PESTICIDE USAGE IN NORTHERN IRELAND

Survey Report 290

Northern Ireland Top Fruit Crops 2018

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PESTICIDE USAGE SURVEY REPORT 290

NORTHERN IRELAND
TOP FRUIT CROPS
2018

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(An estimated 93% of Northern Ireland top fruit is produced in County Armagh)

SUMMARY

This report presents information from a survey of the pesticide usage practices of top fruit growers in Northern Ireland in 2018. This is the tenth pesticide usage survey to be conducted on top fruit crops in the region since 1992. There were an estimated total of 206 top fruit holdings in Northern Ireland in 2018. Since the previous survey, there was a marginal decrease in the total area of top fruit crops grown to 1,498 hectares, and a slight decrease of 2% of the area of Bramley apples grown. A sample of 74 growers was selected to provide information on crop applications, storage treatments and orchard floor treatments. An estimated 93% of all top fruit crops were grown in County Armagh, with Bramley apple orchards accounting for 97% of the total top fruit grown in Northern Ireland. There were an estimated 48,932 tonnes of Bramley apples harvested in 2018, a 9% increase compared to 2016.

Overall, an estimated 33.5 tonnes of pesticide active ingredients (including other products) were applied to 40,748 spray hectares. The total quantity of fungicides, herbicides, insecticides and acaracides and growth regulators applied was approximately 22.5 tonnes applied to 30,503 spray hectares. The pesticide-treated area decreased by 13% compared with 2016, and the weight of active ingredients applied decreased by 6%.

Fungicide application accounted for 63% of total pesticide treated area (including 'other' products) and 63% of weight applied. When compared with 2016, the area treated with fungicides decreased by 19%, and the weight of fungicides applied decreased by 11%. Captan (20%), mancozeb (14%), dithianon (12%), pyrimethanil (12%) and dodine (10%) and pyraclostrobin (7%) were the fungicide active ingredients most commonly used on top fruit crops, collectively accounting for 74% of fungicide-treated area. An estimated 94% of all fungicide applications were applied to control apple scab (*Venturia inaequalis*).

Insecticide and acaricide application represented 6% and <1% of total pesticide use by area treated and weight of active substance applied, respectively. The area treated with insecticides and acaricides decreased by 13% when compared with 2016. The moulting accelerator, methoxyfenozide accounted for 35% of insecticide treated area, a two-fold increase since 2016. Deltamethrin represented 21% of the insecticide treated area. There was no recorded use of the organophosphate insecticide chlorpyrifos or the carbamate, pirimicarb. It should be noted that, from 31st March 2016, all uses of chlorpyrifos were revoked except for treatment of brassica crops in peat blocks via gantry-mounted sprayers. The use of the pyrethroid insecticide cypermethrin decreased by 82%, representing 13% of total insecticide application. The pyridine carboxamide flonicamid accounted for 3% of insecticide treated area. Aphid control accounted for 9% of insecticide application and a further 78% was attributed to 'general insect control'.

Herbicide application represented 3% of total pesticide use by area treated and 4% of weight applied. Overall, the area treated with herbicide decreased by 32%, but the weight of herbicides applied increased by 1%, when compared with 2016. Glyphosate was the most

frequently used herbicide accounting for 67% of total herbicide application. MCPA accounted for 11% of the total herbicide treated area. The most common weed management practice was to apply herbicides in strips under the tree canopy and mow the inter-row grass area between the rows of trees, with 91% of growers using this method. The remaining 9% of growers either mowed or grazed the strips under the tree canopy in addition to the inter-row area.

Growth regulators accounted for 3% of the pesticide-treated area and less than 1% of the total weight of pesticide applied. Gibberellins, prohexadione and prohexadione-calcium were the only growth regulator active ingredients applied. Prohexadione and prohexadione-calcium accounted for 81% of the area treated with a growth regulator and 99% of the total weight of growth regulator applied.

An estimated 11 tonnes of 'other products', which included foliar feeds, trace elements and calcium-based products, were applied to the crops during this survey period, a similar figure compared to 2016. The majority of applications were to treat potential nutritional disorders.

Data were also collected on post-harvest storage treatments applied to top fruit crops. An estimated 14,476 tonnes of apples were stored, of which only Bramley apples were treated accounting for 14,474 tonnes. The pesticide active 1-Methylcyclopropene was recorded in use on stored top fruit crops in 2018, accounting for 100% of apples treated. Bramley apples represented 99% of all stored apples.

INTRODUCTION

As a participant in the UK Working Party on Pesticide Usage Surveys, the Agri-Food and Biosciences Institute (AFBI) on behalf of the Department of Agriculture, Environmental and Rural Affairs for Northern Ireland (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 also be used by those involved in residue testing, for public information and to evaluate the impact of policy and trends in pesticide usage.

This is the tenth survey of pesticide usage on top fruit crops in Northern Ireland. Results from the previous surveys which reported on pesticide usage practices on top fruit crops in 1992 (Kidd *et al*., 1994), 1997 (Kidd *et al*., 2001), 2002 (Kearns *et al*., 2004), 2006 (Kearns *et al*., 2007), 2008 (Kirbas *et al*., 2009), 2010 (Lavery *et al*., 2011), 2012 (Lavery *et al*., 2013), 2014 (Lavery *et al*., 2015) and 2016 (Jess *et al*., 2017) are included in the report for comparative purposes. A list of published Northern Ireland Pesticide Usage Survey reports is shown in Appendix 1.

METHODS

Using the Northern Ireland Agricultural Census, June 2018 (Anon., 2018) and also single farm payment data (unpublished), a sample of holdings to be surveyed was selected. The sample was stratified into five county regions of Northern Ireland, (there is limited top fruit production in County Londonderry which was omitted from this survey) and into five size groups based on the total area of top fruit crops grown in each county. The total number of holdings together with the number surveyed, are shown in Table 1. Due to the relatively low numbers involved, counties Antrim, Down, Fermanagh and Tyrone have been combined and renamed ‘All other counties’.

The survey period comprises the end of the 2017 harvest to the end of the 2018 harvest. The purpose of the survey was explained to selected growers in preliminary correspondence. A total of 74 holdings (representing 36% of all top fruit growers) were visited and data collected by personal interview. The growers’ reasons for pesticide use were also included, but may not always seem appropriate. Holdings selected in the original sample which were unable to provide data were replaced with those from the same county and size group held on a reserve list.

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

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 was treated with at least one pesticide, and is referred to in hectares (ha).
- ‘Treated area’ refers to the total area treated with a pesticide, which includes all repeated applications to the basic area, and is referred to in spray hectares (spha).
- ‘Spray applications’ refers to the number of treatments by any pesticide type to the treated areas.
- Generally, orchards recorded in this survey are laid out with trees planted in rows and the area between the rows, referred to in the report as the ‘inter-row’ area, is sown with grass. ‘Herbicide strip’ refers to the area beneath the canopy of each tree. Herbicide treatments are applied solely to ‘Herbicide strips’ and not the entire orchard floor.
- ‘Reasons for use’; the reasons reported for the use of pesticides are the growers’ stated reasons for use and may not reflect label recommendations.
- Non-fruiting and fruiting crops were combined and recorded only as ‘Bramley apples’ and ‘Other’ top fruit which covered all ages of top fruit crops. Non-fruiting crops are generally newly planted trees that have not yet produced fruit.
- ‘Rounding’; due to rounding of figures, there may be slight differences in totals both within and between tables.
- Log10 scales have been used in Figures 4, 5 12 and 13 to assist data visualization as the difference between measures is comparatively large.

RESULTS AND DISCUSSION

Crops

The estimated area of top fruit crops grown and the area surveyed are shown in Table 2, together with the proportion (%) of each crop surveyed. An estimated 93% of the total area of top fruit crops was grown in County Armagh, with Bramley apples accounting for 97% of the total area of top fruit crops grown. Other top fruit crops, comprising dessert apples, pears and plums, accounted for the remaining 3%. (Table 3, Figure 1).

Regional Pesticide Usage (Tables 4 & 5, Figures 4 & 5)

Regionally, County Armagh is the main production centre for top fruit in Northern Ireland (primarily Bramley apples), accounting for 94% of the total pesticide-treated area and 92% of the weight of pesticides applied. A very limited quantity of top fruit is produced in the other counties of Northern Ireland.

Pesticide Usage on Crops (Tables 6 & 7, Figures 19 to 30)

The estimated quantities of pesticide active ingredients applied and the area of crops treated with pesticides are shown in Tables 6 & 7 (Figures 19 to 30). Bramley apples accounted for 97% of both the pesticide-treated area and the weight of active ingredients applied. 'Other' top fruit crops accounted for the remainder of both the weight of pesticides applied and the pesticide-treated area.

Number of Spray Applications (Table 8)

The mean number of spray applications of pesticides to top fruit crops is shown in Table 8. All pesticide types were used on all crops. The total grown area of top fruit crops received at least one pesticide application.

Bramley apples received a mean of 17 fungicide applications from 10 spray rounds. On average these crops also received 2 herbicide applications, 2 insecticide/acaricide applications and 2 applications of growth regulators. Bramley apples also received on average 9 applications of 'Other products' from 7 spray rounds.

'Other' top fruit crops received a mean of 17 fungicide applications from 9 spray rounds, 2 herbicide applications, 2 insecticide/acaricides applications, 3 applications of growth regulators and 8 applications of 'Other products'.

Total Pesticide Usage (Tables 4, 5, 9, 10, 11 & 12, Figures 2, 3, 4 & 5)

Approximately the total tonnes of all pesticide active ingredients (including other products) was 33.5 tonnes, applied to 40,748 spray hectares of top fruit crops grown in Northern Ireland in 2018. The total quantity of fungicides, herbicides, insecticides and acaracides and growth regulators applied was approximately 22.5 tonnes applied to 30,503 spray hectares. (Tables 4 & 5, Figures 4 & 5).

Fungicides were applied to 63% of the total pesticide-treated area, representing 63% of the weight of pesticides applied. Insecticides/acaricides, applied to 6% of the pesticide-treated area, represented less than 1% of the total weight of pesticides used. Herbicides accounted for 3% of the area treated and 4% of the total weight of pesticides used. Growth regulators represented 3% and less than 1% of the total pesticide-treated area and weight of active ingredients applied, respectively. The pesticide groups, comprising the active ingredients and formulations applied are shown in Tables 9 and 10.

Captan was applied to 19% of the fungicide-treated area, representing 26% of the weight of fungicides applied. Mancozeb accounted for a further 14% of the fungicide-treated area and 25% of the weight of fungicides applied. Dithianon and pyrimethanil were each applied to 12% of the fungicide-treated area, accounting for 5% of the weight of fungicides applied, while dodine was applied to 10% of the fungicide-treated area, accounting for 9% of the weight of fungicides applied. Copper oxychloride was applied to 4% of the fungicide-treated area, represented 9% of the weight of fungicides applied. Fungicide applications to orchards for the control of apple scab (*Venturia inaequalis*) accounted for 94% of all fungicides used. The remaining 6% of fungicide applications were for canker (*Nectria galligena*), mildew (*Podosphaera leucotricha*), rot control and storage aid. In total, 26 fungicide active ingredients were applied to Bramley apple crops.

Glyphosate (applied to 62% of the herbicide-treated area) was the most commonly applied herbicide active ingredient accounting for 72% of the weight of herbicide active ingredients applied. MCPA accounted for 11% of herbicide-treated area and 9% of the weight of herbicide active ingredients applied. Other herbicides containing active ingredients dicamba/MCPA/mecoprop-P in different formulations and formulations florasulam/halauxifen-methyl and 2,4-D/glyphosate accounted for the remaining herbicide application.

The diacylhydrazine active ingredient methoxyfenozide represented 35% of the insecticide/acaricide-treated area and 58% of the weight of insecticides applied. The pyrethroid active ingredient deltamethrin was applied to 21% of the insecticide-treated area but only accounted for 4% of the weight of insecticides applied. The pyrethroid active ingredient cypermethrin was applied to 13% of the insecticide-treated area, accounting for 16% of the weight of insecticides applied. Chlorantraniliprole represented a further 15% of the insecticide/acaricide-treated area and accounted for only 9% of the weight of

insecticides applied. General insect control accounted for 78% of insecticide application, with a further 9% applied to control aphids. Control of *Blastobasis* spp. accounted for only 6% of insecticide application to top fruit in Northern Ireland. Apple sucker, sawfly and woolly aphid were the other reasons given for insecticide application.

The use of growth regulators decreased by 34% and they were applied to an estimated 1,285 spray hectares of top fruit crops. The cyclohexanecarboxylate growth regulator prohexadione-calcium represented 77% of the area treated and 94% of the weight of growth regulators applied. Gibberellins accounted for 19% of the treated area but only 1% of the weight of growth regulators applied. Prohexadione, the only other active ingredient recorded in this group, accounted for a further 4% of the area treated and 5% of the weight of growth regulators applied. Growth regulators were primarily applied to control and suppress shoot growth on the apple trees.

The active ingredients recorded, ranked by application area and weight applied, are shown in Tables 11 & 12, respectively.

An estimated 10.9 tonnes of 'other products' were applied to 10,245 spray hectares of Bramley apples (Table 15, Figures 31 & 32). A total of 24 'Other products' were applied. These included foliar feeds, trace elements and calcium-based products, of which, a majority were used to treat potential nutritional disorders. Calcium-based products were applied to 42% of the treated area of 'Other products' used on Bramley apple orchards, primarily as foliar feeds and trace elements. Nitrogen-based products were applied to 22% of the area treated, representing 39% of the weight of 'Other products' applied. Manganese application represented a further 2% and 1% of "other product" use by application area and weight applied, respectively. Products containing boron, magnesium, phosphorus, potassium and zinc were also applied to top fruit crops.

'OTHER' TOP FRUIT CROPS (TABLE 14)

'Other' top fruit represented 3% of the total area of top fruit grown with dessert apples being the principal other top fruit grown in Northern Ireland. Other top fruit recorded included plums, pears and culinary apples. There may be other small holdings of top fruit which were not recorded on the Northern Ireland Agricultural Census (2017) and therefore not selected for this survey. This made it extremely difficult to estimate the amount of 'other' top fruit being grown. On average, pesticide usage trends for dessert apples and pears were similar to those associated with Bramley apple crops. A comparison of the grown area of 'other' top fruit is shown in Table 16.

COMPARISON WITH PREVIOUS SURVEYS

Comparative information on pesticide usage on top fruit crops grown in Northern Ireland in 1992, 1996, 2002, 2006, 2008, 2010 and 2012, 2014, 2016 and 2018 is included in Tables 16, 17a, 17b, 20 and Figures 6 to 14.

Area of top fruit crops grown (Table 16)

Despite the number of orchard holdings in Northern Ireland increasing by 49% since 2016, the area of top fruit grown in Northern Ireland in 2018 decreased by 1.8% during the period, with the area of Bramley apple crops decreasing to 1,457 ha. This would suggest that some consolidation has taken place within the industry since 2016. The survey also recorded an 8% increase in the overall area of 'other' top fruit crops grown (including dessert apple, pear and plum orchards), from 38ha to 41ha. As in all previous surveys, a majority of the total top fruit area in Northern Ireland was associated with Bramley apple production (97%).

Comparison of pesticide usage (Tables 17a & 17b, Figures 6 to 13)

There was a 20% decrease in the total area of pesticide application to top fruit crops between 2016 and 2018. The weight of pesticides applied in 2018 decreased by 10% when compared to 2016. This was due to an overall reduction in pesticide application across all pesticide types. (Figures 8 & 9).

The area of top fruit crops treated with fungicides increased by 19% since 2016, and the weight of fungicides applied decreased by 11%. Herbicide applications decreased by 32% for the total area treated but the total weight of active ingredients applied increased by 1%.

The area of top fruit crops treated with insecticide/acaricide decreased by 13% and the weight of active ingredients applied decreased by 30% since 2016 (Figures 10 & 11). Pyrethroid applications decreased by 43% in area treated and 24% in quantity applied. The neonicotinoid active ingredient thiacloprid was recorded in use for the first time in top fruit crops. No insecticides containing carbamate or organophosphate active ingredients were recorded in 2018. Other insecticides included moulting accelerators, diamides and METI acaricides and insecticides (Mitochondrial complex I electron transport Inhibitors).

An estimated 1,285 spray hectares were treated with growth regulators in 2018, a decrease of 34% since 2016. The weight of growth regulators applied decreased by 11% between 2016 and 2018.

The active ingredients most extensively used in 2018 are shown in Table 17b, which also provides the trend in application from 1992 -2018.

Storage of top fruit crops (Tables 18 - 19, Figures 14 to 16)

An estimated 14,474 tonnes of Bramley apples were stored in 2018, of which 86% (12,395) tonnes) received a post-harvest treatment. There was a 40% decrease in the weight of apples stored in 2018 when compared with 2016 (Figure 15). This was attributed to greater than normal quantities of apples stored in 2016 due to a cap on Northern Ireland Bramley requirements as well as EU trade sanctions against Russia which caused an inevitable 'backflow' of fruit from eastern European countries.

Five different storage methods were identified during this survey. Unscrubbed controlled atmosphere stores, representing 41% of stored apples, are refrigerated un-vented stores which use a method to remove and expel carbon dioxide and other gasses from the atmosphere. Cold/refrigerated stores, which have no modified atmosphere and use cooled, forced air ventilation, accounted for 37% of stored apples. Scrubbed controlled atmosphere stores, which are refrigerated and use vents to reduce carbon dioxide levels, accounted for 17% of stored apples. A further 4% of stored apples were in carbon dioxide stores. Less than 1% were stored in unventilated barns.

The ethylene inhibitor, 1-methylcyclopropene, was the only product recorded in use on stored apples, accounting for all stored apples treated. Due to its application method, it was impossible to calculate the weight of active ingredient applied.

Tonnes treated and the active ingredient recorded in use on stored apples are shown in tables 18 to 19.

ACKNOWLEDGEMENTS

We, the authors, wish to thank all of the growers who participated in this survey, without whose co-operation, the completion of this report would not have been possible. We are also grateful for the invaluable assistance of Ms Ciara Isaac and Mr Sean Lennon who worked tirelessly on key aspects of this report.

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Figure 1 **Utilisation of top fruit production area in Northern Ireland, 2018.**

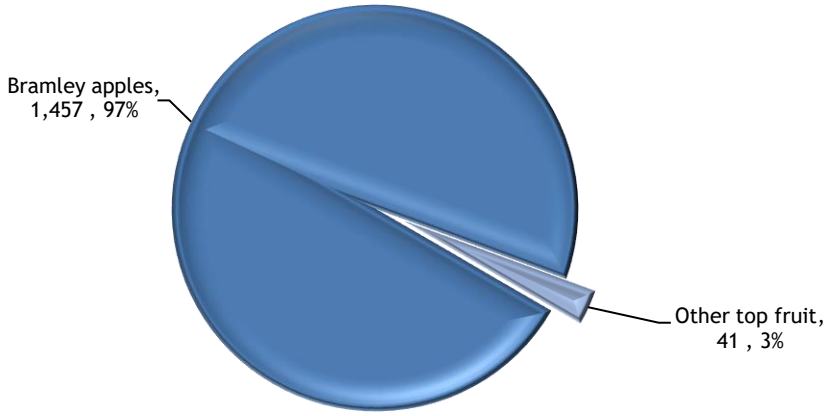


Figure 2 **Proportional area (spha) of top fruit crops treated with each pesticide type in Northern Ireland, 2018.**

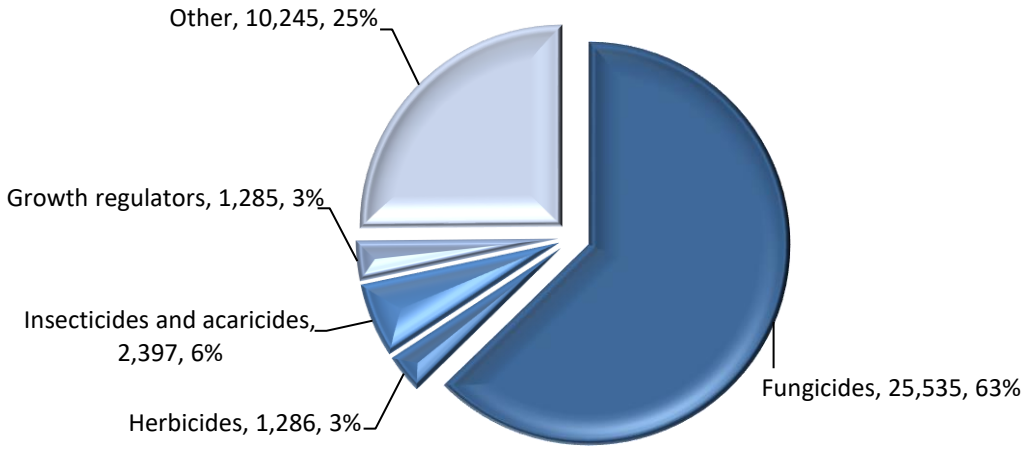


Figure 3 **Proportion of top fruit crops treated with each pesticide type by weight (kg) in Northern Ireland, 2018.**

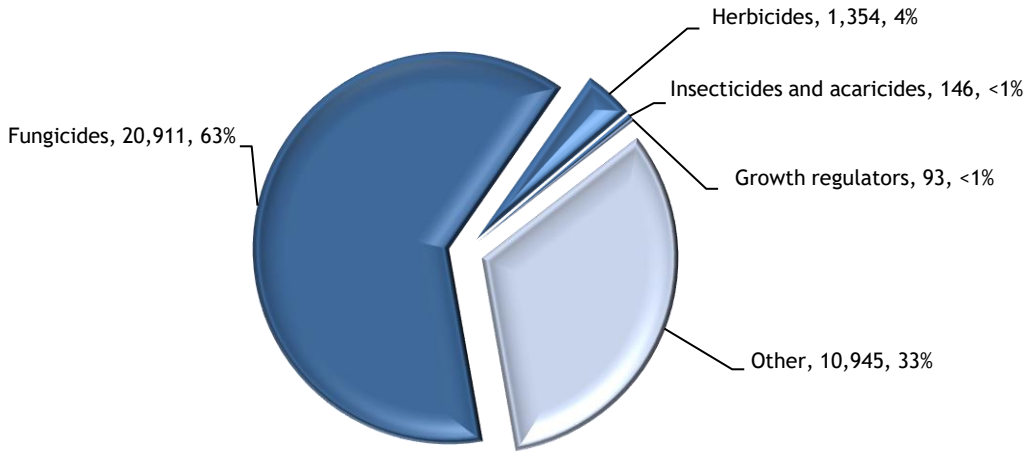
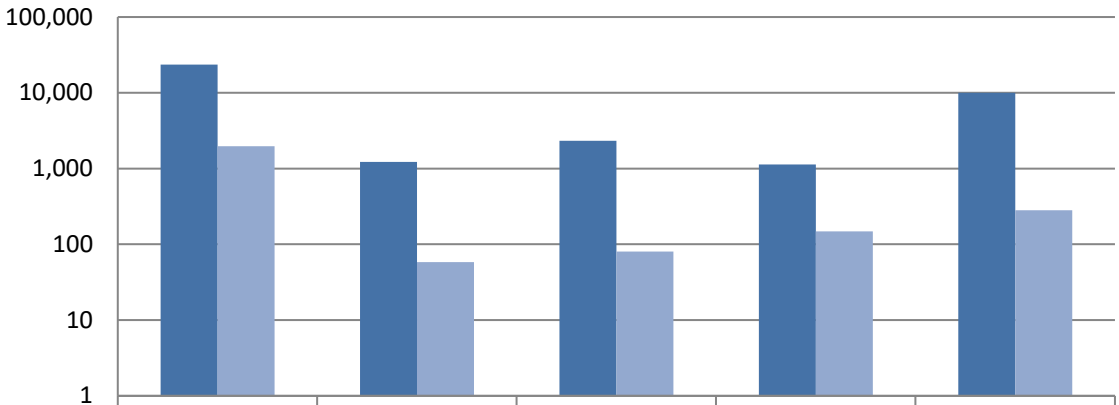
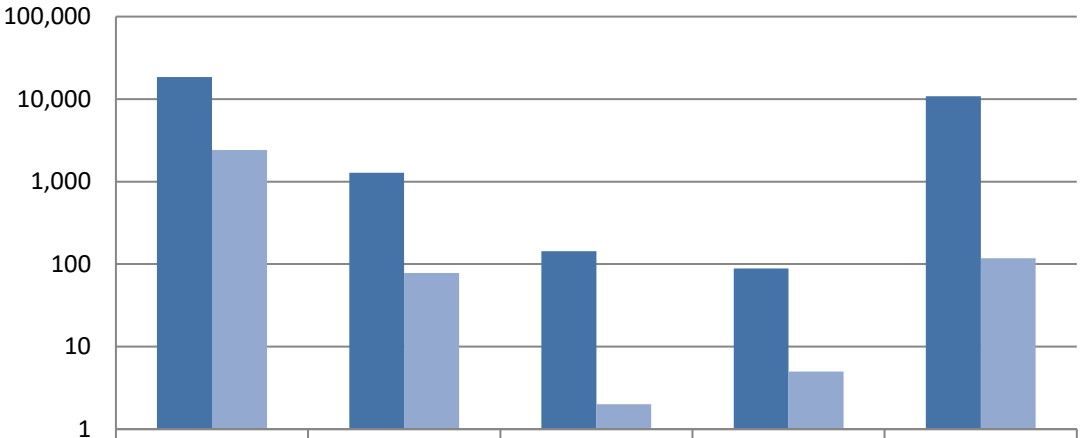


Figure 4 **Area (spha (log_{10})) of top fruit crops treated with each pesticide type in the county regions of Northern Ireland, 2018.**



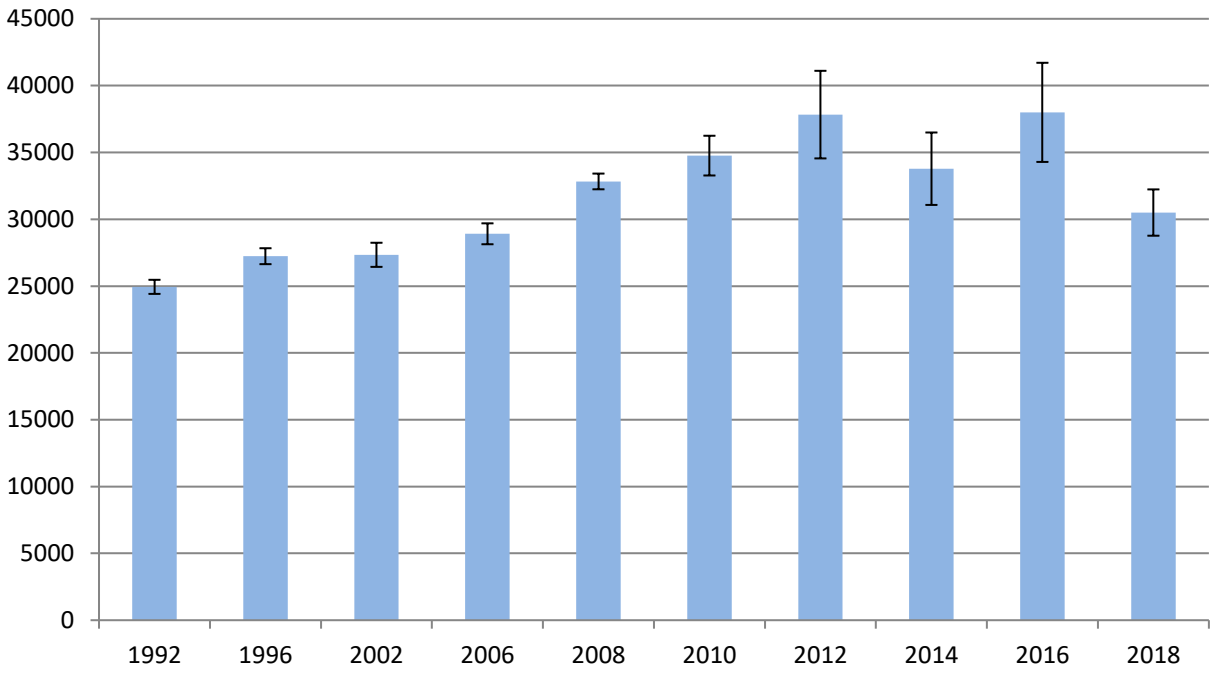
	Fungicides	Herbicides	Insecticides and acaricides	Growth regulators	Other
Armagh	23,570	1,228	2,317	1,137	9,964
All other counties	1,965	58	80	148	281

Figure 5 **Quantity (kg (log_{10})) of each pesticide type applied to top fruit crops in the county regions of Northern Ireland, 2018.**



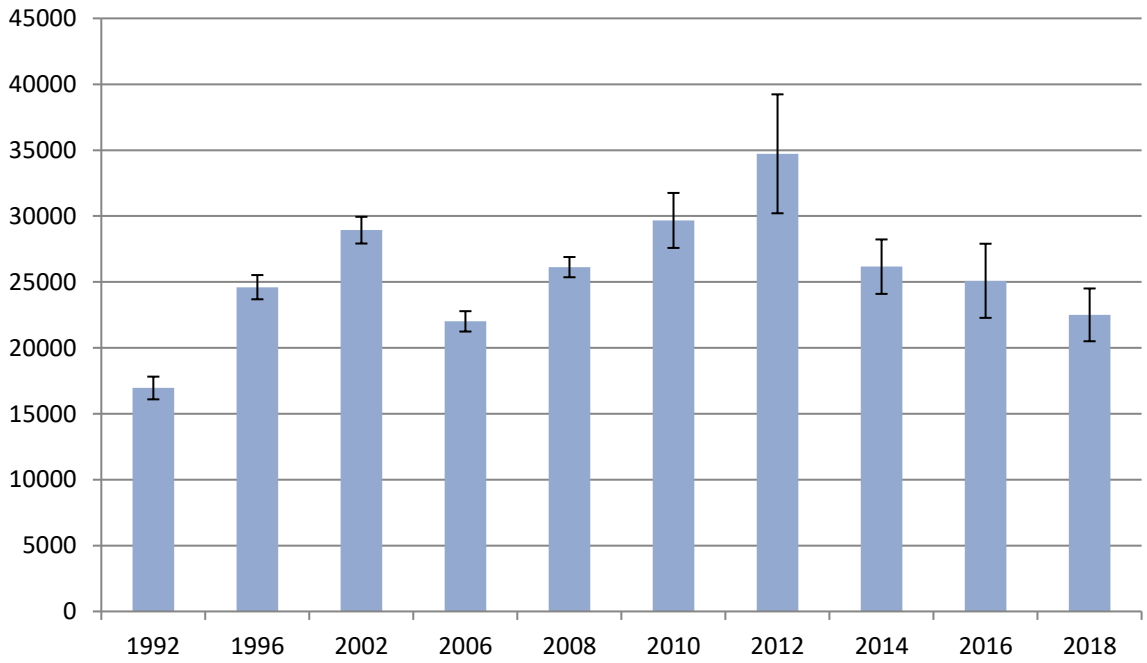
	Fungicides	Herbicides	Insecticides and acaricides	Growth regulators	Other
Armagh	18,497	1,276	144	89	10,827
All other counties	2,414	78	2	5	118

Figure 6 **Comparison of pesticide usage on top fruit crops by area treated (spha) in Northern Ireland, 1992-2018** (*Bars are Standard Error*).



** Figures include fungicides, herbicides, insecticides and acaricides and growth regulators. "Other products" not included.

Figure 7 **Comparison of pesticide usage on top fruit crops by total weight applied (kg) in Northern Ireland, 1992-2018** (*Bars are Standard Error*).



** Figures include fungicides, herbicides, insecticides and acaricides and growth regulators. "Other products" not included.

Figure 8 **Comparison of area treated (spha) with different pesticide groups in Northern Ireland, 1992-2018.**

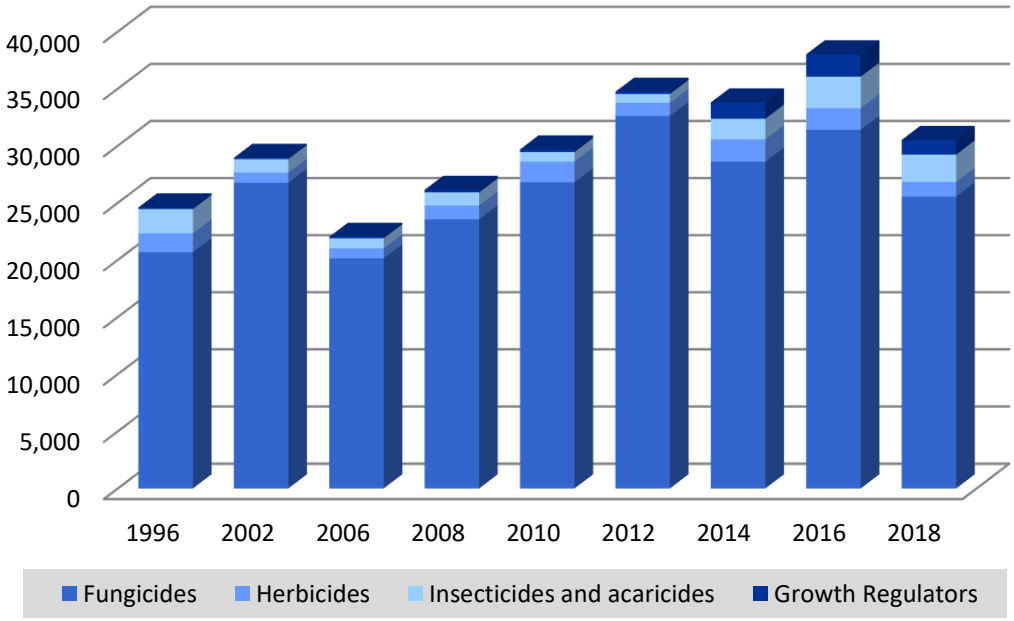


Figure 9 **Comparison of quantity (kg) of different pesticide groups applied to top fruit crops in Northern Ireland, 1992-2018.**

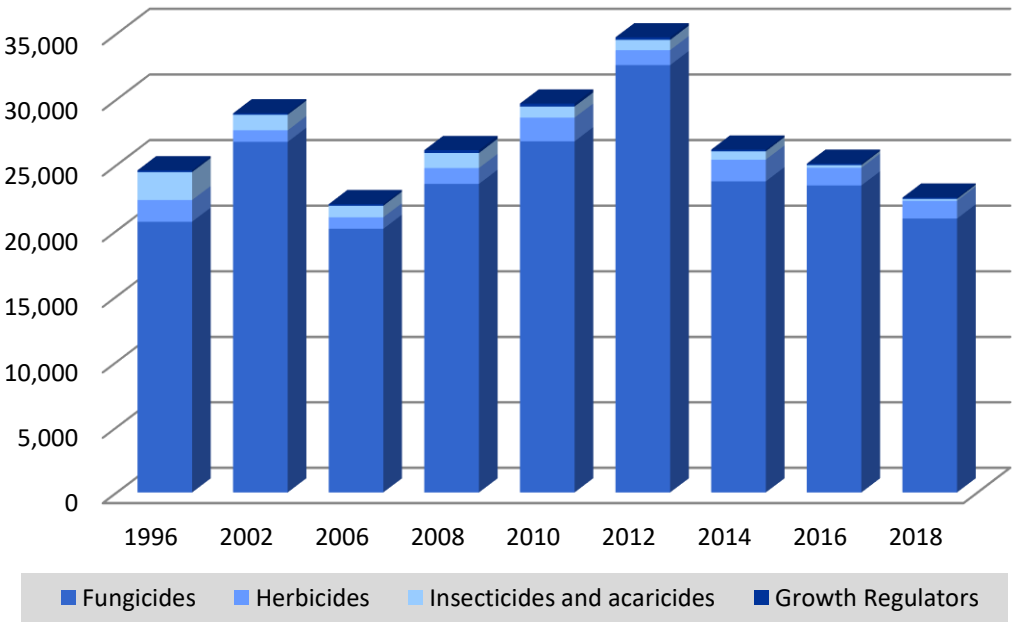
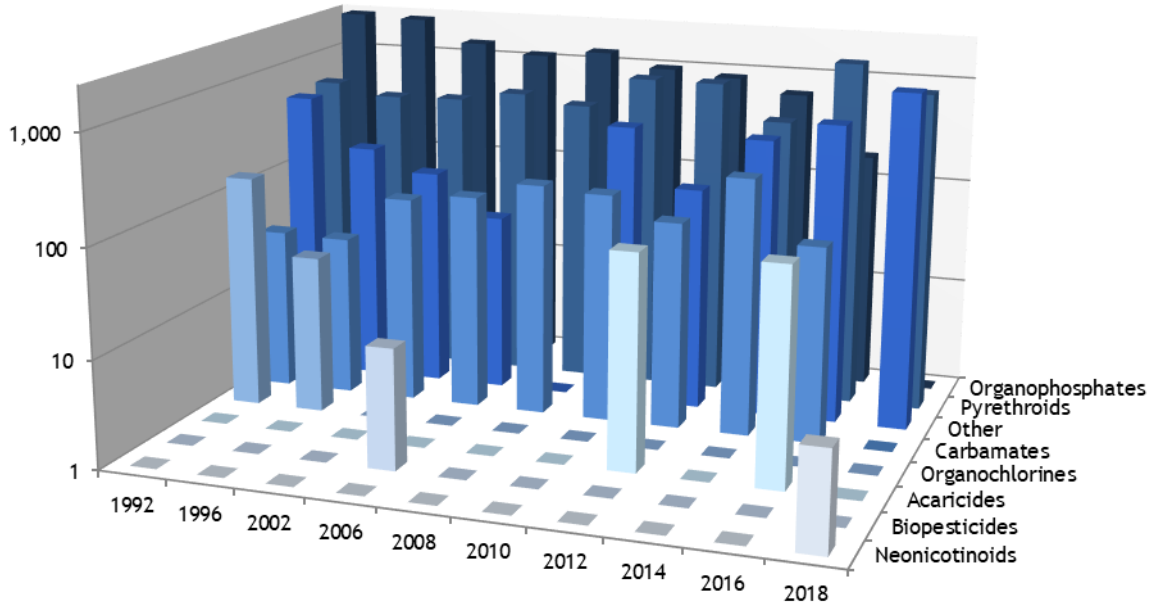
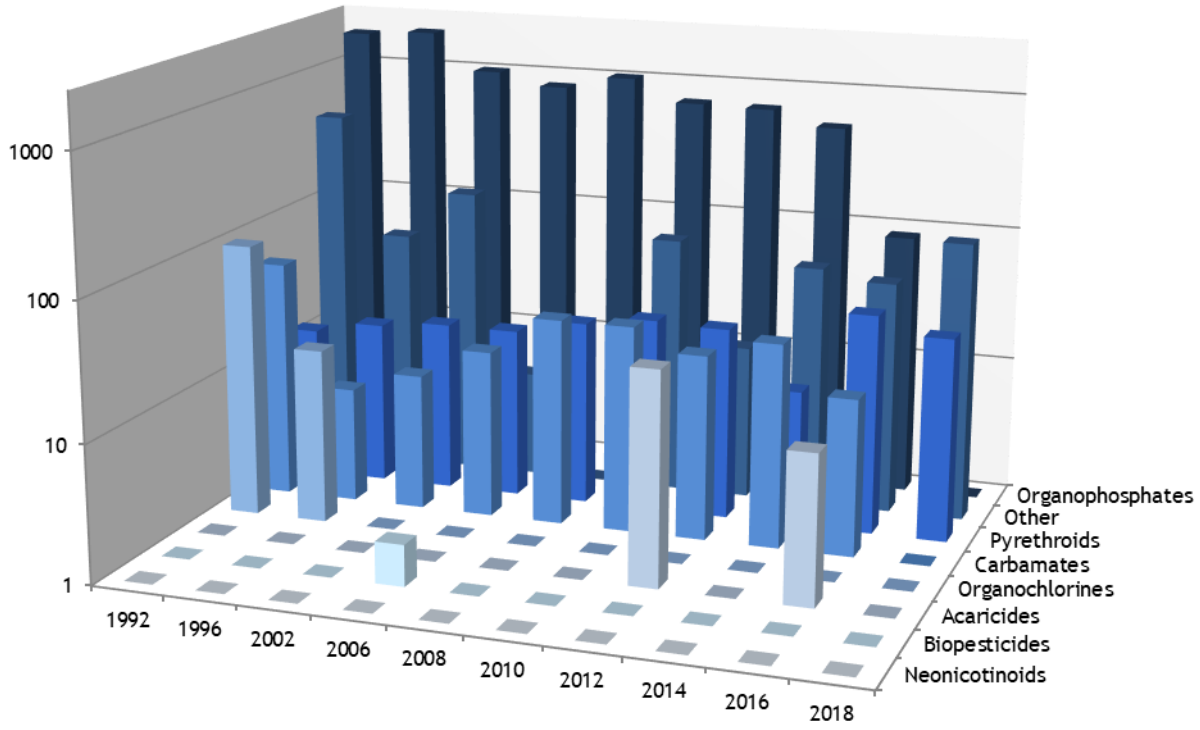


Figure 10 **Comparison of area (spha (log_{10})) of top fruit crops treated with different insecticide types in Northern Ireland, 1992-2018.**



Acaricides previously included with 'Other' from 1992-2010

Figure 11 **Comparison of quantity (kg (log_{10})) of different insecticide types applied to top fruit crops in Northern Ireland, 1992-2018.**



Acaricides previously included with 'Other' from 1992-2010

Figure 12 **Comparison of application rates (kg/spha) for pesticide types used on top fruit crops in Northern Ireland, 1992-2018.**

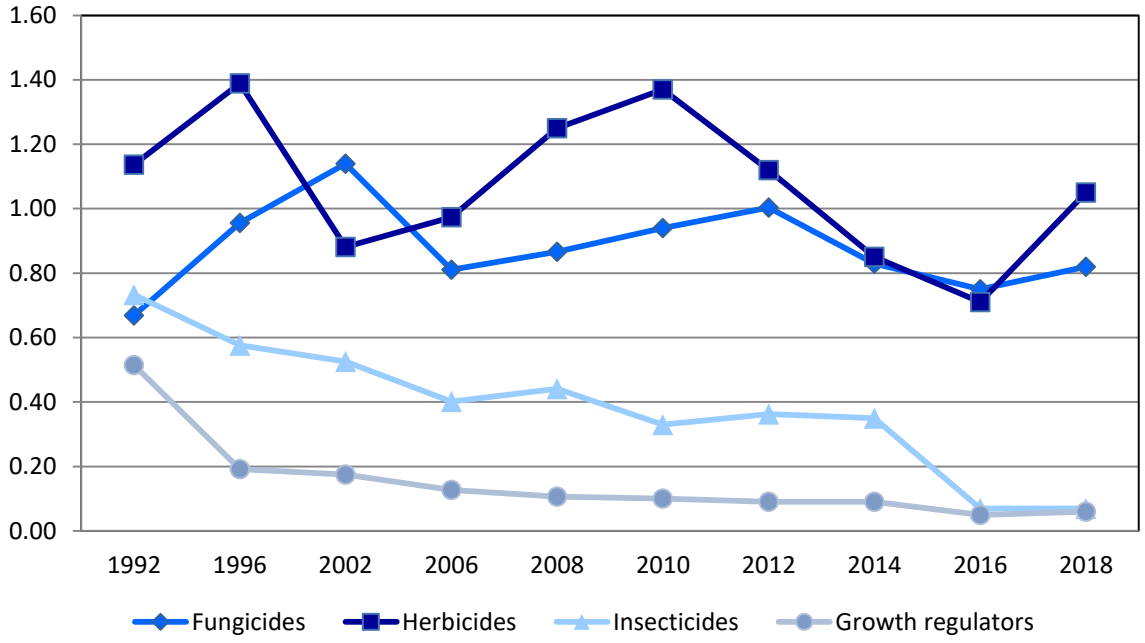


Figure 13 **Quantity of fungicides, herbicides, insecticides and growth regulators applied per basic hectare of top fruit crops (kg/ha) in Northern Ireland, 1996-2018.**

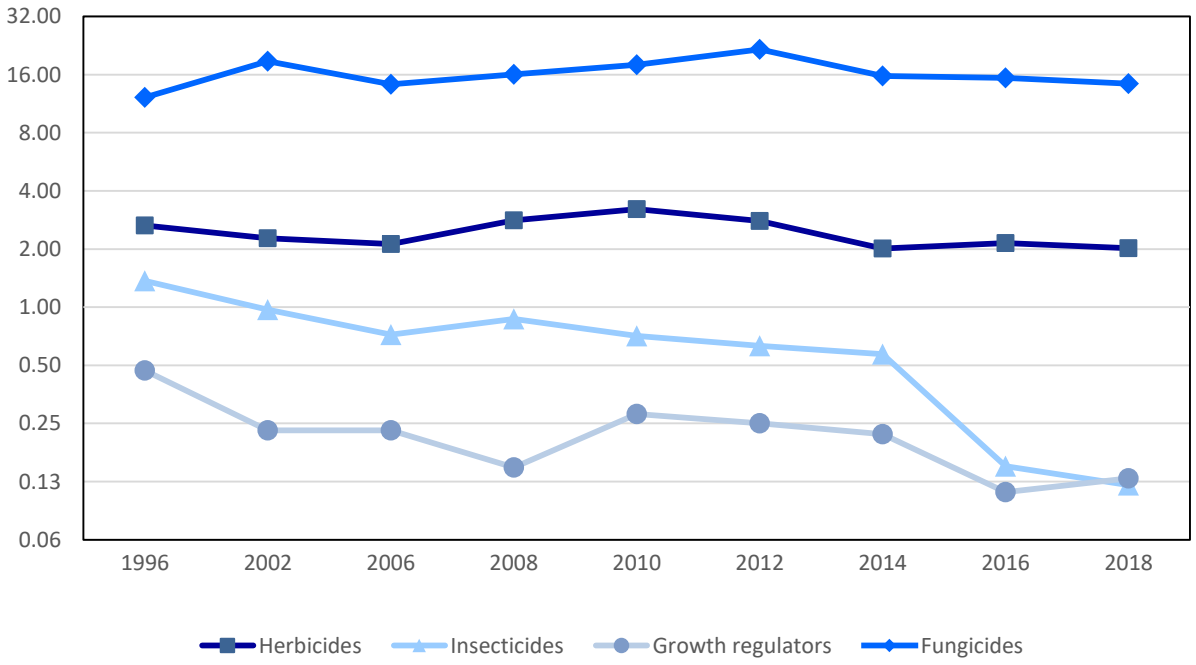
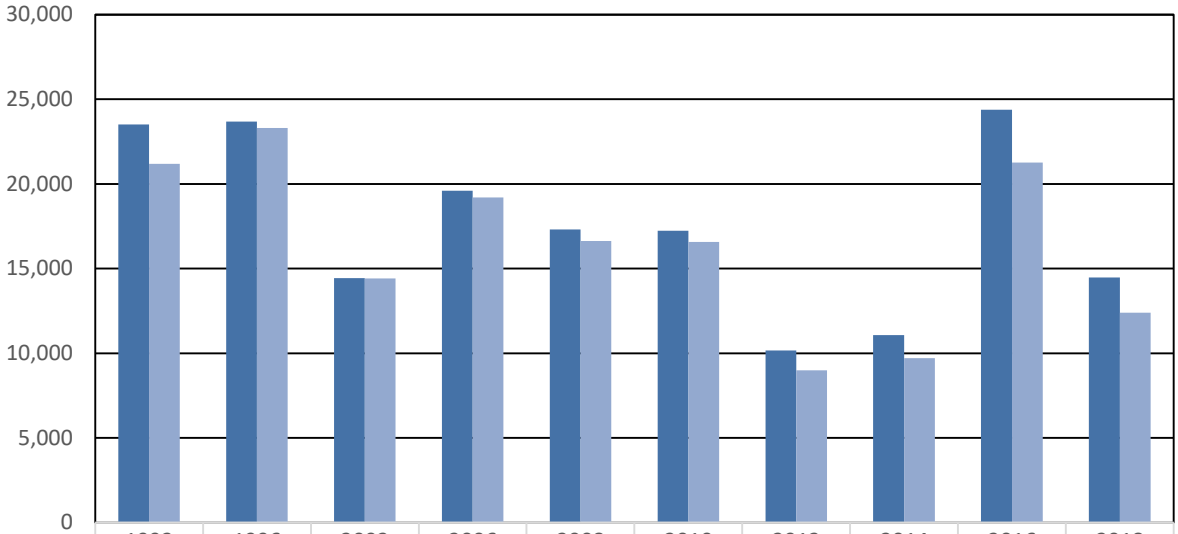


Figure 14 **Quantity of Bramley apples stored and quantity receiving a post-harvest treatment (tonnes) in Northern Ireland, 1992-2018.**



	1992	1996	2002	2006	2008	2010	2012	2014	2016	2018
Tonnes stored	23,516	23,680	14,431	19,599	17,318	17,237	10,159	11,072	24,385	14,474
Tonnes treated	21,194	23,296	14,414	19,191	16,630	16,567	8,992	9,706	21,254	12,395

Figure 15 **Quantity (tonnes) of stored Bramley apples receiving post-harvest treatments in Northern Ireland, 2018.**

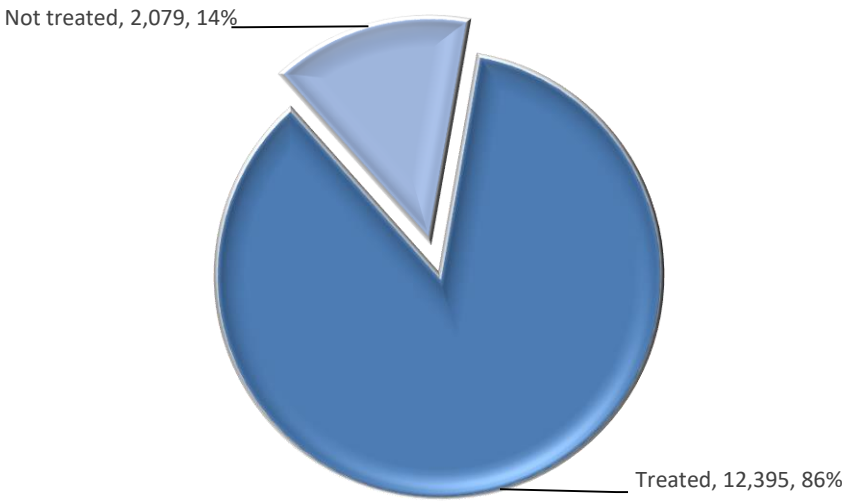
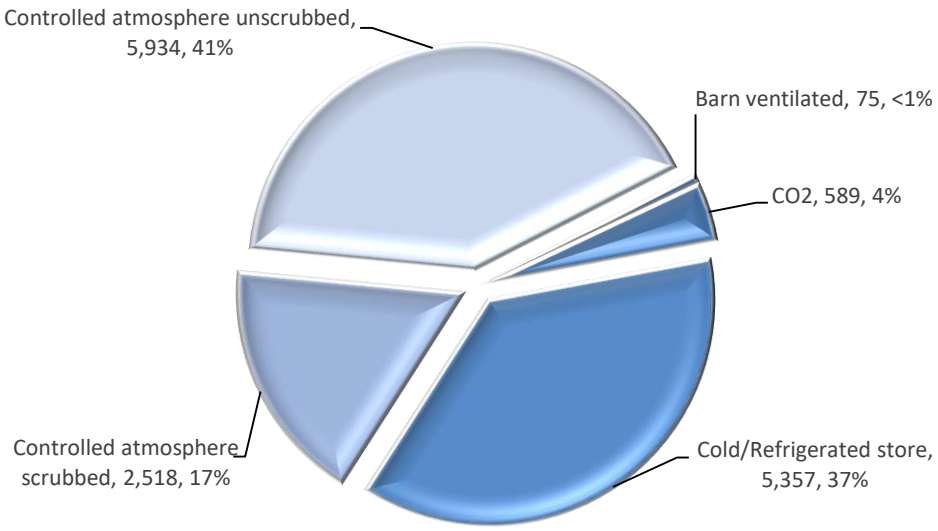


Figure 16 **Quantity of Bramley apples stored (tonnes) and the storage methods used in Northern Ireland, 2018.**



PESTICIDE USAGE ON BRAMLEY APPLE CROPS

- Total area grown: 1,457 hectares
- Basic area treated: 1,457 hectares
- Total area treated: 39,599 spray hectares
- Weight of active substances applied: 32,600 kilogrammes
- 23 different fungicide substances, 9 insecticide/acaricides, 8 herbicides and 3 growth regulators were applied to Bramley apple crops

Fungicides – Bramley apples

- Basic area treated: 1,413 hectares
- Total area treated: 24,918 spray hectares
- Weight of active substances applied: 20,485 kilogrammes
- Fungicides accounted for 63% of total area treated and 63% of total weight applied
- The most commonly used fungicides were captan, mancozeb, pyrimethanil, dodine and dithianon/potassium phosphonates being applied to 15,290 spray hectares of Bramley apple crops

Figure 17 **Total area (spha) of Bramley apple crops treated with fungicide active ingredients in Northern Ireland, 2018.**

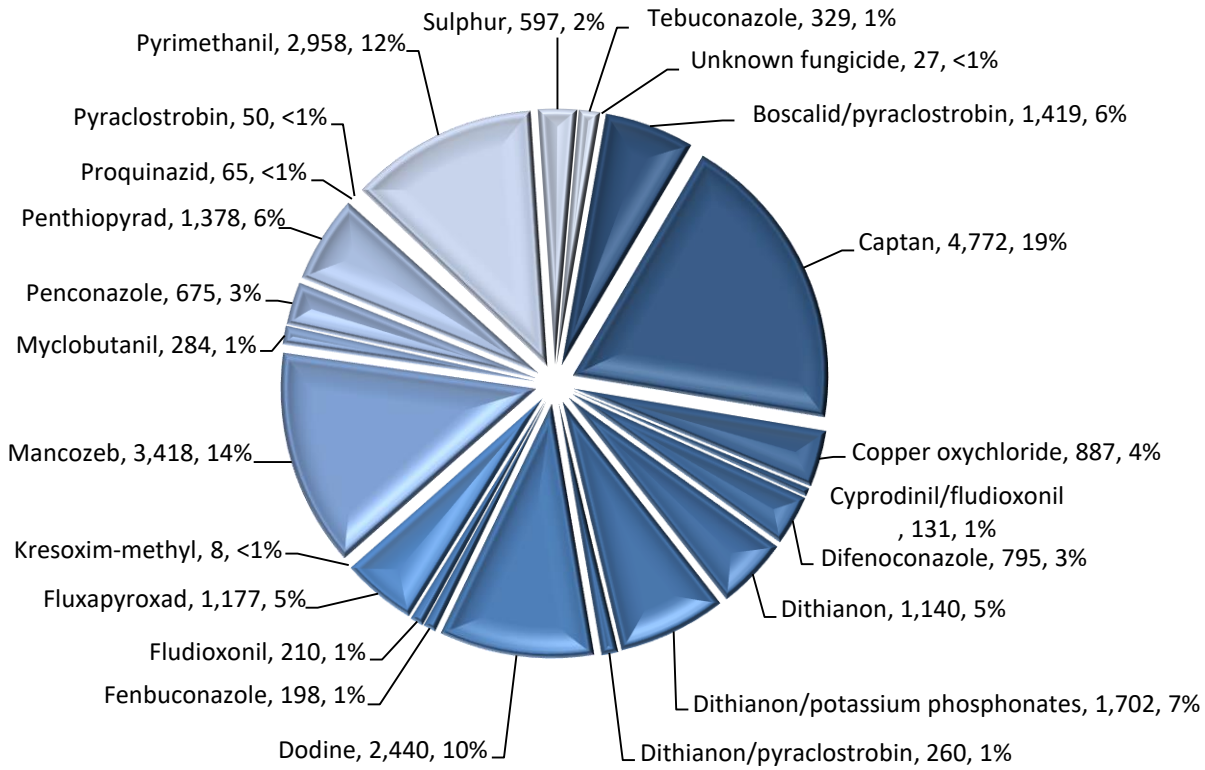


Figure 18 **Total quantity (kg) of fungicide active ingredients applied to Bramley apple crops in Northern Ireland, 2018.**

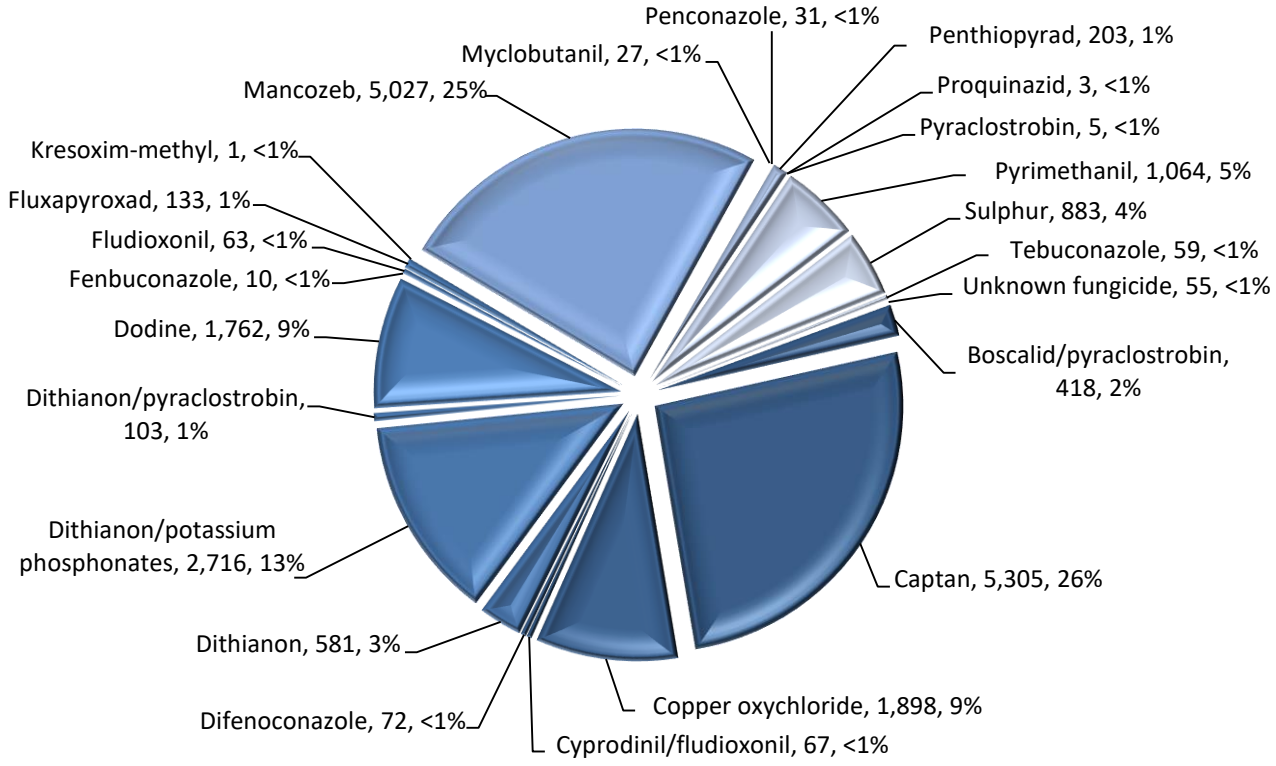
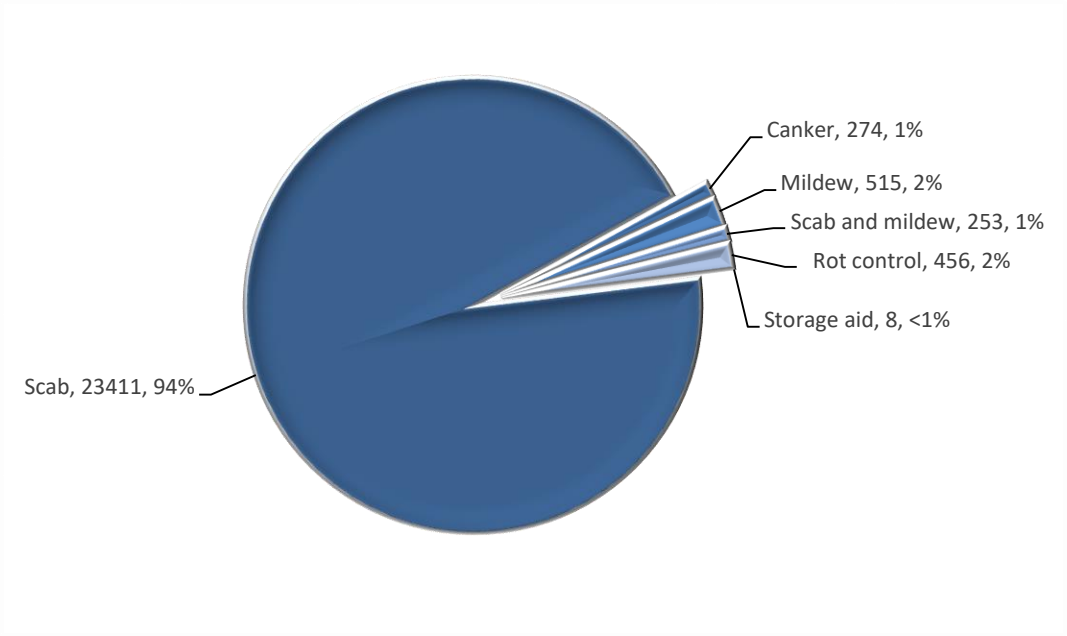


Figure 19 **Bramley apples: Reasons for fungicide use (spha), 2018.**



Herbicides –Bramley apples

- Basic area treated: 654 hectares
- Total area treated: 1,253 spray hectares
- Weight of active substances applied: 1,328 kilogrammes
- Herbicides accounted for 3% of the total area treated and 4% of the total weight applied
- The most frequently used herbicide was glyphosate, applied to 778 spray hectares of Bramley orchard floor areas, accounting for 71% of the total weight of herbicides applied

Figure 20 **Total area (spha) of Bramley apple crops treated with herbicide active ingredients in Northern Ireland, 2018.**

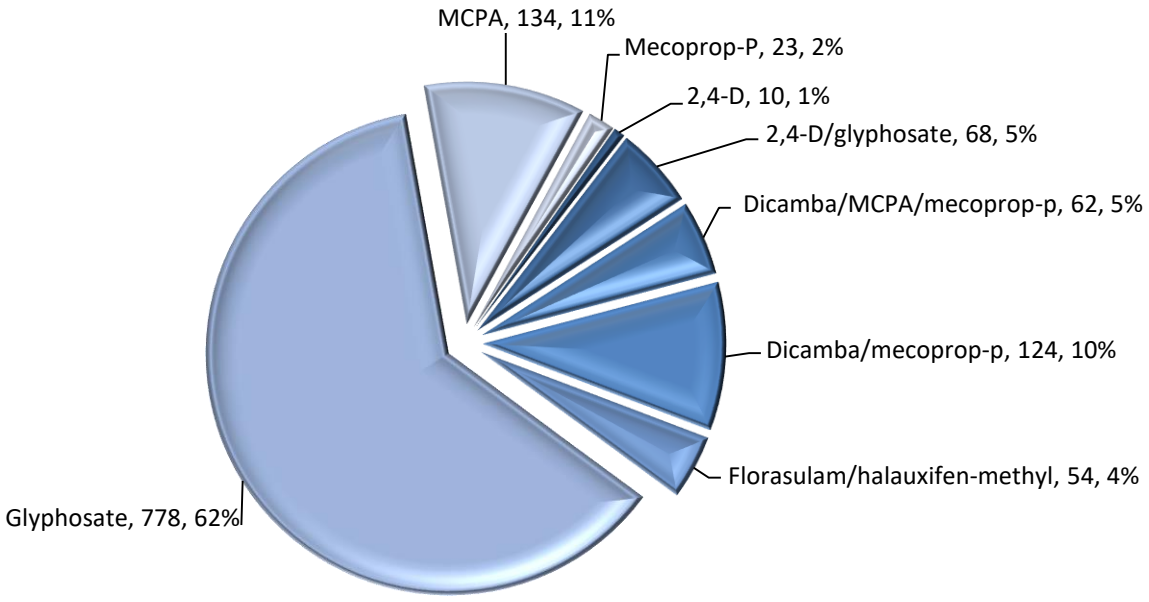


Figure 21 **Total quantity (kg) of herbicide active ingredients applied to Bramley apple crops in Northern Ireland, 2018.**

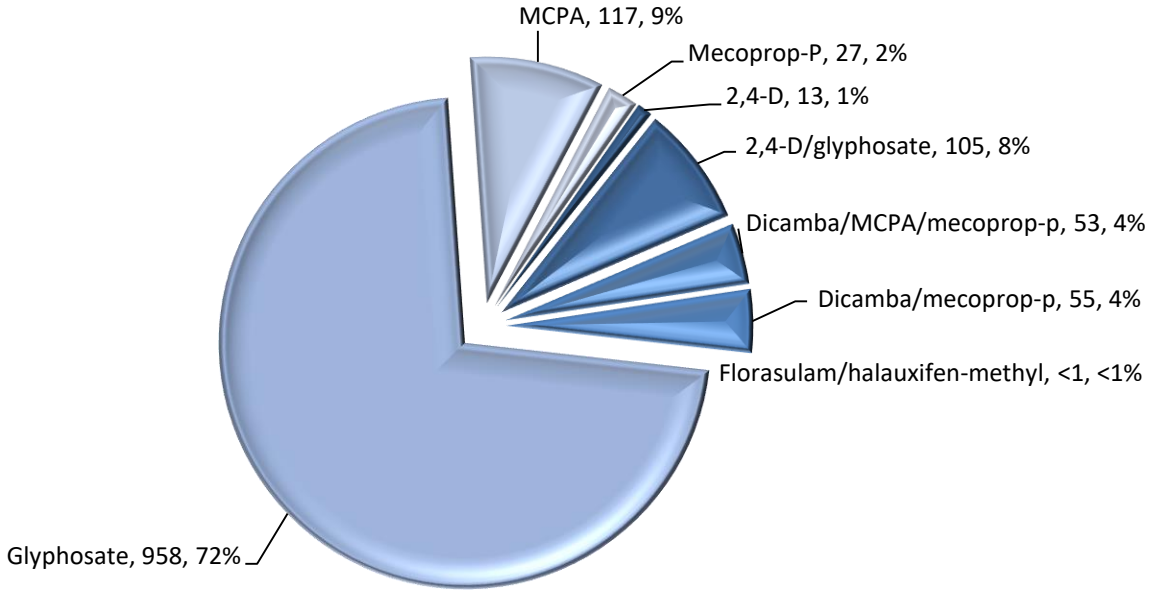
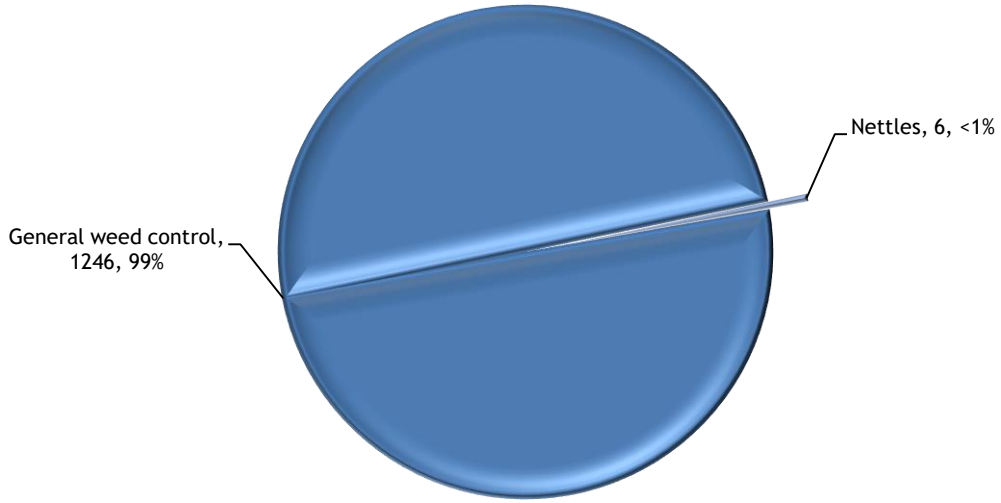


Figure 22 **Bramley apples: Reasons for herbicide use (spha), 2018.**



Insecticide/acaricides – Bramley apples

- Basic area treated: 1,154 hectares
- Total area treated: 2,341 spray hectares
- Weight of active substances applied: 142 kilogrammes
- Insecticide/acaricides accounted for 6% of the total area treated and less than 1% of the total weight applied
- The most commonly used insecticides/acaracides used were methoxyfenozide, deltamethrin, chlorantraniliprole and cypermethrin being applied to 1,971 hectares of Bramley apple crops.

Figure 23 **Total area (spha) of Bramley apple crops treated with insecticide/acaricide active ingredients in Northern Ireland, 2018.**

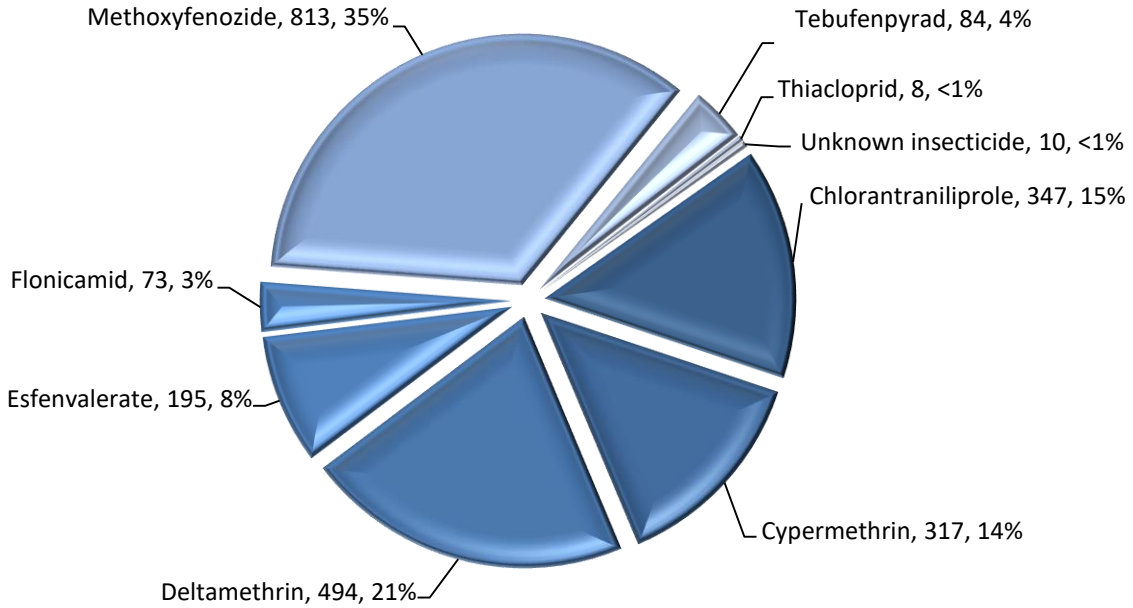


Figure 24 **Total quantity (kg) of insecticide/acaricide active ingredients applied to Bramley apple crops in Northern Ireland, 2018.**

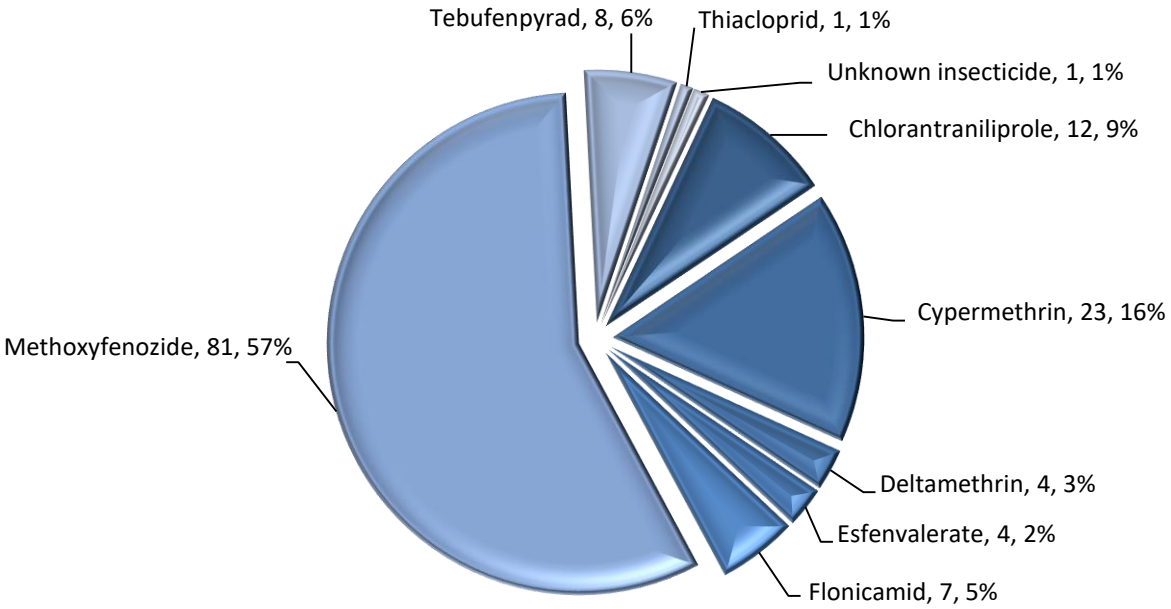
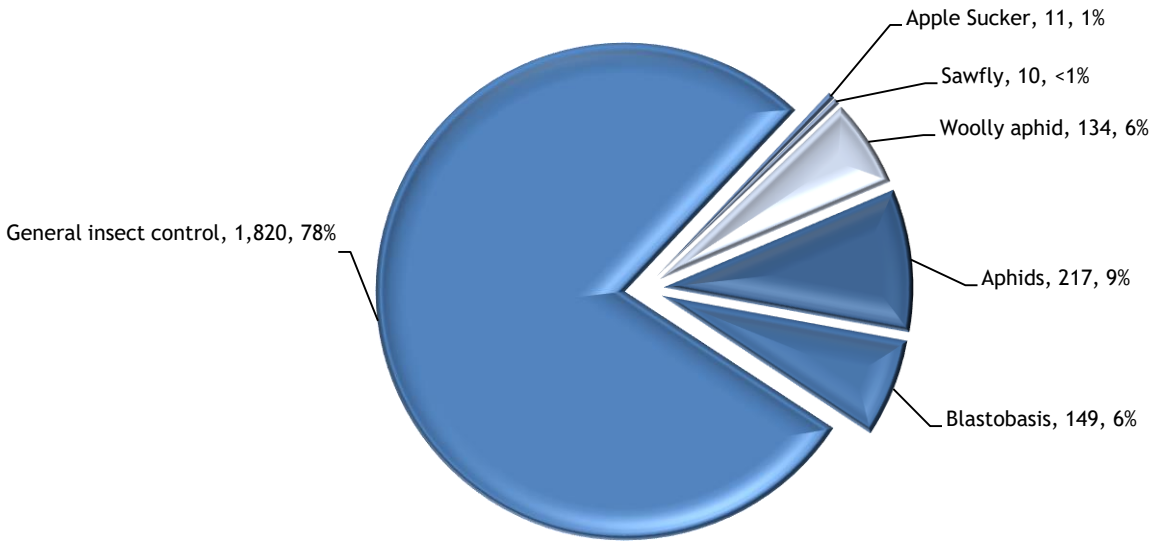


Figure 25 **Bramley apples: Reasons for insecticide/acaricide use (spha), 2018.**



Growth regulators – Bramley apples

- Basic area treated: 9,723 hectares
- Total area treated: 1,285 spray hectares
- Weight of active substances applied: 93 kilogrammes
- Growth regulators accounted for 3% of the total area treated and 0.3% of the total weight applied
- Reason for all applications was for growth regulation

Figure 26 **Total area (spha) of Bramley apple crops treated with growth regulator active ingredients in Northern Ireland, 2018.**

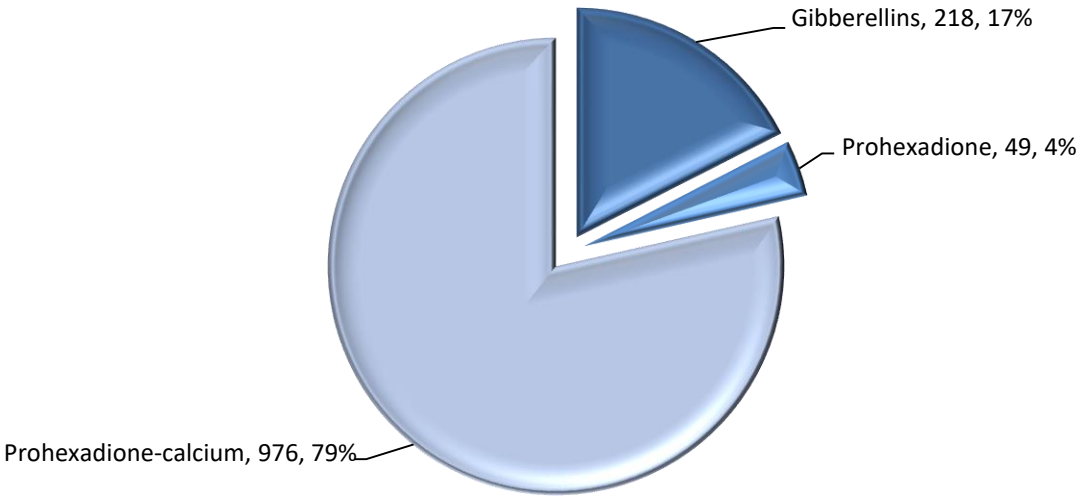
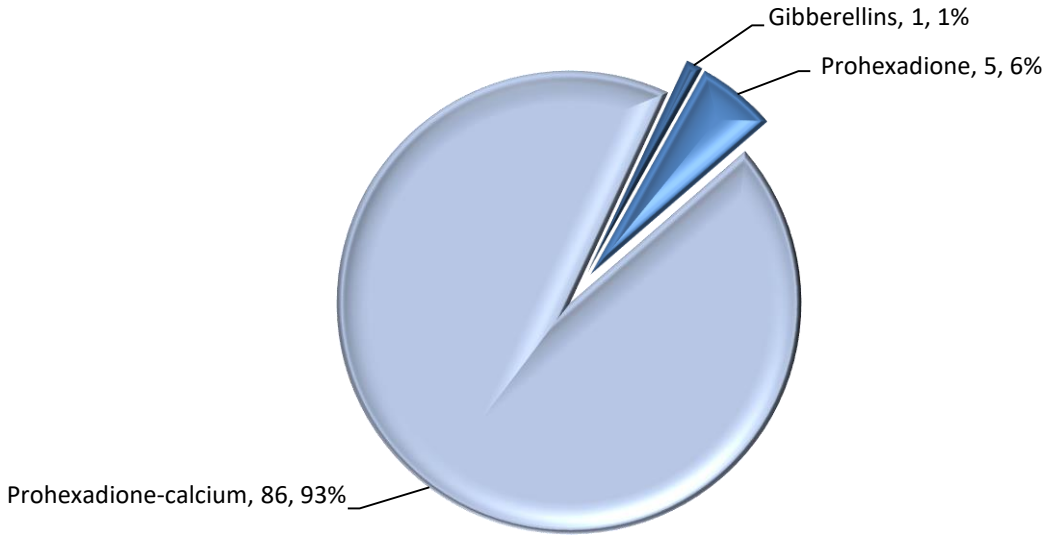


Figure 27 **Total quantity (kg) of growth regulator active ingredients applied to Bramley apple crops in Northern Ireland, 2018.**



'Other products' – Bramley apples

- Total area treated: 9,844 spray hectares
- Weight of 'other products' applied: 10,553 kilogrammes
- 'Other products' accounted for 25% of total area treated and 32% of the total weight applied

Figure 28 **Total area (spha) of Bramley apple crops treated with 'other products' in Northern Ireland, 2018.**

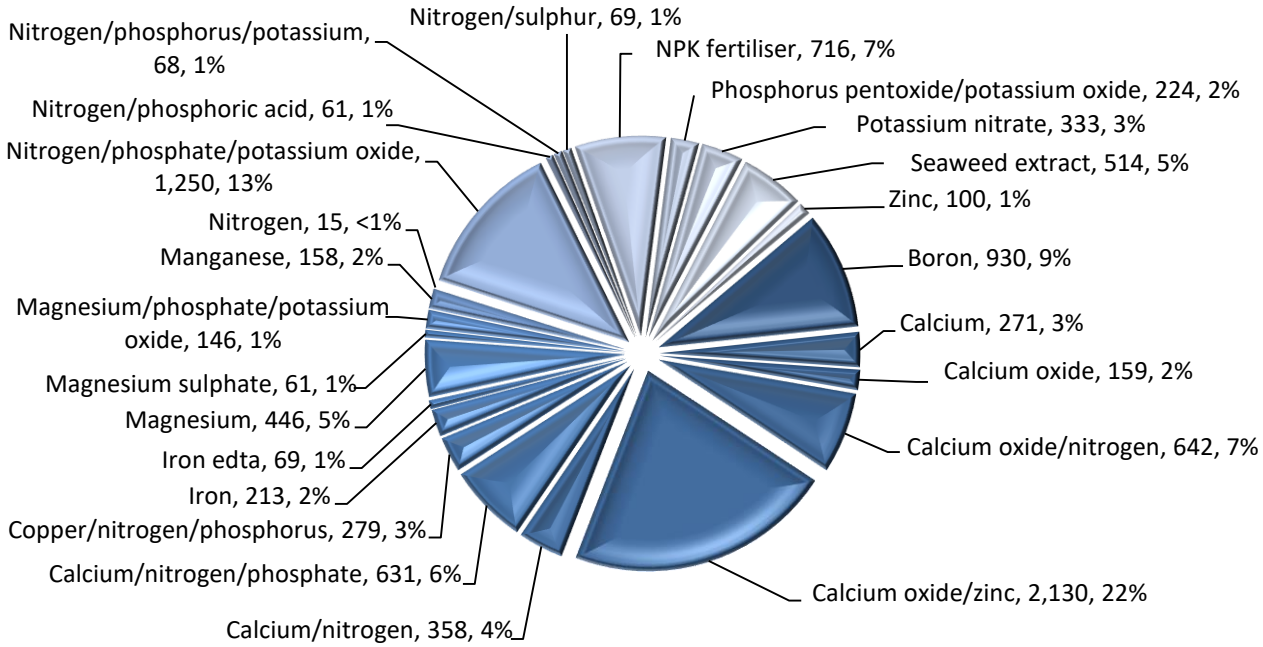
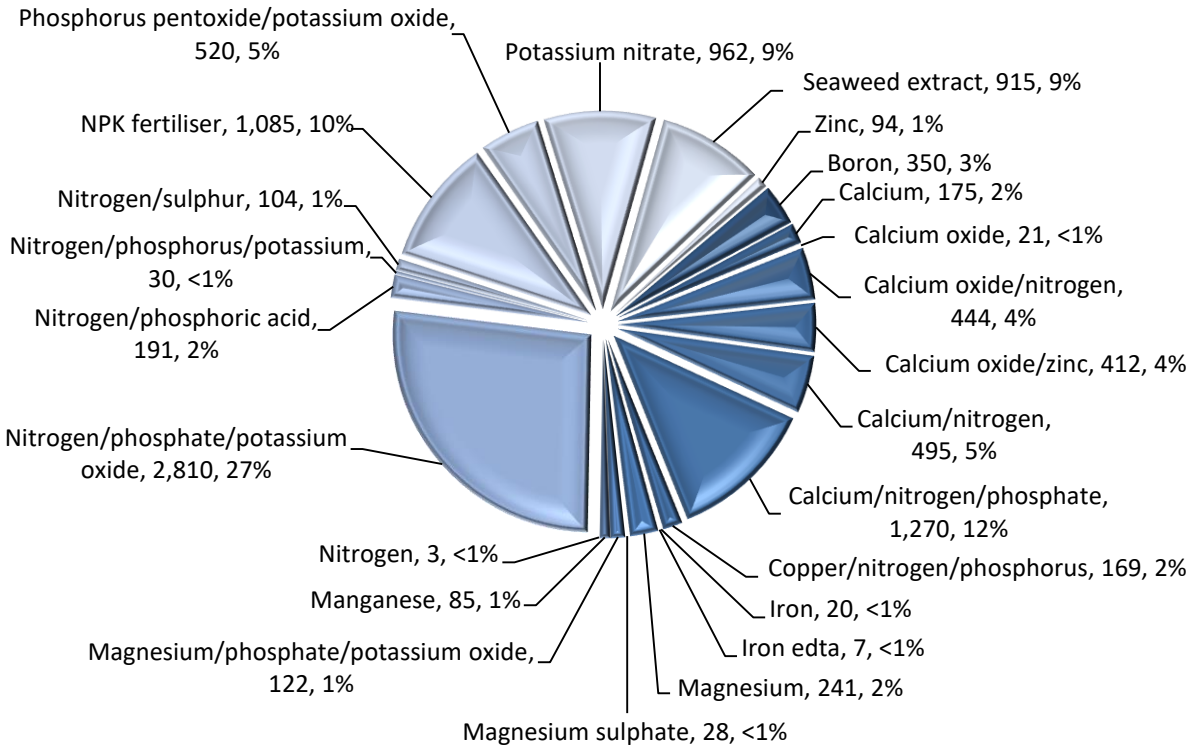


Figure 29 **Total quantity (kg) of 'other' products applied to Bramley apple crops in Northern Ireland, 2018.**



'Other products' included foliar feeds, trace elements and calcium-based products of which the majority were used to treat potential nutritional disorders.

PESTICIDE USAGE ON 'OTHER' TOP FRUIT CROPS

Figure 30 **Total area (spha) of 'other' top fruit crops treated with fungicide active ingredients in Northern Ireland, 2018.**

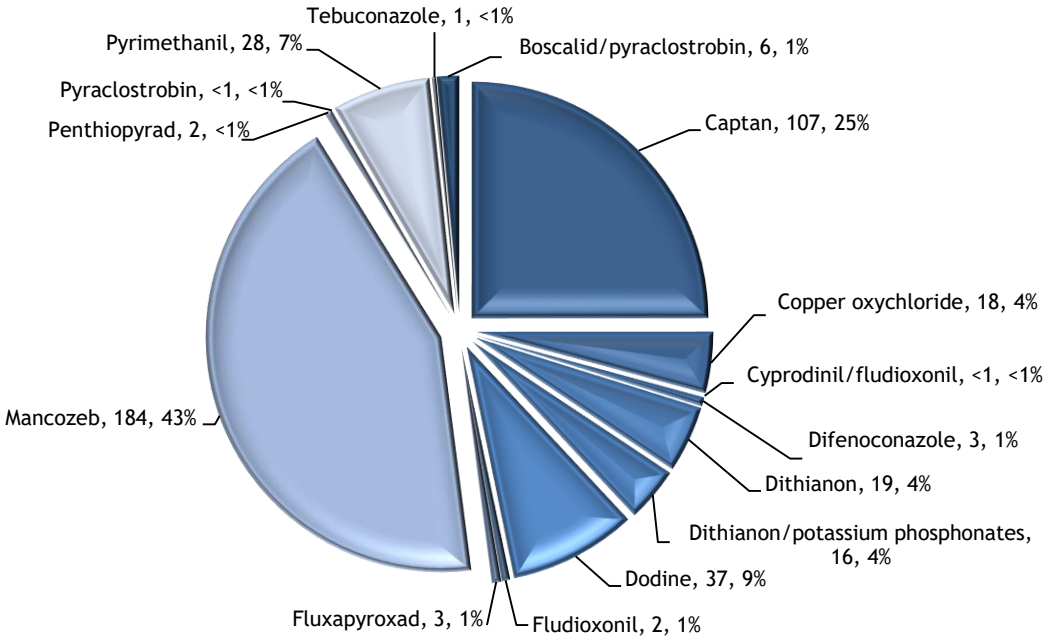
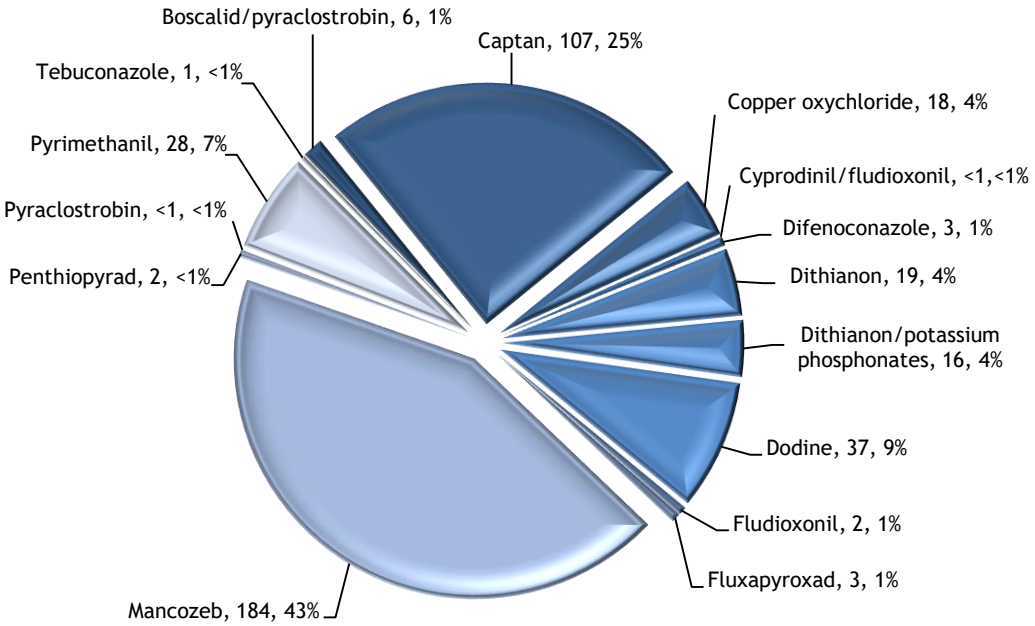


Figure 31 **Total quantity (kg) of fungicides applied to 'other' top fruit crops in Northern Ireland, 2018.**



A further 532 sp ha. Of "Other" top fruit crops were treated with growth regulators, herbicides, insecticides and other pesticides (see Tables 9, 10 and 14).

Table 1 The total number of farms and the number of holdings surveyed from each size group in Northern Ireland, 2018.

County	Size Group (hectares)													
	<2		2<4		4<6		6<9		9<14		14+		Total	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Armagh	41	**5**	31	**12**	25	**14**	19	**11**	17	**16**	33	**11**	166	**69**
All other counties	30	**1**	1	**0**	5	**2**	0	**1**	1	**0**	3	**1**	40	**5**
Northern Ireland	**71**	**6**	32	**12**	30	**16**	19	**12**	18	**16**	36	**12**	206	**74**

Legend

A = Total number of holdings in strata

B = Number of holdings surveyed

Table 2 Estimated grown area of crops (ha), total surveyed area of crops (ha) and proportion (%) of the total area of top fruit crops surveyed in Northern Ireland, 2018.

Crop type	Grown area	Surveyed area	Proportion of crop surveyed
Bramely apples	1,457	633	43%
Other top fruit	41	24	77%
All crops	**1,498**	**657**	**N/A**

Table 3 Estimated area (ha) of top fruit crops grown regionally in Northern Ireland, 2018.

Crop type	County		
	Armagh	All other counties	Northern Ireland
Bramley apples	1,356	100	1,457
Other top fruit	41	0	41
All crops	**1,398**	**100**	**1,498**

Table 4 Estimated area (spha) of top fruit crops receiving treatments, categorised by pesticide type and type and region in Northern Ireland, 2018.

County	*Pesticide Type*					
	Fungicides	Herbicides	Insecticides and acaricides	Growth regulators	Other	Northern Ireland
Armagh	23,570	1,228	2,317	1,137	9,964	38,216
All other counties	1,965	58	80	148	281	2,532
Total	**25,535**	**1,286**	**2,397**	**1,285**	**10,245**	**40,748**

Table 5 **Estimated quantity (kg) of pesticide active ingredients applied to top fruit crops, categorised by pesticide type and region in Northern Ireland, 2018.**

	Pesticide Type					
County	**Fungicides**	**Herbicides**	**Insecticides and acaricides**	**Growth regulators**	**Other**	**Northern Ireland**
Armagh	18,497	1,276	144	89	10,827	30,832
All other counties	2,414	78	2	5	118	2,617
All pesticides	**20,911**	**1,354**	**146**	**93**	**10,945**	**33,449**

Table 6 **Estimated quantity (kg) of pesticide active ingredients applied to top fruit crops, categorised by pesticide type and crop type in Northern Ireland, 2018.**

	Pesticide Type					
Crop Type	**Fungicides**	**Herbicides**	**Insecticides and acaricides**	**Growth regulators**	**Other**	**Total quantity (kg)**
Bramley apples	20,485	1,328	142	92	10,553	32,600
Other top fruit	426	26	4	1	392	849
All Crops	**20,911**	**1,354**	**146**	**93**	**10,945**	**33,449**

Table 7 The basic area (ha) and the total area (spha) of top fruit crops treated with each pesticide type in Northern Ireland, 2018.

Crop Type	Pesticide Type											
	Fungicides		Herbicides		Insecticides and acaricides		Growth regulators		Other products		All pesticides	
	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)
Bramley apples	1,413	24,918	654	1,253	1,154	2,341	723	1,243	968	9,844	1,457	39,599
Other top fruit	40	617	17	33	30	56	14	43	30	401	41	1,150
All Crops	**1,452**	**25,535**	**671**	**1,286**	**1,184**	**2,397**	**738**	**1,285**	**999**	**10,245**	**1,498**	**40,748**

Table 8 The mean number of spray applications of pesticides applied to top fruit crops in Northern Ireland, 2018.

Crop Type	*Pesticide Type*											
	Fungicides		Herbicides		Insecticides and acaricides		Growth regulators		Other products		All crops	
	A	B	A	B	A	B	A	B	A	B	A	B
Bramley apples	16.6	10.7	1.8	1.2	1.9	1.9	1.7	1.7	8.9	6.7	6.9	4.8
Other top fruit	17.0	8.9	2.4	1.7	1.7	1.7	2.8	2.8	8.2	5.7	7.8	4.9
All crops average	**16.6**	**10.6**	**1.8**	**2.0**	**1.9**	**1.9**	**1.7**	**1.7**	**8.8**	**6.6**	**6.9**	**4.8**

Legend

A = Number of applications of treatment type.

B = Number of Spray applications accounting for tank mixes.

Table 9 **Estimated area (spha) of top fruit crops treated with pesticide formulations in Northern Ireland, 2018.**

	Crop type		
Pesticide group and active ingredient	**Bramley apples**	**Other top fruit**	**Total area**
Fungicides			
Boscalid/pyraclostrobin	1,419	20	1,439
Captan	4,772	142	4,914
Copper oxychloride	887	16	903
Cyprodinil/fludioxonil	131	<1	131
Difenoconazole	795	46	840
Dithianon	1,140	48	1,188
Dithianon/potassium phosphonates	1,702	9	1,712
Dithianon/pyraclostrobin	260	.	260
Dodine	2,440	43	2,483
Fenbuconazole	198	.	198
Fludioxonil	210	12	222
Fluxapyroxad	1,177	44	1,221
Kresoxim-methyl	8	.	8
Mancozeb	3,418	124	3,542
Myclobutanil	284	.	284
Penconazole	675	.	675
Penthiopyrad	1,378	13	1,391
Proquinazid	65	.	65
Pyraclostrobin	50	<1	50
Pyrimethanil	2,958	91	3,049
Sulphur	597	.	597
Tebuconazole	329	7	336
Unknown fungicide	27	.	27
All fungicides	**24,918**	**617**	**25,535**
Growth Regulators			
Gibberellins	218	24	242
Prohexadione	49	.	49
Prohexadione-calcium	976	18	994
All growth regulators	**1,243**	**42**	**1,285**
Herbicides			
2,4-D	10	.	10
2,4-D/glyphosate	68	<1	68
Dicamba/MCPA/mecoprop-p	62	4	66
Dicamba/mecoprop-p	124	3	127
Florasulam/halauxifen-methyl	54	.	54
Glyphosate	778	21	799
MCPA	134	4	139
Mecoprop-P	23	.	23
All herbicides	**1,253**	**33**	**1,286**

Table 9 (cont) **Estimated area (spha) of top fruit crops treated with pesticide formulations in Northern Ireland, 2018.**

	Crop type		
Pesticide group and active ingredient	**Bramley apples**	**Other top fruit**	**Total area**
Insecticides and acaracides			
Chlorantraniliprole	347	14	361
Cypermethrin	317	.	317
Deltamethrin	494	15	508
Esfenvalerate	195	<1	195
Flonicamid	73	2	75
Methoxyfenozide	813	24	837
Tebufenpyrad	84	.	84
Thiacloprid	8	.	8
Unknown insecticide	10	.	10
All insecticides and acaracides	**2,341**	**56**	**2,397**
Others			
Boron	930	19	949
Calcium	271	4	275
Calcium oxide	159	.	159
Calcium oxide/nitrogen	642	.	642
Calcium oxide/zinc	2,130	80	2,210
Calcium/nitrogen	358	0	359
Calcium/nitrogen/phosphate	631	57	688
Copper/nitrogen/phosphorus	279	13	293
Iron	213	.	213
Iron edta	69	12	81
Magnesium	446	2	448
Magnesium sulphate	61	.	61
Magnesium/phosphate/potassium oxide	146	.	146
Manganese	158	.	158
Nitrogen	15	88	103
Nitrogen/phosphate/potassium oxide	1,250	7	1,257
Nitrogen/phosphoric acid	61	.	61
Nitrogen/phosphorus/potassium	68	.	68
Nitrogen/sulphur	69	12	81
NPK fertiliser	716	.	716
Phosphorus pentoxide/potassium oxide	224	77	301
Potassium nitrate	333	.	333
Seaweed extract	514	29	544
Zinc	100	.	100
All others	**9,844**	**401**	**10,245**
All pesticides	***39,599***	***1,150***	***40,749***

Table 10 **Estimated quantities (kg) of pesticide active ingredients applied to top fruit crops in Northern Ireland, 2018.**

	Crop type		
Pesticide group and active ingredient	**Bramley apples**	**Other top fruit**	**Total quantity**
Fungicides			
Boscalid/pyraclostrobin	418	6	424
Captan	5,305	107	5,411
Copper oxychloride	1,898	18	1,915
Cyprodinil/fludioxonil	67	<1	67
Difenoconazole	72	3	75
Dithianon	581	19	600
Dithianon/potassium phosphonates	2,716	16	2,732
Dithianon/pyraclostrobin	103	.	103
Dodine	1,762	37	1,799
Fenbuconazole	10	.	10
Fludioxonil	63	2	65
Fluxapyroxad	133	3	135
Kresoxim-methyl	1	.	1
Mancozeb	5,027	184	5,211
Myclobutanil	27	.	27
Penconazole	31	.	31
Penthiopyrad	203	2	206
Proquinazid	3	.	3
Pyraclostrobin	5	<1	5
Pyrimethanil	1,064	28	1,092
Sulphur	883	.	883
Tebuconazole	59	1	60
Unknown fungicide	55	.	55
All fungicides	**20,485**	**426**	**20,911**
Growth Regulators			
Gibberellins	1	<1	1
Prohexadione	5	.	5
Prohexadione-calcium	86	1	87
All growth regulators	**92**	**1**	**93**
Herbicides			
2,4-D	13	.	13
2,4-D/glyphosate	105	1	106
Dicamba/MCPA/mecoprop-p	53	1	54
Dicamba/mecoprop-p	55	<1	55
Florasulam/halauxifen-methyl	<1	.	<1
Glyphosate	958	22	980
MCPA	117	2	119
Mecoprop-P	27	.	27
All herbicides	**1,328**	**26**	**1,354**

Table 10 (cont) **Estimated quantities (kg) of pesticide active ingredients applied to top fruit crops in Northern Ireland, 2018.**

	Crop type		
Pesticide group and active ingredient	**Bramley apples**	**Other top fruit**	**Total quantity**
Insecticides and acaracides			
Chlorantraniliprole	12	<1	13
Cypermethrin	23	.	23
Deltamethrin	4	<1	4
Esfenvalerate	4	<1	4
Flonicamid	7	<1	8
Methoxyfenozide	81	3	84
Tebufenpyrad	8	.	8
Thiacloprid	1	.	1
Unknown insecticide	1	.	1
All insecticides and acaracides	**142**	**4**	**146**
Others			
Boron	350	5	356
Calcium	175	4	178
Calcium oxide	21	.	21
Calcium oxide/nitrogen	444	.	444
Calcium oxide/zinc	412	12	424
Calcium/nitrogen	495	<1	495
Calcium/nitrogen/phosphate	1,270	115	1,385
Copper/nitrogen/phosphorus	169	8	177
Iron	20	.	20
Iron edta	7	1	8
Magnesium	241	1	242
Magnesium sulphate	28	.	28
Magnesium/phosphate/potassium oxide	122	.	122
Manganese	85	.	85
Nitrogen	3	15	18
Nitrogen/phosphate/potassium oxide	2,810	8	2,818
Nitrogen/phosphoric acid	191	.	191
Nitrogen/phosphorus/potassium	30	.	30
Nitrogen/sulphur	104	18	122
NPK fertiliser	1,085	.	1,085
Phosphorus pentoxide/potassium oxide	520	171	691
Potassium nitrate	962	.	962
Seaweed extract	915	34	949
Zinc	94	.	94
All others	**10,553**	**392**	**10,945**
All pesticides	***32,600***	***849***	***33,449***

Table 11 **The active ingredients most extensively used on top fruit crops ranked by treated area (spha) in Northern Ireland, 2018.**

No.	Active ingredient	Treated area (sp.ha)
1	Captan	4,914
2	Mancozeb	3,542
3	Dithianon	3,160
4	Pyrimethanil	3,049
5	Dodine	2,483
6	Pyraclostrobin	1,749
7	Potassium phosphonates	1,712
8	Boscalid	1,439
9	Penthiopyrad	1,391
10	Fluxapyroxad	1,221
11	Prohexadione-calcium	994
12	Copper oxychloride	903
13	Glyphosate	867
14	Difenoconazole	840
15	Methoxyfenozide	837
16	Penconazole	675
17	Sulphur	597
18	Deltamethrin	508
19	Chlorantraniliprole	361
20	Fludioxonil	354
21	Tebuconazole	336
22	Cypermethrin	317
23	Myclobutanil	284
24	Gibberellins	242
25	Mecoprop-P	216
26	MCPA	205
27	Fenbuconazole	198
28	Esfenvalerate	195
29	Dicamba	193
30	Cyprodinil	131
31	Tebufenpyrad	84
32	2,4-D	78
33	Flonicamid	75
34	Proquinazid	65
35	Florasulam	54
36	Halauxifen-methyl	54
37	Prohexadione	49
38	Thiacloprid	8
39	Kresoxim-methyl	8

Table 12 **The active ingredients most extensively used on top fruit crops ranked by weight (kg) in Northern Ireland, 2018.**

No.	Active ingredient	Quantity applied (kg)
1	Captan	5,411
2	Mancozeb	5,211
3	Potassium phosphonates	2,234
4	Copper oxychloride	1,915
5	Dodine	1,799
6	Dithianon	1,175
7	Pyrimethanil	1,092
8	Glyphosate	1,043
9	Sulphur	883
10	Boscalid	281
11	Penthiopyrad	206
12	Pyraclostrobin	174
13	MCPA	160
14	Fluxapyroxad	135
15	Fludioxonil	92
16	Prohexadione-calcium	87
17	Mecoprop-P	85
18	Methoxyfenozide	84
19	Difenoconazole	75
20	Tebuconazole	60
21	2,4-D	56
22	Cyprodinil	40
23	Penconazole	31
24	Myclobutanil	27
25	Cypermethrin	23
26	Chlorantraniliprole	13
27	Fenbuconazole	10
28	Dicamba	9
29	Tebufenpyrad	8
30	Flonicamid	8
31	Prohexadione	5
32	Deltamethrin	4
33	Esfenvalerate	4
34	Proquinazid	3
35	Gibberellins	1
36	Thiacloprid	1
37	Kresoxim-methyl	1
38	Halauxifen-methyl	<0.5
39	Florasulam	<0.1

**** Active ingredients not always sprayed as separate actives but also in formulated mixtures.***

Table 13 **Bramley apples: Reasons for use, total area treated (spha), basic area treated (ha) and total quantity applied (kg).**

	Reason for use								
Pesticide group and active ingredient	**Canker**	**Mildew**	**Rot control**	**Scab**	**Scab and mildew**	**Storage aid**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Fungicides									
Boscalid/pyraclostrobin	23	.	297	1,092	.	8	1,419	801	418
Captan	.	.	.	4,772	.	.	4,772	1,248	5,305
Copper oxychloride	114	.	.	773	.	.	887	701	1,898
Cyprodinil/fludioxonil	.	.	.	131	.	.	131	131	67
Difenoconazole	.	.	.	795	.	.	795	440	72
Dithianon	138	.	.	1,002	.	.	1,140	530	581
Dithianon/potassium phosphonates	.	.	.	1,702	.	.	1,702	623	2,716
Dithianon/pyraclostrobin	.	.	.	260	.	.	260	146	103
Dodine	.	.	.	2,440	.	.	2,440	1,252	1,762
Fenbuconazole	.	.	.	198	.	.	198	150	10
Fludioxonil	.	.	114	96	.	.	210	210	63
Fluxapyroxad	.	.	45	1,132	.	.	1,177	663	133
Kresoxim-methyl	.	.	.	8	.	.	8	8	1
Mancozeb	.	.	.	3,418	.	.	3,418	1,019	5,027
Myclobutanil	.	.	.	55	228	.	284	137	27
Penconazole	.	515	.	156	4	.	675	329	31
Penthiopyrad	.	.	.	1,357	21	.	1,378	768	203
Proquinazid	.	.	.	65	.	.	65	22	3
Pyraclostrobin	.	.	.	50	.	.	50	21	5
Pyrimethanil	.	.	.	2,958	.	.	2,958	1,305	1,064
Sulphur	.	.	.	597	.	.	597	224	883
Tebuconazole	.	.	.	329	.	.	329	184	59
Unknown fungicide	.	.	.	27	.	.	27	14	55
All fungicides	**274**	**515**	**456**	**23,411**	**253**	**8**	**24,918**	**.**	**20,484**

Table 13 (cont) **Bramley apples: Reasons for use, total area treated (spha), basic area treated (ha) and total quantity applied (kg).**

Pesticide group and active ingredient	*Reason for use*			Total area treated (spha)	Basic area treated (ha)	Total quantity applied (kg)
	General weed control	Nettles	Growth regulation			
Herbicides						
2,4-D	10	.	.	10	10	13
2,4-D/glyphosate	68	.	.	68	52	105
Dicamba/MCPA/mecoprop-p	62	.	.	62	62	53
Dicamba/mecoprop-p	124	.	.	124	67	55
Florasulam/halauxifen-methyl	54	.	.	54	54	<1
Glyphosate	771	6	.	778	626	958
MCPA	134	.	.	134	84	117
Mecoprop-P	23	.	.	23	23	27
All herbicides	**1,246**	**6**	**.**	**1,252**	**.**	**1,328**
Growth regulators						
Gibberellins	.	.	218	218	149	1
Prohexadione	.	.	49	49	41	5
Prohexadione-calcium	.	.	976	976	682	86
All growth regulators	**1,246**	**6**	**1,243**	**1,243**	**.**	**92**

Table 13 (cont) **Bramley apples: Reasons for use, total area treated (spha), basic area treated (ha) and total quantity applied (kg).**

	Reason for use								
Pesticide group and active ingredient	**Aphids**	**Apple Sucker**	**Blastobasis**	**General insect control**	**Sawfly**	**Woolly aphid**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Insecticides and acaricides									
Chlorantraniliprole	.	.	25	323	.	.	347	347	12
Cypermethrin	195	.	.	123	.	.	317	285	23
Deltamethrin	22	.	.	462	.	10	494	376	4
Esfenvalerate	.	11	.	60	10	114	195	174	4
Flonicamid	.	.	.	73	.	.	73	73	7
Methoxyfenozide	.	.	124	689	.	.	813	668	81
Tebufenpyrad	.	.	.	84	.	.	84	84	8
Thiacloprid	.	.	.	8	.	.	8	8	1
Unknown insecticide	.	.	.	.	.	10	10	10	1
All insecticides and acaracides	**217**	**11**	**149**	**1,820**	**10**	**134**	**2,341**	**.**	**142**

Table 14 **'Other' top fruit: Reasons for use, total area treated (spha), basic area treated (ha) and total quantity applied (kg).**

	Reason for use				
Pesticide type and formulation	**Scab**	**Canker**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Fungicides					
Boscalid/pyraclostrobin	20	.	20	20	6
Captan	142	.	142	35	107
Copper oxychloride	16	.	16	16	18
Cyprodinil/fludioxonil	<1	.	<1	<1	<1
Difenoconazole	46	.	46	13	3
Dithianon	24	24	48	25	19
Dithianon/potassium phosphonates	9	.	9	5	16
Dodine	43	.	43	28	37
Fludioxonil	12	.	12	12	2
Fluxapyroxad	44	.	44	28	3
Mancozeb	124	.	124	27	184
Penthiopyrad	13	.	13	13	2
Pyraclostrobin	<1	.	<1	<1	<1
Pyrimethanil	91	.	91	27	28
Tebuconazole	7	.	7	3	1
All fungicides	**593**	**24**	**617**	**.**	**426**

Table 14 (cont) **'Other' top fruit: Reasons for use, total area treated (spha), basic area treated (ha) and total quantity applied (kg).**

	Reason for use						
Pesticide type and formulation	**Growth Regulation**	**General Weed Control**	**Apple Sucker**	**General Insect Control**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Growth Regulators							
Gibberellins	24	.	.	.	24	12	<1
Prohexadione-calcium	19	.	.	.	19	14	1
All growth regulators	**43**	**.**	**.**	**.**	**43**	**.**	**1**
Herbicides							
2,4-D/glyphosate	.	<1	.	.	<1	<1	1
Dicamba/MCPA/mecoprop-p	.	4	.	.	4	4	1
Dicamba/mecoprop-p	.	3	.	.	3	2	<1
Glyphosate	.	21	.	.	21	16	22
MCPA	.	4	.	.	4	2	2
All herbicides	**.**	**33**	**.**	**.**	**33**	**.**	**26**
Insecticides							
Chlorantraniliprole	.	.	.	14	14	14	0.5
Deltamethrin	.	.	.	15	15	15	0.1
Esfenvalerate	.	.	<1	.	<1	<1	<0.01
Flonicamid	.	.	.	2	2	2	<1
Methoxyfenozide	.	.	.	24	24	12	2.9
All insecticides	**.**	**.**	**<1**	**55**	**56**	**.**	**4**

Table 15 **Estimated area treated (spha) and quantity of 'other' products applied (kg) to Bramley apple crops, 2018.**

Formulation	*Crop type*			
	Bramley apples		Total	
	spha	kg	spha	kg
Boron	930	350	949	356
Calcium	271	175	275	178
Calcium oxide	159	21	159	21
Calcium oxide/nitrogen	642	444	642	444
Calcium oxide/zinc	2,130	412	2,210	424
Calcium/nitrogen	358	495	359	495
Calcium/nitrogen/phosphate	631	1,270	688	1,385
Copper/nitrogen/phosphorus	279	169	293	177
Iron	213	20	213	20
Iron edta	69	7	81	8
Magnesium	446	241	448	242
Magnesium sulphate	61	28	61	28
Magnesium/phosphate/potassium oxide	146	122	146	122
Manganese	158	85	158	85
Nitrogen	15	3	103	18
Nitrogen/phosphate/potassium oxide	1,250	2,810	1,257	2,818
Nitrogen/phosphoric acid	61	191	61	191
Nitrogen/phosphorus/potassium	68	30	68	30
Nitrogen/sulphur	69	104	81	122
NPK fertiliser	716	1,085	716	1,085
Phosphorus pentoxide/potassium oxide	224	520	301	691
Potassium nitrate	333	962	333	962
Seaweed extract	514	915	544	949
Zinc	100	94	100	94
Total	**9,844**	**10,553**	**10,245**	**10,945**

Table 16 **Comparison of area (ha) of top fruit crops grown in Northern Ireland, 1992-2018.**

	Survey year										
Crop Type	**1992**	**1996**	**2002**	**2006**	**2008***	**2010***	**2012***	**2014***	**2016***	**2018***	**% change in area grown 2016/2018**
Bramley apples											
Bramley apples (fruiting)	1,574	1,511	1,265	1,341	1,463	1,491	1,503	1,510	1,488	1,457	-2.00%
Bramley apples (non-fruiting)	158	189	197	74	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Bramley apples	**1,732**	**1,701**	**1,462**	**1,415**	**1,463**	**1,491**	**1,503**	**1,510**	**1,488**	**1,457**	**-2.00%**
Other top fruit crops											
Other top fruit crops (fruiting)	57	13	20	21	19	25	3	9	38	41	+8%
Other top fruit crops (non-fruiting)	5	0.4	4	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All other top fruit crops	**62**	**13**	**24**	**35**	**19**	**25**	**3**	**9**	**38**	**41**	**+8%**
Total crops	**1,794**	**1,714**	**1,486**	**1,450**	**1,482**	**1,516**	**1,506**	**1,519**	**1,526**	**1,498**	**-1.80%**

**** Note: From 2008, fruiting and non-fruiting crops were recorded together.***

Table 17a Comparison of area treated (spha) and quantity of pesticides applied (kg) to top fruit crops in Northern Ireland, 1992-2018.

Table 17a Comparison of area treated (spha) and quantity of pesticides applied (kg) to top fruit crops in Northern Ireland, 1992-2018.

	Survey year																			
	1992		**1996**		**2002**		**2006**		**2008**		**2010**		**2012**		**2014**		**2016**		**2018**	
Pesticide Type	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	A	B	A	B
Fungicides	20,272	13,549	21,620	20,672	23,473	26,756	24,836	20,132	27,200	23,554	28,593	26,796	32,505	32,604	28,597	23,748	31,386	23,438	25,535	20,911
Herbicides	761	865	1,190	1,652	1,000	881	899	875	965	1,206	1,314	1,805	1,020	1,142	1,953	1,651	1,895	1,340	1,286	1,354
Growth regulators	134	69	713	137	610	107	990	126	2,066	219	2,313	226	2,151	195	1,423	125	1,959	104	1,285	93.311273
Mixed activity a.i.'s	11	73	17	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Insecticides (by classification)																				
Acaricides	112	31	751	157	201	24	301	24	645	93	.	.	96	35	.	.	2	<1	.	.
Biopesticides	.	.	.	.	.	.	13	2	.	.	.	.	.	.	.	.	.	.	.	.
Carbamates	33	56	32	7	88	10	104	17	152	33	139	33	86	23	248	31	67	14	.	.
Neonicotinoids	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	1
Organochlorines	153	101	30	19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Organophosphates	2,357	1,733	2,239	1,870	1,373	996	1,129	811	1,305	1,016	976	702	868	684	684	533	177	87	.	.
Pyrethroids	586	13	464	16	481	18	595	18	496	23	983	27	980	26	460	10	1,789	41	1,021	31
Unknown insecticides																			10	**
Other insecticides	524	465	182	60	115	139	47	6	.	.	445	81	126	14	411	61	725	64	1,358	113
All Insecticides	**3,765**	**2,399**	**3,698**	**2,129**	**2,258**	**1,186**	**2,189**	**878**	**2,598**	**1,165**	**2,543**	**843**	**2,156**	**782**	**1,811**	**637**	**2,761**	**206**	**2,397**	**146**
All pesticides	**24,943**	**16,955**	**27,238**	**24,604**	**27,341**	**28,930**	**28,914**	**22,011**	**32,831**	**26,125**	**34,763**	**29,669**	**37,832**	**34,723**	**33,784**	**26,161**	**38,001**	**25,088**	**30,503**	**22,504**

** No weight available for unknown insecticides

Legend

* does not include 'other' pesticide types

Table 17b **Comparison of application ratios (kg/ha) of the active ingredients most extensively used on top fruit crops in Northern Ireland, 1992-2018.**

	Survey year									
Active Ingredient	**1992**	**1996**	**2002**	**2006**	**2008**	**2010**	**2012**	**2014**	**2016**	**2018**
2,4-D	.	.	.	.	.	.	.	.	.	0.9
Boscalid	.	.	.	<0.1	0.1	0.1	0.1	0.1	0.4	0.3
Captan	1.9	1.9	1.3	1.4	1.7	3.8	4.3	4.2	4.3	4.2
Chlorantraniliprole	.	.	.	.	.	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	0.3	0.3	0.4	0.6	0.7	0.5	0.5	0.3	0.5	.
Clofentezine	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	.
Clopyralid	.	.	.	.	.	.	.	<0.7	.	.
Copper oxychloride	0.7	0.4	0.7	0.4	0.7	0.5	0.1	0.2	2.5	2.7
Copper sulphate	0.3	0.1	0.2	.	.	<0.1	0.1	.	.	.
Cypermethrin	.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyprodinil	.	.	.	.	<0.1	<0.1	<0.1	<0.1	0.7	0.3
Deltamethrin	<0.1	.	<0.1	.	.	<0.1	<0.1	<0.8	<0.1	<0.1
Dicamba	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	0.1
Difenoconazole	.	.	<0.1	.	<0.1	<0.1	<0.1	<0.1	<0.01	0.2
Dimethoate	.	.	.	.	.	.	.	<0.3	.	.
Dithianon	1.4	2.4	3.3	2.5	4.0	3.3	2.6	1.4	1.7	1.3
Dodine	0.1	0.5	0.3	0.7	0.6	0.7	1.0	1.5	1.4	1.4
Esfenvalerate	.	.	.	.	.	.	.	.	.	<0.1
Fenbuconazole	.	<0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.1
Flonicamid	.	.	.	.	.	.	.	.	.	0.1
Florasulam	.	.	.	.	.	.	.	.	.	<0.01
Fludioxonil	.	.	.	.	<0.1	<0.1	<0.1	<0.1	0.1	0.3
Flutriafol	.	.	.	.	.	.	.	<0.5	.	.
Fluxapyroxad	.	.	.	.	.	.	.	.	.	0.2
Gibberellins	.	.	.	<0.1	<0.1	<0.1	<0.1	<0.6	.	<0.01
Glufosinate-ammonium	<0.1	<0.1	<0.1	.	<0.1	<0.1	<0.1	.	.	.
Glyphosate	0.1	0.4	0.3	0.3	0.6	0.8	0.5	0.6	1.3	1.6
Halauxifen-methyl	.	.	.	.	.	.	.	.	.	<0.01
Kresoxim-methyl	.	.	.	<0.1	<0.1	<0.1	<0.1	<0.1	.	<0.01
Lime	.	.	.	.	.	.	0.1	.	.	.

Table 17b (cont) **Comparison of application ratios (kg/ha) of the active ingredients most extensively used on top fruit crops in Northern Ireland, 1992-2018.**

	Survey year									
Active Ingredient	**1992**	**1996**	**2002**	**2006**	**2008**	**2010**	**2012**	**2014**	**2016**	**2018**
Lime sulphur	0.2	.	.	.	.	<0.1	0.1	.	3.7	.
Mancozeb	2.2	5.9	11.4	7.2	6.7	6.8	7.8	6.0	6.9	5.0
MCPA	<0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.4	1.2	1.1
Mecoprop-P	.	.	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.8	0.5
Methoxyfenozide	.	.	.	.	.	.	<0.1	<0.1	0.1	0.1
Myclobutanil	0.3	0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	0.2
Paclobutrazol	<0.1	0.1	.	0.1	<0.1	0.1	0.1	<0.1	0.1	.
Paraffin oil	.	.	.	.	.	.	.	<0.1	.	.
Penconazole	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Penthiopyrad	.	.	.	.	.	.	.	.	.	0.3
Pirimicarb	.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	.
Potassium phosphonates	.	.	.	.	.	.	.	.	.	3.6
Prohexadione	.	.	.	.	.	.	.	.	.	0.1
Prohexadione-calcium	.	.	.	<0.1	0.1	0.1	0.1	<0.1	<0.1	0.1
Proquinazid	.	.	.	.	.	.	.	.	.	0.2
Pyraclostrobin	.	.	.	<0.1	0.1	0.1	0.1	0.1	0.5	0.2
Pyrimethanil	.	<0.1	0.3	0.6	1.1	0.9	1.1	0.7	0.7	0.8
Spirodiclofen	.	.	.	.	.	.	<0.1	<0.1	.	.
Sulphur	.	<0.1	0.2	0.1	0.7	0.9	4.2	1.1	3.7	3.9
Tebuconazole	.	.	.	.	.	.	<0.1	.	0.4	0.3
Tebufenpyrad	.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.4	<0.1	0.1
Thiacloprid	.	.	.	.	.	.	.	.	.	0.1
Triclopyr	.	.	.	.	.	.	.	<0.2	.	.

Table 18 **Estimated quantities (tonnes) of stored apples receiving treatment, the total amount of active ingredients applied (kg) and reason for use in Northern Ireland, 2018.**

Pesticide formulation	Quantity treated	Quantity applied	Reason for use
Other products			
1-methylcyclopropene	12,395	*N/A	Storage aid
All treatments	**12,395**	***N/A**	**Storage aid**

*Due to the application method it was impossible to calculate the weight of active ingredient applied

Table 19 **Comparison of the estimated quantities (tonnes) of Bramley apples stored and the total weight of active ingredients applied (kg) in Northern Ireland, 1992-2018.**

	Survey year																			
	1992		1996		2002		2006		2008		2010		2012		2014		2016		2018	
Pesticide formulation	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied	Total quantity stored	Total quantity applied
Antioxidants																				
Diphenylamine	2,154	71	10,496	611	7,778	195	13,216	307	16,630	435	15,966	433	.	.	.	.	.	.	.	.
Ethoxyquin	8,350	378	1,381	50	750	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.
All antioxidants	**10,504**	**449**	**11,877**	**661**	**8,528**	**210**	**13,216**	**307**	**16,630**	**435**	**15,966**	**433**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**
Fungicides																				
Benomyl	4,166	124	.	.	385	4	332	2	.	.	.	.	.	.	.	.	.	.	.	.
Carbendazim	1,789	39	6,372	87	5,384	44	830	4	.	.	.	.	.	.	.	.	.	.	.	.
Carbendazim/metalaxyl	4,299	115	3,901	90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Captan	.	.	.	.	117	64	477	195	.	.	.	.	.	.	.	.	.	.	.	.
Cyprodinil/fludioxonil	.	.	.	.	.	.	.	.	214	1	256	1	490	3	.	.	629	6		
Thiophanate-methyl	436	5	1,146	40	.	.	129	1	.	.	.	.	.	.	.	.	.	.	.	.
Metalaxyl-M	.	.	.	.	.	.	4,207	5	.	.	.	.	.	.	.	.	.	.	.	.
All fungicides	**10,690**	**283**	**11,419**	**217**	**5,886**	**112**	**5,975**	**207**	**214**	**1**	**256**	**1**	**490**	**3**	**.**	**.**	**629**	**6**	**.**	**.**
Other products																				
1-methylcyclopropene	.	.	.	.	.	.	.	.	.	.	345	1	8,502	<1	9,706	N/A	20,625	N/A	12,395	N/A
All other products	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**345**	**1**	**8,502**	**<1**	**9,706**	**N/A**	**20,265**	**N/A**	**12,395**	**N/A**
All treatments	**21,194**	**732**	**23,296**	**878**	**14,414**	**322**	**19,191**	**514**	**16,844**	**436**	**16,567**	**435**	**8,992**	**3**	**9,706**	**N/A**	**21,254**	**6**	**12,395**	**.**
Stored without treatment	***2,322***	**.**	***384***	**.**	***17***	**.**	***408***	**.**	***689***	**.**	***670***	**.**	***1,167***	**.**	***1,366***	***N/A***	***3,131***	***N/A***	***2,079***	***N/A***
Total stored	**23,516**	**.**	**23,680**	**.**	**14,431**	**.**	**19,599**	**.**	**17,533**	**.**	**17,237**	**.**	**10,159**	**.**	**11,072**	**N/A**	**24,385**	**.**	**14,474**	**.**

Table 20 **Total grown area (ha), total quantity harvested (tonnes) and total yield (tonnes/ha) of Bramley apple crops in Northern Ireland, 2018.**

Age of orchard (years)	Total grown area (ha)	Total quantity harvested (tonnes)	Yield (tonnes/ha)
Bramley apples			
< 5	64	1,179	18.5
5 to 9	88	3,283	37.5
10 to 14	131	3,821	29.1
15 to 24	283	8,741	30.8
25 to 34	149	10,481	70.3
> 35	742	21,428	28.9
Total Bramley apples	**1,457**	**48,932**	**215.1**

Northern Ireland Pesticide Usage Survey Published Reports Appendix 1

Report No.	Report title	ISBN
99	Grassland & Fodder Crops 1989	1-855 27 079 X
105	Arable Crops 1990	1-855 27 130 3
106	Soft Fruit Crops 1990	1-855 27 149 4
109	Vegetable Crops 1991	1-855 27 137 0
110	Protected Crops 1991 (edible & ornamental)	1-855 27 283 0
111	Mushroom Crops 1991	1-855 27 150 8
117	Arable Crops 1992	1-855 27 193 1
118	Top Fruit Crops 1992	1-855 27 194 X
124	Grassland & Fodder crops 1993	1-855 27 221 0
131	Forestry 1993	1-855 27 282 2
132	Arable Crops 1994	1-855 27 314 4
139	Vegetable Crops 1995	1-855 27 346 2
140	Mushroom Crops 1995	1-855 27 347 0
146	Arable Crops 1996	1-855 27 469 8
147	Top fruit 1996	1-855 27 470 1
156	Grassland & Fodder Crops 1997	1-855 27 506 6
157	Sheep Treatments 1997	1-855 27 425 6
167	Soft Fruit 1998	1-855 27 540 6
168	Arable Crops 1998	1-855 27 536 8
169	Vegetable Crops 1999	1-855 27 561 9
170	Mushroom Crops 1999	1-855 27 549 X
177	Arable Crops 2000	1-855 27 670 4
178	Top Fruit Crops 2002	1-855 27 618 6
194	Arable Crops 2002	1-855 27 674 7
198	Grassland & Fodder Crops 2003	1-855 27 797 2

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Report No.	Report title	ISBN
199	Hardy Nursery Stock Crops 2003	1-855 27 789 1
201	Protected Ornamental Crops 2003	1-855 27 739 5
206	Arable Crops 2004	1-855 27 833 2
207	Vegetable crops 2004	1-855 27 869 3
208	Grassland & Fodder Crops 2005	1-855 27 998 8
209	Sheep Treatments 2005	1-855 27 999 5
216	Arable Crops 2006	1-848 07 035 6
217	Top Fruit Crops 2006	1-848 07 019 6
218	Soft Fruit Crops 2006	1-848 07 036 3
222	Vegetable Crops 2007	1-848 07 062 2
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	1-848 07 485 9
259	Vegetable Crops 2013	1-848 07 486 6
260	Arable Crops 2014	1-84807-552-8

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

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