

PESTICIDE USAGE IN NORTHERN IRELAND

Survey Report 300

Northern Ireland Soft Fruit Crops 2020

A National Statistics Publication



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PESTICIDE USAGE SURVEY REPORT

SOFT FRUIT CROPS IN NORTHERN IRELAND 2020

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CONTENTS

● Summary	1
● Introduction	3
● Methods	4
● Definitions and Notes	5
● Trends	6
● Figures 1-17 (Index below)	6
● Crop Distribution	7
● Pesticide Usage on Crops	9
● Acknowledgements	14
● References	14
● Tables 1-17 (Index below)	15
● Appendix	31

Figures Index

Figure No.	Figure	Page No.
Figure 1	Changes in the area (ha) of soft fruit crops grown in Northern Ireland, 1990-2020.	5
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, 1990–2020.	5
Figure 3	Soft Fruit crops grown (ha) and proportion (%) by method of protection in Northern Ireland, 2020.	6
Figure 4	Changes in method of protection (ha) used for soft fruit crops between 1998 and 2020.	6
Figure 5	Soft fruit production area (ha) for each crop type in Northern Ireland, 2020.	7
Figure 6	Pesticide type applied to soft fruit crops by area treated (spha) and proportion (%) in Northern Ireland, 2020.	7
Figure 7	Pesticide type applied to soft fruit crops by weight applied (kg) and proportion (%) in Northern Ireland, 2020.	8
Figure 8	Fungicide active ingredients applied to soft fruit crops showing treated area (spha) and proportion (%) applied in Northern Ireland, 2020.	8
Figure 9	Fungicide active ingredients applied to soft fruit crops showing quantity applied (kg) and proportion (%) applied in Northern Ireland, 2020.	9
Figure 10	Herbicide active ingredients applied to soft fruit crops showing treated area (spha) and proportion (%) applied in Northern Ireland, 2020.	9
Figure 11	Herbicide active ingredients applied to soft fruit crops showing quantity applied (kg) and proportion (%) applied in Northern Ireland, 2020.	10
Figure 12	Insecticide and acaricide active ingredients applied to soft fruit crops showing treated area (spha) and proportion (%) applied in Northern Ireland, 2020.	10
Figure 13	Insecticide and acaricide active ingredients applied to soft fruit crops showing quantity applied (kg) and proportion (%) applied in Northern Ireland, 2020.	11
Figure 14	Strawberries (protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.	11
Figure 15	Strawberries (semi-protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.	11
Figure 16	Strawberries (non-protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.	12
Figure 17	Other crops (non-protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.	12

Table Index

Table No.	Title	Page No.
Table 1	Number of holdings and area (ha) of soft fruit crops sampled in Northern Ireland, 2020.	14
Table 2	Number and area (ha) of soft fruit crops surveyed in Northern Ireland, 2020.	14
Table 3	Estimated area (ha) of soft fruit crops grown in Northern Ireland, 2020, by method of protection.	14
Table 4	Basic-treated area (ha) and the total-treated area (spha) of soft fruit crops in Northern Ireland 2020 treated with each pesticide type.	15
Table 5	Total quantity (kg) of pesticide type applied to soft fruit crops in Northern Ireland, 2020.	16
Table 6	The mean number of spray applications to soft fruit crops in Northern Ireland, 2020.	17
Table 7	Estimated area (spha) of soft fruit crops treated with pesticide active ingredients in Northern Ireland, 2020.	18-19
Table 8	Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2020.	20-21
Table 9	The active ingredients most extensively used on soft fruit crops in Northern Ireland, 2020, ranked by treated area (spha).	22
Table 10	The active ingredients most extensively used on soft fruit crops in Northern Ireland 2020, ranked by weight (kg).	23
Table 11	Strawberries (protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).	24
Table 12	Strawberries (semi-protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).	25
Table 13	Strawberries (non-protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).	26
Table 14	Other crops (protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).	27
Table 15	Other crops (non-protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).	28
Table 16	Comparison of pesticide usage on soft fruit crops 1990-2020, total area treated (spha) with main pesticide groups and quantities of active ingredient (kg) used.	29
Table 17	Comparison of pesticide usage on strawberry crops* 1990-2020, total area (spha) treated with main pesticide groups and quantities of active ingredient (kg) used. (*Combined total of protected, semi-protected and non-protected)	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 2020. Data were collected from 9 growers representing 33% 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 2018, the total area of soft fruit crops grown decreased by 17% to approximately 14 hectares and the area treated with pesticides (spray hectares) decreased by 25%.

A total of 24 kilograms of pesticides were applied to 39 spray hectares of soft fruit crops in 2020. Strawberries were the most commonly produced soft fruit (protected, semi-protected and non-protected), with 21 kilograms of pesticides being applied to 35 spray hectares. This represented approximately 89% of the total pesticide-treated area and 88% of the total quantity of pesticides applied.

Fungicide usage decreased by 25% when compared with 2018. Fungicides were applied to 54% of the total pesticide-treated area, representing 36% of the total weight of pesticides used in 2020. Azoxystrobin and fenhexamid were the fungicides applied to the largest area. Fenhexamid and sulphur 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 29% compared with 2018. Herbicide active ingredients were applied to 16% of the total pesticide-treated area (36% of the total weight of pesticides used) with propyzamide and

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

Insecticide and acaricide usage decreased by 45% in 2020 when compared with 2018. Insecticide and acaricide active ingredients accounted for 10% of the total pesticide-treated area and 2% of the total weight of pesticides applied in 2020. The insecticide and acaricide pirimicarb and thiacloprid were the most frequently applied active substances and were only applied to strawberries. Reasons for insecticide/acaricide use during this survey period included general insect control, aphids, red spider mites, sawfly and vine weevil.

Biopesticides were applied to 9% of the treated area in 2020, comparable with 7% in 2018. Biopesticides were only applied to protected and semi-protected strawberry crops. *Bacillus subtilis* was the most commonly applied biopesticide accounting for 78% of the biopesticide treated area. Biopesticide applications were to control grey mould (*Botrytis cinerea*), powdery mildew (*Podosphaera aphanis*), aphids, red spider mite and vine weevil. *Aphelinus abdominalis*, *Aphidius colemani*, *Ephedrus cerasicola*, *Praon volucre*, *Bacillus subtilis*, *Steinernema feltiae*, *Steinernema kraussei* and *Phytoseiulus persimilis* were the only biopesticides used.

Molluscicides were only applied to non-protected crops and accounted for 7% 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 5% of the pesticide treated area and 23% of the weight of pesticides applied. 'Other products' were only applied to protected and semi-protected strawberry crops with the reason for use given as aphid control.

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 eighth 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), 2016 (Lavery *et al*, 2017) and 2018 (Kirbas *et al*, 2019) 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 14 hectares in 2020. Of all soft fruit crops grown, 12% were grown under permanent protection, 24% 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 (9.08 ha) and 'other crops' (4.95 ha). 'Other crops' refer to raspberries, blackberries, gooseberries, blackcurrants, redcurrants and tayberries.

The principal pests and diseases recorded were aphids, spider mites (*Tetranychus urticae*), vine weevil, (*Otiorhynchus sulcatus*), strawberry powdery mildew (*Podosphaera aphanis*) and Botrytis.

METHODS

Using the Northern Ireland Agricultural Census, June 2019 (Anon; 2020), 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, 9 participated in the survey. Growers were surveyed during February and March 2021 and data relating to pesticide usage were collected by telephone interview. This survey covers the period from September 2020 to September 2021. The growers' stated reasons for pesticide use were also included, but may not always be appropriate.

The Covid pandemic and resulting restrictions that commenced in early 2020 have severely impacted our capability to conduct the survey programme. In particular, we have been unable to complete personal interviews, relying on telephone or email correspondence, which is not always convenient to participants. Due to the changes in our data collection method we were increasingly faced with incomplete or missing data. However, we are pleased that despite these drawbacks, we are able to present the report in a timely manner.

The collected data were analysed using SPSS (Statistical Package for the Social Sciences) software.

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.
- 'Reason for treatment'; the reasons reported for the use of pesticides are the growers' stated Reason for treatment 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.
- 'Natural products' include products which have a physical mode of action. The mode of action is non-chemical and non-biological.
- '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, inter-row areas and field margins.

TRENDS

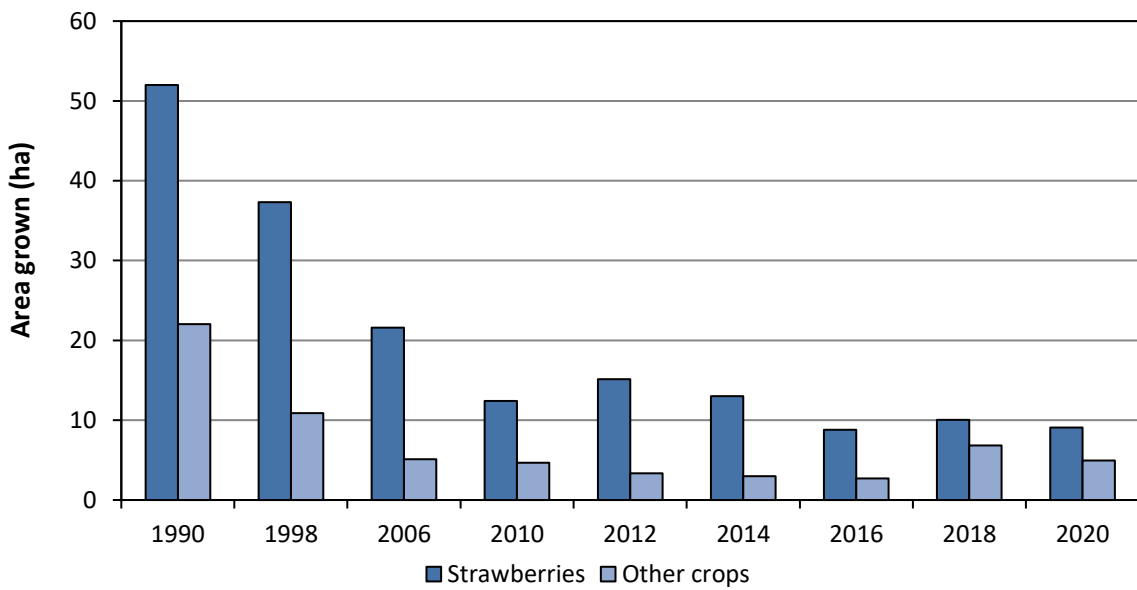


Figure 1 Changes in the area (ha) of soft fruit crops grown in Northern Ireland, 1990-2020.

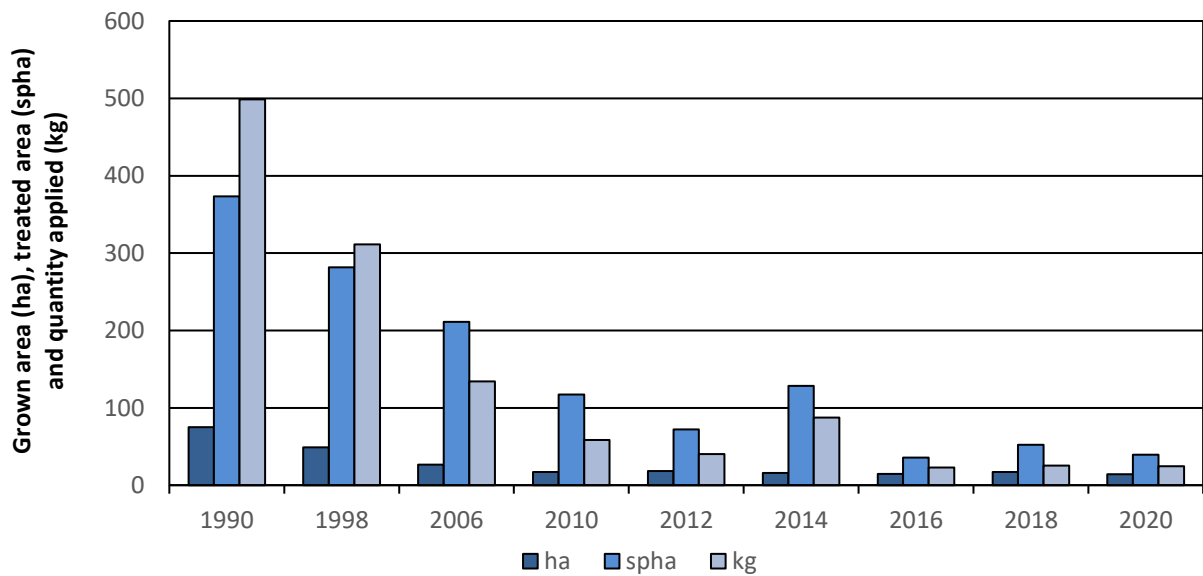


Figure 2 Changes in the overall grown area (ha), pesticide-treated area (spha) and the total quantity (kg) of active ingredient applied to soft fruit crops in Northern Ireland, 1990–2020.

CROP DISTRIBUTION

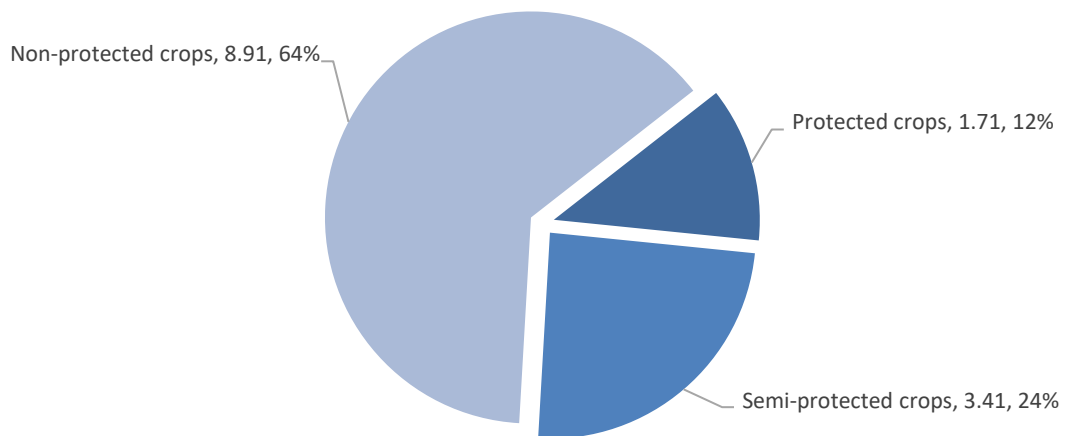


Figure 3 Soft Fruit crops grown (ha) and proportion (%) by method of protection in Northern Ireland, 2020.

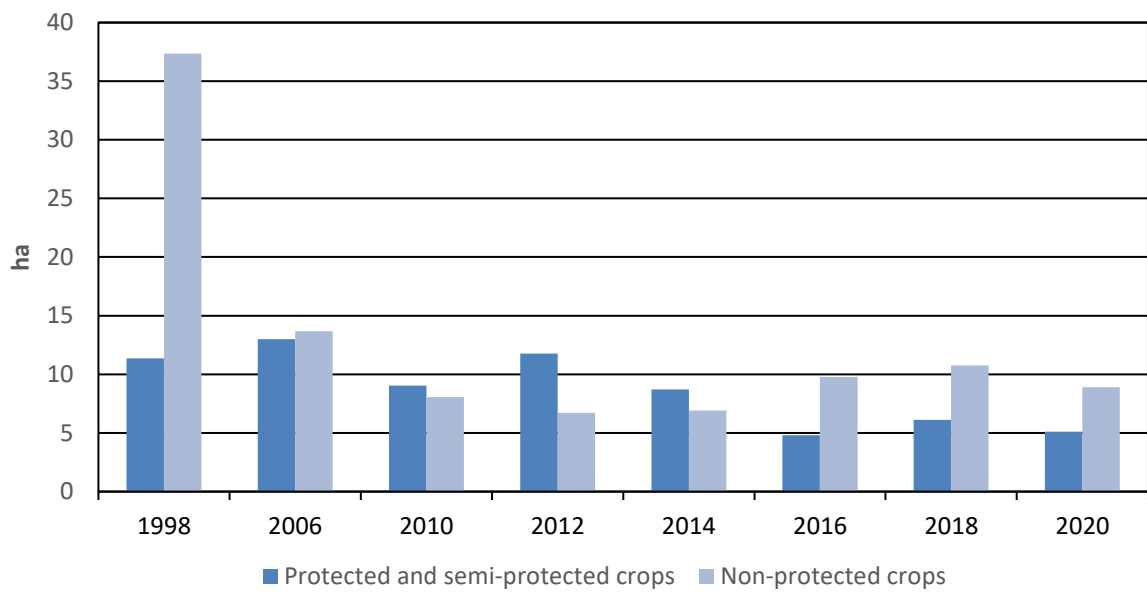


Figure 4 Changes in method of protection (ha) used for soft fruit crops between 1998 and 2020.

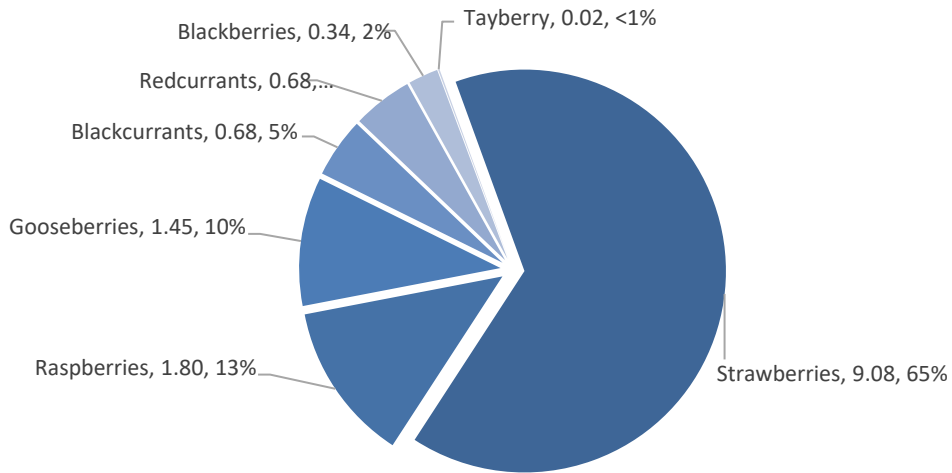


Figure 5 Soft fruit production area (ha) for each crop type in Northern Ireland, 2020.

PESTICIDE USAGE ON CROPS

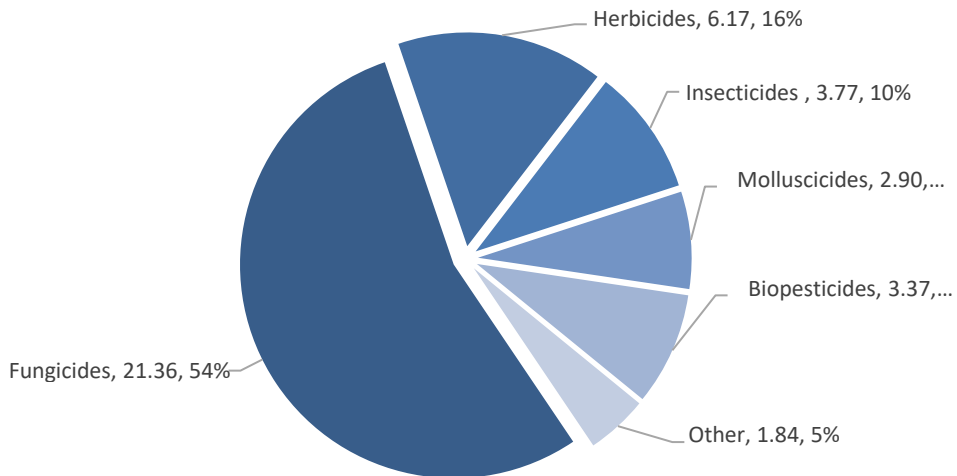


Figure 6 Pesticide type applied to soft fruit crops by area treated (spha) and proportion (%) in Northern Ireland, 2020.

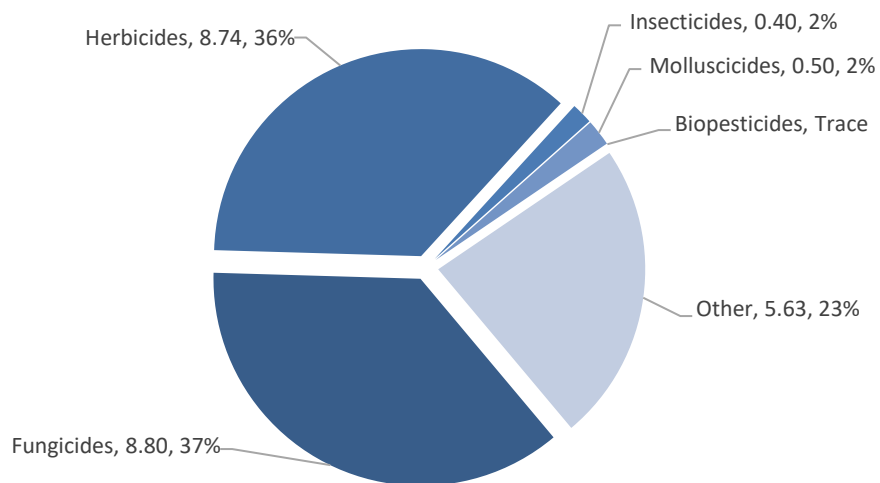


Figure 7 Pesticide type applied to soft fruit crops by weight applied (kg) and proportion (%) in Northern Ireland, 2020.

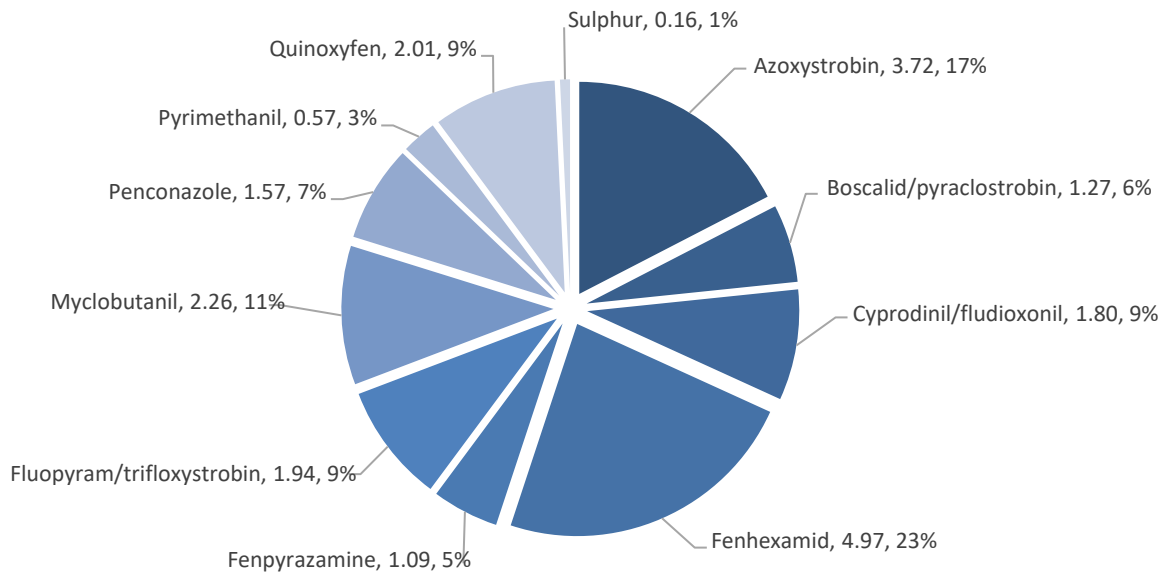


Figure 8 Fungicide active ingredients applied to soft fruit crops showing treated area (spha) and proportion (%) applied in Northern Ireland, 2020.

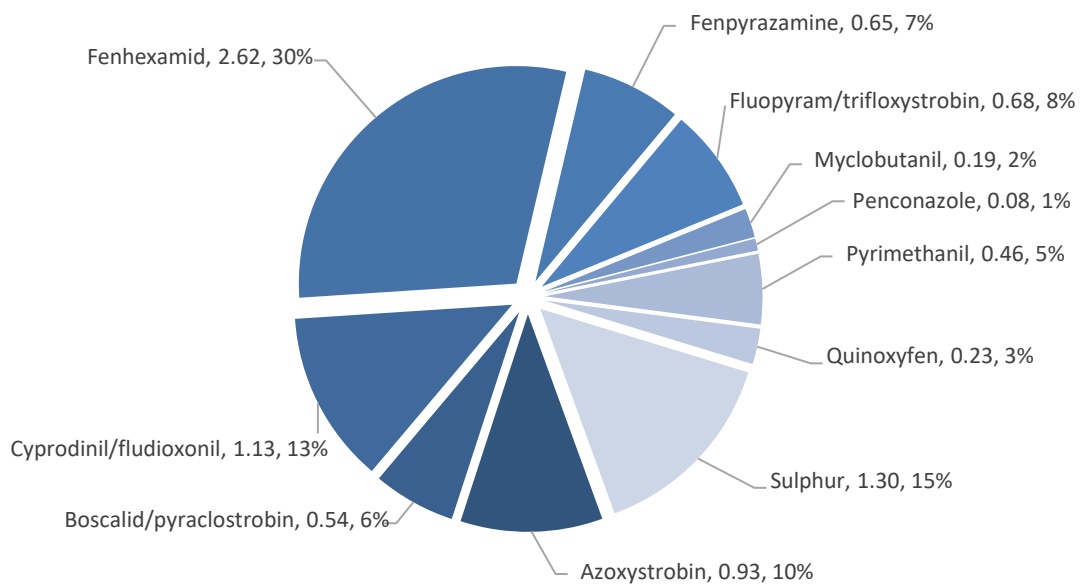


Figure 9 Fungicide active ingredients applied to soft fruit crops showing quantity applied (kg) and proportion (%) applied in Northern Ireland, 2020.

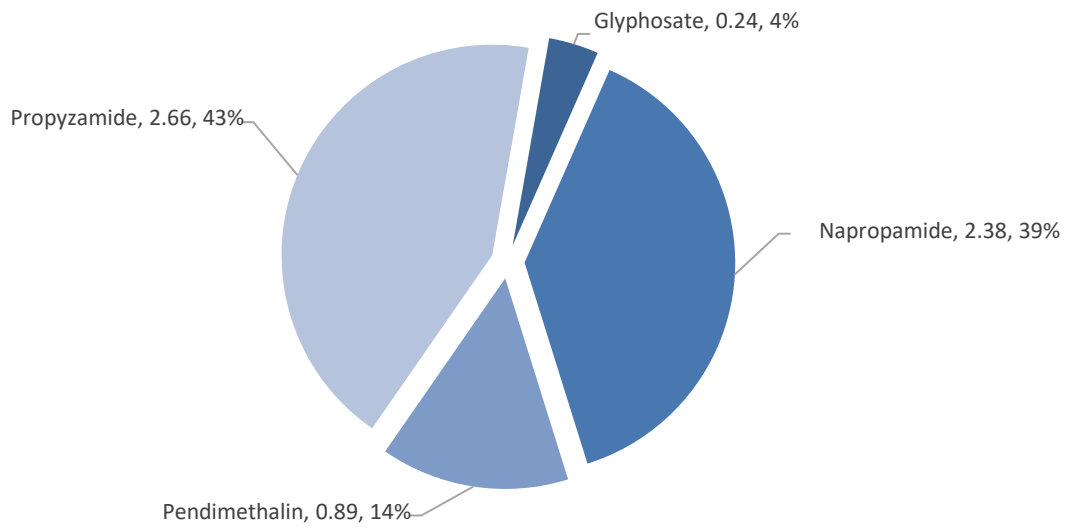


Figure 10 Herbicide active ingredients applied to soft fruit crops showing treated area (spha) and proportion (%) applied in Northern Ireland, 2020.

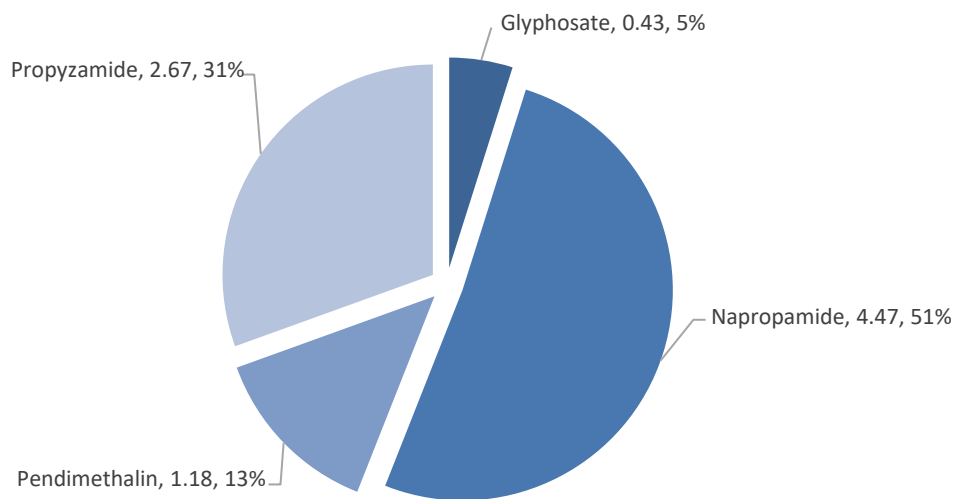


Figure 11 Herbicide active ingredients applied to soft fruit crops showing quantity applied (kg) and proportion (%) applied in Northern Ireland, 2020.

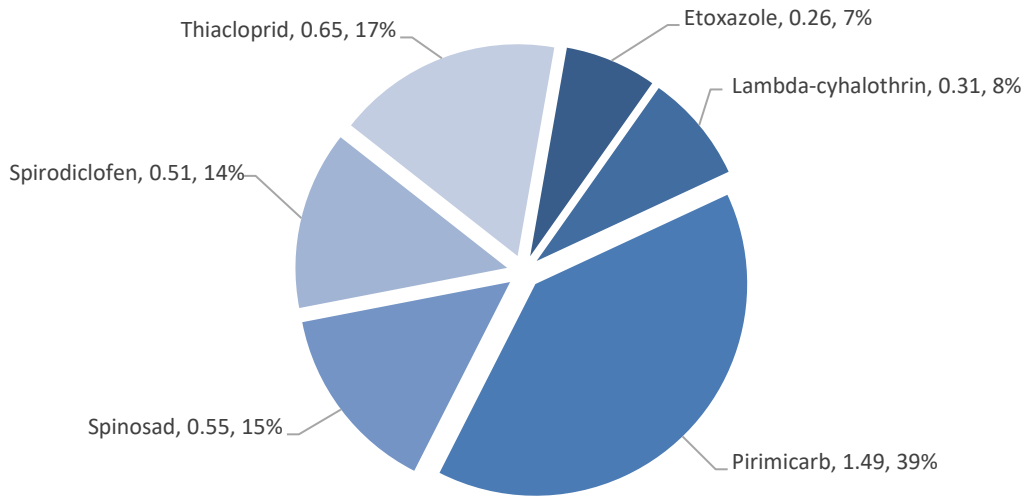


Figure 12 Insecticide and acaricide active ingredients applied to soft fruit crops showing treated area (spha) and proportion (%) applied in Northern Ireland, 2020.

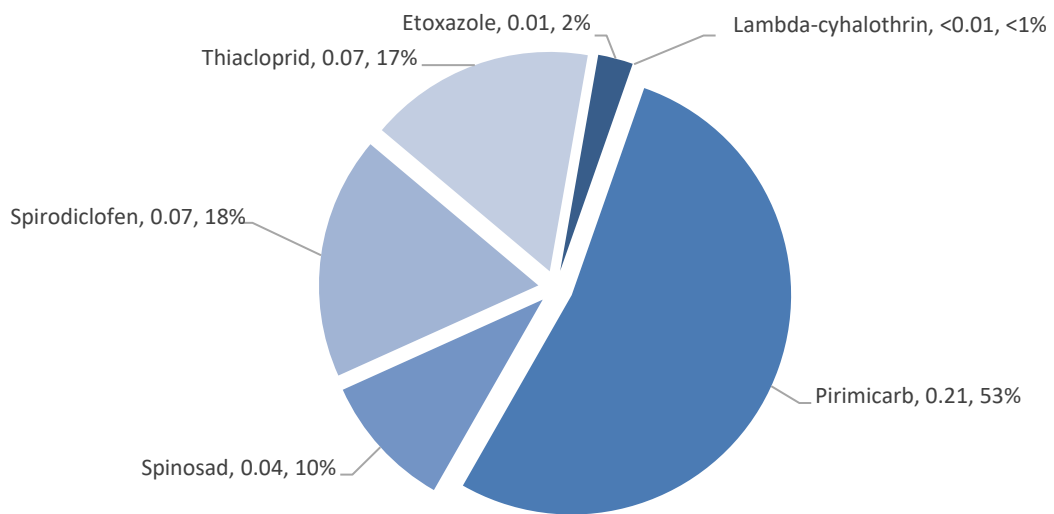


Figure 13 Insecticide and acaricide active ingredients applied to soft fruit crops showing quantity applied (kg) and proportion (%) applied in Northern Ireland, 2020.

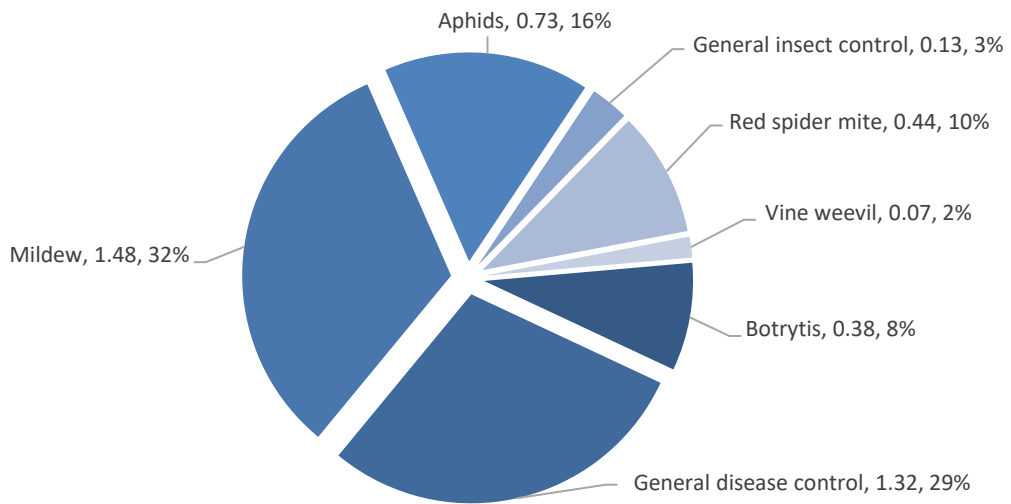


Figure 14: Strawberries (protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.

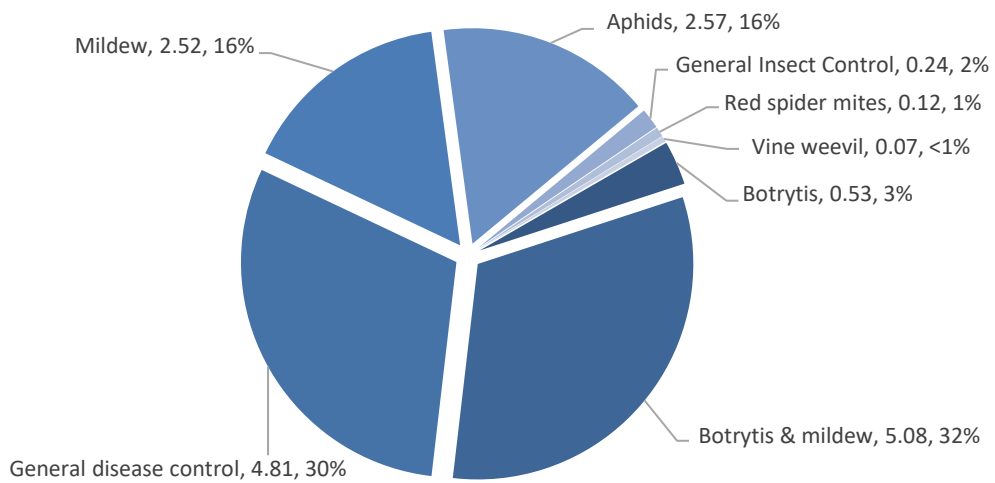


Figure 15: Strawberries (semi-protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.

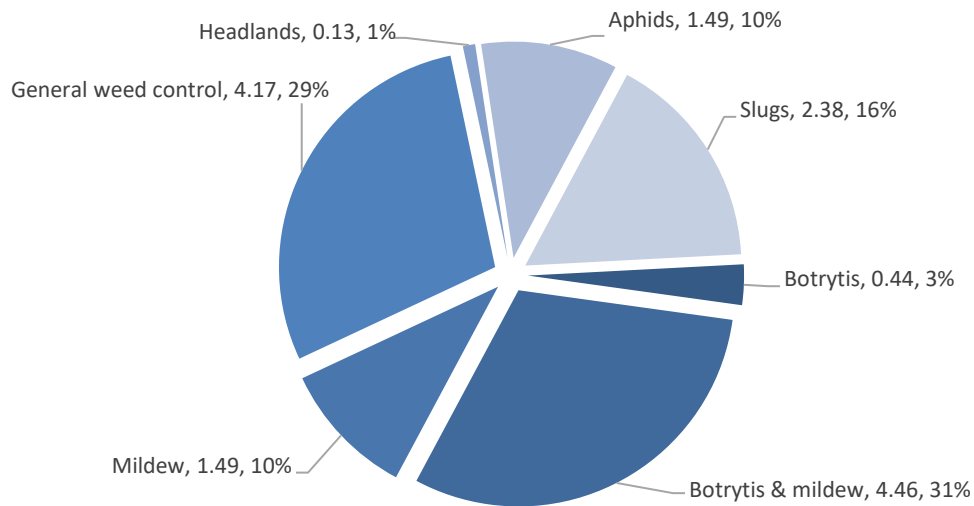


Figure 16: Strawberries (non-protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.

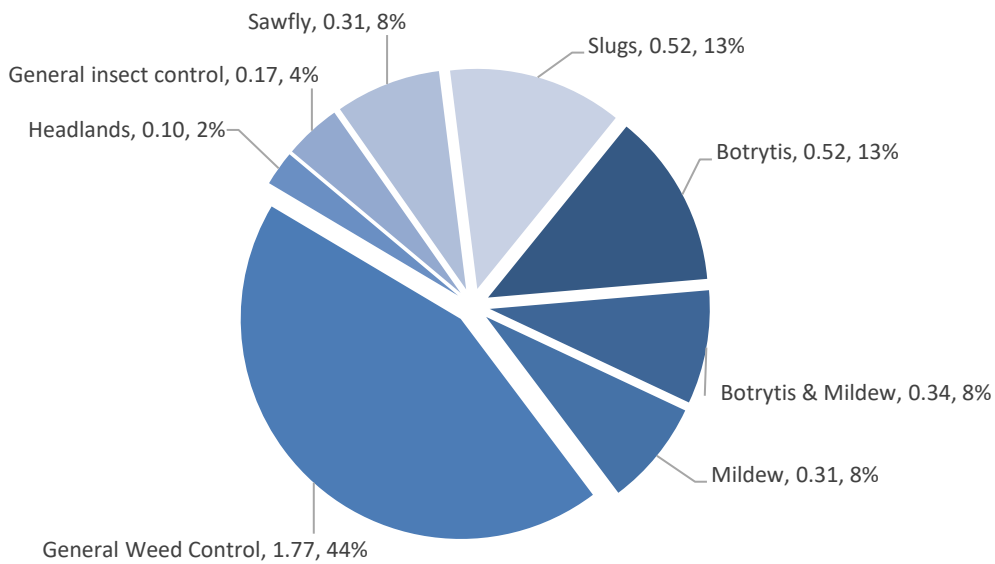


Figure 17: Other crops (non-protected): Reasons for treatment showing area treated (spha) and proportion (%), 2020.

Note: Other crops (protected): Only reason for treatment given was Botrytis and mildew. See [Table 14](#).

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.

J.M Kirbas, M.K. Lavery, S. Jess, D. Matthews and T. Kelly. (2019) Soft Fruit Crops 2018. *Pesticide Usage Survey Report 289* Belfast: AFBINI.

TABLES

Table 1 Number of holdings and area (ha) of soft fruit crops sampled in Northern Ireland, 2020.

<i>Region</i>	Total number of holdings	Number of holdings sampled	Area of holding sampled (ha)	Raised area of population (ha)
Northern Ireland	27	9	6.13	14.03

Table 2 Number and area (ha) of soft fruit crops surveyed in Northern Ireland, 2020.

<i>Crop type and crop location</i>	No. of crops Surveyed	Surveyed area (ha)
Strawberries permanent protection	5	0.66
Strawberries semi-protection	6	1.13
Strawberries field-grown	10	1.61
Other crops permanent protection	1	0.20
Other crops field-grown	16	2.52
All crops	38	6.13

Table 3 Estimated area (ha) of soft fruit crops grown in Northern Ireland, 2020, by method of protection.

<i>Crop Type</i>	<i>Method of protection</i>			Total
	Protected crops	Semi-protected crops	Non-protected crops	
Strawberries	1.37	3.41	4.30	9.08
Other crops	0.34	.	4.61	4.95
All crops	1.71	3.41	8.91	14.03

Table 4 Basic-treated area (ha) and the total-treated area (spha) of soft fruit crops in Northern Ireland, 2020 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)
Protected														
Strawberries	0.52	3.11	.	.	0.28	0.42	0.07	0.73	.	.	0.30	0.30	0.74	4.55
Other crops	0.17	0.34	.	.	.	.	.	.	.	.	.	.	0.17	0.34
All protected	.	3.44	.	.	.	0.42	.	0.73	.	.	.	0.30	.	4.89
Semi-protected														
Strawberries	1.58	10.37	.	.	0.87	1.39	0.58	2.63	.	.	0.51	1.54	1.76	15.93
Other crops	.	.	.	.	.	.	.	.	.	.	.	.	.	.
All semi-protected	.	10.37	.	.	.	1.39	.	2.63	.	.	.	1.54	.	15.93
Non-protected														
Strawberries	1.93	6.38	2.38	4.30	1.49	1.49	.	.	2.38	2.38	.	.	2.42	14.54
Other crops	1.00	1.17	1.77	1.87	0.48	0.48	.	.	0.52	0.52	.	.	1.99	4.03
All non-protected	.	7.55	.	6.17	.	1.97	.	.	.	2.90	.	.	.	18.58
All crops														
Strawberries	4.03	19.86	2.38	4.30	2.64	3.29	0.65	3.37	2.38	2.38	0.81	1.84	4.92	35.03
Other crops	1.17	1.50	1.77	1.87	0.48	0.48	.	.	0.52	0.52	.	.	2.16	4.37
Total	.	21.36	.	6.17	.	3.77	.	3.37	.	2.90	.	1.84	.	39.40

Table 5 Total quantity (kg) of pesticide type applied to soft fruit crops in Northern Ireland, 2020.

<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)
Protected							
Strawberries	2.10	.	0.03	.	Trace	0.24	2.38
Other crops	0.08	.	.	.	Trace	.	0.08
All Protected	2.19	.	0.03	.	Trace	0.24	2.47
Semi-protected							
Strawberries	3.48	.	0.14	.	Trace	5.39	9.35
Other crops	.	.	.	.	.	.	.
All semi-protected	3.48	.	0.14	.	Trace	5.39	9.35
Non-protected							
Strawberries	2.64	6.47	0.21	0.34	.	.	9.65
Other crops	0.50	2.27	0.02	0.16	.	.	2.94
All non-protected	3.14	8.74	0.22	0.50	.	.	12.60
All locations							
Strawberries	8.22	6.47	0.38	0.34	Trace	5.63	21.04
Other crops	0.58	2.27	0.02	0.16	.	.	3.02
All crops	8.81	8.74	0.39	0.50	Trace	5.63	24.06

Table 6 The mean number of spray applications to soft fruit crops in Northern Ireland, 2020.

<i>Crop type</i>	Fungicides	Herbicides	Insecticides and acaricides	Molluscicides	Biopesticides	Others	All pesticides
Strawberries	4.53	2.61	1.25	1.00	4.30	2.05	2.90
Blackberry	2.00	.	1.00	.	.	.	1.50
Blackcurrant	1.00	1.33	.	1.00	.	.	1.14
Gooseberry	1.00	1.33	1.00	1.00	.	.	1.11
Raspberry	1.33	1.33	.	1.00	.	.	1.25
Redcurrant	1.00	1.33	.	1.00	.	.	1.14
Tayberry	1.00	1.50	.	1.00	.	.	1.17
All crops	3.44	1.95	1.21	1.00	4.30	2.05	2.31

Table 7 Estimated area (spha) of soft fruit crops treated with pesticide active ingredients in Northern Ireland, 2020.

<i>Pesticide group & active ingredient</i>	<i>Crop type</i>		<i>Total treated area (spha)</i>
	<i>Strawberries</i>	<i>Other crops</i>	
<i>Fungicides</i>			
Azoxystrobin	3.05	0.67	3.72
Boscalid/pyraclostrobin	1.27	.	1.27
Cyprodinil/fludioxonil	1.80	.	1.80
Fenhexamid	4.46	0.52	4.97
Fenpyrazamine	1.09	.	1.09
Fluopyram/trifloxystrobin	1.94	.	1.94
Myclobutanil	1.95	0.31	2.26
Penconazole	1.57	.	1.57
Pyrimethanil	0.57	.	0.57
Quinoxifen	2.01	.	2.01
Sulphur	0.16	.	0.16
All fungicides	19.86	1.50	21.36
<i>Herbicides</i>			
Glyphosate	0.13	0.10	0.24
Napropamide	2.38	.	2.38
Pendimethalin	0.89	.	0.89
Propyzamide	0.89	1.77	2.66
All herbicides	4.30	1.87	6.17
<i>Insecticides and acaricides</i>			
Etoxazole	0.26	.	0.26
Lambda-cyhalothrin	.	0.31	0.31
Pirimicarb	1.49	.	1.49
Spinosad	0.38	0.17	0.55
Spirodiclofen	0.51	.	0.51
Thiacloprid	0.65	.	0.65
All insecticides and acaricides	3.29	0.48	3.77

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

<i>Pesticide group & active ingredient</i>	<i>Crop type</i>		Total treated area (spha)
	Strawberries	Other crops	
<i>Biopesticides</i>			
<i>Aphelinus and Aphidus sp./ephedrus cerasicola/pracon volucre</i>	0.29	.	0.29
<i>Bacillus subtilis</i>	2.64	.	2.64
<i>Phytoseiulus persimilis</i>	0.29	.	0.29
<i>Steinernema feltiae</i>	0.07	.	0.07
<i>Steinernema kraussei</i>	0.07	.	0.07
All biopesticides	3.37	.	3.37
<i>Molluscicides</i>			
Ferric phosphate	1.49	.	1.49
Metaldehyde	0.89	0.52	1.41
All molluscicides	2.38	0.52	2.90
<i>Other products</i>			
Natural product	1.84	.	1.84
All other products	1.84	.	1.84
All pesticides	35.03	4.37	39.40

Table 8 Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2020.

<i>Pesticide group & active ingredient</i>	<i>Crop type</i>		<i>Total quantity applied (kg)</i>
	<i>Strawberries</i>	<i>Other crops</i>	
<i>Fungicides</i>			
Azoxystrobin	0.76	0.17	0.93
Boscalid/pyraclostrobin	0.54	.	0.54
Cyprodinil/fludioxonil	1.13	.	1.13
Fenhexamid	2.23	0.39	2.62
Fenpyrazamine	0.65	.	0.65
Fluopyram/trifloxystrobin	0.68	.	0.68
Myclobutanil	0.16	0.03	0.19
Penconazole	0.08	.	0.08
Pyrimethanil	0.46	.	0.46
Quinoxifen	0.23	.	0.23
Sulphur	1.30	.	1.30
All fungicides	8.22	0.58	8.80
<i>Herbicides</i>			
Glyphosate	0.24	0.19	0.43
Napropamide	4.47	.	4.47
Pendimethalin	1.18	.	1.18
Propyzamide	0.58	2.09	2.67
All herbicides	6.47	2.27	8.74
<i>Insecticides and acaricides</i>			
Etoxazole	0.01	.	0.01
Lambda-cyhalothrin	.	<0.01	<0.01
Pirimicarb	0.21	.	0.21
Spinosad	0.03	0.01	0.04
Spirodiclofen	0.07	.	0.07
Thiacloprid	0.07	.	0.07
All insecticides and acaricides	0.38	0.02	0.40

Table 8 (cont) Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2020.

<i>Pesticide group & active ingredient</i>	<i>Crop type</i>		<i>Total quantity applied (kg)</i>
	<i>Strawberries</i>	<i>Other crops</i>	
<i>Biopesticides</i>			
<i>Aphelinus and Aphidus sp./Ephedrus cerasicola/Praon volucre</i>	Trace	.	Trace
<i>Bacillus subtilis</i>	Trace	.	Trace
<i>Phytoseiulus persimilis</i>	Trace	.	Trace
<i>Steinernema feltiae</i>	Trace	Trace	Trace
<i>Steinernema kraussei</i>	Trace	.	Trace
All biopesticides	Trace	Trace	Trace
<i>Molluscicides</i>			
Ferric phosphate	0.07	.	0.07
Metaldehyde	0.27	0.16	0.42
All molluscicides	0.34	0.16	0.50
<i>Other products</i>			
Natural product	5.63	.	5.63
All other products	5.63	.	5.63
All pesticides	21.39	3.03	24.06

Table 9 The active ingredients most extensively used on soft fruit crops in Northern Ireland, 2020 ranked by treated area (spha).

No.	Active ingredient	Treated area (spha)
1	Fenhexamid	4.98
2	Azoxystrobin	3.72
3	Propyzamide	2.66
4	<i>Bacillus subtilis</i>	2.64
5	Napropamide	2.38
6	Myclobutanil	2.26
7	Quinoxifen	2.01
8	Trifloxystrobin	1.94
9	Fluopyram	1.94
10	Cyprodinil	1.80
11	Fludioxonil	1.80
12	Penconazole	1.57
13	Pirimicarb	1.49
14	Ferric phosphate	1.49
15	Metaldehyde	1.41
16	Pyraclostrobin	1.27
17	Boscalid	1.27
18	Fenpyrazamine	1.09
19	Pendimethalin	0.89
20	Thiacloprid	0.65
21	Pyrimethanil	0.57
22	Spinosad	0.55
23	Spirodiclofen	0.51
24	Lambda-cyhalothrin	0.31
25	<i>Phytoseiulus persimilis</i>	0.29
26	<i>Aphelinus and Aphidus sp.</i>	0.29
27	<i>Ephedrus cerasicola</i>	0.29
28	<i>Praon volucre</i>	0.29
29	Etoxazole	0.26
30	Glyphosate	0.24
31	Sulphur	0.16
32	<i>Steinernema feltiae</i>	0.07
33	<i>Steinernema kraussei</i>	0.07

Table 10 The active ingredients most extensively used on soft fruit crops in Northern Ireland, 2020 ranked by weight (kg).

No.	Active ingredient	Quantity applied (kg)
1	Napropamide	4.47
2	Propyzamide	2.67
3	Fenhexamid	2.61
4	Sulphur	1.30
5	Pendimethalin	1.18
6	Azoxystrobin	0.93
7	Cyprodinil	0.68
8	Fenpyrazamine	0.65
9	Pyrimethanil	0.46
10	Fludioxonil	0.45
11	Boscalid	0.43
12	Glyphosate	0.43
13	Metaldehyde	0.42
14	Trifloxystrobin	0.34
15	Fluopyram	0.34
16	Quinoxifen	0.23
17	Pirimicarb	0.21
18	Myclobutanil	0.19
19	Pyraclostrobin	0.11
20	Penconazole	0.08
21	Ferric phosphate	0.07
22	Spirodiclofen	0.07
23	Thiacloprid	0.07
24	Spinosad	0.04
25	Etoxazole	0.01
26	Lambda-cyhalothrin	<0.01
27	<i>Bacillus subtilis</i>	Trace
28	<i>Steinernema kraussei</i>	Trace
29	<i>Phytoseiulus persimilis</i>	Trace
30	<i>Aphelinus and Aphidus sp.</i>	Trace
31	<i>Ephedrus cerasicola</i>	Trace
32	<i>Praon volucre</i>	Trace
33	<i>Steinernema feltiae</i>	Trace

Table 11 Strawberries (protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).

Pesticide group & active ingredient	Reason for treatment							Total treated area (spha)	Quantity applied (kg)
	Botrytis	General disease control	Mildew	Aphids	General insect control	Red spider mite	Vine weevil		
Fungicides									
Azoxystrobin	.	0.37	0.73	.	.	.	.	1.09	0.27
Cyprodinil/fludioxonil	0.15	.	.	.	.	.	.	0.15	0.09
Fenpyrazamine	.	0.15	.	.	.	.	.	0.15	0.09
Fluopyram/trifloxystrobin	.	0.29	.	.	.	.	.	0.29	0.12
Myclobutanil	.	.	0.22	.	.	.	.	0.22	0.01
Penconazole	.	0.15	0.07	.	.	.	.	0.22	0.01
Pyrimethanil	0.16	.	.	.	.	.	.	0.16	0.13
Quinoxifen	.	0.37	0.29	.	.	.	.	0.66	0.08
Sulphur	.	.	0.16	.	.	.	.	0.16	1.30
All fungicides	0.31	1.32	1.48	.	.	.	.	3.11	2.10
Insecticides and acaricides									
Etoazole	.	.	.	.	.	0.15	.	0.15	0.01
Spinosad	.	.	.	0.13	.	.	.	0.13	0.01
Thiacloprid	.	.	.	.	0.13	.	.	0.13	0.02
All insecticides and acaricides	.	.	.	0.13	0.13	0.15	.	0.42	0.03
Biopesticides									
<i>Aphelinus and Aphidus sp./ephedrus cerasicola/praoon volucre</i>	.	.	.	0.29	.	.	.	0.29	Trace
<i>Bacillus subtilis</i>	0.07	.	.	.	.	.	.	0.07	Trace
<i>Phytoseiulus persimilis</i>	.	.	.	.	.	0.29	.	0.29	Trace
<i>Steinernema feltiae</i>	.	.	.	.	.	.	0.07	0.07	Trace
All biopesticides	0.07	.	.	0.29	.	0.29	0.07	0.73	Trace
Other products									
Natural product	.	.	.	0.30	.	.	.	0.30	0.24
All other products	.	.	.	0.30	.	.	.	0.30	0.24

Table 12 Strawberries (semi-protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).

<i>Pesticide group & active ingredient</i>	<i>Reason for treatment</i>								Total treated area (spha)	Quantity applied (kg)
	Botrytis	Botrytis & mildew	General disease control	Mildew	Aphids	General Insect Control	Red spider mites	Vine weevil		
<i>Fungicides</i>										
Azoxystrobin		0.49	1.06	0.41	.	.	.	.	1.95	0.49
Boscalid/pyraclostrobin		1.27			.	.	.	.	1.27	0.54
Cyprodinil/fludioxonil	0.12	0.51		0.59	.	.	.	.	1.22	0.76
Fenpyrazamine			0.94		.	.	.	.	0.94	0.56
Fluopyram/trifloxystrobin			0.23	1.41	.	.	.	.	1.64	0.56
Myclobutanil		0.24			.	.	.	.	0.24	0.01
Penconazole			1.35		.	.	.	.	1.35	0.07
Pyrimethanil	0.41				.	.	.	.	0.41	0.33
Quinoxifen			1.23	0.12	.	.	.	.	1.35	0.15
All fungicides	0.53	2.51	4.81	2.52	.	.	.	.	10.37	3.48
<i>Insecticides and acaricides</i>										
Etoxazole	.	.	.	.	.	.	0.12	.	0.12	<0.01
Spinosad	.	.	.	.	.	0.24	.	.	0.24	0.02
Spirodiclofen	.	.	.	.	0.51	.	.	.	0.51	0.07
Thiacloprid	.	.	.	.	0.51	.	.	.	0.51	0.05
All insecticides and acaricides	.	.	.	.	1.03	0.24	0.12	.	1.39	0.14
<i>Biopesticides</i>										
<i>Bacillus subtilis</i>	.	2.57	.	.	.	.	.	.	2.57	Trace
<i>Steinernema kraussei</i>	.	.	.	.	.	.	.	0.07	0.07	Trace
All biopesticides	.	2.57	.	.	.	.	.	0.07	2.63	Trace
<i>Other products</i>										
<i>Natural product</i>	.	.	.	.	1.54	.	.	.	1.54	5.39
All other products	.	.	.	.	1.54	.	.	.	1.54	5.4

Table 13 Strawberries (non-protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).

<i>Pesticide group & active ingredient</i>	<i>Reason for treatment</i>							Total treated area (spha)	Quantity applied (kg)
	Botrytis	Botrytis & mildew	Mildew	General weed control	Headlands	Aphids	Slugs		
<i>Fungicides</i>									
Cyprodinil/fludioxonil	0.44	.	.	.	.	.	.	0.44	0.28
Fenhexamid	.	4.46	.	.	.	.	.	4.46	2.23
Iprodione	.	.	1.49	.	.	.	.	1.49	0.13
All fungicides	0.44	4.46	1.49	.	.	.	.	6.38	2.64
<i>Herbicides</i>									
Glyphosate	0.13	.	.	0.13	0.24
Napropamide	.	.	.	2.38	.	.	.	2.38	4.47
Pendimethalin	.	.	.	0.89	.	.	.	0.89	1.18
Propyzamide	.	.	.	0.89	.	.	.	0.89	0.58
All herbicides	.	.	.	4.17	0.13	.	.	4.30	6.47
<i>Insecticides and acaricides</i>									
Pirimicarb	1.49	.	1.49	0.21
All insecticides and acaricides	1.49	.	1.49	0.21
<i>Molluscicides</i>									
Ferric phosphate	1.49	1.49	0.07
Metaldehyde	0.89	0.89	0.27
All molluscicides	2.38	2.38	0.34

Table 14 Other crops (protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).

<i>Pesticide group & active ingredient</i>	<i>Reason for treatment</i>		<i>Quantity (kg)</i>
	<i>Botrytis & mildew</i>	<i>Total treated area (spha)</i>	
<i>Fungicides</i>			
Azoxystrobin	0.34	0.34	0.08
<i>All fungicides</i>	0.34	0.34	0.08

Table 15 Other crops (non-protected): Active ingredients used with reason for treatment and area treated (spha), total area treated (spha), basic area treated (ha) and total quantity applied (kg).

Pesticide group & active ingredient	Reason for treatment								Total treated area (spha)	Quantity (kg)
	Botrytis	Botrytis & Mildew	Mildew	General Weed Control	Headlands	General insect control	Sawfly	Slugs		
Fungicides										
Azoxystrobin	.	0.34	.	.	.	.	.	.	0.34	0.08
Fenhexamid	0.52	.	.	.	.	.	.	.	0.52	0.39
Myclobutanil	.	.	0.31	.	.	.	.	.	0.31	0.03
All fungicides	0.52	0.34	0.31	.	.	.	.	.	1.17	0.50
Herbicides										
Glyphosate	0.10	.	.	.	0.10	0.19
Propyzamide	.	.	.	1.77	.	.	.	.	1.77	2.09
All herbicides	.	.	.	1.77	0.10	.	.	.	1.87	2.27
Insecticides and acaricides										
Lambda-cyhalothrin	0.31	.	0.31	0.00
Spinosad	0.17	.	.	0.17	0.01
All insecticides and acaricides	0.17	0.31	.	0.48	0.02
Molluscicides										
Metaldehyde	0.52	0.52	0.16
All molluscicides	0.52	0.52	0.16

Table 16 Comparison of pesticide usage on soft fruit crops 1990-2020, 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		2020	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
Fungicides	171.4	277.6	154.1	189.1	134.9	97.7	82.3	40.5	50.4	30.7	87.4	45.9	13.7	8.2	28.6	14.1	21.4	8.8
Herbicides	159.4	199.5	61.8	95.6	25.6	27.6	6.5	10.0	5.6	7.1	10.9	16.8	16.4	12.8	8.7	8.9	6.2	8.7
Insecticides and acaricides	33.7	19.6	41.3	16.7	37.4	7.7	20.9	6.0	12.7	2.4	26.6	6.0	5.6	1.8	6.8	0.7	3.8	0.4
Molluscicides	8.8	1.8	23.0	10.0	1.7	1.3	.	.	1.1	0.2	1.1	0.2	.	.	2.7	0.5	2.9	0.5
Biopesticides	.	.	1.5	Trace	11.4	Trace	7.0	Trace	2.2	Trace	1.2	Trace	0.1	Trace	3.9	Trace	3.4	Trace
Other products	.	.	.	.	.	.	0.6	1.9	.	.	0.9	18.7	.	.	1.7	1.2	1.8	5.6
Total	373.3	498.6	281.6	311.4	210.9	134.2	117.3	58.4	72.0	40.4	128.2	87.6	35.9	22.8	52.4	25.5	39.4	24.1

Table 17 Comparison of pesticide usage on strawberry crops* 1990-2020, 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		2020	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
Fungicides	135.7	229.6	132.2	156.4	121.5	81.4	80.1	39.3	44.2	26.9	80.6	42.8	13.7	8.2	25.5	12.7	19.9	8.2
Herbicides	112.8	133.3	41.1	52.6	22.0	22.3	4.7	7.5	5.3	6.6	8.1	12.2	8.5	7.9	5.7	5.5	4.3	6.5
Insecticides and acaricides	23.6	14.6	37.5	12.8	35.6	6.8	20.7	5.9	11.4	2.2	21.7	4.8	4.9	0.6	6.1	0.7	3.3	0.4
Molluscicides	8.4	1.7	22.5	9.9	1.7	1.3	.	.	1.1	0.2	1.1	0.2	.	.	1.9	0.3	2.4	0.3
Biopesticides	.	.	1.5	Trace	11.3	Trace	6.8	Trace	2.2	Trace	1.2	Trace	0.1	Trace	3.8	Trace	3.4	Trace
Other products	.	.	.	.	.	.	0.6	1.9	.	.	0.9	18.7	.	.	1.7	1.2	1.8	5.6
Total	280.5	379.1	234.7	231.7	192.2	111.8	112.9	54.6	64.2	35.8	113.6	78.7	27.2	16.7	44.8	20.4	35.0	21.0

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

APPENDIX 1: Northern Ireland Pesticide Usage Survey Published Reports

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

APPENDIX 1 (contd.): Northern Ireland Pesticide Usage Survey Published Reports

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
288	Arable Crops 2018	1-83887-064-5
289	Soft Fruit Crops 2018	1-83887-065-2
290	Top Fruit Crops 2018	1-83887-066-9
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