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Australian Pesticides and Veterinary Medicines Authority

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Dimethoate: residues and dietary risk assessment report

The reconsideration of the active constituent dimethoate, registration of products containing dimethoate and approvals of their associated labels.

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EXECUTIVE SUMMARY

Introduction

This residues assessment for the review of dimethoate was undertaken by the APVMA Residues Section. The dietary risk assessment follows the recommended revision of the Acceptable Daily Intake (ADI) from 0.02 mg/kg/day to 0.001 mg/kg bw/day and establishment of an Acute Reference Dose (ARfD) of 0.02 mg/kg bw for dimethoate by the Office of Chemical Safety in the *Human health risk assessment: toxicology report*, published 2010.

This residues assessment includes all dimethoate uses, including those on approved labels and those approved by APVMA permit or previous QLD Board approvals.

The first *Dimethoate residues and dietary risk assessment report* was published in August 2011. This second report incorporates consideration of additional data and consideration of requests for alternative use patterns that were submitted to the APVMA in response to the 2011 report.

Use patterns supported by this assessment

The residues assessment published in 2011 found that certain uses could be supported, based on the data assessed to date. Further, for some crop groups although there was insufficient data to set an MRL there was sufficient information to recommend that the acute dietary exposure was likely to be acceptable. Immediate action was not proposed for these uses but the APVMA indicated that it was likely to remove these uses when the review is finalised if sufficient data to set an MRL were not made available by that time. Label and permit uses for commodities that are supported by this residues assessment, including commodities for which additional data was provided are summarised below:

Use pattern	Previous label use	Previous permit use
Asparagus, all pre harvest uses	✓	
Abiu, all post harvest uses		✓
Avocado, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Avocado, all post harvest uses	✓	✓
Banana, all post harvest uses	✓	✓
Banana, control of banana aphid with concurrent plant destruction. Grazing or supply of produce for human or animal consumption prohibited	✓	
Banana passionfruit, all post harvest uses	✓	
Beans, all pre harvest uses	✓	
Beetroot, pre harvest use with a 14 day withholding period		
Blackberries, pre harvest use (additional data provided—ongoing use supported)		

Use pattern	Previous label use	Previous permit use
Blueberries (and other Vaccinium berries), pre harvest use with a 21 day re-treatment interval (additional data provide—ongoing use supported)	✓	
Cactus fruit, all post harvest uses	✓	
Caimito/star apple, all post harvest uses		✓
Capsicum, all pre harvest uses	✓	
Casimiroas, all post harvest uses		✓
Cereals, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Citrus, all pre harvest uses and post harvest uses Citrus that have received a pre harvest treatment must not be given a post harvest treatment (additional data provided—ongoing use supported)	✓ (pre harvest)	✓ (post harvest)
Cotton, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Custard apple (and cherimoya), all post harvest uses	✓	✓
Durian all post harvest uses		✓
Eggplant, pre harvest use with 14 day WHP (further data provided for permit 80959, supports ongoing use with a 14 day WHP)		✓
Feijoa, all post harvest uses	✓	
Grain legumes (pulses), use for red legged earth mite only	✓	
Grain legumes (pulses), all pre harvest uses, including the specific uses for (additional data provided—ongoing use supported): Adzuki bean, all pre harvest uses Borlotti beans, all pre harvest uses Chickpeas, all pre harvest uses Cowpea, all pre harvest uses Mung bean, all pre harvest uses Navy bean, all pre harvest uses Pigeon pea, all pre harvest uses Lentils, all pre harvest uses Soybean, all pre harvest uses	✓	
Granadillas, all post harvest uses		✓
Guava (inedible peel varieties), all post harvest uses	✓	
Kiwifruit (Chinese gooseberry inedible peel varieties), all post harvest uses	✓	
Litchi, all uses	✓	✓
Maize, all pre harvest uses (additional data provided—ongoing use supported)	✓	

Use pattern	Previous label use	Previous permit use
Mango, all pre harvest uses	✓	
Mango, all post harvest uses	✓	✓
Mangosteen, all post harvest uses		✓
Melons, all pre and post harvest uses (additional data provided—ongoing use supported)	✓ (pre harvest)	✓ (post harvest)
Olives for oil production only (supported under permit 13999, further data required)		✓
Onions, all pre harvest uses	✓	
Oilseeds, use for red legged earth mite only	✓	
Passion fruit all post harvest uses	✓	
Pasture, use for red legged earth mite only	✓	
Papaya (paw paw), all post harvest uses	✓	✓
Peanuts, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Peas, all pre harvest uses including use as a seed dressing (except for snow and sugar snap peas insufficient data)	✓	
Persimmon (American—inedible peel varieties), all post harvest uses	✓	✓
Pineapple, all pre harvest uses (additional data provided—ongoing use under current permit supported)		✓
Pomegranate, all post harvest uses	✓	
Potato and sweet potato, pre harvest use with a 14 day withholding period		
Prickly pear, all post harvest uses		✓
Rambutan, all post harvest uses		✓
Raspberries, pre harvest use (additional data provided—ongoing use supported)		
Rhubarb, all pre harvest uses	✓	
Rollinia, all post harvest uses		✓
Santols, all post harvest uses		✓
Sapodillas, all post harvest uses		✓
Sorghum, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Soursop, all post harvest uses		✓
Strawberry (runner production—vegetative planting material only. DO NOT use on fruiting strawberries)	✓	

Use pattern	Previous label use	Previous permit use
Sweetsop/sugar apple, all post harvest uses		✓
Tamarillo, all post harvest uses		
Tomato (processing), pre harvest use with a 21 day withholding period		
Tomatoes, large, field grown for fresh consumption, pre-harvest use with application prior to the commencement of flowering		
Turnip, pre harvest use with a 14 day withholding period		
Wax jambus, all post harvest uses		✓
Zucchini, all pre harvest uses	✓	

Where appropriate, labels/permits must be revised to include the following withholding period statements:

Citrus
DO NOT harvest for 7 days after application

Blueberries (and other Vaccinium berries including bilberry)
DO NOT harvest for 1 day after application

Blackberries, Raspberries
DO NOT harvest for 7 days after application

Avocado, litchi/lychee
DO NOT harvest for 7 days after application

Mango
DO NOT harvest for 3 days after application

Olives for oil production only (PERMIT)
DO NOT harvest for 6 weeks after application

Pineapple (PERMIT)
DO NOT harvest for 35 days after application

Post Harvest Dipping (Avocados, Bananas, Cactus Fruit, Chilli, Custard Apples, Feijoas, Guavas, Kiwifruit (Chinese Gooseberries inedible peel varieties), Litchis (Lychees), Mangoes, Melons, Passionfruit, Banana Passionfruit, Pawpaws, Persimmons (inedible peel varieties), Pomegranates, Tamarillos, Watermelons) NOT REQUIRED WHEN USED AS DIRECTED (dip uses only)

Litchi (pre-planting dip)
Harvest withholding period: Not required when used as directed

Asparagus, Onions, Rhubarb

DO NOT harvest for 7 days after application

Beans, Peas (green vegetables not sugar or snap peas)
DO NOT harvest for 7 days after application
DO NOT graze or cut for stockfood for 7 days after application

Eggplant (PERMIT), Beetroot, Potatoes and Sweet Potatoes, Turnip
DO NOT harvest for 14 days after application.

Strawberries (runner production – vegetative planting material only)
Harvest withholding period: Not required when used as directed (DO NOT use of fruiting strawberries)

Tomatoes for processing only
DO NOT harvest for 21 days after application

Tomatoes, large, field grown for fresh consumption
Not required when used as directed (i.e. DO NOT apply after commencement of flowering)

Capsicums
DO NOT harvest for 3 days after application

Zucchini
DO NOT harvest for 1 day after application

Melons (including watermelons),
DO NOT harvest for 7 days after application

Cereals (including maize, sorghum)
DO NOT harvest for 4 weeks after application
DO NOT graze or cut for stockfood for 14 days after application

Cotton
DO NOT harvest for 14 days after application
DO NOT feed cotton fodder, stubble or trash to livestock

Peanuts, Pulses (grain legumes)
DO NOT harvest for 14 days after application
DO NOT graze or cut for stockfood for 14 days after application

Pastures
Grazing withholding period: Not required when used as directed (DO NOT use after crop emergence)

Oilseeds (other than peanut and cotton)
Not required when used as directed (DO NOT use after crop emergence)

Seed dressings (Lupins, Peas),
Not required when used as directed

Use patterns that were supported for an interim period pending provision of additional data—data has not been received—no longer supported

For the following use patterns there was insufficient data to set an MRL. As the available data indicated that the dietary exposure was likely to be acceptable the uses were supported for an interim period pending the provision of additional data to confirm that the assessment is appropriate. As no additional data have been received, these uses are no longer supported.

Use pattern	Previous label use	Previous permit use
Abiu, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Artichoke, globe, pre harvest use with 14 day withholding period (pending provision of additional data—data not provided—not supported)		
Banana, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Broccoli, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Cabbage, drumhead varieties only, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Carrot, pre harvest use with 14 day withholding period (pending provision of additional data—data not provided—not supported)		
Casimiroas, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Cauliflower, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Celery, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Chillis, all pre and post harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Custard apple (and cherimoya), all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Durian all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Granadillas, all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Grapes, pre harvest use with application restricted to pre flowering (pending provision of additional data—data not provided—not supported)		

Use pattern	Previous label use	Previous permit use
Leucaena, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Mangosteen, all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Olives for oil production only under permit 13999 (additional data required for ongoing use)		✓
Oilseeds, all pre harvest uses, (except cotton, peanuts and uses for red legged earth mite), including the specific uses for (pending provision of additional data—data not provided to this review—not supported—note separate application for canola/oilseed uses for product 56454 – protected data): Canola, use as a seed dressing Linseed, use as a seed dressing Sesame Sunflowers	✓	
Parsnip, pre harvest use with 14 day withholding period (pending provision of additional data—data not provided—not supported)		
Passion fruit all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Pastures, Pasture Seed & Forage Crops (inc. clover, medics, lucerne), all pre harvest uses (except for red legged earth mite) including (pending provision of additional data—data not provided to this review—not supported—note separate application for pasture uses for product 56454 – protected data): Clover, use as a seed dressing Lucerne, use as a seed dressing	✓	
Papaya (paw paw), all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Peas (Snow and Sugar Snap), all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Radish, pre harvest use with a 14 day withholding period (pending provision of additional data—data not provided—not supported)		
Rambutan, all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Santols, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓ (pre harvest)	✓ (post harvest)
Sapodillas, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓ (pre harvest)	✓ (post harvest)

Use pattern	Previous label use	Previous permit use
Stone fruit, pre harvest use with alternative GAP where application timing is limited to pre petal fall (no additional data provided—use not supported)		
Sweet corn, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Vetch, use as a seed dressing (pending provision of additional data—data not provided—use not supported)	✓	
Wax jambus, all pre harvest uses (pending provision of additional data—data not provided—use not supported)	✓	

Use patterns NOT supported by this assessment

The following use patterns cannot be supported because either the available data indicates that either there is a potentially unacceptable short-term dietary exposure, there is insufficient data to establish MRLs or residue data was not provided to the APVMA.

Acute dietary exposure concerns

For the following use patterns, available residues data indicate that short term exposure to dimethoate residues may exceed reference health standards. The APVMA cannot be satisfied that these uses would not be an undue hazard to the safety of people using anything containing its residues and they must be deleted:

Use pattern	Previous label use	Previous permit use
All general fruit uses		✓
All general vegetable uses	✓	
Berry fruit, all general pre harvest uses (including currants, except Vaccinium berries, blackberries and raspberries)	✓	
Brussels sprouts, all pre harvest uses	✓	
Capsicum, all post harvest uses	✓	
Celery, all pre harvest uses (except interim use with 21 d WHP)	✓	
Cucurbits, all pre harvest uses (except zucchini and melons), including the specific uses for 'Cucumber'	✓	
Cucurbits, all post harvest uses (except melons)		✓
Egg plants, all uses (except pre-harvest with alternative GAP with 14 day WHP)	✓ (pre and post harvest)	✓ (post harvest)
Grapes, all pre harvest uses (except interim use where application is restricted to pre flowering)	✓	
Leafy vegetables, all pre harvest uses including silverbeet and lettuce	✓	
Olives, all pre harvest uses (except for oil production with 6 week harvest withholding period)		✓
Pome fruit, all post harvest uses on apples	✓	✓
Root vegetables, all pre harvest uses (except interim use on beetroot, carrot, parsnip, potato, radish, sweet potato and turnip with alternative GAP with 14 day WHP)	✓	
Stalk/stem vegetables all pre harvest uses (except asparagus and rhubarb with 7 day withholding period; and celery with 21 day withholding period, globe artichokes with 14 day withholding period)	✓	
Stone fruits, all pre harvest uses (except alternative GAP where application is limited to pre petal fall)	✓	
Strawberries, all uses (except runner productionvegetative planting material only)	✓	
Tomatoes, all uses (except pre harvest with alternative GAP with 21 day WHP or large, field grown pre-flowering)	✓ (pre and post harvest)	✓ (post harvest)

Insufficient residue data provided

For the following use patterns the available residue data were insufficient for MRL establishment or assessment of acute dietary exposure. On the basis of available data an acute dietary risk has been identified. The APVMA cannot be satisfied that these uses would not be an undue hazard to the safety of people using anything containing its residues and they must be deleted:

Use pattern	Previous label use	Previous permit use
Beetroot, all pre harvest uses (except alternative GAP with 14 day withholding period)	✓	
Broccoli, all pre harvest uses	✓	
Cabbage, all pre harvest uses	✓	
Carrots, all pre harvest uses	✓	
Cauliflower, all pre harvest uses	✓	
Cherries, all post harvest uses	✓	✓
Kohlrabi, all pre harvest uses	✓	
Persimmon, all pre harvest uses	No specific approved use	
Pome fruit, all pre harvest uses and post harvest uses (except apples)	✓ (pre and post harvest)	✓ (post harvest)
Peaches, all post harvest uses	✓	✓
Potatoes and sweet potatoes, all pre harvest uses (except alternative GAP with 14 day withholding period)	✓	
Turnips, all pre harvest uses (except alternative GAP with 14 day withholding period)	✓	

Residue data not provided

Use on commodities for which residue data were requested but were not provided to the APVMA and which assessment of other similar commodities identifies acute dietary risk. The APVMA cannot be satisfied that these uses would not be an undue hazard to the safety of people using anything containing its residues and they must be deleted:

Use pattern	Previous label use	Previous permit use
Acerola, all post harvest uses		✓
Ambarella (great hog plum lesser or vi apple), all post harvest uses		✓
Apricots, all post harvest uses	✓	✓
Babacos, all pre and post harvest uses	✓ (pre harvest	✓ (post harvest)
Bell fruit (water apple), all post harvest uses		✓
Berry fruit, including blackberries, boysenberries, loganberries, mulberries and raspberries, all post harvest uses		✓
Blueberries, all post harvest uses		✓
Bulb vegetables, except onions, all pre harvest uses	✓	
Cape gooseberry, all post harvest uses		✓
Carambola, all pre harvest uses	✓	
Cashew apple, all post harvest uses		✓
Date (fresh), all post harvest uses		✓
Figs, all post harvest uses	✓	
Gourd—bitter, all post harvest uses		✓
Grape, all post harvest uses		✓
Grumichama/Brazil cherry, all post harvest uses		✓
Hog plum, all post harvest uses		✓
Kumquat, all post harvest uses		✓
Loofa—smooth, all post harvest uses		✓
Loquats, all post harvest uses	✓	
Malay apple, all post harvest uses		✓
Miracle fruit, all post harvest uses		✓
Nectarines, all post harvest uses	✓	✓
Olives all post harvest uses		✓
Parsnip, all pre harvest use (except alternative GAP with 14 day withholding period)	✓	
Pepinos, all post harvest uses	✓	
Persimmon (Japanese—edible peel varieties), all post harvest uses	✓	
Plums, all post harvest uses	✓	✓
Plumcot, all post harvest uses		✓
Rose apple, all post harvest uses		✓

Chronic Dietary Exposure Assessment

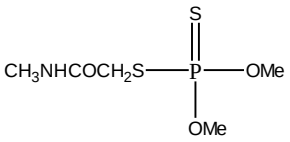
The chronic dietary exposure to dimethoate is estimated by the national estimated daily intake (NEDI) calculation, which encompassed all registered and temporary uses of the chemical and the mean daily dietary consumption data derived from the 1995 National Nutrition Survey of Australia. The NEDI calculation is made in accordance with World Health Organization (WHO) Guidelines and is a conservative estimate of dietary exposure to chemical residues in food.

If the recommendations in this review are put into place the NEDI for the estimated combined intake of dimethoate and omethoate (assuming a relative chronic toxicity of ~1:3) is equivalent to <90% of the dimethoate ADI.

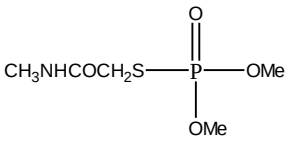
1 INTRODUCTION

The APVMA commenced the review of the toxicology, OHS, trade and residues aspects of both dimethoate and omethoate in 2004. Omethoate is the oxygen analogue of dimethoate and is also a metabolite of dimethoate.

The first *Dimethoate residues and dietary risk assessment report* was published in August 2011. This second report incorporates consideration of additional data and consideration of requests for alternative use patterns that were submitted to the APVMA in response to the 2011 report.



Dimethoate



Omethoate

Dimethoate is a broad use systemic organophosphate insecticide/acaricide. Products were registered for more than 200 use patterns, including pre harvest and post harvest uses in orchard and field crops, to control more than 80 insect pest species. Omethoate is also registered for use in several crops including cotton, pome fruit, bananas, citrus, lupins, onions, pastures, potatoes and flowers. This report considers residues of dimethoate and omethoate arising from the use of dimethoate. Residues of omethoate arising from the use of omethoate are the subject of a separate report.

A contemporary toxicology assessment has recently been undertaken for dimethoate.[1] The outcomes of the toxicology assessment of dimethoate were a revision of the Acceptable Daily Intake (ADI) from 0.02 mg/kg/day to 0.001 mg/kg bw/day, based on a No Observable Effect Level (NOEL) of 0.1 mg/kg bw/day for increased pup mortality and acetylcholinesterase inhibition in pups, and incorporating a 100-fold safety factor. And the establishment of an Acute Reference Dose (ARfD) at 0.02 mg/kg bw based on a NOEL of 0.2 mg/kg bw for inhibition of acetylcholinesterase activity in whole blood in a 14–57-day human study, and applying a 10-fold safety factor.

The revision of the ADI for dimethoate and the establishment of an ARfD required a contemporary assessment of dietary exposure associated with approved uses. Concurrently, consideration has been given to establishing appropriate maximum residue limits (MRLs) to support continuing uses.

1 The full report is available at <www.apvma.gov.au/products/review/docs/dimethoate_human_health_tox.pdf>.

2 LABEL AND MAXIMUM TREATMENT REGIME CONSIDERED IN THIS ASSESSMENT

Food-producing uses under permit and on label (as at May 2011 prior to the October 2011 suspension of dimethoate) are summarised below. Uses on ornamental crops are not considered in this report, as these crops are not food-producing. Please note that many of these uses have been modified or removed in the course of this review.

A. Tree and vine crops (dimethoate 400 g/L EC)

Crop	Pest controlled	Application instructions	WHP (days)	Comments
Abiu	Queensland fruit fly	75 mL/100 L	7	Apply when pest first appears and repeat as necessary
Avocado				
Babaco				
Banana	Silvering thrips and mites	75 mL/100 L	7	Apply in at least 1 000 L of water per hectare when pest appears
	Paper wasps			Spray when wasp activity reaches high level. Thoroughly cover foliage and stems with spray
	Banana fruit fly			Apply when pest first appears
	Control of banana aphid during banana plant destruction	100 mL/100 mL With concurrent use of glyphosate		Inject solution into stem. Inject 30–60 mL per plant DO NOT allow cattle to graze destroyed crop area while plant residue remains Produce from treated plants must not be supplied to or otherwise made available for human or animal consumption
Carambola (five corner)	Queensland fruit fly	75 mL/100 L	7	Apply when pest first appears and repeat as necessary
Casimiroa (white sapote)				
Citrus fruit (except Meyer lemon, Seville orange and cumquat)	Queensland fruit fly, Mediterranean fruit fly	75 mL/100 L (150 mL/100 L NSW, WA)	7	Apply full cover sprays 2 weeks apart 7 weeks and 5 weeks before harvest. If harvesting is delayed a third spray may be required. **WA ONLY:** apply about 6 weeks before fruit ripens. Re-apply at fortnightly intervals. The last spray should be made 1 week before fruit ripens
	Aphids, thrips, bronze orange bug	75 mL/100 L		Apply when pest appears and repeat as necessary

Crop	Pest controlled	Application instructions	WHP (days)	Comments
	Wingless grasshopper			Apply when grasshoppers appear and re-apply as required. In addition to the in area spray a band about 20 m around the areas to be protected
Custard apple	Queensland fruit fly	75 mL/100 L	7	Apply every 7–14 days as required during fruit ripening
Granadilla	Queensland fruit fly	75 mL/100 L	7	Apply when pest first appears and repeat as necessary
Grape	Queensland fruit fly	75 mL/100 L	7	Apply when pest first appears and repeat as necessary
	Aphids, thrips, jassids, mites (inc. spider mites)			Apply when pest first appears and repeat at 3-weekly intervals or as necessary
Litchi	Litchi erinose mite	75 mL/100 L	7	Apply just before a growth flush and repeat at intervals until all new growth is damage free
Mango	Queensland fruit fly, Mediterranean fruit fly	75 mL/100 L	3 7 (varies between labels)	Apply when pest appears and repeat as necessary
Passionfruit	Queensland fruit fly, Mediterranean fruit fly, aphids	75 mL/100 L	7	Apply when pest appears and repeat as necessary
Pawpaw	Queensland fruit fly, Mediterranean fruit fly, cucumber fly	75 mL/100 L	7	Apply when pest appears and repeat as necessary
Pome fruit (apple, pear, quince, not loquat)	Queensland fruit fly, Mediterranean fruit fly	75 mL/100 L 150 mL/100 L (150 ml/L is for QLD and Med fly in NSW only)	7	Apply full cover sprays 2 weeks apart 5 and 7 weeks before harvest. If harvesting is delayed a third spray may be required. **WA ONLY:** apply about 6 weeks before fruit ripens. Re-apply at fortnightly intervals. The last spray should be made 1 week before the fruit ripens
	Woolly aphids	75 mL/100 L		Apply when pest appears and repeat as necessary
	Wingless grasshoppers, thrips, aphids			Apply when pest first appears and repeat as necessary. In addition to the in area spray a band about 20 m around the areas to be protected
Santols	Queensland fruit fly	75 mL/100 L	7	Apply when pest first appears and repeat as necessary
Sapodilla (chiku)				

Crop	Pest controlled	Application instructions	WHP (days)	Comments
Stone fruit (cherry, nectarine, peach, plum, not apricot or early peach varieties)	Queensland fruit fly, Mediterranean fruit fly	75 mL/100 L	7	Two applications as thorough fruit and foliage spray 4 weeks and 2 weeks before picking. A third spray may be required if harvest is delayed. **WA ONLY:** apply about 6 weeks before fruit ripens. Re-apply at fortnightly intervals. The last spray should be made 1 week before the fruit ripens
	Aphids, thrips, wingless grasshoppers			Apply when pest appears and repeat as necessary; for thrips, wingless grasshoppers repeat at 3-weekly intervals or as necessary
Wax jambu	Queensland fruit fly	75 mL/100 L	7	Apply when pest appears and repeat as necessary

B. Fruit and vegetable crops (dimethoate 400 g/L EC)

Crop	Pest Controlled	Application instructions	WHP (days)	Comments
Bean	Spider mite, thrips, leafhoppers, jassids, green vegetable bug, aphids, bugs, mites	75 mL/100 L	7	Apply when pest appears and repeat as necessary. For green vegetable bug in beans apply at first flowering and repeat 3 weeks later
	Bean fly			Apply 3 and 7 weeks after crop emergence and then at weekly intervals until blossom
	Cow pea aphid	350–650 mL/ha		Apply when pest appears and repeat as necessary. Use the higher rate in cold weather
	Redlegged earth mite	750 mL/ha		Apply when pest appears and repeat as necessary
Beetroot	Leafmining fly, redlegged earth mite	750 mL/ha or 75 mL/100 L	7	Apply when pest damage first appears and repeat as necessary
Berry fruit (inc. blackberry, currant, mulberry, raspberry, strawberry)	Aphids, thrips, jassids, spider mite, redlegged earth mite, strawberry bug, Rutherglen bug	75 mL/100 L	7	Apply when pest appears and repeat at 3-weekly intervals or as necessary

Crop	Pest Controlled	Application instructions	WHP (days)	Comments
Blueberry	Queensland fruit fly	75 mL/100 L	1	Make 1 application before harvest, if fruit fly are present. A maximum number of 7 sprays can be applied per season with a minimum 21-day interval between applications Apply 3, 2 and 1 weeks before harvesting when fruit fly are numerous
Carrot	Redlegged earth mite	75 mL/100 L	7	Apply at first signs of pest and repeat as necessary
Capsicum	Aphids, thrips, green vegetable bug, jassids, cucumber fly, fruit fly	75 mL/100 L	3 7 (varies between labels)	Apply when pest appears and repeat as necessary
Celery	Leafmining fly	750 mL/ha or 75 mL/100 L	7	Apply when pest damage first appears and repeat as necessary
Cucurbits (inc. cucumber, zucchini, squash, melon, pumpkin, choko, marrow, gherkin and others)	Aphids, thrips, green vegetable bug, jassids, cucumber fly	75 mL/100 L	1	Apply when pests appear and repeat as necessary
Leafy vegetables (cole crops, lettuce, silver beet, celery)	Aphids, thrips, jassids	75 mL/100 L	7	Apply when pests appear and repeat as necessary
Lettuce	Leafmining fly	750 mL/ha or 75 mL/100 L	7	Apply when pest damage first appears and repeat as necessary
Onion	Redlegged earth mite	75 mL/100 L	7	Apply at first signs of pest and repeat as necessary
Parsnip	Redlegged earth mite	75 mL/100 L	7	Apply at first signs of pest and repeat as necessary
Pea	Spider mite, thrips, leafhoppers, jassids, green vegetable bug, aphids, bugs, mites, bean fly	75 mL/100 L	7	Apply when pests appear and repeat as necessary. For green vegetable bug in beans apply at first flowering and repeat 3 weeks later
	Cow pea aphid	350–650 mL/ha		Apply when pests appear and repeat as necessary. Use the higher rate in cold weather

Crop	Pest Controlled	Application instructions	WHP (days)	Comments
	Redlegged earth mite	800 mL/ha		Apply when pests appear and repeat as necessary
Potato	Thrips, jassids, green vegetable bug, aphids	75 mL/100 L	7	Apply when pest appears and repeat as necessary, for thrips, aphids and jassids repeat at 3-weekly intervals as required
Root vegetables (onion, carrot, beetroot, parsnip)	Thrips, jassids, aphids, redlegged earth mite	75 mL/100 L	7	Apply when pests appear repeat at 3-weekly intervals or as necessary
Silverbeet	Leafmining fly	800 mL/ha or 75 mL/100 L	7	Apply when pest damage first appears and repeat as necessary
Strawberry	Aphid spider mites and/or thrips, Queensland fruit fly, wingless grasshopper	75 mL/100 L	1	DO NOT apply to the entire field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Apply when pest appears and repeat at 3-weekly intervals or as necessary
Tomato	Queensland fruit fly, Mediterranean fruit fly	75 mL/100 L Misting machine: apply 850 mL/min. 70 L water/ha	7	**Qld:** apply full cover sprays 4 and 2 weeks prior to harvest **NSW:** apply full cover sprays 4 and 3 weeks prior to harvest **Vic:** apply at 7 and 5 weeks prior to harvest **WA:** apply about 6 weeks before fruit ripens. Re-apply at fortnightly intervals. Last spray 1 week before ripening
	Tomato mite, bryobia mite	60 mL/100 L		Apply as a cover spray 4 and 2 weeks before harvest. A third spray may be needed if harvest is delayed
	Aphids, jassids, green vegetable bug, thrips	75 mL/100 L		Apply when pests appear and repeat as necessary
Vegetables (general) (inc. legume, fruiting cucurbits, leafy stalk, stem, cole, root, bulb, tuber vegetables)	Aphids, thrips, jassids, mites, leaf hoppers, green vegetable bugs, wingless grasshopper	75 mL/100 L	7 (1 cucurbits)	Apply when pests appear and repeat as necessary. For wingless grasshoppers, in addition to infested areas spray a band of about 20 metres around areas to be protected

C. Field Crops and Pasture (dimethoate 400 g/L EC)

Crop	Pest Controlled	Application instructions	WHP days	Comments
Adzuki bean	Thrips	800 mL/ha or 75 mL/100 L	14	Two treatments between pre-bloom (just before bud formation) and pod initiation may be necessary. If infestation is severe or prolonged apply the first spray at the pre-bloom stage and the second spray at full-flowering
	Leafhoppers, bean fly, bean blossom thrips			Apply when pests appear and repeat as necessary
	Aphids (excluding green peach aphid)	500 mL/ha		Apply when flower spikes carry 20 to 50 aphids and repeat as necessary
	Mirid bugs			Apply when insects first appear and repeat as necessary
Canola	Redlegged earth mite	85 mL/100 L	14	Spray just after emergence
Cereals	Lucerne flea	55–85 mL/ha	28, harvest 1, grazing	Apply 3–5 weeks after the commencement of autumn rains or when outbreak occurs. Use the higher rate in cold weather. Do not spray bare ground. Allow the crop to emerge before application. Apply in a minimum of 33 L/water/ha
	Redlegged earth mite	85 mL/ha		
	Wingless grasshopper	75 mL/100 L or 750 mL/ha		Apply when grasshoppers first appear and repeat as necessary. In addition to the in area spray a band about 20 m around the areas to be protected
	Brown wheat mite, blue oat mite	90 mL/ha		Apply when mites appear and repeat as necessary
	Leafhoppers, cereal aphid	500 mL/ha		Apply when pest threatens damage to crop and repeat as necessary
Cotton	Bugs (inc. green vegetable bugs, green mirids, apple dimpling bug, brown smudge bug, broken-backed bug, Rutherglen bug)	340–500 mL/ha	14	Apply when pests appear and repeat as necessary. Use higher rates for heavy infestation
	Thrips, leafhoppers	300–375 mL/ha		
	Wingless grasshopper	750 mL/ha or 75 mL/100 L		

Crop	Pest Controlled	Application instructions	WHP days	Comments
	Aphids, spider mites (inc. red spider, twospottted mite)	500 mL/ha		
Cowpea	Aphids, mirid bugs	500 mL/ha	14	Apply when pests appear and repeat as necessary
	Thrips	500–800 mL/ha		Two treatments between pre-bloom (just before bud formation) and pod initiation may be necessary. If infestation is severe or prolonged apply the first spray at the pre-bloom stage and the second spray at full-flowering
	Bean fly, leafhoppers	800 mL/ha		Apply when pests appear and repeat as necessary
Field beans Field peas	Aphids, thrips, leafhoppers (inc. jassids), mites (inc. spider mites), bugs (inc. green vegetable bug), bean fly, redlegged earth mite	75 mL/100 L or 800 mL/ha	1, grazing	Apply when pests appear and repeat as necessary. For green vegetable bug in beans apply at first flowering and repeat 3 weeks later
Duboisia	Thrips	75 mL/100 L	7	Apply as an overall spray. Apply every 7–10 days or as pest populations indicate
Grain legumes	Spider mite, thrips, jassids, green vegetable bug, aphids, bean fly, redlegged earth mite	75 mL/100 L or 800 mL/ha	14	Apply when insects appear and repeat as necessary. Spray when flowering spikes carrying 20–50 aphids are easily seen and when there is evidence of virus disease
	Lucerne flea	85 mL/100L		Apply at emergence
Lentil	Redlegged earth mite	90 mL/ha	**7**	Apply when pests appear and repeat as necessary
Leucaena	Leucaena psyllid	340 mL/ha	1, grazing	Apply when pest population builds up
Lucerne	Spotted alfalfa aphid, blue green aphid, pea aphid	150–225 mL/ha (WA) 150 mL/ha (Qld, NSW, Vic) 250–375 mL/ha (SA) 375 mL/ha (Tas)	1, up to 250 mL/ha 7, for 250 mL/ha and above	Apply when aphids begin to build up on the stem or apply at the same rate as soon as possible after cutting the lucerne stand if and when the infestation occurs. Repeat if necessary
Lucerne (continued)	Leaf hoppers (jassids)	350 mL/ha		Apply when pests appear and repeat as necessary

Crop	Pest Controlled	Application instructions	WHP days	Comments
	Wingless grasshopper	75 mL/100 L		Apply when grasshoppers first appear and repeat as necessary. In addition to the in area spray a band about 20 m around the areas to be protected
	Lucerne flea, redlegged earth mite	55–85 mL/ha 40–55 mL/ha (WA)		Apply 3–5 weeks after the commencement of autumn rains or when outbreak occurs. Use the higher rate in cold weather. Do not spray bare ground. Allow the crop to emerge before application
	Blue oat mite	90 mL/ha		Apply when pests appear and repeat as necessary
	Bean fly	340 mL/ha		
Lupin	Blue-green aphid, cow pea aphid	500 mL/ha	14	Apply when flower spikes carry 20 to 50 aphids and repeat as necessary
	Green peach aphid	800 mL/ha		
Maize	Maize leafhopper, thrips	500 mL/ha	28, harvest 1, grazing	Apply 2 sprays 5–7 days apart
Mung bean	Thrips	800 mL/ha or 75 mL/100 L	7 14 (varies between labels)	Two treatments between pre-bloom (just before bud formation) and pod initiation may be necessary. If infestation is severe or prolonged apply the first spray at the pre-bloom stage and the second spray at full-flowering
	Bean fly, leafhoppers			Apply when pests appear and repeat as necessary
	Aphids, mirid bugs	500 mL/ha		Apply when pests appear and repeat as necessary
Navy bean	Thrips	750 mL/ha or 75 mL/100 L	7 14 (varies between labels)	Two treatments between pre-bloom (just before bud formation) and pod initiation may be necessary. If infestation is severe or prolonged apply the first spray at the pre-bloom stage and the second spray at full-flowering
	Aphids, mirid bugs	500 mL/ha		Apply when pests appear and repeat as necessary

Crop	Pest Controlled	Application instructions	WHP days	Comments
Adzuki bean, cowpea, mungbean, navy bean, pigeon pea, chickpea, lupin, borlotti bean	Aphids	500 mL/ha	7	Apply when flower spikes carry 20 to 50 aphids and repeat as necessary
	Mirid bugs			Apply when insects appear and repeat as necessary
	Thrips, bean fly, leafhoppers, green peach aphid	800 mL/ha or 75 mL/100 L		For thrips (excluding bean blossom thrip): two treatments between pre-bloom and pod initiation may be necessary. Apply both sprays early during this period if infestation is severe or prolonged. Use sufficient water to give good coverage For bean fly, bean blossom thrips and leafhoppers: Apply when pests appear For green peach aphid: Apply when flower spikes carry 20 to 50 aphids and repeat as necessary
Oil seeds (inc. mustard, linseed, poppy, canola, safflower, sunflower)	Lucerne flea, redlegged earth mite	55–85 mL/ha 40–55 mL/ha (WA)	14	Apply 3–4 times 5 weeks after the commencement of autumn rains or when outbreak occurs. Use the higher rate in cold weather. Do not spray bare ground. Allow the crop to emerge before application For redlegged earth mite apply from boom spray or aircraft in a minimum of 33 L water per hectare
	Green vegetable bug, jassids	350 mL/ha		
	Wingless grasshopper	750 mL/ha or 75 mL/100L		Apply at first sign of pests. Repeat as required

Crop	Pest Controlled	Application instructions	WHP days	Comments
Pasture, pasture seed and forage crops (inc. clover, medics, cereals, lucerne, legumes for animal feed)	Lucerne flea, redlegged earth mite	55–85 mL/ha	1, up to 250 mL/ha	Apply from boom spray or aircraft in a minimum of 33 L water per hectare. Use the higher rate in NSW and for heavy infestations in other states
	Blue oat mite	90 mL/100L		
	Spotted alfalfa aphid, blue green aphid	150 mL/ha (Qld, NSW, Vic) 375 mL/ha (Tas, SA) 150–225 mL/ha (WA)	7, for 250 mL/ha and above	Appear when aphids first appear using sufficient water to ensure thorough coverage. Repeat only if necessary **Vic:** Apply when 20–40 aphids/stem on maturing plants and 1–2 aphids/planting seedlings are present **WA:** Use higher rates as first spray or for heavy infestations. Use lower rate for repeat spray or light infestations
	Pangola aphids	190 mL/ha		Apply when insects appear
	Wingless grasshopper	75 mL/100 L		Apply when grasshoppers first appear and repeat as necessary. In addition to the in area spray a band about 20 m around the areas to be protected
Peanut	Aphids, jassids, thrips, green vegetable bug, peanut mite	340–350 mL/ha	7	Apply when pest appears and repeat as necessary
Pigeon pea	Thrips	800 mL/ha or 75 mL/100 L	14	Two treatments between pre-bloom (just before bud formation) and pod initiation may be necessary. If infestation is severe or prolonged apply the first spray at the pre-bloom stage and the second spray at full-flowering
Sesame	Aphids	500 mL/ha	14	Apply when pests threaten damage to crops
Sorghum	Aphids	500 mL/ha	28, harvest 1, grazing	Apply when pests appear and repeat as necessary
Soybean	Green vegetable bug, jassids	340 mL/ha	7	Apply when pests appear and repeat as necessary
Sunflower	Thrips, twospotted mite	800 mL/ha	14	Apply when pests appear and repeat as necessary
Tobacco	Lucerne flea, redlegged earth mite	80 mL/ha	28	Apply spray to tobacco in seed bed when insects are present. Re-apply after 7 days if necessary

D. Seed dressings (dimethoate 400 g/L EC)

Crop	Pest Controlled	Application instructions	Comments
Clover	Redlegged earth mite, lucerne flea	300 mL/2 L water/100 kg seed	Use rolling drum or cement mixer. Avoid using this product with inoculated seed. Sow as soon as possible after treatment
Canola		150 mL/600 mL water/50 kg seed	
Linseed			
Lucerne		300 mL/900 mL water/50 kg seed	
Lupins		75 mL/600 mL water/50 kg seed	
Peas			
Sub-clover		150 mL/600 mL water/50 kg seed	
Vetches		75 mL/600 mL water/50 kg seed	

E. Dimethoate fruit dips (400 g/L EC, WHP: Nil)

Crop	Pest	Rate	Comments
Avocado	Queensland fruit fly	Charge the dip at the rate of 100 m/L/100 L water	Dip the fruit for 1 minute and allow to drain before packing
Chinese gooseberry			
Lychee (Litchi)			
Persimmon			
Cherry			
Custard apple			
Banana	Fruit fly	75 mL/100 L	Dip fruit for 10 to 60 seconds. Top up with concentration of 125 to 150 mL/100 L
Cherry	Fruit fly	50 mL/100 L	Dip fruit for a minimum of 30 seconds
Lychee plants (before planting in the field)	Erinose mite	75 mL/100 L	Dip plants to disinfect before planting. Immerse plants for 1 minute in the mixture and drain
Mango	Queensland fruit fly, Mediterranean fruit fly	Charge the dip at the rate of 100 m/L/100 L water	Dip the fruit for 1 minute and allow to drain before packing
Pawpaw	Queensland fruit fly, Mediterranean fruit fly	Charge the dip at the rate of 100 m/L/100 L water	Dip the fruit for 1 minute and allow to drain before packing
Passionfruit	Queensland fruit fly, Mediterranean fruit fly	Charge the dip at the rate of 100 m/L/100 L water	Dip the fruit for 1 minute and allow to drain before packing

F. Dimethoate post harvest dip quarantine treatment only (dimethoate 400 g/L EC, WHP: Nil)

Crop	Pest	Rate	Comments
Avocado	Queensland fruit fly, Mediterranean fruit fly	100 m/L/100 L water	**Dipping:** Immerse product in emulsion for 1 minute or according to the requirements of the importing State or Country **Topping Up** (400 ppm dimethoate emulsion only): top up with a separately prepared 400 ppm (100 mL/100 L) emulsion **Reinforcement** (400 ppm dimethoate emulsion only): after each week, add 3 mL of product/100 L of dip emulsion
Apple			
Apricot			
Banana			
Cactus fruit			
Chilli			
Custard apple			
Eggplant			
Feijoa			
Fig			
Guava			
Kiwifruit			
Loquat			
Nectarine			
Pawpaw			
Banana passionfruit			
Passionfruit			
Peach			
Pear			

Crop	Pest	Rate	Comments
Pepino			
Persimmon			
Plum			
Pomegranate			
Quince			
Tamarillo (tree tomato)			
Capsicum	Queensland fruit fly	100 mL/100 L water	Apply thoroughly as an on-line post harvest spray according to the requirements of the importing State or country **Topping Up** (400 ppm dimethoate emulsion only): top up with a separately prepared 400 ppm (100 mL/100 L) emulsion **Reinforcement** (400 ppm dimethoate emulsion only): after each week, add 3 mL of product/100 L of dip emulsion
Cherry	Queensland fruit fly	50 mL/100 L 100 mL/100 L water	Dip for a minimum of 30 seconds
Mango	Queensland fruit fly, Darwin fruit fly	100 m/L/100 L water	**Dipping:** Immerse product in emulsion for 1 minute or according to the requirements of the importing State or country **Topping Up** (400 ppm dimethoate emulsion only): top up with a separately prepared 400 ppm (100 mL/100 L) emulsion **Reinforcement** (400 ppm dimethoate emulsion only): after each week, add 3 mL of product/100 L of dip emulsion
Tomato	Queensland fruit fly	100 m/L/100 L water	**Dipping:** Immerse product in emulsion for 1 minute or according to the requirements of the importing State or country. Alternatively apply thoroughly as an on-line post harvest spray **Topping Up** (400 ppm dimethoate emulsion only): top up with a separately prepared 400 ppm (100 mL/100 L) emulsion **Reinforcement** (400 ppm dimethoate emulsion only): after each week, add 3 mL of product/100 L of dip emulsion
Cherry tomato			

G. Home garden

Crop	Pest	Product description	Rate	How to apply
Citrus	Fruit fly	100 g/L EC	Mix 30 mL per 10 L of water	Apply 4 and 2 weeks before harvest (5–10 L of spray per tree)
		300 g/L EC	10 mL/10 L	Apply 7 and 5 weeks before harvest (5–10 L of spray per tree)
Fruit trees	Thrips, bean fly, leaf miner, jassids, tomato mite, mealy bug, azalea lace bug, green vegetable bug, bronze orange bug, Rutherglen bug, white fly	0.3 g/L aerosol	Hold can 30 cm from plant and spray to just wet all surfaces	Apply when pests first appear and repeat at 10–14-day intervals, or on reinfestation.
	Aphids, thrips, bean fly, leaf miner, jassids, tomato mite, mealy bug, azalea lace bug, green vegetable bug, bronze orange bug	300 g/L EC	10 mL/10 L	Apply as a spray when pests first appear and repeat at 10–14-day intervals, or on reinfestation.
Pome fruit (apple, pear, quince)	Fruit fly	100 g/L EC	Mix 30 mL per 10 L of water	Apply 4 and 2 weeks before harvest (5–10 L of spray per tree)
		300 g/L EC	10 mL/10 L	Apply 7 and 5 weeks before harvest (5–10 L of spray per tree)
		0.3 g/L aerosol	Hold can 30 cm from plant and spray to just wet all surfaces	Apply 7 and 5 weeks before harvest
Potato	Aphid, Rutherglen bug	100 g/L EC	Mix 30 mL per 10 L of water	Spray when pests first appear and repeat at 10–14-day intervals or on reinfestation.
		300 g/L EC	10 mL/10 L per 100 m^2	Apply when pests appear
		0.3 g/L aerosol	Hold can 30 cm from plant and spray to just wet all surfaces	Apply when pests appear

Crop	Pest	Product description	Rate	How to apply
Stone fruit	Fruit fly	100 g/L EC	Mix 30 mL per 10 L of water	Apply 4 and 2 weeks before harvest (5–10 L of spray per tree)
		300 g/L EC	10 mL/10 L	
		0.3 g/L aerosol	Hold can 30 cm from plant and spray to just wet all surfaces	Apply 4 and 2 weeks before harvest
Tomato	Fruit fly	100 g/L EC	Mix 30 mL per 10 L of water	Apply 4 and 2 weeks before harvest (5–10 L of spray per tree)
		0.3 g/L aerosol	Hold can 30 cm from plant and spray to just wet all surfaces	Apply 4 and 2 weeks before harvest
Vegetables	Aphids, thrips, leafhoppers and green vegetable bugs	300 g/L EC	5 mL per 5 L of water	Apply when pests first appear
	Wingless grasshoppers	300 g/L EC	5 mL per 5 L of water	Apply when pest first appears and reapply as required
	Thrips, bean fly, leaf miner, jassids, tomato mite, mealy bug, azalea lace bug, green vegetable bug, bronze orange bug, Rutherglen bug, white fly	100 g/L EC	Mix 30 mL per 10 L of water	
		0.3 g/L aerosol	Hold can 30 cm from plant and spray to just wet all surfaces	Apply when pests first appear and repeat at 10–14-day intervals, or on reinfestation
	Aphids, thrips, bean fly, leaf miner, jassids, tomato mite, mealy bug, azalea lace bug, green vegetable bug, bronze orange bug	300 g/L EC	10 mL/10 L	Apply as a spray when pests first appear and repeat at 10–14-day intervals, or on reinfestation

H. Dimethoate permits relevant for food crops

Permit 8241, dimethoate (400 g/L)/stone fruit (expired 30 April 2010)

Situation	Pest	Rate	Critical use comments
Stone fruit (post harvest treatment)	Queensland fruit fly	Prepare dip/flood spray emulsion by mixing 50 mL of product with 100 L of water to achieve a 200 ppm emulsion	Dipping—immerse fruit in dip for 1 minute Flood spraying—spray for 12 seconds at 32 L/minute per square metre. Ensure that fruit remains wet for 1 minute after treatment This treatment must not be undertaken unless 28 days have elapsed since the last pre harvest application of dimethoate to fruit

Permit 8559, dimethoate (400 g/L)/olives (expires 30/09/09) (renewed as 11780, expires 31/3/11) renewed as 13999

Crop	Pest	Rate	Critical use comments
Olive Currently Olive trees for oil production only	Lace bug, green vegetable bug, Rutherglen bug	75 mL/100 L	Apply in a spray volume sufficient to ensure complete coverage of the foliage, 1200L/ha is acceptable. 0.5% all season spray oil, or wetting agent used at its label rate, will assist coverage and effectiveness. Apply a maximum of 4 applications per season

Withholding periods:

~~Do not harvest for 14 days after application~~. Currently: Do not harvest for 6 weeks after application.

Do not graze or cut treated areas for stockfeed.

Permit 9100, dimethoate (400 g/L) and glyphosate (360 g/L)/bananas. Reissued as 12994 (Surrendered)

Crop	Pest	Rate	Critical use comments
Banana plants diseased with bunchy top virus	For the destruction of banana plants diseased with bunchy top virus And Control of banana aphid as the vector of bunchy top virus	To kill the diseased plant, apply at a rate of 100 mL (glyphosate) product per 1 L water and inject 5–15 mL prepared solution per pseudostem To prevent aphids spreading the disease, prepare a solution of 100 mL (dimethoate) product per 100 mL water, and apply 30–60 mL prepared solution per pseudostem by stem injection	Banana aphid control must only be undertaken to plants following the use of glyphosate as directed for plant destruction Inject mixture into pseudostem above the growing point. Inject suckers up to 1 m tall at lower rate at one point and inject taller plants at two points (glyphosate) and three points (dimethoate) around the stem Where bunches are present spray the surface of the fruit with red marker dye. Inject at one time only and leave plant to dry out before disturbing further

Withholding period:

Do not allow cattle to graze destroyed crop area while plant residue remains.

Note the very similar use pattern included on product labels

Permit 9343, various pesticides/mustard. Reissued as 13353

Crop	Pest	Rate	Critical use comments
Mustard (oilseed cultivars) (*Brassica juncea*)	As approved for canola	As per current use rates, timing, frequency and method of application defined on product labels registered for use on canola	Refer to the approved product label for critical comments, timing, frequency and method of application for canola

Withholding period:

Adhere to all withholding periods and restrictions as detailed on approved product labels for products registered for use on Canola.

Permit 10285, dimethoate (400 g/L)/citrus, NT only (expired 30 September 2010) (renewed as 12380, expired 30 March 2015)

Crop	Pest	Rate	Critical use comments
Citrus (post harvest treatment)	Queensland fruit fly	Prepare solution by mixing 100 mL product with 100 L of water (achieves 400 ppm emulsion)	**Dip:** fully immerse produce for a period of not less than 60 seconds. Drain and allow to air dry **Flood spray:** spray the produce in a single layer in a high-volume application of at least 16 L spray solution/minute per square metre for a minimum of 10 seconds, then ensure produce remains wet for at least 1 minute **Top up:** topping up may be undertaken to maintain the mixture at the required volume and concentration

Withholding period:

Nil withholding period required.

Permit 10309, dimethoate/selected fruit (expired 30 September 2010)

Crop	Pest	Rate	Critical use comments
Apple, apricot, avocado, banana, cactus fruit, Cape gooseberry, chilli, custard apple, eggplant, feijoa, fig, guava, kiwifruit, loquat, mango, nectarine, pawpaw, passionfruit, peach, pear, pepino, persimmon, plum, pomegranate, quince, tamarillo (tree tomato), tomato	Queensland fruit fly	Prepare flood solution with a concentration of 400 mg/L (400 ppm) dimethoate	To achieve the required concentration, mix 1 mL of 400g/L dimethoate product per litre of water **Flood spray:** spray the produce in a single layer in a high-volume application of at least 16 L spray solution/minute per square metre for a minimum of 10 seconds, then ensure produce remains wet for at least 1 minute **Top up:** topping up may be undertaken to maintain the mixture at the required volume and concentration

Withholding period:

Nil withholding period required.

Permit 10310, dimethoate/citrus (expired 30 September 2010)—Qld only

Crop	Pest	Rate	Critical use comments
Citrus (post harvest treatment)	Queensland fruit fly	Prepare dip and flood solution with a concentration of 400 mg/L (400 ppm) dimethoate	To achieve the required concentration mix 1 mL of 400g/L dimethoate product per litre of water **Dip:** fully immerse produce for a period of not less than 60 seconds. Drain and allow to air dry **Flood spray:** spray the produce in a single layer in a high-volume application of at least 16 L spray solution/minute per square metre for a minimum of 10 seconds, then ensure produce remains wet for at least 1 minute **Top up:** topping up may be undertaken to maintain the mixture at the required volume and concentration

Withholding period:

Nil withholding period required.

Permit 10457, dimethoate (400 g/L), pineapple (expires 5 October 2017)

Crop	Pest	Rate	Critical use comments
Pineapple	Pineapple red mite, Flat mite	110 mL/ 100L water or 44 g ai/100L	Apply as a foliar spray using coarse droplets using a hydraulic boomspray with solid cone or flat fan nozzles an operating pressure of 210–300 kPa, and a spray volume of 2000 L/ha Apply according to the following spray regime; Apply 4 applications at day 0, day 7, day 21 and day 42, once the plants are actively growing. At induction stage, apply a further 4 applications starting at day 0, day 7, day 21 and day 42. Prior to harvest, apply a final series of 4 starting at day 0, day 7, day 21 and day 42 with the last application 35 days prior to harvest DO NOT apply more than 12 applications per year DO NOT tank mix with highly alkaline materials

Harvest: DO NOT harvest for 35 DAYS after application.

Grazing: NIL.

Permit 10534, dimethoate (400 g/L), post harvest dipping and flood spraying (expired 30 April 2010)—NSW only (renewed as 12074, expired 30 April 2015)

Commodity (post harvest)	Pest	Rate	Critical use comments
Commodity (post harvest—dip and flood spray) abiu, acerola, apple, avocado, babaco, banana, blackberry, blueberry, boysenberry, caimito/star apple, Cape gooseberry, capsicum, carambola/star fruit, cashew apple, casimiro/ white sapote, cherimoya, chilli, citrus, custard apple, date (fresh), durian, feijoa, fig, granadilla, grape, grumichama/Brazil cherry, guava, hog plum, kiwifruit, litchi, loganberry, loquat, mango, mangosteen, miracle fruit, mulberry, nashi, passionfruit, pear, pepino, persimmon, prickly pear, quince, rambutan, raspberry, rollinia, santol, sapodilla, soursop, stone fruit, sweetsop/sugar apple, tamarillo (tree tomato), tomato, wax jambu	Queensland fruit fly	All fruit except stone fruit: Prepare dip/flood spray solution by mixing 1 mL of product per 1 L of water (achieves a 400 mg/L (400 ppm) solution) Stone fruit: Prepare dip/flood spray solution by mixing 0.5 mL of product with 1 L of water (achieves a 200 mg/L (200 ppm) solution)	**DO NOT** UNDERTAKE THIS TREATMENT ON **PEACHES, APRICOTS AND CHERRIES** THAT HAVE BEEN SUBJECTED TO **PRE HARVEST APPLICATIONS OF DIMETHOATE SPRAYS** **Dip**: immerse fruit in dip for 1 minute. Ensure that fruit remains wet for 1 minute. **Flood spray:** All fruit except capsicums: flood spray in a single layer at a rate of at least 16 L/minute per square metre which provides complete coverage of the fruit for minimum of 10 seconds after which the fruit must remain wet for not less than 60 seconds Capsicums only: flood spray in a single layer at a rate of at least 9.2 L/minute per square metre of the area being sprayed, which provides complete coverage of the fruit for a minimum of 60 seconds Peaches and other stone fruit: flood spray in a single layer at a rate of at least 32 L/minute per square metre of the area being sprayed, which provides complete coverage of the fruit for a minimum of 12 seconds, after which the fruit must remain wet for not less than 60 seconds **Top up:** topping up may be undertaken to maintain the mixture at the required volume and concentration. Top up with a separately prepared 400 ppm emulsion (or 200 ppm emulsion when dipping stone fruit) **Reinforcement:** after each week, add 3 mL of product/100 L of dip emulsion except for stone fruit which requires 1.5 mL of product/100 L of dip emulsion

Withholding period:

Not required when used as directed.

Permit 10555, dimethoate (400 g/L), post harvest treatment of specified fruits and vegetables, (expired 30 June 2015)—SA only

Commodities	Pest	Rate	Critical use comments
Crop (post harvest—dip) abiu, acerola, apple, apricot, avocado, babaco, banana, blackberry, blueberry, caimito/star apple, Cape gooseberry, capsicum, carambola/star fruit, cashew apple, casimiro/ white sapote, cherimoya, cherry, chilli, citron, custard apple, date (fresh), durian, feijoa, fig, gourd—bitter, granadilla, grapefruit, grape, grumichama/Brazil cherry, guava, kiwifruit, kumquat, lemon, lime, loganberry, loofa—smooth, loquat, mandarin, mango, mangosteen, mulberry, nashi, nectarine, olive, orange, passionfruit, peach, peacharine, pear, pepino, persimmon, plum, plumcot, prickly pear, pummelo, quince, rambutan, raspberry, rollinia, santol, sapodilla, soursop, sweetsop/sugar apple, tamarillo (tree tomato), tangelo, tomato, wax jambu	Queensland fruit fly	All fruit except stone fruit: Prepare dip/flood spray solution by mixing 1 mL of product per 1 L of water (achieves a 400 mg/L (400 ppm) solution) Stone fruit: Prepare dip/flood spray solution by mixing 0.5 mL of product with 1 L of water (achieves a 200 mg/L (200 ppm) solution)	**Dipping:** dip fruit and completely submerge for a period of not less than 60 seconds **Flood spray:** All fruit except capsicums: flood spray in a single layer at a rate of at least 16L/minute per square metre which provides complete coverage of the fruit for minimum of 10 seconds after which the fruit must remain wet for not less than 60 seconds Capsicums only: flood spray in a single layer at a rate of at least 9.2L/minute per square metre of the area being sprayed, which provides complete coverage of the fruit for a minimum of 60 seconds Peaches and other stone fruit: flood spray in a single layer at a rate of at least 32L/minute per square metre of the area being sprayed, which provides complete coverage of the fruit for a minimum of 12 seconds, after which the fruit must remain wet for not less than 60 seconds **Topping up:** topping up may be undertaken to maintain the mixture at the required volume and concentration. Top up with a separately prepared 400 ppm emulsion (or 200 ppm emulsion when dipping stone fruit)

Withholding period:

Not required when used as directed.

Permit 10571, dimethoate (400 g/L), durian, mangosteen, rambutan (expired 31 March 2013)

Crop	Pest	Rate	Critical use comments
Durian, mangosteen, rambutan	Mealy bugs, scales	75 mL/100 L	Apply as a cover spray at first sign of infestation

Withholding period:

Do not harvest for 7 days after last application.

Permit 10734, dimethoate (400 g/L), specified fruits (post harvest) (expired 31 March 2010)

Commodity	Pest	Rate	Critical use comments
Abiu, **ambarella** (great hog plum, lesser or vi apple), **bell fruit** (water apple), **carambola** (five-corner fruit or star fruit), **grumichama** (Brazil cherry or pitanga), **hog plum** (yellow mombin), **Malay apple** (pomerac), **miracle fruit**, **rose apple**, **nashi fruit** (Asian or oriental pear), **date** (fresh), **wax jambu**	Queensland fruit fly, Lesser Queensland fruit fly	Prepare dip or flood spray by applying 1 mL of product per 1 L water Achieves a 400 ppm solution	**Dip:** treat fruit by full immersion for a period of not less than 60 seconds **Flood spray:** flood spray the fruit in a single layer using a high-volume application of at least 16 L/minute per square metre of the area being sprayed, which provides complete coverage of the fruit for a minimum of 10 seconds, after which the fruit must remain wet for not less than 60 seconds

Withholding period:

Not required when used as directed.

Permit 11629, dimethoate (400 g/L) and maldison, home gardens (expired 30 June 2011 – surrendered)

Situation	Pest	Rate	Critical use comments
Home gardens and nurseries Ornamental flowers Home gardens Vegetables, fruit trees and lawns	Australian plague locust (*Chortoicetes terminfera*)	100 g/L dimethoate products: apply at a rate of 30 mL product in 10 L water. 300 g/L dimethoate products: apply at a rate of 10 mL product in 10 L water. 500 g/L maldison products: apply at a rate of 20 mL product in 10 L water.	Apply via hand held spray equipment to locusts when they appear and re-apply as required Areas to be sprayed MUST be vacated by all persons other than the person undertaking spraying

Withholding period for edible crops:

DO NOT PICK/HARVEST FRUIT AND VEGETABLES FOR 7 DAYS AFTER APPLICATION.

Permit 11784, dimethoate (400 g/L), canola (expired 30 September 2010)

Crop	Pest	Rate	Critical use comments
Canola	Green peach aphid, turnip aphid, cabbage aphid	Apply up to a maximum rate of 750 mL product per hectare	Apply via boomspray or aircraft. DO NOT apply more than 1 application per season. DO NOT apply to flowering crops.

DO NOT apply later than 21 days before harvest.

DO NOT graze or cut for fodder.

Permit 12343, Dimethoate (400 g/L), specified fruits and vegetables (post harvest) (expired 30 April 2015)—Queensland only

Commodity	Pest	Rate	Critical use comments
Berry fruit, citrus fruit, pome fruit, tropical and sub-tropical fruit AND fruiting vegetables (excluding cucurbits)	Queensland fruit fly and Lesser Queensland fruit fly	Prepare dip/flood spray solution by mixing 1 mL of product per 1 L water (achieves 400 mg/L [400 ppm] solution)	Dipping or flood spraying of stone fruit must not be undertaken unless 28 days have elapsed since the last pre harvest application of dimethoate to stone fruit. Do not dip hollow fruited chillies. Apply only by flood spray. **Dipping:** Immerse fruit in dip for 1 minute. Ensure that fruit remains wet for 1 minute. **Flood spray:** All fruit except stone fruit: Floodspray in a single layer at a rate of at least 16 L/minute per square metre, which provides complete coverage of the fruit for a minimum of 10 seconds after which the fruit must remain wet for not less than 60 seconds. Stone fruit: Flood spray in a single layer at a rate of at least 32L/minute per square metre of the area being sprayed, which provides complete coverage of the fruit for a minimum of 12 seconds, after which the fruit must remain wet for not less than 60 seconds.
Stone fruit		Prepare dip/flood spray solution by mixing 0.5 mL of product with 1 L of water (achieves a 200 mg/L [200 ppm] solution)	

Withholding period:

Not required when used as directed.

Permit 12506, dimethoate (400 g/L), eggplant (expires 31 October 2018)

Crop	Pest	Rate	Critical use comments
Eggplant	Queensland fruit fly, Mediterranean fruit fly	75 mL product / 100 L water or 750 mL product / ha	Apply as cover spray during fruit development and ripening when fruit flies are first detected by inspection or trapping Apply spray in sufficient volume to provide adequate penetration and coverage of foliage and fruit. Avoid excessive runoff. Refer Dilute Spraying instructions on product label Where fine misting applicators are used; apply 850 mL of product in a minimum of 70 L water per hectare

DO NOT harvest for 14 DAYS after final application.

Permit 13158, dimethoate (400 g/L), specified citrus & hot chilli peppers (post-harvest) various fruit fruit flies Expires 5 October 2017

Crop	Pest	Critical use comments
Citrus fruit Excluding: all edible skin species eg kumquats, and mandarins that have received pre-harvest treatment with dimethoate.	Various fruit flies	Prepare dip/flood spray solution by mixing 100 mL of product per 100 L water Achieves 400 mg/L (400 ppm) solution
Tropical and sub-tropical fruit with inedible peel only (specific fruits listed)		
Hot chilli peppers: excluding: all sweet chilli peppers and capsicum		Prepare as above, via flood spray only

Withholding period:

Not required when used as directed.

Permit 13170, dimethoate (400 g/L), Melons including watermelons (post-harvest) Various Fruit Fly species. Expires 5 October 2017

Crop	Pest	Critical use comments
Melons including watermelons	Pests of quarantine concern: Cucumber fly Lesser Queensland Fruit Fly Queensland Fruit Fly Mediterranean fly Banana fly Mango Fly	Prepare dip/flood spray solution by mixing 100 mL of product per 100 L water Achieves 400 mg/L (400 ppm) solution Dipping: Immerse fruit in dip for 1 minute. Ensure that fruit remains wet for 1 minute Floodspraying: Apply thoroughly as a 1 minute packing-line spray

Withholding period:

Not required when used as directed.

Permit 13254, dimethoate (400 g/L), chilli peppers (expires 5 October 2017)

Crop	Pest	Rate	Critical use comments
Chilli peppers	Queensland fruit fly, Mediterranean fruit fly	75 mL product / 100 L water or 750 mL product / ha	Apply as cover spray when fruit fly pests occur and repeat as necessary up to a maximum ten (10) applications per crop per season Using high volume rate: spray in sufficient volume to provide adequate penetration and coverage of foliage and fruit. Avoid excessive runoff. Refer product label for instructions on Dilute and Concentrate Spraying Apply retreatment at 7–14 day intervals between consecutive applications, depending on pest pressure

DO NOT harvest for 7 DAYS after final application.

Permit 13290, dimethoate (400 g/L), blueberries, bilberries and other vaccinium berries (expires 5 October 2017)

Crop	Pest	Rate	Critical use comments
Blueberries, bilberries and other vaccinium berries	Queensland fruit fly, Mediterranean fruit fly	75 mL product / 100 L water	Apply as cover spray during fruit development and ripening when fruit flies are detected by inspection or trapping Apply spray in sufficient volume to provide adequate penetration and coverage of foliage and fruit. Avoid excessive runoff. Refer Dilute Spraying instructions on product label DO NOT exceed a maximum number of 7 applications per crop with a minimum retreatment interval of 21 days between consecutive applications

DO NOT harvest for 1 day after final application.

Permit 82378, dimethoate (400 g/L), faba beans, mirid bugs (expires 31 May 2021)

Crop	Pest	Rate	Critical use comments
Faba beans	Mirid bugs	500 mL product/ha	Apply when pest first appear in crop Ground application only using calibrated boom sprayer or similar equipment Apply using water volume of 50–100 L/ha Apply maximum three (3) foliar treatments per crop, with minimum 7 day interval between consecutive sprays

Harvest: DO NOT harvest for 14 DAYS after application

Grazing: DO NOT graze or cut for stock food for 14 DAYS after application.

Queensland Board Approvals. All now cancelled or expired

Previous Queensland Board Approval : No longer in force					
Commodity	Pest	Rate	WHP (days)	Critical use comments	Scheduled cancellation
Abiu	Fruit flies (tephritidae)	75 mL/100 L (400 g/L product)	7	Repeated applications may be necessary to reduce damage	30-Sep-2011
Banana	Banana aphid, banana fruit fly	75 mL/100 L (400 g/L product)	7	Apply as spray to point of runoff to infested suckers and bunches (banana aphid) Apply if necessary (banana fruit fly)	31-March-2012
Bean—adzuki	Bean fly, flower thrips	800 mL/ha (400 g/L product)	7		30-Sep-2011
Citrus—post harvest	Queensland fruit fly	0.1 L/100 L (400 g/L product)	0	Immerse produce in emulsion for 1 minute	30-Sep-2011
Cucurbit—post harvest	Cucumber fly	0.1 L/100 L (400 g/L product)	0	Immerse produce in emulsion for 1 minute. Alternatively, apply thoroughly as a 1-minute packing line spray	30-Sep-2011
Custard apple	Fruit fly, Queensland fruit fly	0.03% (75 mL/100 L of a 400 g/L product)	7	Apply fortnightly during March–May period if consignments are proposed for the Melbourne market. Apply as a high-volume spray	30-Sep-2012
Granadilla	Fruit flies	75 mL/100 L (400 g/L product)	7	Repeated applications may be necessary to reduce damage	30-Sep-2011
Lychee	Litchi erinose mite	100 mL of 30% product per 100 L (75 mL/100 L of 400 g/L product)	7		30-Sep-2012
Maize	Maize leaf hopper	470 mL of 30% product per ha (or 350 mL of 400 g/L product)	28 (H) 1 (G)	Apply when populations are noted in maize	30-Sep-2012

Previous Queensland Board Approval : No longer in force					
Commodity	Pest	Rate	WHP (days)	Critical use comments	Scheduled cancellation
Peanut	Mirids	0.35–0.5 L/ha (400 g/L product)	7 H) 1 (G)		31-Mar-2012
Pineapple	Pineapple flat mite	0.11 L/100 L (400 g/L product)	14	Apply 4 sprays at fortnightly intervals at flower initiation and a further 4 sprays at fortnightly intervals with the final spray at least 14 days prior to harvest. Use at least 2000 L spray mixture/ha	30-Sep-2011
Santol	Fruit flies	75 mL/100 L (400 g/L product)	7	Repeated applications may be necessary to reduce damage	31-Mar-2012
Sapodilla	Fruit flies	75 mL/100 L (400 g/L product)	7	Repeated applications may be necessary to reduce damage	31-Mar-2012
Strawberry	Queensland fruit fly	75 mL/100 L (400 g/L product)	1	Apply as a cover spray commencing in September or when trap catches indicate fly populations are increasing	30-Sep-2012
Tomato	Cucumber fly	0.75 L/ha or 75 mL/100 L (400 g/L product)	7	Apply when adults are seen in the crop	30-Sep-2011

3 PREVIOUS MRLS AND RESIDUE DEFINITIONS

The current Australian residue definition for dimethoate is:

sum of dimethoate and omethoate, expressed as dimethoate.

The Australian residue definition for omethoate is:

omethoate.

Entries at the commencement of the review in Table 1 and Table 4 of the Australian Pesticides and Veterinary Medicines Authority (APVMA) MRL Standard for dimethoate and omethoate are summarised below.

Table 1: Pre-review entries for dimethoate and omethoate in Table 1 of the APVMA MRL Standard

Compound	Food		MRL (mg/kg)
Dimethoate—see also Omethoate			
	GC 0080	Cereal grains	*0.05
	VL 0465	Chervil	T2
	MO 0105	Edible offal (mammalian)	*0.05
	PE 0112	Eggs	*0.05
	VC 0045	Fruiting vegetables, cucurbits	5
		Fruits [except strawberry, litchi, peach, quandong and mango]	5
	HS 0783	Galangal, rhizomes	T2
	HH 0092	Herbs	T2
		Kaffir lime leaves	T2
		Lemon grass	T2
	DT 1111	Lemon verbena	T2
	FI 0343	Litchi	5
	VD 0545	Lupin (dry)	0.5
	FI 0345	Mango	1
	MM 0095	Meat [mammalian]	*0.05
	ML 0106	Milks	*0.05
		Mizuna	T2
	SO 0088	Oilseed (except peanut)	0.1
	FS 0247	Peaches	3
	SO 0697	Peanut	*0.05
	VO 0445	Peppers, Sweet [capsicums]	2
	PO 0111	Poultry, Edible offal	*0.05
	PM 0110	Poultry meat	*0.05
		Quandong	T5
	VL 0496	Rucola (Rocket)	T2
	FB 0275	Strawberry	5

Compound	Food		MRL (mg/kg)
	VO 0448	Tomato	2
	HS 0794	Tumeric, root	T2
		Vegetables [except lupin (dry); peppers, sweet; tomato]	2
Omethoate			
	GC 0080	Cereal grains	*0.05
	MO 0105	Edible offal (mammalian)	*0.05
	PE 0112	Eggs	*0.05
		Fruits	2
	VD 0545	Lupin (dry)	0.1
	MM 0095	Meat [mammalian]	*0.05
	ML 0106	Milks	*0.05
	SO 0088	Oilseed	*0.05
	VO 0445	Peppers, Sweet [capsicums]	1
	PO 0111	Poultry, Edible offal of	*0.05
	PM 0110	Poultry meat	*0.05
	VO 0448	Tomato	1
		Vegetables [except lupin; peppers, sweet; tomato]	2

Table 2: Pre-review entries for dimethoate and omethoate in Table 4 of the APVMA MRL Standard

Compound	Animal feed commodity		MRL (mg/kg)
Dimethoate			
	AL 0545	Lupin, forage	1
Omethoate			
	AL 0157	Legume animal feeds [Fresh weight]	20
	AL 0545	Lupin, forage	0.5
	AS 0161	Straw, fodder (dry) and hay of cereal grains and other grass-like plants	20
	AM 0165	Miscellaneous fodder and forage crops [Fresh weight]	20

There are no entries for dimethoate or omethoate in Table 5 of the MRL Standard.

4 METABOLISM

4.1 Metabolism in plants

Several reviews of dimethoate plant metabolism studies available in the scientific literature were provided.[2,3] They include studies on sugar beet, potatoes, wheat, sorghum, maize, beans, peas, onions, cucumbers, tomatoes, cotton, citrus, olives and rice. Full details of the primary studies were not provided, but the same general conclusion was reached in each review document: it was concluded that dimethoate acts systemically and is translocated within the plant after application to the leaf, stem injection, and following uptake via the root system. The investigation of degradation and metabolism reveals uniform behaviour in all crops. The half-life of dimethoate and its metabolites in plants is in the range of 1 to 4 days (but up to 11 days in stored grain). Dimethoate and its transformation products undergo relatively rapid enzymatic degradation in plant tissues and is degraded by oxidases, hydrolases and amidases. Final products are phosphate, C1-, C2- or N1- fractions found in cell-related compounds. In most of the studies omethoate was detected in lower concentrations than dimethoate.

Metabolism studies undertaken on potatoes and wheat have been provided to the APVMA and are summarised in the following tables. These studies have also been evaluated by the 2003 Joint FAO/WHO Meeting on Pesticide Residues (JMPR).

4.1.1 Potatoes

Dimethoate labelled with ^{14}C in both methoxy groups was mixed with an EC formulation containing non-labelled material. The mixture was applied to potatoes (BBCH 45–47) as a foliar spray at a target rate of 2 × 340 g ai/ha with 14 days between applications. The potato plants were grown to maturity outdoors in individual containers. Samples were collected immediately after each application and at intervals up to 28 days after the second application. Foliage was surface washed with acetonitrile, then homogenised and extracted with acetonitrile, acetonitrile/water and water. Tubers were homogenised and extracted with acetonitrile and acetonitrile/water. Levels of radioactivity in the surface washes and extracts were determined by liquid scintillation counting (LSC), and levels of radioactivity in unextractable residues were determined by combustion followed by LSC. Extracts containing significant radioactivity were analysed by HPLC and TLC with comparison against reference substances. Unextractable residues were further investigated by treating with acid, base or enzyme.

Total radioactive residues (TRRs) and concentrations of metabolites in foliage and tuber are summarised in Table 1.

2 Pistel F 1993. The metabolism of dimethoate in plants. Dimethoate Task Force, 31 March.

3 Heidemann A 1995. The metabolism of dimethoate in plants. Dimethoate Task Force, 2 February.

Table 1: Metabolites observed in the foliage and tubers of potato plants

Component/ fraction	Foliage (mg equivalents/kg)				Tuber (mg equivalents/kg)				
	Day 0	Day 2	Day 7	Day 14	Day 0	Day 7	Day 14	Day 21	Day 28
Dimethoate	8.38	2.39	1.89	0.20	<0.01	<0.01	<0.01	<0.01	<0.01
Omethoate	0.73	0.32	0.72	0.12	<0.01	<0.01	<0.01	<0.01	<0.01
Desmethyl dimethoate	<0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
O-desmethyl omethoate	0.39	0.03	0.21	0.04	<0.01	0.07	0.02	0.04	0.04
Dimethyldithiophosphate	0.04	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01
O-desmethyl omethoate carboxylic acid	<0.02	<0.01	<0.01	0.02	0.02	0.02	0.03	0.03	0.03
O-desmethyl N-desmethyl omethoate	0.22	0.18	0.24	0.11	0.23	0.12	0.09	0.09	0.10
Dimethoate carboxylic acid/des-O-methyl isodimethoate	0.10	<0.01	0.17	0.04	<0.01	<0.01	<0.01	<0.01	<0.01
Others	0.62	0.45	0.63	0.13	0.02	0.01	0.02	0.02	0.02
(Major other)	(0.28)	(0.19)	(0.36)	(0.06)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Water extractable	na	na	0.14	0.08	na	<0.01	<0.01	0.01	0.01
Protease extractable	0.53	0.41	0.25	0.22[a]	0.01	<0.01	<0.01	<0.01	<0.01
Base extractable	na	na	na	0.20[b]	na	na	0.01	0.01	0.01
Unextractable	1.29	0.59	0.37	0.09	0.02	0.03	0.02	0.03	0.03
Total	**12.30**	**4.37**	**4.63**	**1.32**	**0.30**	**0.25**	**0.19**	**0.23**	**0.24**

NA Not applicable

a Mainly polar material.

B Composed of polar baseline material (0.13 mg/kg) and two minor unknowns representing 0.04 and 0.03 mg/kg.

Total radioactive residues were highest in foliage (12.30 mg equiv/kg) and tuber (0.30 mg equiv/kg) immediately after the second application (day 0). In foliage, dimethoate and omethoate accounted for 68% and 6% of the TRR respectively (8.38 mg and 0.73 mg equiv/kg) on day 0. By day 14, dimethoate and omethoate accounted for 15% and 9% of the TRR in foliage respectively (0.2 and 0.12 mg equiv/kg). No dimethoate or omethoate was detected in the tubers at any time.

An additional study investigated an unknown component that was present in potato foliage and represented up to 7.7% of the TRR (0.36 mg/kg) on day 7, decreasing to 4.8% (0.06 mg/kg) after 14 days. The component was isolated by TLC and HPLC and investigated by LC-MS and GC-MS. Hydrolytic treatments demonstrated that the component is a glucose conjugate of hydroxy dimethoate.

4.1.2 Wheat

Dimethoate labelled with ^{14}C in both methoxy groups was mixed with an EC formulation containing non-labelled material. The mixture was applied to wheat as a foliar spray at 680 g ai/ha at BBCH 24 followed by 400 g ai/ha at BBCH 69. The experiment was also performed using an exaggerated application rate (5×, 3.4 and 2.0 kg ai/ha). The wheat plants were grown to maturity in individual containers located outdoors. Samples were collected after the first application (day 0) and after 14, 26 and 39 days. Samples were also taken after the second application (day 41), and after 62 (early harvest) and 73 days (normal harvest). Depending on the growth stage of the plant, samples consisted of whole plant, ear, remaining plant, grain, hull or straw. Samples were extracted with acetonitrile/water. Levels of radioactivity in extracts were determined by LSC and the levels in unextractable residues were determined by combustion followed by LSC. Extracts containing significant radioactivity were analysed by HPLC and TLC with comparison against reference substances. Unextractable residues were further investigated by treating with acid, base or enzyme. Total radioactive residues and concentrations of metabolites (in mg equivalents/kg) in crop parts are summarised in Table 2.

Dimethoate and omethoate residues were highest in plant material immediately after application. On day 41 (after the second application) dimethoate and omethoate accounted for 83% and 3% of the TRR respectively in the remaining plant (equivalent to 13.4 and 0.42 mg/kg).

Dimethoate and omethoate were not detected in grain samples at harvest after application at the 1× rate. Low levels of dimethoate (0.10 mg/kg) and omethoate (0.06 mg/kg) were detected in day 73 grain samples after treatment at the exaggerated rate (5×). Other wheat samples from the exaggerated application rate were not investigated.

Table 2: Concentration of metabolites (in mg equiv/kg) observed in wheat after two applications of dimethoate at 680 and 400 g ai/ha respectively

Component/ fraction	Day 0	Day 14	Day 26		Day 39 (before 2nd application)		Day 41 (after 2nd application)		Day 62	Day 73				
	Whole plant	Whole plant	Ear	Remaining plant	Ear	Remaining plant	Ear	Remaining plant	Grain	Hull	Straw	Grain	Hull	Straw
Dimethoate	29.00	0.07	<0.01	0.02	<0.01	<0.01	20.96	13.40	<0.01	1.21	0.40	<0.01	1.01	0.27
Omethoate	0.21	0.13	<0.01	0.03	<0.01	<0.01	0.43	0.42	<0.01	2.37	0.22	<0.01	1.85	0.28
Dimethyl dithiophosphate	<0.03	0.08	<0.01	<0.01	<0.01	0.02	0.11	0.32	<0.01	0.77	0.18	<0.01	0.71	0.16
Des-O-methyl isodimethoate	<0.03	0.49	<0.01	0.28	0.07	0.20	0.32	0.60	0.26	7.21	1.29	0.29	3.00	0.28
O-desmethyl N desmethyl omethoate	0.12	0.43	0.18	0.56	0.30	0.35	0.39	0.71	0.97	7.07	2.01	1.50	15.23	3.17
O-desmethyl omethoate carboxylic acid	<0.03	0.02	0.01	0.05	0.01	0.05	<0.02	<0.02	0.09	<0.02	0.30	0.15	1.01	0.28
Component A[a]	<0.03	0.01	<0.01	0.03	<0.01	0.02	<0.02	<0.02	0.28	0.44	0.28	0.49	2.43	0.53
Others[b]	0.35	0.15	<0.01	0.06	0.01	0.08	0.36	0.23	0.25	2.21	0.37	0.38	3.23	0.68
(Major other)	(0.12)	(0.03)	(<0.01)	(<0.01)	(<0.01)	(0.02)	(<0.07)	(0.11)	(0.08)	(0.58)	(0.08)	(0.04)	(<0.03)	(<0.01)
Base extractable	na	0.24	0.02	0.14	na	0.15	na	na	0.25	1.09	1.02	1.47	3.60	2.18
Unextractable	0.06	0.05	0.01	0.06	0.04	0.04	0.16	0.42	0.19	0.88	0.35	<0.01	1.62	<0.01
Total	**29.74**	**1.67**	**0.22**	**1.23**	**0.43**	**0.90**	**22.73**	**16.10**	**2.29**	**23.26**	**6.42**	**4.28**	**33.69**	**7.83**

a Component A was subsequently shown to be mainly O-desmethyl-N-desmethyl omethoate which was retained at the point of application during TLC.

B Individual components represent <10% of the total radioactive residue.

The major metabolic reactions observed in wheat and potatoes were:

Oxidation to yield omethoate.

O-demethylation and N-demethylation of omethoate to yield O-desmethyl N-desmethyl omethoate.

Formation of hydroxy dimethoate and conjugation with glucose.

Hydrolysis of the amide bond to give dimethoate carboxylic acid and subsequent degradation to give dimethyl dithiophosphate.

Demethylation to yield desmethyl dimethoate or des-O-methyl isodimethoate.

Demethylation of omethoate to give O-desmethyl omethoate and subsequent hydrolysis of the amide bond to give O-desmethyl omethoate carboxylic acid.

Based on these results a metabolic pathway was proposed for plants (Figure 1).

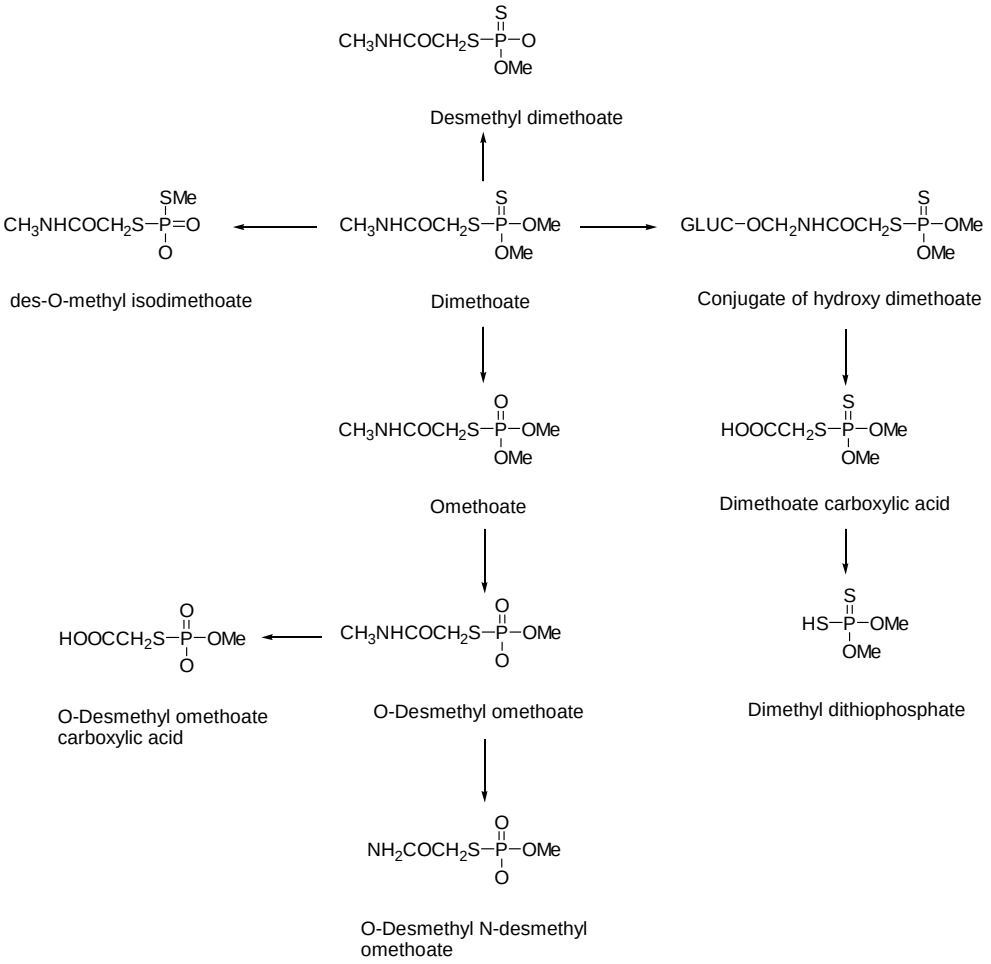


Figure 1: Metabolism (proposed) of dimethoate in plants

4.1.3 Rotational crop metabolism

A confined rotational accumulation study on wheat, lettuce and turnips was conducted using [^{14}C-methoxy]dimethoate. Planting boxes containing a sandy loam soil (pH 6.4, organic matter 1.6%) were treated with the test substance at 0.5 lb ai/A (0.56 kg ai/ha). The test crops were planted in the ^{14}C-dimethoate treated soil at 30 and 120 days after treatment. The planting boxes were maintained outdoors while fallow and in screen houses after planting. Lettuce and wheat were grown in the same planting box. A separate box was used for turnip. Wheat forage was harvested 62 and 168 days after application for the first and second rotation respectively. Lettuce was harvested 78 and 174 days after application, turnip (root and foliage) at 100 and 208 days after application, wheat hay at 97 and 216 days after application while wheat grain and straw was harvested 141 and 272 days after application for each rotation.

Total radioactive residues found in the crops after each plant back interval are summarised in Table 3.

Table 3: Total radioactive residues in rotational crops after treatment of soilwith [^{14}C-methoxy]dimethoate

Crop	TRR (mg equiv/kg)	
	30-day planting interval	120-day planting interval
Lettuce	0.030	0.003
Turnip foliage	0.037	0.005
Turnip root	0.008	0.001
Wheat forage	0.036	0.004
Wheat hay	0.037	0.009
Wheat straw	0.045	0.020
Wheat grain	0.021	0.012

Low levels of radioactivity were taken up by the rotational crops. The TRRs in the crops planted 120 days after treatment were generally an order of magnitude lower than those planted 30 days after treatment. Given the low TRRs observed for the 30-day and 120-day plant back intervals, additional crops were not planted at longer plant back intervals.

Crop matrices with TRR >0.01 mg equiv/kg were subjected to solvent extraction (acetonitrile and acetonitrile/HCl). Non-extractable fractions ranged from 0.006 to 0.031 mg equiv/kg. Extracts containing >0.01 mg equiv/kg were analysed by HPLC. Dimethoate and omethoate were not detected in any of the crop extracts.

4.2 Metabolism in animals

4.2.1 Lactating goat

Two lactating goats were administered [^{14}C-methoxy]dimethoate by capsule once daily for 3 consecutive days at a dose equivalent to 30 ppm in the diet (1.6 mg/kg body weight/day). An additional goat served as a control. Milk samples were collected twice daily from the treated goats during the dosing period. The treated

animals were sacrificed about 23 hours after the final dose and total radioactive residue levels were determined in tissues by combustion analysis.

Urinary excretion was the main route of elimination of radioactivity. About 91% and 86% was excreted in the urine of the two treated animals. Cumulative radioactivity in the feces accounted for 3% and 4% of the dose. After sacrifice, less than 1% of the dose remained unexcreted in the gastrointestinal tract. Cumulative radioactivity recovered in milk accounted for less than 0.1% of the administered dose. The TRR found in the tissues and milk is summarised in Table 4.

Table 4: Total radioactive residues in goat tissues and milk (mg equivalents/kg) following dosing equivalent to 30 ppm in the diet for 3 days

Sample	Goat no. 651	Goat no. 658
Liver	1.221	1.012
Kidney	0.149	0.154
Muscle	0.070	0.047
Fat (composite)	0.045	0.057
Blood	0.076	0.079
Milk	0.035 to 0.228	0.052 to 0.135

The observed TRRs in milk were higher in samples collected within 8 hours post treatment, compared to samples collected 8 to 24 hours post treatment each day, suggesting rapid elimination in milk. Metabolites identified in tissue and liver extracts are summarised in Table 5.

Table 5: Metabolites identified in tissues and milk

Component	mg equivalents/kg			
	Liver	Kidney	Muscle	Milk
Dimethoate carboxylic acid (by HPLC only)	0.031[a]	N/D	N/D	0.019[a]
Omethoate (by HPLC only)	0.120[a]	N/D	N/D	N/D
Anions such as dimethyl phosphate and dimethyl thiophosphate	0.076	0.020	0.002	0.005
Phosphorylated natural products	0.762	0.130	0.049	0.148
TRR	1.221	0.149	0.070	0.228
Accountability of ^{14}C	81%	100.7%	72.9%	75.4%

a Solubilised by protease treatment of the extracted sample.

Residues of dimethoate and its metabolites did not concentrate in fat. All extractable fractions of fat contained ≤0.005 mg equiv/kg. The non-extractable residue was 0.018 mg equiv/kg. For other tissues, dimethoate carboxylic acid was identified in liver and milk, and omethoate in liver. The report suggests that the poor extractability and the HPLC characterisation of the extractable radioactivity support the

($^{14}CH_3$-O)$_2$P=O phosphorylation of natural products. Low levels of anions were also present in the extracts of liver, kidney, muscle and milk.

4.2.2 Laying hens

Three groups of five White Leghorn laying hens were orally administered [^{14}C-methoxy]dimethoate by capsule once daily for 7 consecutive days at a dose rate equivalent to 10 ppm in the diet (approximately 0.9 mg/kg bw/day). An additional group of hens served as a control. Egg samples were collected twice daily and separated into yolks and whites. Treated hens were sacrificed between 22 and 24 hours after the final dose. Tissues and eggs were composited by treatment group. Total radioactive residue levels (TRRs were determined by combustion analysis.

Mean cumulative radioactivity recovered in excreta was 66%, in cage wash 9%, in gastrointestinal tract <1% and in bile <1%. Mean cumulative radioactivity recovered in eggs accounted for <1% of the administered dose. Mean daily TRR levels in yolks ranged from 0.018 to 0.339 mg equiv/kg, and in whites ranged from 0.090 to 0.180 mg equiv/kg. A plateau in egg residues was not reached during dosing. TRRs in tissues and eggs are summarised in Table 6.

Table 6: Residue levels in tissues and eggs following dosing equivalent to 10 ppm in the diet for 7 days

Sample	Collection	Mean TRR (mg equivalents/kg)			
		Group B	Group C	Group D	Overall mean B,C,D
Liver	Sacrifice	0.615	0.621	0.687	0.641
Breast muscle		0.098	0.087	0.102	0.096
Thigh muscle		0.079	0.090	0.083	0.084
Fat		0.028	0.024	0.061	0.038
Skin		0.042	0.044	0.066	0.051
Blood		0.234	0.234	0.242	0.237
Egg yolk	0–24 hr	0.018	0.020	0.016	0.018
	24–48 hr	0.040	0.051	0.044	0.045
	48–72 hr	0.106	0.099	0.110	0.105
	72–96 hr	0.156	0.168	0.199	0.174
	96–120 hr	0.277	0.246	0.241	0.255
	120–144 hr	0.279	0.295	0.414	0.329
	144 hr – sac.	0.310	0.351	0.355	0.339
Egg white	0–24 hr	0.080	0.070	0.120	0.090
	24–48 hr	0.092	0.112	0.141	0.115
	48–72 hr	0.090	0.120	0.202	0.137
	72–96 hr	0.139	0.152	0.249	0.180
	96–120 hr	0.183	0.152	0.175	0.170
	120–144 hr	0.146	0.115	0.140	0.134
	144 hr – sac.	0.144	0.161	0.149	0.151

Extractability of radioactivity from tissues and eggs with acetonitrile and water was poor, ranging from 8.9% in liver to 50% in egg white. Tissues were subjected to protease, weak base, strong acid and strong base hydrolysis to release the radioactivity. Dimethoate was not detected in any of the tissues, egg, excreta or blood extracts, suggesting rapid metabolism. The major metabolites dimethyl phosphate and dimethyl

thiophosphate were rapidly excreted. Omethoate and dimethoate carboxylic acid were characterised by HPLC. Most of these metabolites were released from liver and egg white following protease treatment (Table 7).

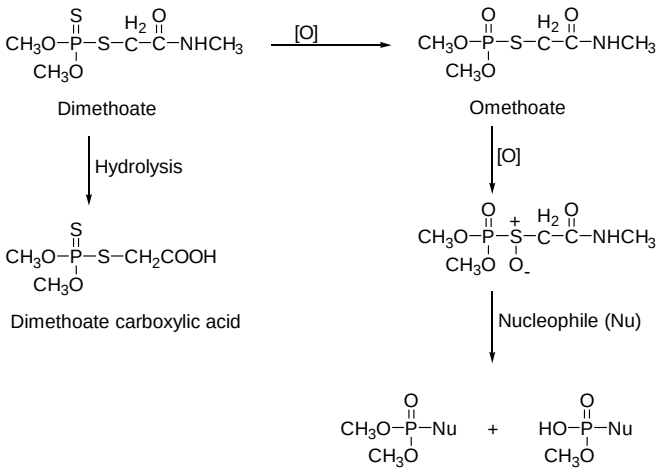
Table 7: Identification of metabolites in liver and egg white

Matrix	Metabolite	mg equivalents/kg
Liver	Omethoate, HPLC only	0.081
	Dimethoate carboxylic acid, HPLC only	0.131
	^{14}C-Phosphorylated natural products	0.514
Egg white	Omethoate, HPLC only	0.004
	Dimethoate carboxylic acid, HPLC only	0.005
	^{14}C-Phosphorylated natural products	0.103

For tissues protease, HCl and NaOH treatment were required to solubilise residual radiocarbon. No evidence of ^{14}C-formate was found. No evidence of ^{14}C amino acids were found after solubilisation of liver extracts with 6 N HCl. Anionic compounds in the excreta were readily derivatised by benzylation; derivatisation of metabolites extracted from the tissues was poor. Due to difficulties in extraction and analysis by C-18 HPLC, where ^{14}C eluted early and was poorly recovered, it was suggested the main path for metabolism in tissues was the $(^{14}CH_3\text{-}O)_2P{=}O$ phosphorylation of natural products. This is supported by the goat metabolism study. In egg yolk 31.8% of the TRR co-chromatographed with phospholipids.

Based on the goat and hen studies, a metabolic pathway for dimethoate in target animals was proposed (Figure 2). The pathway involves hydrolysis leading to the formation of dimethoate carboxylic acid and oxidation leading to omethoate. Further oxidation is followed by reaction with naturally occurring nucleophiles.

Figure 2: Proposed metabolic pathway for dimethoate in target animals. (Note: Nu may be any electron-rich endogenous component. Thus the sulphoxide may phosphorylate proteins, lipids etc.)



5 ANALYTICAL METHODS

Validated methods were provided for the determination of dimethoate and omethoate in both plant and animal commodities. For plant commodities in the trials conducted outside Australia, residues were generally extracted with acetone and partitioned into dichloromethane. Residues were generally cleaned up on a celite/activated carbon column or by gel permeation chromatography for oily samples. Residues were generally quantified by gas chromatography with a flame photometric detector in the phosphorous mode. In some cases quantification was by LC-MS. The LOQ for plant commodities was generally 0.01 mg/kg for dimethoate and omethoate. Method recoveries are given with the individual report summaries in Appendixes 4–7.

In the Australian trials provided by Horticulture Australia Limited (HAL), samples were homogenised and subsamples extracted into an organic solvent using high power ultrasonication and mechanical shaking. The solvent was evaporated under vacuum and the aqueous residue partitioned against dichloromethane. The dichloromethane extracts were combined and evaporated under vacuum to dryness before redissolving in acetone. An aliquot was filtered before determination of dimethoate and omethoate by GC-MSMS. The LOQ for the method was 0.01 mg/kg for omethoate and dimethoate. Method recoveries are given with the individual report summaries in Appendix 8 (published August 2011).

For animal commodities, samples were initially extracted with acetone or acetonitrile followed by a protease treatment of the dried post extraction solids. The combined extract and enzyme hydrolysate were partitioned with dichloromethane. The organic layer was subjected to several steps including solid phase extraction and evaporation and re-suspension in benzene. Analysis was by GC-FPD. The method limit of quantitation is 0.001 mg/kg for milk and eggs, and 0.01 mg/kg for tissues. Recoveries of dimethoate and omethoate from fortified samples of milk, eggs and tissues were generally within acceptable limits, except for the recovery of omethoate from egg whites fortified at 0.001 mg/kg (mean recovery 64%).

6 RESIDUE DEFINITION

The current residue definition for dimethoate for both enforcement and dietary exposure assessment is the sum of dimethoate and omethoate, expressed as dimethoate. The residue definition for omethoate is omethoate. The available metabolism studies show that the main route of degradation of dimethoate in plants and animals is through the formation of omethoate. Adequate analytical methodology is available for the determination of dimethoate and omethoate residues in plant and animal matrices. Based on the review of the available metabolism data and the most recent toxicology assessments of both dimethoate and omethoate it is considered that the current residue definitions remain appropriate for both enforcement and dietary exposure (risk) assessment, noting the discussion below. Those definitions are:

Compound	Residue
Dimethoate—see also Omethoate	Sum of dimethoate and omethoate, expressed as dimethoate
Omethoate	Omethoate

In this document, residues calculated according to the enforcement residue definition for dimethoate are referred to as '*total dimethoate residues*'. Based on the relative molecular weights, total dimethoate residues, according to the residue definition, are calculated as:

Dimethoate (mg/kg) = dimethoate (parent, mg/kg) + 1.075 x omethoate (mg/kg)

7 RESIDUES IN FOOD AND ANIMAL FEEDS

Because an ARfD for dimethoate has been established, the short-term dietary risk assessment for approved uses of dimethoate is central to this review. As such, National Estimated Short Term Intake (NESTI) calculations are conducted and compared against the new dimethoate ARfD before MRL recommendations are made. For these calculations, intakes are estimated on the basis of individual commodity or commodity groups.

The following health standards[4] have been recommended by the Office of Chemical Safety, Australian Government Department of Health.

Compound	Dietary Standard mg/kg bw		NOEL mg/kg bw	Safety Factor
Dimethoate	ADI	0.001	0.1	100
	ARfD	0.02	0.2	10

Acute dietary exposure is estimated by the NESTI calculation. The NESTI calculations are made in accordance with the deterministic method used by the JMPR[5] with 97.5th percentile food consumption data derived from the 1995 National Nutrition Survey of Australia. NESTI calculations are conservative estimates of short-term exposure (24-hour period) to chemical residues in food. The calculations are conducted for both children (2-6 years) and for the general population (2 years and older).

As the application of dimethoate products results in dimethoate and omethoate residues, corrections are made to the total dimethoate–omethoate residue concentration to acknowledge that both residues (compounds) share a common toxicological mode of action. From the Office of Chemical (OCS) toxicology assessments and on the basis of advice from Food Standards Australia New Zealand, a comparison was made of NOAELs and LOAELs for the two compounds on the basis of erythrocyte and/or brain acetylcholinesterase inhibition, this being the relevant toxicological endpoint for organophosphates. Omethoate is more toxic than dimethoate. The relative toxicity of omethoate compared to dimethoate, following chronic and acute exposures in laboratory animal studies, was found to be about ~3:1 and ~7:1, respectively. In all of the following dietary exposure (risk) assessments, corrections are made to account for the greater toxicity of omethoate than dimethoate.

Residues for the short-term (acute) dietary exposure estimates are calculated as:

D + O (mg/kg) = dimethoate (parent, mg/kg) + (7 x omethoate (mg/kg))
The resultant residue (D + O) is compared against the dimethoate ARfD.

Residues for the long-term (chronic) dietary exposure estimates are calculated as:

D + O (mg/kg) = dimethoate (parent, mg/kg) + (3 x omethoate (mg/kg))
The resultant residue (D + O) is compared against the dimethoate ADI.

4 The full report is available at <www.apvma.gov.au/products/review/docs/dimethoate_human_health_tox.pdf>.

5 World Health Organization 2008. Dietary exposure assessment of chemicals in food: report of a Joint FAO/WHO Consultation. Annapolis Maryland, USA, 2–6 May 2005.

An example of the calculation of residues for acute dietary exposure estimates for the post harvest treatment of cherries is given below.

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Cherries, Study 07-HAL-005(b)GLP, Volume 2, Part a	20 g ai/100 L, dip 1 minute	1.76	0.06	1.82	2.18
		3.04	0.15	3.20	4.09

When only a total dimethoate residue was recorded for the sample having the high residue (HR), the sample was initially assumed to be all omethoate as a worst case and compared to the dimethoate ARfD as above. If it passed, the use was considered acceptable. In some instances where the HR was given as dimethoate only, the rest of the available data for that particular commodity was used to estimate the proportion of the total residue due to omethoate and then the residue for acute dietary exposure estimates calculated as above.

The residue estimate used in the chronic calculation was refined according to World Health Organization (WHO) guidance.[5] This involved the use of median residues from supervised field trials (STMRs) and consideration of residue monitoring data, where available.

In the acute dietary exposure estimates, the dimethoate and omethoate residue from the individual sample containing the highest residue according to the residue definition is used. That same value is also used for MRL estimation. A minimum dataset of six residue trials consistent with the approved GAP, or as otherwise stated in APVMA residue guideline 24, was generally required to conduct a suitably robust estimate of acute dietary exposure. For minor crops a lesser dataset was considered appropriate if there were supporting data from a major crop within the crop group or from a number of other minor members of the same crop group.

For Case 1 NESTI calculations (for example, for berries and other small fruit) the dimethoate MRL (or estimated MRL) was used as the residue input for the calculation, rather than the HR or high residue. While this differs from current WHO recommendations, it is considered appropriately protective of human health as a meal-sized portion for small commodities such as berry fruit may be equivalent to a composite sample used for determining residues for MRL setting. For Case 1 calculations, a ratio of dimethoate to omethoate was calculated from the sample in the trials that had the highest proportion of omethoate at the appropriate post harvest interval (PHI). This ratio was applied to the MRL, and the estimated dimethoate and omethoate residues were used for the acute dietary intake calculation as outlined above.

For commodities with inedible peel, where the pulp is the edible portion of the fruit, such as melons and some tropical fruits, pulp data have been used in the acute dietary estimates where available. Where residues have been reported on a ‘whole fruit’ basis and no pulp data are available to refine the dietary estimate, assumptions have been made regarding the proportion of the commodity that forms the edible part and the whole fruit values adjusted accordingly. References to data sources for such cases are provided.

In response to the initial residues review report in 2011 the APVMA received numerous requests to use proportionality principles/scaling in assessing residues data. However, in the case of dimethoate there are 2 systemic components to the residue. The two components of the residue definition for dimethoate are dimethoate itself and omethoate. Omethoate is the more toxic component of the two and makes a greater

contribution to the toxicological significance of the dimethoate residues. This is important for the dietary exposure estimates, both short-term and long-term. The APVMA considers scaling to be unacceptable, for the following reasons:

1. The ratio of dimethoate to omethoate is not consistent or predictable, either between commodities or in many cases for a single commodity sampled at various time points after treatment. Predictability of the ratio would be required to enable the concept of proportionality to be applied correctly.
2. In a number of field trials provided to the APVMA for the review, only dimethoate residues were determined in a range of commodities and omethoate was not analysed. Both components are required to be analysed and reported to enable proportionality to be applied correctly.
3. For combination applications of the product to a single commodity, for example pre-harvest spray followed by post-harvest dipping, the observed residue is the result of the combination of the residues arising from both treatments. It is almost impossible to correctly apply the concept of proportionality due to the different residue profiles that each treatment contributes to the final residue. For the concept of proportionality to be applied correctly, a predictable pattern or profile of residue occurrence is required for the overall treatment to the commodity.
4. Few side-by-side residue trials undertaken at different application rates have been submitted to the review.

The 2010 JMPR noted a number of cases for which scaling is inappropriate and stated that *'special consideration is required for scaling of residues in protected edible parts of the commodities for dietary intake purposes. While residues are generally proportional in the whole commodity (eg, citrus fruit), careful application of scaling factors is required for the corresponding protected parts.'* Many commodities considered in the dimethoate review have protected edible portions.

The APVMA has taken a flexible approach to considering data in this review, as it does generally. Specifically, the "±25% rule" has been applied where data generated at rates within 25% of the target rate is considered to represent the use. Additionally, the APVMA has used, where appropriate, residues data generated at higher rates, without scaling, to assess acute dietary exposure to support use during the suspension of products that commenced in October 2011.

7.1 Maximum Residue Limits and permits

Non-specific crop group MRLs

A number of MRLs are established for broad, non-specific crop groups. It is recommended that these MRLs be deleted and replaced with specific crop or crop group MRLs where required. The MRLs recommended for deletion are:

Compound	Food	MRL (mg/kg)
Dimethoate—see also Omethoate		
	Fruits [except strawberry, litchi, peach, quandong and mango]	5
	Vegetables [except lupin (dry); peppers, sweet; tomato]	2

MRLs without associated use patterns

A number of MRLs no longer have associated uses. They were associated with minor use permits (PER 2355 and PER 9691) that have expired. The respective MRLs are listed below and will be deleted from the APVMA MRL Standard.

Compound	Food		MRL (mg/kg)
Dimethoate			
	VL 0465	Chervil	T2
	HS 0783	Galangal, rhizomes	T2
	HH 0092	Herbs	T2
		Kaffir lime leaves	T2
		Lemon grass	T2
	DT 1111	Lemon verbena	T2
		Mizuna	T2
		Quandong	T5
	VL 0496	Rucola (Rocket)	T2
	HS 0794	Tumeric, root	T2

It is noted that use on chervil, rucola and mizuna would previously have been allowed under the general label use of dimethoate on leafy vegetables and the associated dimethoate and omethoate vegetable MRLs.

Permits

A number of permit approvals were previously granted on the basis of existing registrations or uses, which were approved under the state registration system and therefore only a dietary exposure assessment would have been done. In these instances residue data were often not available.

7.2 FC Citrus fruit

In response to the *Dimethoate residues and dietary risk assessment Report* of 2011:

Additional data for the post-harvest treatment of oranges were submitted for consideration.

A request for consideration of alternative uses was made.

The assessment of 2011 is reproduced here along with consideration of the new data and alternative use proposals.

Dimethoate was previously registered for the pre harvest treatment of citrus fruit (except Meyer lemons, Seville oranges and cumquats) at up to 150 mL/100 L (60 g ai/100 L) as summarised below. Use on citrus generally was also approved for home garden products. The highest rate (for Mediterranean fruit fly) allows 2–3 sprays 2 weeks apart. Lower rates (30 g ai/100 L) may be repeated as necessary. The post-harvest treatment of citrus fruit with dimethoate by dip or flood spray was approved under permit as summarised below.

Crop	Treatment	Rate (dimethoate)	WHP (days)	Critical comments
Citrus fruit (except Meyer lemons, Seville oranges and cumquats)	Dimethoate/ pre harvest	60 g ai/100L	7	Apply 2 sprays 2 weeks apart, 7 weeks and 5 weeks before harvest. If harvesting is delayed a third spray may be required. **WA only:** apply about 6 weeks before the fruit ripens. Re-apply at fortnightly intervals. The last spray should be made 1 week before the fruit ripens.
Citrus	Dimethoate/ post harvest (permit)	400 mg ai/L	Not required	Dip or flood spray.

Post-harvest use

In the initial dimethoate review report, the post-harvest use of dimethoate on citrus was supported for mandarins only as insufficient data were available for oranges. The data addressing the post-harvest GAP for oranges and mandarins, including the new data for oranges, are summarised below.

Table 8: Residue data addressing the post-harvest GAP for citrus

Trial and study reference	Actual application scenario	Dimethoate (whole fruit) (mg/kg)	Omethoate (whole fruit) (mg/kg)	Total residue in whole fruit for MRL Determination (mg/kg)	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
Oranges 1998 JMPR	400 mg/L dip	–	–	0.43[a]	
Valencia oranges, Corcoran et al. 1996	400 mg/L + wax	0.31	<0.02	0.33	0.45

Trial and study reference	Actual application scenario	Dimethoate (whole fruit) (mg/kg)	Omethoate (whole fruit) (mg/kg)	Total residue in whole fruit for MRL Determination (mg/kg)	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
Murcott mandarins, Corcoran et al. 1996	400 mg/L + wax	0.49	<0.02	0.51[b]	0.63
Mandarins, HAL/GLP/0701-1	40 g ai/100 L dip	0.58, 0.73, 0.75, 0.88[c]	<0.005 (2), <0.006, <0.008	0.59, 0.74, 0.76, 0.89	0.124[d]
Oranges, Study number 12-AKC-003GLP (New study)	40 g ai/100 L dip	0.510, 0.590, 0.600, 0.630, 0.660, 0.670	0.003 (3), 0.004 (2), 0.005	0.513, 0.593, 0.604, 0.633, 0.664, 0.675	0.394[e]

a Proportion of residue due to omethoate not recorded.

B Whole fruit residue—no information on residue in edible portion.

C Selected highest value from reported data.

D Sample with highest residues in mandarin edible portion for dietary exposure assessment had dimethoate 0.089 mg/kg, omethoate <0.005 mg/kg.

e Sample with highest residues in orange edible portion for dietary exposure assessment had dimethoate 0.380 mg/kg, omethoate 0.002 mg/kg.

For mandarins, highest total dimethoate residues in whole fruit were 0.59, 0.74, 0.76 and 0.89 mg/kg. Omethoate residues were <0.005 (2), <0.006, and <0.008 mg/kg. The STMRs for dimethoate (parent) and omethoate in mandarin whole fruit after post-harvest treatment were 0.73 and <0.006 mg/kg respectively.

For oranges, highest total dimethoate residues in whole fruit were 0.45, 0.51, 0.59, 0.60, 0.63 and 0.66 mg/kg. Omethoate residues were 0.003 (3), 0.004 (2), 0.005 and <0.02 mg/kg. The STMRs for dimethoate (parent) and omethoate in orange whole fruit after post-harvest treatment were 0.60 and 0.004 mg/kg respectively.

Outcomes of the acute dietary exposure assessment for the post-harvest treatment of mandarins and oranges with dimethoate are summarised below.

	Observed total HR (mg/kg)	Residue for acute dietary exposure assessment (mg/kg)	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Mandarins—post harvest	0.89 (whole fruit)	0.124 (pulp)	15	5	Yes
Oranges—post harvest	0.675 (whole fruit)	0.394	60	20	Yes

Following consideration of the new data the post-harvest treatment of citrus continues to be supported.

Pre-harvest use

Australian residue data for the pre harvest application of dimethoate to citrus fruit are not available. Details of 18 overseas trials conducted on oranges, mandarins, lemons and clementines grown in Italy, Greece and Spain were reviewed. Additional data for oranges and pomelos from trials conducted in Brazil and Thailand are available from the 2003 JMPR. However, these trials used lower spray concentrations (40 g ai/100 L) than those registered in Australia. For the trials corresponding to Australian GAP, residues in the edible portion were not provided at a 7-day PHI but were provided for a 21-day PHI. An average ratio of residues in the edible portion to whole fruit at a 21-day PHI was calculated for oranges, mandarins and lemons. These ratios (Table 9) were then applied to the whole fruit residues at 7 days to give the values used in dietary intake calculations.

Table 9: Ratio of residues in edible portion to whole fruit at 21-day PHI

	Dimethoate	Omethoate
Oranges	0.031×	0.68×
Mandarins and clementines	0.024×	0.44×
Lemons	0.14×	0.50×

Data for currently approved GAP are summarised in Table 10.

Table 10: Residue data addressing the common pre harvest GAP for citrus; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue in whole fruit for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Oranges, European studies summarised in Appendix. 7	60 g ai/100 L, 3 applications	0.63, 0.75, 0.82, 2.21	<0.01, 0.05 (2), 0.06	0.68, 0.80, 0.83, 2.27	0.36 (estimated edible portion)[a]
Mandarins and clementines, European studies summarised in Appendix. 7	60 g ai/100 L, 3 applications	1.16, 1.22, 1.72, 3.55	0.06 (2), 0.07, 0.13	1.24, 1.28, 1.78, 3.69	0.48 (estimated edible portion)[b]
Lemons, European studies summarised in Appendix. 4	60 g ai/100 L, 3 applications	1.49, 2.53	0.04, 0.09	1.59, 2.57	0.49 (estimated edible portion)[c]

a Highest dimethoate and omethoate residues in whole fruit were 2.21 and 0.06 mg/kg respectively, estimated edible portion residues 0.069 and 0.041 mg/kg respectively.

B Highest dimethoate and omethoate residues in whole fruit were 3.55 and 0.13 mg/kg respectively, estimated edible portion residues 0.085 and 0.057 mg/kg respectively.

C Highest dimethoate and omethoate residues in whole fruit were 2.53 and 0.04 mg/kg respectively, estimated edible portion residues 0.35 and 0.02 mg/kg respectively.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of citrus are summarised below.

	Observed total HR (mg/kg)	Residue for acute dietary exposure assessment (mg/kg)	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Pre harvest					
Oranges	2.27 (whole fruit)	0.36 (edible portion)	55	20	Yes
Mandarins	3.69 (whole fruit)	0.48 (edible portion)	70	20	Yes
Lemons	2.57 (whole fruit)	0.49 (edible portion)	50	15	Yes

The acute dietary exposures are acceptable for pre-harvest treatment of oranges, mandarins and lemons, the main members of the citrus group. The pre harvest use of dimethoate on citrus therefore continues to be supported. It is noted that the summed exposures for oranges that have received a post-harvest treatment and oranges that have received a pre-harvest treatment is more than 100% of the ARfD for children. Therefore oranges that have received a pre-harvest treatment of dimethoate should not receive a post-harvest treatment.

The pre harvest data support the establishment of dimethoate and omethoate MRLs of 5 and 0.5 mg/kg respectively for FC 0001 Citrus fruits.

Citrus processing

Residues in whole fruit were highest in mandarins after pre harvest treatment. Information provided by the citrus industry indicates that mandarins are processed in Australia as a by-product of fresh fruit packing. About 15% of the mandarin crop may be sent to juice. In an orange processing study[6] involving pre harvest application of dimethoate (residues in edible portion not determined), dimethoate (and total dimethoate) residues in whole oranges were reduced 0.15× on preparation of juice, with omethoate residues reduced 0.10×. The STMRs for dimethoate (parent) and omethoate in mandarin whole fruit after post harvest treatment were 0.74 and <0.006 mg/kg respectively. The STMR-Ps for dimethoate and omethoate in juice are 0.11 and <0.001 mg/kg. This is acceptable with respect to the acute dietary intake of dimethoate and omethoate in juice using the consumption figure for orange juice (highest estimated exposure 32% of ARfD for children).

For the pre harvest treatment of mandarins, the STMRs for parent and omethoate in whole fruit were 1.47 and 0.07 mg/kg respectively. The STMR-Ps for dimethoate and omethoate in juice are 0.22 and 0.007 mg/kg respectively. This is acceptable with respect to the acute dietary intake of dimethoate and omethoate in juice using the consumption figure for orange juice (highest estimated exposure 75% of ARfD for children). Given that a combined exposure to residues in juice from mandarins that have undergone both pre and post harvest treatment would be above 100% of the ARfD for children, it is recommended that mandarins that

[6] Part B, Appendix 2.

have undergone pre harvest treatment should not be given a subsequent post harvest treatment. The STMRs for dimethoate and omethoate in oranges following pre harvest treatment were lower than for mandarin, exposure to dimethoate residues via orange juice is also acceptable.

For lemons, the mean residues of parent and omethoate in whole fruit were 2.01 and 0.065 mg/kg respectively. The estimated mean residues in lemon juice were 0.30 and 0.0065 mg/kg. Although this is based on only two trials, the residue for exposure estimates is higher than that calculated for mandarins. Acute exposure estimates for dimethoate residues in lemon juice are acceptable (highest estimated exposure 15% of ARfD for children).

Dimethoate (and total dimethoate) residues concentrated about 2.1× in dry pulp. Omethoate residues concentrated about 1.6× in dry pulp. Based on highest total dimethoate and omethoate residues in orange fruit of 2.27 and 0.06 mg/kg, the predicted HRs in dry pulp are 4.8 and 0.1 mg/kg respectively. It is recommended that dimethoate and omethoate MRLs of 10 and 0.5 mg/kg respectively be established for AB 0001 Citrus pulp, dry.

The STMR-Ps for livestock dietary burden calculations are estimated to be 1.63 mg/kg for dimethoate and 0.08 mg/kg for omethoate.

Recommendations

- The pre harvest treatment of citrus with dimethoate is supported.
- The post harvest treatment of citrus is supported. Oranges and mandarins that have been given a pre harvest treatment should not be given a subsequent post-harvest treatment. As uses on oranges and mandarins have been extrapolated to the whole citrus group, this restriction should apply to citrus generally.
- Dimethoate and omethoate MRLs of 5 and 0.5 mg/kg respectively are recommended for FC 0001 Citrus fruits.
- New dimethoate and omethoate Table 4 entries of 10 and 0.5 mg/kg respectively be established for AB 0001 Citrus pulp, dry.

7.3 FP Pome fruit

Continued use on Pome fruit was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted, however an alternative use has been proposed. Previous findings are presented here along with consideration of the alternative use.

Dimethoate was previously registered in Australia as a pre harvest treatment for pome fruit—apples, pears and quinces (not loquats). There were also registered and permit post harvest treatments for pome fruit generally.

Crop	Treatment	Rate	WHP (days)	Comments
Pome fruit, apples, pears, quinces (not loquats)	Pre harvest (dimethoate)	60 g ai/100 L	7	Reapply at fortnightly intervals. Last spray applied 1 week before fruit ripens (lower rates may be repeated as necessary).
Apples, loquats, nashi, pears, quinces	Post harvest (dimethoate—registered and permit[7])	40 g ai/100 L or 400 mg ai/L	–	Dip or flood spray.

The uses were covered by the dimethoate and omethoate fruit MRLs of 5 and 2 mg/kg respectively.

Post harvest use

Summaries of Australian trials for the post harvest treatment of apples with dimethoate are available for review. Data on previously approved GAP from the label instructions are summarised in Table 11.

Table 11: Residue data addressing the common post harvest GAP for pome fruit

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Apples; Horticulture Industry Response	400 mg ai/L dip	–	–	0.18, 0.77, 1.06, 1.27	–
Apples, Horticulture Industry Response, Page & Nimmo 2000	400 mg ai/L dip	0.76, 0.96, 1.09, 1.33, 1.51, 1.83	<0.02 (6)	0.78, 0.98, 1.11, 1.35, 1.53, 1.85	1.97

Residue data for pears are not available. Outcomes of the acute dietary exposure assessment for post harvest treatment of apples are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Apple—post harvest	1.85	1.97	330	110	No

The previously approved post harvest use of dimethoate on pome fruit is no longer supported due to unacceptable acute dietary exposure estimates for children and the general population for apples. Specific residue data are not available to individually assess acute dietary exposure for pome fruits other than apples.

7 Permits 10555, 12074 and 12343 (general use on pome fruit).

Pre harvest use

Australian residue data covering the pre harvest use patterns for pome fruit were not available. Summaries of overseas data for pre harvest application of dimethoate to apples and pears have been provided, although the application concentration in the majority of the trials was too low to be considered representative of Australian GAP (30–40 g ai/100L c.f. 60 g ai/100L). Those trials will not be considered further. Available data addressing previously approved GAP are summarised in Table 12.

Table 12: Residue data addressing the common pre harvest GAP for pome fruit; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Apple, European trials summarised in App. 7	70 g ai/100 L, 7 applications	0.60	0.09	0.70	
Apples, *J. Agric. Food Chem* 1987, 35, 506	50 g ai/100 L, 5 applications	1.3	0.11	1.41	
	50 g ai/100 L, 7 applications	1.9	0.16	2.06	3.02

A dataset consisting of three trials is not considered adequate to support a robust estimate of dietary exposure for pome fruit.

Recommendations

- The post harvest treatment of apples with dimethoate is no longer supported due to unacceptable acute dietary exposure estimates for children and the general population.
- The post harvest treatment of all pome fruit other than apples (including the specific uses for apples, loquats, nashi pears, pears, quinces) with dimethoate is no longer supported as adequate data are not available to assess acute dietary exposure and estimate MRLs.
- The pre harvest treatment of all pome fruit (including specific uses for apples, pears and quinces) with dimethoate is no longer supported as adequate data are not available to assess acute dietary exposure.

Alternative GAP for pome fruit

Following the initial publication of the residues review report the APVMA was requested to consider if use on pome fruit can be supported if the withholding period is extended to 21 days. Available data addressing GAP at the newly proposed 21 day withholding period are summarised below in Table 13.

Table 13: Residue data addressing the proposed alternative pre harvest GAP for pome fruit; PHI 21 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Apple, European trials summarised in App. 7	70 g ai/100 L, 7 applications	0.69	0.13	0.83	1.60
Apples, *J. Agric. Food Chem* 1987, 35, 506	50 g ai/100 L, 5 applications	0.84	0.12	0.97	1.68
	50 g ai/100 L, 7 applications	1.4	0.13	1.54	2.31

A data set of 3 trials is not considered adequate to support a robust estimate of dietary exposure for pome fruit. Based on this data the acute exposure to dimethoate residues in apples would remain unacceptable even if the withholding period were increased to 21 days. (The NESTI for apples for children is equivalent to 640% of the ARfD; the NESTI for apples for the general population is equivalent to 170% of the ARfD)

- The pre harvest treatment of pome fruit with dimethoate with a 21 day withholding period is not supported.

A response to the initial residues review report also indicated that dimethoate is often used on apples during the development stage. The response did not propose a latest growth stage for application. In one of the available overseas trials dimethoate was applied during fruit development at 180 g ai/100 L. Residues of dimethoate and omethoate in the fruit were each <0.05 mg/kg at 98 days after treatment [noting also that residues above this LOQ (d 0.12 mg/kg, o <0.05 mg/kg) were seen in an apple trial which sampled 53 days after application at 80 g ai/100 L]. Using a residue of 0.4 mg/kg for dietary exposure assessment (0.05 + 0.05×7) still gives an unacceptable acute dietary exposure for children (110% of the acute reference dose). The proposed use has not been fully described and suitable data are not available to allow its assessment. It is not supported at this time.

7.4 FS Stone fruit

Continued use on Stone fruit was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted, however an alternative use has been proposed. Previous findings are presented here along with consideration of the alternative use.

7.4.1 FS 0240 Apricots

A summary of a single overseas pre harvest trial on apricots has been provided for review. However, the application rate was significantly higher than that registered in Australia for stone fruit (570 g ai/ha in a spray volume of 350 L/ha). The previously approved uses for dimethoate in Australia do not include pre harvest use on apricots. These data will not be considered further.

Post harvest treatment of apricots was registered as a quarantine treatment and was also allowed under permit. However, as appropriate residue data are not available, the post harvest treatment of apricots with dimethoate is no longer supported.

7.4.2 FS 0013 Cherries

Dimethoate was registered as a post harvest fruit dip for cherries with similar dip and flood spray uses approved under permit. There were also registered uses of dimethoate as a pre harvest spray for stone fruits (not apricots or early peach varieties) as summarised in the following table.

Crop	Treatment	Rate	WHP (days)	Comments
Cherries	Post harvest (registered and permit[8])	20 g ai/100 L (registered) or 200 mg ai/L (permit)	–	Dip or flood spray
Stone fruits (not apricots or early peach varieties)	Pre harvest	30 g ai/100 L	7	Apply when pests appear and repeat as necessary

These uses were covered by the dimethoate and omethoate fruit MRLs of 5 and 2 mg/kg respectively.

Post harvest use

Residue data on the post harvest treatment of cherries with dimethoate have been provided for the review. Data addressing previously approved GAP are summarised in Table 14.

Table 14: Residue data addressing the common post harvest GAP for cherries

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Cherries, Study 07-HAL-005(b)GLP, Volume 2, Part a	20 g ai/100 L, dip 1 minute	1.76	0.06	1.82	2.18
		3.04	0.15	3.20	4.09

A dataset consisting of two trials is not considered adequate to support a robust estimate of dietary exposure for cherries. Analysis on the basis of the available data indicates that acute exposure estimates for children would be unacceptable (see Section 8.1 Acute dietary exposure estimates).

The post harvest treatment of cherries with dimethoate is not supported due to an inadequate dataset to assess acute dietary exposure.

Pre harvest use

Australian data addressing previously approved pre harvest GAP are summarised in Table 15.

8 Permits 10555, 12704 (stone fruit generally) and 12343 (stone fruit generally).

Table 15: Residue data addressing the common pre harvest GAP for cherries; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment mg/kg)
Study 07-HAL-005(a)GLP; Volume 2; Part a	30 g ai/100 L, 1–3 applications, 7-day interval	0.27, 0.41 (2), 0.52, 0.96	0.09, 0.18, 0.23, 0.35, 0.46	0.37, 0.60, 0.77, 0.91, 1.34	3.41[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.96 mg/kg and omethoate of 0.35 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of cherries are summarised below (based on the Australian data).

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Cherries—pre harvest	1.34	3.41	280	50	No

The pre harvest treatment of cherries with dimethoate is not supported due to unacceptable acute dietary exposure estimates for children.

Recommendations

- The post harvest treatment of cherries with dimethoate is no longer supported as the dataset is inadequate to assess acute dietary exposure.
- The pre harvest treatment of cherries with dimethoate is no longer supported due to unacceptable acute dietary exposure estimates for children.

7.4.3 FS 0245 Nectarine

Pre harvest use of dimethoate on nectarines was approved under the general stone fruit use. Post harvest treatment of nectarines with a dimethoate dip was registered as a quarantine treatment.

Crop	Treatment	Rate	WHP (days)	Comments
Stone fruits (not apricots or early peach varieties)	Pre harvest	30 g ai/100 L	7	Apply when pests appear and repeat as necessary
Nectarine	Post harvest	40 g ai/100 L (registered) or 20 g ai/100 L (permit)	–	Dip or flood spray

Post harvest use

Residue data for the post harvest treatment of nectarines with dimethoate are not available. This use is no longer supported.

Pre harvest use

Australian studies have been provided for the pre harvest treatment of nectarines with dimethoate. Data addressing previously approved GAP are summarised in Table 16.

Table 16: Residue data addressing the common pre harvest GAP for nectarines; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP; Volume 2; Part a	30 g ai/100 L, 1–3 applications, 7-day interval	0.52, 0.72, 0.78[a], 1.06	0.13 (2), 0.35[a], 0.35	0.66, 0.86, 1.16[a], 1.44	3.51[b]
Jessup & Walsh 2001	30 g ai/100 L, 1 application	0.17	0.01	0.18	

a Occurred at 14 days after the last application.

B Sample with highest residue for dietary exposure assessment had a dimethoate residue of 1.06 mg/kg and omethoate of 0.35 mg/kg.

In the available Australian pre harvest trials, total dimethoate residues in nectarines at 7 days after the last application were 0.18, 0.66, 0.86, 1.16 and 1.44 mg/kg. Omethoate residues were 0.01, 0.13 (2), 0.35 (2) mg/kg.

The acute dietary exposure assessment for pre harvest treatment of nectarines is summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Nectarines—pre harvest	1.44	3.51	510	220	No

The pre harvest treatment of nectarines with dimethoate is not supported due to unacceptable acute dietary exposure estimates for children and the general population.

Recommendations

- The previously approved post harvest use of dimethoate on nectarines is no longer supported as residue data are not available.
- The previously approved pre harvest use of dimethoate on nectarines is no longer supported owing to unacceptable acute dietary exposure.

7.4.4 FS 0247 Peach

Dimethoate was registered as a pre harvest treatment for stone fruits and as a post harvest quarantine dip for peaches. Post harvest treatment at lower rates was allowed under permit[9] as summarised below.

Crop	Treatment	Rate	WHP (days)	Comments
Stone fruits (not apricots or early peach varieties)	Pre harvest	30 g ai/100 L	7	Apply when pests appear and repeat as necessary
Peaches	Post harvest (registered and permit)	40 g ai/100 L (registered) or 20 g ai/100L (permit)	–	Dip or flood spray

The uses were covered by the dimethoate peach MRL at 3 mg/kg and the omethoate fruit MRL at 2 mg/kg.

Post harvest use

Residue data for the post harvest dipping of peaches were previously considered by the APVMA.[10] Data addressing previously approved, low dip concentration GAP are summarised in Table 17. The concentration of omethoate in the samples was not reported.

Table 17: Residue data addressing the common post harvest GAP for peaches

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
DP097-01, DP097-02, DP097-03	20 g ai/100 L dip, 1 minute	–	–	1.27[a], 1.52, 1.60	1.60[b]

a Sample also received 3 pre harvest sprays of dimethoate.

B For initial dietary exposure assessment it was assumed all the highest total residue was present as dimethoate.

A dataset consisting of 3 post harvest trials is not considered adequate to support a robust estimate of dietary exposure for peaches. Preliminary analysis on the basis of the available data indicates that acute exposure estimates for children would be unacceptable (see Section 8.1 Acute dietary exposure estimates).

The post harvest treatment of peaches with dimethoate is not supported due to an inadequate dataset to assess acute dietary exposure

Pre harvest use

Australian data for the pre harvest treatment of peaches with dimethoate have been provided to the review. Additional overseas trials are available from the 1990 and 1994 JMPR, but these trials did not report the

9 Permits 10555, 12704 (stone fruit generally) and 12343 (stone fruit generally).

10 Adriaansen CJ 1998 Residual concentrations of dimethoate when used as a post harvest dip for the control of Queensland fruit fly in peaches (DP097-01, DP097-02, DP097-03).

levels of omethoate in samples. Australian data addressing previously approved GAP are summarised in Table 18.

Table 18: Residue data addressing the common pre harvest GAP for peaches; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP; Volume 2; Part a	30 g ai/100 L, 1–3 applications, 7-day interval	0.33, 0.66, 0.76, 1.06	0.35, 0.45, 0.53, 1.10	0.90, 1.04, 1.24, 2.24	8.76[a]
Jessup & Walsh 2001	30 g ai/100 L, 1–5 applications	0.33, 0.55, 0.78[b]	0.04, 0.05[b], 0.05	0.38, 0.59, 0.83[b]	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 1.06 mg/kg and omethoate of 1.10 mg/kg.

b Observed at 11 days after application.

In the available Australian pre harvest trials, total dimethoate residues in peaches at approximately 7 days after the last application were 0.38, 0.59, 0.83, 0.90, 1.04, 1.24 and 2.24 mg/kg. Omethoate residues were 0.04, 0.05 (2), 0.35, 0.45, 0.53 and 1.10 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of peaches are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Peaches—pre harvest	2.24	8.76	1400	520	No

The pre harvest treatment of peaches with dimethoate is not supported due to unacceptable acute dietary exposure estimates for children and the general population.

Recommendations

- The post harvest treatment of peaches with dimethoate is no longer supported due to an inadequate dataset to assess acute dietary exposure.
- The pre harvest treatment of peaches with dimethoate is no longer supported due to unacceptable estimates of acute dietary exposure.

7.4.5 FS 0014 Plums

Dimethoate was registered as a post harvest dip for plums at 40 g ai/100 L as a quarantine treatment. Post harvest treatment at lower rates was allowed under permit. There were also registered uses of dimethoate as a pre harvest spray for stone fruits (not apricots or early peach varieties).

Crop	Treatment	Rate	WHP (days)	Comments
Stone fruits (not apricots or early peach varieties)	Pre harvest	30 g ai/100 L	7	Apply when pests appear and repeat as necessary.
Plums	Post harvest (registered and permit[11])	40 g ai/100 L (registered) or 200 mg ai/L (permit)	–	Dip or flood spray.

The uses were covered by the dimethoate and omethoate fruit MRLs of 5 and 2 mg/kg respectively.

Post harvest use

No data are available to allow continued support of the post harvest treatment of plums with dimethoate.

Pre harvest use

Overseas data are available for the pre harvest treatment of plums with dimethoate. Data addressing previously approved GAP are summarised in Table 19.

Table 19: Residue data addressing the common pre harvest GAP for plums; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European trials summarised in App. 7	30–40 g ai/ 100 L, 1–5 applications	<0.05 (6) 0.05, 0.06, 0.09, 0.12, 0.13 (2), 0.14, 0.20, 0.28, 0.32, 0.45, 0.52, 0.60, 0.86, 1.03	<0.02 (2), <0.05 (12), 0.05 (2), 0.08, 0.09, 0.12, 0.15, 0.20	<0.10 (6), 0.10, 0.11, 0.14, 0.17, 0.18 (2), 0.19, 0.22, 0.37, 0.41, 0.47, 0.74, 0.76, 0.96, 1.12	1.59[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 1.03 mg/kg and omethoate of 0.08 mg/kg.

A summary of the acute dietary exposure assessment for pre harvest treatment of plums follows.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Plums—pre harvest	1.12	1.59	200	70	No

The pre harvest treatment of plums with dimethoate is not supported due to unacceptable acute dietary exposure estimates for children.

11 Permits 10555, 12704 (stone fruit generally) and 12343 (stone fruit generally).

Recommendations

- The previously approved post harvest uses of dimethoate on plums are no longer supported as residue data are not available.
- The previously approved pre harvest uses of dimethoate on plums are not supported due to unacceptable acute dietary exposure estimates for children.

7.4.6 Summary of recommendations for stone fruits

- The previously approved pre harvest uses on stone fruits are no longer supported due to unacceptable acute dietary exposure estimates.
- The previously approved post harvest uses on stone fruits are no longer supported due to:
    - inadequate data and unacceptable acute dietary exposure estimates for cherries and peaches
    - insufficient data to assess acute dietary exposure or establish MRLs for the uses on apricots, nectarines and plums.

Alternative GAP for stone fruit

After the publication of the initial residues review report the APVMA received a request from the stone fruit industry to consider an alternative GAP for stone fruit where application was limited to the flowering period for western flower thrip control. Limited data were available to support this use pattern, however given the timing of application it was considered unlikely that the use will result in residues in stone fruit at harvest. The use was supported for an interim period pending provision of additional residue data to confirm that significant residues would not be present at harvest. Dimethoate and omethoate MRLs at T*0.02 and T*0.01 mg/kg respectively were recommended for stone fruit. The harvest withholding period was 'not required when used as directed'. The use was limited to pre petal fall.

As no additional residues data for stone fruit have been provided since the initial residues review this interim use is no longer supported and the temporary MRLs for stone fruit should now be deleted.

7.5 FB Berries and other small fruit

7.5.1 FB 0020 Blueberries (and other Vaccinium berries)

In response to the *Dimethoate residues and dietary risk assessment report* of 2011:

- Additional data for the pre-harvest treatment of blueberries were submitted for consideration.
- A request was made for consideration of extrapolation of the blueberry data to Vaccinium berries generally.

The assessment of 2011 is reproduced here along with consideration of the new data and alternative use proposals.

Dimethoate was previously approved in Australia for the control of Queensland fruit fly in blueberries as described in the following table.

Crop	Treatment	Rate or spray conc.	WHP (days)	Critical comments
Blueberries	Pre harvest	30 g ai/100 L or 300 g ai/ha	1	One application on or before harvest, maximum 7 sprays per season, minimum 21 days apart or apply 3, 2 and 1 weeks before harvesting when fruit fly are numerous
	Post harvest (permit[12])	400 mg ai/L	Not required	Dip or flood spray.

After the initial publication of the residues report the APVMA received a request to consider extrapolating the available blueberry data to the commodity group FB 0019 Vaccinium berries to allow use of dimethoate on related species such as bilberries (*Vaccinium myrtillus*). An outcome of the initial dimethoate residues review evaluation was the interim support of a pre-harvest use on dimethoate on Vaccinium berries including blueberries as summarised below:

Crop	Treatment	Rate (dimethoate)	WHP (days)	Critical comments
Blueberries, bilberries and other vaccinium berries	Dimethoate/pre-harvest	30 g ai/100 L or 300 g ai/ha	1	DO NOT exceed a maximum number of 7 applications per crop per season with a minimum retreatment interval of 21 days between consecutive applications

Temporary MRLs of T5 and T2 mg/kg were recommended for dimethoate and omethoate respectively on FB 0019 Vaccinium berries (the omethoate MRL was not established pending the outcome of the omethoate review). Additional for dimethoate on blueberries have now been provided (2 new GLP trials). All the currently available data addressing the new GAP for blueberries are summarised below:

Post harvest use

Residue data are not available to support the post harvest treatment of blueberries with dimethoate as previously allowed under permit. This use is no longer supported.

Pre harvest use

Residue data from the US IR-4 program were submitted (six trials) but the field trials did not correspond to Australian GAP. Data from a total of five trials addressing currently approved GAP for pre harvest use (7 applications, 21-day re-treatment interval, 1-day WHP) are available. The trials do not reflect another GAP on some labels which allows 3 applications at weekly intervals before harvest and this GAP is no longer supported.

Residues observed after a 1-day PHI are summarised in Table 20. In some cases the residues increased with the PHI reflecting the systemic nature of dimethoate. In these cases the highest total residue observed after the 1-day PHI has been recorded, in accordance with accepted practice.

12 Permits 10555, 12074 and 12343 (12343 is for berry fruit generally).

While the number of applications in the available trials does not reflect the currently approved maximum GAP of 7, it is considered that the most number of applications that blueberry fruit is likely to receive is 4 for one harvest, given a flowering to commercial harvest time period of 70 days. Also application is restricted to every 21 days, by which time residues would have declined significantly. It is considered that the last spray will have the greatest influence on final residues. The data therefore support the GAP of 7 applications with a minimum 21-day re-treatment interval.

Table 20: Residue data addressing the GAP for blueberries (pre harvest use); PHI one or more days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
NSW Agriculture 1994[a]	30 g ai/100 L, 1 application	–	–	0.26[b]	
Coffs Harbour, 1999[a]	30 g ai/100 L, 1 application	–	–	0.38	
Field survey, 1999[a]	270 g ai/ha, 3 applications, 10–17 days apart	–	–	0.76[c]	
Study 07-HAL-005(a) GLP, Volume 3, Part a, 2008	30 g ai/100 L, 3 applications, 19–25 days apart	1.34	0.31	1.7	
		1.94	0.65	2.6[d]	
Study AKC-1201 (new study)	30 g ai/100 L, 4 applications, 21 days apart	2.32, 2.75	0.31, 0.54	2.65, 3.33	See text

a Considered for product 32962.

B Residue observed at 7-day PHI.

C Residue observed at 4-day PHI.

D Residue observed at 3-day PHI.

Residues of dimethoate in the new blueberry trials were within the previously proposed temporary MRL of T5 mg/kg for Vaccinium berries. Outcomes of the acute dietary exposure assessment for blueberries are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment (based on MRL[A]) mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Blueberries—pre harvest	3.3	12.5	40	10	Yes

a Dimethoate/total dimethoate ratio from HR sample (75% dimethoate) used to estimate individual residues at the proposed dimethoate MRL of 5 mg/kg (3.75 mg/kg dimethoate, 1.25 mg/kg omethoate).

The use of dimethoate on vaccinium berries, including blueberries continues to be supported. The MRL of T5 mg/kg for dimethoate on FB 0019 Vaccinium berries should now be made permanent.

Recommendation

- The post harvest use of dimethoate on blueberries is not supported as residue data are not available.
- The approved GAP involving pre harvest application at 7-day intervals is no longer supported as the available residue data did not match this use pattern.
- The currently approved pre harvest use of dimethoate on blueberries with a minimum 21-day re-treatment interval is supported. The use pattern will be extended to cover the commodity group FB 0019 Vaccinium berries.
- MRLs of 5 and 2 mg/kg are recommended for dimethoate and omethoate respectively on FB 0019 Vaccinium berries.

7.5.2 FB 0269 Grapes

Continued use on Grapes was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted, however an alternative use has been proposed. Previous findings are presented here along with consideration of the alternative use.

Dimethoate was registered for the control of various pests on grapes as summarised below.

Crop	Treatment	Rate	WHP (days)	Critical comments
Grapes	Pre harvest	30 g ai/100 L	7	Apply when pests appear and repeat as necessary
	Post harvest (under permit[13])	400 mg ai/L	–	Dip or flood spray

The use was covered by the dimethoate and omethoate fruit MRLs, established at 5 and 2 mg/kg respectively.

Post harvest use

Residue data are not available to support the post harvest treatment of grapes with dimethoate as previously allowed under permit. This use is no longer supported.

Pre harvest use

Australian and overseas data for the pre harvest treatment of grapes with dimethoate have been provided for review. Data addressing previously approved GAP are summarised in Table 21.

13 Permits 10555 and 12074.

Table 21: Residue data addressing the common GAP for grapes (pre harvest use); PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP Volume 3, Part a	30 g ai/100 L, 3 applications, 7–22 days apart	1.23	1.54	2.89	See text
		0.29	0.93	1.29	
		0.98	1.13	2.20	
European trials summarised in Appendix 7	20–40 g ai/ 100 L, 1–2 applications	0.13, 0.17, 0.59	<0.05 (2), 0.12	0.18, 0.22, 0.72	

Total dimethoate residues in the Australian and European trials after a 7-day PHI were 0.18, 0.22, 0.72, 1.29, 2.20 and 2.89 mg/kg. Omethoate residues were <0.05 (2), 0.12, 0.93, 1.13 and 1.54 mg/kg. Dimethoate and omethoate MRLs of 4 and 2 mg/kg, respectively, would be appropriate for FB 0269 Grapes.

Outcomes of the acute dietary exposure assessment for grapes are summarised below.

	Observed total HR mg/kg	Residue for dietary exposure assessment(Based on MRL[A]) mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Grapes—pre harvest	2.89	17.7	3000	1300	No

a Dimethoate/total dimethoate ratio from HR sample (43% dimethoate) used to estimate values if residues were at proposed dimethoate MRL of 4 mg/kg (1.72 mg/kg dimethoate, 2.28 mg/kg omethoate).

The previous pre harvest use of dimethoate on grapes is no longer supported due to unacceptable acute dietary exposure estimates.

Alernative GAP for grapes

After the initial publication of the residues review report the APVMA received a request to consider if a pre flowering application to grapes can continue to be supported.

Australian residue data for grapes with longer harvest intervals were not available. In one overseas trial a single application of dimethoate was made at fruit development at 55 g ai/100 L (0.22 kg ai/ha). Dimethoate and omethoate residues at 86 days after treatment were <0.05 and 0.05 mg/kg respectively. For the other available overseas trials the earliest growth stage at the time of the last treatment was at the beginning of the ripening phase or the beginning of fruit colouring. While trials where the last application was made pre flowering are not available, it was considered unlikely that residues would be detected at harvest if application was restricted to this growth stage. The use was supported for an interim period pending provision of residue data to confirm that this assessment is appropriate. Temporary MRLs of T*0.1 and T*0.05 were recommended for dimethoate and omethoate respectively on FB 0269 Grapes. Only the dimethoate MRL was established.

Outcomes of the acute dietary exposure assessment for pre flowering application to grapes (based on residues at the proposed MRL) are summarised below:

	Observed total HR mg/kg	Residue for dietary exposure assessment(Based on MRL[A]) mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Grapes—pre harvest (application pre flowering)	<0.1	0.4	70	30	Yes

a Assumes dimethoate and omethoate are each present at 0.05 mg/kg.

As no additional data for grapes have been provided since the initial residues review, the interim use on grapes with a pre-flowering application is no longer supported. The temporary MRL recommended for dimethoate on grapes to cover the interim use should be deleted.

Recommendation

- The previous pre harvest use of dimethoate on grapes is no longer supported due to unacceptable acute dietary exposure estimates for children and the general population.
- The alternative GAP for use of dimethoate on grapes pre flowering was supported for an interim period pending the provision of additional residue data. The harvest withholding period was not required when used as directed. As no additional residue data have been received, the support for this interim use should now be withdrawn.
- The temporary MRL of T*0.1 mg/kg recommended for dimethoate on FB 0269 Grapes to cover the interim pre-flowering use should now be deleted.

7.5.3 FB 0274 Strawberries

Continued use on Strawberries was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted. An alternative use on strawberry runners (vegetative planting material only) has been supported under permit after support for the registered use on fruiting crops was withdrawn. Previous findings are presented here.

Dimethoate was registered for use on strawberries as described below.

Crop	Treatment	Rate	WHP (days)	Critical comments
Strawberries	Pre harvest	30 g ai/ 100 L	1	Spray when pests appear and repeat at 3-weekly intervals or as necessary

The use was covered by the dimethoate strawberry MRL at 5 mg/kg and the omethoate fruits MRL at 2 mg/kg.

Data from four trials addressing previously approved GAP are available for review as summarised below in Table 22. Residues shown are after a 1-day PHI. The highest total dimethoate residue in strawberries was 3.5 mg/kg. However, no information was provided on the proportion of the residue due to omethoate in this

study. A dimethoate:omethoate ratio from the other strawberry studies has been used to estimate the highest residue for acute dietary exposure assessment as indicated below.

Table 22: Residue data addressing the common GAP for strawberries (pre harvest use); PHI 1 day

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
PACC[a] May 1984, Agenda Item 9.4	0.03% ai, 4 applications, 7 days apart	–	–	1.31–3.50 (mean 2.56)	See text
Study 07-HAL-005(a) GLP, Volume 3	30 g ai/100 L, 3 applications, 7 days apart	0.61	0.24	0.87	
		0.90	0.15	1.06	
		0.76	0.24	1.02	

a Pesticide and Agricultural Chemicals Committee

Total dimethoate residues in strawberries after a 1-day PHI were 0.87, 1.02, 1.06, 1.31–3.50 mg/kg. Omethoate residues were 0.15and 0.24 (2) mg/kg. The previous dimethoate strawberry MRL of 5 mg/kg would be appropriate for this use. An MRL of 2 mg/kg would be appropriate for omethoate on FB 0274 Strawberries for this use.

Outcomes of the acute dietary exposure assessment for strawberries are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment (based on MRL[A]) mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Strawberries—pre harvest	3.50	9.5	450	115	No

a Used dimethoate/total dimethoate ratio from omethoate HR sample where omethoate was determined (85% dimethoate) to estimate values if residues were at proposed dimethoate MRL (4.25 mg/kg dimethoate, 0.75 mg/kg omethoate).

Recommendation

- The previously approved use of dimethoate on strawberries is no longer supported due to unacceptable acute dietary exposure estimates for children and the general population.
- It is noted that a dimethoate MRL of T*0.02 mg/kg was recommended after the initial review to cover use on strawberry runners (vegetative planting material only). This use remains acceptable as there is little potential for residues in fruit (see permit 13155). This MRL should be made permanent as the strawberry runner use will be on label. Similarly an MRL of *0.01 mg/kg is also recommended for omethoate on strawberry.

7.5.4 Other berry fruit

An interim use on blackberries and raspberries was supported in the *Dimethoate residues and dietary risk assessment report* of 2011. Additional data for blackberries and raspberries have now been provided. Previous findings are presented here along with consideration of the new data.

Dimethoate labels previously contained a general instruction for use on berry fruit at 75 mL/100 L (30 g ai/100 L) as summarised below. Applications may be repeated as necessary and a 7-day withholding period applies. Post harvest treatment of blackberries, boysenberries, loganberries, mulberries and raspberries and berry fruit generally was previously allowed under permit as summarised below.

Crop	Treatment	Rate	WHP (days)	Critical comments
Berry fruit	Pre harvest	30 g ai/ 100 L	7	Apply when pests first appear and repeat at 3-weekly intervals or as necessary.
	Post harvest (permit)[14]	400 mg ai/ L	Not required	Dip/flood spray.

An outcome of the initial dimethoate review was the interim support of a use of dimethoate on blackberries and raspberries. The supported use pattern is summarised below:

Crop	Treatment	Rate	WHP (days)	Critical comments
Blackberries, raspberries	Pre harvest	30 g ai/ 100 L	7	Apply when pests first appear and repeat at 3-weekly intervals or as necessary.

Temporary MRLs of T5 and T3 mg/kg were recommended for dimethoate and omethoate respectively on FB 0264 Blackberries and FB 0272 Raspberries, red, black (only the dimethoate MRLs were established). Additional data for dimethoate on raspberries and blackberries have now been provided (2 new GLP trials).

Post harvest use

Residue data are not available to support the post harvest treatment of blackberries, boysenberries, loganberries, mulberries, raspberries and berry fruit generally with dimethoate as previously allowed under permit. These uses are no longer supported.

Pre harvest use

Australian residue data for pre harvest treatment of blackberries and raspberries are available. Data from two trials on each, addressing currently approved GAP, are available for review as summarised in Table 23.

14 Permit 10555, 12074 and 12343.

Table 23: Residue data addressing the GAP for blackberries and raspberries (pre harvest use); PHI 5 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Blackberries, Study 07-HAL-005(a)GLP, Volume 3, Part a	30 g ai/100 L, 3 applications, 22–25 days apart	1.65	0.75	2.46	6.9
Raspberries, Study 07-HAL-005(a)GLP, Volume 3, Part a	30 g ai/100 L, 3 applications, 19–25 days apart	1.72	1.59	3.43	12.8
Raspberries, Study AKC-1201 (new study)	30 g ai/100 L, 3 applications, 21 days apart	1.31	0.32	1.65	3.55
Blackberries, Study AKC-1201 (new study)	30 g ai/100 L, 3 applications, 21 days apart	0.70	0.21	0.93	2.17

Residues of dimethoate in the new blackberry and raspberry trials were within the previously proposed temporary MRLs of T5 mg/kg. Outcomes of the acute dietary exposure assessments for raspberries and blackberries are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment (based on MRL[a]) mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Raspberries	3.43	20	70	15	Yes
Blackberries	3.43	20	70	15	Yes

[a]Dimethoate/total dimethoate ratio from HR sample (50% dimethoate) used to estimate values if residues were at proposed dimethoate MRL of 5 mg/kg (2.5 mg/kg dimethoate, 2.5 mg/kg omethoate) – dietary exposure estimate based on MRL.

Outcomes of the acute dietary exposure assessments for raspberries and blackberries remain acceptable. The use of dimethoate on raspberries and blackberries continues to be supported. The MRLs of T5 mg/kg for dimethoate on FB 0264 Blackberries and FB 0272 Raspberries, red, black should be made permanent.

With respect to other berry fruit, a summary of overseas trials on currants has been provided. In 16 trials conducted in Germany, dimethoate was applied to currants at 40 g ai/100 L. One to 3 applications were made, with the interval between applications ranging from 10 days to over a month. These data are not consistent with Australian GAP. However, as the spray concentrations were higher than approved in Australia, a dietary exposure has been estimated. Data addressing the 7-day withholding period are summarised in Table 24.

Table 24: Residue data addressing the common GAP for currants (pre harvest use); PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Residue for acute dietary exposure assessment[A] (mg/kg)
European trials summarised in Appendix 7	40 g ai/100 L, 3 applications, 10 days – 1 month apart	0.11, 0.20, 0.27, 0.28, 1.1, 1.20, 2.0, 4.5 (2)	0.01, 0.02, 0.03, 0.04, 0.05, 0.12, 0.26, 0.29, 0.60	0.28, 0.33 (n = 2), 0.39, 1.12, 1.23, 2.31, 4.54, 5.14	1.45

a Currants processed to juice (case 3); used STMRs to calculate residue for acute dietary exposure assessment (dimethoate 1.1 mg/kg, omethoate 0.05 mg/kg).

Outcomes of the acute dietary exposure assessment for currants are summarised below.

	Observed total HR (mg/kg)	Residue for acute dietary exposure assessment (Based on STMRs) mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Currants—pre harvest	5.14	1.45	290	60	No

Recommendations

- The post harvest treatment of blackberries, boysenberries, loganberries, mulberries, raspberries and berry fruit generally with dimethoate is no longer supported as residue data are not available.
- The pre harvest treatment of berry fruit generally with dimethoate is not supported as acute dietary exposure estimates are unacceptable (currants, strawberries).
- Pre harvest treatment of blackberries and raspberries is supported. The temporary MRLs of T5 and T3 mg/kg previously recommended for dimethoate and omethoate respectively on FB 0264 Blackberries and FB 0272 Raspberries, Red, Black should be made permanent.

7.6 FT Assorted tropical and sub-tropical fruits, edible peel

An outcome of the *Dimethoate residues and dietary risk assessment report* of 2011 was that uses on Assorted tropical and sub-tropical fruits, edible peel were no longer supported. No further alternative data has been submitted, however an alternative use for olives has been proposed. Previous findings are presented here along with consideration of the alternative use.

Dimethoate was registered as a pre harvest treatment for control of Queensland fruit fly on carambola and babaco. Post harvest treatment of acerola, babaco, carambola, cashew apple, date (fresh), fig, grumichama, hog plum, kumquat (cumquat), olives, and tropical and sub-tropical fruit generally was approved under permit[15].The pre harvest treatment of olives with dimethoate was also approved under permit[16].

15 Permit 10555, 12074 and 12343.

16 Permit 11780.

Crop	Treatment	Rate	WHP (days)	Comments
Carambola, babaco	Pre harvest	30 g ai/100 L	7	Apply when pests appear and repeat as necessary
Olives	Pre harvest (permit)	30 g ai/100 L	14	
Tropical and sub-tropical fruit	Post harvest (permit)	400 mg ai/L (40 g ai/100L)	Not required	Dip or flood spray

No data are available to support the previously approved pre harvest use of dimethoate on carambola and babaco, or edible peel tropical and sub-tropical fruit generally. These uses are no longer supported.

7.6.1 FT 0305 Olives

Australian and international data are available for olives. The Australian trials did not report the proportion of the total residue due to omethoate, while the overseas trials used a higher application rate than approved in Australia. Data addressing previously approved GAP from permits are summarised in Table 25.

Table 25: Residue data addressing the common pre harvest GAP for olives; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Data evaluated for permit 8559	30 g ai/100 L, 2 applications, 14 days apart	–	–	2.32, 2.87	7.49
European data summarised in Appendix 7	60 g ai/100 L, 4 applications	0.01 (2), 0.21, 1.27, 1.38	0.29, 0.40 (2), 0.41, 0.47	0.44, 0.45, 0.64, 1.58, 1.89	

a Estimated based on proportion of residue due to omethoate in overseas trials—see text.

The total dimethoate residue in olives at 14 DALA (days after last treatment) in the Australian trial was 2.32 and 2.87 mg/kg. The proportion of the residue due to omethoate was not recorded. In the overseas trials the percentage of the total residue due to dimethoate alone at a 14-day PHI in the HR sample was 73% (1.38 mg/kg out of 1.89 mg/kg). The estimated dimethoate and omethoate residues in the Australian trial are therefore 2.10 and 0.77 mg/kg respectively. The estimated residue for acute dietary exposure assessment is therefore 7.49 mg/kg based on the Australian trial.

The acute dietary exposure assessment for pre harvest treatment of olives is summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Olives—pre harvest	2.87	7.49	400	80	No

The acute dietary exposure to dimethoate residues in olives is unacceptable for children. It is also noted that several olive processing studies are available. Residues of dimethoate and omethoate were reduced on processing to refined oil. However, as the dataset is limited and there was no significant reduction in residues of dimethoate or omethoate on canning (without sterilisation), it is not possible to refine the dietary exposure assessment for whole fruit. (Immediately after processing, dimethoate residues were 0.92–1.3× the residue prior to canning; omethoate residues were 0.89–1.1× the residue prior to canning). If the STMRs from the European trials are used for acute dietary exposure estimates, the exposure is still unacceptable for children (160% of ARfD).

Alternative GAP for olives grown for oil production only

After publication of the initial review report a request was received from the olive industry for use of dimethoate under permit (13999) on olive trees grown for oil production only in conjunction with a 6 week harvest withholding period.

Crop	Treatment	Rate	WHP (days)	Comments
Olives grown for oil production only	Pre harvest	30 g ai/100 L	6 weeks	Apply a maximum of 4 applications per season

In the European trials residues of dimethoate in olive flesh at 41 – 42 days after the last of 4 applications of dimethoate at 60 g ai/100 L were <0.002, <0.01, 0.01, 0.03 and 0.20 mg/kg. Residues of omethoate were 0.06 (n = 3), 0.25 and 0.33 mg/kg. The highest dimethoate and omethoate processing factors for refined oil were 0.29× and 0.024×. Applying the highest processing factors to the highest residues in olive flesh, the estimated residues in refined oil are 0.058 mg/kg dimethoate and 0.0079 mg/kg omethoate. Outcomes of the acute dietary exposure assessment for the alternative GAP for olives for oil production only are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Olive oil, refined	0.066	0.11	<5	<1	Yes

The use of dimethoate on olives grown for oil production only in conjunction with a 6 week harvest withholding period was supported under permit 13999 (19th April 2013 to 5th October 2017). Temporary MRLs of T0.1 mg/kg and T0.01 mg/kg were recommended for dimethoate and omethoate respectively on OR 0305 Olive oil, refined. Only the dimethoate MRL was established.

Recommendations

- The approved pre harvest use of dimethoate on olives under permit is no longer supported due to unacceptable acute dietary exposure estimates.
- The alternative use of dimethoate on olives grown for oil production only in conjunction with a 6 week harvest withholding period was supported under permit 13999 (expires 5th October 2017).
- A temporary MRL of T0.1 mg/kg has been established for dimethoate on OR 0305 Olive oil, refined to cover the use under permit 13999.

- A temporary MRL of T0.01 mg/kg is recommended for omethoate on OR 0305 Olive oil, refined to cover the use under permit 13999.

7.6.2 FT 0307 Persimmon, Japanese

A study on the pre harvest treatment of persimmon with dimethoate has been provided for review. Data addressing previously approved GAP for other tropical fruit and sub-tropical fruit, edible peel are summarised in Table 26.

Table 26: Residue data addressing the common pre harvest GAP for other tropical fruit and sub-tropical fruit, edible peel; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Persimmon, 07-HAL-005(a)GLP, Volume 4, Part a	30 g ai/100 L, 3 applications, 7 days apart	0.97	1.24	2.30	9.6

A dataset consisting of a single trial is not considered adequate to support a robust estimate of dietary exposure for persimmon. Preliminary analysis on the basis of the available data indicates that acute exposure estimates for children and the general population would be unacceptable (see Section 8.1 Acute dietary exposure estimates). In response to the initial publication of the residues review report it was suggested that the APVMA should use the high consumer data for persimmons which was used previously in undertaking short term dietary intake estimations for endosulfan. FSANZ was consulted regarding appropriate consumption figure for persimmons and indicated that the replacement values used in the endosulfan review are based on an outdated data package and do not meet current FSANZ requirements for estimation of the 97.5th percentile intake. It is also noted that Codex are proposing a change in classification for persimmons to include them with pome fruit. Use of dimethoate on pome fruit has is also not supported by this review.

The pre harvest treatment of persimmon with dimethoate is not supported due to an inadequate dataset to assess acute dietary exposure.

Tropical and sub-tropical fruits, edible peel, recommendations

- The approved pre and post harvest uses of dimethoate on tropical and sub-tropical fruit, edible peel are no longer supported.
- Dietary exposure estimates were unacceptable for pre harvest treatment of olives; insufficient data are available for other pre and post harvest uses.
- An alternative use of dimethoate on olives grown for oil production only in conjunction with a 6 week harvest withholding period was supported under permit 13999 (expires 5th October 2017).

7.7 FI Assorted tropical and sub-tropical fruits, inedible peel

Since the *Dimethoate residues and dietary risk assessment report* of 2011 additional data have been received for avocado and pineapples. Previous findings are presented here along with consideration of the new data.

7.7.1 FI 0326 Avocado

Dimethoate was registered for the control of Queensland fruit fly as a pre harvest foliar spray or a post harvest dip. Similar post harvest treatments of avocado with dimethoate are also allowed under permit[17].

Crop	Treatment	Rate	WHP (days)	Comments
Avocado	Pre harvest	30 g ai/100 L	7	Apply when pests appear and repeat as necessary.
	Post harvest	40 g ai/100 L	Not required	Dip or flood spray.

The uses were covered by the dimethoate and omethoate fruit MRLs of 5 and 2 mg/kg respectively.

Pre and Post harvest use

Residue data for avocado were previously available for post harvest use. Six new Australian residue trials have now been provided in which avocados received both a pre and post-harvest treatment. Data addressing currently approved GAP are summarised in Table 27.

Table 27: Residue data addressing the common pre + post harvest GAP for avocado, PHI 7 days for pre-harvest treatment

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue in whole fruit for MRL determination (mg/kg)	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
NRA minute 26 May 1999, as 1998 JMPR	400 mg ai/L dip	–	–	0.20 (assumed total)	
Study 07-HAL-005(b)GLP, Volume 3, Part a	40 g ai/100 L dip	1.26, 1.63, 1.71	0.02, 0.03, 0.04	1.29, 1.65, 1.75	0.18[a]
Study 12-AKC-002GLP (new study)	30 g ai/100 L 3 foliar applications + 40 g ai/100 L dip	0.042, 0.062, 0.062, 0.067, 0.107, 0.166 (pulp)	<0.005, <0.01, <0.01, <0.01, 0.01, 0.032 (pulp)	0.322, 0.429, 0.458, 0.501, 0.754, 0.807	0.39[b]

17 Permit 10555, 12074 and 12343.

a Sample with highest residue in pulp for dietary exposure assessment had 0.04 mg/kg dimethoate, 0.02 mg/kg omethoate.

B Sample with highest residue in pulp for dietary exposure assessment had 0.166 mg/kg dimethoate, 0.032 mg/kg omethoate.

Outcomes of the acute dietary exposure assessment for pre + post harvest treatment of avocado are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Avocado—pre + post harvest	1.75 (whole fruit)	0.39 (edible portion)	96.5	15	Yes

Outcomes of the acute dietary exposure assessment for avocados are acceptable. The pre and post-harvest treatment of avocados with dimethoate is supported. Dimethoate and omethoate MRLs of 3 and 0.1 mg/kg respectively are recommended for FI 0326 Avocado based on highest total dimethoate and omethoate residues of 1.75 and 0.04 mg/kg in whole fruit after post harvest treatment.

Recommendations

- The pre and post harvest treatment of avocados with dimethoate continues to be supported.
- It is recommended that new MRLs of 3 and 0.1 mg/kg respectively be established for dimethoate and omethoate on FI 0326 Avocado.

7.7.2 FI 0327 Banana

Dimethoate was registered for the control of various pests in bananas as a foliar spray or a fruit dip as summarised below. (Similar post harvest treatments of bananas were also allowed under permit[18].)

Crop	Treatment	Rate (dimethoate)	WHP (days)	Comments
Banana	Pre harvest (dimethoate)	30 g ai/100 L	7 days	Apply in at least 1,000 L water per hectare when pests appear.
	Post harvest (dimethoate)	30 g ai/100 L (40 g ai/100 L as quarantine treatment or 400 mg ai/L under permit)	Not required	Dip (or also flood spray under permit).

Note: A use on banana for control of banana aphid with concurrent destruction of plants is considered a non-food use and is not considered here.

The uses were covered by the dimethoate and omethoate fruit MRLs at 5 and 2 mg/kg respectively.

18 Permit 10555, 12074 and 12343 (general use on tropical and sub-tropical fruit).

Post harvest use

Residue data for dimethoate on bananas have previously been considered by the APVMA.[19] Post harvest dipping of banana at 300 mg dimethoate/L resulted in dimethoate residues of 0.3–0.7 mg/kg in whole fruit and 0.05–0.08 mg/kg in pulp (number of trials not stated). The proportion of the residue due to omethoate was not reported. For the acute dietary exposure assessment it was assumed that the residue in the pulp was all omethoate, which would be the worst case. A summary of the assessment follows.

	Residues (mg/kg total)	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Banana—post harvest	0.3–**0.7** (whole fruit)	0.56 (0.08×7) (pulp)	65	20	Yes

Pre harvest use

No residue data are available for the registered pre harvest use of dimethoate on bananas to estimate MRLs or acute dietary exposure. Given the systemic nature of dimethoate the use is no longer supported.

Based on a highest total residue of 0.7 mg/kg in whole fruit after a dimethoate post harvest dip, it is recommended that residues will be covered by the dimethoate and omethoate MRLs for FI 0030 Assorted tropical and sub-tropical fruits—inedible peel at 5 and 2 mg/kg respectively recommended in section 7.7.6.

Recommendations

- The pre harvest treatment of bananas with dimethoate is no longer supported as residue data are not available.
- The post harvest treatment of bananas with dimethoate continues to be supported.

7.7.3 FI0343 Litchi

Dimethoate was registered in Australia for use on litchis as either a pre-planting dip, a pre harvest foliar spray or a post harvest dip as summarised below. Similar post harvest treatments were also allowed under permit[20].

Crop	Treatment	Rate	WHP (days)	Comments
Litchi	Pre-planting dip	30 g ai/100 L	7	Immerse plants in mixture for 1 minute and drain before planting in the field.
	Pre harvest spray	30 g ai/100 L	7	Apply just before a growth flush and repeat at 14–21-day intervals until all new growth is damage free.

19 For product 33055, 19 June 2001.

20 Permit 12074 and 12343 (general use on tropical and sub-tropical fruit).

Post harvest	40 g ai/100 L or 400 mg ai/L	–	Dip or flood spray.

The uses were covered by a dimethoate MRL for litchi of 5 mg/kg and the omethoate fruit MRL of 2 mg/kg.

Post harvest use

Residue data for the post harvest treatment of litchis with dimethoate are available. Data addressing currently approved GAP are summarised in Table 28. Highest residues in the whole fruit were observed immediately after treatment. Highest residues in the edible portion were observed in samples collected 5 days after treatment.

Table 28: Residue data addressing the post harvest GAP for litchi

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue in whole fruit for MRL determination (mg/kg)	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
NRA minute 26 May 1999, as JMPR 1998	Dip 315 mg/L, 1 minute	–	–	2.1	1.1[a]
	Flood spray 290 mg/L, 10 sec	–	–	1.3	0.81[b]

a Sample with highest residue in edible portion for dietary exposure assessment was taken 5 days after treatment and had a dimethoate residue of 0.99 mg/kg and omethoate of 0.02 mg/kg.

b Sample with highest residue in edible portion for dietary exposure assessment was taken 5 days after treatment and had a dimethoate residue of 0.67 mg/kg and omethoate of 0.02 mg/kg.

A summary of the outcomes of the acute dietary exposure assessment for post harvest treatment of litchi follows.

	Estimated total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Litchi — post harvest	2.1	1.1 (pulp)	60	15	Yes

The currently approved post harvest use of dimethoate on litchi remains acceptable

Pre harvest use

Residue data covering a pre harvest foliar spray to litchis have been provided. Data addressing currently approved GAP are summarised in Table 29.

Table 29: Residue data addressing the pre harvest GAP for litchi; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue in whole fruit for MRL determination (mg/kg)	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP; Volume 5; Part a	30 g ai/100 L, 3 applications, 7–10 days apart	1.02	1.07	2.17	0.55[a]
		0.51	0.36	0.90	0.09

a Sample with highest residue in edible portion for dietary exposure assessment had a dimethoate residue of 0.06 mg/kg and omethoate of 0.07 mg/kg.

A summary of the outcomes of the acute dietary exposure assessment for pre harvest treatment of litchi follows.

	Estimated total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Litchi — pre harvest	2.17	0.55 (pulp)	30	10	Yes

The currently approved pre harvest use of dimethoate on litchi remains acceptable

The pre-planting dip application is supported. Litchi trees do not produce fruit for about the first 3 years[21] and residues are not expected to occur in fruit as a result of this use.

Recommendations

- The approved pre and post harvest uses of dimethoate on litchi continues to be supported.
- The currently established MRL of 5 mg/kg for dimethoate on litchi remains appropriate. However, this MRL will be replaced with a group MRL for FI 0030 Assorted tropical and sub-tropical fruits—inedible peel at 5 mg/kg (see section 7.7.6).
- It is recommended that a new MRL of 2 mg/kg are established for omethoate on FI 0030 Assorted tropical and sub-tropical fruits – inedible peel.

7.7.4 FI 0345 Mango

Dimethoate was registered in Australia for control of various insect pests in mangoes. It could be used as an in field (pre harvest) treatment as well as a post harvest treatment as summarised below. Similar post harvest treatments of mango with dimethoate were also allowed under permit[22].

21 <www.fao.org/docrep/005/ac684e/ac684e05.htm>.

22 Permits 10555, 12074 and 12343 (general use for tropical and sub-tropical fruit).

Crop	Treatment	Rate	WHP (days)	Comments
Mango	Pre harvest	30 g ai/100 L	3	Apply when pests appear and repeat as necessary
	Post harvest (label and permit)	40 g ai/100 L	–	Dip or flood spray.

The uses were covered by the dimethoate mango MRL at 1 mg/kg and the omethoate fruit MRL at 2 mg/kg.

Pre and post harvest use

Residue data for the foliar and post harvest application of dimethoate on mangoes have been considered previously by the APVMA and are also available through the JMPR. Edible portion data were available for five trials undertaken according to the approved use pattern. The data addressing currently approved GAP are summarised in Table 30.

Table 30: Residue data addressing the pre and post harvest GAP for mango; PHI 3 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue in whole fruit for MRL determination (mg/kg)	Edible portion data available	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
Residues evaluation for product 32962, application 29807, as 2003 JMPR	3 foliar applications at 30 g ai/100 L, followed after 3 days by a post harvest dip at 40 g ai/100 L	0.34	0.06	0.40	Yes	
		0.25	0.05	0.30	Yes	
		0.26	0.02	0.28	Yes	
		0.43	0.02	0.45	Yes	0.62[a]
		0.18	0.03	0.21	Yes	
NRA minute 26 May 1999, as 1998 JMPR	High-volume spray 400 mg/L (post harvest)	–	–	0.27		
	Dip 500 mg/L (post harvest)	–	–	0.49		

a Sample with highest residue in edible portion for dietary exposure assessment had a dimethoate residue of 0.48 mg/kg and omethoate of 0.02 mg/kg in mango pulp.

When dimethoate was used according to GAP for the spray and dip applications combined (30 g ai/100 L, 3 applications at 7-day intervals, 3-day WHP, followed by a dip of 400 ppm, 1 application, 0-day WHP), total residues of dimethoate in whole mangoes were 0.21, 0.28, 0.30, 0.40 and 0.45 mg/kg. Omethoate residues were 0.02 (n = 2), 0.03, 0.05 and 0.06 mg/kg.

Outcomes of the acute dietary exposure assessment for combined pre and post harvest treatment of mango are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Mango—pre harvest + post harvest	0.45 (whole fruit)	0.62	65	30	Yes

The acute dietary exposure to dimethoate residues in mangoes after combined pre and post harvest treatment is acceptable. The current MRL of 1 mg/kg for dimethoate on mangoes remains appropriate, given a highest total residue of 0.45 mg/kg in whole fruit. A new MRL of 0.1 mg/kg should be established for omethoate on FI 0345 Mango, based on a highest omethoate residue of 0.06 mg/kg in whole fruit.

Recommendations

- The approved pre harvest and post harvest uses of dimethoate on mangoes continues to be supported.
- The current MRL of 1 mg/kg for dimethoate on mangoes remains appropriate. A new MRL of 0.1 mg/kg should be established for omethoate on FI 0345 Mango.

7.7.5 FI 0353 Pineapple

A Queensland Board Approval previously existed for use for the foliar treatment of pineapples with dimethoate (expired 30 September 2011)[23].

Current labels do not include a pre-harvest use patternfor pineapple, however the following use under permit has been assessed:

Crop	Treatment	Rate	WHP (days)	Comments
Pineapple	Pre harvest	44 g ai/100 L	35	Multiple applications at 14-day intervals

Two Australian trials were previously available. The withholding period of 35 days was recommended to ensure residues of dimethoate and omethoate were below the LOQ in the edible portion and therefore acute dietary intakes would be acceptable.

As the relative weights of peel and pulp were not recorded it was not possible to accurately estimate residues in the whole fruit. An additional two GLP residue trials have since been provided. Data addressing currently approved GAP are summarised in Table 31.

23 Before the National Registration Scheme began, the Queensland Department of Primary Industries and Fisheries issued approvals for off-label use of pesticides (known as Queensland Board Approvals).

Table 31: Residue data addressing the pre harvest GAP for pineapple; PHI 35 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
Data supplied for permit 10457, resubmitted as Study 07-HAL-005(a)GLP	44 g ai/100 L, 4 applications, 14 days apart	<0.01 (pulp)	<0.01 (pulp)	0.08
		<0.01 (pulp)	<0.01 (pulp)	
Study AKC-1202 (new study)	44 g ai/100 L, 4 applications, 7-21 days apart	0.01, 0.02 (pulp)	0.01, 0.01 (pulp)	0.09

The highest calculated total dimethoate residue in the whole fruit in the new study was 0.04 mg/kg, with the highest omethoate residue 0.01 mg/kg.

A summary of the outcomes of the acute dietary exposure assessment for pre harvest treatment of pineapples follows.

	Estimated total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Pineapple—pre harvest	0.04 (whole fruit)	0.09 (pulp)	50	15	Yes

On the basis of the available data, the acute dietary exposure to dimethoate in pineapples after pre harvest treatment is acceptable. New dimethoate and omethoate MRLs of 0.07 and 0.03 mg/kg are recommended for FI 0353 Pineapple based on calculated highest residues in whole fruit of 0.04 and 0.01 mg/kg respectively.

Pineapple bran, forage and tops may be fed to livestock. Highest total dimethoate residues in peel (the main component of bran), tops and forage in the new residue trials were 0.47, 0.18 and 0.20 mg/kg respectively on a dry weight basis. Residues in bran, tops and forage are therefore not considered to be of significant concern for animal feeding (see section 7.21).

Recommendations

- Pre harvest use of dimethoate on pineapples is supported in conjunction with a 35-day harvest withholding period.
- It is recommended that new dimethoate and omethoate MRLs of 0.07 and 0.03 mg/kg respectively be established for FI 0353 Pineapple.

7.7.6 Other assorted tropical and sub-tropical fruit, inedible peel

Dimethoate was registered as a pre harvest application to abiu, casimiroa (white sapote), granadilla, santol, sapodilla and wax jambu, custard apple, pawpaw and passionfruit as summarised below. The pre harvest treatment of durian, mangosteen and rambutan with dimethoate was allowed under permit (10571).

Dimethoate was registered for post harvest applications as a dip for use on persimmon, custard apple, pawpaw and passionfruit, and as a quarantine treatment on banana passionfruit, cactus fruit, feijoa, guava, kiwifruit, pawpaw, passionfruit, persimmon and pomegranate. Post harvest treatment of various fruit from this group with dimethoate was also allowed under permit, including abiu, cactus fruit, caimito (star apple), casimiroa (white sapote), cherimoya, custard apple, durian, feijoa, grandilla, guava, kiwifruit, mangosteen, passionfruit, persimmon, prickly pear, rambutan, rollinia, sapodilla, soursop, sweetsop (sugar apple), tamarillo and wax jambu.[24]

Crop	Treatment	Rate	WHP (days)	Comments
Abiu, casimiroa (white sapote), granadilla, santol, sapodilla, wax jambu	Pre harvest	30 g ai/ 100 L	7	Apply when pests appear and repeat as necessary.
Custard apple	Pre harvest	30 g ai/ 100 L	7	Apply every 7–14 days as required during fruit ripening.
Pawpaw, passionfruit	Pre harvest	30 g ai/ 100 L	7	Apply when pests appear and repeat as necessary.
Durian, mangosteen and rambutan (permit)	Pre harvest	30 g ai/ 100 L	7	Apply as a cover spray at first sign of infestation.
Tamarillo (tree tomato)	Post harvest	40 g ai/100 L	-	Dip
Abiu, cactus fruit, casimiro (white sapote), caimito (star apple), cherimoya, custard apple, durian, feijoa, grandilla, guava, kiwifruit, mangosteen, pawpaw, passionfruit, persimmon, pomegranate, prickly pear, rambutan, rollinia, sapodilla, soursop, sweetsop (sugar apple), wax jambu (includes registered uses and uses under permit)	Post harvest	40 g ai/ 100 L or 400 mg ai/L	–	Dip or flood spray.

Post harvest use

A study has been provided for the post harvest treatment of custard apple and papaya (pawpaw) with dimethoate. For papaya, the study did not provide the weights of the skin and pulp samples so it is not

24 Permit 10555, 12074 and 12343 (general use for tropical and sub-tropical fruit).

possible to accurately calculate residues in the whole fruit. Data addressing currently approved GAP are summarised in Table 32.

Table 32: Residue data addressing the post harvest GAP for custard apple and papaya

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue in whole fruit for MRL determination (mg/kg)	Highest residue in edible portion for acute dietary exposure assessment (mg/kg)
Custard apple, Study 07-HAL-005(b)GLP; Volume 3; Part a	40 g ai/100 L, dip 1 min.	1.10	0.04	1.14	
		3.10	0.06	3.16	0.18[a]
Papaya, Study 07-HAL-005(b)GLP; Volume 3; Part a	40 g ai/100 L, dip 1 min.	0.02 (pulp)	<0.01 (pulp)	–	
		<0.01 (pulp)	0.02 (pulp)	–	0.15

a Sample with highest residue in edible portion for dietary exposure assessment had a dimethoate residue of 0.04 mg/kg and omethoate of 0.02 mg/kg.

In custard apple whole fruit, total dimethoate residues were 1.14 and 3.16 mg/kg. Omethoate residues were 0.04 and 0.06 mg/kg.

Total dimethoate residues in papaya pulp were 0.03 (2) mg/kg. Omethoate residues were <0.01 and 0.02 mg/kg. The dataset is limited; however, it is consistent with the post harvest avocado data and is considered adequate to support dietary exposure assessment.

Based on an edible portion of 70% of the total mass[25] and the highest total dimethoate residue in the skin of 8.94 mg/kg (with 0.03 mg/kg in the pulp), the estimated highest total dimethoate residue in the whole papaya fruit is 2.7 mg/kg. For a highest omethoate residue of 0.20 mg/kg in the skin (with <0.01 mg/kg in the pulp), the estimated highest omethoate residue in whole fruit is 0.07 mg/kg.

Outcomes of the acute dietary exposure assessment for post harvest treatment of custard apple and papaya are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Custard apple—post harvest	3.16 (whole fruit)	0.18 (pulp)	60	20	Yes
Papaya/pawpaw—post harvest	2.7 (whole fruit, estimated)	0.15	70	15	Yes

25 Wills et al. 1986.

The acute dietary exposure to dimethoate residues in custard apple and papaya after post harvest treatment is acceptable.

The available residue data support post harvest use on avocado, banana, litchi, mango, custard apple and papaya (paw paw). On this basis the continued post harvest use of dimethoate on other members of the tropical and sub-tropical fruit (inedible peel) group (abiu, banana passionfruit, cactus fruit, caimito (star apple), casimiroa (white sapote), cherimoya, durian, feijoa, grandilla, guava, kiwifruit, mangosteen passionfruit, persimmon (American, inedible peel varieties), pomegranate, prickly pear, rambutan, rollinia, santol, sapodilla, soursop, sweetsop (sugar apple), tamarillo and wax jambu) continue to be supported.
A new dimethoate MRL of 5 mg/kg for FI 0030 Assorted tropical and subtropical fruits—inedible peel (except avocado, mango, pineapple) and an omethoate MRL of 2 mg/kg for FI 0030 Assorted tropical and subtropical fruits—inedible peel (except avocado, mango, pineapple) are recommended.

Pre harvest use

Residue data to support the registered uses of pre harvest application to abiu, casimiroa (white sapote), granadilla, santol, sapodilla, wax jambu, custard apple, papaya (pawpaw) and passionfruit are not available. Those uses are no longer supported. Similarly, there are no data to support the continued pre harvest treatment of durian, mangosteen and rambutan with dimethoate under permit.

It is noted that a single pre harvest trial has been provided on persimmons as an edible peel tropical fruit (see Section 7.6.2 FT 0307 Persimmon, Japanese). A single trial is considered inadequate to assess dietary exposure.

Recommendations

- Pre harvest application of dimethoate to abiu, banana, casimiroa (white sapote), granadilla, santol, sapodilla, wax jambu, custard apple, papaya (pawpaw) and passionfruit is no longer supported, as there is insufficient data to assess dietary exposure.
- Pre harvest treatment of durian, mangosteen and rambutan with dimethoate as previously approved under permit is no longer supported.
- Pre harvest treatment of persimmon is not supported.
- The approved pre harvest treatment of avocado, litchi, mango and pineapple continue to be supported.
- The approved post harvest treatment of abiu, avocado, banana, banana passionfruit, cactus fruit, caimito (star apple), casimiroa (white sapote), cherimoya, custard apple, durian, feijoa, grandilla, guava, kiwifruit, litchi, mango,mangosteen, papaya (paw paw), passionfruit, persimmon (American—inedible peel varieties), pomegranate, prickly pear, rambutan, rollinia, santol, sapodilla, soursop, sweetsop (sugar apple), tamarillo and wax jambu continue to be supported.
- New MRLs of 3 and 0.1 mg/kg respectively be established for dimethoate and omethoate on FI 0326 Avocado.
- New dimethoate and omethoate MRLs of 0.07 and 0.03 mg/kg respectively be established for FI 0353 Pineapple.
- A new dimethoate MRL of 5 mg/kg for FI 0030 Assorted tropical and subtropical fruits—inedible peel (except avocado, mango, pineapple) be established.

- A new MRL of 0.1 mg/kg should be established for omethoate on FI 0345 Mango.
- A new omethoate MRL of 2 mg/kg for FI 0030 Assorted tropical and subtropical fruits—inedible peel (except avocado, mango, pineapple) be established.

7.8 VA Bulb vegetables

Continued use on Bulb vegetables was supported for onions only in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted. Previous findings are presented here.

Dimethoate was registered in Australia for the control of various insect pests on bulb vegetables as summarised below.

Crop	Treatment	Rate	WHP (days)	Comments
Vegetables (inc. bulb)	Pre harvest (dimethoate)	30 g ai/100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary

The uses were covered by dimethoate and omethoate vegetable MRLs each at 2 mg/kg.

New Australian data for the pre harvest treatment of onions have been provided for review. Details of nine German trials on onions are also available. Data addressing currently approved GAP for onions are summarised in Table 33.

Table 33: Residue data addressing the common GAP for onions; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Onions, study 07-HAL-005(a)GLP, Volume 6, Part a	30 g ai/100 L, 3 applications, 6–9 days apart	0.06, 0.11, 0.14, 0.24	0.04, 0.08, 0.14, 0.20	0.10, 0.20, 0.29, 0.46	1.64[a]
European studies summarised in Appendix 7	40 g ai/100 L, 1–3 applications	<0.01 (2), 0.01, <0.02, <0.05 (2), 0.08, 0.10, 0.31	<0.01 (2), <0.02 (3), 0.02, <0.05 (2)	0.01 (d only), <0.02 (2), <0.04, <0.1 (2), 0.10, 0.12, 0.33	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.24 mg/kg and omethoate of 0.20 mg/kg.

Although the European data were generated following treatment at a significantly higher concentration than that currently approved in Australia, it lends support to the limited Australian dataset for the purposes of acute dietary exposure assessment and MRL setting. A summary of the acute dietary exposure assessment for onions follows.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Onions—pre harvest (dimethoate)	0.46	1.64	80	40	Yes

The acute dietary exposure to dimethoate residues in onions is acceptable. It is recommended that new dimethoate and omethoate MRLs of 0.7 and 0.5 mg/kg be established for VA 0385 Onions. As data are only available for onions, extrapolation to other bulb vegetables is not supported.

Recommendations

- The general pre harvest use of dimethoate on bulb vegetables is supported for onions only, as residue data are only available for this commodity.
- It is recommended that new dimethoate and omethoate MRLs of 0.7 and 0.5 mg/kg be established for VA 0385 Onions.

7.9 VB Brassica (cole or cabbage) vegetables, head cabbages, flowerhead brassicas

Previous dimethoate labels contain a general use for vegetables as summarised in the following table.

Crop	Rate	WHP (days)	Comments
Vegetables (general) (inc. cole)	30 g ai/100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary.

The uses were covered by the dimethoate and omethoate vegetable MRLs each at 2 mg/kg.

Requests for consideration of alternative uses have been made for broccoli, Brussels sprouts, cabbages and cauliflower.

Australian residue data for brassica vegetables (broccoli, cauliflower, Brussels sprouts and cabbage) have been provided for review. Data from trials conducted in Germany and the United Kingdom have also been provided: eight trials were conducted on cabbage with a further three on white cabbage and 17 on Savoy cabbage. Eight trials were conducted on cauliflower, 12 on Brussels sprouts and two on kohlrabi.

7.9.1 VB 0400 Broccoli and broccolini

Continued use on broccoli and broccolini was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted, however an alternative use has been proposed. Previous findings are presented here along with consideration of the alternative use.

Data addressing previously approved GAP for broccoli and broccolini are summarised in Table 34.

Table 34: Residue data addressing the common GAP for broccoli and broccolini; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Broccoli and broccolini, Study 07-HAL(a)GLP, Volume 7, Part a	30 g ai/100 L, 3 applications, 7 days apart	0.39, 0.73, 1.15[a]	0.26, 0.42[a], 0.57	0.67, 1.34, 1.60[a]	4.72[b]

a Observed 14 days after last application.

B Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.73 mg/kg and omethoate of 0.57 mg/kg.

A dataset consisting of three trials is not considered adequate to support a robust estimate of dietary exposure. Preliminary analysis on the basis of the available data indicates that acute exposure estimates for children and the general population would be unacceptable (see Section 8.1 Acute dietary exposure estimates).

The pre harvest treatment of broccoli, broccolini and similar brassica vegetables such as Chinese broccoli with dimethoate is not supported due to an inadequate dataset to assess acute dietary exposure.

Alternative GAP

After the initial publication of the residues review report the APVMA was asked to consider if an alternative GAP with a 21 day withholding period could be supported for broccoli. As data for broccoli at longer harvest intervals were not available it was requested that data submitted for cauliflower be extrapolated to broccoli.

Outcomes of the acute dietary exposure assessment for broccoli based on the cauliflower residue data (see 7.9.4) and a 21 day PHI are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Broccoli	0.13	0.37	50	15	Yes

As the dietary exposure is acceptable based on the cauliflower residue data the use was supported for an interim period pending the provision of residue data for broccoli. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate on VB 0400 Broccoli. Only the dimethoate MRL was established.

As no additional residue data for broccoli have been received, support for this interim use is now withdrawn. The temporary MRL of T0.3 mg/kg for dimethoate on broccoli should now be deleted.

7.9.2 VB 0402 Brussels sprouts

Continued use on Brussels sprouts was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted, however an alternative use has been proposed. Previous findings are presented here along with consideration of the alternative use.

Data addressing previously approved GAP for Brussels sprouts are summarised in Table 35. The European data is considered not to support the Australian GAP owing to its higher application rate but has been included for comparative purposes.

Table 35: Residue data addressing the common GAP for Brussels sprouts; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL(a)GLP, Volume 7, Part a	30 g ai/100 L, 3 applications, 7-day intervals	0.30, 0.39	0.29, 0.34	0.61, 0.76	2.77[a]
European studies summarised in Appendix 7	40 g ai/100 L, 2–3 applications	<0.05, 0.08, 0.11 , 0.12	0.13, 0.18, 0.61	0.12 (d only), 0.25, 0.27, 0.71	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.39 mg/kg and omethoate of 0.34 mg/kg.

The European data were generated following treatment at a significantly higher concentration than previously approved in Australia; however, it lends support the acceptability of the limited Australian dataset for acute dietary exposure assessment. Outcomes of the acute dietary exposure assessment for Brussels sprouts are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Brussels sprouts	0.76	2.77	105	35	No

The outcome of the acute dietary exposure assessment for dimethoate on Brussels sprouts is unacceptable for children (2–6 years) based on the Australian data. The use of dimethoate on Brussels sprouts is no longer supported.

Alternative GAP

In response to the initial publication of the residues review report the APVMA was asked to consider an alternative GAP for Brussels sprouts with an extended 14 day withholding period in conjunction with the use of alternative consumption figures in the NESTI calculation. The APVMA consulted with FSANZ on the

appropriate consumption figure for Brussels sprouts for children. FSANZ responded that the consumption figure for brassica vegetables as previously used remains appropriate.

For the proposed alternative GAP, the available Australian trials did not determine residues after a 14 day PHI. Residues in the available European trials at 14 or more days after the last application are summarised below in Table 36.

Table 36: Residue data addressing the proposed alternative GAP for Brussels sprouts; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised in Appendix 7	67 g ai/100 L (0.4 kg ai/ha), 6 applications	0.03 (2), 0.04, 0.06, 0.10 (2), 0.11 (2)	<0.01 (2), 0.02, 0.03 (2), 0.04, 0.07, 0.11	0.04, 0.05, 0.07, 0.09, 0.12, 0.14, 0.19, 0.22	
European studies summarised in Appendix 7	40 g ai/100 L, 2–3 applications	<0.05 (2), 0.05, 0.06	0.09, 0.16, 0.41 (21 days)	0.06 (d only), 0.15, 0.22, 0.49 (21 days)	2.92

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of <0.05 mg/kg and omethoate of 0.41 mg/kg at 21 days after the last application.

Outcomes of the revised acute dietary exposure assessment for Brussels sprouts based on the overseas data and a 14 day withholding period are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Brussels sprouts	0.49	2.92	110	40	No

The proposed alternative use of dimethoate on Brussels sprouts with a 14 day withholding period is not supported due to unacceptable acute dietary exposure estimates for children.

7.9.3 VB 0041 Cabbage

Continued use on cabbage was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted, however an alternative use has been proposed. Previous findings are presented here along with consideration of the alternative use.

Data addressing previously approved GAP for cabbage are summarised in Table 37. The European data are considered not to comply with the Australia GAP but are included here for comparative purposes.

Table 37: Residue data addressing the common GAP for cabbage; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Australian cabbage, Study 07-HAL(a)GLP, Appendix 8	30 g ai/100 L, 3 applications, 7-day intervals	0.13, 0.19	0.11, 0.13	0.25, 0.33	1.1[a]
European white cabbage, summarised in Appendix 7	40 g ai/100 L, 2 applications	0.02, 0.14, 0.16	0.01 (from sample with D 0.02)	0.03, 0.14, 0.16	
European Savoy cabbage, summarised in Appendix 7	40–70 g ai/100 L, 1–4 applications (final applications were at 40 g ai/ 100 L)	0.01, <0.02 (3), 0.02 (3), 0.03, 0.04, 0.05, 0.07, 0.08 (2), 0.09, 0.22, 0.43	<0.01, <0.02, 0.02 (2), 0.03 (3), 0.05, 0.07, 0.17, 0.19, 0.30, 0.37 (2), 0.38 (D 0.43), 0.67 (D 0.08)	0.03 (2), 0.04, 0.05 (2), 0.07, 0.09, 0.16, 0.20, 0.27, 0.29, 0.37, 0.42, 0.43, 0.80, 0.84	4.77[b]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.19 mg/kg and omethoate of 0.13 mg/kg.

b Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.08 mg/kg and omethoate of 0.67 mg/kg.

Cabbage is a major crop and data from two trials are not sufficient to undertake a dietary exposure assessment. The use of dimethoate on cabbage is no longer supported.

Alternative GAP

After publication of the initial residues review report the APVMA was requested to consider an alternative GAP for cabbages with a 21 day withholding period. It was also requested that the use be restricted to drumhead varieties only.

No Australian data for cabbages are available for longer harvest intervals. The available overseas data for a 21 day PHI are summarised below, noting that it is not considered appropriate to scale residues for rate for dimethoate. Drumhead varieties are highlighted in bold (As indicated by AusVeg in their response)

Table 38: Residue data addressing the alternative GAP for cabbage; PHI 21 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European cabbage, summarised in Appendix 7	67 g ai/100 L (0.4 kg ai/ha), 6 applications	**0.01**, **0.02**, 0.04, **0.06**, 0.20, 0.23, 0.25, 0.99	**0.01**, **0.02 (2)**, 0.03, 0.17, 0.35, 0.36, 0.46	**0.02**, **0.04**, 0.07, **0.08**, 0.41, 0.59, 0.74, 1.37	3.47[a], 0.2[b]
European white cabbage, summarised in Appendix 7	40 g ai/100 L, 2 applications	**<0.01, <0.02 (2)**	**<0.01** (from sample with d <0.01)	**<0.02**	
European Savoy cabbage, summarised in Appendix 7	40 – 70 g ai/100 L, 1 – 4 applications (final applications were at 40 g ai/100 L)	<0.01 (4), <0.02 (8), <0.05 (6), 0.15	<0.01 (4), <0.02 (6), 0.03 (2), 0.09 (2), 0.12 (2), 0.51, 0.68	<0.02 (5), <0.04 (6), 0.05, 0.15 (2), 0.18 (3), 0.60, 0.78	4.81[c]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.25 mg/kg and omethoate of 0.46 mg/kg.

b The highest residue for dietary exposure assessment for drumhead cabbage only is 0.2 mg/kg from sample with a dimethoate residue of 0.06 mg/kg and omethoate 0.02.

C Sample with highest residue for dietary exposure assessment had a dimethoate residue of <0.05 mg/kg and omethoate of 0.68 mg/kg.

Outcomes of the revised acute dietary exposure assessment for cabbage based on the proposed alternative GAP with a 21 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
All cabbage	1.37	4.81	315	235	No
Drumhead cabbage	0.08	0.20	15	10	Yes

The acute dietary exposure is acceptable for drumhead cabbages only. Use was only supported on drumhead varieties for an interim period pending provision of additional data. Temporary dimethoate and omethoate MRLs of T0.2 and T0.05 mg/kg respectively were recommended for VB 0041 Cabbages, head. Only the dimethoate MRL was established.

As no additional residue data for cabbage have been provided, support for this interim use is now withdrawn. The temporary MRL of T0.2 mg/kg for dimethoate on VB 0041 Cabbages, head should now be deleted.

7.9.4 VB 0404 Cauliflower

Continued use on cauliflower was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted, however an alternative use has been proposed. Previous findings are presented here along with consideration of the alternative use.

Data addressing previously approved GAP for cauliflower are summarised in Table 39. The European data do not comply with Australian GAP but are included here for comparative purposes.

Table 39: Residue data addressing the common GAP for cauliflower; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Australian cauliflower, Study 07-HAL(a)GLP, Volume 7, Part a	30 g ai/100 L, 3 applications, 7-day intervals	0.23, 0.44, 0.81	0.44, 0.49, 0.55	0.70, 1.03, 1.34	4.24[a]
European cauliflower, summarised in Appendix 7	40 g ai/100 L, 2–3 applications, 1st application often by drenching	0.04 (O = 0.03), 0.09, 0.10, 0.14, 0.30, 1.37 (O = 0.23)	0.03, 0.23	0.07, 1.62	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.81 mg/kg and omethoate of 0.49 mg/kg.

A dataset consisting of three trials is not considered adequate to support a robust estimate of dietary exposure. Preliminary analysis on the basis of the available Australian data indicate that acute exposure estimates for children and the general population would be unacceptable.

The previous pre harvest treatment of cauliflower with dimethoate is not supported due to an inadequate dataset to assess acute dietary exposure.

Alternative GAP

After publication of the initial residues review report the APVMA was asked to consider an alternative GAP for cauliflower with a 21 day withholding period. Available residue data addressing a 21 day withholding period are summarised in Table 40, noting that it is not considered appropriate to scale residues in the overseas trials for rate.

Table 40: Residue data addressing the alternative GAP for cauliflower; PHI 21 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Australian cauliflower, Study 07-HAL(a)GLP, Volume7, Part a	30 g ai/100 L, 1 applications	0.09	0.04	0.13	0.37
European cauliflower, summarised in Appendix 7	40 g ai/100 L, 2-3 applications, 1st application often by drenching	0.01 (o = <0.01), <0.02 (o = 0.05), <0.02 (o = 0.02), <0.02, 0.05, 0.05, 0.10	<0.01, 0.02, 0.05	0.02, 0.04, 0.07	
European cauliflower, summarised in Appendix 7	67 g ai/100 L (0.4 kg ai/ha, 6 applications)	<0.01 (4), 0.02, 0.11	<0.01 (6)	<0.02 (4), 0.03, 0.12	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.09 mg/kg and omethoate of 0.04 mg/kg.

Outcomes of the revised acute dietary exposure assessment for cauliflower based on the proposed alternative GAP with a 21 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Cauliflower	0.13	0.37	40	15	Yes

As the acute dietary exposure to dimethoate residues is acceptable with a 21 day PHI, the alternative GAP for dimethoate on cauliflower was supported for an interim period pending the provision of additional data. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate on VB 0404 Cauliflower. Only the dimethoate MRL was established.

As no additional residue data for cauliflower have been provided, support for this interim use is now withdrawn. The temporary MRL of T0.3 mg/kg for dimethoate on VB 0404 Cauliflower should now be deleted.

7.9.5 VB 0405 Kohlrabi

For the kohlrabi trials only summary data were provided. In both trials 2 applications of dimethoate were made at 40 g ai/100 L. In the first trial the initial application was by drenching. The interval between applications was over 1 month in the first trial and 10 days in the second. Residues were reported as dimethoate only. The dimethoate residue in kohlrabi at 7 days after the last application was 1.85 mg/kg in the

first trial. The second trial did not determine residues at a 7-day PHI. At 25 days after the last application the high dimethoate residue was 0.03 mg/kg.

The dataset is not adequate to support a robust estimate of dietary exposure for kohlrabi. Preliminary analysis on the basis of the available data indicates that acute exposure estimates for children would be unacceptable.

The treatment of kohlrabi with dimethoate is not supported due to an inadequate dataset to assess acute dietary exposure.

7.9.6 Summary of recommendations for brassica (cole or cabbage) vegetables, head cabbages, flowerhead brassicas

Continued use of dimethoate on members of this group according to previously approved use patterns cannot be supported owing to acute dietary exposure estimates exceeding the ARfD of dimethoate, or, in the case of cabbage and kohlrahi[26], insufficient data are available to allow an exposure assessment to be undertaken.

- For broccoli an alternative GAP with a 21 day withholding period was supported for an interim period pending the provision of additional data. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate on VB 0400 Broccoli. Only the dimethoate MRL was established as omethoate residues were covered by a group MRL. As no additional data were provided, support for this interim use is now withdrawn. The temporary dimethoate MRL should now be deleted.
- For cabbage an alternative GAP with a 21 day withholding period was supported for an interim period for drumhead varieties only, pending the provision of additional data. Temporary MRLs of T0.2 and T0.05 mg/kg were recommended for dimethoate and omethoate on VB 0041 Cabbages, Head. Only the dimethoate MRL was established as omethoate residues were covered by a group MRL. As no additional data were provided, support for this interim use is now withdrawn. The temporary dimethoate MRL should now be deleted.
- For cauliflower an alternative GAP with a 21 day withholding period was supported for an interim period pending the provision of additional data. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate on VB 0404 Cauliflower. Only the dimethoate MRL was established as omethoate residues were covered by a group MRL. As no additional data were provided, support for this interim use is now withdrawn. The temporary dimethoate MRL should now be deleted.

7.10 VC Fruiting vegetables, cucurbits

Since the *Dimethoate residues and dietary risk assessment report* of 2011 additional data have been received for melons. An alternative use was proposed for cucumber. Previous findings for cucurbits are presented here along with consideration of the new data.

26 APVMA guidelines require about six residue trials for cabbage when a group MRL is being considered that address the proposed GAP, for risk assessment and MRL estimation.

Dimethoate was registered in Australia for the control of cucumber fly and other pests on cucurbits. There were no registered uses for post harvest treatment of cucurbits, although a Queensland Board Approval (approval 70033) for a post harvest dip/spray (0.1 L/100 L of a 400 g/L product, nil WHP) was in place for cucurbits (expired 30 September 2011). Permit 10555 also allowed the post harvest treatment of gourd – bitter and loofa – smooth.

Crop	Treatment	Rate	WHP (days)	Comments
Cucurbits	Pre harvest	30 g ai/100 L or 300 g ai/ha	1	Apply when pests appear and repeat as necessary.
	Post harvest (Queensland Board Approval)	40 g ai/100 L	–	Dip or spray.

The uses were covered by a dimethoate MRL of 5 mg/kg for cucurbits and an omethoate MRL of 2 mg/kg for vegetables [except lupin; peppers, sweet; tomato].

7.10.1 VC 0424 Cucumber

Post harvest use

Australian residue data for the post harvest treatment of cucumbers were previously available. New data have also been provided for review. Data addressing previously approved GAP for post harvest treatment of cucumbers are summarised in Table 41.

Table 41: Residue data addressing the common GAP for cucumbers, post harvest treatment

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
NRA minute, 26 May 1999	409 mg/L dip	–	–	0.6	–
Study 09-HAL-017GLP	40 g ai/100 L dip	0.84, 1.91, 2.13, 2.74	0.08, 0.1 (2), 0.22	0.95, 2.02, 2.22, 2.98	4.28[a]
Study 07-HAL-005(b)GLP, Volume 4, Part a	40 g ai/100 L dip	1.84	0.12	1.97	
Study 09-HAL-005GLP	30 g ai/100 L (3 applications pre harvest) + 40 g ai/100 L dip	2.37	0.20	2.59	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 2.74 mg/kg and omethoate of 0.22 mg/kg.

Outcomes of the acute dietary exposure assessment for post harvest treatment of cucumber are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Cucumber—post harvest	2.98	4.28	350	120	No

The acute dietary exposure to dimethoate residues in cucumbers after post harvest treatment is unacceptable for both children and the general population. The use is no longer supported.

Pre harvest use

Four Australian trials conducted on cucumber grown in protected situations have been provided for review. Data on previously approved GAP for pre harvest treatment of cucumbers are summarised in Table 42.

Table 42: Residue data addressing the common GAP for cucumbers, pre harvest treatment; 1-day PHI

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP; Volume 8, Part a	30 g ai/100 L, 3 applications, 7-day intervals	0.46, 0.59, 0.78	0.15 (3)	0.62, 0.75, 0.94	1.83[a]
Study 09-HAL-005GLP	30 g ai/100 L, 3 applications, 7-day intervals	0.08	0.03	0.11	0.29

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.78 mg/kg and omethoate of 0.15 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of cucumber are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Pre harvest—cucumber	0.94	1.83	150	50	No

The acute dietary exposure to dimethoate residues in pre harvest treated cucumbers is unacceptable for children. The use is no longer supported.

Recommendations

- The pre and post harvest treatment of cucumbers with dimethoate is no longer supported due to unacceptable acute dietary exposure estimates. The estimates were unacceptable when the pre and post harvest treatments were made individually or were combined in the same trial.

Alternative GAP

After initial publication of the residues review report the APVMA was asked to consider an alternative pre harvest GAP for cucumbers with an extended 3 day withholding period.

Only one pre-harvest cucumber trial sampling at 3 days after the last application is available. The APVMA has been requested to also consider the results of a zucchini trial which also sampled at 3 days after the last application. As residues in the zucchini trials were in general significantly lower than the cucumber trials this is not considered appropriate. A single cucumber trial addressing the proposed 3 day withholding period is not considered sufficient for estimation of acute dietary exposure. The alternative GAP for cucumbers with a 3 day withholding period is therefore not supported.

7.10.2 Melons, includes the categories VC 0046 Melons, except Watermelon and VC 0432 Watermelon

An outcome of the initial review report was that the pre and post-harvest treatment of melons with dimethoate was supported for an interim period to allow for the collection of more residue data. Temporary MRLs of T5 and T0.2 mg/kg were recommended for dimethoate and omethoate respectively on VC 0046 Melons, except watermelon and VC 0432 Watermelon to cover both the pre and post-harvest uses. Additional data for melons have now been received and are summarised below:

Table 43: Residue data addressing the common pre and post-harvest GAP for melons (new data).

Trial and study reference	Actual application scenario	Dimethoate (mg/kg) (whole fruit)	Omethoate (mg/kg) (whole fruit)	Total residue for MRL Determination (mg/kg) (whole fruit)	Highest residue for acute dietary exposure assessment (mg/kg)
Rock melon and honey dew melon; Study number HAN1203	30 g ai/100 L, 3 applications, 27, 17 and 7 DBH; Followed by 40 g ai/100 L dip	0.50, 0.66, 0.75, 0.90, 0.96, 1.09	0.161, 0.187, 0.188, 0.194, 0.215, 0.240	0.70, 0.86, 0.92, 1.14, 1.22, 1.30	0.301[a]

[a] sample with the highest residue in the edible portion after combined pre and post-harvest treatment contained 0.14 mg/kg dimethoate and 0.023 mg/kg omethoate.

Previously available data for the pre and post-harvest treatment of melons with dimethoate are summarised below:

Table 44: Residue data addressing the common GAP for melons, post harvest treatment (previously considered)

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL Determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Cantaloupe, NRA minute, 26 May 1999	409 mg/L dip	–	–	1.3, 1.5	–
Watermelon, NRA minute, 26 May 1999	374 mg/L dip	–	–	0.17, 0.19	
Rock melon, Study 07-HAL-005(b)GLP, Vol 4, Part a	40 g ai/100 L, dip	0.02, 0.05, 0.06 (pulp)	<0.01 (2), 0.01 (pulp)	0.03, 0.06, 0.07 (pulp)	0.13 (pulp)
Rock melon, Study 09-HAL-005GLP	30 g ai/100 L (3 applications pre harvest) + 40 g ai/100 L dip	0.63, 0.87 (whole fruit)	0.11, 0.18 (whole fruit)	0.75, 1.06 (whole fruit)	
Rock melon, Communication from K Bodnaruk	Post harvest dip	0.89 (whole fruit)	0.01 (whole fruit)	0.90 (whole fruit)	0.84[a] (pulp)
	Pre harvest spray and post harvest dip	0.73	0.01	0.74	0.91[a] (pulp)

a Flesh samples were thought to have been contaminated due to storage with peel.

Table 45: Residue data addressing the common GAP melons, pre harvest treatment; 1-day PHI (considered in initial assessment)

Trial and study reference	Actual application scenario	Dimethoate (mg/kg) (whole fruit)	Omethoate (mg/kg) (whole fruit)	Total residue for MRL Determination (mg/kg) (whole fruit)	Highest residue for acute dietary exposure assessment (mg/kg)
Rock melon, Study 09-HAL-005GLP	30 g ai/100 L, 3 applications, 7-day intervals	0.03, 0.05	0.01, 0.02	0.04, 0.07	0.19[a]
Rock melon, from K. Bodnaruk	Pre harvest spray	0.13	0.02	0.15	0.11[b] (flesh)
Melons, European data summarised in Appendix 7	60 g ai/100 L, 2 applications, 10–15-day interval	0.04, 0.09, 0.11, 0.15, 0.17, 0.22, 0.26, 0.41 (0-day PHI)	<0.002, <0.01 (5), 0.01 (2) (0-day PHI)	0.05, 0.10, 0.11, 0.16, 0.18, 0.23, 0.27, 0.42 (0-day PHI)	0.48[c]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.05 mg/kg and omethoate of 0.02 mg/kg.

b Sample had dimethoate and omethoate residues of 0.072 and 0.006 mg/kg respectively in the flesh.

c Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.41 mg/kg and omethoate of <0.01 mg/kg.

Outcomes of the acute dietary exposure assessment for melons for pre and post-harvest treatment based on the new data are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute Exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Melon, except watermelon	1.30	0.301	90	35	Yes
Watermelon	1.30	0.301	90	90	Yes

The proposed post-harvest treatment of melons including watermelons is supported noting that if fruit are also to be treated pre-harvest then a 7 day WHP must be observed for the pre-harvest treatment in line with the submitted residue data (noting that the current withholding period for the pre-harvest treatment of melons is 1 day on permit 13155).

The temporary MRLs for dimethoate on VC 0046 Melons, except Watermelon and VC 0432 Watermelon each at T5 mg/kg should be made permanent.

Recommendations

- The pre and post harvest use of dimethoate on melons is supported. MRLs of 5 and 0.2 mg/kg are recommended for dimethoate and omethoate respectively on VC 0046 Melons, except watermelon and VC 0432 Watermelon to cover both the pre and post harvest uses.
- A 7 day withholding period is recommended for the pre-harvest treatment, in line with the new residue trials that involved both a pre and a post-harvest treatment.

7.10.3 VC 0431 Zucchini

Post harvest use

Australian residue data for the post harvest treatment of zucchini were previously available. Additionally, new Australian data for the post harvest treatment of zucchini have been provided for review.

Data on previously approved GAP for post harvest treatment of zucchini are summarised in Table 46.

Table 46: Residue data addressing the common GAP for zucchini, post harvest treatment

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
NRA minute 26 May 1999	400 mg/L dip (40 g ai/100 L)	–	–	1.8, 1.5	–
Study 09-HAL-017GLP	40 g ai/100 L dip	0.97, 1.3, 1.46, 1.76, 2.42	0.07, 0.09, 0.11, 0.16, 0.17	1.09, 1.38, 1.56, 1.92, 2.60	3.61[a]
Study 09-HAL-005GLP	30 g ai/100 L (pre harvest) + 40 g ai/100 L dip	1.43	0.12	1.56	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 2.42 mg/kg and omethoate of 0.17 mg/kg.

A summary of the outcomes of the acute dietary exposure assessment for post harvest treatment of zucchini follows.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Zucchini—post harvest	2.60	3.61	385	110	No

The acute dietary exposure to dimethoate residues in zucchini after post harvest treatment is unacceptable for both children and the general population. The use is no longer supported.

Pre harvest treatment

Four Australian trials conducted on zucchini have been provided for review. Data addressing previously approved GAP for pre harvest treatment of zucchini are summarised in Table 47.

Table 47: Residue data addressing the common GAP for zucchini, pre harvest treatment; 1-day PHI

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP; Volume 8, Part a	30 g ai/100 L, 3 applications, 7-day intervals	0.09, 0.14, 0.23	0.06 (2), 0.08	0.15, 0.22, 0.30	0.70
Study 09-HAL-005GLP	30 g ai/100 L, 3 applications, 7-day intervals	0.05	0.02	0.07	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.14 mg/kg and omethoate of 0.08 mg/kg.

MRLs of 0.7 and 0.2 mg/kg have been established for dimethoate and omethoate on VC 0431 Squash, summer.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of zucchini are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Zucchini— pre harvest	0.30	0.70	75	20	Yes

Acute dietary exposure estimates for pre harvest use on zucchini are acceptable for a 1-day PHI.

Recommendations

- The post harvest treatment of zucchinis with dimethoate is no longer supported due to unacceptable acute dietary exposure estimates.
- The pre harvest treatment of zucchini with dimethoate continues to be supported, the 1-day WHP is acceptable.

7.10.4 Summary of recommendations for fruiting vegetables cucurbits

- The pre and post harvest treatment of cucurbits with edible skin such as cucumbers (except zucchini) is no longer supported due to unacceptable acute dietary exposure estimates.
- The pre harvest treatment of zucchini with dimethoate continues to be supported, the 1 day WHP is acceptable.
- The pre and post harvest use of dimethoate on melons is supported. MRLs of 5 and 0.2 mg/kg are recommended for dimethoate and omethoate respectively on VC 0046 Melons, except watermelon and VC 0432 Watermelon to cover both the pre and post harvest uses. A 7 day withholding period is recommended for the pre-harvest treatment of melons, in line with the new residue trials that involved both a pre and a post-harvest treatment.

- The post harvest treatment of gourd (bitter) and loofah (smooth) under permit is not supported in the absence of specific residue data for these commodities.

7.11 VO Fruiting vegetables, other than cucurbits

No additional data for other fruiting vegetables have been provided since the *Dimethoate residues and dietary risk assessment report* of 2011. Alternative uses were proposed for eggplant and tomatoes. Previous findings for other fruiting vegetables are presented here along with consideration of the new uses.

7.11.1 VO 0440 Eggplant

Dimethoate was registered as a post harvest dip for the quarantine treatment of eggplants. Similar uses were approved under permit. There was a general pre harvest use of dimethoate on vegetables (including fruiting) as summarised below.

Crop	Treatment	Rate	WHP (days)	Comments
Eggplant	Post harvest (registered and permit[27])	40 g ai/100 L or 400 mg ai/L	–	Dip or spray.
Vegetables (inc. fruiting)	Pre harvest	30 g ai/100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary.

These uses were covered by the dimethoate and omethoate vegetable MRLs each of 2 mg/kg.

Post harvest use

Residue data for the post harvest treatment of eggplants have been provided for review. Data on previously approved GAP for post harvest treatment of egg plant are summarised in Table 48.

Table 48: Residue data addressing the common post harvest GAP for egg plant

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 09-HAL-017GLP	40 g ai/100 L	3.13, 4.37	0.25, 0.38	4.64, 3.54	6.12[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 4.37 mg/kg and omethoate of 0.25 mg/kg.

A dataset consisting of two trials is not considered adequate to support a robust estimate of dietary exposure for egg plant.

27 Permit 12074 and 12343 (general use for fruiting vegetables).

A summary of the acute dietary exposure assessment, based on available data, for post harvest treatment of eggplants follows.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Eggplant—post harvest	4.64	6.12	810	510	No

The acute exposure to dimethoate residues in eggplants after post harvest treatment is unacceptable for both children and the general population.

Pre harvest use

Australian residue data for the pre harvest treatment of eggplants have been provided. Data on previously approved GAP are summarised in Table 49.

Table 49: Residue data addressing the common pre harvest GAP for egg plant, PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP, Volume 9, Part a	30 g ai/100 L, 3 applications, 6–8-day intervals	0.13, 0.18	0.07, 0.09	0.23, 0.26	0.76[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.13 mg/kg and omethoate of 0.09 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of eggplants are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Eggplant—pre harvest	0.26	0.76	101	60	No

The outcome of the acute dietary exposure estimate on the basis of two samples is just above the Acute Reference Dose for children. In addition a dataset of two samples is not adequate to represent the spread of likely dimethoate residues in eggplant following treatment with dimethoate. The pre harvest treatment of eggplants with dimethoate is not supported due to unacceptable acute dietary exposure estimates for children.

Alternative GAP

After the initial publication of the residues review report the APVMA was asked to consider an alternative GAP for eggplant under permit (12506) involving a 21 day withholding period. Although the acute exposure to dimethoate residues in eggplant at a 7 day PHI was just above the acute reference dose for children (2–6 yrs), no further data are available for eggplant which would allow consideration of a longer withholding period. However, consideration was given to extrapolation from the available data for tomatoes: In eight European trials on tomatoes, two applications of dimethoate were made with an interval of 13–15 days at 0.1 kg ai/100 L (0.61–0.65 kg ai/ha). At 20–23 days after the last application dimethoate residues were <0.002 mg/kg (n = 8). Omethoate residues were <0.01 (n = 6) and 0.01 (n = 2) mg/kg. The combined residue for acute dietary exposure assessment is 0.072 mg/kg.

Outcomes of the acute dietary exposure assessment for eggplants based on extrapolation from the available tomato data and a 21 day PHI are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Eggplant— (21 day PHI, tomato data)	0.013	0.072	10	6	Yes

The alternative GAP for dimethoate on eggplants with a 21 day WHP was supported under permit 12506 (30th January 2013 to 31st October 2018). Temporary MRLs each at T0.02 mg/kg were recommended for dimethoate and omethoate respectively on VO 0440 Eggplant. Only the dimethoate MRL was established. The permit evaluation suggested a further 4 trials conducted on eggplant would be required to support an on-going use. These trials sampling at a 14 day PHI have since been provided in support of permit 12506 (application 80959).

The data are summarised below:

Table 50: Residue data addressing alternative pre harvest GAP for egg plant, PHI 14 days (new data)

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Data provided in support of permit 12506	340 g ai/ha, 3 applications, 3–12-day intervals	0.004, 0.004, 0.005, 0.046	0.003, 0.010, 0.029, 0.045	0.007, 0.014, 0.035, 0.094	0.361[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.046 mg/kg and omethoate of 0.045 mg/kg.

Outcomes of the acute dietary exposure assessment for eggplants based on the available eggplant data and a 14 day PHI are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Eggplant— (14 day PHI, new eggplant data)	0.094	0.361	50	30	Yes

Recommendations

- The previously approved pre and post harvest uses of dimethoate on eggplants are no longer supported due to unacceptable acute dietary exposure estimates.
- An alternative pre-harvest GAP with a 21 day withholding period was supported under permit 12506 (expires 5th October 2015). Temporary MRLs each at T0.02 mg/kg were recommended for dimethoate and omethoate respectively on VO 0440 Eggplant. Only the dimethoate MRL was established.
- New data for eggplant were provided for permit 80959. The data support a 14 day PHI and an increase in the dimethoate MRL for VO 0440 Eggplant to T0.2 mg/kg. An omethoate MRL of 0.07 mg/kg would be appropriate for eggplant.

It is noted that after the initial publication of the residues review report the APVMA was asked to reconsider the consumption figure used for children in the NESTI calculation. Prior to publication of the dietary risk assessment the APVMA had consulted with FSANZ regarding the appropriate consumption figure for eggplant. FSANZ recommended that the consumption figure for VO other fruiting vegetables is a suitable replacement for eggplants due to the lack of other alternatives. Since publication of the 2011 review document FSANZ have since confirmed their earlier advice.

7.11.2 VO 0445 Peppers, sweet

Dimethoate was registered in Australia for the control of Queensland fruit fly in capsicum. It could be used as an in field (pre harvest) treatment as well as a post harvest treatment. There were also general pre harvest uses on fruiting vegetables and post harvest uses on chilli (chili).

Crop	Treatment	Rate	WHP (days)	Comments
Capsicum	Pre harvest	30 g ai/100 L or 300 g ai/ha	3[a]	Apply when pests appear and repeat as necessary.
Vegetables, fruiting	Pre harvest	30 g ai/100 L or 300 g ai/ha	7[a]	Apply when pests appear and repeat as necessary.
Capsicums, chilli	Post harvest (registered and permit[28])	40 g ai/100 L or 400 mg ai/L	–	Dip or flood spray.

a It is noted that 3-day or 7-day withholding periods are recommended in different sections of the same labels.

28 Permit 10555, 12074 and 12343 (general use on fruiting vegetables).

MRLs of 2 and 1 mg/kg were established for dimethoate and omethoate on VO 0445 Peppers, Sweet [capsicums].

Post harvest use

Data addressing the post harvest treatment of capsicums have been previously considered by the APVMA. Additional data have also been provided for review. Data addressing previously approved GAP for post harvest treatment of capsicums are summarised in Table 51.

Table 51: Residue data addressing the common post harvest GAP for capsicum

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
NRA minute, 26 May 1999	380–390 mg/L	–	–	1.0, 1.05, 1.1	
Report no VG00097-2, K Bodnaruk 2002 (and 2003 JMPR) summarised in Appendix 7	40 g ai/100L	1.46, 1.56, 1.80, 2.95	<0.04 (2), 0.19 (2)	1.60, 1.65, 1.99, 2.99	
Data supplied for product 32962 (and 2003 JMPR)	40 g ai/100 L	0.27, 1.26, 1.50	<0.04 (3)	0.29, 1.30, 1.52	
	300 g ai/ha (pre harvest, 3 applications) + 40 g ai/100 L (post harvest)	0.23, 1.71, 1.75	<0.04 (3)	0.25, 1.73, 1.79,	
Study 09-HAL-017GLP	40 g ai/100 L	1.09, 1.49, 1.68, 2.19, 2.27, 2.3	0.09, 0.15 (3), 0.17, 0.34	1.25, 1.67, 1.78, 2.43, 2.46, 2.56	4.57[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 2.19 mg/kg and omethoate of 0.34 mg/kg.

It was suggested the high residue of 2.99 mg/kg was higher than expected as the samples in this trial were stacked before drying had been completed, leading to the possibility that samples on the bottom could be affected by run off from samples on the top. However, the highest residue for dietary exposure estimates was observed in a different trial.

Outcomes of the acute dietary exposure assessment for post harvest treatment of capsicums are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Capsicums—post harvest	2.56	4.57	220	95	No

The post harvest treatment of capsicums with dimethoate is no longer supported due to unacceptable acute dietary exposure estimates for children.

Pre harvest use

Data addressing the pre harvest treatment of capsicums have been previously considered by the APVMA. Additional data have also been provided for review. Data addressing currently approved GAP for pre harvest treatment of capsicums are summarised in Table 52.

Table 52: Residue data addressing the common pre harvest GAP for capsicum; PHI 3 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Data supplied for product 32962 (and 2003 JMPR)	300 g ai/ha, 3 applications	0.04, 0.08, 0.14	<0.02, 0.02, <0.04	0.06, 0.10, 0.18	
Study 07-HAL-005(a)GLP, Volume 9, Part a	30 g ai/100 L, 3 applications, 7-day intervals	0.15, 0.32	0.04, 0.11	0.19, 0.44	1.09 [a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.32 mg/kg and omethoate of 0.11 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of capsicums are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Capsicums—pre harvest	0.44	1.09	50	25	Yes

Acute dietary exposure estimates for pre harvest use on capsicums are acceptable for a 3-day PHI. The alternative label instructions with a 7-day PHI would therefore also be acceptable.

The highest total dimethoate and omethoate residues in capsicums after pre harvest treatment were 0.44 and 0.11 mg/kg respectively. It is recommended that the dimethoate and omethoate MRLs for VO 0445

Peppers, Sweet [Capsicums] be reduced to 0.7 and 0.3 mg/kg respectively to reflect the pre harvest use pattern only. Either a 3-day or 7-day withholding period is acceptable for pre harvest application.

Chilli peppers

The initial residue review report was not supportive of pre or post harvest use of dimethoate on chilli peppers as specific residue data were not available. The APVMA has been requested to consider extrapolation from the available residue data for capsicums. The APVMA was also requested to reconsider if using consumption value for capsicums as a default for chilli peppers for children is inappropriate as the consumption of chilli peppers by children between the ages of 2 and 6 is unlikely to be as high as that of capsicums. The APVMA consulted with FSANZ regarding an appropriate consumption figure for chilli peppers for children. FSANZ proposed to substitute with chilli peppers for 2-6 years from the 2007 National Children's Nutrition and Physical Activity Survey (NCNPAS) with large portion consumption of 0.004 kg.

Outcomes of the acute dietary exposure assessments for chilli peppers using the available pre and post harvest capsicum residue data are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Peppers, chilli — post harvest	2.56	4.57	5	15	Yes
Peppers, chilli – pre harvest	0.44	1.09	<5	<5	Yes

As the outcomes of the acute dietary exposure assessments for chilli peppers are acceptable for both pre and post harvest uses based on the available capsicum residue data, the uses were supported for an interim period pending provision of additional residue data for chilli peppers. Dimethoate and omethoate MRLs of T5 and T0.5 mg/kg respectively were recommended for VO 0444 Peppers, Chili, and Peppers, Chili, other cultivars. Only the dimethoate MRL was established.

As no additional residue data for chilli peppers have been received, support for this interim use is now withdrawn. The temporary MRLs of T5 mg/kg for dimethoate on VO 0444 Peppers, Chili and Peppers, Chili, other cultivars should now be deleted.

Recommendations

- The pre harvest treatment of capsicums with dimethoate continues to be supported. Either a 3-day or 7-day WHP is acceptable.
- Post harvest uses on capsicums cannot be supported due to unacceptable acute dietary exposure estimates.
- The dimethoate and omethoate MRLs for VO 0445 Peppers, Sweet [capsicums] should be reduced to 0.7 and 0.3 mg/kg respectively to reflect the pre harvest use pattern only.
- The pre and post harvest uses of dimethoate on chilli peppers were supported for an interim period pending the provision of additional residue data. As no additional residue data for chili peppers have been received, support for these interim uses is now withdrawn. The temporary MRLs of T5 mg/kg for dimethoate on VO 0444 Peppers, Chili, and Peppers, Chili, other cultivars should now be deleted.

7.11.3 VO 0447 Sweet corn

Sweet corn was covered by the general pre harvest use of dimethoate on vegetables, including fruiting as summarised below.

Crop	Treatment	Rate	WHP (days)	Comments
Vegetables (inc. fruiting)	Pre harvest	30 g ai/100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary.

Details of two Australian pre harvest trials on sweet corn have been provided. Data addressing currently approved GAP for pre harvest treatment of sweet corn are summarised in Table 53.

Table 53: Residue data addressing the common pre harvest GAP for sweet corn; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a) GLP, Volume 9, Part a	30 g ai/100 L	0.05	0.04	0.09	0.33
Pers. Communication (K Bodnaruk)		0.08	0.07	0.15	0.57

Total dimethoate residues in sweet corn ears at 7 DALA were 0.09 and 0.15 mg/kg with omethoate residue of 0.04 and 0.07 mg/kg. Outcomes of the acute dietary exposure assessment for sweet corn are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Sweet corn	0.15	0.57	80	20	Yes

Based on these results preliminary acute exposure estimates to dimethoate and omethoate residues in sweet corn are acceptable (80% of ARfD for children). However, only two sweet corn trials are available, which is insufficient for establishment of permanent MRLs (guidelines indicate that six trials are required). Use on sweet corn was supported for an interim period pending the provision of additional residue data. Temporary MRLs of T0.3 and T0.2 mg/kg were recommended for dimethoate and omethoate respectively on VO 0447 Sweet corn (corn-on-the-cob). Only the dimethoate MRL was established.

As no additional residue data for sweet corn have been received, support for this interim use is now withdrawn. The temporary MRL of T0.3 mg/kg for dimethoate on VO 0447 Sweet corn (corn-on-the-cob) should be deleted.

Recommendations

- The continued use of dimethoate on sweet corn was supported for an interim period pending the provision of additional residue data. As no additional residue data for sweet corn have been received, support for this interim use is now withdrawn.
- Temporary MRLs of T0.3 and T0.2 mg/kg were recommended for dimethoate and omethoate respectively on VO 0447 Sweet corn (corn-on-the-cob) to cover the interim use. Only the dimethoate MRL was established. The temporary dimethoate MRL of T0.3 mg/kg should now be deleted.
-

7.11.4 VO 0448 Tomato

Dimethoate was registered as a pre harvest treatment for tomatoes and as a post harvest treatment for tomatoes and cherry tomatoes as summarised below. Post harvest treatment of tomatoes and fruiting vegetables generally was also approved under permit.

Crop	Treatment	Rate	WHP (days)	Comments
Tomato	Pre harvest	30 g ai/100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary.
Tomato, cherry tomato	Post harvest (registered and permit[29])	40 g ai/100 L or 400 mg ai/L	–	Dip or flood spray.

The uses were covered by a dimethoate MRL of 2 mg/kg for tomatoes and an omethoate MRL of 1 mg/kg for tomatoes.

Post harvest use

Australian residue data for the post harvest treatment of tomatoes were previously considered. Additional summary residue data have also been provided for review.

Data addressing previously approved GAP for post harvest treatment of tomatoes are summarised in Table 54 below.

29 Permit 10555, 12074 and 12343 (general use on fruiting vegetables).

Table 54: Residue data addressing the common post harvest GAP for tomatoes

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
NRA minute, 26 May 1999	520 mg/L flood spray	–	–	0.89[a]	–
	403–428 mg/L dip	–	–	0.66, 0.70, 0.71, 0.79, 1.8	1.8 (assume all d)
Trials summarised in Horticulture Industry Response document	425 mg/L dip	–	–	0.57, 0.79	–
	500 mg/L spray	–	–	0.66, 0.48[b]	–
	400 mg/L dip	0.42, 0.59, 0.66, 0.67, 1.05 (d only)	<0.01 (2), 0.01, 0.03	0.43, 0.60, 0.67, 0.70	1.05 (assume all d)

a Later analysis showed average omethoate residues of <0.005 mg/kg.

b Later analysis showed omethoate residues of 0.02 mg/kg.

The maximum dimethoate residue in tomatoes immediately after a dimethoate flood spray or dip at about the label concentration was 1.8 mg/kg. The proportion of the residue due to omethoate was not recorded for this sample. The highest total residue where omethoate was reported was 0.7 mg/kg, with omethoate comprising 0.03 mg/kg. A summary of the acute dietary exposure assessment for post harvest treatment of tomatoes are summarised in the following table.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Tomatoes—post harvest	1.8	1.8 (assumed all dimethoate)	200	80	No

For post harvest use the proportion of the highest residue present as omethoate is not available. If it is assumed that all of the total dimethoate HR of 1.8 mg/kg was present as dimethoate the acute exposure is unacceptable for children. The use is not supported.

Pre harvest use

New Australian residue data for the pre harvest application to tomatoes are available. Additional European studies have also been provided for review. Data addressing previously approved GAP for pre harvest treatment of tomatoes are summarised in Table 55.

Table 55: Residue data addressing the common pre harvest GAP for tomatoes; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP, Volume 9, Part a	30 g ai/100 L, 3 applications, 6–8-day intervals	0.33, 0.49, 0.52	0.27, 0.34, 0.40	0.62, 0.86, 0.95	3.32[a]
European trial summarised in Appendix 7	40 g ai/100 L, 2–3 applications	<0.01, <0.02, 0.02 (2), 0.03, 0.06 (2), 0.07, 0.10, 0.11 (2), 0.12, 0.14 (2), 0.22, 0.59	<0.01, <0.02, 0.04, <0.05 (2), 0.05, 0.06, 0.07 (5), 0.08, 0.12 (2), 0.36	<0.02, <0.04, 0.08, 0.11 (3), 0.14 (2), 0.16 (2), 0.17, 0.22, 0.23, 0.27, 0.30, 0.98	0.98[b]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.52 mg/kg and omethoate of 0.40 mg/kg.

b Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.59 mg/kg and omethoate of 0.36 mg/kg. However, this trial may be discounted as the timing of the last application was when flower had faded, next highest sample had 0.14 mg/kg dimethoate and 0.12 mg/kg omethoate.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of fresh tomatoes are summarised below. The application rates in the European trials are considered to significantly exceed the Australian GAP. However, the residues observed in the European trials will be considered in support of a use on processing tomatoes.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Tomatoes—pre harvest	0.95 (Aus trials)	3.32	370	150	No

Acute dietary exposure estimates for pre harvest treated tomatoes are unacceptable for children and the general population. The continued pre harvest application of dimethoate to fresh market tomatoes is not acceptable with the previous 7-day harvest WHP.[30]

Tomato processing/alternative GAP

Agronomic requirements for processing tomatoes differ from those of fresh market tomatoes. A tomato processing study has been provided to the review.[31] Dimethoate and omethoate residues did not concentrate in juice or wet and dry pomace. They did, however, concentrate in puree (1.5× for total residue)

30 If the WHP were extended to 14 days, an omethoate HR of 0.22 mg/kg would still result in an unacceptable acute exposure for children (165% of ARfD).

31 Part B, Appendix 2.

and paste (2.6× for total residue). For processed commodities such as puree, paste and juice it is appropriate to use STMR-Ps in NESTI calculations. As residues in the RAC did not give acceptable acute dietary exposure estimates, use on processing tomatoes cannot be supported with a 7 day withholding period. A request for continued use of dimethoate on processing tomatoes with a 21 day withholding period was received in response to the initial publication of the residues review report. Details of 8 European trials which sampled at longer PHIs were provided for review. The trials involved significantly higher application rates than registered in Australia. Two applications of dimethoate were made with an interval of 13-15 days at 0.1 kg ai/100 L (0.61-0.65 kg ai/ha). At 20 – 23 days after the last application dimethoate residues were <0.002 (n=8) mg/kg. Omethoate residues were <0.01 (n=6) and 0.01 (n=2) mg/kg. The residue for acute dietary exposure estimates is 0.072 mg/kg. Outcomes of the acute dietary exposure assessment for the pre harvest treatment of tomatoes with a 21 day PHI are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Tomatoes—pre harvest (21 day WHP)	0.013 (European trials)	0.072	10	5	Yes

A 21 day withholding period would give acceptable acute dietary exposure estimates for both children and the general population based on European data which involved higher application rates than required in Australia. Use on processing tomatoes can therefore be supported in conjunction with a 21 day withholding period. MRLs of 0.02 mg/kg are required for each of dimethoate and omethoate on VO 0448 Tomato.

Tomato pomace may be used as a livestock feed in Australia. In the tomato processing study provided for the review, residues of dimethoate and omethoate did not concentrate on processing of whole tomatoes to dry pomace (Concentration factors were 0.57× for dimethoate and 0.17× for omethoate). MRLs of 0.02 mg/kg are also recommended for each of dimethoate and omethoate on Tomato pomace, dry.

Fresh tomatoes –prior to flowering alternative GAP

After the initial publication of the residues review report and the October 2011 suspension of dimethoate products, the APVMA was asked to consider an alternative GAP for tomatoes, field grown only, prior to fruit set. The APVMA considered this request and included the following GAP in Permit 13155:

Tomatoes, large, field grown for fresh consumption

DO NOT apply after commencement of flowering, DO NOT USE on tomatoes grown in covered or protected situations such as glasshouses, green houses or plastic tunnels and DO NOT USE on cherry, grape or mini tomatoes. Harvest withholding period: NOT REQUIRED WHEN USED AS DIRECTED (ie. DO NOT apply after commencement of flowering)

This use continues to be supported and will be covered by the MRLs recommended to cover the other supported use on processing tomatoes.

Tomato recommendations

- The approved pre and post harvest treatments of tomatoes with dimethoate are no longer supported due to unacceptable acute dietary exposure estimates. The existing dimethoate and omethoate MRLs for tomatoes should be revised.
- A pre harvest use of dimethoate on processing tomatoes is supported with a 21 day withholding period.
- MRLs of 0.02 mg/kg are recommended for each of dimethoate and omethoate on VO 0448 Tomato.
- MRLs of 0.02 mg/kg are also recommended for each of dimethoate and omethoate on Tomato pomace, dry.
- A pre-harvest use on large field grown fresh tomatoes with application prior to the commencement of flowering is also supported. The harvest withholding period for this use is 'Not required when used as directed'

7.11.5 VO 0443 Pepino and Cape Gooseberry (VO 0441 Ground cherries)

Permits 12074 and 10555 allowed the post harvest treatment of pepinos and cape gooseberry with a dimethoate dip or flood spray at 400 mg ai/L. This use was covered by the dimethoate and omethoate vegetable MRLs of 2 mg/kg. The available data for capsicums and tomatoes suggest that these MRLs may not be appropriate for pepinos or cape gooseberry. It is not appropriate to support the continuation of these use patterns without the provision of specific residue data or other data suitable for extrapolation.

7.12 VL Leafy vegetables

Continued use on Leafy vegetables was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. No further alternative data has been submitted. Previous findings are presented here.

Dimethoate was registered for use on leafy vegetables at 800 mL/ha (320 g ai/ha) on lettuce and silverbeet, and generally at 75 mL/100 L (30 g ai/100 L).

Crop	Treatment	Rate	WHP (days)	Critical comments
Leafy vegetables	Pre harvest	320 g ai/ha (lettuce/silverbeet) 30 g ai/100 L	7	Apply when pests appear and repeat as necessary.

The uses were covered by the dimethoate and omethoate vegetable MRLs, each at 2 mg/kg.

Australian residue data for use of dimethoate on field grown leafy vegetables (two trials each on Chinese cabbage, leafy lettuce and silverbeet) are available. Details of eight trials on protected lettuce, 36 trials on field grown lettuce and three trials on spinach conducted in the United Kingdom, Italy, Spain, Greece and Germany have also been provided. The majority of the European data was generated at spray concentrations higher than those approved for use in Australia. Data addressing previously approved GAP for leafy vegetables are summarised in Table 56. Although the European data for spinach and lettuce do not conform to the Australian GAP they are included for comparative purposes.

Table 56: Residue data addressing the common GAP for leafy vegetables; 7-day PHI

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Chinese cabbage, Study 07-HAL-005(a)GLP, Volume 10, Part a	30 g ai/100 L, 3 applications, 7–8-day intervals	0.29, 0.55	0.19, 0.20	0.51, 0.75	1.88[a]
Leafy lettuce, Study 07-HAL-005(a)GLP, Volume 10, Part a	30 g ai/100 L, 1–3 applications, 6–8-day intervals	0.21, 0.29, 0.41, 0.49	0.07, 0.18, 0.20, 0.35	0.29, 0.51, 0.68, 0.78	2.86[b]
Silver beet, Study 07-HAL-005(a)GLP, Volume 10, Part a	30 g ai/100 L, 3 applications, 7–8-day intervals	0.63, 0.87	0.32, 0.71	0.97, 1.63	5.84[c]
Spinach, European data summarised in Appendix 7	40 g ai/100 L, 1 application	0.23, 2.60, 3.28	0.29, 1.15, 1.49	1.47, 2.91, 4.88	13.71[d]
Protected lettuce, European data summarised in Appendix 7	170 g ai/100 L (340 g ai/ha), 1 application	2.1, 2.9, 3.4, 9.7	0.18, 0.30, 0.31, 0.45	2.29, 3.23, 3.72, 10.18	12.85[e]
Field lettuce, European data summarised in Appendix 7 (predominantly head lettuce, possible leaf lettuce highlighted)	40–60 g ai/100 L (240–520 g ai/ha) or 170 g ai/100 L (340 g ai/ha)	<0.01, 0.06 (2), 0.07, 0.08, 0.09, 0.10, 0.12 (4), 0.14, 0.18, 0.20, 0.29, 0.30 (2), 0.42, 0.44, 0.46, 0.61, 0.62, 0.64, 0.71, 1.52, 1.58, 2.25, 2.96, 3.45	<0.01 (3), <0.05 (2), 0.01, 0.02 (3), 0.05 (2), 0.06 (2), 0.07, 0.08 (2), 0.09, 0.11, 0.16 (2), 0.19, 0.21, 0.27, 0.30, 0.51, 0.96	<0.02, 0.07 (2), 0.09, 0.10 (2), 0.15, 0.16, 0.17 (3), 0.22, 0.24, 0.26, 0.30 (d only), 0.38, 0.39, 0.54, 0.61 (d only), 0.61, 0.78, 0.81, 0.85, 0.91, 1.58 (d only), 2.55, 2.80, 3.25, 3.53	8.24[f]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.55 mg/kg and omethoate of 0.19 mg/kg.

b Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.41 mg/kg and omethoate of 0.35 mg/kg.

c Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.87 mg/kg and omethoate of 0.71 mg/kg.

d Sample with highest residue for dietary exposure assessment had a dimethoate residue of 3.28 mg/kg and omethoate of 1.49 mg/kg.

e Sample with highest residue for dietary exposure assessment had a dimethoate residue of 9.7 mg/kg and omethoate of 0.45 mg/kg.

f Sample with highest residue for dietary exposure assessment had a dimethoate residue of 1.52 mg/kg and omethoate of 0.96 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of leafy vegetables are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Leafy vegetables					
Silverbeet	1.63	5.84	270	160	No
Leafy lettuce	0.78	2.86	130	75	No
Chinese cabbage	0.75	1.88	110	60	No
Spinach (overseas data)	4.88	13.71	450	460	No
Head lettuce (overseas data)	3.53	8.24	380	215	No

The Australian dataset for Chinese cabbage, leafy lettuce and silverbeet gives unacceptable acute dietary exposure outcomes. This is supported by overseas data for head lettuce and spinach. The previous use of dimethoate on leafy vegetables with a 7-day withholding period is no longer supported.

Recommendations

- The previously approved use of dimethoate on leafy vegetables is no longer supported due to unacceptable acute dietary exposure estimates for children and the general population.

7.13 VP Legume vegetables

No additional data for legume vegetables have been provided since the *Dimethoate residues and dietary risk assessment report* of 2011. Finding based on the previously submitted data are presented below:

Dimethoate was registered in Australia for the control of various pests in beans, peas and legume vegetables generally as summarised below.

Crop	Treatment	Rate	WHP (days)	Comments
Beans	Foliar	30 g ai/100 L	7	Apply when pests appear and repeat as necessary.
Beans, peas	Foliar	260 g ai/ha	7	Apply when pests appear and repeat as necessary.
Peas	Foliar	30 g ai/100 L	1 (G) 7 (H)	Apply when pests appear and repeat as necessary.
Vegetables (inc legumes)	Foliar	30 g ai/ 100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary.
Peas	Seed treatment	30 g ai/600 mL water/50 kg seed		Use rolling drum or cement mixer. Avoid using this product with inoculated seed. Sow as soon as possible after treatment.

These uses were covered by the dimethoate and omethoate vegetable MRLs, each at 2 mg/kg.

Australian residue data for legume vegetables (green beans and peas) have been provided for review. Additional overseas trials on French beans and peas have also been provided. Data addressing currently approved GAP for pre harvest treatment of beans and peas are summarised in Table 57.

Table 57: Residue data addressing the common pre harvest GAP for beans and peas; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Green beans, Study 07-HAL-005(a)GLP, Volume 11, Part a	30 g ai/100 L, 3 applications, 6–8-day intervals	0.08, 0.19	0.03, 0.16	0.11, 0.37	1.31[a]
French beans, European studies summarised in Appendix 7	40 g ai/100 L, 1–6 applications	0.14 (2), 0.50	<0.02, 0.04, 0.05	0.18, 0.19, 0.52	0.64[b]
Peas, Study 07-HAL-005(a)GLP, Volume 11, Part a	30 g ai/100 L, 3 applications, 7-day intervals	0.24	0.31	0.57	2.41
Peas, European studies summarised in Appendix 7	67–79 g ai/100 L (336–382 g ai/ha in 450 L/ha), 2–4 applications	0.13, 0.21, 0.27, 0.37	0.02, 0.06 (2), 0.61	0.15, 0.27, 0.33, 1.03	4.64[c]
Snow peas, *J. Agric. Food Chem.* 2003, 51,1328	1.7 kg ai/ha	–	–	0.052	–

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.19 mg/kg and omethoate of 0.16 mg/kg.

b Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.50 mg/kg and omethoate of <0.02 mg/kg.

c Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.37 mg/kg and omethoate of 0.61 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of legume vegetables are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Legumes					
Peas—dimethoate	1.03	4.64	98	55	Yes
Beans—dimethoate	0.52	1.31	30	15	Yes

The acute dietary exposure to dimethoate residues in peas and beans is acceptable. The exposure for peas is close to 100% of the ARfD for children. However, the high residue used for these estimates comes from the overseas trials that used an application rate of up to 1.2× that registered in Australia. It also is noted that information on reduction of total dimethoate residues in green beans on cooking is available from the 1994 JMPR. As cooking reduced dimethoate residues by ≥23%, the actual exposures to dimethoate are likely to be lower than those estimated above.

The use requires establishment of MRLs of 2 and 1 mg/kg for dimethoate and omethoate respectively on VP 0060 Legume vegetables, based on highest total dimethoate and omethoate residues of 1.03 and 0.61 mg/kg respectively. In the initial residues review report these MRLs were recommended as temporary, requiring the provision of additional residue data on snow peas to confirm that the above estimates are appropriate. Only the dimethoate MRL was established.

As no additional data have been provided for snow peas, the use should be restricted to legume vegetables, except snow peas and sugar snap peas. The temporary MRL of 2 mg/kg for dimethoate on VP 0060 Legume vegetables should now be made permanent.

Grazing withholding period

Australian data for hay/straw/vine at the 1-day grazing WHP were not available. At a 7-day WHP in the Australian pea trial, total dimethoate residues in pea straw were 1.71 mg/kg; omethoate residues were 0.84 mg/kg. The moisture content of the straw was not provided. In the overseas trials, total dimethoate residues in whole pea plants immediately after the last application were 2.61, 3.47, 3.66, 3.85, 4.88, 5.33, 5.78, 7.51, 8.00 and 8.75 mg/kg. Omethoate residues were 0.069, 0.11, 0.13, 0.15, 0.17, 0.21, 0.35, 0.38, 0.39 and 0.67 mg/kg. The dry matter contents of the plant samples were not recorded.

Limited Australian data are available to indicate residues in pea and bean plant material that can be used as animal feeds. The overseas data also suggest that significant residues will occur in pea plant material after the 1-day grazing withholding period. The highest residue in pea plant material from the overseas trials immediately after application was 8.75 mg/kg. Assuming a dry matter content of 25% for pea vines (green), the highest residue would correspond to 35 mg/kg dry weight. This is higher than the feeding level used in the goat metabolism study (30 ppm). As a dimethoate animal transfer study is not available and significant residues are expected to be present in animal feeds at the previous grazing withholding period, the grazing withholding period has been extended to 7 days, the same as the harvest withholding period.

At 7 days after the last application in the Australian trial, residues in pea straw were 1.7 mg/kg. Assuming 88% dry matter[32] would give a high residue of 1.9 mg/kg. In the overseas trials, total dimethoate residues in pea plant material at 7 DALA were 0.24, 0.25, 0.48, 0.57, 0.86, 1.17 and 1.34 mg/kg. Omethoate residues were 0.092, 0.108, 0.113, 0.25, 0.27, 0.36 and 0.42 mg/kg. Assuming 25% dry matter, a high total dimethoate residue of 5.4 mg/kg (dry weight) and a high omethoate residue of 1.7 mg/kg are estimated. A 7-day grazing withholding period would therefore bring the total residue within the range of the feeding level used in the goat metabolism study.

The grazing withholding period should be increased to 7 days and MRLs of 10 and 5 mg/kg would be appropriate for dimethoate and omethoate respectively on AL 0157 Legume animal feeds (see Section 7.21 Animal commodities). These MRLs will not be established at this time as a primary feed commodities MRL will be established for dimethoate at a higher level to cover use on cereals (see section 71.7). (current MRL of T20 mg/kg for omethoate on Legume animal feeds is no longer appropriate. An MRL of 10 mg/kg is recommended for omethoate on Primary Feed Commodities to cover this and other uses (including peanut forage with a HR of 4.6 mg/kg, see section 7.18).

Recommendations

- The continued use of dimethoate on legume vegetables (except snow peas and sugar snap peas) is supported:
- New legume vegetable MRLs of 2 mg/kg for dimethoate and 1 mg/kg for omethoate are recommended.
- The grazing withholding period associated with the uses should be extended from nil or 1 day to 7 days.
- An MRL of 10 mg/kg is recommended for omethoate on Primary Feed Commodities.
- Additional residue data for snow peas are required before a use on snow peas and sugar snap peas can be supported.

7.14 VD Pulses

Additional data for pulses have been received since the *Dimethoate residues and dietary risk assessment report* of 2011. Findings based on the new and previously submitted data are presented below:

Dimethoate was previously approved for use on grain legumes generally. Seed treatment uses on lupins and peas were also previously approved.

Crop	Treatment	Rate	WHP (days)	Comments
Grain legumes and specifically adzuki bean, borlotti bean, chickpea, cowpea, mung bean, navy bean, pigeon pea, lentils, soybean	Foliar	34 g ai/100 L or 320 g ai/ha	7–14	Apply when insects appear and repeat as necessary.
Lupin and peas	Seed treatment	30 g ai/ 600 mL water/ 50 kg seed		Use rolling drum or cement mixer. Avoid using this product with inoculated seed. Sow as soon as possible after treatment.

32 OECD feedstuffs derived from field crops, February 2009.

For the initial review, data from one residue trial on lupins was available. Additional data for pulses have now been provided. US data for dry peas and soybeans have been made available, however these trials do not address the critical GAP (320 g ai/ha, 14 day PHI). Nine Australian GLP trials on mungbeans, navybeans and soybeans have also been provided. The new Australian trials address the critical GAP and are summarised below with the previous lupin trial.

Table 58: Residue data addressing the common GAP for pulses; 14-day PHI

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Lupins, PACC, December 1988	0.28 kg ai/ha	0.3[a]	<0.002[a]	0.3[a]	–
Mungbeans, Navybeans, Soybeans, Study number PHA/GLP/12/04-1 (new data)	320 g ai/ha, 3 applications, 14 day intervals	<0.02 (6), 0.04, 0.066, 0.40	<0.02 (8), 0.064	<0.04 (6), 0.06, 0.068, 0.47	0.848[b]

a Residues in pods sampled at 7 days after treatment.

B Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.40 mg/kg and omethoate 0.064 mg/kg.

Outcomes of the acute dietary exposure assessment for the pre-harvest treatment of pulses are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Pulses	0.47	0.848	10	5	Yes

The acute dietary exposure to dimethoate residues in pulses is acceptable. MRLs of 0.7 mg/kg and 0.1 mg/kg are recommended for dimethoate and omethoate respectively on VD 0070 Pulses in conjunction with a 14 day WHP. A minimum 14 day re-treatment interval should be specified on the label in line with the GAP used in the residue trials.

Residues in pulse forage and fodder

Total dimethoate residues in pulse forage at 7 days after the last of 3 applications at 320 g ai/ha in the Australian trials were 1.54, 1.69, 2.28, 2.40, 3.11, 4.28, 4.73, 5.06 and 10.5 mg/kg (dry weight). Omethoate residues were 0.086, 0.11, 0.24, 0.30, 0.51, 0.60, 1.17, 1.43 and 1.54 mg/kg (dry weight). It is noted that the forage samples were collected after 3 late season applications close to harvest. However, samples were taken at 7 days after the last application when a 14 day grazing withholding period was recommended for the interim use on pulses after the initial dimethoate review.

Total dimethoate residues in pulse trash at 14 days after the last of 3 applications at 320 g ai/ha in the Australian trials were 0.2, 0.42, 1.3, 1.7, 2.0, 2.2, 3.0, 5.4 and 7.2 mg/kg (dry weight). Omethoate residues were 0.05, 0.08, 0.09, 0.10, 0.19, 0.25, 0.37, 0.59 and 0.75 mg/kg (dry weight).

MRLs of 20 mg/kg and 3 mg/kg would be appropriate for dimethoate and omethoate respectively on AL 0157 Legume animal feeds in conjunction with a 14 day grazing withholding period. However, use would be covered by the dimethoate Primary feed commodities MRL at 40 mg/kg recommended for use on other crops including pastures and cereals. Similarly, an MRL of 10 mg/kg is recommended for omethoate on Primary Feed Commodities to cover this and other uses (including peanut forage with a HR of 4.6 mg/kg, see section 7.18)

Seed treatment use

A seed treatment rate of 30 g ai/50 kg seed would correspond to a dimethoate rate of 60 g ai/ha for a typical lupin or field pea seeding rate of 100 kg/ha of seed.[33] Given the time between treatment and harvest and the low rate of dimethoate per hectare compared to the foliar treatment the seed treatment uses on lupins and peas continues to be supported.

Recommendations

- The foliar uses of dimethoate on pulses and other grain legumes continues to be supported with a 14 day harvest and grazing withholding period. A minimum 14 day retreatment interval should be specified on the label in line with the GAP used in the residue trials.
- The seed treatment uses on lupins and peas continue to be supported.
- MRLs of 0.7 mg/kg and 0.1 mg/kg are recommended for dimethoate and omethoate respectively on VD 0070 Pulses. (Currently covered by MRLs of 2 mg/kg for omethoate on Vegetables [except lupins; peppers, sweet; tomato] and 0.1 mg/kg for VD 0545 Lupin (dry).
- Residues of dimethoate in pulse forage and fodder will be covered by the MRL of 40 mg/kg recommended for dimethoate on Primary feed commodities for other uses. Similarly an MRL of 10 mg/kg is recommended for omethoate on Primary feed commodities to cover this use and others. This MRL will replace current Table 4 entries for omethoate.

7.15 VR Root and tuber vegetables

Use of dimethoate on root and tuber vegetables was not supported in the *Dimethoate residues and dietary risk assessment report* of 2011. Alternative uses were then proposed. The previous findings together with assessment of the alternative uses are presented here.

Dimethoate was registered in Australia for the control of various pests on potatoes. There was also a general registration for root vegetables (including carrots, beetroot and parsnips) and for vegetables generally as summarised below.

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33 www.pulseaus.com.au/pdf/Lupins%20for%20SA%20%26%20Vic.pdf?zoom_highlight=Virus+control+in+chickpea%96special+considerations; http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/157507/field-pea-western-NSW-planting-guide.pdf

Crop	Treatment	Rate	WHP (days)	Comments
Potatoes	Dimethoate	30 g ai/100 L	7	Apply when pests appear and repeat as necessary.
Root vegetables (carrots, beetroot, parsnips)	Dimethoate	30 g ai/100 L	7	Apply when pests appear and repeat at 3-weekly intervals as required.
Vegetables (general) (inc. root, tuber)	Dimethoate	30 g ai/100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary.

The uses were covered by the dimethoate and omethoate vegetable MRLs each at 2 mg/kg.

7.15.1 VR 0574 Beetroot

A single Australian trial on beetroot has been provided for review. An additional 15 European trials on sugar beet (also *Beta vulgaris*) are available. The European data do not address the Australian use pattern for use of dimethoate on root vegetables.

Data addressing previously approved GAP for pre harvest treatment of beetroot are summarised in Table 59.

Table 59: Residue data addressing the common pre harvest GAP for beetroot; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP, Volume 12, Part a	30 g ai/100 L, 3 applications, 14-day intervals	0.34	0.15	0.50	1.39

A dataset consisting of a single trial is not adequate to support an estimate of dietary exposure for beetroot. Preliminary analysis on the basis of the available data indicates that acute exposure estimates for children would be unacceptable (see Section 8.1 Acute dietary exposure estimates).

The previous treatment of beetroot with dimethoate is not supported due to an inadequate dataset to assess acute dietary exposure.

Alternative GAP

In response to this assessment the APVMA was asked to consider an alternative GAP for beetroot involving a 14 day withholding period. It was also requested that the APVMA consider scaling the available European data on sugar beet, which involved application at higher rates. No Australian trials are available at longer harvest intervals to support the alternative GAP and it is not appropriate to scale residues for dimethoate. However, the European trials addressing a 14 day PHI are considered below.

Table 60: Residue data addressing the proposed alternative pre harvest GAP for beetroot; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European sugar beet studies summarised in Appendix 7	60 g ai/100 L (0.6 kg ai/ha), 2 applications	<0.002 (4)	<0.002 (3), <0.01	<0.004 (3), <0.01	
European sugar beet studies summarised in Appendix 7 of review report	0.32 kg ai/ha, 2-4 applications	<0.01, <0.02, <0.05	<0.01, <0.02, <0.05	<0.02, <0.04, <0.1	0.4[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of <0.05 mg/kg and omethoate of <0.05 mg/kg.

Outcomes of the revised acute dietary exposure assessment for beetroot based on the overseas data and a 14 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Beetroot (14 day withholding period)	<0.1	0.4	30	10	Yes

As the acute dietary exposure to dimethoate residues in beetroot is acceptable based on the overseas sugar beet trials (often involving higher application rates) and a 14 day PHI, the alternative GAP was supported for an interim period pending the provision of confirmatory data for beetroot. Temporary MRLs of T*0.1 and T*0.05 mg/kg were recommended for dimethoate and omethoate respectively on beetroot. Only the dimethoate MRL was established.

No additional data have been provided for beetroot. However, it is considered that the overseas sugar beet data is sufficient to support an ongoing use. The temporary MRL of T*0.1 mg/kg for dimethoate on VR 0574 Beetroot should be made permanent.

7.15.2 VR 0577 Carrot

Two Australian trials on carrots have been provided for review. Summaries of additional European data are also available but these trials do not appropriately address GAP.

Data addressing previously approved GAP for pre harvest treatment of carrots are summarised in Table 61.

Table 61: Residue data addressing the common pre harvest GAP for carrots; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP, Volume 12, Part a	30 g ai/100 L, 3 applications, 14–15-day intervals	0.17, 0.43	0.10, 0.17	0.35, 0.54	1.36[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.17 mg/kg and omethoate of 0.17 mg/kg.

The acute dietary exposure assessment for pre harvest treatment of carrots is summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Carrot	0.54	1.36	90	30	No—see text

The exposure to dimethoate residues in carrots for children is close to 100% of the ARfD. A dataset consisting of two trials is not considered adequate to support a robust estimate of dietary exposure for carrots. If the highest residue from the potato trials is used, the exposure for children is 150% of the ARfD. The previous use of dimethoate on carrots can no longer be supported.

Alternative GAP

In response to this assessment the APVMA was asked to consider an alternative GAP with a 14 day withholding period and the available overseas data involving application at higher rates. No Australian trials are available with longer harvest intervals to support the alternative GAP. The available overseas studies are summarised below.

Table 62: Residue data addressing the proposed alternative pre harvest GAP for carrots; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised by 1998 JMPR	0.6 kg ai/ha, 2-3 applications	0.001 (2), 0.006, 0.008, 0.013, 0.019, 0.02, 0.097, 0.127 (d only)	<0.002 (2), 0.002, 0.003, 0.004 (2), 0.02, 0.053	0.003 (2), 0.01 (2), 0.02 (2), 0.04, 0.127, 0.15	0.47[a]
European studies summarised in Appendix 7	40 g ai/100 L, 3 applications	<0.01 (2)	<0.01 (2)	<0.02 (2)	

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.097 mg/kg and omethoate of 0.053 mg/kg.

Outcomes of the revised acute dietary exposure assessment for carrot based on the overseas data and a 14 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Carrot (14 day withholding period)	0.15	0.47	30	10	Yes

As the acute dietary exposure to dimethoate residues in carrot is acceptable based on the overseas trials (involving higher application rates) and a 14 day PHI, the alternative GAP was supported for an interim period pending the provision of additional data or provision of full study reports for consideration. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate respectively on carrot. Only the dimethoate MRL was established as omethoate was covered by a group MRL pending the outcome of the omethoate review.

As no additional residue data for carrots (or the full study reports for the JMPR trials) have been received, support for the interim use on carrots is now withdrawn. The temporary MRL of T0.3 mg/kg for dimethoate on VR 0577 Carrot should be deleted.

7.15.3 VR 0589 Potato and VR 0508 Sweet potato

Two Australian trials on potato and one on sweet potato have been provided for review. Additional European data are also available but these trials do not appropriately address GAP.

Only the Australian data appropriately address the approved use. The potato and sweet potato data will be considered a single dataset. Data addressing previously approved GAP for pre harvest treatment of potatoes are summarised in Table 63.

Table 63: Residue data addressing the common pre harvest GAP for potatoes; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Potatoes, sweet potatoes, Study 07-HAL-005(a)GLP, Volume 12, Part a	30 g ai/100 L, 3 applications, 14–17 days apart	0.18, 0.25, 0.31	0.21, 0.20, 0.29	0.41, 0.47, 0.62	2.34[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.31 mg/kg and omethoate of 0.29 mg/kg.

Even considering the potato and sweet potato data as a single dataset, it is not adequate for the assessment of acute dietary exposure. Preliminary analysis on the basis of the available data suggests that acute exposure estimates for children and the general population would be unacceptable (see Section 8.1 Acute dietary exposure estimates).

The previous uses on potatoes and sweet potatoes cannot be supported.

Alternative GAP

After the initial publication of the residues review report the APVMA was asked to consider if the available data could be used to support an alternative GAP with a 14 day withholding period. Australian trials with longer harvest intervals are not available to support the alternative GAP. The available overseas data are summarised below:

Table 64: Residue data addressing the proposed alternative pre harvest GAP for potatoes; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Potatoes, European studies summarised in Appendix 7	0.34 kg ai/ha (0.155 kg ai/100 L), 2 applications	<0.001, <0.01 (5)	<0.005, <0.01 (5)	<0.006, <0.02 (5)	
Potatoes, European studies summarised in Appendix 7	0.32 – 0.48 kg ai/ha (0.03 – 0.1 kg ai/100 L), 2-3 applications	<0.01, 0.01, <0.02 (4), 0.02	<0.01 (2), <0.02 (4), 0.02	0.02, 0.03 (2), <0.04 (4)	0.15[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of <0.01 mg/kg and omethoate of 0.02 mg/kg.

Outcomes of the revised acute dietary exposure assessment for potatoes and sweet potatoes based on the overseas potato data and a 14 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Potato	0.04	0.15	20	10	Yes
Sweet Potato	0.04	0.15	40	10	Yes

As the acute dietary exposures to dimethoate residues in potato and sweet potatoes are acceptable based on the overseas trials (involving higher application rates) and a 14 day PHI, the alternative GAP is supported. Permanent MRLs of 0.1 and 0.05 mg/kg are recommended for dimethoate and omethoate respectively on VR 0589 Potato and VR 0508 Sweet potato.

7.15.4 VR 0494 Radish

Summary European data for radish have been provided for review. Data addressing previously approved GAP for pre harvest treatment of radish are summarised in Table 65.

Table 65: Residue data addressing the common pre harvest GAP for radish; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised in Appendix 7	40 g ai/100 L, 1–2 applications[a]	0.79, 1.3, 1.4, 1.9, 2.7, 2.9, 3.1	0.09, <0.1 (6)	0.89, 1.4, 1.5, 2.0, 2.8, 3.0, 3.2	3.8[b]

a Two of the trials noted that application was by drenching, it is not clear if this also applies to the remaining trials.

b Sample with highest residue for dietary exposure assessment had a dimethoate residue of 3.1 mg/kg and omethoate of <0.1 mg/kg.

A summary of the acute dietary exposure assessment for pre harvest treatment of radish follows.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Radish	3.2	3.8	110	30	No

The acute dietary exposure to dimethoate residues in radish is unacceptable for children. The previous use of dimethoate on radish is not supported.

Alternative GAP

In response to this assessment the APVMA was requested to consider an alternative GAP with a 14 day withholding period. Available overseas trials for radish addressing a 14 day withholding period are summarised below.

Table 66: Residue data addressing the proposed alternative pre harvest GAP for radish; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised in Appendix 7	40 g ai/100 L, 1–2 applications[a]	0.06 (d only), 0.22 (d only), 0.4, 0.5, 0.54, 0.8, 1.1, 1.4, 1.9, 2.0	<0.1 (7), 0.1	0.06, 0.22, 0.5, 0.6, 0.65, 0.9, 1.2, 1.5, 2.0, 2.1	2.7[b]

a Two of the trials noted that application was by drenching, it is not clear if this also applies to the remaining trials.

b Sample with highest residue for dietary exposure assessment had a dimethoate residue of 2.0 mg/kg and omethoate of <0.1 mg/kg.

Outcomes of the revised acute dietary exposure assessment for radish based on the overseas data and a 14 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Radish (14 day WHP)	2.1	2.7	80	20	Yes

As the acute dietary exposure to dimethoate residues in radish is acceptable based on the overseas trials (involving higher application rates) and a 14 day PHI, the alternative GAP was supported for an interim period pending the provision of Australian data for radish. Temporary MRLs of T3 and T0.2 mg/kg were recommended for dimethoate and omethoate respectively on VR 0494 Radish. Only the dimethoate MRL was established.

As no additional residue data for radish have been provided, support for the interim use is now withdrawn. The temporary MRL of T3 mg/kg for dimethoate on VR 0494 Radish should be deleted.

7.15.5 VR 0506 Turnips

Residue data submitted to the review in support of the use on parsnips and turnips do not address the Australian use pattern. The previous use of dimethoate on parsnips and turnips can no longer be supported.

Alternative GAP

The APVMA has been asked to consider if an alternative GAP for turnips with a 14 day withholding period can be supported based on the available data. US residue data addressing the alternative GAP are summarised below:

Table 67: Residue data addressing the proposed alternative GAP for turnip; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Turnip, US studies summarised in Appendix 7	0.28 kg ai/ha, 3 applications	<0.1 (7)	<0.1 (7)	<0.2	0.8

Outcomes of the revised acute dietary exposure assessment for turnip based on the overseas data and a 14 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Turnip (14 day withholding period)	<0.2	0.8	20	10	Yes

As the acute dietary exposure to dimethoate residues in turnip is acceptable based on the overseas trials and a 14 day PHI, the alternative GAP can be supported. Permanent MRLs of *0.2 and *0.1 mg/kg are recommended for dimethoate and omethoate respectively on VR 0506 Turnip, Garden.

7.15.6 VR 0588 Parsnips

Given that the alternative GAP with a 14 day withholding period has been supported for other root and tuber vegetables, this use pattern was also considered for parsnips. As no specific residue data are available for parsnips, consideration was given to extrapolation from the available residue data for carrots (APVMA guidelines indicate carrots and parsnips are in the same subgroup for extrapolation purposes). Outcomes of the acute dietary exposure assessment for parsnips based on the carrot residue data and a 14 day withholding period are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Parsnip (14 day withholding period)	0.15	0.47	38	11	Yes

As the acute dietary exposure to dimethoate residues in parsnip is acceptable based on the overseas carrot trials (involving higher application rates) and a 14 day PHI, the alternative GAP was supported for an interim period pending the provision of additional data or provision of all study reports for consideration. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate respectively on VR 0588 Parsnip. Only the dimethoate MRL was established.

As no additional residue data for parsnip have been received (or the full study data which was required for carrots), support for the interim use is now withdrawn. The temporary MRL of T0.3 mg/kg for dimethoate on VR 0588 Parsnip should be deleted.

7.15.6 Summary of recommendations for root and tuber vegetables

- The previous uses on root and tuber vegetables are not supported:
- For beetroot, potato and sweet potato, inadequate data are available to establish MRLs for the previous GAP. Based on the available data, outcomes of the acute dietary exposure assessment are unacceptable.
- An alternative GAP with a 14 day withholding period was supported for beetroot for an interim period pending provision of additional data. Temporary MRLs of T*0.1 and T*0.05 mg/kg were recommended for dimethoate and omethoate respectively on beetroot. Only the dimethoate MRL was established. It is considered that the available overseas data is sufficient to support an ongoing use. The temporary MRL of T*0.1 mg/kg for dimethoate on VR 0574 Beetroot should be made permanent.
- An alternative GAP with a 14 day withholding period is supported for potato and sweet potato. Permanent MRLs of 0.1 and 0.05 mg/kg are recommended for dimethoate and omethoate respectively on VR 0589 Potato and VR 0508 Sweet potato.
- For radish, the outcome of the acute dietary exposure assessment is unacceptable for children if the previous withholding period is observed. An alternative GAP with a 14 day withholding period was

supported for an interim period pending the provision of additional residue data. Temporary MRLs of T3 and T0.2 mg/kg were recommended for dimethoate and omethoate respectively on VR 0494 Radish. Only the dimethoate MRL was established. As no additional residue data for radish have been provided, support for the interim use is now withdrawn. The temporary MRL of T3 mg/kg for dimethoate on VR 0494 Radish should be deleted.

- For turnips, inadequate data are available to assess acute dietary exposure and to establish MRLs for the currently approved GAP. For turnips an alternative GAP with a 14 day withholding period is supported. Permanent MRLs of *0.2 and *0.1 mg/kg are recommended for dimethoate and omethoate respectively on VR 0506 Turnip, Garden.
- For carrots, an alternative GAP with a 14 day withholding period was supported for an interim period pending the provision of additional data. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate respectively on VR 0577 Carrot. Only the dimethoate MRL was established. As no additional residue data for carrots (or the full study reports for the JMPR trials) have been received, support for the interim use on carrots is now withdrawn. The temporary MRL of T0.3 mg/kg for dimethoate on VR 0577 Carrot should be deleted.
- For parsnips an alternative GAP with a 14 day withholding period was supported based on data for carrots for an interim period pending provision of the full study reports. Temporary MRLs of T0.3 and T0.1 mg/kg were recommended for dimethoate and omethoate respectively on VR 0588 Parsnip. Only the dimethoate MRL was established. As no additional residue data for parsnip have been received (or the data which was required for carrots), support for the interim use is now withdrawn. The temporary MRL of T0.3 mg/kg for dimethoate on VR 0588 Parsnip should be deleted.

7.16 VS Stalk and stem vegetables

No additional data for stalk and stem vegetables have been provided since the *Dimethoate residues and dietary risk assessment report* of 2011. Alternative uses have been proposed for globe artichokes and celery. The previous findings and an assessment of the new uses are presented below.

Dimethoate was registered for use on celery. There was also a general use on vegetables (including stalk and stem) as summarised below.

Crop	Rate	WHP (days)	Comments
Celery	320 g ai/ha or 30 g ai/100 L	7	Apply when pest damage first appears and repeat as necessary
Vegetables (inc. stalk, stem)	30 g ai/100 L or 300 g ai/ha	7	Apply when pests appear and repeat as necessary

The uses were covered by the dimethoate and omethoate vegetable MRLs each at 2 mg/kg.

7.16.1 VS 0621 Asparagus

Six European trials on asparagus have been provided for review. Data do not closely meet the currently approved GAP for pre harvest treatment of asparagus as dimethoate was applied at a higher spray

concentration. Because the observed residues were at or below the relevant method LOQs they are considered appropriate to support the use. They are summarised in Table 68.

Table 68: Residue data addressing the common pre harvest GAP for asparagus; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised in Appendix 7	40–100 g ai/ 100 L (414–430 g ai/ ha), 1–2 applications	<0.002 (3), <0.01 (2), 0.01	<0.002 (6)	<0.004 (3), <0.01 (2), 0.01	0.02[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.01 mg/kg and omethoate of <0.002 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of asparagus are summarised in the following table.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Stalk and stem					
Asparagus	0.01	0.02	<5	<5	Yes

Acute dietary exposure resulting from consumption of treated asparagus is acceptable. The use continues to be supported. Dimethoate and omethoate MRLs of 0.02 and *0.002 mg/kg are recommended for VS 0621 Asparagus.

7.16.2 VS 0620 Artichoke, globe

European trials on globe artichokes have been provided for review. Two trials addressing previously approved GAP for pre harvest treatment of artichokes are summarised in Table 69.

Table 69: Residue data addressing the common pre harvest GAP for artichokes; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised in Appendix 7	40 g ai/100 L, 3 applications	0.16, 0.86	0.03, 0.13	0.19, 1.00	1.77[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.86 mg/kg and omethoate of 0.13 mg/kg.

A summary of the acute dietary exposure assessment for pre harvest treatment of artichokes follows.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Artichoke, globe	1.0	1.77	110	50	No

The dietary exposure estimate for combined residues for globe artichokes exceeds the dimethoate ARfD for children. The previous use of dimethoate on globe artichokes is no longer supported.

Alternative GAP

In response to this assessment the APVMA was asked to consider an alternative GAP for globe artichokes with a 14 day withholding period. Overseas data addressing the proposed alternative GAP for artichokes are summarised below:

Table 70: Residue data addressing the proposed alternative pre harvest GAP for artichokes; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised in Appendix 7	40 g ai/100 L, 3 applications	0.02, 0.43	<0.01, 0.07	0.03, 0.51	0.92[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.43 mg/kg and omethoate of 0.07 mg/kg.

Outcomes of the revised acute dietary exposure assessment for globe artichokes based on the overseas data and a 14 day withholding period are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Artichoke, globe (14 day WHP)	0.51	0.92	60	30	Yes

As the acute dietary exposure to dimethoate residues in artichokes is acceptable based on the overseas trials involving a 14 day PHI, the alternative GAP was supported for an interim period pending the provision of additional data for artichokes. Temporary MRLs of T1 and T0.2 mg/kg were recommended for dimethoate and omethoate respectively on VS 0620 Artichoke, Globe. Only the dimethoate MRL was established.

As no additional residue data for artichokes have been provided, support for the interim use is now withdrawn. The temporary MRL of T1 mg/kg for dimethoate on VS 0620 Artichoke, Globe should be deleted.

7.16.3 VS 0624 Celery

Two Australian trials on celery have been provided. Additional European studies are also available but did not address GAP. Data addressing previously approved GAP for pre harvest treatment of celery are summarised in Table 71.

Table 71: Residue data addressing the common pre harvest GAP for celery; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP, Volume 13, Part a	30 g ai/100 L, 3 applications, 7–8-day intervals	0.33, 0.39	0.18, 0.56	0.52, 0.99	4.31[a]

a *Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.39 mg/kg and omethoate of 0.56 mg/kg.*

Two trials on celery are not sufficient for robust dietary exposure assessment or determination of MRLs. Based on the available data, the dietary exposure to dimethoate residues in celery is unacceptable for children (see Section 8.1 Acute dietary exposure estimates).[34] The previous use of dimethoate on celery is not supported.

Alternative GAP

In response to this assessment the APVMA was asked to consider an alternative GAP involving a 21 day withholding period in addition to the available overseas studies which involve application at higher rates than registered in Australia. Available European data addressing a 21 day withholding period are summarised below:

Table 72: Residue data addressing the proposed alternative pre harvest GAP for celery; PHI 21 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
European studies summarised in Appendix 7	50 g ai/100 L, 2 applications	<0.002, 0.07, 0.09, 0.28	<0.01, 0.02, 0.04 (2)	<0.01, 0.11 (2), 0.32	0.56[a]

a *Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.28 mg/kg and omethoate of 0.04 mg/kg.*

Outcomes of the revised acute dietary exposure assessment for celery based on the overseas data and a 21 day withholding period are summarised below:

34 If the WHP is extended to 14 days the omethoate HR is 0.16 mg/kg and the acute dietary exposure estimations are acceptable.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Celery (21 day WHP)	0.32	0.56	40	10	Yes

As the acute dietary exposure to dimethoate residues in celery is acceptable based on the overseas trials involving higher application rates and a 21 day PHI, the alternative GAP was supported for an interim period pending the provision of data for celery generated according to the proposed GAP. Temporary MRLs of T0.5 and T0.1 mg/kg were recommended for dimethoate and omethoate respectively on VS 0624 Celery. Only the dimethoate MRL was established.

As no additional residue data for celery have been provided, support for the interim use is now withdrawn. The temporary MRL of T 0.5 mg/kg for dimethoate on VS 0624 Celery should be deleted.

7.16.4 VS 0627 Rhubarb

Two Australian trials on rhubarb have been provided for review. Data addressing currently approved GAP for pre harvest treatment of rhubarb are summarised in Table 73.

Table 73: Residue data addressing the common pre harvest GAP for rhubarb; PHI 7 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study 07-HAL-005(a)GLP, Volume 13, Part a	30 g ai/100 L, 3 applications, 6–8-day intervals	0.08, 0.15	0.09, 0.17	0.18, 0.33	1.34[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.15 mg/kg and omethoate of 0.17 mg/kg.

Outcomes of the acute dietary exposure assessment for pre harvest treatment of rhubarb are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Stalk and stem					
Rhubarb	0.33	1.34	65	70	Yes

The acute dietary exposure estimates for rhubarb are acceptable. Although the residues data are limited, it is appropriate to consider the rhubarb data separately from the celery data. Use of dimethoate on rhubarb is therefore supported with a 7-day WHP. It is recommended that dimethoate and omethoate MRLs of 0.7 and 0.3 mg/kg be established for VS 0627 Rhubarb.

7.16.5 Summary of recommendations for stalk and stem vegetables

- The previously approved general use of dimethoate on stalk and stem vegetables is not supported, although the use can be retained for asparagus and rhubarb.
- Use on globe artichokes with an alternative GAP (14 day withholding period) was supported for an interim period pending the provision of additional data. As no additional residue data for artichokes have been provided, support for the interim use is now withdrawn. The temporary MRL of T1 mg/kg for dimethoate on VS 0620 Artichoke, Globe should be deleted.
- Use on celery with an alternative GAP (21 day withholding period) was supported for an interim period pending the provision of additional data. As no additional residue data for celery have been provided, support for the interim use is now withdrawn. The temporary MRL of T 0.5 mg/kg for dimethoate on VS 0624 Celery should be deleted.
- It is recommended that following new dimethoate and omethoate MRLs are established:

Commodity	MRL (mg/kg)	
	Dimethoate	Omethoate
VS 0621 Asparagus	0.02	*0.002
VS 0627 Rhubarb	0.7	0.3

7.17 GC Cereal grains

Use of dimethoate on cereals was supported for an interim period in the *Dimethoate residues and dietary risk assessment report* of 2011, pending submission of the full study reports for trials summarised in the JMPR. These studies have now been provided. Findings based on the submitted data are presented below.

Dimethoate was registered for the control of various pests on cereals. The critical use pattern from a residues perspective is summarised below. There are also individual uses for dimethoate on maize and sorghum.

Crop	Rate	WHP (days)	Comments
Cereals	30 g ai/100 L or 300 g ai/ha	28 (harvest), 1 (grazing)	Apply when grasshoppers appear and re-apply as required.
Maize	200 g ai/ha	28 (harvest), 1 (grazing)	Apply 2 sprays 5–7 days apart.
Sorghum	200 g ai/ha	28 (harvest), 1 (grazing)	Apply when pests appear and repeat as necessary.

These uses were covered by the dimethoate and omethoate cereal grains MRL of *0.05 and *0.01 mg/kg respectively. There were Table 4 entries for omethoate on the straw, fodder (dry) and hay of cereal grains and other grass-like plants and miscellaneous fodder and forage crops [Fresh weight], each at 20 mg/kg.

Australian residue data for the use of dimethoate on cereal grains are not available.

7.17.1 GC 0654 Wheat and GC 0640 Barley

Overseas trials conducted on wheat and barley have been provided. Additional European data for wheat and barley are available from the 1998 and 2003 JMPR. Full details of the studies summarised by the JMPR have now been provided for the review.

A summary of the available data for wheat and barley grain is given in Table 74.

Table 74: Residue data addressing the common GAP for wheat and barley grain, 28-day PHI

Trial and study reference	Actual application scenario		Dimethoate mg/kg	Omethoate mg/kg	Dimethoate (total) mg/kg
German wheat and barley trials (submitted for review, summarised in Appendix 7)	2–3 applications, 240–260 g ai/ha, (40–60 g ai/100 L)	Grain: 21–35-day PHI	<0.01 (2), <0.02 (3), 0.02, <0.05	<0.01, <0.02 (2), 0.02 (2), <0.05	<0.02 (D only), 0.03 (3), <0.04 (2), <0.1
Wheat (2003 JMPR)	1–2 applications, 350–770 g ai/ha (final application 350–440 g ai/ha)	Grain: 28-day PHI	<0.001 (4), 0.001 (2), 0.007, <0.01 (4), 0.014, 0.024	<0.001 (5), 0.001,0.002 (3),<0.01 (4)	<0.002 (4), 0.002, 0.003, 0.008, 0.016, <0.02 (4), 0.026
Wheat and barley (1998 JMPR)	4 applications, first 2 at 660–750 g ai/ha; last 2 at 340–380 g ai/ha	Grain: 24–28-day PHI	<0.01, 0.02 (3), 0.07 (2), 0.12, 0.19, 0.29	<0.01 (6), 0.01, 0.02 (2)	<0.02, 0.03 (3), 0.08, 0.09, 0.14, 0.20, 0.30
Wheat, additional data provided after initial review (DMT-573)	2 applications, first 761 g ai/ha, second 388 g ai/ha	Grain: 29 day PHI	<0.001	0.001	<0.002

The highest total dimethoate residue in wheat and barley grain in the available trials was 0.30 mg/kg. No omethoate residues above the current MRL were observed.

A summary of the acute dietary exposure assessment for pre harvest treatment of wheat and barley follows.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment[A] mg/kg	Acute exposure[B] (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Cereals					
Wheat and barley	0.30	0.08	5	<5	Yes

a Residue for acute dietary exposure assessment is based on dimethoate and omethoate STMRs of 0.014 and <0.01 mg/kg respectively.

B Acute exposure calculated for CF Cereal grain fractions, CM Early milling products, GC Cereal grains and wheat bran. Acute exposures shown are for Cereal grain fractions with the highest estimated exposure.

The acute dietary exposure estimates are acceptable for wheat and barley. Based on a highest total residue of 0.3 mg/kg the dimethoate cereal grains MRL should be increased to 0.5 mg/kg. The omethoate MRL at

*0.05 mg/kg remains appropriate. While it is recognised that early application rates in the overseas wheat and barley trials were higher than those currently registered in Australia, the final applications in the trials approximated those used in Australia.

A summary of the available data for wheat and barley straw is given in Table 75.

Table 75: Residue data addressing the common GAP for wheat and barley straw, 28-day PHI

TRIAL and study reference	Actual application scenario		Dimethoate mg/kg (fresh weight)	Omethoate mg/kg (fresh weight)	Dimethoate (total) mg/kg (fresh weight)
German wheat and barley trials provided for review	2–3 applications, 240–260 g ai/ha, (40–60 g ai/100 L)	Straw: 24–35-day PHI	<0.05, 0.05, 0.12, 0.24	<0.02, 0.02, <0.05	<0.1, 0.07, 0.14, 0.24 (D only)
Wheat (2003 JMPR)	1–2 applications, 350–770 g ai/ha (final application 350–440 g ai/ha)	Straw: 28-day PHI	0.02, <0.01 (2), 0.01, 0.02, 0.03, 0.05 (2), 0.07, 0.09, 0.15, 0.37, 0.45	<0.001, <0.01 (9), 0.02, 0.06, 0.07	<0.02 (2), 0.02, 0.03 (2), 0.04, 0.06 (2), 0.08, 0.10, 0.17, 0.43, 0.53
Wheat and barley (1998 JMPR)	4 applications, first 2 at 660–750 g ai/ha; last 2 at 340–380 g ai/ha	Straw: 24–28-day PHI	0.02, 0.18, 0.25, 0.28, 0.37, 0.48, 0.65, 0.76, 1.96	<0.01 (2), 0.01 (2), 0.02, 0.03 (2), 0.05 (2)	0.03, 0.19, 0.28, 0.29, 0.38, 0.50, 0.70, 0.79, 2.01
Wheat, additional data provided after initial review (DMT-573)	2 applications, first 761 g ai/ha, second 388 g ai/ha	Straw: 29 day PHI	<0.002	<0.002	<0.004

The highest total dimethoate residue in wheat and barley straw in the available trials was 2.01 mg/kg, with the highest omethoate residue 0.07 mg/kg. MRLs of 5 and 0.2 mg/kg would be appropriate for dimethoate and omethoate respectively in Straw of cereal grains, based on the wheat and barley data. These will not be established at this time, as a primary feed commodities MRL is proposed below.

With respect to the 1-day grazing WHP, residues in plant material were not determined after this PHI in the trials provided for review. Immediately after the final application total dimethoate residues in wheat and barley plant material were 2.09, 2.36, 3.36 and 10.72 mg/kg. Omethoate residues were 0.07, 0.08, 0.12 and 0.58 mg/kg. The dry matter content of the samples was not recorded. Assuming a dry matter content of 25%[35], the highest total dimethoate residue on a dry weight basis is 42.9 mg/kg, which is significantly higher than the feeding level of the goat metabolism study. No animal transfer studies are available. A longer grazing withholding period will therefore be considered.

A summary of the available data for wheat and barley plant material after a 14-day PHI is given in Table 76.

35 Annex 4, OECD Guidance Document on Overview of Residue Chemistry Studies.

Table 76: Residue data addressing the common GAP for wheat and barley plant material, 14-day grazing withholding period

TRIAL and study reference	Actual application scenario		Dimethoate mg/kg (fresh weight)	Omethoate mg/kg (fresh weight)	Dimethoate (total) mg/kg (fresh weight)
German wheat and barley trials provided for review (App 4)	2–3 applications, 240–260 g ai/ha, (40–60 g ai/100 L)	Plant material: 14-day PHI	0.03, 0.05, 0.12	0.04, 0.05, 0.09	0.07, 0.10, 0.22
Wheat (2003 JMPR)	1–2 applications, 350–770 g ai/ha (final application 350–440 g ai/ha)	Plant material: 14–15-day PHI	0.02, 0.08, 0.13, 0.14, 0.68, 1.40, 1.70	0.02, 0.03, 0.05, 0.06, 0.14, 0.21, 0.25	0.05, 0.10, 0.19 (2), 0.91, 1.55, 1.97
Wheat and barley (1998 JMPR)	4 applications, first 2 at 660–750 g ai/ha; last 2 at 340–380 g ai/ha	Plant material: 14-day PHI	0.09, 0.11,0.13, 0.40,0.58, 0.74, 0.75, 0.90[†], 1.13, 1.50, 1.62, 2.68, 3.03, 5.20	<0.01, 0.01, 0.02, 0.03, 0.04, 0.05 (3), 0.07, 0.08, 0.09, 0.10, 0.12, 0.13	0.10, 0.14 (2), 0.44, 0.69, 0.80, 0.826, 0.92, 1.18, 1.55, 1.76, 2.76, 3.13, 5.33
Barley, additional data provided after initial review (DMT-679)	1 application 324 – 375 g ai/ha	Plant material: 13-14 day PHI	0.05, 0.49 (2), 0.85	0.03, 0.20, 0.21, 0.25	0.08, 0.72, 0.76, 1.07
Wheat, additional data provided after initial review (DMT-573)	2 applications, first 761 g ai/ha, second 388 g ai/ha	Plant material: 14 day PHI	0.15	0.07	0.23

[†]Reported as 1.01 mg/kg in original study report.

The highest total dimethoate residue in plant material after a 14-day PHI was 5.33 mg/kg. Assuming a dry matter content of 25%, the highest total dimethoate residue would correspond to 21.32 mg/kg on a dry weight basis. (The highest residue was found in a trial in which the first 2 applications were at 0.74 kg ai/ha, followed by applications at 0.37 and 0.36 kg ai/ha—the interval between applications was 7, 15 and 58 days, suggesting that it is the last application that will make the most significant contribution to the residue). These data indicate that residues in cereal forage would be within the feeding level of the goat metabolism study if a 14-day grazing WHP were observed. MRLs of 30 and 1 mg/kg would be appropriate for dimethoate and omethoate respectively on Forage and fodder of cereal grains (green) based on the available wheat and barley data. Previously, to cover this and uses on other crops which may be used as animal feeds, a dimethoate MRL of 30 was established for Primary Feed Commodities. The dimethoate Primary feed commodities MRL was later increased to 40 mg/kg based on data for pasture supplied by one holder in a separate application to confirm/amend the pasture use pattern on the label for Danadim Insecticide (Product 56454). An omethoate Primary Feed Commodities MRL of 10 mg/kg is recommended in this evaluation.

Two dimethoate wheat processing studies have been provided. In the first study, residues of dimethoate and omethoate were not detected (<0.01 mg/kg) in processed fractions derived from grain from a dimethoate treated crop. However, as residues in grain were also <0.01 mg/kg, it is not possible to calculate processing factors for commodities derived from wheat based on this study. In a second wheat processing study, dimethoate and omethoate were concentrated 2× and 1.4× in cleaned bran respectively. Dimethoate was

also concentrated 1.3× in the germ rich fraction. The transfer factors for all other processed fractions from wheat were less than 1.

It is recommended that MRLs of 1 and 0.05 mg/kg for dimethoate and omethoate be established for CF 0654 Wheat bran, processed.

7.17.2 GC 0645 Maize

European data for dimethoate on maize are available from the 1998 JMPR. Full reports for these studies have been provided since the initial residues review. Data addressing currently approved GAP for maize are summarised in Table 77.

Table 77: Residue data addressing the common GAP for maize grain; PHI 28 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
1998 JMPR	320 g ai/ha, 1 application	<0.01	<0.01	<0.02	<0.08
		<0.01	<0.01	<0.02	<0.08

Residues of dimethoate and omethoate in maize grain at 28 days after application at 1.6× the Australian rate were each <0.01 mg/kg (n = 2). Given that the residue data are consistent with the wheat and barley data the dataset is considered acceptable for acute dietary exposure assessment. Outcomes of the acute dietary exposure assessment for pre harvest treatment of maize are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Cereals					
Maize	<0.02	<0.08	<5	<5	Yes

The acute exposure to dimethoate residues in maize is acceptable and residues in grain will comply with the cereal grains MRL recommended on the basis of the wheat and barley data.

The maize trials did not determine residues in plant material after a 1-day withholding period. Immediately after application, dimethoate residues in plant material were 12.3 and 13.2 mg/kg, with omethoate residues <0.01 (2) mg/kg. Assuming maize forage contains 40% dry matter[36], the highest residue is 33 mg/kg dry weight, which is just above the feeding level used in the goat metabolism study. Residues in plant material were below this level 7 days after application (dimethoate 0.22–0.52 mg/kg, omethoate 0.032–0.093 mg/kg). The 14-day grazing withholding period recommended for wheat and barley should also apply to maize.

36 Annex 4, OECD Guidance Document on Overview of Residue Chemistry Studies.

A corn processing study has also been provided and indicates that residues of dimethoate and omethoate did not concentrate in processed field corn grain commodities. It is therefore not necessary to establish separate MRLs for processed commodities from maize/corn.

7.17.3 GC 0651 Sorghum

Data for dimethoate residues in sorghum grown in the United States of America are available from the 1998 JMPR. Full reports for these studies have been provided since the initial residues review. Data addressing currently approved GAP for sorghum are summarised in Table 78.

Table 78: Residue data addressing the common GAP for sorghum grain; PHI 28 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
1998 JMPR	0.56 kg ai/ha, 3 applications, 7 days apart	<0.01 (5)	<0.01 (5)	<0.01 (5)	<0.08

Residues of dimethoate and omethoate in sorghum grain at 28 days after the last application at higher rates than approved in Australia were each <0.01 mg/kg (n = 5). Outcomes of the acute dietary exposure assessment for pre harvest treatment of sorghum are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Cereals					
Sorghum	<0.02	<0.08	<5	<5	Yes

The acute exposure to dimethoate residues in sorghum is acceptable and residues in grain will comply with the cereal grains MRL recommended on the basis of the wheat and barley data.

The available JMPR trials did not report residues in sorghum plant material after the current 1-day grazing withholding period. At 28 days after the last application the maximum dimethoate residue in sorghum forage or hay was 0.02 mg/kg with omethoate 0.01 mg/kg. The 14-day grazing withholding period recommended for wheat and barley should also apply to sorghum.

7.17.4 Summary of recommendations for cereals

- The continued use of dimethoate on cereals is supported.
- It is recommended that the dimethoate cereal grains MRL be increased to 0.5 mg/kg. The current omethoate cereal grains MRL at *0.05 mg/kg remains acceptable.
- Dimethoate and omethoate MRLs of 1 and 0.05 mg/kg respectively are recommended for CF 0654 Wheat bran, processed.

- The grazing withholding period for forage and fodder associated with these uses must be extended to 14 days.
- Residues in cereal forage, fodder and straw will be within the MRL of 40 mg/kg previously recommended for dimethoate on Primary Feed Commodities to cover a use on pasture. Omethoate residues in cereal forage, fodder and straw will be within the MRL of 10 mg/kg recommended for omethoate on Primary Feed Commodities.

7.18 SO Oilseeds

Use of dimethoate on cotton was supported for an interim period in the *Dimethoate residues and dietary risk assessment report* of 2011. Use on other oilseeds was supported for an application at crop emergence only for treatment of red-legged earth mite. Additional data has now been received for peanuts and full reports of studies on cotton, safflower and soybean have also been provided.

Dimethoate was registered for the control of various pests on cotton, sunflowers, peanuts, sesame and oilseeds generally. The critical use patterns from a residue perspective for dimethoate on oilseeds are summarised below.

Crop	Rate	WHP (days)	Comments
Cotton	300 g ai/ha or 30 g ai/100 L	14	Apply when pests appear and repeat as necessary
Peanuts	140 g ai/ha	7	Apply when pests appear and repeat as necessary
Sesame	200 g ai/ha	14	Apply when pests threaten damage to crops
Sunflowers	320 g ai/ha	14	Apply when pests appear and repeat as necessary
Oilseeds	30 g ai/100 L or 300 g ai/ha	14	Apply when grasshoppers appear and re-apply as required

Permit 9343 (expired 3/3/2012 reissued as 13353) allows application of dimethoate to oilseed cultivars of mustard. The permit states that use rates, timing and frequency are as defined on product labels for registered use on canola.

Permit 11784 (expired 30/9/2010) specifically allowed application of dimethoate to canola at up to 300 g ai/ha. The permit allowed only 1 application per season in conjunction with a 21-day harvest withholding period. The permit included a restraint against grazing or cutting for fodder.

These uses were covered by dimethoate MRLs of 0.1 mg/kg for oilseeds (except peanut) and *0.05 mg/kg for peanuts. The omethoate MRL for oilseed is *0.05 mg/kg.

New use pattern for canola, linseed, mustard and poppy:

Since the initial residues evaluation FMC Australasia Pty Ltd have submitted residue data to confirm/amend the use patterns for canola, linseed, mustard and poppies on the label for Danadim Insecticide (Product no. 56454, see trade advice notice, published June 2015). That data is protected and is not available to the review. A dimethoate MRL of 0.2 mg/kg was recommended for dimethoate on SO 0088 Oilseed except peanut. An MRL of 0.05 mg/kg was recommended for omethoate on SO 0088 Oilseed.

For the initial residues review the only data provided in relation to oilseeds were processing studies for cottonseed and safflower (Appendix 4). Additional data for cotton, safflower and peanuts have now been provided.

In the cotton processing study 2 applications of dimethoate were made at the exaggerated rate of 2.8 kg ai/ha. The interval between applications was 13 days. Cotton seed samples were harvested 14 days after the second application and processed to delinted seed, meal, hulls, oil (crude, refined and bleached/deodourised) and soapstock. Residues of dimethoate and omethoate were non-detectable (<0.01 mg/kg) in refined and bleached oil samples and non-detectable in soapstock (although method for soapstock was not successfully validated for omethoate). For the other matrices, the maximum total dimethoate residues were 0.03 mg/kg in cottonseed, 0.04 mg/kg in meal, 0.09 mg/kg in hulls and 0.02 mg/kg in crude oil samples. The maximum processing factors for dimethoate (parent) in meal and hulls were 2× and 4.5× respectively. Omethoate was not detected in these samples.

In the safflower processing study 2 applications of dimethoate were made at the exaggerated rate of 2.8 kg ai/ha. The interval between applications was 14 days with samples of seed collected 14–15 days after the second application. Seed samples were processed into meal and refined oil. The maximum total dimethoate residue (in parent equivalents) was 0.70 mg/kg in seed, 0.68 mg/kg in meal and <0.01 mg/kg in refined oil.

Limited residue data for dimethoate are available for other oilseed crops from the 1984 JMPR:

> *Cotton seed*: No residues were found in cotton seed 10–30 days after the last of 10 sprays, each at 0.5–0.9 kg/ha (LOQ not stated).
>
> *Mustard*: Dimethoate residues persisted to a level of 0.08 mg/kg 6–29 days after spraying. (Rates not specified.)
>
> *Peanuts*: Following 2 sprays with dimethoate (0.3 g/L) the residue in peanut kernels was 0.48–0.55 mg/kg.
>
> *Soybeans*: When a diluted dimethoate emulsion was applied at rates of 125, 250 and 500 g ai/ha, residues had decreased to 0.1 mg/kg by the seventh day after treatment.

Summary United States data for dimethoate on cotton and soya beans were previously considered in support of a permit application for dimethoate use on canola. Full reports of these studies have been provided since the initial residues review. Additional residues studies on cotton seed oil and meal have also been provided, although none of the studies are contemporary.

In a non-contemporary safflower study provided after the initial review, residues in seed were determined 0, 2, 5 or 9 days after the last of 2 treatments at 0.5 or 1.0 lb ai/Ac. A dimethoate residue of 0.075 mg/kg was found in the 0 day sample treated at 0.5 lb ai/Ac for the first application and 1.0 lb ai/Ac (1.12 kg ai/ha) for the second. All other samples contained <0.05 mg/kg dimethoate. All samples contained <0.05 mg/kg omethoate.

Cotton

There were five trials where cotton seed was analysed for both dimethoate and omethoate. Rates of dimethoate were 0.28–1.12 kg ai/ha with harvest intervals of 3–120 days. In two trials each involving 1 application, at 0.56 and 1.12 kg ai/ha, residues in the cotton seed were below 0.05 mg/kg for both

dimethoate and omethoate at a PHI of 10–14 days. Data addressing currently approved GAP for cotton are summarised in Table 79.

Table 79: Residue data addressing the common GAP for cotton; PHI 14 days

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Cotton data supplied in support of permit 11140	0.5 lb ai/Ac (0.56 kg ai/ha), 1 application	<0.05 (2)	<0.05 (2)	<0.1	0.4
	1 lb ai/Ac (1.12 kg ai/ha), 1 application	<0.05 (2)	<0.05 (2)	<0.1	0.4

In six additional trials cotton seed oil and cotton seed meal were analysed following applications of dimethoate at varying rates (0.28–2.24 kg ai/ha) with harvest intervals of 0–56 days. Dimethoate residues in cotton seed oil from trials harvested at a 14-day PHI after treatment at 0.56 kg ai/ha were: 0.05, <0.05, <0.05 mg/kg with no detections in the cotton seed meal. For trials treated with 1.12 kg ai/ha residues in the cotton seed oil after a 14-day PHI were: 0.04, <0.05, <0.05, with again no detections in the cotton seed meal. There was no analysis for omethoate in these trials.

For soya beans there were nine trials with either single or multiple applications of dimethoate at rates of 0.56, 1.12 and 2.80 kg ai/ha with harvest intervals of 20–58 days. Results were reported for both soya bean seed and soya bean hay. Dimethoate and omethoate residues, from four trials with 3 applications, from soya bean seed harvested at a PHI of 20–24 days were all <0.05 mg/kg. Residues in soya bean hay ranged from <0.05 mg/kg at 0.5 lb ai/Ac, and <0.05 to 0.23 mg/kg at the 1.0 lb ai/Ac rate.

The overseas data support the continued use of dimethoate on cotton. Residues of dimethoate and omethoate in cotton seed were each <0.05 mg/kg at 10–14 days after application at up to 3.7× the approved maximum Australian rate. Outcomes of the acute dietary exposure assessment for cotton are summarised below.

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Oilseeds					
Cotton	<0.1	0.4	<5	<5	Yes

The acute exposure to dimethoate residues in cotton is acceptable. A dimethoate MRL of *0.1 mg/kg is recommended for SO 0691 Cotton seed. Omethoate residues will be covered by the oilseeds MRL of 0.05 mg/kg. No data are available for cotton forage or trash, but it is not considered good practice to feed these commodities to livestock. Based on a maximum processing factor for dimethoate parent of 4.5× to hulls and 2× for meal, an MRL of 0.5 mg/kg is recommended for dimethoate on cotton seed meal and hulls. As omethoate was not detected in these commodities in the processing study, an MRL of *0.05 is recommended for omethoate on cotton seed meal and hulls.

Peanuts

Details of 4 Australian GLP trials on peanuts have been provided since the initial residues review. Data addressing the common GAP for peanuts are summarised below:

Table 80: Residue data addressing the common GAP for peanuts; 14-day PHI (new data)

Trial and study reference	Actual application scenario	Dimethoate (mg/kg)	Omethoate (mg/kg)	Total residue for MRL determination (mg/kg)	Highest residue for acute dietary exposure assessment (mg/kg)
Study number 12-AKC-001GLP	320 g ai/ha, 3 applications, 14 day intervals	<0.001 (3), 0.007	<0.001 (4)	<0.002 (3), 0.008	0.014[a]

a Sample with highest residue for dietary exposure assessment had a dimethoate residue of 0.007 mg/kg and omethoate <0.001 mg/kg.

Outcomes of the acute dietary exposure assessment for the pre-harvest treatment of peanuts are summarised below:

	Observed total HR mg/kg	Residue for acute dietary exposure assessment mg/kg	Acute exposure (% of ARfD)		Use acceptable?
			2–6 years	2+ years	
Peanuts	0.008	0.014	0.1	0.1	Yes

The acute dietary exposure to dimethoate residues in peanuts is acceptable. MRLs of 0.02 mg/kg and *0.01 mg/kg are recommended for dimethoate and omethoate respectively on SO 0697 Peanuts in conjunction with a 14 day harvest WHP.

Peanut forage

Total dimethoate residues in peanut forage at 14 days after the last of 3 applications at 320 g ai/ha were 1.12, 1.37, 2.33 and 9.50 mg/kg. Omethoate residues were 0.65, 1.00, 1.50 and 3.95 mg/kg. It is noted that the forage samples were collected close to harvest and are considered representative of fodder. OECD guidelines indicate peanut fodder contains 85% dry matter. The highest total dimethoate residue is estimated to be 11.2 mg/kg on a dry weight basis. The highest omethoate residue is estimated to be 4.6 mg/kg on a dry weight basis. MRLs of 20 and 10 mg/kg would be appropriate for dimethoate and omethoate respectively on AL 0697 Peanut fodder in conjunction with a 14 day grazing WHP. No data have been provided to indicate what residues in forage would be from early season application in a failed crop situation. However, it is considered that residues in peanut forage would be unlikely to exceed the dimethoate Primary feed commodities MRL at 40 mg/kg recommended for use on other crops including pastures and cereals. A Primary Feed Commodities MRL of 10 mg/kg is also recommended for omethoate.

Other oilseeds

Limited data that are available for oilseeds other than cotton and peanuts, noting that during evaluation FMC Australasia Pty Ltd have supplied residue data to confirm/amend the use pattern for canola, linseed, mustard

and poppy on the label for Danadim Insecticide (Product 56454). The generally available data are not sufficient to support use of dimethoate on oilseeds other than cotton and peanuts. A use on oilseeds for redlegged earth mite can continue to be supported provided the critical comments state that application should be at crop emergence. The harvest withholding period for this use should be not required when used as directed. To cover this use it would be appropriate to establish dimethoate and omethoate MRLs each at *0.01 mg/kg for SO 0088 Oilseed (except cotton and peanuts). However, a higher MRL at 0.2 mg/kg has since been established for dimethoate on SO 0088 Oilseed except peanut in the evaluation a separate registration application in relation to product 56454.

Recommendations

- The approved uses of dimethoate on sesame, sunflowers and other oilseeds (other than cotton and peanuts) are no longer supported, except for treatment of redlegged earth mite, as appropriate residue data are not available.
- It is recommended that the dimethoate and omethoate oilseeds MRLs be amended.
- The approved use of dimethoate on cotton continues to be supported. It is recommended that:
    - A new MRLs of *0.1 mg/kg be established for dimethoate on SO 0691 Cotton seed.
    - New Table 4 entries in the MRL Standard of 0.5 and *0.05 mg/kg be established for dimethoate and omethoate respectively on Cotton seed meal and hulls.
- The approved use of dimethoate on peanuts continues to be supported in conjunction with a 14 day harvest and grazing withholding period. It is recommended that:
    - New MRLs of 0.02 and *0.01 mg/kg be established for dimethoate and omethoate on SO 0697 Peanuts.
- A use on oilseeds for redlegged earth mite will be retained provided the critical comments indicate application should be at crop emergence.
- Dimethoate and omethoate MRLs each at *0.01 mg/kg would be appropriate for SO 0088 Oilseed (except cotton and peanuts) to cover the use for redlegged earth mite at crop emergence. These MRLs are no longer required noting the MRLs that have been established in the interim based on protected registration application data: 0.2 mg/kg for dimethoate on SO 0088 Oilseed except peanut. This MRL should be amended to exclude cotton seed as a separate MRL has now been recommended for cotton seed.

7.19 Uses on pasture and forage crops

Dimethoate was registered for the control of various pests on pastures, pasture seed and forage crops (including clover, medics, cereals, lucerne, legumes for animal feeds, leucaena). The critical use from a residues perspective is summarised below.

Crop	Treatment	Rate	WHP (days)	Comments
Pastures, pasture seed and forage crops (inc. clover, medics, cereals, lucerne, legumes for animal feed)	Foliar	30 g ai/100 L or 300 g ai/ha	1 (grazing)	Apply when grasshoppers appear and re-apply as required
Leucaena	Foliar	136 g ai/ha	1 (grazing)	

New use pattern for pasture

Since the initial residues evaluation a separate application has been made to amend/confirm the pasture use pattern on the Danadim Insecticide label (Product no. 56454, see trade advice notice, published June 2015). That data is protected and is not available to the review. Prior to the *Dimethoate residues and dietary risk assessment report* of 2011 there were no Table 4 entries for dimethoate on pasture or forage crops (with the exception of lupin forage at 1 mg/kg). Residue data are not available to establish Table 4 entries in the MRL Standard for pastures and to estimate livestock dietary burden. The use of dimethoate on pastures and forage crops can no longer be supported (with the exception of the use on the Danadim label for which separate residue data was supplied as part of an application to amend the labels).

A general use can be retained for treatment of redlegged earth mite at 100 g ai/ha provided application is restricted to crop emergence. The withholding period will then be not required when used as directed. The use will be covered by the MRL for dimethoate on Primary feed commodities of 40 mg/kg recommended to cover uses on pastures based on the protected data submitted to registration for product 56454. Omethoate will be covered by the Primary Feed Commodities MRL of 10 mg/kg recommended in this evaluation.

7.20 Seed dressing uses

Dimethoate was registered as a seed dressing for vetches, lucerne, clover, linseed and canola. Application rates range from 150 to 600 mL/100 kg seed (60–240 g ai/100 kg seed). Residue data are not available to establish Table 1 and Table 4 entries in the MRL Standard, to estimate livestock dietary burden or to establish appropriate grazing withholding periods. The use of dimethoate on these crops as a seed dressing can no longer be supported.

7.21 Animal commodities

Anticipated maximum livestock dietary burdens for cattle and poultry are shown in the following table:

Cattle: 500 kg bw, 20 kg DM/day

Commodity	% in diet	Feed intake	Residue (mg/kg)	% DM	Livestock dietary exposure		
					mg/animal	ppm	mg/kg bw
Citrus pulp	30	6	1.7 (STMR-P total)	91	10.2	0.51	0.02
Pineapple bran	60	12	0.47 (HR total in peel)	25	22.6	1.13	0.045
Pasture (New registration data for product 56454–protected)	100	20	28.3 (HR total)	100	566	28.3	1.13
Legume animal feeds (14-day grazing WHP)	100	20	7.2 (HR total)	100	144	7.2	0.288
Cereal forage (14-day grazing WHP)	100	20	21.3 (HR total)	100	426	21.3	0.852
Cereal grains	100	20	0.024 (STMR total)	89	0.54	0.027	0.0011
Peanut fodder	100	20	11.2 (HR total)	100	224	11.2	0.448
Cotton seed	30	6	*0.1	88	0.68	0.034	0.0014
Cotton seed meal	30	6	≤0.2	89	1.35	0.067	0.0027
Cotton hulls	20	4	≤0.45	90	2.0	0.10	0.004

In the initial residues review evaluation, the maximum dietary exposure to dimethoate for cattle was estimated as a result of the consumption of cereal forage as 100% of the diet to give a total dimethoate intake of 21.3 ppm. Taking into consideration the new residue data for dimethoate on pasture the maximum dietary exposure for cattle is now 28.3 ppm, based on consumption of pasture as 100% of the diet. Therefore livestock burden is no higher than that considered for Product no. 56454 (see trade advice notice, published June 2015) and appropriate mammalian commodity MRLs are established for dimethoate. The omethoate MRLs require further consideration.

Poultry: 2 kg bw, 0.15 kg DM/day

Commodity	% in diet	Feed intake	Residue (mg/kg)	% DM	Livestock dietary exposure		
					mg/animal	ppm	mg/kg bw
Cereal grains	100	0.15	0.024 (STMR total)	89	0.0040	0.027	0.0020
Cotton seed	30	0.045	*0.1	88	0.0051	0.034	0.0026
Cotton seed meal	20	0.03	≤0.2	89	0.0067	0.045	0.0033

The maximum dietary exposure to dimethoate for poultry will be as a result of consumption of cereal grain as 80% of the diet with cotton seed meal as 20% to give a total dimethoate intake of 0.067 ppm.

Animal commodity MRLs for dimethoate and omethoate were previously established at *0.05 mg/kg for tissues, milk and eggs. Animal transfer studies for dimethoate and omethoate are not available.

In the goat metabolism study goats were dosed for 3 consecutive days with ^{14}C-dimethoate at a rate equivalent to 30 ppm in the diet. Dimethoate residues were not detected in tissues and milk. Omethoate residues were 0.12 mg/kg in liver after protease treatment and not detected in other tissues and milk. As a major pathway of dimethoate metabolism in animals occurs *via* omethoate, and as omethoate residues occur in animal feeds at a much lower level than dimethoate (parent) the study is suitable for estimation of animal commodity MRLs.

The predicted residues in tissues and milk (as considered previously) by comparison with those observed in the goat metabolism study are summarised in the following table.

Matrix	Residue observed after dosing at 30 ppm (mg/kg)		Estimated residue for feeding level of 21.3 ppm (mg/kg)	
	Dimethoate	Omethoate	Dimethoate	Omethoate
Liver	ND	0.120	<0.001	0.085
Kidney	ND	ND	<0.001	<0.001
Muscle	ND	ND	<0.001	<0.001
Fat	ND	ND	<0.001	<0.001
Milk	ND	ND	<0.001	<0.001

ND Not detected (assumed limit of reporting 0.001 mg/kg)

Previously, based on a maximum dimethoate intake of 21.3 ppm for cattle and the goat metabolism study, the predicted maximum residue of omethoate in liver is 0.085 mg/kg (0.12 × 21.3 ÷ 30). This required an increase to the MRL for omethoate in edible offal (mammalian) to 0.1 mg/kg. As the residue definition for dimethoate is the sum of dimethoate and omethoate, the MRL for dimethoate on edible offal was also increased to 0.1 mg/kg. The established MRLs for meat and milk remained acceptable.

Considering the new pasture residue data for product 56454[37] with a HR of 28.3 mg/kg, the calculated residue of omethoate in liver from feeding at 28.3 ppm is 0.11 mg/kg (0.12 × 28.3 ÷ 30), which is approximately equivalent to the MRL of 0.1 mg/kg recommended previously for Edible offal (mammalian). This previously recommended MRL is considered to remain acceptable as although the HR in pasture was 28.3 mg/kg, the next highest residue was 14.6 mg/kg with 6 of the 9 results below 10 mg/kg. The above calculations are therefore considered to be conservative, noting also the half life of dimethoate in pasture of approximately 7 days or less and the low K_{ow} Log P.

In the poultry metabolism study hens were dosed for 7 days with ^{14}C-dimethoate at a rate equivalent to 10 ppm in the diet. The TRR in liver (0.705 mg/kg) was significantly higher than in other tissues or eggs. Omethoate only accounted for 0.081 mg/kg in liver and 0.004 mg/kg in egg white. Dimethoate was not

[37] Application number 60387, TAN published June 2015

detected in any sample. A highest dimethoate exposure of 0.067 ppm in the feed would not be expected to produce dimethoate or omethoate residues above current MRLs. The poultry commodity MRLs for dimethoate and omethoate remain appropriate.

It is noted that a validated analytical method has been provided for the determination of dimethoate and omethoate in animal tissues, milk and eggs. The LOQ for the method is 0.01 mg/kg for tissues and 0.001 mg/kg for milk and eggs. This is below the levels of the current animal commodity MRLs for dimethoate and omethoate.

A summary of the acute dietary exposure assessments for animal commodities follows.

Commodity	Residue for acute dietary exposure estimate (mg/kg)	% of acute ARfD		Outcome
		2–6 years	2+ years	
ML 0106 Milks	0.008	5	<5	Supported
MM 0095 Meat (mammalian)	0.008	<1	<1	Supported
MO 0105 Edible offal (mammalian)	0.771	5	10	Supported
PE 0112 Eggs	0.008	<1	<1	Supported
PM 0110 Poultry meat	0.008	<1	<1	Supported
PO 0111 Poultry, edible offal	0.008	<1	<1	Supported

Animal commodity recommendations

- The MRL for omethoate on MO 0105 Edible offal (mammalian) should be increased from *0.05 mg/kg to 0.1 mg/kg.
- The remaining established animal commodity MRLs for dimethoate and omethoate continue to be supported.

7.22 Home garden uses

Dimethoate is approved for use in the home garden on a number of crops grown in these situations. Owing to concerns over acute (short-term) dietary exposure to dimethoate residues identified in commercial situations the following approved home garden uses can no longer be supported:

- citrus
- fruit trees
- pome fruit
- potatoes
- stone fruit
- tomatoes
- vegetables.

Consideration of commercial uses has indicated that approvals can continue on a small range of crops that fall within the general fruit tree and vegetable home garden uses. Approval of these uses in the home garden is not supported as they only represent a small range of edible crops generally grown in the home garden and use on other crops represents a significant acute dietary exposure risk. Additionally, the acceptability of the commercial uses is based on a high level of control of application rate and harvest withhold period that cannot necessarily be expected of home garden users. On this basis the APVMA cannot be satisfied that the continued use of dimethoate in the home garden would not be an undue hazard to the safety of people using anything containing its residues and these uses must be deleted.

8 DIETARY EXPOSURE ESTIMATES

The following health standards have been recommended by the Office of Chemical Safety, Australian Government Department of Health and Ageing.

Compound	Dietary Standard, mg/kg bw		No Observable Effect Level (NOEL), mg/kg bw	Safety Factor
Dimethoate	ADI	0.001	0.1	100
	ARfD	0.02	0.2	10

8.1 Acute dietary exposure estimates

Acute dietary exposure is estimated by the National Estimated Short Term Intake (NESTI) calculation. The NESTI calculations are made in accordance with the deterministic method used by the JMPR with 97.5th percentile food consumption data derived from the 1995 National Nutrition Survey of Australia. NESTI calculations are conservative estimates of acute exposure (24-hour period) to chemical residues in food.

As discussed in Chapter 7, to account for the shared mode of action of dimethoate and omethoate, residues for acute dietary exposure estimates are calculated as:

D + O (mg/kg) = dimethoate (parent, mg/kg) + (7 x omethoate (mg/kg))

The estimated intakes are then compared against the dimethoate ARfD.

The NESTI calculations are in the appendixes. The ARfD is exceeded for a number of commodities as summarised in Table 81.

Table 81: Summary of acute dietary exposure (NESTI) calculations

Acute dietary exposure (NESTI) calculations				
Commodity	Residue for acute dietary exposure assessment (mg/kg)	% of ARfD		Outcome
		2–6 years	2+ years	
FB 0261 Bilberry (foliar) (Vaccinium berries)	12.5	40	10	Supported—caveats (see text Section 7.5.1)
FB 0264 Blackberries (foliar)	20	70	20	Supported
FB 0020 Blueberries (foliar) (Vaccinium berries)	12.5	40	10	Supported—caveats (see text Section 7.5.1)
FB 0269 Grapes (pre harvest)	17.7	3000	1300	Not supported
FB 0269 Grapes (foliar application pre flowering)	0.4	70	30	Insufficient data—phase out acceptable

Acute dietary exposure (NESTI) calculations				
Commodity	Residue for acute dietary exposure assessment (mg/kg)	% of ARfD		Outcome
		2–6 years	2+ years	
FB 0272 Raspberries, red, black	20	70	20	Supported
FB 0274 Strawberries (pre harvest)	9.5	450	115	Not supported
FB 0274 Strawberry (runners)	0.08	5	1	Supported
FB 0021 Currants (pre harvest)	1.45	290	60	Not supported
FC 0001 Citrus Mandarins (post harvest)	0.124	15	5	Supported
FC 0001 Citrus Lemons (pre harvest)	0.49	50	5	Supported
FC 0001 Citrus Mandarins (pre harvest)	0.48	70	20	Supported
FC 0001 Citrus Oranges (pre harvest)	0.36	55	20	Supported
FC 0001 Citrus Oranges (post harvest)	0.394	60	20	Supported
FI 0326 Avocado (pre + post harvest)	0.39	96.5	15	Supported
FI 0327 Banana (post harvest)	≤0.08 (assume all d)	10	5	Supported
	≤0.08 (assume all o)	65	20	
FI 0332 Custard apple (post harvest)	0.18	60	20	Supported
FI 0343 Litchi (post harvest)	1.1	60	15	Supported
FI 0343 Litchi (foliar)	0.55	30	10	Supported
FI 0345 Mango (foliar and post harvest)	0.62	65	30	Supported
FI 0350 Papaya (post harvest)	0.15	70	15	Supported
FI 0353 Pineapple (35-day WHP)	0.09	50	15	Supported
FP 0226 Apple (Pre-harvest)	3.02	510	160	Not supported
FP 0226 Apple (post harvest)	1.97	330	110	Not supported
FS 0013 Cherries (Post harvest)	4.09	340	60	Not supported
FS 0013 Cherries (foliar)	3.41	280	50	Not supported

Acute dietary exposure (NESTI) calculations				
Commodity	Residue for acute dietary exposure assessment (mg/kg)	% of ARfD		Outcome
		2–6 years	2+ years	
FS 0013 Cherries (alternative GAP – foliar application at flowering)	0.08	7	1	Insufficient data – phase out acceptable
FS 0014 Plums (foliar)	1.59	200	70	Not supported
FS 0014 Plums (alternative GAP – foliar application at flowering)	0.08	10	3	Insufficient data – phase out acceptable
FS 0245 Nectarine (foliar)	3.51	510	220	Not supported
FS 0245 Nectarine (alternative GAP – foliar application at flowering)	0.08	10	5	Insufficient data – phase out acceptable
FS 0247 Peach (Post harvest)	1.6 (assumed all d)	250	95	Not supported
FS 0247 Peach (foliar)	8.76	1400	520	Not supported
FS 0247 Peach (alternative GAP – foliar application at flowering)	0.08	13	4	Insufficient data – phase out acceptable
FT 0305 Olives (Pre-harvest)	7.49	400	80	Not supported
FT 0305 Olives for oil production only, 6 week WHP	0.11	<5	<1	Supported (permit)
FT 0307 Persimmons (Pre-harvest)	9.6	930	190	Not supported
GC 0080 Cereal grains (STMR used)	0.08	5	<5	Supported
GC 0645 Maize	<0.08	<5	<5	Supported
GC 0651 Sorghum	<0.08	<5	<5	Supported
SO 0691 Cotton	0.4	<5	<5	Supported
SO 0697 Peanut	0.014	<1	<1	Supported
SO 0088 Oilseed (protected data – for product 56454)	0.154	<1	<1	Supported
SO 0088 Oilseeds (application at crop emergence)	0.08	<1	<1	Supported
VA 0385 Onion (pre-harvest)	1.64	80	40	Supported
VB 0421 Broccoli	4.7	620	200	Not supported

Acute dietary exposure (NESTI) calculations				
Commodity	Residue for acute dietary exposure assessment (mg/kg)	% of ARfD		Outcome
		2–6 years	2+ years	
VB 0421 Broccoli (alternative GAP with 21 day WHP)	0.37	50	16	Insufficient data – phase out acceptable
VB 0402 Brussels sprouts	2.77	105	35	Not supported
VB 0041 Cabbage (drum head only and alternative GAP with 21 day WHP)	0.2	15	10	Insufficient data – phase out acceptable
VB 0404 Cauliflower	4.24	450	170	Not supported
VB 0404 Cauliflower (alternative GAP with 21 day WHP)	0.37	40	15	Insufficient data – phase out acceptable
VC 0424 Cucumber (post harvest)	4.28	350	120	Not supported
VC 0424 Cucumber (foliar)	1.83	150	50	Not supported
VC 0431 Zucchini (post harvest)	3.61	385	110	Not supported
VC 0431 Zucchini (foliar)	0.7	75	20	Supported
VC 0046 Melons, except water melons (pre + post harvest)	0.301	90	35	Supported
VC 0432 Watermelons (pre + post harvest)	0.301	90	90	Supported
VD 0070 Pulses	0.848	10	5	Supported
VL 0464 Silverbeet	5.84	270	160	Not supported
VL 0467 Chinese cabbage	1.88	110	60	
VL 0482 Lettuce, Head	8.24	380	215	
VL 0483 Lettuce, Leaf	2.86	130	75	
VL 0502 Spinach	13.71	450	460	
VO 0440 Eggplant (post harvest)	6.12	810	510	Not supported
VO 0440 Eggplant (foliar)	0.76	101	60	Not supported
VO 0440 Eggplant (foliar – alternative GAP with 21 day WHP)	0.072	10	6	Supported (permit)
VO 0440 Eggplant (foliar – alternative GAP with 14 day WHP)	0.361	50	30	Supported (permit)

Acute dietary exposure (NESTI) calculations				
Commodity	Residue for acute dietary exposure assessment (mg/kg)	% of ARfD		Outcome
		2–6 years	2+ years	
VO 0445 Peppers, sweet (post harvest)	4.57	220	95	Not supported
VO 0445 Peppers, sweet (foliar)	1.09	50	25	Supported
VO 0444 Peppers, chilli (post harvest)	4.57	5	15	Insufficient data – phase out acceptable
VO 0444 Peppers, chilli (foliar)	1.09	1	3	Insufficient data – phase out acceptable
VO 0447 Sweet corn	0.57	80	20	Insufficient data – phase out acceptable
VO 0448 Tomato (post harvest)	1.8 (assumed all d)	200	80	Not supported
VO 0448 Tomato (foliar)	3.32	370	150	Not supported
VO 0448 Tomato (foliar – alternative GAP with 21 day WHP)	0.072	10	5	Supported
VP 0061 Beans	1.31	30	15	Supported
VP 0063 Peas	4.64	98	55	
VR 0494 Radish	3.8	110	30	Not supported
VR 0494 Radish (alternative GAP with 14 day WHP)	2.7	80	20	Insufficient data – phase out acceptable
VR 0506 Turnip	0.8	20	10	Supported
VR 0508 Sweet potato	2.34	570	120	Not supported
VR 0508 Sweet potato (alternative GAP with 14 day WHP)	0.15	40	10	Supported
VR 0574 Beetroot	1.39	109	30	Not supported
VR 0574 Beetroot (alternative GAP with 14 day WHP)	0.4	30	10	Supported
VR 0577 Carrot	1.36	90	30	Not supported (see text Section 7.15.2)
VR 0577 Carrot (alternative GAP with 14 day WHP)	0.47	30	10	Insufficient data – phase out acceptable

Acute dietary exposure (NESTI) calculations				
Commodity	Residue for acute dietary exposure assessment (mg/kg)	% of ARfD		Outcome
		2–6 years	2+ years	
VR 0588 Parsnip (alternative GAP with 14 day WHP)	0.47	40	10	Insufficient data – phase out acceptable
VR 0589 Potato	2.34	340	130	Not supported
VR 0589 Potato (alternative GAP with 14 day WHP)	0.15	20	10	Supported
VS 0620 Artichoke, globe	1.77	110	50	Not supported
VS 0620 Artichoke, globe (alternative GAP with 14 day WHP)	0.92	60	30	Insufficient data – phase out acceptable
VS 0621 Asparagus	0.02	<5	<5	Supported
VS 0624 Celery	4.31	290	85	Not supported
VS 0624 Celery (alternative GAP with 21 day WHP)	0.56	40	10	Insufficient data – phase out acceptable
VS 0627 Rhubarb	1.34	65	70	Supported
ML 0106 Milks	0.008	5	<5	Supported
MM 0095 Meat (mammalian)	0.008	<1	<1	Supported
MO 0105 Edible offal (mammalian)	0.771	5	10	Supported
PE 0112 Eggs	0.008	<1	<1	Supported
PM 0110 Poultry meat	0.008	<1	<1	Supported
PO 0111 Poultry, edible offal	0.008	<1	<1	Supported

8.2 Chronic dietary exposure

The chronic dietary exposures to dimethoate and omethoate are estimated by the National Estimated Daily Intake (NEDI) calculation encompassing all registered/temporary uses of the chemical and the mean daily dietary consumption data derived from the 1995 National Nutrition Survey of Australia. The NEDI calculation is made in accordance with WHO Guidelines[38] and is a conservative estimate of dietary exposure to chemical residues in food.

As discussed in Chapter 7, to account for the shared mode of action of dimethoate and omethoate, residues for chronic dietary exposure estimates are calculated as:

D + O (mg/kg) = dimethoate (parent, mg/kg) + (3 x omethoate (mg/kg))

The estimated intakes are then compared against the dimethoate ADI.

If the recommendations in this review are put into place the NEDI for the estimated combined intake of dimethoate and omethoate (assuming a relative toxicity of ~1:3) is equivalent to <90% of the dimethoate ADI.

38 WHO 1997. Guidelines for predicting dietary intake of pesticide residues.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Residue data not provided

Use on commodities for which residue data were requested but were not provided to the APVMA and which assessment of other similar commodities identifies acute dietary risk. The APVMA cannot be satisfied that these uses would not be an undue hazard to the safety of people using anything containing its residues and they must be deleted:

Residues data not provided—APVMA cannot be satisfied		
Use pattern	**Previous label use**	**Previous permit use**
Acerola, all post harvest uses		✓
Ambarella (great hog plum lesser or vi apple), all post harvest uses		✓
Apricots, all post harvest uses	✓	✓
Babacos, all pre and post harvest uses	✓ (pre harvest	✓ (post harvest)
Bell fruit (water apple), all post harvest uses		✓
Berry fruit, including blackberries, boysenberries, loganberries, mulberries and raspberries, all post harvest uses		✓
Blueberries, all post harvest uses		✓
Bulb vegetables, except onions, all pre harvest uses	✓	
Cape gooseberry, all post harvest uses		✓
Carambola, all pre harvest uses	✓	
Cashew apple, all post harvest uses		✓
Date (fresh), all post harvest uses		✓
Figs, all post harvest uses	✓	
Gourd – bitter, all post harvest uses		✓
Grape, all post harvest uses		✓
Grumichama/Brazil cherry, all post harvest uses		✓
Hog plum, all post harvest uses		✓
Kumquat, all post harvest uses		✓
Loofa – smooth, all post harvest uses		✓
Loquats, all post harvest uses	✓	
Malay apple, all post harvest uses		✓
Miracle fruit, all post harvest uses		✓
Nectarines, all post harvest uses	✓	✓
Olives all post harvest uses		✓
Parsnip, all pre harvest use (except alternative GAP with 14 day withholding period)	✓	
Pepinos, all post harvest uses	✓	
Persimmon (Japanese – edible peel varieties), all post harvest uses	✓	
Plums, all post harvest uses	✓	✓

Residues data not provided—APVMA cannot be satisfied		
Use pattern	**Previous label use**	**Previous permit use**
Plumcot, all post harvest uses		✓
Rose apple, all post harvest uses		✓

9.2 Insufficient residue data provided

For the following use patterns the available residue data were insufficient for MRL establishment or assessment of acute dietary exposure. On the basis of available data an acute dietary risk has been identified. The APVMA cannot be satisfied that these uses would not be an undue hazard to the safety of people using anything containing its residues and they must be deleted:

Use pattern	Previous Label use	Previous Permit use
Beetroot, all pre harvest uses (except alternative GAP with 14 day withholding period)	✓	
Broccoli, all pre harvest uses	✓	
Cabbage, all pre harvest uses	✓	
Carrots, all pre harvest uses	✓	
Cauliflower, all pre harvest uses	✓	
Cherries, all post harvest uses	✓	✓
Kohlrabi, all pre harvest uses	✓	
Persimmon, all pre harvest uses	No specific approved use	
Pome fruit, all pre harvest uses and post harvest uses (except apples)	✓ (pre and post harvest)	✓ (post harvest)
Peaches, all post harvest uses	✓	✓
Potatoes and sweet potatoes, all pre harvest uses (except alternative GAP with 14 day withholding period)	✓	
Turnips, all pre harvest uses (except alternative GAP with 14 day withholding period)	✓	

9.3 Acute dietary exposure concerns

For the following use patterns, available residues data indicate that short term exposure to dimethoate residues may exceed reference health standards. The APVMA cannot be satisfied that these uses would not be an undue hazard to the safety of people using anything containing its residues and they must be deleted:

Use pattern	Previous label use	Previous permit use
All general fruit uses		✓
All general vegetable uses	✓	
Berry fruit, all general pre harvest uses (including currants, except Vaccinium berries, blackberries and raspberries)	✓	

Use pattern	Previous label use	Previous permit use
Brussels sprouts, all pre harvest uses	✓	
Capsicum, all post harvest uses	✓	
Celery, all pre harvest uses (except interim use with 21 d WHP)	✓	
Cucurbits, all pre harvest uses (except zucchini and melons), including the specific uses for: Cucumber, all pre harvest uses	✓	
Cucurbits, all post harvest uses (except melons)		✓
Egg plants, all uses (except pre-harvest with alternative GAP with 14 day WHP)	✓ (pre and post harvest)	✓ (post harvest)
Grapes, all pre harvest uses (except interim use where application is restricted to pre flowering)	✓	
Leafy vegetables, all pre harvest uses including silverbeet and lettuce	✓	
Olives, all pre harvest uses (except for oil production with 6 week harvest withholding period)		✓
Pome fruit, all post harvest uses on apples	✓	✓
Root vegetables, all pre harvest uses (except interim use on beetroot, carrot, parsnip, potato, radish, sweet potato and turnip with alternative GAP with 14 day WHP)	✓	
Stalk/stem vegetables all pre harvest uses (except asparagus and rhubarb with 7 day withholding period; and celery with 21 day withholding period, globe artichokes with 14 day withholding period)	✓	
Stone fruits, all pre harvest uses (except alternative GAP where application is limited to pre petal fall)	✓	
Strawberries, all uses (except runner production – vegetative planting material only)	✓	
Tomatoes, all uses (except pre harvest with alternative GAP with 21 day WHP or large field grown pre-flowering)	✓ (pre and post harvest)	✓ (post harvest)

9.4 Home garden uses

Dimethoate is approved for use in the home garden on a number of crops grown in these situations. Owing to concerns over acute (short-term) dietary exposure to dimethoate residues identified in commercial situations the following approved home garden uses can no longer be supported:

- citrus
- fruit trees
- pome fruit
- potato
- stone fruit
- tomato
- vegetables.

Consideration of commercial uses has indicated that approvals can continue on a small range of crops that fall within the general fruit tree and vegetable home garden uses. Approval of these uses in the home garden is not supported as they only represent a small range of edible crops generally grown in the home garden and use on other crops represents a significant acute dietary exposure risk. Additionally, the acceptability of the commercial uses is based on a high level of control of application rate and harvest withhold period that cannot necessarily be expected of home garden users. On this basis the APVMA cannot be satisfied that the continued use of dimethoate in the home garden would not be an undue hazard to the safety of people using anything containing its residues and these uses must be deleted.

9.5 Use patterns that remain acceptable from a residues (human health) perspective

The residues assessment found that certain uses could be supported, based on the data assessed to date. Further, for some crop groups although there was insufficient data to set an MRL there was sufficient information to recommend that the acute dietary exposure is likely to be acceptable. Immediate action was not proposed for these uses but the APVMA indicated that it was likely to remove these uses when the review is finalised if sufficient data to set an MRL are not made available by that time. Label and permit uses for commodities that may continue beyond interim action, including commodities for which additional data were provided are summarised below:

Acceptable use patterns		
Use pattern	Label use	Permit use
Asparagus, all pre harvest uses	✓	
Abiu, all post harvest uses		✓
Avocado, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Avocado, all post harvest uses	✓	✓
Banana, all post harvest uses	✓	✓
Banana, control of banana aphid with concurrent plant destruction. Grazing or supply of produce for human or animal consumption prohibited	✓	
Banana passionfruit, all post harvest uses	✓	
Beans, all pre harvest uses	✓	
Beetroot, pre harvest use with a 14 day withholding period		
Blackberries, pre harvest use (additional data provided—ongoing use supported)		
Blueberries (and other Vaccinium berries), pre harvest use with a 21 day re-treatment interval (additional data provided—ongoing use supported)	✓	
Cactus fruit, all post harvest uses	✓	
Caimito/star apple, all post harvest uses		✓
Capsicum, all pre harvest uses	✓	
Casimiroas, all post harvest uses		✓
Cereals, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Citrus, all pre harvest uses and post harvest uses	✓ (pre harvest)	✓ (post harvest)

Acceptable use patterns		
Use pattern	Label use	Permit use
Citrus that have received a pre harvest treatment must not be given a post harvest treatment (additional data provided—ongoing use supported)		
Cotton, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Custard apple (and cherimoya), all post harvest uses	✓	✓
Durian all post harvest uses		✓
Eggplant, pre harvest use with 14 day WHP (further data provided for permit 80959, supports ongoing use with a 14 day WHP)		✓
Feijoa, all post harvest uses	✓	
Grain legumes (pulses), use for red legged earth mite only	✓	
Grain legumes (pulses), all pre harvest uses, including the specific uses for (additional data provided—ongoing use supported): Adzuki bean, all pre harvest uses Borlotti beans, all pre harvest uses Chickpeas, all pre harvest uses Cowpea, all pre harvest uses Mung bean, all pre harvest uses Navy bean, all pre harvest uses Pigeon pea, all pre harvest uses Lentils, all pre harvest uses Soybean, all pre harvest uses	✓	
Granadillas, all post harvest uses		✓
Guava (inedible peel varieties), all post harvest uses	✓	
Kiwifruit (Chinese gooseberry inedible peel varieties), all post harvest uses	✓	
Litchi, all uses	✓	✓
Maize, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Mango, all pre harvest uses	✓	
Mango, all post harvest uses	✓	✓
Mangosteen, all post harvest uses		✓
Melons, all pre and post harvest uses (additional data provided—ongoing use supported)	✓ (pre harvest)	✓ (post harvest)
Olives for oil production only (supported under permit 13999, further data required)		✓
Onions, all pre harvest uses	✓	
Oilseeds, use for red legged earth mite only	✓	
Passion fruit all post harvest uses	✓	
Pasture, use for red legged earth mite only	✓	
Papaya (paw paw), all post harvest uses	✓	✓
Peanuts, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Peas, all pre harvest uses including use as a seed dressing (except for snow and sugar snap peas insufficient data)	✓	

Acceptable use patterns		
Use pattern	Label use	Permit use
Persimmon (American – inedible peel varieties), all post harvest uses	✓	✓
Pineapple, all pre harvest uses (additional data provided—ongoing use under current permit supported)		✓
Pomegranate, all post harvest uses	✓	
Potato and sweet potato, pre harvest use with a 14 day withholding period		
Prickly pear, all post harvest uses		✓
Rambutan, all post harvest uses		✓
Raspberries, pre harvest use (additional data provided—ongoing use supported)		
Rhubarb, all pre harvest uses	✓	
Rollinia, all post harvest uses		✓
Santols, all post harvest uses		✓
Sapodillas, all post harvest uses		✓
Sorghum, all pre harvest uses (additional data provided—ongoing use supported)	✓	
Soursop, all post harvest uses		✓
Strawberry (runner production—vegetative planting material only. DO NOT use on fruiting strawberries)	✓	
Sweetsop/sugar apple, all post harvest uses		✓
Tamarillo, all post harvest uses		
Tomato (processing), pre harvest use with a 21 day withholding period		
Tomatoes, large, field grown for fresh consumption, pre-harvest use with application prior to the commencement of flowering		
Turnip, pre harvest use with a 14 day withholding period		
Wax jambus, all post harvest uses		✓
Zucchini, all pre harvest uses	✓	

Use Patterns that were supported for an interim period pending provision of additional data – data has not been received – no longer supported

For the following use patterns there was insufficient data to set an MRL. As the available data indicated that the dietary exposure was likely to be acceptable the uses were supported for an interim period pending the provision of additional data to confirm that the assessment is appropriate. As no additional data have been received, these uses are no longer supported.

Interim use patterns that can no longer be supported		
Use pattern	Label use	Permit use
Abiu, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	

Interim use patterns that can no longer be supported		
Use pattern	**Label use**	**Permit use**
Artichoke, globe, pre harvest use with 14 day withholding period (pending provision of additional data—data not provided—not supported)		
Banana, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Broccoli, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Cabbage, drumhead varieties only, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Carrot, pre harvest use with 14 day withholding period (pending provision of additional data—data not provided—not supported)		
Casimiroas, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Cauliflower, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Celery, pre harvest use with 21 day withholding period (pending provision of additional data—data not provided—not supported)		
Chillis, all pre and post harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Custard apple (and cherimoya), all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Durian all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Granadillas, all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Grapes, pre harvest use with application restricted to pre flowering (pending provision of additional data—data not provided—not supported)		
Leucaena, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Mangosteen, all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Olives for oil production only under permit 13999 (additional data required for ongoing use)		✓
Oilseeds, all pre harvest uses, (except cotton, peanuts and uses for red legged earth mite), including the specific uses for (pending provision of additional data—data not provided to this review—not supported—note separate application for canola/oilseed uses for product 56454 – protected data): Canola, use as a seed dressing Linseed, use as a seed dressing Sesame Sunflowers	✓	
Parsnip, pre harvest use with 14 day withholding period (pending provision of additional data—data not provided—not supported)		

Interim use patterns that can no longer be supported		
Use pattern	**Label use**	**Permit use**
Passion fruit all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Pastures, Pasture Seed & Forage Crops (inc. clover, medics, lucerne), all pre harvest uses (except for red legged earth mite) including (pending provision of additional data—data not provided to this review—not supported—note separate application for pasture uses for product 56454 – protected data): Clover, use as a seed dressing Lucerne, use as a seed dressing	✓	
Papaya (paw paw), all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Peas (Snow and Sugar Snap), all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓	
Radish, pre harvest use with a 14 day withholding period (pending provision of additional data—data not provided—not supported)		
Rambutan, all pre harvest uses (pending provision of additional data—data not provided—not supported)		✓
Santols, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓ (pre harvest)	✓ (post harvest)
Sapodillas, all pre harvest uses (pending provision of additional data—data not provided—not supported)	✓ (pre harvest)	✓ (post harvest)
Stone fruit, pre harvest use with alternative GAP where application timing is limited to pre petal fall (No additional data provided—use not supported)		
Sweet corn, all pre harvest uses (pending provision of additional data—data not provided – not supported)	✓	
Vetch, use as a seed dressing (pending provision of additional data—data not provided—use not supported)	✓	
Wax jambus, all pre harvest uses (pending provision of additional data—data not provided—use not supported)	✓	

9.6 Withholding periods

Where appropriate labels must be revised to include the following withholding period statements:

Citrus
DO NOT harvest for 7 days after application

Blueberries (and other Vaccinium berries including bilberry)
DO NOT harvest for 1 day after application

Blackberries, Raspberries
DO NOT harvest for 7 days after application

Avocado, litchi/lychee
DO NOT harvest for 7 days after application

Mango
DO NOT harvest for 3 days after application

Olives for oil production only (PERMIT)
DO NOT harvest for 6 weeks after application

Pineapple (PERMIT)
DO NOT harvest for 35 days after application

Post Harvest Dipping (Avocados, Bananas, Cactus Fruit, Chilli, Custard Apples, Feijoas, Guavas, Kiwifruit (Chinese Gooseberries inedible peel varieties), Litchis (Lychees), Mangoes, Melons, Passionfruit, Banana Passionfruit, Pawpaws, Persimmons (inedible peel varieties), Pomegranates, Tamarillos, Watermelons) NOT REQUIRED WHEN USED AS DIRECTED (dip uses only)

Litchi (pre-planting dip)
Harvest withholding period: Not required when used as directed

Asparagus, Onions, Rhubarb
DO NOT harvest for 7 days after application

Beans, Peas (green vegetables - not sugar or snap peas)
DO NOT harvest for 7 days after application
DO NOT graze or cut for stockfood for 7 days after application

Eggplant (PERMIT), Beetroot, Potatoes and Sweet Potatoes, Turnip
DO NOT harvest for 14 days after application.

Strawberries (runner production – vegetative planting material only)
Harvest withholding period: Not required when used as directed (DO NOT use of fruiting strawberries)

Tomatoes (processing only)
DO NOT harvest for 21 days after application

Tomatoes, large, field grown for fresh consumption
Not required when used as directed (i.e. DO NOT apply after commencement of flowering)

Capsicums
DO NOT harvest for 3 days after application

Zucchini
DO NOT harvest for 1 day after application

Melons (including watermelons),
DO NOT harvest fro 7 days after application

Cereals (including maize, sorghum)
DO NOT harvest for 4 weeks after application
DO NOT graze or cut for stockfood for 14 days after application

Cotton
DO NOT harvest for 14 days after application
DO NOT feed cotton fodder, stubble or trash to livestock

Peanuts, Pulses (grain legumes)
DO NOT harvest for 14 days after application
DO NOT graze or cut for stockfood for 14 days after application

Pastures
Grazing withholding period: Not required when used as directed (DO NOT use after crop emergence)

Oilseeds (other than peanut and cotton)
Not required when used as directed (DO NOT use after crop emergence)

Seed dressings (Lupins, Peas),
Not required when used as directed

9.7 Amendments to the APVMA MRL Standard

The following amendments to Table 1 and Table 4 of the MRL Standard are recommended for dimethoate:

Table 3: Recommended amendments to Table 1 of the APVMA MRL Standard for dimethoate

Compound	Food	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
Dimethoate				
Modifications to current Table 1 entries				
	Fruits (except strawberry, litchi, peach, quandong and mango)	5	DELETE	DELETE
FC 0001	Citrus fruits	-	5	5
FS 0247	Peaches	3	DELETE	DELETE
FS 0012	Stone fruits	-	T*0.02	DELETE
FB 0264	Blackberries	-	T5	5
FB 0269	Grapes	-	T*0.1	DELETE
FB 0272	Raspberries, Red, Black	-	T5	5
FB 0275	Strawberry	5	T*0.02	*0.02
FB 0019	Vaccinium berries, including Bearberry	-	T5	5
FI 0030	Assorted tropical and sub-tropical fruits – inedible peel (except avocado, mango)		5	5 (also except pineapple)
	Abiu		5	5
FI 0326	Avocado	-	3	3
	Banana passionfruit		5	5
	Cactus fruit		5	5
FI 0343	Litchi	5	DELETE	DELETE
FI 0345	Mango	1	1	1
FI 0353	*Pineapple (permit use)*			*0.07*
	Rollinia		5	5
	Santols		5	5
	Quandong	T5	DELETE	DELETE

Compound	Food	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
OR 0305	*Olive oil, refined (permit use)*		-	*T0.1*
	Vegetables [except lupin (dry); peppers, sweet; tomato]	2	DELETE	DELETE
VA 0385	Onion	-	0.7	0.7
VB 0421	Broccoli	-	T0.3	DELETE
VB 0041	Cabbages, Head	-	T0.2	DELETE
VB 0404	Cauliflower	-	T0.3	DELETE
VC 0045	Fruiting vegetables, cucurbits	5	DELETE	DELETE
VC 0046	Melons, except watermelon	-	T5	5
VC 0431	Squash, summer [zucchini]	-	0.7	0.7
VC 0432	Watermelon	-	T5	5
VO 0440	*Eggplant (permit use)*	-	-	*T0.2*
VO 0444	Peppers, Chili	-	T5	DELETE
	Peppers, Chili, other cultivars	-	T5	DELETE
VO 0445	Peppers, Sweet [capsicums]	2	0.7	0.7
VO 0447	Sweet corn (corn-on-the-cob)	-	T0.3	DELETE
VO 0448	Tomato	2	0.02	0.02
VL 0465	Chervil	T2	DELETE	DELETE
	Mizuna	T2	DELETE	DELETE
VL 0496	Rucola [rocket]	T2	DELETE	DELETE
VP 0060	Legume vegetables	-	T2	2
VD 0545	Lupin (dry)	0.5	DELETE	DELETE
VD 0070	Pulses	-	T0.5	0.7
VR 0574	Beetroot	-	T*0.1	*0.1
VR 0577	Carrot	-	T0.3	DELETE
VR 0588	Parsnip		T0.3	DELETE

Compound	Food	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
VR 0589	Potato	-	0.1	0.1
VR 0494	Radish	-	T3	DELETE
VR 0508	Sweet potato	-	0.1	0.1
VR 0506	Turnip, Garden	-	*0.2	*0.2
VS 0620	Artichoke, Globe	-	T1	DELETE
VS 0621	Asparagus	-	0.02	0.02
VS 0624	Celery	-	T0.5	DELETE
VS 0627	Rhubarb	-	0.7	0.7
GC 0080	Cereal grains	*0.05	T0.5	0.5
CF 0654	Wheat bran, processed	-	T1	1
SO 0088	Oilseed except peanut	0.1	T0.1	DELETE
SO 0088	Oilseed [except cotton seed, peanut]	-	-	0.2
SO 0691	Cotton seed			*0.1
SO 0697	Peanut	*0.05	T*0.05	0.02
HH 0092	Herbs	T2	DELETE	DELETE
	Kaffir lime leaves	T2	DELETE	DELETE
	Lemon grass	T2	DELETE	DELETE
HS 0783	Galangal, rhizomes	T2	DELETE	DELETE
HS 0794	Tumeric, root	T2	DELETE	DELETE
DT 1111	Lemon verbena	T2	DELETE	DELETE
MO 0105	Edible offal (mammalian)	*0.05	0.1	0.1
PE 0112	Eggs	*0.05	*0.05	*0.05
MM 0095	Meat [mammalian]	*0.05	*0.05	*0.05

Compound	Food	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
ML 0106	Milks	*0.05	*0.05	*0.05
PO 0111	Poultry, Edible offal of	*0.05	*0.05	*0.05
PM 0110	Poultry meat	*0.05	*0.05	*0.05

MRLs in italics associated with permits

Table 4: Recommended amendments to Table 4 of the APVMA MRL Standard for dimethoate

Compound	Animal feed commodity	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
Dimethoate				
Modifications to current Table 4 entries				
AB 0001	Citrus pulp, dry	-	10	10
	Cotton seed meal and hulls	-	T0.5	0.5
AL 0545	Lupin, forage	1	DELETE	DELETE
	Primary feed commodities	-	T30	40
	Tomato pomace, dry	-	0.02	0.02

The following amendments to Table 1 and Table 4 of the MRL Standard are recommended for omethoate:

Table 5: Recommended amendments to Table 1 of the APVMA MRL Standard for omethoate

Compound	Food	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
Omethoate				
Modifications to current Table 1 entries				
	Fruits	2		DELETE
FC 0001	Citrus fruits		0.5	0.5
FS 0012	Stone fruit		T*0.01	DELETE
FB 0264	Blackberries		T3	3
FB 0269	Grapes		T*0.05	DELETE
FB 0272	Raspberries, Red, Black		T3	3
FB 0275	Strawberry		T*0.01	*0.01
FB 0019	Vaccinium berries, including Bearberry		T2	2
FI 0030	Assorted tropical ad sub-tropical fruits – inedible peel (except avocado, mango and pineapple)		2	2
	Abiu		2	2
FI 0326	Avocado		0.1	0.1
	Banana passionfruit		2	2
	Cactus fruit		2	2
FI 0345	Mango		0.1	0.1
FI 0353	*Pineapple (permit use)*		*0.03*	*0.03*
	Rollinia		2	2
	Santols		2	2
OR 0305	*Olive oil, refined (permit use)*		*T0.01*	*T0.01*
	Vegetables [except lupin; peppers, sweet; tomato]	2		DELETE

Compound	Food	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
VA 0385	Onion, bulb		0.5	0.5
VB 0400	Broccoli		T0.1	DELETE
VB 0041	Cabbages, head		T0.05	DELETE
VB 0404	Cauliflower		T0.1	DELETE
VC 0046	Melons, except watermelon		T0.2	0.2
VC 0431	Squash, summer		0.2	0.2
VC 0432	Watermelon		T0.2	0.2
VD 0070	Pulses			0.1
VD 0545	Lupin (dry)	0.1	0.1	DELETE
VO 0440	*Eggplant (permit use)*		*T0.02*	*0.07*
VO 0444	Peppers, Chili		T0.5	DELETE
	Peppers, chili, other cultivars		T0.5	DELETE
VO 0445	Peppers, Sweet [capsicums]	1	0.3	0.3
VO 0447	Sweet corn (corn-on-the-cob)		T0.2	DELETE
VO 0448	Tomato	1	0.02	0.02
VP 0060	Legume vegetables		T1	1
VR 0574	Beetroot		T*0.05	*0.05
VR 0577	Carrot		T0.1	DELETE
VR 0589	Potato		0.05	0.05
VR 0494	Radish		T0.2	

Compound	Food	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
VR 0508	Sweet potato		0.05	0.05
VR 0506	Turnip, Garden		*0.1	*0.1
VR 0588	Parsnip		T0.1	DELETE
VS 0621	Asparagus		*0.002	*0.002
VS 0620	Artichoke, Globe		T0.2	DELETE
VS 0624	Celery		T0.1	DELETE
VS 0627	Rhubarb		0.3	0.3
GC 0080	Cereal grains	*0.05	*0.05	*0.05
CF 0654	Wheat bran, processed		0.05	0.05
SO 0088	Oilseed	*0.05	0.05	0.05 (except peanut and cotton)
SO 0691	Cotton seed		*0.05	*0.05
SO 0697	Peanuts		*0.01	*0.01
MO 0105	Edible offal (Mammalian)	*0.05	0.1	0.1
MM 0095	Meat [mammalian]	*0.05	*0.05	*0.05
ML 0106	Milks	*0.05	*0.05	*0.05
PE 0112	Eggs	*0.05	*0.05	*0.05
PO 0111	Poultry, Edible offal of	*0.05	*0.05	*0.05
PM 0110	Poultry meat	*0.05	*0.05	*0.05

[a]The MRLs recommended for omethoate at suspension were not established while the omethoate review was still in progress.

MRLs in italics associated with permits

Table 6: Recommended amendments to Table 4 of the APVMA MRL Standard for Omethoate

Compound	Animal feed commodity	MRL (mg/kg)		
		Prior to review	At suspension[a]	At end of review
Omethoate				
Modifications to current Table 4 entries				
AL 0157	Legume animal feeds [Fresh weight]	20	DELETE	DELETE
AL 0545	Lupin, forage	0.5	DELETE	DELETE
AS 0161	Straw, fodder (dry) and hay of cereal grains and other grass-like plants	20	DELETE	DELETE
AM 0165	Miscellaneous fodder and forage crops [Fresh weight]	20	DELETE	DELETE
AB 0001	Citrus pulp, dry		0.5	0.5
	Cotton seed meal and hulls		*0.05	*0.05
	Primary feed commodities		10	10
	Tomato pomace, dry		0.02	0.02

[a] The MRLs recommended for omethoate at suspension were not established while the omethoate review was still in progress.

ABBREVIATIONS

ADI	Acceptable Daily Intake
ai	active ingredient
APVMA	Australian Pesticides and Veterinary Medicines Authority
ARfD	Acute Reference Dose
BBCH	Biologische Bundesanstalt, Bundessortenamt and Chemical Industry (German scale used to identify the phenological development stages of a plant)
DALA	days after last application
EC	emulsifiable concentrate
GAP	good agricultural practice
GC-FPD	gas chromatography with flame photometric detector (measures and identifies chemicals)
GC-MS	gas chromatography–mass spectrometry (to identify chemicals)
GC-MSMS	gas chromatography–mass spectrometry (measures and identifies chemicals)
HAL	Horticulture Australia Limited
HPLC	high-performance liquid chromatography (to identify chemicals)
HR	high residue
JMPR	Joint FAO/WHO Meeting on Pesticide Residues
lb ai	pounds of active ingredient
LC-MS	liquid chromatography–mass spectrometry (to identify chemicals)
LOAEL	Lowest Observed Adverse Effect Level
LOQ	Limit of Quantitation
LSC	liquid scintillation counting
MRL	Maximum Residue Limit
NEDI	National Estimated Dietary Intake
NESTI	National Estimated Short Term Intake
NOAEL	No Observable Adverse Effect Level
NOEL	No Observable Effect Level
NRA	National Registration Authority (now the Australian Pesticides and Veterinary Medicines Authority)

OCSEH	Office of Chemical Safety and Environmental Health
PHI	pre harvest interval
RAC	raw agricultural commodity
STMR	supervised trials median residue
STMR-P	supervised trials median residue of the processed commodity
TLC	thin layer chromatography
TRR	total radioactive residue
WHO	World Health Organization
WHP	withholding period