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PESTICIDE USAGE IN NORTHERN IRELAND
SURVEY REPORT 318

NORTHERN IRELAND OUTDOOR VEGETABLE CROPS 2023

An Accredited Official Statistics Publication

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A list of published pesticide usage monitoring reports can be found using this link:
https://www.afbini.gov.uk/articles/pesticide-usage-monitoring-reports

PESTICIDE USAGE SURVEY REPORT

OUTDOOR VEGETABLE CROPS IN NORTHERN IRELAND 2023

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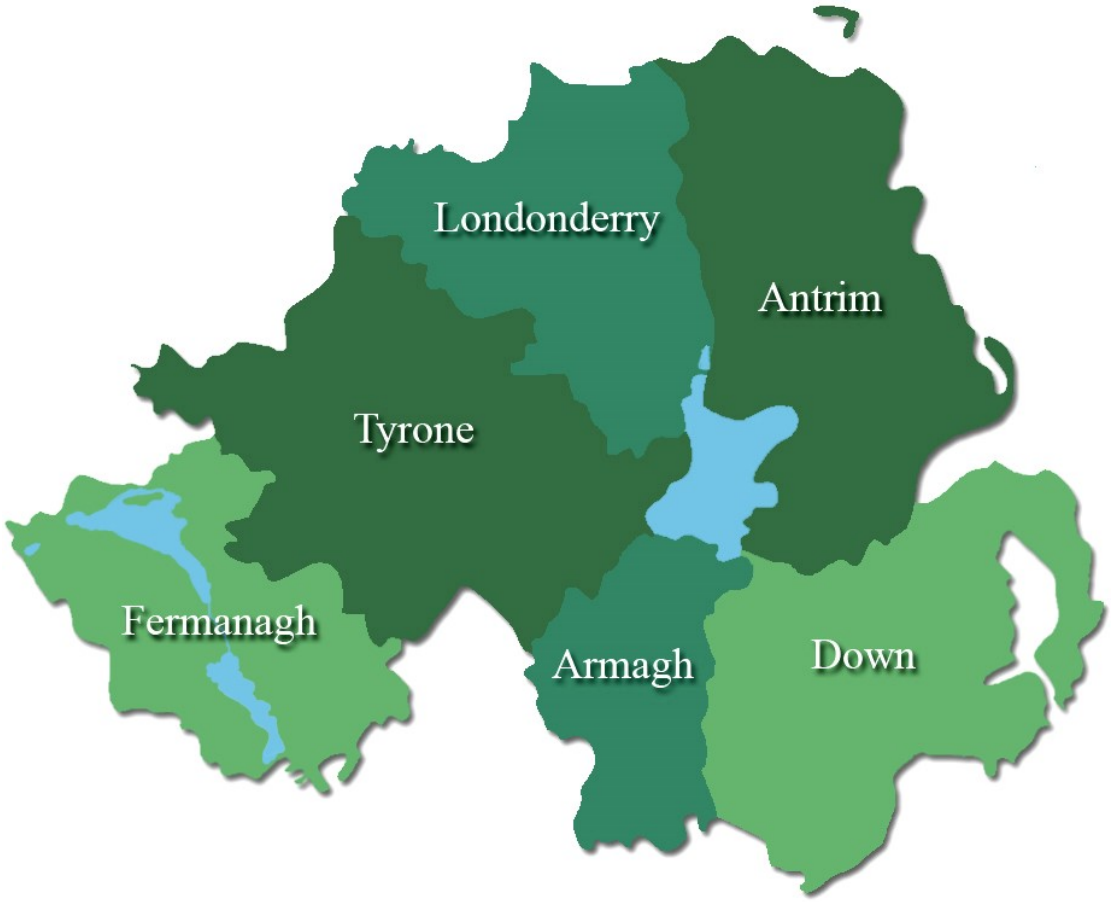

SUMMARY

This is the twelfth survey of pesticide usage on outdoor vegetable crops in Northern Ireland, providing comparative data to that obtained in the previous surveys in 1991 (Jess *et al*., 1993), 1995 (Kidd *et al*., 1998), 1999 (Kearns *et al*., 2002), 2004 (Kearns *et al*., 2005), 2007 (Withers *et al*., 2009), 2011 (Withers *et al*., 2012), 2013 (Withers *et al*., 2014), 2015 (Lavery *et al*., 2016), 2017 (Kirbas *et al*., 2018), 2019 (Lavery *et al*., 2020) and 2021 (Kirbas *et al*., 2022) Information on all aspects of pesticide usage was collected from 36 holdings throughout the province, representing 41% of the total population of outdoor vegetable crop growers in Northern Ireland (Table 1). Quantitative data have been adjusted to provide estimates of total pesticide usage. The area of outdoor vegetable crops grown in Northern Ireland in 2023 was an estimated 1,178 hectares; a 12% increase compared with 2021, though similar to the area recorded in 2017. Carrots, parsnips and leafy and flowerhead brassicas continue to be the dominant outdoor vegetable crops grown in Northern Ireland, accounting for 65% of the area grown, 85% of the area treated with pesticides and 78% of the weight applied.

Totals of 63 products and 46 active substances were recorded in use in this survey. Although the area of outdoor vegetable crops grown in 2023 increased when compared with 2021, the pesticide-treated area decreased by 33% to 10,132 spray hectares, and the quantity of pesticide active substances decreased by 36% to 2,826 kilograms. The fungicide-treated area decreased by 45% and the quantity of fungicide active substances applied decreased by 52%. The area treated with herbicides decreased by 25% and the weight applied decreased by 29%. The insecticide-treated area decreased by 35% and the weight of insecticide active substances decreased by 15%.

The area of vegetable crops grown from treated seed (direct sown or propagated and transplanted) decreased by 20% since 2021, however, the weight of active substances used decreased by 84%, from 11 kilograms to two kilograms. This was mainly due to the withdrawal of cymoxanil/fludioxonil/metalaxyl-m and tefluthrin as a seed dressing on these crops.

Fungicides, applied to 27% of the pesticide-treated area, accounted for 24% of the weight of pesticides applied. Herbicides accounted for 33% of the pesticide-treated area and 71% of the total quantity of pesticides used. Insecticides, applied to 30% of the pesticide-treated area, accounted for only 3% of the total quantity of pesticides used. Growth regulators and molluscicides both accounted for less than 1% of the pesticide treated area and the quantity applied. Seed treatments applied to outdoor vegetable crop seeds grown in 2023 accounted for 9% of the pesticide-treated area, representing less than 1% of the quantity of active substances applied.

Carrots and parsnips accounted for 42% of the of the area treated with fungicides, and 49% of the quantity of fungicide active ingredients applied, with prothioconazole, fluopyram,

azoxystobin/difenoconazole, difenoconazole/fluxapyroxad and metalaxyl-M being the active substances most used on these crops. Leafy and flowerhead brassica crops accounted for 52% of the area of vegetable crops treated with fungicides, and 39% of the total weight of fungicides applied. The three fungicide active substances most commonly applied to brassicas were the curative triazole fungicides prothioconazole and difenoconazole, and the systemic translaminar fungicide azoxystrobin, primarily for general disease control.

The pre-emergent herbicide alconifen, and the isoxazolidinone residual herbicide clomazone, were the herbicide active substances most commonly applied to outdoor vegetable crops. Overall, 54% of all herbicide applications were applied to carrot and parsnip crops, with 20% applied to brassica crops, representing 57% of the total weight of herbicides applied.

Carrots and parsnips accounted for 55% of the insecticide-treated area and 51% of the quantity of insecticide active substances applied. Leafy and flowerhead brassicas accounted for 30% of the insecticide-treated area representing 32% of the weight of insecticides applied. Turnips and swedes accounted for 14% of the insecticide-treated area representing 17% of the weight of insecticides used. The insecticide active substance most commonly used was lambda-cyhalothrin, being applied extensively for control of carrot fly (C*hamaepsila rosae*), aphids and general insect control.

The only molluscicide active substance used was ferric phosphate. Maleic hydrazide was the only growth regulator used, applied exclusively to parsnip crops. There was no recorded use of biopesticides/biological controls in Northern Ireland vegetable crops in 2023.

Crops which were propagated from seed and/or grown under glass or polythene for the duration of their life cycle are recorded in the Edible Protected Crops in Northern Ireland 2023 report (Kirbas *et al*., 2024). These crops have previously been included in the totals for outdoor vegetable crops. The proportion of total treated area of vegetable crops attributed to propagation (edible protected) is estimated at <1%.

A number of new active substances and formulated mixtures, which were not recorded in the previous report, have been used during this survey period. These include the fungicide formulation difenoconazole/fluxapyroxad, and the insecticide active substances acetamiprid and esfenvalerate.

Conversely, a number of active substances and formulated mixtures which were used in 2021 have not been recorded during this survey. These include the fungicide actives isopyrazam and metconazole, the herbicide actives bromoxynil, clopyralid, cycloxydim, dimethenamid-P/metazachlor and ethofumesate, the insecticide actives chlorantraniliprole, garlic extract, indoxacarb and pirimicarb, and the seed treatment actives cymoxanil/fludioxonil/metalaxyl-m and tefluthrin.

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.
- ‘Leafy and flowerhead brassicas’ refers to Brussels sprouts, broccoli, all cabbage types, all cauliflower types and kale. Cabbage includes Chinese (pointed), red, savoy, spring and white cabbage. Cauliflower includes autumn, summer, winter and cauliflowers which could not be further classified.
- ‘Onions and leeks’ refers to salad onions/summer scallions, soup leeks, and leeks which could not be further classified. There were no dry-bulb onions or garlic crops recorded during this survey period.
- ‘Celery and parsley’ refers to soup celery, table celery and parsley.
- ‘Peas and beans’ refers to picking peas and broad beans.
- ‘Other vegetables’ refers to beetroot, pumpkin, rhubarb and squash.
- ‘Ground preparation’ herbicides are also known as pre-cultivation or pre-sowing herbicides.
- Pre-emergence weed control herbicides are also referred to as ‘Sealers’.
- ‘Headlands’ refers to those areas, typically on the field margins, which are not used for growing crops.
- Fluopyram is an active substance with both fungicidal and nematicidal activity.

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)

This is the eleventh survey examining pesticide usage practices on vegetable crops grown in Northern Ireland. Summary results from the previous surveys conducted in 1991 (Jess *et al*., 1993), 1995 (Kidd *et al*., 1998), 1999 (Kearns *et al*., 2002), 2004 (Kearns *et al*., 2005), 2007 (Withers *et al*., 2009), 2011 (Withers *et al*., 2012), 2013 (Withers *et al*., 2014), 2015 (Lavery *et al*., 2016), 2017 (Kirbas *et al*., 2018) and 2019 (Lavery *et al*., 2020) are included in the report for comparative purposes.

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

METHODS

The sample of holdings to be surveyed was selected from each of the six counties, on the basis of the total area of vegetable crops grown, using a combination of data from the Northern Ireland Agricultural Census, June 2023 (*Anon*., 2024), farm level information from the Basic Farm Payment scheme (*Anon*., 2024) and information from previous surveys. However, due to sampling procedures and the distribution of vegetable production in Northern Ireland, no holdings were selected from County Fermanagh.

The sample was stratified into five size groups, according to the total area of vegetable crops grown in each region. Holdings were selected at random within each of the size groups and the number of holdings selected was proportional to the total area of vegetable crops grown. The growers were contacted to confirm if they had grown outdoor vegetable crops in 2023. This information was used to estimate the total number of Northern Ireland growers.

The purpose of the survey was explained to the occupiers of selected holdings in preliminary correspondence. Thirty-six holdings, representing 41% of holdings growing outdoor vegetable crops, were contacted during the period February 2024 to May 2024 and data collected by telephone, email and other electronic means. These data included the area of crops grown, area treated, target crop, pesticide group, active substance and number of treatments applied. The growers' stated reasons for pesticide use were also included but may not always seem appropriate. Holdings selected in the original sample unable to provide data were replaced with those from the same county and size group held on a reserve list. The total number of farms in each size group and the number of farms sampled are shown in Table 1. 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 regarding farm visits, 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 (Figures 1-5). However, we are pleased that despite these drawbacks, we can present the report in a timely manner.

COMPARISONS AND TRENDS

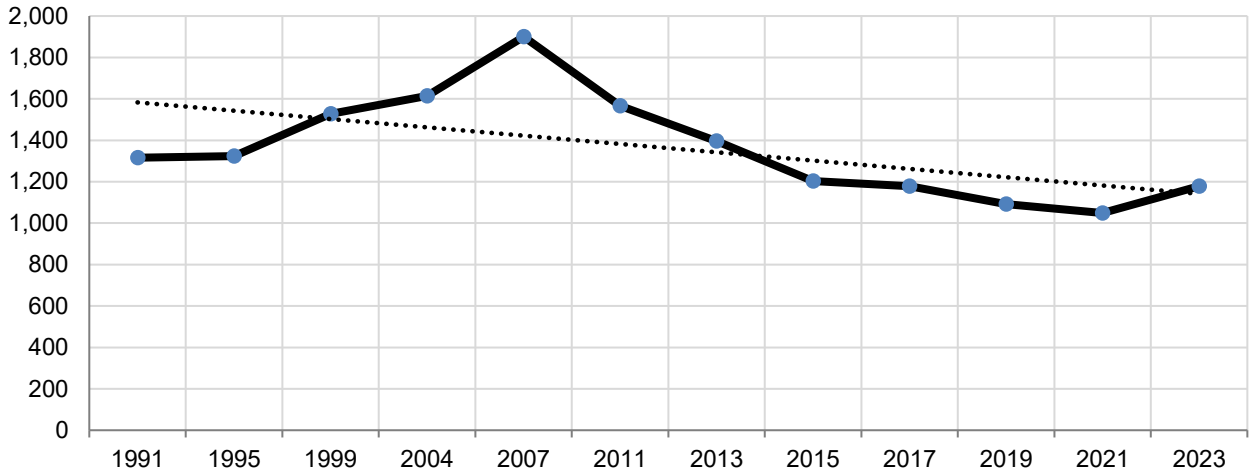

Figure 1: Comparison and trend of the area of outdoor vegetable crops grown (ha) in Northern Ireland between 1991-2023.

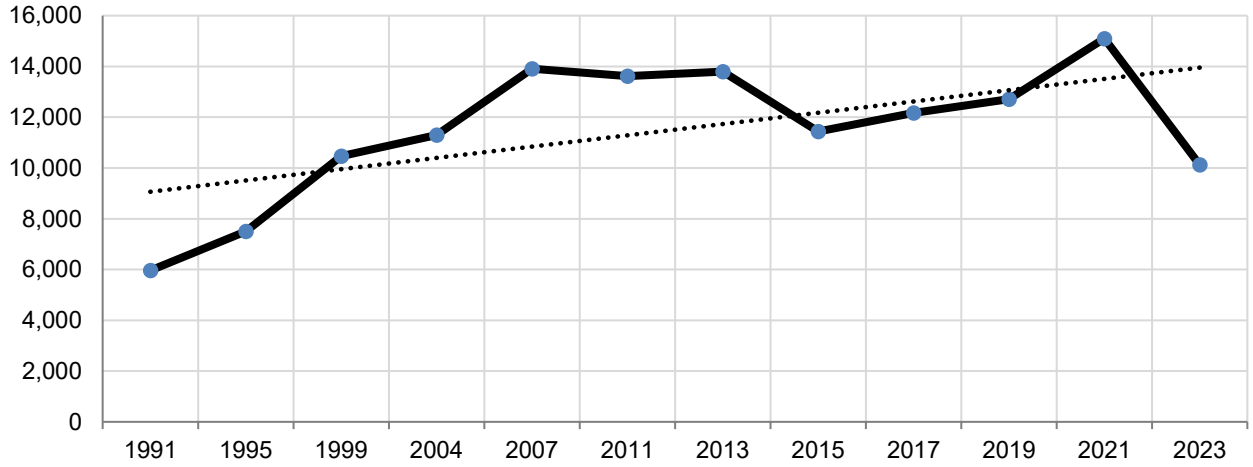

Figure 2: Comparison and trend of the area of outdoor vegetable crops treated (spha) in Northern Ireland between 1991-2023.

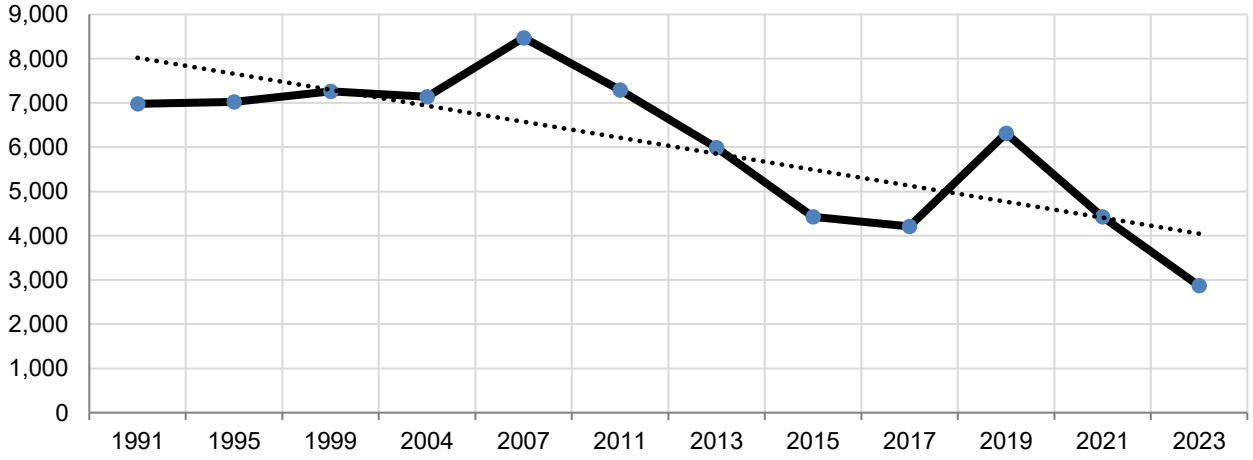

Figure 3: Comparison and trend of the weight of pesticides applied (kg) to outdoor vegetable crops in Northern Ireland between 1991-2023.

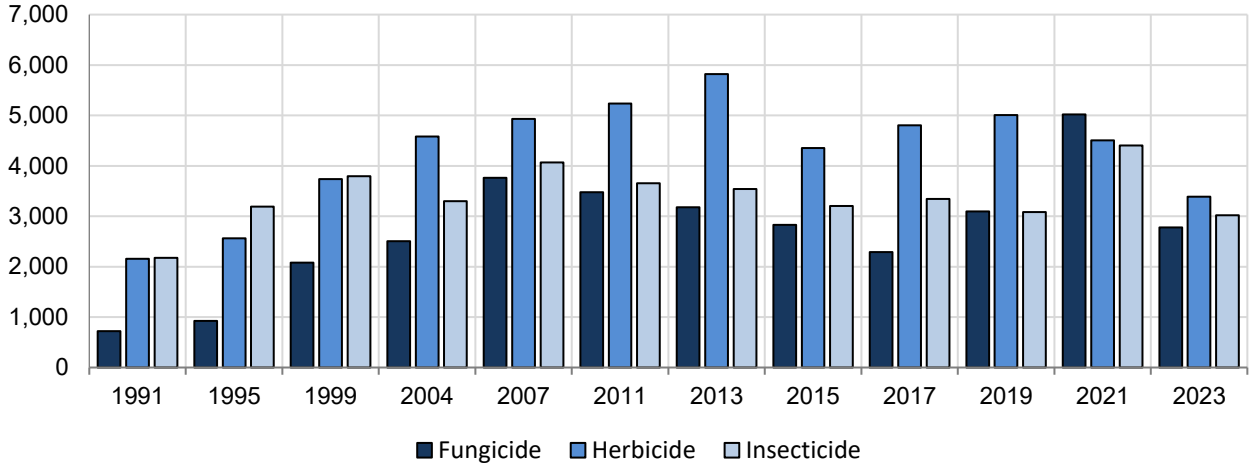

Figure 4: Comparison of the area treated (spha) with the major pesticide groups applied to outdoor vegetable crops in Northern Ireland between 1991-2023.

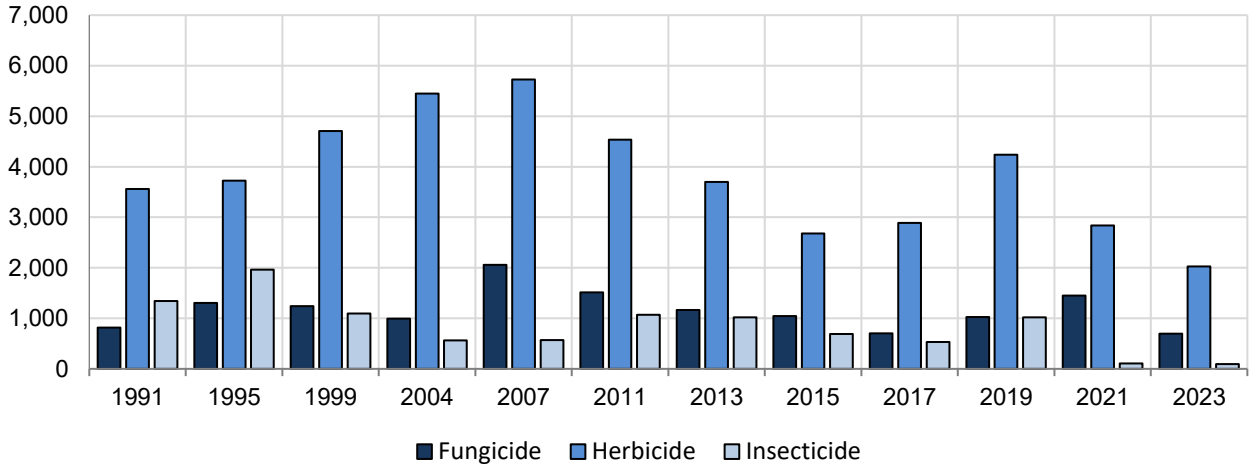

Figure 5: Comparison of the weight (kg) of the major pesticide groups applied to outdoor vegetable crops in Northern Ireland between 1991-2023.

CROPS AND TREATMENTS

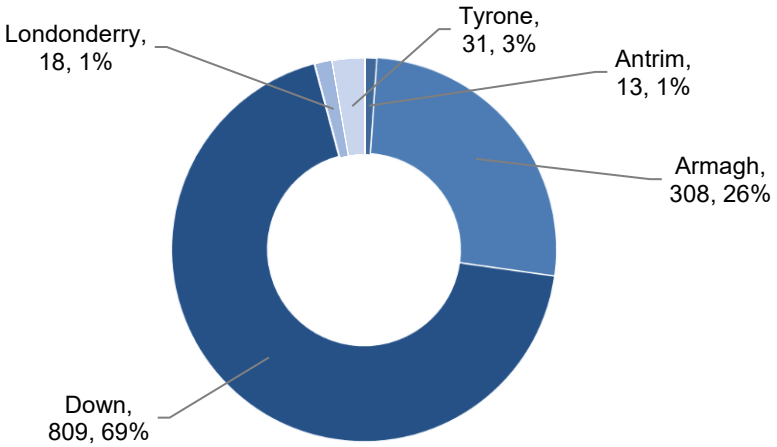

Figure 6a: Regional distribution of outdoor vegetable crops grown (ha) in Northern Ireland, 2023.

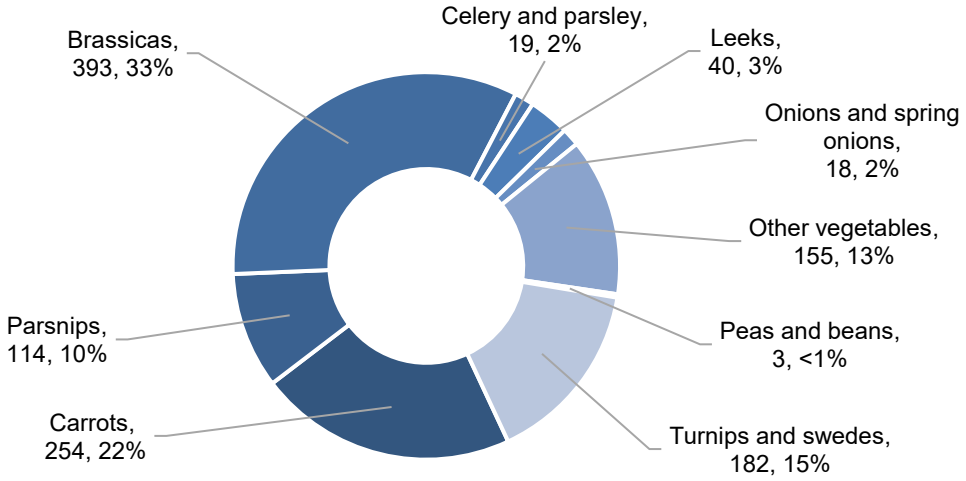

Figure 6b: Proportional areas of the different outdoor vegetable crops grown (ha) in Northern Ireland, 2023.

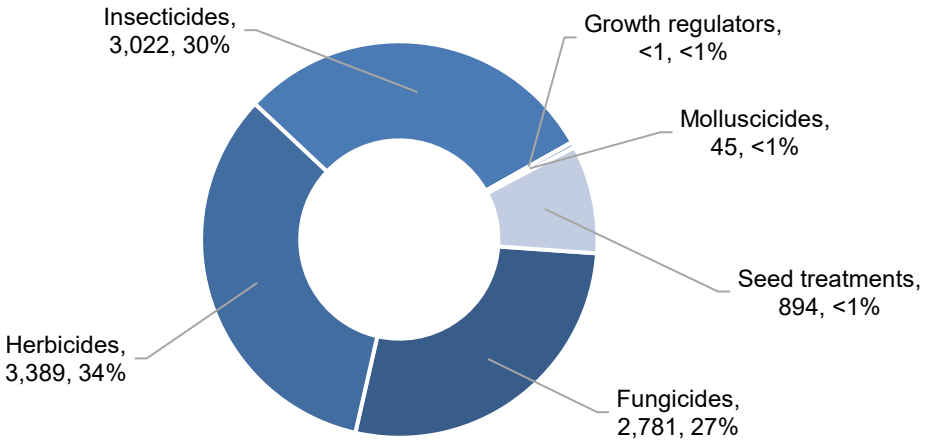

Figure 7a: Pesticide usage (spha) on outdoor vegetable crops in Northern Ireland, 2023.

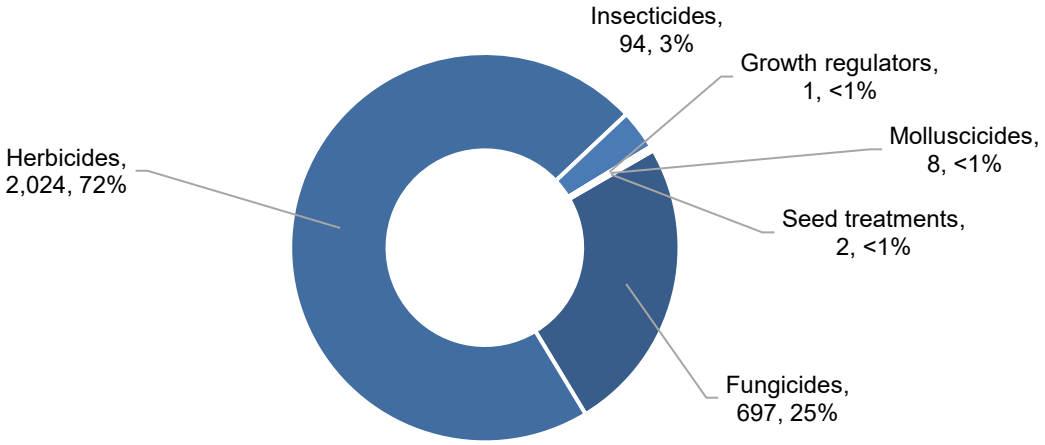

Figure 7b: Pesticide usage (kg) on outdoor vegetable crops in Northern Ireland, 2023.

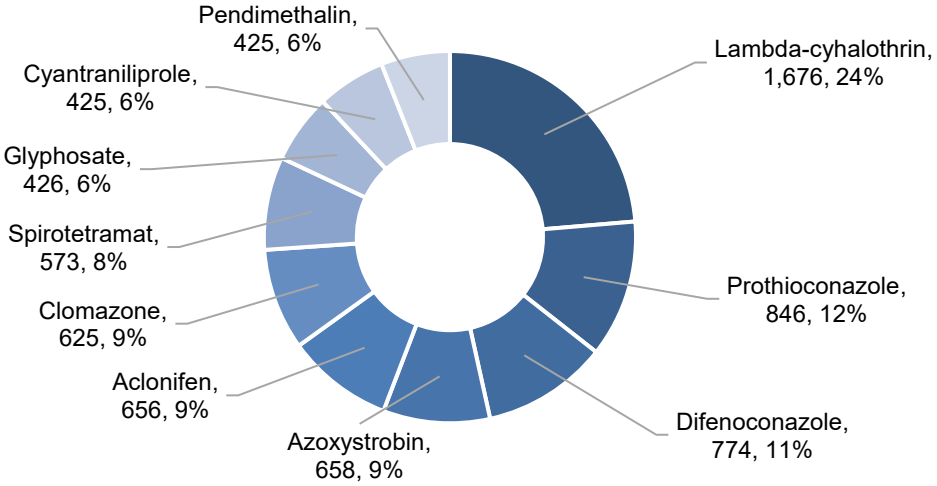

Figure 8: The ten most commonly used pesticide active substances by area treated (spha) in Northern Ireland, 2023.

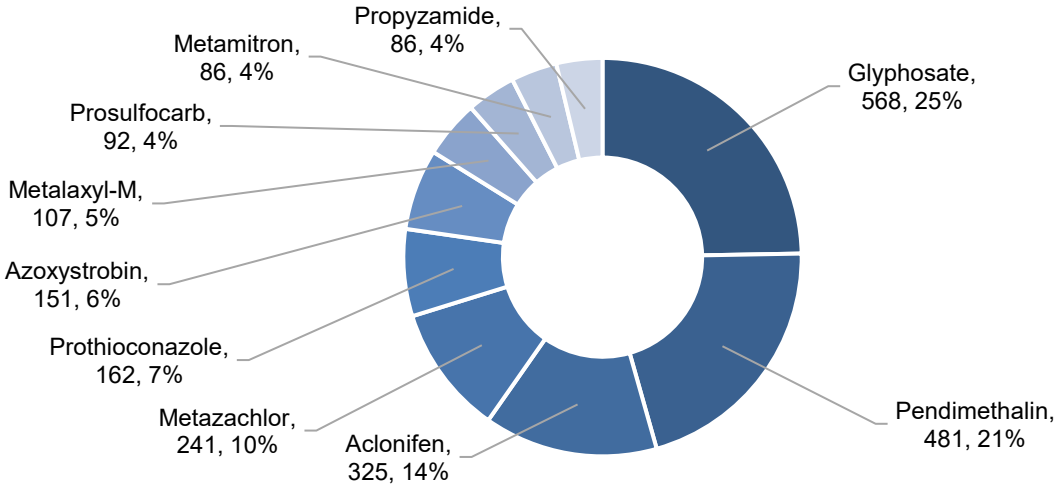

Figure 9: The ten most commonly used pesticide active substances by weight applied (kg) in Northern Ireland, 2023.

PESTICIDE USAGE ON CROPS (Tables 5 & 6)

An in-depth analysis of pesticide usage on each crop is contained on pages 16-44 and contains the following crop groupings: Carrots and parsnips, Celery and parsley, Leafy and flowerhead brassicas, Onions and leeks, Other vegetables, Peas and beans, and Turnips and swedes. Information relating to the basic grown area (ha), basic treated area (ha), total treated area (spha) and quantity applied (kg) of the three main pesticide types (fungicides, herbicides and insecticides) is included along with the reasons given for their use. Information relating to the use of growth regulators, molluscicides and seed treatments is included, where appropriate.

PROPORTION OF CROPS TREATED (Table 7)

The proportional areas of crops treated with different pesticide groups, together with the number of spray applications are shown in Table 7. All crops received at least one pesticide treatment during this period (including seed treatments).

TOTAL PESTICIDE USAGE (Tables 8 & 9)

Approximately 2,826 kilograms of pesticide active ingredients were applied to 10,132 spray hectares of outdoor vegetable crops grown in Northern Ireland in 2023.

An estimated 94% of all fungicide applications were made to brassica, carrot and parsnip crops. The active substance prothioconazole was the most frequently used fungicide, mainly on brassica and carrot crops, accounting for 30% of the total fungicide-treated area and 23% of the weight of fungicides used. The broad-spectrum systemic fungicide azoxystrobin was applied to 14% of both the total fungicide-treated area and quantity of fungicides applied, mainly to brassica and parsnip crops. The most common reason for fungicide use was ‘General disease control’.

Herbicide applications made to carrot and brassica crops accounted for 63% of all herbicide applications, representing 55% of herbicides applied. Aclonifen accounted for 19% of the total herbicide-treated area and 16% of the weight of herbicides applied, mainly to carrot and parsnip crops. Clomazone, whilst accounting for 18% of the herbicide-treated area, accounted for only 2% of the total weight of herbicides applied, mainly to brassica and carrot crops. The two main reasons given for use of these active substances were ‘general weed control’ and ‘pre-emergence weed control’.

An estimated 86% of all insecticide applications were made to brassica, carrot and parsnip crops. The main reasons given for insecticide use were ‘aphids’, ‘carrot fly’ and ‘general insect control’. The pyrethroid insecticide lambda-cyhalothrin accounted for 55% of the total insecticide-treated area and 19% of the quantity of insecticides applied. Spirotetramat and

cyantraniliprole collectively accounted for 33% of the total insecticide-treated area, however, they represented 71% of the quantity of insecticides applied.

The only growth regulator used in 2023, maleic hydrazide, was applied exclusively to parsnip crops, representing less than 1% of both the total area treated with pesticides and the weight applied.

Likewise, molluscicide treatments were applied to less than 1% of both the total pesticide-treated area and quantity of pesticides applied, with ferric phosphate being the only molluscicide active substance applied, mainly to brassica crops.

Seed treatments applied to outdoor vegetable crops grown in 2023 accounted for 9% of the total pesticide-treated area while representing less than 1% of the quantity of active substances applied. Treatments were mainly applied to brassica seeds (55%), carrot seeds (28%) and parsnip seeds (13%). The two active substances applied were fludioxinil (85%) and metalaxyl-m (15%).

The forty-four active ingredients applied to outdoor vegetable crops in 2023, ranked by spray area (spha) and weight (kg), are shown in Tables 10 and 11, respectively.

COMPARISONS AND TRENDS BY PESTICIDE TYPE

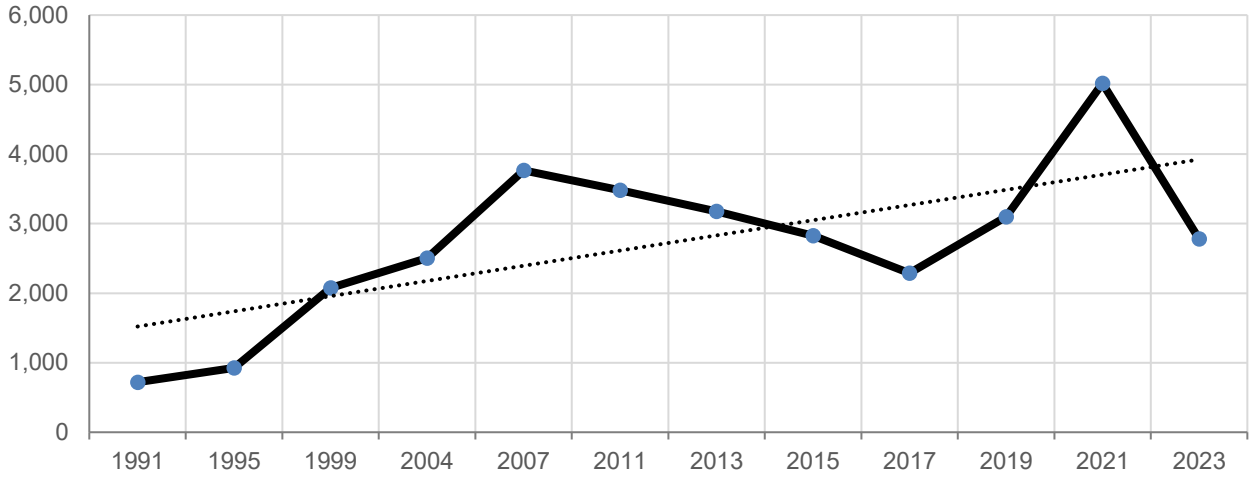

Figure 10: Comparison and trend of the areas of outdoor vegetable crops treated (spha) with fungicides in Northern Ireland, 1991-2023.

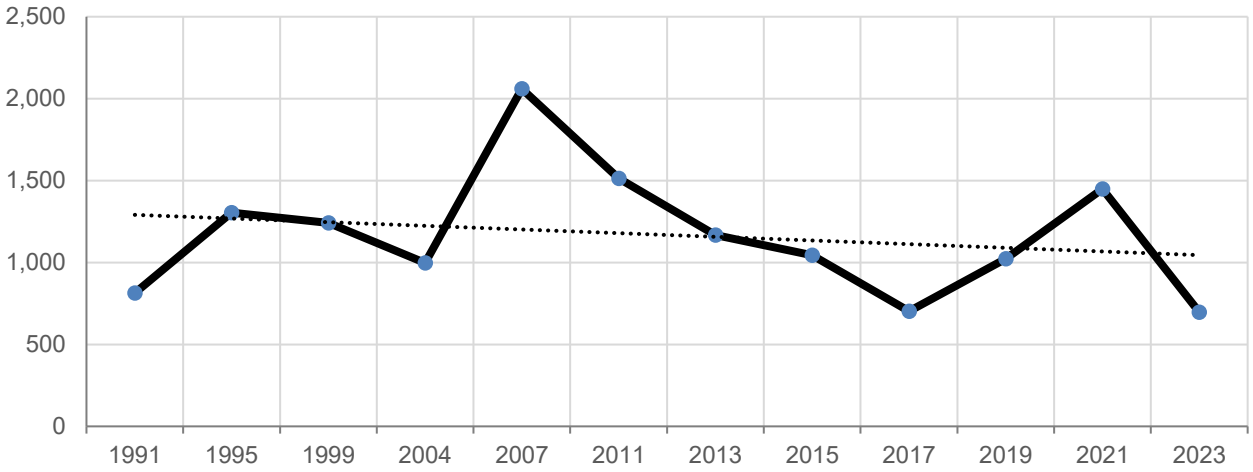

Figure 11: Comparison and trend of the weight of fungicides applied (kg) to outdoor vegetable crops in Northern Ireland, 1991-2023.

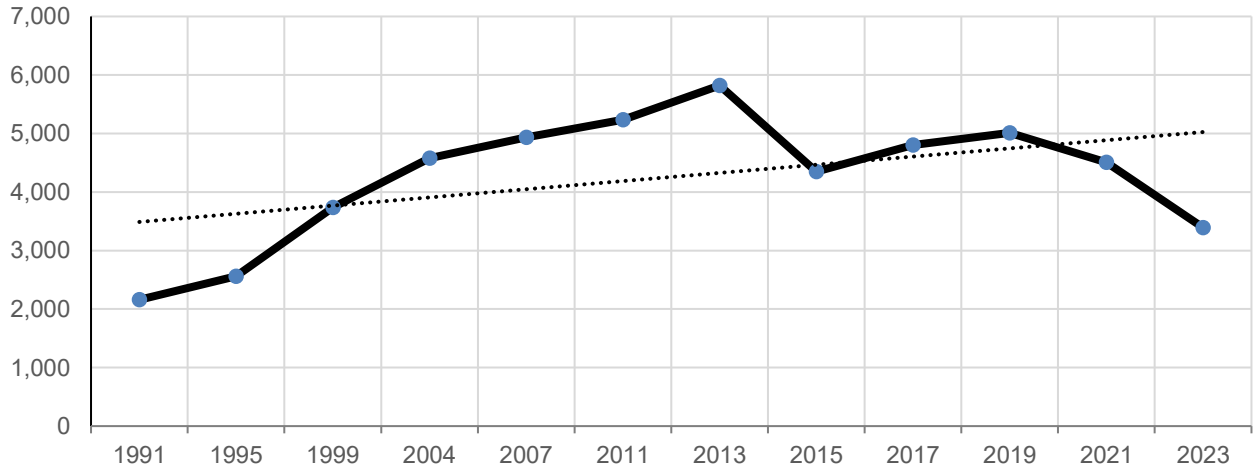

Figure 12: Comparison and trend of the areas (spha) of outdoor vegetable crops treated with herbicides in Northern Ireland, 1991-2023.

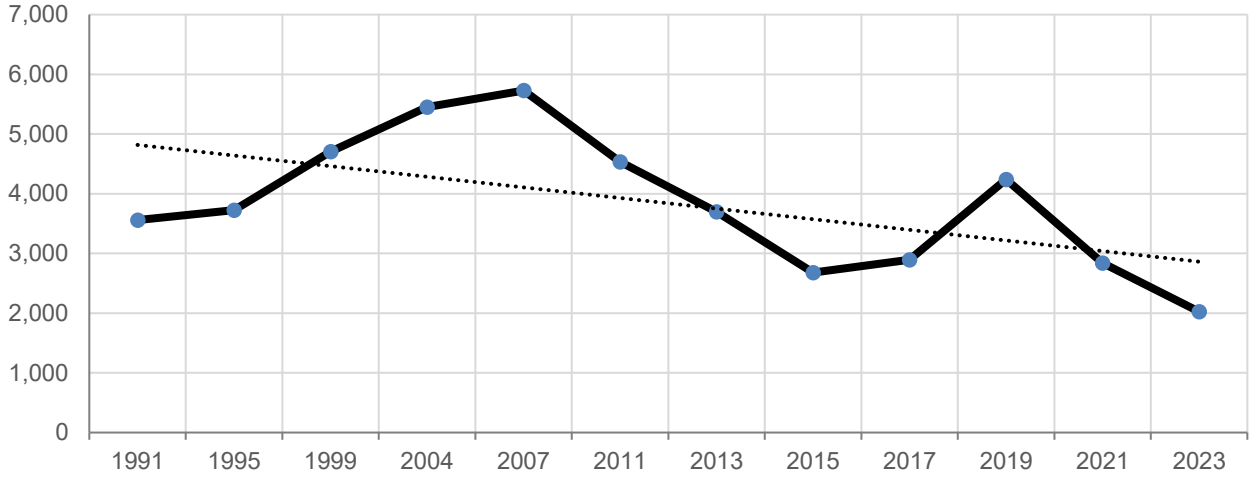

Figure 13: Comparison and trend of the weight (kg) of herbicides applied to outdoor vegetable crops in Northern Ireland, 1991-2023.

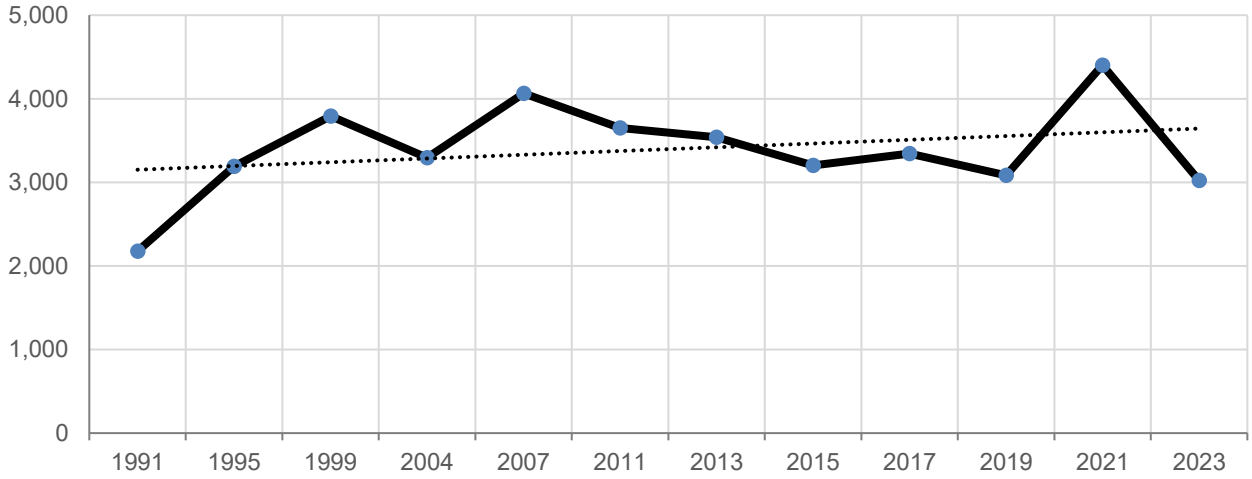

Figure 14: Comparison and trend of the areas (spha) of outdoor vegetable crops treated with insecticides in Northern Ireland, 1991-2023.

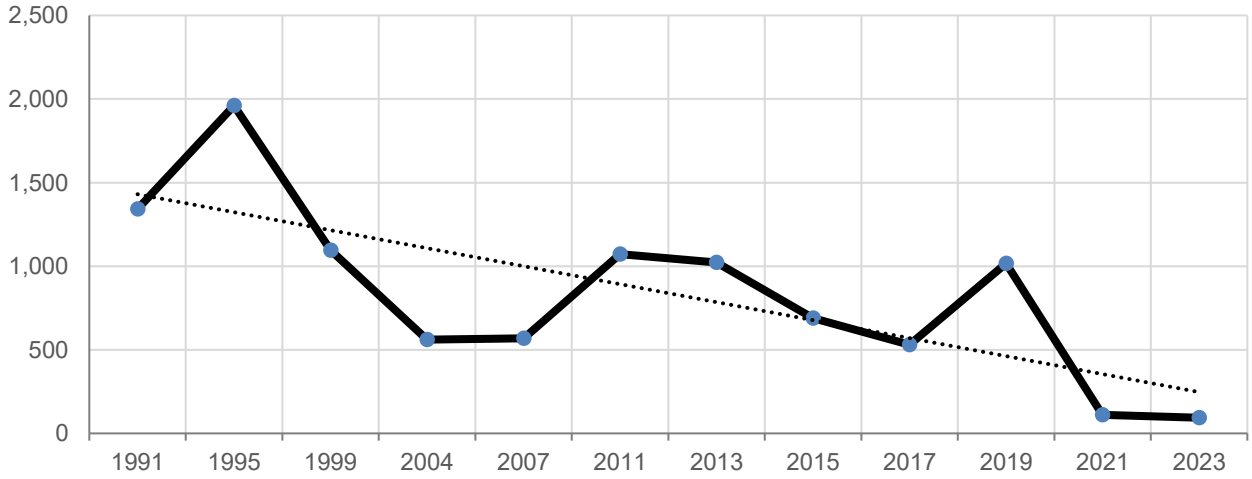

Figure 15: Comparison and trend of the weight (kg) of insecticides applied to outdoor vegetable crops in Northern Ireland, 1991-2023.

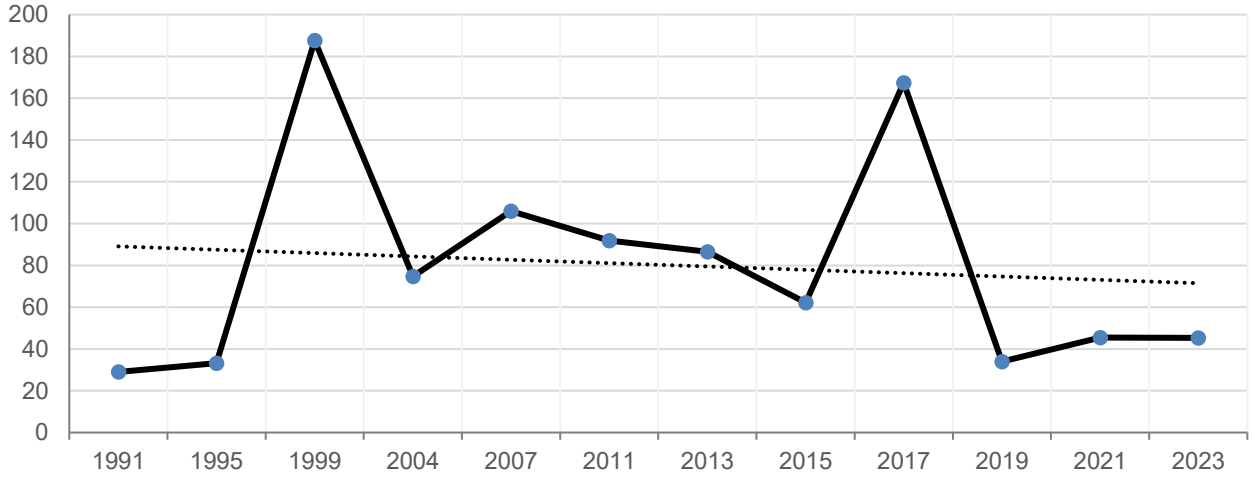

Figure 16: Comparison and trend of the areas (spha) of outdoor vegetable crops treated with molluscicides in Northern Ireland, 1991-2023.

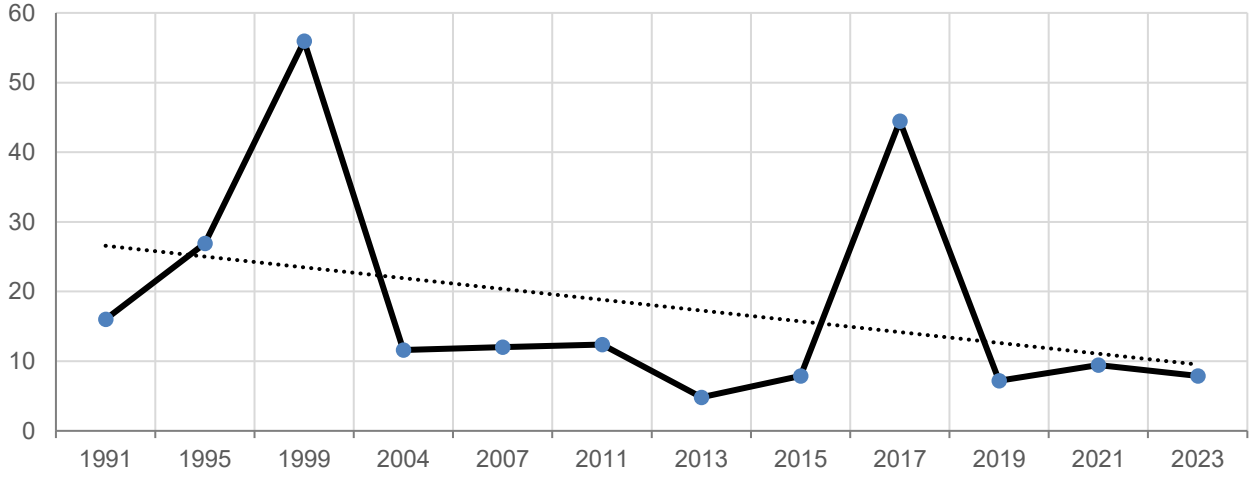

Figure 17: Comparison and trend of the weight (kg) of molluscicides applied to outdoor vegetable crops in Northern Ireland, 1991-2023.

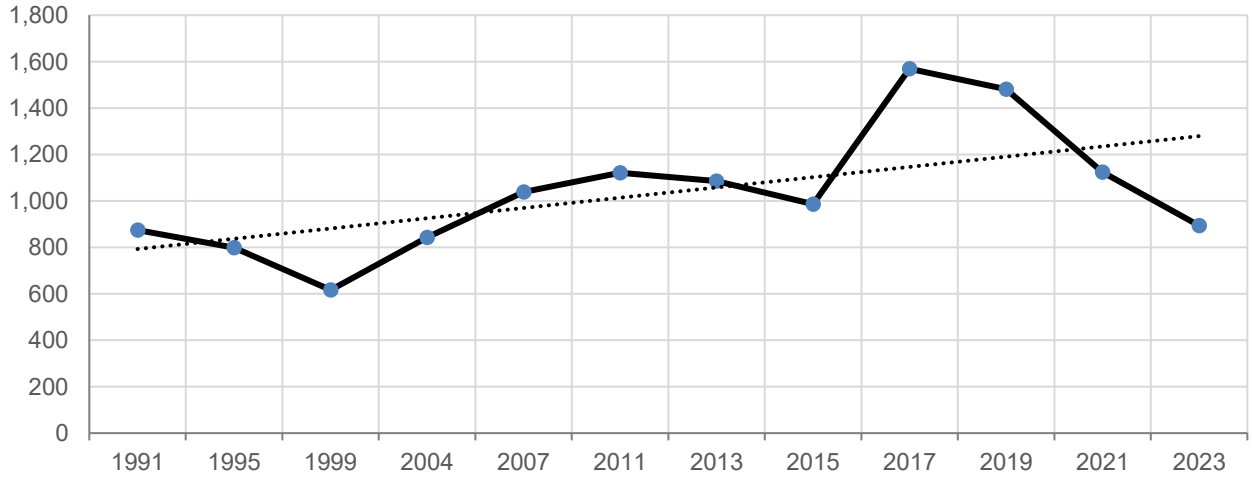

Figure 18: Comparison and trend of the areas (spha) of outdoor vegetable crops with treated seed in Northern Ireland, 1991-2023.

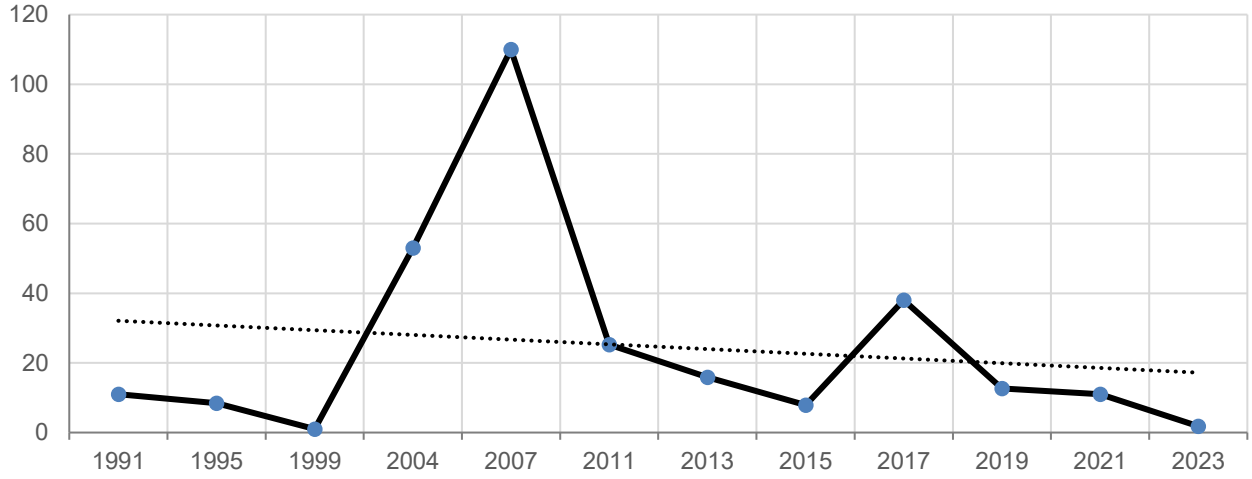

Figure 19: Comparison and trend of the weight (kg) of seed treatments applied to outdoor vegetable crops in Northern Ireland, 1991-2023.

PESTICIDE USAGE ON CARROTS AND PARSNIPS

- 369 hectares of carrot and parsnip crops grown in Northern Ireland
- Basic treated area: 364 hectares
- Total treated area: 5,011 spray hectares
- Total weight applied: 1,545 kilograms
- Refer to Table 7 for proportional area treated and number of spray applications applied and Table 12 for reasons for use

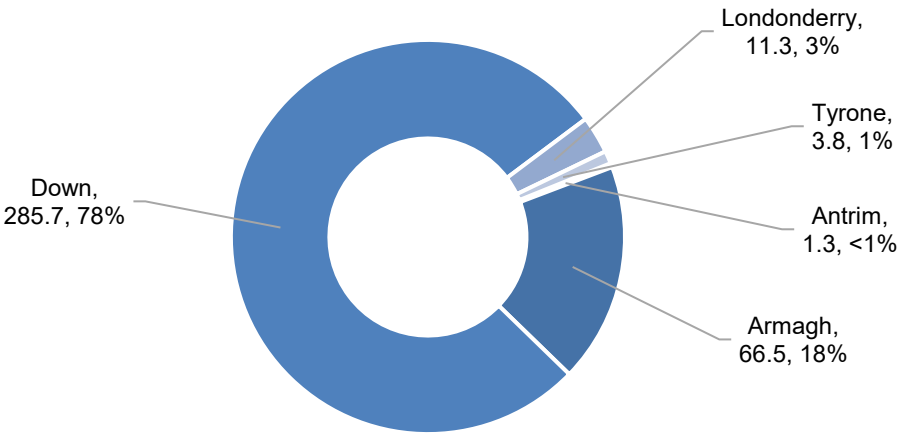

Figure 20: Regional distribution of carrot and parsnip crops grown (ha) in Northern Ireland, 2023.

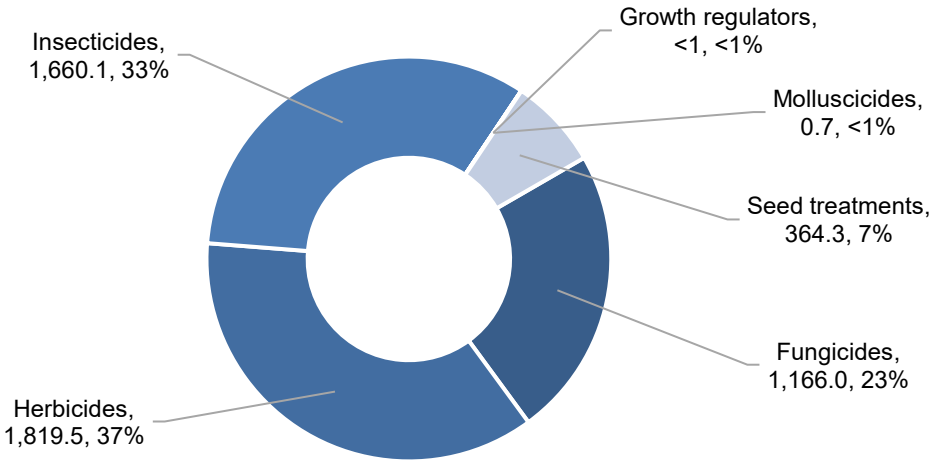

Figure 21: Pesticide usage (spha) on carrot and parsnip crops in Northern Ireland, 2023.

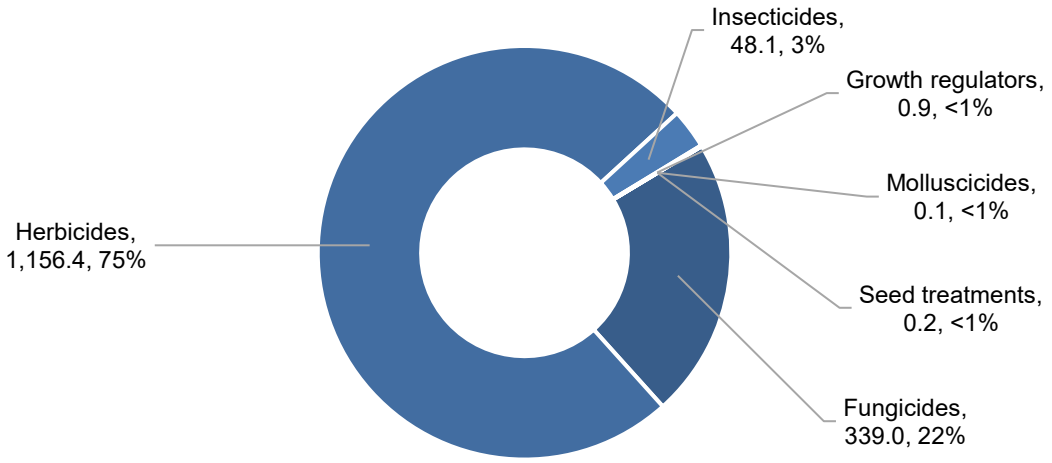

Figure 22: Weight of pesticides (kg) applied to carrot and parsnip crops in Northern Ireland, 2023.

Carrots and parsnips – Fungicides

- Basic treated area: 313 hectares
- Total treated area: 1,166 spray hectares
- Total weight applied: 339 kilograms

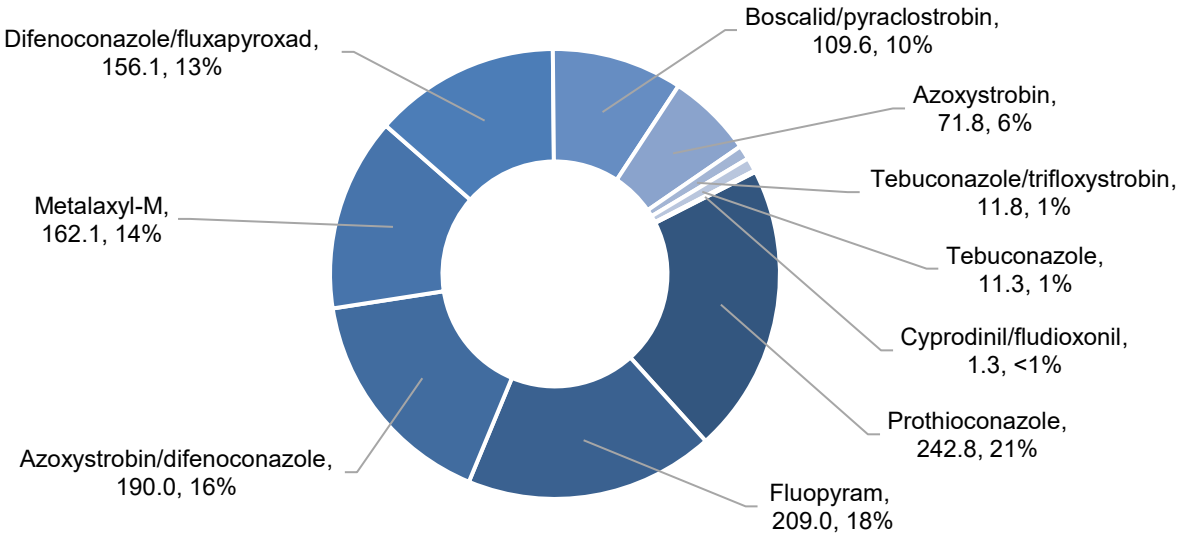

Figure 23: Fungicide active substance usage (spha) on carrot and parsnip crops in Northern Ireland, 2023.

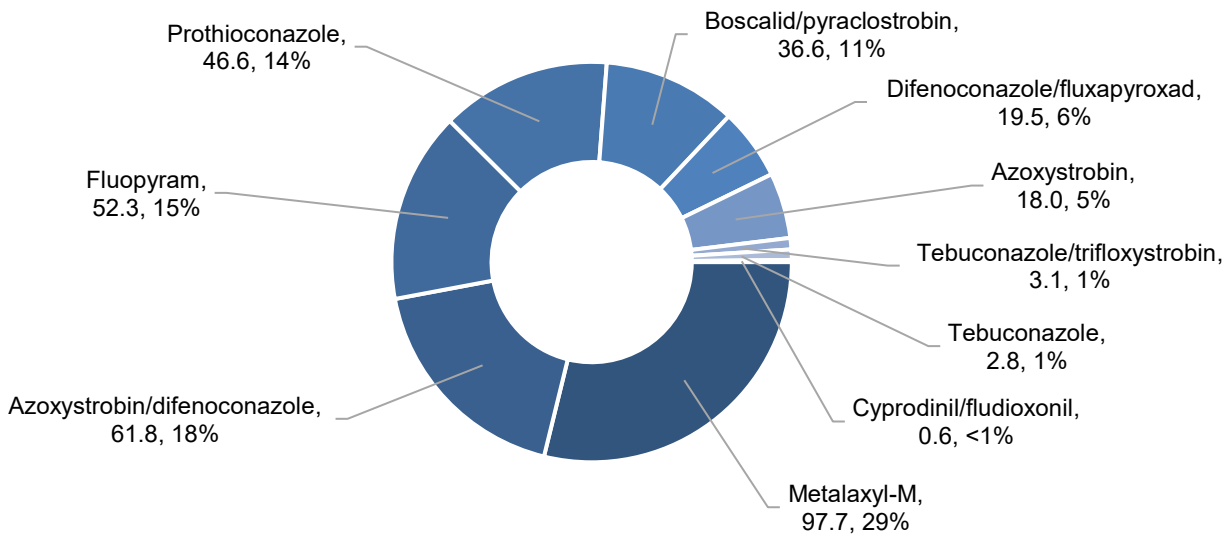

Figure 24: Weight of fungicide active substances (kg) applied to carrot and parsnip crops in Northern Ireland, 2023.

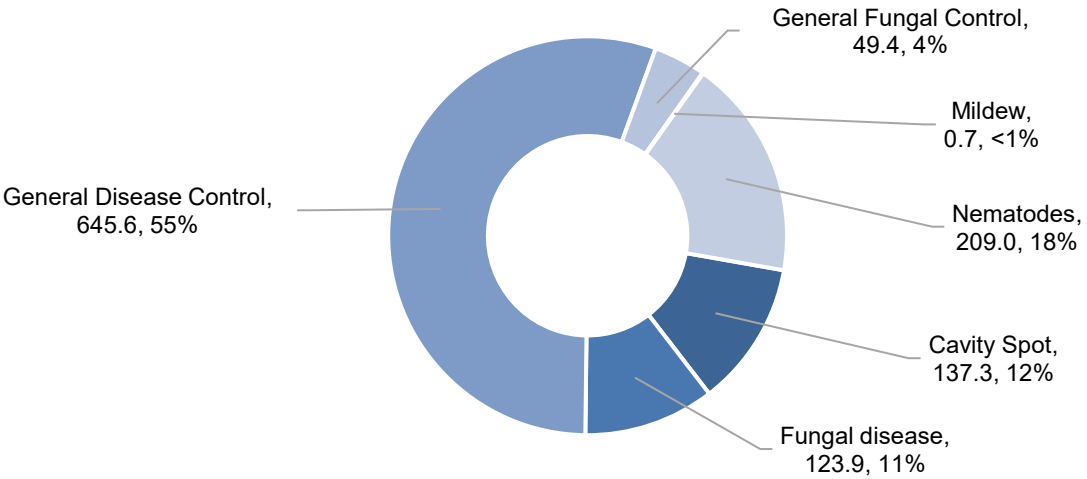

Figure 25: Carrot and parsnip crops NI 2023: reasons for fungicide use (spha).

Carrots and parsnips – Herbicides

- Basic treated area: 364 hectares
- Total treated area: 1,820 spray hectares
- Total weight applied: 1,156 kilograms
- The active substance metribuzin was only applied to carrot crops, whilst metamitron was only applied to parsnip crops

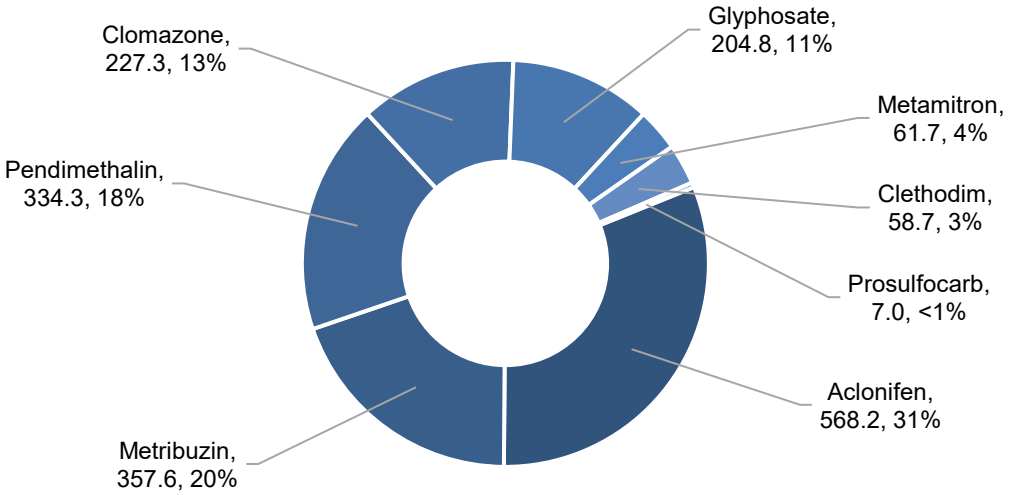

Figure 26: Herbicide active substance usage (spha) on carrot and parsnip crops in Northern Ireland, 2023.

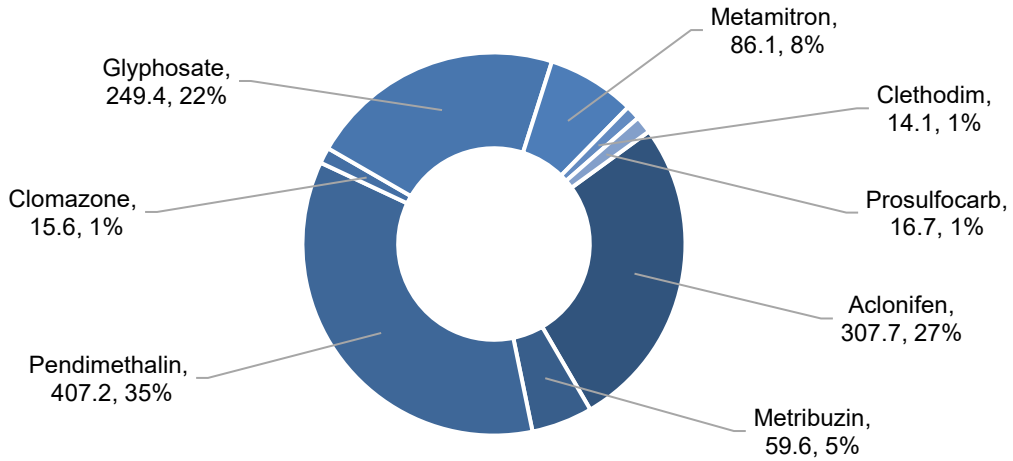

Figure 27: Weight of herbicide active substances (kg) applied to carrot and parsnip crops in Northern Ireland, 2023.

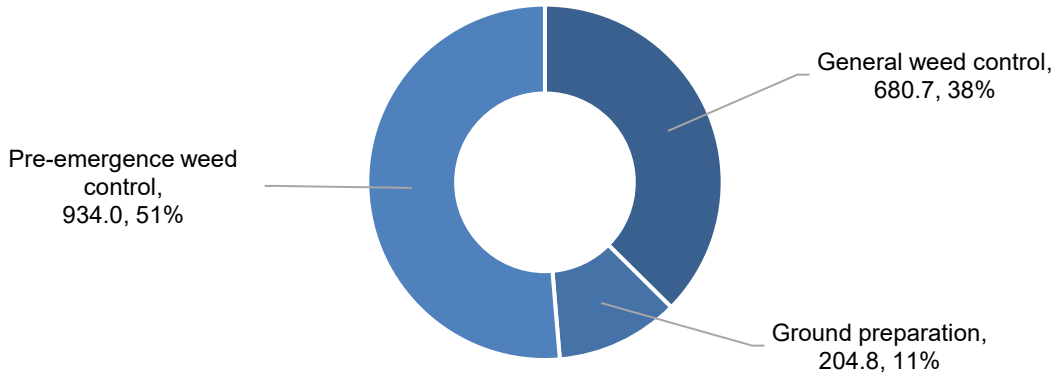

Figure 28: Carrot and parsnip crops NI 2023: reasons for herbicide use (spha).

Carrots and parsnips – Insecticides

- Basic treated area: 326 hectares
- Total treated area: 1,660 spray hectares
- Total weight applied: 48 kilograms

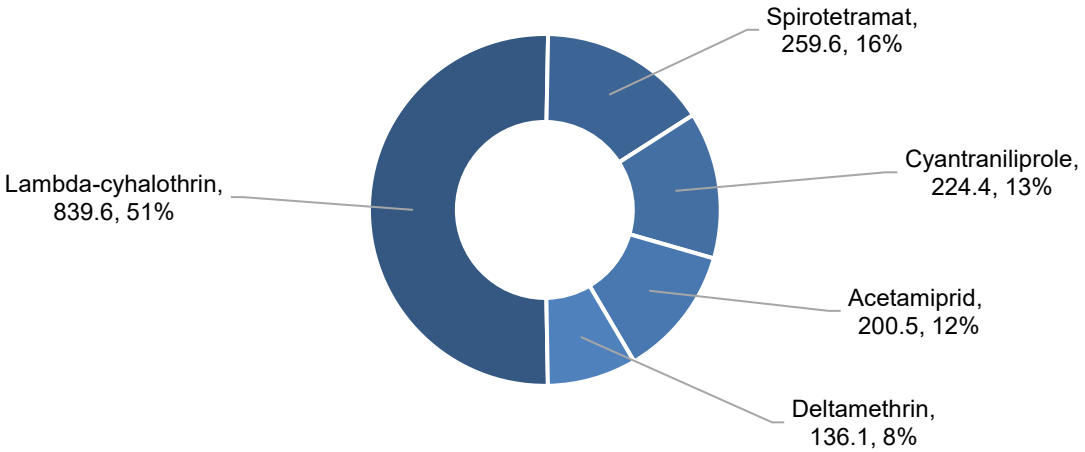

Figure 29: Insecticide active substance usage (spha) on carrot and parsnip crops in Northern Ireland, 2023.

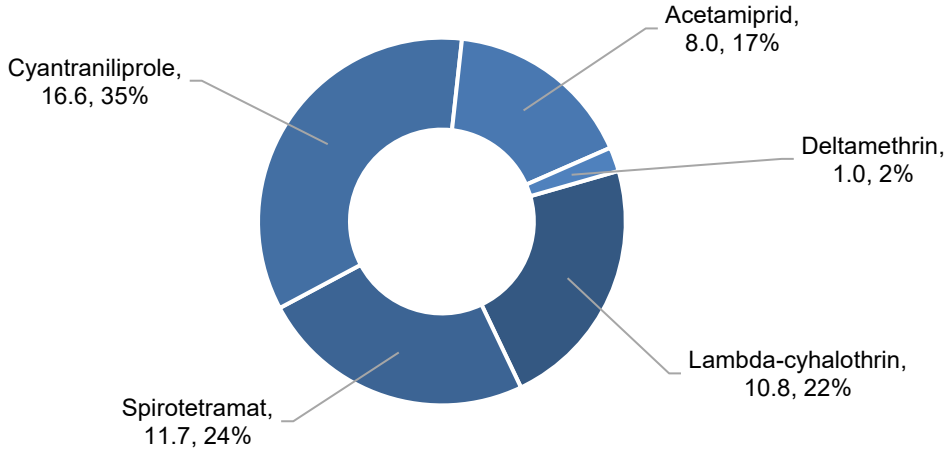

Figure 30: Weight of insecticide active substances (kg) applied to carrot and parsnip crops in Northern Ireland, 2023.

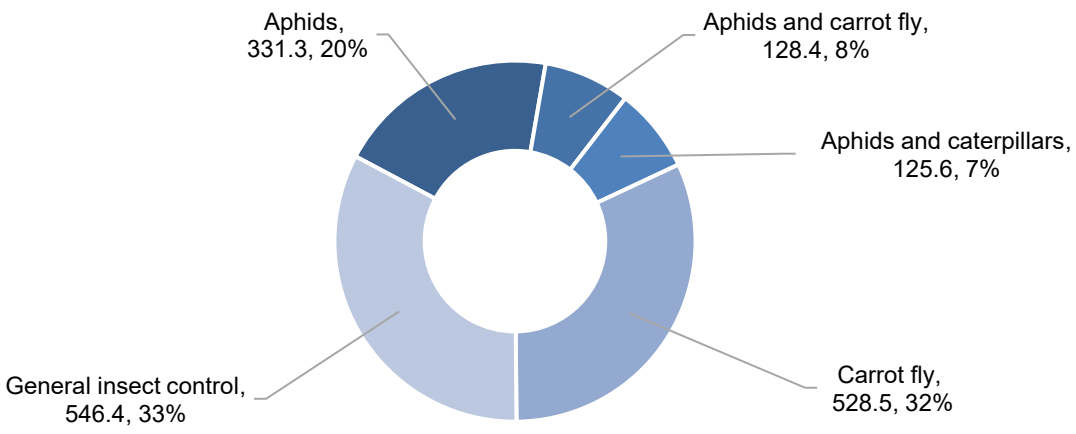

Figure 31: Carrot and parsnip crops NI 2023: reasons for insecticide use (spha).

Carrots and parsnips – Growth regulators

- Basic treated area: <1 hectare
- Total treated area: <1 spray hectare
- Total weight applied: <1 kilograms
- Maleic hydrazide was the only growth regulator active substance used, exclusively on parsnip crops
- The only reason given for use was ‘growth regulator’

Carrots and parsnips – Molluscicides

- Basic treated area: <1 hectare
- Total treated area: <1 spray hectare
- Total weight applied: <1 kilograms
- Ferric phosphate was the only molluscicide active substance used, exclusively on carrot crops
- The only reason given for use was ‘slugs’

Carrots and parsnips – Seed treatments

- Basic treated area: 364 hectares
- Total treated area: 364 spray hectares
- Total weight applied: <1 kilograms
- The only active substance used was fludioxonil
- The only reason given for use was ‘seed treatment’

PESTICIDE USAGE ON CELERY AND PARSLEY

- 19 hectares of celery and parsley crops grown in Northern Ireland
- Basic treated area: 19 hectares
- Total treated area: 140 spray hectares
- Total weight applied: 52 kilograms
- Celery and parsley recorded in Armagh and Down only
- 'Celery and parsley' refers to soup celery, table celery and parsley
- Refer to Table 7 for proportional area treated and number of spray applications applied and Table 13 for reasons for use

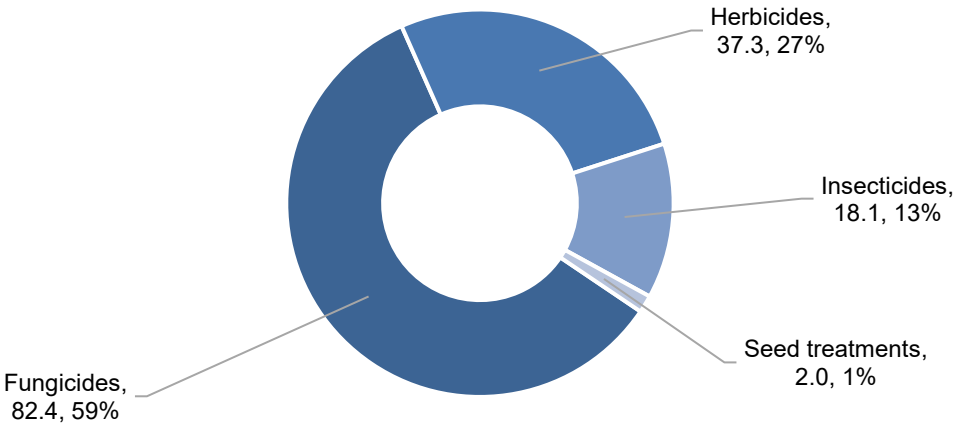

Figure 32: Pesticide usage (spha) on celery and parsley crops in Northern Ireland, 2023.

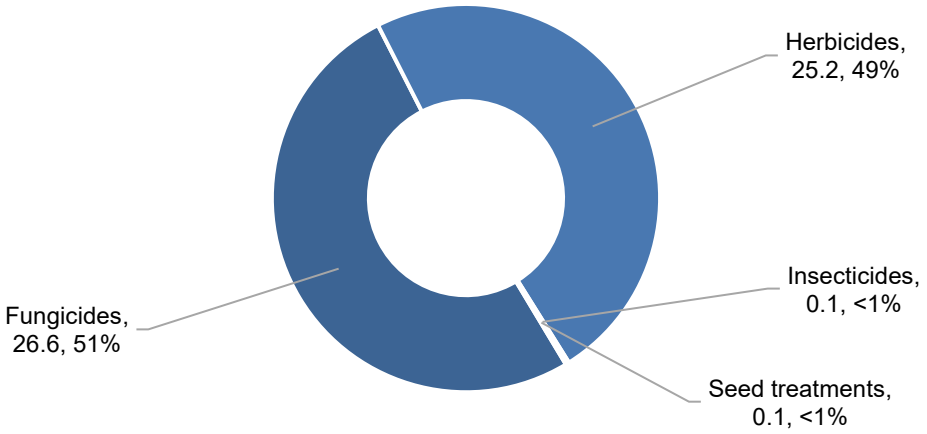

Figure 33: Weight of pesticides (kg) applied to celery and parsley crops in Northern Ireland, 2023.

Celery and parsley – Fungicides

- Basic treated area: 19 hectares
- Total treated area: 82 spray hectares
- Weight of active substances applied: 27 kilograms

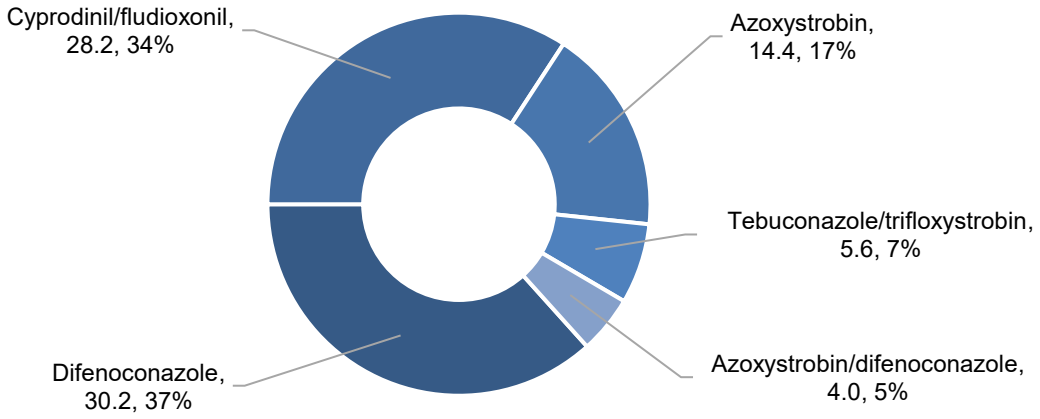

Figure 34: Fungicide active substance usage (spha) on celery and parsley crops in Northern Ireland, 2023.

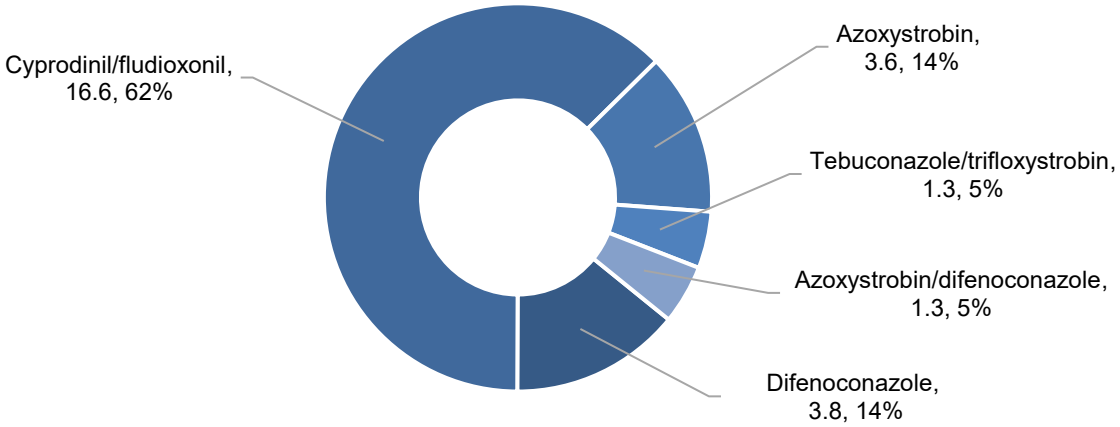

Figure 35: Weight of fungicide active substances (kg) applied to celery and parsley crops in Northern Ireland, 2023.

Celery and parsley – Herbicides

- Basic treated area: 19 hectares
- Total treated area: 37 spray hectares
- Weight of active substances applied: 25 kilograms

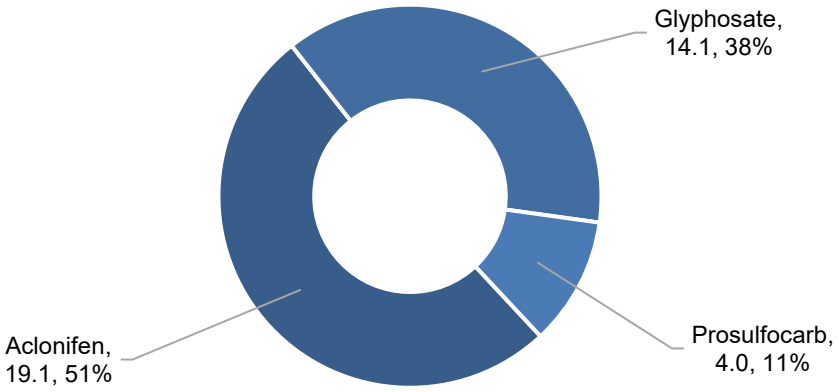

Figure 36: Herbicide active substance usage (spha) on celery and parsley crops in Northern Ireland, 2023.

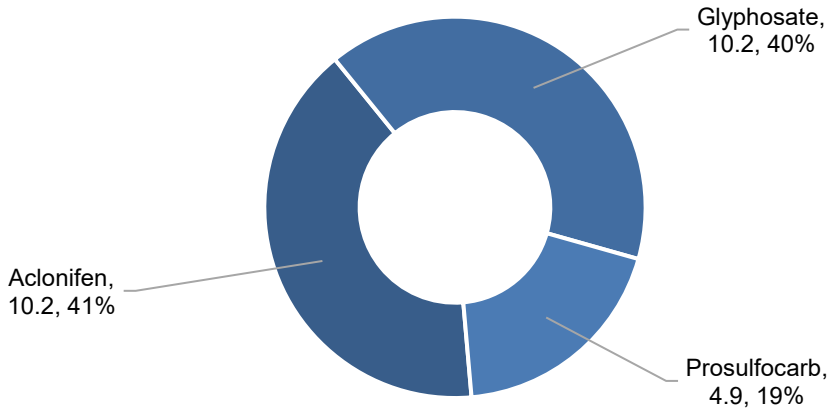

Figure 37: Weight of herbicide active substance usage (kg) on celery and parsley crops in Northern Ireland, 2023.

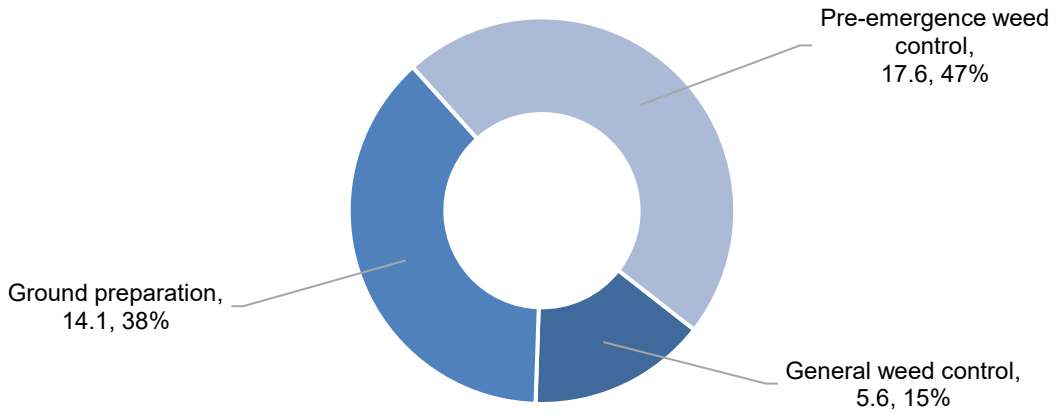

Figure 38: Celery and parsley crops NI 2023: reasons for herbicide use (spha).

Celery and parsley – Insecticides

- Basic treated area: 18 hectares
- Total treated area: 18 spray hectares
- Weight of active substances applied: <1 kilograms
- Lambda-cyhalothrin was the only insecticide active substance used
- The two reasons given for use were ‘aphids’ (18%), and ‘general insect control’ (82%)

Celery and parsley – Seed treatments

- Basic treated area: 2 hectares
- Total treated area: 2 spray hectares
- Weight of active substances applied: <1 kilograms
- Metalaxyl-M was the only seed treatment active substance used
- The only reason given for use was ‘seed treatment’

PESTICIDE USAGE ON LEAFY AND FLOWERHEAD BRASSICAS

- 393 hectares of leafy and flowerhead brassica crops grown in Northern Ireland
- Basic treated area: 382 hectares
- Total treated area: 3,611 spray hectares
- Total weight applied: 655 kilograms
- 'Leafy and flowerhead brassicas' refers to Brussels sprouts, broccoli, all cabbage types, all cauliflower types and kale. Cabbage includes Chinese (pointed), red, savoy, spring and white cabbage. Cauliflower includes autumn, summer, winter and cauliflowers which could not be further classified
- Refer to Table 7 for proportional area treated and number of spray applications applied and Table 14 for reasons for use

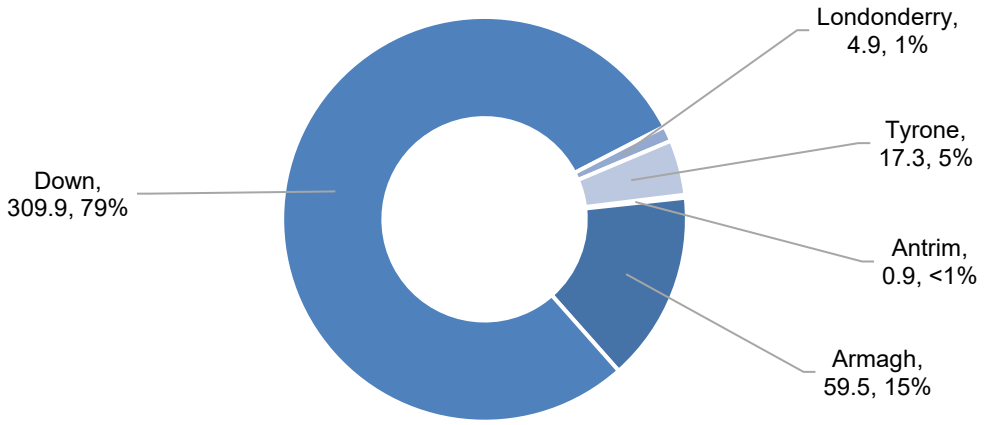

Figure 39: Regional distribution of leafy and flowerhead brassica crops grown (ha) in Northern Ireland, 2023.

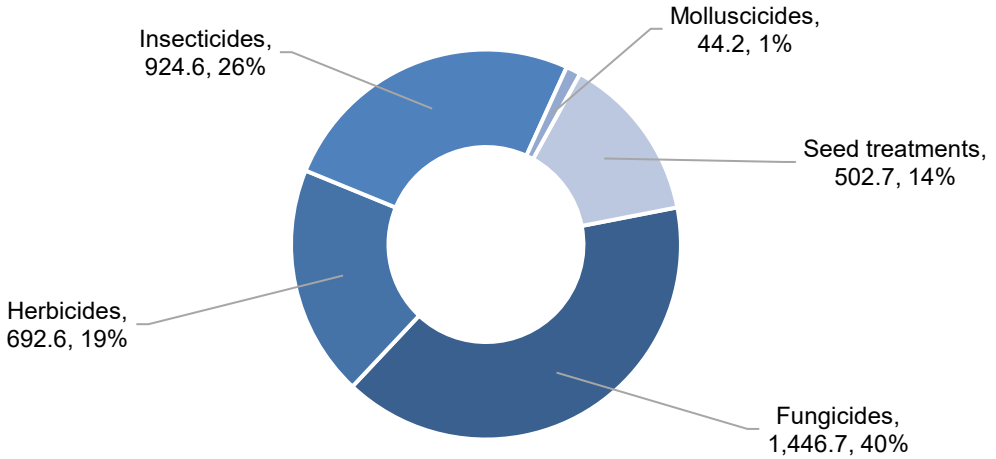

Figure 40: Pesticide usage (spha) on leafy and flowerhead brassica crops in Northern Ireland, 2023.

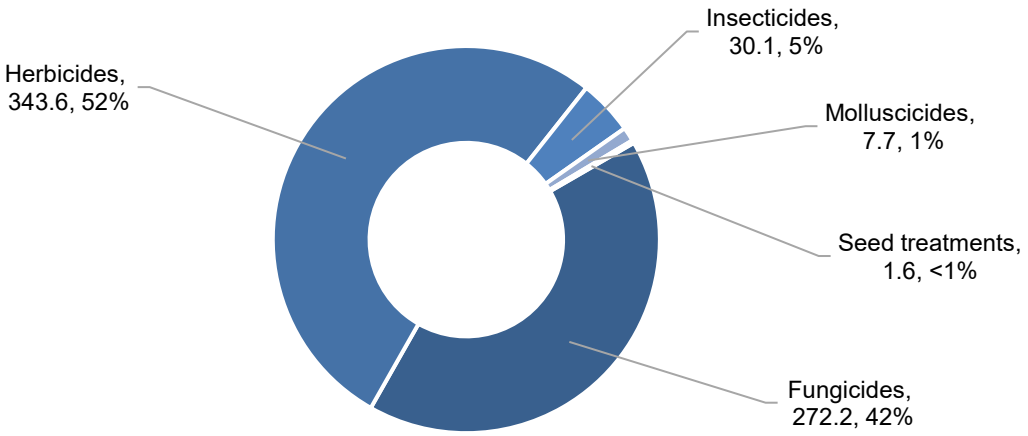

Figure 41: Weight of pesticides (kg) applied to leafy and flowerhead brassica crops in Northern Ireland, 2023.

Leafy and flowerhead brassicas – Fungicides

- Basic treated area: 341 hectares
- Total treated area: 1,447 spray hectares
- Total weight applied: 272 kilograms

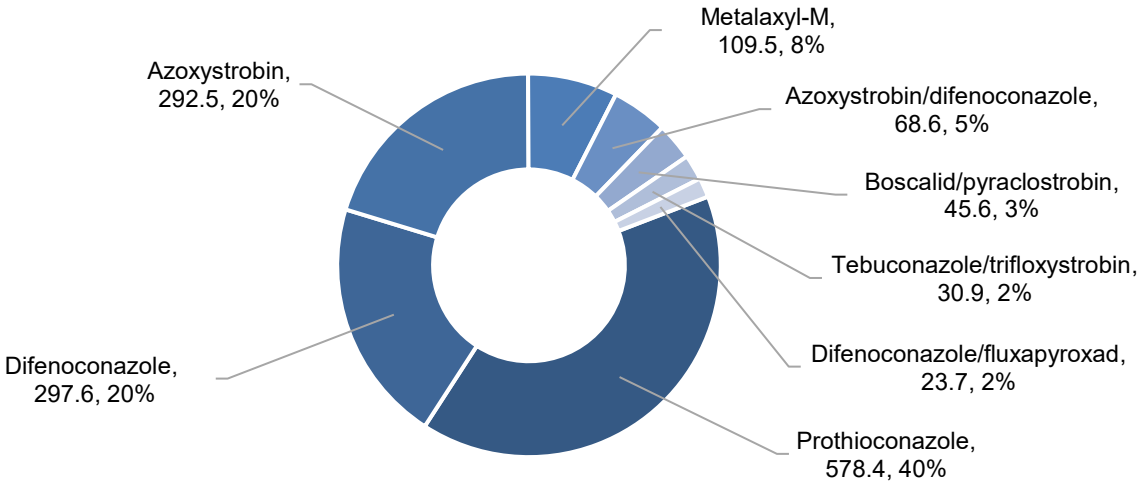

Figure 42: Fungicide active substance usage (spha) on leafy and flowerhead brassica crops in Northern Ireland, 2023.

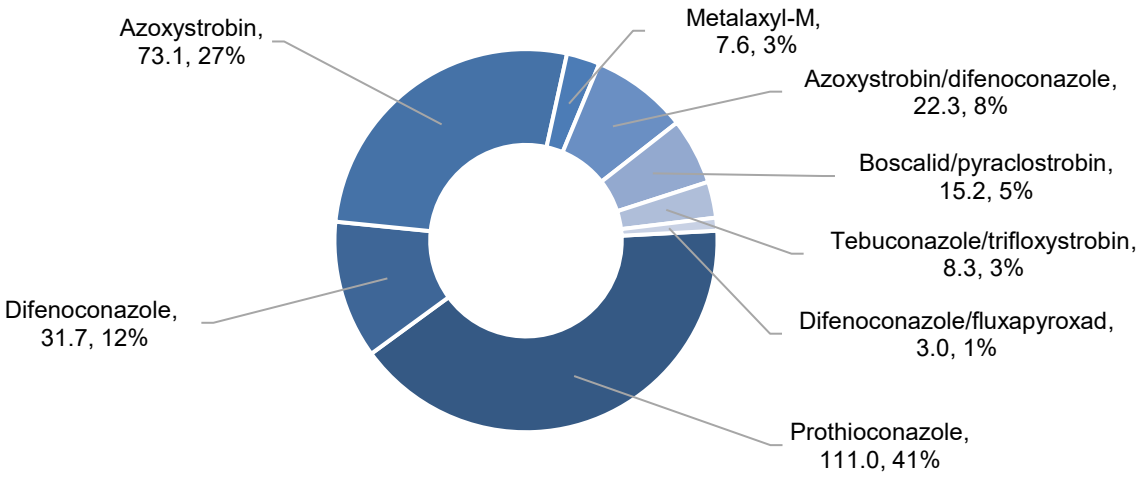

Figure 43: Weight of fungicide active substances (kg) applied to leafy and flowerhead brassica crops in Northern Ireland, 2023.

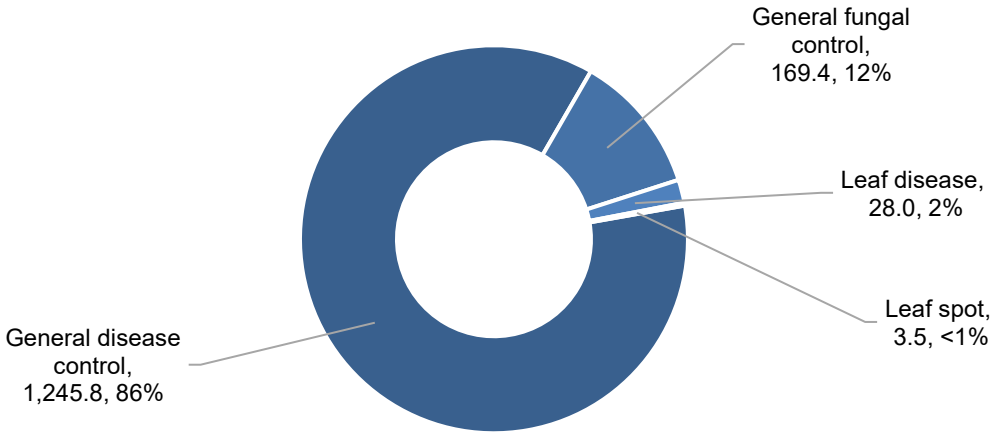

Figure 44: Leafy and flowerhead brassica crops NI 2023: reasons for fungicide use (spha).

Leafy and flowerhead brassicas – Herbicides

- Basic treated area: 379 hectares
- Total treated area: 693 spray hectares
- Total weight applied: 344 kilograms

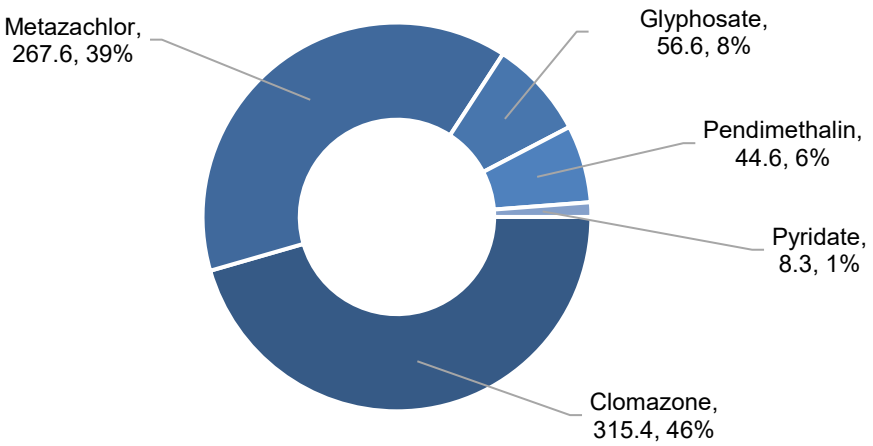

Figure 45: Herbicide active substance usage (spha) on leafy and flowerhead brassica crops in Northern Ireland, 2023.

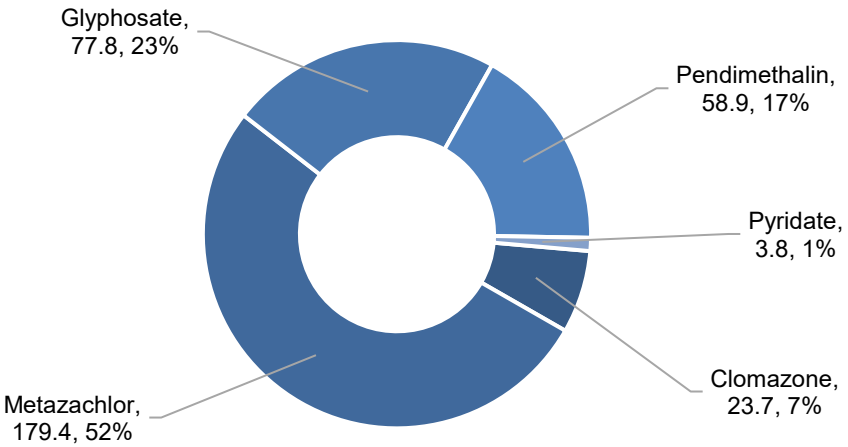

Figure 46: Weight of herbicide active substance usage (kg) on leafy and flowerhead brassica crops in Northern Ireland, 2023.

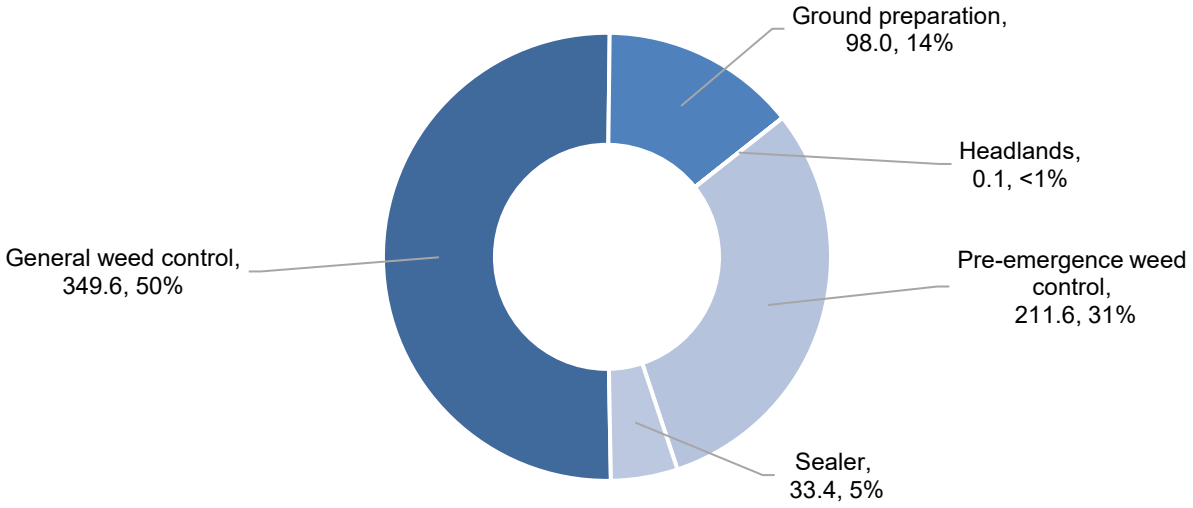

Figure 47: Leafy and flowerhead brassica crops NI 2023: reasons for herbicide use (spha)

Leafy and flowerhead brassicas – Insecticides

- Basic treated area: 328 hectares
- Total treated area: 925 spray hectares
- Total weight applied: 30 kilograms

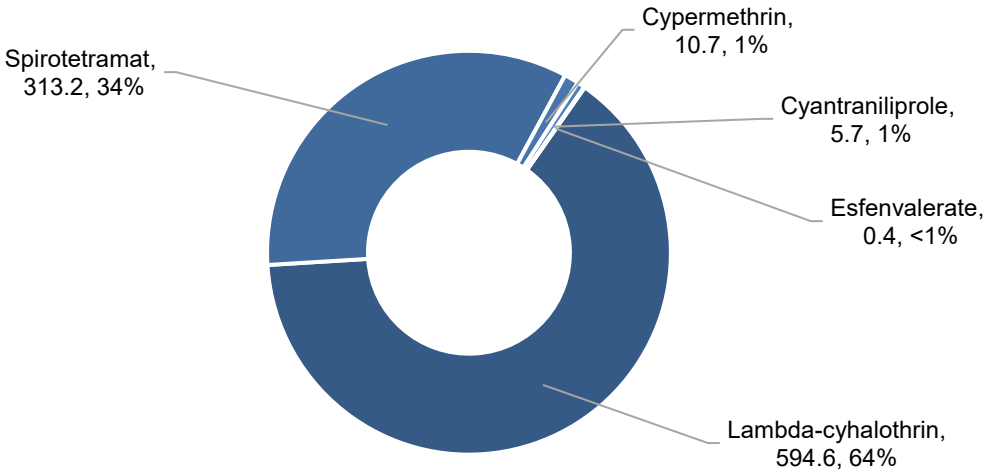

Figure 48: Insecticide active substance usage (spha) on leafy and flowerhead brassica crops in Northern Ireland, 2023.

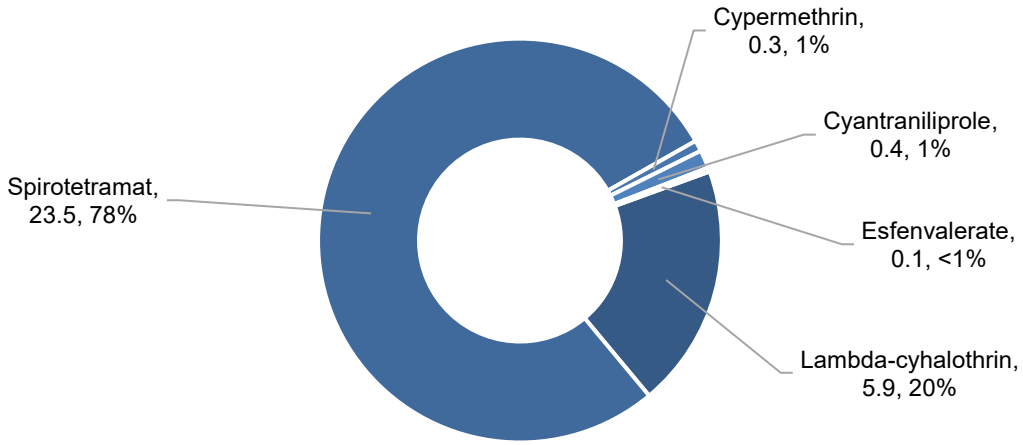

Figure 49: Weight of insecticide active substance usage (kg) on leafy and flowerhead brassica crops in Northern Ireland, 2023.

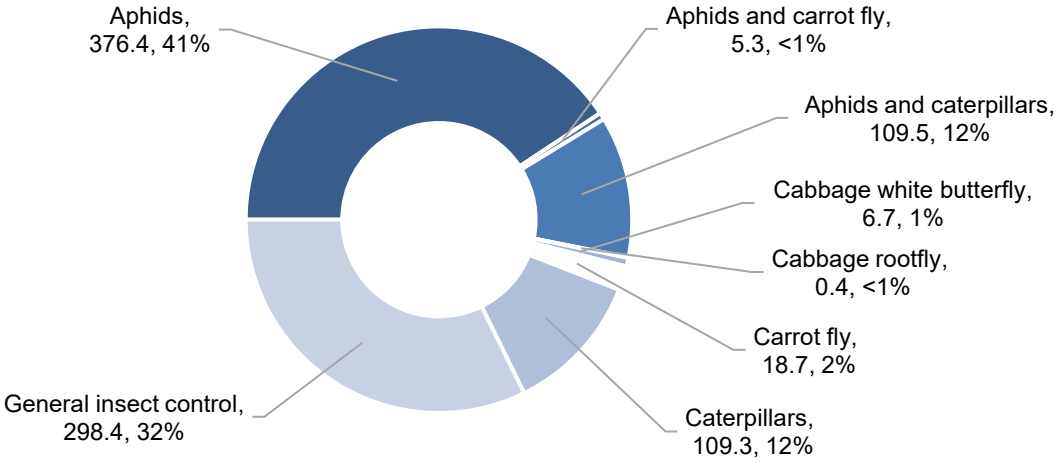

Figure 50: Leafy and flowerhead brassica crops NI 2023: reasons for insecticide use (spha).

Leafy and flowerhead brassicas – Molluscicides

- Basic treated area: 44 hectares
- Total treated area: 44 spray hectares
- Total weight applied: 8 kilograms
- Ferric phosphate was the only molluscicide active substance used
- The only reason given for use was ‘slugs’

Leafy and flowerhead brassicas – Seed treatments

- Basic treated area: 369 hectares
- Total treated area: 369 spray hectares
- Total weight applied: 1.6 kilograms
- The two seed treatment active substances used were fludioxonil and Metalaxyl-M
- The only reason given for use was ‘seed treatment’

PESTICIDE USAGE ON ONIONS AND LEEKS

- 29 hectares of onion and leek crops grown in Northern Ireland
- Basic treated area: 29 hectares
- Total treated area: 188 spray hectares
- Total weight applied: 110 kilograms
- 'Onions and leeks' refers to salad onions/summer scallions, soup leeks, and leeks which could not be further classified
- Refer to Table 7 for proportional area treated and number of spray applications applied and Table 15 for reasons for use

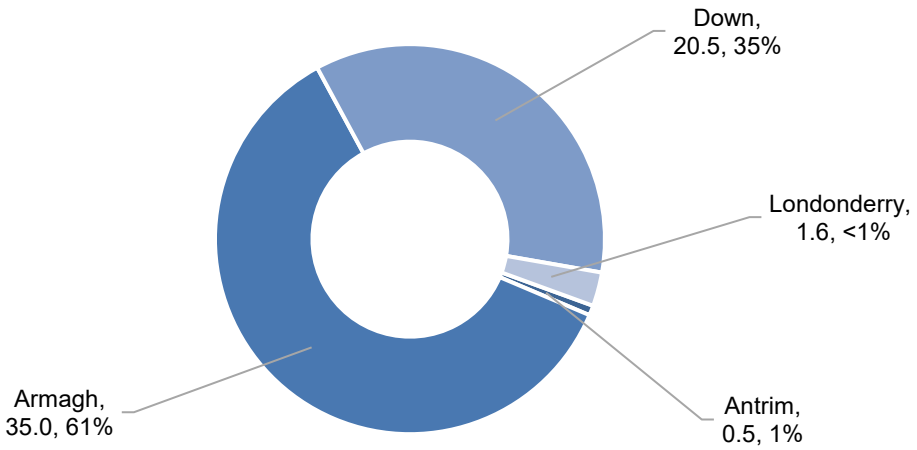

Figure 51: Regional distribution of onion and leek crops grown (ha) in Northern Ireland, 2023.

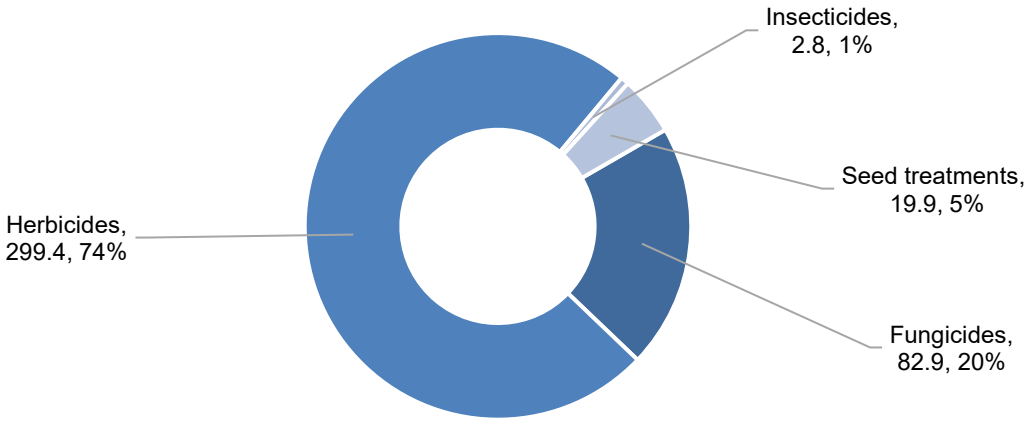

Figure 52: Pesticide usage (spha) on onion and leek crops in Northern Ireland, 2023.

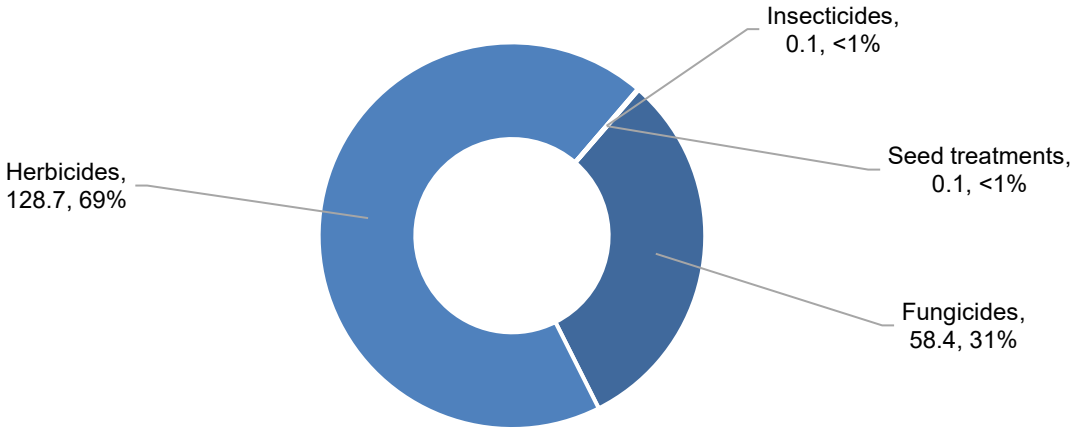

Figure 53: Weight of pesticides (kg) applied to onion and leek crops in Northern Ireland, 2023.

Onions and leeks – Fungicides

- Basic treated area: 39 hectares
- Total treated area: 83 spray hectares
- Total weight applied: 58 kilograms

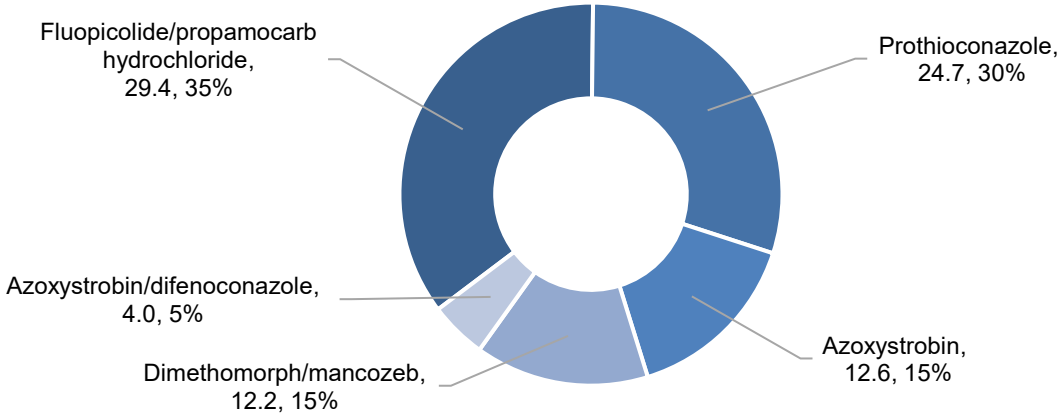

Figure 54: Fungicide active substance usage (spha) on onion and leek crops in Northern Ireland, 2023.

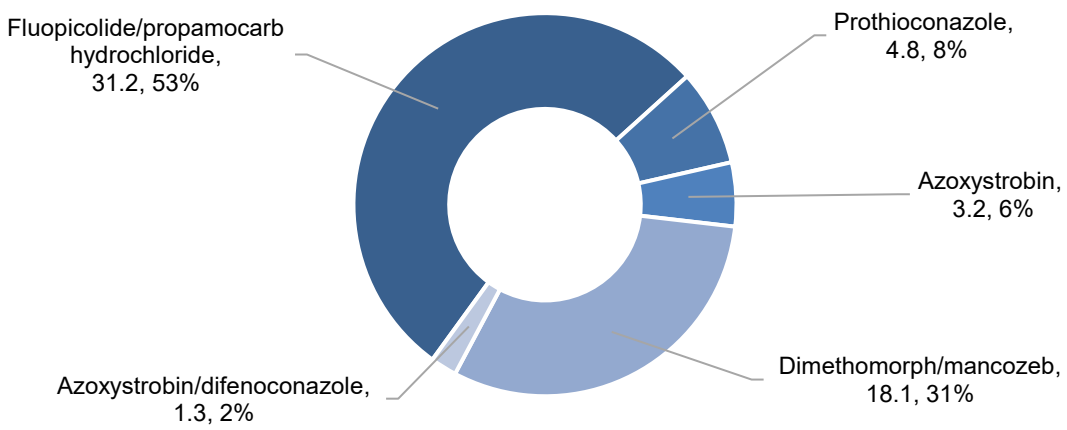

Figure 55: Weight of fungicide active substances (kg) applied to onion and leek crops in Northern Ireland, 2023.

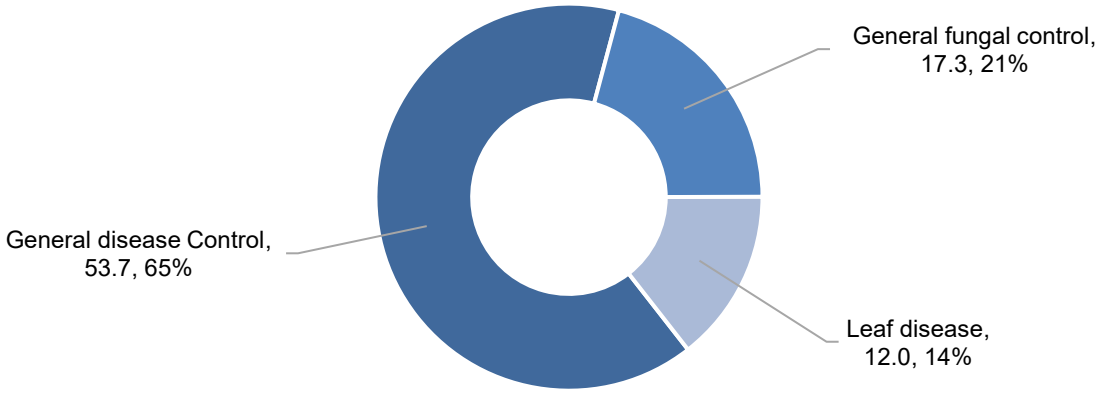

Figure 56: Onion and leek crops NI 2023: reasons for fungicide use (spha).

Onions and leeks – Herbicides

- Basic treated area: 57 hectares
- Total treated area: 299 spray hectares
- Total weight applied: 129 kilograms

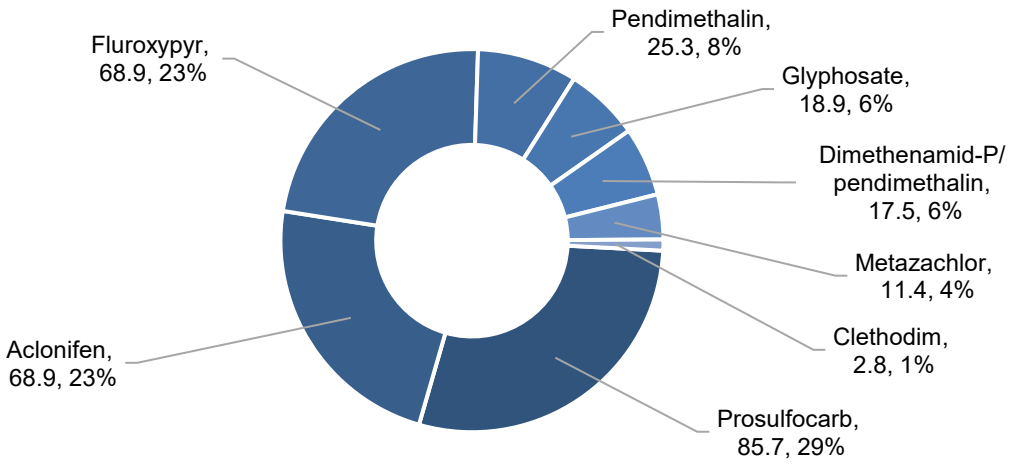

Figure 57: Herbicide active substance usage (spha) on onion and leek crops in Northern Ireland, 2023.

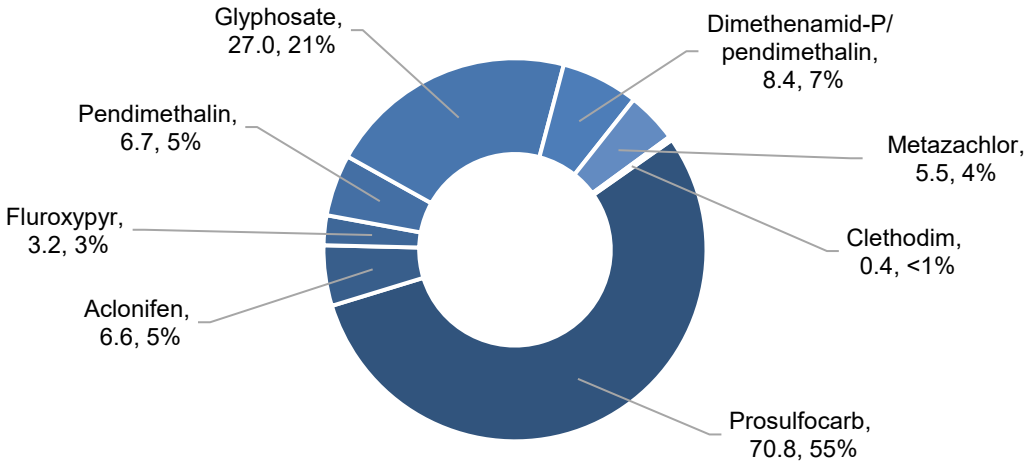

Figure 58: Weight of herbicide active substance usage (kg) on onion and leek crops in Northern Ireland, 2023.

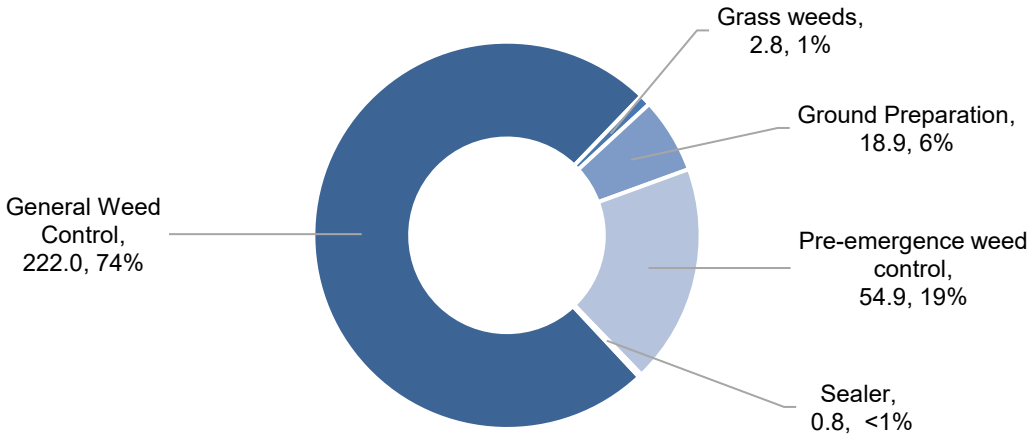

Figure 59: Onion and leek crops NI 2023: reasons for herbicide use (spha).

Onions and leeks – Insecticides

- Basic treated area: 3 hectares
- Total treated area: 3 spray hectares
- Total weight applied: <1 kilograms
- Lambda-cyhalothrin was the only insecticide active substance used
- The only reason given for use was ‘general insect control’

Onions and leeks – Seed treatments

- Basic treated area: 20 hectares
- Total treated area: 20 spray hectares
- Total weight applied: <1 kilograms
- Fludioxonil was the only seed treatment active substance used
- The only reason given for use was ‘seed treatment’

PESTICIDE USAGE ON OTHER VEGETABLES

- 155 hectares of other vegetable crops grown in Northern Ireland
- Basic treated area: 143 hectares
- Total treated area: 376 spray hectares
- Total weight applied: 305 kilograms
- 'Other vegetables' refers to beetroot, pumpkin, rhubarb and squash
- Refer to Table 7 for proportional area treated and number of spray applications applied and Table 16 for reasons for use

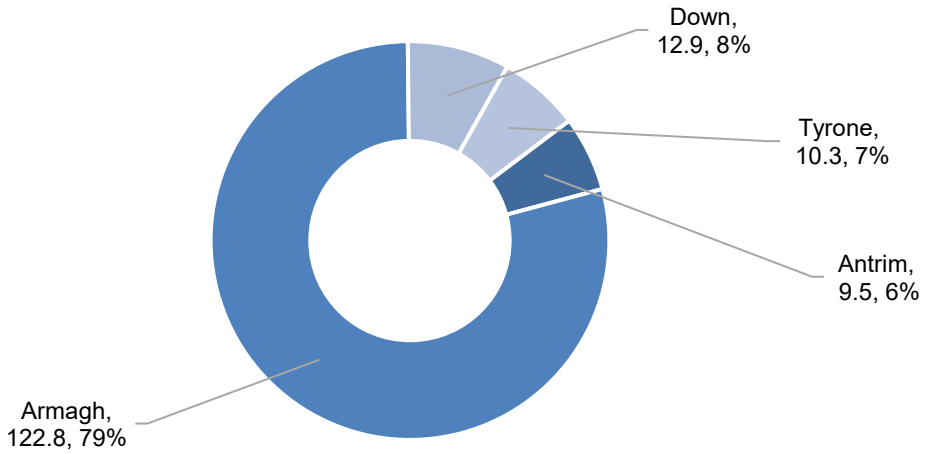

Figure 60: Regional distribution of other vegetable crops grown (ha) in Northern Ireland, 2023.

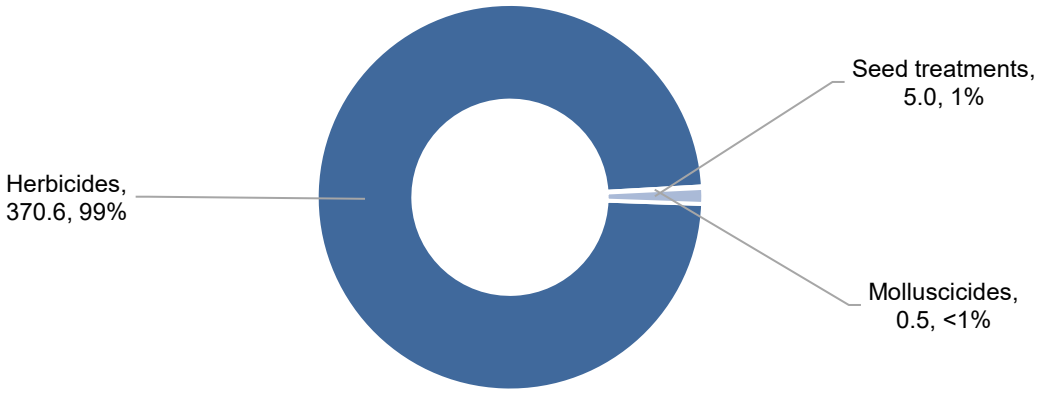

Figure 61: Pesticide usage (spha) on other vegetable crops in Northern Ireland, 2023.

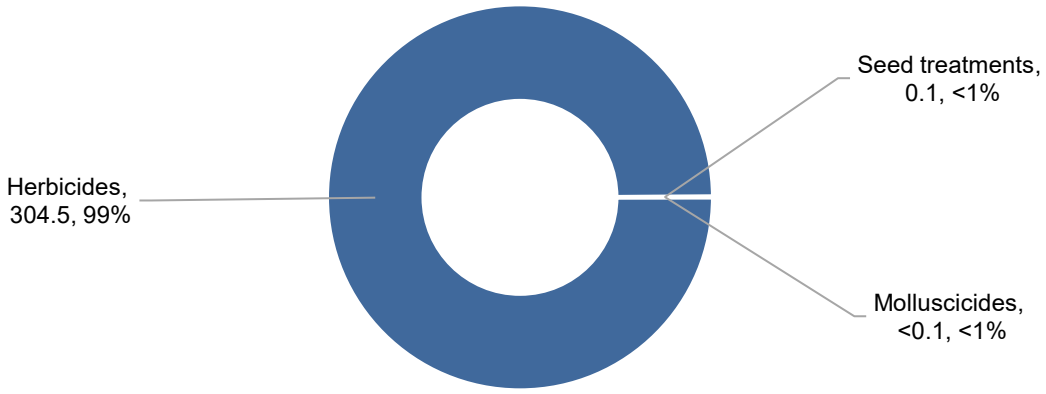

Figure 62: Weight of pesticides (kg) applied to other vegetable crops in Northern Ireland, 2023

Other vegetables – Herbicides

- Basic treated area: 137 hectares
- Total treated area: 371 spray hectares
- Total weight applied: 305 kilograms

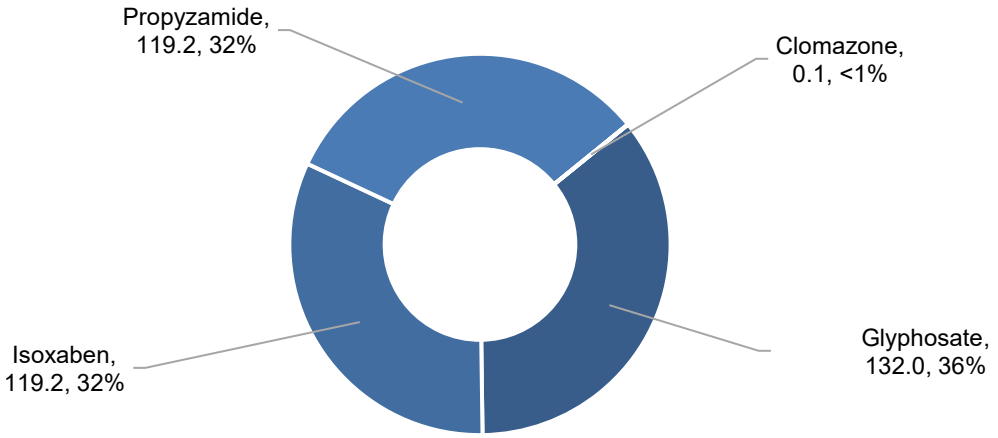

Figure 63: Herbicide active substance usage (spha) on other vegetable crops in Northern Ireland, 2023.

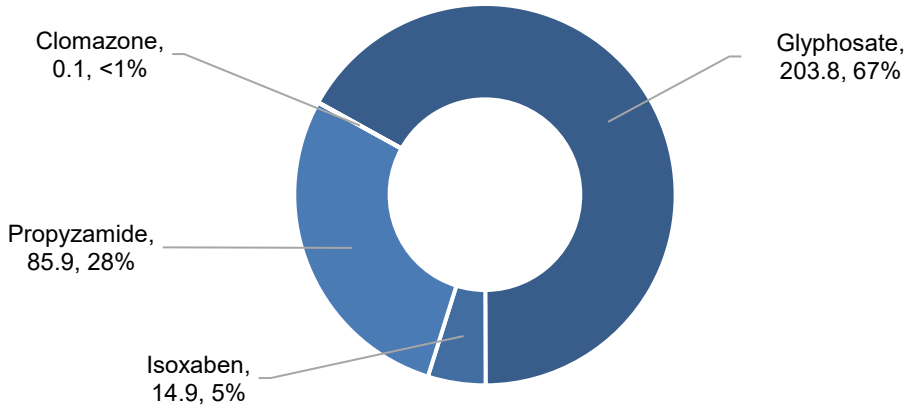

Figure 64: Weight of herbicide active substance usage (kg) on other vegetable crops in Northern Ireland, 2023.

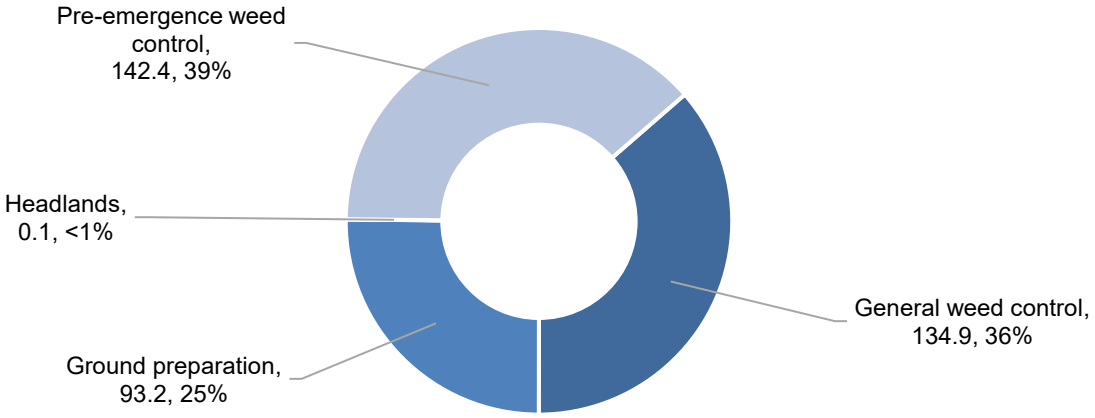

Figure 65: Other vegetables: reasons for herbicide use (spha).

Other vegetables – Molluscicides

- Basic treated area: <1 hectare
- Total treated area: <1 spray hectare
- Total weight applied: <1 kilograms
- Ferric phosphate was the only molluscicide active substance used
- The only reason given for use was ‘slugs’

Other vegetables – Seed treatments

- Basic treated area: 5 hectares
- Total treated area: 5 spray hectares
- Total weight applied: <1 kilograms
- Fludioxonil was the only seed treatment active substance used
- The only reason given for use was ‘seed treatment’

PESTICIDE USAGE ON PEAS AND BEANS

- 3 hectares of pea and bean crops grown in Northern Ireland
- Basic treated area: 3 hectares
- Total treated area: 9 spray hectares
- Total weight applied: 4 kilograms
- Peas and beans recorded in Antrim, Armagh and Down only
- 'Peas and beans' refers to picking peas and broad beans
- Refer to Table 7 for proportional area treated and number of spray applications applied and Table 17 for reasons for use

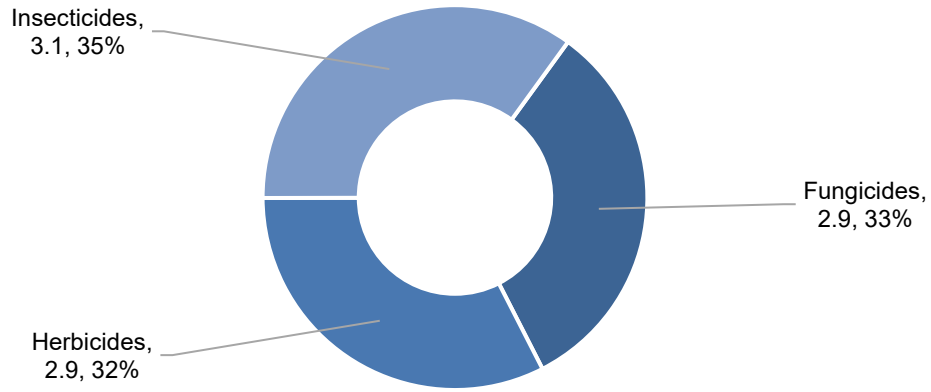

Figure 66: Pesticide usage (spha) on pea and bean crops in Northern Ireland, 2023.

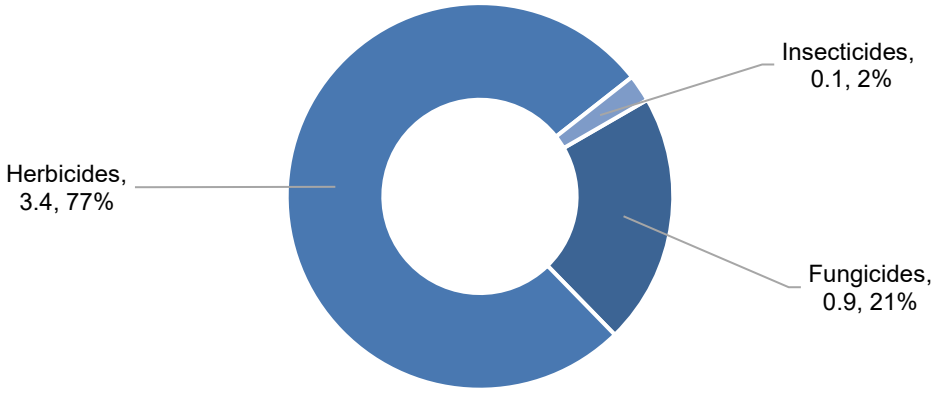

Figure 67: Weight of pesticides (kg) applied to pea and bean crops in Northern Ireland, 2023.

Peas and beans – Fungicides

- Basic treated area: 3 hectares
- Total treated area: 3 spray hectares
- Total weight applied: 1 kilogram
- The only reason given for fungicide use was ‘general disease control’

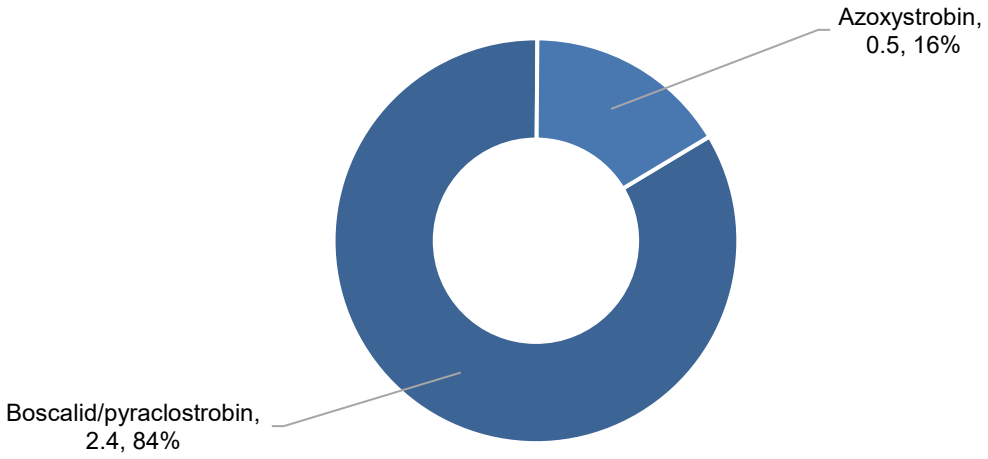

Figure 68: Fungicide active substance usage (spha) on pea and bean crops in Northern Ireland, 2023.

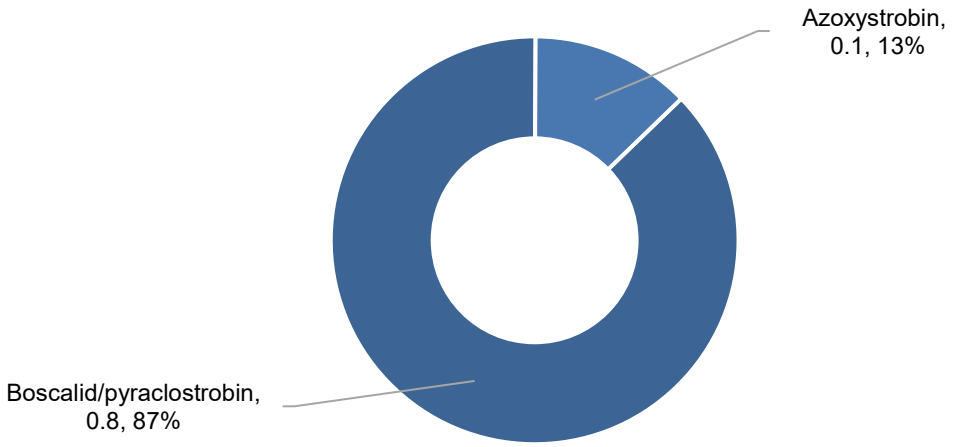

Figure 69: Weight of fungicide active substances (kg) applied to pea and bean crops in Northern Ireland, 2023.

Peas and beans – Herbicides

- Basic treated area: 3 hectares
- Total treated area: 3 spray hectares
- Total weight applied: 3 kilograms
- The only reason given for use was ‘pre-emergence weed control’

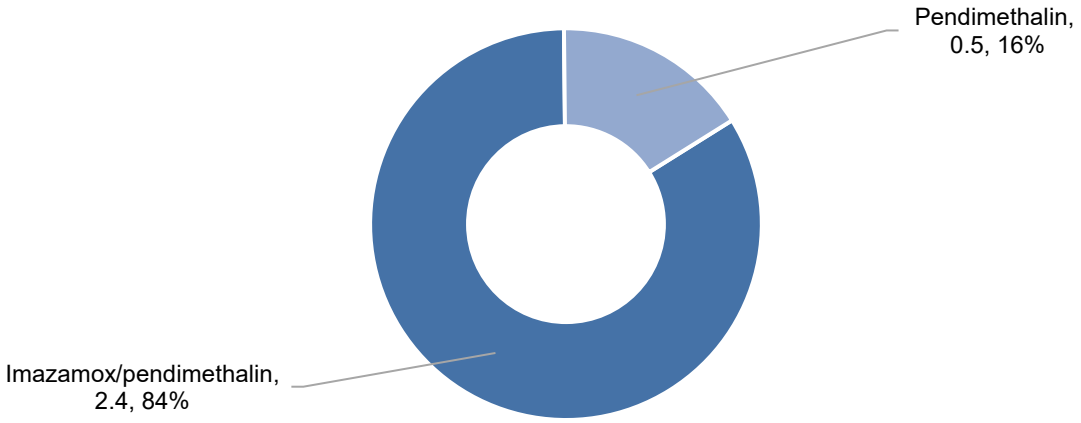

Figure 70: Herbicide active substance usage (spha) on pea and bean crops in Northern Ireland, 2023.

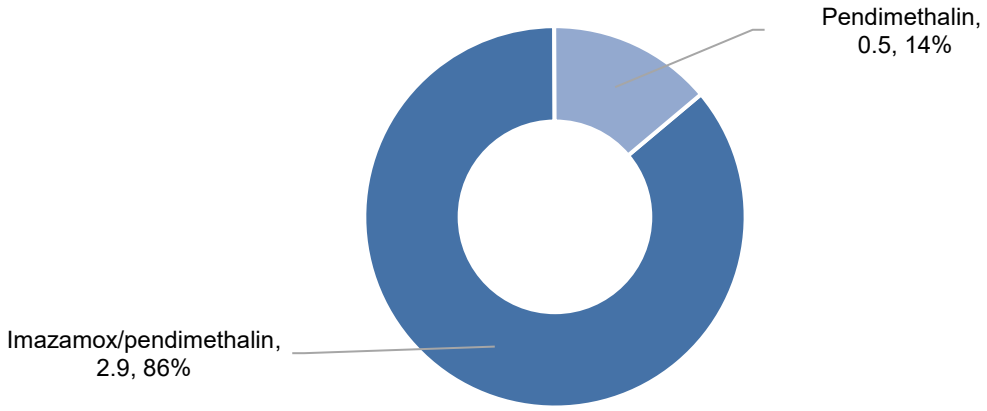

Figure 71: Weight of herbicide active substance usage (kg) on pea and bean crops in Northern Ireland, 2023.

Peas and beans – Insecticides

- Basic treated area: 3 hectares
- Total treated area: 3 spray hectares
- Total weight applied: <1 kilograms
- Lambda-cyhalothrin was used exclusively for ‘general insect control’ whilst deltamethrin was used exclusively for ‘bean weevil’

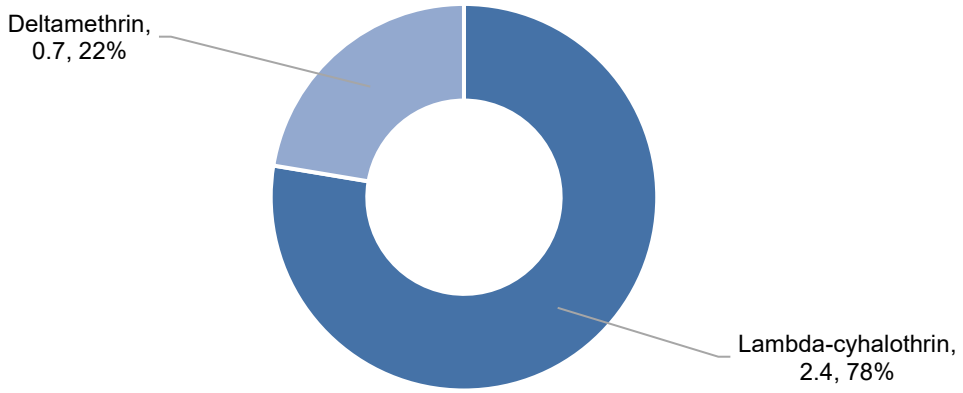

Figure 72: Insecticide active substance usage (spha) on pea and bean crops in Northern Ireland, 2023.

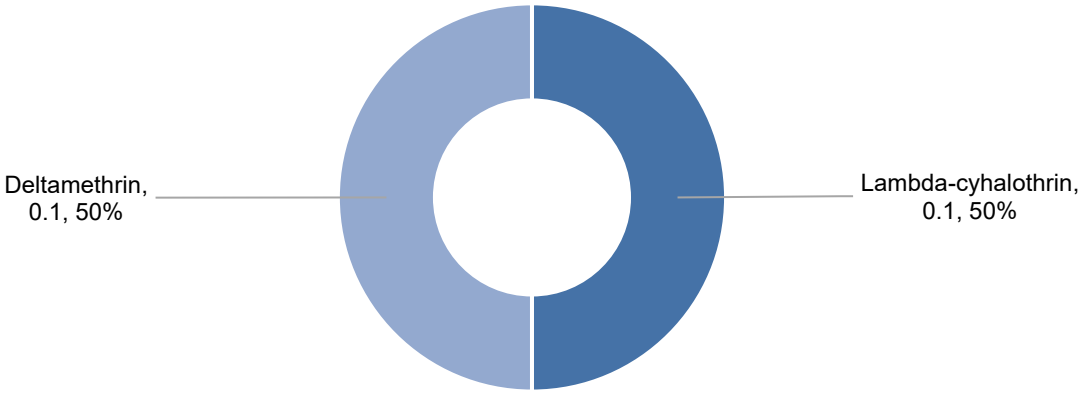

Figure 73: Weight of insecticide active substance usage (kg) on pea and bean crops in Northern Ireland, 2023.

PESTICIDE USAGE ON TURNIPS AND SWEDES

- 182 hectares of turnip and swede crops grown in Northern Ireland
- Basic treated area: 182 hectares
- Total treated area: 580 spray hectares
- Total weight applied: 78 kilograms
- Only herbicides and insecticides applied to turnip and swede crops
- Refer to Table 7 for proportional area treated and number of spray applications applied and Table 18 for reasons for use

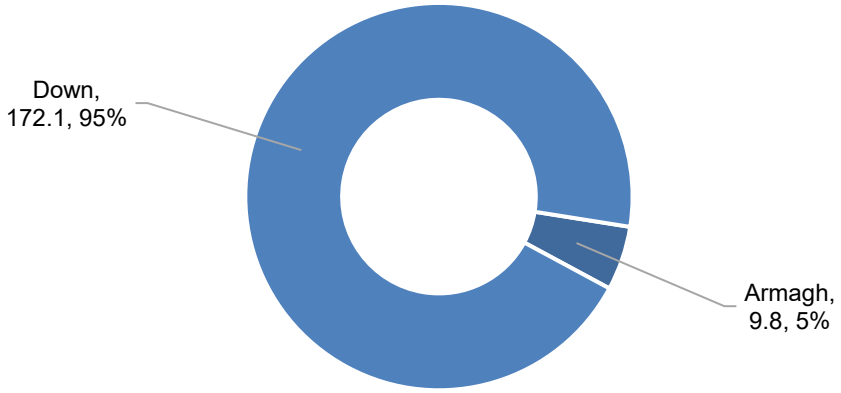

Figure 74: Regional distribution of turnip and swede crops grown (ha) in Northern Ireland, 2023.

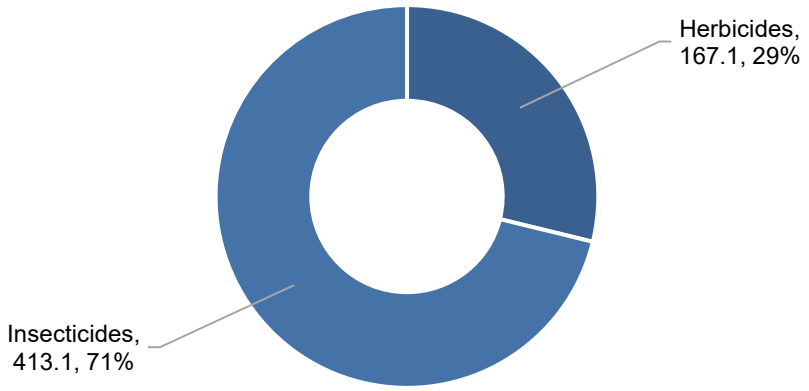

Figure 75: Pesticide usage (spha) on turnip and swede crops in Northern Ireland, 2023.

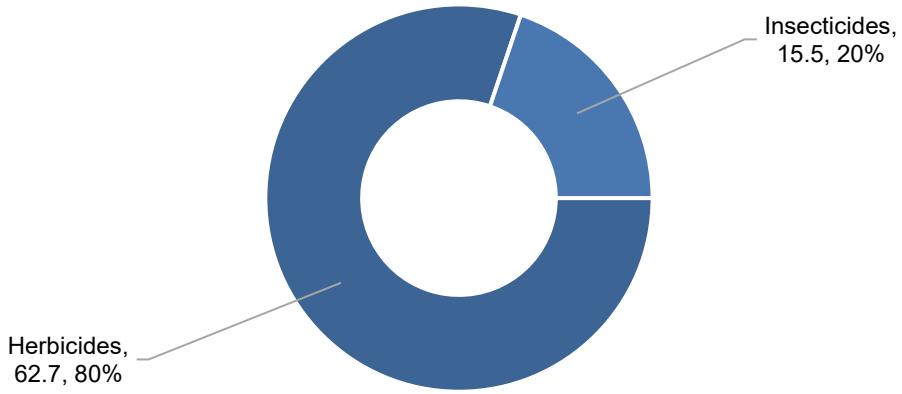

Figure 76: Weight of pesticides (kg) applied to turnip and swede crops in Northern Ireland, 2023.

Turnips and swedes – Herbicides

- Basic treated area: 85 hectares
- Total treated area: 167 spray hectares
- Total weight applied: 63 kilograms
- S-metolachlor was only applied to swedes
- The only reason for herbicide use was 'pre-emergence weed control'

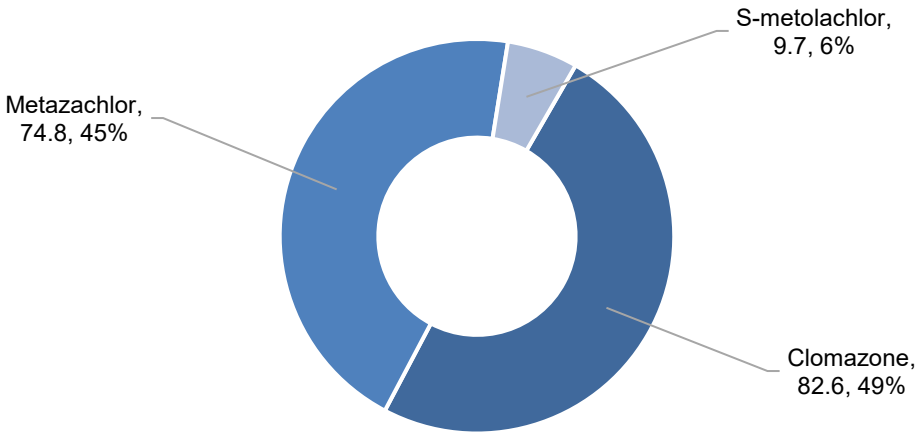

Figure 77: Herbicide active substance usage (spha) on turnip and swede crops in Northern Ireland, 2023.

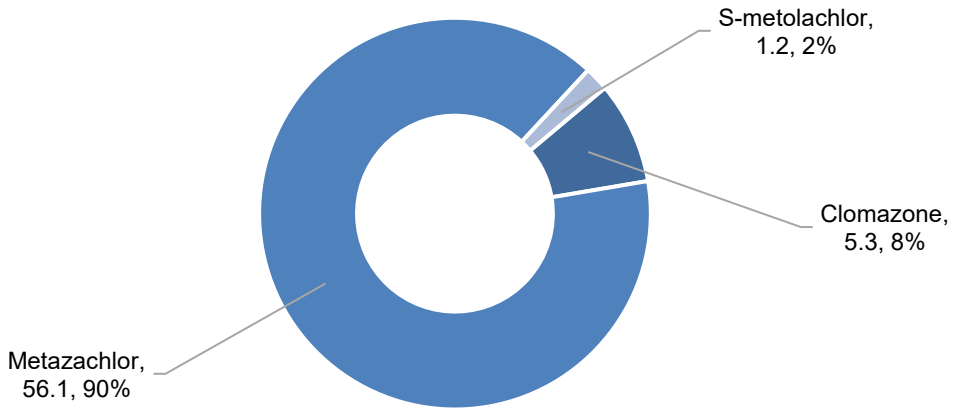

Figure 78: Weight of herbicide active substance usage (kg) on turnip and swede crops in Northern Ireland, 2023.

Turnips and swedes – Insecticides

- Basic treated area: 170 hectares
- Total treated area: 413 spray hectares
- Total weight applied: 16 kilograms
- Lambda-cyhalothrin only applied to turnips, for ‘flea beetles’
- Cyantraniliprole only applied to swedes, for ‘aphids’

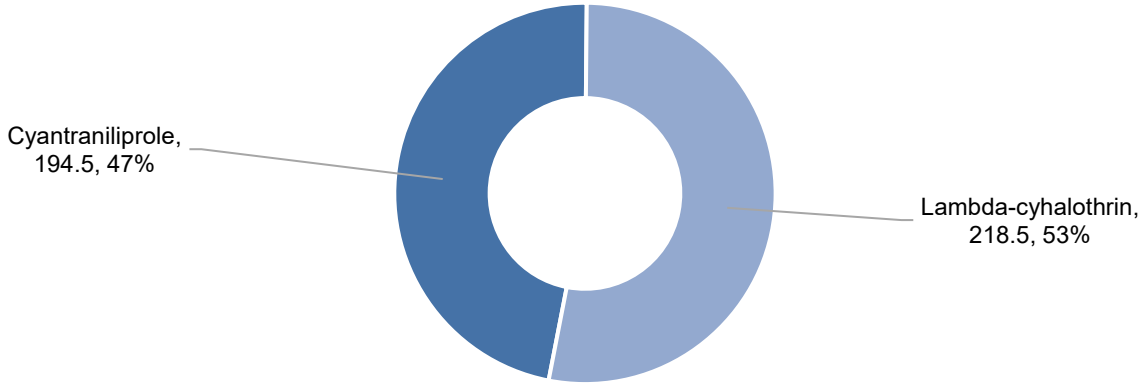

Figure 79: Insecticide active substance usage (spha) on turnip and swede crops in Northern Ireland, 2023.

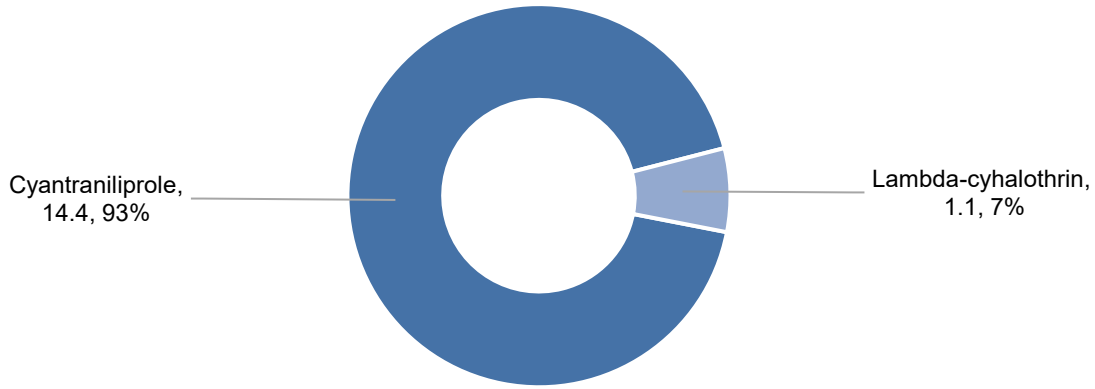

Figure 80: Weight of insecticides (kg) applied to turnip and swede crops in Northern Ireland, 2023.

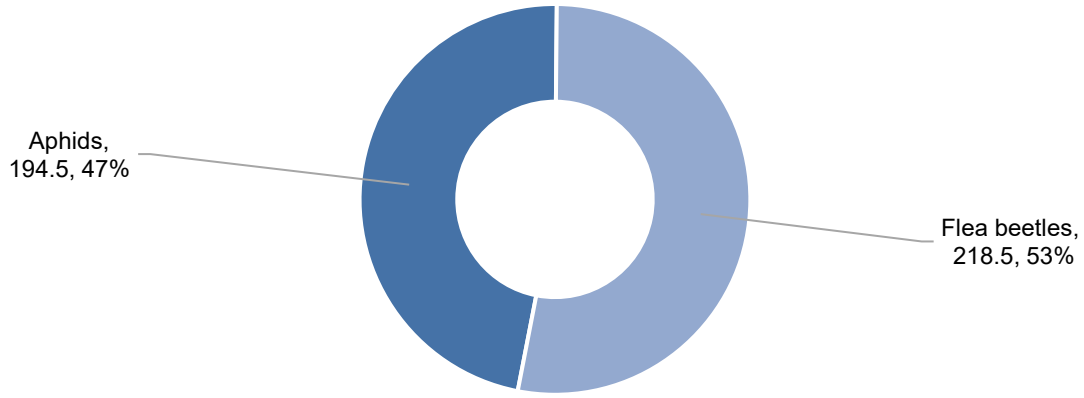

Figure 81: Turnip and swede crops NI 2023: reasons for insecticide use (spha).

ACKNOWLEDGEMENTS

We, the authors, wish to thank all of the growers who participated in this survey and without whose co-operation the completion of this report would not have been possible. We are extremely grateful for the assistance of Ms Alison Faulkner, AFBI, who worked tirelessly on key aspects of this report. We are also grateful to our colleagues at Fera Science Limited (FERA), York, and Science & Advice for Scottish Agriculture (SASA), Edinburgh, who provided advice and assistance with many aspects of this report.

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Table 1: The total number of farms in each size group with vegetable crops in the June 2023 census and number of samples from each size group.

	Size group (hectares)											
	<2		2<5		5<15		15<40		40+		Total	
Region	A	B	A	B	A	B	A	B	A	B	A	B
Northern Ireland	28	12	19	6	22	11	12	4	4	3	87	36

Legend
A = Total number of holdings in strata
B = Number of holdings surveyed

Table 2: Total number and area of crops surveyed (ha) in Northern Ireland, 2023.

Crop type	Number of crops surveyed	Surveyed area (ha)
Carrots	19	254.3
Pumpkins	9	137.6
Parsnips	14	114.3
Pointed cabbage	8	110.0
Swedes	7	109.0
Turnips	2	72.9
Broccoli	13	71.9
Brussels sprouts	10	63.3
Savoy cabbage	23	60.1
Leeks	7	37.7
Autumn cauliflower	4	25.9
Cauliflowers	13	22.4
White cabbage	7	19.4
Salad onions	2	16.3
Table celery	4	14.5
Rhubarb	5	12.4
Winter cauliflower	4	8.5
Beetroot	3	5.4
Summer cauliflower	6	4.3
Kale	5	3.7
Parsley	2	2.6
Red cabbage	4	2.6
Soup leeks	2	2.4
Broad beans	4	2.1
Soup celery	1	2.0
Summer scallions	2	1.3
Peas	1	1.2
Winter cabbage	2	0.3
Squash	2	0.2
Spring cabbage	1	0.2
All crops	**186**	**1,178.7**

Table 3: Estimated area (ha) of vegetable crops grown regionally in Northern Ireland, 2023.

	County					
Crop type	**Antrim**	**Armagh**	**Down**	**Londonderry**	**Tyrone**	**Northern Ireland**
Carrots	.	59.7	182.6	8.1	3.8	254.3
Pumpkins	.	119.6	7.7	.	10.3	137.6
Parsnips	1.3	6.7	103.1	3.2	.	114.3
Pointed cabbage	.	5.1	97.5	.	7.4	110.0
Swedes	.	9.7	99.3	.	.	109.0
Turnips	.	0.0	72.8	.	.	72.9
Broccoli	.	18.3	52.7	.	0.8	71.9
Brussels sprouts	0.9	24.0	38.3	.	.	63.3
Savoy cabbage	.	5.7	47.2	2.4	4.9	60.1
Leeks	.	18.7	18.9	.	.	37.7
Autumn cauliflower	.	.	25.9	.	.	25.9
Cauliflowers	.	1.4	21.0	.	.	22.4
White cabbage	.	1.1	15.9	2.4	.	19.4
Salad onions	.	16.3	.	.	.	16.3
Table celery	.	14.1	0.4	.	.	14.5
Rhubarb	9.5	2.6	0.2	.	.	12.4
Winter cauliflower	.	.	8.5	.	.	8.5
Beetroot	.	0.4	5.0	.	.	5.4
Summer cauliflower	.	1.9	0.8	.	1.6	4.3
Kale	.	1.2	.	.	2.6	3.7
Parsley	.	.	2.6	.	.	2.6
Red cabbage	.	0.6	2.0	.	.	2.6
Soup leeks	.	.	0.8	1.6	.	2.4
Broad beans	0.5	0.4	1.2	.	.	2.1
Soup celery	.	.	2.0	.	.	2.0
Summer scallions	0.5	.	0.8	.	.	1.3
Peas	.	.	1.2	.	.	1.2
Winter cabbage	.	0.3	.	.	.	0.3
Squash	.	0.2	.	.	.	0.2
Spring cabbage	.	.	0.2	.	.	0.2
All crops	**12.6**	**308.1**	**808.7**	**17.8**	**31.4**	**1,178.7**

Table 4a: Estimated area (spha) of vegetable crops treated regionally in Northern Ireland, 2023, with each pesticide type.

	County					
Pesticide type	**Antrim**	**Armagh**	**Down**	**Londonderry**	**Tyrone**	**Northern Ireland**
Fungicide	7.5	444.5	2,284.4	32.4	12.1	2,781.0
Herbicide	11.9	1,261.1	2,047.0	46.9	22.4	3,389.4
Insecticide	4.7	481.6	2,488.6	22.7	24.3	3,021.8
Growth regulator	0.3	.	.	.	.	0.3
Molluscicide	.	23.7	21.6	.	.	45.3
Seed treatment	2.7	139.9	721.4	17.8	12.1	893.9
All pesticides	**27.2**	**2,350.8**	**7,563.1**	**119.8**	**71.0**	**10,131.8**

Table 4b: Estimated weight (kg) of pesticide applied regionally in Northern Ireland, 2023, with each pesticide type.

	County					
Pesticide type	**Antrim**	**Armagh**	**Down**	**Londonderry**	**Tyrone**	**Northern Ireland**
Fungicide	2.1	124.6	561.5	7.5	1.5	697.2
Herbicide	9.8	788.3	1,162.0	36.9	27.6	2,024.5
Insecticide	<0.1	13.9	78.5	0.3	1.0	93.8
Growth regulator	0.9	.	.	.	.	0.9
Molluscicide	.	3.5	4.4	.	.	7.9
Seed treatment	<0.1	0.1	1.7	<0.1	<0.1	1.8
All pesticides	**12.8**	**930.4**	**1,808.2**	**44.7**	**30.1**	**2,826.1**

Table 5: The total area (spha) and the basic area (ha) of vegetable crops treated with each pesticide type in Northern Ireland, 2023.

	Pesticide Type													
	Fungicides		Herbicides & desiccants		Insecticides		Growth regulators		Molluscicides		Seed treatments		All pesticides	
Crop type	**(spha)**	**(ha)**	**(spha)**	**(ha)**	**(spha)**	**(ha)**	**(spha)**	**(ha)**	**(spha)**	**(ha)**	**(spha)**	**(ha)**	**(spha)**	**(ha)**
Carrots and parsnips	1,166.0	312.8	1,819.5	364.3	1,660.1	325.5	0.3	0.3	0.7	0.7	364.3	364.3	5,010.9	364.3
Celery and parsely	82.4	19.1	37.3	19.1	18.1	18.1	.	.	.	.	2.0	2.0	139.9	19.1
Leafy and flowerhead brassicas	1,446.7	341.3	692.6	379.4	924.6	327.6	.	.	44.2	43.5	502.7	369.3	3,610.8	382.3
Onions and leeks	82.9	38.5	299.4	57.1	2.8	2.8	.	.	.	.	19.9	19.9	405.1	57.1
Other vegetables	.	.	370.6	137.3	.	.	.	.	0.5	0.2	5.0	5.0	376.0	142.5
Peas and beans	2.9	2.9	2.9	2.9	3.1	2.8	.	.	.	.	.	.	8.9	3.3
Turnips and swedes	.	.	167.1	84.6	413.1	170.1	.	.	.	.	.	.	580.2	181.8
All crops	**2,781.0**	**714.7**	**3,389.4**	**1,044.8**	**3,021.8**	**846.9**	**0.3**	**0.3**	**45.3**	**44.4**	**893.9**	**760.6**	**10,131.8**	**1,150.0**

Table 6: The total quantities (kg) of each pesticide type used on vegetable crops in Northern Ireland, 2023.

	Pesticide Type						
Crop type	**Fungicides**	**Herbicides**	**Insecticides**	**Growth regulators**	**Molluscicides**	**Seed treatments**	**Total quantity (kg)**
Carrots and parsnips	339.0	1,156.4	48.1	0.9	0.1	0.2	1,544.7
Celery and parsely	26.6	25.2	0.1	.	.	0.1	51.9
Leafy and flowerhead brassicas	272.2	343.6	30.1	.	7.7	1.6	655.2
Onions and leeks	58.4	128.7	<0.1	.	.	<0.1	187.2
Other vegetables	.	304.5	.	.	<0.1	<0.1	304.6
Peas and beans	0.9	3.4	<0.1	.	.	.	4.3
Turnips and swedes	.	62.7	15.5	.	.	.	78.2
All pesticides	**697.2**	**2,024.5**	**93.8**	**0.9**	**7.9**	**1.8**	**2,826.1**

Table 7: The proportional area (%) of each crop treated with pesticides and the number of spray applications in Northern Ireland, 2023.

	Pestcide type													
	Fungicides		Herbicides		Insecticides		Growth Regulators		Molluscicides		Seed treatments		All Pesticides	
Crop type	**%**	**sp apps**	**%**	**sp apps**	**%**	**sp apps**	**%**	**sp apps**	**%**	**sp apps**	**%**	**sp apps**	**%**	**sp apps**
Carrots and parsnips	85%	2.7	99%	4.2	88%	4.0	<1%	1.0	<1%	1.0	99%	1.0	99%	2.9
Celery and parsely	100%	3.1	100%	1.7	95%	1.0	.	.	.	.	11%	1.0	100%	2.0
Leafy and flowerhead brassicas	87%	3.5	97%	1.7	83%	2.3	.	.	11%	1.1	94%	1.3	97%	2.1
Onions and leeks	67%	1.9	99%	2.5	5%	1.0	.	.	.	.	35%	1.0	99%	1.9
Other vegetables	.	.	88%	1.6	.	.	.	.	<1%	2.0	3%	1.0	92%	1.7
Peas and beans	88%	1.0	88%	1.0	84%	1.4	.	.	.	.	.	.	98%	1.1
Turnips and swedes	.	.	46%	1.7	94%	2.3	.	.	.	.	.	.	100%	2.1
Total	**61%**	**3.1**	**89%**	**2.2**	**72%**	**2.6**	**<1%**	**1.0**	**4%**	**1.2**	**65%**	**1.2**	**98%**	**2.2**

Table 8: Estimated area (spha) of outdoor vegetable crops treated with pesticide formulations in Northern Ireland, 2023.

	Crop type										
Pesticide group & active substance	**Brassicas**	**Carrots**	**Celery**	**Leeks**	**Other vegetables**	**Parsley**	**Parsnips**	**Peas & beans**	**Salad onions/ scallions**	**Turnips & swedes**	**Total Area (spha)**
Fungicides											
Azoxystrobin	292.5	8.1	14.4	12.1	.	.	63.7	0.5	0.5	.	391.8
Azoxystrobin/difenoconazole	68.6	68.1	0.8	4.0	.	3.2	122.0	.	.	.	266.6
Boscalid/pyraclostrobin	45.6	109.6	.	.	.	.	<0.1	2.4	.	.	157.7
Cyprodinil/fludioxonil	.	.	28.2	.	.	.	1.3	.	.	.	29.5
Difenoconazole	297.6	.	30.2	.	.	.	.	.	.	.	327.8
Difenoconazole/fluxapyroxad	23.7	95.7	.	.	.	.	60.5	.	.	.	179.9
Dimethomorph/mancozeb	.	.	.	12.2	.	.	.	.	.	.	12.2
Fluopicolide/propamocarb hydrochloride	.	.	.	29.4	.	.	.	.	.	.	29.4
Fluopyram	.	148.5	.	.	.	.	60.5	.	.	.	209.0
Metalaxyl-M	109.5	100.4	.	.	.	.	61.7	.	.	.	271.6
Prothioconazole	578.4	181.2	.	24.7	.	.	61.5	.	.	.	845.9
Tebuconazole	.	8.1	.	.	.	.	3.2	.	.	.	11.3
Tebuconazole/trifloxystrobin	30.9	10.5	5.6	.	.	.	1.3	.	.	.	48.3
All fungicides	**1,446.7**	**730.2**	**79.2**	**82.5**	**.**	**3.2**	**435.8**	**2.9**	**0.5**	**.**	**2,781.0**

Table 8 (cont): Estimated area (spha) of outdoor vegetable crops treated with pesticide formulations in Northern Ireland, 2023.

	Crop type										
Pesticide group & active substance	**Brassicas**	**Carrots**	**Celery**	**Leeks**	**Other vegetables**	**Parsley**	**Parsnips**	**Peas & beans**	**Salad onions/ scallions**	**Turnips & swedes**	**Total Area (spha)**
Herbicides											
Aclonifen	.	450.7	16.5	52.7	.	2.6	117.4	.	16.2	.	656.2
Clethodim	.	58.7	.	2.8	.	.	.	.	.	.	61.5
Clomazone	315.4	224.0	.	.	0.1	.	3.2	.	.	82.6	625.3
Dimethenamid-P/pendimethalin	.	.	.	.	.	.	.	.	17.5	.	17.5
Fluroxypyr	.	.	.	52.7	.	.	.	.	16.2	.	68.9
Glyphosate	56.6	134.7	14.1	18.9	132.0	.	70.1	.	.	.	426.4
Imazamox/pendimethalin	.	.	.	.	.	.	.	2.4	.	.	2.4
Isoxaben	.	.	.	.	119.2	.	.	.	.	.	119.2
Metamitron	.	.	.	.	.	.	61.7	.	.	.	61.7
Metazachlor	267.6	.	.	11.4	.	.	.	.	.	74.8	353.9
Metribuzin	.	357.6	.	.	.	.	.	.	.	.	357.6
Pendimethalin	44.6	229.4	.	25.3	.	.	104.9	0.5	.	.	404.7
Propyzamide	.	.	.	.	119.2	.	.	.	.	.	119.2
Prosulfocarb	.	3.5	2.0	69.5	.	2.0	3.5	.	16.2	.	96.8
Pyridate	8.3	.	.	.	.	.	.	.	.	.	8.3
S-metolachlor	.	.	.	.	.	.	.	.	.	9.7	9.7
All herbicides	**692.6**	**1,458.6**	**32.6**	**233.4**	**370.6**	**4.6**	**360.9**	**2.9**	**66.0**	**167.1**	**3,389.4**

Table 8 (cont): Estimated area (spha) of outdoor vegetable crops treated with pesticide formulations in Northern Ireland, 2023.

	Crop type										
Pesticide group & active substance	**Brassicas**	**Carrots**	**Celery**	**Leeks**	**Other vegetables**	**Parsley**	**Parsnips**	**Peas & beans**	**Salad onions/ scallions**	**Turnips & swedes**	**Total Area (spha)**
Insecticides											
Acetamiprid	.	137.2	.	.	.	.	63.3	.	.	.	200.5
Cyantraniliprole	5.7	163.9	.	.	.	.	60.5	.	.	194.5	424.6
Cypermethrin	10.7	.	.	.	.	.	.	.	.	.	10.7
Deltamethrin	.	75.6	.	.	.	.	60.5	0.7	.	.	136.8
Esfenvalerate	0.4	.	.	.	.	.	.	.	.	.	0.4
Lambda-cyhalothrin	594.6	552.2	16.1	2.8	.	2.0	287.3	2.4	.	218.5	1,676.1
Spirotetramat	313.2	196.3	.	.	.	.	63.3	.	.	.	572.8
All insecticides	**924.6**	**1,125.3**	**16.1**	**2.8**	**.**	**2.0**	**534.8**	**3.1**	**.**	**413.1**	**3,021.8**
Growth regulators											
Maleic hydrazide	.	.	.	.	.	.	0.3	.	.	.	0.3
All growth regulators	**.**	**.**	**.**	**.**	**.**	**.**	**0.3**	**.**	**.**	**.**	**0.3**
Molluscicides											
Ferric phosphate	44.2	0.7	.	.	0.5	.	.	.	.	.	45.3
All molluscicides	**44.2**	**0.7**	**.**	**.**	**0.5**	**.**	**.**	**.**	**.**	**.**	**45.3**
Seed treatments											
Fludioxonil	369.3	250.3	.	2.5	5.0	.	114.0	.	17.5	.	758.6
Metalaxyl-M	133.4	.	.	.	.	2.0	.	.	.	.	135.4
All seed treatments	**502.7**	**250.3**	**.**	**2.5**	**5.0**	**2.0**	**114.0**	**.**	**17.5**	**.**	**893.9**

Table 9: Estimated quantities (kg) of pesticide formulations used on outdoor vegetable crops in Northern Ireland, 2023.

	Crop type										
Pesticide group & active substance	**Brassicas**	**Carrots**	**Celery**	**Leeks**	**Other vegetables**	**Parsley**	**Parsnips**	**Peas & beans**	**Salad onions/ scallions**	**Turnips & swedes**	**Total Quantity (kg)**
Fungicides											
Azoxystrobin	73.1	2.0	3.6	3.0	.	.	15.9	0.1	0.1	.	97.9
Azoxystrobin/difenoconazole	22.3	22.1	0.3	1.3	.	1.0	39.6	.	.	.	86.7
Boscalid/pyraclostrobin	15.2	36.6	.	.	.	.	<0.1	0.8	.	.	52.7
Cyprodinil/fludioxonil	.	.	16.6	.	.	.	0.6	.	.	.	17.2
Difenoconazole	31.7	.	3.8	.	.	.	.	.	.	.	35.4
Difenoconazole/fluxapyroxad	3.0	12.0	.	.	.	.	7.6	.	.	.	22.5
Dimethomorph/mancozeb	.	.	.	18.1	.	.	.	.	.	.	18.1
Fluopicolide/propamocarb hydrochloride	.	.	.	31.2	.	.	.	.	.	.	31.2
Fluopyram	.	37.1	.	.	.	.	15.1	.	.	.	52.3
Metalaxyl-M	7.6	60.7	.	.	.	.	37.0	.	.	.	105.4
Prothioconazole	111.0	34.8	.	4.8	.	.	11.8	.	.	.	162.4
Tebuconazole	.	2.0	.	.	.	.	0.8	.	.	.	2.8
Tebuconazole/trifloxystrobin	8.3	2.8	1.3	.	.	.	0.3	.	.	.	12.7
All fungicides	**272.2**	**210.2**	**25.5**	**58.3**	**.**	**1.0**	**128.8**	**0.9**	**0.1**	**.**	**697.2**

Table 9 (cont): Estimated quantities (kg) of pesticide formulations used on outdoor vegetable crops in Northern Ireland, 2023.

	Crop type										
Pesticide group & active substance	**Brassicas**	**Carrots**	**Celery**	**Leeks**	**Other vegetables**	**Parsley**	**Parsnips**	**Peas & beans**	**Salad onions/ scallions**	**Turnips & swedes**	**Total Quantity (kg)**
Herbicides											
Aclonifen	.	208.7	7.5	5.6	.	2.7	99.0	.	1.0	.	324.5
Clethodim	.	14.1	.	0.4	.	.	.	.	.	.	14.5
Clomazone	23.7	15.3	.	.	<0.1	.	0.3	.	.	5.3	44.6
Dimethenamid-P/pendimethalin	.	.	.	.	.	.	.	.	8.4	.	8.4
Fluroxypyr	.	.	.	2.7	.	.	.	.	0.5	.	3.2
Glyphosate	77.8	169.6	10.2	27.0	203.7	.	79.8	.	.	.	568.2
Imazamox/pendimethalin	.	.	.	.	.	.	.	2.9	.	.	2.9
Isoxaben	.	.	.	.	14.9	.	.	.	.	.	14.9
Metamitron	.	.	.	.	.	.	86.1	.	.	.	86.1
Metazachlor	179.4	.	.	5.5	.	.	.	.	.	56.1	241.0
Metribuzin	.	59.6	.	.	.	.	.	.	.	.	59.6
Pendimethalin	58.9	285.6	.	6.7	.	.	121.6	0.5	.	.	473.3
Propyzamide	.	.	.	.	85.9	.	.	.	.	.	85.9
Prosulfocarb	.	12.4	2.4	68.2	.	2.4	4.3	.	2.6	.	92.3
Pyridate	3.8	.	.	.	.	.	.	.	.	.	3.8
S-metolachlor	.	.	.	.	.	.	.	.	.	1.2	1.2
All herbicides	**343.6**	**765.3**	**20.1**	**116.2**	**304.5**	**5.1**	**391.0**	**3.4**	**12.5**	**62.7**	**2,024.5**

Table 9 (cont): Estimated quantities (kg) of pesticide formulations used on outdoor vegetable crops in Northern Ireland, 2023.

	Crop type										
Pesticide group & active substance	**Brassicas**	**Carrots**	**Celery**	**Leeks**	**Other vegetables**	**Parsley**	**Parsnips**	**Peas & beans**	**Salad onions/ scallions**	**Turnips & swedes**	**Total Quantity (kg)**
Insecticides											
Acetamiprid	.	5.5	.	.	.	.	2.5	.	.	.	8.0
Cyantraniliprole	0.4	12.1	.	.	.	.	4.5	.	.	14.4	31.4
Cypermethrin	0.3	.	.	.	.	.	.	.	.	.	0.3
Deltamethrin	.	0.6	.	.	.	.	0.5	<0.1	.	.	1.0
Esfenvalerate	<0.1	.	.	.	.	.	.	.	.	.	<0.1
Lambda-cyhalothrin	5.9	7.4	0.1	<0.1	.	<0.1	3.4	<0.1	.	1.1	17.9
Spirotetramat	23.5	8.8	.	.	.	.	2.8	.	.	.	35.2
All insecticides	**30.1**	**34.4**	**0.1**	**<0.1**	**.**	**<0.1**	**13.7**	**<0.1**	**.**	**15.5**	**93.8**
Growth regulators											
Maleic hydrazide	.	.	.	.	.	.	0.9	.	.	.	0.9
All growth regulators	**.**	**.**	**.**	**.**	**.**	**.**	**0.9**	**.**	**.**	**.**	**0.9**
Molluscicides											
Ferric phosphate	7.7	0.1	.	.	<0.1	.	.	.	.	.	7.9
All molluscicides	**7.7**	**0.1**	**.**	**.**	**<0.1**	**.**	**.**	**.**	**.**	**.**	**7.9**
Seed treatments											
Fludioxonil	<0.1	0.1	.	<0.1	<0.1	.	<0.1	.	<0.1	.	0.2
Metalaxyl-M	1.6	.	.	.	.	0.1	.	.	.	.	1.6
All seed treatments	**1.6**	**0.1**	**.**	**<0.1**	**<0.1**	**0.1**	**<0.1**	**.**	**<0.1**	**.**	**1.8**

Table 10: The forty four active substances used on vegetable crops in Northern Ireland, 2023, ranked by treated area (spha).

No.	Active substance	Treated area (spha)
1	Lambda-cyhalothrin	1,676.1
2	Prothioconazole	845.9
3	Difenoconazole	774.3
4	Azoxystrobin	658.4
5	Aclonifen	656.2
6	Clomazone	625.3
7	Spirotetramat	572.8
8	Glyphosate	426.4
9	Cyantraniliprole	424.6
10	Pendimethalin	424.6
11	Metribuzin	357.6
12	Metazachlor	353.9
13	Metalaxyl-M	271.6
14	Fluopyram	209.0
15	Acetamiprid	200.5
16	Fluxapyroxad	179.9
17	Boscalid	157.7
18	Pyraclostrobin	157.7
19	Deltamethrin	136.8
20	Isoxaben	119.2
21	Propyzamide	119.2
22	Prosulfocarb	96.8
23	Fluroxypyr	68.9
24	Metamitron	61.7
25	Clethodim	61.5
26	Tebuconazole	59.6
27	Trifloxystrobin	48.3
28	Ferric phosphate	45.3
29	Cyprodinil	29.5
30	Fludioxonil	29.5
31	Fluopicolide	29.4
32	Propamocarb hydrochloride	29.4
33	Dimethenamid-P	17.5
34	Mancozeb	12.2
35	Dimethomorph	12.2
36	Cypermethrin	10.7
37	Nitrogen	10.5
38	Phosphate	10.5
39	Potassium oxide	10.5
40	S-metolachlor	9.7
41	Pyridate	8.3
42	Imazamox	2.4
43	Esfenvalerate	0.4
44	Maleic hydrazide	0.3

Table 11: The forty four active substances used on vegetable crops in Northern Ireland, 2023, ranked 2023, ranked by weight (kg).

No.	Active substance	Quantity applied (kg)
1	Glyphosate	568.2
2	Pendimethalin	480.5
3	Aclonifen	324.5
4	Metazachlor	241.0
5	Prothioconazole	162.4
6	Azoxystrobin	151.3
7	Metalaxyl-M	107.0
8	Prosulfocarb	92.3
9	Metamitron	86.1
10	Propyzamide	85.9
11	Difenoconazole	77.8
12	Metribuzin	59.6
13	Fluopyram	52.3
14	Clomazone	44.6
15	Boscalid	42.1
16	Spirotetramat	35.2
17	Cyantraniliprole	31.4
18	Propamocarb hydrochloride	28.3
19	Lambda-cyhalothrin	17.9
20	Mancozeb	16.3
21	Isoxaben	14.9
22	Clethodim	14.5
23	Fluxapyroxad	13.5
24	Tebuconazole	11.3
25	Pyraclostrobin	10.6
26	Cyprodinil	10.3
27	Acetamiprid	8.0
28	Ferric phosphate	7.9
29	Fludioxonil	7.1
30	Nitrogen	5.3
31	Phosphate	5.3
32	Potassium oxide	5.3
33	Trifloxystrobin	4.2
34	Dimethenamid-P	3.9
35	Pyridate	3.8
36	Fluroxypyr	3.2
37	Fluopicolide	2.8
38	Dimethomorph	1.8
39	S-metolachlor	1.2
40	Deltamethrin	1.0
41	Maleic hydrazide	0.9
42	Cypermethrin	0.3
43	Imazamox	0.2
44	Esfenvalerate	<0.1

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

	Reasons for treatment											
Pesticide group and active substance	**Cavity spot**	**Fungal disease**	**General disease control**	**General fungal control**	**General weed control**	**Ground preparation**	**Mildew**	**Nematodes**	**Pre-emergence weed control**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Fungicides												
Azoxystrobin	.	.	60.5	11.3	.	.	.	.	.	71.8	71.8	18.0
Azoxystrobin/difenoconazole	.	.	190.0	.	.	.	.	.	.	190.0	129.6	61.8
Boscalid/pyraclostrobin	.	60.7	35.6	13.4	.	.	.	.	.	109.7	109.7	36.6
Cyprodinil/fludioxonil	.	1.3	.	.	.	.	.	.	.	1.3	1.3	0.6
Difenoconazole/fluxapyroxad	.	.	156.1	.	.	.	.	.	.	156.1	156.1	19.5
Fluopyram	.	.	.	.	.	.	.	209.0	.	209.0	209.0	52.3
Metalaxyl-M	137.3	.	24.8	.	.	.	.	.	.	162.1	162.1	97.7
Prothioconazole	.	60.7	168.0	13.4	.	.	0.7	.	.	242.8	232.2	46.6
Tebuconazole	.	.	.	11.3	.	.	.	.	.	11.3	11.3	2.8
Tebuconazole/trifloxystrobin	.	1.3	10.5	.	.	.	.	.	.	11.8	11.8	3.1
All fungicides	**137.3**	**123.9**	**645.6**	**49.4**	**.**	**.**	**0.7**	**209.0**	**.**	**1,166.0**	**.**	**339.0**
Herbicides												
Aclonifen	.	.	.	.	283.6	.	.	.	284.5	568.2	346.3	307.7
Clethodim	.	.	.	.	58.7	.	.	.	.	58.7	58.7	14.1
Clomazone	.	.	.	.	.	.	.	.	227.3	227.3	227.3	15.6
Glyphosate	.	.	.	.	.	204.8	.	.	.	204.8	204.8	249.4
Metamitron	.	.	.	.	.	.	.	.	61.7	61.7	61.7	86.1
Metribuzin	.	.	.	.	292.6	.	.	.	65.1	357.6	228.6	59.6
Pendimethalin	.	.	.	.	38.8	.	.	.	295.4	334.3	334.3	407.2
Prosulfocarb	.	.	.	.	7.0	.	.	.	.	7.0	5.7	16.7
All herbicides	**.**	**.**	**.**	**.**	**680.7**	**204.8**	**.**	**.**	**934.0**	**1,819.5**	**.**	**1,156.4**

Table 12 (cont): Carrots and parsnips pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

	Reasons for treatment											
Pesticide group and active substance	**Aphids**	**Aphids and carrot fly**	**Aphids and caterpillars**	**Carrot fly**	**General insect control**	**Growth regulator**	**Mildew**	**Seed treatment**	**Slugs**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Insecticides												
Acetamiprid	141.8	.	.	13.4	45.3	.	.	.	.	200.5	200.5	8.0
Cyantraniliprole	.	125.6	.	.	98.9	.	.	.	.	224.4	224.4	16.6
Deltamethrin	.	.	125.6	10.5	.	.	.	.	.	136.1	136.1	1.0
Lambda-cyhalothrin	22.7	.	.	490.5	326.4	.	.	.	.	839.6	322.7	10.8
Spirotetramat	166.8	2.8	.	14.1	75.8	.	.	.	.	259.6	244.2	11.7
All insecticides	**331.3**	**128.4**	**125.6**	**528.5**	**546.4**	**.**	**.**	**.**	**.**	**1,660.1**	**.**	**48.1**
Growth regulators												
Maleic hydrazide	.	.	.	.	.	0.3	.	.	.	0.3	0.3	0.9
All growth regulators	**.**	**.**	**.**	**.**	**.**	**0.3**	**.**	**.**	**.**	**0.3**	**.**	**0.9**
Molluscicides												
Ferric phosphate	.	.	.	.	.	.	.	.	0.7	0.7	0.7	0.1
All molluscicides	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**0.7**	**0.7**	**.**	**0.1**
Seed treatments												
Fludioxonil	.	.	.	.	.	.	.	364.3	.	364.3	364.3	0.2
All seed treatments	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**364.3**	**.**	**364.3**	**.**	**0.2**

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

	Reasons for treatment										
Pesticide group and active substance	**Aphids**	**General disease control**	**General fungal control**	**General insect control**	**General weed control**	**Ground preparation**	**Pre-emergence weed control**	**Seed treatment**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Fungicides											
Azoxystrobin	.	.	14.4	.	.	.	.	.	14.4	8.8	3.6
Azoxystrobin/difenoconazole	.	4.0	.	.	.	.	.	.	4.0	3.0	1.3
Cyprodinil/fludioxonil	.	.	28.2	.	.	.	.	.	28.2	14.1	16.6
Difenoconazole	.	2.0	28.2	.	.	.	.	.	30.2	16.1	3.8
Tebuconazole/trifloxystrobin	.	.	5.6	.	.	.	.	.	5.6	5.6	1.3
All fungicides	**.**	**6.0**	**76.4**	**.**	**.**	**.**	**.**	**.**	**82.4**	**.**	**26.6**
Herbicides											
Aclonifen	.	.	.	.	5.6	.	13.6	.	19.1	19.1	10.2
Glyphosate	.	.	.	.	.	14.1	.	.	14.1	14.1	10.2
Prosulfocarb	.	.	.	.	.	.	4.0	.	4.0	4.0	4.9
All herbicides	**.**	**.**	**.**	**.**	**5.6**	**14.1**	**17.6**	**.**	**37.3**	**.**	**25.2**
Insecticides											
Lambda-cyhalothrin	3.2	.	.	14.9	.	.	.	.	18.1	18.1	0.1
All insecticides	**3.2**	**.**	**.**	**14.9**	**.**	**.**	**.**	**.**	**18.1**	**.**	**0.1**
Seed treatments											
Metalaxyl-M	.	.	.	.	.	.	.	2.0	2.0	2.0	0.1
All seed treatments	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**2.0**	**2.0**	**.**	**0.1**

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

	Reasons for treatment											
Pesticide group and active substance	**General disease control**	**General fungal control**	**General weed control**	**Ground preparation**	**Headlands**	**Leaf disease**	**Leaf spot**	**Pre-emergence weed control**	**Sealer**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Fungicides												
Azoxystrobin	263.9	28.6	.	.	.	.	.	.	.	292.5	122.5	73.1
Azoxystrobin/difenoconazole	30.8	23.7	.	.	.	14.0	.	.	.	68.6	62.6	22.3
Boscalid/pyraclostrobin	21.9	23.7	.	.	.	.	.	.	.	45.6	45.6	15.2
Difenoconazole	250.3	45.9	.	.	.	.	1.4	.	.	297.6	187.4	31.7
Difenoconazole/fluxapyroxad	.	23.7	.	.	.	.	.	.	.	23.7	23.7	3.0
Metalaxyl-M	109.5	.	.	.	.	.	.	.	.	109.5	109.5	7.6
Prothioconazole	539.9	23.7	.	.	.	14.0	0.7	.	.	578.4	280.0	111.0
Tebuconazole/trifloxystrobin	29.5	.	.	.	.	.	1.4	.	.	30.9	30.2	8.3
All fungicides	**1,245.8**	**169.4**	**.**	**.**	**.**	**28.0**	**3.5**	**.**	**.**	**1,446.7**	**.**	**272.2**
Herbicides												
Clomazone	.	.	215.9	.	.	.	.	98.7	0.7	315.4	315.4	23.7
Glyphosate	.	.	.	56.6	<0.1	.	.	.	.	56.6	56.6	77.8
Metazachlor	.	.	124.2	0.4	.	.	.	110.3	32.7	267.6	267.6	179.4
Pendimethalin	.	.	1.1	41.0	.	.	.	2.6	.	44.6	44.6	58.9
Pyridate	.	.	8.3	.	.	.	.	.	.	8.3	8.3	3.8
All herbicides	**.**	**.**	**349.6**	**98.0**	**<0.1**	**.**	**.**	**211.6**	**33.4**	**692.6**	**.**	**343.6**

Table 14 (cont): Leafy and flowerhead brassicas pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

	Reasons for treatment												
Pesticide group and active substance	**Aphids**	**Aphids and carrot fly**	**Aphids and caterpillar**	**Cabbage rootfly**	**Cabbage white butterfly**	**Carrot fly**	**Caterpillars**	**General insect control**	**Seed treatment**	**Slugs**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Insecticides													
Cyantraniliprole	.	5.3	.	.	.	.	.	0.3	.	.	5.7	4.3	0.4
Cypermethrin	.	.	.	.	.	8.0	.	2.7	.	.	10.7	10.7	0.3
Esfenvalerate	.	.	.	0.4	.	.	.	.	.	.	0.4	0.4	<0.1
Lambda-cyhalothrin	110.9	.	109.5	.	6.7	10.7	109.3	247.6	.	.	594.6	297.0	5.9
Spirotetramat	265.5	.	.	.	.	.	.	47.7	.	.	313.2	271.9	23.5
All insecticides	**376.4**	**5.3**	**109.5**	**0.4**	**6.7**	**18.7**	**109.3**	**298.4**	**.**	**.**	**924.6**	**.**	**30.1**
Molluscicides													
Ferric phosphate	.	.	.	.	.	.	.	.	.	44.2	44.2	43.5	7.7
All molluscicides	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**44.2**	**44.2**	**.**	**7.7**
Seed treatments													
Fludioxonil	.	.	.	.	.	.	.	.	369.3	.	369.3	369.3	<0.1
Metalaxyl-M	.	.	.	.	.	.	.	.	133.4	.	133.4	133.4	1.6
All seed treatments	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**502.7**	**.**	**502.7**	**.**	**1.6**

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

	Reasons for treatment												
Pesticide group and active substance	**General disease control**	**General fungal control**	**General insect control**	**General weed control**	**Grass weeds**	**Ground preparation**	**Leaf disease**	**Pre-emergence weed control**	**Sealer**	**Seed treatment**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Fungicides													
Azoxystrobin	12.6	.	.	.	.	.	.	.	.	.	12.6	12.6	3.2
Azoxystrobin/difenoconazole	.	.	.	.	.	.	4.0	.	.	.	4.0	4.0	1.3
Dimethomorph/mancozeb	12.2	.	.	.	.	.	.	.	.	.	12.2	12.2	18.1
Fluopicolide/propamocarb hydrochloride	12.1	17.3	.	.	.	.	.	.	.	.	29.4	29.4	31.2
Prothioconazole	16.7	.	.	.	.	.	8.0	.	.	.	24.7	20.7	4.8
All fungicides	**53.7**	**17.3**	**.**	**.**	**.**	**.**	**12.0**	**.**	**.**	**.**	**82.9**	**.**	**58.4**
Herbicides													
Aclonifen	.	.	.	68.9	.	.	.	.	.	.	68.9	34.4	6.6
Clethodim	.	.	.	.	2.8	.	.	.	.	.	2.8	2.8	0.4
Dimethenamid-P/pendimethalin	.	.	.	.	.	.	.	17.5	.	.	17.5	17.5	8.4
Fluroxypyr	.	.	.	68.9	.	.	.	.	.	.	68.9	34.4	3.2
Glyphosate	.	.	.	.	.	18.9	.	.	.	.	18.9	18.9	27.0
Metazachlor	.	.	.	6.6	.	.	.	4.0	0.8	.	11.4	7.4	5.5
Pendimethalin	.	.	.	4.0	.	.	.	21.3	.	.	25.3	21.3	6.7
Prosulfocarb	.	.	.	73.6	.	.	.	12.1	.	.	85.7	48.4	70.8
All herbicides	**.**	**.**	**.**	**222.0**	**2.8**	**18.9**	**.**	**54.9**	**0.8**	**.**	**299.4**	**.**	**128.7**
Insecticides													
Lambda-cyhalothrin	.	.	2.8	.	.	.	.	.	.	.	2.8	2.8	<0.1
All insecticides	**.**	**.**	**2.8**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**2.8**	**.**	**<0.1**
Seed treatments													
Fludioxonil	.	.	.	.	.	.	.	.	.	19.9	19.9	19.9	<0.1
All seed treatments	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**19.9**	**19.9**	**.**	**<0.1**

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

	Reasons for treatment								
Pesticide group and active substance	**General weed control**	**Ground preparation**	**Headlands**	**Pre-emergence weed control**	**Seed treatment**	**Slugs**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Herbicides									
Clomazone	.	0.1	.	.	.	.	0.1	0.1	<0.1
Glyphosate	<0.1	93.1	<0.1	38.8	.	.	132.0	124.3	203.8
Isoxaben	67.4	.	.	51.8	.	.	119.2	119.2	14.9
Propyzamide	67.4	.	.	51.8	.	.	119.2	119.2	85.9
All herbicides	**134.9**	**93.2**	**<0.05**	**142.4**	**.**	**.**	**370.6**	**.**	**304.5**
Molluscicides									
Ferric phosphate	.	.	.	.	.	0.5	0.5	0.2	<0.1
All molluscicides	**.**	**.**	**.**	**.**	**.**	**0.5**	**0.5**	**.**	**<0.1**
Seed treatments									
Fludioxonil	.	.	.	.	5.0	.	5.0	5.0	<0.1
All seed treatments	**.**	**.**	**.**	**.**	**5.0**	**.**	**5.0**	**.**	**<0.1**

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

	Reasons for treatment						
Pesticide group and active substance	**Bean weevil**	**General disease control**	**General insect control**	**Pre-emergence weed control**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Fungicides							
Azoxystrobin	.	0.5	.	.	0.5	0.5	0.1
Boscalid/pyraclostrobin	.	2.4	.	.	2.4	2.4	0.8
All fungicides	**.**	**2.9**	**.**	**.**	**2.9**	**.**	**0.9**
Herbicides							
Imazamox/pendimethalin	.	.	.	2.4	2.4	2.4	2.9
Pendimethalin	.	.	.	0.5	0.5	0.5	0.5
All herbicides	**.**	**.**	**.**	**2.9**	**2.9**	**.**	**3.4**
Insecticides							
Deltamethrin	0.7	.	.	.	0.7	0.3	<0.1
Lambda-cyhalothrin	.	.	2.4	.	2.4	2.4	<0.1
All insecticides	**0.7**	**.**	**2.4**	**.**	**3.1**	**.**	**<0.1**

Table 18: Turnips and swedes pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

	Reasons for treatment					
Pesticide group and active substance	**Aphids**	**Flea beetles**	**Pre-emergence weed control**	**Total treated area (spha)**	**Basic treated area (ha)**	**Quantity applied (kg)**
Herbicides						
Clomazone	.	.	82.6	82.6	82.6	5.3
Metazachlor	.	.	74.8	74.8	74.8	56.1
S-metolachlor	.	.	9.7	9.7	9.7	1.2
All herbicides	**.**	**.**	**167.1**	**167.1**	**.**	**62.7**
Insecticides						
Cyantraniliprole	194.5	.	.	194.5	97.3	14.4
Lambda-cyhalothrin	.	218.5	.	218.5	72.8	1.1
All insecticides	**194.5**	**218.5**	**.**	**413.1**	**.**	**15.5**

Table 19: Comparison of the area of vegetable crops grown (ha) in Northern Ireland and the proportional differences between 1991-2023.

	Survey year												
Crop type	**1991 (ha)**	**1995 (ha)**	**1999 (ha)**	**2004 (ha)**	**2007 (ha)**	**2011 (ha)**	**2013 (ha)**	**2015 (ha)**	**2017 (ha)**	**2019 (ha)**	**2021 (ha)**	**2023 (ha)**	**% change in area 2021/2023**
Brassicas													
Brussels sprouts	121.6	85.7	114.5	29.8	43.6	54.9	29.5	23.1	17.2	34.2	4.6	63.3	1263%
Cabbage (summer/autumn/winter)	118.6	61.0	120.7	76.6	110.8	69.5	18.5	7.4	1.8	15.5	12.2	0.5	-96%
Cabbage (other)*	168.6	202.8	175.3	156.0	241.8	173.0	159.0	126.3	114.1	167.8	111.3	192.1	73%
Calabrese/broccoli	50.6	55.8	60.6	147.5	159.5	96.3	55.4	37.6	77.5	39.3	33.5	71.9	114%
Cauliflower	166.8	228.8	181.4	171.4	188.1	86.2	50.8	24.9	29.2	22.4	26.0	61.1	135%
Kale	.	.	.	.	.	0.9	.	4.7	2.6	0.5	1.6	3.7	133%
All leafy and flowerhead brassicas	**626.2**	**634.1**	**652.5**	**581.3**	**743.8**	**480.7**	**313.1**	**224.0**	**242.3**	**279.7**	**189.3**	**392.6**	**107%**
Turnip and swede													
Turnip and swede	127.6	121.9	121.5	280.8	223.5	253.3	248.5	248.9	272.1	80.9	151.4	181.9	20%
All turnip and swede	**127.6**	**121.9**	**121.5**	**280.8**	**223.5**	**253.3**	**248.5**	**248.9**	**272.1**	**80.9**	**151.4**	**181.9**	**20%**
Peas and beans													
Beans	11.8	11.7	9.4	6.6	5.0	2.0	26.2	2.4	3.2	4.0	13.4	2.1	-84%
Peas	13.2	6.9	5.5	2.4	2.7	15.8	5.0	2.4	3.2	3.4	12.4	1.2	-90%
All peas and beans	**25.0**	**18.6**	**14.9**	**9.0**	**7.7**	**17.8**	**31.2**	**4.9**	**6.4**	**7.4**	**25.8**	**3.3**	**-87%**
Leeks and onions													
Leeks	39.3	63.5	68.1	89.9	109.3	104.2	109.9	91.1	76.5	116.9	22.9	40.1	75%
Onions	6.4	.	14.5	13.3	10.7	17.4	7.8	7.3	9.1	0.2	.	.	.
Spring onions	51.9	42.0	58.9	61.8	39.4	28.8	11.8	16.4	16.7	42.4	6.0	17.6	193%
All leeks and onions	**97.6**	**105.5**	**141.5**	**164.9**	**159.4**	**150.4**	**129.6**	**114.8**	**102.3**	**159.5**	**28.9**	**57.7**	**99%**

Table 19 (cont): Comparison of the area of vegetable crops grown (ha) in Northern Ireland and the proportional differences between 1991-2023.

	Survey year												
Crop type	1991 (ha)	1995 (ha)	1999 (ha)	2004 (ha)	2007 (ha)	2011 (ha)	2013 (ha)	2015 (ha)	2017 (ha)	2019 (ha)	2021 (ha)	2023 (ha)	% change in area 2021/2023
Carrots and parsnips													
Carrots	269.9	261.0	360.8	347.8	436.3	353.1	335.4	312.9	335.3	283.5	423.6	254.3	-40%
Parsnips	80.9	73.8	109.8	99.6	185.9	166.4	184.1	164.1	121.4	172.1	186.8	114.3	-39%
All carrots and parsnips	**350.8**	**334.9**	**470.6**	**447.4**	**622.2**	**519.5**	**519.5**	**477.0**	**456.7**	**455.6**	**610.4**	**368.6**	**-40%**
Celery, lettuce and parsley													
Celery	24.5	27.1	45.5	32.2	57.8	44.1	57.6	43.9	26.1	26.4	16.4	16.5	1%
Lettuce	26.6	38.4	27.0	42.8	24.3	59.4	54.7	39.5	38.8	.	2.8	.	.
Parsley	20.1	31.4	40.0	41.9	47.8	33.3	23.8	29.6	12.7	36.8	2.6	2.6	1%
All celery, lettuce and parsely	**71.2**	**96.9**	**112.5**	**116.9**	**129.9**	**136.8**	**136.1**	**113.0**	**77.6**	**63.2**	**21.8**	**19.1**	**-12%**
Other vegetables													
Cucurbits	0.1	1.5	1.8	.	1.8	.	.	4.0	0.6	20.2	15.1	137.8	813%
Beetroot	3.6	3.1	6.9	3.8	6.7	8.2	12.9	12.3	9.5	16.1	3.9	5.4	37%
Rhubarb	13.7	6.8	6.1	10.8	4.9	.	5.5	4.1	10.8	9.1	1.6	12.4	673%
Celeriac	.	.	.	.	.	0.0	0.1	0.5	.	.	.	.	.
All other vegetables	**17.5**	**11.3**	**14.8**	**14.6**	**13.4**	**8.2**	**18.5**	**20.9**	**20.9**	**45.5**	**20.6**	**155.5**	**655%**
Total vegetable crops	**1,315.9**	**1,323.2**	**1,528.3**	**1,614.9**	**1,899.9**	**1,566.7**	**1,396.5**	**1,203.3**	**1,178.3**	**1,091.8**	**1,048.2**	**1,178.7**	**12%**

Northern Ireland Pesticide Usage Survey Published Reports Appendix 1

Report No.	Report title	ISBN
99	Grassland & Fodder Crops 1989	1-85527-079-X
105	Arable Crops 1990	1-85527-130-3
106	Soft Fruit Crops 1990	1-85527-149-4
109	Vegetable Crops 1991	1-85527-137-0
110	Protected Crops 1991 (edible & ornamental)	1-85527-283-0
111	Mushroom Crops 1991	1-85527-150-8
117	Arable Crops 1992	1-85527-193-1
118	Top Fruit Crops 1992	1-85527-194-X
124	Grassland & Fodder crops 1993	1-85527-221-0
131	Forestry 1993	1-85527-282-2
132	Arable Crops 1994	1-85527-314-4
139	Vegetable Crops 1995	1-85527-346-2
140	Mushroom Crops 1995	1-85527-347-0
146	Arable Crops 1996	1-85527-469-8
147	Top fruit 1996	1-85527-470-1
156	Grassland & Fodder Crops 1997	1-85527-506-6
157	Sheep Treatments 1997	1-85527-425-6
167	Soft Fruit 1998	1-85527-540-6
168	Arable Crops 1998	1-85527-536-8
169	Vegetable Crops 1999	1-85527-561-9
170	Mushroom Crops 1999	1-85527-549-X
177	Arable Crops 2000	1-85527-670-4
178	Top Fruit Crops 2002	1-85527-618-6
194	Arable Crops 2002	1-85527-674-7
198	Grassland & Fodder Crops 2003	1-85527-797-2
199	Hardy Nursery Stock Crops 2003	1-85527-789-1
201	Protected Ornamental Crops 2003	1-85527-739-5
206	Arable Crops 2004	1-85527-833-2
207	Vegetable crops 2004	1-85527-869-3
208	Grassland & Fodder Crops 2005	1-85527-998-8
209	Sheep Treatments 2005	1-85527-999-5
216	Arable Crops 2006	1-84807-035-6
217	Top Fruit Crops 2006	1-84807-019-6

Report No.	Report title	ISBN
218	Soft Fruit Crops 2006	1-84807-036-3
222	Vegetable Crops 2007	1-84807-062-2
223	Mushroom Crops 2007	1 84807-061-5
230	Arable Crops 2008	1 84807-135-3
231	Top Fruit Crops 2008	1-84807-134-6
238	Grassland & Fodder Crops 2009	1-84807-186-5
239	Hardy Nursery Stock Crops 2009	1-84807-187-2
240	Soft Fruit Crops 2010	1-84807-251-0
241	Top Fruit Crops 2010	1-84807-250-3
242	Arable Crops 2010	1-84807-252-7
245	Mushroom crops 2011	1-84807-308-1
246	Vegetable Crops 2011	1-84807-309-8
247	Arable Crops 2012	1-84807-404-3
248	Soft Fruit Crops 2012	1-84807-402-6
249	Top Fruit Crops 2012	1-84807-403-3
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	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

Report No.	Report title	ISBN
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
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
319	Edible Protected Crops 2023	1-908471-01-7

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