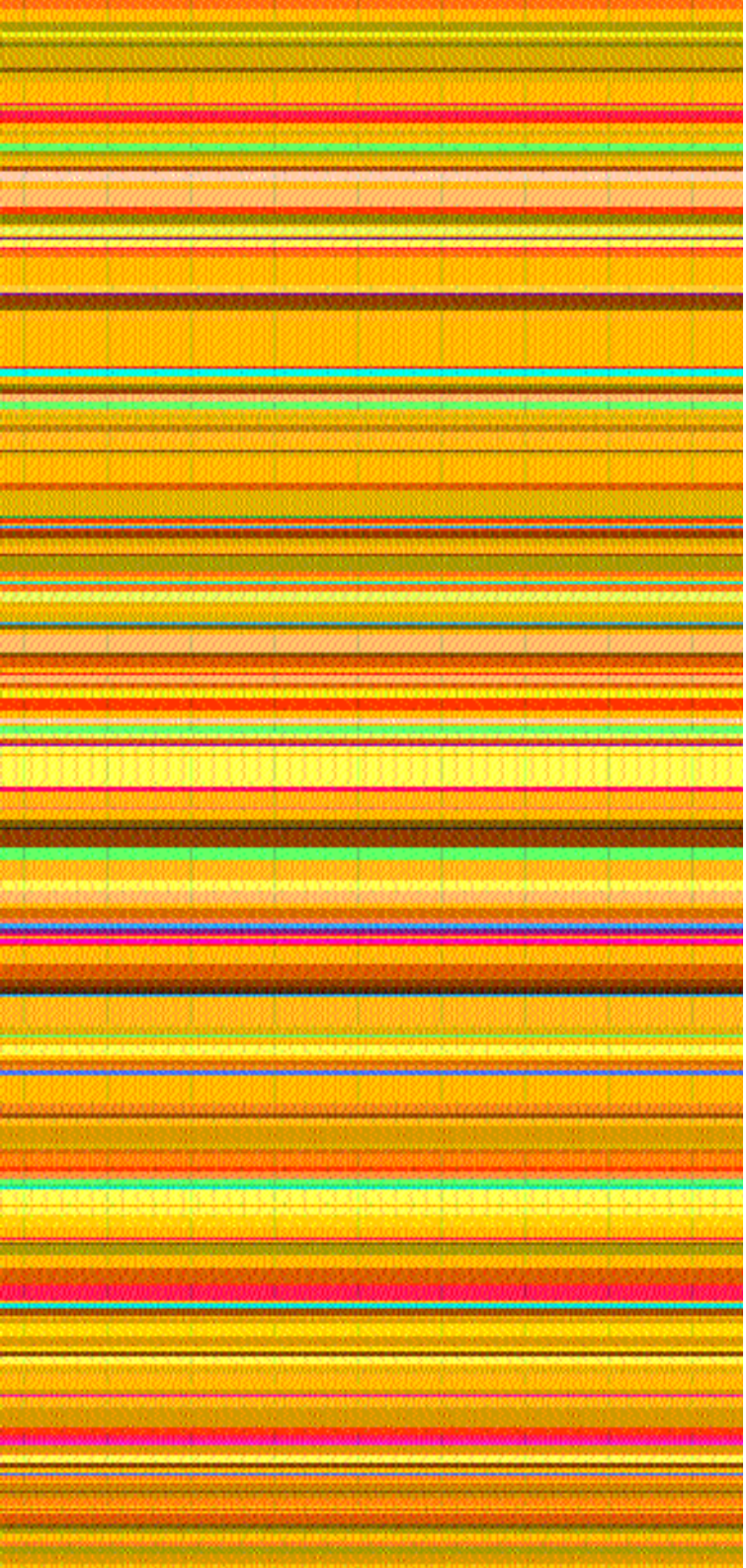


# Guidelines

for  
personal protection  
when using  
crop protection  
products  
in hot climates





# Guidelines

for  
personal protection  
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in hot climates

It should be clearly understood that these guidelines are intended to complement the requirements of any local and national laws and regulations and also 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 responsible, safe and effective use of crop protection products and has produced guidelines and other literature to facilitate this. These provide practical advice to farmers and others for using products under the real conditions they face. They emphasise that crop protection products should be used only when needed and to follow the instructions provided on the label of the product. However, tropical and other hot countries present a particular challenge as it is not always feasible for operators to obtain specialised protective equipment, or, when available, it is not possible to wear because of the personal discomfort or distress caused by the hot and humid conditions.

Therefore, in order to provide more advice for such situations, guidelines on the use of personal protective equipment were published in 1989 by GIFAP, CropLife International's predecessor. These guidelines, adopted by the Food and Agriculture Organization of the United Nations (FAO) as the basis of their own recommendations, brought together advice and recommendations from a variety of sources 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 trainers, extension officers, farmers and other agricultural workers using crop protection products in tropical conditions and complement the CropLife International Guidelines for the safe and effective use of crop protection products. Together, they provide sufficient information for operators to handle and apply crop protection products safely in a variety of climatic conditions worldwide.

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 responsible and effective use of crop protection products.



C. Verschueren  
Director General,  
CropLife International

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## INTRODUCTION

All crop protection products **must** be handled with respect and certain basic precautions **must** be followed. In some situations, for example during the mixing and loading of formulations, additional items of protective clothing may be required to ensure safety. Such additional items of protective clothing will be specified on the relevant product labels.

It is recognised that there are greater difficulties in wearing additional items of protective clothing in hot and humid climates than in temperate conditions. This is because such items may increase discomfort and, in some circumstances, lead to actual physical hazard. More advice needs to be given to pest control operators working in these conditions and therefore these Guidelines have been produced to help in this respect.

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

This booklet should be read in conjunction with the CropLife International Guidelines for the safe and effective use of crop protection products and the FAO Code of Conduct on the distribution and use of pesticides, which provide overall advice to farmers and others on the correct use of crop protection products, wherever and however they are applied.



Whenever this sign appears it indicates bad practices, which should be avoided.

# 1. HOW CROP PROTECTION PRODUCTS CAN GET INTO THE BODY

In order to understand how to protect against the hazards of crop protection products it is important to know how they might enter the body. There are three routes, via the mouth (oral), the skin (dermal) and by breathing into the lungs via the nose or mouth (inhalation).

In most operations with crop protection products exposure to the skin is the most likely route of contamination because of spillage, splashes or spray contact. Thus the main emphasis in this Guideline is how to minimise skin contact. The head is a sensitive area due to a higher rate of absorption of product via hair follicles. The eyes are particularly sensitive and require special attention.

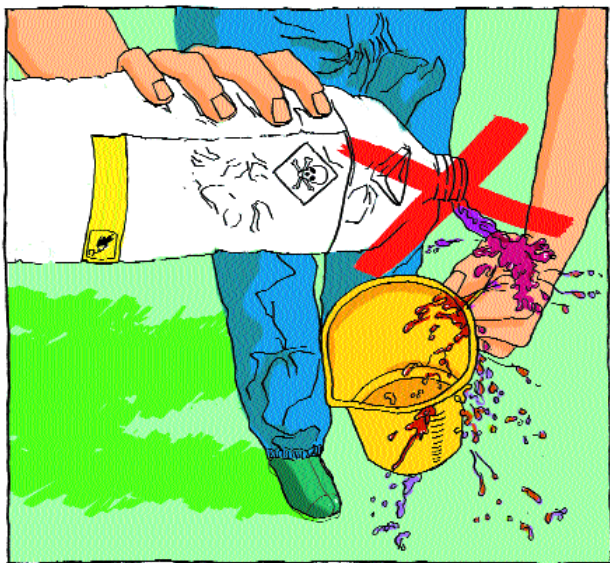
An inhalation hazard may occur in some instances because some products are volatile or because the method of application produces liquid or solid particles fine enough to reach the breathing zone and be inhaled. Ways in which this exposure can be minimised are described.

Although intake through the mouth is the least likely route of exposure during normal uses of crop protection products, simple measures are described to avoid this exposure.

It is also important to understand that the general precautions to avoid or minimise contact apply to the use of all crop protection products. Even if you know that a product has low toxicity, always follow the general safety precautions described in the next section.



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

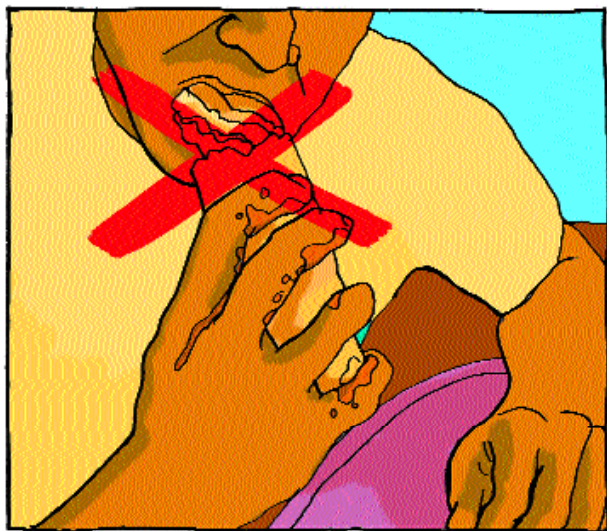
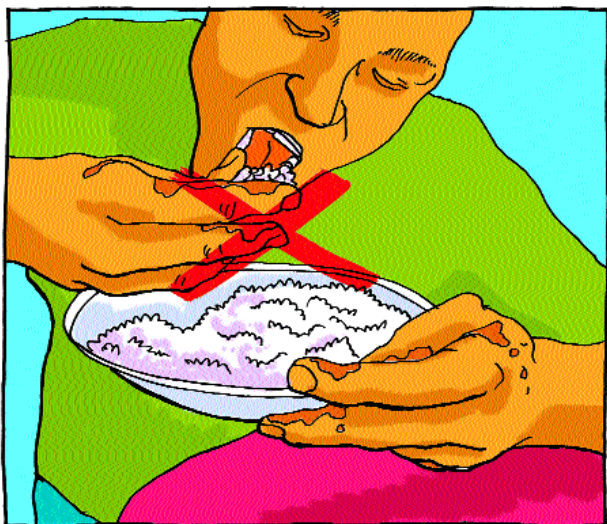


! Through the skin



! By breathing

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



 Through the mouth

## 2. GENERAL PERSONAL SAFETY PRECAUTIONS

Crop protection products are sold in containers or packages in various forms and in most cases the concentrated product will have to be diluted before application



Types of pesticide containers

There are certain personal precautions which **must always** be followed when crop protection products are used in order to minimise personal exposure during handling and application.

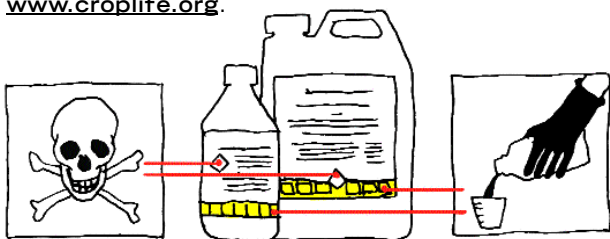
### Read the product label

Always read the product label before starting to use a crop protection product. If you do not understand any instruction, seek advice from someone who does. Note the safety precautions recommended for handling the concentrated formulation, which may be different to those for applying the diluted product. Obtain and wear the necessary items of protective clothing if these are recommended on the product label.



Always read the label and get advice before using a crop protection product

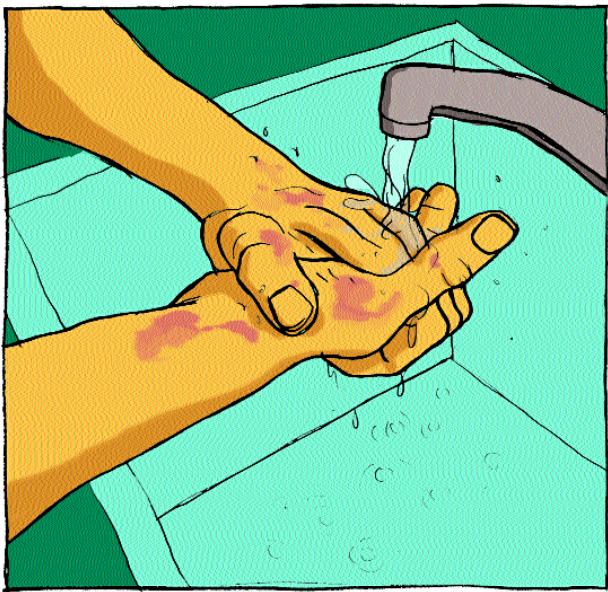
Some crop protection products have to be used with more care than others. Look for colour coding, warning symbols, pictograms or additional safety instructions in order to know if more than general precautions are to be followed. For information on label colours and pictograms, see the CropLife leaflet 'Pictograms for agrochemical labels' or visit the CropLife International website, [www.croplife.org](http://www.croplife.org).



Look for warning symbols, pictograms and colour coding on labels

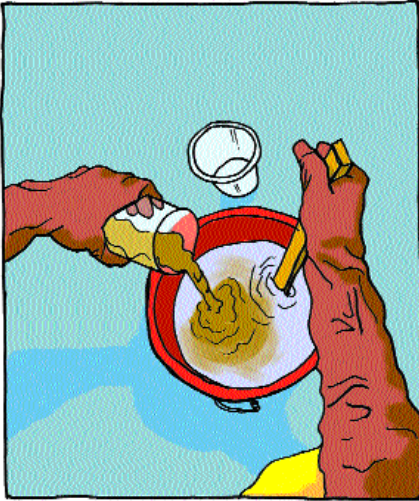
## Prevent skin contamination

When pouring or mixing the concentrated product avoid splashing or spilling on to skin or clothing. If any product falls onto the skin, or into the eyes, wash it off as soon as possible. Heavily contaminated clothing **must** be removed immediately and washed with detergent and water.

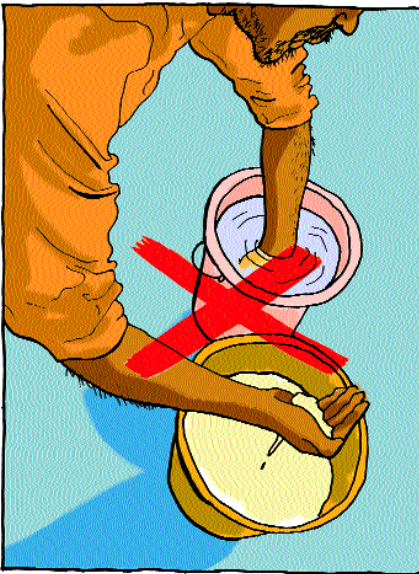


### Wash off skin contamination

Use suitable equipment for measuring out and transferring the product. Never use hands as scoops or for stirring liquids.



Use suitable equipment for measuring and mixing products



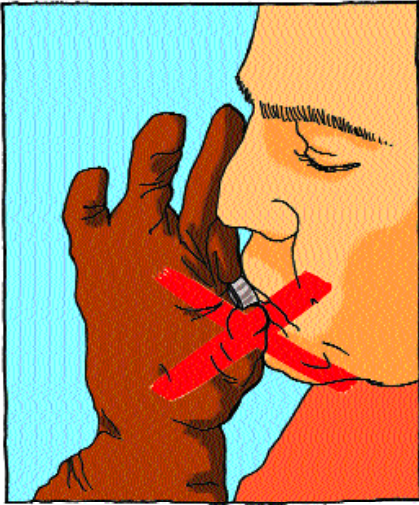
Never scoop or stir crop protection products with hands

When spraying the diluted product always work upwind of the spray and avoid coming into contact with it. Avoid contact with freshly sprayed foliage.



Do not spray into the wind

Use the correct application equipment, maintain it properly and use it correctly. **Never** use leaky equipment; leaks cause skin contamination.



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

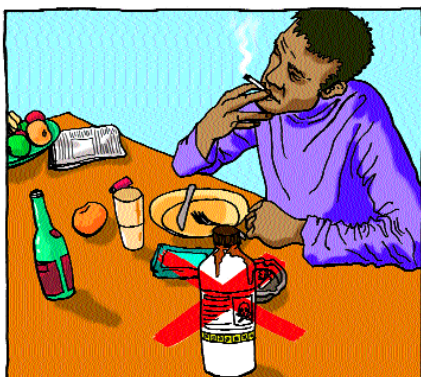
Do not attempt to blow out clogged spray nozzles with the mouth. Clean them with water or a soft probe such as a grass stem.



## Personal hygiene

Personal hygiene is of utmost importance when using crop protection products.

- When working with crop protection products do not eat, drink or smoke
- Do not touch the face or other bare skin with contaminated hands or gloves
- Always wash hands and face before eating, drinking or smoking, or going to the toilet.



Wash hands and face before eating, drinking or smoking



After working with crop protection products wash thoroughly

- Wash contaminated skin and clothing with soap and water
- Wash work clothes each day, separately from other clothing
- Do not wash near, or discard washing water into, watercourses such as streams and lakes.



Wash contaminated skin and clothing with soap and water

### 3. PERSONAL PROTECTION IN HOT CLIMATES

#### General advice

The general precautions recommended in the previous section apply to the use of crop protection products in any area of the world.

In addition to these general precautions, work clothing, gloves and, when recommended, additional protective equipment such as eye protection and protective garments help reduce exposure.

The problem in hot and humid climates is that wearing additional protective clothing may cause severe discomfort or physical distress due to heat stress.

There are certain measures, which can be taken to help reduce this problem:

- Always keep the protective clothing equipment in mind when choosing a product to use
- Where possible, a formulation that does not require the wearing of additional items of protective clothing should be used



#### Work at the cooler times of the day

- If possible apply the product during the cooler hours of the day when it is more comfortable to wear protective clothing.

## Work clothing for handling and applying crop protection products

Work clothing **must** be comfortable but also give sufficient protection to do the job safely.



Wear clothing to cover as much of the body as possible

The **minimum** requirement for **all** types of crop protection product operations is clothing covering most of the body. In practice this includes a long sleeve upper garment, a garment covering the lower body including the legs, footwear (boots or shoes) and, if spraying high crops, a hat. In practice, the thicker or heavier the clothing material the better it protects against pesticide penetration. Thicker or heavier materials however may be less comfortable. Where possible choose clothing made of the thicker/heavier material that is durable and also comfortable enough to wear for a working day.



The body is well covered by some types of national dress

## Hand, eye and face protection

When pouring, mixing and loading formulations of crop protection products, gloves **must** be worn, additionally the wearing of eye protection and an apron is recommended. Since this operation usually takes a short period of time, these precautions can be taken in hot and humid conditions as easily as in other situations.



Wear recommended personal protective equipment when mixing and loading

## Gloves

Gloves can reduce possible contamination by a large extent if they are used and maintained properly. As well as being required for mixing and loading, it is recommended that they are worn when applying liquid products.

They **must** be worn when applying dusts or granules by hand.



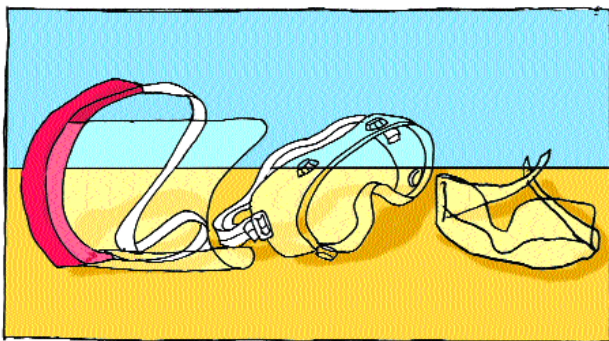
Gloves protect the hands when applying granules

Gloves are available in various types of material. Some materials give better protection than others against the different kinds of formulations. Advice on the protective properties of glove materials, as well as care and maintenance, is given in Section 4.

## Eye and face protection

Face shields or goggles are used for eye protection. Face shields are the cooler to wear in hot and humid climates, do not mist over as easily as goggles and give whole face protection.

Advice on types and design, as well as care and maintenance, of eye and face protection equipment is given in Section 4.



Eye and face protective equipment

## Other protective equipment

The measures outlined above will help protect the operator during the mixing, loading and application of most crop protection products. There will be cases, however, where additional protective equipment is required because of special circumstances.

These circumstances include protection from inhalation of vapour, fine dust or spray, protection against especially hazardous products or application methods and crop characteristics such as tall dense crops.

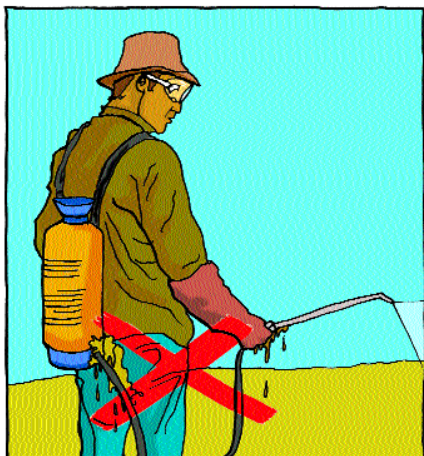
In these cases additional items of protective equipment will be specified on product labels. Such items may include: aprons, boots, face masks, respirators or overalls.

Advice and information on these items in the context of their use in hot and humid climates is given in Section 4.



## Protection against leakage from application equipment

Leaks from defective application equipment, such as hand sprayers, are the most likely cause of severe contamination. The first priority is to avoid leakage by using good quality application equipment that does not leak, by keeping this equipment in good order and not overfilling the equipment. If leakage for short periods cannot be avoided, contamination of work clothing and skin can be minimised by wearing extra protection. Simple measures include placing plastic sheeting or bags over the upper and/or lower body areas where leakage may occur.



Do not use leaking or defective equipment

Preferably a properly designed garment made of suitable protective material should be worn over the potentially exposed body areas. The materials and designs for such garments are given in Section 4.



Use additional protection if leakage from defective spray equipment for short periods cannot be avoided.

## 4. MATERIALS, DESIGN, AVAILABILITY AND MAINTENANCE OF PROTECTIVE CLOTHING ITEMS AND EQUIPMENT

This section contains advice on the range of protective clothing items that can be used by operators when handling and applying crop protection products. Recommendations are based upon the best information available and take account of the practical conditions in tropical countries.

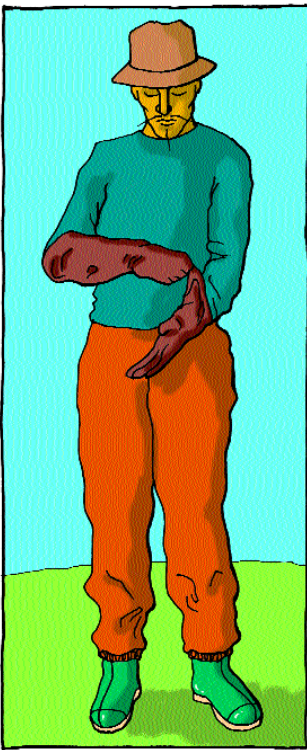
All hygiene precautions advised in the previous sections **must** be observed even though protective clothing items are worn.

### Protective garments

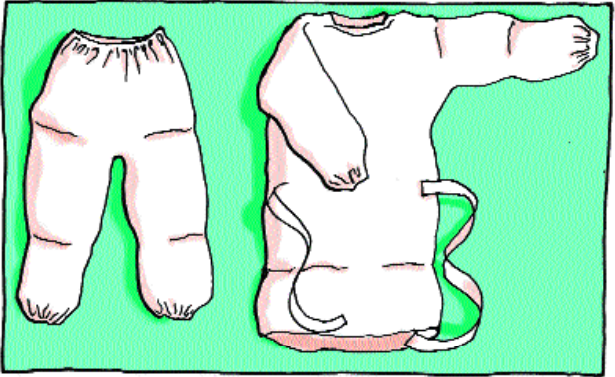
For many operations, clothing covering most of the body provides sufficient protection (see Section 3). When more protection is required, this can be provided by wearing garments such as overalls; these preferably should have elasticated ends to the sleeves and trousers.

Cotton is one of the most comfortable materials for tropical conditions and is readily available in most places. It is durable over long periods when worn for work. The protection afforded by cotton depends upon the weave of the material, its weight and thickness. Where possible, choose garments with material as thick and as heavy as can be worn with reasonable comfort in the prevailing climate. However, if cotton becomes wet it will not afford protection, and can increase skin contamination; handling and spraying practices should be such as to avoid the garment becoming wet, e.g. do not walk into the spray or through areas of the crop that have been recently sprayed. Alternatively, wear extra protective clothing, such as an apron or a rain suit to prevent soaking of overalls or other clothing.

Suitable alternative materials to cotton for wearing in hot and humid climates include those based upon non-woven polypropylene; they are as comfortable as cotton under these conditions. They are less durable than cotton however, and therefore will have to be replaced more often according to the type of work involved. Availability of suitable materials and clothing will vary from country to country.



Clothing covering most of the body provides sufficient protection



A two-piece garment that gives extra protection

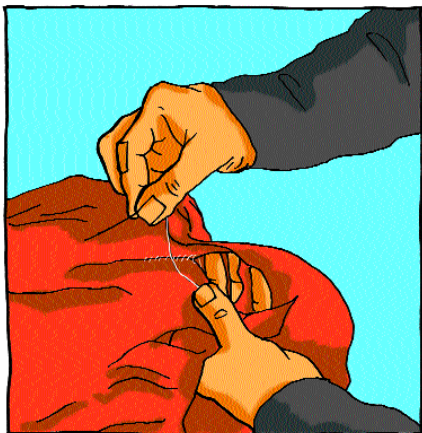
Overalls provide a simple design for protective garments. An alternative is to have a two-piece garment with a separate top and trousers. This gives greater flexibility because the top or the trousers can be worn separately or together over normal work clothing according to the type of handling operation. Instructions for making a two-piece garment are given in the Appendix.

## Maintenance of work clothing

Work clothing **must** be kept in a good state of repair so that there are no tears or worn areas through which crop protection products can cause skin contamination. Footwear **must** be inspected regularly for any signs of damage and be repaired or replaced accordingly.



Do not wear damaged clothing



Repair damaged work clothing

Work clothing, including footwear, **must** be washed after each day's use with soap or other detergent – even if it does not appear dirty or soiled, every item of clothing that has contact with concentrated or diluted product has to be assumed to be contaminated. It **must** be washed separately from other clothing and kept in a separate place. If heavy contamination is suspected washing is unlikely to be effective. If this occurs, or the clothing is damaged beyond effective repair, or the 'working life' of specialised protective clothing has been reached, the clothes should be destroyed (cut up and made unusable) and disposed of as described for contaminated material in the CropLife International 'Guidelines for the avoidance, limitation and disposal of crop protection product waste on the farm.'

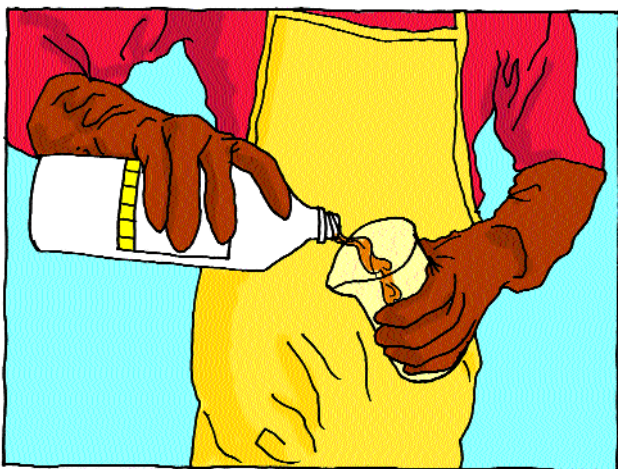


Wash work clothing after each day's use

## Gloves

Protective gloves are available in a wide variety of materials and designs. The following advice covers most situations:

- Always follow the general recommendations on wearing gloves, given in Section 3
- Select gloves that fit the hands comfortably and that are flexible enough to grip containers and other equipment firmly. They **must** be long enough to reach the elbows and should be worn outside the sleeves of the shirt/overalls. If short gloves are the only ones available they should cover the wrists at least and be worn inside the sleeves, which should be elasticised. Gloves with lining inside are not recommended for handling crop protection products (the lining will make cleaning difficult if contamination occurs)
- Gloves made of nitrile rubber or Neoprene offer good protection against a wide range of crop protection products and should preferably be used



Choose gloves that fit the hand comfortably



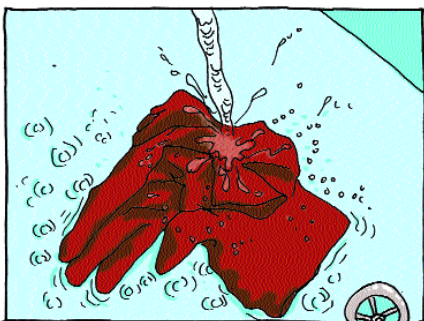
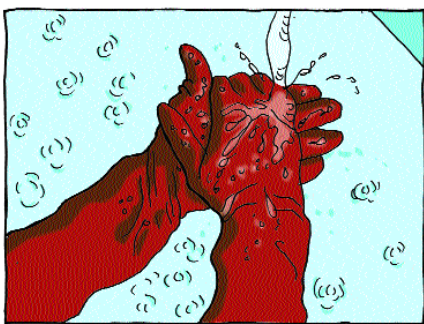
- Gloves made of natural rubber offer protection against liquid products, which are dissolved or suspended in water, for example, suspension concentrates. They also protect against solid products such as granules or dusts. Rubber gloves do not provide sufficient protection against liquid products containing other solvents, for example, emulsifiable concentrates
- For temporary protection against aqueous based or solid products disposable gloves made of polyethylene can provide sufficient protection. These **must** be worn for one load or application operation only and disposed of safely afterwards.

## Maintenance of gloves

Before use, examine gloves carefully for any sign of wear or tear particularly between the fingers. If in doubt, replace them.

Do not touch other parts of the body with gloves while using crop protection products and prior to washing them.

After use, gloves **must** be rinsed with water before they are removed from the hands.



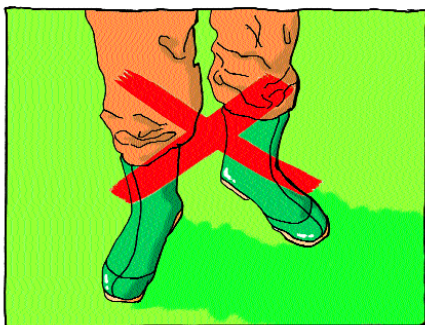
Wash gloves during breaks and after work

At the end of each day's use, gloves **must** be washed inside as well as outside and dried before they are used again.

## Boots

Boots made of rubber give protection to a wide range of crop protection products. Leather footwear is unsuitable because it absorbs some crop protection products and cannot be decontaminated.

Boots should be at least calf height, unlined (lining will make cleaning difficult if contamination occurs), with trousers worn outside so that any splashes or spills do not fall inside the boots. They **must** be washed inside as well as outside at the end of each day's work and then allowed to dry. They **must** be inspected regularly for any sign of damage or leakage and replaced when necessary.



Wear trousers outside the boots

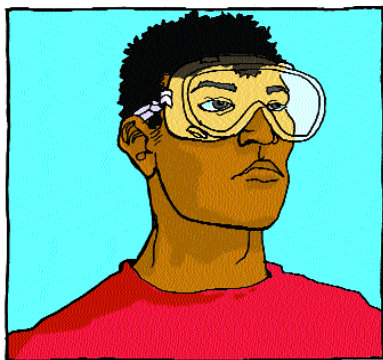
## Eye and face protection

### Eye protection

A simple face shield made from clear transparent material is a comfortable form of eye and face protection for wearing in tropical field conditions. Face shields offer protection against splashes and are less likely to mist over than goggles. Instructions for making a simple face shield are given in the Appendix. Goggles, which are an alternative for eye protection, are more uncomfortable and may not be acceptable to operators in hot and humid conditions. If eye protection is needed, and a face shield is not available, then a pair of safety glasses is an acceptable alternative.



Faceshields for full face protection



Goggles or safety glasses may also be worn for eye protection

### Maintenance of eye protection equipment

Before use, examine eye protection equipment carefully for signs of damage. If in doubt, replace it.

Clean eye protection equipment when necessary during use to ensure clear vision. Wash after use to remove any contamination.

### Face masks

A lightweight face mask covering the mouth and nose **must** be worn when handling dusts (but normally should not be used for spraying, unless local regulations specifically require this). It should be emphasised that such masks are to be regarded as disposable items and **must** be discarded after use.



### Face mask to protect against dusts only

Full or half-face respirators are required only for certain specialised operations, for example fumigation indoors, and **must** be worn if recommended. They should be cleaned and maintained after use as directed by the manufacturer. Because of the physical discomfort involved, this type of equipment can be worn for only very short periods in tropical conditions.

## Aprons

Aprons are useful additional protective items for mixing and loading operations with concentrated formulations and for cleaning out containers before disposal. Aprons made of PVC or rubber, or disposable ones made of polyethylene materials, provide adequate additional protection for operations of this kind. To be effective, an apron should cover the front of the body up to the neck and down to the knees. As with other protective equipment it **must** be washed after use and inspected regularly for signs of damage. Instructions to make a simple apron are provided in the Appendix.

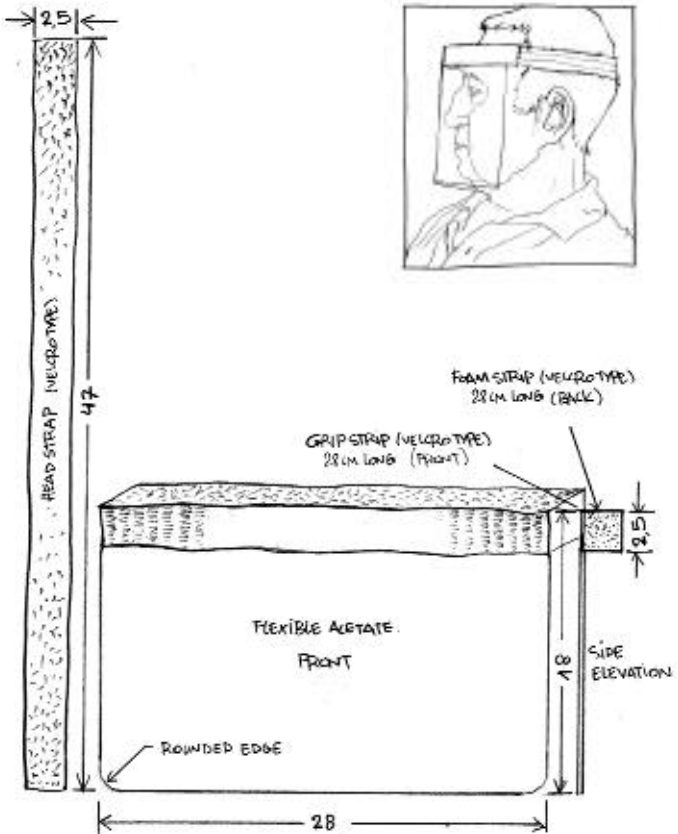


Apron for extra protection when mixing and loading crop protection products

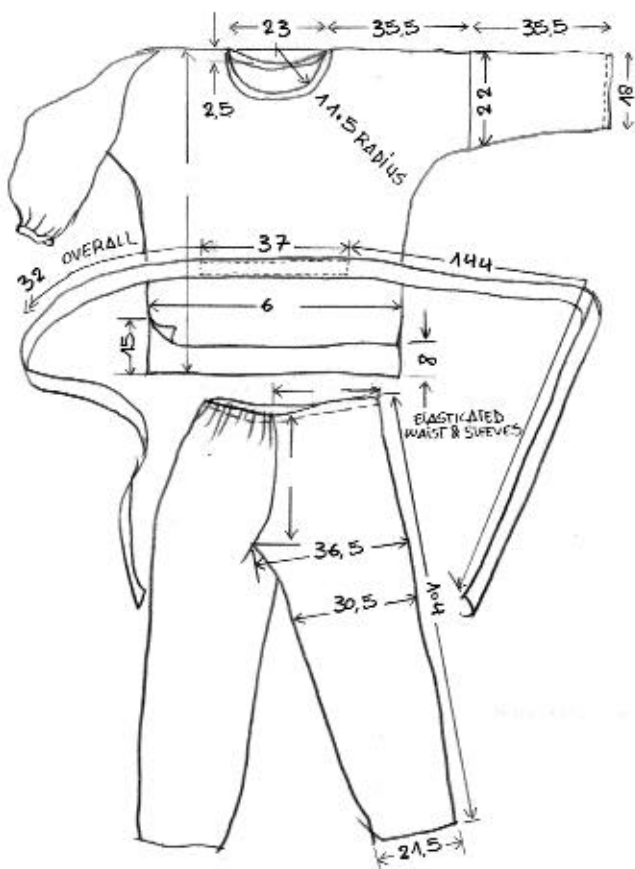
If nothing else is available, clean plastic sheets or sacks cut to form an apron can be worn as a temporary measure and destroyed after use.

# APPENDIX: INSTRUCTIONS FOR MAKING PERSONAL PROTECTIVE EQUIPMENT

## A. Face mask



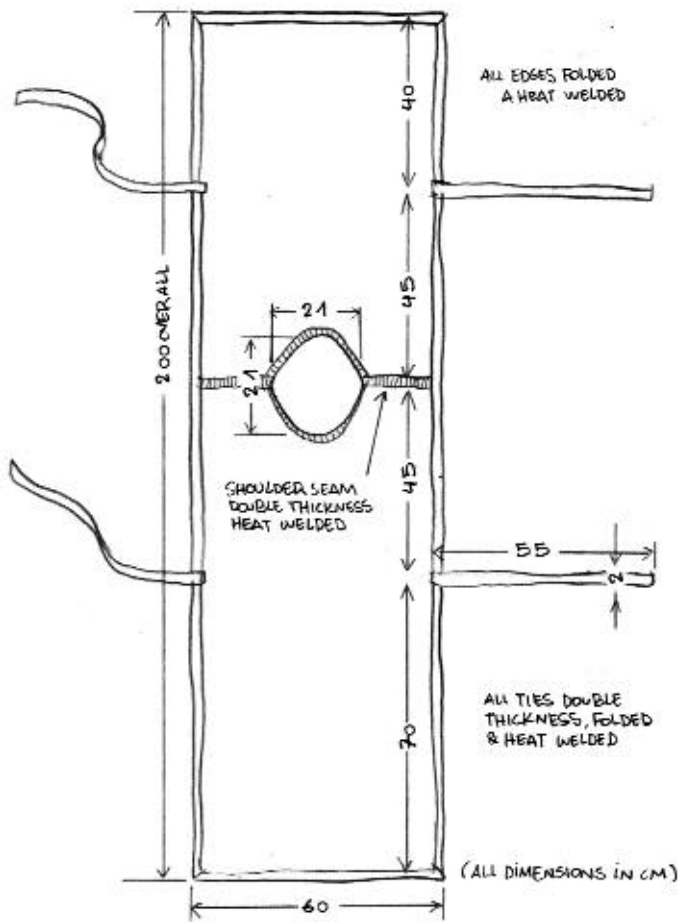
## B. Two piece protective garment



(ALL DIMENSIONS IN CM)



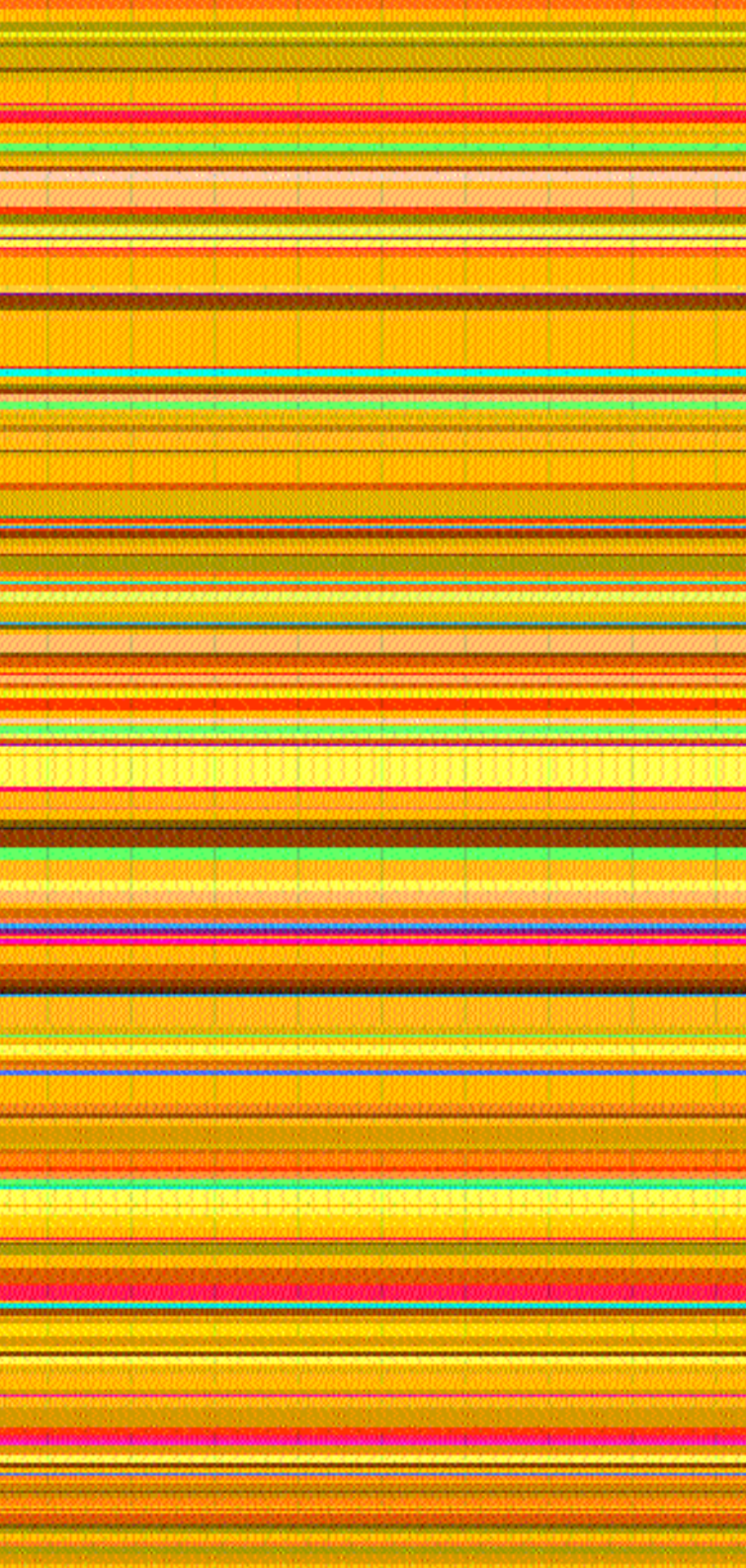
# C. Apron



Design: **NAos design**  
Illustrations: **Bruno Manfrin**  
Published by **CropLife International**

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October 2004



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