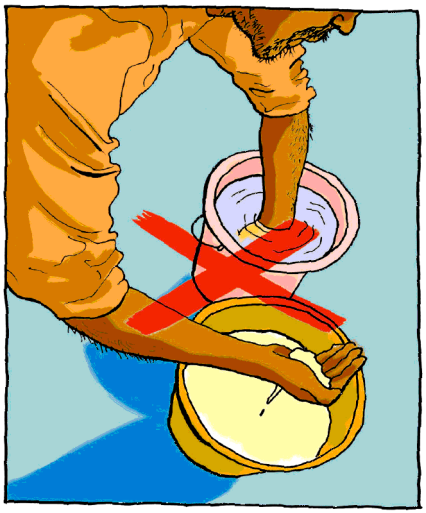
If a stock of spray liquid is being prepared, do not make up more than can be used within a reasonable time. Never make up more than can be used during the same day.

When measuring and mixing, the recommended procedure is as follows:

1. It is essential to avoid skin contamination, therefore wear protective clothing as recommended on the product label. Gloves **must** be worn. Additionally, the wearing of eye protection equipment and an apron is recommended. If contamination of skin or clothing occurs, wash off immediately, using plenty of water. Splashes in the eyes **must** be washed out for at least 10 minutes (see also the first aid procedures on pages 50 to 53). Always wash hands after using concentrates.
2. Measure out and mix products next to where they are going to be applied. Do not measure out or mix crop protection products in or near houses, or where livestock are kept.
3. Keep children and animals away.
4. Take care not to contaminate water supplies, or puddles from which animals may drink.
5. Use suitable equipment:
   - Measures or graduated jugs for liquids, scoops for powders. Where measures are supplied with the packs, or marked upon them - use them. Never use hands as scoops
   - Bucket or open-topped drum, with stick or paddle, for mixing. Never dip hands and arms into liquids when stirring
   - Funnel
   - Filter.
6. Use the cleanest water available; filter out debris.
7. Pour liquids carefully to avoid spillage and splashes - use a funnel if necessary. Never suck up any liquid crop protection product with a tube. Rinse measuring cylinders and add to the spray tank.
8. Handle dusts and wettable powders carefully to avoid fluffing-up. Stand upwind so that dust or splashes blow away from you. A mask **must** be worn when measuring and mixing dusts and powders.
9. Clean all contaminated equipment after use. Washing water should be disposed of as described below - point 12, page 29. Mixing vessels and measures used for crop protection products **must not** be used for any other purpose.

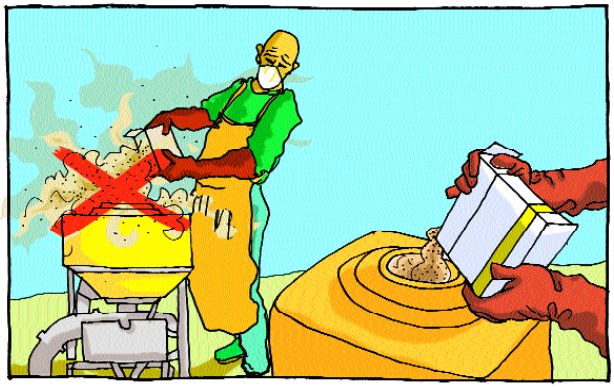


Use suitable equipment for measuring and mixing

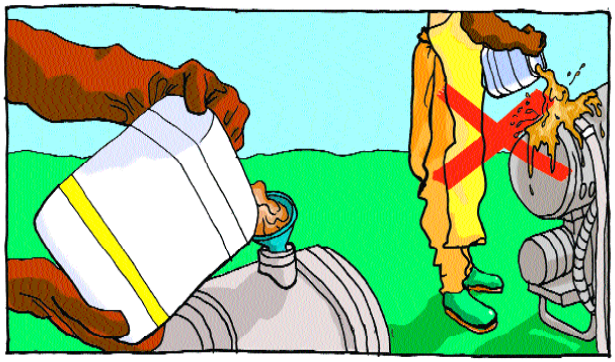


Never scoop or stir crop protection products with bare hands

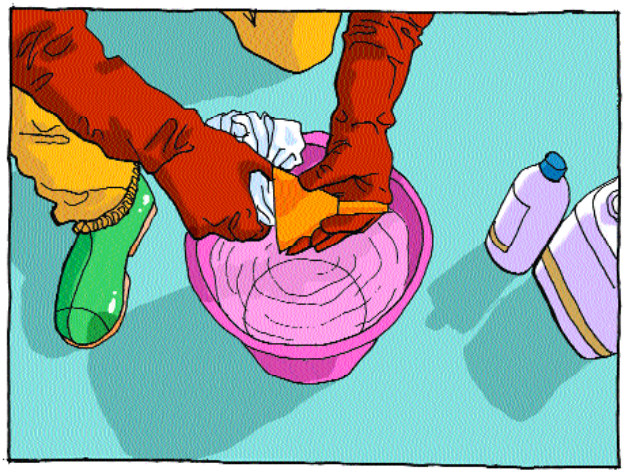
10. After use, close packages carefully to prevent leaks or contamination, and store safely. Always keep crop protection products in their original containers; do not transfer into bottles for beverages or food containers.



Handle dusts carefully, and stand upwind



Pour liquids carefully to avoid spillage and splashes



Wash all equipment after use

11. If the crop protection product spills, deal with it in the manner described on page 13.
12. Small quantities of surplus and unwanted products should, wherever possible, be retained in the sales container and subsequently included in a future spray application involving the same type of product. With liquid formulations the containers should be triple-rinsed with water (see page 31), and the rinsings added to the spray tank for application.

Disposal of containers

ALL EMPTY CONTAINERS **MUST** BE SAFELY DEALT WITH

Disposal should be in accordance with local regulations; where possible, containers should be recycled or disposed of via specialised hazardous waste disposal systems.
In the absence of the facilities to do this, the following procedures for disposal may be used as a last resort:

- Metal cans and drums: wash out (triple rinse, see below), puncture, crush and bury (Note: do not puncture or crush aerosol cans)
- Plastic: wash out (triple rinse, see below), puncture and bury
- Cardboard packaging: burn or bury.



Do not put crop protection products into bottles for beverages



If there is no other disposal alternative, bury empty containers and bury or burn cardboard packaging

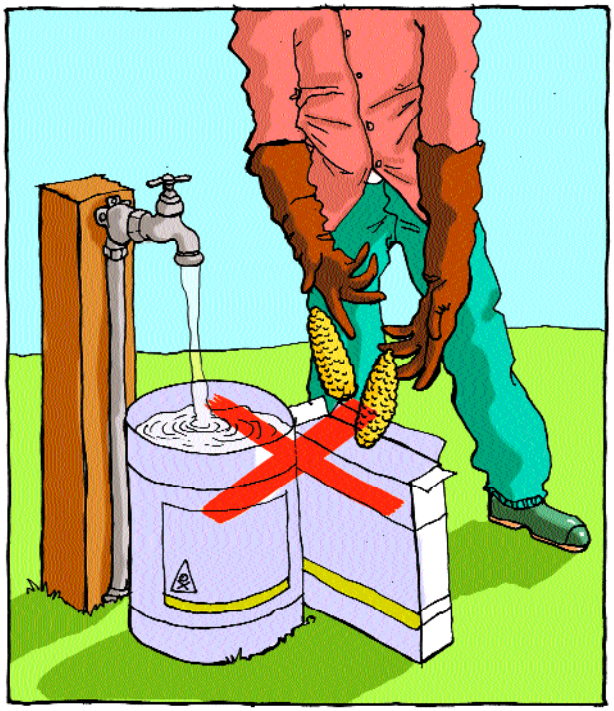
Burning **must** take place away from dwellings and from crops. Use an incinerator, as described in the CropLife International 'Guidelines for the avoidance, limitation and disposal of pesticide waste on the farm', to ensure that the incineration temperature is high enough for destruction of crop protection residues. Do not stand in any smoke from such fires, and keep children, other people and animals away.

Crop protection product containers **must not** be rinsed or washed in streams, rivers or ponds.
The containers should be 'triple rinsed' i.e. filled and emptied three times with clean water. The procedure is as follows: empty the container by inverting the container over the spray or mixing tank and allowing it to drain for at least 30 seconds, until the flow has slowed to a drip; then fill the container one-quarter to one-third full of water; replace the cap; shake vigorously for 30 seconds; drain the rinse into the mixing or spray tank, again by inverting the container over the spray or mixing tank and allowing it to drain for at least 30 seconds, until the flow has slowed to a drip. Repeat the rinsing twice more.

Disposal pits **must** be away from dwellings, wells, waterways and crops.

If containers cannot be disposed of immediately, the rinsed containers or unrinsed cardboard should be punctured or made unusable and stored securely to prevent theft or misuse, and away from children and animals.

DO NOT USE CROP PROTECTION PRODUCT CONTAINERS FOR FOOD OR DRINKING WATER FOR HUMANS OR ANIMALS. IT IS EVERYONE'S RESPONSIBILITY TO DISCOURAGE THIS PRACTICE.



Do not use crop protection product containers to store food or water

4. APPLICATION EQUIPMENT - USE, MAINTENANCE AND REPAIR

The type of application equipment employed depends upon the form in which the crop protection product is being used – for example spray, dust or granule - and upon the scale of operation.

IT IS THE RESPONSIBILITY OF ALL CONCERNED WITH THE USE OF CROP PROTECTION PRODUCTS TO ENSURE THAT PEOPLE ENGAGED IN APPLICATION, WHETHER AS SPRAYER OPERATORS OR AS HELPERS, ARE PROTECTED AND PROPERLY TRAINED TO ACHIEVE GOOD RESULTS SAFELY.

The details of any training should suit the situation and the technique involved, and **must** adequately cover the following aspects of application:

- Choice of application equipment
- Checking application equipment
- Choice and use of correct personal protective equipment
- Filling
- Calibrating
- Operating
- Cleaning and maintenance, spare parts
- Fault-finding
- Repairs - by operator
  - by mechanic



Application equipment and spare parts **must** be readily available

It is not possible to give detailed instructions about the full range of application machinery in this booklet; a series of guidelines on standards for application equipment are available from the UN Food and Agricultural Organization (www.fao.org). There are a number of general principles relating to portable equipment, which **must** be observed in order to ensure effective results and safe use.

Retailers and supervisors

Ensure that adequate supplies of affordable sprayers or dusters, of good quality and in good condition, and a full range of spare parts are available before the application season commences. Manufacturers' operating, repair and spare parts manuals **must** be available for reference.

Owners and operators of machines

- Take the most-needed spare parts and tools, such as washers, nozzles, hose clips, batteries, spark plugs, screwdrivers, spanners and pliers, into the field so that running repairs can be carried out
- If available and possible - and particularly if a number of machines are being used in a gang - take a complete spare machine into the field, so as to save time if one breaks down



Do not use leaking or defective equipment

- Never use leaky equipment - leaks will cause skin contamination, which may have impact on your health, and will result in poor application and may cause crop damage
- Never use poor-quality equipment - It is more likely to leak. Also, faulty output and poor spraying or dusting patterns will give poor results and may cause damage to crops and be a waste of time and money.
- Clean and check equipment at the end of each day's operations. Pay particular attention to thorough cleaning if the equipment is not to be used again for some time - residual crop protection product may cause corrosion and clogging

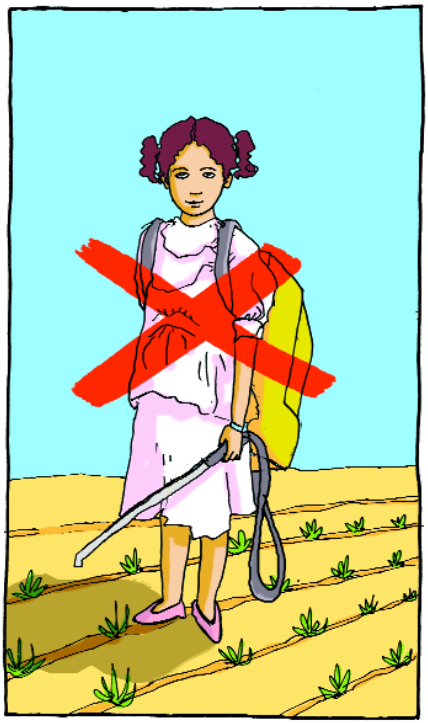


Clean and check equipment at the end of each day's work

5. USE OF CROP PROTECTION PRODUCTS IN THE FIELD

There are many techniques for the use of crop protection products in the field, dependent upon the crop, the pest problem, and the equipment to be used. These techniques **must** be taught to operators in local training schemes.

There are, however, a number of basic principles, common to most situations, which enable users to obtain the most effective results while safeguarding themselves, other people and the environment (see also 'Operational Precautions' on page 46).



Never allow children to apply crop protection product



Do not spray or dust into the wind

- Do not apply crop protection products without adequate training
- Read and follow the label instructions or ask for advice regarding dose, technique, protective clothing, timing, repeat applications, re-entry periods and pre-harvesting intervals
- Always wear appropriate protective clothing
- Never allow children to apply, or be exposed to, crop protection products; keep them out of areas being treated
- Do not allow other workers in the field when crop protection products are being applied
- Take heed of weather conditions, particularly wind, which can cause drift. This may make the crop protection product ineffective by blowing it away from the target, and it may be hazardous if it drifts onto the operator, other crops, water, animals or houses. Some crop protection products are easily washed off by rain, and need a rain-free period after application in order to be effective - the product label will indicate this
- Check you are spraying the right area
- Never leave pesticide containers and contaminated equipment unattended
- Keep people and animals out of freshly treated crops.



Do not apply crop protection products when it is likely to rain

6. GENERAL PRECAUTIONS

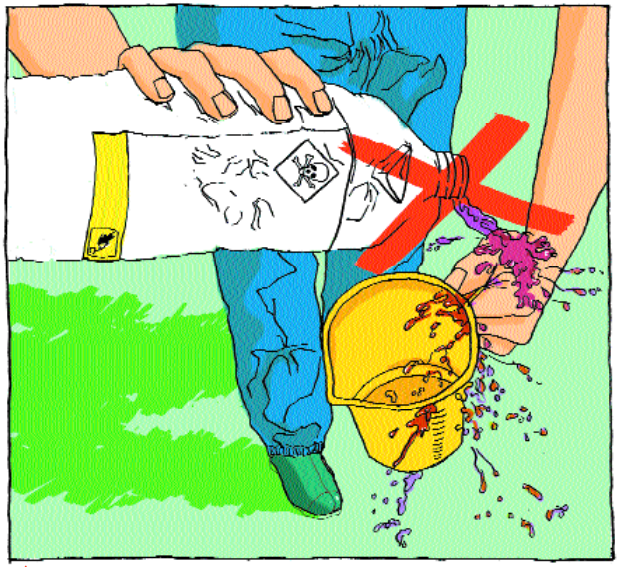
Hazards

Crop protection products can be used safely, provided the label instructions and good application practices are strictly followed. Precautions **must** match the level of hazard – the product labels and leaflets give instructions about this.

ALWAYS READ THE PRODUCT LABEL. FOLLOW ITS INSTRUCTIONS. THE SPECIFIED PRECAUTIONS ARE ESSENTIAL.

Crop protection products can become hazardous through improper use. Users **must** be informed and trained to understand the potential hazards of the different products and the precautions which **must** be taken to avoid them. The major aim **must** be to minimise exposure of humans and animals, as well as contamination of the environment.

Crop protection products can enter the body in various ways. Proper handling and use minimises risk of exposure

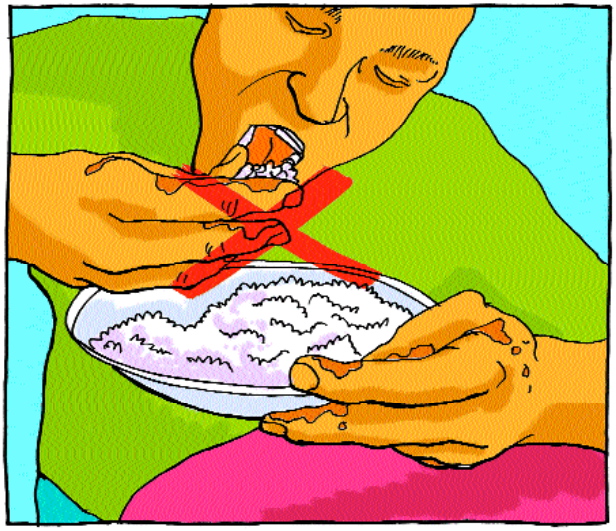


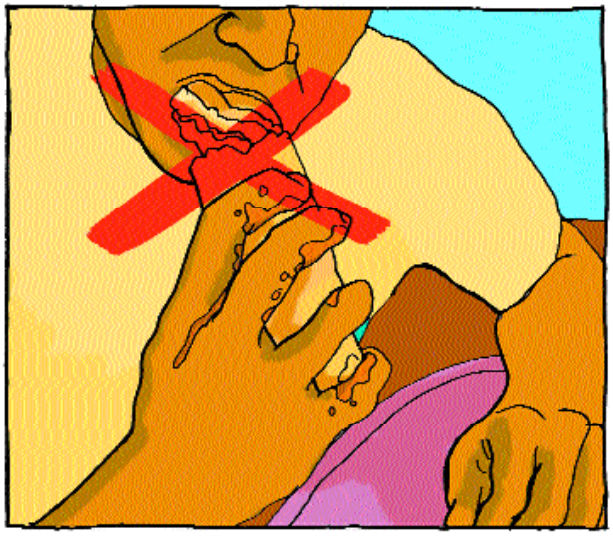
Through the skin



By breathing

Crop protection products can enter the body in various ways. Proper handling and use minimises risk of exposure





Through the mouth

Humans

There are three major routes by which crop protection products may enter the human body:

- Through the skin, including the eyes (dermal absorption)
- Through the mouth (oral ingestion)
- Through breathing (inhalation).

Skin contact is the most common cause of crop protection product poisoning. This can occur not only through obvious splashes and spillage of concentrates directly onto the skin, but also through the wearing of contaminated clothing, or by continuous exposure to spray. Chemicals may pass readily from clothing to the skin and may penetrate even through healthy, unbroken skin into the body. Heavy skin contamination is most likely to be the result of splashes from concentrated product during mixing, or from leaking application equipment. Both can be easily avoided through care, wearing appropriate protective clothing and proper maintenance of equipment.

HANDS AND ARMS ARE OFTEN EXPOSED WHEN HANDLING A PRODUCT.

Entry through the mouth can be particularly dangerous, but the precautions to prevent it are simple:

- Do not eat, drink or smoke with hands that are contaminated with crop protection product. Always wash hands thoroughly after handling or using crop protection products
- Do not store crop protection products in bottles for beverages or food containers. They **must** be kept in their original containers
- Do not transport or store crop protection products together with food, so as to avoid contamination
- Keep rodenticide baits and crop protection product treated seeds away from foodstuffs, to avoid accidental consumption
- Never use treated seed for human or animal consumption.

Intake by breathing may be a risk if volatile chemicals are used in enclosed spaces or under still-air conditions. Ensure plenty of ventilation when handling crop protection products, and use respirators when advised. Although only very fine sprays and dusts are capable of passing along the airways from the nose into the lungs, it is good practice to avoid breathing spray mists or dusts.

Domestic animals

Domestic animals can also be at risk, by eating contaminated foodstuffs or by drinking contaminated water. Therefore, they should be kept away from mixing areas, spraying or dusting operations and from recently treated areas. To avoid contamination, animal feeds **must** be stored separately from crop protection products.

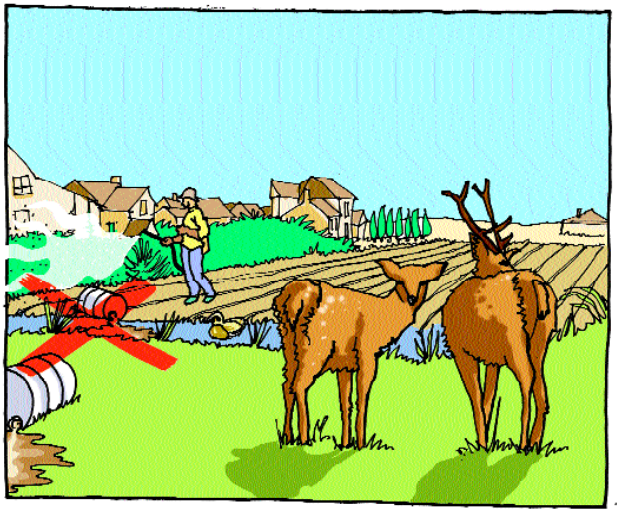
Environment

Wherever a crop protection product is in use, there is a possibility that by accident, carelessness or lack of understanding, some product will find its way outside the crop or the area that is being treated. The resulting contamination of the environment may be a hazard to wildlife and people.

Special risk areas include:

- Wells, ponds and water courses
- Cultivated land, where existing or subsequent crops may be contaminated
- Uncultivated land, supporting wild plants and animals.

The most common causes of such contamination are spillage and leaks during transport, storage and application, improper disposal of containers and leftover crop protection products, washing of containers and equipment, overdosing during application, and application in strong winds or close to sensitive areas such as open water. Precautions to prevent such contamination are dealt with in various parts of these guidelines.



Do not contaminate the environment
by mis-use of crop protection products

Protective equipment

With all crop protection products, users **must** minimise their own contamination. To help prevent skin contamination, clothing recommended by the product manufacturers and on the label **must always** be worn during mixing and application. All clothing **must** be well washed each time crop protection products are used.

Even if no specific protective clothing is recommended on the product label, lightweight clothing, covering as much of the body as possible, should be worn.



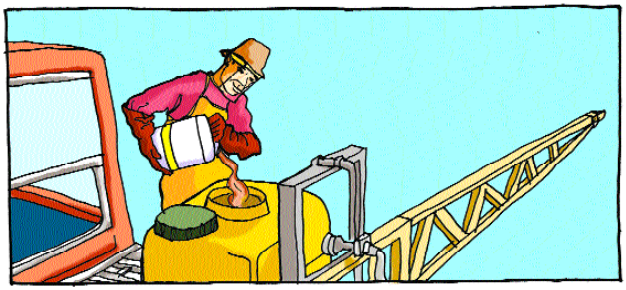
Wear clothing to cover as much of the body as possible

If the product label specifies, additional protective clothing should be worn; in most cases, this refers to gloves and face mask/goggles. In a few cases, labels may specify the use of more extensive protection such as respirators. The correct use and maintenance of specialised equipment is essential, and **must** be the subject of special training and skilled supervision. It is important to ensure that adequate and affordable supplies of such equipment are always available.

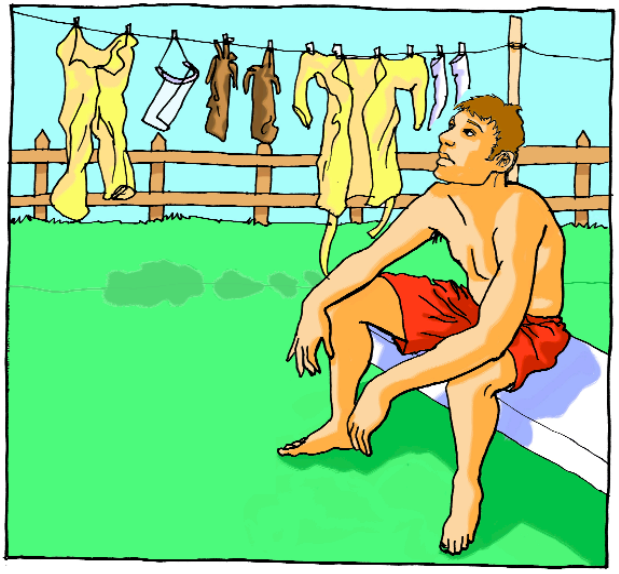
Always try to select a particular crop protection product formulation with less stringent precautionary requirements.

Application at cooler times of the day is recommended.

ADVICE ON USING PERSONAL PROTECTIVE EQUIPMENT, CAN BE FOUND IN THE CROPLIFE INTERNATIONAL 'GUIDELINES FOR PERSONAL PROTECTION WHEN USING CROP PROTECTION PRODUCTS IN HOT CLIMATES'



Wear the recommended protective equipment correctly



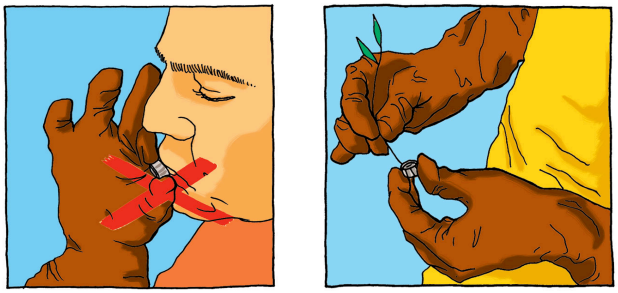
Wash all clothing and equipment after each day's use. Clothing should be washed separately from other washing

7. OPERATIONAL PRECAUTIONS

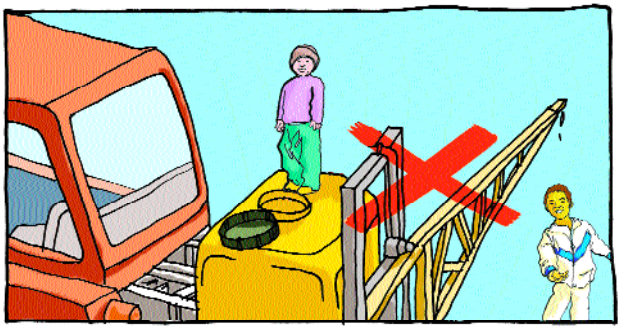
Safe application techniques

In order to minimise the risks to operators, other people, and the environment in general, the following rules **must** be observed:

- Do not work in strong winds
- work so that any wind blows the crop protection product away from operators and others, not onto them
- Never use leaking or overfill spraying equipment
- Do not blow out clogged nozzles through the mouth - clean them with water or a soft probe, such as a grass stem
- Keep people and animals away
- Never leave crop protection products and equipment unattended
- Never leave crop protection product containers open
- Collect all wastes, such as empty packages, for safe disposal.



Do not blow out clogged nozzles with the mouth—clean them with water or a soft probe



Never leave crop protection products and dirty equipment unattended

Hygiene

Personal hygiene is of utmost importance to everyone involved in the application of crop protection products. Operators **must** be trained:

- Not to eat, drink or smoke during work
- To wash their hands and face before eating, drinking or smoking
- Not to touch their faces or other bare skin with contaminated gloves or hands (note: even if they look clean, hands and gloves can be contaminated)
- To wash gloves before removal
- To wash thoroughly after work, and launder clothing each day separate from family washing
- To ensure that all the safety precautions on the product label are observed.



Wash hands and face before eating, drinking, or smoking

Re-entry to treated crops
With some crop protection products there **must** be a time interval between treatment of a crop and re-entry. This prevents the risk of contamination by working in or walking through a treated crop.

Where such risks exist, the product labels state the minimum periods which **must** elapse before re-entry. These periods **must** be strictly observed. If a period of time is not recommended, it is a sensible precaution always to wait at least 24 hours after the last application. Never enter a field before the spray has dried. Re-entry periods specified for humans also apply to animals.



Obey the label instructions about entering treated crops. Place signs in to indicate this.

Pre-harvesting interval
Where applicable, the product label will specify the period which **must** elapse between the last treatment and harvesting of the crop. This period **must** be strictly observed in order to ensure that crop protection product residues on the crop are within acceptable limits.

Disposal of wastes
After application of any crop protection product, the area of operation **must** be cleared of any waste product or containers, and equipment **must** be emptied and cleaned.

Concentrates must be kept in their original containers, securely sealed and safely stored.

Spray mixtures: plan operations so that no surplus remains at the end of the day. However, should leftovers occur, due to unforeseen circumstances, they may be used the following day unless the product label advises against this. Where this is not possible, small quantities of spray mixtures can be diluted and used up by repeated application to the crop.

8. FIRST AID

Speed is essential in the treatment of any contamination incident to prevent it leading to poisoning, especially when a person has been exposed to a highly toxic crop protection product. These products are recognisable by the 'skull and cross bones' warning indicated on the label. In such cases, call a doctor immediately or take the patient to hospital as soon as possible and show the crop protection product label. The first-aid measures mentioned below can be used in the field for the treatment of irritation and minor cases of poisoning. Steps, which can be taken before a doctor can reach the patient or before the patient can be sent to hospital, are also mentioned.

General principles
It is easier to prevent poisoning than to treat it, so handle crop protection products carefully.

People can be taken ill from natural causes when handling crop protection products and it is important to establish whether a crop protection product is involved before treatment is given. Wrong treatment may worsen a patient's condition.

Keeping a patient calm and comfortable and obtaining immediate medical attention will give him/her the best chance of recovering.

If breathing stops, perform artificial respiration immediately, observing appropriate precautions and using proper equipment to avoid ingesting any of the product yourself.



Start artificial respiration immediately if breathing stops

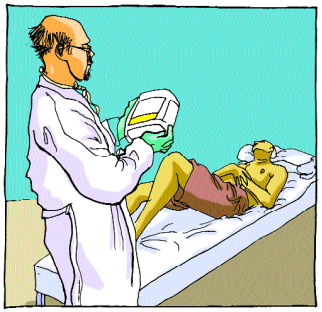
Few crop protection products have antidotes. If they exist, their use will be indicated on the label. Antidotes **must** only be used by qualified persons.

Never administer alcohol or milk when poisoning is suspected.

Symptoms of poisoning - first-aid treatment
Symptoms can either be localised - for example irritation of the nose, throat, skin or eyes - or more general. To some extent, the appropriate first-aid measures depend upon the route of exposure to the crop protection product.

Oral ingestion
Although accidental ingestion of a crop protection product happens less frequently than exposure by other routes, when it does occur it may present a considerable hazard. It is often accompanied by vomiting, abdominal pains and diarrhoea - symptoms that are common to the ingestion of most chemicals. People who have ingested crop protection product **must** be treated by a doctor promptly, either locally or at a hospital. Meanwhile, keep the patient calm and comfortable and protect him/her from heat and cold. Administer medical charcoal, if available.

PRIORITY **MUST ALWAYS** BE TO SEEK MEDICAL ATTENTION AS QUICKLY AS POSSIBLE, AND TO PROVIDE THE LABEL FROM CROP PROTECTION PRODUCT CONTAINER.



Obtain medical attention as quickly as possible, and show the label

Inhalation
This usually occurs when working in closed areas.

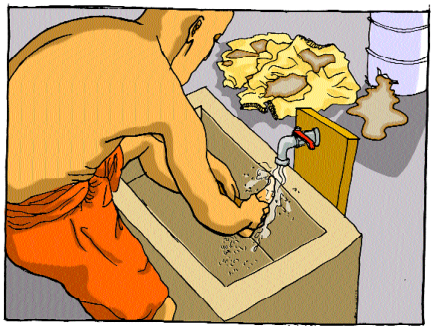
If poisoning – however slight – is suspected, remove patient from the work area. Loosen clothing around the throat and chest.

Absorption of crop protection product by inhalation can result in symptoms similar to those experienced following oral exposure.

Dermal
Many crop protection products can irritate the skin, and some penetrate rapidly.

Wash splashes of concentrate from the skin immediately, by rinsing in plenty of clean water, followed by using soap and water. Remove contaminated clothing immediately and wash underlying skin.
If the skin blisters and subsequently becomes broken, apply soothing creams.

If the chemical penetrates the skin rapidly it is possible that, as with inhalation exposure, symptoms similar to those experienced following oral ingestion will be encountered.



Remove contaminated clothing immediately and wash skin



Wash crop protection product splashes from the eyes with clean water for at least 10 minutes

Ocular
In cases where splashes of crop protection product have entered the eyes, wash the eyes thoroughly with cool, clean water for at least 10 minutes. Where eye irritation is severe, send the patient to a doctor.

For further information, see CropLife's 'Guidelines for emergency measures in cases of crop protection product poisoning'.

9. APPENDICES

Appendix 1: Check list for using crop protection products

- Handle crop protection products carefully
- Check that you are using the right crop protection for the pest problem
    - Purchase only the amount you need for the job
    - Do not buy damaged, opened or decanted packs
    - Transport according to local laws and the CropLife guidelines
- Sore packs of crop protection products in secure premises
- Always read and follow label instructions
- Work carefully to avoid torn packages, leaks and spills
- Work with due regard to your own safety (prevent skin and clothing contamination)
- Work with due regard to the safety of other people, especially children and women
- Use the correct amount of crop protection product (too much burns the plants and does not improve control; too little does not control the pest)
- Wear protective clothing:
    - Cover yourself up (specialised clothing overalls, or long sleeve shirt and trousers) to avoid contact with the spray or dust
    - Check the label or instructions and refer to the CropLife guidelines to see what you should wear; protective equipment includes rubber boots, face shield, gloves, dust mask, overalls, apron, respirator, hat, goggles
- Measure accurately
- Have water and soap at mixing place in case of contamination
- Use the right equipment
- Mix and fill sprayer next to where the application is to be made and away from houses and animals
- Never mix crop protection products with your hands, even if wearing gloves; use a stick to stir
- Check the sprayer and nozzle are in good working order without leaks
- Use the most appropriate nozzle that is available, change regularly – if damaged and at least once a year
- Check the sprayer has been calibrated
- Do not overfill the sprayer
- Apply crop protection products at cooler times of the day and when rain is not imminent
- Check you are spraying the right area
- Work with due regard to the safety of the crop
- Prevent environmental contamination
- Wash yourself and all equipment after use according to recommendations in the CropLife guidelines
- Dispose of waste materials, containers, wash water etc. according to local laws and recommendations in the CropLife guidelines
- Clearly mark sprayed areas.

Appendix 2a: Major crop protection product formulation types – Solids

PHYSICAL STATE	HOW APPLIED	DILUENT	FORMULATION TYPE	RISKS		
Solid	Undiluted		Dust	Dust generated in handling the concentrate	Operator exposed to concentrate	Drifts readily, watch the wind direction and speed. Risk of inhalation.
			Granule			Minimal exposure of operator who uses special spreading equipment.
			Smoke generator			Risk of inhalation.
	Diluted	Bran, grain	Bait concentrate		Dilution diminishes toxicity in use	Do not mistake bait for food.
		Water	WP (wettable powder)			Particulary for WP, the mixer needs more protection than the operator. Large drops, moderate drift.
			Soluble/ dispersible granule			

Appendix 2b: Major crop protection product formulation types – Liquids

PHYSICAL STATE	HOW APPLIED	DILUENT	FORMULATION TYPE	RISKS		
Liquid	Undiluted		ULV (Ultra-Low Volume)	Splashes adhere to clothes and skin	Operator exposed to concentrate	Operator exposed to full concentration, and risk of inhalation of spray drift
			Aerosol			Risk of inhalation
	Diluted	Water	EC (Emulsifiable Concentrate) SC (Suspension Concentrate)		Dilution diminishes toxicity in use	The mixer needs more protection than the operator
		Oil	ULV			Mixer and operator exposed to high concentration, and risk of inhalation of spray drift

Appendix 3: Glossary

Antidote:
medicine given to counteract poison

Bait:
a mixture of a crop protection product and an attractive foodstuff (for example, rodenticide plus grain or bran)

Calibration:
(of application equipment) measuring and adjusting the output and working rate of application equipment, so as to achieve accurate dose rates of crop protection products

Concentrates:
the form in which crop protection products are usually sold, mostly requiring dilution before use. 'Emulsifiable' concentrates are liquids which form emulsions upon dilution; 'suspension' concentrates form suspensions

Contamination:
pollution by the undesirable presence of crop protection product

Dilution:
the addition of (usually) water to reduce the concentration of a crop protection product before use

Dose rate:
the amount of crop protection product recommended to be used on (usually) a given area of crop. Expressed, e.g., in litres or kilogrammes per hectare. Often, the dilution to be employed is also stated - e.g., 1 kg product in 100 litres of water per hectare

Number of applications:
the maximum number of applications allowed for a particular product to a crop within a season

Pre-harvesting interval:
the period of time which **must** elapse between the application of a crop protection product and the harvesting of a crop, to ensure that product residues on the crop are within acceptable limits

Protective clothing/personal protective equipment:
clothing and equipment selected or designed to protect the wearer against contamination by crop protection products; to be worn, as recommended, when handling, mixing and applying crop protection products

Re-entry period:
the time which **must** elapse after a crop or area has been treated with a crop protection product before it is advisable for people or animals to re-enter the treated area

Spray mixture:
crop protection product concentrate diluted with water, or sometimes oil, as used for spraying crops, etc.

ULV sprays:
'Ultra-Low Volume' spray, usually applied undiluted, or mixed with a small volume of diluent and applied at a rate of </= 5 litres per hectare, with special equipment

Volatile:
describing chemicals which evaporate readily, even at low temperatures

Appendix 4: Label information on hazard classification

PESTICIDE CLASSIFICATION*				
Class		Colour Band	Symbol	
IA	Extremely hazardous	Red		Danger
IB	Highly hazardous	Red		Danger
II	Moderately hazardous	Yellow		Harmful
III	Slightly hazardous	Blue	(none)	Caution
	Unlikely to pose acute hazards	Green	(none)	Caution

* According to the World Health Organisation (WHO)

10. USEFUL REFERENCES

CropLife International publications

Guidelines for personal protection when using crop protection products in hot climates (Guideline 2)

Guidelines for the safe warehousing of crop protection products (Guideline 3)

Guidelines for the safe transport of crop protection products (Guideline 4)

Guidelines for the avoidance, limitation and disposal of crop protection product waste on the farm (Guideline 5)

Guidelines for the safe formulation and packaging of crop protection products (Guideline 6)

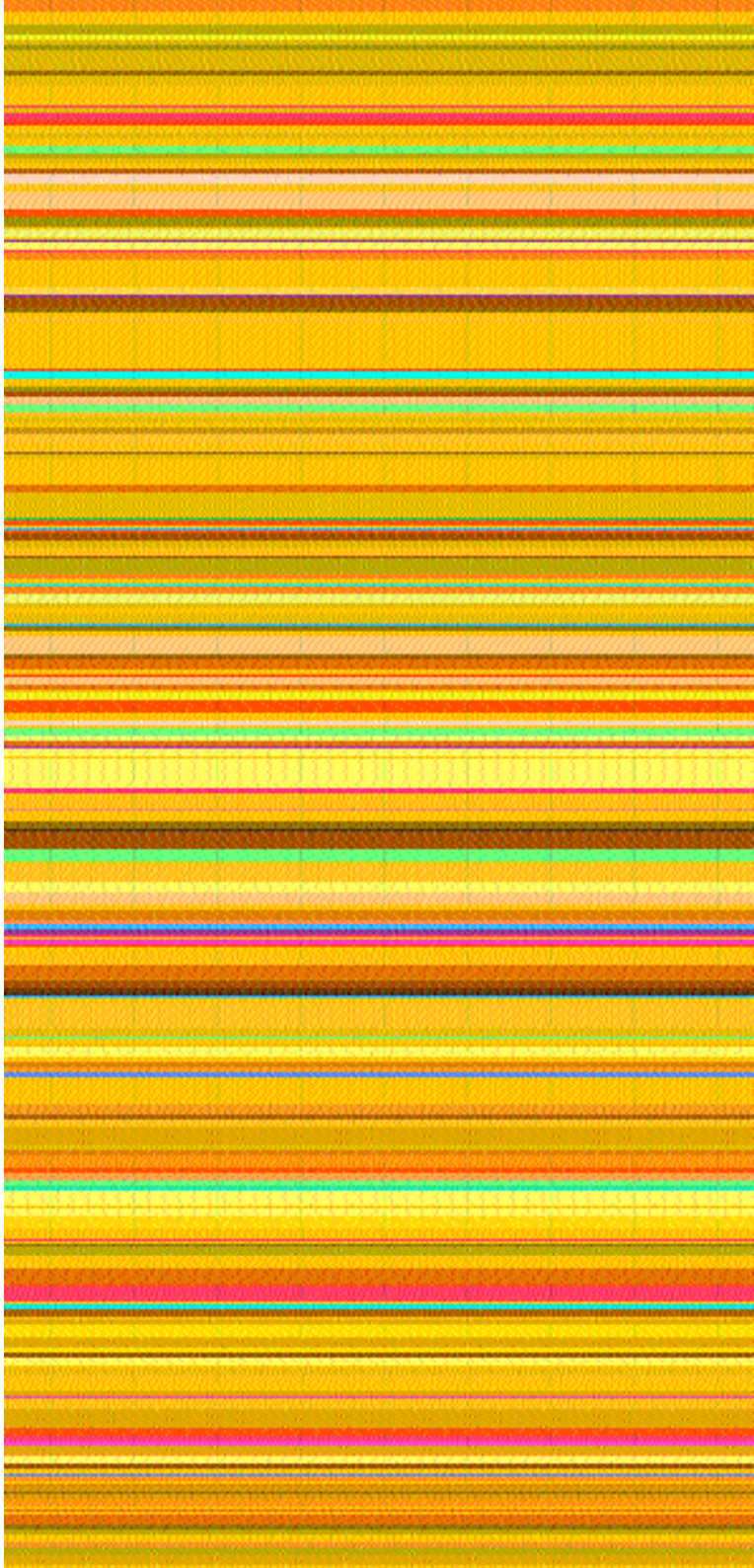
Guidelines for emergency measures in cases of crop protection product poisoning (Guideline 7)

Also visit the Croplife International website for latest information and publications.
www.croplife.org

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