

Improving pesticide health and safety

About this sub-section

This sub-section will help us to:

- use risk assessment to identify health and safety risk control measures for pesticide use/exposure
- think about alternatives to pesticides
- develop trade union action plans

No such thing as the “safe use of pesticides”

Although employers, pesticide industry sellers and advisors, and even government advisors may tell you the opposite, in practice, there will always be a degree of risk attached to pesticide use. Always remember to look for alternatives to pesticide use to prevent risks. (See below regarding IPPM and organic farming).

However, the reality is that many agricultural workers are still forced to use, or are exposed to, pesticides as an everyday part of their job. Pesticides present their greatest danger when being used. So in this section, we look at the hazards and risks that can occur before, during, and after pesticide use, and what practical measures should be taken to improve worker health and safety protection. Risk assessment is an important tool.

The ILO Convention No 184 on safety and health in agriculture, Article 7

“The employer shall:

- *(a) carry out appropriate risk assessments in relation to the safety and health of workers and, on the basis of these results, adopt preventive and protective measures to ensure that under all conditions of their intended use, all agricultural activities, workplaces, machinery, equipment, chemicals, tools and processes under the control of the employer are safe and comply with prescribed safety and health standards;*
- *(b) ensure that adequate and appropriate training and comprehensible instructions on safety and health and any necessary guidance or supervision are provided, including information on hazards and risks associated with their work and the action to be taken for their protection, taking into account their level of education and differences in language”.*

ILO Recommendation No 192 on safety and health in agriculture Paragraph 5

“At the level of the undertaking risk assessment and management measures should be implemented in the following order of priority:

- *elimination of the risk;*
- *control of the risk at the source;*
- *minimisation of the risk by such means as the design of safe work systems, the introduction of technical and organisational measures and safe practices, and training; and*
- *in so far as the risk remains, provision and use of personal protective equipment and clothing, at no cost to the worker”.*

Using health and safety risk assessment on the farm or plantation

TRAINING ACTIVITY

AIMS

To help us to:

- identify the hazards associated with specific work activities/workplaces, the levels of risk, and the likely injuries or ill health problems
- decide who is most at risk of being injured or made ill
- learn how to carry out a simple risk assessment so as to be able to help train employers, and their workers, on this technique. In order to help the employer put in place, or strengthen existing, risk reduction measures in order to better protect the workers' health and safety

TASK

Your trainer will distribute the health and safety risk assessment forms, and will arrange for small groups of participants who do similar work to be formed.

In your small group:

1. Select a major crop of your choice which is grown in your country or region
2. Select 2 work activities involved in growing this crop and list them under Column 1 in your health and safety risk assessment form. E.g. land preparation, planting, weeding, harvesting etc
3. In Step 1 of the risk assessment, Column 2, list the two main hazards for **each** work activity selected, giving details of possible injuries or health effects
4. In Step 2 of the risk assessment, Column 3, give details of the number of workers – distinguishing between gender and age – at risk for **each** hazard identified, and some details of the work they do. This includes details of any children who are involved in the various work activities
5. Step 3 of the risk assessment, Column 4, identifies the health and safety risk reduction measures to be assessed and put in place by the employer to prevent or reduce the risks to the workers from the hazards identified. The health and safety risk reduction measures should be assessed and put into place in the following order:

1. Elimination of risk
2. Substitution
3. Use of equipment, tools, technology
4. Work organisation and procedures, instructions, supervision, training and information
5. Health/medical testing and surveillance
6. Personal protective equipment (in so far as the risk remains)

Use the worked example of risk assessment on pesticide spraying below to help you
Elect a spokesperson to report back on your group's findings.

Trainer's notes

The key point to emphasise in this exercise is the use of the list of risk reduction measures – in the order they are written – as outlined above.

IT IS SUGGESTED THAT THE TRAINER STARTS BY GOING THROUGH THE WORKED EXAMPLE OF RISK ASSESSMENT ON PESTICIDES ON PAGE X WITH THE PARTICIPANTS. ONCE THE PARTICIPANTS HAVE UNDERSTOOD THE BASIC IDEA, THEY CAN BE DIVIDED INTO GROUPS TO CARRY OUT THE RISK ASSESSMENT ACTIVITY ABOVE.

Health and Safety Risk Assessment is a step in a **risk management process**, and is a widely used management technique in industry and agriculture. Risk assessment is designed to help those in charge of workplaces – the employer and her/his representative(s), in cooperation with her/his workers - to systematically assess their workplace activities with a view to preventing and reducing fatal accidents, injuries, and ill health at work. Risk assessment is a working methodology that helps employers/companies put into effect the provisions of their general health and safety policies.

Farmers (self-employed or employers), and their farm workers, can be trained how to carry out risk assessments in their own business/farm undertakings, and to implement the risk reduction measures identified by them in their assessment **before** workers are exposed to danger. *The ILO conventions on health and safety in agriculture and mining require employers to carry out a risk assessment **before** exposing workers to danger.*

Risk assessment is a self-help tool. It allows farmers to take action themselves to remedy health and safety problems on their farms. Using this technique to tackle their daily problems avoids them having to over rely on officials like labour inspectors to tell them what is wrong and how to solve their problems, though of course they can seek advice and help from such persons.

What is a risk assessment?

Risk assessment can be used by companies/enterprises/farms of all sizes - small, medium and large. Risk assessments for larger scale undertakings will inevitably be more complex than for small businesses.

Workplace risk assessments are specific to an enterprise, company, farm, and often to a particular workplace in the undertaking. A "workplace" can be anything from a farm field or farm yard, a small workshop, to a large machine shop in a factory. Risk assessments vary according to whether the whole "undertaking" (made up of a series of workplaces) is being assessed, or whether the assessment is of a more limited nature - only looking at specific work activities or specific workplaces on the farm.

A risk assessment involves **three** steps.

Step 1. The first step is identifying the **hazard(s)**, defined as the potential to cause harm. Hazards (dangers) can include machinery, tools, transport, processes, industrial chemicals, pesticides, dust, noise, disease, poor work organisation etc. The aim is to spot the hazards that could result in harm to the safety or health of the workers **before** anyone is harmed.

An "employer" should:

- identify which work activities and processes are the most dangerous
- learn from experience of previous accidents and work-related ill health
- note how many workers are at risk for each hazardous activity, recording whether they are adult female and/or young female and male workers. Are any children involved?
- ask the workers for their views on the dangers of the job(s) they carry out and how workplace accidents and ill health can be prevented
- think about the potential for harm for each work activity or process and the health and safety measures that should be put in place to prevent accidents or ill health

Step 2. The employer then has to evaluate the type and degree of **risk** for **EACH HAZARD** identified, the probability of accidents and/or ill health from each hazard, and which workers are specifically at risk from each of the hazards. Different risk reduction measures will be required for each hazard.

For each hazard, the employer needs to identify which workers are at the greatest risk of being injured or made ill, how they may be harmed, whether female or young workers are especially at risk and so on.

Step 3. For each hazard, the "employer" should work out the health and safety risk reduction measures she/he needs to put in place to prevent or reduce the risk of her/his workers being killed, injured or made ill.

The health and safety risk reduction measures to be assessed and put in place by the employer should always follow this order:

Health and safety measure 1: Eliminating the risk is always the first option to be considered and the best solution. For example, eliminating the risk from toxic pesticides by using organic farming methods; or by replacing a noisy machine with a quiet one. Total risk elimination (zero risk) is usually only possible in a limited number of cases.

If the employer's risk assessment concludes that for a particular hazard, total elimination of risk is not possible and giving the reasons why, the employer moves on to consider the next risk reduction measure, Substitution.

Health and safety measure 2: Substitution is the next risk reduction option to be considered by the employer. For example, substituting a less toxic pesticide or industrial chemical for the more toxic one previously used.

Health and safety measure 3: Using simple **Equipment, tools** or **technology** to reduce the risk is the next option to be considered by the employer. For example, soundproofing a noisy machine, using dust extracting equipment, or something as simple as a wheelbarrow or hand cart to carry heavy loads.

Health and safety measure 4: Using **Safe work practices, organisation and procedures, supervision**, linked to **appropriate information and training** for managers, supervisors and workers is the next option to be considered by the employer. This means the employer or her/his manager(s) has to give clear instructions on work organisation and procedures to the workers – written down if necessary – on how to carry out a dangerous task in a health and safety manner . This means that the employer or her/his manager(s) has to ensure the enterprise and its different workplaces are well organised and run, and supervisors and general workers are properly trained.

Health and safety measure 5: The employer's risk assessment may next determine that certain **Health/medical testing and surveillance measures** may help prevent workers from falling ill when carrying out dangerous tasks. For example, regular lung function tests for workers exposed to potentially harmful levels of dust

Health and safety measure 6: In so far as the risk remains, provision by the employer, at no cost of the worker, of **Personal protective equipment (PPE - a term which includes clothing)**, is the last option to be considered by the employer's risk assessment. Except in a few cases (e.g. chain saw use), PPE should **never** be the first way in which to protect workers; the idea is to keep use of PPE to a minimum. The employer should provide PPE to supplement the other health and safety measures above which she/he has already put in place. PPE has to be of good quality and provide genuine health and safety protection. So the risk assessment should give details of the types of PPE, the protection factor each item offers, frequency of replacement etc. The employer should ensure there are systems to ensure that PPE is well maintained and regularly replaced.

Farm health and safety risk assessment form

Name of the employer and farm address			
CROP + WORK ACTIVITY/WORKPLACE BEING ASSESSED	STEP 1 IDENTIFY THE MAIN WORK HAZARDS + likely INJURIES or HEALTH PROBLEMS for each hazard	STEP 2 IDENTIFY THE WORKERS MOST AT RISK (for each hazard)	RISK REDUCT PLACE/OP For each hazar identified shoul emplo
	List the main hazard(s), i.e., dangers for each work activity or workplace + Likely safety or health problems resulting from the work activity/workplace	Adult female workers Adult male workers Young female workers Young male workers	Measure 1. Eliminatio Measure 2. Substituti Measure 3. Use of ec Measure 4. Work org supervision, training, Measure 5. Health/m Measure 6. Personal remains)
Activity/Workplace 1.			
Activity/Workplace 2.			

Signed by: the employer, or the employer's representative and that person's job title:

Name (in capital letters) of the employer, or the employer's representative and that person's job title:

Date – day, month, year

Place: add Address and LOCATION OF THE WORKPLACE(S), or DETAILS OF THE WORK ACTIVITY, ASSE

Note: It may **not** be necessary to use all the risk reduction measures to control a particular hazard. If, for example, the employer's risk assessment has concluded that it is possible to totally eliminate the risk to the workers, then other risk reduction measures will obviously **not** be needed. So the employer will **not** need to carry out the rest of the risk assessment for this particular hazard as the health and safety problem has been solved.

Table 1: An example of farm health and safety risk assessment

FARM HEALTH AND SAFETY RISK ASSESSMENT F
<p>NAME OF THE EMPLOYER & FARM ADDRESS</p> <p>Ms Takaru, Valley Farm,.[LOCATION]</p>
<p>CROP & WORKPLACE OR WORK ACTIVITY BEING ASSESSED</p> <p>Cotton: Spraying a chemical insecticide (a category of pesticide) which is classified as “highly toxic” under nat</p>
<p>STEP 1: IDENTIFY THE MAIN HAZARDS</p> <p>Using information on the pesticide label and from the pesticide manufacturer’s safety data sheet, the empl hazard as the risk of pesticide poisoning, as a highly toxic insecticide (a type of pesticide) is currently bein</p>
<p>STEP 2: IDENTIFY WORKERS MOST AT RISK (for EACH hazard)</p> <p>a) The three person Spray Team workers have the highest risk of being poisoned as they are directly handlin containers, cleaning spray equipment and personal protective equipment, storing the pesticide and so on.</p> <p>b) Field workers gang - 14 adult female and 6 male workers including a supervisor - are at risk of pesticide p from insecticide (pesticide) spray drift if the spray team is working in fields too close to them; and/or (ii) handlin crop vegetation if the pesticide manufacturer’s recommended re-entry interval/period for the insecticide is ignc</p> <p>As the field workers’ potential exposure to pesticides is indirect, they are at less risk of being poisoned than th</p>
<p>STEP 3: RISK REDUCTION MEASURES TO BE PUT IN PLACE BY THE EMPLOYER</p> <p>For each hazard, the risk reduction measures are to be put into place/operation by the employer in the</p> <p>The farm employer’s risk assessment has concluded that, in order to reduce the risks of pesticide poisoning fo are exposed to danger, the following health and safety risk reduction measures are to be considered and put t they are listed:</p> <p><u>Measure 1. Elimination of risk (zero risk) for the hazard(s) identified</u></p> <p>The employer’s risk assessment starts by considering whether it is possible to totally eliminate any danger in t methods. The employer should check</p> <ul style="list-style-type: none"> ✓ if any non-chemical method of dealing with the pest problem is available? For example, integrated producti chemical biopesticide, or an organic approach? ✓ Is the degree of economic crop damage caused by the pest such that it warrants pesticide use? <p>However, the employer’s risk assessment concludes that the chemical insecticide has to be used as there are available to adequately control the cotton insect pest. <i>So in this instance, total elimination of risk is not possib</i>. moves on to consider the next risk reduction measure, Substitution</p> <p><u>Measure 2. Substitution</u></p> <p>The employer’s risk assessment next considers the possibility of substituting use of the highly toxic insecticid</p> <ul style="list-style-type: none"> ✓ a less toxic pesticide? ✓ a less hazardous formulation by using a granules instead of a liquid which can splash? <p>However, the employer’ risk assessment concludes the highly toxic insecticide will have to be used as it is the particular cotton pest problem. So the employer’s risk assessment moves on to consider the next risk reductio</p> <p><u>Measure 3. Use of equipment, tools, technology</u></p> <p>The employer’s risk assessment next considers what simple equipment, tools or technology can help reduc and the field gang workers. The employer’s risk assessment states that the knapsack sprayers have been tho and new spray nozzles have been fitted. Other examples making the job safer by use of equipment and techn</p>

- Sealed mixing and filling systems for tractor-mounted sprayers The operator simply puts the pesticide container away from danger whilst the mixing is done automatically, avoiding contact with or risk of splashing from wearing appropriate personal protective equipment to supplement the technical and engineering controls, container at least three times and puts it in a secure place for disposal
- Pesticide formulations in dissolvable, water soluble plastic sachets. These sachets are simply placed whole in the spray tank cover is replaced, the mixture agitated, and the packaging dissolves inside the spray tank, releasing the pesticide. Dispose of afterwards
- Pesticide tractor cabs fitted with approved, charcoal-based pesticide filters which absorb any pesticide before the tractor cab *do not* work so don't accept them!

So in this instance, ensuring good quality, calibrated and well **maintained spray equipment** will help protect against spray drift (new, efficient nozzles). So the employer's risk assessment moves on to consider the next risk reduction measure.

Measure 4. Work organisation, instructions, supervisions, training, and information

There are whole series of practical, **organisational, procedural, information, training measures** and **official measures** based on the risk assessment, **before** spraying takes place:

training and information

4.1 The employer's risk assessment states that the **spray team is professionally trained** (including regular refresher training) and that the following **information (in the local language)** on both correct use of the pesticide and health and safety risks is available:

- (i) the (government-approved) pesticide label on the spray container;
- (ii) the pesticide manufacturer's health and safety data sheet for the insecticide being sprayed (provided in a language representative by the pesticide distributor when delivering the insecticide to the farm)

4.2 The spray team is provided with, and is trained in use of, first aid equipment. Plus water is available to use in case of eye contact. Adequate washing facilities are also available in the main farm building so the operators can clean up properly.

workplace organisation and procedures, instruction and supervision

4.3 The **spray team leader** is responsible, on a daily basis, for directly instructing the **field worker gang supervisor** which fields are to be sprayed; when; with which pesticide(s); crop re-entry intervals (as per the pesticide label).

4.4 The **field worker gang supervisor** is then responsible for instructing the field gang workers which fields are to be sprayed; when; with which pesticides, crop re-entry intervals. The **supervisor** is responsible for ensuring that her/his workers work well away from sprayed fields before the authorised re-entry interval.

4.5 Both the **field supervisor and field gang** have been **given training on pesticides health and safety** as required.

4.6 The **spray gang** is under clear instruction from the employer/management to **IMMEDIATELY stop spraying** if they are too close to the field gang workers, or if an unexpected change of wind direction means that the workers are suffering from spray drift. *The employer/management has also informed the field gang workers their supervisor of this instruction.*

4.7 The **field gang supervisor** is under clear instruction from the employer/management to **IMMEDIATELY stop working** if she/he unexpectedly finds they are working too close to the spray team or contamination from spray drift suffering from wind direction. *The employer/management has also informed the field gang workers their supervisor of this instruction.*

4.8 The employer's RA states that the field workers are under clear management instruction to **remove themselves** from sprayed fields if they have reasonable justification to believe there is an imminent and serious risk to their health and safety from pesticide exposure. Their supervisor immediately of their action.

So having ensured that the insecticide spraying is well organised, the employer's risk assessment moves on to consider the next risk reduction measure: Health/medical testing and surveillance

Measure 5. Health/medical testing and surveillance

In taking advice from the pesticide supplier's representative and government agricultural extension officer, the employer concludes that in respect of use of this particular insecticide, there are *no* preventive health tests which can be used. So the assessment has concluded that there are no suitable tests to detect early signs of pesticide poisoning.

However, the employer has ensured that, in addition to the spray team, the field gang workers have **first aid** trained in its use, and **water**, in case of skin or eye contamination.

Measure 6. Personal protective equipment

Finally, in so far as the risk remains, the employer' risk assessment determines what personal protective equipment boost the levels of worker protection provided by the other risk reduction measures listed above:

6.1 Spray team workers

The employer's risk assessment concludes that the spray team operators, as they are the group most at risk of *the following personal protective equipment*. The information on which PPE should be used was obtained by the label, and the pesticide manufacturer's health and safety data sheet which was obtained from her pesticide supplier.

PPE to be worn or used

- a protective coverall; rubber gloves coming above the wrist of the coverall; rubber boots
- half-mask chemical respirator, fitted with charcoal filters, when mixing and spraying the pesticide, and cleaning spray equipment;
- face shield when mixing the insecticide, cleaning the knapsack sprayers, or washing out empty containers.

6.2 Field workers

The employer's risk assessment concludes that **additional** PPE for field workers is **not** necessary as it would provide protection (overalls, gloves and boots are provided as standard work items). The risk assessment states that the PPE put in place should provide adequate levels of health and safety protection for the field workers from the risk of pesticide exposure.

Signed by: Ms Takaru, or the employer's representative, including that person's job title

Name (in capital letters) of the employer or the employer's representative including that person's job title

Date – day, month, year

Place: add Address and LOCATION OF THE WORKPLACE(S)

OPEN BOX

Types of personal protective equipment for workers on farms and plantations

As PPE is the least effective means of protecting the operator, it should always be *the LAST control measure* to be adopted. It should only be used to supplement the other control measures identified above, once these have been put into operation. Unfortunately for many workers it is usually the first - and often the only - control measure provided by the employer. Globally, PPE is the main means of operator protection from pesticides as both the pesticide industry and agricultural employers over-rely on this control measure.

Gloves: Protective, unlined rubber or neoprene gloves, which should be at least 0.4mm thick whilst retaining flexibility in all weather, should always be worn when handling pesticides. They should protect the whole hand and wrist – being not less than 300 millimetres in length measured from the tip of the second finger to the edge of the cuff. Sleeves of coveralls should be worn under the gloves at all times. Gloves should be designed for use with pesticides (General industrial gloves which often have a cloth cuff are *not* suitable as they will absorb pesticide). Some pesticides like methyl bromide penetrate rubber gloves, and also natural rubber gloves may not prevent contamination from solvents like xylene.

Torn or damaged gloves should not be worn and should be replaced immediately. The gloves should be washed daily after work with water and detergent, rinsed and dried. Regular replacement is also important.

Apron: A protective rubber/neoprene apron covering the front and sides of the body from immediately below the shoulders to at least 70 millimetres below the tops of any boots that are being worn (it should extend to at least below the knees).

Coverall: A protective garment, or combination of garments (offering no less protection than a single garment), close fitting at the neck and wrist and which:

- covers the whole body and all clothing other than that which is covered by a good, face-shield, respiratory protective equipment, footwear and gloves, and which minimises heat stress to the operator when worn
- when required to be worn in connection with the use of a pesticide in the form of a granule, dust or powder, has all its external pockets covered and has its sleeves over the tops of gloves being worn
- is white or of a colour which produces a clearly noticeable contrast if contaminated with pesticide
- is regularly washed to avoid contamination with pesticide

Boots: Protective (gum or wellington) boots made of rubber or neoprene extending to at least immediately below the knees. Coveralls should be worn over the top of boot. Leather or canvas boots are NOT suitable as they readily absorb pesticide

Face shield: A transparent shield covering the whole of the forehead and face designed so as to protect the forehead and face from being splashed. These are better than goggles which only protect the eyes. (If goggles are used, the eye lenses must be chemically resistant and the straps plastic or rubber, NOT cloth)

Head gear: A hood or waterproof, wide brimmed hat, or other covering to the head so designed as to protect the forehead, neck, and back and sides of the head from contamination by pesticide in the circumstances in which is being used

Respirators protective equipment (RPE): Respirators, breathing apparatus, cartridges (filters), and masks should be of a type approved by, or conforming to a standard approved by, the pesticide registration or health and safety authority in a country. RPE is recommended for use with more hazardous pesticides (see the label or data sheet). The chemical cartridges should be the one approved for a particular pesticide(s) and they should be changed regularly when odours are detected through them, when breathing is restricted or according to manufacturer's instructions or the law – whichever comes first.

The cartridges should be removed and respirators washed after use with water and detergent, and rinsed and dried. When not in use, the respirator and cartridges should be stored in a sealed plastic bag to prevent contamination.

If disposable masks are used, then these must be approved and registered for use with the particular pesticide(s) and contain an activated charcoal filter. Disposable dust masks – 'nuisance' dust or even higher quality ones – will **NOT** protect against spray droplets getting into the lungs

Checklist - shortcomings of PPE

- ✓ PPE can be uncomfortable, and users - quite understandably - often resist wearing it for long periods especially in hot climates/working conditions. There is evidence to show that wearing PPE in hot climates/working conditions can expose the operator to heat exhaustion
- ✓ PPE is often poorly designed, and only offers limited protection. Poor design does not take into account for example, different sizes and build of people, nor their different facial characteristics in the case of masks, or the differences between women and men
- ✓ Pesticide labels and even material safety data sheets give little concrete information on what types of PPE should be worn and what degree of protection they offer. For many types of PPE there is no standardisation of equipment, and vital safety information such as protection factors and durability is not given. Gloves, for example come in a confusing array of types and materials. The purchaser has little or no safety information on which to make a rational choice
- ✓ PPE is often unsuitable for the task in hand. It is common to see spray operators wearing 'nuisance' dust masks in the mistaken belief that these will prevent them breathing in the fine spray droplets. They will not. Only disposable masks or respirators which contain a charcoal filter will stop fine pesticide droplets reaching the lungs
- ✓ PPE should be kept in good condition, uncontaminated from previous use, and provided at no cost to the worker. In practice, clothing and respirators are often poorly maintained, frequently stored with private clothing, and not cleaned or replaced often enough. So negotiating for proper storage and maintenance of PPE, and regular replacement at no cost to the worker is important.

CLOSE BOX

Applying the risk assessment

Once the employer has carried out the risk assessment and discussed the findings with the workforce, the risk control measures should be put in place.

Packaging and containers

The employer should ensure that pesticides are supplied in packaging and containers which comply with national standards and regulations, and with labels in the appropriate local language(s). Packages may vary greatly in size, from a small plastic container, packet or box to a large metal or plastic drum. Repackaging of pesticides should NOT be attempted under any circumstances!

Transfer/Decanting

Only in very exceptional circumstances should pesticides be transferred from one container to another and then only be trained staff with appropriate supervision. The new container must then be appropriately labelled.

Unfortunately, on many farms/plantations it is common practice to take a pesticide out its original packet/container and:

- either put it into smaller unmarked packets such as a paper bag
- or, in the case of a liquid, decant it into smaller unmarked containers or used, empty pesticide containers from other products.

These smaller packets or containers are then taken to place where the product is to be applied. A reason given for this practice is to stop theft of pesticides. Transfer or decanting is however a bad practice and one that should be discouraged.

Transport

On the farm or plantation, safe transport to the fields where the substances are to be used is important as they may be a long way from the pesticide store. Ensure that:

- ✓ random stacking is avoided
- ✓ pesticides are separated from other materials and persons transported on/in the same vehicle, and
- ✓ pesticides are NOT carried alongside the driver in a vehicle/ tractor cab

Storage

Employers who have to store pesticides should know how to construct and maintain a storage shed, and to have a safe system of work for the staff working in the store and those with regular access to it. Ideally a special store for pesticides should be constructed and be:

- ✓ properly sited to allow easy access for delivery and loading on to vehicles
- ✓ built well away from houses, livestock areas, flammable materials, and water or areas liable to flooding (to prevent the risk of contaminating underground water supply sources)
- ✓ separated from other stocks such as fertilisers, flammable materials and crops/food (if the store/storage area is within a general-purpose building)
- ✓ of sound construction, have walls, floor and roof which are fire and corrosion resistant, impervious to liquids and insulated, and the floor should be slatted to avoid contamination from spills and provided with a raised sill so that the building can contain any spillage prior to mopping up. Have an external watertight tank to store spilled liquids. Have material, to mop up spillages, e.g. sawdust
- ✓ provided with suitable entrances and exits with fire resistant doors opening outwards wherever possible
- ✓ fitted with strong and durable shelving
- ✓ provided with natural ventilation or extractor fans to avoid build-up of fumes

- ✓ provided with sufficient lighting so that all labels can be read, whilst avoiding direct sunlight because of the risk of spontaneous combustion if chemicals become too warm
- ✓ heated well in colder climates, enough to avoid frosts, especially when storing liquids
- ✓ secure against theft, vandals and animals with a clear sign displayed giving warning that poisons are stocked within
- ✓ provided with washing facilities and a place to put PPE used in the store

In addition, care must be taken to:

- ✓ store items carefully, and categorise them where possible into poisons, corrosive, flammable materials and so on
- ✓ store single steel drums no more than three high and single plastic drums no more than two high.
- ✓ keep a record of pesticides in the store

Poorly stored pesticides can cause a number of problems, including:

- lack of warning signs so that people are at risk
- no ventilation allowing build up of toxic fumes
- increased health risk for the storeperson if there is inadequate space between storage shelves and that person's seat/desk
- lack of PPE for use in the store
- spillage, or leaking containers resulting in pesticide seeping into bare ground and watercourses
- packets catching fire
- deterioration after being exposed to weather damage.
- poorly constructed stores that are vulnerable to theft or vandalism

Training

Pesticide applicators/operators and helpers should receive proper training covering:

- ✓ emergency/first aid measures in the event of malfunction or accident
- ✓ correct choice of spray equipment
- ✓ checking of spray equipment to ensure correct calibration and functioning, and fault finding
- ✓ checking and maintenance of PPE
- ✓ mixing, filling and application
- ✓ attending to simple repairs including nozzle blockages in the field
- cleaning, maintenance of application equipment, and PPE

Pesticide application

Pesticides are sold in many forms - liquids, granules, dusts, fogs, smokes, vapours - and all require handling differently to stop pesticides being inhaled, ingested, absorbed by skin, or contaminating the environment. Contamination

can arise during handling, mixing, and loading of spraying machines and knapsack sprayers from:

- inhaling vapour, droplets, or even dust, from the concentrated pesticide
- splashing liquid pesticide on skin or into eyes
- getting liquid or powder pesticide onto the hands and exposed parts of the body and clothing. From there it can get into the mouth, be in contact with the skin, or be absorbed through the skin into the bloodstream

Checklist: Pre-spraying precautions

- ✓ Read the label plus any other information provided
- ✓ Avoid using pesticides provided in unlabelled paper/plastic bags or decanted into unlabelled or wrongly labelled containers. If your employer instructs you to use pesticides in this way, make sure that you are provided with a copy of the proper label and written instructions on how to use the pesticide in a correct manner
- ✓ Check the spray equipment including calibration
- ✓ Check and wear any PPE
- ✓ Check the first aid equipment
- ✓ Check that weather conditions are satisfactory
- ✓ Put any warning signs in position

Checklist: Precautions during mixing and filling/loading

- ✓ Use PPE as per the label instructions, but in the absence of clear advice on PPE, wear a coverall and gloves and use a face shield to ensure minimum protection
- ✓ Take care that gloves do not tear on jagged metal or plastic edges when unscrewing the cap
- ✓ NEVER mix a pesticide with your bare hands. Only open one container at a time, and replace the cap/close the container if there is chemical left
- ✓ Do *not* mix two or more concentrates before loading them into the tank
- ✓ Do *not* decant pesticides between containers and spray equipment
- ✓ Measure out pesticides only in an appropriate vessel and rinse it immediately; use scales dedicated to the task for powders
- ✓ Avoid lifting containers above shoulder height as they can splash
- ✓ Do *not* climb up a sprayer with an open container
- ✓ Make sure of good foothold if you have to pour directly into a tank, preferably on the ground on a platform at the right height
- ✓ Pour slowly with the container opening positioned so that air can enter, so avoiding glugging and splashing
- Use filling attachments such as chemical induction probes and low level filling and mixing tanks, or sealed mixing and filling systems

- ✓ Avoid cause foaming by sucking air into the tank when using an induction probe
- ✓ Rinse empty containers - at least three times - and store in a secure place prior to disposal
- ✓ Use a probe to rinse containers if you can
- ✓ Ensure there can be no run-back of pesticide into the water supply

- **DO NOT** return a probe to its holster without washing it; likewise for a knapsack lance
- **DO NOT** make a direct connection between a domestic water supply and a spray tank
- **DO NOT** take water from a stream without preventing run-back
- **DO NOT** smoke, eat or even drink when handling pesticides as this may result in pesticides getting into the mouth and being swallowed. Anyone smoking whilst handling pesticides inhales the chemical vapour through a mini-furnace inside the cigarette or pipe

Checklist: Precautions during application

- ✓ Spray correctly either walking or driving at the correct speed to ensure correct dosing on to the ground or crops
- ✓ Take notice of changing weather conditions and stop if it gets too windy
- ✓ Watch out for fellow workers nearby or members of the public passing on footpaths
- ✓ NEVER spray too near to water courses - respect buffer zones around crops
- ✓ Make sure you have some water and first aid equipment with you
- ✓ Avoid bad practices like trying to clear a blocked nozzle by putting it to your mouth and blowing the obstruction clear. Clean the nozzle with water or a soft probe such as a grass stem. Wear gloves when doing this
- ✓ Look out for overhead electricity cables and make sure any spray boom does not come into contact with them. Many fatal electrocutions have been caused in this way

Checklist: Post-spraying precautions

- Have a preliminary wash of hands, face and neck or other parts of the body which may have become contaminated. Wash gloves before removing them
- Return unused pesticides to the store, and empty, three times rinsed containers to a secure storage area prior to disposal
- Remove any warning signs
- Decontaminate/clean application equipment by washing it thoroughly, and make sure that you wear PPE whilst doing this. The washings should be

drained into a soak-away or similar chamber to be confined safely and without risks to the environment.

NEVER clean spray equipment in a stream or watercourse

- ✓ Decontaminate/clean PPE by washing down items such as gloves, aprons, boots and face shield. Gloves should be washed inside and out and allowed to dry. Respiratory protective equipment should be wiped clean prior to thorough washing (remove the chemical cartridge)
- ✓ Bathe or wash thoroughly after completing the above actions
- ✓ For items such as coveralls ensure there are special arrangements at work for washing/laundrying them properly. The person doing the laundrying must also be properly protected whilst cleaning them

NEVER take pesticide-contaminated clothing or equipment to be washed at home as you put your family at risk

- ✓ Complete a record of use. It is good management practice to know which pesticides worked best in which field, and it is also source of reference in the event of pesticide-related illness
- ✓ Observe re-entry times to treated areas

Record keeping

It is essential that employers keep good records about employee exposure and all operations involving the storage, application and disposal of pesticides. Exposure records must be kept for at least five years, and 30 years in the case of health surveillance records. Records must aid both stock control, and be usable as a reference in the event of the accidental contamination of workers, the public, honey bees, other creatures or non-target crops. Recommendations for records suggest the following headings: operator; date; application site; crop; material or structure treated; reason for treatment; product used, dilution and application rate; hours pesticide used; weather conditions; and any other relevant detail.

Re-entry period

The time interval that should elapse between pesticide application and entering the treated field, glasshouse/plastic tunnel, livestock shed for safety reasons is known as the re-entry period/interval. It should not be confused with the harvest interval which is the time between pesticide application and the harvesting of the crop in order to avoid or minimise the problem of pesticide residues. Re-entry periods are designed to allow residues to decay to a point where the exposure is insufficient to cause harmful effects.

Re-entry periods will vary according to the type of pesticide used, the dose applied, the surface area of crop treated, weather conditions. The minimum re-entry times as stated on the label, the safety data sheet, or in a written instruction must always be respected. It may need to be increased if vulnerable populations are to be exposed to danger, for example, members of the public coming to buy produce on a farm.

If entry is required to a treated area before the re-entry period, then PPE must be worn.

Precautions during disposal of surplus pesticide and containers

Mixed pesticide surplus to requirements should be safely disposed of (as per label/MSDS) The work area must be cleared up; any chemical packets/containers put back in the store; and containers disposed of safely. All these stages can result in contamination if they are not carried out properly. They can also have catastrophic effects on livestock, pets and wildlife, and contaminate water sources.

Checklist: disposal of mixed, surplus pesticides

- ✓ Drainings/washings should run into a specially constructed and maintained soil soakaway or other special container
- ✓ Pesticides washed from the sprayer must never be allowed to run into public sewers or where there is a danger of seepage into any form of watercourse
- ✓ If possible, use a flushing device (rather than filling the spray tank with water and pumping it through) to clean out equipment and containers as this will reduce the volume of washings

Checklist: disposal of unwanted, obsolete pesticides

- ✓ Large quantities of unwanted pesticide should be disposed of after consultation with the local official agricultural adviser/official or after consultation with the manufacturer
- ✓ Many local authorities operate special landfill sites for disposal of hazardous waste. There may also be reputable, specialist waste disposal contractors who can be hired

Disposal of pesticide containers

All too often pesticide containers are left in fields, or dumped in watercourses. Ideally, containers should be returned to the manufacturer for disposal, and in some cases this is possible. The international pesticide industry has pilot schemes in some countries where empty, rinsed pesticide containers can be returned to the local agrochemical distributor or special depots.

- ✓ All containers (including paper packages) should be rinsed out - at least three times - and the washings disposed of as for tank washings described above. PPE, especially gloves, coverall and a face shield, should be worn
- ✓ Storage of containers prior to disposal must be in a well defined and marked area, preferably under cover or with a special waterproof container provided for empty paper sacks if these are stored outside
- ✓ Containers should NEVER BE REUSED whether for storing drinking water, diesel fuel, or for any other purpose. Paper, plastic and metal should be punctured or crushed to make unusable
- ✓ On the premises owned or occupied by the employer, disposal should be carried out carefully depending on the container material
- ✓ Glass and metal (not aerosols) should be either crushed in a sack (for glass) or flattened, and buried at a depth of at least 1 metre, below the level of any land drains, in an isolated place. The area should be fenced or

marked with warning signs. A record should be kept of dates and the material buried

- ✓ Labels should NOT be disfigured. Containers can be buried, with the same precautions as glass or metal. In some cases it may be permissible to burn lightly contaminated packaging. The local authority should be consulted beforehand and if necessary, the manufacturer