

# PESTICIDE USAGE IN NORTHERN IRELAND

Survey Report 289

## Northern Ireland Soft Fruit Crops 2018

A National Statistics Publication



## A NATIONAL STATISTICS PUBLICATION

All official statistics should comply with all aspects of the Code of Practice for Official statistics. They are awarded National Statistics status following an assessment by the Authority's regulatory arm. The Authority considers whether the statistics meet the highest standards of Code compliance, including the value they add to public decisions and debate.

It is the responsibility of the Agri-Food and Biosciences Institute to maintain compliance with the standards expected of National Statistics. If we become concerned about whether these statistics are still meeting the appropriate standards, we will discuss any concerns with the Authority promptly. National Statistics status can be removed at any point when the highest standards are not maintained, and reinstated when standards are restored.

National Statistics are produced to high professional standards set out in the National Statistics Code of Practice. They undergo regular quality assurance reviews to ensure that they meet customers' needs. They are free from any political interference.

For general enquires about National Statistics, contact the National Statistics Public Enquiry Service on 0845 601 3034 or to view the statistics release calendar please use the following link: [www.statistics.gov.uk](http://www.statistics.gov.uk).

A list of published pesticide usage monitoring reports can be found using this link:

<https://www.afbini.gov.uk/articles/pesticide-usage-monitoring-reports>

The Agri-Food and Biosciences Institute (AFBI) was created on 1<sup>st</sup> April 2006 as the amalgamation of DARD Science Service and the Agricultural Research Institute of Northern Ireland.



# PESTICIDE USAGE SURVEY REPORT 289

## SOFT FRUIT CROPS IN NORTHERN IRELAND 2018

J.M Kirbas, M.K. Lavery, S. Jess,  
D. Matthews and T. Kelly

Pesticide Usage Monitoring Group  
Sustainable Agri-Food Science Division  
Newforge Lane  
Belfast BT9 5PX

Tel: 028 90255283

Email: [pesticide.science@afbini.gov.uk](mailto:pesticide.science@afbini.gov.uk)

*Agri-Food and Biosciences Institute*

<https://www.afbini.gov.uk/articles/pesticide-usage-monitoring-surveys>

*Department of Agriculture, Environment and Rural Affairs*

<https://www.daera-ni.gov.uk/articles/departmental-responsibilities-regarding-pesticides>



INVESTOR IN PEOPLE

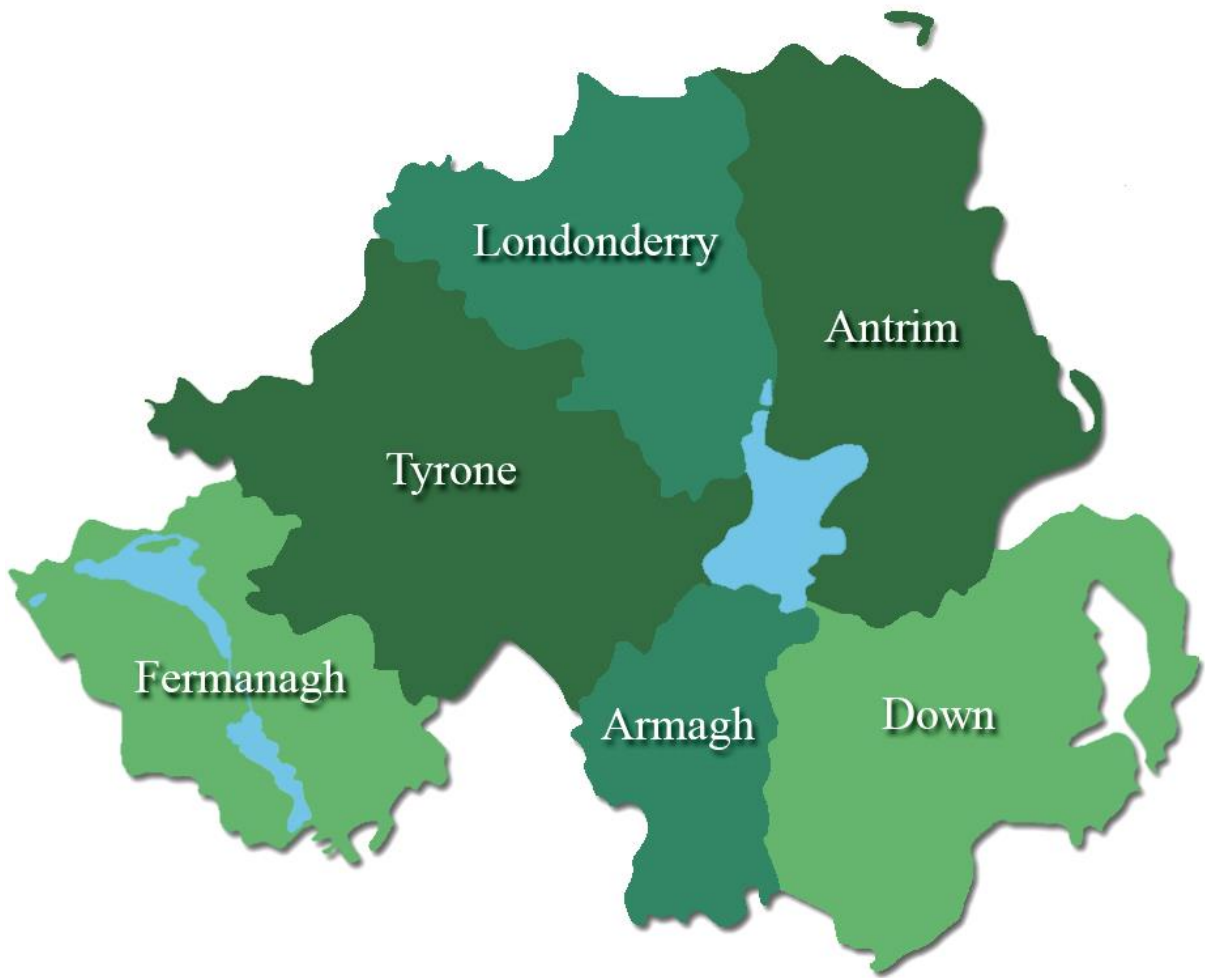
*Agri-food and Biosciences Institute for Northern Ireland*

ISBN 978-1-83887-065-2

## CONTENTS

● Summary	1
● Introduction	2
● Methods	4
● Definitions and Notes	4
● Trends	5
● Crop Distribution	6
● Pesticide Usage on Crops	7
● Acknowledgements	13
● References	13
● Tables 1-17	14
● Appendix	30

## 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 2018. Data were collected from 9 growers representing 35% of all soft fruit holdings in Northern Ireland. Quantitative data has been adjusted to provide estimates of total pesticide usage. A survey of the total population was not possible primarily due to non-participation of growers.

Soft fruit cultivation is a very minor sector of agricultural production in Northern Ireland and includes a range of crops grown on relatively small areas, which receive varying degrees of pesticide application. These factors lead to greater statistical uncertainty associated with the estimates produced and, whilst these data give an indication of pesticide use in this sector, they are less statistically robust than the estimates from the other reports in this series and should be interpreted accordingly.

Compared with the previous survey, carried out in 2016, the total area of soft fruit crops grown increased by 16% to approximately 17 hectares and the area treated with pesticides (spray hectares) increased by 46%.

A total of 25 kilograms of pesticides were applied to 52 spray hectares of soft fruit crops in 2018. Strawberries were the most commonly produced soft fruit (protected, semi-protected and non-protected), with 20 kilograms of pesticides being applied to 45 spray hectares. This represented approximately 85% of both the total pesticide-treated area and the total quantity of pesticides applied.

Fungicide usage increased 2-fold when compared with 2016. Fungicides were applied to 54% of the total pesticide-treated area, representing 56% of the total weight of pesticides used in 2018. Azoxystrobin and iprodione were the fungicides applied to the largest area. Iprodione and fenhexamid were also the most frequently used fungicides by weight applied. Grey mould (*Botrytis cinerea*) and powdery mildew (*Podosphaera aphanis*) were the main reasons given for fungicide use on strawberries.

Herbicide usage, applied to the inter-row area of non-protected crops, decreased by an estimated 47% compared with 2016. Herbicide active ingredients were applied to 17% of the total pesticide-treated area (35% of the total weight of pesticides used) with propyzamide,

napropamide and pendimethalin collectively accounting for 82% of the herbicide-treated area and 86% of the weight of herbicides applied.

Insecticide and acaricide usage increased by 21% in 2018 when compared with 2016. Insecticide and acaricide active ingredients accounted for 13% of the total pesticide-treated area and 3% of the total weight of pesticides applied in 2018. The insecticide and acaricide dimethoate and acaricide etoxazole and were the most frequently applied active substances and were only applied to strawberries. General insect control was the principal reason for insecticide/acaricide use during this survey period. Other reasons included aphids, caterpillar, red spider mites and sawfly.

Biopesticides were applied to 7% of the treated area in 2018, compared with <1% in 2016. *Bacillus subtilis* was the most commonly applied biopesticide accounting for 77% of the biopesticide treated area. Biopesticide applications were to control grey mould (*Botrytis cinerea*), Rhizoctonia, powdery mildew in strawberries (*Podosphaera aphanis*), caterpillars and vine weevil. *Bacillus subtilis*, *Bacillus thuringiensis* and *Steinernema feltiae*, *Gliocladium catenulatum* and *Steinernema kraussei* were the only biopesticides used.

Molluscicides were only applied to non-protected crops and accounted for 5% of the total pesticide treated area and 2% of the weight of pesticides applied.

'Other products' (derived completely from natural ingredients but not classified as 'plant protection products') accounted for 3% of the pesticide treated area and 4% of the weight of pesticides applied.

## INTRODUCTION

As a participant of the UK Working Party on Pesticide Usage Surveys, the Agri-Food and Biosciences Institute (AFBI), on behalf of the Department of Agriculture, Environment and Rural Affairs (DAERA), conducts a 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 UK Expert Committee on Pesticides. In addition, the information may be used by those involved in residue testing, environmental impact studies, public information and for the evaluation and regulation of trends in pesticide usage. Pesticide usage monitoring forms part of an obligation under the Food and Environment Act (1985) for post-registration monitoring of pesticides

approved for use. The programme forms an integral part of the government's pesticide safety control arrangements, in providing quantitative and qualitative data on the usage of pesticides in agriculture, horticulture, food storage and associated industries. In addition, Regulation (EC) No. 1185/2009 also requires data delivery on agricultural use of pesticides.

This work is also undertaken in England and Wales by FERA Science Ltd (FERA) and in Scotland by Science and Advice for Scottish Agriculture (SASA). Pesticide usage reports from these regions may be obtained at the following sites:

[\(https://secure.fera.defra.gov.uk/pusstats/surveys/\)](https://secure.fera.defra.gov.uk/pusstats/surveys/)

[\(https://www.sasa.gov.uk/pesticides/pesticide-usage/pesticide-usage-survey-reports\)](https://www.sasa.gov.uk/pesticides/pesticide-usage/pesticide-usage-survey-reports)

This is the seventh 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), 2012 (Lavery *et al*, 2013), 2014 (Lavery *et al*, 2015) and 2016 (Lavery *et al*, 2017) 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 17 hectares in 2018. Of all soft fruit crops grown, 19% were grown under permanent protection, 18% were grown under semi-protection and the remaining 64% were grown without protection (Figure 3).

The crop types recorded in this survey (area grown in hectares) were strawberries (10.05 ha) and 'other crops' (6.82 ha). 'Other crops' refer to raspberries, blackberries, gooseberries, blackcurrants, redcurrants and tayberries.

The principal pests and diseases recorded were aphids, spider mites (*Tetranychus urticae*), caterpillars, sawfly, strawberry powdery mildew (*Podosphaera aphanis*), Botrytis and crown rot.



## METHODS

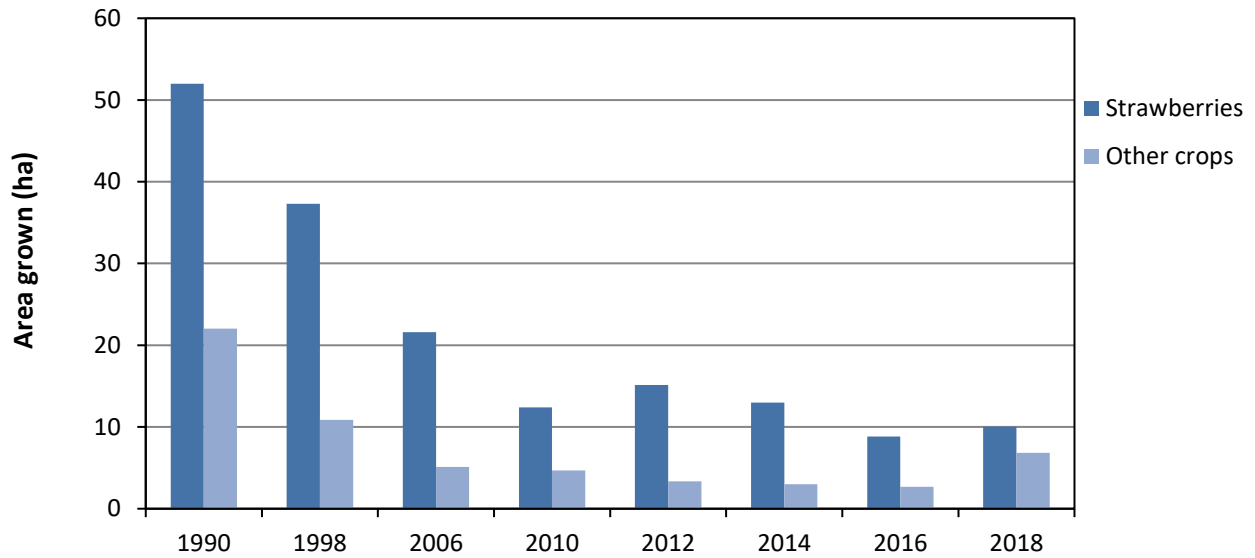
Using the Northern Ireland Agricultural Census, June 2017 (Anon; 2018), Single Farm Payment data (unpublished) and details of growers from previous surveys, the population of soft fruit growers was established and holdings to be surveyed selected. A preliminary letter was sent to growers explaining the purpose of the survey. Of a possible 26 growers, 9 participated in the survey. Growers were visited during February and March 2019 and data relating to pesticide usage were collected by either personal or telephone interview. This survey covers the period from September 2018 to September 2019. The growers' stated reasons for pesticide use were also included, but may not always be appropriate.

## DEFINITIONS AND NOTES

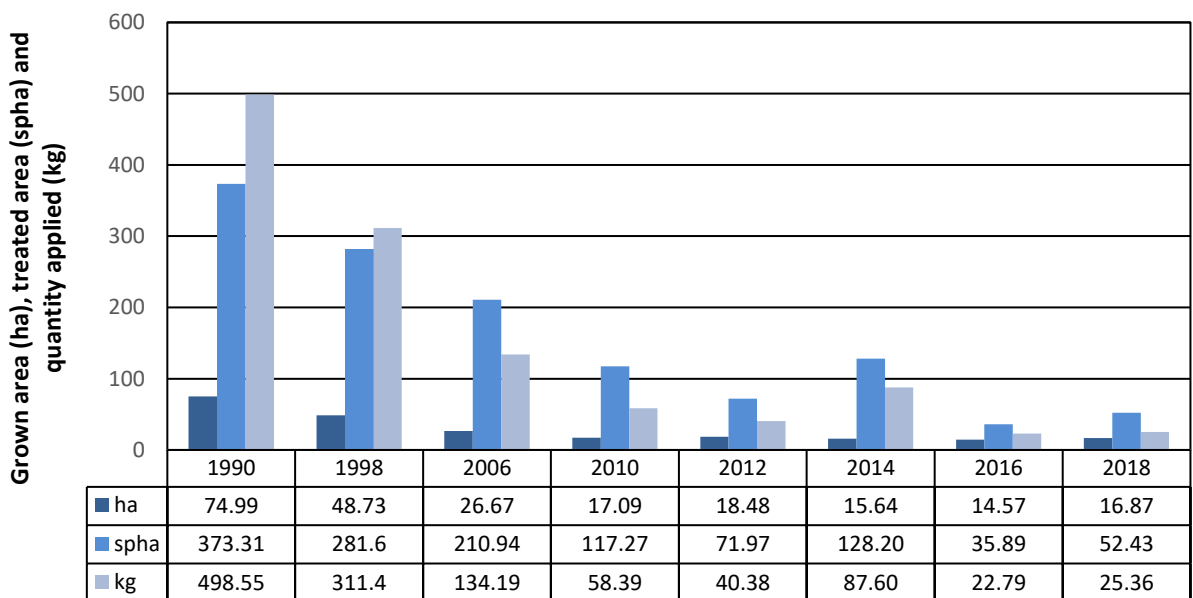
- 'Total grown area' refers to the actual planted area of crop, and is referred to in hectares (ha).
- 'Basic-treated area' refers to the actual planted area of crop which was treated with at least one pesticide application, and is referred to in hectares (ha).
- 'Total-treated area' refers to all applications 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 17% 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, blackberries, gooseberries, blackcurrants, redcurrants and tayberries.
- Herbicides also refer to desiccants where they have been used for weed control in headlands and field margins.

# TRENDS

**Figure 1** Changes in the area (ha) of soft fruit crops grown in Northern Ireland, 1990-2018.

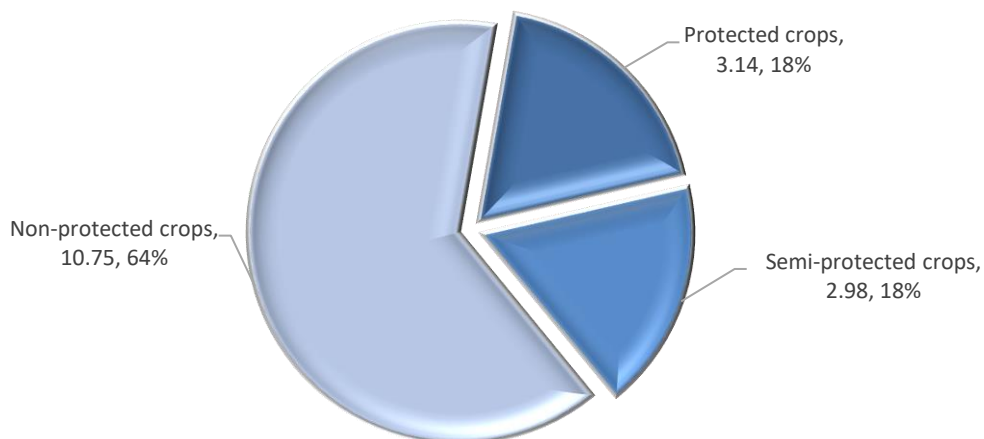


**Figure 2** Changes in the overall grown area (ha), pesticide-treated area (spha) and the total quantity (kg) of active ingredient applied to soft fruit crops in Northern Ireland, 1990–2018.



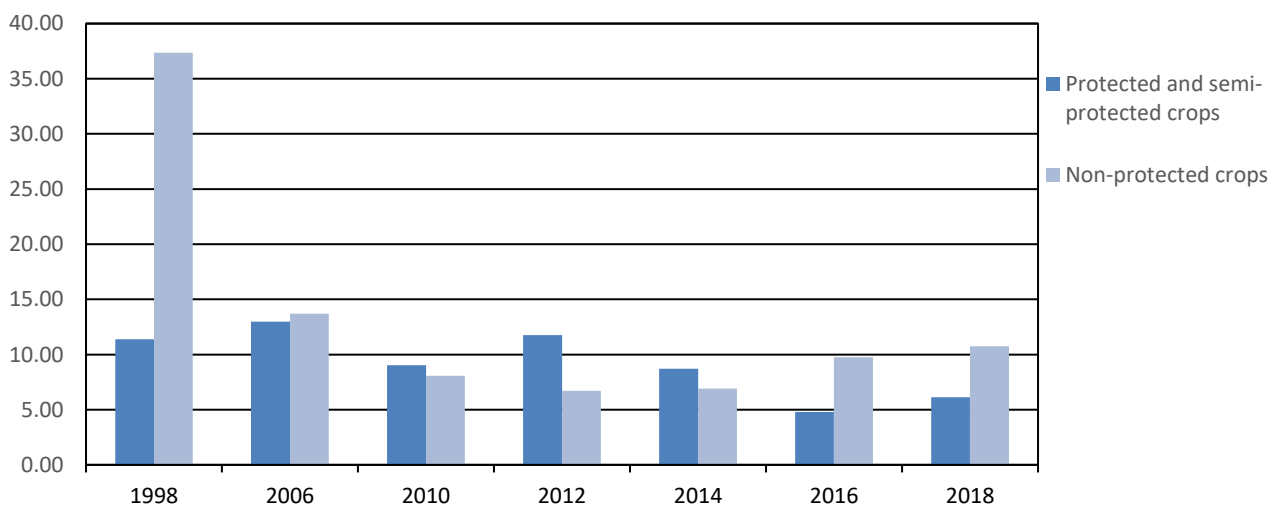
## CROP DISTRIBUTION

**Figure 3** Proportion (%) of soft fruit crops grown in Northern Ireland, 2018 by method of protection.



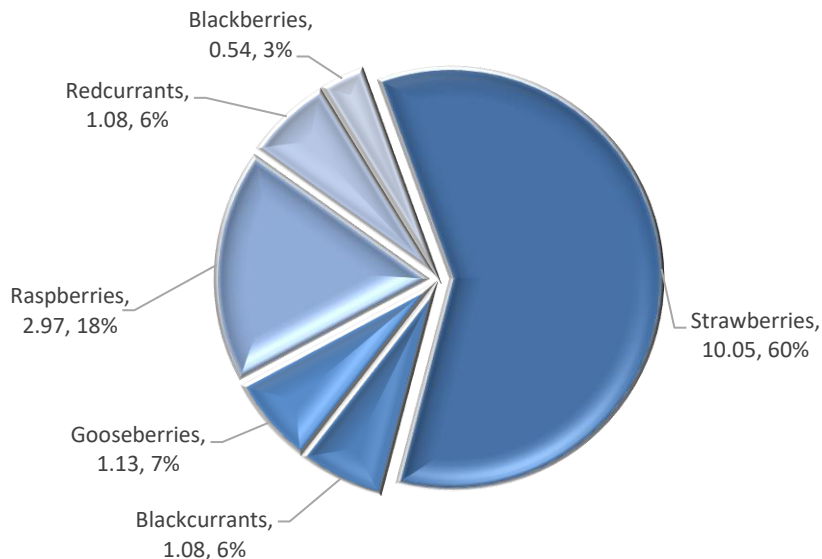
<b>Method of protection</b>	<b>Estimated cropping area of soft fruit (ha)</b>
Protected crops	3.14
Semi-protected crops	2.98
Non-protected crops	10.75

**Figure 4** Changes in method of protection used for soft fruit crops between 1998 and 2018.



<b>Method of protection</b>	<b>1998 (ha)</b>	<b>2006 (ha)</b>	<b>2010 (ha)</b>	<b>2012 (ha)</b>	<b>2014 (ha)</b>	<b>2016 (ha)</b>	<b>2018 (ha)</b>
Protected and semi-protected crops	11.37	12.99	9.03	11.77	8.70	4.80	6.12
Non-protected crops	37.36	13.69	8.06	6.72	6.90	9.77	10.75

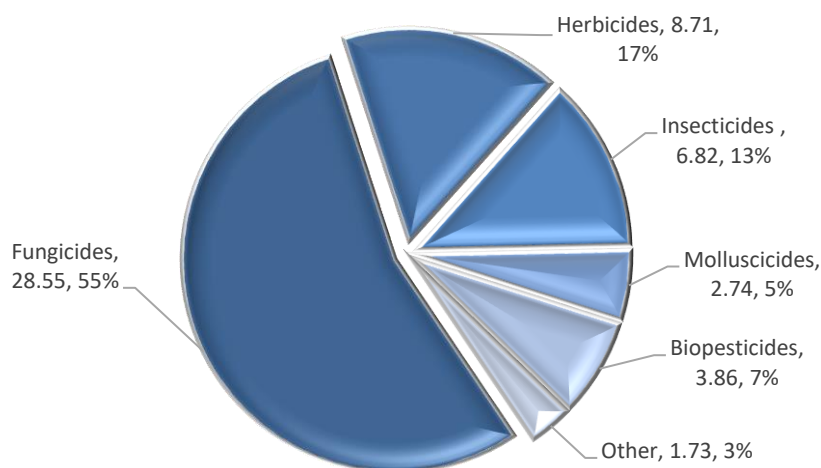
**Figure 5 Utilisation of soft fruit production area (hectares) in Northern Ireland, 2018.**



<b>Crop</b>	<b>Estimated area of soft fruit (ha)</b>
Strawberries	10.05
Blackcurrants	1.08
Gooseberries	1.13
Raspberries	2.97
Redcurrants	1.08
Blackberries	0.54

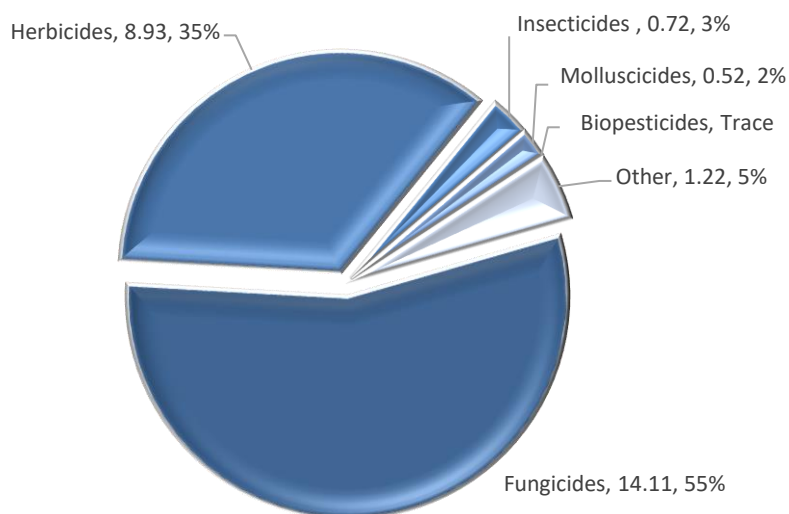
## PESTICIDE USAGE ON CROPS

**Figure 6 Proportional area (spha) of soft fruit crops treated with each pesticide type in Northern Ireland, 2018.**



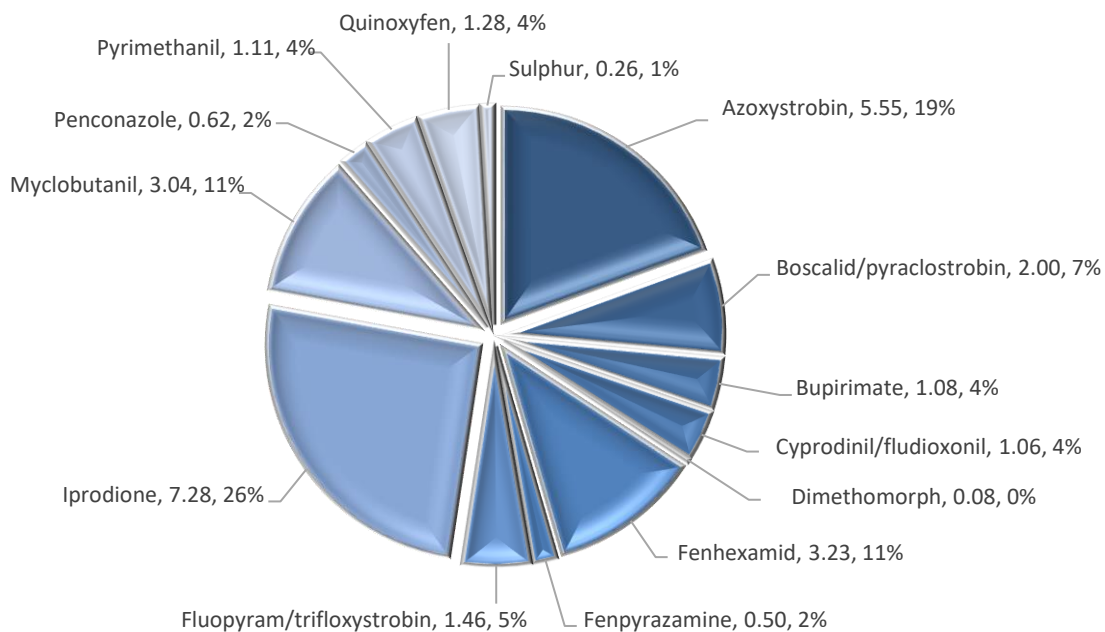
	<b>Fungicides</b>	<b>Herbicides</b>	<b>Insecticides</b>	<b>Molluscicides</b>	<b>Biopesticides</b>	<b>Other</b>
<b>Treated area (spha)</b>	<b>28.55</b>	<b>8.71</b>	<b>6.82</b>	<b>2.74</b>	<b>3.86</b>	<b>1.73</b>

**Figure 7** Proportion of soft fruit crops treated with each pesticide type by weight (kg) in Northern Ireland, 2018.

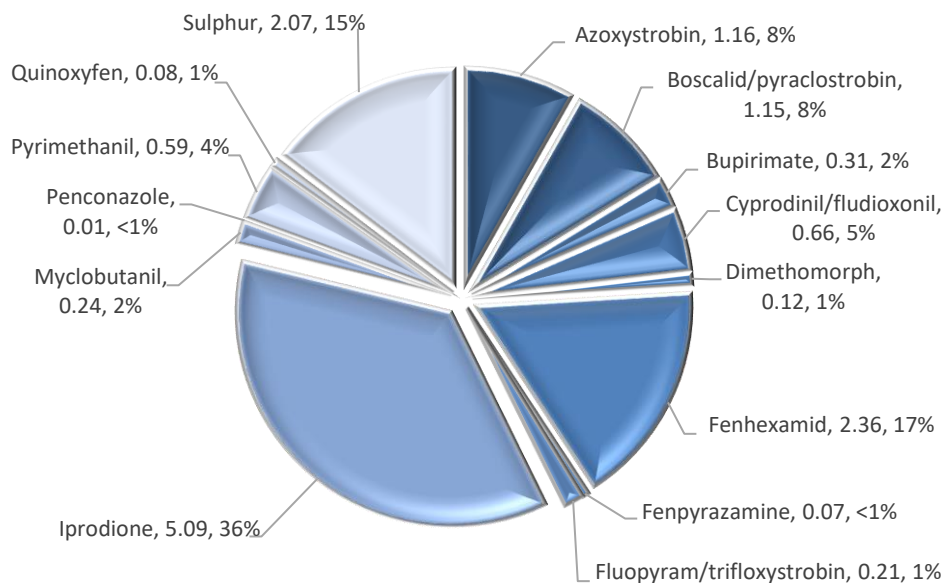


	Fungicides	Herbicides	Insecticides	Molluscicides	Biopesticides	Other
Quantity applied (kg)	14.11	8.93	0.72	0.52	Trace	1.22

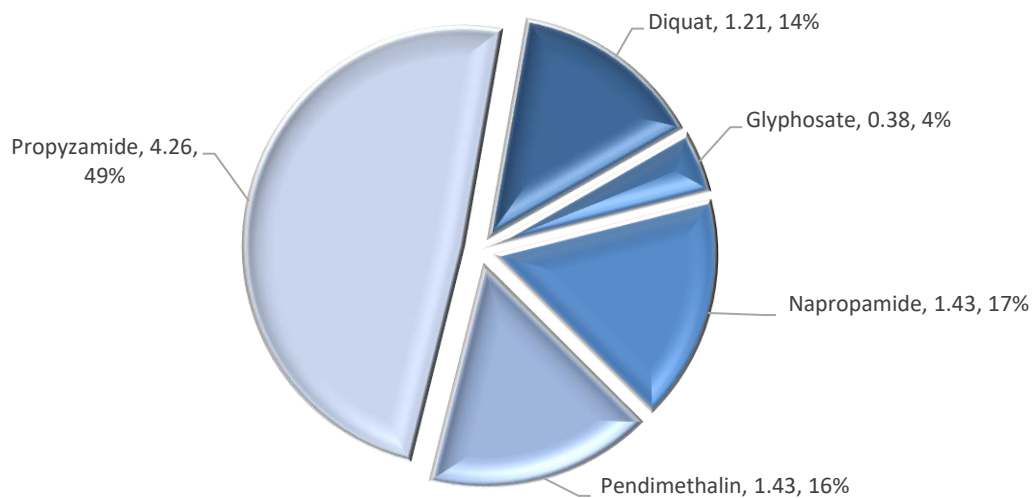
**Figure 8** Total area (spha) of soft fruit crops treated with fungicide active ingredients in Northern Ireland, 2018.



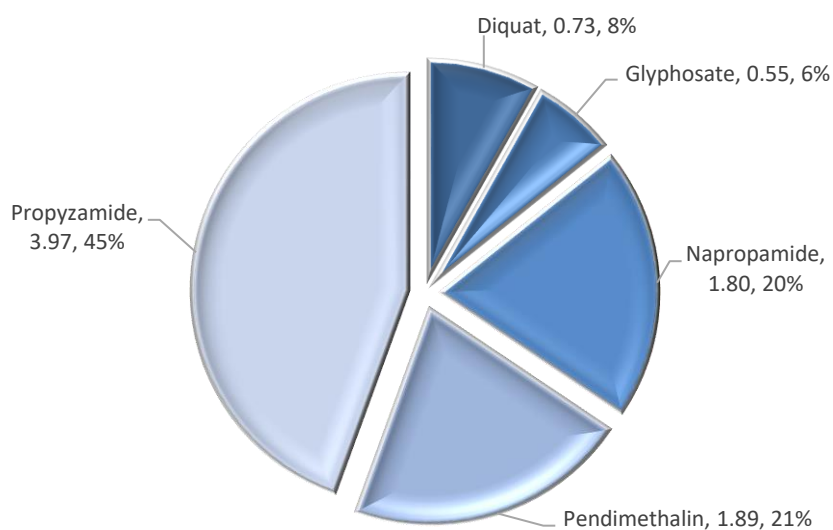
**Figure 9** Total quantity (kg) of soft fruit crops treated with fungicide active ingredients in Northern Ireland, 2018.



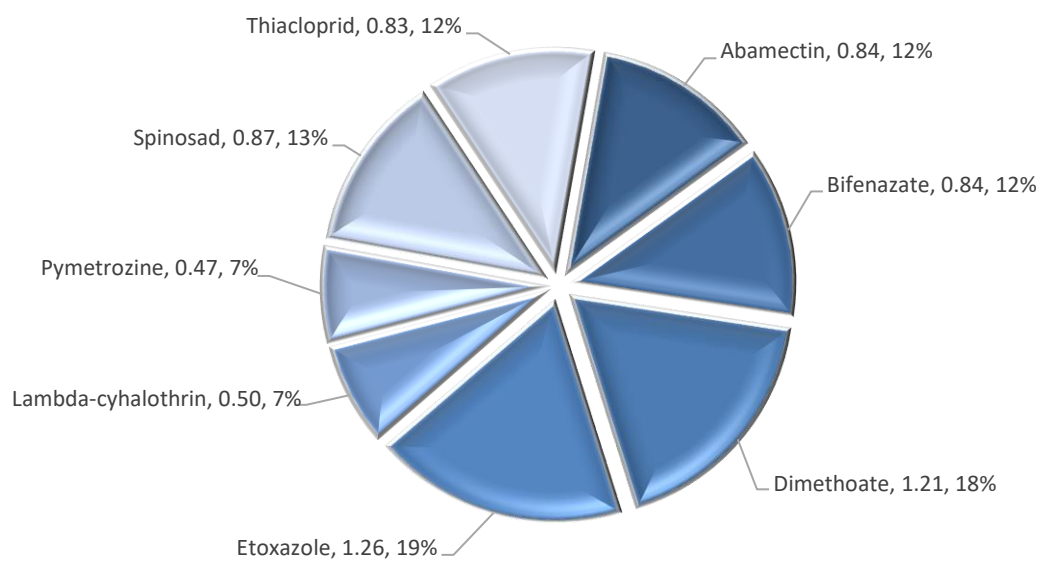
**Figure 10** Total area (spha) of soft fruit crops treated with herbicide active ingredients in Northern Ireland, 2018.



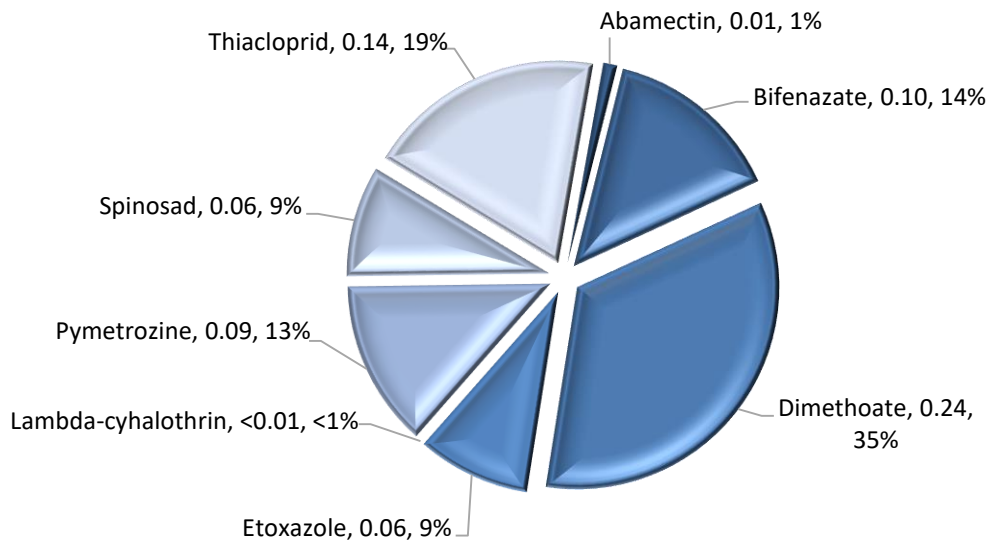
**Figure 11** Total quantity (kg) of herbicide active ingredients applied to soft fruit crops in Northern Ireland, 2018.



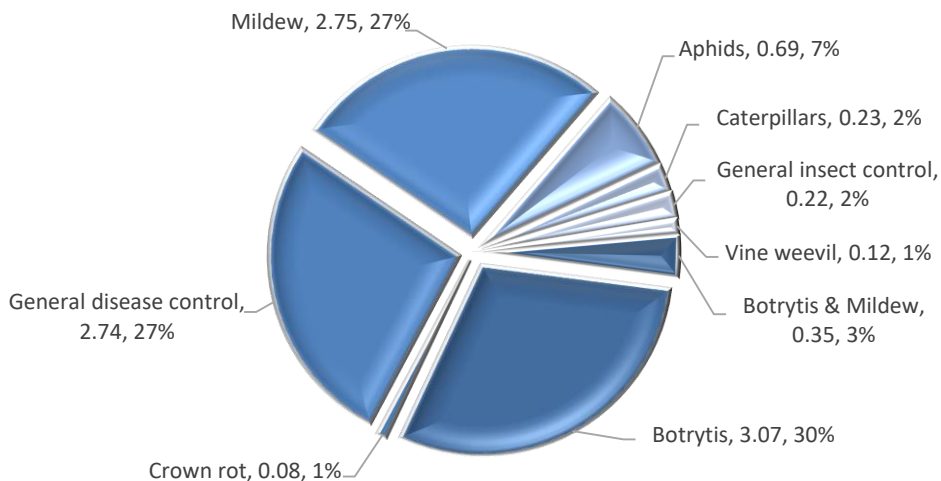
**Figure 12** Total area (spha) of soft fruit crops treated with insecticide active ingredients in Northern Ireland, 2018.



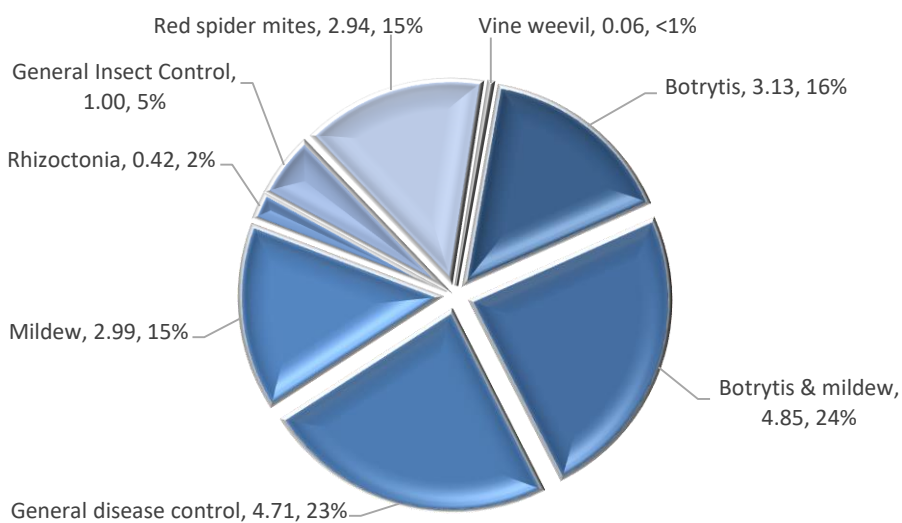
**Figure 13 Total quantity (kg) of insecticide and acaricide active ingredients applied to soft fruit crops in Northern Ireland, 2018.**



**Figure 14: Strawberries (protected): Reasons for use (spha)**

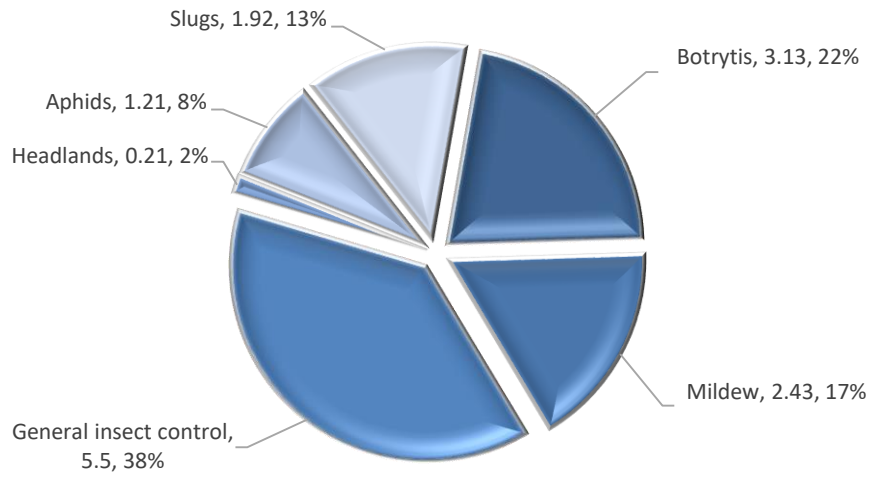


**Figure 15: Strawberries (semi-protected): Reasons for use (spha)**

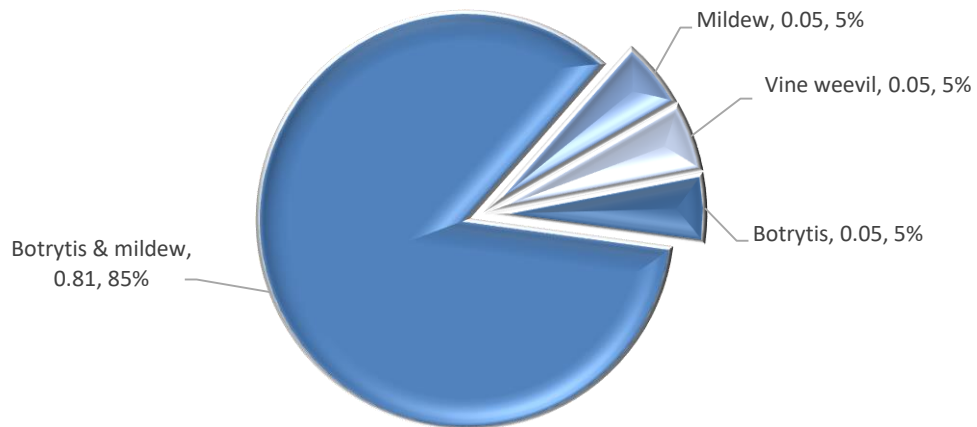




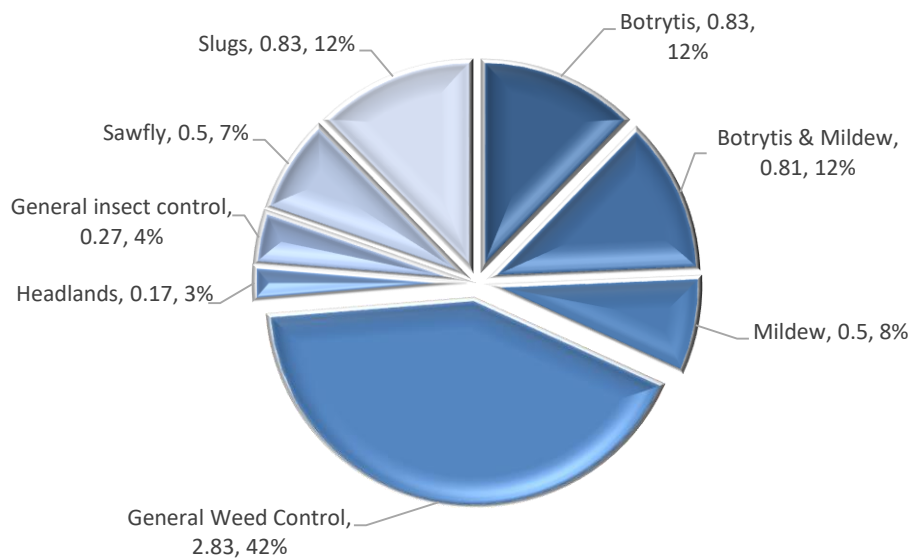
**Figure 16: Strawberries (non-protected): Reasons for use (spha)**



**Figure 17: Other crops (protected): Reasons for use (spha)**



**Figure 18: Other crops (non-protected): Reasons for use (spha)**



## 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 would also like to thank staff at the Science & Advice for Scottish Agriculture (SASA), Edinburgh and Fera Science Limited (FERA), York for their advice on many aspects of this report.

## REFERENCES

**Kidd, S.L.B., Jess, S., McCallion, T. (1994)** Soft Fruit Crops 1990. *Pesticide Usage Survey Report 106* Belfast: HMSO.

**Kearns, C.A., Jess, S., Matthews, D., McCallion, T. (2002)** Soft Fruit Crops 1998. *Pesticide Usage Survey Report 167* Belfast: Textflow Astron.

**Kearns, C.A., Jess, S., Keatings, T., Kelly, T. (2008)** Soft Fruit Crops 2006. *Pesticide Usage Survey Report 218* Belfast: AFBINI.

**Lavery, M.K., Jess, S., Matthews, D., Kelly, T. (2011)** Soft Fruit Crops 2010. *Pesticide Usage Survey Report 240* Belfast: AFBINI.

**Lavery, M.K., Jess, S., Matthews, D., Kelly, T., Patton, A. (2013)** Soft Fruit Crops 2012. *Pesticide Usage Survey Report 248* Belfast: AFBINI.

**Lavery, M.K., Jess, S., Matthews, D., Kelly, T., Patton, A. (2015)** Soft Fruit Crops 2014. *Pesticide Usage Survey Report 262* Belfast: AFBINI.

**Lavery, M.K., Jess, S., McLaughlin J., Matthews, D., Kelly, T. (2017)** Soft Fruit Crops 2016. *Pesticide Usage Survey Report 276* Belfast: AFBINI.

**Table 1** Number of holdings and area (ha) of soft fruit crops sampled in Northern Ireland, 2018.

<i>Region</i>	Total number of holdings	Number of holdings sampled	Area of holding sampled (ha)	Raised area of population (ha)
Northern Ireland	26	9	6.10	16.87

**Table 2** Number and area (ha) of soft fruit crops surveyed in Northern Ireland, 2018.

<i>Crop type and crop location</i>	No. of crops Surveyed	Surveyed area (ha)
Strawberries permanent protection	7	0.90
Strawberries semi-protection	5	1.03
Strawberries field-grown	10	1.61
Other crops permanent protection	2	0.24
Other crops field-grown	15	2.32
<b>All crops</b>	<b>39</b>	<b>6.10</b>

**Table 3** Estimated area (ha) of soft fruit crops grown in Northern Ireland, 2018, 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	2.51	2.98	4.56	10.05
Other crops	0.63	.	6.19	6.82
<b>All crops</b>	<b>3.14</b>	<b>2.98</b>	<b>10.75</b>	<b>16.87</b>

**Table 4 Basic-treated area (ha) and the total-treated area (spha) of soft fruit crops in Northern Ireland, 2018 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	1.06	8.05	.	.	0.33	0.90	0.47	0.82	.	.	0.69	0.47	1.06	10.24
Other crops	0.32	0.90	.	.	.	.	0.05	0.05	.	.	.	.	0.32	0.95
<b>All protected</b>	.	<b>8.95</b>	.	.	.	<b>0.90</b>	.	<b>0.87</b>	.	.	.	<b>0.47</b>	.	<b>11.19</b>
<b>Semi-protected</b>														
Strawberries	1.23	11.90	.	.	1.00	3.94	0.48	3.00	.	.	0.42	1.26	1.29	20.10
Other crops	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>All semi-protected</b>	.	<b>11.90</b>	.	.	.	<b>3.94</b>	.	<b>3.00</b>	.	.	.	<b>1.26</b>	.	<b>20.10</b>
<b>Non-protected</b>														
Strawberries	1.92	5.56	2.64	5.72	1.21	1.21	.	.	1.92	1.92	.	.	2.71	14.41
Other crops	1.60	2.13	2.83	2.99	0.77	0.77	.	.	0.83	0.83	.	.	3.18	6.72
<b>All non-protected</b>	.	<b>7.69</b>	.	<b>8.71</b>	.	<b>1.98</b>	.	.	.	<b>2.74</b>	.	.	.	<b>21.12</b>
<b>All crops</b>														
Strawberries	4.21	25.52	2.64	5.72	2.55	6.05	0.94	3.82	1.92	1.92	1.11	1.73	5.06	44.75
Other crops	1.91	3.04	2.83	2.99	0.77	0.77	0.05	0.05	0.83	0.83	.	.	3.49	7.67
<b>Total</b>	.	<b>28.55</b>	.	<b>8.71</b>	.	<b>6.82</b>	.	<b>3.86</b>	.	<b>2.74</b>	.	<b>1.73</b>	.	<b>52.41</b>

**Table 5** Total quantity (kg) of pesticide type applied to soft fruit crops in Northern Ireland, 2018.

<i>Method of protection and crop type</i>	Fungicides (kg)	Herbicides (kg)	Insecticides and acaricides (kg)	Molluscicides (kg)	Biopesticides (kg)	Other (kg)	All pesticides (kg)
<b>Protected</b>							
Strawberries	5.73	.	0.14	.	Trace	0.38	6.25
Other crops	0.38	.	.	.	Trace	.	0.38
<b>All Protected</b>	<b>6.11</b>	<b>.</b>	<b>0.14</b>	<b>.</b>	<b>Trace</b>	<b>0.38</b>	<b>6.63</b>
<b>Semi-protected</b>							
Strawberries	3.72	.	0.31	.	Trace	0.84	4.87
Other crops	.	.	.	.	.	.	.
<b>All semi-protected</b>	<b>3.72</b>	<b>.</b>	<b>0.31</b>	<b>.</b>	<b>Trace</b>	<b>0.84</b>	<b>4.87</b>
<b>Non-protected</b>							
Strawberries	3.28	5.47	0.24	0.27	.	.	9.26
Other crops	1.00	3.47	0.02	0.25	.	.	4.74
<b>All non-protected</b>	<b>4.28</b>	<b>8.93</b>	<b>0.27</b>	<b>0.52</b>	<b>.</b>	<b>.</b>	<b>14.00</b>
<b>All locations</b>							
Strawberries	12.73	5.47	0.69	0.27	Trace	1.22	20.38
Other crops	1.38	3.47	0.02	0.25	.	.	5.12
<b>All crops</b>	<b>14.11</b>	<b>8.93</b>	<b>0.72</b>	<b>0.52</b>	<b>Trace</b>	<b>1.22</b>	<b>25.50</b>

**Table 6** The mean number of spray applications to soft fruit crops in Northern Ireland, 2018.

<i>Crop type</i>	Fungicides	Herbicides	Insecticides and acaricides	Molluscicides	Biopesticides	Others	All pesticides
Strawberries	5.46	2.03	2.58	1.00	3.23	1.72	3.39
Blackberry	3.00	.	1.00	.	.	.	2.00
Blackcurrant	1.00	1.33	.	1.00	.	.	1.14
Gooseberry	1.00	1.33	1.00	1.00	.	.	1.11
Raspberry	1.75	1.33	.	1.00	1.00	.	1.40
Redcurrant	1.00	1.33	.	1.00	.	.	1.14
Tayberry	1.00	1.50	.	1.00	.	.	1.17
<b>All crops</b>	<b>3.82</b>	<b>2.03</b>	<b>2.25</b>	<b>1.00</b>	<b>2.81</b>	<b>1.72</b>	<b>2.50</b>

**Table 7** Estimated area (spha) of soft fruit crops treated with pesticide active ingredients in Northern Ireland, 2018.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total treated area (spha)</i>
	<i>Strawberries</i>	<i>Other crops</i>	
<b><i>Fungicides</i></b>			
Azoxystrobin	4.48	1.08	5.55
Boscalid/pyraclostrobin	2.00		2.00
Bupirimate	1.08		1.08
Cyprodinil/fludioxonil	1.06		1.06
Dimethomorph	0.08		0.08
Fenhexamid	2.40	0.83	3.23
Fenpyrazamine	0.50		0.50
Fluopyram/trifloxystrobin	1.46		1.46
Iprodione	6.70	0.59	7.28
Myclobutanil	2.50	0.55	3.04
Penconazole	0.62		0.62
Pyrimethanil	1.11		1.11
Quinoxifen	1.28		1.28
Sulphur	0.26		0.26
<b>All fungicides</b>	<b>25.52</b>	<b>3.04</b>	<b>28.55</b>
<b><i>Herbicides</i></b>			
Diquat	1.21		1.21
Glyphosate	0.21	0.17	0.38
Napropamide	1.43		1.43
Pendimethalin	1.43		1.43
Propyzamide	1.43	2.83	4.26
<b>All herbicides</b>	<b>5.72</b>	<b>2.99</b>	<b>8.71</b>

**Table 7 (cont)** Estimated area (spha) of soft fruit crops treated with pesticide active ingredients in Northern Ireland, 2018.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total treated area (spha)</i>
	<i>Strawberries</i>	<i>Other crops</i>	
<b><i>Insecticides and acaricides</i></b>			
Abamectin	0.84	.	0.84
Bifenazate	0.84	.	0.84
Dimethoate	1.21	.	1.21
Etoxazole	1.26	.	1.26
Lambda-cyhalothrin	.	0.50	0.50
Pymetrozine	0.47	.	0.47
Spinosad	0.60	0.27	0.87
Thiacloprid	0.83	.	0.83
<b>All insecticides and acaricides</b>	<b>6.05</b>	<b>0.77</b>	<b>6.82</b>
<b><i>Biopesticides</i></b>			
<i>Bacillus thuringiensis</i>	0.23	.	0.23
<i>Bacillus subtilis</i>	2.99	.	2.99
<i>Gliocladium catenulatum</i>	0.42	.	0.42
<i>Steinernema feltiae</i>	0.12	0.05	0.16
<i>Steinernema kraussei</i>	0.06	.	0.06
<b>All biopesticides</b>	<b>3.82</b>	<b>0.05</b>	<b>3.86</b>
<b><i>Molluscicides</i></b>			
Ferric phosphate	1.21	.	1.21
Metaldehyde	0.70	0.83	1.53
<b>All molluscicides</b>	<b>1.92</b>	<b>0.83</b>	<b>2.74</b>
<b><i>Other products</i></b>			
Natural product	1.73	.	1.73
<b>All other products</b>	<b>1.73</b>	<b>.</b>	<b>1.73</b>
<b>All pesticides</b>	<b>44.75</b>	<b>7.67</b>	<b>52.41</b>



**Table 8** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2018.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total quantity applied (kg)</i>
	<i>Strawberries</i>	<i>Other crops</i>	
<b><i>Fungicides</i></b>			
Azoxystrobin	0.89	0.27	1.16
Boscalid/pyraclostrobin	1.15	.	1.15
Bupirimate	0.31	.	0.31
Cyprodinil/fludioxonil	0.66	.	0.66
Dimethomorph	0.12	.	0.12
Fenhexamid	1.74	0.62	2.36
Fenpyrazamine	0.07	.	0.07
Fluopyram/trifloxystrobin	0.21	.	0.21
Iprodione	4.65	0.44	5.09
Myclobutanil	0.19	0.05	0.24
Penconazole	0.01	.	0.01
Pyrimethanil	0.59	.	0.59
Quinoxifen	0.08	.	0.08
Sulphur	2.07	.	2.07
<b>All fungicides</b>	<b>12.73</b>	<b>1.38</b>	<b>14.11</b>
<b><i>Herbicides</i></b>			
Diquat	0.73	.	0.73
Glyphosate	0.31	0.24	0.55
Napropamide	1.80	.	1.80
Pendimethalin	1.89	.	1.89
Propyzamide	0.74	3.23	3.97
<b>All herbicides</b>	<b>5.47</b>	<b>3.47</b>	<b>8.93</b>

**Table 8 (cont)** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2018.

<i>Pesticide group &amp; active ingredient</i>	<i>Crop type</i>		<i>Total quantity applied (kg)</i>
	<i>Strawberries</i>	<i>Other crops</i>	
<b><i>Insecticides and acaricides</i></b>			
Abamectin	0.01	.	0.01
Bifenazate	0.10	.	0.10
Dimethoate	0.24	.	0.24
Etoxazole	0.06	.	0.06
Lambda-cyhalothrin	.	<0.01	<0.01
Pymetrozine	0.09	.	0.09
Spinosad	0.04	0.02	0.06
Thiacloprid	0.14	.	0.14
<b>All insecticides and acaricides</b>	<b>0.69</b>	<b>0.02</b>	<b>0.71</b>
<b><i>Biopesticides</i></b>			
<i>Bacillus thuringiensis</i>	Trace	.	Trace
<i>Bacillus subtilis</i>	Trace	.	Trace
<i>Gliodadium catenulatum</i>	Trace	.	Trace
<i>Steinernema feltiae</i>	Trace	Trace	Trace
<i>Steinernema kraussei</i>	Trace	.	Trace
<b>All biopesticides</b>	<b>Trace</b>	<b>Trace</b>	<b>Trace</b>
<b><i>Molluscicides</i></b>			
Ferric phosphate	0.06	.	0.06
Metaldehyde	0.21	0.25	0.46
<b>All molluscicides</b>	<b>0.27</b>	<b>0.25</b>	<b>0.52</b>
<b><i>Other products</i></b>			
Natural product	1.22	.	1.22
<b>All other products</b>	<b>1.22</b>	<b>.</b>	<b>1.22</b>
<b>All pesticides</b>	<b>20.37</b>	<b>5.12</b>	<b>25.50</b>

**Table 9** The active ingredients most extensively used on soft fruit crops in Northern Ireland, 2018 ranked by treated area (spha).

No.	Active ingredient	Treated area (spha)
1	Iprodione	7.28
2	Azoxystrobin	5.55
3	Propyzamide	4.26
4	Fenhexamid	3.23
5	Myclobutanil	3.04
6	<i>Bacillus subtilis</i>	2.99
7	Pyraclostrobin	2.00
8	Boscalid	2.00
9	Metaldehyde	1.53
10	Trifloxystrobin	1.46
11	Fluopyram	1.46
12	Napropamide	1.43
13	Pendimethalin	1.43
14	Quinoxifen	1.27
15	Etoazole	1.26
16	Dimethoate	1.21
17	Diquat	1.21
18	Ferric phosphate	1.21
19	Pyrimethanil	1.11
20	Bupirimate	1.08
21	Cyprodinil	1.06
22	Fludioxonil	1.06
23	Spinosad	0.87
24	Abamectin	0.84
25	Bifenazate	0.84
26	Thiacloprid	0.83
27	Penconazole	0.62
28	Lambda-cyhalothrin	0.50
29	Fenpyrazamine	0.50
30	Pymetrozine	0.47
31	<i>Gliocladium catenulatum</i>	0.42
32	Glyphosate	0.38
33	Sulphur	0.26
34	<i>Bacillus thuringiensis</i>	0.23
35	<i>Steinernema feltiae</i>	0.16
36	Dimethomorph	0.08
37	<i>Steinernema kraussei</i>	0.06

**Table 10** The active ingredients most extensively used on soft fruit crops in Northern Ireland, 2018 ranked by weight (kg).

No.	Active ingredient	Quantity applied (kg)
1	Iprodione	5.09
2	Propyzamide	3.97
3	Fenhexamid	2.36
4	Sulphur	2.07
5	Pendimethalin	1.89
6	Napropamide	1.80
7	Azoxystrobin	1.16
8	Boscalid	0.92
9	Diquat	0.73
10	Pyrimethanil	0.59
11	Glyphosate	0.55
12	Metaldehyde	0.46
13	Cyprodinil	0.40
14	Bupirimate	0.31
15	Fludioxonil	0.26
16	Dimethoate	0.24
17	Myclobutanil	0.24
18	Pyraclostrobin	0.23
19	Thiacloprid	0.14
20	Dimethomorph	0.12
21	Trifloxystrobin	0.10
22	Fluopyram	0.10
23	Bifenazate	0.10
24	Pymetrozine	0.09
25	Quinoxifen	0.08
26	Fenpyrazamine	0.07
27	Etoxazole	0.06
28	Spinosad	0.06
29	Ferric phosphate	0.06
30	Penconazole	0.01
31	Abamectin	0.01
32	Lambda-cyhalothrin	<0.01
33	<i>Bacillus subtilis</i>	Trace
34	<i>Bacillus thuringiensis</i>	Trace
35	<i>Glomerella catenulatum</i>	Trace
36	<i>Steinernema feltiae</i>	Trace
37	<i>Steinernema kraussei</i>	Trace

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

Pesticide group & active ingredient	Reason for treatment									Total treated area (spha)	Quantity applied (kg)
	Botrytis & Mildew	Botrytis	Crown rot	General disease control	Mildew	Aphids	Caterpillars	General insect control	Vine weevil		
<b>Fungicides</b>											
Azoxystrobin	.	.	.	0.28	1.17	.	.	.	.	1.44	0.31
Boscalid/pyraclostrobin	.	.	.	0.35	.	.	.	.	.	0.35	0.21
Bupirimate	.	.	.	0.12	0.35	.	.	.	.	0.47	0.11
Cyprodinil/fludioxonil	.	.	.	0.35	.	.	.	.	.	0.35	0.22
Dimethomorph	.	.	0.08	.	.	.	.	.	.	0.08	0.12
Fenhexamid	.	0.35	.	.	.	.	.	.	.	0.35	0.26
Fenpyrazamine	.	.	.	0.12	.	.	.	.	.	0.12	0.02
Fluopyram/trifloxystrobin	.	.	.	0.08	0.07	.	.	.	.	0.15	0.03
Iprodione	.	1.99	.	0.47	.	.	.	.	.	2.46	1.77
Myclobutanil	.	.	.	0.35	0.35	.	.	.	.	0.70	0.04
Penconazole	.	.	.	0.08	0.12	.	.	.	.	0.20	0.01
Pyrimethanil	.	0.61	.	0.08	.	.	.	.	.	0.69	0.51
Quinoxifen	.	.	.	.	0.43	.	.	.	.	0.43	0.04
Sulphur	.	.	.	.	0.26	.	.	.	.	0.26	2.07
<b>All fungicides</b>	.	<b>2.95</b>	<b>0.08</b>	<b>2.27</b>	<b>2.75</b>	.	.	.	.	<b>8.05</b>	<b>5.73</b>
<b>Insecticides and acaricides</b>											
Pymetrozine	.	.	.	.	.	0.47	.	.	.	0.47	0.09
Spinosad	.	.	.	.	.	0.22	.	.	.	0.22	0.02
Thiacloprid	.	.	.	.	.	.	.	0.22	.	0.22	0.03
<b>All insecticides and acaricides</b>	.	.	.	.	.	<b>0.69</b>	.	<b>0.22</b>	.	<b>0.91</b>	<b>0.14</b>
<b>Biopesticides</b>											
<i>Bacillus thuringiensis</i>	.	.	.	.	.	.	0.23	.	.	0.23	Trace
<i>Bacillus subtilis</i>	0.35	0.12	.	.	.	.	.	.	.	0.47	Trace
<i>Steinernema feltiae</i>	.	.	.	.	.	.	.	.	0.12	0.12	Trace
<b>All biopesticides</b>	<b>0.35</b>	<b>0.12</b>	.	.	.	.	<b>0.23</b>	.	<b>0.12</b>	<b>0.82</b>	<b>Trace</b>
<b>Other products</b>											
Natural product	.	.	.	0.47	.	.	.	.	.	0.47	0.38
<b>All other products</b>	.	.	.	<b>0.47</b>	.	.	.	.	.	<b>0.47</b>	<b>0.38</b>

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

Pesticide group & active ingredient	Reason for treatment								Total treated area (spha)	Quantity applied (kg)
	Botrytis	Botrytis & mildew	General disease control	Mildew	Rhizoctonia	General Insect Control	Red spider mites	Vine weevil		
<b>Fungicides</b>										
Azoxystrobin	0.42	1.20	0.81	0.61	.	.	.	.	3.03	0.57
Boscalid/pyraclostrobin	.	1.65	.	.	.	.	.	.	1.65	0.93
Bupirimate	.	.	0.19	0.42	.	.	.	.	0.61	0.20
Fenhexamid	0.84	.	.	.	.	.	.	.	0.84	0.57
Fenpyrazamine	.	.	0.38	.	.	.	.	.	0.38	0.05
Fluopyram/trifloxystrobin	.	.	0.61	0.69	.	.	.	.	1.31	0.18
Iprodione	0.84	0.78	0.19	.	.	.	.	.	1.81	1.06
Myclobutanil	.	0.39	0.19	.	.	.	.	.	0.58	0.03
Penconazole	.	.	0.42	.	.	.	.	.	0.42	0.01
Pyrimethanil	0.19	.	0.23	.	.	.	.	.	0.42	0.08
Quinoxifen	.	.	.	0.84	.	.	.	.	0.84	0.05
<b>All fungicides</b>	<b>2.29</b>	<b>4.01</b>	<b>3.03</b>	<b>2.57</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>11.90</b>	<b>3.72</b>
<b>Insecticides and acaricides</b>										
Abamectin	.	.	.	.	.	.	0.84	.	0.84	0.01
Bifenazate	.	.	.	.	.	.	0.84	.	0.84	0.10
Etoxazole	.	.	.	.	.	.	1.26	.	1.26	0.06
Spinosad	.	.	.	.	.	0.39	.	.	0.39	0.03
Thiacloprid	.	.	.	.	.	0.61	.	.	0.61	0.11
<b>All insecticides and acaricides</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>1.00</b>	<b>2.94</b>	<b>.</b>	<b>3.94</b>	<b>1.90</b>
<b>Biopesticides</b>										
<i>Bacillus subtilis</i>	0.84	0.84	0.42	0.42	.	.	.	.	2.52	Trace
<i>Gliocladium catenulatum</i>	.	.	.	.	0.42	.	.	.	0.42	Trace
<i>Steinernema krausse</i>	.	.	.	.	.	.	.	0.06	0.06	Trace
<b>All biopesticides</b>	<b>0.84</b>	<b>0.84</b>	<b>0.42</b>	<b>0.42</b>	<b>0.42</b>	<b>.</b>	<b>.</b>	<b>0.06</b>	<b>3.00</b>	<b>Trace</b>
<b>Other products</b>										
Natural product	.	.	1.26	.	.	.	.	.	1.26	0.84
<b>All other products</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>1.26</b>	<b>0.8</b>

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

<i>Pesticide group &amp; active ingredient</i>	<i>Reason for treatment</i>						<b>Total treated area (spha)</b>	<b>Quantity applied (kg)</b>
	<b>Botrytis</b>	<b>Mildew</b>	<b>General weed control</b>	<b>Headlands</b>	<b>Aphids</b>	<b>Slugs</b>		
<b><i>Fungicides</i></b>								
Cyprodinil/fludioxonil	0.70	.	.	.	.	.	0.70	0.44
Fenhexamid	.	1.21	.	.	.	.	1.21	0.91
Iprodione	2.43	.	.	.	.	.	2.43	1.82
Myclobutanil	.	1.21	.	.	.	.	1.21	0.11
<b><i>All fungicides</i></b>	<b>3.13</b>	<b>2.43</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>5.56</b>	<b>3.28</b>
<b><i>Herbicides</i></b>								
Diquat	.	.	1.21	.	.	.	1.21	0.73
Glyphosate	.	.	.	0.21	.	.	0.21	0.31
Napropamide	.	.	1.43	.	.	.	1.43	1.80
Pendimethalin	.	.	1.43	.	.	.	1.43	1.89
Propyzamide	.	.	1.43	.	.	.	1.43	0.74
<b><i>All herbicides</i></b>	<b>.</b>	<b>.</b>	<b>5.50</b>	<b>0.21</b>	<b>.</b>	<b>.</b>	<b>5.72</b>	<b>5.47</b>
<b><i>Insecticides and acaricides</i></b>								
Dimethoate	.	.	.	.	1.21	.	1.21	0.24
<b><i>All insecticides and acaricides</i></b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>1.21</b>	<b>.</b>	<b>1.21</b>	<b>0.24</b>
<b><i>Molluscicides</i></b>								
Ferric phosphate	.	.	.	.	.	1.21	1.21	0.06
Metaaldehyde	.	.	.	.	.	0.70	0.70	0.21
<b><i>All molluscicides</i></b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>1.92</b>	<b>1.92</b>	<b>0.27</b>

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

<i>Pesticide group &amp; active ingredient</i>	<i>Reason for use</i>				<b>Total treated area (spha)</b>	<b>Quantity (kg)</b>
	<b>Botrytis</b>	<b>Botrytis &amp; mildew</b>	<b>Mildew</b>	<b>Vine weevil</b>		
<b><i>Fungicides</i></b>						
Azoxystrobin	.	0.54	.	.	0.54	0.13
Iprodione	0.05	0.27	.	.	0.32	0.24
Myclobutanil	.		0.05	.	0.05	<0.01
<b>All fungicides</b>	<b>0.05</b>	<b>0.81</b>	<b>0.05</b>	<b>.</b>	<b>0.90</b>	<b>0.38</b>
<b><i>Biopesticides</i></b>						
<i>Steinernema feltiae</i>	.	.	.	0.05	0.05	Trace
<b>All biopesticides</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>0.05</b>	<b>0.05</b>	<b>Trace</b>



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

<i>Pesticide group &amp; active ingredient</i>	<i>Reason for use</i>								<b>Total treated area (spha)</b>	<b>Quantity (kg)</b>
	<b>Botrytis</b>	<b>Botrytis &amp; Mildew</b>	<b>Mildew</b>	<b>General Weed Control</b>	<b>Headlands</b>	<b>General insect control</b>	<b>Sawfly</b>	<b>Slugs</b>		
<b><i>Fungicides</i></b>										
Azoxystrobin	.	0.54	.	.	.	.	.	.	0.54	0.13
Fenhexamid	0.83	.	.	.	.	.	.	.	0.83	0.62
Iprodione	.	0.27	.	.	.	.	.	.	0.27	0.20
Myclobutanil	.	.	0.50	.	.	.	.	.	0.50	0.05
<b>All fungicides</b>	<b>0.83</b>	<b>0.81</b>	<b>0.50</b>	.	.	.	.	.	<b>2.13</b>	<b>1.00</b>
<b><i>Herbicides</i></b>										
Glyphosate	.	.	.	.	0.17	.	.	.	0.17	0.24
Propyzamide	.	.	.	2.83	.	.	.	.	2.83	3.23
<b>All herbicides</b>	.	.	.	<b>2.83</b>	<b>0.17</b>	.	.	.	<b>2.99</b>	<b>3.47</b>
<b><i>Insecticides and acaricides</i></b>										
Lambda-cyhalothrin	.	.	.	.	.	.	0.50	.	0.50	<0.01
Spinosad	.	.	.	.	.	0.27	.	.	0.27	0.02
<b>All insecticides and acaricides</b>	.	.	.	.	.	<b>0.27</b>	<b>0.50</b>	.	<b>0.77</b>	<b>0.02</b>
<b><i>Molluscicides</i></b>										
Metaldehyde	.	.	.	.	.	.	.	0.83	0.83	0.25
<b>All molluscicides</b>	.	.	.	.	.	.	.	<b>0.83</b>	<b>0.83</b>	<b>0.25</b>

**Table 16 Comparison of pesticide usage on soft fruit crops 1990-2018, total area treated (spha) with main pesticide groups and quantities of active ingredient (kg) used.**

Pesticide group	1990		1998		2006		2010		2012		2014		2016		2018	
	(spha)	(kg)	(spha)	(kg)	(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	13.70	8.20	28.55	14.11
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	16.44	12.76	8.71	8.93
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	5.64	1.82	6.82	0.72
Molluscicides	8.83	1.79	22.96	10.00	1.72	1.29	.	.	1.09	0.16	1.10	0.20	.	.	2.74	0.52
Biopesticides	.	.	1.50	Trace	11.40	Trace	7.04	Trace	2.15	Trace	1.20	Trace	0.11	Trace	3.86	Trace
Other products	.	.	.	.	.	.	0.62	1.91	.	.	0.90	18.70	.	.	1.73	1.22
<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>	<b>35.89</b>	<b>22.78</b>	<b>52.41</b>	<b>25.50</b>

**Table 17 Comparison of pesticide usage on strawberry crops\* 1990-2018, total area (spha) treated with main pesticide groups and quantities of active ingredient (kg) used.**

Pesticide group	1990		1998		2006		2010		2012		2014		2016		2018	
	(spha)	(kg)	(spha)	(kg)	(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	13.70	8.20	25.52	12.73
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	8.46	7.88	5.72	5.47
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	4.88	0.62	6.05	0.69
Molluscicides	8.42	1.70	22.47	9.91	1.72	1.29	.	.	1.09	0.16	1.10	0.20	.	.	1.92	0.27
Biopesticides	.	.	1.45	Trace	11.31	Trace	6.79	Trace	2.15	Trace	1.20	Trace	0.11	Trace	3.82	Trace
Other products	.	.	.	.	.	.	0.62	1.91	.	.	0.90	18.70	.	.	1.73	1.22
<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>	<b>27.15</b>	<b>16.70</b>	<b>44.75</b>	<b>20.38</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
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

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

Report No.	Report title	ISBN
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
260	Arable Crops 2014	1-84807-552-8
261	Top Fruit Crops 2014	1-84807-553-5
262	Soft Fruit Crops 2014	1-84807-571-9
267	Edible Protected Crops 2015	1-84807-684-6
268	Outdoor Vegetable Crops 2015	1-84807-685-3
275	Arable crops 2016	1-84807-808-6
276	Soft Fruit Crops 2016	1-84807-809-3
277	Top Fruit Crops 2016	1-84807-810-9
280	Edible Protected Crops 2017	1-84807-918-2
281	Vegetable Crops 2017	1-84807-917-5
282	Grassland & Fodder Crops 2017	1-84807-916-8

**ISBN 978-1-83887-065-2**