

Fruits, Vegetables and Pesticide Residues



Introduction

Fruit and vegetables are an important part of a balanced diet. We are told to eat two pieces of fruit and five vegetables every day, but are they safe to eat? What about the chemicals the farmers use to keep their crops free from pests? Do these chemicals stay on the food we eat?

All foods sold in Australia must comply with the requirements of the Australia New Zealand Food Authority (ANZFA) Food Standards Code. The Code contains 'maximum residue limits' (MRLs) for pesticides permitted on specific foods. The MRL is determined from a number of factors including:

- how much of the food is eaten in the average diet;
- how toxic the pesticide is; and
- how easily the food absorbs the pesticide.

A large safety margin is included in the MRL. Foods that comply with the MRLs indicate that they have been grown using good agricultural practice.

Some pesticides may be approved for use on one food, but they cannot be used on another unless they have been approved for that food. Technically, the chemical may be safe to use. However, a food cannot legally be sold if it contains a pesticide residue in excess of that listed in the Code.



Ninety-five per cent of the vegetables analysed complied with the food standards.

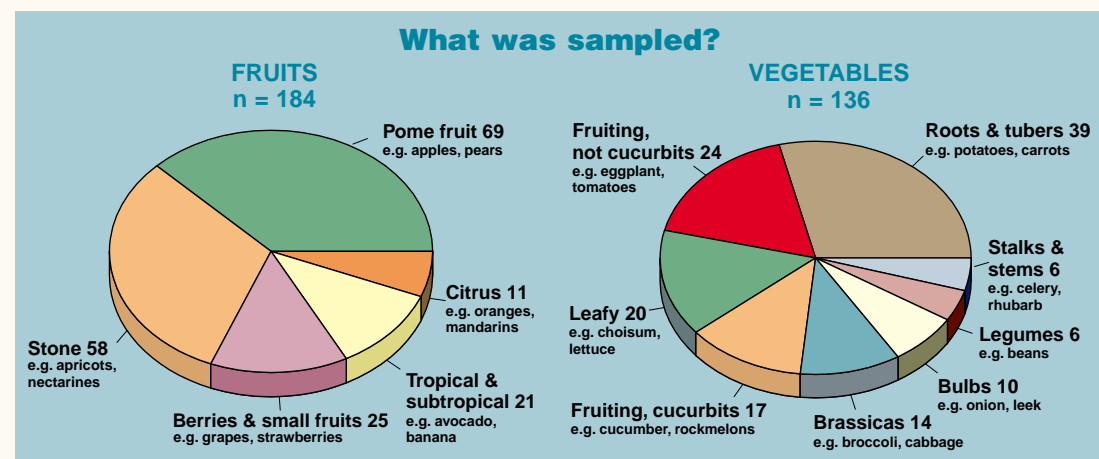
Mini-survey – dithiocarbamates

In 1997, a mini-survey of 150 salad vegetables was undertaken to investigate the use of the fungicide dithiocarbamate. Previous West Australian surveys had not analysed products for the use of this chemical. Of 50 lettuce, 50 tomato and 50 celery samples analysed, none contained dithiocarbamate in excess of the MRL.

In 1998, the Western Australian Food Monitoring Program conducted a major survey investigating pesticide residue levels on fruit and vegetables as part of its continuing pesticide surveillance strategy.

Major survey results

Environmental Health Officers (EHOs) from 22 local governments throughout Western Australia collected a wide variety of fruit and vegetables from growers, packers and markets (see 'What was sampled?'). Each of the 320 samples was analysed for 35 different pesticides with a total of 11,200 tests being undertaken by the Chemistry Centre of Western Australia (see 'What did we look for?').



What did we look for?

Samples were analysed for the presence of the following 36 listed chemicals, which represent a broad range of chemicals used in agriculture. If a chemical was detected, the level was compared against the MRL for that particular food.

Organochlorines – Aldrin, Chlordane, DDT, Dieldrin, HCB, Heptachlor, Lindane, Endosulfan.

Organophosphates – Chlorpyrifos, Demeton-S-Methyl, Diazinon, Dimethoate, Fenamiphos, Fenthion, Maldison, Methamidophos, Methidathion, Mevinphos, Parathion Methyl, Phorate, Parathion.

Pyrethroids – Cypermethrin, Deltamethrin, Fenvalerate, Permethrin.

Carbamates – Benomyl, Carbaryl, Carbendazim, Carbofuran, Methiocarb, Methomyl.

Other – Pirimicarb (fungicide), Chlorothalonil, Dicofol, Procymidone, Tetradifon.

Of the fruits and vegetables sampled, 13 (4%) contained MRLs which did not comply with the Code. Of these, three samples contained too much of a permitted pesticide and 10 samples contained small amounts of pesticides which were not permitted on those particular foods (see 'Survey results').

The samples that contained too much pesticide were:

- two samples of strawberries containing three times the permitted amount of carbendazim; and
- one sample of choisum, a leafy chinese cabbage, containing 36 times the permitted amount of cypermethrin. The same sample of choisum also contained permethrin, which is currently not permitted on this food.

The 10 samples that contained pesticides not permitted for use on those particular foods included:

- four samples of rockmelon and one sample of pumpkin containing very small amounts (less than 0.05 mg/kg) of the organochlorines Dieldrin and Aldrin. Organochlorines take years to break down in the soil and their use in agriculture has been prohibited since 1987. The Code permits very small amounts of organochlorine residues in many foods, but the list does not include rockmelon and pumpkin. The small amounts detected on the samples were

consistent with residual amounts remaining in the soil. Application has been made to ANZFA to amend the Code to include MRLs for these foods;

- one sample of apples and one of pears containing fenamiphos (both less than 0.02 mg/kg);
- one sample of avocado and another of zucchini both containing 0.03 mg/kg of permethrin; and
- one sample of peaches containing 4 mg/kg of carbofuran.

Samples that did not comply were traced back to their growers by EHOs and appropriate action taken to remedy the identified problems. Many growers did not have a food safety program and were unaware that proposed national legislation may require one in the near future (see 'What is a food safety program?' overleaf).



Ninety-seven per cent of the fruits analysed complied with the food standards.

Survey results

Food	# Sampled	# Pass	#Fail	Reason for failure	
				Food	Chemical
Fruits	184	178 (97%)	6 (3%)	Apple (1) Pear (1) Peach (1) Avocado (1) Strawberry (2)	Fenamiphos* Fenamiphos* Carbofuran* Permethrin* Carbendazim^
Vegetables	136	129 (95%)	7 (5%)	Rockmelon (4) Pumpkin (1) Zucchini (1) Choisum (1)	Dieldrin or Aldrin* Dieldrin* Permethrin* Cypermethrin^ and Permethrin*
Total	320	307 (96%)	13 (4%)		

Key: *Pesticide not permitted on that food as no MRL in Code.
^Pesticide permitted but level exceeded MRL in Code.



144 Local Governments

What is a food safety program?

A food safety program in its simplest form is a written system that demonstrates that a business is operating using good manufacturing practice. It may contain the following information:

- a flow chart identifying each stage of the process;
- what can go wrong at each stage of the process; and
- what can be done to prevent something from going wrong.

Key elements of a food safety program for many horticultural businesses include keeping a spray diary and training staff.

The farming industry's own Farmcare course trains staff in the correct use of farm chemicals and a pesticide safety training video in many languages is available from the Environmental Health Service, Health Department of Western Australia. In addition, the FoodSafe Program, developed by the Australian Institute of Environmental Health, provides basic food hygiene training.

Some businesses with complicated processes will require an in-depth food safety program to ensure that all risks are minimised. These will be based on Hazard Analysis Critical Control Point (HACCP) principles.

SQF 2000 has been developed by Agriculture WA especially for primary producers who wish to have an accredited HACCP-based system in place.

Some producers may wish to learn more about HACCP by implementing the FoodSafe Plus Food Safety Program developed by the Australian Institute of Environmental Health.

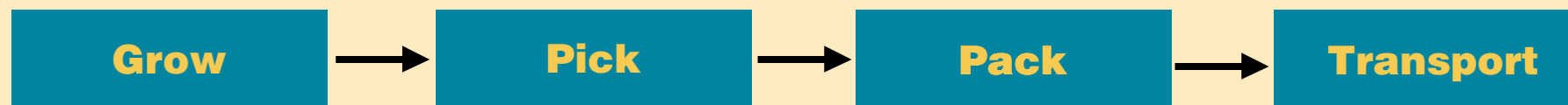
Food safety programs can protect a food business through:

- demonstrating that staff know how to handle food safely;
- demonstrating that good manufacturing practices are followed; and
- providing evidence of 'due diligence' in a court of law.



How to develop a food safety program

STEP 1: Identify the process.



STEP 2: Identify what can go wrong at each stage.

A crop can be damaged at any stage in the process in the following ways:

- **physically** - damaged during picking, packing or transport;
- **chemically** - by using the wrong pesticide or storing the crop near chemicals; and
- **microbiologically** - the moulds on some crops can produce cancer-causing toxins (e.g. patulin in apple juice). Also, bacteria and viruses from packers' hands may contaminate the food, for example salmonella, E. coli or hepatitis A from handling manures, animals or from poor hygiene practices.

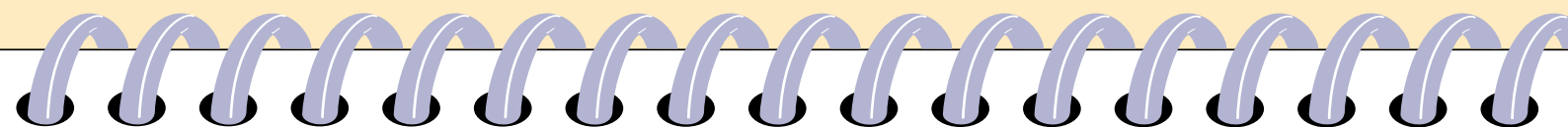
STEP 3: Take action to prevent it happening.

- Are any chemicals sprayed on the crop?
- Are staff trained to use chemicals safely?
- Is the chemical registered for use on that crop?
- Is the chemical applied as instructed on the label?
- Are details recorded in the spray diary?

- Check spray diary to ensure crop is not in a withholding period.
- Have staff been trained to pick crop without damaging it?
- Is rotten, mouldy food thrown away?
- Does food receive post-harvest treatment to reduce field heat temperature?

- Have staff been trained to pack food without contaminating it?
- Do staff wash hands before packing food?
- Are batches of food labelled?
- Are chemicals stored away from foods?

- Are transporting staff trained not to damage food during loading and unloading?
- Have you written down where the food went so if there was a recall you could trace it?
- Is food protected from contamination during delivery?



Spray diary sample Herbicides, fungicides and insecticides

Farm name _____ Equipment last calibrated _____

Date	Lot, block, beds or area sprayed	Type of produce	Target pest/disease	Chemical trade name	Rate L/Ha	Amount chemical per 100 L	Comments (rain, wind, temp)	With-holding period (days)	Sign

Who was involved in this survey?

Metropolitan local governments (8):
 Armadale, Cockburn, Joondalup, Kalamunda, Kwinana, Stirling, Swan, Wanneroo

Country local governments (14):
 Albany, Augusta-Margaret River, Bunbury, Busselton, Carnarvon, Chittering, Gingin, Greenough, Harvey, Manjimup, Murray, Serpentine-Jarrahdale, Waroona, Wyndham-East Kimberley

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 Monitoring Program
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