Pesticide Residue Testing
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Cover photo: Export quality apple

Fluquinconazole

It’s a fungicide not a swearword
Introduction

Eurofins is New Zealand’s leading laboratory network in the areas of Food, Water and Environmental testing and sampling services. We have been providing these services in New Zealand for over 20 years.

Eurofins Scientific is the world leader in the fields of food testing and environmental laboratory services. It is also number one in the world in pharmaceutical products testing and one of the global market leaders in agroscience, genomics, pharmaceutical discovery and central laboratory services.

We understand that New Zealand food companies pride themselves in producing good quality, high grade items for consumption in both the domestic and export markets. Our aim is to work with you in providing premium quality testing support services for your quality control requirements and brand protection needs.

We have strategically positioned laboratory facilities in Auckland, the Bay of Plenty, Wellington, Christchurch and Dunedin, offering a full scope of sampling and testing services whilst ensuring that samples from around New Zealand are processed into the laboratory as fast as possible.

Areas that we specialise in are as follows:

- Food and Feed Testing
- Food Safety and Auditing
- Fruit Quality Services
- Agricultural Testing
- Environment Testing
- Contaminated Land
- Agroscience Services
- Pharma Development
- Consumer Product Testing

Who should read this brochure?

This brochure has been prepared for all food manufacturers, wholesalers, retailers and exporters who require pesticide residue testing.

As one of New Zealand's leading laboratories we are able to perform tests for an extensive range of residue compounds to meet local and export compliance requirements.
What Are Pesticide Residues

Pesticides are chemicals used in agriculture to protect crops against insects, fungi, weeds and other pests. In addition to their use in agriculture, pesticides are also used to protect public health in controlling the vectors of tropical diseases, such as mosquitoes.

But pesticides are also potentially toxic to humans. They may induce adverse health effects including cancer, effects on reproduction, immune or nervous systems. Before they can be authorized for use, pesticides should be tested for all possible health effects and the results should be analysed by experts to assess any risks to humans.

‘Pesticide’ is a general term used for substances which are applied to poison pests (weeds, insects, moulds, rodents, etc.). The pesticides most acutely dangerous to man are insecticides and rodenticides, although by weight, herbicides are the most widely used type of pesticide – about 80% of all compounds used are herbicides. Not every pesticide is acutely toxic to humans or to other non-target species.

Pesticides are applied to crops often by ground or aerial spraying or other ground application methods and are most prevalent in agricultural areas. Pesticides are also used on golf courses, forested areas, along roadsides, and in suburban and urban landscape areas.

Pesticide residue refers to the pesticides that may remain on or in food after pesticide formulations are applied to food crops. The levels of these residues in foods are often stipulated by regulatory bodies in many countries.

New Zealand Ministry for Primary Industries (MPI), Codex, and other Regulatory Body’s Maximum Residue Limits (MRLs) are based on Good Agricultural Practice data and foods derived from commodities that comply with the respective Codex, or other Regulatory Body, MRLs are intended to be toxicologically acceptable.

Codex, and other Regulatory Body MRLs for a plant or dairy product takes into account the maximum level expected to occur in a composite sample, which has been derived from multiple units of the treated product and which is intended to represent the average residue level in a lot.

In consequence, MRLs for plant products and dairy products apply to a composite bulk sample derived from 1-10 primary samples or on a minimum sample size.

**Pesticides** are substances that are meant to control pests or weeds. The term pesticide includes all of the following: herbicide, insecticide, insect growth regulator, nematicide, termiteicide, molluscicide, piscicide, avicide, rodenticide, predacide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide, disinfectant (antimicrobial), and sanitizer.
The analytical testing of food products is defined by international convention, published in a document called the Codex Alimentarius. This is published by the Food and Agriculture Organisation of the United Nations World Health Organisation.

This document defines the different matrices that food types falls into and also details the procedures that laboratories are required to follow in order to accurately test and report pesticides residues in those foods.

This 183 page document has been summarised in the table below which represents the food matrices that Eurofins is able to test.

<table>
<thead>
<tr>
<th>Codex Commodity Group</th>
<th>Common Properties</th>
<th>Commodity Class</th>
<th>Representative Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>High water and chlorophyll content</td>
<td>Leafy vegetables, Brassica leafy vegetables, Legume vegetables</td>
<td>Spinach, lettuce, broccoli, cabbage, kale, parsley, green beans</td>
</tr>
<tr>
<td>II.</td>
<td>High water and low or no chlorophyll content</td>
<td>Pome fruits, Stone fruits, Berries, Small fruits, Fruiting vegetables, Root vegetables</td>
<td>Apple, pear, Peach, cherry, Strawberry, Grape, Tomato, bell pepper, melon, Mushroom, potato, carrot</td>
</tr>
<tr>
<td>III.</td>
<td>High acid content</td>
<td>Citrus fruits</td>
<td>Lemon, orange, kiwifruit</td>
</tr>
<tr>
<td>IV.</td>
<td>High sugar content</td>
<td>Dried or processed fruit</td>
<td>Raisins, dates, fruit jams, fruit juices</td>
</tr>
<tr>
<td>V.</td>
<td>High oil or fat</td>
<td>Oil seeds</td>
<td>Avocado, sunflower seeds, olives, walnut, pecan nut, pistachios</td>
</tr>
<tr>
<td>VI.</td>
<td>Dry materials</td>
<td>Cereals, Cereal products</td>
<td>Wheat flour, rice, maize, grains, wheat flour, wheat bran</td>
</tr>
<tr>
<td>Products of Animal Origin</td>
<td>Dairy origin</td>
<td>Milk, Processed Milk</td>
<td>Whole milk, skimmed milk, WMP, SMP, butter milk, butter, cheese, infant formula, WPC</td>
</tr>
</tbody>
</table>

Representative species are given for guidance and for example only, therefore other species, fitting into the commodity class, can be prepared by this bench method, at the discretion of the responsible Key Technical Person. For example, brussel sprouts are not cited as an example but would fit into commodity class I, similarly limes would fit into commodity class III.
Pesticide Residue Analysis

The analysis of pesticide residues requires two distinct laboratory processes. Representative samples must be collected from the bulk lot of the food and a minimum sample size sent to the laboratory.

Homogenisation
Once at the laboratory the sample is homogenised through several processes of blending. Usually this requires a standardised portion of the product to be chopped up and coarsely blended before being blended again a second time until it is a uniform pulp.

What makes up the sample is clearly defined by standard procedures, and these procedures are included in the laboratory sample preparation procedures. These procedures clarify what part of the food product gets included in the test sample.

For example*: Does an olive pip get included in the test process? Does the skin of an orange get included?

The Testing Process
The test sample is then treated in the laboratory with a range of solvents which extract all the pesticide residue compounds.

Compounds Reported
There are thousands of pesticide compounds that have been used at various times around the world, but not all are tested for routinely by laboratories. Most laboratories run test-lists of several hundred compounds analysed with the two different instruments shown below.

Even though the laboratory test list may contain a compound, it may not work with all matrices or it may not be reported at the standard detection limit. The reason for this is because the makeup of the sample can affect the compounds: high acid samples can destroy some of the compounds; high fat or sugar content samples can cause interference during instrumental analysis.

The Eurofins compound list is developed from consultation with our overseas laboratories and includes compounds of concern for many of our trading partners. Each of the test-lists we report is specifically targeted to the Codex matrix. The standard reporting detection limit is 0.01mg/Kg.

![Shimadzu LC-MSMS](image1)

![Shimadzu GC-MSMS](image2)
Working with Eurofins

The process of collecting, homogenising, testing and reporting pesticide residues in food products begins at source and with the initial sampling process. This process needs to be correct in order to obtain a representative sample.

Representative

“A sample must have the same distribution of characteristics as the body from which it is drawn. Only then, can the sample be used to draw conclusions about the greater body”.

This means that if the sample is taken wrong then our results will be wrong.

Please contact us prior to sample collection to discuss the logistics of the samples and to get a quote for the testing. This discussion will include the minimum sample size and sample delivery timeframes.

We will also discuss the pesticide residue compounds that you require so that we provide you with the analytical test information that meets your needs.

Contact details can be found on the last page.

Some interesting facts

Eurofins can test for over 500 individual pesticide compounds

Common compounds you may have heard of include

DDT, Dieldrin, and Chlordane

Less common compounds include

Flutriafol, Isoxathion, and Trifloxystrobin

Organic Farmers use pesticides such as rotenone and pyrethrin.

In a good year New Zealand can export over 4 billion kiwifruit.
# Contact Details

<table>
<thead>
<tr>
<th>Site</th>
<th>Department</th>
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Email can be directed to staff using "first name last name"@eurofins.com

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Hamilton: 12-14 Pukete Road, Te Rapa, Hamilton, 3240
Christchurch: 43 Detroit Drive, Rolleston 7675
Dunedin: 16 Lorne Street, South Dunedin, 9012

**WEB**

www.eurofins.co.nz

* Answers: An olive pip would not be tested but the orange skin would.