



PESTICIDE USAGE IN NORTHERN IRELAND
SURVEY REPORT 319

NORTHERN IRELAND EDIBLE PROTECTED CROPS 2023



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Northern Ireland Edible Protected Crops 2023

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PESTICIDE USAGE SURVEY REPORT 319

EDIBLE PROTECTED CROPS IN NORTHERN IRELAND 2023

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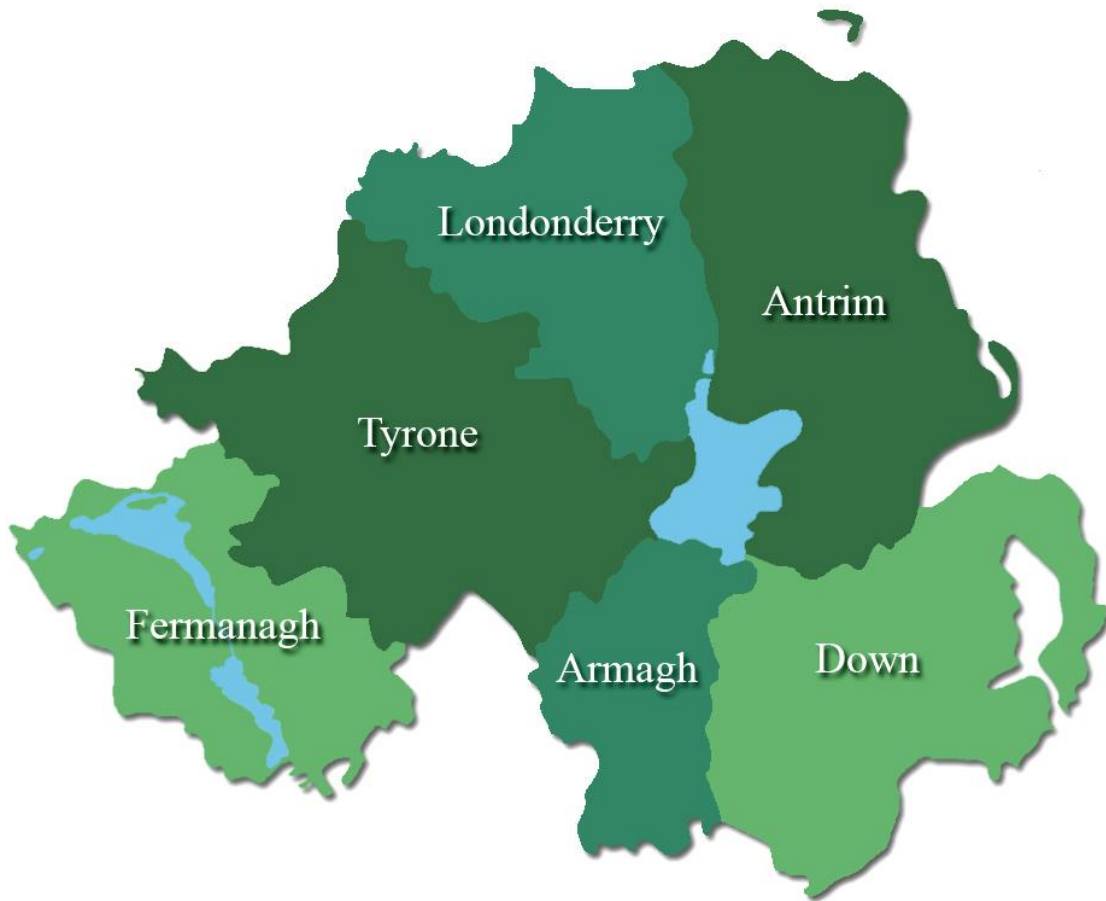
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The County Regions of Northern Ireland



SUMMARY

This is the fifth survey examining pesticide usage practices on edible protected crops (excluding soft fruit) grown under permanent protection in Northern Ireland, providing comparative data to that obtained in the previous surveys in 2015 (Lavery *et al.*, 2016), 2017 (Lavery *et al.*, 2018), 2019 (Lavery *et al.*, 2020) and 2021 (Kirbas *et al.*, 2022). For this survey, a number of different vegetable crops and tomatoes, which are propagated and/or grown under permanent cover of glass or polythene until harvested, are included. Information relating to pesticide use on soft fruit crops is recorded in the pesticide usage report Soft Fruit Crops, 2022 (Kirbas *et al.*, 2023).

Protected crop 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. In keeping with the 2021 report, this report contains multiple-cropping areas, where successive crops are produced from the same basic area. This may result in figures which differ from the basic farm level information contained in the farm census.

Data were collected from ten holdings, representing 66% of the total area of edible protected crops grown in Northern Ireland ([Table 1](#)). Holdings were selected from information contained in the Northern Ireland Agricultural Census, June 2022 (Anon., 2023) and Basic Payment Scheme returns, 2023. Raising factors have been applied to estimate national pesticide usage from sampled data. Data relating to individual crop types have not been published due to the small cultivation and sample areas and the possibility of identifying growers.

A total of thirteen fungicide active substances including formulated fungicide mixtures were recorded in use on edible protected crops in Northern Ireland in 2023. Cyprodinil/fludioxonil represented 26% of the fungicide-treated area and 7% of the weight of fungicides applied. However, fosetyl-aluminium/propamocarb hydrochloride, which accounted for 4% of the fungicide-treated area, represented 70% of the weight of fungicides applied, primarily on brassica crops during propagation stage for the control of downy mildew. Propamocarb

hydrochloride accounted for less than 1% of the fungicide-treated area but 9% of the weight of fungicides applied. (Tables [7](#) and [8](#)).

There were only two herbicide active substance applied in 2023 which accounted for less than 2% of the total pesticide-treated area and the total weight of pesticides applied. (Tables [7](#), [8](#) and [13](#)).

A total of six insecticide active ingredients were recorded in 2023. The tetramic acid insecticide spirotetramat accounted for 76% of the area treated with insecticides, representing 82% of the weight of insecticides applied. The diamide insecticide cyantraniliprole accounted for 7% of the area treated with insecticides and 13% of the weight of insecticides applied. The pyrethroid insecticide lambda-cyhalothrin accounted for 13% of the insecticide-treated area and 2% of the weight of insecticides applied. (Tables [7](#), [8](#) and [12](#)).

Two microbial pesticides were recorded in 2023, *Bacillus subtilis* and *Gliocladium catenulatum*, for the control of *Botrytis cinerea* and damping-off diseases accounted for 6% of the total pesticide-treated area and 8% of the weight of pesticides applied. (Tables [7](#), [8](#) and [11-17](#)).

Seed treatments accounted for 4% of the total pesticide-treated area and <1% of the weight of pesticides applied. The seed treatment active substances fludioxonil and metalaxyl-M, were primarily applied to leafy and flowerhead brassica crops, representing 86% of the seed-treated area and 38% of the weight applied. Lettuce, tomatoes and turnips and swedes were the only crops not to receive a seed treatment.

Lettuce crops accounted for the largest growing area of all edible protected crops, although this was principally due to repeat cropping within the basic growing area. Lettuce crops received 76% of all fungicides applied representing 16% of the weight applied. Conversely, leafy and flowerhead brassica crops, which received 21% of all fungicides applied, accounted for 83% of the weight applied. Lettuce crops received an average of 3.4 fungicide, 1.0 herbicide, 1.9 insecticide and 1 biopesticide applications. (Tables [6](#) and [13](#)).

Commercial edible protected cropping is a relatively specialist area of crop cultivation, extending the natural growing season to provide a continuous supply of crops for retailers. Edible protected crops may also be imported from abroad to augment locally grown crops.

Edible protected crops can be grown on relatively small areas, particularly at propagation stage, but increased space is required to accommodate them as the plants mature. Multi-cropping also allows successive crops to be produced from the same basic area.

Growing crops in permanent glasshouses or polythene tunnels enables the grower to closely monitor and maintain the conditions within. The effectiveness of biopesticides and pollinators can also be maximised within the enclosed environment. However, increased energy costs and the incidence of pests such as glasshouse whitefly (*Trialeurodes vaporariorum*) that reproduce rapidly under these conditions can prove problematic within a protected structure and lead to increased pesticide inputs.

Crops that were grown outdoors for part of or all of their life cycle, are recorded in the Outdoor Vegetable Crops in Northern Ireland 2023 report (Lavery *et al.*, 2024).

DEFINITIONS AND NOTES

- ‘Grown area’ refers to the actual planted area of crop and is referred to in hectares (ha).
- ‘Basic area’ refers to the actual planted area of crop which received at least one pesticide application and is referred to in hectares (ha).
- ‘Treated area’ refers to the total area treated with a pesticide, including all repeated applications to the basic area, and is referred to in spray hectares (spha).
- ‘Quantity applied’ refers to the weight of pesticides applied, including all repeated applications, and is referred to in kilograms (kg).
- ‘Reasons for use’: the reasons reported for the use of pesticides are the **growers** stated reason for use and may sometimes seem inappropriate or appear similar to other reasons with the same meaning.
- ‘Rounding’: due to rounding of figures, there may be slight differences in totals both within and between tables.
- ‘Beans’: refers to beans (where no type was specified), broad beans and runner beans.
- ‘Leafy and flowerhead brassicas’: refers to purple broccoli, Brussels sprouts, cabbage, calabrese, autumn and summer cauliflower and kale. ‘Cabbage’ includes savoy, white, red, spring, summer and winter cabbage.
- ‘Celery and parsley’: refers to celeriac, table and soup celery and parsley.
- ‘Onions and leeks’: refers to leeks (where no type was specified), table leeks, onions, shallots and salad onions.
- ‘Other crops’: refers to asparagus, basil, beetroot, chard, courgette, cucumber, edible flowers, endives, pumpkin, rocket, sage, samphire, sorrel, squash, sweetcorn, thyme, lovage, marjoram, oregano and pak choi.
- The following crops received no pesticide treatments: asparagus, basil, cauliflowers for propagation, chard, cucumber, lovage, marjoram, onions for propagation, oregano for propagation, pak choi, pumpkin, rocket, sage for propagation, samphire for propagation, sorrel for propagation, sweetcorn for propagation, and tomatoes for propagation.
- Crop-specific regional information has not been included due to the small number of businesses surveyed.

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. In addition, regulation EC 1185/2009 also provides a statutory requirement for the collection of pesticide statistics. 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.

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://www.sasa.gov.uk/pesticides/pesticide-usage/pesticide-usage-survey-reports>)

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

Due to the very small area of protected edible crops grown in Northern Ireland, the limited pesticide input and the issues associated with estimating pesticide use, this report may not be produced in subsequent years unless crop area or pesticide input increases. Data will continue to be collected and submitted to the UK reports.

METHODS

The holdings to be surveyed were selected on the basis of the total area of edible protected crops grown (excluding soft fruit), using a combination of data from the Northern Ireland Agricultural Census, June 2020 (*Anon.*, 2023) and Basic Payment Scheme returns, 2023.

The purpose of the survey was explained to the occupiers of selected holdings in preliminary correspondence. The holdings were then surveyed by telephone and email correspondence during April and May 2023. The data collected included the area of crops grown, area treated, target crop, pesticide group, active substance used, and number of treatments applied. During analysis, the sample data were raised to the total area of edible protected crops using raising factors calculated from the ratio of the number of farms sampled to the number growing protected edible crops. The growers' stated reasons for pesticide use were also included but may not always seem appropriate. The collected data were entered using SQL, a relational database programme. Validated data were downloaded for analysis using IBM SPSS Statistics Version 22 software.

Following the Covid pandemic and resulting precautions, our data collection methods have changed from personal interview to telephone, email and other electronic correspondence which is not always convenient to participants. We have been increasingly faced with incomplete or missing data, making comparisons between years difficult. However, we are pleased that despite these drawbacks, we are able to present the report in a timely manner.

CROPS

The number and areas of crops surveyed are shown in Table 1 as combined crop groups. Data from seven farms provided information on 52 crop types. Crops include asparagus, basil, beetroot, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celeriac, celery, chard, courgettes, cucumber, edible flowers, endives, kale, kohlrabi, leeks, lettuce, lovage, marjoram, oregano, onions, pak choi, parsley, pumpkin, rocket, sage, samphire, sorrel, squash, swede, sweetcorn, thyme and tomatoes. The total area of crops sampled in the survey was representative of the area of edible protected crops grown in Northern Ireland in 2023. A total of 480 treatments, including seed treatments and biopesticides, were applied to edible protected crops using 24 products. There were a number of crops, particularly at

propagation stage, representing significantly small areas which did not receive pesticide treatments.

Refer to [Table 6](#) for information relating to proportional area treated and number of spray applications applied to each crop type.

FIGURES

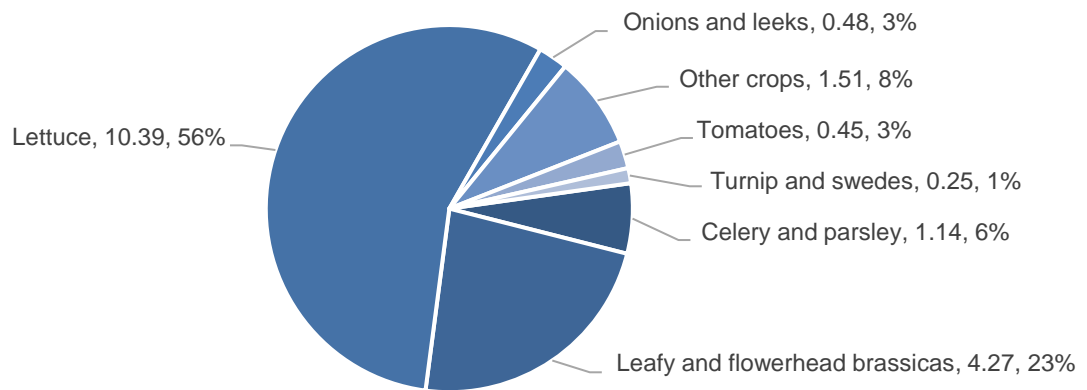


Figure 1 Proportional (%) areas of the different edible protected crop groups grown (ha) in Northern Ireland, 2023 (Table 1).

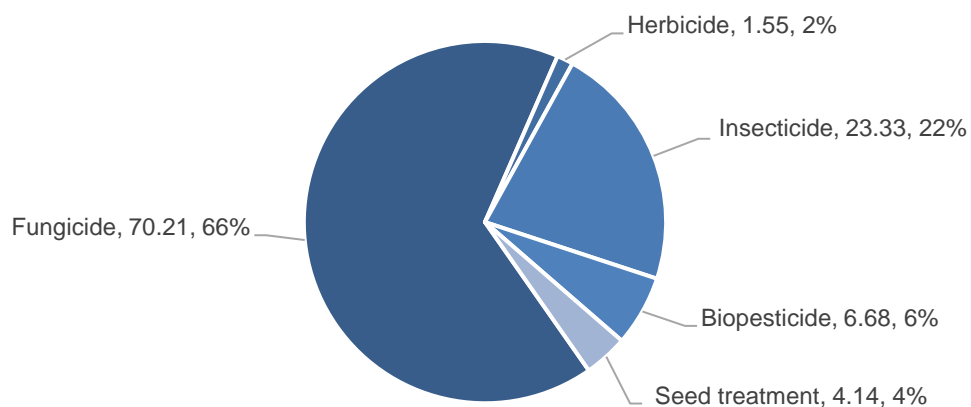


Figure 2 Pesticide usage (spha) on edible protected crops in Northern Ireland, 2023 (Table 4).

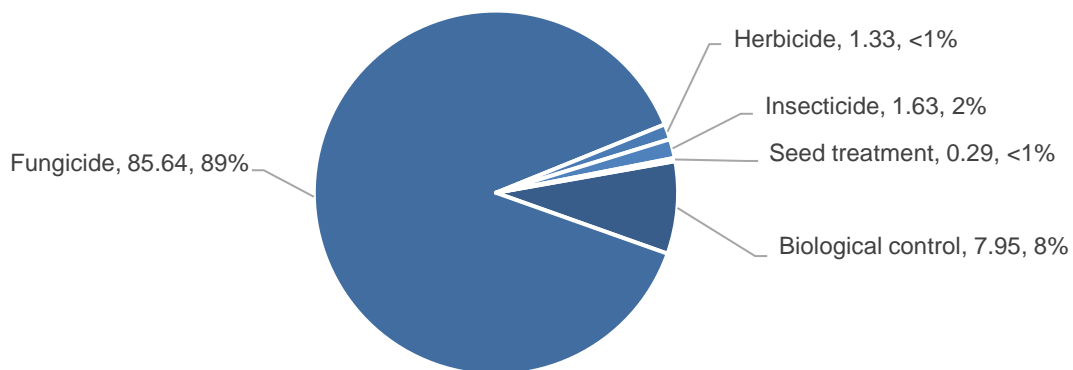


Figure 3 Pesticide usage (kg) on edible protected crops in Northern Ireland, 2023 (Table 5).

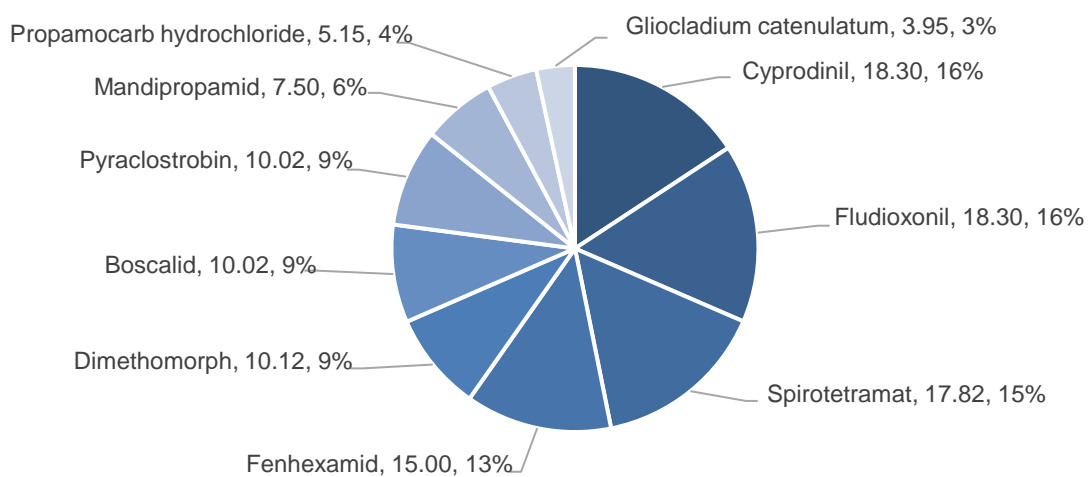


Figure 4 The ten most commonly used pesticide active substances by area treated (spha) in Northern Ireland, 2023 (Table 9).

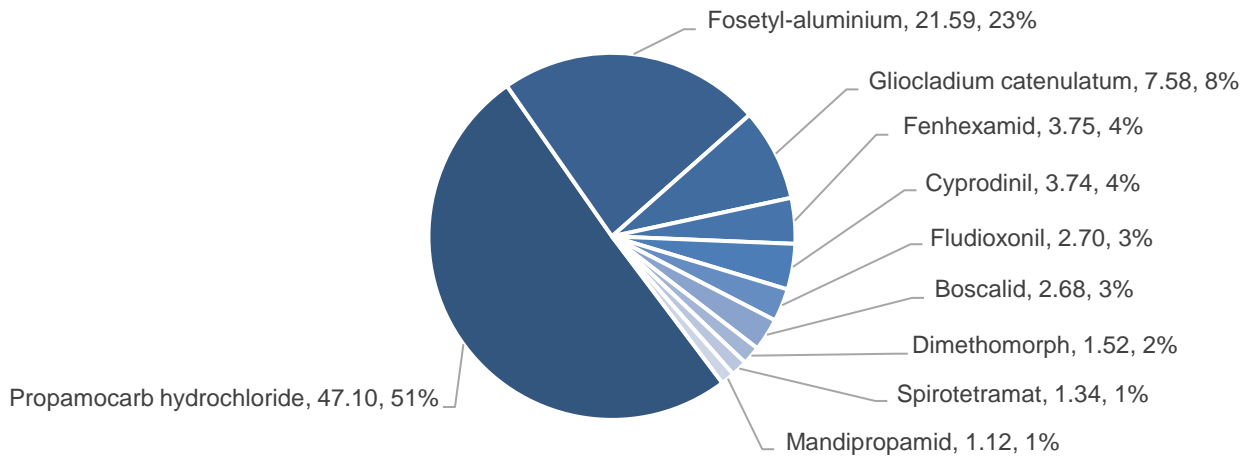


Figure 5 The ten most commonly used pesticide active substances by weight applied (kg) in Northern Ireland, 2023 (Table 10).

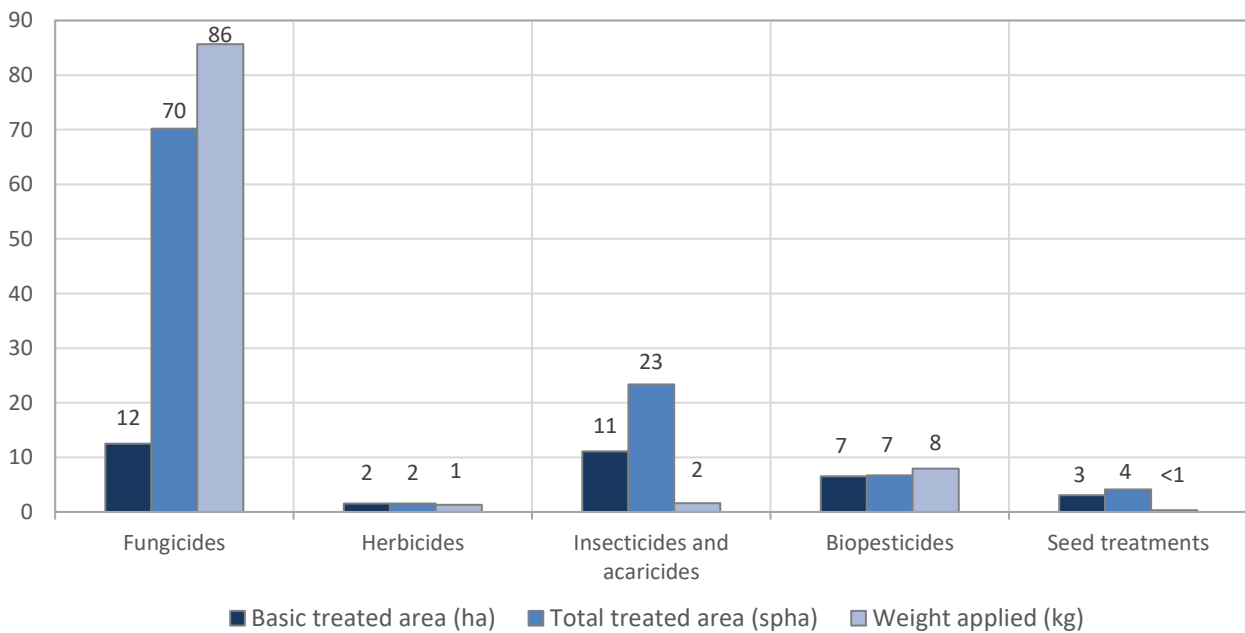


Figure 6 Basic treated area (ha), total treated area (spha) and weight of pesticides applied to edible protected crops in Northern Ireland, 2023 (Tables 4 and 5).

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TABLES

Table 1 Total number of crops surveyed, sampled area (ha) and total estimated area grown (ha) in Northern Ireland, 2023.

<i>Crop group</i>	Number of crops surveyed	Sampled area (ha)	Total estimated area (ha)
Celery and parsley	7	0.76	1.14
Leafy and flowerhead brassicas	61	2.85	4.27
Lettuce	17	6.92	10.39
Onions and leeks	4	0.32	0.48
Other crops	31	1.00	1.51
Tomatoes	4	0.30	0.45
Turnip and swedes	1	0.16	0.25
All crops	125	12.32	18.48

Table 2: Estimated area (spha) of edible protected crops treated regionally in Northern Ireland, 2023 with each pesticide type.

<i>Pesticide type</i>	<i>County</i>			<i>Northern Ireland</i>
	<i>Antrim</i>	<i>Armagh</i>	<i>Down</i>	
Fungicides	1.19	52.50	16.52	70.21
Herbicides	0.43	1.13	.	1.55
Insecticides and acaricides	1.01	15.00	7.32	23.33
Biopesticides	.	.	6.68	6.68
Seed treatments	0.21	.	3.93	4.14
All pesticides	2.84	68.63	34.45	105.92

Table 3: Estimated weight (kg) of pesticide applied regionally in Northern Ireland, 2023 with each pesticide type.

<i>Pesticide type</i>	<i>County</i>			<i>Northern Ireland</i>
	<i>Antrim</i>	<i>Armagh</i>	<i>Down</i>	
Fungicides	0.36	13.42	71.86	85.64
Herbicides	0.54	0.79	.	1.33
Insecticides and acaricides	0.06	1.12	0.44	1.63
Biopesticides	.	.	7.95	7.95
Seed treatments	<0.01	.	0.29	0.29
All pesticides	0.96	15.33	80.54	96.83

Table 4: The total area (spha) and the basic area (ha) of edible protected crops treated with each pesticide type in Northern Ireland, 2023.

Crop group	Pesticide Type											
	Fungicides		Herbicides		Insecticides and acaricides		Biopesticides		Seed treatments		All pesticides	
	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)
Celery and parsley	1.14	0.96	0.11	0.11	0.18	0.18	0.18	0.18	0.23	0.23	1.83	1.14
Leafy and flowerhead brassicas	14.88	2.94	.	.	7.32	2.94	2.83	2.73	3.55	2.51	28.58	2.95
Lettuce	53.48	7.96	1.13	1.13	15.83	7.96	2.32	2.32	.	.	72.76	10.28
Onions and leeks	0.48	0.48	0.11	0.11	.	.	0.38	0.38	0.11	0.11	1.07	0.48
Other crops	0.12	0.04	.	.	.	.	0.73	0.69	0.26	0.25	1.11	0.70
Tomatoes	0.11	0.11	0.22	0.22	.	.	.	.	.	.	0.32	0.32
Turnip and swedes	.	.	.	.	.	.	0.25	0.25	.	.	0.25	0.25
All crops	70.21	12.49	1.55	1.55	23.33	11.08	6.68	6.54	4.14	3.09	105.92	16.12

Table 5: The total quantities (kg) of each pesticide type used on edible protected crops in Northern Ireland, 2023.

Crop group	Pesticide type					
	Fungicides	Herbicides	Insecticides and acaricides	Biopesticides	Seed treatments	Total quantity (kg)
Celery and parsley	0.64	0.11	0.01	0.03	<0.01	0.79
Leafy and flowerhead brassicas	71.03	.	0.44	0.94	0.11	72.52
Lettuce	13.73	0.79	1.17	4.46	.	20.15
Onions and leeks	0.10	0.11	.	0.72	<0.01	0.94
Other crops	0.11	.	.	1.32	0.18	1.61
Tomatoes	0.03	0.32	.	.	.	0.34
Turnip and swedes	.	.	.	0.47	.	0.47
All crops	85.64	1.33	1.63	7.95	0.29	96.83

Table 6: The proportional area (%) of each crop treated with pesticides and the number of spray applications in Northern Ireland, 2023.

Crop type	Pesticide type											
	Fungicides		Herbicides		Insecticides and acaricides		Biopesticides		Seed treatments		All Pesticides	
	%	Sp apps	%	Sp apps	%	Sp apps	%	Sp apps	%	Sp apps	%	Sp apps
Celery and parsley	84	1.8	9	1.0	16	1.0	16	1.0	20	1.0	100	1.2
Leafy and flowerhead brassicas	69	5.3	.	.	69	2.4	64	1.1	59	1.4	69	2.6
Lettuce	77	3.4	11	1.0	77	1.9	22	1.0	.	.	99	2.3
Onions and leeks	100	1.0	22	1.0	.	.	78	1.0	22	1.0	100	1.0
Other crops	3	3.0	.	.	.	.	50	1.1	18	1.2	51	1.2
Tomatoes	24	1.0	49	1.0	.	.	.	.	.	.	73	1.0
Turnip and Swedes	.	.	.	.	.	.	1	1.0	.	.	100	1.0
Total	39	4.5	5	1.0	35	2.3	20	1.1	10	1.3	50	2.3

Table 7: Estimated area (spha) of edible protected crops treated with pesticide formulations in Northern Ireland, 2023.

Pesticide group and active substance	Crop name							Total
	Celery and parsley	Leafy and flowerhead brassicas	Lettuce	Onions and leeks	Other crops	Tomatoes	Turnip and swedes	
Fungicides								
Azoxystrobin	0.78	.	0.46	0.11	.	0.11	.	1.45
Boscalid/pyraclostrobin	.	2.52	7.50	.	.	.	.	10.02
Cyprodinil/fludioxonil	0.18	2.51	15.53	.	0.08	.	.	18.30
Difenoconazole	.	2.30	.	.	.	.	.	2.30
Dimethomorph	.	2.62	7.50	.	.	.	.	10.12
Fenhexamid	.	.	15.00	.	.	.	.	15.00
Fluopicolide/propamocarb hydrochloride	.	2.41	.	.	.	.	.	2.41
Fosetyl-aluminium/propamocarb hydrochloride	0.18	2.30	.	.	<0.05	.	.	2.52
Mandipropamid	.	.	7.50	.	.	.	.	7.50
Propamocarb hydrochloride	.	0.22	.	.	.	.	.	0.22
Prothioconazole	.	.	.	0.38	.	.	.	0.38
All fungicides	1.14	14.88	53.48	0.48	0.12	0.11	.	70.21
Herbicides								
Glyphosate	0.11	.	.	0.11	.	0.22	.	0.43
Propyzamide	.	.	1.13	.	.	.	.	1.13
All herbicides	0.11	.	1.13	0.11	.	0.22	.	1.55

Table 7 (contd) Estimated area (spha) of edible protected crops treated with pesticide formulations in Northern Ireland, 2023.

Pesticide group and active substance	Crop name							Total
	Celery and parsley	Leafy and flowerhead brassicas	Lettuce	Onions and leeks	Other crops	Tomatoes	Turnip and swedes	
<i>Insecticides and acaricides</i>								
Cyantraniliprole	.	1.74	.	.	.	.	.	1.74
Deltamethrin	0.08	.	0.38	.	.	.	.	0.45
Lambda-cyhalothrin	.	2.85	0.08	.	.	.	.	2.93
Pirimicarb	.	.	0.30	.	.	.	.	0.30
Spinosad	.	0.10	.	.	.	.	.	0.10
Spirotetramat	0.11	2.64	15.08	.	.	.	.	17.82
All insecticides and acaricides	0.18	7.32	15.83	.	.	.	.	23.33
<i>Biopesticides</i>								
<i>Bacillus subtilis</i>	0.18	2.51	.	.	<0.05	.	.	2.73
<i>Gliocladium catenulatum</i>	<0.05	0.31	2.32	0.38	0.69	.	0.25	3.95
All biopesticides	0.18	2.83	2.32	0.38	0.73	.	0.25	6.68
<i>Seed treatments</i>								
Fludioxonil	0.17	2.12	.	0.11	0.25	.	.	2.64
Metalaxyl-M	0.06	1.42	.	.	<0.05	.	.	1.49
All seed treatments	0.23	3.55	.	0.11	0.26	.	.	4.14

Table 8 Estimated quantities (kg) of pesticide formulations used on edible protected crops in Northern Ireland, 2023.

Pesticide group and active substance	Crop name							Total
	Celery and parsley	Leafy and flowerhead brassicas	Lettuce	Onions and leeks	Other crops	Tomatoes	Turnip and swedes	
Fungicides								
Azoxystrobin	0.20	.	0.11	<0.05	.	<0.05	.	0.36
Boscalid/pyraclostrobin	.	0.84	2.51	.	.	.	.	3.35
Cyprodinil/fludioxonil	0.07	1.26	4.88	.	<0.05	.	.	6.24
Difenoconazole	.	0.29	.	.	.	.	.	0.29
Dimethomorph	.	0.17	1.35	.	.	.	.	1.52
Fenhexamid	.	.	3.75	.	.	.	.	3.75
Fluopicolide/propamocarb hydrochloride	.	2.65	.	.	.	.	.	2.65
Fosetyl-aluminium/propamocarb hydrochloride	0.38	58.05	.	.	0.08	.	.	58.51
Mandipropamid	.	.	1.12	.	.	.	.	1.12
Propamocarb hydrochloride	.	7.78	.	.	.	.	.	7.78
Prothioconazole	.	.	.	0.07	.	.	.	0.07
All fungicides	0.64	71.03	13.73	0.10	0.11	<0.05	.	85.64
Herbicides								
Glyphosate	0.11	.	.	0.11	.	0.32	.	0.54
Propyzamide	.	.	0.79	.	.	.	.	0.79
All herbicides	0.11	.	0.79	0.11	.	0.32	.	1.33

Table 8 (contd) Estimated quantities (kg) of pesticide formulations used on edible protected crops in Northern Ireland, 2023.

Pesticide group and active substance	Crop name							Total
	Celery and parsley	Leafy and flowerhead brassicas	Lettuce	Onions and leeks	Other crops	Tomatoes	Turnip and swedes	
<i>Insecticides and acaricides</i>								
Cyantraniliprole	.	0.21	.	.	.	.	.	0.21
Deltamethrin	<0.05	.	<0.05	.	.	.	.	<0.05
Lambda-cyhalothrin	.	<0.05	<0.05	.	.	.	.	<0.05
Pirimicarb	.	.	<0.05	.	.	.	.	<0.05
Spinosad	.	<0.05	.	.	.	.	.	<0.05
Spirotetramat	<0.05	0.20	1.13	.	.	.	.	1.34
All insecticides and acaricides	<0.05	0.44	1.17	.	.	.	.	1.63
<i>Biopesticides</i>								
<i>Bacillus subtilis</i>	<0.05	0.34	.	.	<0.05	.	.	0.37
<i>Gliocladium catenulatum</i>	<0.05	0.60	4.46	0.72	1.32	.	0.47	7.58
All biopesticides	<0.05	0.94	4.46	0.72	1.32	.	0.47	7.95
<i>Seed treatments</i>								
Fludioxonil	<0.05	<0.05	.	<0.05	0.17	.	.	0.21
Metalaxyl-M	<0.05	0.08	.	.	<0.05	.	.	0.08
All seed treatments	<0.05	0.11	.	<0.05	0.18	.	.	0.29

Table 9: The twenty four active ingredients used on edible protected crops in Northern Ireland, 2023 ranked by treated area (spha).

No.	Active substance	Treated area (spha)
1	Cyprodinil	18.30
2	Fludioxonil	18.30
3	Spirotetramat	17.82
4	Fenhexamid	15.00
5	Dimethomorph	10.12
6	Boscalid	10.02
7	Pyraclostrobin	10.02
8	Mandipropamid	7.50
9	Propamocarb hydrochloride	5.15
10	<i>Gliocladium catenulatum</i>	3.95
11	Lambda-cyhalothrin	2.93
12	<i>Bacillus subtilis</i>	2.73
13	Fosetyl-aluminium	2.52
14	Fluopicolide	2.41
15	Difenoconazole	2.30
16	Cyantraniliprole	1.74
17	Metalaxyl-M	1.49
18	Azoxystrobin	1.45
19	Propyzamide	1.13
20	Deltamethrin	0.45
21	Glyphosate	0.43
22	Prothioconazole	0.38
23	Pirimicarb	0.30
24	Spinosad	0.10

Table 10: The twenty-four active ingredients used on edible protected crops in Northern Ireland, 2023 ranked by weight (kg).

No.	Active substance	Treated area (kg)
1	Propamocarb hydrochloride	47.10
2	Fosetyl-aluminium	21.59
3	<i>Gliocladium catenulatum</i>	7.58
4	Fenhexamid	3.75
5	<i>Cyprodinil</i>	3.74
6	Fludioxonil	2.70
7	Boscalid	2.68
8	Dimethomorph	1.52
9	Spirotetramat	1.34
10	Mandipropamid	1.12
11	Propyzamide	0.79
12	Pyraclostrobin	0.67
13	Glyphosate	0.54
14	<i>Bacillus subtilis</i>	0.37
15	Azoxystrobin	0.36
16	Difenoconazole	0.29
17	Fluopicolide	0.24
18	Cyantraniliprole	0.21
19	Metalaxyl-M	0.08
20	Prothioconazole	0.07
21	Pirimicarb	0.04
22	Lambda-cyhalothrin	0.03
23	Spinosad	0.01
24	Deltamethrin	<0.01

Table 11: Celery and parsley: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

Pesticide group and active substance	Reasons for treatment									Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Alternaria & ring spot	Botrytis	Damping off diseases	Downy mildew	Rhizoctonia	Pre-emergence weed control	General insect control	Seed Treatment				
Fungicides												
Azoxystrobin	0.78	.	.	.	.	.	.	.	.	0.78	0.78	0.20
Cyprodinil/fludioxonil	0.18	.	.	.	.	0.18	0.18	0.07
Fosetyl-aluminium/propamocarb hydrochloride	.	.	.	0.18	.	.	.	.	.	0.18	0.18	0.38
All fungicides	0.78	.	.	0.18	0.18	.	.	.	.	1.14	.	0.64
Herbicides												
Glyphosate	0.11	.	.	.	0.11	0.11	0.11
All herbicides	0.11	.	.	.	0.11	.	0.11
Insecticides and acaricides												
I Deltamethrin	0.08	.	.	0.08	0.08	<0.01
I Spirotetramat	0.11	.	.	0.11	0.11	0.01
All insecticides and acaricides	0.18	.	.	0.18	.	0.01
Biopesticides												
<i>B Bacillus subtilis</i>	.	.	0.18	.	.	.	.	.	.	0.18	0.18	0.02
<i>B Gliocladium catenulatum</i>	.	<0.01	.	.	.	.	.	.	.	<0.01	<0.01	<0.01
All biopesticides	.	<0.01	0.18	.	.	.	.	.	.	0.18	.	0.02
Seed treatments												
Fludioxonil	0.17	.	0.17	0.17	<0.01
Metalaxyl-M	0.06	.	0.06	0.06	<0.01
All seed treatments	0.23	.	0.23	.	<0.01

Table 12: Leafy and flowerhead brassicas: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

Pesticide group and active substance	Reasons for treatment										Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)	
	Altenaria	Botrytis	Damping off diseases	Downy mildew	Rhizoctonia	White blister	Aphids	Cabbage root fly	Caterpillars	Seed treatment				
Fungicides														
Boscalid/pyraclostrobin	2.52	.	.	.	.	.	2.52	2.52	0.84
Cyprodinil/fludioxonil	2.51	.	.	.	.	.	.	2.51	2.51	1.26
Difenoconazole	2.30	.	.	.	.	.	.	.	.	.	.	2.30	2.30	0.29
Dimethomorph	.	.	.	2.62	.	.	.	.	.	.	.	2.62	2.62	0.17
Fluopicolide/propamocarb hydrochloride	.	.	.	2.41	.	.	.	.	.	.	.	2.41	2.41	2.65
Fosetyl-aluminium/propamocarb hydrochloride	.	.	.	2.30	.	.	.	.	.	.	.	2.30	2.30	58.05
Propamocarb hydrochloride	.	.	.	0.22	.	.	.	.	.	.	.	0.22	0.22	7.78
All fungicides	2.30	.	.	7.55	2.51	2.52	.	.	.	.	.	14.88	.	71.03
Insecticides and acaricides														
Cyantraniliprole	1.74	.	.	.	1.74	1.74	0.21
Lambda-cyhalothrin	2.85	.	.	2.85	2.85	0.03
Spinosad	0.10	.	.	.	0.10	0.10	0.01
Spirotetramat	2.64	.	.	.	.	2.64	2.64	0.20
All insecticides and acaricides	2.64	1.84	2.85	.	.	7.32	.	0.44
Biopesticides														
<i>Bacillus subtilis</i>	.	.	2.51	.	.	.	.	.	.	.	.	2.51	2.51	0.34
<i>Gliocladium catenulatum</i>	.	0.31	.	.	.	.	.	.	.	.	.	0.31	0.31	0.60
All biopesticides	.	0.31	2.51	.	.	.	.	.	.	.	.	2.83	.	0.94
Seed treatments														
Fludioxonil	2.12	.	2.12	2.12	0.03
Metalaxyl-M	1.42	.	1.42	1.42	0.08
All seed treatments	3.55	.	3.55	.	0.11

Table 13: Lettuce: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

Pesticide group and active substance	Reasons for treatment							Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)	
	Botrytis	General disease control	Mildew	Sclerotinia	General weed control	Aphids	General insect control				Whitefly
Fungicides											
Azoxystrobin	.	0.46	.	.	.	.	.	.	0.46	0.46	0.11
Boscalid/pyraclostrobin	.	.	.	7.50	.	.	.	.	7.50	7.50	2.51
Cyprodinil/fludioxonil	15.00	0.53	.	.	.	.	.	.	15.53	7.80	4.88
Dimethomorph	.	.	7.50	.	.	.	.	.	7.50	7.50	1.35
Fenhexamid	15.00	.	.	.	.	.	.	.	15.00	7.50	3.75
Mandipropamid	.	.	7.50	.	.	.	.	.	7.50	7.50	1.12
All fungicides	30.00	0.98	15.00	7.50	.	.	.	.	53.48	.	13.73
Herbicides											
Propyzamide	1.13	.	.	.	1.13	1.13	0.79
All herbicides	1.13	.	.	.	1.13	.	0.79
Insecticides and acaricides											
Deltamethrin	0.38	.	.	0.38	0.30	<0.01
Lambda-cyhalothrin	0.08	0.08	0.08	<0.01
Pirimicarb	0.30	.	.	0.30	0.30	0.04
Spirotetramat	15.00	0.08	.	15.08	7.58	1.13
All insecticides and acaricides	15.68	0.08	0.08	15.83	.	1.17
Biopesticides											
<i>Gliocladium catenulatum</i>	2.32	2.32	4.46	0.63
All biopesticides	2.32	2.32	.	0.63

Table 14: Onions and leeks: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

Pesticide group and active substance	Reasons for treatment					Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Altenaria	Botrytis	General disease control	Ground preparation	Seed treatment			
Fungicides								
Azoxystrobin	.	.	0.11	.	.	0.11	0.11	0.03
Prothioconazole	0.38	.	.	.	.	0.38	0.38	0.07
All fungicides	0.38	.	0.11	.	.	0.48	0.48	0.10
Herbicides								
Glyphosate	.	.	.	0.11	.	0.11	0.11	0.11
All herbicides	.	.	.	0.11	.	0.11	0.11	0.11
Biopesticides								
<i>Gliocladium catenulatum</i>	.	0.38	.	.	.	0.38	0.38	0.72
All biopesticides	.	0.38	.	.	.	0.38	.	0.73
Seed treatments								
Metalaxyl-M	.	.	.	.	0.02	0.02	0.02	<0.01
All seed treatments	.	.	.	.	0.02	0.02	.	<0.01

Table 15: Other crops: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

Pesticide group and active substance	Reasons for treatment					Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Botrytis	Damping off diseases	Downy mildew	Rhizoctonia	Seed treatment			
Fungicides								
Cyprodinil/fludioxonil	.	.	.	0.08	.	0.08	0.04	0.03
Fosetyl-aluminium/propamocarb hydrochloride	.	.	0.04	.	.	0.04	0.04	0.08
All fungicides	.	.	0.04	0.08	.	0.12	.	0.11
Biopesticides								
<i>Bacillus subtilis</i>	.	0.04	.	.	.	0.04	0.04	0.01
<i>Gladiolus catenulatus</i>	0.69	.	.	.	.	0.69	0.69	1.32
All biopesticides	0.69	0.04	.	.	.	0.73	.	1.32
Seed treatments								
Fludioxonil	.	.	.	.	0.25	0.25	0.25	0.17
Metalaxyl-M	.	.	.	.	0.01	0.01	0.01	<0.01
All seed treatments	.	.	.	.	0.26	0.26	.	0.17

Table 16: Tomatoes: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

Pesticide group and active substance	Reasons for treatment		Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	General disease control	Ground preparation			
Fungicides					
Azoxystrobin	0.11	.	0.11	0.11	0.03
All fungicides	0.11	.	0.11	0.11	0.03
Herbicides					
Glyphosate	.	0.22	0.22	0.22	0.32
All herbicides	.	.	0.22	.	0.32

Table 17: Turnips and swedes: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

Pesticide group and active substance	Reasons for treatment		Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Botrytis				
Biopesticides					
<i>Gliocladium catenulatum</i>	0.25		0.25	0.25	0.47
All biopesticides	0.25		0.25	.	0.47

Table 18: Comparison of the area of edible protected crops grown (ha) in Northern Ireland 2015-2023, by crop group.

<i>Crop group</i>	Northern Ireland				
	2015	2017	2019	2021	2023
Beans	.	.	0.28	0.12	.
Carrots	.	.	0.04	0.09	.
Celery and parsley	1.45	1.77	0.61	0.70	1.14
Leafy and flowerhead brassicas	3.08	2.67	3.89	4.49	4.27
Lettuce	9.61	14.02	8.59	8.68	10.39
Onions and leeks	1.21	0.81	0.66	0.65	0.48
Other crops	0.03	1.18	0.85	1.43	1.51
Tomatoes	19.62	6.34	1.17	0.83	0.45
Turnips and swedes	.	.	.	.	0.25
All crops	35.00	26.78	16.10	16.99	18.48

Table 19: Comparison of pesticide usage on edible protected crops 2015-2023, total area treated (spha) with main pesticide groups and quantities (kg) of active ingredient used.

<i>Pesticide group</i>	2015		2017		2019		2021		2023	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
Fungicides	13.85	21.44	107.92	65.44	69.74	91.62	79.66	164.60	70.21	85.64
Herbicides	1.49	1.97	.	.	8.78	7.21	7.50	5.25	1.55	1.33
Insecticides and acaricides	8.26	141.41	49.19	146.62	33.01	7.32	31.56	1.75	23.33	1.63
Biopesticides	2.12	0.68	29.88	2.27	19.59	1.63	21.20	5.46	6.68	7.95
Seed treatments	13.21	0.85	7.50	7.08	5.01	0.34	6.48	0.07	4.14	0.29
Growth regulators	.	.	.	.	0.27	0.13	.	.	.	.
Molluscicides	.	.	.	.	7.50	1.11	7.50	1.11	.	.
Total	38.92	166.34	194.48	221.42	143.91	109.35	153.90	178.23	105.92	96.83

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
218	Soft Fruit Crops 2006	1-848 07 036 3
222	Vegetable Crops 2007	1-848 07 062 2

Report No.	Report title	ISBN
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	1-84807-308-1
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	1-84807-485-9
259	Vegetable Crops 2013	1-84807-486-6
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	Outdoor 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
293	Outdoor Vegetable Crops 2019	1-908471-15-4
294	Edible Protected Crops 2019	1-908471-16-1
299	Arable Crops 2020	1-908471-19-2
300	Soft Fruit Crops 2020	1-908471-21-5
301	Top Fruit Crops 2020	1-908471-20-8
306	Outdoor Vegetable Crops 2021	1-908471-26-0
307	Edible Protected Crops 2021	1-908471-27-7
308	Grassland & Fodder Crops 2021	1-908471-25-3

Report No.	Report title	ISBN
313	Arable Crops 2022	1-908471-29-1
314	Soft Fruit Crops 2022	1-908471-30-7
315	Top Fruit Crops 2022	1-908471-31-4
318	Outdoor Vegetable Crops 2023	1-908471-00-0

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