



Managing Chemical Residues in Crops and Produce.

Michael Laity, Frankston

Introduction

Conventional agricultural systems in Australia use a wide range of agricultural chemicals to boost the yield and quality of produce and to control weeds, insect pests and disease. While recognizing the important role these chemicals play, growers should be mindful that consumers are becoming increasingly concerned with the level of chemical residues in produce.

The main concern is when chemical residues are detected at unacceptable levels (i.e. above the Maximum Residue Limit (MRL) set by Food Standards Australia New Zealand (FSANZ)), as this may impact on human health and market access. Should produce contain residues above the MRL, this could have serious repercussions for trade markets, both domestic and international.

Managing chemical residues is essential, not to mention Good Agricultural Practice (GAP). Growers are responsible for ensuring that chemicals are used correctly to minimise any chance of unacceptable chemical residues occurring.

Follow the label directions

Labels provide detailed information about what crops/produce the chemical can be used on, what pest it controls, application rates, withholding periods (WHPs) and MRLs. Using a chemical product according to the label directions minimizes the risk that unacceptable chemical residues occur in produce because the use has been tested and is warranted by the manufacturer. Any variation from the label directions is considered an 'off-label' use and should be avoided where possible.

Off-label use of chemicals

Off-label use refers to situations when a chemical is used in a manner that is not specified on the chemical's product label. Examples of off-label use include when a chemical is used to control a different pest or to protect a different host (crop/animal), at a different rate, or in a different manner to that listed on the label.

In Victoria, it is legal to use chemicals other than 'restricted use' chemicals (i.e. agricultural chemical

products that are Schedule 7 Poisons (Dangerous Poisons or contain atrazine, metham sodium or ester formulations of MCPA, 2,4-D, 2,4-DB or triclopyr)) off-label providing that:

- the maximum label rate is not exceeded
- the label frequency of application is not exceeded
- any specific label statements prohibiting the use are complied with (e.g. **DO NOT** statements).

The main issue with using a chemical off-label relates to the ability to manage residues in treated produce. When a chemical is used off-label, how it interacts with the crop being treated, and how long it will take before the residue reaches an acceptable level is unknown.

Chemical users should thoroughly consider their options before using a chemical off-label, because should they choose to do so, they accept total responsibility for:

- efficacy
- residues in the environment
- occupational Health and Safety issues
- residues in produce.

Chemical residues in crops and produce

Chemical residues will generally remain in a crop or its produce for a period of time following a chemical application. The rate at which a chemical accumulates and degrades in a plant can be difficult to predict and depends on a range of factors, including:

- the rate and frequency used
- the formulation and properties of the active constituent in the chemical product.
- adjuvants added to the chemical product or/at application
- equipment used
- climatic conditions after and during application
- crop characteristics and growth stage
- crop growth after application

- the rate of chemical breakdown in plants, soil or water and resulting products from the breakdown.

Spray drift or accidental spraying can also cause unwanted chemical residues.

Analytical chemical testing can be used to detect any unacceptable chemical residues in produce.

Residue testing data is used to determine WHP statements placed on chemical product labels. A WHP is the minimum period of time that must elapse between the last application of an agvet chemical product, and the 'use' of the agricultural produce to which the chemical was applied. The WHP on a label is designed to ensure that food and fibre derived from chemically treated crops complies with domestic market Maximum Residue Limits (MRLs).

Tolerances for chemical residue levels permissible in domestically consumed food products are set by FSANZ. The MRLs for various commodities are published in the Food Standards Code (FSC). Crops or produce with residue levels below the MRL are considered to meet GAP and is acceptable for sale and consumption.

There is a greater likelihood that produce treated off-label will contain unacceptable residues, which is why off-label chemical users are particularly at risk, as any residual effect from using the chemical off-label may be unknown. Given that there may be no MRL established, any detection could seriously impact on market trade, both domestic and international.

Steps in managing chemical residues

While DPI encourages the use of chemicals in accordance with label directions, it is recognised that there are some situations where a chemical can be used off-label. Managing residues when using a chemical off-label is a complex task, and growers should seek professional advice whenever possible.

While each situation may be different, there are steps that growers can take to manage residue risks.

Step 1: Examine all control options

Examine physical, cultural, biological control options and chemicals registered for use in the situation. Chemical use may be avoidable or minimised if an alternative pest control method can be used. Off-label chemical use should be only used as a last resort.

Step 2: Know the crop and situation

Knowing the crop and situation may not be as simple as it sounds. The type and growth stage of the crop can have a major effect on the uptake and degradation of a chemical.

For example, a fast, actively growing crop is more likely to degrade or disperse chemical residues within the plant.

It should not be assumed that it is safe to use a chemical according to label directions when it is used off-label in a situation that appears to be similar to the registered use, as there can be unforeseen outcomes from such a use.

Case Study 1 – Strawberry growers

A number of strawberry growers used an off-label chemical to control Rutherglen bug.

The chemical was registered for use in strawberries in Queensland and the Northern Territory and there is a MRL established for strawberries.

Despite following the label directions for the other States, residues were detected in the strawberries at levels 3 times the MRL.

Climatic differences between the States were likely to have contributed to the unacceptable residue.

Step 3: Choose the chemical

Choosing an effective and safe chemical can be difficult. Growers are encouraged to seek professional advice when selecting a chemical to use. A professional can advise on issues such as the effectiveness and risks of using a particular chemical, appropriate application rates and methods. Where possible, choose a chemical that has the crop or situation listed on the label.

Care should also be taken when tank mixing with other chemicals, adjuvants or fertilisers.

Step 4: Know the intended market's Maximum Residue Limits (MRLs)

There is a risk that the market may not have an established MRL, particularly with respect to off-label use and export markets. In this situation, any detection of the chemical residue may be considered unacceptable.

Domestic market MRLs are set by FSANZ and can be found in the FSC. FSANZ is not the only authority that establishes MRLs in Australia. The APVMA also establishes MRLs, however these must be assessed and gazetted by FSANZ before they are legally accepted in Victoria.

Case Study 2 – Lettuce growers

Lettuce growers sprayed crops according to an APVMA permit with an APVMA MRL. No FSANZ MRL had been established at this time. As the APVMA MRL is not legally acceptable in Victoria until it has been gazetted by FSANZ, and the residue detection was considered unacceptable.

Many countries have established their own MRLs for a range of produce to suit their requirements, many of which differ to those in Australia. Some countries choose to adopt the international MRLs set by the Codex

Alimentarius Commission. There are also instances where there is no MRL established.

Growers supplying export markets must be aware of the differing MRL requirements for the countries they supply and factor them into their chemical use. The absence of a MRL may be a good reason to select a different chemical.

Case Study 3 – Exported wheat

Australian wheat was treated with fenitrothion whilst it was stored in Australia. The chemical treatment was a registered label use with an established FSANZ MRL of 10mg/kg.

The wheat was then exported to India, where it Indian authorities detected fenitrothion residues above the Indian MRL of 0.02mg/kg. This detection caused a disruption to trade.

Step 5: Apply a suitable withholding period (WHP) and/or post-harvest treatment

After applying a chemical, growers should allow a suitable WHP before selling or using the treated crop or produce. In some circumstances a post-harvest wash may assist to reduce surface residues however, this won't alter the need to adhere to any WHPs that apply.

Step 6: Testing for residues

Many chemical users are aware that unacceptable chemical residues can present problems. Unfortunately, this is often overlooked because the problem cannot be physically seen. Often, a problem isn't found until it is detected through a governmental testing program or by the produce buyer.

To manage unacceptable residues risks (particularly when using chemicals off-label), growers should send a sample of the treated crop to a National Association of Testing Authorities (NATA) accredited laboratory for chemical testing. The laboratory should be asked to test for all chemicals that are used where the crop or produce was grown, including neighbouring crops.

Growers should consider annual testing as a risk assessment tool to verify that unacceptable residues are not the product of any off-label chemical use.

If unacceptable residues are detected, the chemical user must re-examine their options and chemical use practices.

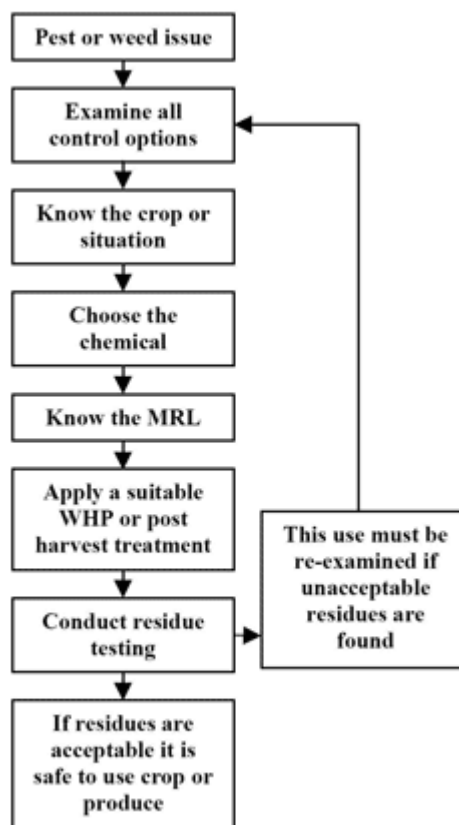


Figure 1. Summary of chemical residue management steps.

Summary

Growers must carefully consider the consequences of all chemical use practices, especially when chemicals are used off-label.

Since most produce is traceable to the producer, who is held accountable for any unacceptable residues present, care must be taken to ensure any residues present are below the relevant MRL to avoid any serious repercussions effecting trade.

Further Information

- DPI Chemical Standards website - www.dpi.vic.gov.au/chemicalstandards
- APVMA website - www.apvma.gov.au
- Food Standards Australia and New Zealand (FSANZ) website - www.foodstandards.gov.au
- National Association of Testing Authorities (NATA) website - www.nata.asn.au
- DPI Chemical Standards Officers
 - North West
 - Alan Roberts (03) 5430 4416
 - Dave Rumbold (03) 5430 4806
 - North East
 - Steven Field (03) 5824 5532

South West & Port Phillip West

Jo Robinson (03) 5355 0522

Neil Harrison (03) 5336 6616

Gippsland & Port Phillip East

David Stewart (03) 9785 0173

Michael Laity (03) 9785 0191

- Chemical resellers and agronomists
- Chemical manufacturers
- Consultants
- Industry associations

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