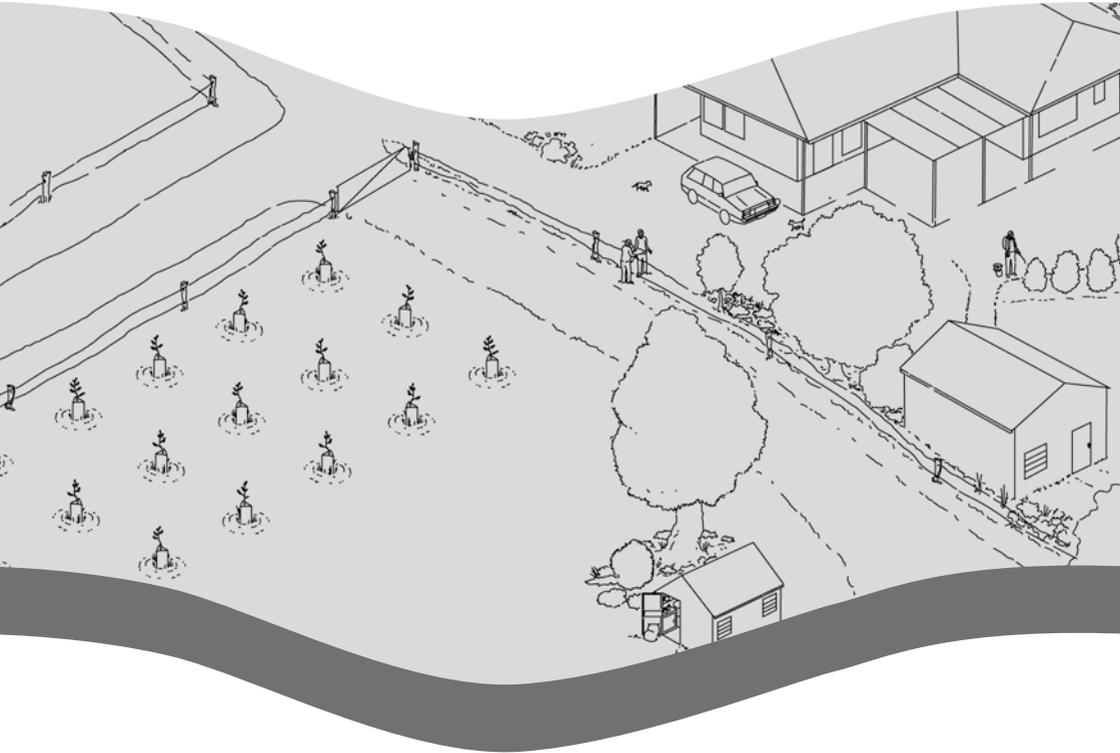


# SAFE AND EFFECTIVE PESTICIDE USE

*A handbook for  
lifestyle landholders*

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# INTRODUCTION

This handbook has been developed for use by smaller-scale rural or 'lifestyle' landholders who use pesticides on their property to control environmental pests, or pests associated with primary production or domestic gardens. It provides information on the safe handling and responsible use of pesticides to minimise human health risks and reduce the likelihood of pesticide contamination in the environment. It also advocates the use of alternative pest control methods where this is possible, and practical methods of minimising any risk of environmental damage from pest control operations (e.g. to watercourses or non-target flora and fauna).

When used irresponsibly, pesticides can:

- ▶ pollute land and water, damaging ecosystems by affecting biodiversity
- ▶ harm non-target organisms including native and ornamental plants, crops, animals, and micro-flora and fauna
- ▶ cause illness or harm to the spray operator or other humans who are exposed to them
- ▶ contaminate agricultural produce, causing legal and trade problems and human health risks.

This handbook is one in a series of three. The others are:

- ▶ *Safe and effective pesticide use: a handbook for commercial spray operators*
- ▶ *Safe and effective herbicide use: a handbook for near-water applications.*

This handbook has been developed in line with the EPA's *Guidelines for Responsible Pesticide Use 2005*. By following the principles outlined in the guidelines and this handbook, landholders can reduce the risk of accidental contamination of the environment through pesticide use.

When used responsibly, pesticides can reduce the likelihood of polluting land and water, and damaging ecosystems



*Pesticides should be viewed as one of a number of useful tools available to help manage pest problems*

### Definitions

**Pesticides** are substances or organisms used to kill, incapacitate, inhibit the growth of, or repel, pests. They can be natural or synthetic chemicals. Some living organisms that act as biological control agents can also be regarded as pesticides.

Common environmental pests include vertebrate pests (e.g. foxes, rabbits), insect pests (e.g. locusts, millipedes) and plant pests (weeds). Many of these affect primary production.

The range of pesticides available to the lifestyle landholder is extensive and includes vertebrate baits, insecticides, termiticides, herbicides, fungicides, bactericides, post-harvest fruit dips, and animal dips and sprays.

A **herbicide** is a chemical substance that will kill or inhibit the growth of plants. Herbicides may kill virtually all plants or be quite selective in the way they work. They are commonly used to control the growth and spread of weeds.

An **insecticide** is a chemical substance designed to kill insects.

A **fungicide** is a chemical substance designed to kill fungi.

**Spray drift** is the airborne movement of agricultural chemicals away from the target area during, or shortly after, its application.

An **ecosystem** is a self-sustaining association of plants and animals and the physical environment in which they live.



## Legislation

Many introduced plants and animals are declared as pests under the *Natural Resources Management Act 2004* (formerly, *Animal & Plant Control Act 1986*), because they pose threats to agriculture, the environment or to public safety, and have the potential to spread beyond their current range. Landholders are required by law to control these species.

However, as a landholder you have legal obligations to protect the environment from harm. Pesticide use must be consistent with provisions in the *Environment Protection Act 1993* and the *Environment Protection (Water Quality) Policy 2015* (Water Quality Policy).

The 'General Environmental Duty' under Section 25 of the Environment Protection Act reads:

***A person must not undertake any activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimize any resulting environmental harm.***

Further information on a broad range of environmental regulation can be obtained from *EPA Guidelines for Responsible Pesticide Use 2005* <[www.epa.sa.gov.au/pdfs/guide\\_pesticides.pdf](http://www.epa.sa.gov.au/pdfs/guide_pesticides.pdf)> and from PIRSA's website <[www.pir.sa.gov.au/lego/](http://www.pir.sa.gov.au/lego/)>.

## Integrated pest management

Integrated pest management (IPM) is a planned, commonsense approach that combines environmentally-friendly methods of pest control with careful and minimal use of toxic pesticides. Such an

┌ *The EPA considers that allowing pesticides to enter surface or ground waters, escape from a property, cause harm to the environment, or cause harm to other people would be a breach of the Environment Protection Act* └

*Reduced pesticide use will lead to slower development of pesticide resistance and a lower risk of contamination of the agricultural product and the environment*

approach requires a comprehensive assessment of local conditions, including such factors as climate, season, the biology of the pest species, and government regulations.

Using Integrated Pest Management (IPM), you can employ a range of control methods such as biological, cultural or mechanical, along with appropriate choice of crops and varieties. This will allow you to limit your use of chemical pesticides, providing the best value for time and money and minimising the risk of environmental damage.

Monitoring the extent of a pest problem is an integral part of an IPM approach and determines when pesticide use is required, in conjunction with other measures, on the basis of need rather than using a calendar approach.

To reduce your pesticide use, consider the following control methods as part of your integrated pest management approach:

- ▶ good crop and site hygiene, which reduces the risk of pest infestation
- ▶ rotation of vegetation/crops, which breaks the pest's habitat and food supply
- ▶ use of pest-resistant plant varieties
- ▶ mechanical pest control methods, such as barriers or traps
- ▶ biological control, including promotion of natural control organisms such as predators, parasites and disease-causing organisms, or planting vegetation/crops that attract beneficial insects, such as lady birds, for aphid control.
- ▶ prevention of weeds (e.g. through mulching)
- ▶ physical control (e.g. through hand pulling, tilling).

*For more information about IPM see Resources, page 31.*

***There are many options available to landholders that avoid the need for toxic chemicals.***

# SAFETY FIRST



As a responsible user of pesticides you will need to consider all aspects of safety, including safe transport, storage and mixing of chemicals. You will need personal protective equipment, and you will need to understand how to operate spray equipment and the principles of calibration. First, you should know how to read the labels on pesticide containers.

## Understanding labels

Chemical labels are not advertising. They provide technical information designed to help you select and later use the contents correctly without causing personal or environmental harm. Labels contain information about the product, including instructions for handling and information about the chemical's toxicity.

Before selecting or using a chemical, read the label carefully. Pay particular attention to the toxicity warning and directions for use.

### *Toxicity warning*

Chemicals are either not classified (unscheduled) or classified according to toxicity and listed as being either Schedule 5,

*Before selecting or using a chemical, read the label carefully. Pay particular attention to the toxicity warning and directions for use.*



*Read all sections of the label before opening the container and follow label directions exactly*

Schedule 6 or Schedule 7 chemicals. Signal headings (key warnings) at the top of the label are related to human health and indicate the chemical's schedule.

**Table 1: Herbicide classification**

Signal heading	Schedule	Degree of hazard
No signal heading required; 'Keep out of the reach of children' only	Unscheduled	Low toxicity
'Caution'	Schedule 5	Slight degree of hazard
'Poison'	Schedule 6	Moderate degree of hazard
'Dangerous Poison'	*Schedule 7	High degree of hazard

\*By law, Schedule 7 chemicals must not be sold to or be used by persons who have not completed appropriate training (e.g. ChemCert or equivalent) and shall not be used in domestic settings.

### *Directions for use*

This section of the label provides details about the pests the chemical will control, the situations in which it can be used, how it is to be applied and the rates at which it must be used. This information is usually presented in a panel or table. Different rates may be specified depending on methods of application and the pest to be controlled.

Read all sections of the label before selecting the most appropriate chemical to use. When you wish to use the chemical, follow label directions exactly. Variations from the directions may cause off-target damage or result in the chemical being ineffective. Labels also include general information on:

- ▶ conditions required to achieve best results
- ▶ mixing instructions
- ▶ other warnings such as effects on plants or fauna

- ▶ storage of product
- ▶ cleanup, spills and disposal of containers
- ▶ safety directions and first aid.

If you still have doubts or would like more information, seek advice or obtain a material safety data sheet (MSDS) from the chemical supplier.

### Transport and storage

To minimise the risk of inadvertent spills or accidents you must make arrangements for the safe transport and storage of pesticides.

#### *Transport*

When purchasing a pesticide, ensure the container is in good condition and not leaking. Purchase only the amount of pesticide you need as this reduces the amount being transported and any subsequent risk in storage. Always check product labels to ensure they are present and intact.

In addition:

- ▶ Ensure the risk of spill is minimised by transporting the product inside another container or a thick, securely closed plastic bag.
- ▶ Do not transport pesticides unnecessarily. Purchase pesticides as the final item before travelling home or to the point of storage.
- ▶ If possible only transport pesticides in a ute or trailer and never in the cabin of a vehicle or the vehicle boot, as boots are connected to the cabin.
- ▶ Carry personal protective equipment with you in the vehicle, including gloves, so you will be prepared to deal with a spill in transit.
- ▶ Carry a spare plastic bag or absorbent material such as cat litter or sawdust, which will help soak up any spill.

Do not transport pesticides unnecessarily. Purchase pesticides as the final item before travelling home or to the point of storage.

*If possible, keep all pesticides on a surface that has a barrier to contain spills (e.g. bunding tray). Do not store pesticides in an area where spills will drain into waterbodies or a stormwater system*

### Storage

Lock pesticides in a cupboard in a shed, preferably away from the workbench and areas of activity or areas accessed by children. If storing pesticides in the house, keep them in a locked cupboard away from children and the kitchen. Keep pesticides stored in a cool area, away from sunlight.

In addition:

- ▶ Store pesticides in original containers only, making sure labels are protected and readable.
- ▶ Keep personal protective equipment near the storage facility so it can be reached easily if a spill or accident occurs.
- ▶ Keep a 'spills kit' and absorbent material close to the pesticide storage location so it can be reached quickly in event of a spill.
- ▶ Write the date of pesticide purchase on the container.
- ▶ Do not store products after their use-by date has expired. If no use-by date is specified pesticides should be disposed of after two years.
- ▶ Ensure you do not store volatile or reactive products together.

### Personal protective equipment

Chemical poisoning can occur through the skin, through the eyes, or by inhalation or ingestion. The groin and head areas are the most sensitive to absorption through the skin but the hands are the areas of greatest exposure when working with chemicals. Poisoning can cause acute illness, usually after an accident, splash or ingestion, while chronic illness may develop over a period of years after repeated low-level exposure.

Safety directions on labels provide information on the result of contact with the chemical, such as 'product will irritate the eyes and skin'. Directions also provide information on the personal protective equipment (PPE) to be worn when mixing and applying the chemical. PPE is designed to safeguard against both acute and

chronic pesticide poisoning and generally includes products that prevent absorption of pesticide through the skin or eyes, or by inhalation. PPE commonly recommended for use when applying pesticides includes:

- ▶ goggles or face shield to protect the eyes
- ▶ chemical-resistant gloves to protect hands
- ▶ overalls to protect legs, arms, torso and groin
- ▶ respirator with filter cartridges to prevent inhalation of pesticide vapour or mist
- ▶ rubber or PVC boots to protect feet
- ▶ washable or chemical-resistant hat to protect head and scalp
- ▶ PVC apron for use during mixing.

Guidance on what PPE to wear for each application situation can be obtained from product labels and MSDS fact sheets.

### Mixing pesticides

Pesticides should be measured and mixed in areas that are well-ventilated, level, well-lit, and with a supply of clean water. Operators should wear appropriate personal protective equipment while mixing pesticides, and follow all instructions on the pesticide label.

Safe mixing advice:

- ▶ Always read and make sure you understand label instructions for mixing before opening pesticide containers.
- ▶ Use appropriate utensils when transferring pesticides between containers and application equipment. Containers should measure volumes of concentrate accurately and allow the transfer of pesticides without spilling.
- ▶ Measure and mix pesticides on a stable surface and at a comfortable height.
- ▶ Use recommended PPE when mixing pesticides (see label or MSDS facts sheets).



*Guidance on what PPE to wear for each application situation can be obtained from product labels and MSDS fact sheets*



*Calibration means measuring the output of your spraying equipment. This is the key to safe, effective and cost-efficient pesticide use.*

- ▶ Mix in an area with an impervious floor which allows for spills to be cleaned up, not in an area where a spill could run into a stormwater drain or waterbody.
- ▶ Do not work alone if the pesticide is highly toxic.
- ▶ Mix in a well-ventilated and well-lit area.
- ▶ Use clean water for mixing—poor quality water can reduce pesticide performance.
- ▶ Do not combine products unless label instructions state it is appropriate to do so.
- ▶ Only prepare the volume of mix needed to complete the task. This avoids having to store or dispose of unused portions.
- ▶ Do not siphon pesticide concentrate or spray mix.

### Calibration

Calibration means measuring the output of your spraying equipment. This is the key to safe, effective and cost-efficient pesticide use.

Correct calibration means you are applying the right amount of chemical at the right concentration. Over-application of pesticide can cause off-target damage and pollute the environment. Under-application of pesticide will not treat the target pest effectively. Inappropriate rates of chemical application are also therefore a waste of time and money. Furthermore, it is illegal to apply pesticides at a higher rate than stated on the label.

With correct calibration you should avoid the problem of disposing of any excess herbicide, as you will apply only the amount you need to complete the job.

Before calibrating, ensure all spray equipment is clean and in good working order. All seals and nozzles should be clean and working effectively so that spray mix is delivered to the target pest or weed at the correct rate.

### *Calibrating small spray units (up to 7 litres)*

An average application rate for spray mix is 50 mL per square metre. This ensures an even coverage of the target without spraying to the stage of run-off. This figure will be used in the following steps.

#### **Step 1—Determine the area involved**

Determine the area you need to apply the herbicide to. This will then allow you to calculate the amount of pesticide you mix. The table below shows that, for an area of 100 m<sup>2</sup>, you'll need five litres of spray (at the average application rate of 50 mL per square metre).

**Table 2: Volume of spray needed at application rate of 50 mL/m<sup>2</sup>**

Area to be covered (m <sup>2</sup> )	20	40	60	80	100	120	140
Volume of spray (L)	1	2	3	4	5	6	7

#### **Step 2—Mix the pesticide**

Mix the right amounts of chemical concentrate and water in the spray unit. This ratio is described on the product label (e.g. 10 mL of concentrate per litre of water).

#### **Step 3—Determine the rate per square metre**

To determine the rate per square metre at which you apply the pesticide, time how long it takes to spray 50 mL of spray mix into a measuring jug. This gives you the time required to cover one square metre of ground.

### *Calibrating knapsacks and hand-line equipment*

#### **Step 1—Determine spray rate**

Fill the spray tank with water and measure out an area of 10 square metres on the lawn. Use a watch to time how long it takes to spray that area at your comfortable working speed. You should aim to



Knowing the volume of spray mix required to cover the pest and target area will reduce the likelihood of excess spray mix being left over at the end of the job

spray the foliage just enough to wet it, not to the point where there is run-off. Excess runoff can be considered 'over-application' and can be harmful to the environment.

Next, spray into a container for the same amount of time at the same operating pressure. Measure the volume of water in the container. This is the volume of spray mix that will be required to effectively treat a 10 square metre area of ground. Dividing the measured volume of water by 10 will give you the amount of spray mix required to treat one square metre.

$$\text{Spray rate} = \frac{\text{Volume of water used (mL)}}{10} = \text{mL required per m}^2$$

The value derived should be approximately 50 mL.

### Step 2—Area per tank

To work out the area that one full tank will spray at the spray rate, divide the volume of the spray tank by the spray rate.

$$\text{Area per tank} = \frac{\text{Tank volume (mL)}}{\text{Spray rate (mL per m}^2\text{)}}$$

Knowing the volume of spray mix required to cover the pest and target area will reduce the likelihood of excess spray mix being left over at the end of the job.

### Step 3—Mixing the chemical

Refer to the product label for information on the amount of chemical concentrate required for a given volume of water. This will usually be expressed in millilitres or grams per litre. Carefully mix the concentrate with the water in the spray tank. Many chemicals are applied in very small quantities; therefore, accurate measuring of concentrate is vital.

Congratulations! You have now calibrated your sprayer and can be confident of using the right amount of chemical at the right rate. This is the key to controlling a weed or pest while minimising the risk of environmental pollution and personal harm.

### Accidents and emergency situations

Preparation is the best defence against emergencies. You should develop an appropriate emergency plan allowing you to deal with such a situation. Make sure you have access to appropriate emergency equipment including protective clothing, spill containment and clean-up equipment.

#### *Poisoning*

Consult the pesticide label and/or the MSDS for specific information on first aid. Never put yourself at an unreasonable risk to rescue others, as you may become the next victim. If there is any doubt about whether a person has been poisoned or not, seek medical attention.

Follow first aid steps for anyone who is poisoned or exposed to a pesticide. These could include:

- ▶ removal of affected clothing immediately
- ▶ washing of contaminated skin with soap and water.

If chemical is splashed in the eye, wash it immediately in running water for 15 minutes and call a doctor immediately. The Poisons Information Centre can be contacted on 13 11 26 at any time.

☐ *Contact emergency services on 000 if required and other appropriate personnel for further spill containment and clean-up operations* ☐

#### *Leaks and spills*

Consult the relevant MSDS or manufacturer of the pesticide for specific information on handling leaks and spills. In the event of a chemical spill:

- ▶ ensure it is safe for you to approach the area
- ▶ move people a safe distance from the area
- ▶ keep bystanders away from the spill
- ▶ contain the spilled material if possible, using a physical barrier (e.g. bunding)
- ▶ use an absorbent material to soak up spilled liquid.

MSDS facts sheets have information on clean-up and decontamination procedures. If in doubt, contact the emergency phone number on the pesticide label for specialist advice.

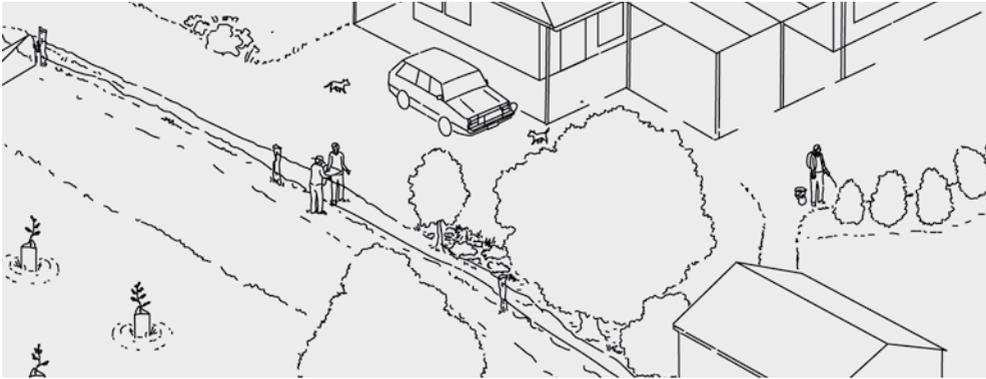
If required, contact emergency services on 000 and other appropriate personnel for further spill containment and clean-up operations.

#### *Fire and pesticides*

In any fire involving pesticides, the first response is to ensure your own safety, then to raise the alarm, both to people in the vicinity and to the relevant fire authority. Next, evacuate people from downwind of the fire. Do not fight the fire yourself unless you are certain of your own safety. When the fire is extinguished, clean up as for leaks and spills.

If there is a risk of contaminating waterways, the water and foam used in fire fighting should be contained.

# BEFORE SPRAYING



## Risk assessment

The landowner should conduct a risk assessment prior to any spraying work that considers:

- ▶ feasibility/practicability of the required job
- ▶ physical characteristics of the job site
- ▶ optimal pest control method, including alternatives to use of pesticide
- ▶ pesticide characteristics (physical, chemical and environmental)
- ▶ potential environmental effects resulting from spraying
- ▶ related human health issues.

▮ *All landholders should have a property management plan that considers the sensitivity of neighbouring land to any chemical use* ▮

## Property management planning

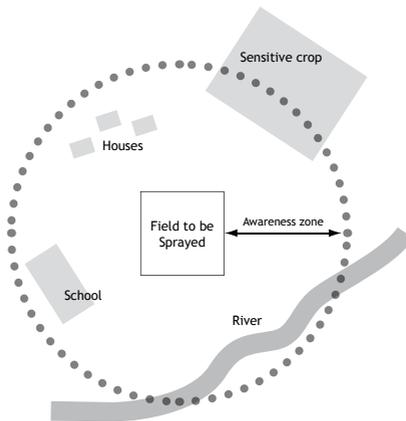
All landholders should have a property management plan that considers the sensitivity of neighbouring land to any chemical use. Crops should be located with such matters in mind. If you intend to purchase a new property, consider the likelihood that neighbouring crops, homes, gardens and waterways could be affected by your intended chemical use.

Conflicts over spray drift can be minimised by ensuring adequate buffer zones are located between areas where chemicals will be

used, and downwind areas that may be sensitive to chemical use (e.g. waterways and wetlands, native flora and fauna, houses and schools, neighbouring sensitive crops, livestock, beehives and aquaculture, etc.)

### *Awareness zones*

An awareness zone map highlights any sensitive areas around the field to be sprayed and shows the prevailing wind direction. This will help to provide you with a risk assessment for the area.



A spray plan should be prepared for areas that are routinely sprayed. The plan should consist of a map of the awareness zone, and include information on methods of drift reduction. It should also indicate any protective buffer zones.

### *Buffer Zones*

Buffer zones (or 'separation distances') can be used on the downwind edge of a field to ensure spray drift does not impact on neighbouring sensitive areas. The establishment of effective buffer zones will often help avoid litigation or conflict with neighbours and communities. Buffer zones should be regarded as supplementary to other methods of drift minimisation, not as a substitute. Different types of buffer zones include:

#### **Field splitting**

This involves treating the upwind section of a field, leaving the required buffer distance to neighbouring sensitive areas unsprayed (a 'no-spray zone'), until there is a favourable change in wind direction. For example, when a southerly wind is blowing, a spray operator could spray the southern end of the field, and vice versa when a northerly wind is blowing. Downwind 'no-spray zones' may be prescribed on product labels.

#### **Vegetative buffers**

Rows of trees, shrubs or tall grasses can be planted on the downwind edge of a property to reduce the impact of spray drift on neighbouring sensitive areas. Vegetative buffers work by filtering spray droplets out of the air as it passes through foliage. Vegetative buffers should only be considered in addition to other methods of drift control, not as a substitute.

Many factors influence the type and distance required for the buffer. Principles of vegetative buffer design include buffer width, height and distance, and type of buffer vegetation. Specialist advice may be useful at the design stage.

┌ *The establishment of effective buffer zones will often help avoid litigation or conflict with neighbours and communities* └

*If you are uncertain which chemical would be most appropriate for a specific spray operation, seek expert advice on product choice*

### Choose the right pesticide

Always check the level of toxicity on the product label. Be aware that the use of certain chemicals could present a significant hazard to nearby people, crops, waterways and desirable vegetation. If spraying is to be done near sensitive areas, avoid causing off-target damage by using less hazardous chemicals or alternative treatments.

Highly volatile herbicides, such as ester formulations of 2,4-D and MCPA, should not be used near susceptible crops such as vineyards and tomatoes. For further information see the PIRSA *Avoid Spray Drift* fact sheet.

In addition, insecticides that are highly toxic to fish, yabbies and marron, (e.g. synthetic pyrethroids) should not be used near waterways or aquaculture farms. Soil-active herbicides can present a significant hazard to non-target vegetation. If you are uncertain which chemical would be most appropriate for a specific spray operation, seek expert advice on product choice (see Resources, page 30).

### Consider waterbodies

Waterbodies are particularly sensitive to pesticide pollution and need special consideration. Many pesticides are toxic in aquatic ecosystems and can inadvertently kill organisms such as invertebrates, amphibians, fish and aquatic plants. Pesticides can also pollute drinking water where watercourses drain to reservoir or water supply systems.

Herbicides can enter waterbodies either directly through in-stream spraying or spray drift, or they can move into them via surface water run-off or leaching and sub-surface drainage. Therefore, even off-stream activities can result in herbicides entering waterways.

Additional information on how to best meet your environmental duty while controlling weeds near a waterbody is provided in the companion booklet *Safe and effective herbicide use: a handbook for near-water applications*.

It is recommended that only trained, licensed contractors carry out spray applications near waterbodies because of the sensitivity of these environments. However, if you feel you can select the appropriate chemical and apply it according to best practice, and so avoid environmental or personal harm, then the following points are critical:

- ▶ Never spray herbicides over a waterbody.
- ▶ Do not apply herbicides to the edge of a waterbody or in wetted areas around the edge of a waterbody unless the herbicide is registered for use in aquatic environments by the Australian Pesticides & Veterinary Medicines Authority.
- ▶ Where you have access to the edge of the waterbody, direct spray away from it where possible.
- ▶ Spray herbicides only to the point of covering foliage with droplets. Excess spray causes run-off, which can enter waterbodies.
- ▶ Use a flat fan nozzle and a low pump/spray pressure to reduce the likelihood of drift and off-target damage.



*Spray drift can be in the form of droplets, particles (fine dust) or vapour and becomes an issue when it has potential to damage health, trade or the environment*

### Avoiding drift and other off-target migration

Spray drift is the airborne movement of agricultural chemicals away from the target area during, or shortly after, its application. It can be in the form of droplets, particles (fine dust) or vapour and becomes an issue when it has potential to damage health, trade or the environment.

Spray drift can occur to some degree even when the chemical is being applied according to label instructions.

Spray drift is not the only process by which chemicals can potentially leave the target area. Chemical trespass is the broader term used to describe the off-target impact of a chemical on air, soil, groundwater and surface waters.

To ensure the impact of spray drift on sensitive areas is minimised, spraying should be carefully planned, especially for areas that are routinely sprayed. Planning should include a map of the awareness zone (see p. 18) and information on methods of drift reduction and buffer zones (see p. 19). If a contractor is spraying the area for you, make sure they have a copy of your spray plan or at least a sketch of the particular awareness zone.

### Consider weather conditions

Consider the environmental and seasonal conditions that affect how well the pesticide works on its target. Pay particular attention to:

- ▶ temperature and humidity
- ▶ wind speed and direction
- ▶ rainfall
- ▶ dust conditions
- ▶ season.

### *Temperature and humidity*

Do not spray herbicides when the daytime temperature is too high. Temperatures of less than 27°C are best. When plants are heat stressed they will not absorb herbicide effectively. Some herbicides may also become volatile in hot weather and pose risks to environmental and human health.

Humidity should be higher than 45% to prevent the evaporation of water-based sprays. With high temperatures and low humidity there is more chance of volatile chemicals evaporating from plant surfaces, even hours after application, and drifting away from the target area.

### *Wind speed and direction*

When winds are strong there is a higher risk of herbicide drift onto native vegetation, into waterbodies, or onto neighbouring properties. The risk of spray drift is lowest when there is a light wind (5-8 km/h), which may also assist in carrying spray mix onto the target pest.

However, do not spray when the wind speed is either still or very light (0-3 km/hr). Under these conditions, inversions may be present which can enable spray to drift over large distances. During periods of low wind speed, variable changes in wind direction are also more likely.

Do not spray when the wind is blowing towards a sensitive area, unless an appropriate buffer zone has been established.

### *Rainfall*

Do not spray when rainfall is anticipated within six hours, as pesticide washed off the pest can then pollute the soil and run off into aquatic ecosystems.



Keeping neighbours informed about your proposed use of chemicals can help reduce the likelihood of misunderstanding and conflict

### *Other considerations*

Do not spray when the target pest is covered in dust or dirt, as absorption of the herbicide is then limited. Consider also, in the case of pest plants, whether the plant is dormant or approaching dormancy. Herbicides are absorbed best by plants during the active growth stage of the plant.

### **Communicate with neighbours**

Keeping neighbours informed about your proposed use of chemicals can help reduce the likelihood of misunderstanding and conflict. Consult with neighbours about the best time of day to spray and remind them before the spray occurs, to give them an opportunity to move stock, disconnect rainwater tanks, and close house windows.

### **Choosing the spray equipment**

Hand-held sprayers are suitable for ground spraying on small land holdings.

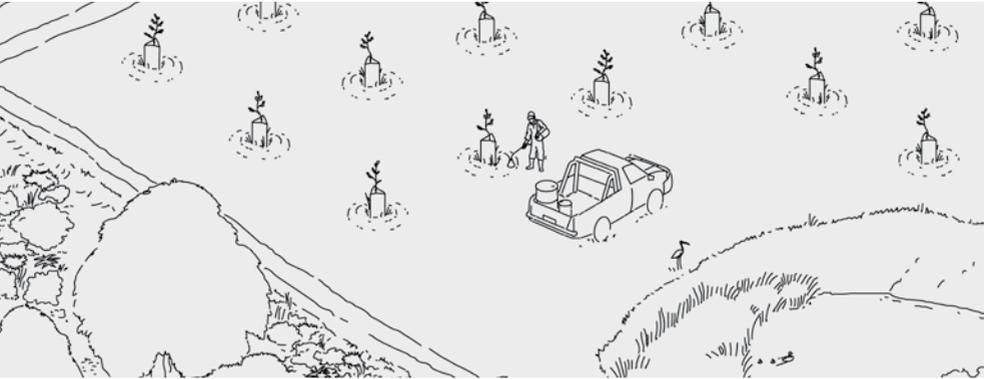
## Good spray practice

The table below gives an overview of how to achieve good spray practice.

**Table 3: Good spray practice**

Factor	Good Practice
Communication with neighbours	Choose the communication that works for your neighbours and you  Adjust or modify spraying schedule if required
Product selection	Use chemicals appropriate to the weed or pest to be controlled. From these, select for the lowest toxicity  Use alternative, non-chemical treatments
Property management planning	Make a property management plan which includes: <ul style="list-style-type: none"> <li>• awareness zones</li> <li>• buffer zones</li> </ul>
Weather conditions	Spray only if the following conditions are met: <ul style="list-style-type: none"> <li>• wind speed of 5-8 km/hr</li> <li>• prevailing winds blow away from sensitive areas</li> <li>• mild day temperature</li> <li>• relatively high humidity</li> </ul>
Spray equipment	Calibrate equipment prior to spray operation  Select appropriate nozzle size and type, spray pressure and spray height  Regularly maintain equipment
Integrated pest management	Establish an integrated pest management plan

# DURING SPRAYING



## Risk monitoring

Sometimes conditions change while applying pesticides. For example, wind speed or direction can change quickly, or it may start raining. You should constantly monitor environmental conditions while working, and may have to adjust their procedures if there are changes, or even stop the application. If conditions alter while applying the pesticide, this should be noted in your pesticide application record (see p. 29).

The following factors should be considered as part of continually assessing the risk for off-target migration:

- ▶ product
- ▶ awareness zones
- ▶ buffer zones
- ▶ weather conditions
- ▶ spray equipment.

### Low-drift techniques

Use 'low-drift' nozzles that minimise the number of small droplets produced, consistent with the coverage required. Smaller droplets are more susceptible to spray drift, as they tend to remain airborne much longer, and can be carried further from the target by wind before landing.

The release height should be set as low as possible, consistent with nozzle specifications and coverage requirements. To ensure the majority of droplets are the optimum size, spray pressure should be kept as low as possible, consistent with nozzle specifications and coverage requirements.

Spray equipment should be calibrated regularly to ensure chemical is being applied at the correct rate in accordance with manufacturer's instructions.

For information on methods of minimising drift from a specific type of spray equipment, contact a recognised spray equipment manufacturer or distributor.



# AFTER SPRAYING



## Clean up

Equipment should always be cleaned in a safe location where spills can be contained and will not result in environmental harm. Using water to clean equipment will further dilute any residual pesticide to low levels, and the resulting solution is best sprayed onto a lawned area or bare ground taking the following precautions:

- ▶ Do not apply wash-water to the point of saturation and run-off.
- ▶ Do not apply wash-water along boundary fence lines as this will increase the chance of pesticides escaping from your property.
- ▶ Do not dispose of wastewater into areas where children play, or pets have access, as low levels of pesticide are still likely to be present.
- ▶ Do not deposit wastewater where it will run into waterways, drainage lines or stormwater systems.

## Disposal

If you do happen to have surplus spray mix or pesticide waste, label it with the pesticide name, including any risk and safety information displayed on the original pesticide label. Store it safely until it can be disposed of appropriately. It is best to use all spray mix prepared if possible.

You must follow label directions for the disposal of wastes and pesticide containers. Only dispose of waste pesticides at authorised collection centres, such as licensed waste disposal centres or the EPA's Hazardous Household Waste Depot at Dry Creek.

Do not dispose toxic pesticide waste:

- ▶ through sewerage systems, where it can interfere with the sewage treatment process
- ▶ down the drain or gutter, where it will pass through the stormwater system and then into waterways
- ▶ to landfill via dumping or domestic waste, as it can contaminate soil and leach into groundwater and stormwater.

## Recordkeeping

Maintain a spray diary, keeping records of what was sprayed, the method of application, when spraying was carried out, and the weather conditions at the time of spraying.

*For further information call 8204 2004 or, in the country, 1800 623 445. Empty pesticide containers can be disposed of through local council programs such as drumMUSTER.*

# RESOURCES

Topic	Contact details	Notes
Disposal of unwanted concentrated pesticide	EPA Ph: (08) 8204 2004 or 1800 623 445 or epainfo@epa.sa.gov.au or www.epa.sa.gov.au/pub.html	<i>Household hazardous waste—management and disposal</i> ; EPA guideline
	ChemClear Ph: 1800 008 182 www.chemclear.com.au	
Disposal of unwanted pesticide containers	drumMuster www.drummuster.com.au, or Ph: (08) 8554 7268 or 0409 834 113	Contact local council
Emergency	000	Fire, ambulance, police
Emergency (environmental)	Environment Protection Authority Ph: 1800 100 833	Emergency Response Line (to report an incident that has actually, or may potentially, cause serious or material environmental harm)
Emergency (poisoning)	Poisons Information Centre Ph: 13 11 26	24 hours a day, 7 days a week

Topic	Contact details	Notes
General pesticide information	EPA Ph: (08) 8204 2004 or 1800 623 445 or epainfo@epa.sa.gov.au or www.epa.sa.gov.au/pub.html	<i>EPA Guidelines for Responsible Pesticide Use 2005</i>
	PIRSA Ph: (08) 8226 0405	<i>inFINDER</i> set of CDs, available from PIRSA (pesticide labels, MSDS, and registered uses of pesticides);
	EXTOXNET <a href="http://extoxnet.orst.edu">http://extoxnet.orst.edu</a>	Website of Oregon State University/ USA with chemical & physical characteristics of pesticides relating to environmental safety and transport
	NRM Boards <a href="http://www.nrm.sa.gov.au">www.nrm.sa.gov.au</a>	
Integrated pest management (IPM)	National Association for Sustainable Agriculture Australia <a href="http://www.nasaa.com.au/">www.nasaa.com.au/</a> PO Box 768 Stirling SA 5152 Ph: (08) 8370 8455 Fax: (08) 8370 8381 Email: <a href="mailto:enquiries@nasaa.com.au">enquiries@nasaa.com.au</a>	Organic growers
	BFA <a href="http://www.bfa.com.au/">www.bfa.com.au/</a>	Organic growers
	<a href="http://www.environment.act.gov.au/petsandlocalwildlife/integratedpestmanagement.html">www.environment.act.gov.au/petsandlocalwildlife/integratedpestmanagement.html</a>	Another useful website

Topic	Contact	Notes
Licensed contractors	Natural Resources Management Boards www.nrm.sa.gov.au  Groundsprayers Association of South Australia c/ Wrenhaven Pty Ltd Ph: (08) 8391 1999	
Pesticide storage, transport and handling	PIRSA, Rural Chemicals Program Ph: 1300 799 684	<i>Agricultural &amp; Veterinary Chemicals (Control of Use) Act 2002</i>
Reporting a significant pesticide spill	Police Ph: 131 444 (24 hrs)  Department of Human Services Ph: (08) 8226 7107 (24 hrs)	<i>Controlled Substances Act 1984, and Regulations</i>
Spray drift management: principles, strategies and supporting information.	PIRSA Chemical Trespass Coordinator Ph: (08) 8226 0528 Fax: (08) 8226 1844	PISC (SCARM) Report 82, Primary Industries Report Series, CSIRO Publishing /PISC (SCARM), October 2002.
Training in the use of farm chemicals	ChemCert Australia (SA) Inc Ph: (08) 8842 4048	<i>Controlled Substances Act 1984, and Regulations. Agricultural and Veterinary Products (Control of Use) Act 2002 and Regulations.</i>
Weed management	CRC for Weed Management Ph: (08) 8303 6590	
Workplace health and safety	Workplace Services, DAIS Ph: 1300 365 255 www.eric.sa.gov.au wisinfo@eric.sa.gov.au	<i>Occupational, Health, Safety and Welfare Act 1986</i>

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**Government  
of South Australia**

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