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Safe use of Pesticides

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Pesticides are substances or organisms used to kill, incapacitate, inhibit the growth of, or prevent, pests. They can be natural or synthetic chemicals. Some living organisms that act as biological control agents can also be considered as pesticides. Common environmental pests include vertebrate pests (e.g. rabbits), insect pests (e.g. locusts and millipedes), and plant pests (weeds). Many weeds, pests, and diseases affect primary production. Commercial spray operators have contact to a wide range of pesticides, including baits, herbicides, fungicides, bactericides, insecticides, post-harvest fruit dips, and products applied to animals. When used appropriately, pesticides can control environmental pests proficiently and be of significant economic benefit to primary production. However, if they are changed, pesticides can put human health, trade and the environment at risk.

A **herbicide** is a chemical material that will kill or inhibit the growth of plants. Herbicides may kill virtually all plants or be quite selective in the way they effort. Herbicides are generally used to control the growth and spread of weeds. An **insecticide** is a chemical substance considered to kill insects. A **fungicide** is a chemical substance considered to kill fungi. Spray drift is the airborne drive of agricultural chemicals away from the target area during, or shortly after, its application. An **ecosystem** is a self-sustaining relationship of plants and animals and the physical environment in which they live.

To minimise the potential for environmental harm, pesticide use by commercial spray contractors and other operators whose business includes the use of pesticides must be regular with provisions in the Environment Protection Act 1993 and the Environment Protection (Water Quality) Policy 2015 (Water Quality Policy).

A quality assurance (QA) program has been established for the commercial spray application industry in South Australia. While not mandatory, commercial spray operators are invigorated to adopt this QA program for their own businesses as a means of representing compliance with environmental and controlled substances legislation.

The Agricultural and Veterinary Products (Control of Use) Act 2002 specifies qualifications required for people using approved classes of chemicals or methods of application. Presently this provision applies to Schedule 7 pesticides and to pesticides containing mevinphos, endosulfan or acrolein. Use of these products is limited to people who hold a 'prescribed qualification'

1. Safety first

The Occupational Health, Safety & Welfare Act 1986 (OHS&W Act) needs employers to provide information, instruction, training and supervision to employees when execution any hazardous activity, including storing, handling and using pesticides.

Transporting pesticides: When transporting and storing pesticides, care must be occupied to protect the operator, other people and the environment. Containers of pesticide concentrate must be safe while in transit and during short-term storage at mixing sites. Safety may be via a locked cage or cabinet on the tray of the spray vehicle.

Storing pesticides: Pesticides should be sealed in either an isolated, stand-alone building; a partitioned section of a multipurpose, uninhabited building; or, a cupboard within a multipurpose building. They should be stored in a cool area, missing from sunlight.

Mixing pesticides: Pesticides should be stately and mixed in areas that are well-ventilated, level, well-lit, and with a supply of clean water. Operators should wear appropriate individual protective equipment while mixing pesticides.

Calibration: Before calibrating, confirm all spray equipment is clean and in good working order. All seals and nozzles should be clean and working successfully so that the spray mix is delivered to the target pest or weed at the appropriate rate. The purpose of calibration is to apply pesticides regularly into the target at the correct rate. Equipment for determining pesticide concentrate (e.g. scales), as well as application equipment (e.g. boom sprayers, hand sprayers, orchard/vineyard sprayers), should be calibrated according to the manufacturer's recommendation and according to a schedule that confirms optimal equipment performance at all times.

2. Before Spraying

Before applying pesticides, it is suggested that the spray operator conduct a thorough assessment of the job at hand. The conclusion of a risk assessment is not only a requirement under the OHS&W Regulations 1995, but also good practice.

Choose the right pesticide: Continuously check the level of toxicity on the product label. Spray operators should be aware that the use of definite chemicals could present a significant hazard to nearby people, crops, streams and desirable vegetation. If spraying is to be done close sensitive areas, avoid causing off-target damage by using less hazardous chemicals or alternative treatments.

Extremely 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 adding, 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-day a significant hazard to non-target vegetation.

Chemical characteristics

Measure the following characteristics of chemicals when selecting a pesticide:

General environmental risk: Choice a creation that has few or no environmental risks (e.g. to birds, fish, invertebrates, native vegetation, waterways).

Persistence: Does the product stay active in the environment for a long period of time. In general, a no persistent product (short half-life) is more necessary than one that is persistent or 'residual.

Volatility: Does the product freely evaporate into the atmosphere. Choice a product with low volatility to minimise the risk of volatile drift onto non-target areas.

Adsorption: Select a product with a high adsorption coefficient as it adheres to organic matter in the plant and soil, and is less portable in the environment.

Solubility: Select a product with low solubility, as it is less expected to migrate from the application site in surface or soil water.

Buffer zones

Buffer zones, or 'separation distances', can be used on the downwind edge of a field to confirm spray drift does not impact on adjoining sensitive areas. The establishment of actual

buffer zones will often help avoid community conflict or litigation. Different types of buffer zones include:

Field splitting: This includes treating the upwind section of a field, leaving the required buffer distance to neighboring sensitive areas unsprayed (a 'no-spray zone'), until there is a favorable change in wind direction. For example, when a southerly wind is driving, 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 decrease the impact of spray drift on neighboring sensitive areas. Vegetative buffers work by filtering spray droplets out of the air as it permits through foliage. Vegetative buffers should only be measured in addition to other methods of drift control, not as a substitute.

Consider weather conditions

Consider weather conditions before spraying, paying specific attention to:

Wind speed: Constantly light winds are ideal (3–15 km/hr. or as specified on label). Higher wind speeds may be acceptable in low risk areas, or where passable distances to other areas are maintained.

Wind direction: The wind should be blowing away from sensitive zones.

Temperature: Mild temperatures (45%) are perfect.

The morning hours often give the paramount weather conditions for spraying. Spray operators should monitor and record wind direction, wind speed, temperature and humidity before and during every spray operation. Inexpensive hand-held devices are available to help this. Otherwise, take readings using the Beaufort Scale.

3. During Spraying

Occasionally conditions change while applying pesticides. For example, wind speed or direction can change rapidly, or it may start raining. The pesticide applicator should continually monitor environmental conditions while working, and may have to adjust their procedures if there are changes, or even stop the application. If conditions change while applying the pesticide, this should be noted in the pesticide application record.

Spray drift is the airborne movement of pesticide away from the target area during or soon after ground or aerial application. Spray drift can be in the form of droplets, fine dust or vapor. It has the potential to influence on human health, trade and the environment, and can happen even when the chemical is being applied according to label instructions.

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

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

Spray equipment

Spray equipment should be operated with the aim of decreasing drift. Equipment is available to decrease spray drift, but operator expertise is also essential to select the right nozzle size and type, spray pressure and spray height. For further information on techniques of minimising drift from a specific type of spray equipment, contact a known spray equipment manufacturer or distributor.

4. After Spraying

To minimise cost and potential harm to the environment, the goal of each spray operation should be to plan the spray job carefully to avoid extra spray solution. Clean equipment away

from sensitive areas such as waterbodies, children's play areas or sensitive vegetation. In relative to the disposal of unwanted pesticides and wash water, failure to observe the following strictures may signify a breach of the General Environmental Duty under the Environment Protection Act.

Record of pesticide application: A record of pesticide application for every job must be kept by the spray operator, and a copy of this record should be given to the client. Application records should contain:

- Operator's name
- Situation of application (e.g. crop, pasture, native vegetation, amenity area)
- Growth stage and general condition of crop where appropriate
- Pests to be controlled
- Personal protective equipment worn by operator
- Measures taken to minimise off-target migration of pesticide, environmental damage or noise pollution.
- Name and address of landholder
- Precise location of application area (may include a map)
- Date of application
- Growth stage and general condition of pests
- Level of infestation of pests