

PESTICIDE USAGE IN NORTHERN IRELAND  
SURVEY REPORT 262

**NORTHERN IRELAND  
SOFT FRUIT CROPS  
2014**



Agriculture, Fishing and Forestry

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# PESTICIDE USAGE SURVEY REPORT 262

## NORTHERN IRELAND SOFT FRUIT CROPS 2014

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INVESTOR IN PEOPLE

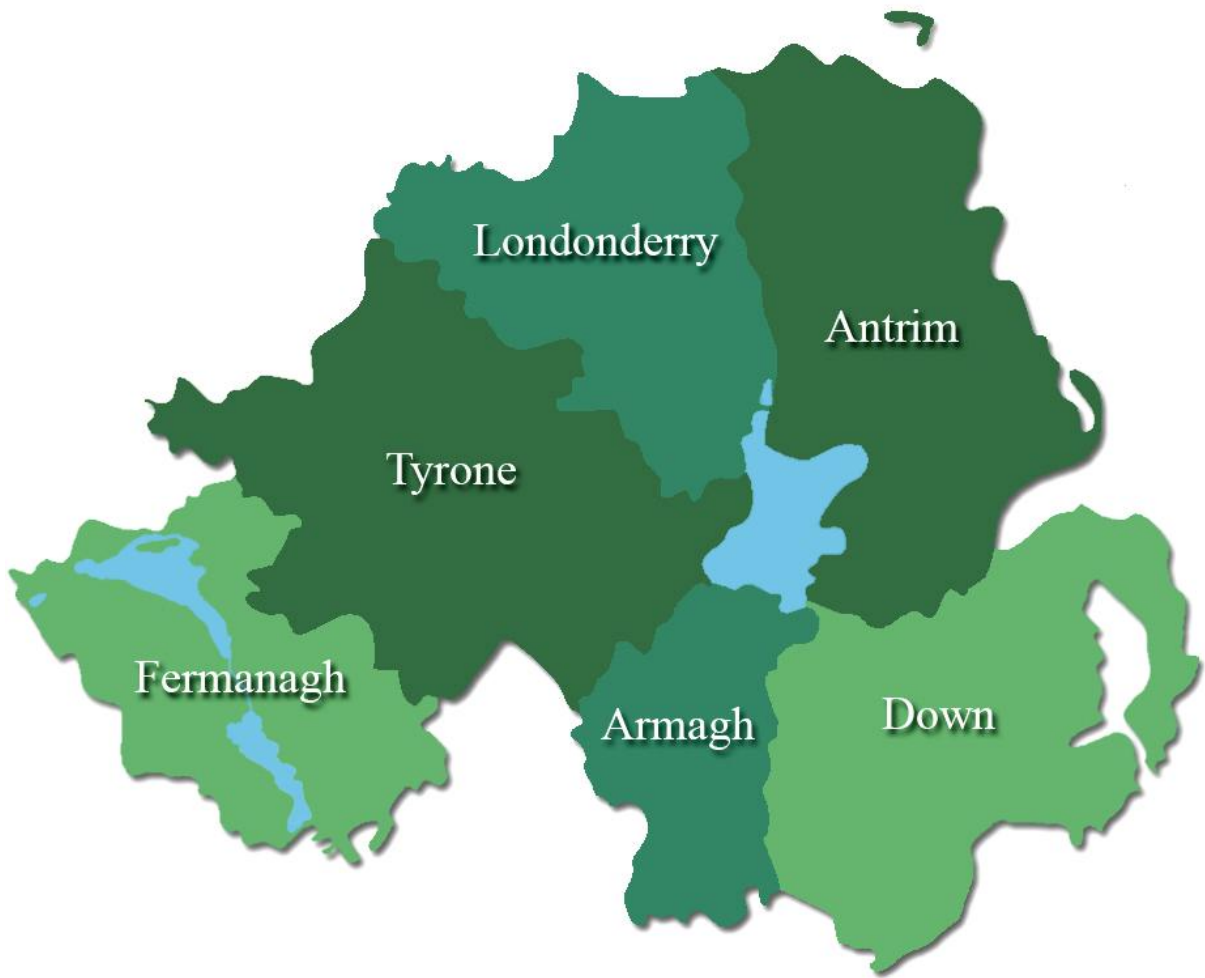
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## The County Regions of Northern Ireland



## SUMMARY

This report presents information from a survey of pesticide usage practices on soft fruit crops in Northern Ireland in 2014. Data was collected from 11 growers representing 41% of all soft fruit holdings in Northern Ireland. The data have been raised using SPSS (Statistical Package for the Social Sciences) software to give estimates of regional pesticide usage. Due to the small sample size, figures may be subject to significant variation, though the estimates indicate correlation with surveys conducted in 2010 and 2006.

Compared with the previous survey, carried out in 2012, the total area of soft fruit crops grown decreased by 11% to approximately 16 hectares but the area treated with pesticides (spray hectares) increased by 77% between 2012 and 2014, mainly due to increased fungicide use in non-protected strawberry crops. This may be attributable to periods of unsettled weather.

A total of 88 kilograms of pesticides were applied to 128 spray hectares of soft fruit crops in 2014. Strawberries were the most commonly produced soft fruit (protected, semi-protected and non-protected), with 79 kilograms of pesticides being applied to 114 spray hectares. This represented 89% of both the total weight of pesticides applied and the area treated.

Fungicide usage increased by 73% compared with 2012. Fungicides were applied to 68% of the total pesticide-treated area representing 91% of the total weight of pesticides used in 2014. Iprodione and azoxystrobin were the fungicides applied to the largest area whilst iprodione and fenhexamid were the most frequently used fungicides by weight applied. Sulphur was used as a fungicide on protected and semi-protected strawberries for the treatment of strawberry powdery mildew (*Podosphaera aphanis*).

Herbicide usage increased by an estimated 93% compared with 2012 but decreased by 57% when compared with 2006. Herbicide active ingredients were applied to 9% of the total pesticide-treated area (19% of the total weight of pesticides used) with pendimethalin being the most commonly used herbicide.

Insecticide and acaricide usage increased by 110% when compared with 2012, and 24% compared with 2010. Insecticide and acaricide active ingredients accounted for 21% of the total pesticide-treated area and 7% of the total weight of pesticides applied in 2014. The chloronicotinyl insecticide thiacloprid was the most frequently applied active substance, primarily on strawberries, replacing clofentezine as the most commonly used insecticide/acaricide type. Aphids were the primary reason for insecticide/acaricide use during this survey period.

Biopesticides (including invertebrate parasites and predators) were applied to <1% of the treated area in 2014, compared with 3% in 2012. Applications were principally to control vine weevil (*Otiorhynchus sulcatus*), with *Steinernema kraussei* being the most commonly used biopesticide.

Molluscicides were applied to approximately 0.5 hectare of strawberries (both protected and non-protected), for the control of slugs. Metaldehyde and methiocarb were the only recorded molluscicide active substances used during soft fruit production in 2014.

'Other products' refer to active ingredients, which are derived completely from natural ingredients but are not classified as 'plant protection products'. Approximately 19kg of these were applied to semi-protected strawberries for spider mite (*Tetranychus urticae*) and foliar feed.

## INTRODUCTION

As a participant in the UK Working Party on Pesticide Usage Surveys, the Agri-Food and Biosciences Institute (AFBI), on behalf of the Department of Agriculture and Rural Development for Northern Ireland (DARDNI), conducts a cyclical programme of surveys to examine pesticide usage in all sectors of the agricultural and horticultural industries. Principally, the data collected provides information for consideration by the Advisory Committee on Pesticides. In addition, the information may also be used by those involved in residue testing, for public information and to evaluate the impact of policy and trends in pesticide usage.

This is the sixth survey of pesticide usage on soft fruit crops in Northern Ireland. Results from the previous surveys, which reported on pesticide usage practices on soft fruit crops in 1990 (Kidd *et al*; 1994), 1998 (Kearns *et al*; 2002), 2006 (Kearns *et al*; 2008), 2010 (Lavery *et al*, 2011); and 2012 (Lavery *et al*, 2013) are included in the report for comparative purposes.

A list of published Northern Ireland Pesticide Usage Survey reports is shown in Appendix 1.

Soft fruit grown under permanent protection (glasshouse and polythene tunnel), outdoors under semi-protection (Spanish tunnels) and in the field without any protection were recorded in this survey.

The soft fruit industry in Northern Ireland has continually decreased in size from an estimated 75 hectares in 1990 to approximately 16 hectares in 2014. Of all soft fruit crops grown, 24% were grown under permanent protection, 32% were grown under semi-protection and the remaining 44% had no protection (Figure 3). Reports prior to 2010 combined protected and semi-protected crops.

The crop types recorded in this survey (area grown in hectares) were strawberries (12.9 ha) and 'other crops' (2.7 ha). 'Other crops' refer to raspberries, blueberries, gooseberries, blackcurrants, redcurrants and tayberries.

The principal pests and diseases recorded were aphids, spider mites (*Tetranychus urticae*), grey mould (*Botrytis cinerea*), strawberry powdery mildew (*Podosphaera aphanis*) and blackspot (*Diplocarpon rosae*).

## METHODS

Using the Northern Ireland Agricultural Census, June 2013 (Anon; 2014), single farm payment data (unpublished) and details of growers from previous surveys, the population of soft fruit growers was established and holdings to be surveyed selected. A preliminary letter was sent to growers explaining the purpose of the survey. Of a possible 27 growers, 11 participated in the survey. Growers were visited during March and April 2014 and data relating to pesticide usage were collected by either personal or telephone interview. This survey covers the period from September 2013 to September 2014. The growers' stated reasons for pesticide use were also included, but may not always be appropriate.

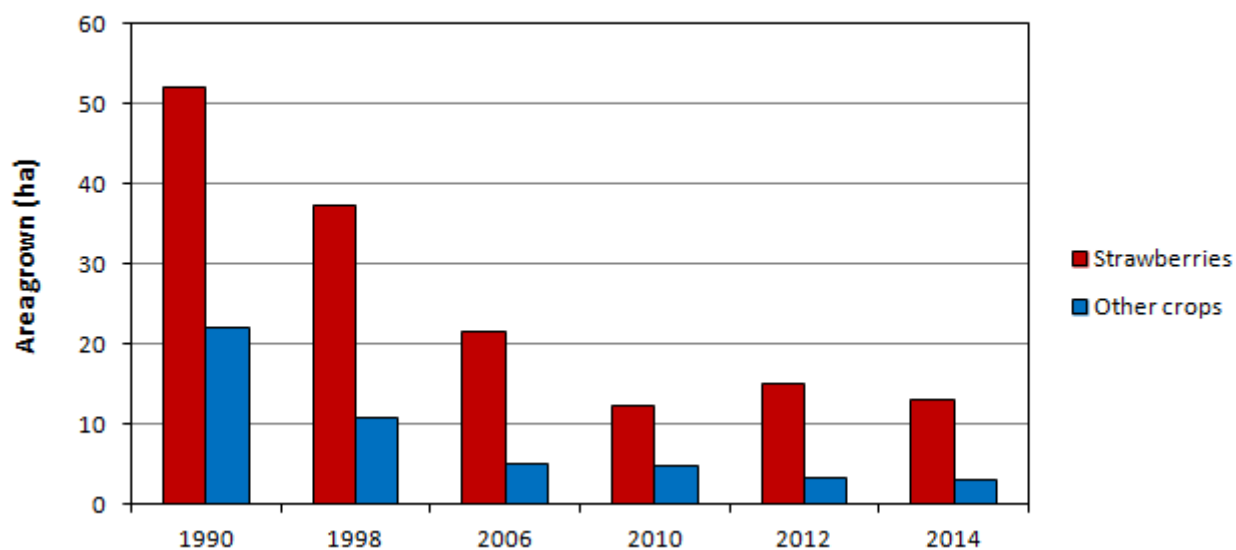
## DEFINITIONS AND NOTES

- 'Total grown area' refers to the actual planted area of crop, and is referred to in hectares (ha).
- 'Basic-treated area' refers to the actual planted area of crop which was treated with at least one pesticide application, and is referred to in hectares (ha).
- 'Total-treated area' refers to all applications made to the 'basic-treated area', including all repeat applications, and is referred to in spray hectares (spha).
- 'Protected crops' refers to all crops grown under permanent protection, i.e. glasshouse or polythene tunnel, for the entire duration of their production cycle.
- 'Semi-protected crops' refers to all crops grown outdoors which were covered at various times during production with Spanish tunnels.
- 'Non-protected crops' refers to all crops grown outdoors in field conditions without any protection during their production cycle.
- 'Reasons for use'; the reasons reported for the use of pesticides are the growers' stated reasons for use and may sometimes not reflect label recommendations.
- Some treatments to soft fruit are restricted to the plants or to the ground between them. For the purposes of this report, where a field or crop is referred to, it is assumed the entire field / area was treated with the exception of herbicide usage where 40% of the total area treated for all crops is accounted for by the inter-row area within these crops.
- 'Rounding'; due to rounding of figures, there may be slight differences in totals both within and between tables.
- 'Biopesticides' are recorded by area treated (spha) only, as they are applied in units other than weight or volume (e.g. million per hectare) and this does not translate readily into a conventional weight.
- 'Other crops' refers to raspberries, blueberries, gooseberries, blackcurrants, redcurrants and tayberries.

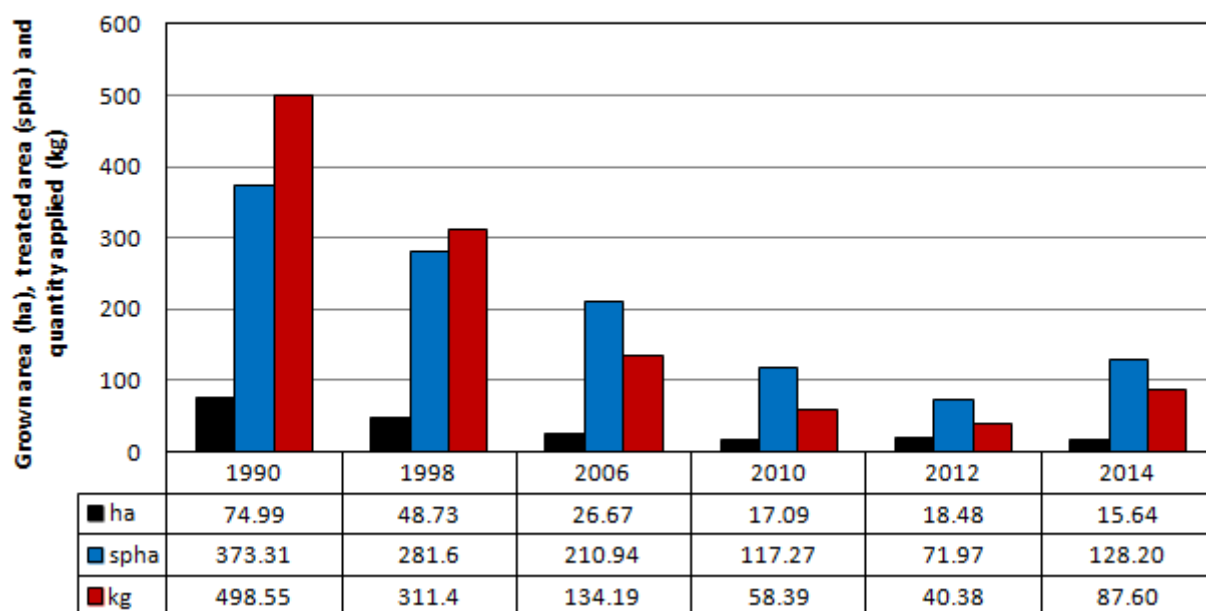


## TRENDS

**Figure 1** Changes in the area (ha) of soft fruit crops grown in Northern Ireland, 1990-2014.

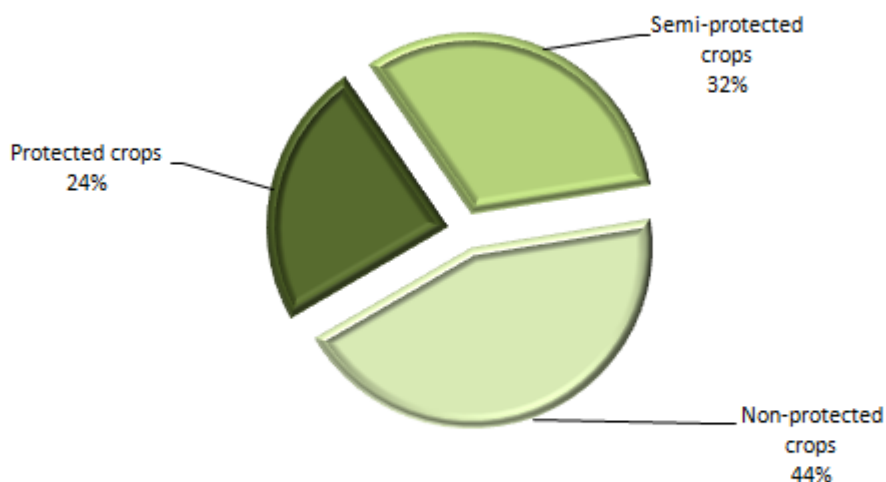


**Figure 2** Changes in the overall grown area (ha), pesticide-treated area (spha) and the total quantity (kg) of active ingredient applied to soft fruit crops in Northern Ireland, 1990-2014.



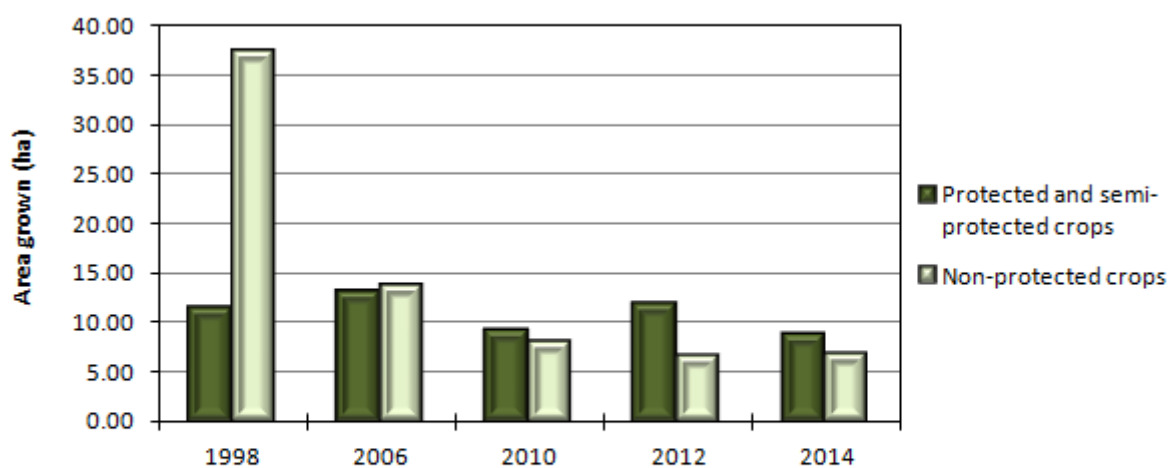
## CROP DISTRIBUTION

**Figure 3** The proportion of soft fruit crops grown in Northern Ireland, 2014 by method of protection.



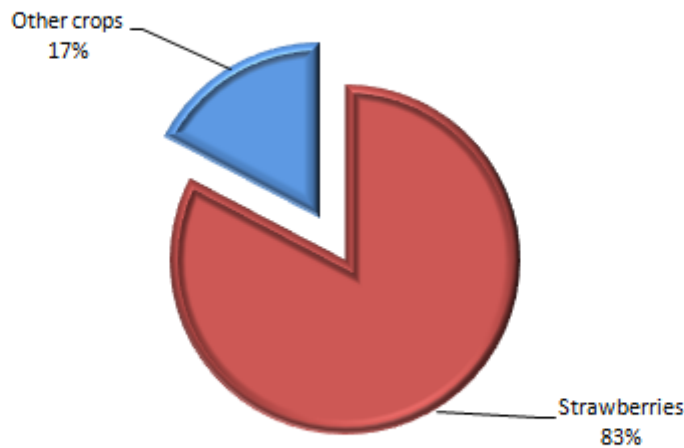
<i>Method of protection</i>	<i>Estimated cropping area of soft fruit (ha)</i>
Protected crops	3.70
Semi-protected crops	5.00
Non-protected crops	6.90

**Figure 4** Changes in method of protection used for soft fruit crops between 1998 and 2014.



<i>Method of protection</i>	<i>1998 (ha)</i>	<i>2006 (ha)</i>	<i>2010 (ha)</i>	<i>2012 (ha)</i>	<i>2014 (ha)</i>
Protected and semi-protected crops	11.37	12.99	9.03	11.77	8.70
Non-protected crops	37.36	13.69	8.06	6.72	6.90

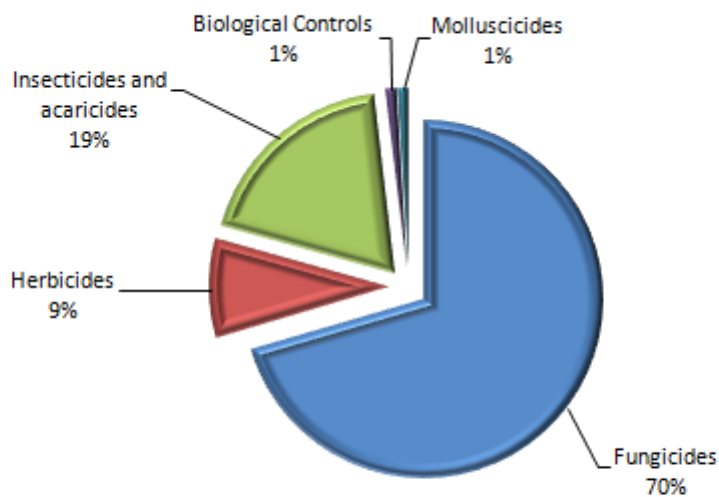
**Figure 5** The proportional distribution of soft fruit crops grown in Northern Ireland, 2014, by crop group.



<i>Crop</i>	<i>Estimated cropping area of soft fruit (ha)</i>
Strawberries	12.90
Other crops	2.70

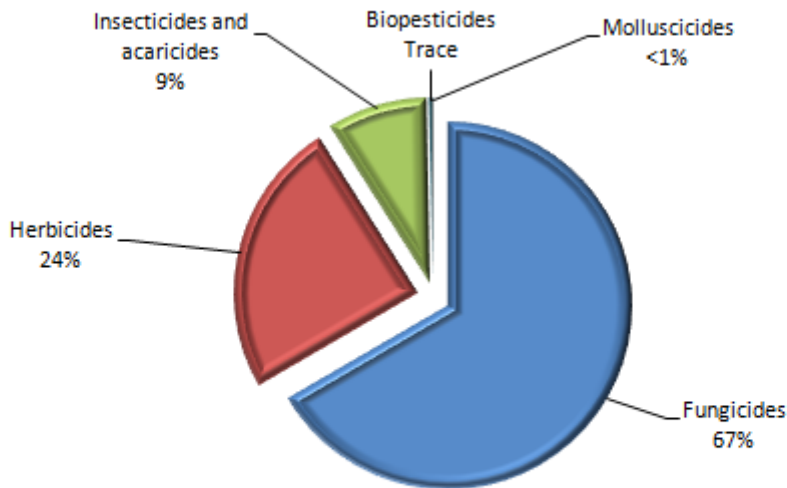
## PESTICIDE USAGE ON CROPS

**Figure 6** The proportional area (%) of soft fruit crops treated with each pesticide group, 2014.



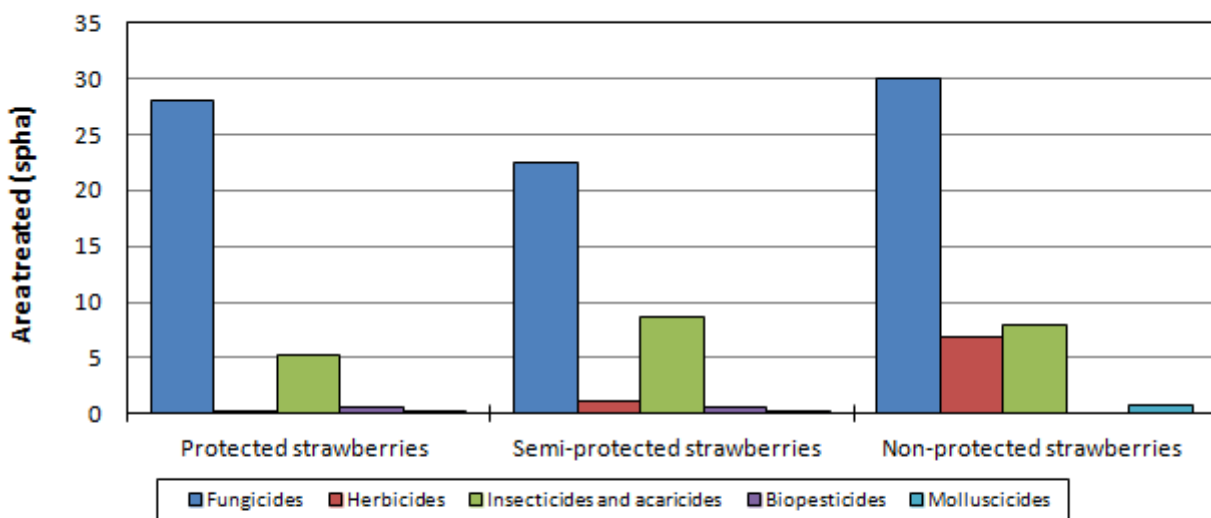
<i>Pesticide group</i>	<i>Fungicides</i>	<i>Herbicides</i>	<i>Insecticides and acaricides</i>	<i>Biopesticides</i>	<i>Molluscicides</i>
Treated area (spha)	87.40	10.90	23.40	1.20	1.10

**Figure 7** The proportional quantities (%) of pesticides applied to soft fruit crops, 2014.



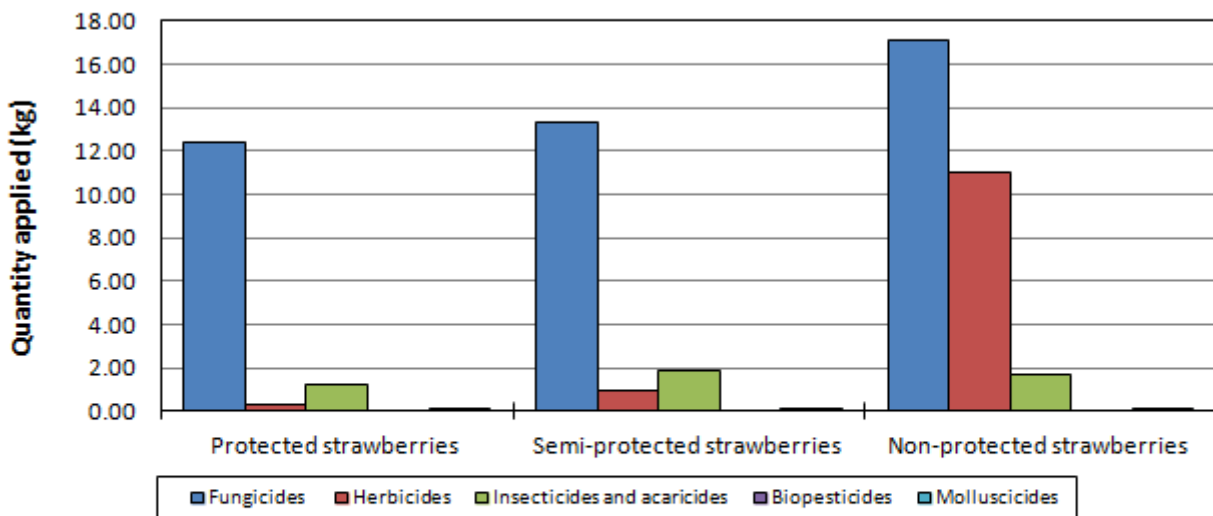
Pesticide group	Fungicides	Herbicides	Insecticides and acaricides	Biopesticides	Molluscicides
Quantity applied (kg)	30.71	7.08	2.45	Trace	0.16

**Figure 8** Estimated area (spha) of strawberry crops treated with each pesticide type in Northern Ireland, 2014.



Method of protection	Fungicides (spha)	Herbicides (spha)	Insecticides and acaricides (spha)	Biopesticides (spha)	Molluscicides (spha)
Protected strawberries	28.10	0.10	5.20	0.60	0.10
Semi-protected strawberries	22.50	1.10	8.60	0.60	0.20
Non-protected strawberries	30.00	6.90	7.90	NIL	0.70
<b>Total</b>	<b>80.60</b>	<b>8.10</b>	<b>21.70</b>	<b>1.20</b>	<b>1.00</b>

**Figure 9** Estimated quantity (kg) of each pesticide type applied to strawberry crops in Northern Ireland, 2014.



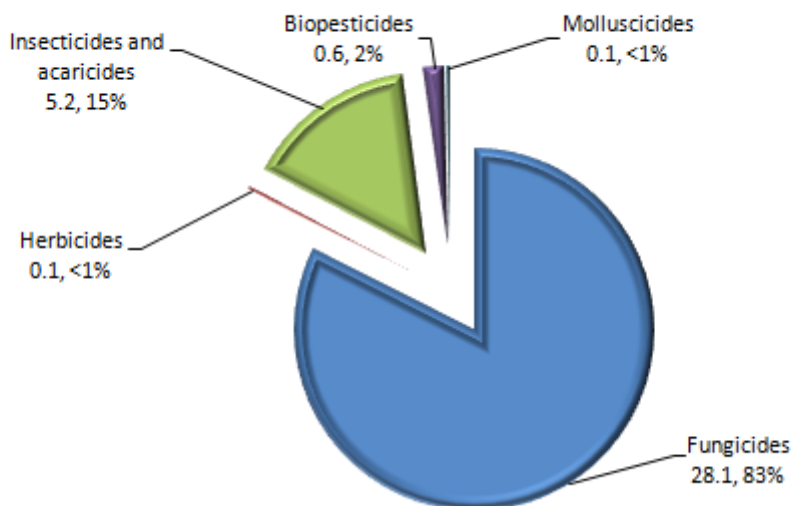
Method of protection	Fungicides (kg)	Herbicides (kg)	Insecticides and acaricides (kg)	Biopesticides (kg)	Molluscicides (kg)
Protected strawberries	12.40	0.30	1.20	Trace	<0.10
Semi-protected strawberries	13.30	0.90	1.90	Trace	0.10
Non-protected strawberries	17.10	11.00	1.70	Trace	0.10
<b>Total</b>	<b>42.80</b>	<b>12.20</b>	<b>4.80</b>	<b>Trace</b>	<b>0.20</b>

## PROTECTED STRAWBERRIES

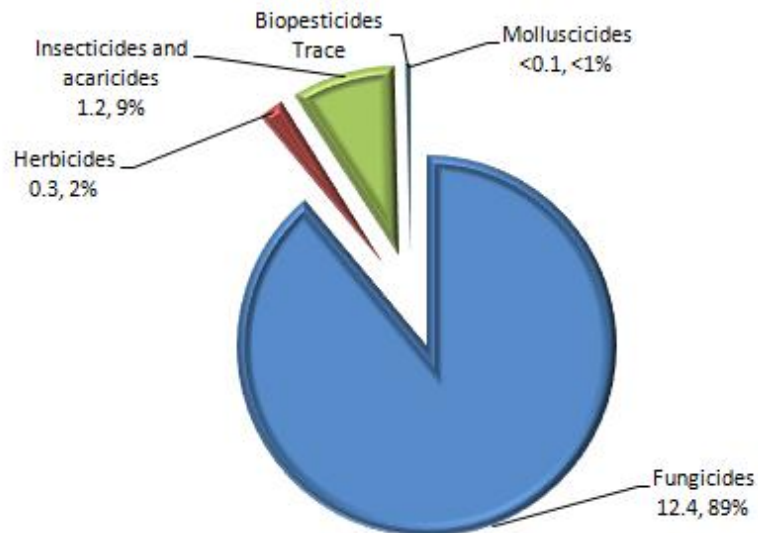
(Table 11)

- Total area grown: 3.0 hectares
- Basic area treated: 3.2 hectares
- Total area treated: 34.3 spray hectares
- Weight of active substances applied: 14.0 kilogrammes
- 14 different fungicide substances, 7 insecticide/acaricides, 1 biopesticide, 1 herbicide and 2 molluscicides were applied to protected strawberry crops

**Figure 10** Pesticide usage (spha) on protected strawberry crops in Northern Ireland, 2014.



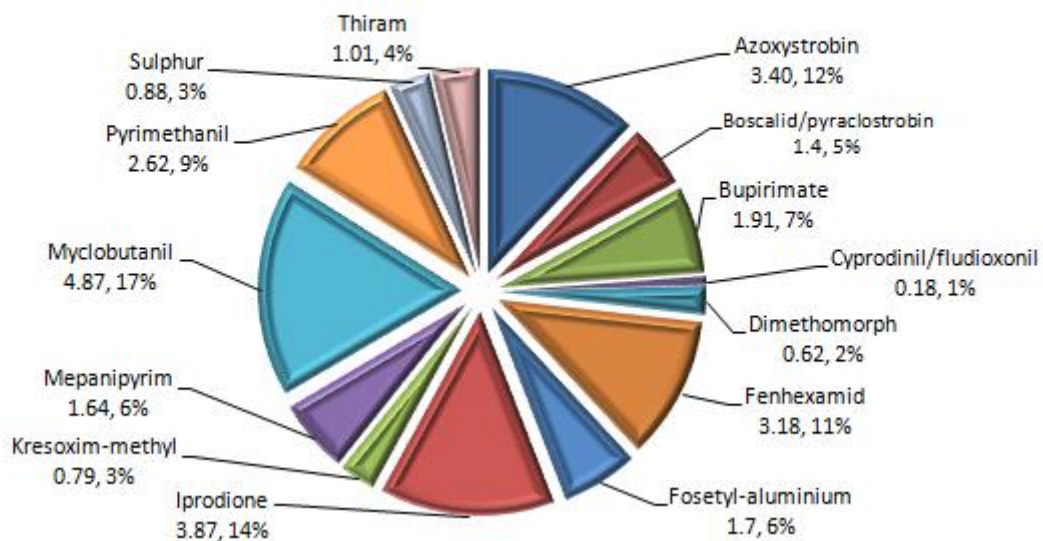
**Figure 11** Weight of pesticides (kg) applied to protected strawberry crops in Northern Ireland, 2014.



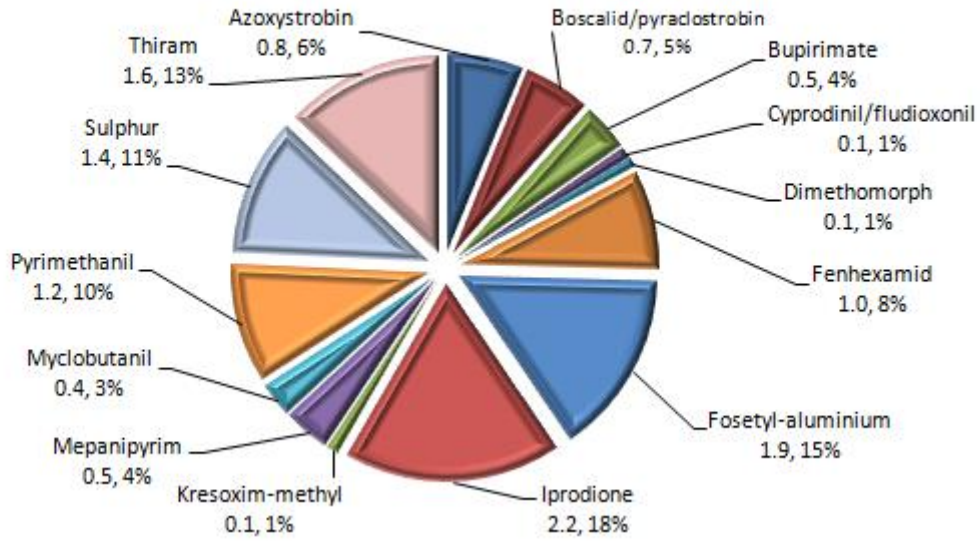
### Fungicides – protected strawberries

- Basic area treated: 1.2 hectares
- Total area treated: 28.05 spray hectares
- Weight of active substances applied: 12.4 kilogrammes
- 40% of the area grown treated with fungicides

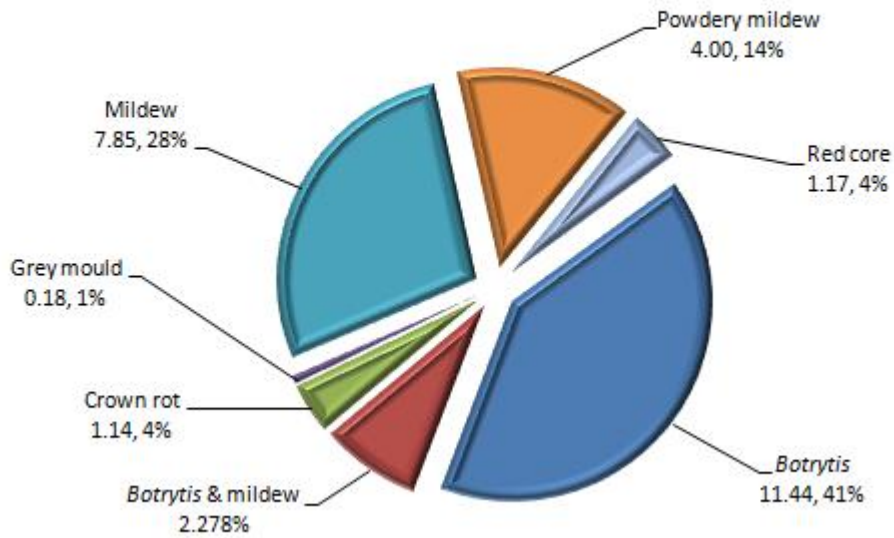
**Figure 12** Fungicide active ingredient usage on protected strawberry crops in Northern Ireland, (spha) 2014.



**Figure 13** Fungicide active ingredient usage on protected strawberry crops in Northern Ireland, (kg) 2014.



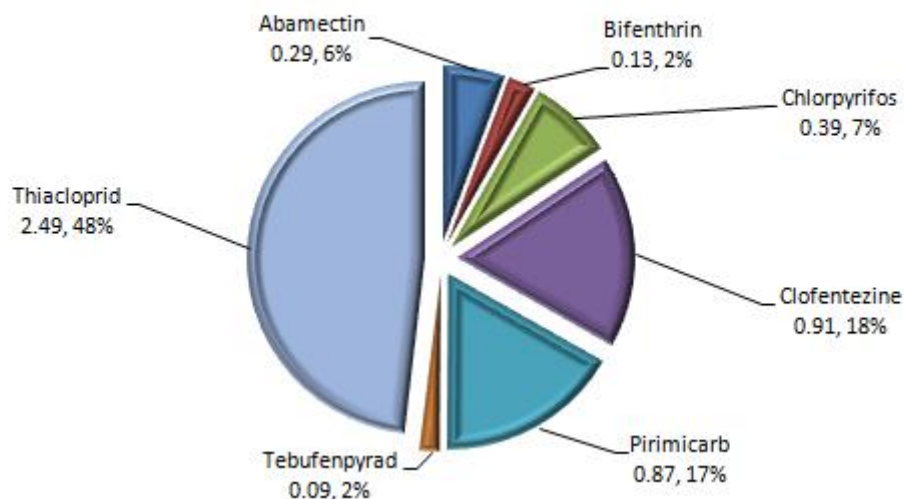
**Figure 14** Protected strawberries: reasons for fungicide use (spha), 2014.



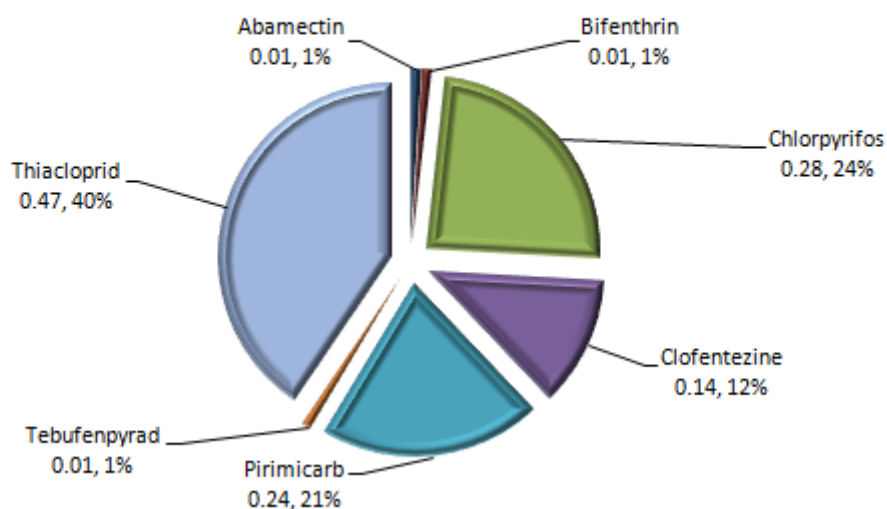
### ***Insecticides and acaricides – protected strawberries***

- Basic area treated: 1.2 hectares
- Total area treated: 5.17 spray hectares
- Weight of active substances applied: 1.2 kilogrammes
- 40% of the area grown treated with insecticides/acaricides

**Figure 15** Insecticide and acaricide active ingredient usage on protected strawberry Northern Ireland, (spha) 2014.

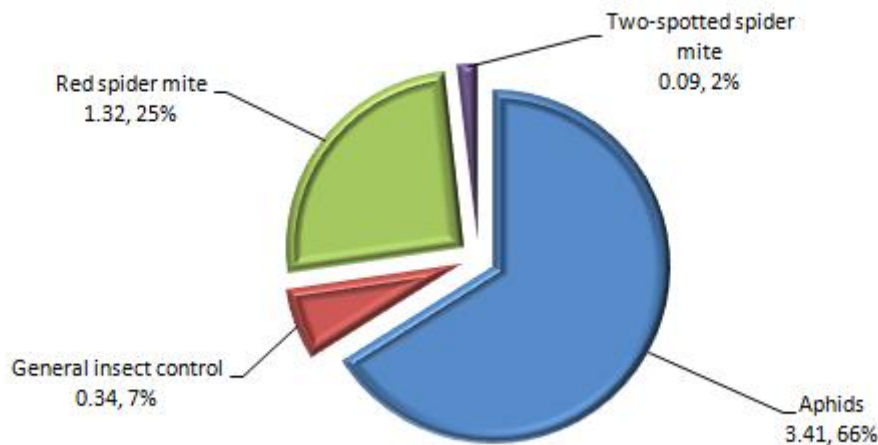


**Figure 16** Insecticide and acaricide active ingredient usage on protected strawberry Northern Ireland, (kg) 2014.





**Figure 17** Protected strawberries: reasons for insecticide and acaricide use (spha), 2014.



### **Biopesticides – protected strawberries**

- Basic area treated: 0.59 hectares
- Total area treated: 0.59 spray hectares
- Weight of active substances applied: Trace
- 20% of the area grown treated with biopesticides
- The only biopesticide applied was *Steinernema kraussei*:
- The reason given for biopesticide use was 'vine weevil' ((*Otiorhynchus sulcatus*)).

### **Herbicides – protected strawberries**

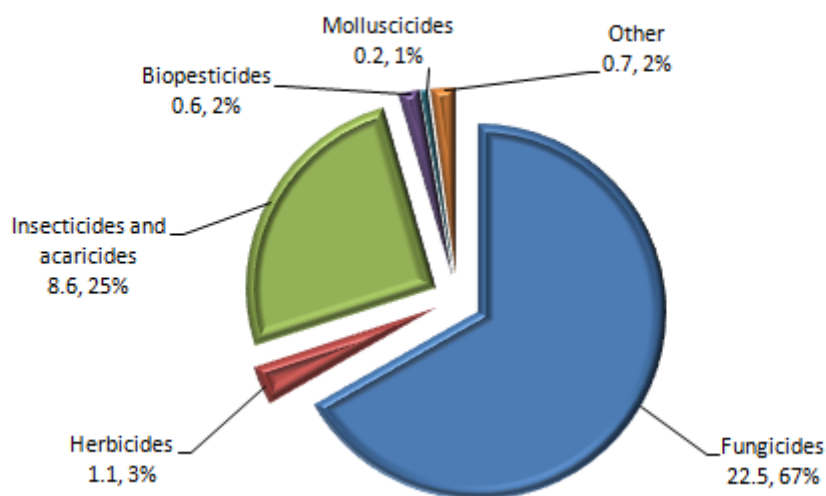
- Basic area treated: 0.12 hectares
- Total area treated: 0.12 spray hectares
- Weight of active substances applied: 0.3 kilogrammes
- 4% of the area grown treated with herbicides
- The reason given for herbicide use was 'Ground preparation'
- Herbicides were only applied to the ground area below raised benches
- The only active substance applied was glyphosate

### **Molluscicides – protected strawberries**

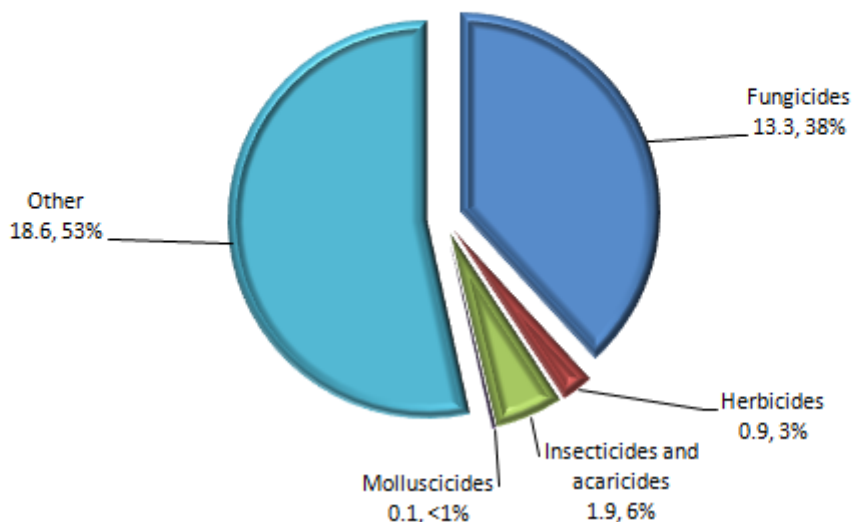
- Basic area treated: 0.05 hectares
- Total area treated: 0.1 spray hectares
- Weight of active substances applied: <0.1 kilogram
- 2% of the area grown treated with molluscicides
- The reason given for molluscicide use was 'slugs'
- The active substances applied were metaldehyde and methiocarb

- Total area grown: 5.0 hectares
- Basic area treated: 7.9 hectares
- Total area treated: 33.7 spray hectares
- Weight of active substances applied: 34.8 kilogrammes
- 15 different fungicide substances, 8 insecticide/acaricides, 1 biopesticide, 2 herbicides and 2 molluscicides were applied to semi-protected strawberry crops

**Figure 18 Pesticide usage (spha) on semi-protected strawberry crops in Northern Ireland, 2014.**



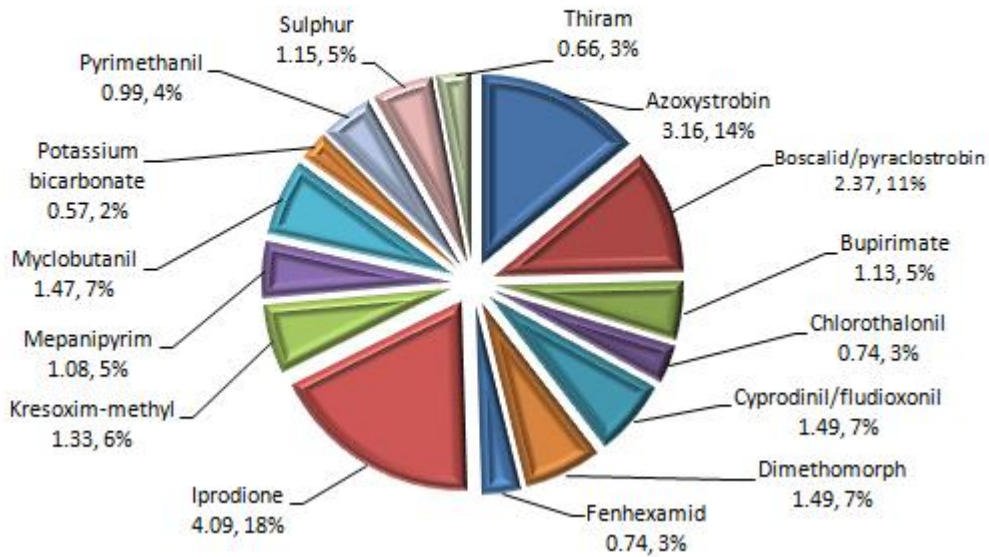
**Figure 19 Weight of pesticides (kg) applied to semi-protected strawberry crops in Northern Ireland, 2014.**



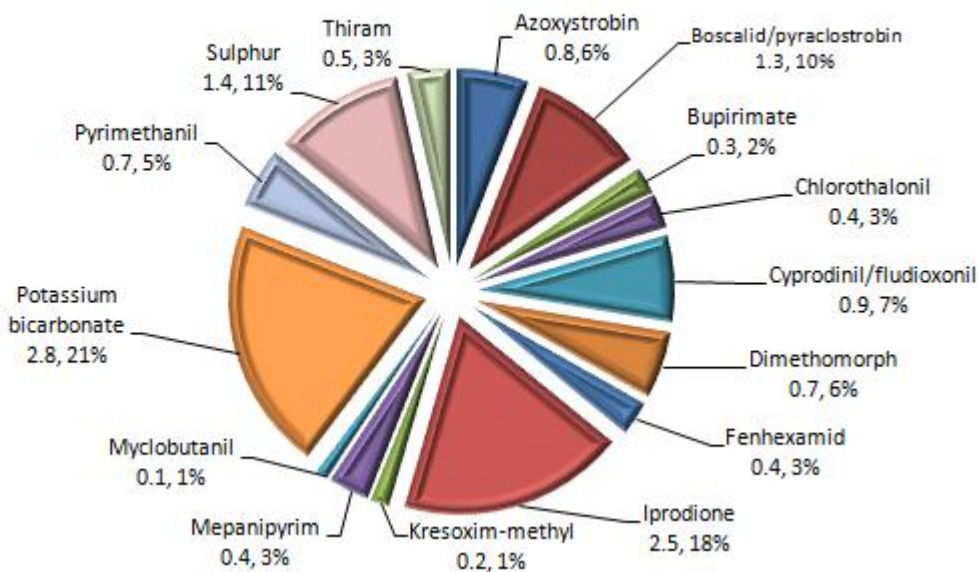
### Fungicides - semi-protected strawberries

- Basic area treated: 2.7 hectares
- Total area treated: 22.48 spray hectares
- Weight of active substances applied: 13.3 kilogrammes
- 54% of the area grown treated with fungicides

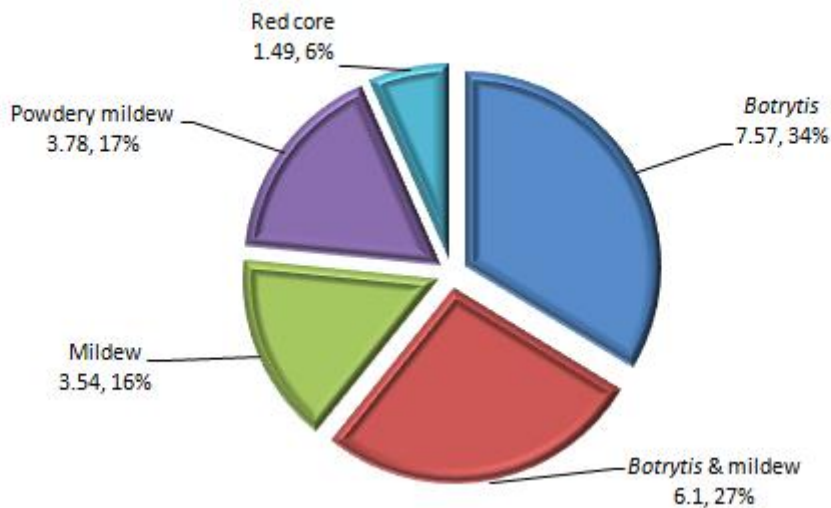
**Figure 20** Fungicide active ingredient usage on semi-protected strawberry crops in Northern Ireland, (spha) 2014.



**Figure 21** Weight of pesticides (kg) applied to semi-protected strawberry crops in Northern Ireland, 2014.



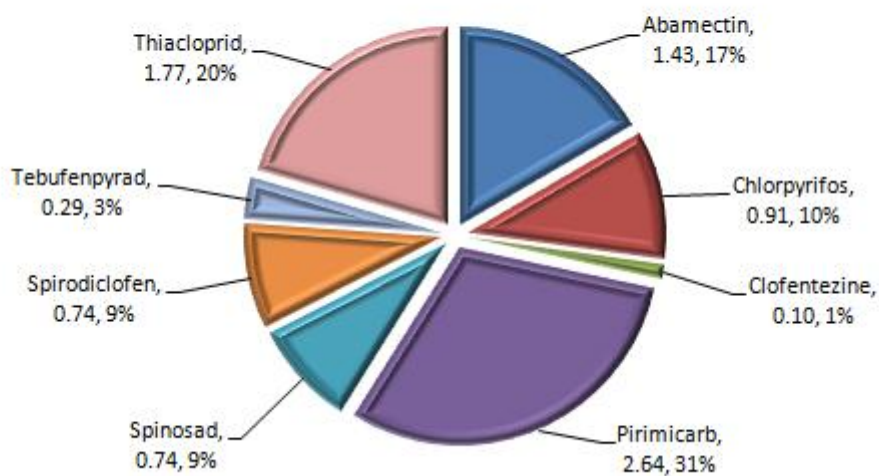
**Figure 22** Semi-protected strawberries: reasons for fungicide use (spha), 2014.



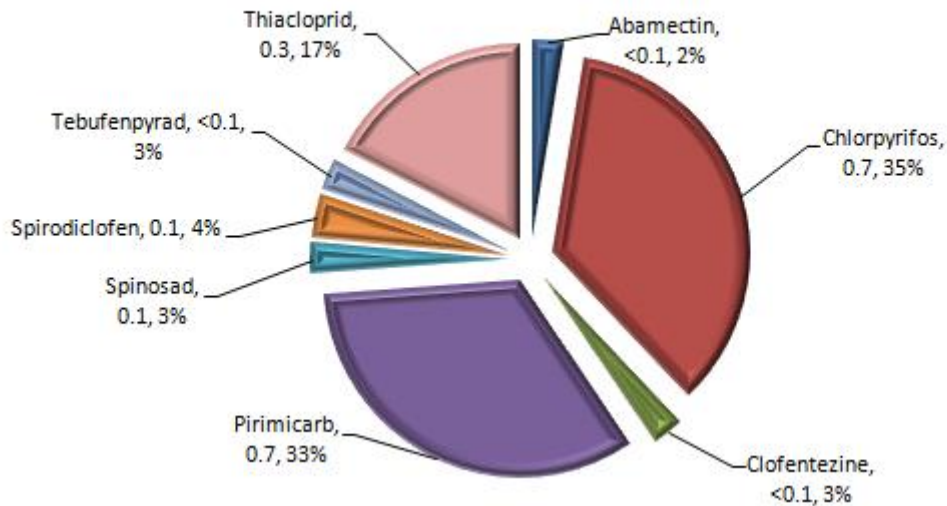
***Insecticides and acaricides – semi-protected strawberries***

- Basic area treated: 2.7 hectares
- Total area treated: 8.64 spray hectares
- Weight of active substances applied: 1.9 kilogrammes
- 54% of the area grown treated with insecticides/acaricides
- ‘Aphids’ was the reason given for 58% of use in semi-protected strawberries

**Figure 23** Insecticide and acaricide active ingredient usage on semi-protected strawberry crops in Northern Ireland, (spha) 2014.



**Figure 24** Insecticide and acaricide active ingredient usage on semi-protected strawberry crops in Northern Ireland, (kg) 2014.



### **Biopesticides – semi-protected strawberries**

- Basic area treated: 0.57 hectares
- Total area treated: 0.57 spray hectares
- Weight of active substances applied: Trace
- 11% of the area grown treated with biopesticides
- The only biopesticide applied was *Bacillus subtilis*

### **Herbicides – semi-protected strawberries**

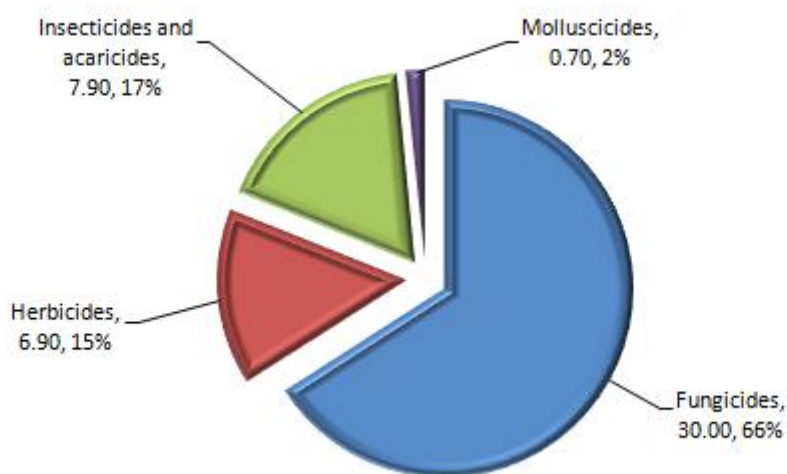
- Basic area treated: 1.06 hectares
- Total area treated: 1.06 spray hectares
- Weight of active substances applied: 0.9 kilogrammes
- 21% of the area grown treated with herbicides
- The reasons given for herbicide use were ‘Ground preparation’ and ‘Nettles’
- Herbicides were only applied to the ground area below raised benches
- The two active substances applied were lenacil and MCPA

### **Molluscicides – semi-protected strawberries**

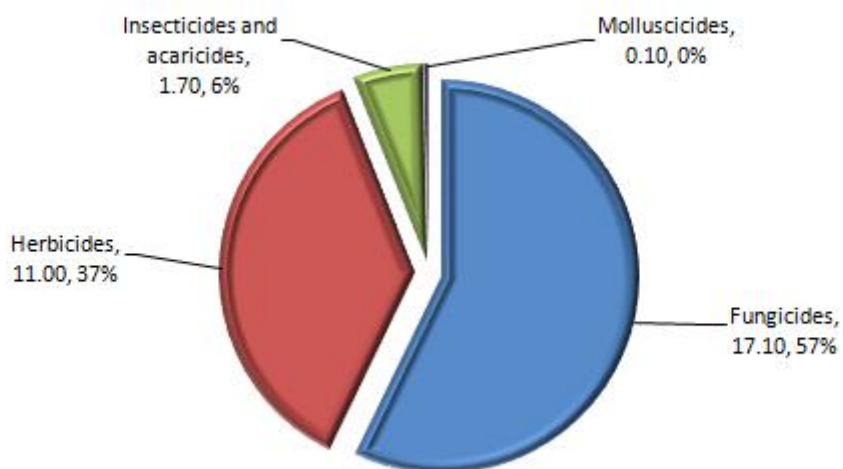
- Basic area treated: 0.08 hectares
- Total area treated: 0.08 spray hectares
- Weight of active substances applied: <0.1 kilogram
- 2% of the area grown treated with molluscicides
- The only reason given for molluscicide use was ‘slugs’
- The active substances applied were metaldehyde and methiocarb

- Total area grown: 4.94 hectares
- Basic area treated: 10.5 hectares
- Total area treated: 45.5 spray hectares
- Weight of active substances applied: 29.8 kilogrammes
- 9 different fungicide substances, 5 insecticide/acaricides, 4 herbicides and 2 molluscicides were applied to non-protected strawberry crops

**Figure 25 Pesticide usage (spha) on non-protected strawberry crops in Northern Ireland, 2014.**



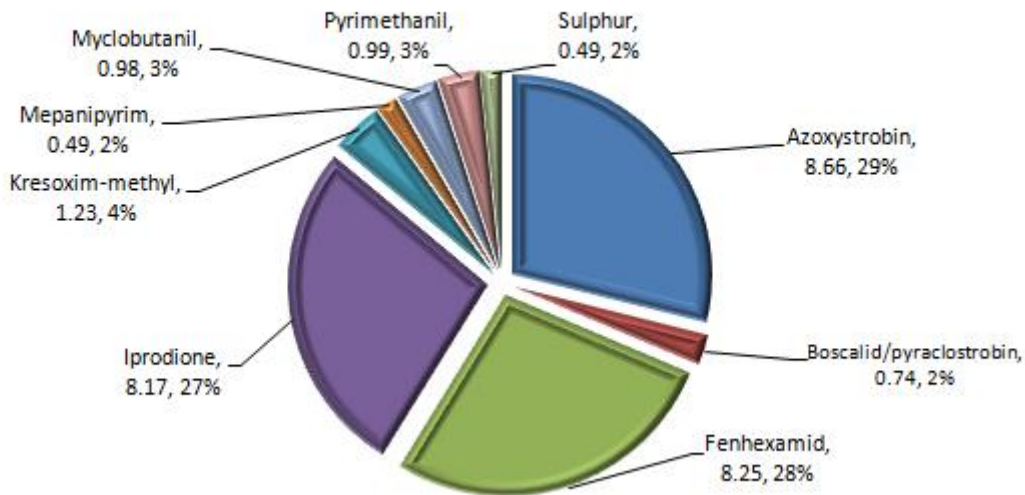
**Figure 26 Weight of pesticides (kg) applied to non-protected strawberry crops in Northern Ireland, 2014.**



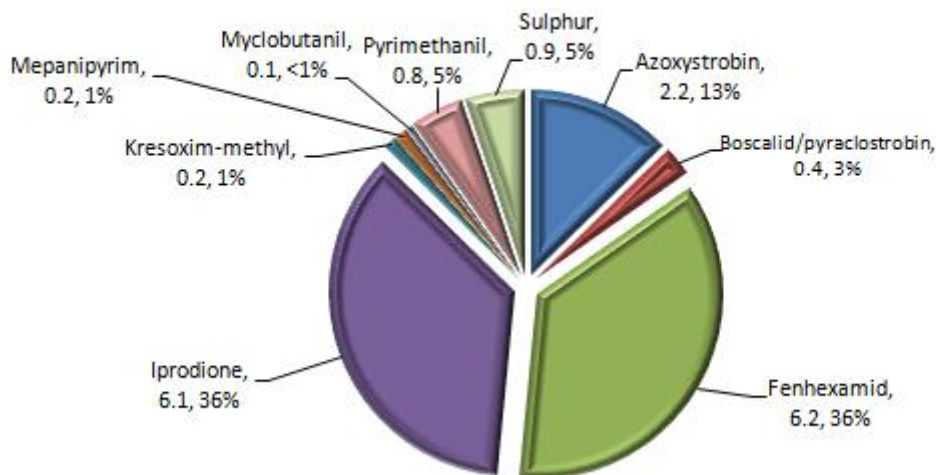
### Fungicides – non-protected strawberries

- Basic area treated: 3.84 hectares
- Total area treated: 30.0 spray hectares
- Weight of active substances applied: 17.1 kilogrammes
- 78% of the area grown treated with fungicides

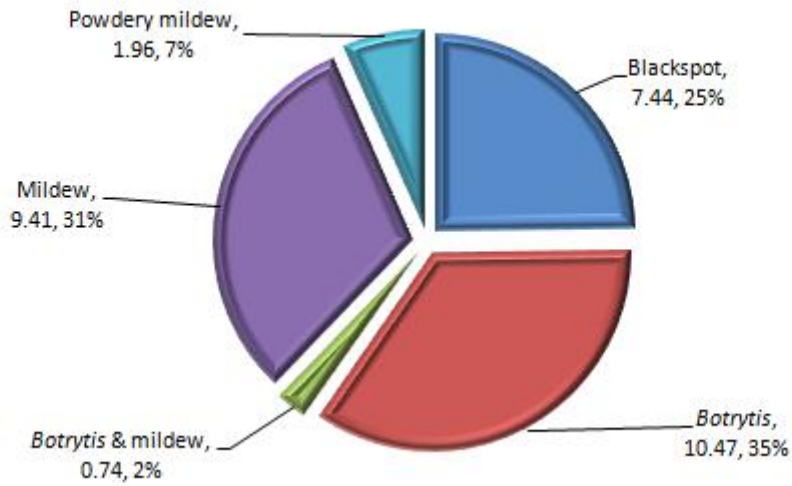
**Figure 27 Fungicide active ingredient usage on non-protected strawberry crops in Northern Ireland, (spha) 2014.**



**Figure 28 Fungicide active ingredient usage on non-protected strawberry crops in Northern Ireland, (kg) 2014.**



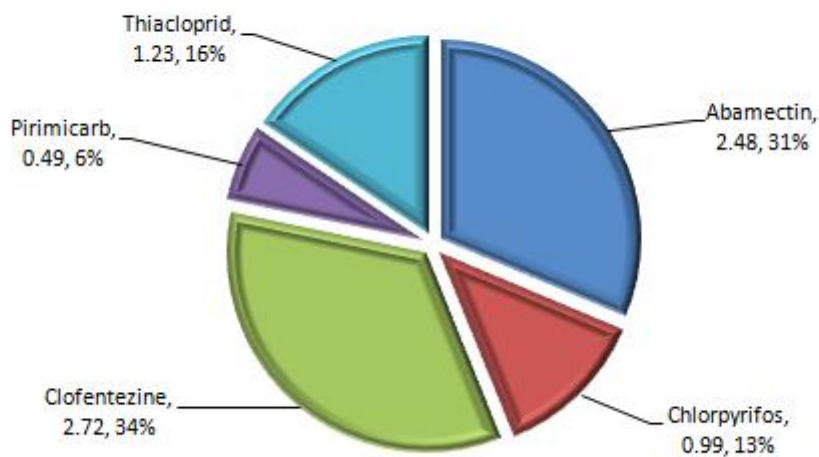
**Figure 29 Non-protected strawberries: reasons for fungicide use (spha), 2014.**



**Insecticides and acaricides - non-protected strawberries**

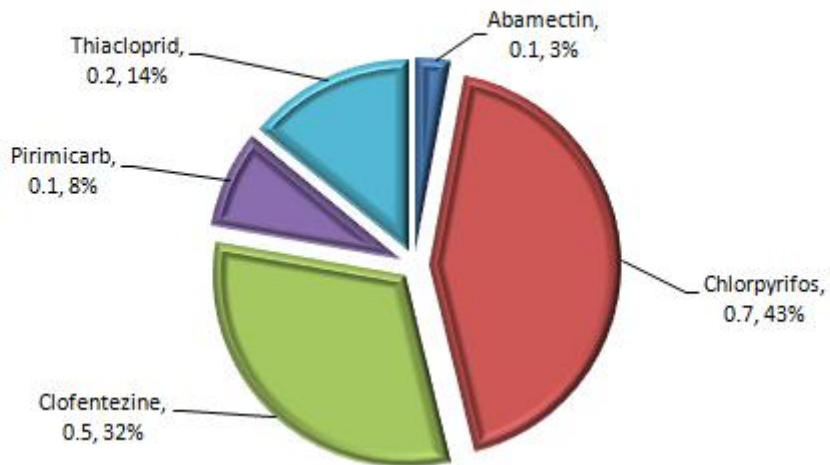
- Basic area treated: 3.44 hectares
- Total area treated: 7.91 spray hectares
- Weight of active substances applied: 1.7 kilogrammes
- 70% of the area grown treated with insecticides/acaricides
- The reasons given for using insecticides were ‘Aphids’ and ‘Red spider mite’

**Figure 30 Insecticide and acaricide active ingredient usage on non-protected strawberry crops in Northern Ireland, (spha) 2014.**





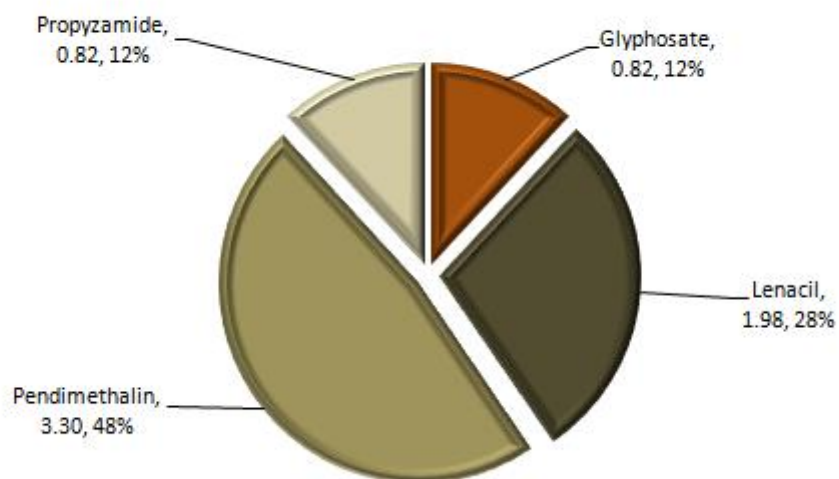
**Figure 31** Insecticide and acaricide active ingredient usage on non-protected strawberry crops in Northern Ireland, (kg) 2014.



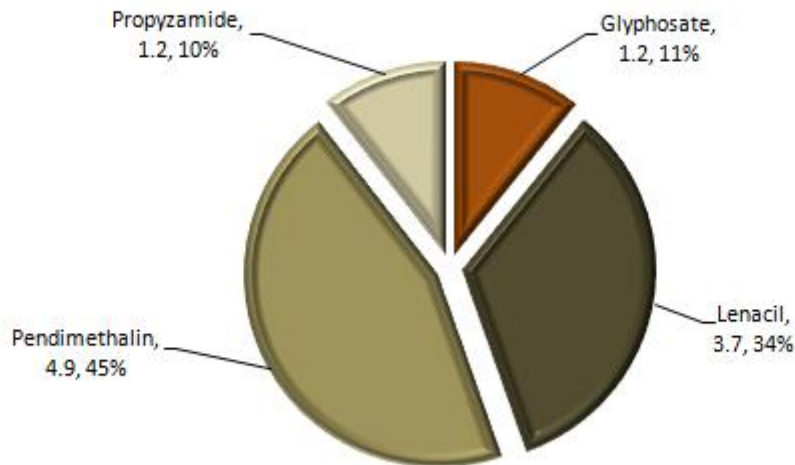
### Herbicides - non-protected strawberries

- Basic area treated: 2.78 hectares
- Total area treated: 6.93 spray hectares
- Weight of active substances applied: 11.0 kilogrammes
- 57% of the area grown treated with herbicides
- The reasons given for using herbicides were 'General weed control' and 'Ground preparation'

**Figure 32** Herbicide active ingredient usage on non-protected strawberry crops in Northern Ireland, (spha) 2014.



**Figure 33** Herbicide active ingredient usage on non-protected strawberry crops in Northern Ireland, (kg) 2014.



### ***Molluscicides - non-protected strawberries***

- Basic area treated: 0.34 hectares
- Total area treated: 0.34 spray hectares
- Weight of active substances applied: 0.1 kilogram
- 7% of the area grown treated with molluscicides
- The only reason given for molluscicide use was 'slugs'
- The only active substances applied were metaldehyde and methiocarb

### **PROTECTED 'OTHER CROPS'**

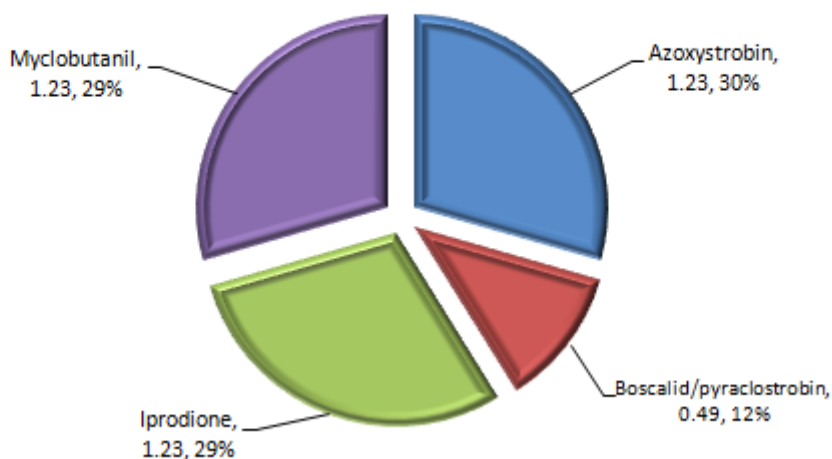
**(Table 14)**

- Total area grown: 0.7 hectares
- Basic area treated: 0.50 hectares
- Total area treated: 7.4 spray hectares
- Weight of active substances applied: 2.4 kilogrammes
- 4 fungicide substances and 5 insecticide/acaricides were applied to protected 'other crops'

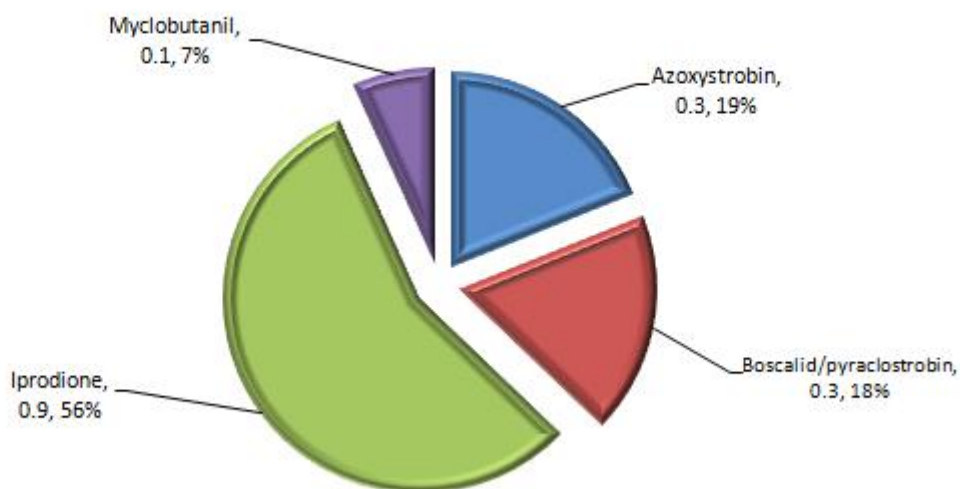
### Fungicides - protected 'other crops'

- Basic area treated: 0.25 hectares
- Total area treated: 4.18 spray hectares
- Weight of active substances applied: 1.6 kilogrammes
- 36% of the area grown treated with fungicides

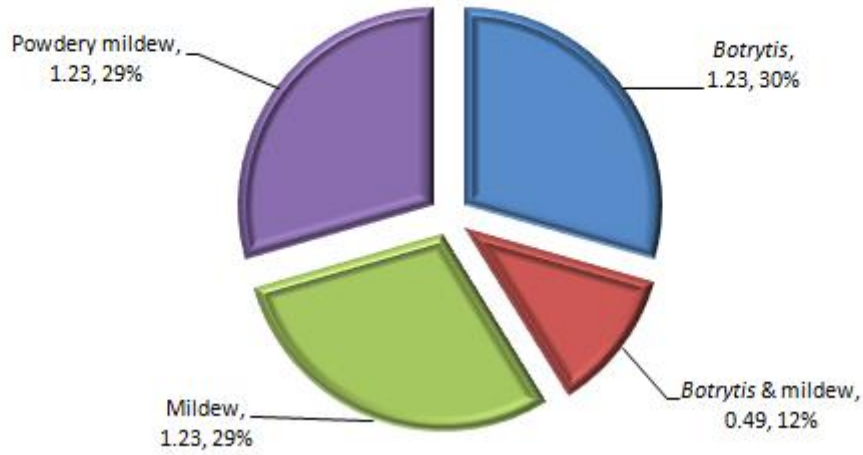
**Figure 34** Fungicide active ingredient usage on protected 'other crops' in Northern Ireland, (spha) 2014.



**Figure 35** Fungicide active ingredient usage on protected 'other crops' in Northern Ireland, (kg) 2014.



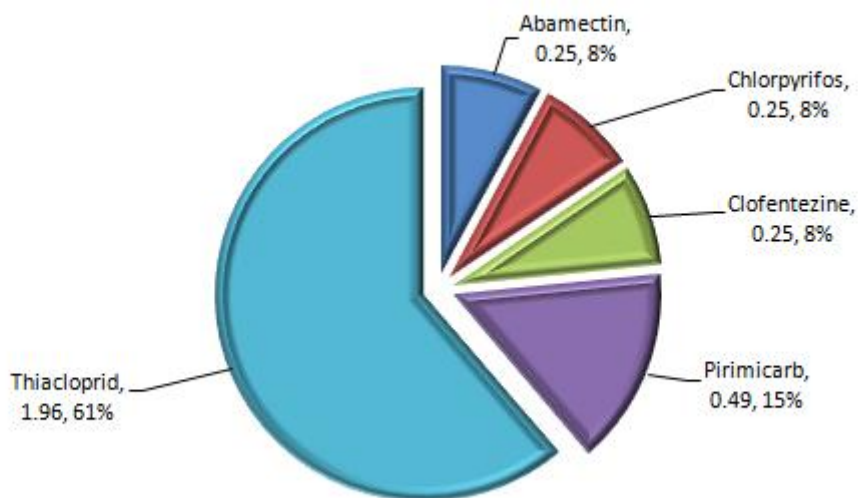
**Figure 36** Protected 'other crops': reasons for fungicide use (spha), 2014.



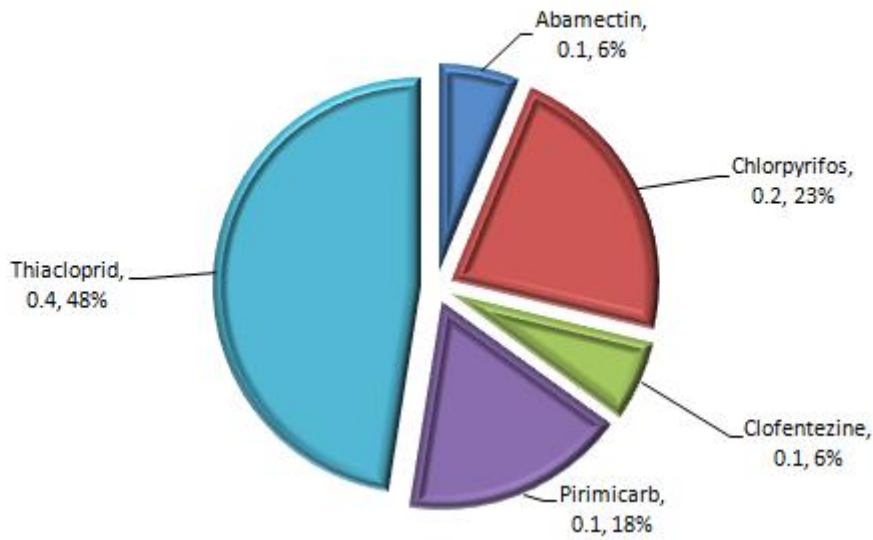
***Insecticides and acaricides - protected 'other crops'***

- Basic area treated: 0.25 hectares
- Total area treated: 3.19 spray hectares
- Weight of active substances applied: 0.08 kilogrammes
- 36% of the area grown treated with insecticides/acaricides

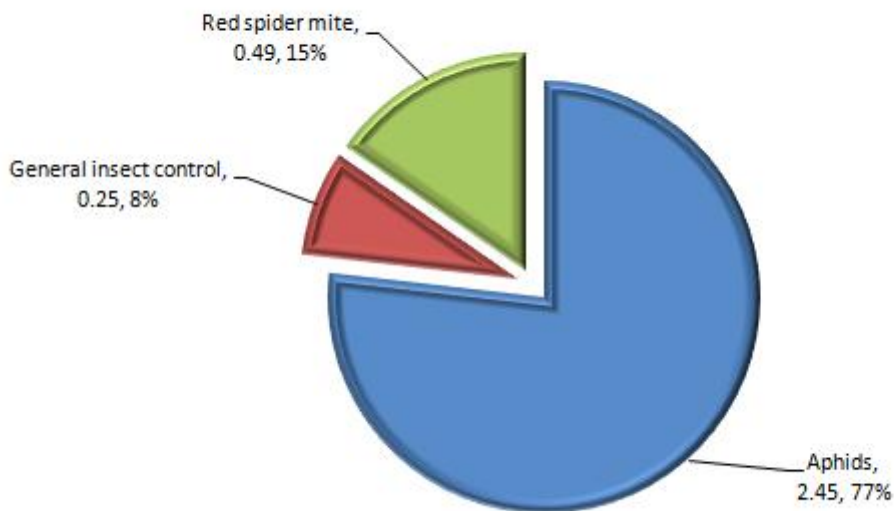
**Figure 37** Insecticide and acaricide active ingredient usage on protected 'other crops' in Northern Ireland, (spha) 2014.



**Figure 38** Insecticide and acaricide active ingredient usage on protected 'other crops' in Northern Ireland, (kg) 2014.



**Figure 39** Protected 'other crops': reasons for Insecticide and acaricide use (spha), 2014.

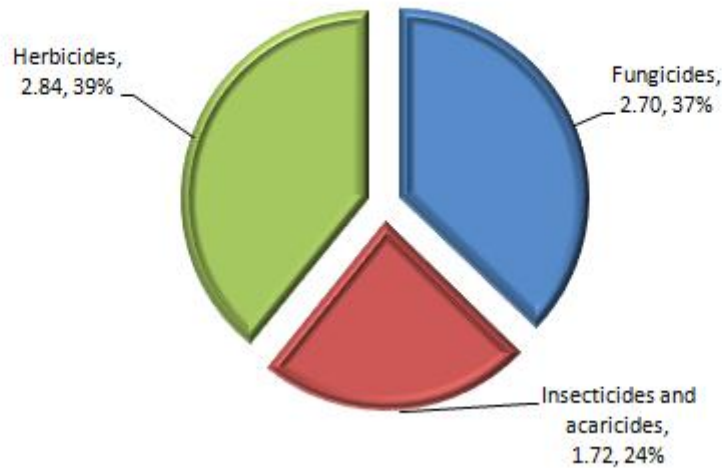


## **NON-PROTECTED 'OTHER CROPS'**

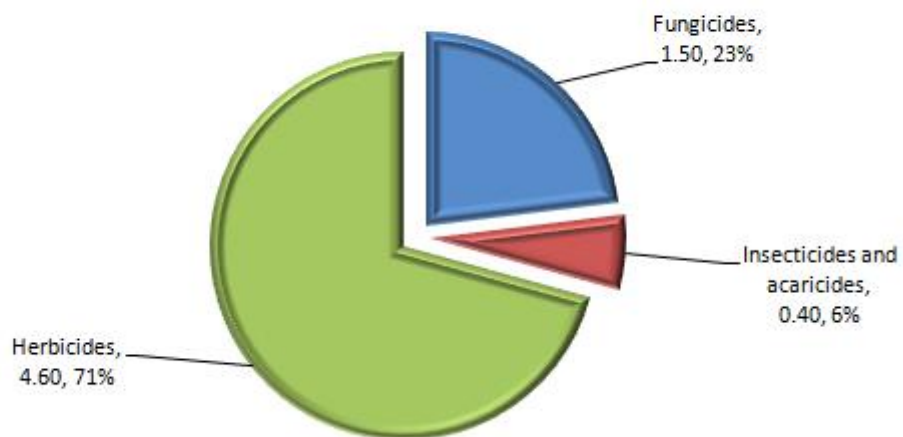
**(Table 15)**

- Total area grown: 2.0 hectares
- Basic area treated: 1.5 hectares
- Total area treated: 7.3 spray hectares
- Weight of active substances applied: 6.4 kilogrammes

**Figure 40** Pesticide usage (spha) on non-protected 'other crops' in Northern Ireland, 2014.



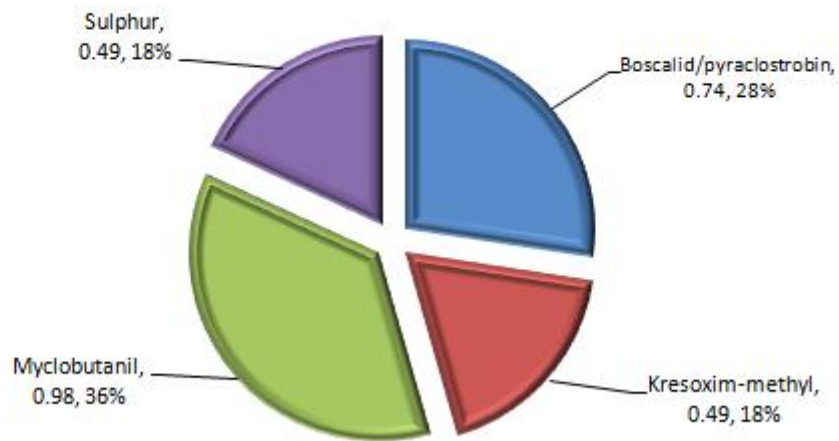
**Figure 41** Weight of pesticides (kg) applied to non-protected 'other crops' in Northern Ireland, 2014.



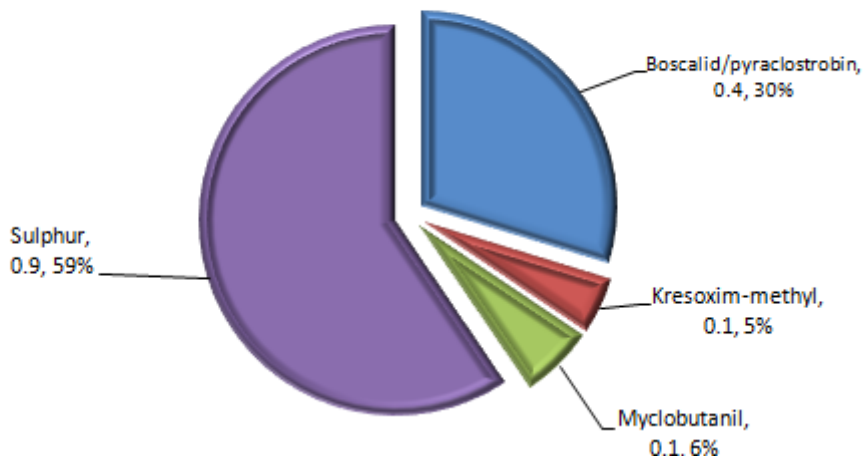
### **Fungicides – non-protected 'other crops'**

- Basic area treated: 0.25 hectares
- Total area treated: 2.7 spray hectares
- Weight of active substances applied: 1.5 kilogrammes
- 13% of the area grown treated with fungicide

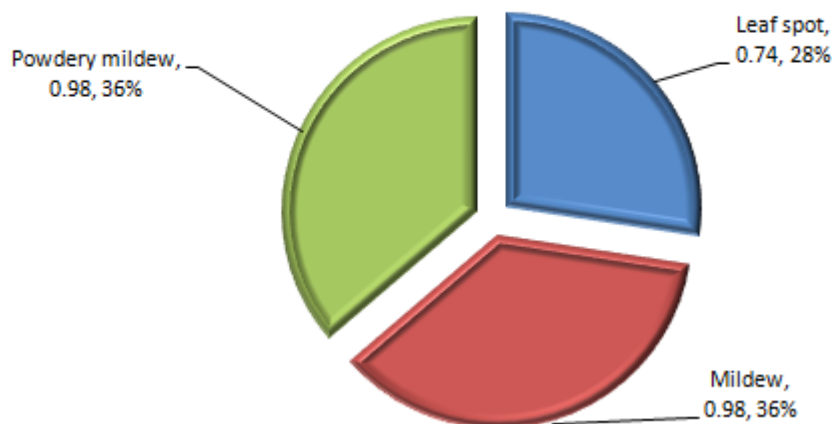
**Figure 42** Fungicide active ingredient usage on non-protected 'other crops' in Northern Ireland, (spha) 2014.



**Figure 43** Fungicide active ingredient usage on non-protected 'other crops' in Northern Ireland, (kg) 2014.



**Figure 44** Non-protected 'other crops': reasons for fungicide use (spha), 2014.



### ***Insecticides and acaricides –non-protected ‘other crops’***

- Basic area treated: 0.25 hectares
- Total area treated: 1.72 spray hectares
- Weight of active substances applied: 0.4 kilogrammes
- 13% of the area grown treated with insecticides/acaricides
- The two active substances used were pirimicarb and thiacloprid
- The reasons given for use were ‘Aphids’ and ‘General insect control’

### ***Herbicides - non-protected ‘other crops’***

- Basic area treated: 0.95 hectares
- Total area treated: 2.84 spray hectares
- Weight of active substances applied: 4.6 kilogrammes
- 48% of the area grown treated with herbicides
- The only reason given for using herbicides was ‘General weed control’

## **ACKNOWLEDGEMENTS**

We, the authors, wish to thank all of the growers who participated in this survey, without whose co-operation the completion of this report would not have been possible. We are also grateful for the invaluable assistance of Mr David Williams who worked tirelessly on key aspects of this report and also staff at the Food & Environmental Research Agency, York for their advice regarding the agronomy and growing practices of soft fruit.

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**Table 1** Number of holdings and area (ha) of soft fruit crops sampled in Northern Ireland, 2014.

<i>Region</i>	Total number of holdings	Number of holdings sampled	Area of holding sampled (ha)	Raised area of population (ha)
Northern Ireland	27	11	6.37	15.64

**Table 2** Number and area (ha) of soft fruit crops surveyed in Northern Ireland, 2014.

<i>Crop type and crop location</i>	No. of crops Surveyed	Surveyed area (ha)
Strawberries permanent protection	9	1.21
Strawberries semi-protection	7	2.05
Strawberries field-grown	6	2.01
Other crops permanent protection	2	0.30
Other crops field-grown	6	0.80
<b>All crops</b>	<b>30</b>	<b>6.37</b>

**Table 3** Estimated area (ha) of soft fruit crops grown in Northern Ireland, 2014, by method of protection.

<i>Crop Type</i>	<i>Method of protection</i>			<b>Total</b>
	Protected crops	Semi-protected crops	Non-protected crops	
Strawberries	3.0	5.0	4.9	12.9
Other crops	0.7	.	2.0	2.7
<b>All crops</b>	<b>3.7</b>	<b>5.0</b>	<b>6.9</b>	<b>15.6</b>

**Table 4** Basic-treated area (ha) and the total-treated area (spha) of soft fruit crops in Northern Ireland 2014 treated with each pesticide type.

<i>Method of protection and crop type</i>	Fungicides		Herbicides		Insecticides and acaricides		Biopesticides		Molluscicides		Other		All pesticides	
	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)
<b>Protected</b>														
Strawberries	1.2	28.1	0.1	0.1	1.2	5.2	0.6	0.6	0.1	0.1	0.1	0.2	3.2	34.3
Other crops	0.3	4.2	.	.	0.3	3.2	.	.	.	.	.	.	0.5	7.4
<b>All protected</b>	<b>1.4</b>	<b>32.2</b>	<b>0.1</b>	<b>0.1</b>	<b>1.4</b>	<b>5.2</b>	<b>0.6</b>	<b>0.6</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>3.5</b>	<b>41.7</b>
<b>Semi-protected</b>														
Strawberries	2.7	22.5	1.1	1.1	2.7	8.6	0.6	0.6	0.1	0.2	0.7	0.7	7.9	33.7
<b>All semi-protected</b>	<b>2.7</b>	<b>22.5</b>	<b>1.1</b>	<b>1.1</b>	<b>2.7</b>	<b>8.6</b>	<b>0.6</b>	<b>0.6</b>	<b>0.1</b>	<b>0.2</b>	<b>0.7</b>	<b>0.7</b>	<b>7.9</b>	<b>33.7</b>
<b>Non-protected</b>														
Strawberries	3.9	30.0	2.8	6.9	3.5	7.9	.	.	0.3	0.7	.	.	10.5	45.5
Other crops	0.3	2.7	1.0	2.8	0.3	1.7	.	.	.	.	.	.	1.5	7.3
<b>All non-protected</b>	<b>4.1</b>	<b>32.7</b>	<b>3.8</b>	<b>9.8</b>	<b>3.7</b>	<b>9.6</b>	<b>.</b>	<b>.</b>	<b>0.5</b>	<b>0.5</b>	<b>.</b>	<b>.</b>	<b>12.0</b>	<b>52.8</b>
<b>All crops</b>														
Strawberries	7.8	80.6	4.0	8.1	7.4	21.7	1.1	1.1	0.5	1.1	0.8	0.9	21.6	113.5
Other crops	0.5	6.9	1.0	2.8	0.5	4.9	.	.	.	.	.	.	2.0	14.7
<b>Total</b>	<b>8.3</b>	<b>87.4</b>	<b>5.0</b>	<b>10.9</b>	<b>7.9</b>	<b>26.6</b>	<b>1.1</b>	<b>1.1</b>	<b>0.5</b>	<b>1.1</b>	<b>0.8</b>	<b>0.9</b>	<b>23.6</b>	<b>128.2</b>

**Table 5** Total quantity (kg) of pesticide type applied to soft fruit crops in Northern Ireland, 2014.

<i>Method of protection and crop type</i>	Fungicides (kg)	Herbicides (kg)	Insecticides and acaricides (kg)	Biopesticides (kg)	Molluscicides (kg)	Other (kg)	All pesticides (kg)
<b><i>Protected</i></b>							
Strawberries	12.4	0.3	1.2	Trace	<0.1	0.1	14.0
Other crops	1.6	.	0.8	.	.	.	2.4
<b>All Protected</b>	<b>14.1</b>	<b>0.3</b>	<b>2.0</b>	<b>Trace</b>	<b>&lt;0.1</b>	<b>0.1</b>	<b>16.4</b>
<b><i>Semi-protected</i></b>							
Strawberries	13.3	0.9	1.9	.	0.1	18.6	34.8
<b>All semi-protected</b>	<b>13.3</b>	<b>0.9</b>	<b>1.9</b>	<b>.</b>	<b>0.1</b>	<b>18.6</b>	<b>34.8</b>
<b><i>Non-protected</i></b>							
Strawberries	17.1	11.0	1.7	Trace	0.1	.	29.8
Other crops	1.5	4.6	0.4	Trace	.	.	6.4
<b>All non-protected</b>	<b>18.6</b>	<b>15.5</b>	<b>2.1</b>	<b>Trace</b>	<b>0.1</b>	<b>.</b>	<b>36.3</b>
<b><i>All locations</i></b>							
Strawberries	42.8	12.2	4.8	Trace	0.2	18.7	78.7
Other crops	3.1	4.6	1.2	Trace	.	.	8.9
<b>All crops</b>	<b>45.9</b>	<b>16.8</b>	<b>6.0</b>	<b>Trace</b>	<b>0.2</b>	<b>18.7</b>	<b>87.6</b>

**Table 6** The proportional area (%) of each crop treated with pesticides and the mean number of spray applications, Northern Ireland 2014.

<i>Crop type</i>	Fungicides		Herbicides		Insecticides and acaricides		Biopesticides		Molluscicides		Other		All pesticides	
	%	sp app.	%	sp app.	%	sp app.	%	sp app.	%	sp app.	%	sp app.	%	sp app.
Strawberries	60	14.4	31	1.7	57	4.4	9	1.0	4	2.0	6	2.0	66	7.3
Other crops	18	14.0	35	3.0	18	10.0	.	.	.	.	.	1.0	53	6.4
<b>All crops</b>	<b>53</b>	<b>14.4</b>	<b>32</b>	<b>4.9</b>	<b>50</b>	<b>4.9</b>	<b>7</b>	<b>1.0</b>	<b>3</b>	<b>2.0</b>	<b>5</b>	<b>1.7</b>	<b>64</b>	<b>7.2</b>

**Table 7** Estimated area (spha) of soft fruit crops treated with pesticide active ingredients in Northern Ireland, 2014.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total treated area (spha)</i>	<i>2012 totals (spha)</i>	<i>2010 totals (spha)</i>	<i>2006 totals (spha)</i>
	<i>Strawberries</i>	<i>Other crops</i>				
<b><i>Fungicides</i></b>						
Azoxystrobin	15.23	1.23	16.45	3.06	7.80	6.76
Boscalid/pyraclostrobin	4.51	1.23	5.73	0.53	5.64	0.58
Bupirimate	3.04	.	3.04	1.22	4.72	6.88
Chlorothalonil	0.74	.	0.74	.	1.55	4.46
Cyprodinil/fludioxonil	1.67	.	1.67	1.93	1.44	.
Dimethomorph	2.11	.	2.11	0.78	1.55	.
Fenhexamid	12.17	.	12.17	5.20	7.09	5.24
Fluazinam	.	.	.	1.11	.	.
Fosetyl-aluminium	1.70	.	1.70	1.82	3.94	5.48
Iprodione	16.13	1.23	17.36	9.58	12.36	29.89
Kresoxim-methyl	3.35	0.49	3.84	0.85	0.07	.
Mepanipyrim	3.21	.	3.21	2.81	1.90	4.35
Meptyldinocap	.	.	.	1.28	.	.
Myclobutanil	7.32	2.21	9.53	9.34	13.88	28.98
Potassium bicarbonate	0.57	.	0.57	0.06	7.41	.
Pyrimethanil	4.60	.	4.60	5.58	7.90	9.81
Quinoxifen	.	.	.	0.36	0.72	0.25
Sodium bicarbonate	.	.	.	0.32	.	.
Sulphur	2.53	0.49	3.02	1.11	2.20	.
Thiram	1.67	.	1.67	2.59	1.91	1.62
Tolyfluanid	.	.	.	0.93	0.22	24.86
<b>All fungicides</b>	<b>80.55</b>	<b>6.87</b>	<b>87.42</b>	<b>50.44</b>	<b>82.31</b>	<b>129.16</b>

*2012, 2010 & 2006 totals are included for comparative purposes*

**Table 7 (cont)** Estimated area (spha) of soft fruit crops treated with pesticide active ingredients in Northern Ireland, 2014.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total treated area (spha)</i>	<i>2012 totals (spha)</i>	<i>2010 totals (spha)</i>	<i>2006 totals (spha)</i>
	<i>Strawberries</i>	<i>Other crops</i>				
<b><i>Herbicides</i></b>						
Diquat	.	.	.	.	0.02	0.97
Glufosinate-ammonium	.	.	.	0.90	.	.
Glyphosate	0.82	0.95	1.77	1.39	3.17	2.72
Isoxaben	.	.	.	.	0.22	1.21
Lenacil	2.23	.	2.23	.	0.90	2.50
MCPA	0.94	.	0.94	.	.	.
Pendimethalin	3.30	0.95	4.25	1.82	0.22	1.57
Propachlor	.	.	.	.	0.41	.
Propyzamide	0.82	0.95	1.77	1.53	0.41	2.05
Simazine	.	.	.	.	1.09	3.33
<b>All herbicides</b>	<b>8.12</b>	<b>2.84</b>	<b>10.96</b>	<b>5.64</b>	<b>6.44</b>	<b>14.35</b>
<b><i>Insecticides and acaricides</i></b>						
Abamectin	4.20	0.25	4.45	1.73	1.07	1.71
Bifenthrin	0.13	.	0.13	0.07	1.38	12.89
Chlorpyrifos	2.30	0.25	2.55	0.50	4.52	6.62
Clofentezine	3.73	0.25	3.98	4.78	3.46	3.56
Cypermethrin	.	.	.	0.05	.	.
Deltamethrin	.	.	.	.	0.11	.
Dimethoate	.	.	.	0.30	0.96	0.02
Etoxazole	.	.	.	0.24	2.69	.
Pirimicarb	4.00	0.98	4.98	2.68	4.14	9.97
Pymetrozine	.	.	.	0.08	.	.
Spinosad	0.74	.	0.74	.	.	.
Spirodiclofen	0.74	.	0.74	.	.	.
Tebufenpyrad	0.39	.	0.39	0.72	1.68	0.83
Thiacloprid	5.49	3.19	8.68	1.52	0.86	.
<b>All insecticides and acaricides</b>	<b>21.73</b>	<b>4.91</b>	<b>26.63</b>	<b>12.65</b>	<b>20.87</b>	<b>35.60</b>

**Table 7 (cont)** Estimated area (spha) of soft fruit crops treated with pesticide active ingredients in Northern Ireland, 2014.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total treated area (spha)</i>	<i>2012 totals (spha)</i>	<i>2010 totals (spha)</i>	<i>2006 totals (spha)</i>
	<i>Strawberries</i>	<i>Other crops</i>				
<b><i>Biopesticides</i></b>						
<i>Bacillus subtilis</i>	0.57	.	0.57	0.47	4.15	.
<i>Phasmarhabditis hermaphrodita</i>	.	.	.	0.49	.	.
<i>Phytoseiulus persimilis</i>	.	.	.	0.66	0.85	5.25
<i>Steinernema feltiae</i>	.	.	.	0.36	.	.
<i>Steinernema kraussei</i>	0.59	.	0.59	0.17	1.79	.
<b>All biopesticides</b>	<b>1.15</b>	<b>.</b>	<b>1.15</b>	<b>2.15</b>	<b>7.03</b>	<b>5.25</b>
<b><i>Molluscicides</i></b>						
Metaldhyde	0.47	.	0.47	.	.	.
Methiocarb	0.47	.	0.47	1.09	.	.
<b>All molluscicides</b>	<b>0.94</b>	<b>.</b>	<b>0.94</b>	<b>1.09</b>	<b>.</b>	<b>.</b>
<b><i>Other products</i></b>						
Acetic acid/hydrogen peroxide/ peracetic acid	.	.	.	.	0.18	.
Magnesium	0.22	.	0.22	.	0.38	.
Natural product	0.74	.	0.74	.	0.38	.
Sodium hypochlorite	.	.	.	.	0.06	.
<b>All other products</b>	<b>0.97</b>	<b>.</b>	<b>0.97</b>	<b>.</b>	<b>0.62</b>	<b>.</b>
<b>All pesticides</b>	<b>113.45</b>	<b>14.62</b>	<b>128.07</b>	<b>71.96</b>	<b>117.27</b>	<b>.</b>

*2012, 2010 & 2006 totals are included for comparative purposes*

**Table 8** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2014.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total quantity applied (kg)</i>	<i>2012 totals (kg)</i>	<i>2010 totals (kg)</i>	<i>2006 totals (kg)</i>
	<i>Strawberries</i>	<i>Other crops</i>				
<b><i>Fungicides</i></b>						
Azoxystrobin	3.72	0.31	4.02	0.55	1.60	4.98
Boscalid/pyraclostrobin	2.40	0.74	3.14	0.19	3.18	0.15
Bupirimate	0.78	.	0.78	0.24	1.28	2.31
Chlorothalonil	0.37	.	0.37	.	1.55	6.19
Cyprodinil/fludioxonil	1.05	.	1.05	1.21	0.90	.
Dimethomorph	0.84	.	0.84	0.16	0.16	.
Fenhexamid	7.58	.	7.58	3.01	2.56	3.38
Fluazinam	.	.	.	0.83	.	.
Fosetyl-aluminium	1.88	.	1.88	4.00	7.94	12.31
Iprodione	10.83	0.92	11.75	6.31	7.71	17.44
Kresoxim-methyl	0.50	0.07	0.58	0.13	0.01	.
Mepanipyrim	1.11	.	1.11	1.13	0.59	1.64
Meptyldinocap	.	.	.	0.27	.	.
Myclobutanil	0.57	0.20	0.77	0.73	0.84	2.00
Potassium bicarbonate	2.76	.	2.76	0.01	2.07	.
Pyrimethanil	2.66	.	2.66	3.75	4.02	8.23
Quinoxifen	.	.	.	0.05	0.09	0.06
Sodium bicarbonate	.	.	.	1.35	.	.
Sulphur	3.73	0.88	4.61	2.35	4.13	.
Thiram	2.06	.	2.06	3.39	1.57	4.10
Tolylfluanid	.	.	.	1.06	0.34	29.69
<b>All fungicides</b>	<b>42.83</b>	<b>3.12</b>	<b>45.96</b>	<b>30.71</b>	<b>40.52</b>	<b>92.48</b>

*2012, 2010 & 2006 totals are included for comparative purposes*



**Table 8 (cont)** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2014.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total quantity applied (kg)</i>	<i>2012 totals (kg)</i>	<i>2010 totals (kg)</i>	<i>2006 totals (kg)</i>
	<i>Strawberries</i>	<i>Other crops</i>				
<b><i>Herbicides</i></b>						
Diquat	.	.	.	.	0.02	0.97
Glufosinate-ammonium	.	.	.	0.90	.	.
Glyphosate	1.18	1.36	2.54	1.39	3.17	2.72
Isoxaben	.	.	.	.	0.22	1.21
Lenacil	4.26	.	4.26	.	0.90	2.50
MCPA	0.66	.	0.66	.	.	.
Pendimethalin	4.92	1.89	6.81	1.82	0.22	1.57
Propachlor	.	.	.	.	0.41	.
Propyzamide	1.15	1.32	2.47	1.53	0.41	2.05
Simazine	.	.	.	.	1.09	3.33
<b>All herbicides</b>	<b>12.17</b>	<b>4.57</b>	<b>16.74</b>	<b>5.64</b>	<b>6.44</b>	<b>14.35</b>
<b><i>Insecticides and acaricides</i></b>						
Abamectin	0.03	<0.01	0.03	1.73	1.07	1.71
Bifenthrin	<0.01	.	<0.01	0.07	1.38	12.89
Chlorpyrifos	1.71	0.18	1.89	0.50	4.52	6.62
Clofentezine	0.70	0.05	0.75	4.78	3.46	3.56
Cypermethrin	.	.	.	0.05	.	.
Deltamethrin	.	.	.	.	0.11	.
Dimethoate	.	.	.	0.30	0.96	0.02
Etoxazole	.	.	.	0.24	2.69	.
Pirimicarb	1.03	0.27	1.30	2.68	4.14	9.97
Pymetrozine	.	.	.	0.08	.	.
Spinosad	0.05	.	0.05	.	.	.
Spirodiclofen	0.07	.	0.07	.	.	.
Tebufenpyrad	0.06	.	0.06	0.72	1.68	0.83
Thiacloprid	1.05	0.61	1.66	1.52	0.86	.
<b>All insecticides and acaricides</b>	<b>4.71</b>	<b>1.12</b>	<b>5.83</b>	<b>12.65</b>	<b>20.87</b>	<b>35.60</b>

*2012, 2010 & 2006 totals are included for comparative purposes*

**Table 8 (cont)** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2014.

Pesticide group & active ingredient	Crop type		Total quantity applied (kg)	2012 totals (kg)	2010 totals (kg)	2006 totals (kg)
	Strawberries	Other crops				
<b>Biopesticides</b>						
<i>Bacillus subtilis</i>	Trace	.	Trace	0.47	4.15	.
<i>Phasmarhabditis hermaphrodita</i>	.	.	.	0.49	.	.
<i>Phytoseiulus persimilis</i>	.	.	.	0.66	0.85	5.25
<i>Steinernema feltiae</i>	.	.	.	0.36	.	.
<i>Steinernema kraussei</i>	Trace	.	Trace	0.17	1.79	.
<b>All biopesticides</b>	<b>Trace</b>	<b>.</b>	<b>Trace</b>	<b>2.15</b>	<b>7.03</b>	<b>5.25</b>
<b>Molluscicides</b>						
Metaldehyde	0.12	.	0.12	.	.	.
Methiocarb	0.02	.	0.02	1.09	.	.
<b>All molluscicides</b>	<b>0.14</b>	<b>.</b>	<b>0.14</b>	<b>1.09</b>	<b>.</b>	<b>.</b>
<b>Other products</b>						
Acetic acid/hydrogen peroxide/ peracetic acid	.	.	.	.	0.18	.
Magnesium	0.13	.	0.13	.	.	.
Natural product	18.62	.	18.62	.	0.38	.
Sodium hypochlorite	.	.	.	.	0.06	.
<b>All other products</b>	<b>18.76</b>	<b>.</b>	<b>18.76</b>	<b>.</b>	<b>0.62</b>	<b>.</b>
<b>All pesticides</b>	<b>78.61</b>	<b>8.82</b>	<b>87.42</b>	<b>71.96</b>	<b>117.27</b>	<b>184.36</b>

2012, 2010 & 2006 totals are included for comparative purposes

**Table 9 The active ingredients most extensively used on soft fruit crops in Northern Ireland 2014 ranked by treated area (spha).**

No.	Active ingredient	Treated area (spha)	2012 totals (spha)	2010 totals (spha)
1	Iprodione	17.36	9.58	12.36
2	Azoxystrobin	16.45	3.06	7.80
3	Fenhexamid	12.17	5.20	7.09
4	Myclobutanil	9.53	9.34	13.88
5	Thiacloprid	8.68	1.52	0.86
6	Boscalid	5.73	0.53	5.64
7	Pirimicarb	4.98	2.68	4.14
8	Pyrimethanil	4.60	5.58	7.90
9	Abamectin	4.45	1.73	1.07
10	Pendimethalin	4.25	1.82	0.22
11	Clofentezine	3.98	4.78	3.46
12	Kresoxim-methyl	3.84	0.85	0.07
13	Mepanipyrim	3.21	2.81	1.90
14	Bupirimate	3.04	1.22	4.72
15	Sulphur	3.02	1.11	2.20
16	Chlorpyrifos	2.55	0.50	4.52
17	Lenacil	2.23	.	0.90
18	Dimethomorph	2.11	0.78	1.55
19	Glyphosate	1.77	1.39	3.17
20	Propyzamide	1.77	1.53	0.41
21	Fosetyl-aluminium	1.70	1.82	3.94
22	Cyprodinil	1.67	.	.
23	Thiram	1.67	2.59	1.91
24	MCPA	0.94	.	.
25	Chlorothalonil	0.74	.	1.55
26	Spinosad	0.74	.	.
27	Spirodiclofen	0.74	.	.
28	<i>Steinernema kraussei</i>	0.59	0.17	1.79
29	<i>Bacillus subtilis</i>	0.57	0.47	4.15
30	Potassium bicarbonate	0.57	0.06	7.41
31	Metaldehyde	0.47	.	.
32	Methiocarb	0.47	1.09	.
33	Tebufenpyrad	0.39	0.72	1.68
34	Bifenthrin	0.13	0.07	1.38
35	Dimethoate	.	0.30	0.96
36	Etoxazole	.	0.24	2.69
37	Pymetrozine	.	0.08	.
38	Cypermethrin	.	0.05	.
39	Simazine	.	.	1.09
40	Propachlor	.	.	0.41

**Table 10** The active ingredients most extensively used on soft fruit crops in Northern Ireland 2014 ranked by weight (kg).

No.	Active ingredient	Quantity applied (kg)	2012 totals (kg)	2010 totals (kg)
1	Iprodione	11.75	6.31	7.71
2	Fenhexamid	7.58	3.01	2.56
3	Pendimethalin	6.81	2.40	0.44
4	Sulphur	4.61	2.35	4.13
5	Lenacil	4.26	.	1.97
6	Azoxystrobin	4.02	0.55	1.60
7	Boscalid	3.14	0.19	3.18
8	Potassium bicarbonate	2.76	0.01	2.07
9	Pyrimethanil	2.66	3.75	4.02
10	Glyphosate	2.54	2.00	4.75
11	Propyzamide	2.47	2.01	0.52
12	Thiram	2.06	3.39	1.57
13	Chlorpyrifos	1.89	0.45	3.40
14	Fosetyl-aluminium	1.88	4.00	7.94
15	Thiacloprid	1.66	0.11	0.06
16	Pirimicarb	1.30	0.74	1.11
17	Mepanipyrim	1.11	1.13	0.59
18	Cyprodinil	1.05	.	.
19	Dimethomorph	0.84	0.16	0.16
20	Bupirimate	0.78	0.24	1.28
21	Myclobutanil	0.77	0.73	0.84
22	Clofentezine	0.75	0.91	0.53
23	MCPA	0.66	.	.
24	Kresoxim-methyl	0.58	0.13	0.01
25	Chlorothalonil	0.37	.	1.55
26	Metaaldehyde	0.12	.	.
27	Spirodiclofen	0.07	.	.
28	Tebufenpyrad	0.06	.	.
29	Spinosad	0.05	.	.
30	Abamectin	0.03	0.01	<0.01
31	Methiocarb	0.02	0.16	.
32	Bifenthrin	0.00	<0.01	0.03
33	<i>Steinernema kraussei</i>	Trace	Trace	Trace
34	<i>Bacillus subtilis</i>	Trace	Trace	Trace
35	Dimethoate	.	<0.01	0.33
36	Cypermethrin	.	<0.01	.
37	<i>Phytoseiulus persimilis</i>	.	Trace	Trace
38	<i>Phasmarhadditis hermaphrodita</i>	.	Trace	.
39	<i>Steinernema feltiae</i>	.	Trace	.
40	Simazine	.	.	1.22

**Table 11** Strawberries (protected): Reason for use, total cropping area (ha), total-treated area (spha), basic-treated area (ha), percentage of cropping area treated and quantity applied (kg).

Pesticide group & active ingredient	Reason for use							Total treated area (spha)	Total grown area of protected strawberries = 3.00 ha		Quantity applied (kg)
	Botrytis	Botrytis & mildew	Crown rot	Grey mould	Mildew	Powdery mildew	Red core		Basic treated area (ha)	Percentage of grown area treated	
<b>Fungicides</b>											
Azoxystrobin	.	.	.	.	3.40	.	.	3.40	1.05	35%	0.8
Boscalid/pyraclostrobin	0.52	0.87	.	.	.	.	.	1.40	0.91	30%	0.7
Bupirimate	0.52	.	.	.	1.11	0.28	.	1.91	0.68	23%	0.5
Cyprodinil/fludioxonil	.	.	.	0.18	.	.	.	0.18	0.09	3%	0.1
Dimethomorph	.	.	0.62	.	.	.	.	0.62	0.62	21%	0.1
Fenhexamid	3.18	.	.	.	.	.	.	3.18	0.66	22%	1.0
Fosetyl-aluminium	.	.	0.52	.	.	.	1.17	1.70	0.59	20%	1.9
Iprodione	3.87	.	.	.	.	.	.	3.87	0.97	32%	2.2
Kresoxim-methyl	.	.	.	.	.	0.79	.	0.79	0.29	10%	0.1
Mepanipyrim	0.47	1.17	.	.	.	.	.	1.64	0.95	32%	0.5
Myclobutanil	.	.	.	.	2.81	2.06	.	4.87	1.05	35%	0.4
Pyrimethanil	2.09	.	.	.	0.52	.	.	2.62	0.78	26%	1.2
Sulphur	.	.	.	.	.	0.88	.	0.88	0.37	12%	1.4
Thiram	0.79	0.22	.	.	.	.	.	1.01	0.37	12%	1.6
<b>All fungicides</b>	<b>11.44</b>	<b>2.27</b>	<b>1.14</b>	<b>0.18</b>	<b>7.85</b>	<b>4.00</b>	<b>1.17</b>	<b>28.05</b>	<b>1.20</b>	<b>40%</b>	<b>12.4</b>

**Table 11 (cont) Strawberries (protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).**

Pesticide group & active ingredient	Reason for use							Total treated area (spha)	Total grown area of protected strawberries = 3.00 ha		
	Ground preparation	Aphids	General insect control	Red spider mite	Two-spotted spider mite	Slugs	Vine weevil		Basic treated area (ha)	Percentage of grown area treated	Quantity applied (kg)
<b>Herbicides</b>											
Glyphosate	0.12	.	.	.	.	.	.	0.12	0.12	4%	0.3
All herbicides	0.12	.	.	.	.	.	.	0.12	0.12	4%	0.3
<b>Insecticides and acaricides</b>											
Abamectin	.	.	.	0.29	.	.	.	0.29	0.29	10%	<0.1
Bifenthrin	.	.	.	0.13	.	.	.	0.13	0.06	2%	<0.1
Chlorpyrifos	.	0.12	0.27	.	.	.	.	0.39	0.39	13%	0.28
Clofentezine	.	.	.	0.91	.	.	.	0.91	0.91	30%	0.14
Pirimicarb	.	0.87	.	.	.	.	.	0.87	0.39	13%	0.24
Tebufenpyrad	.	.	.	.	0.09	.	.	0.09	0.09	3%	0.01
Thiacloprid	.	2.42	0.07	.	.	.	.	2.49	0.46	15%	0.47
All insecticides and acaricides	.	3.41	0.34	1.32	0.09	.	.	5.17	1.20	40%	1.2
<b>Biopesticides</b>											
<i>Steinernema kraussei</i>	.	.	.	.	.	.	0.59	0.59	0.59	20%	Trace
All biopesticides	.	.	.	.	.	.	0.59	0.59	0.59	20%	Trace

**Table 11 (cont)** Strawberries (protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).

Reason for use								Total grown area of protected strawberries = 3.00 ha			
Pesticide group & active ingredient	Ground preparation	Aphids	General insect control	Red spider mite	Two-spotted spider mite	Slugs	Vine weevil	Total treated area (spha)	Basic treated area (ha)	Percentage of grown area treated	Quantity applied (kg)
<b>Molluscicides</b>											
Metalddehyde	.	.	.	.	.	0.05	.	0.05	0.05	2%	<0.1
Methiocarb	.	.	.	.	.	0.05	.	0.05	0.05	2%	<0.1
<b>All molluscicides</b>	.	.	.	.	.	<b>0.10</b>	.	<b>0.10</b>	<b>0.05</b>	<b>2%</b>	<b>&lt;0.1</b>

**Table 12** Strawberries (semi-protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).

Pesticide group & active ingredient	Reason for use					Total treated area (spha)	Total grown area of semi-protected strawberries = 5.00 ha		
	Botrytis	Botrytis & mildew	Mildew	Powdery mildew	Red core		Basic treated area (ha)	Percentage of grown area treated	Quantity applied (kg)
<b>Fungicides</b>									
Azoxystrobin	.	1.49	1.67	.	.	3.16	1.78	36%	0.8
Boscalid/pyraclostrobin	.	2.37	.	.	.	2.37	1.78	36%	1.3
Bupirimate	.	.	.	1.13	.	1.13	0.57	11%	0.3
Chlorothalonil	0.74	.	.	.	.	0.74	0.74	15%	0.4
Cyprodinil/fludioxonil	.	1.49	.	.	.	1.49	1.49	30%	0.9
Dimethomorph	.	.	.	.	1.49	1.49	1.49	30%	0.7
Fenhexamid	0.74	.	.	.	.	0.74	0.74	15%	0.4
Iprodione	3.34	0.74	.	.	.	4.09	1.61	32%	2.5
Kresoxim-methyl	.	.	0.74	0.59	.	1.33	0.54	11%	0.2
Mepanipyrim	1.08	.	.	.	.	1.08	0.29	6%	0.4
Myclobutanil	.	.	.	1.47	.	1.47	0.29	6%	0.1
Potassium bicarbonate	.	.	0.57	.	.	0.57	0.57	11%	2.8
Pyrimethanil	0.99	.	.	.	.	0.99	0.87	17%	0.7
Sulphur	.	.	0.57	0.59	.	1.15	0.86	17%	1.4
Thiram	0.66	.	.	.	.	0.66	0.66	13%	0.5
<b>All fungicides</b>	<b>7.57</b>	<b>6.10</b>	<b>3.54</b>	<b>3.78</b>	<b>1.49</b>	<b>22.48</b>	<b>2.70</b>	<b>54%</b>	<b>13.3</b>



**Table 12 (cont) Strawberries (semi-protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).**

Pesticide group & active ingredient	Reason for use										Total treated area (spha)	Total grown area of semi-protected strawberries = 5.00 ha		
	Aphids	Botrytis & mildew	Ground preparation	Nettle	General insect control	Red spider mite	Spider mite	Thrips	Two-spotted spider mite	Slugs		Basic treated area (ha)	Percentage of grown area treated	Quantity applied (kg)
<b>Herbicides</b>														
Lenacil	.	.	0.12	.	.	.	.	.	.	.	0.12	0.12	2%	0.3
MCPA	.	.	.	0.94	.	.	.	.	.	.	0.94	0.94	19%	0.7
<b>All herbicides</b>	.	.	<b>0.12</b>	<b>0.94</b>	.	.	.	.	.	.	<b>1.06</b>	<b>1.06</b>	<b>21%</b>	<b>0.9</b>
<b>Insecticides and acaricides</b>														
Abamectin	.	.	.	.	.	0.69	.	0.74	.	.	1.43	1.04	21%	<0.1
Chlorpyrifos	0.62	.	.	.	0.29	.	.	.	.	.	0.91	0.67	13%	0.7
Clofentezine	.	.	.	.	.	0.10	.	.	.	.	0.10	0.10	2%	<0.1
Pirimicarb	2.64	.	.	.	.	.	.	.	.	.	2.64	2.35	47%	0.7
Spinosad	.	.	.	.	.	.	.	0.74	.	.	0.74	0.74	15%	0.1
Spirodiclofen	.	.	.	.	.	.	0.74	.	.	.	0.74	0.74	15%	0.1
Tebufenpyrad	.	.	.	.	.	.	.	.	0.29	.	0.29	0.29	6%	<0.1
Thiacloprid	1.77	.	.	.	.	.	.	.	.	.	1.77	0.29	6%	0.3
<b>All insecticides and acaricides</b>	<b>5.03</b>	.	.	.	<b>0.29</b>	<b>0.79</b>	<b>0.74</b>	<b>1.49</b>	<b>0.29</b>	.	<b>8.64</b>	<b>2.70</b>	<b>54%</b>	<b>1.9</b>
<b>Biopesticides</b>														
<i>Bacillus subtilis</i>	.	0.57	.	.	.	.	.	.	.	.	0.57	0.57	11%	Trace
<b>All biopesticides</b>	.	<b>0.57</b>	.	.	.	.	.	.	.	.	<b>0.57</b>	<b>0.57</b>	<b>11%</b>	<b>Trace</b>
<b>Molluscicides</b>														
Metaaldehyde	.	.	.	.	.	.	.	.	.	0.08	0.08	0.08	2%	<0.1
Methiocarb	.	.	.	.	.	.	.	.	.	0.08	0.08	0.08	2%	<0.1
<b>All molluscicides</b>	.	.	.	.	.	.	.	.	.	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>2%</b>	<b>&lt;0.1</b>

**Table 13** Strawberries (non-protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).

Pesticide group & active ingredient	Reason for use					Total treated area (spha)	Total grown area of non-protected strawberries = 4.94 ha		Quantity applied (kg)
	Blackspot	Botrytis	Botrytis & mildew	Mildew	Powdery mildew		Basic treated area (ha)	Percentage of grown area treated	
<b>Fungicides</b>									
Azoxystrobin	7.44	.	.	1.23	.	8.66	2.72	56%	2.2
Boscalid/pyraclostrobin	.	.	0.74	.	.	0.74	0.25	5%	0.4
Fenhexamid	.	0.81	.	7.44	.	8.25	2.88	59%	6.2
Iprodione	.	8.17	.	.	.	8.17	2.72	56%	6.1
Kresoxim-methyl	.	.	.	0.74	0.49	1.23	0.49	10%	0.2
Mepanipyrim	.	0.49	.	.	.	0.49	0.25	5%	0.2
Myclobutanil	.	.	.	.	0.98	0.98	0.25	5%	0.1
Pyrimethanil	.	0.99	.	.	.	0.99	0.50	10%	0.8
Sulphur	.	.	.	.	0.49	0.49	0.25	5%	0.9
<b>All fungicides</b>	<b>7.44</b>	<b>10.47</b>	<b>0.74</b>	<b>9.41</b>	<b>1.96</b>	<b>30.00</b>	<b>3.84</b>	<b>78%</b>	<b>17.1</b>

**Table 13 (cont) Strawberries (non-protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).**

<i>Pesticide group &amp; active ingredient</i>	<i>Reason for use</i>					<i>Total treated area (spha)</i>	<i>Total grown area of non-protected strawberries = 4.90 ha</i>		
	<i>Aphids</i>	<i>General weed control</i>	<i>Ground preparation</i>	<i>Red spider mite</i>	<i>Slugs</i>		<i>Basic treated area (ha)</i>	<i>Percentage of grown area treated</i>	<i>Quantity applied (kg)</i>
<b><i>Herbicides</i></b>									
Glyphosate	.	0.82	.	.	.	0.82	0.82	17%	1.2
Lenacil	.	1.49	0.50	.	.	1.98	1.98	40%	3.7
Pendimethalin	.	3.30	.	.	.	3.30	3.30	67%	4.9
Propyzamide	.	0.82	.	.	.	0.82	0.82	17%	1.2
<b>All herbicides</b>	.	<b>6.43</b>	<b>0.50</b>	.	.	<b>6.93</b>	<b>2.78</b>	<b>57%</b>	<b>11.0</b>
<b><i>Insecticides and acaricides</i></b>									
Abamectin	2.48	.	.	.	.	2.48	2.48	51%	<0.1
Chlorpyrifos	0.99	.	.	.	.	0.99	0.74	15%	0.7
Clofentezine	.	.	.	2.72	.	2.72	2.72	56%	0.5
Pirimicarb	0.49	.	.	.	.	0.49	0.25	5%	0.1
Thiacloprid	1.23	.	.	.	.	1.23	0.25	5%	0.2
<b>All insecticides and acaricides</b>	<b>5.19</b>	.	.	<b>2.72</b>	.	<b>7.91</b>	<b>3.44</b>	<b>70%</b>	<b>1.7</b>
<b><i>Molluscicides</i></b>									
Metaldehyde	.	.	.	.	0.34	0.34	0.34	7%	0.1
Methiocarb	.	.	.	.	0.34	0.34	0.34	7%	<0.1
<b>All biopesticides</b>	.	.	.	.	<b>0.34</b>	<b>0.34</b>	<b>0.34</b>	<b>7%</b>	<b>0.1</b>

**Table 14** Other crops (protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).

Reason for use										Total grown area of protected other crops = 0.70 ha			
Pesticide group & active ingredient	Botrytis	Botrytis & mildew	General weed control	Leaf spot	Mildew	Powdery mildew	Aphids	General insect control	Red spider mite	Total treated area (spha)	Basic treated area (ha)	Percentage of grown area treated	Quantity (kg)
<b>Fungicides</b>													
Azoxystrobin	.	.	.	.	1.23	.	.	.	.	1.23	0.25	36%	0.3
Boscalid/pyraclostrobin	.	0.49	.	.	.	.	.	.	.	0.49	0.25	36%	0.3
Iprodione	1.23	.	.	.	.	.	.	.	.	1.23	0.25	36%	0.9
Myclobutanil	.	.	.	.	.	1.23	.	.	.	1.23	0.25	36%	0.1
<b>All fungicides</b>	<b>1.23</b>	<b>0.49</b>	<b>.</b>	<b>.</b>	<b>1.23</b>	<b>1.23</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>4.18</b>	<b>0.25</b>	<b>36%</b>	<b>1.6</b>
<b>Insecticides and acaricides</b>													
Abamectin	.	.	.	.	.	.	.	.	0.25	0.25	0.25	36%	<0.1
Chlorpyrifos	.	.	.	.	.	.	.	0.25	.	0.25	0.25	36%	0.2
Clofentezine	.	.	.	.	.	.	.	.	0.25	0.25	0.25	36%	0.1
Pirimicarb	.	.	.	.	.	.	0.49	.	.	0.49	0.25	36%	0.1
Thiacloprid	.	.	.	.	.	.	1.96	.	.	1.96	0.25	36%	0.4
<b>All insecticides and acaricides</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>2.45</b>	<b>0.25</b>	<b>0.49</b>	<b>3.19</b>	<b>0.25</b>	<b>36%</b>	<b>0.8</b>

**Table 15 Other crops (non-protected): Reason for use, total grown area (ha), total-treated area (spha), basic-treated area (ha), percentage of grown area treated and quantity applied (kg).**

							Total grown area of non-protected other crops = 2.00 ha			
Pesticide group & active ingredient	General weed control	Leaf spot	Mildew	Powdery mildew	Aphids	General insect control	Total treated area (spha)	Basic treated area (ha)	Percentage of grown area treated	Quantity (kg)
<b>Fungicides</b>										
Boscalid/pyraclostrobin	.	0.74	.	.	.	.	0.74	0.25	13%	0.4
Kresoxim-methyl	.	.	.	0.49	.	.	0.49	0.25	13%	0.1
Myclobutanil	.	.	0.98	.	.	.	0.98	0.25	13%	0.1
Sulphur	.	.	.	0.49	.	.	0.49	0.25	13%	0.9
<b>All fungicides</b>	.	0.74	0.98	0.98	.	.	2.70	0.25	13%	1.5
<b>Herbicides</b>										
Glyphosate	0.95	.	.	.	.	.	0.95	0.95	48%	1.4
Pendimethalin	0.95	.	.	.	.	.	0.95	0.95	48%	1.9
Propyzamide	0.95	.	.	.	.	.	0.95	0.95	48%	1.3
<b>All herbicides</b>	2.84	.	.	.	.	.	2.84	0.95	48%	4.6
<b>Insecticides and acaricides</b>										
Pirimicarb	.	.	.	.	0.49	.	0.49	0.25	13%	0.1
Thiacloprid	.	.	.	.	.	1.23	1.23	0.25	13%	0.2
<b>All insecticides and acaricides</b>	.	.	.	.	0.49	1.23	1.72	0.25	13%	0.4

**Table 16 Comparison of pesticide usage on soft fruit crops 1990-2014, total area treated (spha) with main pesticide groups and quantities of active ingredient (kg) used.**

Pesticide group	1990		1998		2006		2010		2012		2014	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
Fungicides	171.37	277.61	154.09	189.10	134.88	97.65	82.30	40.52	50.44	30.71	87.40	45.90
Herbicides	159.40	199.54	61.80	95.60	25.57	27.60	6.45	9.96	5.63	7.07	10.90	16.80
Insecticides and acaricides	33.71	19.61	41.25	16.70	37.37	7.65	20.86	5.99	12.66	2.44	26.60	6.00
Molluscicides	8.83	1.79	22.96	10.00	1.72	1.29	.	.	1.09	0.16	1.10	0.20
Biopesticides	.	.	1.50	Trace	11.40	Trace	7.04	Trace	2.15	Trace	1.20	Trace
Other products	.	.	.	.	.	.	0.62	1.91	.	.	0.90	18.70
<b>Total</b>	<b>373.31</b>	<b>498.55</b>	<b>281.60</b>	<b>311.40</b>	<b>210.94</b>	<b>134.19</b>	<b>117.27</b>	<b>58.39</b>	<b>71.97</b>	<b>40.38</b>	<b>128.20</b>	<b>87.60</b>

**Table 17 Comparison of pesticide usage on strawberry crops\* 1990-2014, total area (spha) treated with main pesticide groups and quantities of active ingredient (kg) used.**

Pesticide group	1990		1998		2006		2010		2012		2014	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
Fungicides	135.67	229.57	132.16	156.41	121.53	81.42	80.05	39.31	44.24	26.88	80.60	42.80
Herbicides	112.80	133.31	41.11	52.60	22.00	22.25	4.73	7.46	5.31	6.55	8.10	12.20
Insecticides and acaricides	23.64	14.56	37.49	12.82	35.62	6.84	20.67	5.92	11.39	2.23	21.70	4.80
Molluscicides	8.42	1.70	22.47	9.91	1.72	1.29	.	.	1.09	0.16	1.10	0.20
Biopesticides	.	.	1.45	Trace	11.31	Trace	6.79	Trace	2.15	Trace	1.20	Trace
Other products	.	.	.	.	.	.	0.62	1.91	.	.	0.90	18.70
<b>Total</b>	<b>280.53</b>	<b>379.14</b>	<b>234.68</b>	<b>231.74</b>	<b>192.18</b>	<b>111.80</b>	<b>112.86</b>	<b>54.60</b>	<b>64.18</b>	<b>35.82</b>	<b>113.60</b>	<b>78.70</b>

\*Combined total of protected, semi-protected & non-protected strawberries.

## Northern Ireland Pesticide Usage Survey Published Reports Appendix 1

Report No.	Report title	ISBN
99	Grassland & Fodder Crops 1989	1-855 27 079 X
105	Arable Crops 1990	1-855 27 130 3
106	Soft Fruit Crops 1990	1-855 27 149 4
109	Vegetable Crops 1991	1-855 27 137 0
110	Protected Crops 1991 (edible & ornamental)	1-855 27 283 0
111	Mushroom Crops 1991	1-855 27 150 8
117	Arable Crops 1992	1-855 27 193 1
118	Top Fruit Crops 1992	1-855 27 194 X
124	Grassland & Fodder crops 1993	1-855 27 221 0
131	Forestry 1993	1-855 27 282 2
132	Arable Crops 1994	1-855 27 314 4
139	Vegetable Crops 1995	1-855 27 346 2
140	Mushroom Crops 1995	1-855 27 347 0
146	Arable Crops 1996	1-855 27 469 8
147	Top fruit 1996	1-855 27 470 1
156	Grassland & Fodder Crops 1997	1-855 27 506 6
157	Sheep Treatments 1997	1-855 27 425 6
167	Soft Fruit 1998	1-855 27 540 6
168	Arable Crops 1998	1-855 27 536 8
169	Vegetable Crops 1999	1-855 27 561 9
170	Mushroom Crops 1999	1-855 27 549 X
177	Arable Crops 2000	1-855 27 670 4
178	Top Fruit Crops 2002	1-855 27 618 6
194	Arable Crops 2002	1-855 27 674 7
198	Grassland & Fodder Crops 2003	1-855 27 797 2
199	Hardy Nursery Stock Crops 2003	1-855 27 789 1
201	Protected Ornamental Crops 2003	1-855 27 739 5
206	Arable Crops 2004	1-855 27 833 2

## Northern Ireland Pesticide Usage Survey Published Reports Appendix 1 (contd.)

Report No.	Report title	ISBN
207	Vegetable crops 2004	1-855 27 869 3
208	Grassland & Fodder Crops 2005	1-855 27 998 8
209	Sheep Treatments 2005	1-855 27 999 5
216	Arable Crops 2006	1-848 07 035 6
217	Top Fruit Crops 2006	1-848 07 019 6
218	Soft Fruit Crops 2006	1-848 07 036 3
222	Vegetable Crops 2007	1-848 07 062 2
223	Mushroom Crops 2007	1 848 07 061 5
230	Arable Crops 2008	1 848 07 135 3
231	Top Fruit Crops 2008	1-848 07 134 6
238	Grassland & Fodder Crops 2009	1-848 07 186 5
239	Hardy Nursery Stock Crops 2009	1-848 07 187 2
240	Soft Fruit Crops 2010	1-848 07 251 0
241	Top Fruit Crops 2010	1-848 07 250 3
242	Arable Crops 2010	1-848 07 252 7
245	Mushroom Crops 2011	1-848 07 308 1
246	Vegetable Crops 2011	1-848 07 309 8
247	Arable Crops 2012	1-848 07 404 3
248	Soft Fruit Crops 2012	1-848 07 402 6
249	Top Fruit Crops 2012	1-848 07 403 3
258	Grassland & Fodder Crops 2013	1-848 07 485 9
259	Vegetable Crops 2013	1-848 07 486 6

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