



PESTICIDE USAGE IN NORTHERN IRELAND  
SURVEY REPORT 308

**NORTHERN IRELAND  
GRASSLAND AND FODDER CROPS  
2021**



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# PESTICIDE USAGE SURVEY REPORT 308

## GRASSLAND AND FODDER CROPS IN NORTHERN IRELAND 2021

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The County Regions of Northern Ireland

## SUMMARY

This is the ninth survey examining pesticide usage practices on grassland and fodder crops in Northern Ireland, providing comparative data to that obtained in the previous surveys in 1989 (Jess *et al.*, 1992), 1993 (Jess *et al.*, 1995), 1997 (Jess *et al.*, 2000), 2003 (Withers *et al.*, 2005), 2005 (Withers *et al.*, 2007), 2009 (Withers *et al.*, 2010), 2013 (Withers *et al.*, 2014) and 2017 (Lavery *et al.*, 2018). Information on all aspects of pesticide usage was collected from 200 enclosed grassland, 55 arable silage, 23 fodder maize and 4 other fodder crop holdings throughout the province, representing 2.3% of the total area of grassland and fodder crops grown. Quantitative data have been adjusted to provide estimates of total pesticide usage. The total area of grassland and fodder crops grown in Northern Ireland in 2021 was an estimated 1,348,412 hectares.

Overall, the area of grassland and fodder crops grown in 2021 increased by 14% when compared to 2017. The area of established grassland crops increased by 12% during this period and there was a 31% increase in the area of sown crops which included arable silage, arable silage (undersown) and all grass reseed areas up to five years old. The area of fodder crops grown in Northern Ireland in 2021 increased by 52% compared to that recorded in 2017, primarily due to an increase in fodder maize and fodder kale production during this period. Overall, grass silage production increased by 47% between 2017 and 2021. A period of prolonged favourable weather, extending beyond the normal growing season into Autumn, allowed for an additional fifth and sixth cut of grass silage which was recorded for the first time in 2021.

The area of grassland and fodder crops receiving pesticide treatments increased by 6% when compared to that recorded in 2017. A total of 120,962 kilogrammes of pesticide active ingredients was applied to 153,560 spray hectares of grassland and fodder crops during 2021. This represented a 22% increase in the weight of pesticides applied compared to 2017. A total of 107 products comprising 55 active substances were recorded in use during this survey. Herbicides accounted for 89% of the pesticide-treated area, representing 98% of the weight of pesticides applied. Fungicides, insecticides growth regulators and seed treatments collectively accounted for the remainder of the total pesticide usage and were applied to arable silage, arable silage (undersown), grass reseed and fodder crop areas. No molluscicide use was recorded during this survey period.

The area of established grassland crops treated with pesticides increased by 1% when compared to 2017, however, the weight of active substances applied increased by 18% during the same period. The area of sown crops treated with pesticides, primarily arable silage (undersown) and grass reseed, increased by 29% and the weight of active substances applied increased by 54%, consistent with the increased grown area of these crops. The area of fodder maize grown in 2021 increased by 55% when compared with 2017 and, whilst the pesticide-treated area of these crops decreased by 8%, the weight applied increased by 18%. The area of other fodder crops grown increased by 102%, specifically fodder kale, from 406 ha in 2017 to 1,149 ha in 2021. Seed treatments were the only active substances recorded as used on other fodder crops, with the non-systemic fungicide fludioxonil and the synthetic pyrethroid tefluthrin being the only two applied.

In keeping with data from previous years, herbicides remain the most extensively used pesticide type on grassland and fodder crops. During this survey period, the area treated with herbicides and the weight applied has increased by 4% and 23%, respectively, when compared with 2017.

The five most commonly applied herbicides, either in formulation or as individual active substances, ranked by treated area (spha), were fluroxypyr, triclopyr, MCPA (2-methyl-4-chlorophenoxyacetic acid), mecoprop-P (methylchlorophenoxypropionic acid) and aminopyralid. The five most commonly applied herbicides, ranked by weight (kg), were MCPA, triclopyr, glyphosate, fluroxypyr and mecoprop-P.

An estimated 50% (29,384 spha) of grass silage 1<sup>st</sup> cut and 45% (16,527 spha) of enclosed grazing received herbicide treatments for control of docks (*Rumex* spp.). The broad-spectrum systemic herbicide glyphosate was applied extensively to grass reseed areas for 'ground preparation'. MCPA, a selective phenoxy herbicide, was used to control a range of broadleaved weeds in established grassland crops including docks (*Rumex* spp.) and rushes (*Juncus* spp.) in both enclosed and rough grazing areas.

The main herbicide used on 65% of hay and haylage was aminopyralid + triclopyr, however, there is no approval for use on these crops due to residue issues in manure (and then onto allotments and gardens). This was confined to one farm holding only.

## 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.
- ‘Rounding’: due to rounding of figures, there may be slight differences in totals both within and between tables.
- ‘Spray applications’ refers to the number of treatments of any pesticide type applied to the treated areas.
- ‘General weed control’ refers to post emergence weed control when specific weed definitions are not available.
- ‘Ground preparation’ refers to treatments applied before or during seed bed preparation.
- ‘Sealer’ refers to the application of herbicides to the crop, usually during sowing, to kill weed seedlings as they emerge.
- ‘Enclosed grazing’ is defined as land which has been improved by management practices such as liming, top dressing and fencing etc., where there is not a significant presence of sensitive plant species, and which could be cultivated for other purposes.
- ‘Grass silage’. Prior to 1997, the survey areas of grass silage from multiple cuts were reported as a single crop. However, in all subsequent reports, survey areas and pesticide treatments on individual cuts of silage were recorded separately. The ‘Grass silage 1<sup>st</sup> cut’ area is the basic area from which all additional cuts are taken.
- ‘Grass reseed’ is defined as land which includes all new leys, undersown grass (as part of a nurse crop) and all reseeds less than 5 years old.
- ‘Rough grazing’ is defined as land containing semi-natural vegetation including heathland, heather moorland, bog and rough grassland suitable only for use as grazing and which could not be cultivated for other purposes.



- 'Arable silage' is defined as arable crops, particularly cereals, which has been ensiled whole and has not been combined for grain.
- 'Arable silage (undersown)' is defined as an arable crop grown as a nurse crop for a green cover crop, such as ryegrass, and which has been ensiled rather than combined for grain.
- Other fodder crops comprised fodder beet and fodder kale and have been grouped together for statistical purposes.

## 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 shown in [Appendix 1](#).

## CROPS

Information was collected for enclosed grazing, grass silage, hay and haylage, rough grazing, sown crops, fodder maize and other fodder crops. Data for pesticide usage on these crops were collected from 1,118 crops surveyed on 200 enclosed grassland, 55 arable silage, 23 fodder maize and 4 other fodder crop holdings.

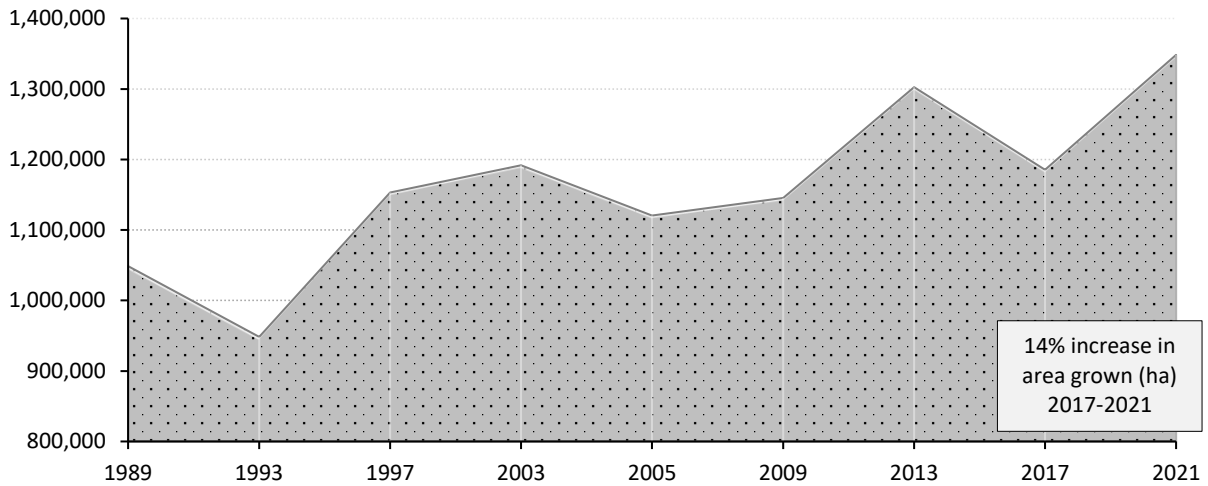
## METHODS

The sample of holdings to be surveyed was selected from each of the six counties, based on the total area of established grassland grown. To ensure adequate coverage of different fodder crops and to accurately assess total usage for fodder crops, separate samples were also selected from the Northern Ireland Agricultural Census, June 2020 (Anon., 2021) for farms growing arable silage, fodder maize and other fodder crops.

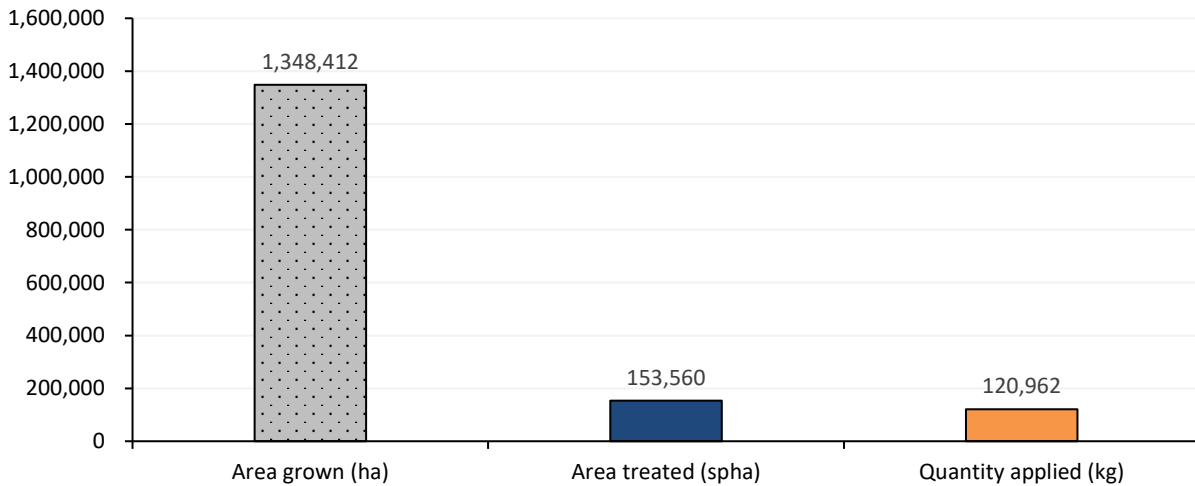
In each region the sample holdings were stratified into six size groups according to the total area of enclosed grassland. Holdings were selected at random from within each size group with the number of holdings selected proportional to the total area of enclosed grassland in the size group. Samples of holdings for arable silage, fodder maize and other fodder crops were selected from defined populations of fodder crop growers using separate area size groups, with the number of holdings selected being proportional to the total area of fodder crops.

The purpose of the survey was explained to the selected holdings by letter in preliminary correspondence. The holdings were then contacted by telephone and information relating to the survey was collected between November 2021 and March 2022. No on-farm surveys were conducted during this period due to the on-going Covid-19 pandemic restrictions. The data collected included the area of crops grown, area treated, pesticides used and the number of treatments applied. The growers' given reasons for pesticide use, including inappropriate usage, were also recorded. Holdings selected in the original sample that were unable to provide data were replaced with those from the same region and size group held on a reserve list. During analysis, the sample data were raised to the total population level using raising factors calculated from the ratio of the number of farms sampled to the number of farms in the population within each region and size group. A further adjustment factor corrected the data in accordance with the areas of grassland and fodder crops published in the Northern Ireland Agricultural Census, June 2020 (Anon., 2021). The total number of farms in each size group and the number of farms sampled are shown in [Tables 1a - d](#). The collected data were entered using a structured query language (SQL) relational database programme. Validated data were downloaded for analysis using IBM SPSS Statistics Version 25 software.

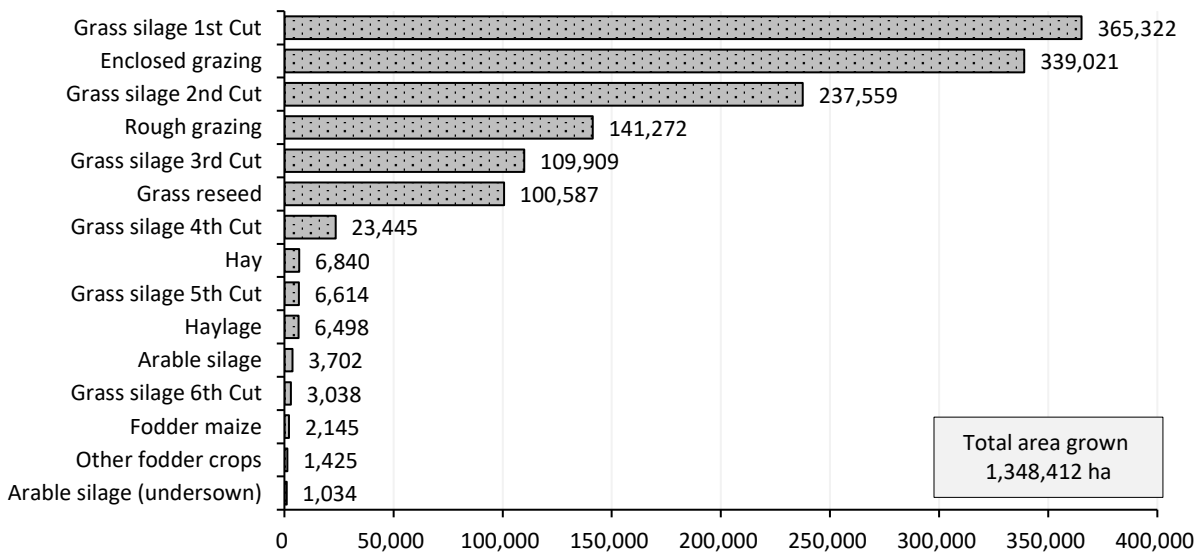
## REGIONAL CROP DISTRIBUTIONS



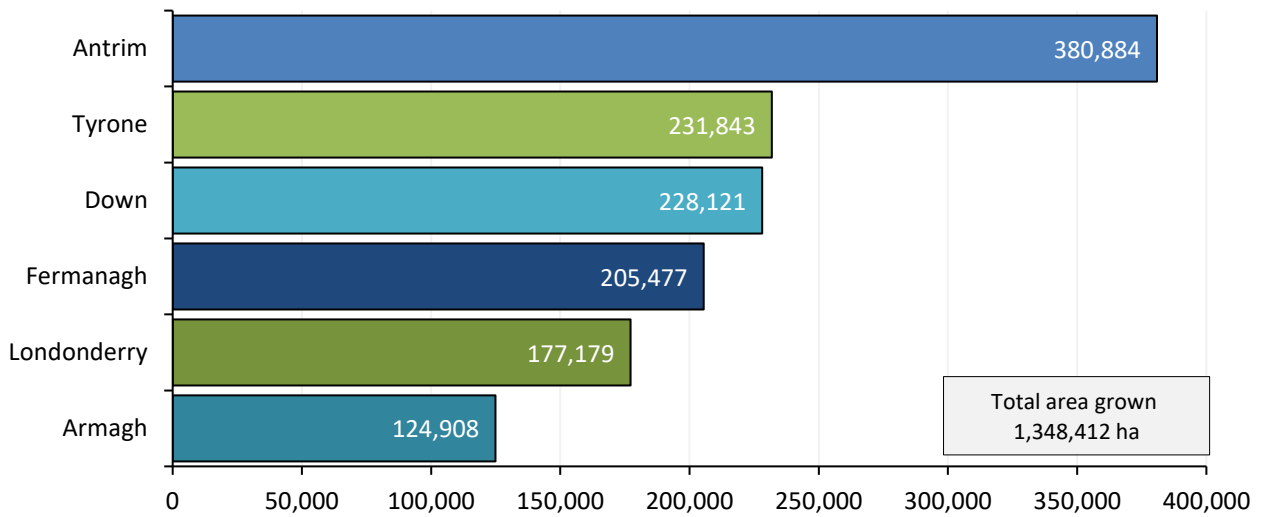
**Figure 1** Comparison of the area of grassland and fodder crops grown (ha) in Northern Ireland, 1989- 2021.



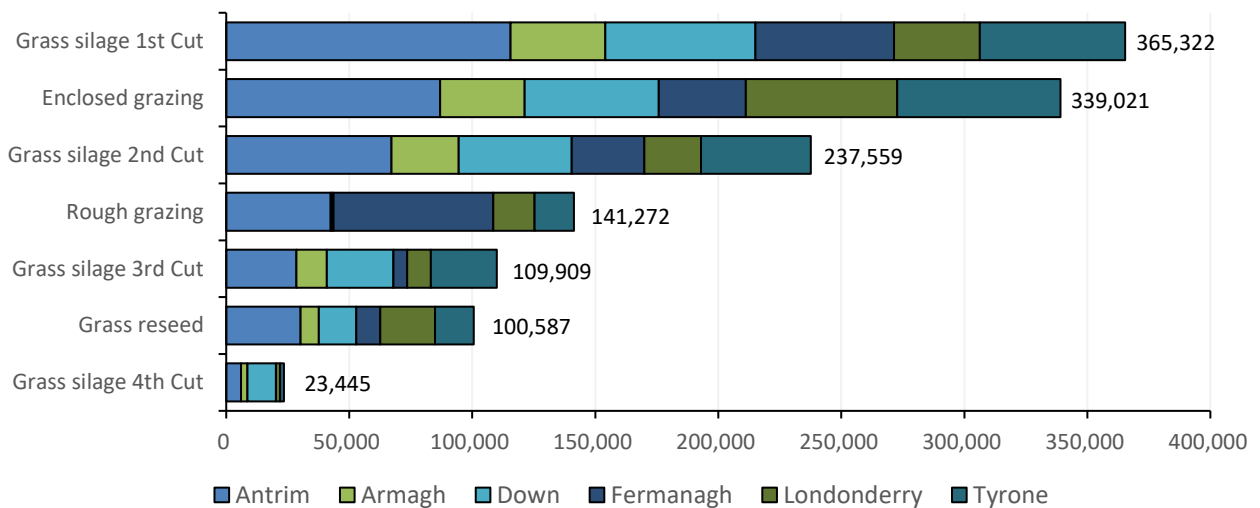
**Figure 2** Area of grassland and fodder crops grown (ha), area treated (spha) and quantity of pesticides applied (kg) in Northern Ireland, 2021.



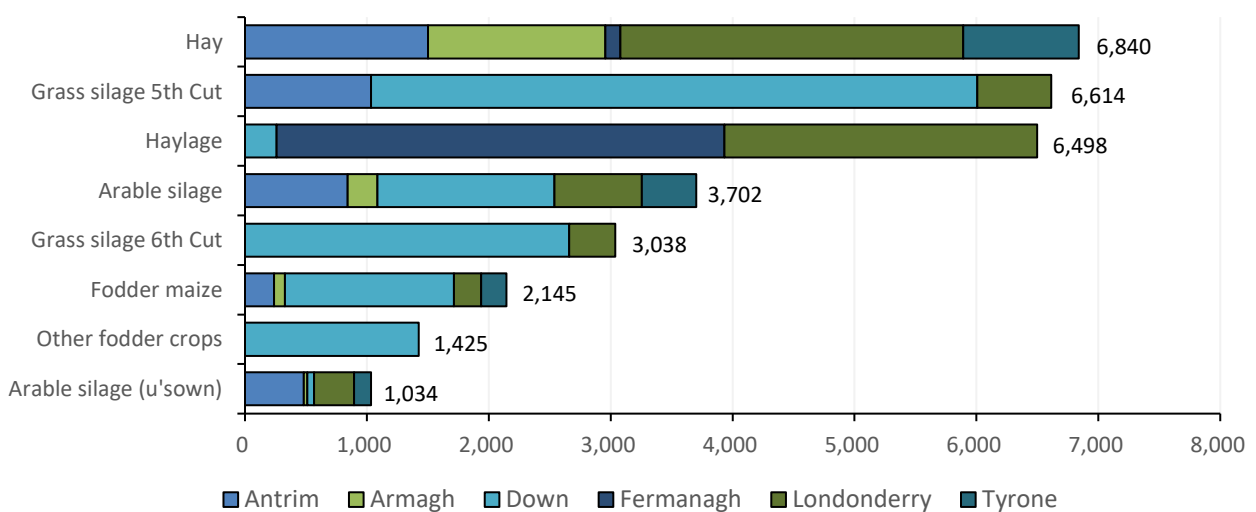
**Figure 3** Distribution of individual grassland and fodder crops grown in Northern Ireland (ha), 2021.



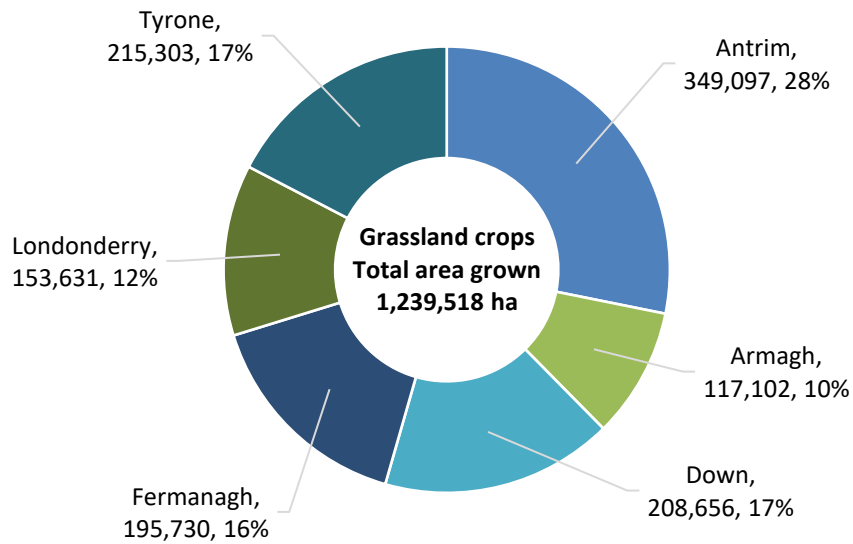
**Figure 4** Regional distribution of grassland and fodder crops grown in Northern Ireland (ha), 2021.



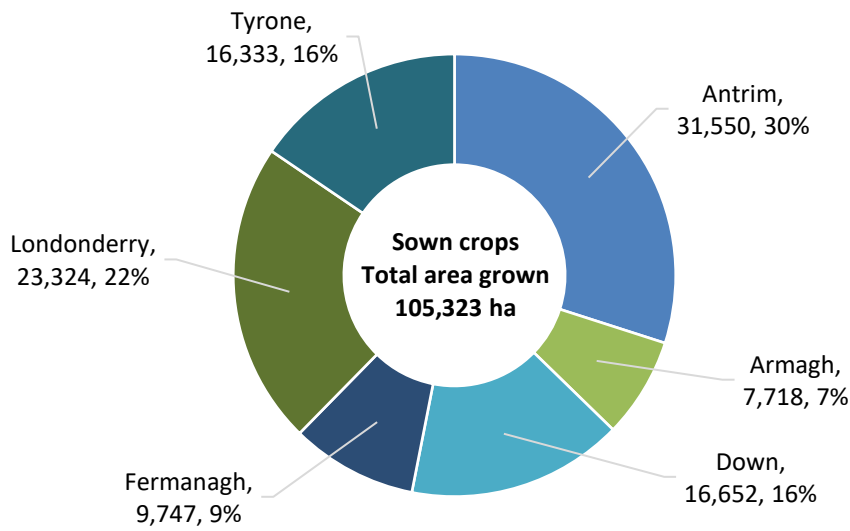
**Figure 5** Regional distribution of individual grassland and fodder crops grown in Northern Ireland (ha), 2021.



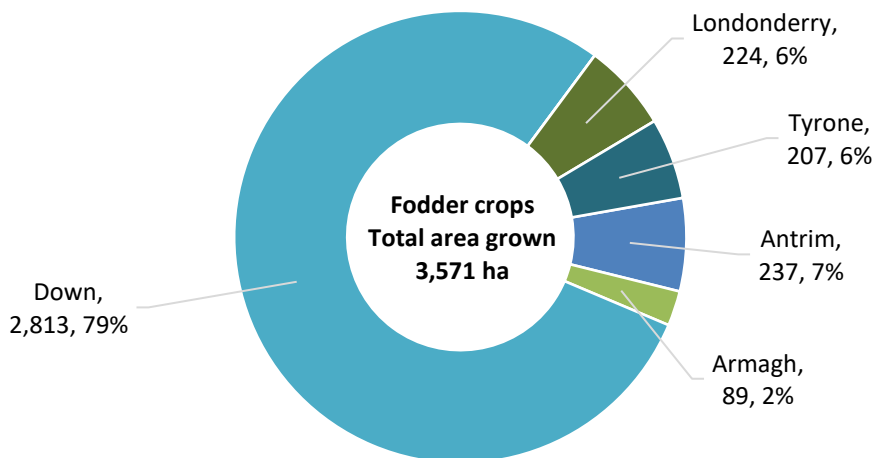
**Figure 5 (contd)** Regional distribution of individual grassland and fodder crops grown in Northern Ireland (ha), 2021.



**Figure 6** Regional distribution of area (ha) of established grassland crops grown in Northern Ireland, 2021.

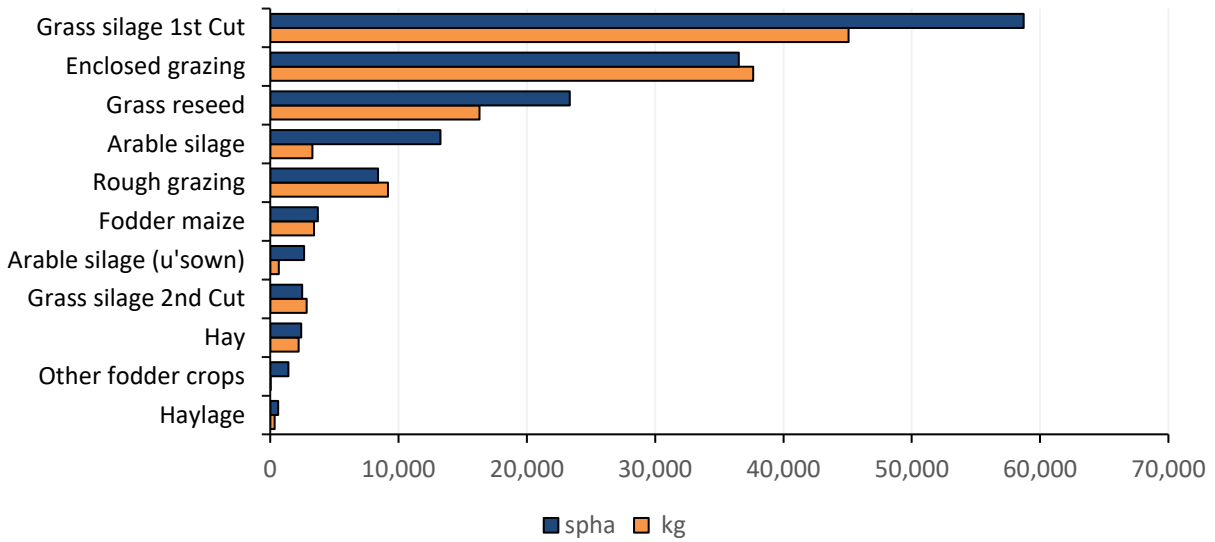


**Figure 7** Regional distribution of area (ha) of sown crops grown in Northern Ireland, 2021.

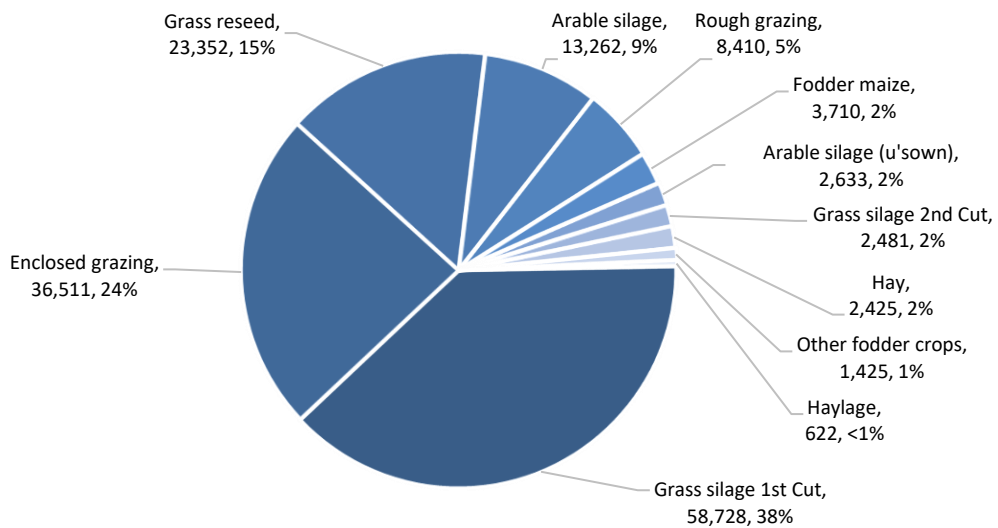


**Figure 8** Regional distribution of area (ha) of fodder crops grown in Northern Ireland, 2021.

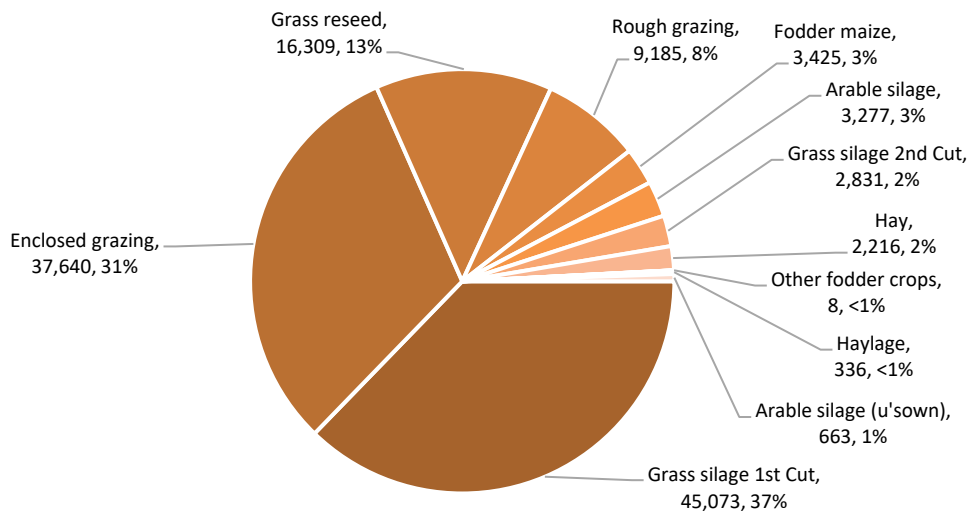
## PESTICIDE USAGE



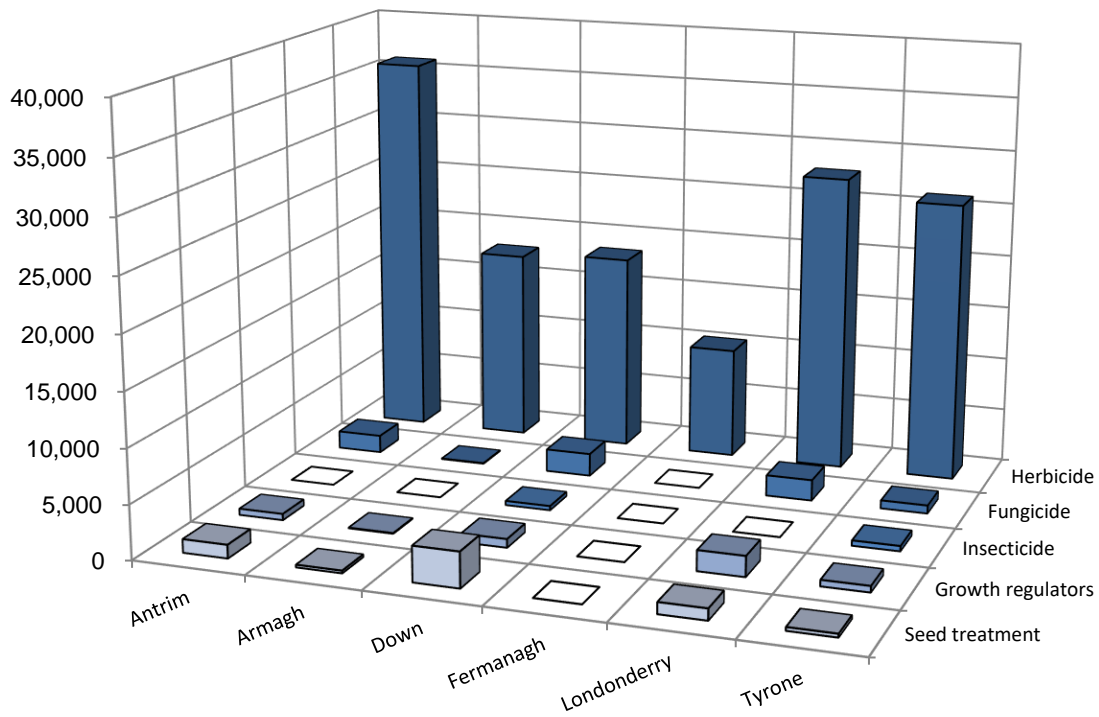
**Figure 9** Total treated-area (spha) and weight of pesticides applied (kg) to grassland & fodder crops in Northern Ireland, 2021.



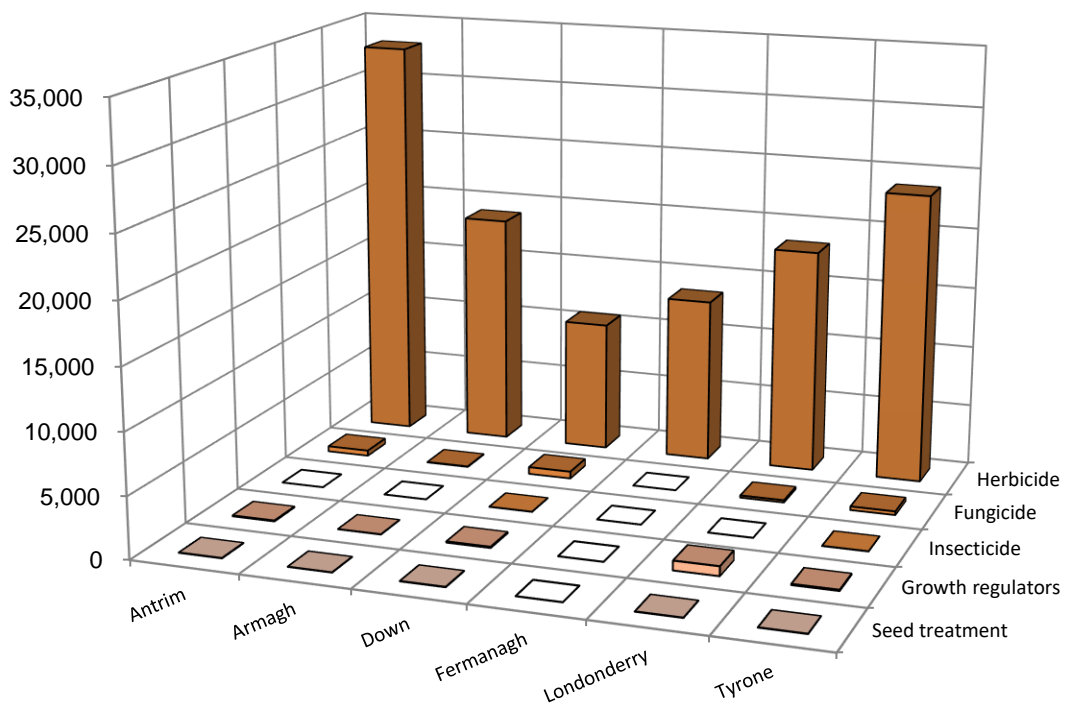
**Figure 10** Total treated-area (spha) of each crop type in Northern Ireland, 2021.



**Figure 11** Weight of pesticide applied (kg) to each crop type in Northern Ireland, 2021.

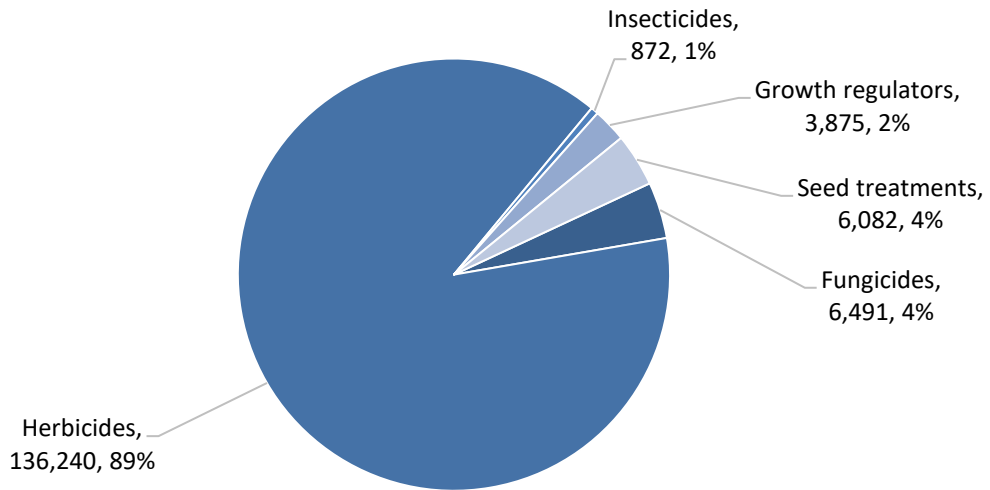


**Figure 12** Area (spha) of grassland and fodder crops treated regionally with each pesticide type in Northern Ireland, 2021.

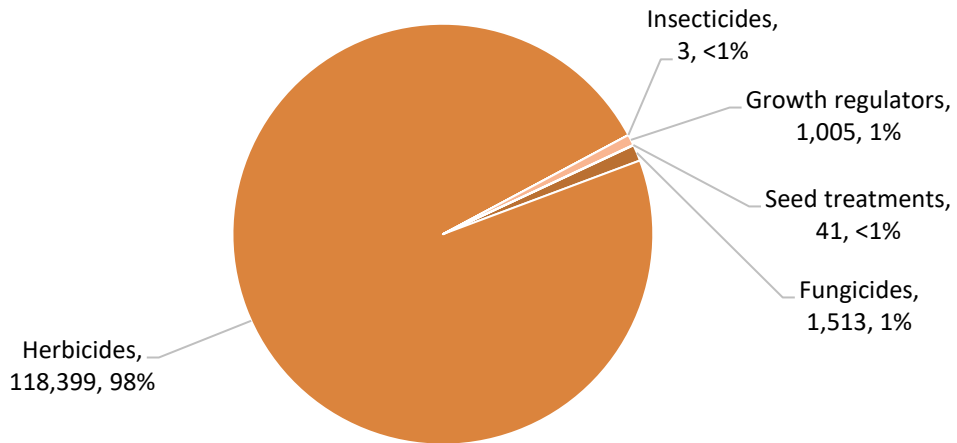


**Figure 13** Weight (kg) of each pesticide type applied regionally to grassland and fodder crops in Northern Ireland, 2021.





**Figure 14** Total area (spha) of grassland and fodder crops treated with each pesticide type in Northern Ireland, 2021.



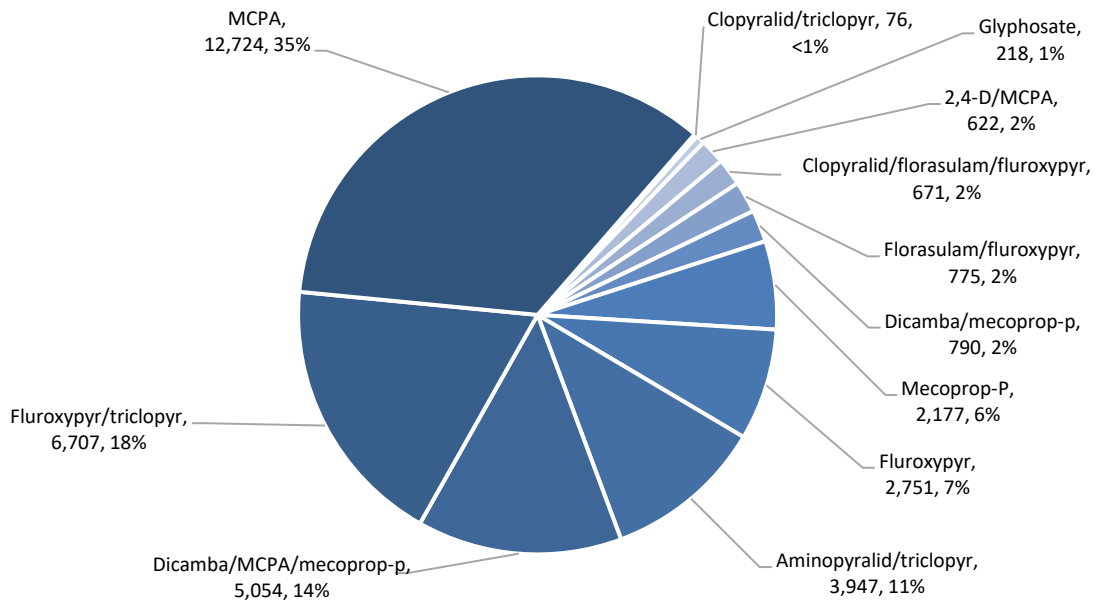
**Figure 15** Total quantities (kg) of each pesticide type applied to grassland and fodder crops in Northern Ireland, 2021.

# PESTICIDE USAGE ON ESTABLISHED GRASSLAND CROPS

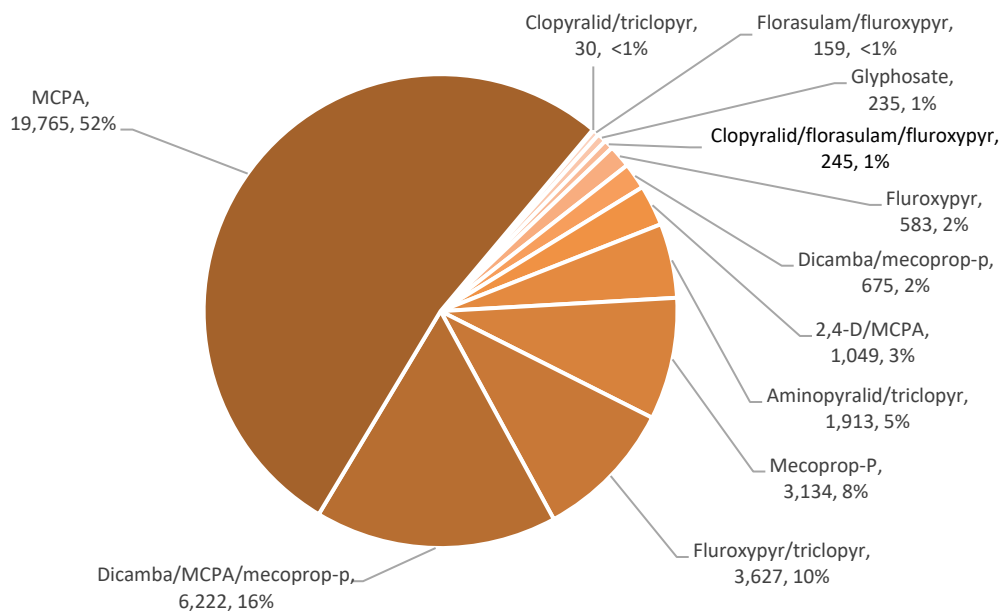
## Enclosed grazing

Tables 3-9 & 14

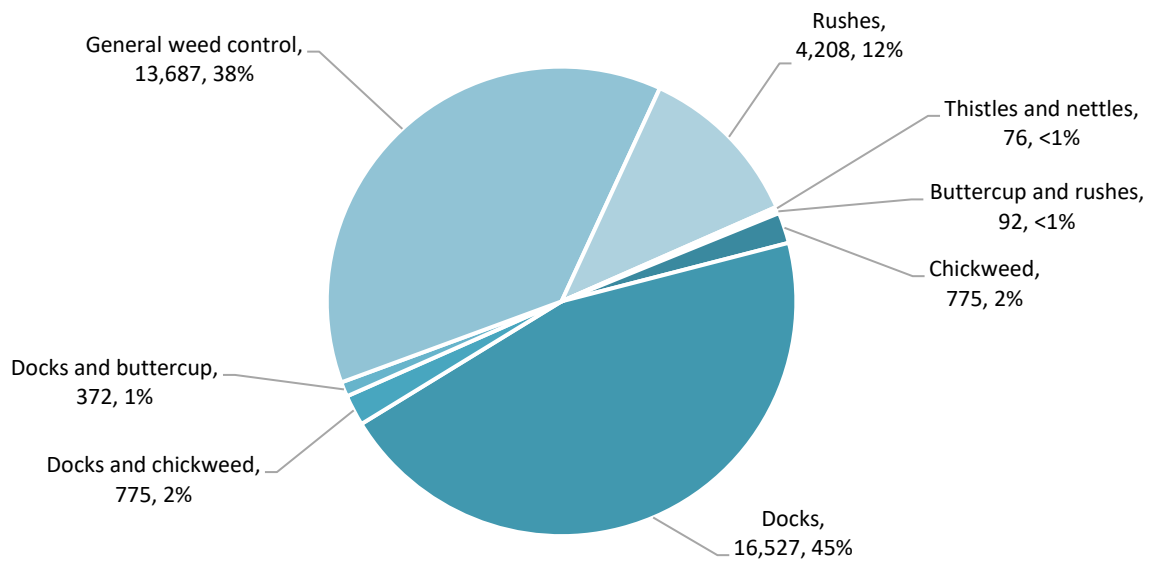
- 339,021 hectares of enclosed grassland grown in Northern Ireland.
- 36,511 treated hectares (spha).
- 37,640 kilogrammes applied.
- 10.2% of the total enclosed grazing area received treatments.
- Only herbicides were applied to enclosed grazing areas.



**Figure 16** Enclosed grazing: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 17** Enclosed grazing: weight (kg) of herbicide active substances applied, 2021.

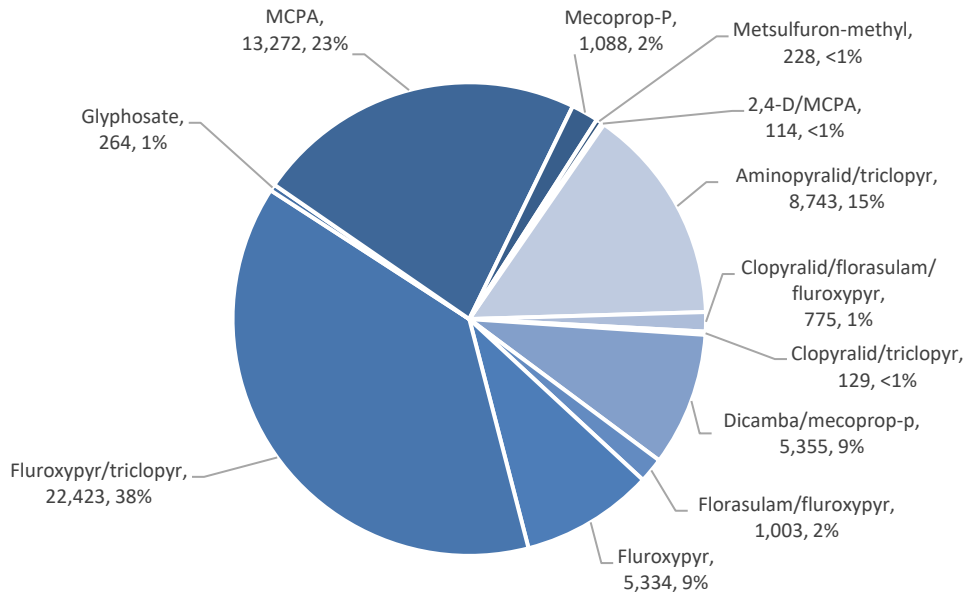


**Figure 18** Enclosed grazing: reasons for herbicide use (spha), 2021.

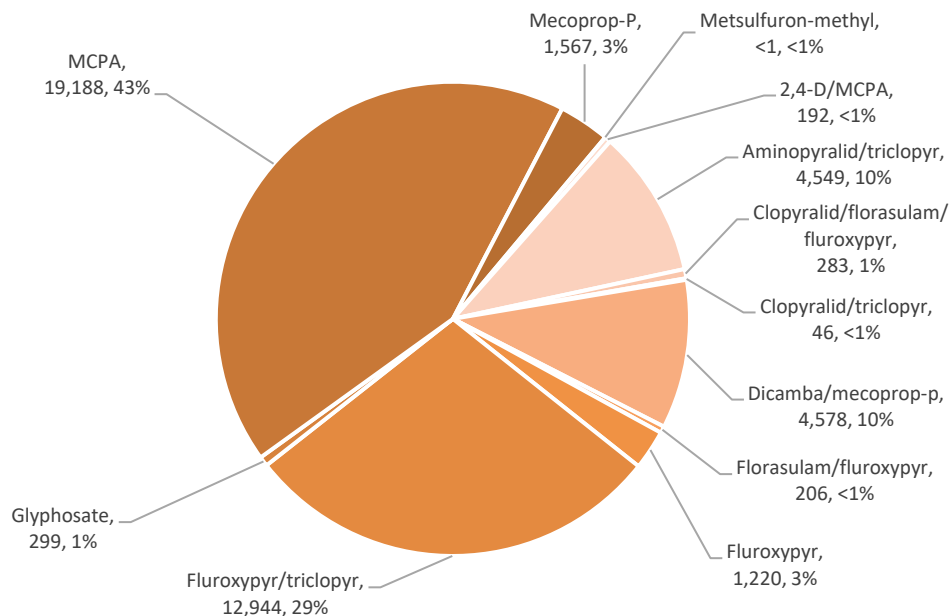
## Grass silage 1<sup>st</sup> cut

Tables 2-9 & 17

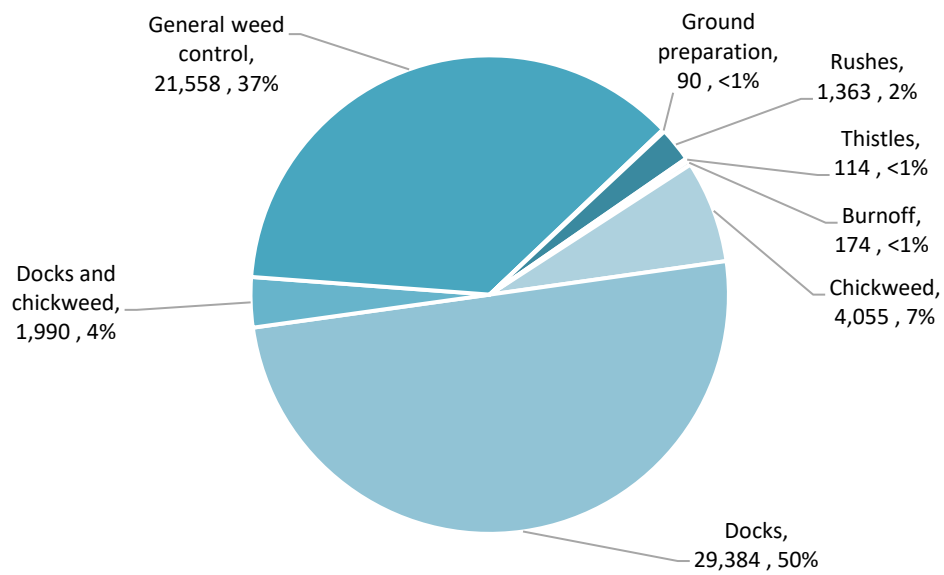
- 365,322 hectares of grass silage 1<sup>st</sup> cut grown in Northern Ireland.
- 58,728 treated hectares (spha).
- 45,073 kg of active substances applied.
- 15.3% of the grass silage 1<sup>st</sup> cut crop area received treatments.
- Only herbicides were applied to grass silage 1<sup>st</sup> cut crops.



**Figure 19** Grass silage 1<sup>st</sup> cut: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 20** Grass silage 1<sup>st</sup> cut: weight (kg) of herbicide active substances applied, 2021.

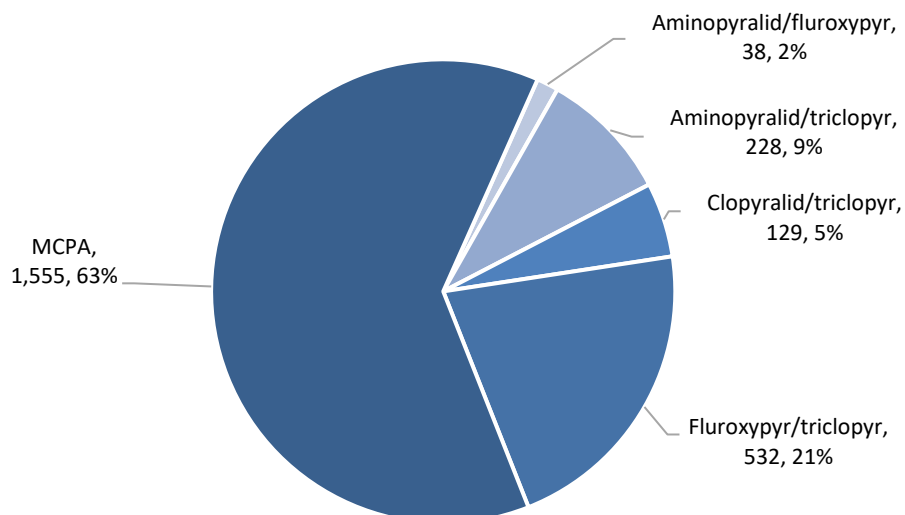


**Figure 21** Grass silage 1<sup>st</sup> cut: reasons for herbicide use (spha), 2021.

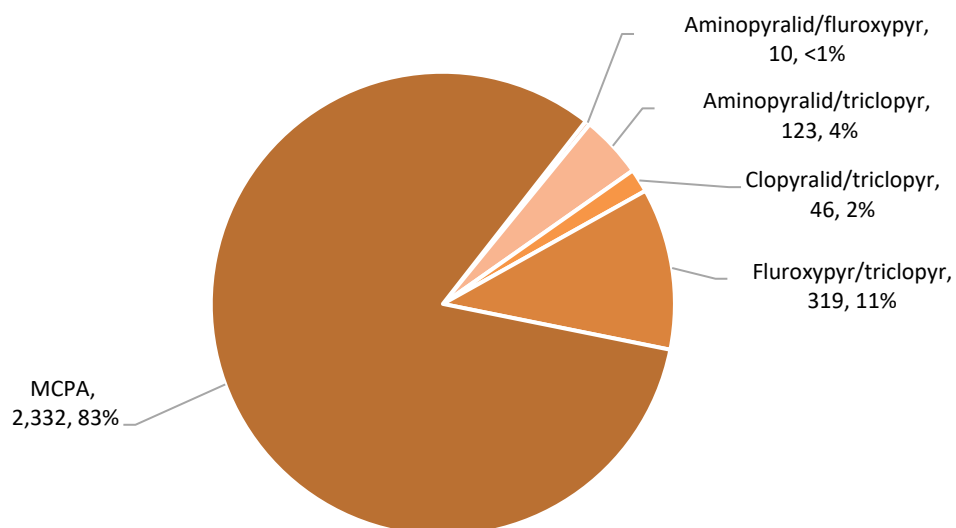
## Grass silage 2<sup>nd</sup> cut

Tables 2-9 & 18

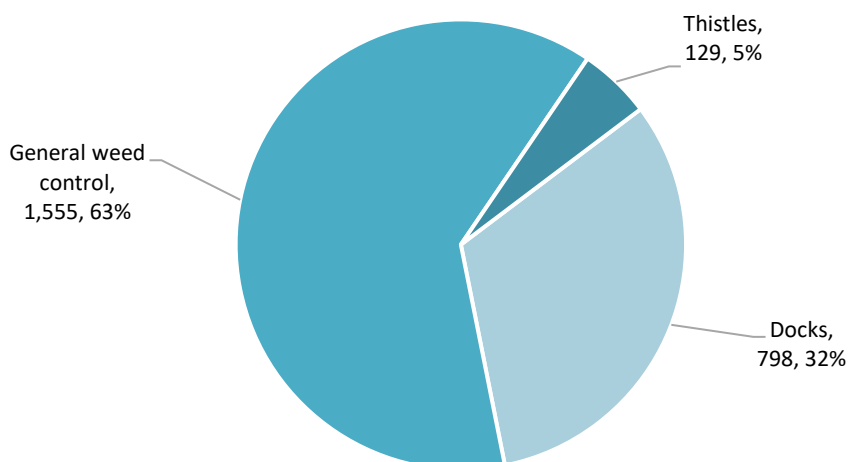
- 237,599 hectares of grass silage 2<sup>nd</sup> cut grown in Northern Ireland.
- 2,481 treated hectares (spha).
- 2,831 kg of active substances applied.
- 1% of the grass silage 2<sup>nd</sup> cut crop area received treatments.
- Only herbicides were applied to grass silage 2<sup>nd</sup> cut crops.



**Figure 22** Grass silage 2<sup>nd</sup> cut: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 23** Grass silage 2<sup>nd</sup> cut: weight (kg) of herbicide active substances applied, 2021.



**Figure 24** Grass silage 2<sup>nd</sup> cut: reasons for herbicide use (spha), 2021.

### Grass silage 3<sup>rd</sup> cut

Tables 2 & 3

- 109,909 hectares of grass silage 3<sup>rd</sup> cut grown in Northern Ireland.
- No treatments were applied to these crops.

### Grass silage 4<sup>th</sup> cut

Tables 2 & 3

- 23,445 hectares of grass silage 4<sup>th</sup> cut grown in Northern Ireland.
- No treatments were applied to these crops.

### Grass silage 5<sup>th</sup> cut

Tables 2 & 3

- 6,614 hectares of grass silage 5<sup>th</sup> cut grown in Northern Ireland.
- No treatments were applied to these crops.

### Grass silage 6<sup>th</sup> cut

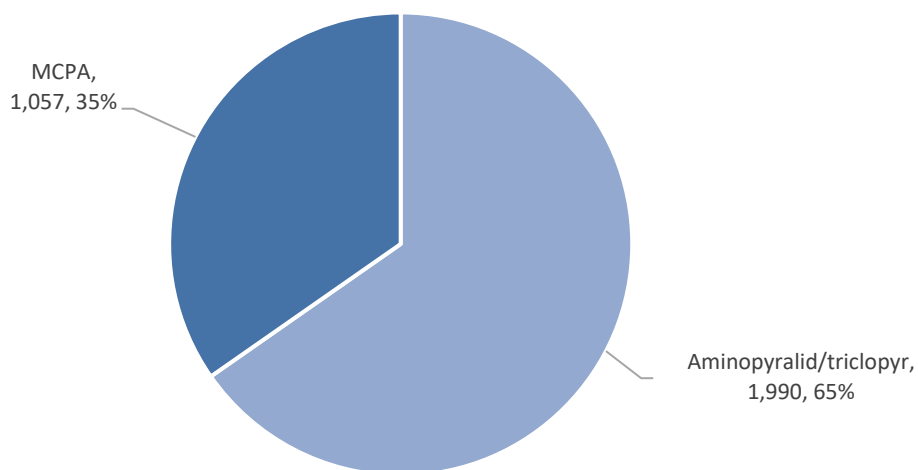
Tables 2 & 3

- 3,038 hectares of grass silage 6<sup>th</sup> cut grown in Northern Ireland.
- No treatments were applied to these crops.

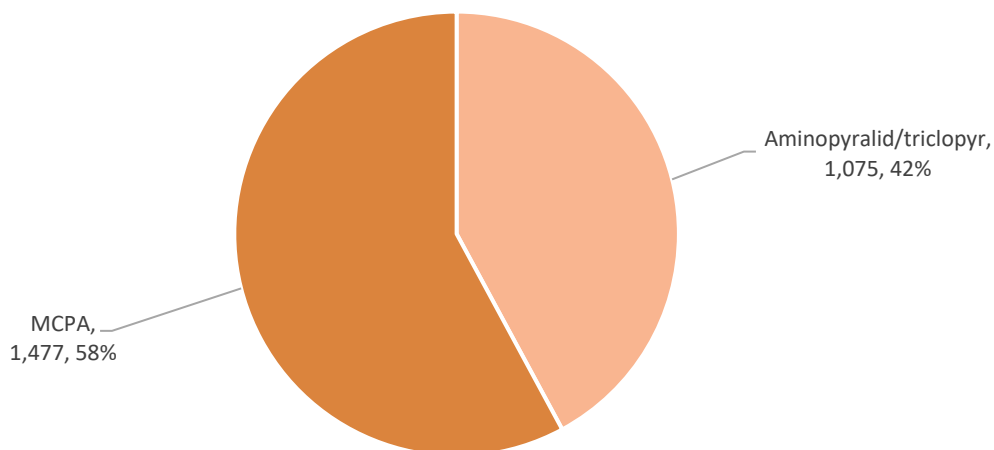
## Hay and haylage

Tables 3- 9 & 19

- 13,338 hectares of hay and haylage grown in Northern Ireland.
- 3,047 treated hectares (spha).
- 2,552 kg of active substances applied.
- 35.5% of the hay area received treatments.
- 9.6% of the haylage area received treatments.
- Only herbicides were applied to hay and haylage crops.

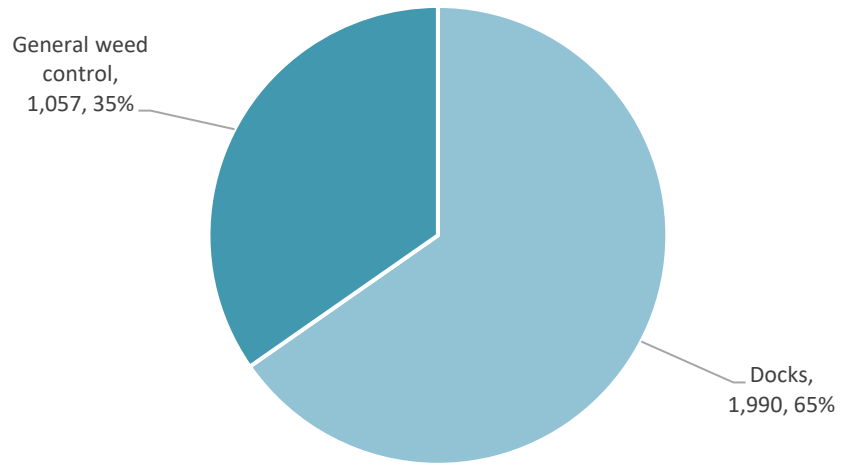


**Figure 25** Hay and haylage: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 26** Hay and haylage: weight (kg) of herbicide active substances applied, 2021.



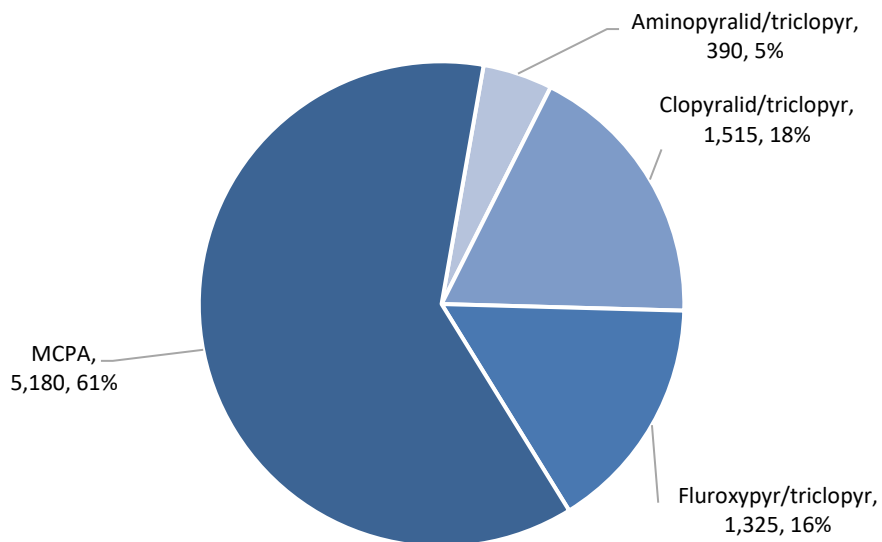


**Figure 27** Hay and haylage: reasons for herbicide use (spha), 2021.

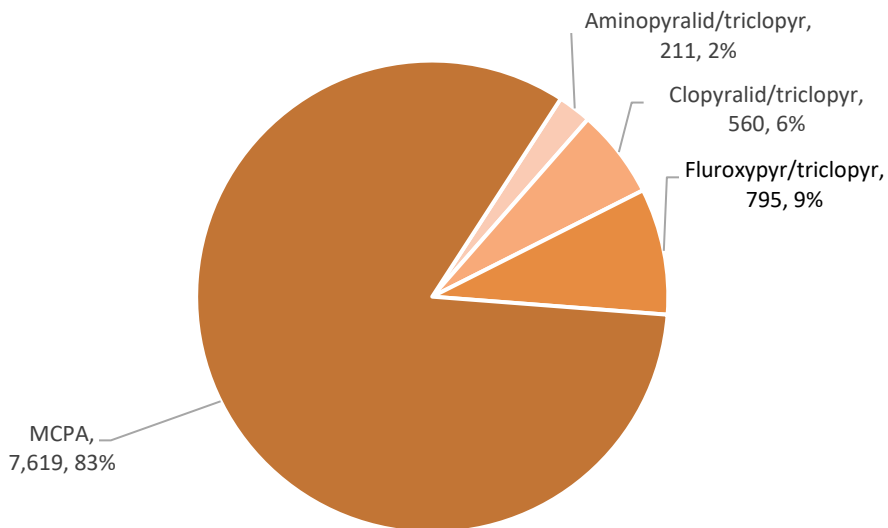
## Rough grazing

Tables 3-9 & 21

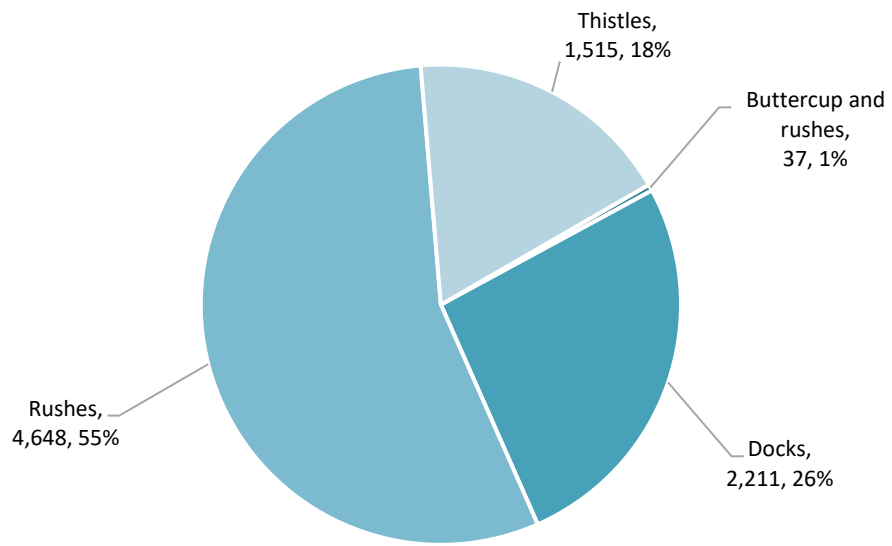
- 141,272 hectares of rough grazing in Northern Ireland.
- 8,410 treated hectares (spha).
- 9,185 kg of active substances applied.
- 5.1% of the rough grazing area received treatments.
- Only herbicides were applied to rough grazing crops.



**Figure 28** Rough grazing: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 29** Rough grazing: weight (kg) of herbicide active substances applied, 2021.



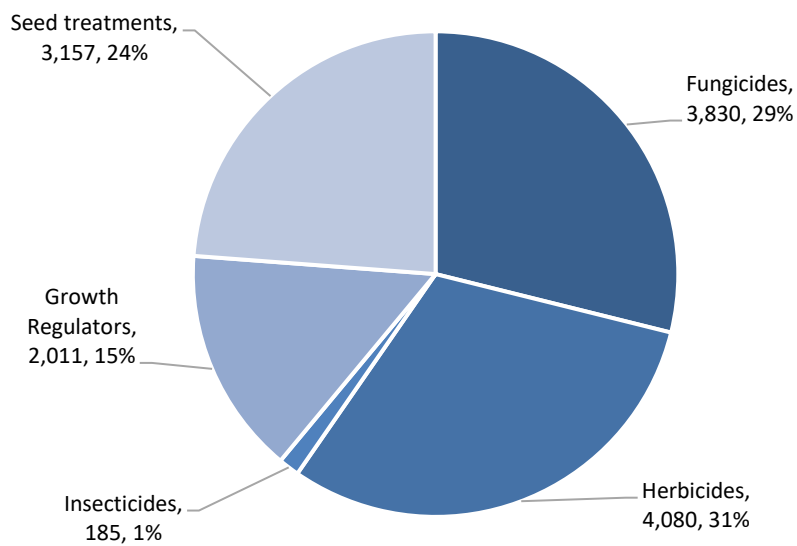
**Figure 30** Rough grazing: reasons for herbicide use (spha), 2021.

## PESTICIDE USAGE ON SOWN CROPS

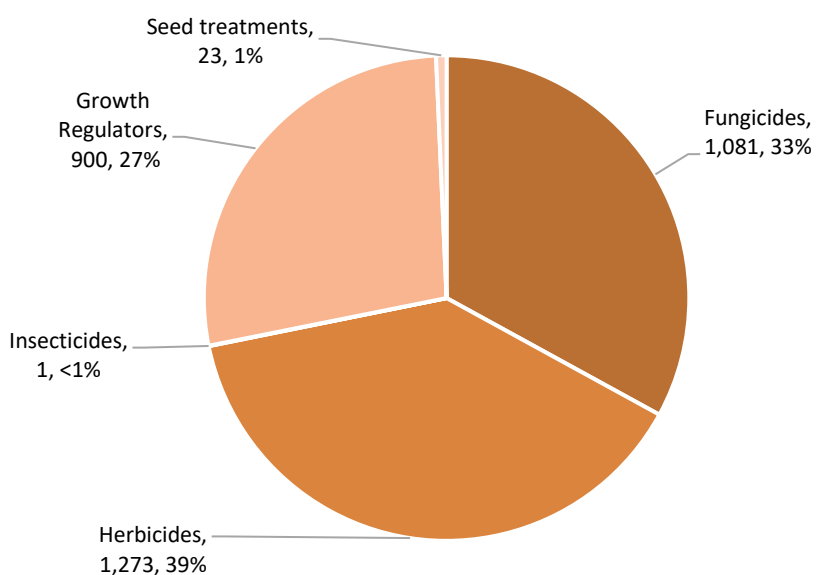
### Arable silage

Tables 3-9 & 12

- 3,702 hectares of arable silage grown in Northern Ireland.
- 13,262 treated hectares (spha).
- 3,277 kg of active substances applied.
- 88.9% of the arable silage area received treatments.
- Fungicides, herbicides, insecticides, growth regulators and seed treatments were applied to arable silage crops.
- On average, arable silage crops received 2 fungicide, 2 herbicide, 1 insecticide, 2 growth regulator and 1 seed treatment application.



**Figure 31** Arable silage: Area (spha) of each pesticide group applied, 2021.

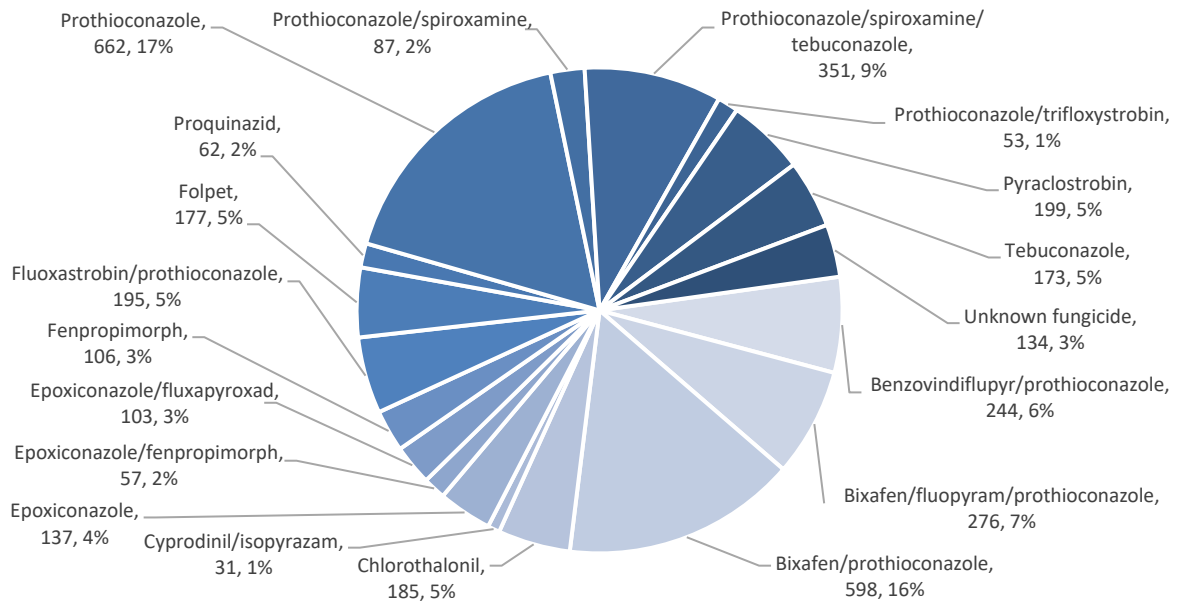


**Figure 32** Arable silage: Weight (kg) of each pesticide group applied, 2021.

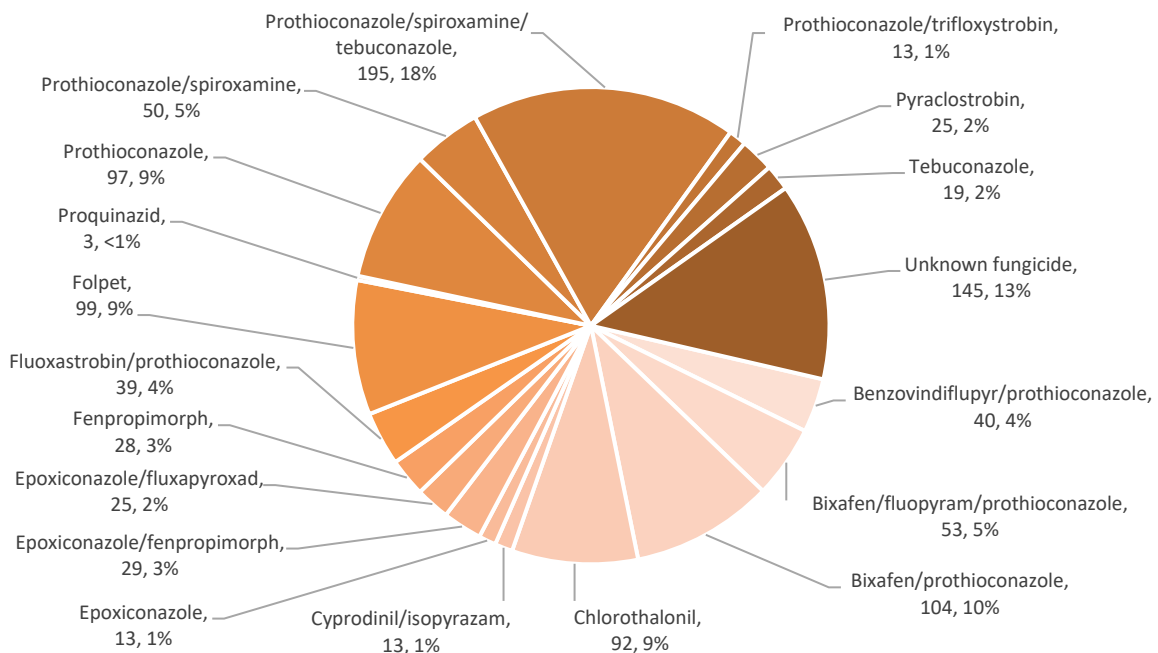
## Arable silage - fungicides

Tables 3-9 & 12

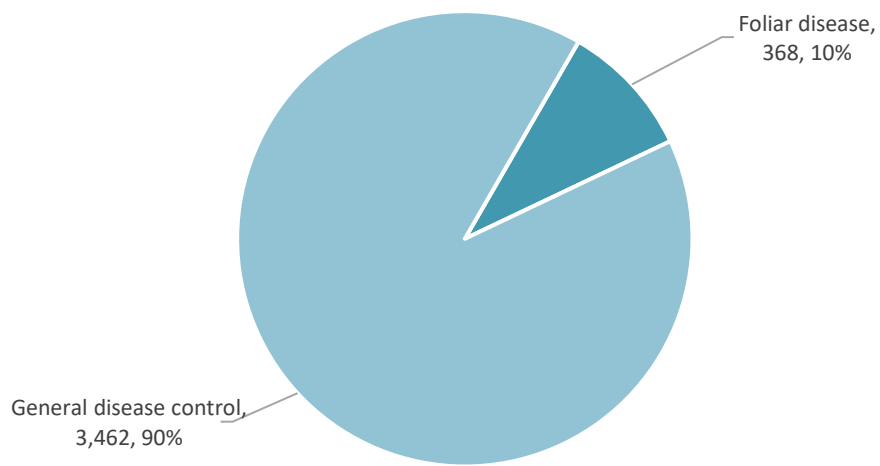
- 3,830 fungicide-treated hectares (spha).
- 1,081 kg of fungicide active substances applied.
- 52.9% of arable silage crops received a fungicide treatment.



**Figure 33** Arable silage: pesticide-treated area (spha) of fungicide active substances, 2021.



**Figure 34** Arable silage: weight (kg) of fungicide active substances applied, 2021.

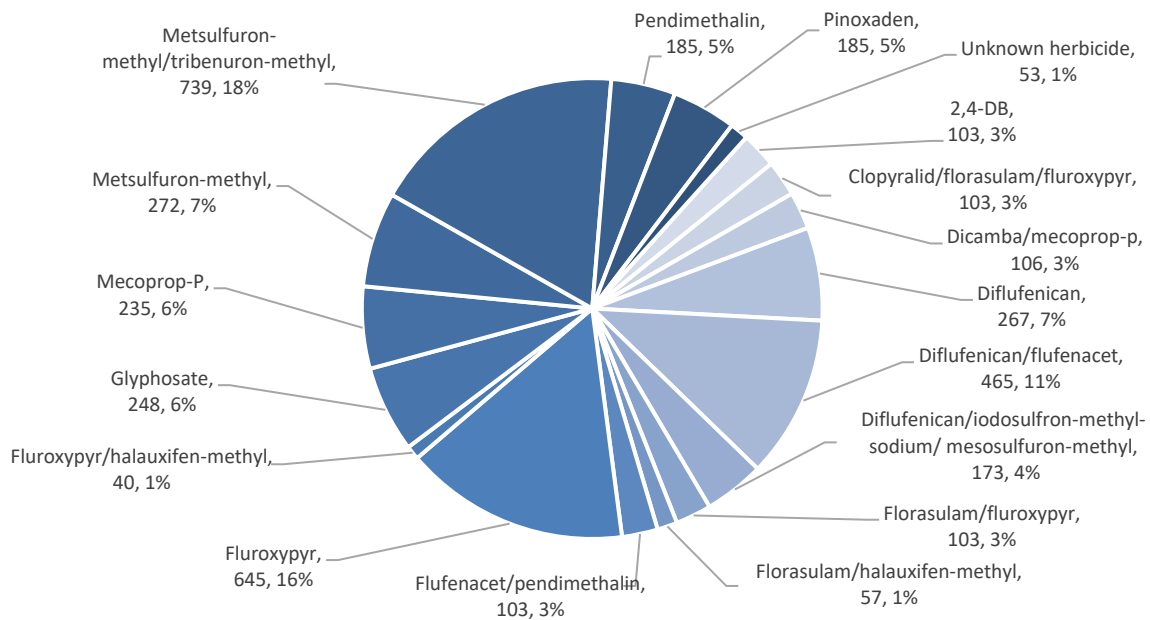


**Figure 35** Arable silage: reasons for fungicide use (spha), 2021.

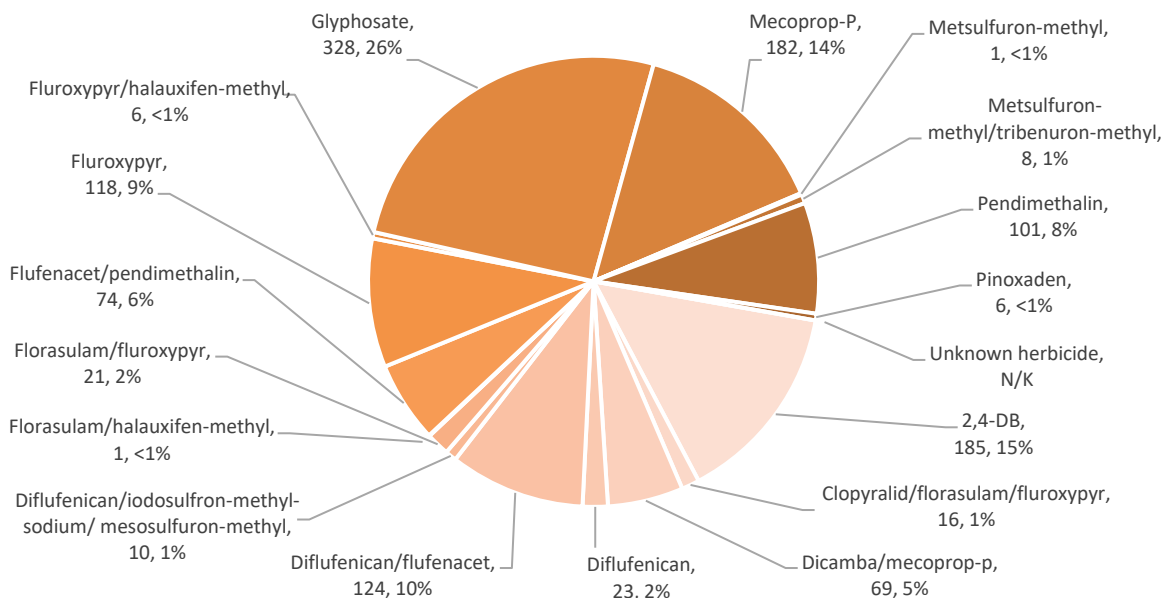
## Arable silage - herbicides

Tables 3-9 & 12

- 4,080 herbicide-treated hectares (spha).
- 3,277 kg of herbicide active substances applied.
- 53.1% of arable silage crops received a herbicide treatment.

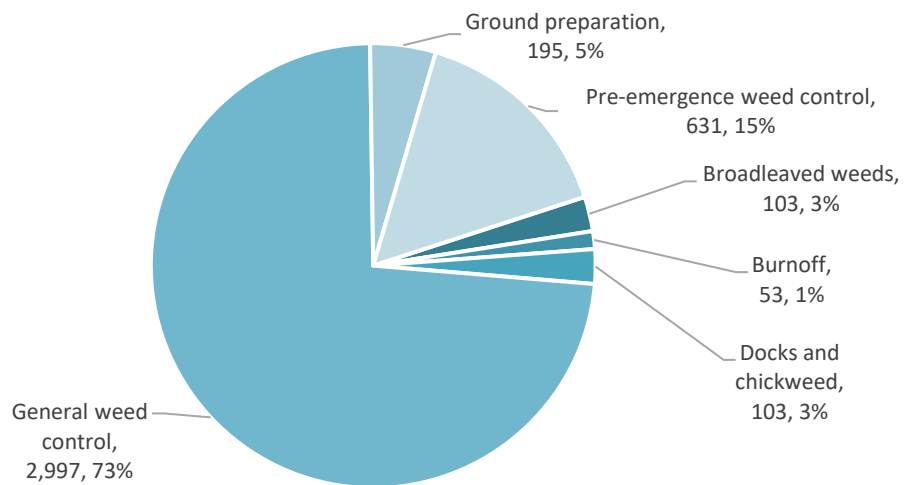


**Figure 36** Arable silage: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 37** Arable silage: weight (kg) of herbicide active substances applied, 2021.

*N/K refers to those treatments where the quantity applied could not be established*



**Figure 38** Arable silage: reasons for herbicide use (spha), 2021.

### Arable silage - insecticides

Tables 3-9 & 12

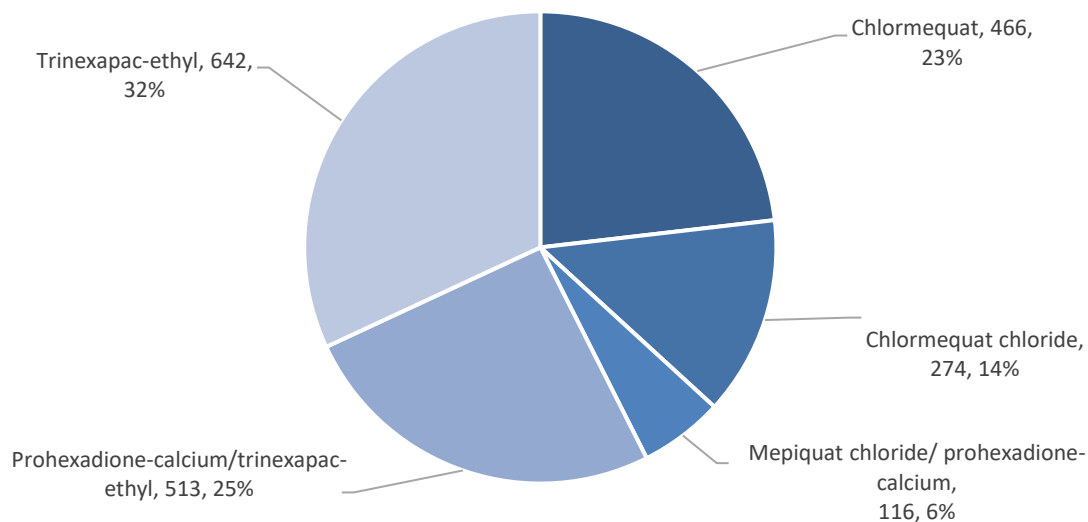
- 185 insecticide-treated hectares (spha).
- 1 kg of insecticide active substances applied.
- 5% of arable silage crops received an insecticide treatment.
- Lambda-cyhalothrin was the only insecticide active substance used on arable silage crops.



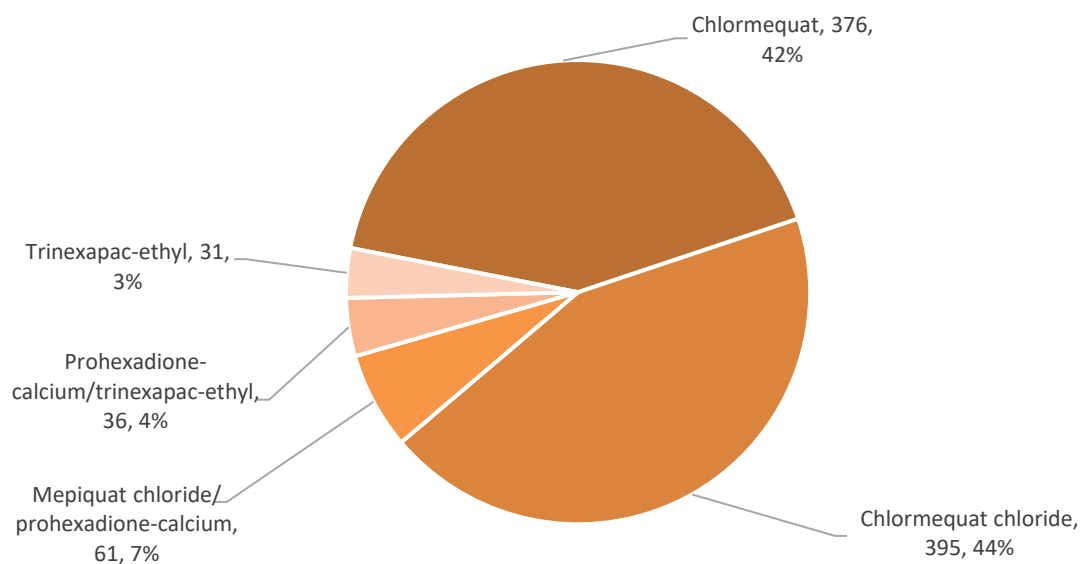
## Arable silage – growth regulators

Tables 3-9 & 12

- 2,011 growth regulator-treated hectares (spha).
- 900 kg of growth regulator active substances applied.
- 35.3% of arable silage crops received a growth regulator treatment.
- The only reason given for use was 'growth regulation'.



**Figure 39** Arable silage: pesticide-treated area (spha) of growth regulator active substances, 2021.

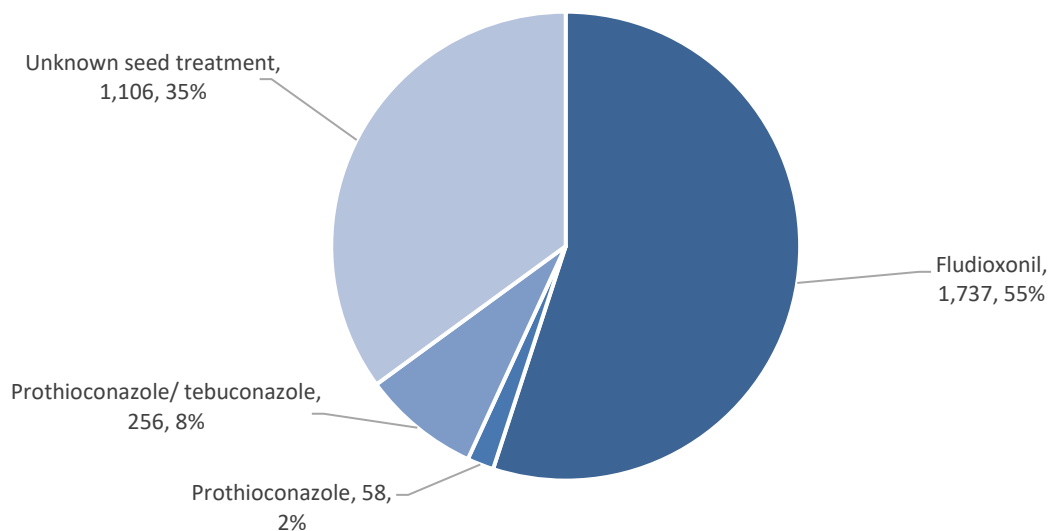


**Figure 40** Arable silage: weight (kg) of growth regulator active substances applied, 2021.

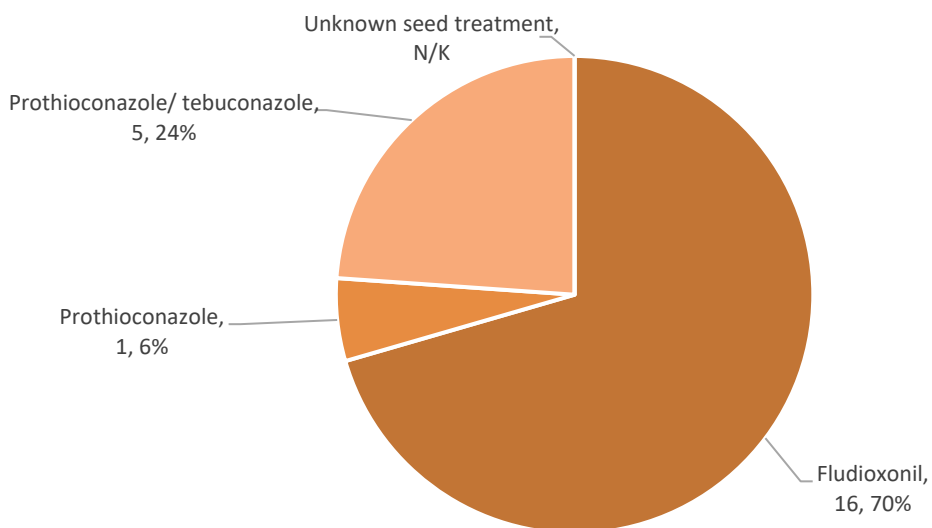
## Arable silage – seed treatments

Tables 3-9 & 12

- 3,157 seed treatment-treated hectares (spha).
- 23 kg of seed treatment active substances applied.
- 85.3% of arable silage crops received a seed treatment.
- The only reason given for use was 'seed treatment'.



**Figure 41** Arable silage: pesticide-treated area (spha) of seed treatment active substances, 2021.



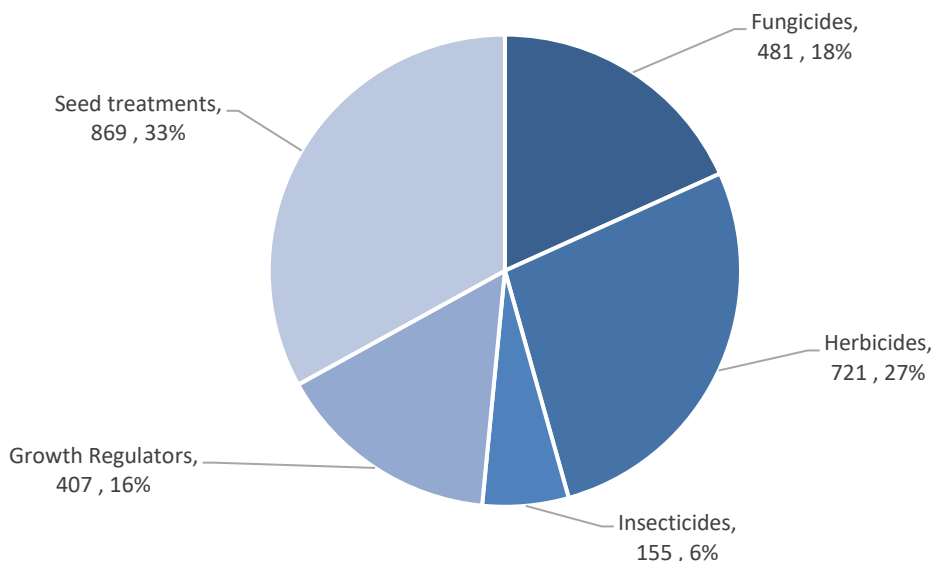
**Figure 42** Arable silage: weight (kg) of seed treatment active substances applied, 2021.

*N/K refers to those treatments where the quantity applied could not be established*

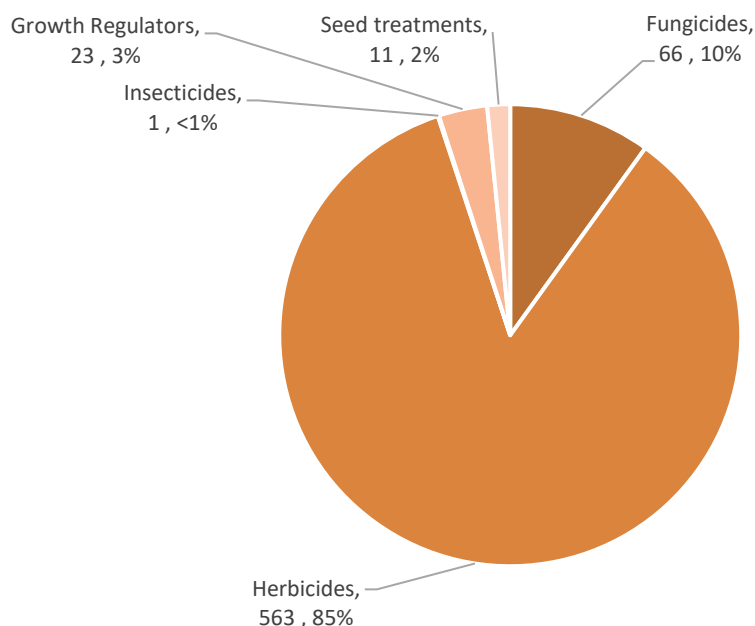
## Arable silage (undersown)

Tables 3-9 & 13

- 1,034 hectares of arable silage (undersown) grown in Northern Ireland.
- 2,633 treated hectares (spha).
- 633 kg of active substances applied.
- Fungicides, herbicides, insecticides, growth regulators and seed treatments were applied to arable silage (undersown) crops.
- 84.1% of the arable silage (undersown) area received treatments.



**Figure 43** Arable silage (undersown): Area (spha) of each pesticide group applied, 2021.

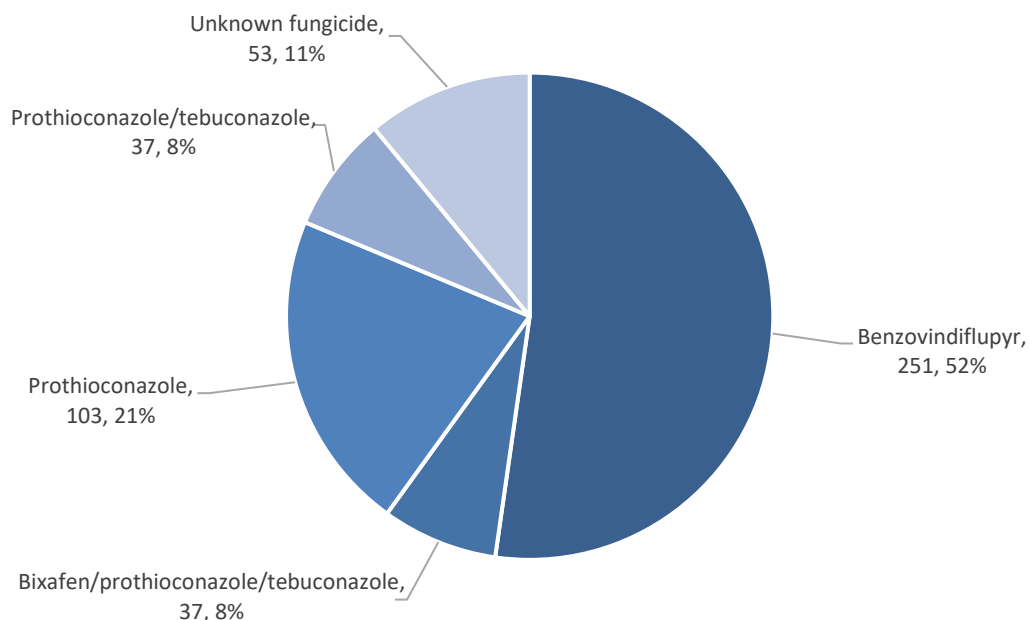


**Figure 44** Arable silage (undersown): Weight (kg) of each pesticide group applied, 2021.

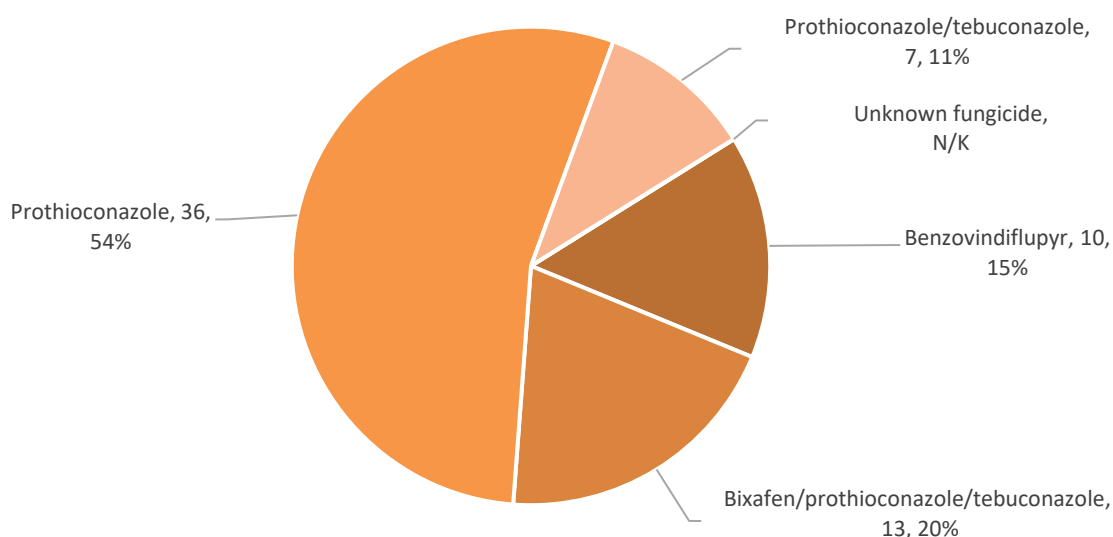
## Arable silage (undersown) - fungicides

Tables 3-9 & 13

- 481 fungicide-treated hectares (spha).
- 66 kg of fungicide active substances applied.
- 42.9% of arable silage (undersown) crops received a fungicide treatment.
- The only reason given for use was 'General disease control'.



**Figure 45** Arable silage (undersown): pesticide-treated area (spha) of fungicide active substances, 2021.



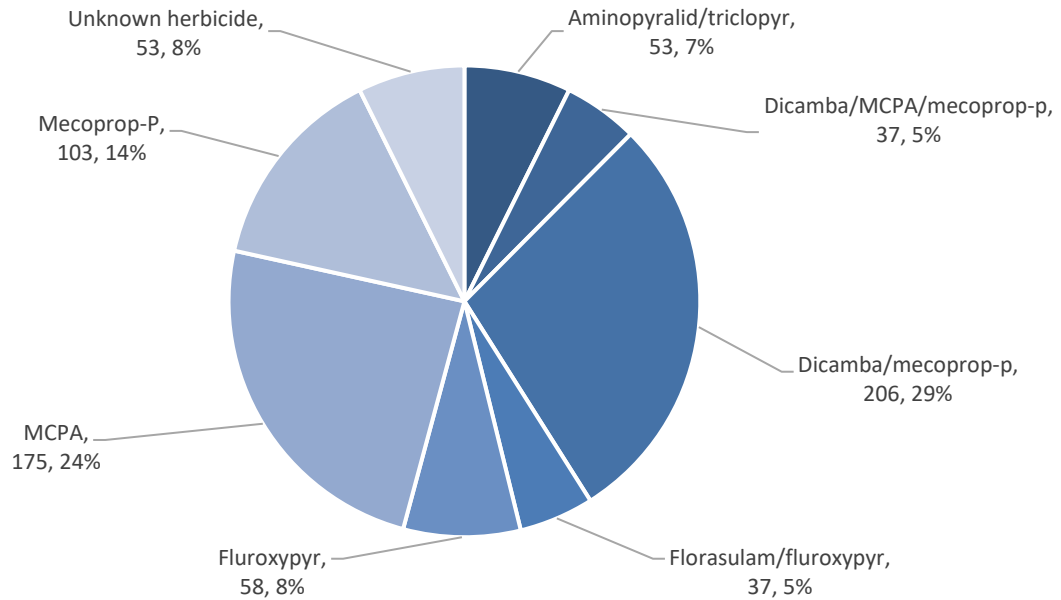
**Figure 46** Arable silage (undersown): weight (kg) of fungicide active substances applied, 2017.

*N/K refers to those treatments where the quantity applied could not be established*

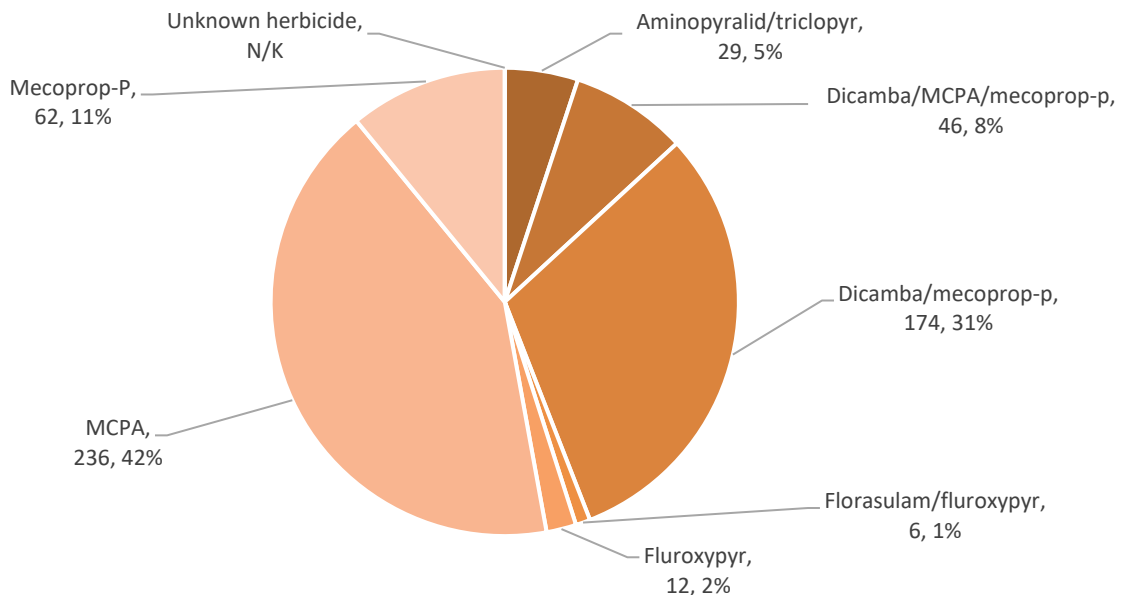
## Arable silage (undersown) - herbicides

Tables 3-9 & 13

- 721 herbicide-treated hectares (spha).
- 563 kg of herbicide active substances applied.
- 67% of arable silage (undersown) crops received a herbicide treatment.

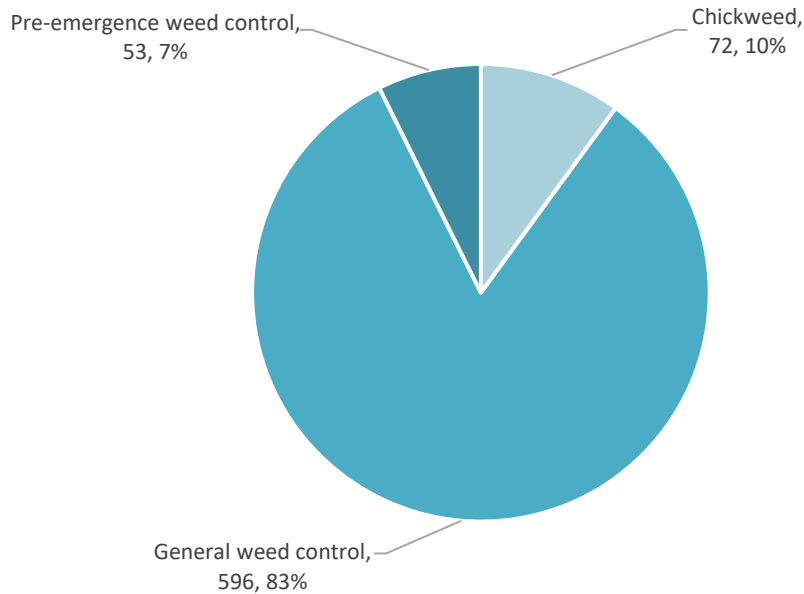


**Figure 47** Arable silage (undersown): pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 48** Arable silage (undersown): weight (kg) of herbicide active substances applied, 2021.

*N/K refers to those treatments where the quantity applied could not be established*



**Figure 49** Arable silage (undersown): reasons for herbicide use (spha), 2021.

### Arable silage (undersown) - insecticides

Tables 3-9 & 13

- 155 insecticide-treated hectares (spha).
- 1 kg of insecticide active substances applied (the quantity of 'Unknown insecticide' could not be determined).
- 15% of arable silage crops (undersown) received an insecticide treatment.
- There were two active substances applied: Lambda-cyhalothrin (103 spha, 1kg), used exclusively for 'Aphids', and 'Unknown insecticide' (53 spha, kg N/K) used exclusively for 'General insect control'.

### Arable silage (undersown) – growth regulators

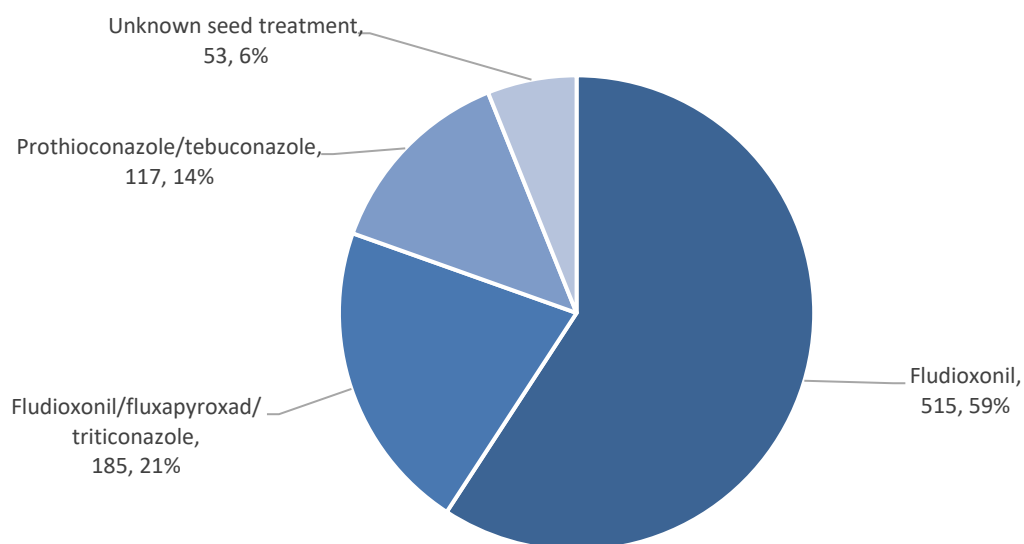
Tables 3-9 & 13

- 407 growth regulator-treated hectares (spha).
- 23 kg of growth regulator active substances applied.
- 39.3% of arable silage crops (undersown) received a growth regulator treatment.
- There were two active substances applied: Trinexapac-ethyl (354 spha, 23kg) and 'Unknown growth regulator' (53 spha, kg N/K).
- The only reason given for use was 'growth regulation'.

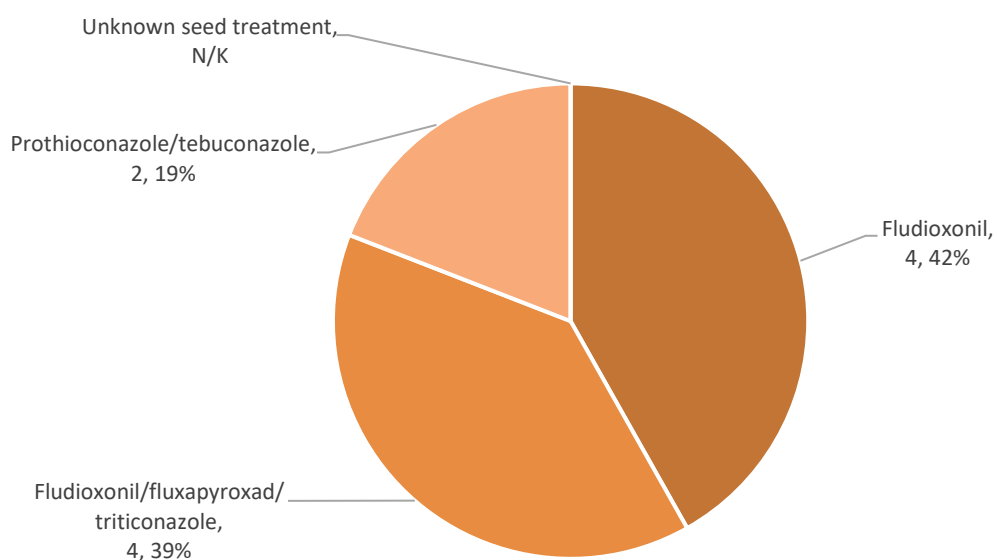
## Arable silage (undersown) – seed treatments

Tables 3-9 & 13

- 869 seed treatment-treated hectares (spha).
- 11 kg of seed treatment active substances applied.
- 84.1% of arable silage crops (undersown) received a seed treatment.
- The only reason given for use was 'seed treatment'.



**Figure 50** Arable silage (undersown): pesticide-treated area (spha) of seed treatment active substances, 2021.



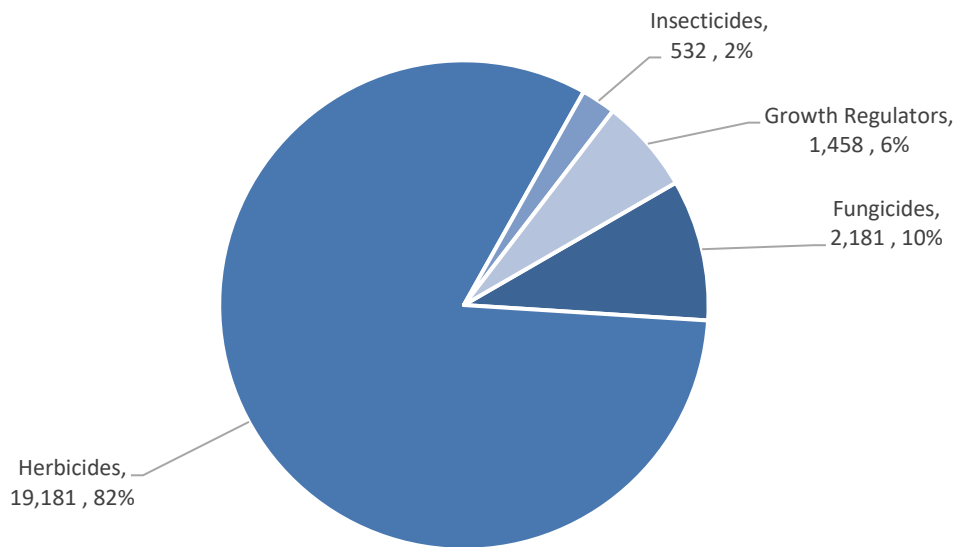
**Figure 51** Arable silage (undersown): weight (kg) of seed treatment active substances applied, 2021.

*N/K refers to those treatments where the quantity applied could not be established*

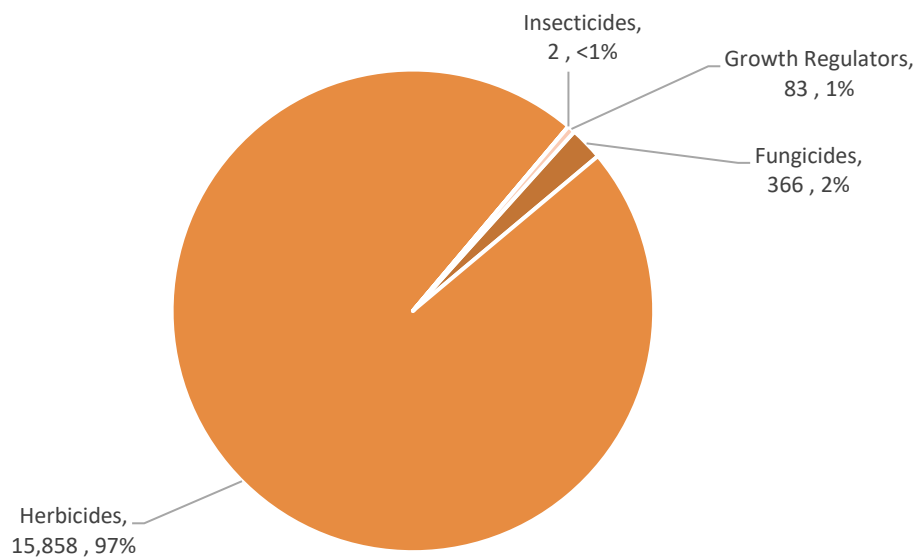
## Grass reseed

Tables 3-9 & 16

- 100,587 hectares of grass reseed were sown in Northern Ireland (includes all new leys, undersown grass and all reseeds less than 5 years old).
- 23,352 treated hectares (spha).
- 16,309 kg of active substances applied.
- Fungicides, herbicides, insecticides and growth regulators were applied to grass reseed areas.
- 17.4% of the grass reseed area received treatments.



**Figure 52** Grass reseed: Area (spha) of each pesticide group applied, 2021.



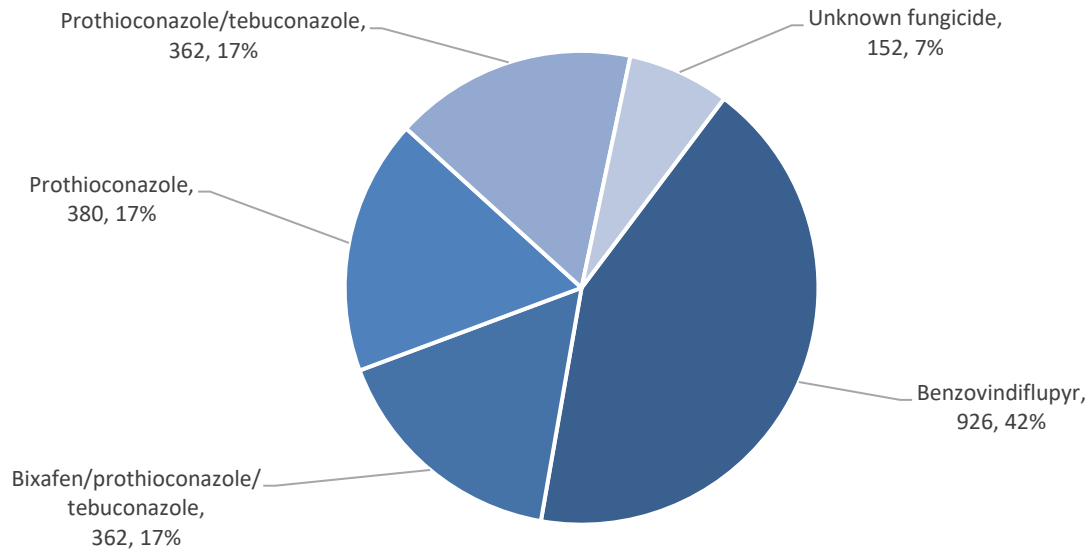
**Figure 53** Grass reseed: Weight (kg) of each pesticide group applied, 2021.



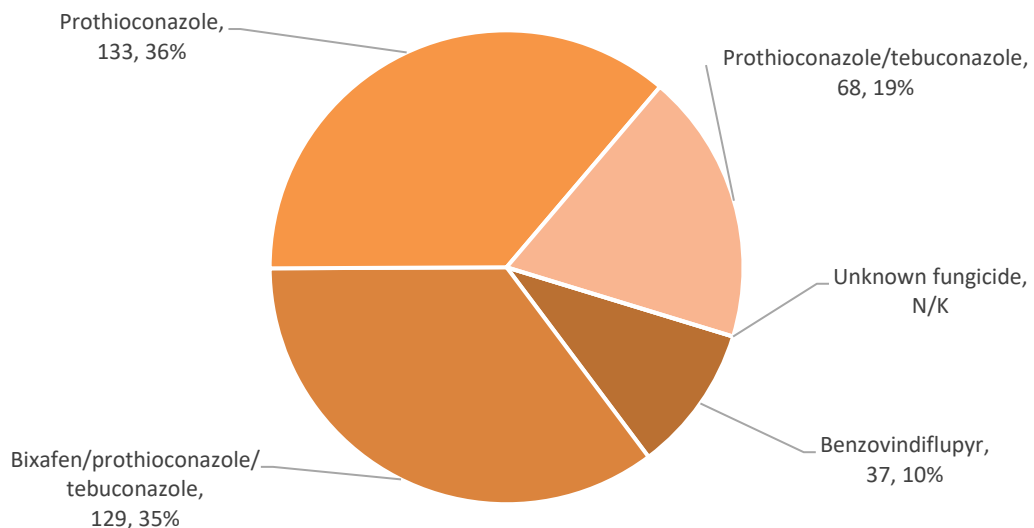
## Grass reseed - fungicides

Tables 3-9 & 16

- 2,181 fungicide-treated hectares (spha).
- 366 kg of fungicide active substances applied.
- 1.8% of grass reseed crops received a fungicide treatment.
- The only reason given for use was 'General disease control'.



**Figure 54** Grass reseed: pesticide-treated area (spha) of fungicide active substances, 2021.



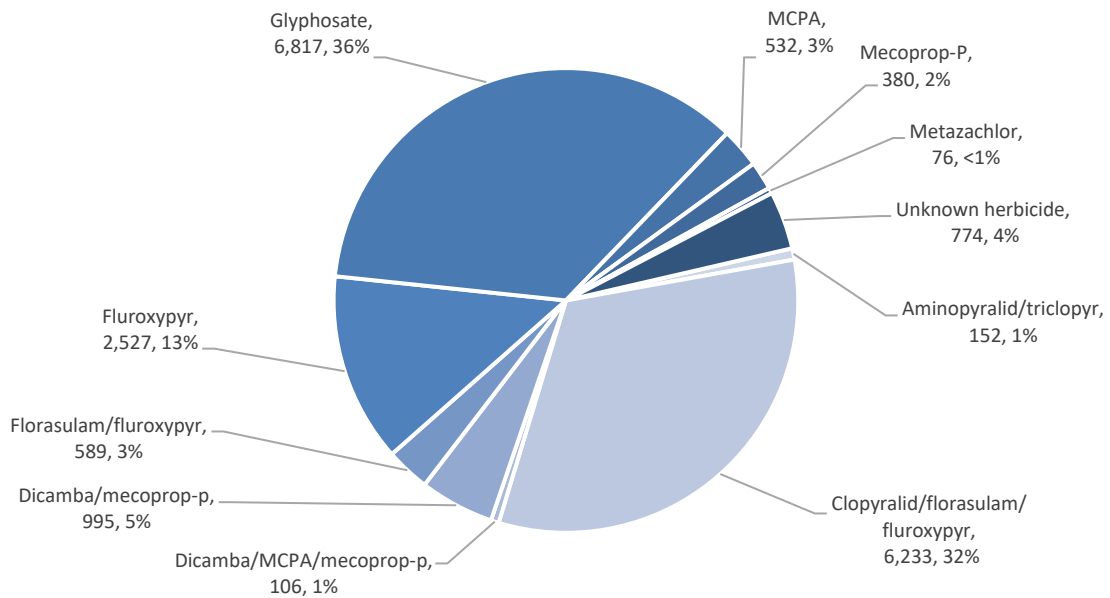
**Figure 55** Grass reseed: weight (kg) of fungicide active substances applied, 2021.

*N/K refers to those treatments where the quantity applied could not be established*

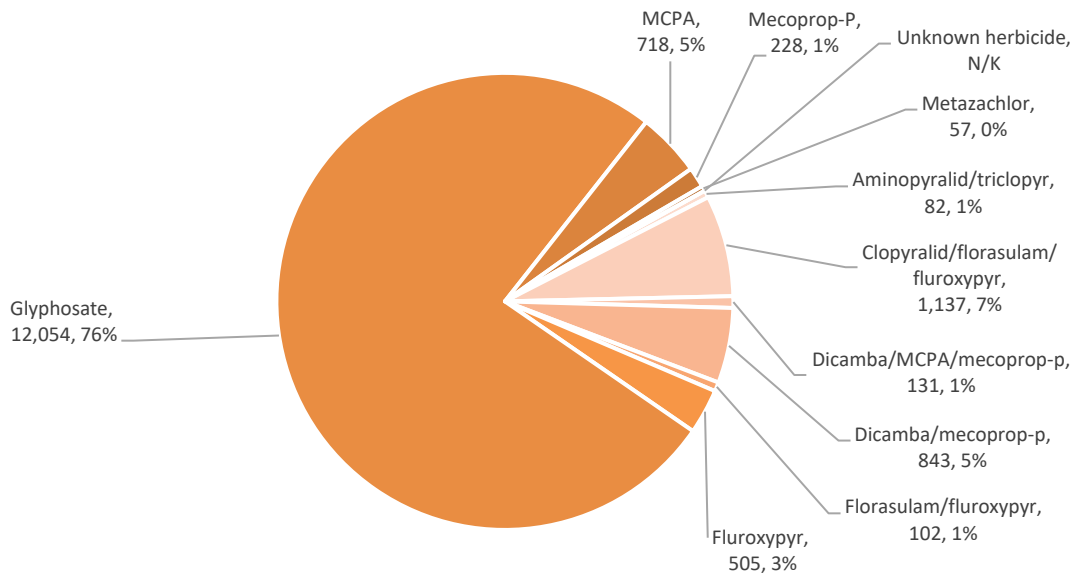
## Grass reseed - herbicides

Tables 3-9 & 16

- 19,181 herbicide-treated hectares (spha).
- 15,858 kg of herbicide active substances applied.
- 17.2% of grass reseed crops received a herbicide treatment.

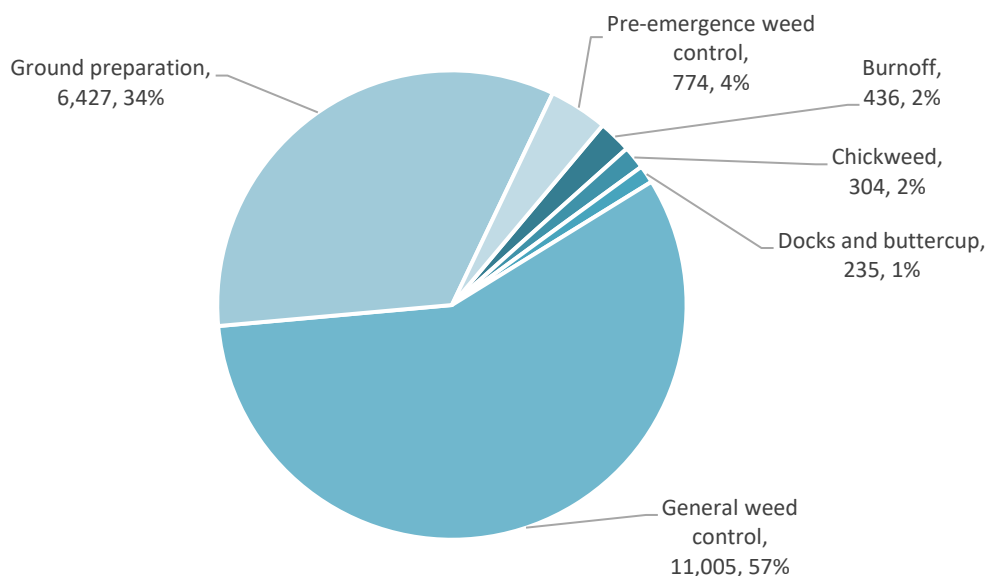


**Figure 56** Grass reseed: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 57** Grass reseed: weight (kg) of herbicide active substances applied, 2021.

*N/K refers to those treatments where the quantity applied could not be established*



**Figure 58** Grass reseed: reasons for herbicide use (spha), 2021.

### Grass reseed - insecticides

Tables 3-9 & 16

- 532 insecticide-treated hectares (spha).
- 2 kg of insecticide active substances applied (the quantity of 'Unknown insecticide' could not be determined).
- 0.5% of grass reseed crops received an insecticide treatment.
- There were two active substances applied: Lambda-cyhalothrin (380 spha, 2kg), used exclusively for 'Aphids', and 'Unknown insecticide' (152 spha, kg N/K) used exclusively for 'General insect control'.

### Grass reseed – growth regulators

Tables 3-9 & 16

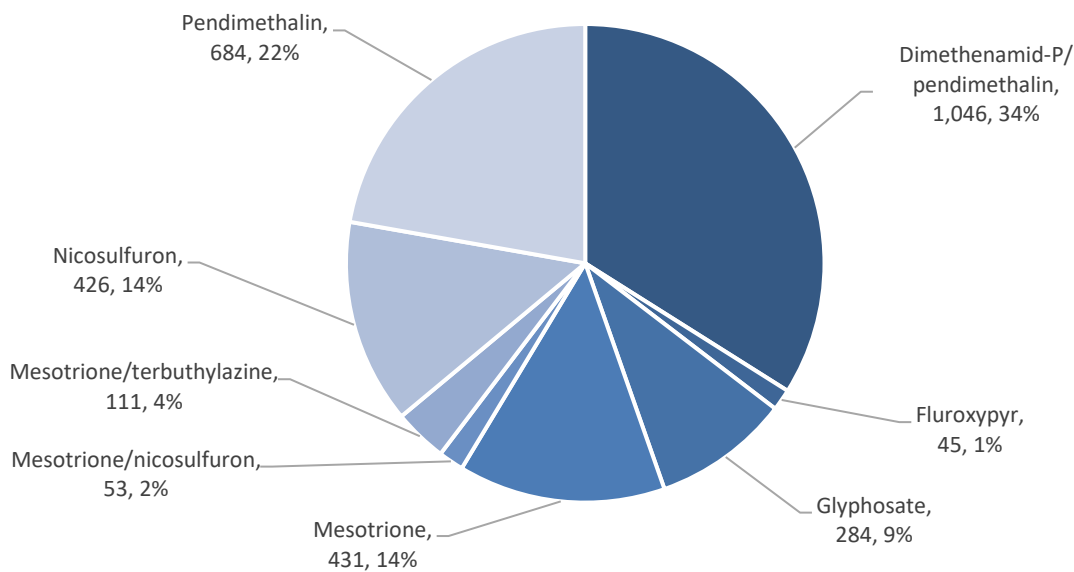
- 1,458 growth regulator-treated hectares (spha).
- 83 kg of growth regulator active substances applied.
- 1.4% of grass reseed crops received a growth regulator treatment.
- There were two active substances applied: Trinexapac-ethyl (1,306 spha, 83kg) and 'Unknown growth regulator' (152 spha, kg N/K).
- The only reason given for use was 'Growth regulation'.

## PESTICIDE USAGE ON FODDER CROPS

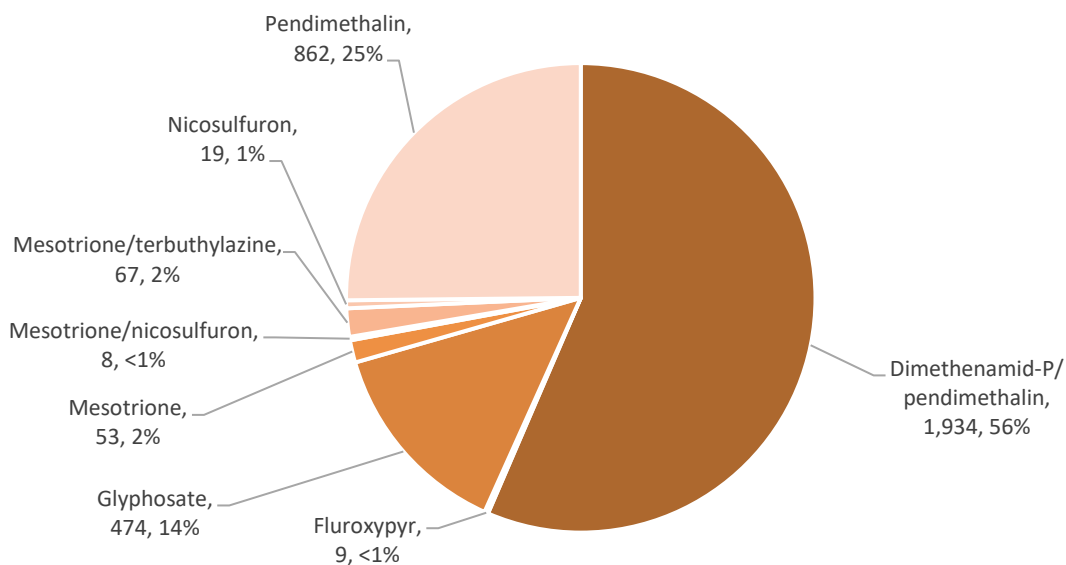
### Fodder maize

Tables 3-9 & 15

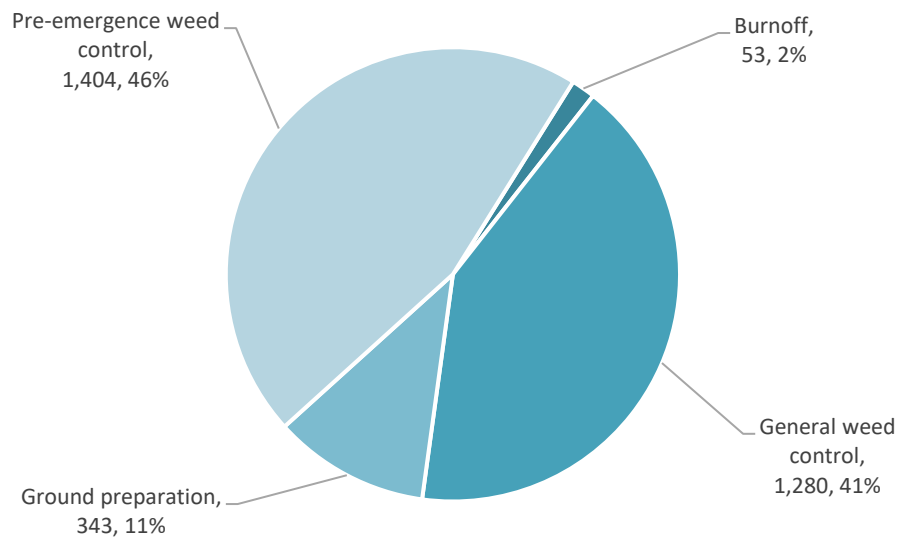
- 2,145 hectares of fodder maize were grown in Northern Ireland.
- 3,710 treated hectares (spha).
- 3,425 kg of active substances applied.
- Herbicides and seed treatments were the only pesticide substances applied.
- 'Unknown seed treatment' was the only seed treatment applied to fodder maize crops (630 spha). The quantity of this active substance could not be determined.
- 72.8% of the fodder maize area received treatments.



**Figure 59** Fodder maize: pesticide-treated area (spha) of herbicide active substances, 2021.



**Figure 60** Fodder maize: weight (kg) of herbicide active substances applied, 2021.



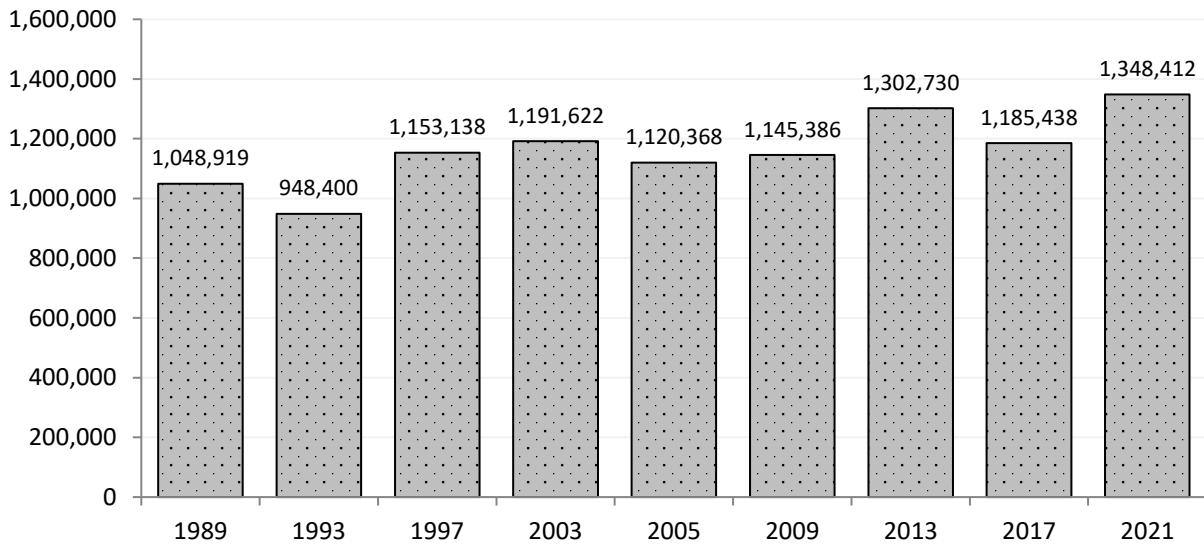
**Figure 61** Fodder maize: reasons for herbicide use (spha), 2021.

### Other fodder crops

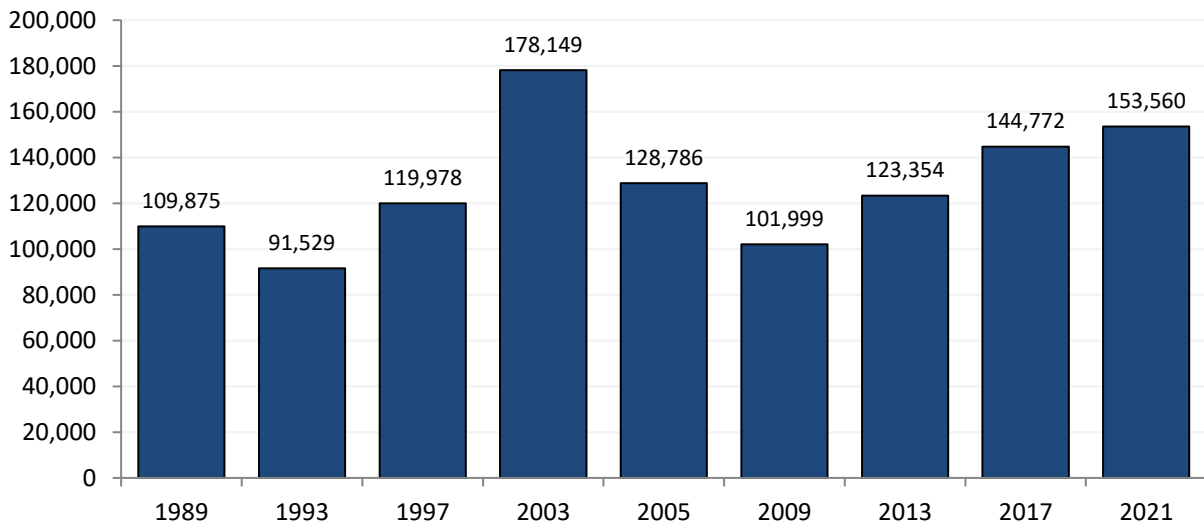
Tables 3-9 & 20

- 1,425 hectares of other fodder crops (fodder beet and fodder kale) were grown in Northern Ireland.
- 1,425 treated hectares (spha).
- 8 kg of active substances applied.
- Seed treatments were the only pesticide substances applied.
- 100% of both fodder beet and fodder kale received seed treatments.
- There were two active substances applied: Fludioxonil (1,149 spha, 3kg) and Tefluthrin (276 spha, 5kg), both used exclusively for 'Seed treatment'.

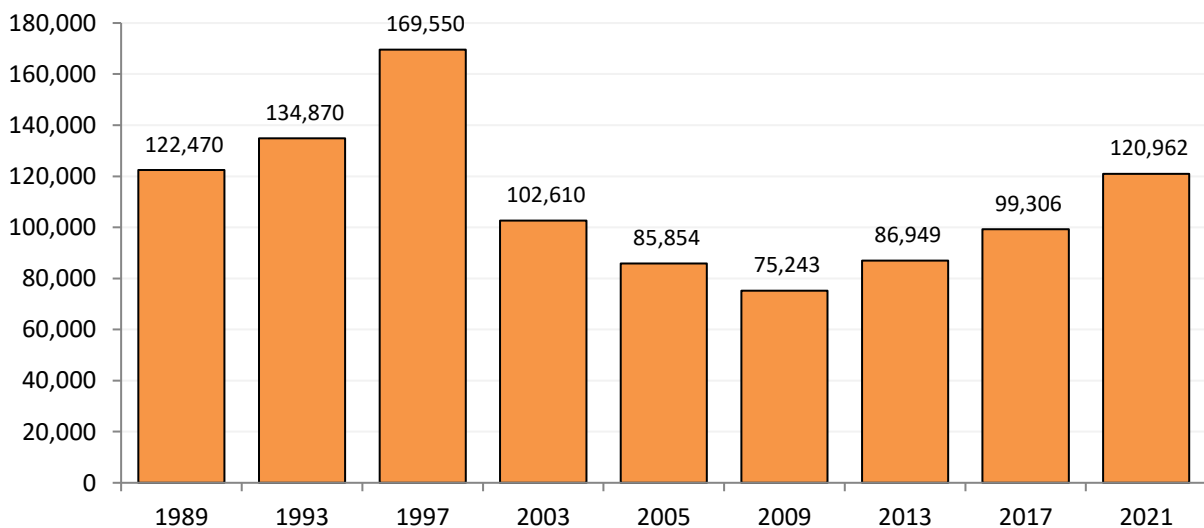
## TRENDS – Grassland and fodder crops



**Figure 62a** Area (ha) of grassland and fodder crops grown, 1989-2021.

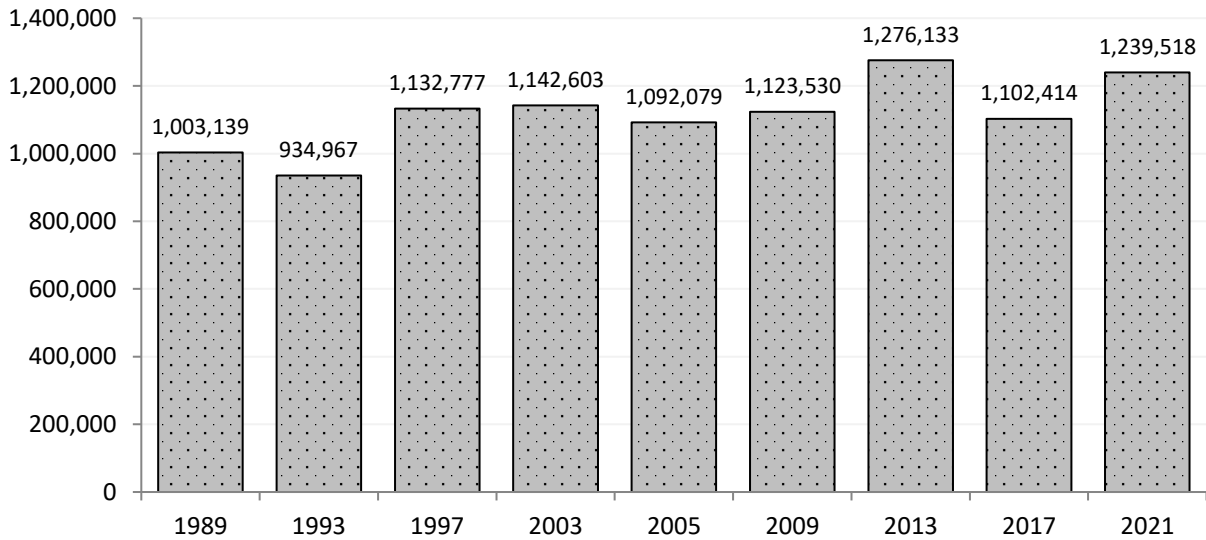


**Figure 62b** Pesticide-treated area (spha) of grassland and fodder crops, 1989-2021.

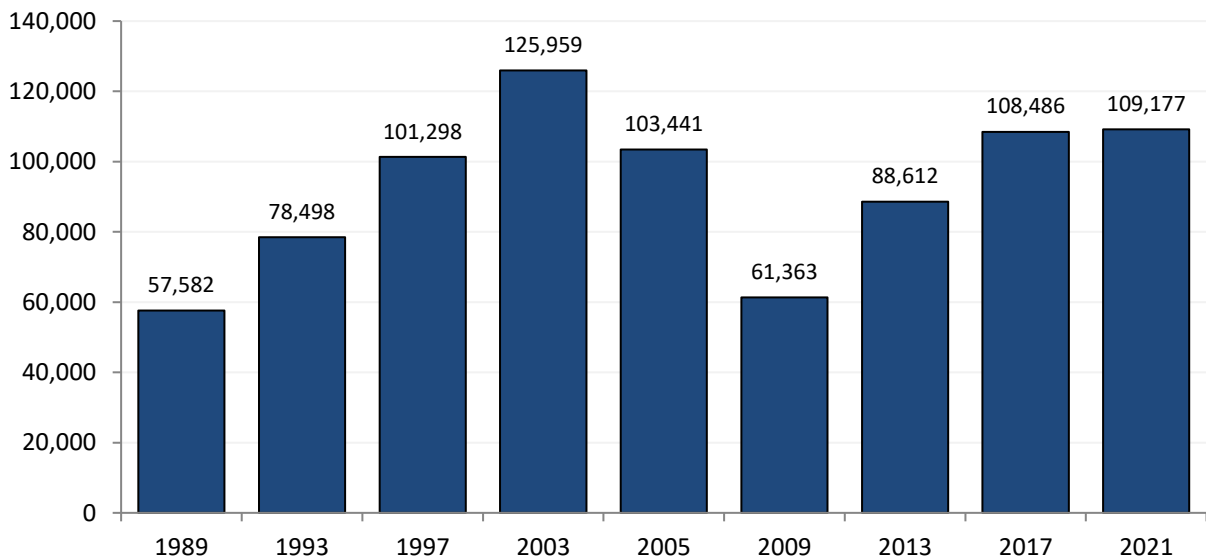


**Figure 62c** Weight (kg) of pesticides applied to grassland and fodder crops, 1989-2021.

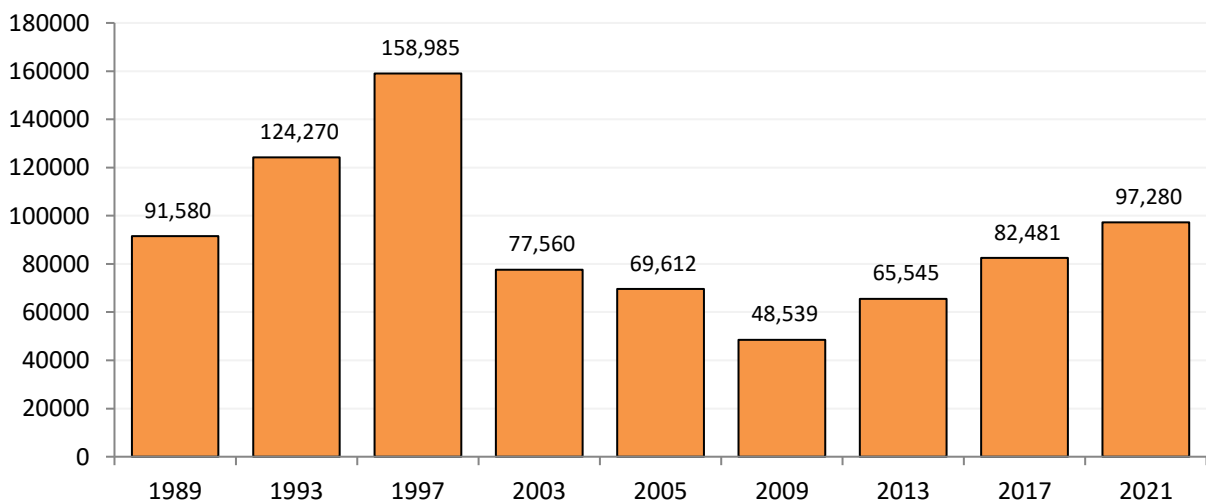
## TRENDS – Established grassland (grazing, silage and hay)



**Figure 63a** Area (ha) of established grassland crops grown, 1989-2021.

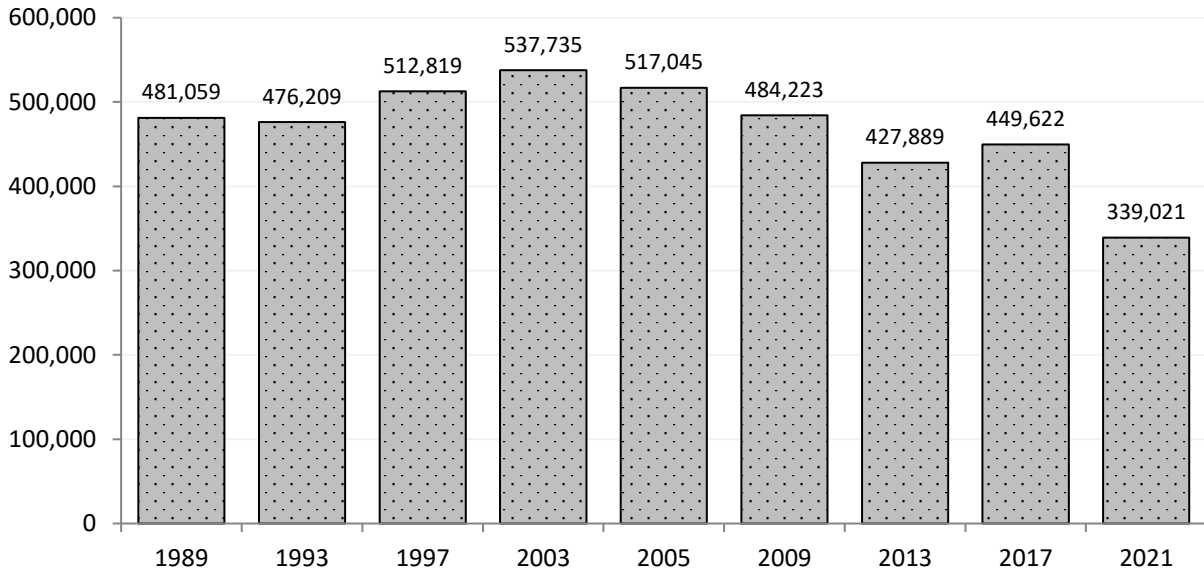


**Figure 63b** Pesticide-treated area (spha) of established grassland crops, 1989-2021.

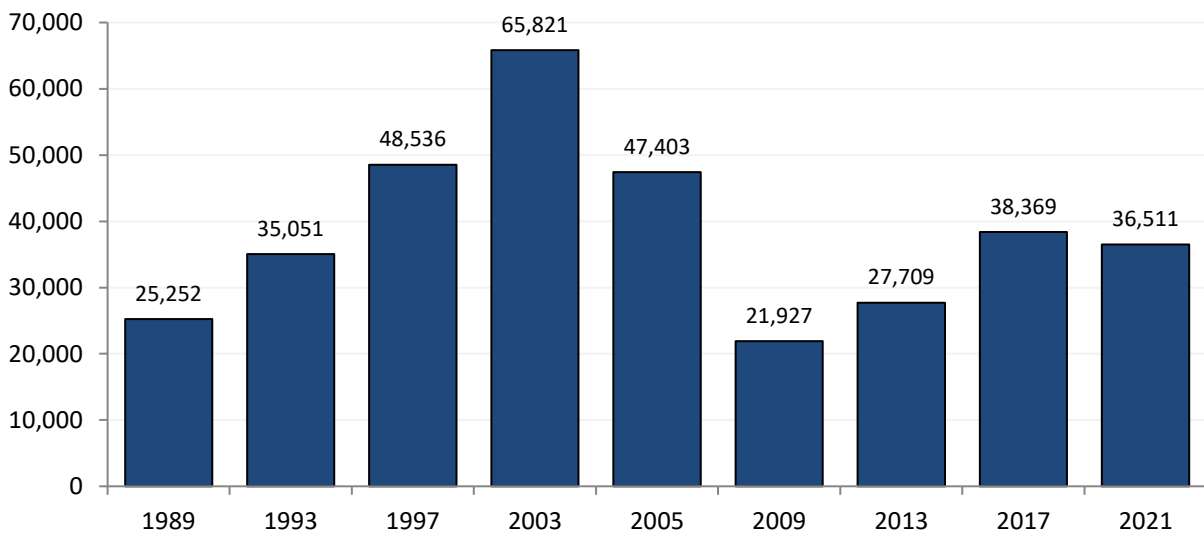


**Figure 63c** Weight (kg) of pesticides applied to established grassland crops, 1989-2021.

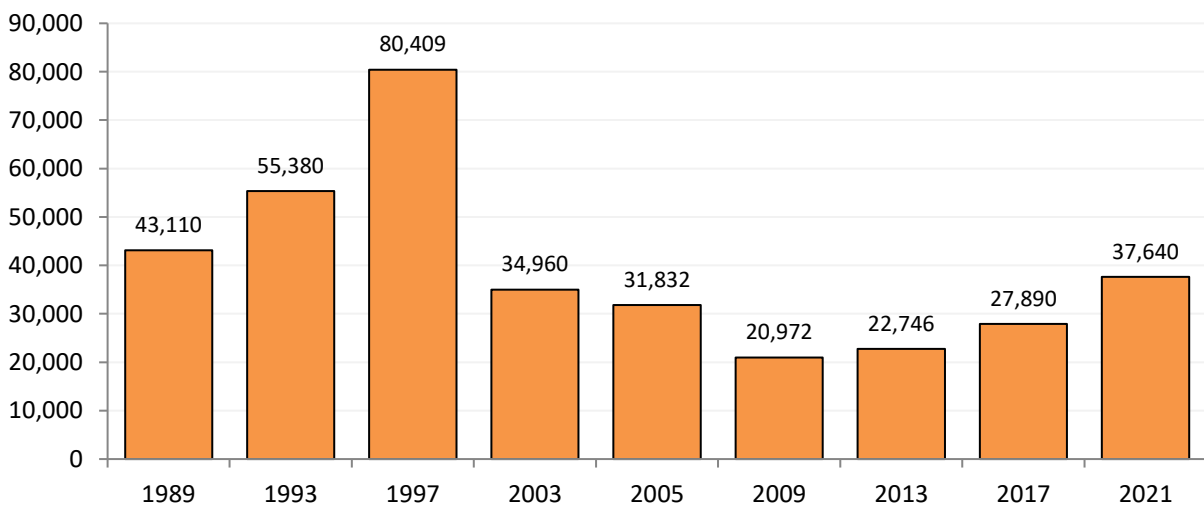
## TRENDS – Enclosed grazing



**Figure 64a** Area (ha) of enclosed grazing grown, 1989-2021.



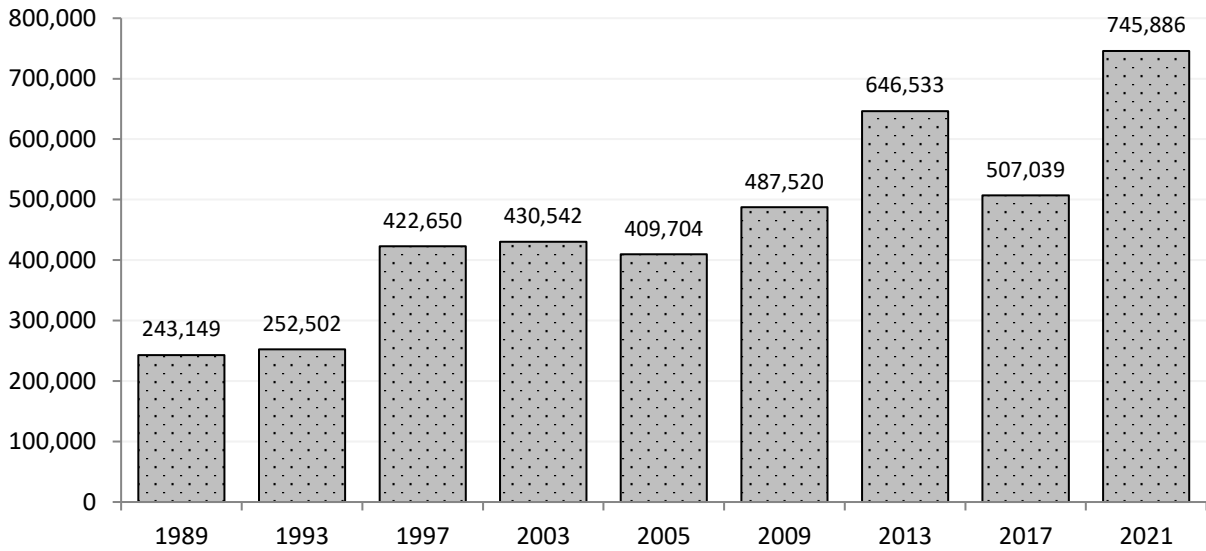
**Figure 64b** Pesticide-treated area (spha) of enclosed grazing, 1989-2021.



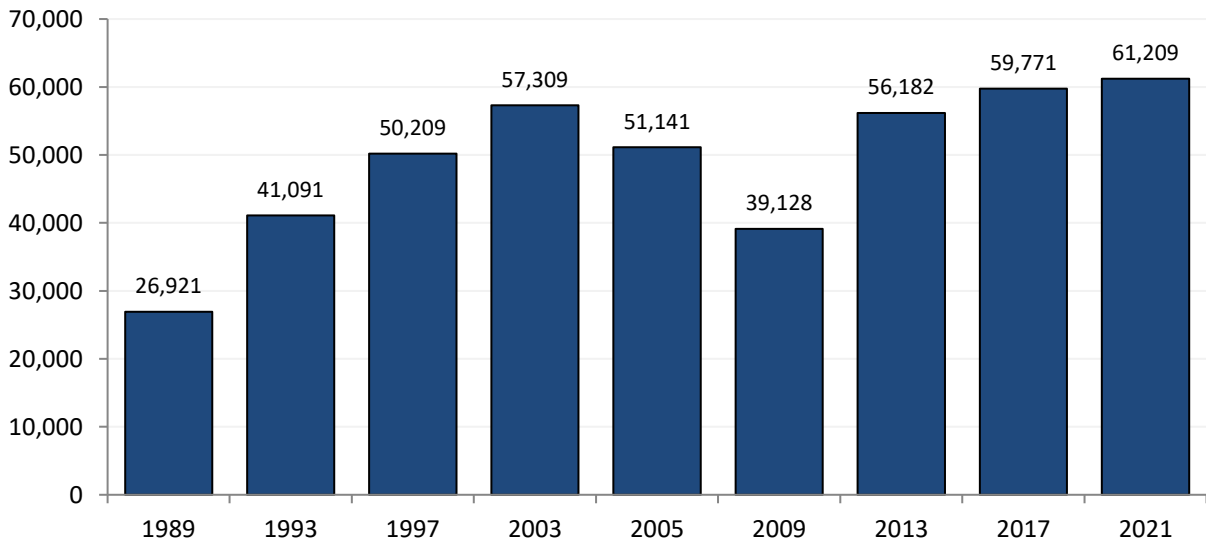
**Figure 64c** Weight (kg) of pesticides applied to enclosed grazing, 1989-2021.



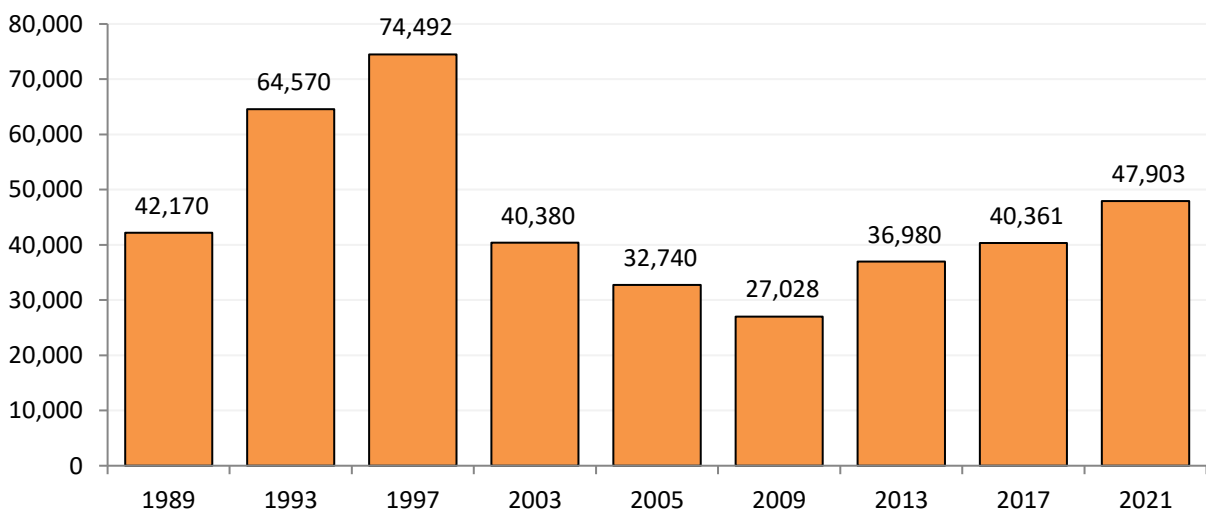
## TRENDS – Grass silage (all cuts combined)



**Figure 65a** Area (ha) of grass silage grown, 1989-2021.

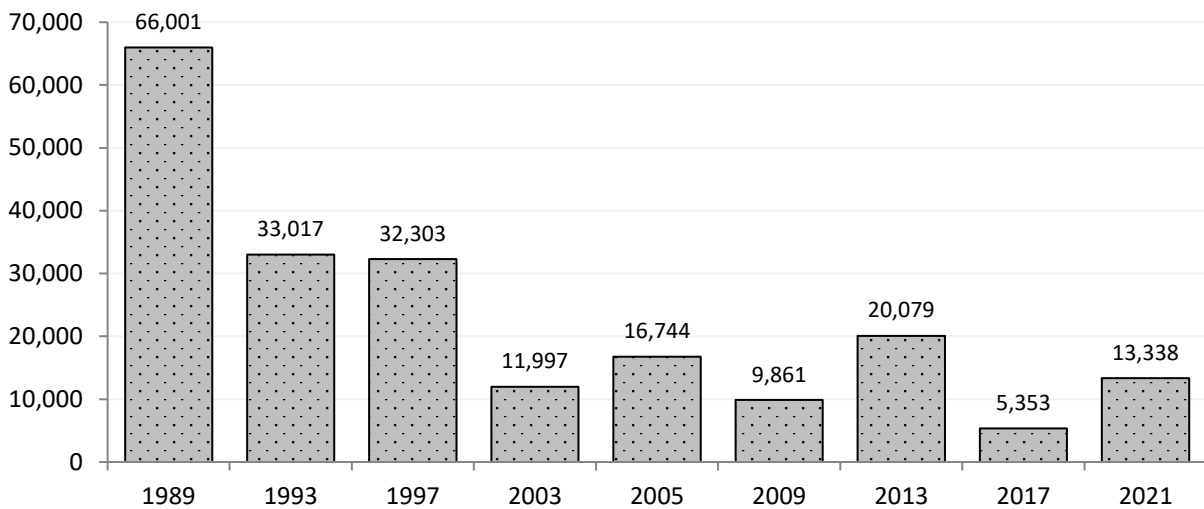


**Figure 65b** Pesticide-treated area (spha) of grass silage, 1989-2021.

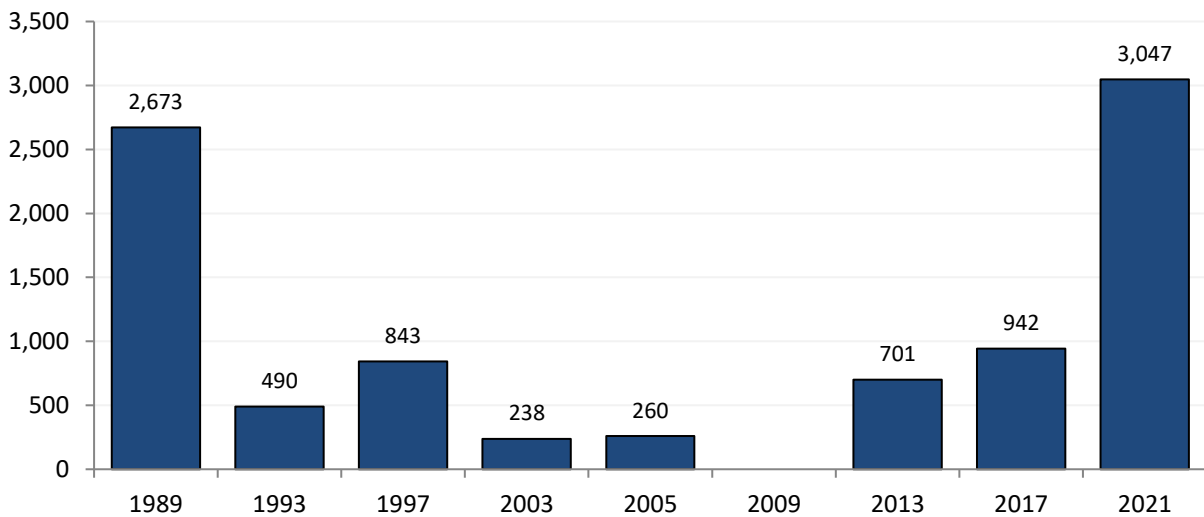


**Figure 65c** Weight (kg) of pesticides applied to grass silage, 1989-2021.

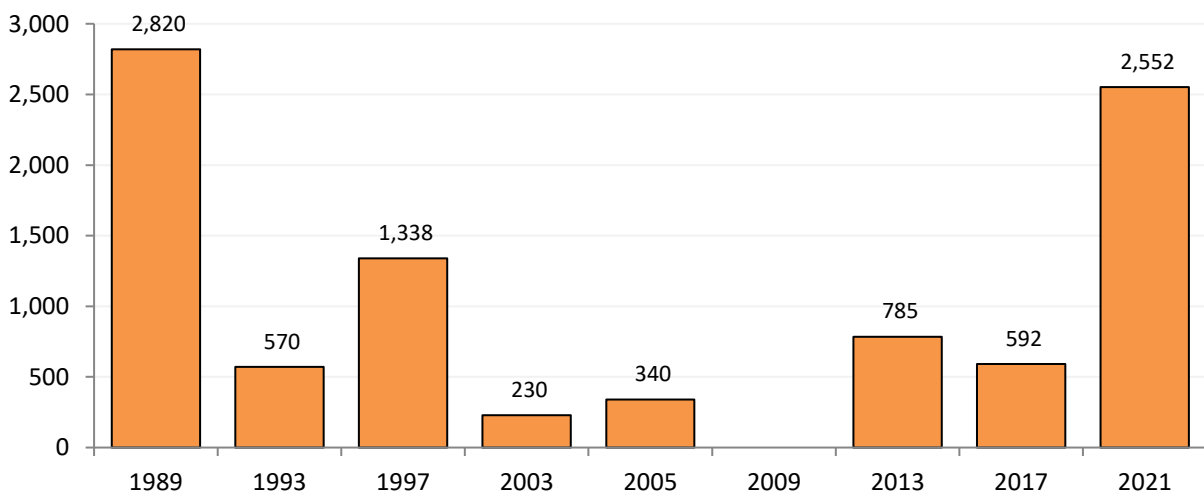
## TRENDS – Hay and haylage



**Figure 66a** Area (ha) of hay and haylage grown, 1989-2021.

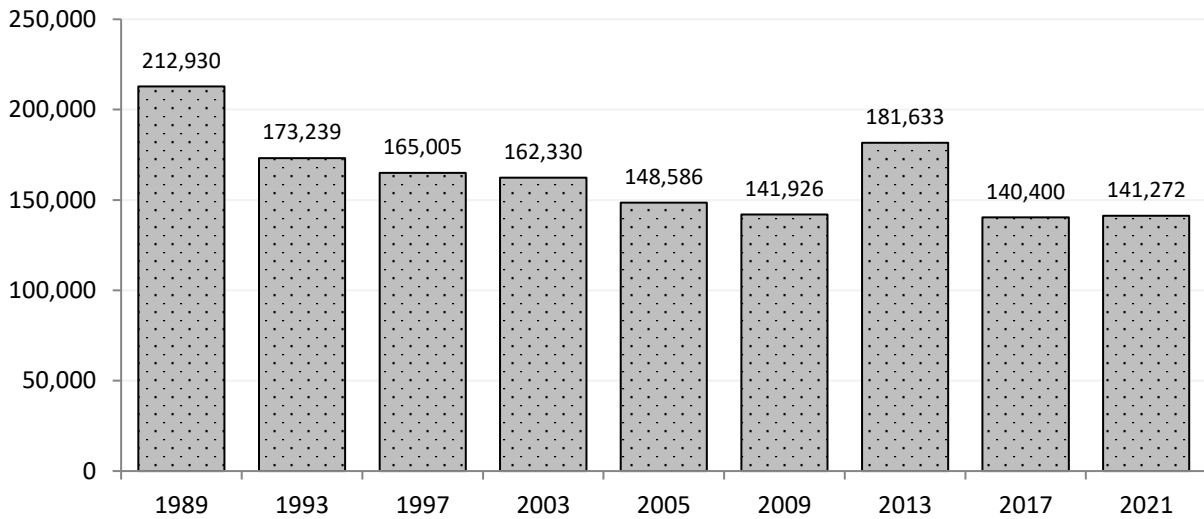


**Figure 66b** Pesticide-treated area (spha) of hay and haylage, 1989-2021 (no treated area data exist for 2009).

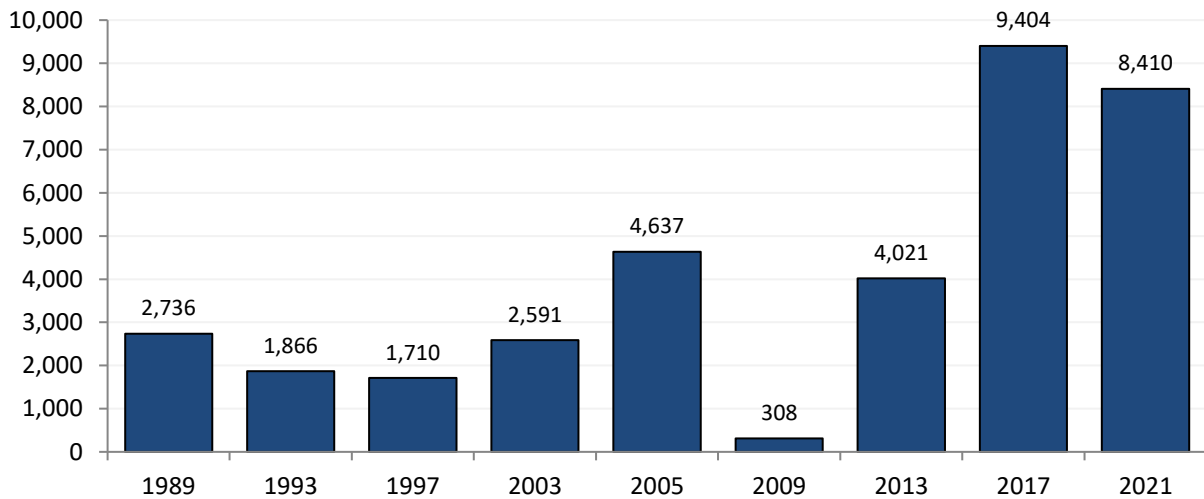


**Figure 66c** Weight (kg) of pesticides applied to hay and haylage, 1989-2021 (no quantity data exist for 2009).

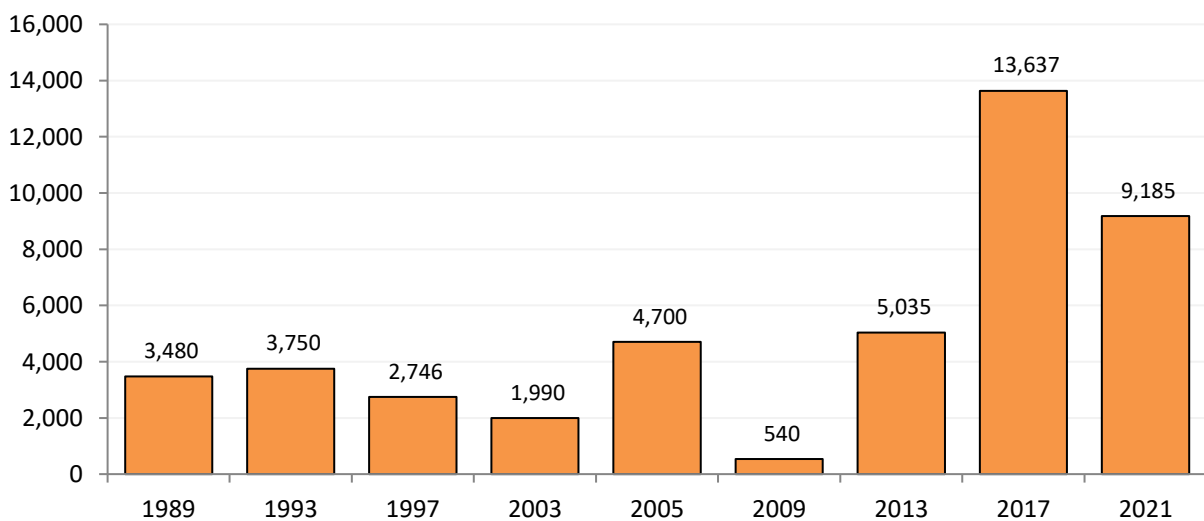
## TRENDS – Rough grazing



**Figure 67a** Area (ha) of rough grazing, 1989-2021.

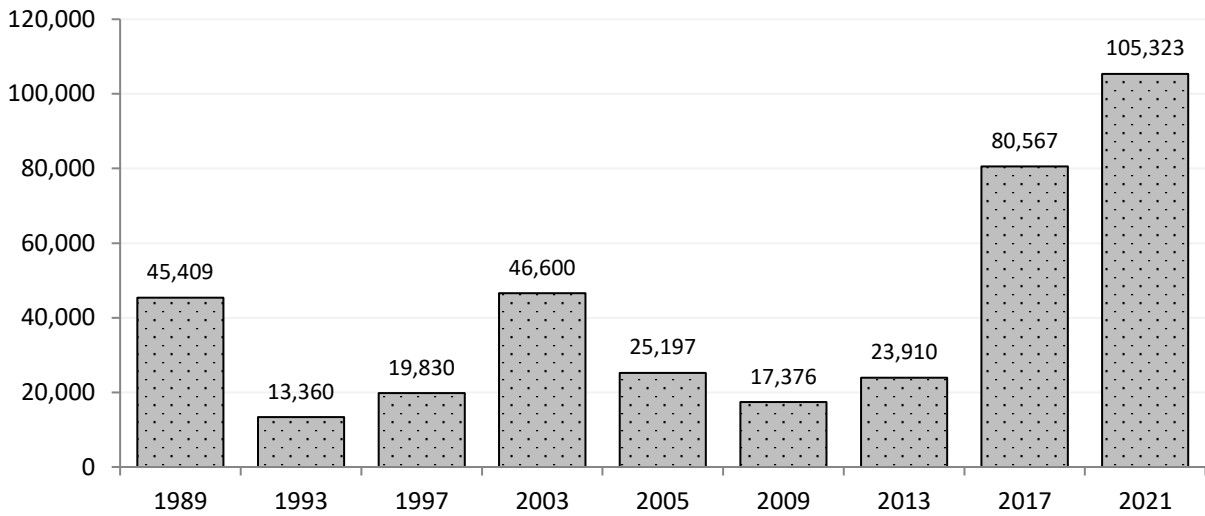


**Figure 67b** Pesticide-treated area (spha) of rough grazing, 1989-2021.

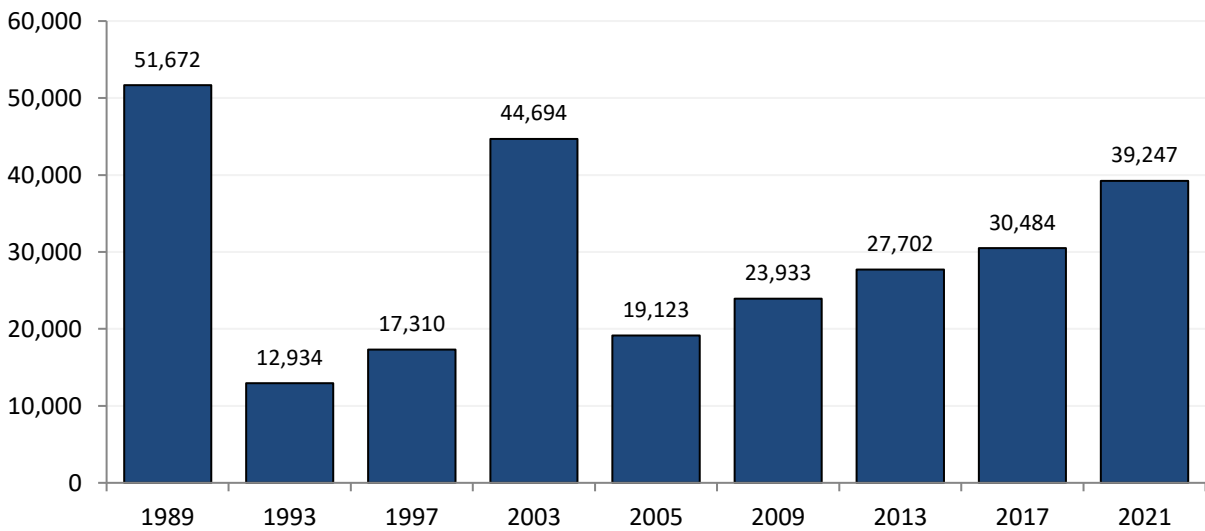


**Figure 67c** Weight (kg) of pesticides applied to rough grazing, 1989-2021.

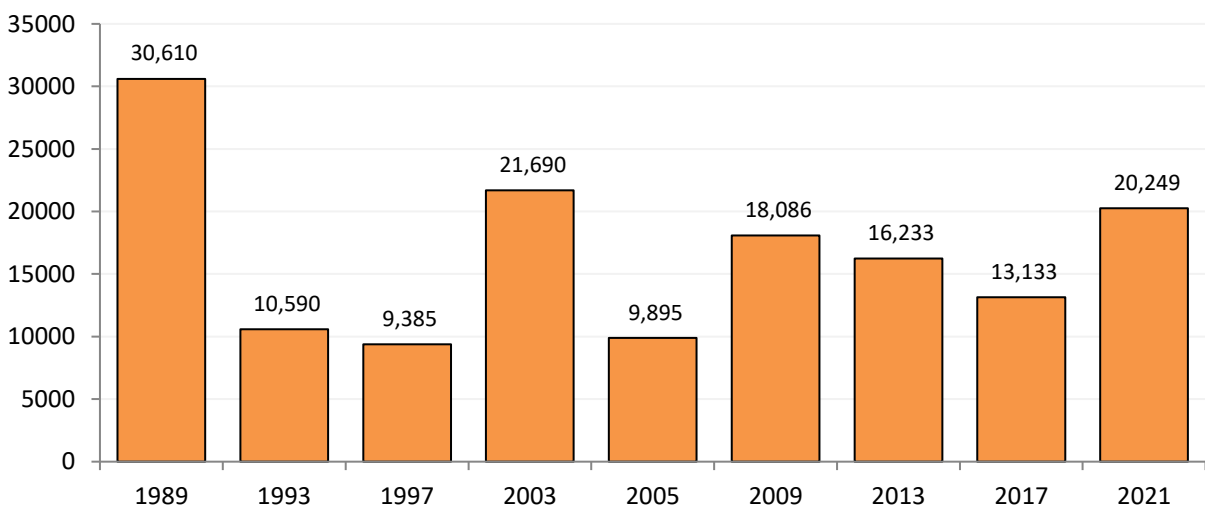
## TRENDS – Sown crops (arable silage, undersown and grass reseed)



**Figure 68a** Area (ha) of sown crops, 1989-2021.

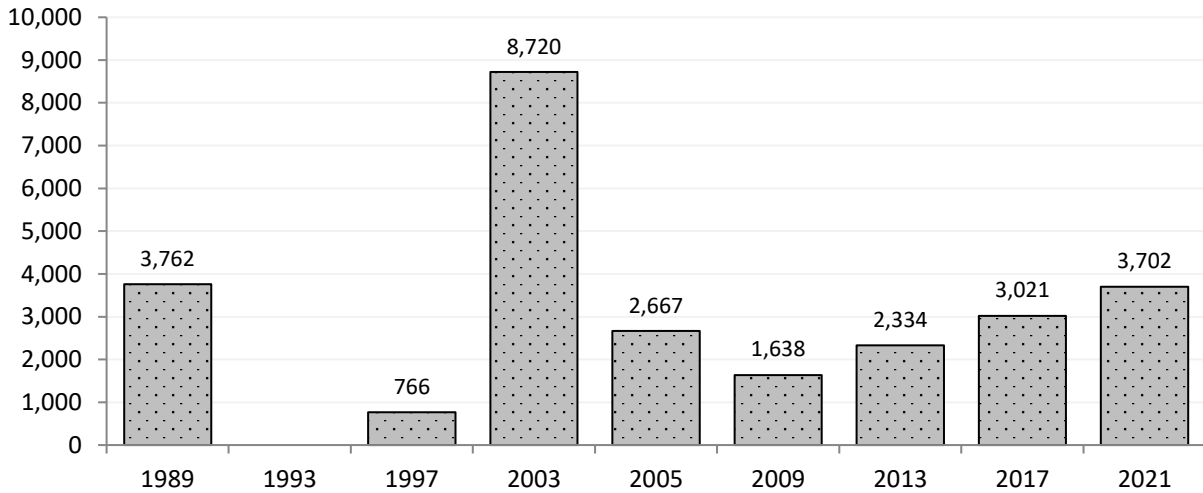


**Figure 68b** Pesticide-treated area (spha) of sown crops, 1989-2021.

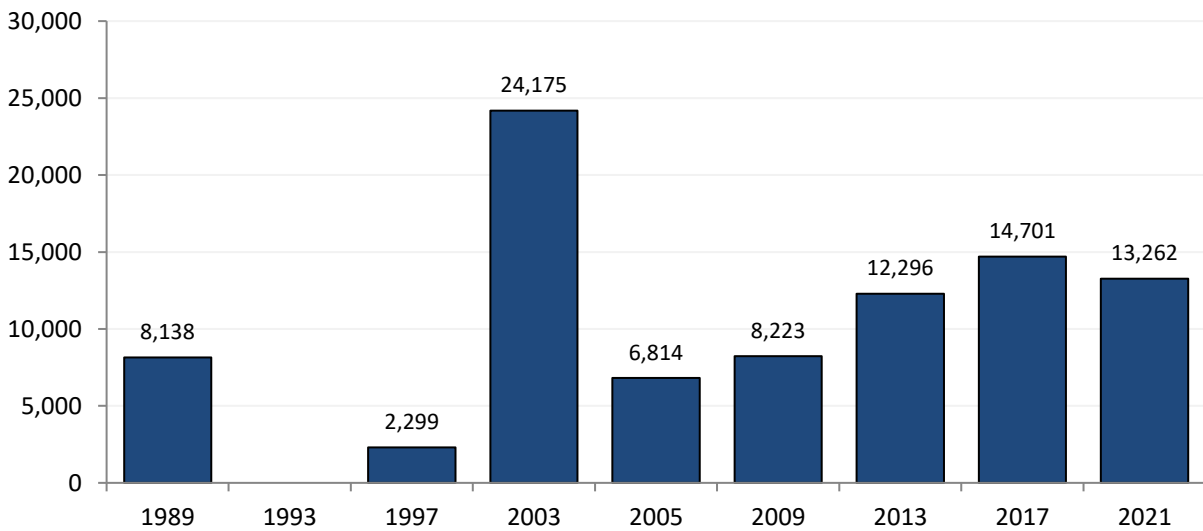


**Figure 68c** Weight (kg) of pesticides applied to sown crops, 1989-2021.

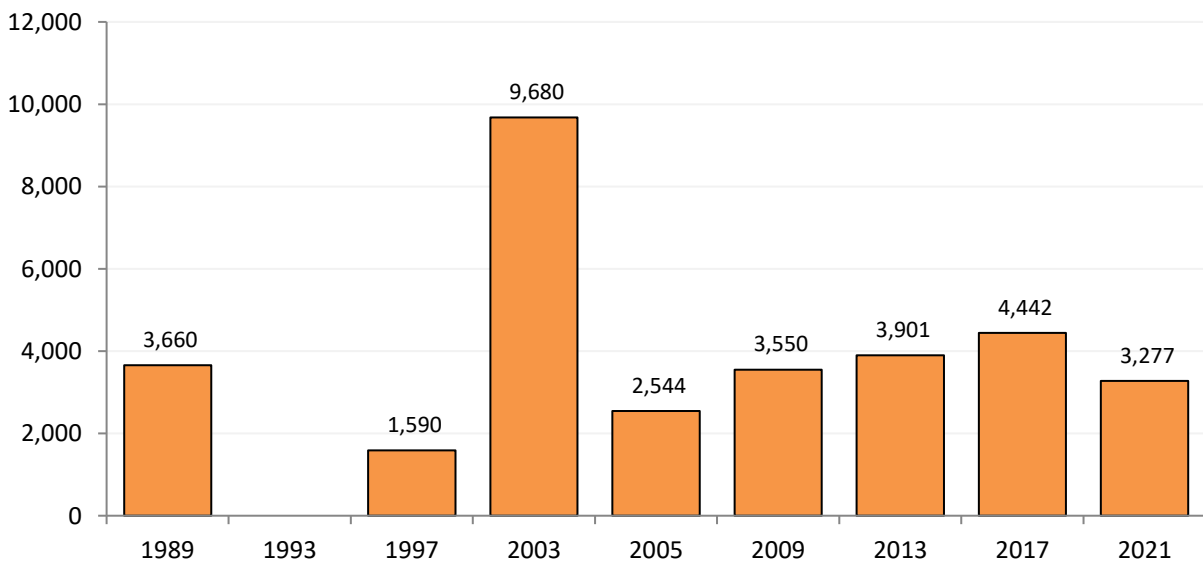
## TRENDS – Arable silage



**Figure 69a** Area (ha) of arable silage, 1989-2021 (no data exist for 1993).

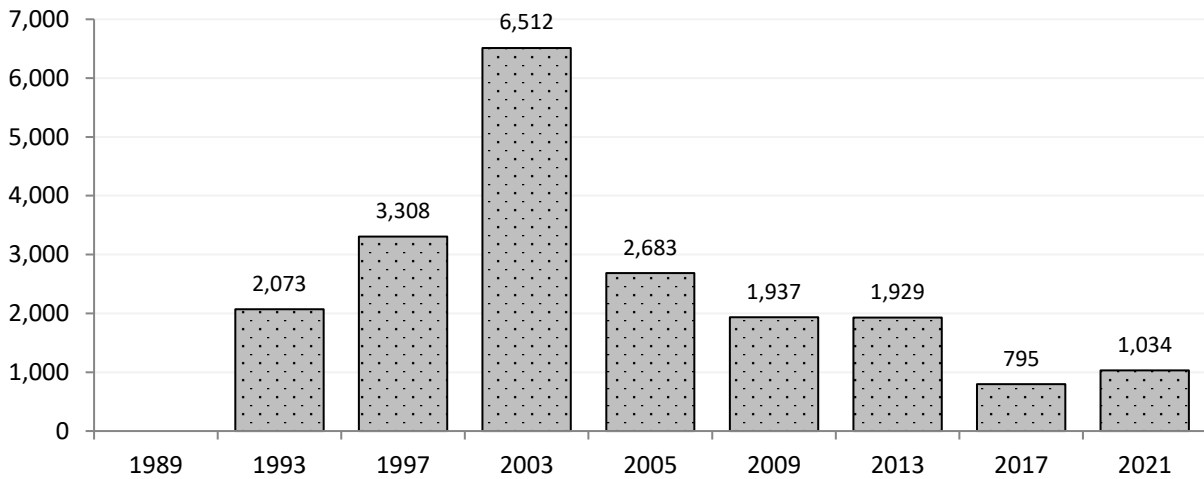


**Figure 69b** Pesticide-treated area (spha) of arable silage, 1989-2021 (no data exist for 1993).

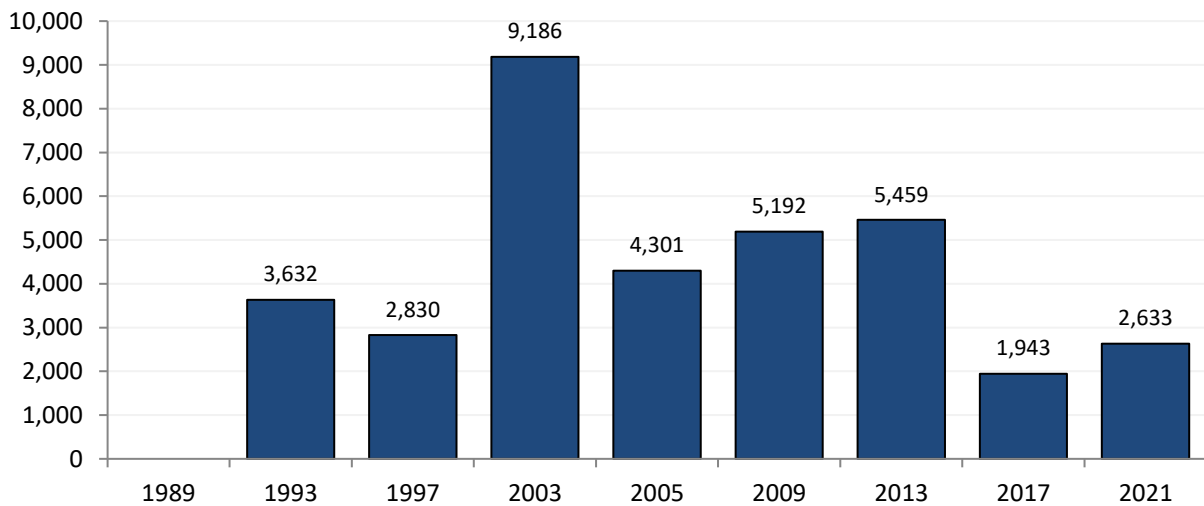


**Figure 69c** Weight (kg) of pesticides applied to arable silage, 1989-2021 (no data exist for 1993).

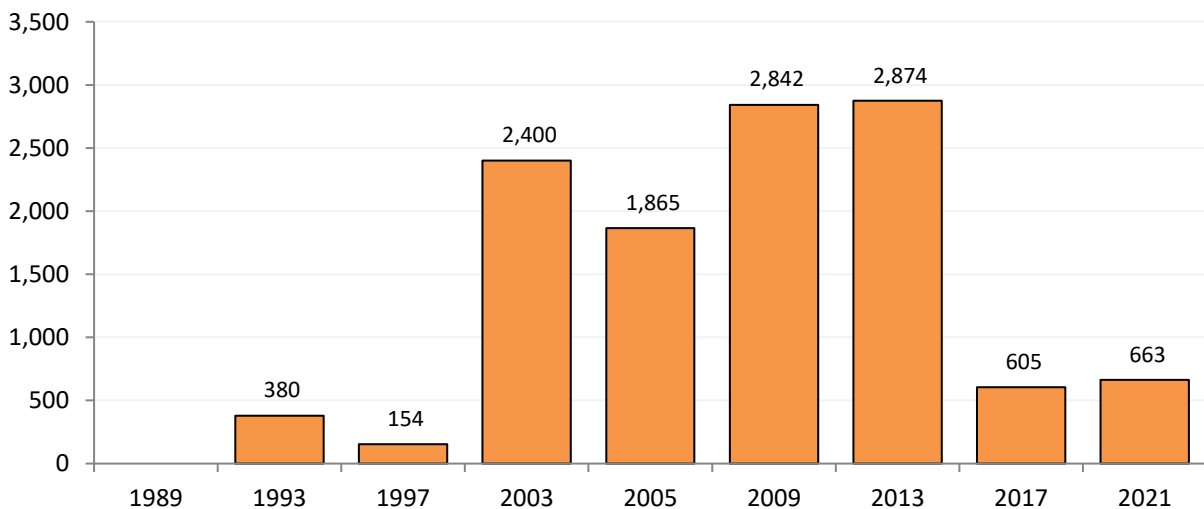
## TRENDS – Arable silage (undersown)



**Figure 70a** Area (ha) of arable silage (undersown), 1989-2021 (no data exist for 1989).

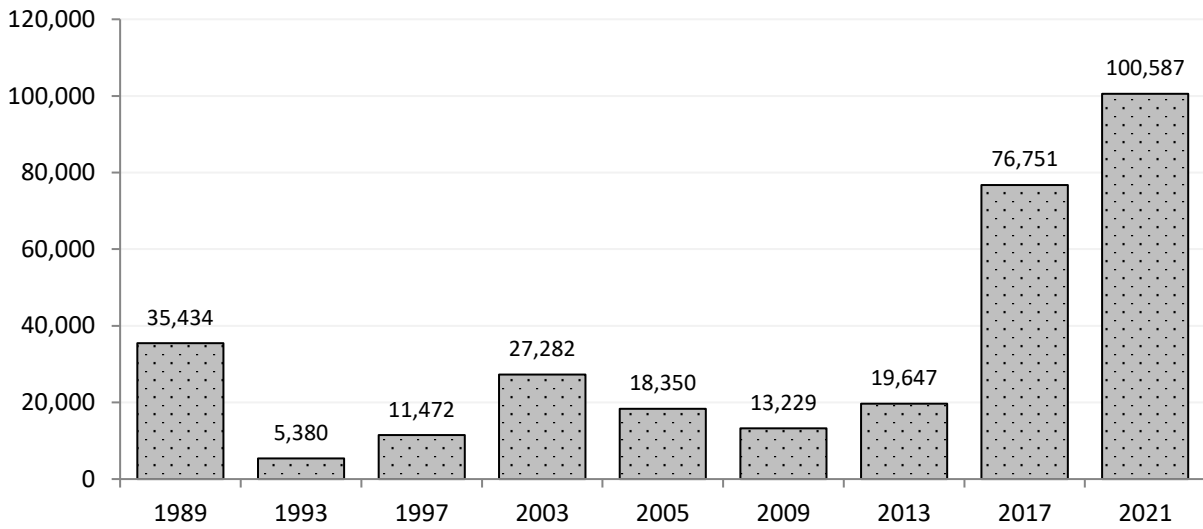


**Figure 70b** Pesticide-treated area (spha) of arable silage (undersown), 1989-2021 (no data exist for 1989).

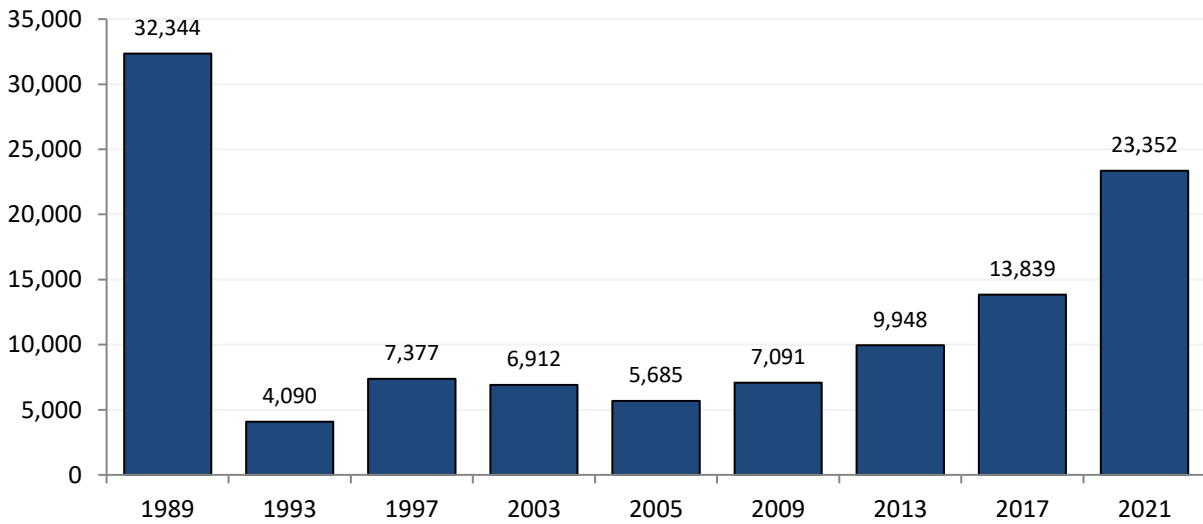


**Figure 70c** Weight (kg) of pesticides applied to arable silage (undersown), 1989-2021 (no data exist for 1989).

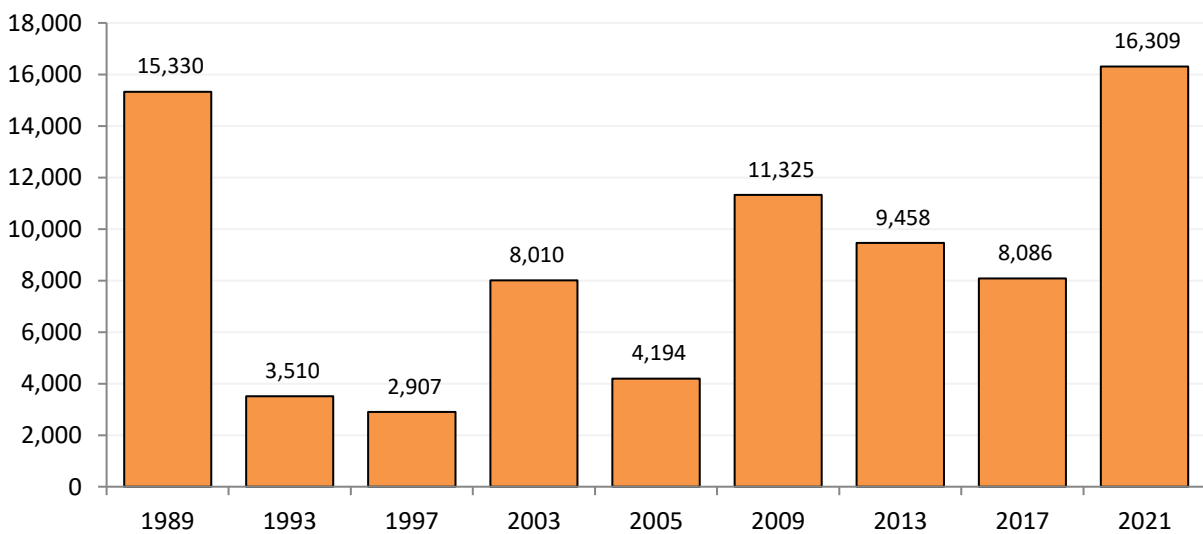
## TRENDS – Grass reseed



**Figure 71a** Area (ha) of grass reseed sown, 1989-2021.

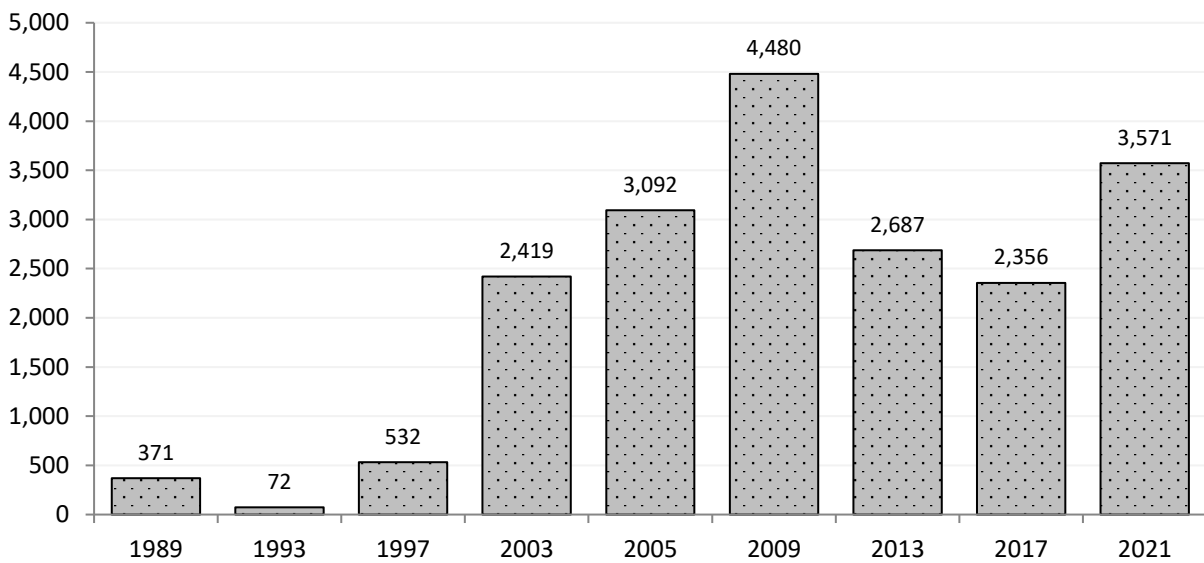


**Figure 71b** Pesticide-treated area (spha) of grass reseed, 1989-2021.

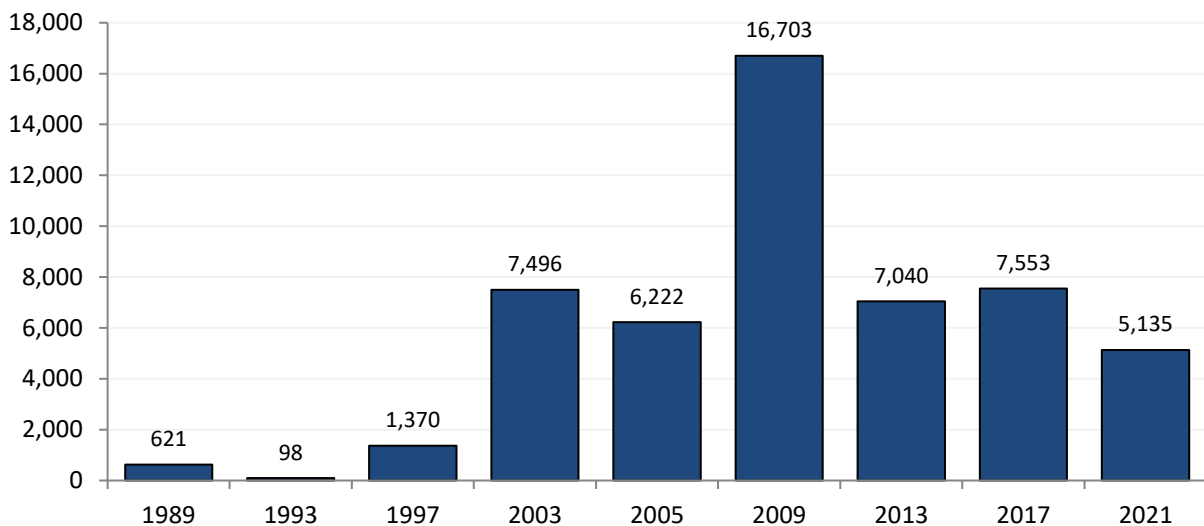


**Figure 71c** Weight (kg) of pesticides applied to grass reseed, 1989-2021.

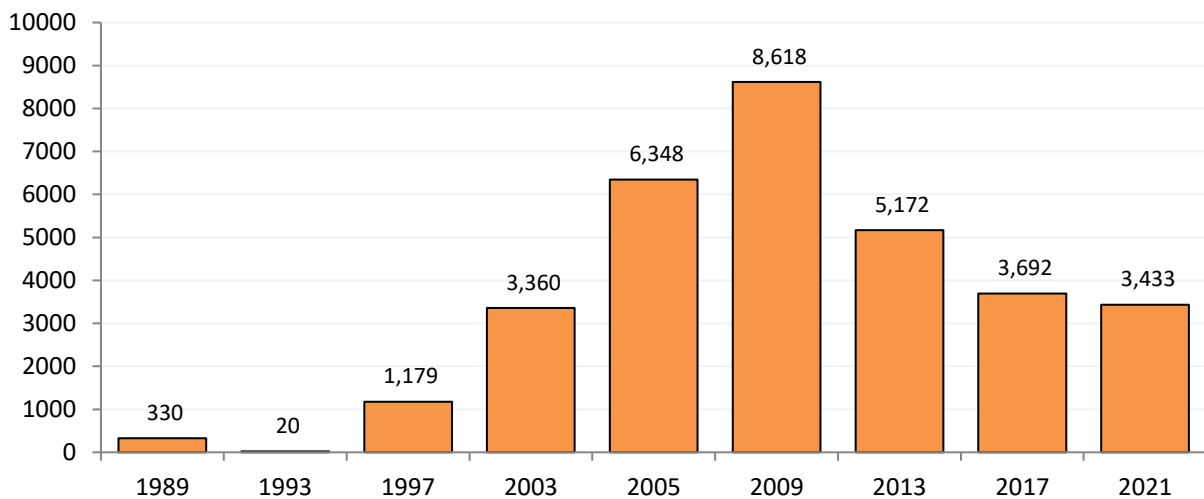
**TRENDS – Fodder crops (maize, beet and kale). Only seed treatments recorded as used on beet and kale crops in 2021.**



**Figure 72a** Area (ha) of fodder crops grown, 1989-2021.



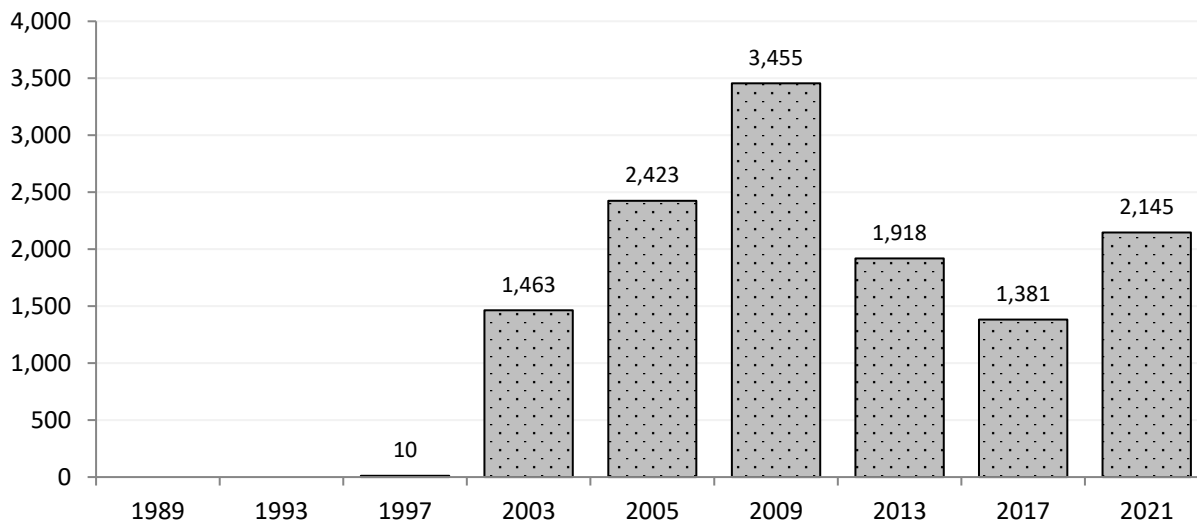
**Figure 72b** Pesticide-treated area (spha) of fodder crops, 1989-2021.



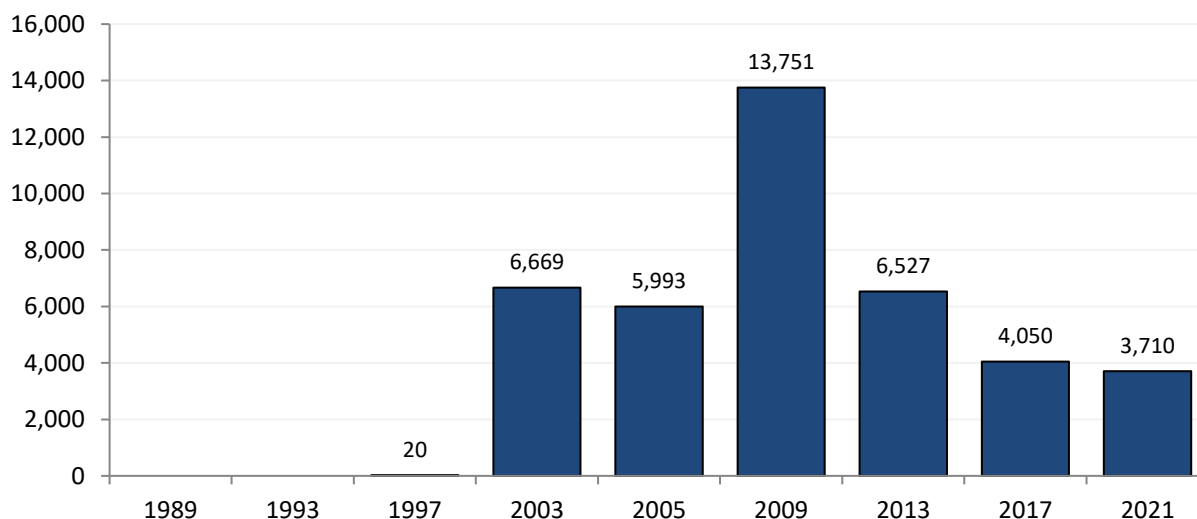
**Figure 72c** Weight (kg) of pesticides applied to fodder crops, 1989-2021.



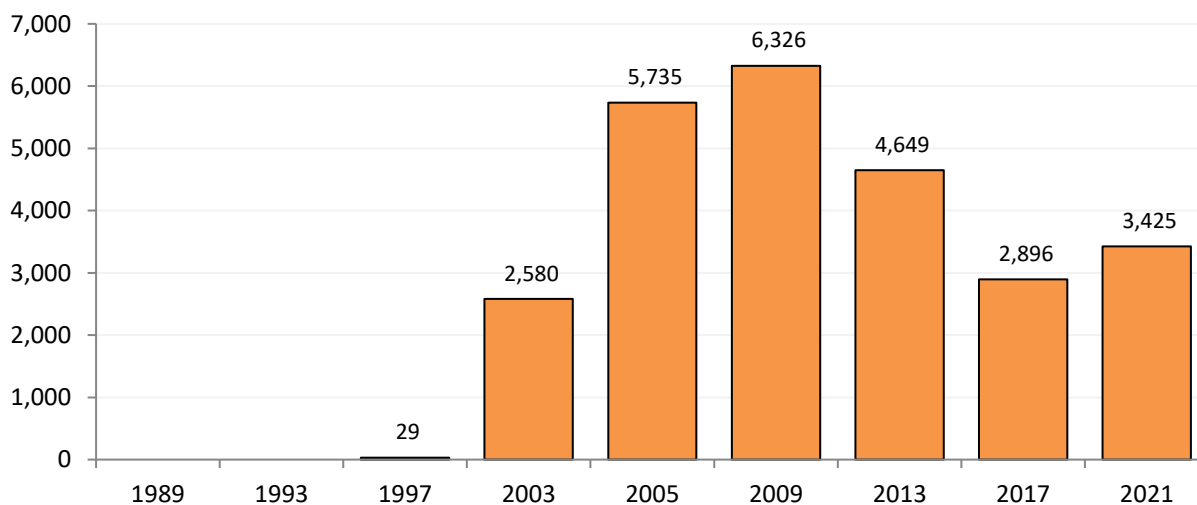
## TRENDS – Fodder maize



**Figure 73a** Area (ha) of fodder maize sown, 1989-2021 (no data exist for 1989 & 1993).

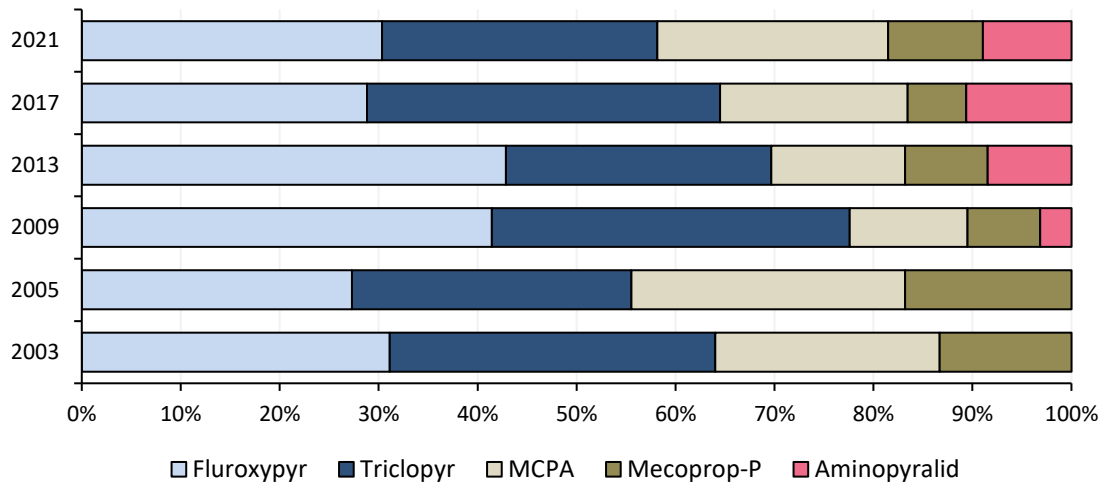


**Figure 73b** Pesticide-treated area (spha) of fodder maize crops, 1989-2021 (no data exist for 1989 & 1993).

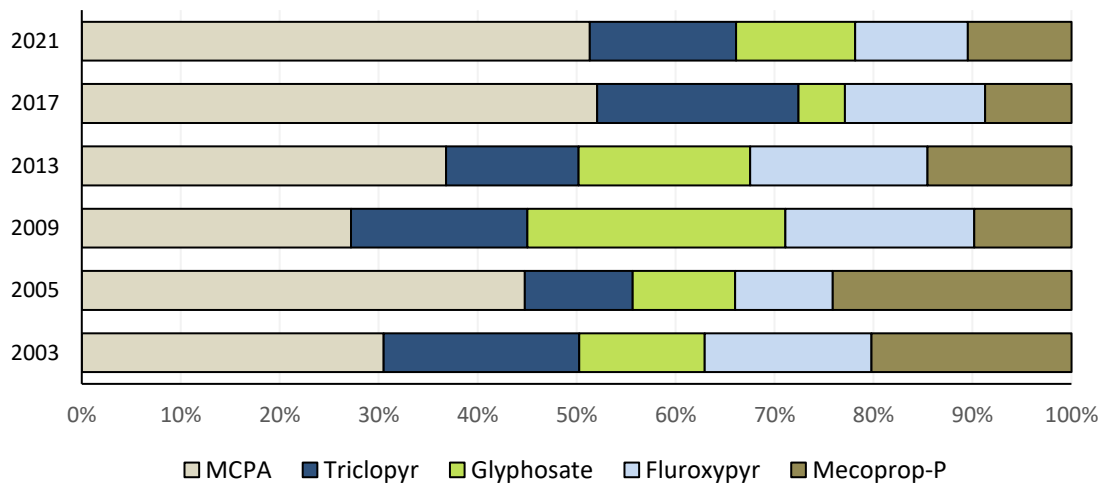


**Figure 73c** Weight (kg) of pesticides applied to fodder maize crops, 1989-2021 (no data exist for 1989 & 1993).

## TRENDS – Top five active substances applied in 2021 compared with previous years (2021-2003)



**Figure 74a** Top five active substances applied in 2021 compared with previous years (2021-2003) by treated area (spha).



**Figure 74b** Top five active substances applied in 2021 compared with previous years (2021-2003) by weight applied (kg).

**Table 1a** Total number of farms in each size group with established grassland in the Northern Ireland June 2021 census and number of samples from each size group.

County	Size group (hectares)												Total	
	<5		5<10		10<20		20<50		50<100		100 +		Holdings in strata	Holdings sampled
	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled
Antrim	395	2	615	3	890	2	1,376	18	744	16	337	19	4,357	60
Armagh	428	1	668	2	912	1	1,049	7	322	6	99	4	3,478	21
Down	663	0	837	0	1,205	0	1,467	15	583	8	213	10	4,968	33
Fermanagh	172	1	364	2	704	4	1,129	8	465	8	182	0	3,016	23
Londonderry	322	1	456	1	765	2	1,117	9	510	7	175	10	3,345	30
Tyrone	458	1	886	0	1,471	5	2,071	4	885	13	276	10	6,047	33
<b>Northern Ireland</b>	<b>2,438</b>	<b>6</b>	<b>3,826</b>	<b>8</b>	<b>5,947</b>	<b>14</b>	<b>8,209</b>	<b>61</b>	<b>3,509</b>	<b>58</b>	<b>1,282</b>	<b>53</b>	<b>25,211</b>	<b>200</b>

**Table 1b** Total number of farms in each size group with arable crop silage in the Northern Ireland June 2021 census and number of samples from each group.

County	Size group (hectares)						Total	
	<5		5<10		10+		Holdings in strata	Holdings sampled
	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled
All counties	161	9	124	19	137	27	422	55
<b>Northern Ireland</b>	<b>161</b>	<b>9</b>	<b>124</b>	<b>19</b>	<b>137</b>	<b>27</b>	<b>422</b>	<b>55</b>

**Table 1c** Total number of farms in each size group with fodder maize in the Northern Ireland June 2021 census and number of samples from each group.

County	Size group (hectares)							
	<8		8<12		12+		Total	
	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled
All counties	60	9	26	2	55	12	141	23
<b>Northern Ireland</b>	<b>60</b>	<b>9</b>	<b>26</b>	<b>2</b>	<b>55</b>	<b>12</b>	<b>141</b>	<b>23</b>

**Table 1d** Total number of farms in each size group with other fodder crops in the Northern Ireland June 2021 census and number of samples from each group.

County	Size group (hectares)							
	<3		3<5		5+		Total	
	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled
All counties	144	2	66	0	110	2	320	4
<b>Northern Ireland</b>	<b>144</b>	<b>2</b>	<b>66</b>	<b>0</b>	<b>110</b>	<b>2</b>	<b>320</b>	<b>4</b>

**Table 2** The total number and area (hectares) of crops sampled in Northern Ireland, 2021.

<i>Crop type</i>	Number of crops surveyed	Surveyed area (ha)
<b><i>Established grassland crops</i></b>		
Enclosed grazing	216	7,088
Grass silage 1st Cut	244	7,465
Grass silage 2nd Cut	153	5,743
Grass silage 3rd Cut	90	3,459
Grass silage 4th Cut	22	965
Grass silage 5th Cut	6	241
Grass silage 6th Cut	2	162
Hay	11	60
Haylage	7	55
Rough grazing	71	1,981
<b><i>Sown crops</i></b>		
Arable silage	53	634
Arable silage (undersown)	16	178
Grass reseed	200	2,008
<b><i>Fodder crops</i></b>		
Fodder maize	23	407
Other fodder crops	4	22
<b>All crops</b>	<b>1,118</b>	<b>30,469</b>

**Table 3** Estimated area (ha) of grassland and fodder crops grown regionally in Northern Ireland, 2021.

<i>Crop type</i>	<i>County</i>						<i>Northern Ireland</i>
	<i>Antrim</i>	<i>Armagh</i>	<i>Down</i>	<i>Fermanagh</i>	<i>Londonderry</i>	<i>Tyrone</i>	
<b><i>Established grassland crops</i></b>							
Enclosed grazing	86,880	34,384	54,585	35,365	61,458	66,349	339,021
Grass silage 1st Cut	115,544	38,561	60,932	56,420	34,787	59,079	365,322
Grass silage 2nd Cut	67,189	27,245	45,923	29,625	22,971	44,604	237,559
Grass silage 3rd Cut	28,576	12,343	26,977	5,586	9,650	26,776	109,909
Grass silage 4th Cut	5,963	2,659	11,580	.	1,709	1,534	23,445
Grass silage 5th Cut	1,033	.	4,973	.	608	.	6,614
Grass silage 6th Cut	.	.	2,659	.	380	.	3,038
Hay	1,502	1,453	.	124	2,812	948	6,840
Haylage	.	.	258	3,673	2,567	.	6,498
Rough grazing	42,410	456	769	64,937	16,688	16,013	141,272
<b><i>Sown crops</i></b>							
Arable silage	843	242	1,453	.	718	446	3,702
Arable silage (undersown)	484	29	53	.	329	140	1,034
Grass reseed	30,223	7,447	15,146	9,747	22,277	15,747	100,587
<b><i>Fodder crops</i></b>							
Fodder maize	237	89	1,387	.	224	207	2,145
Other fodder crops	.	.	1,425	.	.	.	1,425
<b>All crops</b>	<b>380,884</b>	<b>124,908</b>	<b>228,121</b>	<b>205,477</b>	<b>177,179</b>	<b>231,843</b>	<b>1,348,412</b>

**Table 4a** Estimated area (spha) of grassland and fodder crops treated regionally with each pesticide type in Northern Ireland, 2021.

<i>Pesticide type</i>	<i>County</i>						<b>Northern Ireland</b>
	<b>Antrim</b>	<b>Armagh</b>	<b>Down</b>	<b>Fermanagh</b>	<b>Londonderry</b>	<b>Tyrone</b>	
Fungicide	1,635	53	2,111	.	1,938	754	6,491
Herbicide	35,923	17,825	18,353	10,349	27,720	26,069	136,240
Insecticide	.	.	389	.	.	482	872
Growth regulators	578	53	790	.	1,880	575	3,875
Seed treatment	1,236	237	3,246	.	1,044	319	6,082
<b>All pesticides</b>	<b>39,372</b>	<b>18,167</b>	<b>24,890</b>	<b>10,349</b>	<b>32,582</b>	<b>28,199</b>	<b>153,560</b>

**Table 4b** Estimated weight (kg) of pesticide applied to grassland and fodder crops regionally in Northern Ireland, 2021.

<i>Pesticide type</i>	<i>County</i>						<b>Northern Ireland</b>
	<b>Antrim</b>	<b>Armagh</b>	<b>Down</b>	<b>Fermanagh</b>	<b>Londonderry</b>	<b>Tyrone</b>	
Fungicide	438	30	574	.	179	293	1,513
Herbicide	33,081	18,963	10,705	13,488	18,399	23,765	118,399
Insecticide	.	.	1	.	.	2	3
Growth regulators	63	5	86	.	770	81	1,005
Seed treatment	15	3	14	.	6	3	41
<b>All pesticides</b>	<b>33,596</b>	<b>19,000</b>	<b>11,379</b>	<b>13,488</b>	<b>19,354</b>	<b>24,144</b>	<b>120,962</b>

**Table 5** The total area (spha) and the basic area (ha) of grassland and fodder crops treated with each pesticide type in Northern Ireland, 2021.

Crop type	Pesticide Type											
	Fungicides		Herbicides		Insecticides		Growth Regulators		Seed treatments		All pesticides	
	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)
<b>Established grassland crops</b>												
Enclosed grazing	.	.	36,511	34,443	.	.	.	.	.	.	36,511	34,443
Grass silage 1st Cut	.	.	58,728	55,969	.	.	.	.	.	.	58,728	55,969
Grass silage 2nd Cut	.	.	2,481	2,481	.	.	.	.	.	.	2,481	2,481
Hay	.	.	2,425	2,425	.	.	.	.	.	.	2,425	2,425
Haylage	.	.	622	622	.	.	.	.	.	.	622	622
Rough grazing	.	.	8,410	7,270	.	.	.	.	.	.	8,410	7,270
<b>Sown crops</b>												
Arable silage	3,830	1,958	4,080	1,965	185	185	2,011	1,308	3,157	3,157	13,262	3,292
Arable silage (undersown)	481	444	721	692	155	155	407	407	869	869	2,633	869
Grass reseed	2,181	1,820	19,181	17,462	532	532	1,458	1,458	.	.	23,352	17,697
<b>Fodder crops</b>												
Fodder maize	.	.	3,080	1,563	.	.	.	.	630	630	3,710	1,563
Other fodder crops	.	.	.	.	.	.	.	.	1,425	1,425	1,425	1,425
<b>All crops</b>	<b>6,491</b>	<b>4,221</b>	<b>136,240</b>	<b>124,893</b>	<b>872</b>	<b>872</b>	<b>3,875</b>	<b>3,172</b>	<b>6,082</b>	<b>6,082</b>	<b>153,560</b>	<b>128,057</b>



**Table 6** The total quantities (kg) of each pesticide type applied to grassland and fodder crops in Northern Ireland, 2021.

<i>Crop type</i>	<i>Pesticide Type</i>					<i>Total quantity (kg)</i>
	<i>Fungicides</i>	<i>Herbicides</i>	<i>Insecticides</i>	<i>Growth Regulators</i>	<i>Seed treatments</i>	
<b><i>Established grassland crops</i></b>						
Enclosed grazing	.	37,640	.	.	.	37,640
Grass silage 1st Cut	.	45,073	.	.	.	45,073
Grass silage 2nd Cut	.	2,831	.	.	.	2,831
Hay	.	2,216	.	.	.	2,216
Haylage	.	336	.	.	.	336
Rough grazing	.	9,185	.	.	.	9,185
<b><i>Sown crops</i></b>						
Arable silage	1,081	1,273	1	900	23	3,277
Arable silage (undersown)	66	563	1	23	11	663
Grass reseed	366	15,858	2	83	.	16,309
<b><i>Fodder crops</i></b>						
Fodder maize	.	3,425	.	.	.	3,425
Other fodder crops	.	.	.	.	8	8
<b>All crops</b>	<b>1,513</b>	<b>118,399</b>	<b>3</b>	<b>1,005</b>	<b>41</b>	<b>120,962</b>

**Table 7** The proportional area (%) of each crop treated with pesticides and the number of spray applications in Northern Ireland, 2021.

<i>Crop type</i>	<i>Pesticide type</i>											
	<i>Fungicide</i>		<i>Herbicides</i>		<i>Insecticides</i>		<i>Growth Regulators</i>		<i>Seed treatments</i>		<i>All pesticides</i>	
	<i>%</i>	<i>sp apps</i>	<i>%</i>	<i>sp apps</i>	<i>%</i>	<i>sp apps</i>	<i>%</i>	<i>sp apps</i>	<i>%</i>	<i>sp apps</i>	<i>%</i>	<i>sp apps</i>
<b><i>Established grassland crops</i></b>												
Enclosed grazing	.	.	10%	1.0	.	.	.	.	.	.	10%	1.0
Grass silage 1st Cut	.	.	15%	1.0	.	.	.	.	.	.	15%	1.0
Grass silage 2nd Cut	.	.	1%	1.0	.	.	.	.	.	.	1%	1.0
Hay	.	.	35%	1.0	.	.	.	.	.	.	35%	1.0
Haylage	.	.	10%	1.0	.	.	.	.	.	.	10%	1.0
Rough grazing	.	.	5%	1.1	.	.	.	.	.	.	5%	1.1
<b><i>Sown crops</i></b>												
Arable silage	53%	2.1	53%	2.0	5%	1.0	35%	2.0	85%	1.0	89%	1.7
Arable silage (undersown)	43%	1.4	67%	1.6	15%	1.0	39%	1.0	84%	1.0	84%	1.3
Grass reseed	2%	1.4	17%	1.2	1%	1.0	1%	1.0	.	.	17%	1.2
<b><i>Fodder crops</i></b>												
Fodder maize	.	.	73%	2.0	.	.	.	.	29%	1.0	73%	1.7
Fodder beet	.	.	.	.	.	.	.	.	100%	1.0	100%	1.0
Fodder kale	.	.	.	.	.	.	.	.	100%	1.0	100%	1.0

**Table 8** Estimated area (spha) of grassland and fodder crops treated with pesticide formulations in Northern Ireland, 2021.

Pesticide group and active substance	Crop type			Total area (spha)
	Arable silage	Arable silage (undersown)	Grass reseed	
<b>Fungicides</b>				
Benzovindiflupyr	.	251	926	1,178
Benzovindiflupyr/prothioconazole	244	.	.	244
Bixafen/fluopyram/prothioconazole	276	.	.	276
Bixafen/prothioconazole	598	.	.	598
Bixafen/prothioconazole/tebuconazole	.	37	362	399
Chlorothalonil	185	.	.	185
Cyprodinil/isopyrazam	31	.	.	31
Epoxiconazole	137	.	.	137
Epoxiconazole/fenpropimorph	57	.	.	57
Epoxiconazole/fluxapyroxad	103	.	.	103
Fenpropimorph	106	.	.	106
Fluoxastrobin/prothioconazole	195	.	.	195
Folpet	177	.	.	177
Proquinazid	62	.	.	62
Prothioconazole	662	103	380	1,145
Prothioconazole/spiroxamine	87	.	.	87
Prothioconazole/spiroxamine/tebuconazole	351	.	.	351
Prothioconazole/tebuconazole	.	37	362	399
Prothioconazole/trifloxystrobin	53	.	.	53
Pyraclostrobin	199	.	.	199
Tebuconazole	173	.	.	173
Unknown fungicide	134	53	152	339
<b>All fungicides</b>	<b>3,830</b>	<b>481</b>	<b>2,181</b>	<b>6,491</b>

**Table 8 (contd) Estimated area (spha) of grassland and fodder crops treated with pesticide formulations in Northern Ireland, 2021.**

Pesticide group and active substance	Crop type										Total area (spha)
	Arable silage	Arable silage (undersown)	Enclosed grazing	Fodder maize	Grass reseed	Grass silage 1st Cut	Grass silage 2nd Cut	Hay	Haylage	Rough grazing	
<b>Herbicides</b>											
2,4-D/MCPA	.	.	622	.	.	114	.	.	.	.	736
2,4-DB	103	.	.	.	.	.	.	.	.	.	103
Aminopyralid/fluroxypyr	.	.	.	.	.	.	38	.	.	.	38
Aminopyralid/triclopyr	.	53	3,947	.	152	8,743	228	1,368	622	390	15,504
Clopyralid/florasulam/fluroxypyr	103	.	671	.	6,233	775	.	.	.	.	7,782
Clopyralid/triclopyr	.	.	76	.	.	129	129	.	.	1,515	1,849
Dicamba/MCPA/mecoprop-p	.	37	5,054	.	106	.	.	.	.	.	5,197
Dicamba/mecoprop-p	106	206	790	.	995	5,355	.	.	.	.	7,452
Diflufenican	267	.	.	.	.	.	.	.	.	.	267
Diflufenican/flufenacet	465	.	.	.	.	.	.	.	.	.	465
Diflufenican/iodosulfuron-methyl-sodium/mesosulfuron-methyl	173	.	.	.	.	.	.	.	.	.	173
Dimethenamid-P/pendimethalin	.	.	.	1,046	.	.	.	.	.	.	1,046
Florasulam/fluroxypyr	103	37	775	.	589	1,003	.	.	.	.	2,506
Florasulam/halauxifen-methyl	57	.	.	.	.	.	.	.	.	.	57
Flufenacet/pendimethalin	103	.	.	.	.	.	.	.	.	.	103
Fluroxypyr	645	58	2,751	45	2,527	5,334	.	.	.	.	11,360
Fluroxypyr/halauxifen-methyl	40	.	.	.	.	.	.	.	.	.	40
Fluroxypyr/triclopyr	.	.	6,707	.	.	22,423	532	.	.	1,325	30,986
Glyphosate	248	.	218	284	6,817	264	.	.	.	.	7,831
MCPA	.	175	12,724	.	532	13,272	1,555	1,057	.	5,180	34,494
Mecoprop-P	235	103	2,177	.	380	1,088	.	.	.	.	3,982
Mesotrione	.	.	.	431	.	.	.	.	.	.	431
Mesotrione/nicosulfuron	.	.	.	53	.	.	.	.	.	.	53
Mesotrione/terbuthylazine	.	.	.	111	.	.	.	.	.	.	111
Metazachlor	.	.	.	.	76	.	.	.	.	.	76
Metsulfuron-methyl	272	.	.	.	.	228	.	.	.	.	500
Metsulfuron-methyl/tribenuron-methyl	739	.	.	.	.	.	.	.	.	.	739

**Table 8 (contd)** Estimated area (spha) of grassland and fodder crops treated with pesticide formulations in Northern Ireland, 2021.

<i>Pesticide group and active substance</i>	<i>Crop type</i>										<i>Total area (spha)</i>
	<i>Arable silage</i>	<i>Arable silage (undersown)</i>	<i>Enclosed grazing</i>	<i>Fodder maize</i>	<i>Grass reseed</i>	<i>Grass silage 1st Cut</i>	<i>Grass silage 2nd Cut</i>	<i>Hay</i>	<i>Haylage</i>	<i>Rough grazing</i>	
<b><i>Herbicides</i></b>											
Nicosulfuron	.	.	.	426	.	.	.	.	.	.	426
Pendimethalin	185	.	.	684	.	.	.	.	.	.	869
Pinoxaden	185	.	.	.	.	.	.	.	.	.	185
Unknown herbicide	53	53	.	.	774	.	.	.	.	.	880
<b>All herbicides</b>	<b>4,080</b>	<b>721</b>	<b>36,511</b>	<b>3,080</b>	<b>19,181</b>	<b>58,728</b>	<b>2,481</b>	<b>2,425</b>	<b>622</b>	<b>8,410</b>	<b>136,240</b>

**Table 8 (contd) Estimated area (spha) of grassland and fodder crops treated with pesticide formulations in Northern Ireland, 2021.**

Pesticide group and active substance	Crop name					Total
	Arable silage	Arable silage (undersown)	Fodder maize	Grass reseed	Other fodder crops	
<b><i>Insecticides</i></b>						
Lambda-cyhalothrin	185	103	.	380	.	667
Unknown insecticide	.	53	.	152	.	205
<b>All insecticides</b>	<b>185</b>	<b>155</b>	<b>.</b>	<b>532</b>	<b>.</b>	<b>872</b>
<b><i>Growth Regulators</i></b>						
Chlormequat	466	.	.	.	.	466
Chlormequat chloride	274	.	.	.	.	274
Mepiquat chloride/prohexadione-calcium	116	.	.	.	.	116
Prohexadione-calcium/trinexapac-ethyl	513	.	.	.	.	513
Trinexapac-ethyl	642	354	.	1,306	.	2,302
Unknown growth regulator	.	53	.	152	.	205
<b>All growth regulators</b>	<b>2,011</b>	<b>407</b>	<b>.</b>	<b>1,458</b>	<b>.</b>	<b>3,875</b>
<b><i>Seed treatments</i></b>						
Fludioxonil	1,737	515	.	.	1,149	3,401
Fludioxonil/fluxapyroxad/triticonazole	.	185	.	.	.	185
Prothioconazole	58	.	.	.	.	58
Prothioconazole/tebuconazole	256	117	.	.	.	373
Tefluthrin	.	.	.	.	276	276
Unknown seed treatment	1,106	53	630	.	.	1,789
<b>All seed treatments</b>	<b>3,157</b>	<b>869</b>	<b>630</b>	<b>.</b>	<b>1,425</b>	<b>6,082</b>

**Table 9** Estimated quantities (kg) of pesticide formulations applied to grassland and fodder crops in Northern Ireland, 2021.

Pesticide group and active substance	Crop type			Total quantity (kg)
	Arable silage	Arable silage (undersown)	Grass reseed	
<b>Fungicides</b>				
Benzovindiflupyr	.	10	37	47
Benzovindiflupyr/prothioconazole	40	.	.	40
Bixafen/fluopyram/prothioconazole	53	.	.	53
Bixafen/prothioconazole	104	.	.	104
Bixafen/prothioconazole/tebuconazole	.	13	129	142
Chlorothalonil	92	.	.	92
Cyprodinil/isopyrazam	13	.	.	13
Epoxiconazole	13	.	.	13
Epoxiconazole/fenpropimorph	29	.	.	29
Epoxiconazole/fluxapyroxad	25	.	.	25
Fenpropimorph	28	.	.	28
Fluoxastrobin/prothioconazole	39	.	.	39
Folpet	99	.	.	99
Proquinazid	3	.	.	3
Prothioconazole	97	36	133	265
Prothioconazole/spiroxamine	50	.	.	50
Prothioconazole/spiroxamine/tebuconazole	195	.	.	195
Prothioconazole/tebuconazole	.	7	68	75
Prothioconazole/trifloxystrobin	13	.	.	13
Pyraclostrobin	25	.	.	25
Tebuconazole	19	.	.	19
Unknown fungicide	145	.	.	145
<b>All fungicides</b>	<b>1,081</b>	<b>66</b>	<b>366</b>	<b>1,513</b>

**Table 9 (contd) Estimated quantities (kg) of pesticide formulations applied to grassland and fodder crops in Northern Ireland, 2021.**

Pesticide group and active substance	Crop type										Total quantity (kg)
	Arable silage	Arable silage (undersown)	Enclosed grazing	Fodder maize	Grass reseed	Grass silage 1st Cut	Grass silage 2nd Cut	Hay	Haylage	Rough grazing	
<b>Herbicides</b>											
2,4-D/MCPA	.	.	1,049	.	.	192	.	.	.	.	1,242
2,4-DB	185	.	.	.	.	.	.	.	.	.	185
Aminopyralid/fluroxypyr	.	.	.	.	.	.	10	.	.	.	10
Aminopyralid/triclopyr	.	29	1,913	.	82	4,549	123	739	336	211	7,981
Clopyralid/florasulam/fluroxypyr	16	.	245	.	1,137	283	.	.	.	.	1,682
Clopyralid/triclopyr	.	.	30	.	.	46	46	.	.	560	684
Dicamba/MCPA/mecoprop-p	.	46	6,222	.	131	.	.	.	.	.	6,399
Dicamba/mecoprop-p	69	174	675	.	843	4,578	.	.	.	.	6,340
Di flufenican	23	.	.	.	.	.	.	.	.	.	23
Di flufenican/flufenacet	124	.	.	.	.	.	.	.	.	.	124
Di flufenican/iodosulfuron-methyl-sodium/mesosulfuron-methyl	10	.	.	.	.	.	.	.	.	.	10
Dimethenamid-P/pendimethalin	.	.	.	1,934	.	.	.	.	.	.	1,934
Florasulam/fluroxypyr	21	6	159	.	102	206	.	.	.	.	493
Florasulam/halauxifen-methyl	1	.	.	.	.	.	.	.	.	.	1
Flufenacet/pendimethalin	74	.	.	.	.	.	.	.	.	.	74
Fluroxypyr	118	12	583	9	505	1,220	.	.	.	.	2,447
Fluroxypyr/halauxifen-methyl	6	.	.	.	.	.	.	.	.	.	6
Fluroxypyr/triclopyr	.	.	3,627	.	.	12,944	319	.	.	795	17,685
Glyphosate	328	.	235	474	12,054	299	.	.	.	.	13,390
MCPA	.	236	19,765	.	718	19,188	2,332	1,477	.	7,619	51,336
Mecoprop-P	182	62	3,134	.	228	1,567	.	.	.	.	5,173
Mesotrione	.	.	.	53	.	.	.	.	.	.	53
Mesotrione/nicosulfuron	.	.	.	8	.	.	.	.	.	.	8
Mesotrione/terbuthylazine	.	.	.	67	.	.	.	.	.	.	67
Metazachlor	.	.	.	.	57	.	.	.	.	.	57
Metsulfuron-methyl	1	.	.	.	.	0	.	.	.	.	2
Metsulfuron-methyl/tribenuron-methyl	8	.	.	.	.	.	.	.	.	.	8



**Table 9 (contd) Estimated quantities (kg) of pesticide formulations applied to grassland and fodder crops in Northern Ireland, 2021.**

<i>Pesticide group and active substance</i>	<i>Crop type</i>										<i>Total quantity (kg)</i>
	<i>Arable silage</i>	<i>Arable silage (undersown)</i>	<i>Enclosed grazing</i>	<i>Fodder maize</i>	<i>Grass reseed</i>	<i>Grass silage 1st Cut</i>	<i>Grass silage 2nd Cut</i>	<i>Hay</i>	<i>Haylage</i>	<i>Rough grazing</i>	
<b><i>Herbicides</i></b>											
Nicosulfuron	.	.	.	19	.	.	.	.	.	.	19
Pendimethalin	101	.	.	862	.	.	.	.	.	.	963
Pinoxaden	6	.	.	.	.	.	.	.	.	.	6
Unknown herbicide	.	.	.	.	.	.	.	.	.	.	N/K
<b>All herbicides</b>	<b>1,273</b>	<b>563</b>	<b>37,640</b>	<b>3,425</b>	<b>15,858</b>	<b>45,073</b>	<b>2,831</b>	<b>2,216</b>	<b>336</b>	<b>9,185</b>	<b>118,399</b>

*N/K refers to those treatments where the quantity applied could not be established*

**Table 9 (contd) Estimated quantities (kg) of pesticide formulations applied to grassland and fodder crops in Northern Ireland, 2021.**

Pesticide group and active substance	Crop name				Total
	Arable silage	Arable silage (undersown)	Grass reseed	Other fodder crops	
<b><i>Insecticides</i></b>					
Lambda-cyhalothrin	0.9	0.5	1.9	.	3.3
Unknown insecticide	.	.	.	.	N/K
<b>All insecticides</b>	<b>0.9</b>	<b>0.5</b>	<b>1.9</b>	<b>.</b>	<b>3.3</b>
<b><i>Growth Regulators</i></b>					
Chlormequat	376.1	.	.	.	376.1
Chlormequat chloride	395.1	.	.	.	395.1
Mepiquat chloride/prohexadione-calcium	60.8	.	.	.	60.8
Prohexadione-calcium/trinexapac-ethyl	36.5	.	.	.	36.5
Trinexapac-ethyl	31.0	22.5	83.3	.	136.8
Unknown growth regulator	.	.	.	.	N/K
<b>All growth regulators</b>	<b>899.5</b>	<b>22.5</b>	<b>83.3</b>	<b>.</b>	<b>1,005.3</b>
<b><i>Seed treatments</i></b>					
Fludioxonil	16.1	4.4	.	2.7	23.3
Fludioxonil/fluxapyroxad/triticonazole	.	4.2	.	.	4.2
Prothioconazole	1.3	.	.	.	1.3
Prothioconazole/tebuconazole	5.5	2.0	.	.	7.5
Tefluthrin	.	.	.	5.2	5.2
Unknown seed treatment	.	.	.	.	N/K
<b>All seed treatments</b>	<b>22.8</b>	<b>10.6</b>	<b>.</b>	<b>8.0</b>	<b>41.4</b>

*N/K refers to those treatments where the quantity applied could not be established*

**Table 10** The fifty active substances most extensively used on grassland and fodder crops in Northern Ireland, 2021 ranked by treated area (spha).

No.	Active substance	Treated area (spha)
1	Fluroxypyr	52,712
2	Triclopyr	48,339
3	MCPA	40,519
4	Mecoprop-P	16,632
5	Aminopyralid	15,542
6	Dicamba	12,650
7	Florasulam	10,345
8	Clopyralid	9,631
9	Glyphosate	7,831
10	Prothioconazole	3,745
11	Trinexapac-ethyl	2,815
12	Pendimethalin	2,017
13	Benzovindiflupyr	1,421
14	Tebuconazole	1,322
15	Bixafen	1,273
16	Metsulfuron-methyl	1,239
17	Dimethenamid-P	1,046
18	Diflufenican	905
19	Unknown herbicide	880
20	Tribenuron-methyl	739
21	2,4-D	736
22	Lambda-cyhalothrin	667
23	Chlormequat	650
24	Prohexadione-calcium	629
25	Mesotrione	595
26	Flufenacet	568
27	Nicosulfuron	478
28	Spiroxamine	438
29	Unknown fungicide	339
30	Epoxiconazole	297
31	Fluopyram	276
32	Chlormequat chloride	274
33	Unknown growth regulator	205
34	Unknown insecticide	205
35	Pyraclostrobin	199
36	Fluoxastrobin	195
37	Chlorothalonil	185
38	Pinoxaden	185
39	Folpet	177
40	Iodosulfuron-methyl-sodium	173
41	Mesosulfuron-methyl	173
42	Fenpropimorph	164
43	Mepiquat chloride	116
44	Terbuthylazine	111
45	2,4-DB	103
46	Fluxapyroxad	103
47	Halauxifen-methyl	97
48	Metazachlor	76
49	Proquinazid	62
50	Trifloxystrobin	53

**Table 11** The fifty active substances most extensively used on grassland and fodder crops in Northern Ireland, 2021 ranked by weight (kg).

No.	Active substance	Quantity applied (kg)
1	MCPA	57,156
2	Triclopyr	16,429
3	Glyphosate	13,390
4	Fluroxypyr	12,705
5	Mecoprop-P	11,635
6	Pendimethalin	2,070
7	Dicamba	1,184
8	Clopyralid	928
9	Aminopyralid	889
10	Dimethenamid-P	889
11	2,4-D	662
12	Prothioconazole	596
13	Chlormequat	542
14	Chlormequat chloride	395
15	2,4-DB	185
16	Trinexapac-ethyl	159
17	Tebuconazole	150
18	Unknown fungicide	145
19	Spiroxamine	141
20	Flufenacet	110
21	Folpet	99
22	Chlorothalonil	92
23	Mesotrione	70
24	Bixafen	69
25	Benzovindiflupyr	60
26	Diflufenican	58
27	Metazachlor	57
28	Terbuthylazine	55
29	Mepiquat chloride	52
30	Fenpropimorph	49
31	Florasulam	35
32	Epoxiconazole	33
33	Pyraclostrobin	25
34	Prohexadione-calcium	23
35	Fludioxonil	23
36	Nicosulfuron	21
37	Fluoxastrobin	20
38	Fluxapyroxad	12
39	Cyprodinil	9
40	Prothioconazole	7
41	Pinoxaden	6
42	Trifloxystrobin	6
43	Metsulfuron-methyl	6
44	Tefluthrin	5
45	Tribenuron-methyl	4
46	Isopyrazam	4
47	Lambda-cyhalothrin	3
48	Proquinazid	3
49	Fluopyram	2
50	Triticonazole	1

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

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>		<i>Total treated area (spha)</i>	<i>Basic treated area (ha)</i>	<i>Quantity applied (kg)</i>
	<i>Foliar disease</i>	<i>General disease control</i>			
<b><i>Fungicides</i></b>					
Benzovindiflupyr/prothioconazole	.	244	244	244	40
Bixafen/fluopyram/prothioconazole	.	276	276	276	53
Bixafen/prothioconazole	.	598	598	413	104
Chlorothalonil	.	185	185	185	92
Cyprodinil/isopyrazam	.	31	31	31	13
Epoxiconazole	.	137	137	137	13
Epoxiconazole/fenpropimorph	.	57	57	57	29
Epoxiconazole/fluxapyroxad	.	103	103	103	25
Fenpropimorph	.	106	106	106	28
Fluxastrobin/prothioconazole	117	78	195	195	39
Folpet	117	60	177	177	99
Proquinazid	.	62	62	62	3
Prothioconazole	.	662	662	570	97
Prothioconazole/spiroxamine	.	87	87	87	50
Prothioconazole/spiroxamine/tebuconazole	134	217	351	351	195
Prothioconazole/trifloxystrobin	.	53	53	53	13
Pyraclostrobin	.	199	199	199	25
Tebuconazole	.	173	173	173	19
Unknown fungicide	.	134	134	134	145
<b>All fungicides</b>	<b>368</b>	<b>3,462</b>	<b>3,830</b>	<b>.</b>	<b>1,081</b>

**Table 12 (contd) Arable silage: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.**

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>						Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Broadleaved weeds	Burnoff	Docks and chickweed	General weed control	Ground preparation	Pre-emergence weed control			
<b>Herbicides</b>									
2,4-DB	.	.	.	103	.	.	103	103	185
Clopyralid/florasulam/fluroxypyr	.	.	.	103	.	.	103	103	16
Dicamba/mecoprop-p	.	.	.	106	.	.	106	106	69
Diflufenican	.	.	.	185	.	82	267	267	23
Diflufenican/flufenacet	.	.	.	246	.	219	465	465	124
Diflufenican/iodosulfuron-methyl-sodium/mesosulfuron-methyl	.	.	.	173	.	.	173	173	10
Florasulam/fluroxypyr	.	.	103	.	.	.	103	103	21
Florasulam/halauxifen-methyl	.	.	.	57	.	.	57	57	1
Flufenacet/pendimethalin	.	.	.	.	.	103	103	103	74
Fluroxypyr	.	.	.	559	.	87	645	595	118
Fluroxypyr/halauxifen-methyl	.	.	.	40	.	.	40	40	6
Glyphosate	.	53	.	.	195	.	248	248	328
Mecoprop-P	.	.	.	235	.	.	235	235	182
Metsulfuron-methyl	.	.	.	272	.	.	272	272	1
Metsulfuron-methyl/tribenuron-methyl	103	.	.	549	.	87	739	739	8
Pendimethalin	.	.	.	185	.	.	185	185	101
Pinoxaden	.	.	.	185	.	.	185	185	6
Unknown herbicide	.	.	.	.	.	53	53	53	N/K
<b>All herbicides</b>	<b>103</b>	<b>53</b>	<b>103</b>	<b>2,997</b>	<b>195</b>	<b>631</b>	<b>4,080</b>	<b>.</b>	<b>1,273</b>

*N/K refers to those treatments where the quantity applied could not be established*

**Table 12 (contd)** Arable silage: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>			<i>Total treated area (spha)</i>	<i>Basic treated area (ha)</i>	<i>Quantity applied (kg)</i>
	<i>General insect control</i>	<i>Growth regulation</i>	<i>Seed treatment</i>			
<b><i>Insecticides</i></b>						
Lambda-cyhalothrin	185	.	.	185	185	1
<b>All insecticides</b>	<b>185</b>	<b>.</b>	<b>.</b>	<b>185</b>	<b>.</b>	<b>1</b>
<b><i>Growth Regulators</i></b>						
Chlormequat	.	466	.	466	373	376
Chlormequat chloride	.	274	.	274	137	395
Mepiquat chloride/prohexadione-calcium	.	116	.	116	58	61
Prohexadione-calcium/trinexapac-ethyl	.	513	.	513	513	36
Trinexapac-ethyl	.	642	.	642	535	31
<b>All growth regulators</b>	<b>.</b>	<b>2,011</b>	<b>.</b>	<b>2,011</b>	<b>.</b>	<b>900</b>
<b><i>Seed treatments</i></b>						
Fludioxonil	.	.	1,737	1,737	1,737	16
Prothioconazole	.	.	58	58	58	1
Prothioconazole/tebuconazole	.	.	256	256	256	5
Unknown seed treatment	.	.	1,106	1,106	1,106	N/K
<b>All seed treatments</b>	<b>.</b>	<b>.</b>	<b>3,157</b>	<b>3,157</b>	<b>.</b>	<b>23</b>

*N/K refers to those treatments where the quantity applied could not be established*

**Table 13** Arable silage (undersown): 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)
	Chickweed	General disease control	General weed control	Pre-emergence weed control			
<b>Fungicides</b>							
Benzovindiflupyr	.	251	.	.	251	251	10
Bixafen/prothioconazole/tebuconazole	.	37	.	.	37	37	13
Prothioconazole	.	103	.	.	103	103	36
Prothioconazole/tebuconazole	.	37	.	.	37	37	7
Unknown fungicide	.	53	.	.	53	53	N/K
<b>All fungicides</b>	.	<b>481</b>	.	.	<b>481</b>	.	<b>66</b>
<b>Herbicides</b>							
Aminopyralid/triclopyr	.	.	.	53	53	53	29
Dicamba/MCPA/mecoprop-p	.	.	37	.	37	37	46
Dicamba/mecoprop-p	.	.	206	.	206	206	174
Florasulam/fluroxypyr	.	.	37	.	37	37	6
Fluroxypyr	.	.	58	.	58	29	12
MCPA	72	.	103	.	175	175	236
Mecoprop-P	.	.	103	.	103	103	62
Unknown herbicide	.	.	53	.	53	53	N/K
<b>All herbicides</b>	<b>72</b>	.	<b>596</b>	<b>53</b>	<b>721</b>	.	<b>563</b>

*N/K refers to those treatments where the quantity applied could not be established*



**Table 13 (contd)** Arable silage (undersown): pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>				<i>Total treated area (spha)</i>	<i>Basic treated area (ha)</i>	<i>Quantity applied (kg)</i>
	<i>Aphids</i>	<i>General insect control</i>	<i>Growth regulation</i>	<i>Seed treatment</i>			
<b><i>Insecticides</i></b>							
Lambda-cyhalothrin	103	.	.	.	103	103	1
Unknown insecticide	.	53	.	.	53	53	N/K
<b>All insecticides</b>	<b>103</b>	<b>53</b>	<b>.</b>	<b>.</b>	<b>155</b>	<b>.</b>	<b>1</b>
<b><i>Growth Regulators</i></b>							
Trinexapac-ethyl	.	.	354	.	354	354	23
Unknown growth regulator	.	.	53	.	53	53	N/K
<b>All growth regulators</b>	<b>.</b>	<b>.</b>	<b>407</b>	<b>.</b>	<b>407</b>	<b>.</b>	<b>23</b>
<b><i>Seed treatments</i></b>							
Fludioxonil	.	.	.	515	515	515	4
Fludioxonil/fluxapyroxad/triticonazole	.	.	.	185	185	185	4
Prothioconazole/tebuconazole	.	.	.	117	117	117	2
Unknown seed treatment	.	.	.	53	53	53	N/K
<b>All seed treatments</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>869</b>	<b>869</b>	<b>.</b>	<b>11</b>

*N/K refers to those treatments where the quantity applied could not be established*

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

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>								<i>Total treated area (spha)</i>	<i>Basic treated area (ha)</i>	<i>Quantity applied (kg)</i>
	<i>Buttercup and rushes</i>	<i>Chickweed</i>	<i>Docks</i>	<i>Docks and chickweed</i>	<i>Docks and buttercup</i>	<i>General weed control</i>	<i>Rushes</i>	<i>Thistles and nettles</i>			
<b>Herbicides</b>											
2,4-D/MCPA	.	.	.	.	.	.	622	.	622	622	1,049
Aminopyralid/triclopyr	.	.	1,828	.	.	2,119	.	.	3,947	3,947	1,913
Clopyralid/florasulam/fluroxypyr	.	.	516	.	.	155	.	.	671	671	245
Clopyralid/triclopyr	.	.	.	.	.	.	.	76	76	76	30
Dicamba/MCPA/mecoprop-p	.	.	.	.	.	5,054	.	.	5,054	5,054	6,222
Dicamba/mecoprop-p	.	.	.	.	372	418	.	.	790	790	675
Florasulam/fluroxypyr	.	775	.	.	.	.	.	.	775	775	159
Fluroxypyr	.	.	944	.	.	1,808	.	.	2,751	2,751	583
Fluroxypyr/triclopyr	.	.	5,932	775	.	.	.	.	6,707	6,707	3,627
Glyphosate	.	.	.	.	.	218	.	.	218	218	235
MCPA	92	.	5,131	.	.	3,915	3,586	.	12,724	12,724	19,765
Mecoprop-P	.	.	2,177	.	.	.	.	.	2,177	2,177	3,134
<b>All herbicides</b>	<b>92</b>	<b>775</b>	<b>16,527</b>	<b>775</b>	<b>372</b>	<b>13,687</b>	<b>4,208</b>	<b>76</b>	<b>36,511</b>	<b>.</b>	<b>37,640</b>

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

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>					<i>Total treated area (spha)</i>	<i>Basic treated area (ha)</i>	<i>Quantity applied (kg)</i>
	<i>Burnoff</i>	<i>General weed control</i>	<i>Ground preparation</i>	<i>Pre-emergence weed control</i>	<i>Seed treatment</i>			
<b><i>Herbicides</i></b>								
Dimethenamid-P/pendimethalin	.	.	.	1,046	.	1,046	1,046	1,934
Fluroxypyr	.	45	.	.	.	45	45	9
Glyphosate	53	.	232	.	.	284	284	474
Mesotrione	.	431	.	.	.	431	431	53
Mesotrione/nicosulfuron	.	53	.	.	.	53	53	8
Mesotrione/terbuthylazine	.	111	.	.	.	111	111	67
Nicosulfuron	.	426	.	.	.	426	426	19
Pendimethalin	.	215	111	358	.	684	684	862
<b>All herbicides</b>	<b>53</b>	<b>1,280</b>	<b>343</b>	<b>1,404</b>	<b>.</b>	<b>3,080</b>	<b>.</b>	<b>3,425</b>
<b><i>Seed treatments</i></b>								
Unknown seed treatment	.	.	.	.	630	630	630	N/K
<b>All seed treatments</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>630</b>	<b>630</b>	<b>.</b>	<b>N/K</b>

*N/K refers to those treatments where the quantity applied could not be established*

**Table 16** Grass reseed: 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)
	Burnoff	Chickweed	Docks and buttercup	General disease control	General weed control	Ground preparation	Pre-emergence weed control			
<b>Fungicides</b>										
Benzovindiflupyr	.	.	.	926	.	.	.	926	926	37
Bixafen/prothioconazole/tebuconazole	.	.	.	362	.	.	.	362	362	129
Prothioconazole	.	.	.	380	.	.	.	380	380	133
Prothioconazole/tebuconazole	.	.	.	362	.	.	.	362	362	68
Unknown fungicide	.	.	.	152	.	.	.	152	152	N/K
<b>All fungicides</b>	.	.	.	<b>2,181</b>	.	.	.	<b>2,181</b>	.	<b>366</b>
<b>Herbicides</b>										
Aminopyralid/triclopyr	.	.	.	.	.	.	152	152	152	82
Clopyralid/florasulam/fluroxypyr	.	.	.	.	6,233	.	.	6,233	6,233	1,137
Dicamba/MCPA/mecoprop-p	.	.	.	.	106	.	.	106	106	131
Dicamba/mecoprop-p	.	.	235	.	759	.	.	995	995	843
Florasulam/fluroxypyr	.	228	.	.	362	.	.	589	589	102
Fluroxypyr	.	.	.	.	2,527	.	.	2,527	1,264	505
Glyphosate	436	.	.	.	106	6,275	.	6,817	6,817	12,054
MCPA	.	76	.	.	380	76	.	532	532	718
Mecoprop-P	.	.	.	.	380	.	.	380	380	228
Metazachlor	.	.	.	.	.	76	.	76	76	57
Unknown herbicide	.	.	.	.	152	.	622	774	774	N/K
<b>All herbicides</b>	<b>436</b>	<b>304</b>	<b>235</b>	.	<b>11,005</b>	<b>6,427</b>	<b>774</b>	<b>19,181</b>	.	<b>15,858</b>

*N/K refers to those treatments where the quantity applied could not be established*

**Table 16 (contd) Grass reseed: 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)
	Aphids	General insect control	Growth regulation			
<b><i>Insecticides</i></b>						
Lambda-cyhalothrin	380	.	.	380	380	2
Unknown insecticide	.	152	.	152	152	N/K
<b>All insecticides</b>	<b>380</b>	<b>152</b>	<b>.</b>	<b>532</b>	<b>.</b>	<b>2</b>
<b><i>Growth regulators</i></b>						
Tri-nexapac-ethyl	.	.	1,306	1,306	1,306	83
Unknown growth regulator	.	.	152	152	152	N/K
<b>All growth regulators</b>	<b>.</b>	<b>.</b>	<b>1,458</b>	<b>1,458</b>	<b>.</b>	<b>83</b>

*N/K refers to those treatments where the quantity applied could not be established*

**Table 17** Grass silage 1st cut: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>								<i>Total treated area (spha)</i>	<i>Basic treated area (ha)</i>	<i>Quantity applied (kg)</i>
	<i>Burnoff</i>	<i>Chickweed</i>	<i>Docks</i>	<i>Docks and chickweed</i>	<i>General weed control</i>	<i>Ground preparation</i>	<i>Rushes</i>	<i>Thistles</i>			
<b>Herbicides</b>											
2,4-D/MCPA	.	.	.	.	.	.	.	114	114	114	192
Aminopyralid/triclopyr	.	.	6,733	.	2,010	.	.	.	8,743	8,743	4,549
Clopyralid/florasulam/fluroxypyr	.	.	775	.	.	.	.	.	775	775	283
Clopyralid/triclopyr	.	.	.	.	129	.	.	.	129	129	46
Dicamba/mecoprop-p	.	.	.	.	5,355	.	.	.	5,355	5,355	4,578
Florasulam/fluroxypyr	.	775	.	.	228	.	.	.	1,003	1,003	206
Fluroxypyr	.	2,659	.	182	2,493	.	.	.	5,334	5,334	1,220
Fluroxypyr/triclopyr	.	.	18,033	1,808	2,582	.	.	.	22,423	22,423	12,944
Glyphosate	174	.	.	.	.	90	.	.	264	264	299
MCPA	.	622	2,527	.	8,760	.	1,363	.	13,272	13,272	19,188
Mecoprop-P	.	.	1,088	.	.	.	.	.	1,088	1,088	1,567
Metsulfuron-methyl	.	.	228	.	.	.	.	.	228	228	<1
<b>All herbicides</b>	<b>174</b>	<b>4,055</b>	<b>29,384</b>	<b>1,990</b>	<b>21,558</b>	<b>90</b>	<b>1,363</b>	<b>114</b>	<b>58,728</b>	<b>.</b>	<b>45,073</b>

**Table 18** Grass silage 2nd cut: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>			Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Docks	General weed control	Thistles			
<b>Herbicides</b>						
Aminopyralid/fluroxypyr	38	.	.	38	38	10
Aminopyralid/triclopyr	228	.	.	228	228	123
Clopyralid/triclopyr	.	.	129	129	129	46
Fluroxypyr/triclopyr	532	.	.	532	532	319
MCPA	.	1,555	.	1,555	1,555	2,332
<b>All herbicides</b>	<b>798</b>	<b>1,555</b>	<b>129</b>	<b>2,481</b>	<b>.</b>	<b>2,831</b>

**Table 19** Hay and haylage: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>			Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Docks	General weed control	Thistles			
<b>Herbicides</b>						
Aminopyralid/triclopyr	1,990	.	.	1,990	1,990	1,075
MCPA	.	1,057	.	1,057	1,057	1,477
<b>All herbicides</b>	<b>1,990</b>	<b>1,057</b>	<b>.</b>	<b>3,047</b>	<b>.</b>	<b>2,552</b>

**Table 20** Other fodder crops: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

<i>Pesticide group and active substance</i>	<i>Reason for treatment</i>			
	Seed treatment	Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
<b>Seed treatments</b>				
Fludioxonil	1,149	1,149	1,149	3
Tefluthrin	276	276	276	5
<b>All seed treatments</b>	<b>1,425</b>	<b>1,425</b>	<b>.</b>	<b>8</b>

**Table 21** Rough grazing: pesticide-treated area (spha), basic treated area (ha), quantity applied (kg) and reasons for use.

<i>Pesticide group and active substance</i>	<i>Reasons for treatment</i>				Total treated area (spha)	Basic treated area (ha)	Quantity applied (kg)
	Buttercup and rushes	Docks	Rushes	Thistles			
<b>Herbicides</b>							
Aminopyralid/triclopyr	.	390	.	.	390	390	211
Clopyralid/triclopyr	.	.	.	1,515	1,515	1,515	560
Fluroxypyr/triclopyr	.	1,325	.	.	1,325	1,325	795
MCPA	37	495	4,648	.	5,180	5,180	7,619
<b>All herbicides</b>	<b>37</b>	<b>2,211</b>	<b>4,648</b>	<b>1,515</b>	<b>8,410</b>	<b>.</b>	<b>9,185</b>



**Table 22 Comparison of the area (ha) of grassland and fodder crops grown in Northern Ireland, 1989-2021.**

Crop type	Survey year								
	1989	1993	1997	2003	2005	2009	2013	2017	2021
<b>Established grassland crops</b>									
Enclosed grazing	481,059	476,209	512,819	537,735	517,045	484,223	427,889	449,622	339,021
Grass silage	243,149	252,502	422,650	430,542	409,704	487,520	646,533	507,039	745,886
Hay and haylage	66,001	33,017	32,303	11,997	16,744	9,861	20,079	5,353	13,338
Rough grazing	212,930	173,239	165,005	162,330	148,586	141,926	181,633	140,400	141,272
<b>All established grassland crops</b>	<b>1,003,139</b>	<b>934,967</b>	<b>1,132,777</b>	<b>1,142,603</b>	<b>1,092,079</b>	<b>1,123,530</b>	<b>1,276,133</b>	<b>1,102,414</b>	<b>1,239,518</b>
<b>Sown crops</b>									
Arable silage	3,762	.	766	8,720	2,667	1,638	2,334	3,021	3,702
Arable silage (undersown)	.	2,073	3,308	6,512	2,683	1,937	1,929	795	1,034
Cereals (undersown)	6,213	5,907	4,284	4,086	1,497	573	.	.	.
Grass reseed	35,434	5,380	11,472	27,282	18,350	13,229	19,647	76,751	100,587
<b>All sown crops</b>	<b>45,409</b>	<b>13,360</b>	<b>19,830</b>	<b>46,600</b>	<b>25,197</b>	<b>17,376</b>	<b>23,910</b>	<b>80,567</b>	<b>105,323</b>
<b>Fodder crops</b>									
Fodder beet	.	.	70	.	85	.	.	296	276
Fodder kale	.	72	45	335	17	.	.	406	1,149
Fodder kale (undersown)	.	.	58	.	.	.	.	.	.
Fodder maize	.	.	10	1,463	2,423	3,455	1,918	1,381	2,145
Fodder rape	.	.	99	157	192	.	.	177	.
Fodder turnip	371	.	250	464	375	.	.	96	.
All fodder (excluding maize)	371	72	522	956	669	1,024	769	975	1,425
<b>All fodder crops</b>	<b>371</b>	<b>72</b>	<b>532</b>	<b>2,419</b>	<b>3,092</b>	<b>4,480</b>	<b>2,687</b>	<b>2,356</b>	<b>3,571</b>
<b>All crops</b>	<b>1,048,919</b>	<b>948,400</b>	<b>1,153,138</b>	<b>1,191,622</b>	<b>1,120,368</b>	<b>1,145,386</b>	<b>1,302,730</b>	<b>1,185,337</b>	<b>1,348,412</b>

**Table 23 Comparison of pesticide usage on grassland and fodder crops in Northern Ireland, 1989-2021, area treated (spha) and weight applied (kg).**

Crop type	Survey year																	
	1989		1993		1997		2003		2005		2009		2013		2017		2021	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
<b>Established grassland crops</b>																		
Enclosed grazing	25,252	43,110	35,051	55,380	48,536	80,409	65,821	34,960	47,403	31,832	21,927	20,972	27,709	22,746	38,369	27,890	36,511	37,640
Grass silage	26,921	42,170	41,091	64,570	50,209	74,492	57,309	40,380	51,141	32,740	39,128	27,028	56,182	36,980	59,771	40,361	61,209	47,903
Hay	2,673	2,820	490	570	843	1,338	238	230	260	340	.	.	701	785	942	592	3,047	2,552
Rough grazing	2,736	3,480	1,866	3,750	1,710	2,746	2,591	1,990	4,637	4,700	308	540	4,021	5,035	9,404	13,637	8,410	9,185
<b>All established grassland crops</b>	<b>57,582</b>	<b>91,580</b>	<b>78,498</b>	<b>124,270</b>	<b>101,298</b>	<b>158,985</b>	<b>125,959</b>	<b>77,560</b>	<b>103,441</b>	<b>69,612</b>	<b>61,363</b>	<b>48,539</b>	<b>88,612</b>	<b>65,545</b>	<b>108,486</b>	<b>82,481</b>	<b>109,177</b>	<b>97,280</b>
<b>Sown crops</b>																		
Arable silage	8,138	3,660	.	.	2,299	1,590	24,175	9,680	6,814	2,544	8,223	3,550	12,296	3,901	14,701	4,442	13,262	3,277
Arable silage (undersown)	.	.	3,632	380	2,830	154	9,186	2,400	4301.4	1,865	5,192	2,842	5,459	2,874	1,943	605	2,633	663
Cereals (undersown)	11,190	11,620	5,212	6,700	4,804	4,735	4,421	1,600	2,323	1,291	3,427	368	.	.	.	.	.	.
Grass reseed	32,344	15,330	4,090	3,510	7,377	2,907	6,912	8,010	5,685	4,194	7,091	11,325	9,948	9,458	13,839	8,086	23,352	16,309
<b>All sown crops</b>	<b>51,672</b>	<b>30,610</b>	<b>12,934</b>	<b>10,590</b>	<b>17,310</b>	<b>9,385</b>	<b>44,694</b>	<b>21,690</b>	<b>19,123</b>	<b>9,895</b>	<b>23,933</b>	<b>18,086</b>	<b>27,702</b>	<b>16,233</b>	<b>30,484</b>	<b>13,133</b>	<b>39,247</b>	<b>20,249</b>
<b>Fodder crops</b>																		
Fodder beet	.	.	.	.	227	91	.	.	170	612	.	.	.	.	1,323	657	276	5
Fodder kale	.	.	98	20	105	214	670	780	.	.	.	.	.	.	98	71	1,149	3
Fodder kale (undersown)	.	.	.	.	203	249	.	.	.	.	.	.	.	.	.	.	.	.
Fodder maize	.	.	.	.	20	29	6,669	2,580	5,993	5,735	13,751	6,326	6,527	4,649	4,050	2,896	3,710	3,425
Fodder rape	.	.	.	.	164	250	157	<1	59	1	.	.	.	.	139	.	.	.
Fodder swede	.	.	.	.	.	.	.	.	.	.	.	.	.	.	191	69	.	.
Fodder turnip	621	330	.	.	651	347	.	.	.	.	.	.	.	.	.	.	.	.
All fodder (excluding maize)	621	330	98	20	1,350	1,150	827	780	229	613	2,952	2,292	513	523	1,752	796	1,425	8
<b>All fodder crops</b>	<b>621</b>	<b>330</b>	<b>98</b>	<b>20</b>	<b>1,370</b>	<b>1,179</b>	<b>7,496</b>	<b>3,360</b>	<b>6,222</b>	<b>6,348</b>	<b>16,703</b>	<b>8,618</b>	<b>7,040</b>	<b>5,172</b>	<b>7,553</b>	<b>3,692</b>	<b>5,135</b>	<b>3,433</b>
<b>All crops</b>	<b>109,875</b>	<b>122,470</b>	<b>91,529</b>	<b>134,870</b>	<b>119,978</b>	<b>169,550</b>	<b>178,149</b>	<b>102,610</b>	<b>128,786</b>	<b>85,854</b>	<b>101,999</b>	<b>75,243</b>	<b>123,354</b>	<b>86,949</b>	<b>146,524</b>	<b>99,306</b>	<b>158,757</b>	<b>120,962</b>

**Table 24** Comparison of pesticide usage on grassland and fodder crops in Northern Ireland, 1989-2021, area treated (spha), weight applied (kg) and area grown (ha).

Pesticide type	Survey year																			
	1989		1993		1997		2003		2005		2009		2013		2017		2021			
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)		
<b>Fungicides</b>	251	235	180	59	421	161	7,933	2,417	1,776	502	4,737	1,106	4,471	1,704	6,771	2,369	6,491	1,513		
<b>Herbicides</b>	73,637	120,551	85,151	134,680	109,253	168,545	149,630	97,976	118,499	84,221	80,173	72,516	96,197	73,708	130,631	96,148	136,240	118,399		
<b>Insecticides</b>																				
<i>Carbamates</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*	*	
<i>Organochlorines</i>	.	.	.	.	8	4	.	.	.	.	.	.	.	.	.	.	.	*	*	
<i>Organophosphates</i>	91	51	.	.	.	.	415	379	1,268	647	298	159	14,399	10,369	.	.	.	*	*	
<i>Pyrethroids</i>	258	4	.	.	.	.	558	14	960	21	2,623	16	912	6	1,322	6	.	*	*	
<i>Unknown insecticides</i>	.	.	.	.	.	.	.	.	269	.	.	.	.	.	.	.	.	.	*	*
<b>All insecticides</b>	349	55	.	.	8	4	974	393	2,498	667	2,922	176	15,311	10,375	1,322	6	872	3		
<b>Growth regulators</b>	.	.	.	.	176	42	1,870	1,369	486	159	1,973	715	1,742	793	1,490	470	3,875	1,005		
<b>Seed treatments</b>	35,635	1,624	6,199	129	10,121	793	17,741	458	5,527	304	12,193	730	5,631	370	4,557	313	6,082	41		
<b>All pesticides</b>	109,874	122,465	91,529	134,869	119,978	169,545	178,148	102,613	128,786	85,854	101,998	75,243	123,354	86,949	144,772	99,306	153,560	120,962		
<b>Area grown (ha)</b>	1,048,919		948,400		1,153,138		1,191,622		1,120,368		1,145,386		1,302,730		1,185,438		1,348,412			

\*Insecticide classification data not available for 2021

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## Northern Ireland Pesticide Usage Survey Published Reports Appendix 1

<b>Report No.</b>	<b>Report title</b>	<b>ISBN</b>
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

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

<b>Report No.</b>	<b>Report title</b>	<b>ISBN</b>
216	Arable Crops 2006	1-848 07 035 6
217	Top Fruit Crops 2006	1-848 07 019 6
218	Soft Fruit Crops 2006	1-848 07 036 3
222	Vegetable Crops 2007	1-848 07 062 2
223	Mushroom Crops 2007	1 848 07 061 5
230	Arable Crops 2008	1 848 07 135 3
231	Top Fruit Crops 2008	1-848 07 134 6
238	Grassland & Fodder Crops 2009	1-848 07 186 5
239	Hardy Nursery Stock Crops 2009	1-848 07 187 2
240	Soft Fruit Crops 2010	1-848 07 251 0
242	Arable Crops 2010	1-848 07 252 7
245	Mushroom Crops 2011	1-848 07 308 1
246	Vegetable Crops 2011	1-848 07 309 8
247	Arable Crops 2012	1-848 07 404 3
248	Soft Fruit Crops 2012	1-848 07 402 6
249	Top Fruit Crops 2012	1-848 07 403 3
258	Grassland & Fodder Crops 2013	1-84807-485-9
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
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

**ISBN 978-1-908471-25-3**

