Ministry for Primary Industries
Manatū Ahu Matua

The 2015/2016 Report on Pesticides in Fresh and Frozen Produce

A survey under the Food Residues Surveillance Programme (FRSP)

MPI Technical Paper No: 2017/33

by MPI Regulation and Assurance Branch

ISBN No: 978-1-77665-551-9 (online)
ISSN No: 2253-3923 (online)

June 2017

New Zealand Government

Growing and Protecting New Zealand

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Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.New Zealand
Telephone: 0800 00 83 33
Facsimile: 04-894 0300

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1 EXECUTIVE SUMMARY

1. The Ministry for Primary Industries (MPI) has conducted the 2015/16 plant products survey and collected 360 samples from six commodities. The commodities selected were cauliflower, cucurbits (pumpkin and winter squash), leafy vegetables (kale and silver beet), peas (with and without pods), tomatoes and wheat.

2. The main objectives of this survey were to confirm that:
   - Good Agricultural Practice (GAP) was followed by domestic growers in their applications of registered agricultural compounds (known as ag-comp from herein); and
   - the residues of imported plant-based foods were in compliance with the applicable Maximum Residue Levels (MRLs).

3. MPI tested for over 500 ag-comp analytes in each sample using multi-residue screens (see Appendix 6.2 and 6.3). A total of 180,770 ag-comp analyte results for all samples were reported for this survey.

4. Detected results were compared against the applicable Maximum Residue Levels (MRLs) for the selected commodity under the Food Notice: Maximum Residue Levels for Agricultural Compounds (February 2016). Any residue result above the relevant MRL was termed a 'non-compliant result'.

5. There were 43 (<0.02%) ag-comp residues above the applicable MRLs in New Zealand (see Table 1 below). These non-compliant residues were detected in leafy vegetables, peas, tomatoes and wheat samples. No residues above the applicable MRLs were reported in any samples of cauliflower and cucurbits.

Table 1. Summary of non-compliant results and rate of compliance.

Commodity group	Non complaint results (detections above MRLs) ^	Rate of compliance (%) based on total reported results
Cauliflower	0	100
Cucurbits	0	100
Leafy vegetables	13	99.96
Peas	4	99.99
Tomatoes	3	99.99
Wheat	23	99.92

6. The rates of compliance for all crops were over 99.9% indicating that Good Agricultural Practice (GAP) is closely followed by most New Zealand growers.

7. The number of non-compliant residue results will vary from survey to survey due to the selection of commodities. Compared to the previous 2013/14 plant based survey, the number of non-compliant residue results has risen from five to 42 (listed in Table 2).

Table 2. Summary of results from previous surveys

Sampling year	2011-12	2013-14	2015-16
Number of samples	552	444	360
Number of results reported	244113	194541	180770
Number of non-compliant results	14	5	43
Overall compliance rate	>99.9%	>99.9%	>99.9%

8. The Food Residues Surveillance Programme (FRSP) is not a compliance programme that targets individual growers, but MPI does follow up on non-compliant samples. All non-compliant results were also assessed for dietary risk exposure to confirm food safety. There were no food safety concerns for any commodity, except for one silver beet sample.

9. MPI has followed up on three areas of regulatory interest related to this survey:

- One silver beet sample had levels of methamidophos that presented a feasible food safety risk. The sample was traced back to a grower and MPI visited the farm. Further samples were collected from the farm and tested for methamidophos. The subsequent samples had no detections of methamidophos. The results and findings indicated that the survey sample was likely an isolated event.

- There were 20 (out of 60) non-compliant wheat samples with glyphosate levels exceeding the New Zealand default MRL of 0.1 mg/kg (as glyphosate has no set MRL the default MRL applies). None of the wheat samples posed any food safety risks. MPI followed up with the 20 wheat farmers. As a majority of the wheat farmers were following label instructions, there could be other external factors and farming practice changes that may have contributed to the detected levels above the default MRL. MPI is now proposing a review of the residues information for glyphosate.

- In 2015, the Environmental Protection Authority (EPA) announced new controls for organophosphate or carbamate (OPC) chemicals. In November 2015, MPI published a reassessment that does not allow OPC chemicals to be used on crops not listed on the registered labels. MPI reassessment document link here. To complement this reassessment outcome, MPI is aligning Maximum Residue Levels under the Food Notice 2016. Furthermore, the use of OPC chemicals will be phased out by 2023.

2 DEFINITIONS AND ABBREVIATIONS

ARfD	Acute Reference Dose. An acute health based guidance value referenced from the World Health Organization.
ACVM	Agricultural Compounds and Veterinary Medicines
ADI	Acceptable Daily Intake. A chronic health based guidance value referenced from the World Health Organization.
Ag-comp	Agricultural compounds that are used in the management of plants and animals
Agricultural Chemical	A subset of agricultural compounds used to manage plants particularly for pest management purposes. They include pesticides (eg fungicides, herbicides and insecticides)
Analyte	A specified substance in food, horticultural produce, or animal feed resulting from the use of an agricultural compound (from known, unknown or unavoidable sources).
mg/kg bw/day	A milligram of ag-comp per kilogram of body weight per day
CODEX	Codex Alimentarius. A compilation of international food standards published by the joint FAO/WHO Codex Alimentarius Commission (CAC). These standards include maximum residue limits for pesticides.
Default MRL	A legal level of 0.1 mg/kg that is specified in 6(2) of the New Zealand (Maximum Residue Levels of Agricultural Compounds) Food Notice 2016 as applying to all ag-comp/food combinations for which no specific MRL has been established
EPA	Environmental Protection Authority
FRSP	Food Residue Surveillance Programme
GC-MS/MS	Gas Chromatography Mass Spectrometry
GAP	Good Agricultural Practice
LC-MS	Liquid Chromatography Mass Spectrometry
LOR	Limit of Reporting is the minimum concentration of an analyte in a sample that can be reported with a reasonable degree of accuracy and precision.

mg/kg	Milligrams per kilogram; can also be expressed as parts per million (ppm)
MRL	Maximum residue level is the maximum legal level of a residue permitted in the Food Notice in a food for sale in New Zealand
MPI	Ministry for Primary Industries (formerly MAF and NZFSA)
Off-label use	When a registered agricultural compound product is used in a manner that is not specified on the product label. Unless specifically prohibited by a condition of registration this is acceptable provided that residues in the treated crop comply with the applicable MRLs
OPC chemicals	Organophosphate and carbamate chemicals
$PDE_{(food)}$	Potential Daily Exposure though food. A chronic health based guidance value established through a toxicological evaluation by the Environmental Protection Authority
Sample ID	An identification number assigned to each survey sample
WHO	World Health Organization
WHP	Withholding period is the recommended minimum period which should elapse between the last administration or application of an agricultural compound product, including treated feed, and the slaughter, collection or harvesting for human consumption or the use of animal commodity.

3 INTRODUCTION

3.1 AGRICULTURAL COMPOUNDS AND THEIR ROLE IN FOOD PRODUCTION

People have been competing with insects, animal pests, diseases and weeds for food throughout history. This battle for food has meant that populations have, for generations, had to prevail against pests and vermin to gain enough food for sustenance and trade. Agricultural compounds (Ag-comps) are one tool in this effort. Ag-comps can be natural or synthetic and include veterinary medicines, fertilisers and pesticides (fungicides, herbicides and insecticides). Farmers following either conventional or organic methods of production can use approved agricultural compounds to control pests and weeds and improve soil fertility.

Growers and farmers use ag-comps to protect the food supply and to maximise the quantity and quality of the food they grow. Because farming is often an intensive form of production the risk of disease, weeds, parasites and other pests spreading is high.

To be effective, ag-comps must stay in place long enough to do their job. One consequence of this is that residues of some chemicals may remain in fruit or vegetables at the time they are harvested. Ag-comps should be used only if the benefits (in food production and storage) outweigh the risks to people and livestock from their residues.

3.2 SAFETY OF AGRICULTURAL COMPOUNDS AND FOOD SAFETY REQUIREMENTS

In New Zealand, the use of ag-comp products in food production is tightly controlled to meet the goals of managing their risks to human health, food safety, good plant and animal health, and trade. This is managed by requiring them to have an authorisation under two pieces of legislation, one by MPI and the other by New Zealand Environmental Protection Authority (EPA). Before MPI registers an ag-comp product for use in New Zealand under the Agricultural Compounds and Veterinary Medicines Act 1997 (the ACVM Act), it must undergo rigorous assessment in regard to the potential risks (as prescribed in the ACVM Act) it may pose. A similar situation applies to their approval under the Hazardous Substances and New Organisms Act 1996 (the HSNO Act).

An important aspect of assessment is to estimate the amount of residue left in the food at harvest. Based on this information, acceptable residue levels are recorded in New Zealand law, set in accordance with national and international procedures.

Controls are imposed on ag-comp products to minimise the risk to consumers while maximising the potential benefit from using the product on a given crop. Instructions for safe and proper use are stated on the ag-comp product label. Withholding periods (the minimum amount of time that has to pass between application of a ag-comp and harvest) are one example of these controls. MPI undertakes audits to ensure that all instructions are being followed and the controls around them are working.

3.3 OBJECTIVES OF FRSP

The Ministry for Primary Industries (MPI) provides food assurance to New Zealand consumers and international trading partners through its various food monitoring programmes. Since 2003, MPI has been running the Food Residues Surveillance Programme (FRSP) to survey various residues and contaminants in food available in New Zealand. The FRSP is designed to:

- assess overall compliance in relation to new and existing food regulatory measures;
- identify issues of potential importance to public health and safety; and
- assess long-term trends in the levels of residues and contaminants in food.

MPI conducted a recent survey of ag-comp analytes in selected fresh and frozen produce of six selected commodities. The 2015/16 FRSP survey aimed to provide a review of whether:

1. New Zealand growers were following GAP in the applications of ag-comp in agricultural production of the selected commodities; and
2. imported fresh and frozen produce available in New Zealand comply with the requirements of the New Zealand MRL Food Notice.

The detected ag-comp analytes were evaluated against the New Zealand MRL for compliance. The New Zealand MRL Food Notice allows for imported food to comply with a Codex MRL, where no Codex MRL exists, the New Zealand MRL applies (http://www.foodsafety.govt.New Zealand/elibrary/industry/register-list-mrl-agricultural-compounds.htm).

MRLs are set at levels to ensure compliance with good agricultural practice while ensuring there are no adverse health effects. They have substantial safety margins built into them. Information on how MRLs are set and the factors that MPI considers when setting a new MRL or changing an existing MRL can be found here (http://www.mpi.govt.nz/food-safety/whats-in-our-food/chemicals-and-food/).

The FRSP 2015/16 plant product survey's target was not the individual compliance status of growers, but to provide an overview of commodity growers and importers and their use of ag-comp for agricultural production. Growers of non-compliant samples were notified and advised to review their agricultural production practices related to chemical control. The aim of the notification process is to remind the growers of their responsibility to produce safe foods and highlight the importance of adhering to GAP.

3.4 DESIGN AND SCOPE OF THE 2015/2016 FRSP SURVEY

Since 2003, the FRSP has conducted surveys with a selection of different commodities each time. Factors that contribute to the design of the surveys include:

- registrations of new ag-comps;
- phasing out existing ag-comps;
- changes to current MRLs; and/or
- international/industry intelligence.

The scope of this survey included New Zealand grown produce (referred to as 'domestic produce' in this document) from six commodities. They are cauliflower, cucurbits (pumpkin and winter squashes), leafy vegetables (kale and silver beet), peas (with and without pods), tomatoes and wheat. A small percentage of imported samples of some commodities was also collected during the sample collection period, according to seasonal availability.

Samples were collected from November 2015 to August 2016. Chemical analysis and results consolidation were completed in October 2016. Various ag-comp screens were used based on commodities with specific ag-comp analyte and food matrices. Glyphosate screening was included for peas and wheat samples as intelligence suggested that glyphosate is applied as a desiccant in harvesting of these crops overseas. In New Zealand, glyphosate is registered under the ACVM Act for use pre-harvest on peas (threshing only) and wheat, but not specifically specified as a desiccant for harvesting of either crop.

3.5 METHODOLOGY OF 2015/2016 FRSP SURVEY

3.5.1 Sampling

The selected commodities use different distribution channels in the New Zealand market. The samplers included a range of sampling sites: supermarkets, independent retailers (specialty grocers), pack houses, wholesalers/importers, milling plants for wheat, horticultural growers and farms. These six commodities were collected in both the North and South Islands. Due to the seasonality of the collection period, there was no pre-determined number of domestic versus imported samples.

The Codex Guideline CAC/GL 33 1999 was followed with respect to the minimum sample sizes. The minimal units of commodities that made up a sample lot are defined and can be found in Appendix 6.1. For example, one tomato sample was made up of ten or more units of tomatoes from a randomly selected batch and weighed (at least) 1 kg in total.

3.5.2 Sample Preparation and Chemical Analysis

As ag-comp residues may interact with various sample matrices, certain analytes may be excluded from the multi-residue screen due to specific matrix interference. Two multi-residue screen methods were used in this survey to monitor various residues in grain/legume based and plant based matrices.

The Codex Guideline CAC/GL 41 (English version) provided the protocol of how the samples were prepared for residue testing. The individual samples were prepared and extracted for analysis using both the Liquid Chromatography-Mass Spectrometry (LCMS) and Gas Chromatography-Mass Spectrometry (GCMS) instruments. Residues detected above the Limit of Reporting (LOR) were quantified and reported in units of mg/kg.

3.5.3 Residues Compliance

The detected residues were evaluated against the established New Zealand or Codex MRLs for imported foods. The Food Notice: Maximum Residue Levels for Agricultural Compounds (February 2016) was used for the samples collected for the 2015-2016 plant product survey.

All results from imported produce were evaluated against the higher of the New Zealand or Codex MRLs. In the case of ag-comp analytes in Australian samples, the Australian MRL standards were used. The Trans-Tasman Mutual Recognition Agreement (TTMRA) established that regardless of different standards, or other sale-related regulatory requirements between New Zealand and Australia, goods legally sold in one country can be sold in the other.

For foods sold domestically, or imported foods that have no specific MRL under the New Zealand MRL Food Notice, the default MRL will apply. The default MRL is 0.1 mg/kg and more information on the default MRL can be found here.

3.5.4 Dietary Risk Assessment of results exceeding the applicable MRLs

A dietary exposure assessment estimates the burden of an ag-comp present in food to a population, or population subgroup. The risk from exposure to (or intake of) an ag-comp in food is characterised by comparing the consumed body weight adjusted residue to a health based guidance values.

In this report, survey samples that exceeded the applicable MRLs were assessed for dietary risk. This approach is appropriate because any values below the MRLs have already been assessed during regulatory appraisal by MPI and considered not to be of dietary risk. As MRLs are set to enforce good agricultural practice (and hence are not a health standard), any value exceeding a MRL is not automatically a dietary risk. The dietary risk assessments of this survey were conducted in accordance with WHO guidelines. These dietary risk assessments were further determined for chronic (long term/ lifetime) exposure risk of the average consumer and acute (short term) exposure risk of the consumers who consumed high volume of an implicated food.

Food consumption data

Two New Zealand population age groups were identified for these risk assessments: adults and children. The food consumption values (g/kg bw/day) were derived for the adults from the 2008 New Zealand Adult Nutrition Survey and, for the children, from the 2002 New Zealand Child Nutrition Survey. To determine the chronic exposure, the mean survey respondent intake values of the surveys were used. For the acute exposure, 97.5th percentile consumption values were used, representing a sub group that consumes high volume of a particular food on a daily basis.

Health based guidance values

The established health based guidance values for these risk assessments were derived from the EPA and the joint Food and Agriculture Organization of the United Nations and World Health Organization (Joint FAO/WHO). The chronic health based guidance values in order of preference of use are:

1. *Potential Dietary Exposure ($PDE_{(food)}$) from EPA*

   A $PDE_{(food)}$ is a value determined by a toxicological evaluation by the Environmental Protection Authority (EPA) as part of its responsibility for managing public health under the HSNO Act. A $PDE_{(food)}$ gives the potential daily exposure a person may be subject to from a substance, via food. MPI preferentially uses a $PDE_{(food)}$, if it is available as a New Zealand derived value, In the

EPA, reassessment of organophosphates and carbamates ADI values were assigned to these compounds rather than $PDE_{(food)}$ as a result and EPA ADI is used for the health based guidance value for certain compounds.

2. *Acceptable Daily Intake (ADI) from FAO/WHO*

   As $PDE_{(food)}$ values are not available for all of the ag-comps registered in New Zealand, the ADI is used in the absence of one. An ADI is defined by the World Health Organization (WHO) as: "the daily intake which, during an entire lifetime, appears to be without appreciable risk on the basis of all the known facts at the time". "Without appreciable risk" has been further defined as: "the practical certainty that injury will not result even after a lifetime of exposure". ADIs are established by the WHO and Food and Agriculture Organization (FAO) of the United Nations joint expert committees, which are made up of toxicologists and residue specialists. The ADI and $PDE_{(food)}$ are largely equivalent, as they are determined using the same set of toxicology data and through a very similar scientific process.

3. *Acute Reference Dose (ARfD)*

   Certain ag-comps may have a characterised health hazard from exposure over a short duration. For short-term or one off exposure an Acute Reference Dose (ARfD) established by the FAO/WHO is used to characterise the risk.

3.5.5 Notification and follow ups of non-compliant results

All non-compliant samples were from domestic sources and traced back to the grower or on sale business, and they were notified of the non-compliant residue results. Any follow up action taken by MPI is proportionate to risk and ranges from farm visits to email notification of results. Information that may be required includes application rate, withholding periods and other supporting documents. The purpose of the notification and follow up is to request the growers or importers to review their existing systems and GAP to ensure future non compliances do not occur.

4 RESULTS

4.1 SUMMARY OF RESIDUES DETECTED

MPI tested for up to:
- 512 ag-comp analytes in peas and wheat, and
- 505 ag-comp analytes in all other commodities.

The list of analytes tested in each commodity can be found in Appendix 6.2.

A total of 180,770 ag-comp analyte results were analysed for compliance to the applicable MRLs. Seventy-three types of ag-comp analytes were detected in the survey and listed in Appendix 6.6.

4.2 CAULIFLOWER

Types of ag-comp analytes found in cauliflower samples are listed in Appendix 6.7. All cauliflower results were in compliance. Sixty cauliflower samples were collected and analysed. The samples comprised of 54 domestic cauliflowers and six imported from China.

4.3 CUCURBITS (PUMPKIN AND WINTER SQUASH)

Types of ag-comp analytes found in cucurbit samples are listed in Appendix 6.7. All cucurbit results were in compliance. Sixty pumpkin and winter squash samples were collected and analysed, the samples comprised of 57 domestic and three imported from Tonga.

4.4 LEAFY VEGETABLES (SILVER BEET AND KALE)

Types of ag-comp analytes found in leafy vegetable samples are listed in Appendix 6.7. A total of 13 residue results were non-compliant with the applicable MRLs. The residues were detected in seven silver beet and six kale samples and are listed in Table 3. Sixty domestic leafy vegetable samples were collected and analysed. The leafy vegetable samples were made up of 46 kale and 14 silver beet.

Table 3 Non-compliant residues in leafy vegetable samples for 2015/2016 FRSP

No.	Residue Detected	Crop use	Number of non-compliant results	Amount (mg/kg)	MRL (mg/kg)
1	Chlorothalonil	Fungicide	3	0.38 – 6.8#	0.1
2	Cyantraniliprole	Insecticide	1	0.12	0.1
3	Cypermethrin	Insecticide	1	13	0.1
4	Indoxacarb	Pesticide	1	0.22	0.1
5	Methamidophos	Insecticide	1	14	0.5
6	Metrafenone	Fungicide	4	0.16 - 5.3#	0.1
7	Permethrin	Insecticide	2	0.16, 0.17	0.1

Key:
Non-compliant = number of samples (of 60 leafy vegetables analysed) with residues higher than the applicable MRL
- a range of minimum and maximum results are presented when there are more than two results

The detection of the methamidophos residue in one silver beet sample presented a feasible food safety risk following dietary exposure assessment. More details of the silver beet trace-back and follow up are provided in the next section. The other 12 non-compliant residues did not pose food safety concerns to consumers.

4.5 PEAS (WITH AND WITHOUT PODS)

Types of ag-comp analytes found in peas samples are listed in Appendix 6.7. A total of four residue results were non-compliant with the applicable MRLs. The residues were detected in four pea samples and are listed in Table 4. Sixty pea samples were collected and analysed. The pea samples were made up of 54 domestic peas, five from India and one from United Kingdom.

Table 4 Non-compliant residues in pea samples for 2015/2016 FRSP survey

No.	Residue Detected	Crop use	Number of non-compliant results	Amount (mg/kg)	MRL (mg/kg)
1	Azoxystrobin	Fungicide	4	0.023 – 0.05#	0.02

Key
Non-compliant = number of samples (of 60 peas analysed) with residues higher than the applicable MRL
- a range of minimum and maximum results are presented when there are more than two results
N/A – There are no established legal or acceptable levels at this time

There were no food safety concerns for all the non-compliant residues in peas.

4.6 TOMATOES

Types of ag-comp analytes found in tomato samples are listed in Appendix 6.7. A total of three residue results were non-compliant with the applicable MRLs and are listed in Table 5. Sixty domestic tomato samples were collected and analysed. The tomato samples were made up of 58 hot-house tomatoes and two outdoor tomatoes.

Table 5 Non-compliant residues in tomato samples for 2015/2016 FRSP survey

No.	Residue Detected	Crop use	Number of non-compliant results	Amount (mg/kg)	MRL (mg/kg)
1	Imidacloprid (sum of residues expressed as imidacloprid)	Insecticide	2	0.35, 1.5	0.1
2	Metalaxyl	Fungicide	1	0.11	0.05

Key:
Non-compliant = number of samples (of 60 tomatoes analysed) with residues higher than the applicable MRLs

There were no food safety concerns for any of the non-compliant residues in tomatoes.

4.7 WHEAT

Types of ag-comp analytes found in wheat samples are listed in Appendix 6.7. A total of 23 residue results were non-compliant with the applicable MRLs they are listed in Table 6. Sixty wheat samples were collected and analysed. The samples comprised of 42 domestic wheat and 18 imported samples from Australia.

Table 6 Non-compliant residues in wheat samples for 2015/2016 FRSP survey

No.	Residue Detected	Crop use	Number of non-compliant results	Amount (mg/kg)	MRL (mg/kg)
1	Diazinon	Insecticide	1	0.13	0.1
2	Glyphosate	Herbicide	20	0.2-5.9#	0.1
3	Pirimiphos-methyl	Insecticide	2	5.4, 6.6	5

Key:
Non-compliant = number of samples (of 60 wheat analysed) with residues higher than the applicable MRLs
- a range of minimum and maximum results are presented when there are more than two samples

There were no food safety concerns for any of the non-compliant residues detected in wheat.

4.8 FOLLOW UP AND OBSERVATIONS FROM THE 2015/2016 FRSP SURVEY

4.8.1 Follow up on silver beet with high levels of methamidophos

The single sample of silver beet with 14 mg/kg methamidophos detected was calculated as a feasible food safety risk. It was calculated that a one-off exposure to high consumers of silver beet would have exceeded the ARfD, however, the exposure would have still been below levels reported to cause toxic effects.

MPI, on receiving the result, immediately undertook follow-up action to establish the nature and extent of the non-compliance. The non-compliant silver beet sample was rapidly traced back to a specific grower. MPI visited the implicated farm and obtained information about on farm practices. Further samples of silver beet, cabbages and Brussel sprouts were collected from the farm and tested for methamidophos. The subsequent samples had no detections of methamidophos. Similarly, the 2016 New Zealand Total Diet Study did not detect any methamidophos residues in silver beet. The findings suggest that there was no evidence of long-term risk of methamidophos exposure from consuming silver beet. The results and findings indicated that the survey sample was likely an isolated event, possibly due to misapplication.

Methamidophos is now prohibited for use off-label and any detections in non-approved crops will be an offence. Methamidophos is also due for full phase out of use in New Zealand in 2023. The potential food safety risk finding in this survey support the tight controls and phase out of this chemical.

4.8.2 Follow up on wheat samples with glyphosate residues

MPI has contacted wheat growers that supplied the non-compliant samples and discussed their GAP records and harvest dates. Most growers consistently showed that label directions and stated withholding periods were followed.

MPI has proposed a reassessment of the pre-harvest label claim for glyphosate products registered under the ACVM Act. All available residue data will be reviewed and product labels reviewed for clarity and consistency. Additionally, advice on current use will be sought in case agricultural practices have changed since the claim for use on cereals was originally approved. It is possible that reassessment will result in clarification of label directions, and the setting of specific MRLs for glyphosate in affected crops if the current default MRL is found to be inappropriate.

4.8.3 Follow up on other FRSP non-compliant samples

Here is a summary of the other FRSP sample follow ups.

1. Leafy vegetables

The replies and documents provided by the other leafy vegetable growers indicated that off label uses were fairly common and the withholding periods were not always correctly identified. For example, kale (grown for human consumption) is considered a brassica crop by some growers, but it is classified as a leafy vegetable under the Food Notice and by Codex Alimentarius Commission. When some growers see a label claim for brassica, they assume it is applicable to kale, ending up with an incorrect application and/or withholding period.

2. Peas

   The replies and documents provided by the pea growers indicated that application rate, withholding periods and GAP were followed closely. The azoxystrobin MRL for peas will remain unchanged, and this commodity may be included in future surveys.

3. Tomatoes

   The replies and evidence provided by the tomato growers indicated that the incorrect application rate and withholding periods were used for the non-compliant samples with imidacloprid. MPI has sent letters to remind the tomato growers that correct application rate and withholding periods forms an important part of their GAP.

4. Wheat

   Aside from the glyphosate residues, levels of pirimiphos-methyl and diazinon residues (listed in Table 6) above the MRLs were also found in wheat. There were no food safety concerns related to these residues. Growers have reviewed their practices and attributed the residues to post-harvest wheat grain handling.

5. Methamidophos detections in leafy vegetables and tomatoes

   Methamidophos residues were detected in eight samples. Under the current Food Notice, all but one sample complied with the current MRL for methamidophos. However, MPI notified growers of all eight samples about the detected methamidophos because they may have been in breach of the ACVM Act. In November 2015, MPI revised the registered OPC chemical labels to no longer allow off-label applications on crop production.

4.8.4 Survey limitations

Sampling for FRSP plant product surveys is challenging because:

- the historical records of imported commodities are not reflective of current import activities. For example, 2015 import records showed that wheat was imported from Australia, United States and China. During the period of sample collection, the wheat importers only dealt in Australian wheat.

- both domestic and imported samples of some commodities cannot be viewed as comparable. For this survey, all domestic samples were traced back to specific growers whereas the imported samples may be a composite from multiple growers.

- to minimise costs and maximise efficiencies, FRSP samples are batch tested for multiple screens. This can lead to the turnaround time for MPI reporting the survey results being considerably longer than the commercial residues testing that is used by the fresh food suppliers or retailers. MPI will explore testing smaller sample batches and ways to shorten the notification process.

4.8.5 Areas for improvement

1. Off-label use is a common occurrence for most of the non-compliant leafy vegetables samples that were identified. Leafy vegetables were not correctly identified by many growers and label directions for a different crop classification were used, resulting in crops that had non-compliant residue levels.

2. Growers lack awareness of OPC reassessment and its proposed MRL changes. Current registered OPC ag-comps will be phased out in New Zealand by 2023[1]. The 2015/16 survey detected methamidophos residues in ten samples from two domestic and one imported commodities. Nine of the ten detections were not a food safety concern.

   To align with the EPA's assessment of OPC, MPI published the OPC reassessment under the ACVM Act in November 2015. As there are ag-comp products with existing labels in the marketplace, MRLs were not changed to enforce this immediately. The amended MRLs were promulgated in July 2017. To raise the awareness of OPC usage in permitted commodities, MPI will devise a communications plan for growers.

3. Most notified growers had incomplete record keeping practices for chemical use. Detailed records were often not available for the production of domestic commodities. For example: although chemical applications were recorded, there were no corresponding production records detailing when and where a commodity was grown. Another detail that was commonly overlooked was the application rates and the withholding periods.

   MPI recommends that the relevant horticultural organisations review their record keeping requirements as part of their GAP and food safety requirements.

   With the introduction of the Food Act 2014 and Food Regulations 2015, new horticultural businesses must comply with the requirements immediately. However, established horticultural growers are given a transition period to comply between 2017- 2019, depending on the food safety risks of their products. With the different entry points for agricultural growers in this industry, a wide range of knowledge may exist between the small scale and large scale operations. MPI is working on dedicated food safety information specific for the horticultural industries.

[1] http://www.epa.govt.nz/search-databases/HSNO%20Application%20Register%20Documents/APP201045_APP201045_Decision_Amended__with_s67As_and_APP202142_(2015.07.28).pdf

5 CONCLUSION

The 2015/16 FRSP survey was designed to give an overview of the levels of ag-comp analytes in targeted agricultural produce. This survey showed a high overall level of compliance in plant based products available to the New Zealand public.

Leafy vegetables and wheat are two commodities that had the highest number of non-compliant residues. Silver beet and kale are minor crops that are only grown in limited quantities commercially. In New Zealand, there are few registered ag-comp products with label claims for use on minor crops. Due to this, horticultural growers of minor crops are permitted to use most registered ag-comp products off label, provided they ensure residues on any food crop comply with the MRL Notice. Horticulture growers and farmers may need to strengthen their knowledge of off-label applications of registered ag-comps products, particularly in management of residues in food crops.

Based on the wheat growers replies and evidence concerning glyphosate, there are indications that label instructions and WHPs were followed closely. MPI is in the process of reviewing glyphosate MRL for wheat under the ACVM Act.

In spite of the survey limitations, the survey outcomes should be viewed as an assessment of whether commodity growers are on the right track regarding ag-comp applications and adherence to GAPs. Results that are below or at MRL indicate that label directions and GAP are properly followed. Non-compliant residue results above the MRL very rarely equate to food safety risks, but can lead to reviews to identify potential areas of improvement in their agricultural practice.

MPI is working with the appropriate industry bodies to improve the knowledge of horticulture producers on some of these issues and will be investigating other avenues to ensure that MRLs are consistently met. Following on from this, these commodities may be included in future FRSP plant based surveys to verify the effectiveness of these activities.

6 APPENDIX

6.1 FRSP SAMPLE UNITS AND WEIGHTS

Minimum sample units and weight required for nine selected agricultural crops in accordance to the CODEX CAC/GL 33: 1999

Commodity Group	Agricultural Crops	Minimum sample units and weight required for one sample
Cereal grains/grasses	Wheat	1 kg
Legume vegetables	Peas with or without pods	1 kg
Fruiting vegetables other than cucurbits	Tomatoes	1kg (at least 10 units)
Leafy vegetables	Kale and silver beet	2 kg (at least 5 units)
Fruiting vegetables, cucurbits	Pumpkin and winter squashes	2kg (at least 5 units)
Brassica vegetables	Cauliflower	2kg (at least 5 units)

6.2 AG-COMP ANALYTES SCREEN FOR CAULIFLOWER, CURCUBITS, LEAFY VEGETABLES AND TOMATO SAMPLES

2-Aminobenzimidazole	Bentazone	Chloroxuron	DDE-4,4
2-phenylphenol	Bifenazate	Chlorpropham	DDT-2,4
3-Methylphosphinicopropionic acid	Bifenox	Chlorpyrifos	DDT-4,4
Abamectin	Bifenthrin	Chlorpyrifos-methyl	Deltamethrin
Acephate	Bioresmethrin	Chlorsulfuron	Demeton-S
Acetamiprid	Bitertanol	Chlorthal-dimethyl	Demeton-s-methyl
Acetamiprid-N-desmethyl	Bixafen	Chlorthiophos	Demeton-s-methyl-sulfoxide
Acetochlor	Boscalid	Chlozolinate	Demeton-S-sulfone
Acibenzolar acid	Bromacil	Chromafenozide	Demeton-S-sulfoxide
Acibenzolar-S-methyl	Bromobutide	Cinidon-ethyl	Desmedipham
Acrinathrin	Bromophos	Clethodim	Diallate
Alachlor	Bromophos-ethyl	Clodinafop-propargyl	Diazinon
Aldicarb	Bromopropylate	Clofentezine	Dichlobenil
Aldicarb-sulfone	Bupirimate	Clomazone	Dichlofenthion
Aldicarb-sulfoxide	Buprofezin	Cloquintocet-mexyl	Dichlofluanid
Aldrin	Butachlor	Clothianidin	Dichlorvos
Allidochlor	Butafenacil	Coumaphos	Diclobutrazol
Ametoctradin	Butamifos	Coumaphos-oxon	Diclocymet
Ametryn	Cadusafos	Cyanazine	Diclofop-methyl
Aminomethylphosphonic acid	Cafenstrole	Cyanophos	Dicloran
Anilofos	Captan	Cyantraniliprole	Diclosulam
Anthraquinone	Carbaryl	Cyazofamid	Dicofol (sum of residues)
Atrazine	Carbendazim	Cyclanilide	Dicofol-2,4
Azaconazole	Carbetamide	Cycloate	Dicofol-4,4
Azamethiphos	Carbofuran	Cyclosulfamuron	Dicrotophos
Azinphos-ethyl	Carboxin	Cyflufenamid	Dicyclanil
Azinphos-methyl	Carfentrazone-ethyl	Cyfluthrin	Dieldrin
Azoxystrobin	Carpropamid	Cyhalofop-butyl	Diethofencarb
BDM-C10	Chlorantraniliprole	Cyhalothrin	Difenoconazole
BDM-C12	Chlorbufam	Cymoxanil	Diflubenzuron
BDM-C14	Chlordane-cis	Cypermethrin	Diflufenican
BDM-C16	Chlordane-trans	Cyproconazole	Dimepiperate
Benalaxyl	Chlorfenapyr	Cyprodinil	Dimethenamid
Bendiocarb	Chlorfenvinphos	Cyromazine	Dimethoate
Benfluralin	Chloridazon	Daimuron	Dimethomorph
Benodanil	Chlorimuron-ethyl	DDAC	Dimethylvinphos
Benoxacor	Chlorobenzilate	DDD-2,4	Dioxabenzofos
Bensulfuron-methyl	Chlorothalonil	DDD-4,4	Dioxathion
Bensulide	Chlorotoluron	DDE-2,4	Diphenamid
Diphenylamine	Fenoxanil	Flutriafol	Isazofos
Diquat *	Fenoxaprop	Fluvalinate	Isofenphos

Disulfoton	Fenoxaprop-ethyl	Fluxapyroxad	Isofenphos-methyl
Disulfoton-sulfone	Fenoxycarb	Folpet	Isoprocarb
Disulfoton-sulfoxide	Fenpiclonil	Fonofos	Isoprothiolane
Dithiopyr	Fenpropathrin	Forchlorfenuron	Isoproturon
Diuron	Fenpropidin	Formetanate hydrochloride	Isopyrazam
Dodine	Fenpropimorph		Isoxathion
Edifenphos	Fenpyroximate	Fosthiazate	Karbutilate
Emamectin Benzoate	Fensulfothion	Fuberidazole	Kresoxim-methyl
Endosulfan sulfate	Fenthion	Furalaxyl	Lactofen
Endosulfan-alpha	Fenthion-ethyl	Furametpyr	Lenacil
Endosulfan-beta	Fenthion-oxon	Furathiocarb	Leptophos
Endrin	Fenthion-oxon-sulfone	Glufosinate	Lindane
Endrin ketone	Fenthion-oxon-sulfoxide	Glyphosate	Linuron
EPN	Fenthion-sulfone	Halosulfuron-methyl	Lufenuron
Epoxiconazole	Fenthion-sulfoxide	Haloxyfop-etotyl	Malathion
EPTC	Fentrazamide	Haloxyfop-methyl	Mandipropamid
Esprocarb	Fenvalerate	HCH-alpha	Mefenacet
Ethalfluralin	Ferimzone	HCH-beta	Mefenpyr-diethyl
Ethametsulfuron-methyl	Fipronil	HCH-delta	Mepanipyrim
Ethiofencarb	Fipronil-sulfide	Heptachlor	Mepronil
Ethion	Fipronil-sulfone	Heptachlor-endo-epoxide	Mesotrione
Ethiprole	Flamprop	Heptachlor-exo-epoxide	Metalaxyl
Ethofumesate	Flamprop-methyl	Heptenophos	Metamitron
Ethoprophos	Flazasulfuron	Hexachlorobenzene	Metconazole
Ethoxyquin	Fluacrypyrim	Hexaconazole	Methabenzthiazuron
Ethoxysulfuron	Fluazifop-P	Hexaflumuron	Methacrifos
Ethychlozate	Fluazifop-p-butyl	Hexazinone	Methamidophos
Etobenzanid	Fluazinam	Hexythiazox	Methidathion
Etoxazole	Flubendazole	Imazalil	Methiocarb
Etridiazole	Flubendiamide	Imazamethabenz-methyl	Methiocarb-sulfone
Etrimfos	Flucythrinate	Imazosulfuron	Methiocarb-sulfoxide
Famoxadone	Fludioxonil	Imidacloprid	Methomyl
Famphur	Flufenacet	Imidacloprid-5-hydroxy	Methomyl-oxime
Fenamidone	Flumiclorac-pentyl	Imidacloprid-olefin	Methoxychlor
Fenamiphos	Flumioxazin	Inabenfide	Methoxyfenozide
Fenamiphos-sulfone	Fluometuron	Indanofan	Metobromuron
Fenamiphos-sulfoxide	Fluopicolide	Indoxacarb	Metolachlor
Fenarimol	Fluopyram	Iodocarb	Metominostrobin-(E)
Fenbuconazole	Fluquinconazole	Iodofenphos	Metominostrobin-(Z)
Fenchlorphos	Fluridone	Iodosulfuron-methyl	Metosulam
Fenhexamid	Fluroxypyr	Ioxynil	Metrafenone
Fenitrothion	Flusilazole	Iprobenfos	Metribuzin
Fenobucarb	Fluthiacet-methyl	Iprodione	Metsulfuron-methyl
Fenothiocarb	Flutolanil	Iprovalicarb	Mevinphos
Milbemycin A3	Pirimicarb-desmethyl	Pyrimidifen	Terbufos-sulfoxide
Milbemycin A4	Pirimicarb-	Pyriminobac-methyl-(E)	Terbumeton

Mirex	desmethylformamido	Pyriminobac-methyl-(Z)	Terbuthylazine
Molinate	Pirimiphos-methyl	Pyriproxyfen	Terbutryn
Monocrotophos	Pretilachlor	Pyroquilon	Tetrachlorvinphos
Monolinuron	Prochloraz	Pyroxsulam	Tetraconazole
Myclobutanil	Prochloraz-desimidazole-formylamino	Quinalphos	Tetradifon
Napropamide		Quinoclamine	Thenylchlor
Nicotine	Pirimiphos-methyl	Quinoxyfen	Thiabendazole
Nitrofen	Pretilachlor	Quintozene	Thiacloprid
Nitrothal-isopropyl	Prochloraz	Quizalofop-ethyl	Thiamethoxam
Norflurazon	Prochloraz-desimidazole-formylamino	Rimsulfuron	Thiazopyr
Novaluron		Saflufenacil	Thidiazuron
Octhilinone		Sebuthylazine	Thiobencarb
Omethoate	Procymidone	Sethoxydim	Thiocyclam oxalate
Oryzalin	Profenofos	Simazine	Thiometon
Oxabetrinil	Promecarb	Simeconazole	THPI
Oxadiazon	Prometryn	Simetryn	Tiadinil
Oxadixyl	Propachlor	Spinetoram	Tolclofos-methyl
Oxamyl	Propamocarb	Spinosad	Tolylfluanid
Oxycarboxin	Propanil	Spiromesifen	Topramezone
Oxyfluorfen	Propaphos	Spiromesifen-enol	Tralkoxydim
Paclobutrazol	Propaquizafop	Spirotetramat	Transfluthrin
Paraquat *	Propargite	Spirotetramat-enol	Triadimefon
Parathion	Propazine	Spirotetramat-enol-glucoside	Triadimenol
Parathion-methyl	Propetamphos		Tri-allate
Penconazole	Propham	Spirotetramat-keto-hydroxy	Triasulfuron
Pencycuron	Propiconazole		Triazophos
Pendimethalin	Propoxur	Spirotetramat-mono-hydroxy	Tribenuron-methyl
Pentachlorobenzene	Propyzamide		Tribufos
Penthiopyrad	Proquinazid	Spiroxamine	Trichlorfon
Permethrin	Prosulfocarb	Sulfentrazone	Tricyclazole
Phenmedipham	Prothiofos	Sulfoxaflor	Trifloxystrobin acid
Phenothrin	Pymetrozine	Sulprofos	Trifloxystrobin
Phenthoate	Pyraclofos	Tebuconazole	Trifloxysulfuron sodium
Phorate	Pyraclostrobin	Tebufenozide	Triflumizole
Phorate-sulfone	Pyraflufen-ethyl	Tebufenpyrad	Triflumuron
Phorate-sulfoxide	Pyrasulfotole	Tebuthiuron	Trifluralin
Phosalone	Pyrazophos	Tecnazene	Triflusulfuron-methyl
Phosmet	Pyrethrin	Teflubenzuron	Triforine
Phosphamidon	Pyributicarb	Tefluthrin	Triticonazole
Phoxim	Pyridaben	Temephos	Uniconazole
Picolinafen	Pyridaphenthion	Tepraloxydim	Vamidothion
Piperonyl butoxide	Pyrifenox	Terbacil	Vinclozolin
Piperophos	Pyriftalid	Terbufos	XMC
Pirimicarb	Pyrimethanil	Terbufos-sulfone	Zoxamide

Note: * Diquat and paraquat only tested in 30 pea and 30 wheat samples

6.3 AG-COMP ANALYTES SCREEN FOR PEAS AND WHEAT

2-Aminobenzimidazole	Bentazone	Chloroxuron	DDE-4,4
2-phenylphenol	Bifenazate	Chlorpropham	DDT-2,4
3-Methylphosphinicopropionic acid	Bifenox	Chlorpyrifos	DDT-4,4
Abamectin	Bifenthrin	Chlorpyrifos-methyl	Deltamethrin
Acephate	Bioresmethrin	Chlorsulfuron	Demeton-S
Acetamiprid	Bitertanol	Chlorthal-dimethyl	Demeton-s-methyl
Acetamiprid-N-desmethyl	Bixafen	Chlorthiophos	Demeton-s-methyl-sulfoxide
Acetochlor	Boscalid	Chlozolinate	Demeton-S-sulfone
Acibenzolar acid	Bromacil	Chromafenozide	Demeton-S-sulfoxide
Acibenzolar-S-methyl	Bromobutide	Cinidon-ethyl	Desmedipham
Acrinathrin	Bromophos	Clethodim	Diallate
Alachlor	Bromophos-ethyl	Clodinafop-propargyl	Diazinon
Aldicarb	Bromopropylate	Clofentezine	Dichlobenil
Aldicarb-sulfone	Bupirimate	Clomazone	Dichlofenthion
Aldicarb-sulfoxide	Buprofezin	Cloquintocet-mexyl	Dichlofluanid
Aldrin	Butachlor	Clothianidin	Dichlorvos
Allidochlor	Butafenacil	Coumaphos	Diclobutrazol
Ametoctradin	Butamifos	Coumaphos-oxon	Diclocymet
Ametryn	Cadusafos	Cyanazine	Diclofop-methyl
Aminomethylphosphonic acid	Cafenstrole	Cyanophos	Dicloran
Anilofos	Captan	Cyantraniliprole	Diclosulam
Anthraquinone	Carbaryl	Cyazofamid	Dicofol (sum of residues)
Atrazine	Carbendazim	Cyclanilide	Dicofol-2,4
Azaconazole	Carbetamide	Cycloate	Dicofol-4,4
Azamethiphos	Carbofuran	Cyclosulfamuron	Dicrotophos
Azinphos-ethyl	Carboxin	Cyflufenamid	Dicyclanil
Azinphos-methyl	Carfentrazone-ethyl	Cyfluthrin	Dieldrin
Azoxystrobin	Carpropamid	Cyhalofop-butyl	Diethofencarb
BDM-C10	Chlorantraniliprole	Cyhalothrin	Difenoconazole
BDM-C12	Chlorbufam	Cymoxanil	Diflubenzuron
BDM-C14	Chlordane-cis	Cypermethrin	Diflufenican
BDM-C16	Chlordane-trans	Cyproconazole	Dimepiperate
Benalaxyl	Chlorfenapyr	Cyprodinil	Dimethenamid
Bendiocarb	Chlorfenvinphos	Cyromazine	Dimethoate
Benfluralin	Chloridazon	Daimuron	Dimethomorph
Benodanil	Chlorimuron-ethyl	DDAC	Dimethylvinphos
Benoxacor	Chlorobenzilate	DDD-2,4	Dioxabenzofos
Bensulfuron-methyl	Chlorothalonil	DDD-4,4	Dioxathion
Bensulide	Chlorotoluron	DDE-2,4	Diphenamid

Diphenylamine	Fenoxanil	Flutriafol	Isazofos
Diquat	Fenoxaprop	Fluvalinate	Isofenphos
Disulfoton	Fenoxaprop-ethyl	Fluxapyroxad	Isofenphos-methyl
Disulfoton-sulfone	Fenoxycarb	Folpet	Isoprocarb
Disulfoton-sulfoxide	Fenpiclonil	Fonofos	Isoprothiolane
Dithiopyr	Fenpropathrin	Forchlorfenuron	Isoproturon
Diuron	Fenpropidin	Formetanate hydrochloride	Isopyrazam
Dodine	Fenpropimorph		Isoxathion
Edifenphos	Fenpyroximate	Fosthiazate	Karbutilate
Emamectin Benzoate	Fensulfothion	Fuberidazole	Kresoxim-methyl
Endosulfan sulfate	Fenthion	Furalaxyl	Lactofen
Endosulfan-alpha	Fenthion-ethyl	Furametpyr	Lenacil
Endosulfan-beta	Fenthion-oxon	Furathiocarb	Leptophos
Endrin	Fenthion-oxon-sulfone	Glufosinate	Lindane
Endrin ketone	Fenthion-oxon-sulfoxide	Glyphosate	Linuron
EPN	Fenthion-sulfone	Halosulfuron-methyl	Lufenuron
Epoxiconazole	Fenthion-sulfoxide	Haloxyfop-etotyl	Malathion
EPTC	Fentrazamide	Haloxyfop-methyl	Mandipropamid
Esprocarb	Fenvalerate	HCH-alpha	Mefenacet
Ethalfluralin	Ferimzone	HCH-beta	Mefenpyr-diethyl
Ethametsulfuron-methyl	Fipronil	HCH-delta	Mepanipyrim
Ethiofencarb	Fipronil-sulfide	Heptachlor	Mepronil
Ethion	Fipronil-sulfone	Heptachlor-endo-epoxide	Mesotrione
Ethiprole	Flamprop	Heptachlor-exo-epoxide	Metalaxyl
Ethofumesate	Flamprop-methyl	Heptenophos	Metamitron
Ethoprophos	Flazasulfuron	Hexachlorobenzene	Metconazole
Ethoxyquin	Fluacrypyrim	Hexaconazole	Methabenzthiazuron
Ethoxysulfuron	Fluazifop-P	Hexaflumuron	Methacrifos
Ethychlozate	Fluazifop-p-butyl	Hexazinone	Methamidophos
Etobenzanid	Fluazinam	Hexythiazox	Methidathion
Etoxazole	Flubendazole	Imazalil	Methiocarb
Etridiazole	Flubendiamide	Imazamethabenz-methyl	Methiocarb-sulfone
Etrimfos	Flucythrinate	Imazosulfuron	Methiocarb-sulfoxide
Famoxadone	Fludioxonil	Imidacloprid	Methomyl
Famphur	Flufenacet	Imidacloprid-5-hydroxy	Methomyl-oxime
Fenamidone	Flumiclorac-pentyl	Imidacloprid-olefin	Methoxychlor
Fenamiphos	Flumioxazin	Inabenfide	Methoxyfenozide
Fenamiphos-sulfone	Fluometuron	Indanofan	Metobromuron
Fenamiphos-sulfoxide	Fluopicolide	Indoxacarb	Metolachlor
Fenarimol	Fluopyram	Iodocarb	Metominostrobin-(E)
Fenbuconazole	Fluquinconazole	Iodofenphos	Metominostrobin-(Z)
Fenchlorphos	Fluridone	Iodosulfuron-methyl	Metosulam
Fenhexamid	Fluroxypyr	Ioxynil	Metrafenone
Fenitrothion	Flusilazole	Iprobenfos	Metribuzin
Fenobucarb	Fluthiacet-methyl	Iprodione	Metsulfuron-methyl
Fenothiocarb	Flutolanil	Iprovalicarb	Mevinphos

Milbemycin A3	Pirimicarb	Pyrimidifen	Terbumeton
Milbemycin A4	Pirimicarb-desmethyl	Pyriminobac-methyl-(E)	Terbuthylazine
Mirex	Pirimicarb-desmethylformamido	Pyriminobac-methyl-(Z)	Terbutryn
Molinate		Pyriproxyfen	Tetrachlorvinphos
Monocrotophos	Pirimiphos-methyl	Pyroquilon	Tetraconazole
Monolinuron	Pretilachlor	Pyroxsulam	Tetradifon
Myclobutanil	Prochloraz	Quinalphos	Thenylchlor
Napropamide	Prochloraz-desimidazole-formylamino	Quinoclamine	Thiabendazole
Nicotine		Quinoxyfen	Thiacloprid
Nitrofen	Pirimiphos-methyl	Quintozene	Thiamethoxam
Nitrothal-isopropyl	Pretilachlor	Quizalofop-ethyl	Thiazopyr
Norflurazon	Prochloraz	Rimsulfuron	Thidiazuron
Novaluron	Prochloraz-desimidazole-formylamino	Saflufenacil	Thiobencarb
Octhilinone	Procymidone	Sebuthylazine	Thiocyclam oxalate
Omethoate	Profenofos	Sethoxydim	Thiometon
Oryzalin	Promecarb	Simazine	THPI
Oxabetrinil	Prometryn	Simeconazole	Tiadinil
Oxadiazon	Propachlor	Simetryn	Tolclofos-methyl
Oxadixyl	Propamocarb	Spinetoram	Tolylfluanid
Oxamyl	Propanil	Spinosad	Topramezone
Oxycarboxin	Propaphos	Spiromesifen	Tralkoxydim
Oxyfluorfen	Propaquizafop	Spiromesifen-enol	Transfluthrin
Paclobutrazol	Propargite	Spirotetramat	Triadimefon
Paraquat	Propazine	Spirotetramat-enol	Triadimenol
Parathion	Propetamphos	Spirotetramat-enol- glucoside	Tri-allate
Parathion-methyl	Propham		Triasulfuron
Penconazole	Propiconazole	Spirotetramat-keto-hydroxy	Triazophos
Pencycuron	Propoxur	Spirotetramat-mono-hydroxy	Tribenuron-methyl
Pendimethalin	Propyzamide	Spiroxamine	Tribufos
Pentachlorobenzene	Proquinazid	Sulfentrazone	Trichlorfon
Penthiopyrad	Prosulfocarb	Sulfoxaflor	Tricyclazole
Permethrin	Prothiofos	Sulprofos	Trifloxystrobin acid
Phenmedipham	Pymetrozine	Tebuconazole	Trifloxystrobin
Phenothrin	Pyraclofos	Tebufenozide	Trifloxysulfuron sodium
Phenthoate	Pyraclostrobin	Tebufenpyrad	Triflumizole
Phorate	Pyraflufen-ethyl	Tebuthiuron	Triflumuron
Phorate-sulfone	Pyrasulfotole	Tecnazene	Trifluralin
Phorate-sulfoxide	Pyrazophos	Teflubenzuron	Triflusulfuron-methyl
Phosalone	Pyrethrin	Tefluthrin	Triforine
Phosmet	Pyributicarb	Temephos	Triticonazole
Phosphamidon	Pyridaben	Tepraloxydim	Uniconazole
Phoxim	Pyridaphenthion	Terbacil	Vamidothion
Picolinafen	Pyrifenox	Terbufos	Vinclozolin
Piperonyl butoxide	Pyriftalid	Terbufos-sulfone	XMC
Piperophos	Pyrimethanil	Terbufos-sulfoxide	Zoxamide

6.4 SUMMARY OF THE 2015-16 PLANT PRODUCT SURVEY RESULTS

Summary of all results reported against each commodity

Commodity group	Number of results below LOR* (=not detected)	Number of results above LOR (=detected)	Non complaint results (detections above MRLs) ^	Total number of results
Cauliflower	30282	18	0	30300
Cucurbits	30364	3	0	30367
Leafy vegetables	29926	104	13	30030
Peas	30135	34	4	30169
Tomatoes	29949	75	3	30024
Wheat	29776	104	23	29880
All commodities	180432	338	43	180770

*LOR - Limit of reporting

6.6 AG-COMP ANALYTES DETECTED IN SIX COMMODITIES

The table below also includes the frequency of the ag-comp analytes in all tested commodities. Ag-comp analytes detected in imported samples are indicated in brackets.

The multi residue screens used in this survey included benzalkonium chloride (BAC), dicecyl dimethyl ammonium chloride (DDAC) and their congeners. Under the current Food Notice, these compounds are exempted from having a MRL for listed commodities. These compounds are also approved for uses not defined by the ACVM Act. These compounds can act as surface active disinfectants and are used in a variety of applications in food production and processing. The ability to trace the residues back to its source in a food sample was beyond the scope of this survey. However, the detected BAC and DDAC levels above the default New Zealand MRL of 0.1 mg/kg were included for the dietary risk assessments. There were no food safety concerns.

.Frequency and list of ag-comp analytes detected in six commodities

No.	Ag-comp analytes detected	Frequency of residues detected in						
		Cauliflower	Cucurbits	Leafy vegetables		Peas	Tomatoes	Wheat
				Kale	Silver beet			
1	Acephate	0	0	0	1	0	0	0
2	Acetamiprid-N-desmethyl	0	0	1	0	0	0	0
3	Aminomethylphosphonic acid	Not tested				1	Not tested	19
4	Azoxystrobin	0	0	0	0	4	0	0
5	Benzalkonium chloride - C12	0	0	2	0	12	0	0

No.	Ag-comp analytes detected	Frequency of residues detected in						
		Cauliflower	Cucurbits	Leafy vegetables		Peas	Tomatoes	Wheat
				Kale	Silver beet			
	homolog (BDM-C12)							
6	Bentazone	0	0	0	0	1	0	0
7	Boscalid	0	0	1	0	0	0	1
8	Buprofezin	0	0	0	0	0	2	0
9	Captan	1	0	0	0	0	0	0
10	Carbaryl	0	0	0	0	0	0	1 (import)
11	Carbendazim	1	0	2	2	1	6	0
12	Chlorothaloniliprole	0	0	1	1	0	0	0
13	Chlorothalonil	1	0	1	7	0	3	0
11	Chlorpropham	0	0	1	0	0	0	0
12	Chlorpyrifos	0	0	0	1	1	0	2 (import)
13	Chlorpyrifos-methyl	0	0	0	0	0	0	5 (import)
14	Chlorthal-dimethyl	0	0	1	0	0	0	0
15	Chlothianidin	0	0	1	1	0	0	1
16	Cyanazine	0	0	0	0	2	0	0
17	Cyantraniliprole	0	0	2	0	0	0	0
18	Cyhalothrin	0	0	0	2	0	0	0
19	Cypermethrin	0	0	3	0	0	1	0
20	Cyproconazole	0	0	1	0	0	0	0
21	Diazinon	0	0	0	0	0	1	3
22	Dicecyl Dimethyl Ammonium Chloride (DDAC)		1	1	0	0	0	0
23	DDE-p,p'	0	0	1	0	0	0	0
24	Difenoconazole	0	0	0	1	0	1	0
25	Dimethoate	1	0	0	0	0	0	0
26	Dimethomorph	1	0	1	0	0	0	0
27	Fenitrothion	0	0	0	0	0	0	1
28	Fipronil	0	0	1	0	0	0	0
29	Fluazifop-P	0	0	0	1	1	0	0
30	Fluopicolide	0	0	0	0	0	1	0
31	Fluopyram	0	0	1	0	0	1	0
32	Fluvalinate**	0	0	1	0	0	1	0
33	Fluxapyroxad	0	0	0	0	0	0	2
34	Glyphosate	Not tested				1	Not tested	26

No.	Ag-comp analytes detected	Frequency of residues detected in						
		Cauliflower	Cucurbits	Leafy vegetables		Peas	Tomatoes	Wheat
				Kale	Silver beet			
35	Imidacloprid	0	0	3	0	0	3	1
36	Imidacloprid-5-hydroxy	0	0	0	0	0	2	0
37	Imidacloprid-olefin	0	0	5	0	0	2	0
38	Indoxacarb	0	0	1	1	0	0	0
39	Iprodione	1	0	0	0	0	4	0
40	Linuron	0	0	2	1	0	0	0
41	Malathion	0	0	0	0	0	0	1
42	Metalaxyl	2	0	2	1	0	1	1
43	Methamidophos	1	0	2	4	0	3	0
44	Methiocarb-sulfoxide	0	0	1	0	0	0	0
45	Metrafenone	0	0	2	2	0	0	0
46	Myclobutanil	0	0	0	1	0	0	0
47	Benzalkonium chloride – C14 homolog (BDM-C14)	0	0	1	0	8	0	0
48	Omethoate	0	0	1	1	0	0	0
49	Permethrin	0	0	5	3	0	3	0
50	Piperonyl butoxide	0	0	1	0	0	0	4
51	Pirimicarb	1	0	1	1	0	0	0
52	Pirimicarb-desmethyl	0	0	1	4	0	0	0
53	Pirimicarb-desmethylformamido	0	0	1	0	0	0	0
54	Pirimiphos-methyl	0	0	7	1	0	6	29
55	Procymidone	3	2	0	0	0	3	1
56	Prometryn	0	0	2	0	0	0	0
57	Propamocarb	0	0	0	0	0	1	0
58	Propyzamide	0	0	1	0	0	0	0
59	Pyrimethanil	0	0	0	0	0	1	0
60	Pyriproxyfen	0	0	0	0	0	2	0
61	Simazine	0	0	0	0	0	0	1
62	Spinosad	0	0	1	1	0	0	2
63	Spiromesifen	0	0	0	0	0	1	0
64	Spirotetramat-enol	0	0	0	0	0	1	0
65	Spirotetramat-enol-glucoside^	0	0	0	0	0	1	0
67	Sulfoxaflor	0	0	1	0	0	17	0
68	Tebuconazole	0	0	0	0	0	0	3
69	Terbuthylazine	0	0	0	0	1	0	0
70	Thiamethoxam	5	0	4	0	0	0	0
71	Tetrahydrophthalimide(THPI)~	1	0	0	0	0	0	0

No.	Ag-comp analytes detected	Frequency of residues detected in						
		Cauliflower	Cucurbits	Leafy vegetables		Peas	Tomatoes	Wheat
				Kale	Silver beet			
72	Trifluralin	0	0	0	0	1	0	0
73	Triforine	0	0	0	0	0	8	0
	Total	19	3	68	38	34	75	104

Key:

** This residue is the sum of stereoisomers, reported as total fluvalinate.

^ This residue is not part of the residue definition for spirotetramat. The detection is an observation result and not compared against the MRL.

~ This residue is not part of the residue definition for captan. The detection is an observation result and not compared against the MRL.

6.7 NUMBER OF AG-COMP ANALYTES DETECTED IN EACH COMMODITY

There were some samples that had more than one ag-comp analyte reported. The table below is a summary of the number of ag-comp analytes detected in number of samples by commodity.

The range of ag-comp analytes detected in the commodity sample

Agricultural Crop	Total number of samples analysed	Number of ag-comp analytes detected per sample							
		None	1	2	3	4	5	6	7
Cauliflower	60	50	7	1	1	0	0	0	1
Cucurbits	60	57	3	0	0	0	0	0	0
Leafy vegetables	60	19	12	14	6	7	2	0	0
Peas	60	42	13	2	3	0	0	0	0
Tomatoes	60	20	19	9	5	6	0	1	0
Wheat	60	9	26	20	1	4	0	0	0
Total	360	197	80	46	16	17	2	1	1