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PESTICIDE USAGE IN NORTHERN IRELAND
SURVEY REPORT 261

NORTHERN IRELAND TOP FRUIT CROPS 2014

Agriculture, Fishing and Forestry

A National Statistics Publication

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IN NORTHERN IRELAND

Survey Report 261

Northern Ireland Top Fruit Crops 2014

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PESTICIDE USAGE SURVEY REPORT 261

NORTHERN IRELAND TOP FRUIT CROPS 2014

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The County Regions of Northern Ireland

(An estimated 96% 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 2014. It is the eighth pesticide survey to be conducted on top fruit crops in the region since 1992. There were an estimated 219 top fruit growers in Northern Ireland in 2014, of which 52 were selected to be surveyed regarding information on crop, storage and orchard floor treatments. The total area of top fruit crops grown increased by less than 1% to 1,519 hectares when compared with the previous survey in 2012. An estimated 97% of all top fruit crops were grown in County Armagh, with Bramley apple orchards accounting for 99% of the total top fruit grown in Northern Ireland. There were an estimated 38,235 tonnes of Bramley apples harvested in 2014, a 61% increase compared to 2012.

Overall, an estimated 36.5 tonnes of pesticide active substances were applied to 40,936 spray hectares. The pesticide-treated area decreased by 11% compared with 2012, and the weight of active substances applied decreased by 25%.

In common with previous years, fungicides were the most frequently applied pesticide. When compared with 2012, which was a particularly wet year with high scab risk, the area treated with fungicides and the weight applied decreased by 12% and 27%, respectively. In 2014, fungicides were applied to 70% of the pesticide-treated area and accounted for 65% of the weight of pesticides used (including 'other' products). Mancozeb, captan, dithianon and pyrimethanil were the fungicide active substances most commonly used on top fruit crops. An estimated 86% of all fungicide applications were applied to control apple scab (*Venturia inaequalis*).

The area treated with insecticides and acaricides decreased by 16% when compared with 2012. Insecticides and acaricides were applied to 4% of the entire pesticide-treated area, accounting for 2% of the total weight of pesticides used. The organophosphate insecticide chlorpyrifos and the pyrethroid insecticide cypermethrin were the two most frequently applied insecticides, collectively accounting for 61% of the area treated with insecticide/acaricides. An estimated 45% of insecticide/acaricides were applied to control aphids, with a further 21% applied for 'insect control'.

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 96% of growers using this method. The remaining 4% of growers either mowed or grazed the strips under the tree canopy and the inter-row area. Overall, the area treated and weight of herbicides applied increased by 91% and 45%, respectively, when compared with 2012. Glyphosate and dicamba/MCPA/mecoprop-P were the herbicides most frequently used. In Northern Ireland, growers may have multiple planting densities in the same orchard where small areas of older trees are gradually replaced with younger trees. This makes it difficult to estimate the orchard floor treated area due to the different spacing distances between

the trees. For this report, a new method of calculating the treated area has been used which is based on the average age of the trees (see Definitions and Notes).
Growth regulators accounted for 3% of the pesticide-treated area and less than 1% of the total weight of pesticide applied. Paclobutrazol, prohexadione-calcium and gibberellins were the only growth regulator active substances applied. Paclobutrazol accounted for 42% of the area treated with a growth regulator and 56% of the total weight applied.

An estimated 7 tonnes of 'other products', which included foliar feeds, trace elements and calcium-based products, were applied to the crops during this survey period, representing a 26% decrease when compared to 2012. 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 11,272 tonnes of apples were stored, of which 9,706 tonnes (86%) were treated. The only active substance applied to stored apples was 1-methylcyclopropene. 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 and Rural Development for Northern Ireland (DARDNI), 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 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 eighth 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) and 2012 (Lavery *et al*., 2013) 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 2013 (Anon., 2014) 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 period for survey comprises the end of the 2013 harvest to the end of the 2014 harvest.

The purpose of the survey was explained to selected growers in preliminary correspondence. A total of 52 holdings (representing 24% 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. In keeping with the 2012 survey, the less than 2 hectare size group, was included with the less than 4 hectare size group. Many of the top fruit crops grown on these smaller holdings were for personal use and were not treated with pesticides.

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 part of total grown area 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.
- Where herbicide strip areas have not been available from the grower, tree ages have been used to determine the spacing and distance between each row.
- Herbicide strip areas have been calculated based on the following:
  Trees less than 5 years old have herbicide strips which on average are 33% of the orchard floor area.
  Trees greater than 5 and less than 35 years old have herbicide strips which on average are 50% of the orchard floor area.
  Trees greater than 35 years old have herbicide strips which on average are 67% of the orchard floor area.
- Where two or more age groups exist in the same orchard, the herbicide strip has been determined based on the age group with the greater number of trees.
- ‘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.
- In all tables ‘red spider mite’ refers to ‘fruit-tree red spider mite’ (*Panonychus ulmi*).

RESULTS AND DISCUSSION

Crops

The estimated area of crops grown and the area of crops surveyed are shown in Table 2, together with the proportion of each crop surveyed. An estimated 97% of the total area of top fruit crops were grown in County Armagh, with Bramley apples accounting for 99% of the total area of top fruit crops grown. 'Other' top fruit crops accounted for the remaining 1%. (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 97% of the total pesticide-treated area and 98% of the weight of pesticides applied. A very limited amount 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 substances applied and the area of crops treated with pesticides are shown in Tables 6 & 7 (Figures 19 to 30). Bramley apples accounted for over 99% of both the pesticide-treated area and the weight of active substances 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 18 fungicide applications from 12 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 7 applications of 'Other products' from 6 spray rounds.

'Other' top fruit crops received a mean of 16 fungicide applications from 11 spray rounds, 2 herbicide applications, 1 application of insecticide/acaricides, 2 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 36.5 tonnes of pesticide active substances were applied to 40,936 spray hectares of top fruit crops grown in Northern Ireland in 2014 (Tables 4 & 5, Figures 4 & 5).

Fungicides were applied to 70% of the pesticide-treated area, representing 65% of the weight of pesticides applied. Herbicides accounted for 5% of both the area treated and the total weight of pesticides used.

Insecticides/acaricides, applied to 4% of the pesticide-treated area, represented 2% of the total weight of pesticides used. Growth regulators represented 4% and less than 1% of the total pesticide-treated area and weight of active substances applied, respectively. The pesticide groups and active substances applied are shown in Tables 9 and 10.

Mancozeb was applied to 19% of the fungicide-treated area, representing 38% of the weight of fungicides applied. Dithianon was applied to 12% of the fungicide-treated area, accounting for 8% of the weight of fungicides applied. Applications to orchards for the control of apple scab (*Venturia inaequalis*) accounted for 86% of all fungicides used. In total, 16 fungicide active substances were applied to Bramley apple crops. Growers routinely apply different active substances to avoid fungicide resistance.

Glyphosate (applied to 57% of the herbicide-treated area) was the most commonly applied herbicide active substance accounting for 56% of the weight of herbicide active substances applied.

The organophosphorus active substance chlorpyrifos accounted for 37% of the insecticide/acaricide-treated area and represented 83% of the weight of insecticides applied. Cypermethrin which was applied to 25% of the insecticide/acaricide-treated area, accounted for only 2% of the weight of insecticides applied. Pirimicarb accounted for 14% the insecticide/acaricide-treated area and 5% of the weight of insecticide/acaricides applied. General insect control accounted for 58% of insecticide applications

Growth regulators were applied to an estimated 1,423 spray hectares of top fruit crops. The cyclohexanecarboxylate growth regulator prohexadione-calcium was applied to 40% of the area treated, accounting for 44% of the weight of growth regulators applied. Paclobutrazol, a triazole plant growth regulator, was applied to 42% of the treated area, accounting for 56% of the weight of growth regulators applied. Gibberellins was the only other active substance recorded in this group, accounting for 18% of the treated area but only less than 1% of the weight of growth regulators applied.

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

An estimated 10.3 tonnes of 'other products' were applied to 7,124 spray hectares of Bramley apples (Table 15, Figures 31 & 32). A total of 18 'other products' were applied. These included foliar feeds, trace elements and calcium-based products of which the majority were used to treat potential nutritional disorders. Calcium-based products were applied to 56% of the treated area of 'other products' used on Bramley apple orchards, primarily as foliar feeds and trace elements. Nitrogen products were applied to 12% of the area treated, representing 19% of the weight of 'other products' applied.

'OTHER' TOP FRUIT CROPS (TABLE 14)

There was very limited evidence of any top fruit being grown in Northern Ireland other than Bramley apples. An estimated 9 hectares of 'other' top fruit was grown in 2014 compared with 3 hectares in 2012 and 25 hectares in 2010. There may be other small holdings of top fruit which were not recorded on the Northern Ireland Agricultural Census (2012) and therefore not selected for this survey. This made it extremely difficult to estimate the amount of 'other' top fruit being grown. On average, dessert apples and pears received the same treatments as those applied to 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 is included in Tables 16, 17a, 17b and Figures 6 to 15.

Area of top fruit crops grown (Table 16)

Overall, the area of top fruit grown in Northern Ireland in 2014 increased marginally (<1%) compared with that recorded in 2012, with the area of Bramley apple crops increasing by 7 hectares. The data indicate a three-fold increase in the overall area of 'other' top fruit crops grown (previous surveys included plum orchards), from 3 hectares to 9 hectares. As in all previous surveys the majority of the total top fruit area in Northern Ireland was used for Bramley apple production (99%).

Comparison of pesticide usage (Tables 17a & 17b, Figures 6 to 14)

There was an 11% decrease in the total area of pesticide application to top fruit crops between 2012 and 2014 and a 3% decrease since 2010. The weight of pesticides applied in 2014 decreased by 25% when compared to 2012. This was due to reduced fungicide application (Figures 6 & 7).
The area of top fruit crops treated with fungicides decreased by 12% since 2012, and the weight of fungicides applied decreased by 27%. However, herbicide applications increased by 92% for the total area treated and 45% for the total weight of active substances applied.

Insecticide/acaricide applications decreased by 16% and 19%, in the area treated and the weight of active substances applied, respectively (Figures 10 & 11). Applications of carbamate active substances increased almost three fold for the total area treated and 35% of the total weight applied. The area treated with organophosphates fell by 21%, with a 22% reduction in weight of active substances being applied compared with 2012. The area treated with pyrethroids decreased by 53% from 980 spray hectares in 2012 to 460 spray hectares in 2014 and the quantity applied decreased by 62 from 26 kg to 10 kg during the same period.

An estimated 1,811 spray hectares were treated with growth regulators in 2014, a decrease of 16% since 2012. The weight of growth regulators applied also decreased by 19% between 2012 and 2014.

The active substances most extensively used in 2014 are shown in Table 17b, which also provides the trend in application from 1992 -2014.

Storage of top fruit crops (Tables 18 - 20, Figures 15 to 18)

An estimated 11,072 tonnes of Bramley apples were stored in 2014, of which 88% (9,706 tonnes) received a post-harvest treatment. There was a 9% increase in the weight of apples stored in 2014 when compared with 2012 (Figure 15).

Three different storage methods were identified during this survey. CO_2-scrubbed controlled atmosphere stores, representing 6% of stored apples, are refrigerated un-vented stores which use a method to remove and expel carbon dioxide and other gases from the atmosphere. Unscrubbed controlled atmosphere stores, which are refrigerated and use vents to reduce carbon dioxide levels, accounted for 75% of stored apples. Cold/refrigerated stores, which have no modified atmosphere and use cooled, forced air ventilation, accounted for 18% of stored apples. Approximately 1% were stored in ventilated barn stores and were untreated.

The ethylene inhibitor, 1-methylcyclopropene, was the only product recorded in use on stored apples as other active substances are no longer available for use in Northern Ireland. However, due to its application method, it was impossible to calculate the weight of active substance applied.

The active substances recorded in use on stored apples are shown in tables 18 to 21.

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 Mr David Williams who worked tirelessly on key aspects of this report.

We are particularly grateful for the support of Dr. Seán MacAntsaoir and Mr. Andrew Lavery (Northern Ireland Horticulture and Plant Breeding Station, AFBI, Loughgall) for their invaluable information on husbandry and pesticide practices during cultivation of top fruit crops.

REFERENCES

Kidd, S.L.B., Jess, S., McCallion, T. (1994) Top Fruit Crops 1992. *Pesticide Usage Survey Report 118* Belfast: HMSO.

Kidd, S.L.B., Jess, S., McCallion, T. (1996) Top Fruit Crops 1996. *Pesticide Usage Survey Report 147* Belfast: Textflow Astron.

Kearns, C.A., Jess, S., Matthews, D., McCallion, T. (2004) Top Fruit Crops 2002. *Pesticide Usage Survey Report 178* Belfast: DARDNI

Kearns, C.A., Jess, S., Matthews, D., Kelly, T. (2007) Top Fruit Crops 2006. *Pesticide Usage Survey Report 217* Belfast: AFBINI.

Kirbas, J., Jess, S., Withers, A., Matthews, D., Kelly, T. (2009) Top Fruit Crops 2008. *Pesticide Usage Survey Report 231* Belfast: AFBINI.

Lavery, M.K., Jess, S., Kirbas, J.M., Withers, A., Matthews, D., Kelly, T. (2011) Top Fruit Crops 2010. *Pesticide Usage Survey Report 241* Belfast: AFBINI.

Lavery, M.K., Jess, S., Kirbas, J.M., Matthews, D., Patton, A. (2013) Top Fruit Crops 2012. *Pesticide Usage Survey Report 249* Belfast: AFBINI.

Figure 1 **Utilisation of top fruit production area in Northern Ireland, 2014.**

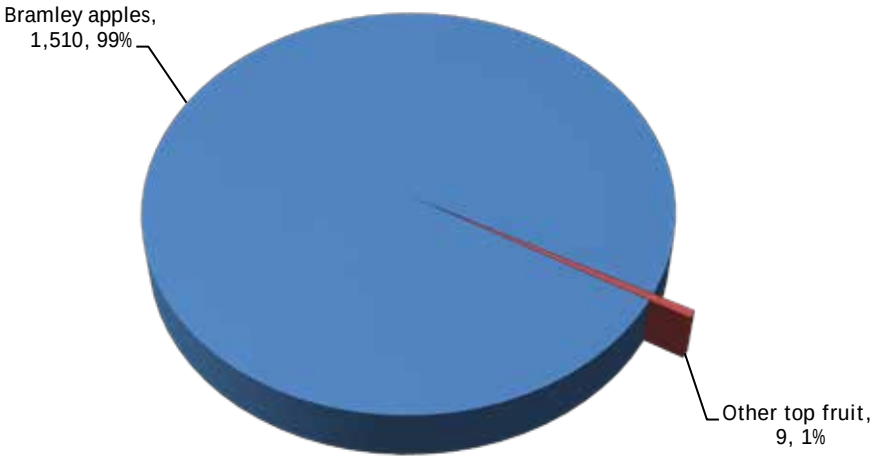


Figure 2 **Proportional area (spha) of top fruit crops treated with each pesticide type in Northern Ireland, 2014.**

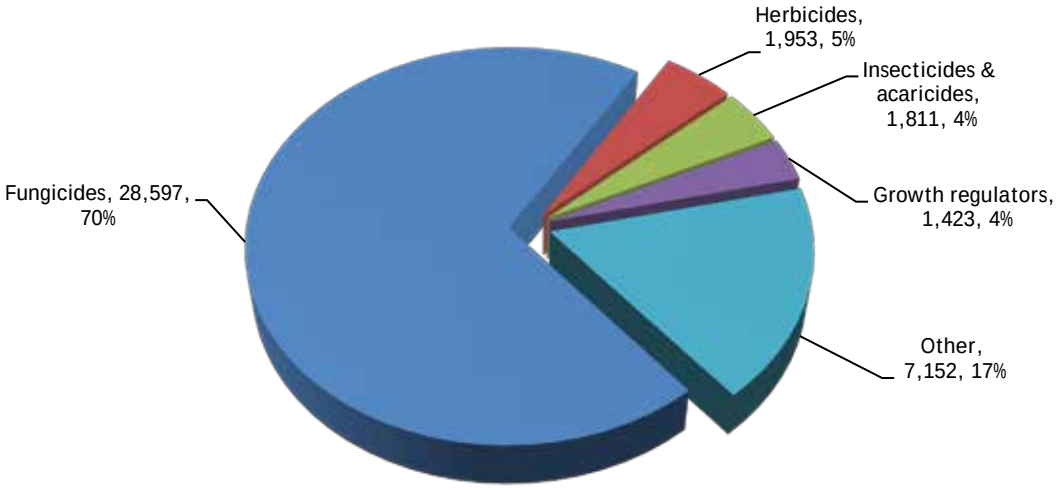


Figure 3 **Proportion of top fruit crops treated with each pesticide type by weight (kg) in Northern Ireland, 2014.**

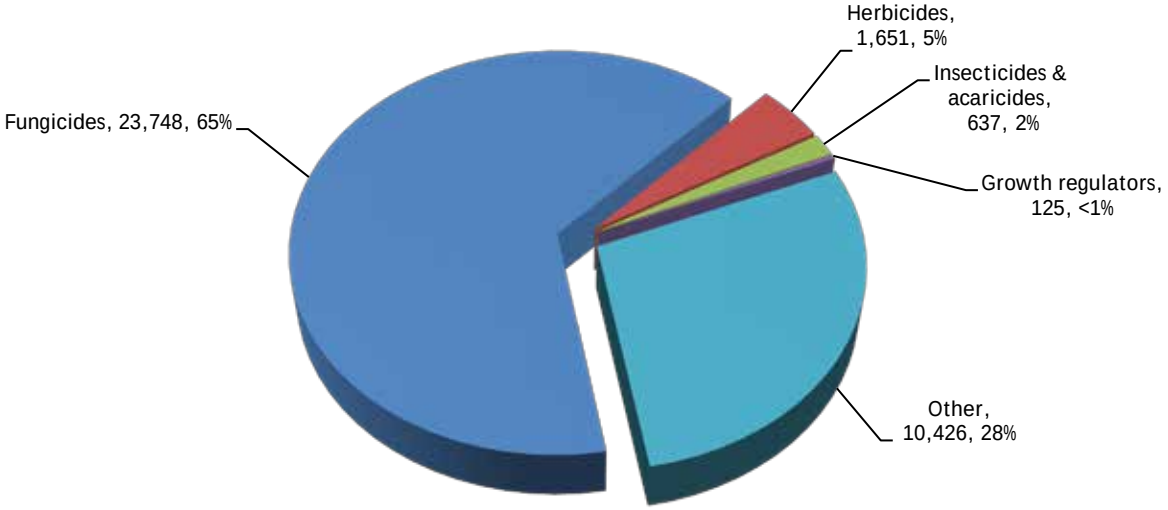
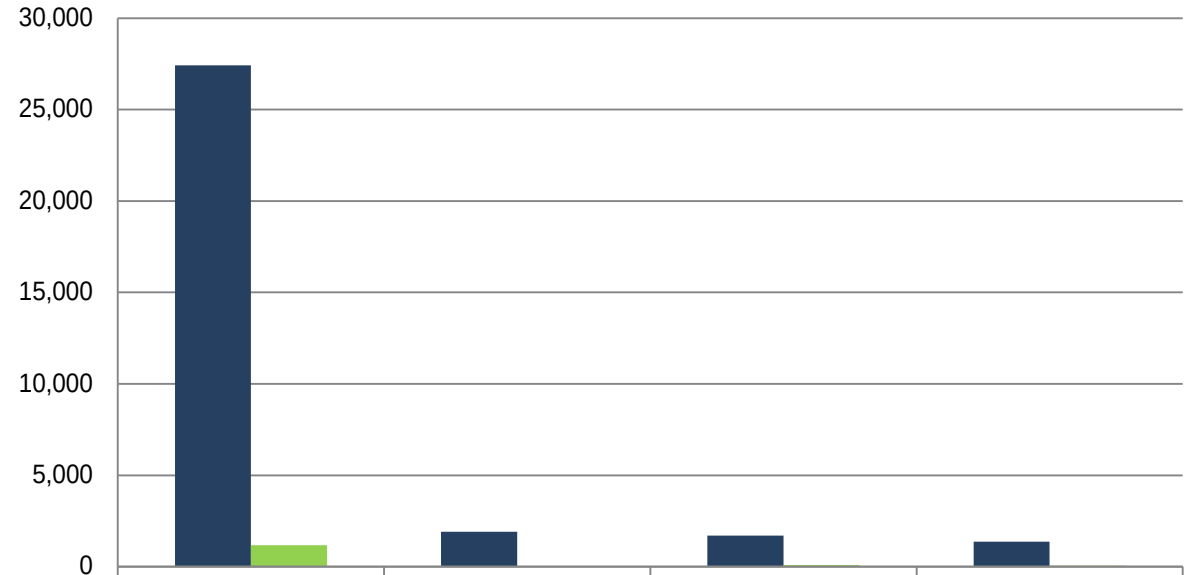
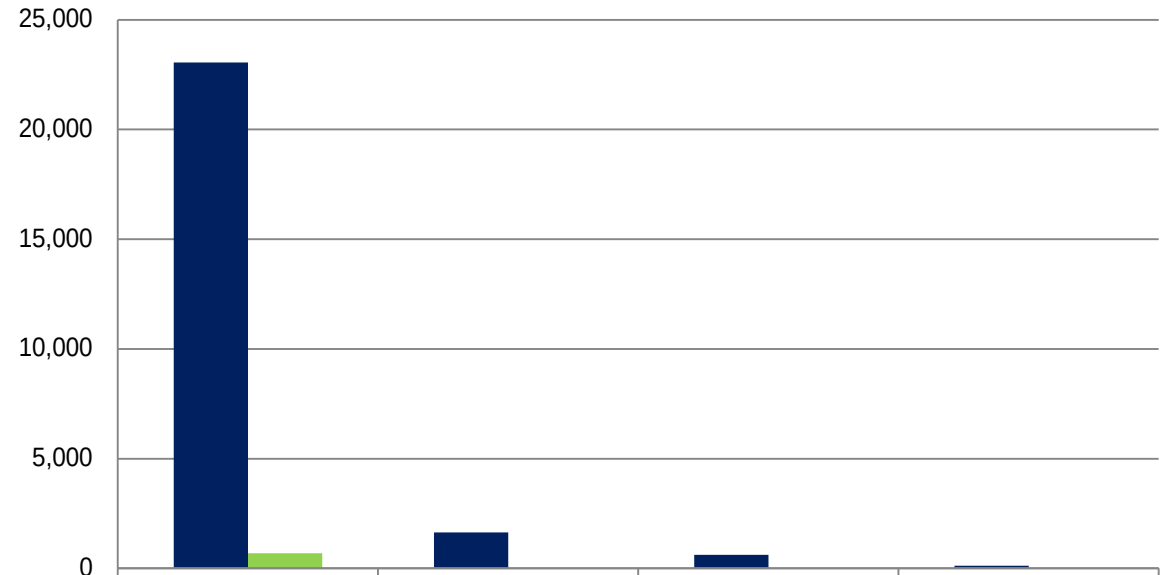


Figure 4 **Area (spha) of top fruit crops treated with each pesticide type in the county regions of Northern Ireland, 2014.**



	Fungicides	Herbicides	Insecticides and acaricides	Growth Regulators
Armagh	27,418	1,913	1,709	1,369
All other counties	1,179	40	102	54

Figure 5 **Quantity (kg) of each pesticide type applied to top fruit crops in the county regions of Northern Ireland, 2014.**



	Fungicides	Herbicides	Insecticides and acaricides	Growth Regulators
Armagh	23,057	1,636	618	120
All other counties	691	15	20	5

Figure 6 **Comparison of pesticide usage on top fruit crops by area treated (spha) in Northern Ireland, 1992-2014.** *Bars show Standard Error.*

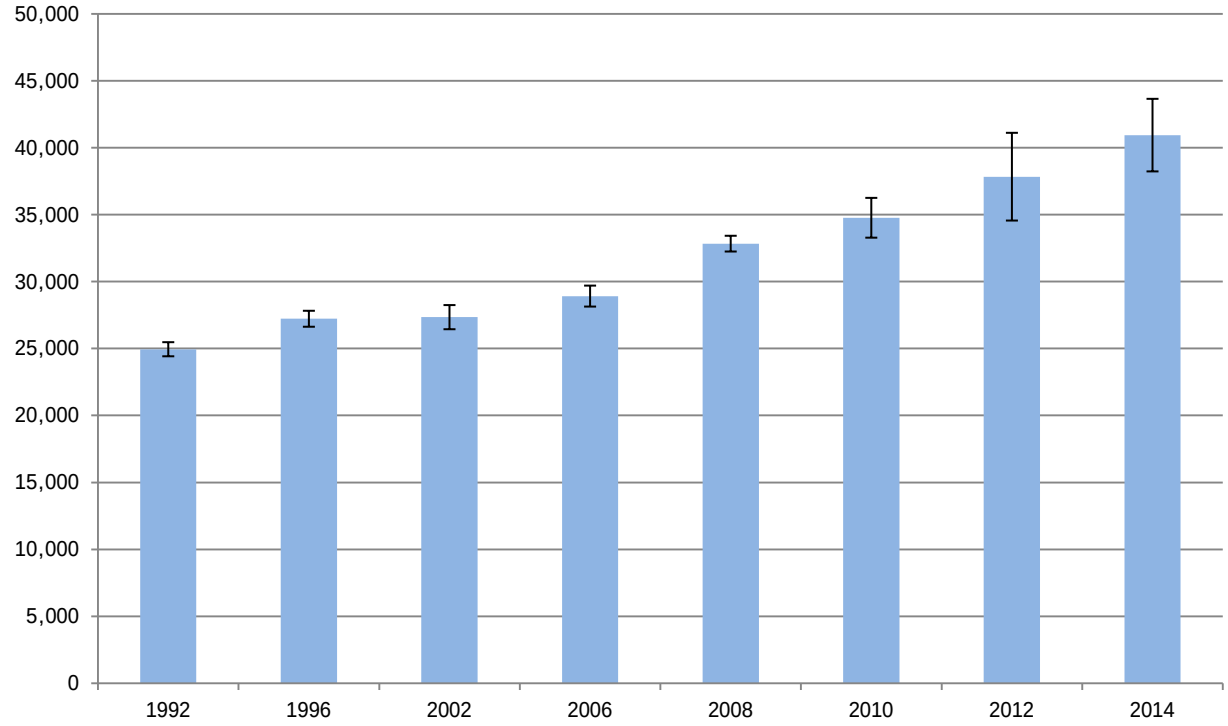


Figure 7 **Comparison of pesticide usage on top fruit crops by total weight applied (kg) in Northern Ireland, 1992-2014.** *Bars show Standard Error.*

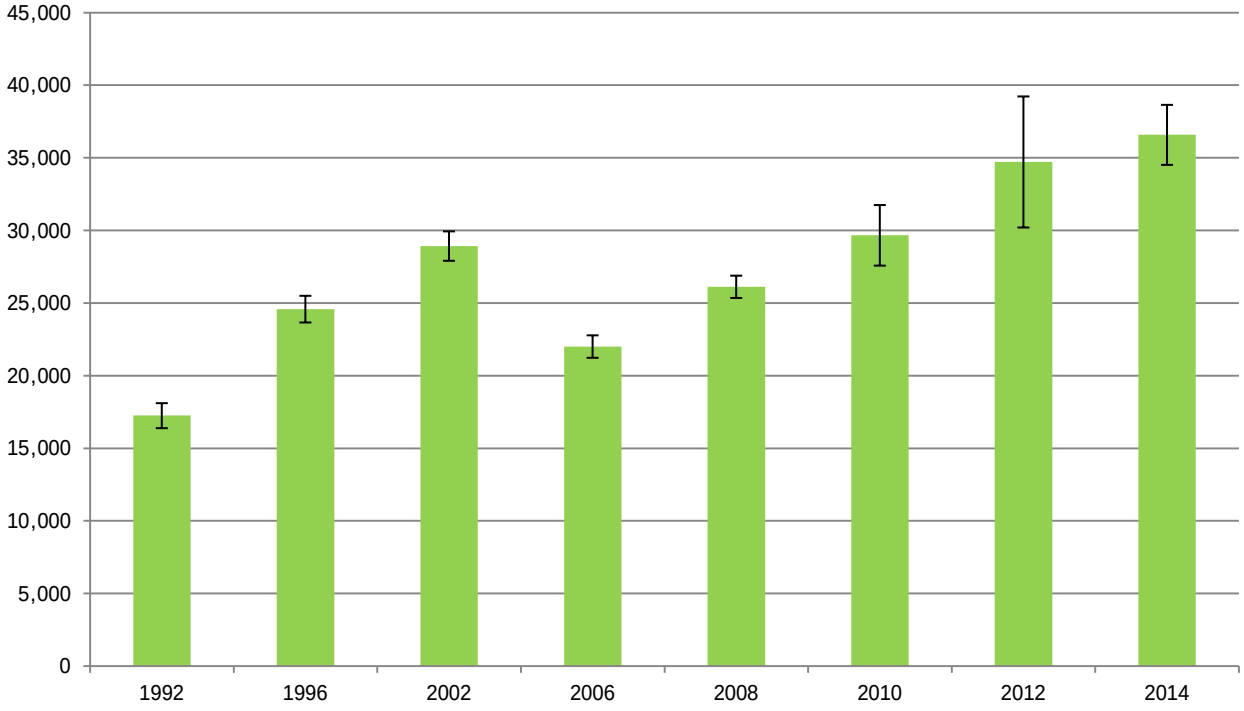


Figure 8 **Comparison of area treated (spha) with different pesticide groups in Northern Ireland, 1992-2014.**

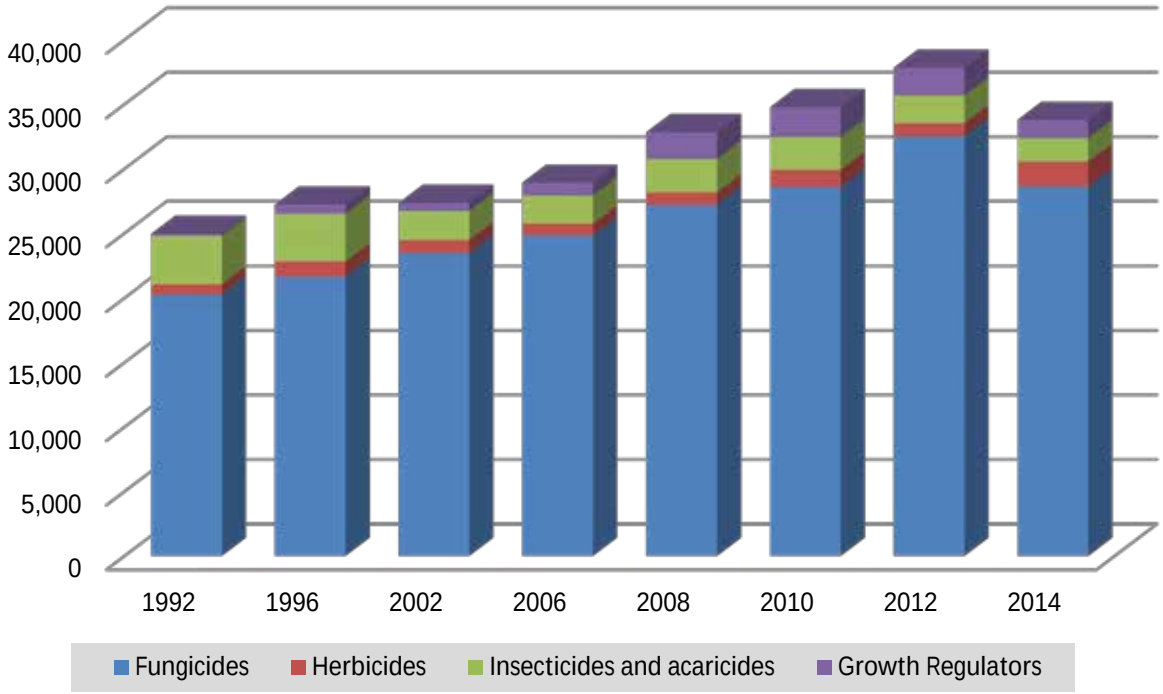


Figure 9 **Comparison of quantity (kg) of different pesticide groups applied to top fruit crops in Northern Ireland, 1992-2014.**

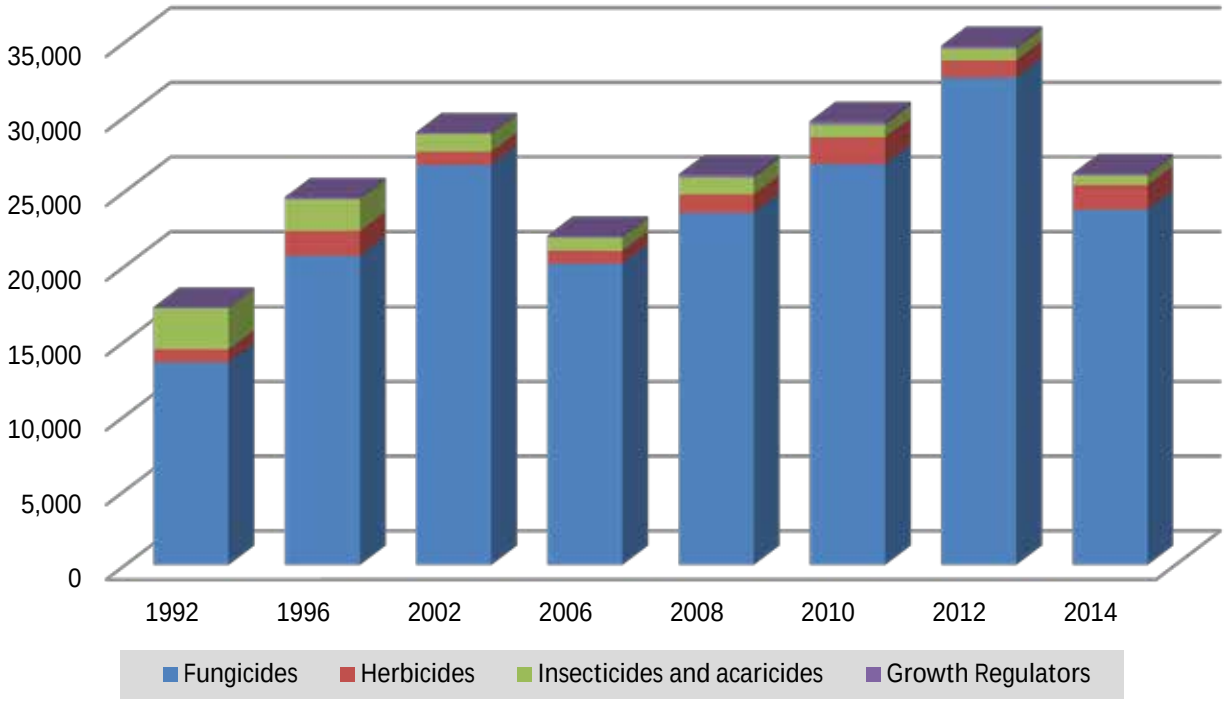
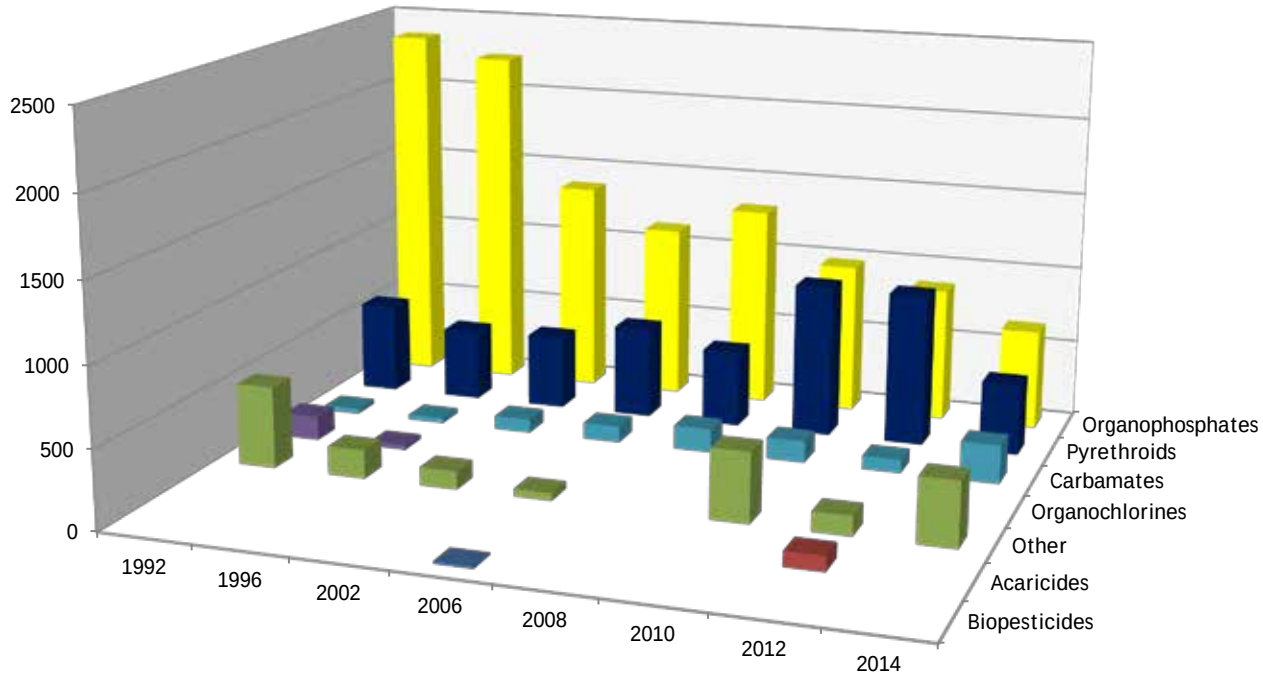
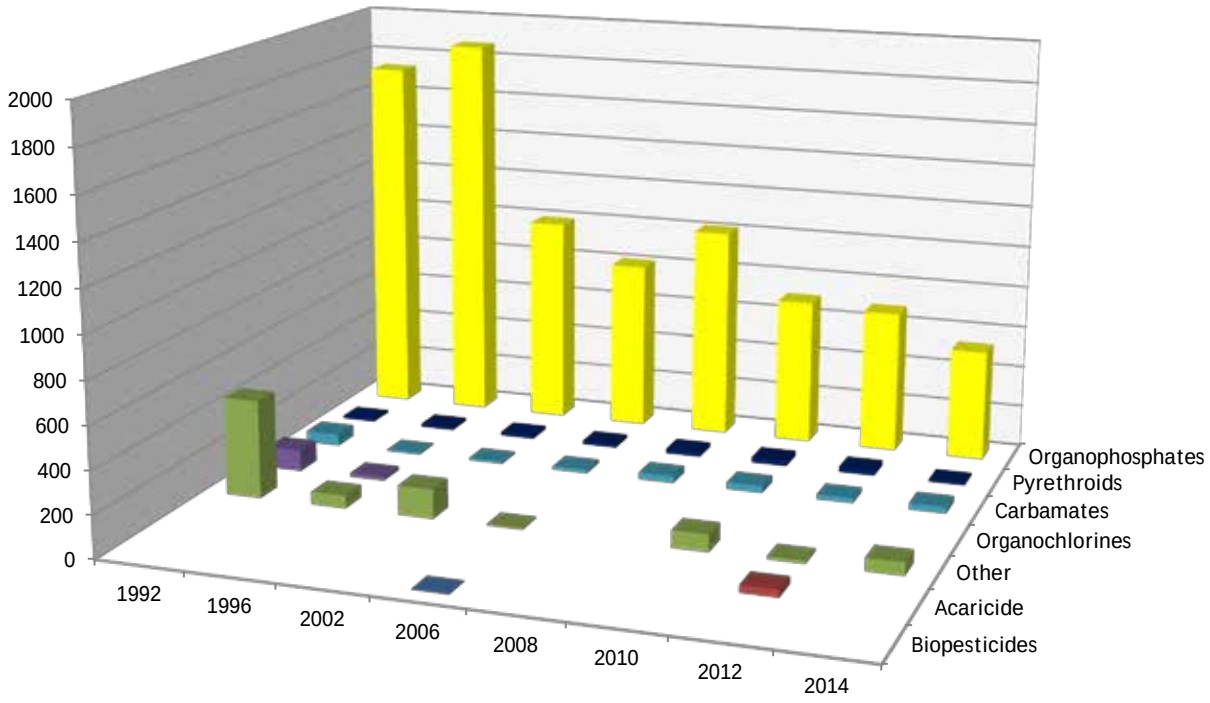


Figure 10 **Comparison of area (spha) of top fruit crops treated with different insecticide types in Northern Ireland, 1992-2014.**



Acaricides previously included with 'Other'

Figure 11 **Comparison of quantity (kg) of different insecticide types applied to top fruit crops in Northern Ireland, 1992-2014.**



Acaricides previously included with 'Other'

Figure 12 **Comparison of application rates (kg/spha) for pesticide types used on top fruit crops in Northern Ireland, 1992-2014.**

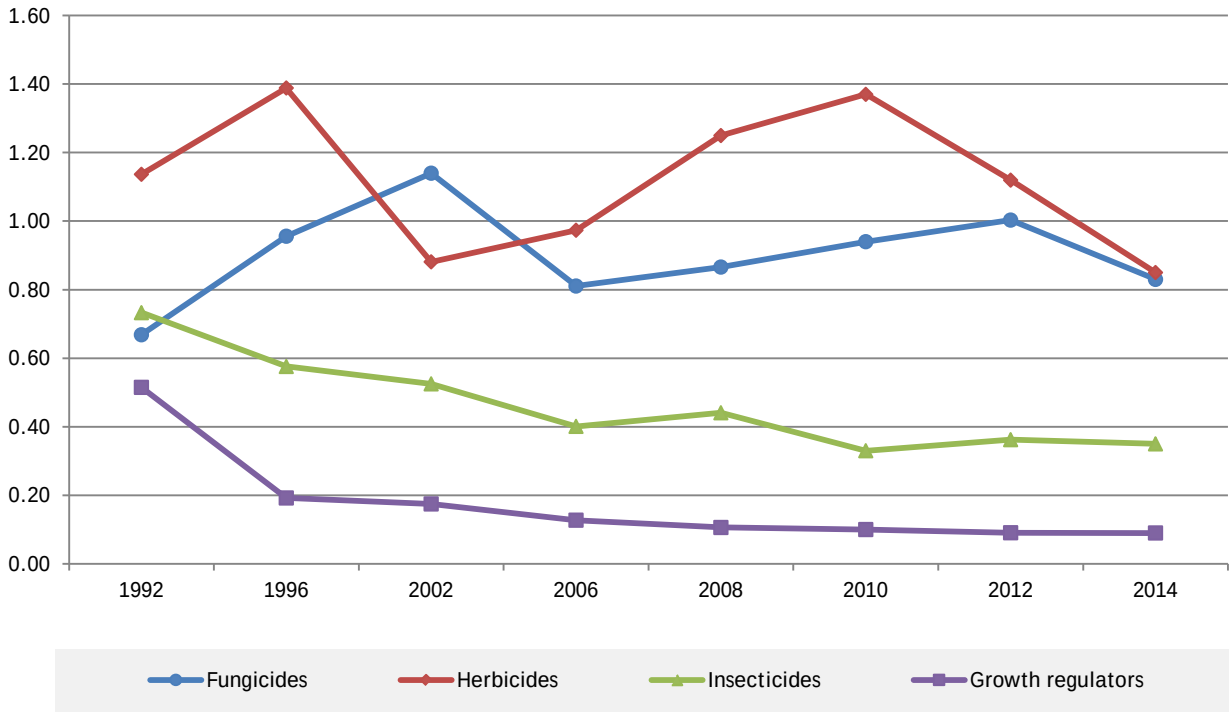


Figure 13 **Quantity of fungicides applied (kg/ha) per hectare of total top fruit crop in Northern Ireland, 1992-2014.**

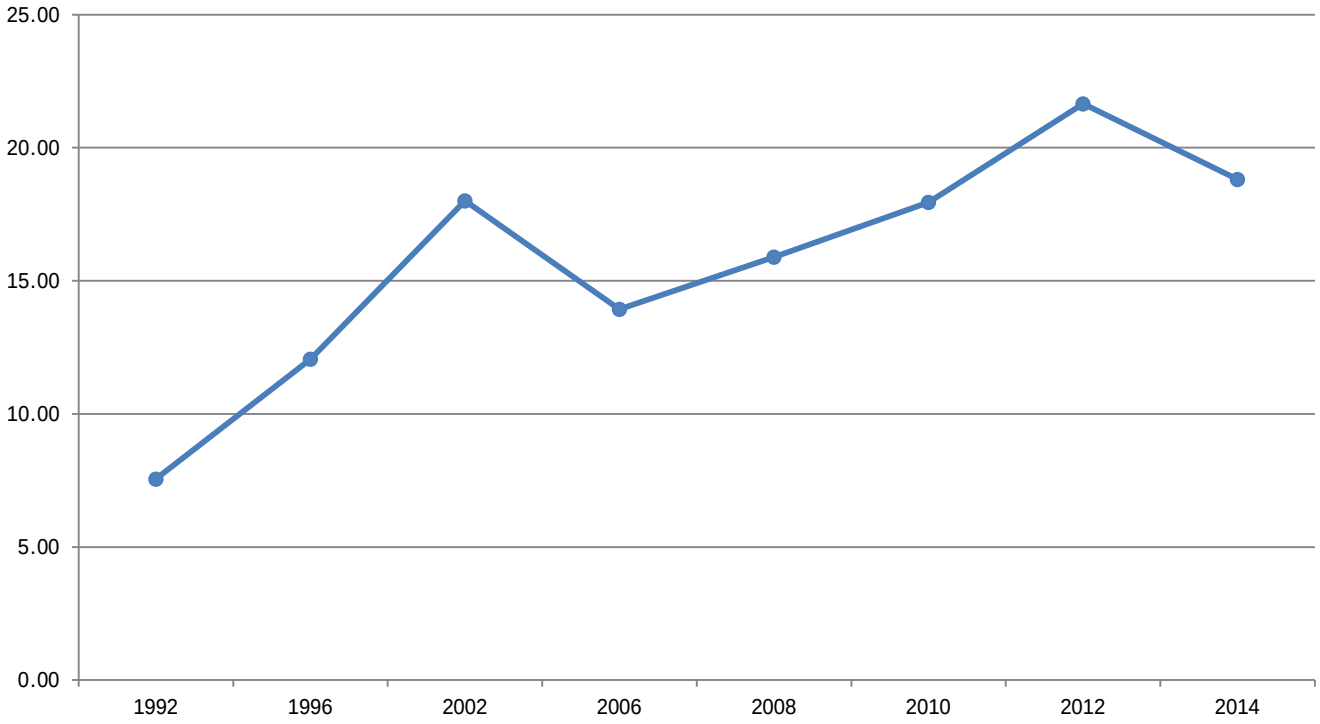


Figure 14 **Quantity of herbicides, insecticides and growth regulators applied per hectare of total top fruit crop (kg/ha) in Northern Ireland, 1992-2014.**

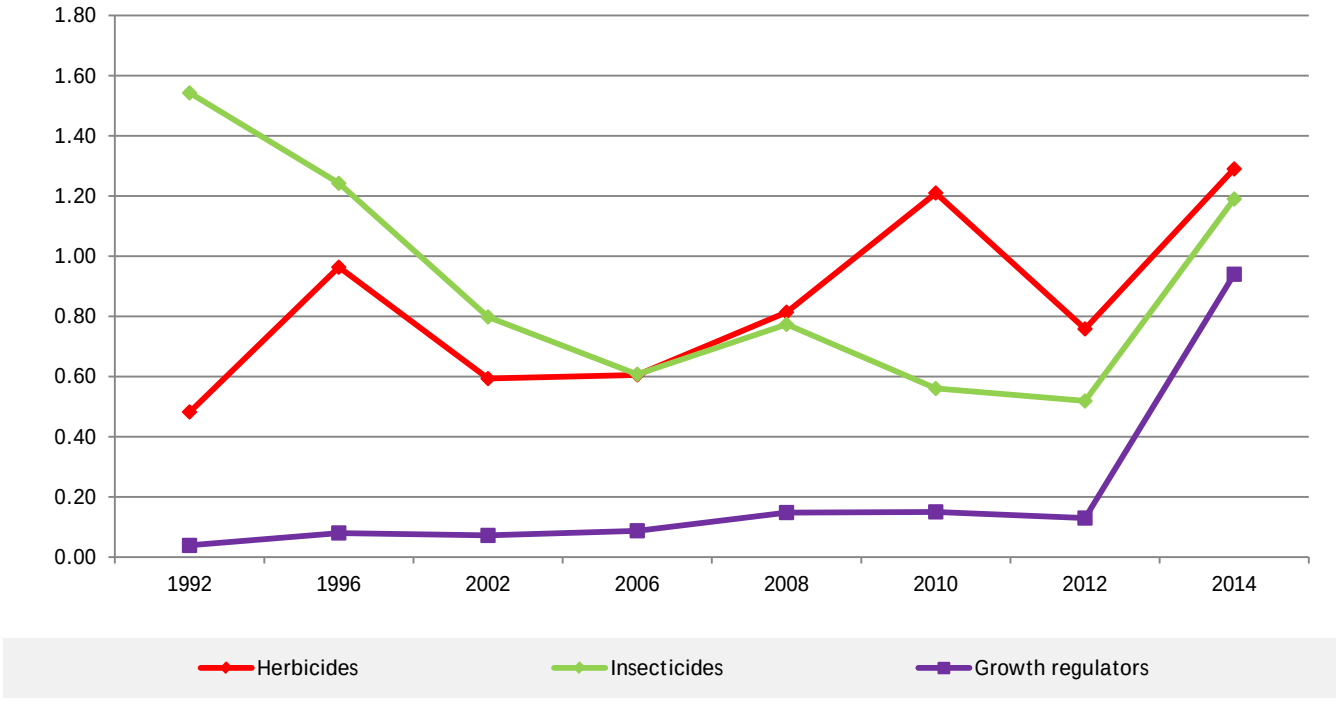
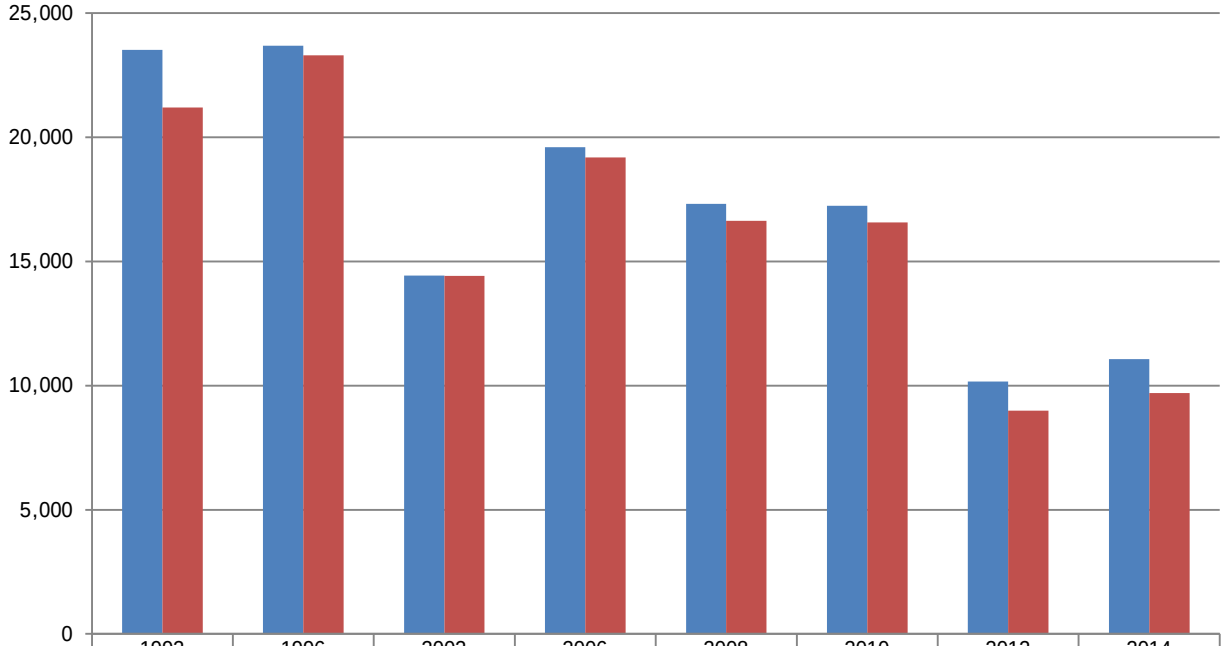


Figure 15 **Quantity of Bramley apples stored and quantity receiving a post-harvest treatment (tonnes) in Northern Ireland, 1992-2014.**



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

Figure 16 **Quantity (tonnes) of stored Bramley apples receiving post-harvest treatments in Northern Ireland, 2014.**

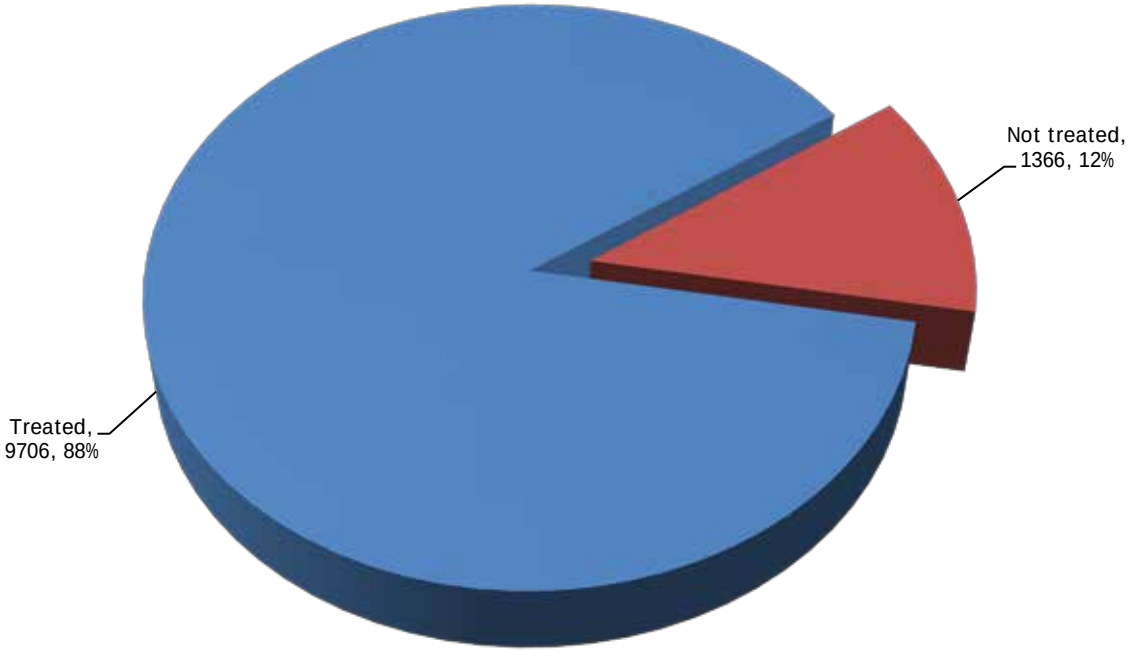
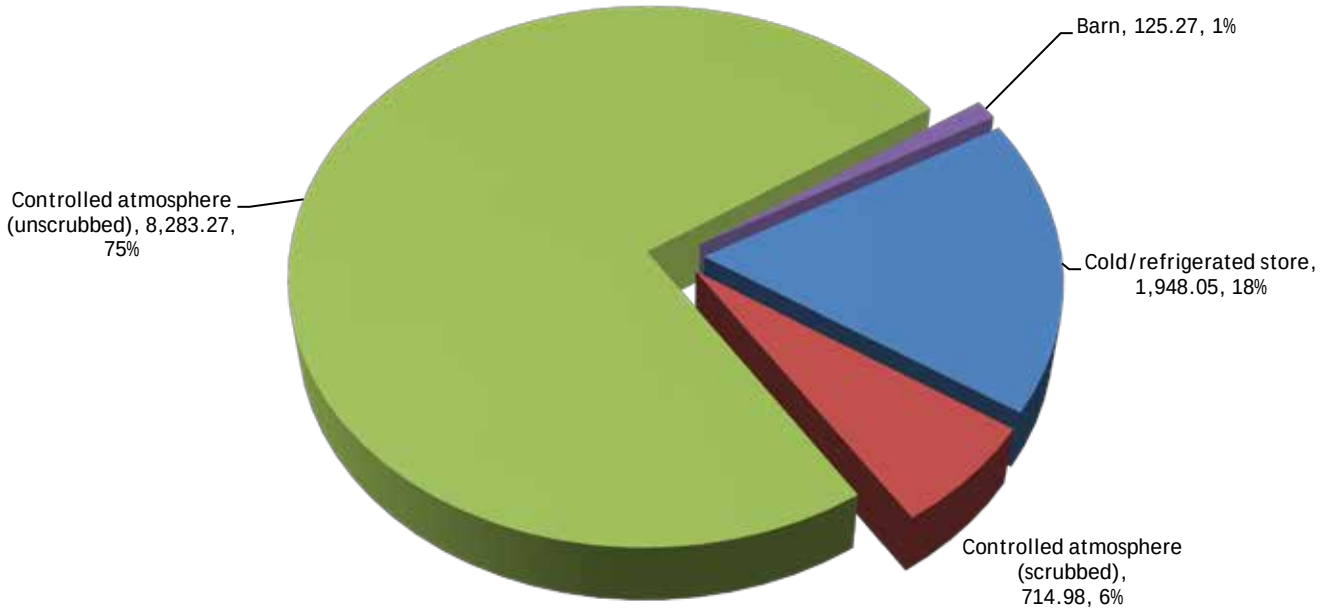


Figure 17 **Quantity of Bramley apples stored (tonnes) and the storage methods used in Northern Ireland, 2014.**



PESTICIDE USAGE ON BRAMLEY APPLE CROPS

- Total area grown: 1,510 hectares
- Basic area treated: 1,496 hectares
- Total area treated: 40,708 spray hectares
- Weight of active substances applied: 35,857 kilogrammes
- 17 different fungicide substances, 11 insecticide/acaricides, 5 herbicides and 3 growth regulators were applied to Bramley apple crops

Fungicides – Bramley apples

- Basic area treated: 1,496 hectares
- Total area treated: 38,424 spray hectares
- Weight of active substances applied: 23,634 kilogrammes
- Fungicides accounted for 70% of total area treated and 65% of total weight applied
- The most commonly used fungicides were mancozeb, captan, dithianon, pyrimethanil and fenbuconazole, being applied to 28,541 spray hectares of Bramley apple crops

Figure 18 **Total area (spha) of Bramley apple crops treated with fungicide active substances in Northern Ireland, 2014.**

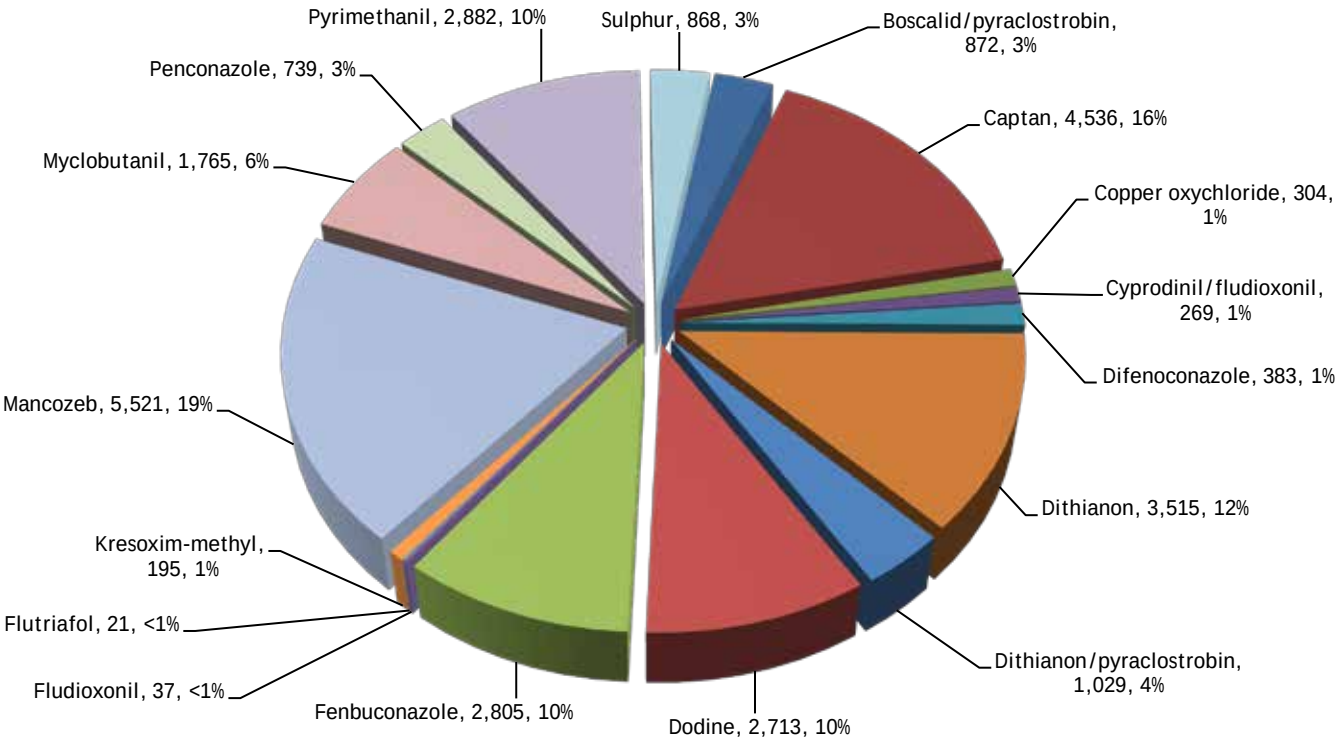


Figure 19 **Total quantity (kg) of fungicide active substances applied to Bramley apple crops in Northern Ireland, 2014.**

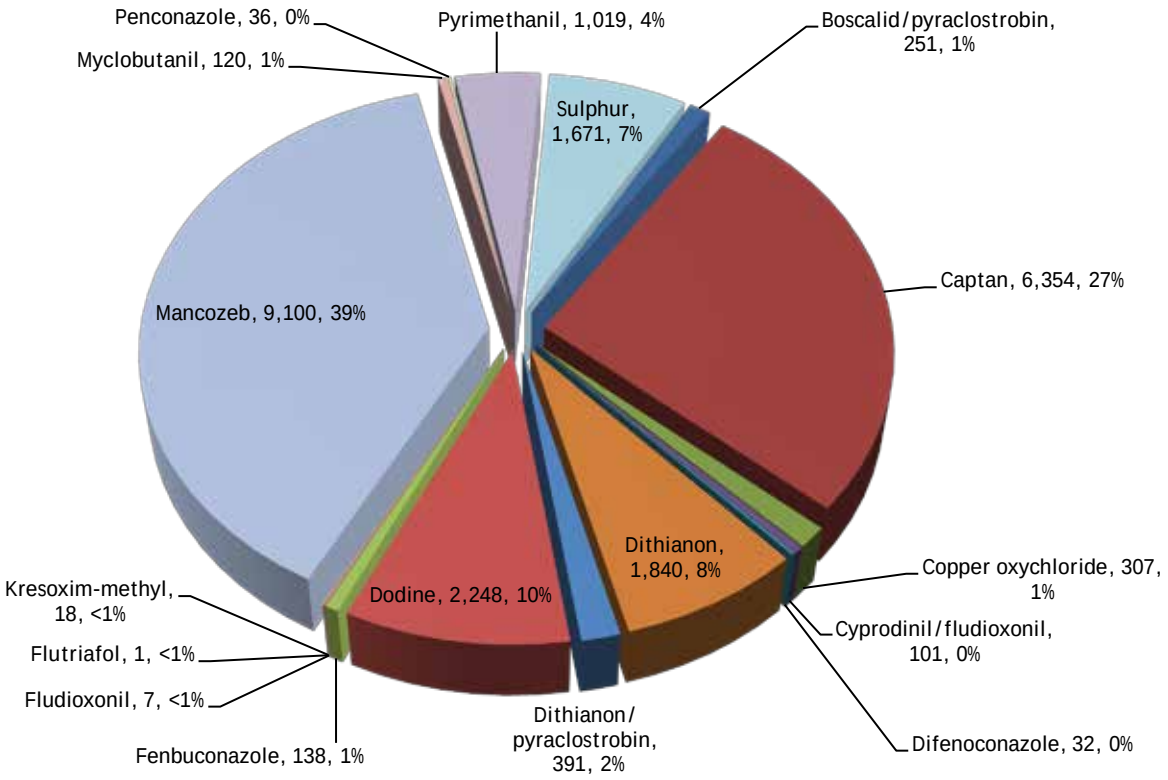
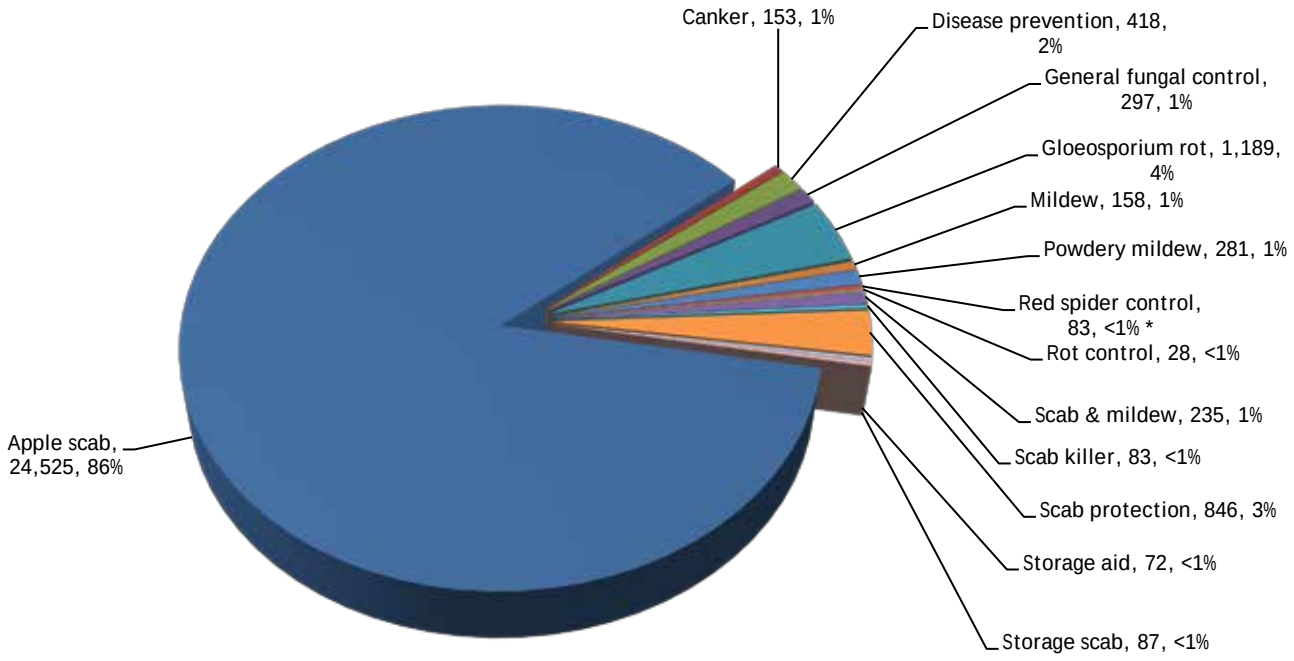


Figure 20 **Bramley apples: Reasons for fungicide use (spha), 2014.**



* red spider control included due to the fungicide/acaricide dual action of sulphur based product

Herbicides – Bramley apples

- Basic area treated: 816 hectares
- Total area treated: 1,947 spray hectares
- Weight of active substances applied: 1,646 kilogrammes
- Herbicides accounted for 5% of both the total area treated and total weight applied
- The most frequently used herbicide was glyphosate, applied to 1,112 spray hectares of Bramley orchard floor areas, accounting for 57% of the total weight of herbicides applied

Figure 21 **Total area (spha) of Bramley apple crops treated with herbicide active substances in Northern Ireland, 2014.**

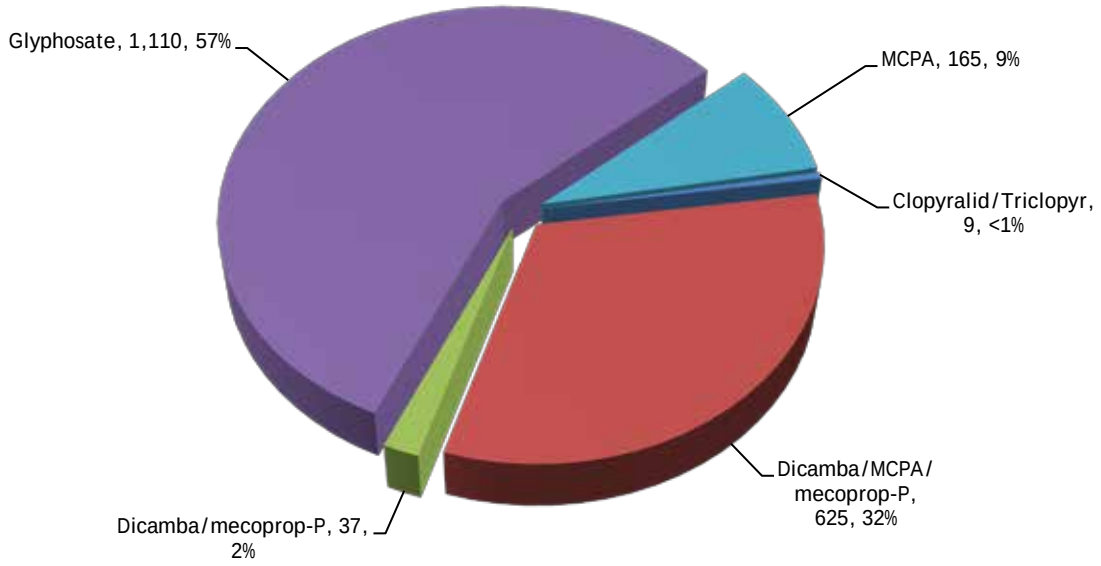


Figure 22 **Total quantity (kg) of herbicide active substances applied to Bramley apple crops in Northern Ireland, 2014.**

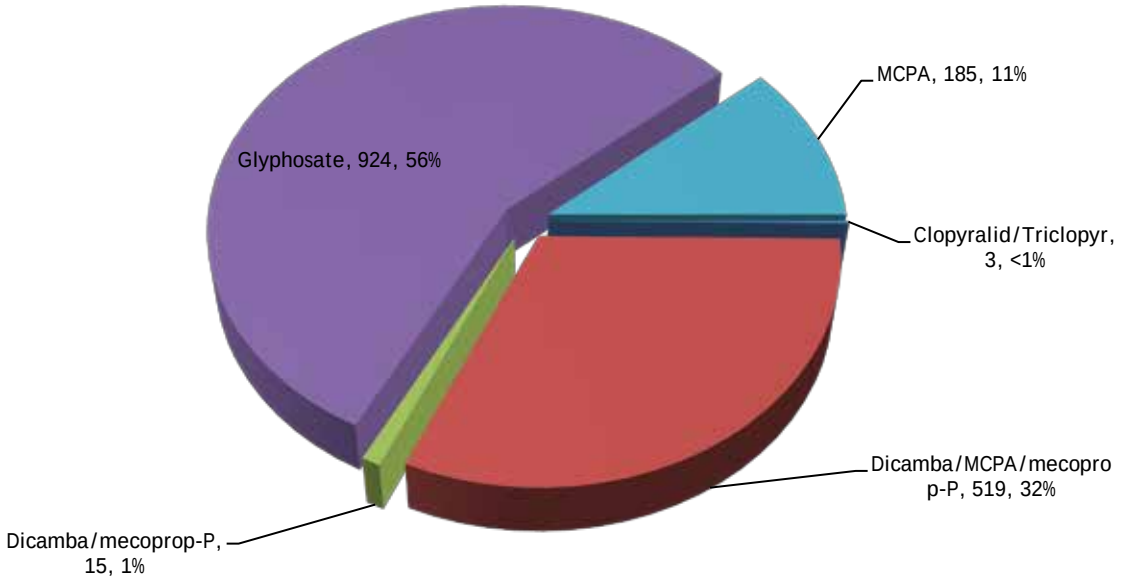
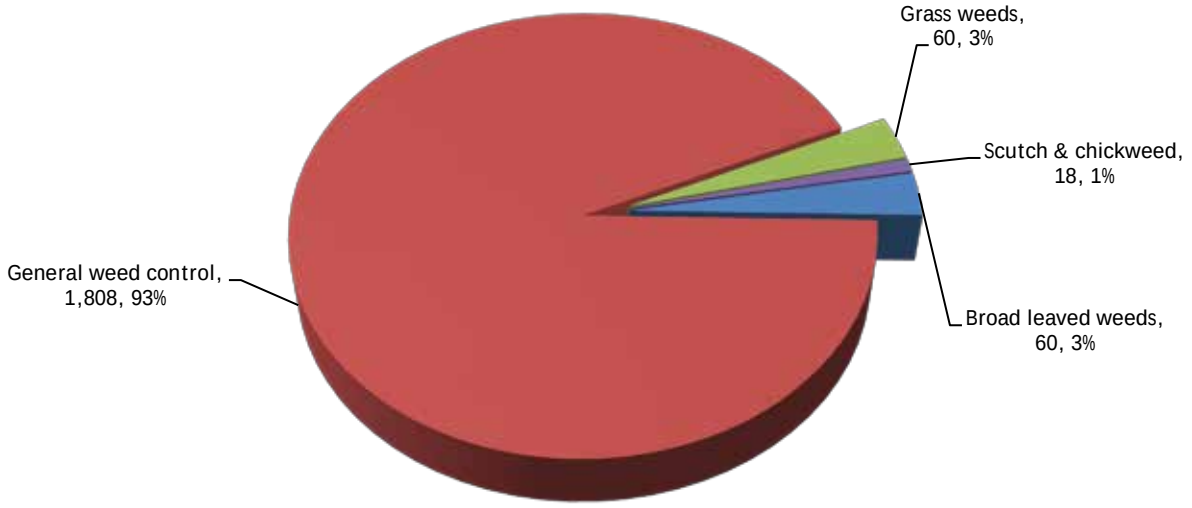


Figure 23 Bramley apples: Reasons for herbicide use (spha), 2014.



Insecticide/acaricides – Bramley apples

- Basic area treated: 1,107 hectares
- Total area treated: 1,807 spray hectares
- Weight of active substances applied: 637 kilogrammes
- Insecticide/acaricides accounted for 4% of the total area treated and 2% of the total weight applied

Figure 24 Total area (spha) of Bramley apple crops treated with insecticide/acaricide active substances in Northern Ireland, 2014.

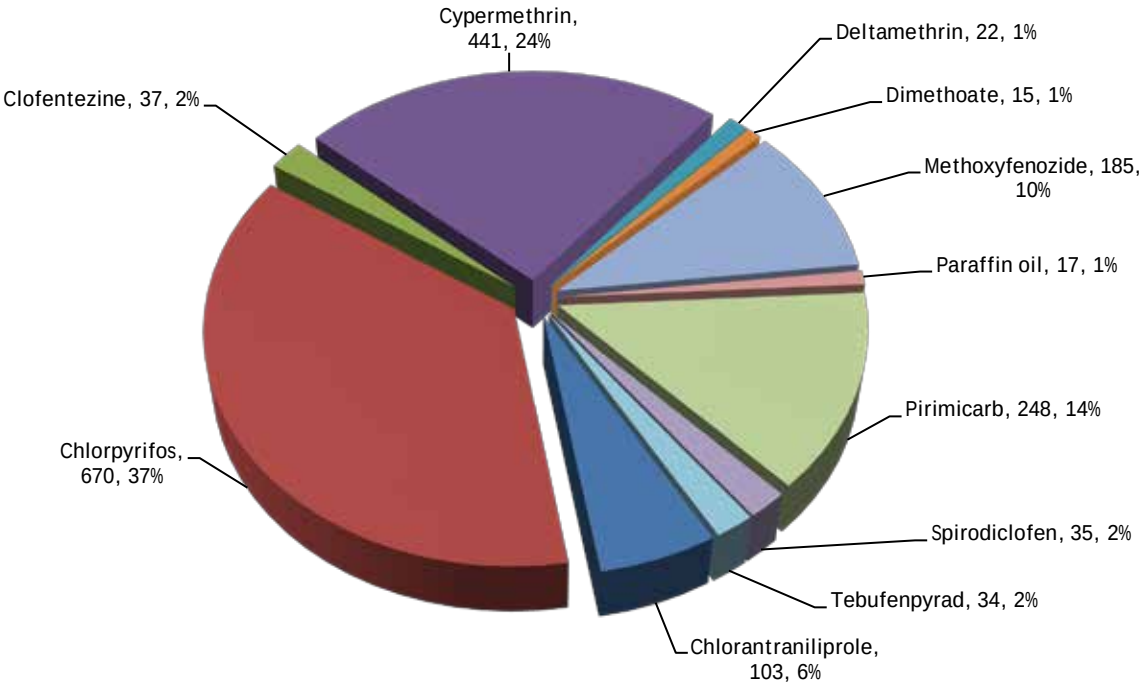


Figure 25 **Total quantity (kg) of insecticide/acaricide active substances applied to Bramley apple crops in Northern Ireland, 2014.**

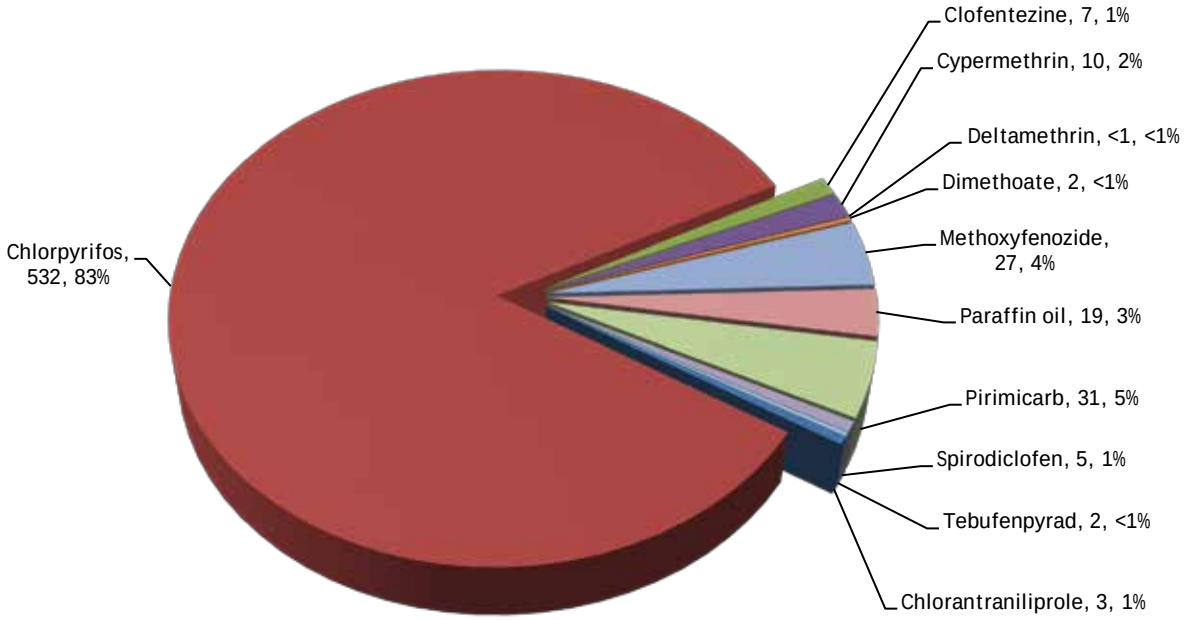
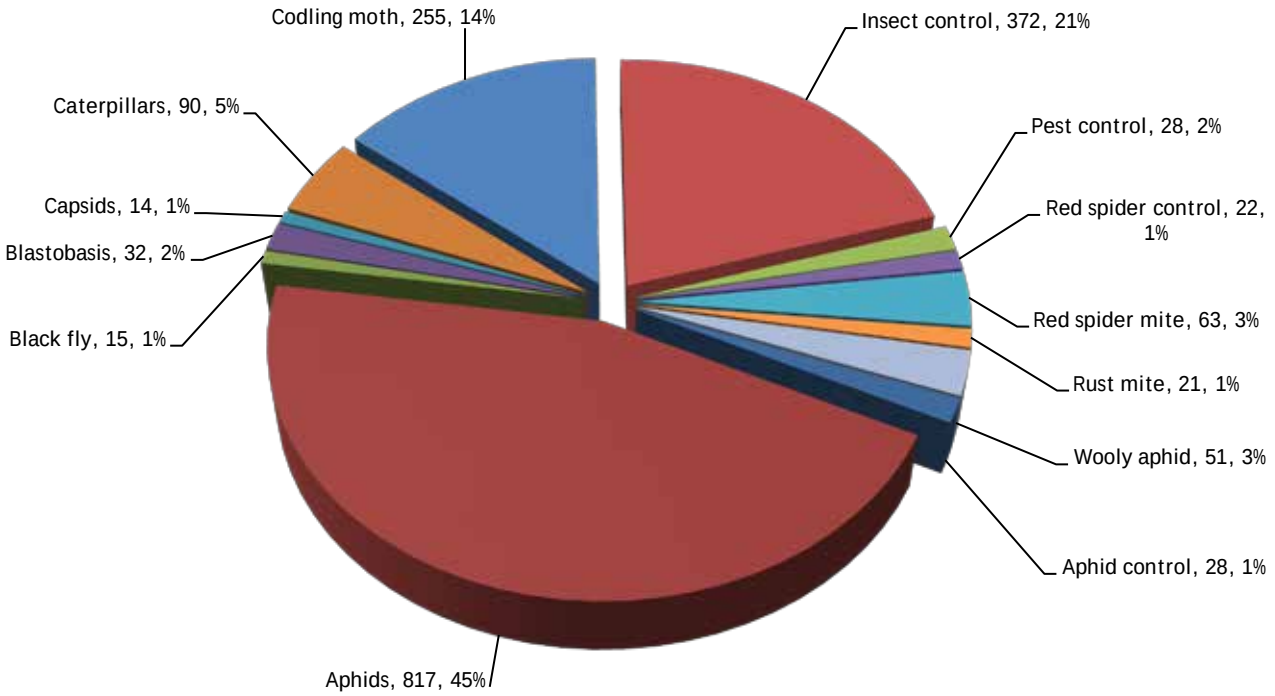


Figure 26 **Bramley apples: Reasons for insecticide/acaricide use (spha), 2014.**



Growth regulators – Bramley apples

- Basic area treated: 564 hectares
- Total area treated: 1,415 spray hectares
- Weight of active substances applied: 125 kilogrammes
- Growth regulators accounted for 3% of the total area treated and <1% of the total weight applied
- All applications were for growth regulation

Figure 27 **Total area (spha) of Bramley apple crops treated with growth regulator active ingredients in Northern Ireland, 2014.**

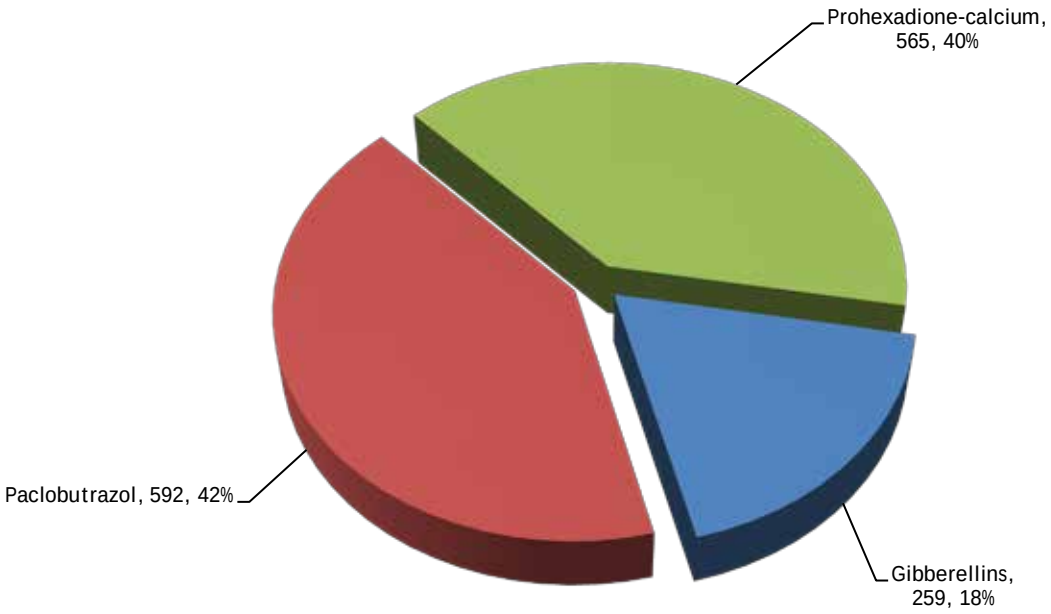
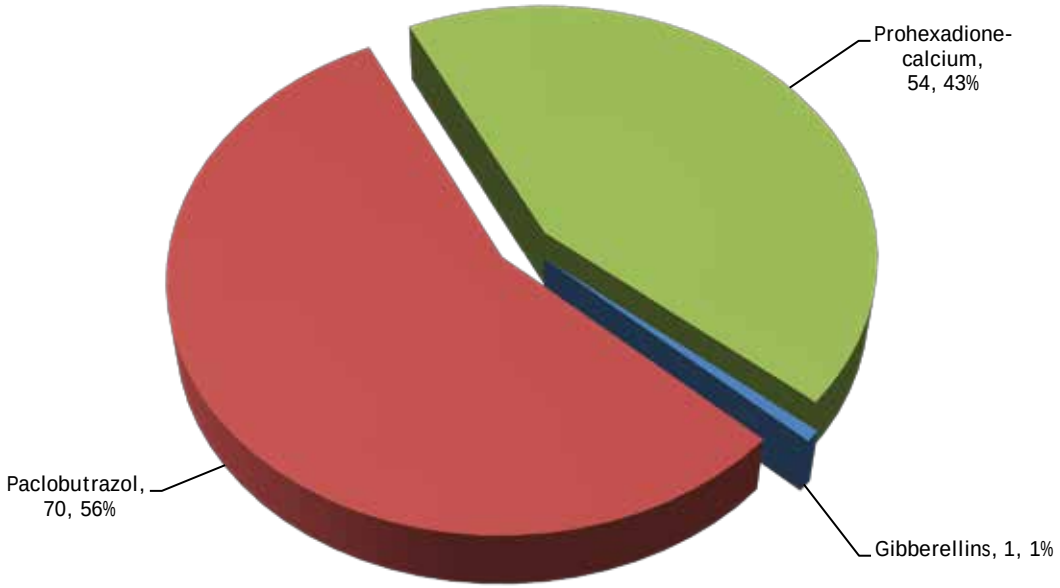


Figure 28 **Total quantity (kg) of growth regulator active substances applied to Bramley apple crops in Northern Ireland, 2014.**



'Other products' – Bramley apples

- Total area treated: 7,124 spray hectares
- Weight of 'other products' applied: 10,372 kilogrammes

Figure 29 **Total area (spha) of Bramley apple crops treated with 'other products' in Northern Ireland, 2014.**

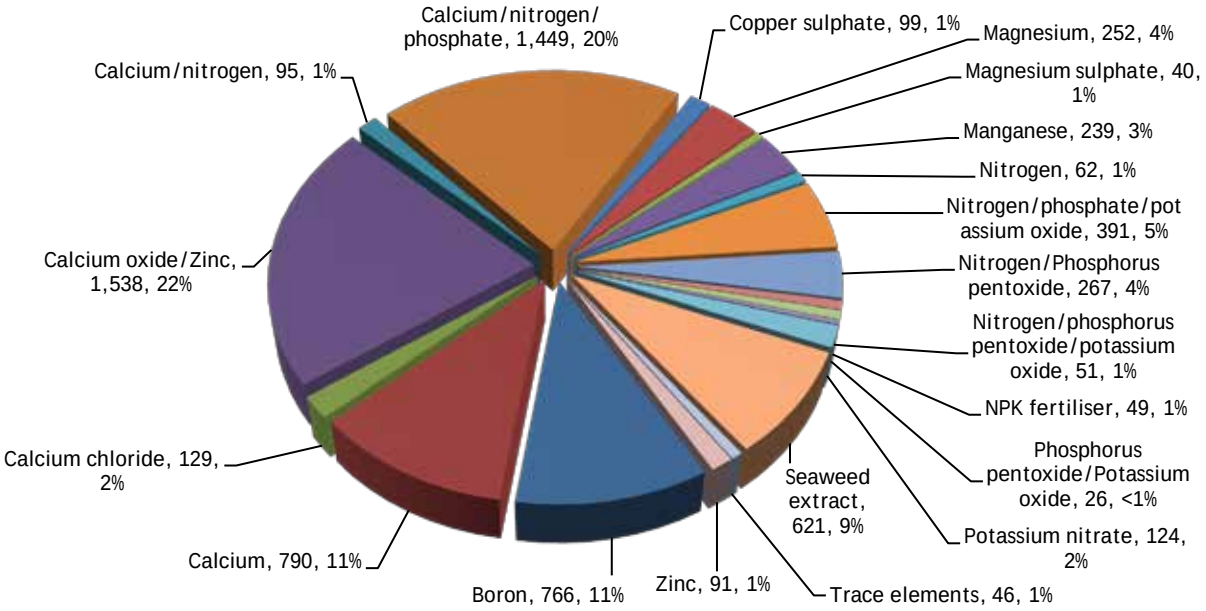
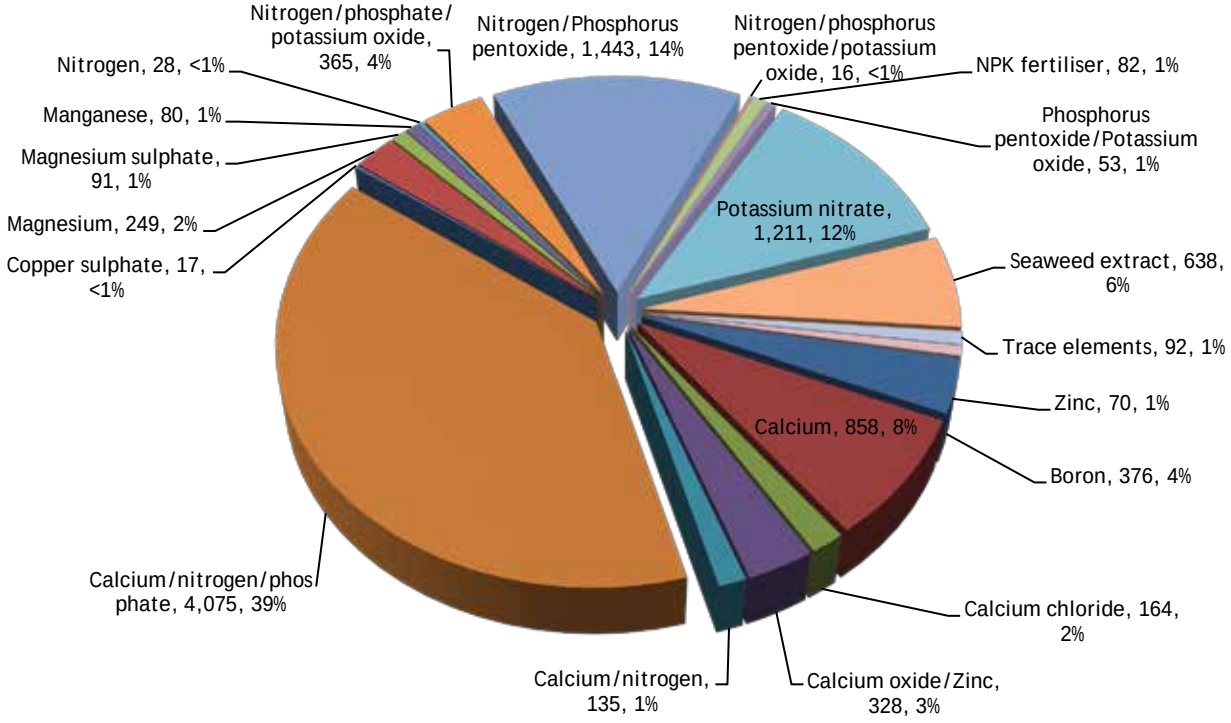


Figure 30 **Total quantity (kg) of 'other' products applied to Bramley apple crops in Northern Ireland, 2014.**



'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 31 **Total area (spha) of 'other' top fruit crops treated with fungicide active substances in Northern Ireland, 2014.**

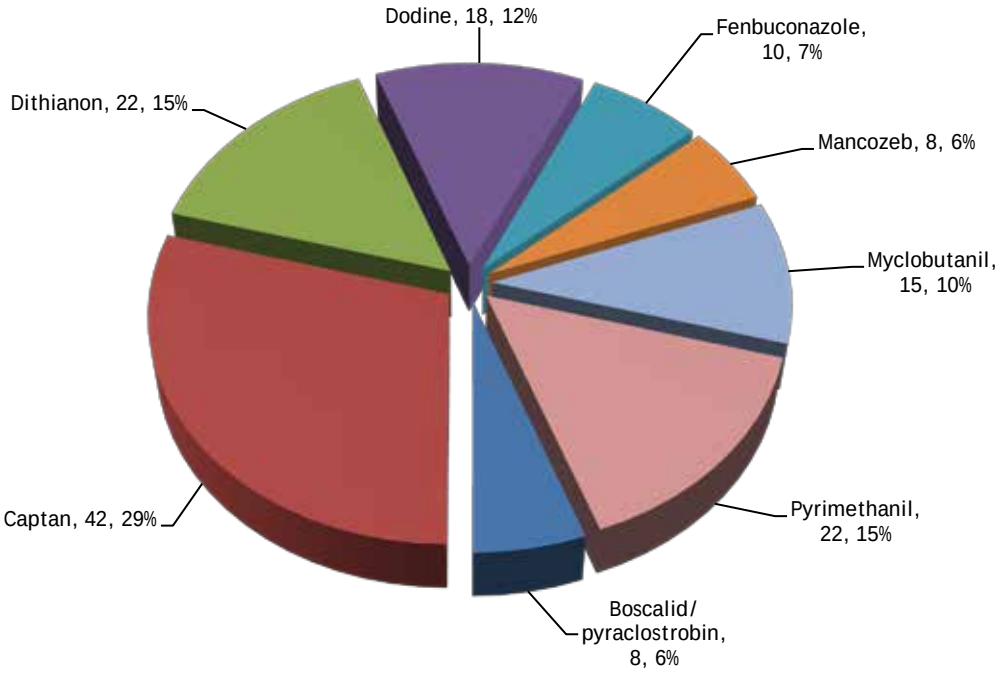
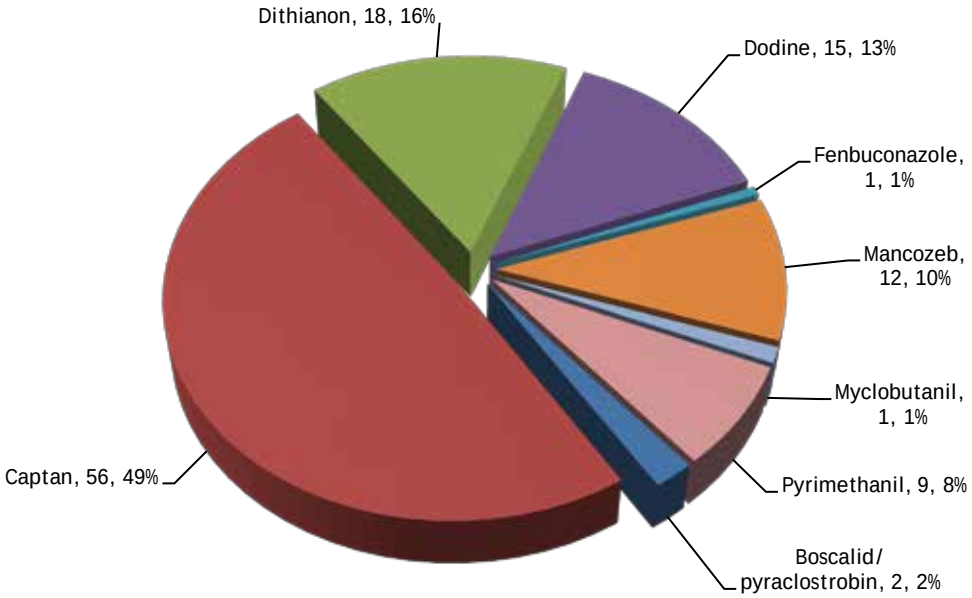


Figure 32 **Total quantity (kg) of fungicides applied to 'other' top fruit crops in Northern Ireland, 2014.**



The only reason given for fungicide use on 'other' top fruit crops was 'Apple scab'. An estimated 5kg of Glyphosate was applied to 4 hectares of 'other' top fruit orchard floor areas for 'General weed control'.

Approximately 0.1kg of cypermethrin was applied to 4 hectares of 'other' top fruit orchards to control 'Aphids' and 0.6kg of the growth regulator prohexadione-calcium were applied to 4 hectares.

Table 1 **The total number of farms and the number of holdings surveyed from each size group in Northern Ireland, 2014.**

County	Size Group (hectares)											
	<4		4<6		6<9		9<14		14+		Total	
	A	B	A	B	A	B	A	B	A	B	A	B
Armagh	83	**9**	28	**6**	14	**7**	20	**11**	34	**17**	179	**50**
All other counties	31	**1**	4	**0**	0	**0**	2	**0**	3	**1**	40	**2**
Northern Ireland	114	**10**	32	**6**	14	**7**	22	**11**	37	**18**	219	**52**

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, 2014.**

Crop type	Grown area	Surveyed area	Proportion of crop surveyed
Bramley apples	1,510	647	43%
Other top fruit	9	4	50%

Table 3 **Estimated area (ha) of top fruit crops grown regionally in Northern Ireland, 2014.**

	County		
	Armagh	All other counties	Northern Ireland
Bramley apples	1,470	40	1,510
Other top fruit	9	.	9
All Crops	**1,478**	**40**	**1,519**

Table 4 **Estimated area (spha) of top fruit crops receiving treatments, categorised by pesticide type and region in Northern Ireland, 2014.**

	Pesticide Type					
County	**Fungicides**	**Herbicides**	**Insecticides and acaricides**	**Growth regulators**	**Other**	**Northern Ireland**
Armagh	27,418	1,913	1,709	1,369	7,152	39,561
All other counties	1,179	40	102	54	.	1,374
Total	**28,597**	**1,953**	**1,811**	**1,423**	**7,152**	**40,936**

Table 5 **Estimated quantity (kg) of pesticide active substances applied to top fruit crops, categorised by pesticide type and region in Northern Ireland, 2014.**

	Pesticide Type					
County	**Fungicides**	**Herbicides**	**Insecticides and acaricides**	**Growth regulators**	**Other**	**Northern Ireland**
Armagh	23,057	1,636	618	120	10,426	35,857
All other counties	691	15	20	5	.	731
All pesticides	**23,748**	**1,651**	**637**	**125**	**10,426**	**36,588**

Table 6 **Estimated quantity (kg) of pesticide active substances applied to top fruit crops, categorised by pesticide type and crop type in Northern Ireland, 2014.**

	Pesticide Type					
Crop Type	**Fungicides**	**Herbicides**	**Insecticides and acaricides**	**Growth Regulators**	**Other**	**Total quantity (kg)**
Bramley apples	23,634	1,646	637	125	10,326	36,367
Other top fruit	114	5	0.1	1	100	220
All Crops	**23,748**	**1,651**	**637**	**125**	**10,426**	**36,588**

Table 7 **The basic area (ha) and the total area (spha) of top fruit crops treated with each pesticide type in Northern Ireland, 2014.**

Crop Type	*Pesticide Type*											
	Fungicides		Herbicides		Insecticides and acaricides		Growth regulators		other		All pesticides	
	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)
Bramley apples	1,496	28,454	816	1,947	1,107	1,807	564	1,415	810	7,085	1,496	40,708
Other top fruit	9	143	4	6	4	4	4	8	9	67	9	228
All Crops	**1,505**	**28,597**	**820**	**1,953**	**1,111**	**1,811**	**568**	**1,423**	**819**	**7,152**	**1,505**	**40,936**

Table 8 **The mean number of spray applications of pesticides applied to Top Fruit crops in Northern Ireland, 2014.**

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	17.5	11.6	2.4	1.5	1.6	1.6	2.0	2.0	7.1	5.6	7.4	5.2
Other top fruit	16.0	11.0	1.5	1.5	1.0	1.0	2.0	2.0	7.5	6.0	6.6	5.0
All crops average	17.5	11.6	2.4	1.5	1.5	1.5	2.0	2.0	7.1	5.6	7.4	5.2

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, 2014.**

	Crop type		
Pesticide group and active substance	**Bramley apples**	**Other top fruit**	**Total area**
Fungicides			
Boscalid/pyraclostrobin	872	8	880
Captan	4,570	8	4,577
Copper oxychloride	304	.	304
Cyprodinil/fludioxonil	269	.	269
Difenoconazole	383	.	383
Dithianon	3,525	12	3,537
Dithianon/pyraclostrobin	1,029	.	1,029
Dodine	2,723	8	2,730
Fenbuconazole	2,815	.	2,815
Fludioxonil	37	.	37
Flutriafol	21	.	21
Kresoxim-methyl	195	.	195
Mancozeb	5,521	8	5,529
Myclobutanil	1,780	.	1,780
Penconazole	739	.	739
Pyrimethanil	2,892	12	2,904
Sulphur	868	.	868
All fungicides	**28,541**	**56**	**28,597**
Herbicides			
Clopyralid/Triclopyr	9	.	9
Dicamba/MCPA/mecoprop-P	625	.	625
Dicamba/mecoprop-P	37	.	37
Glyphosate	1,112	4	1116
MCPA	165	.	165
All herbicides	**1,949**	**4**	**1,953**
Insecticides and acaricides			
Chlorantraniliprole	103	.	103
Chlorpyrifos	669	.	669
Clofentezine	37	.	37
Cypermethrin	441	4	445
Deltamethrin	22	.	22
Dimethoate	15	.	15
Methoxyfenozide	185	.	185
Paraffin oil	17	.	17
Pirimicarb	248	.	248
Spirodiclofen	35	.	35
Tebufenpyrad	34	.	34
All insecticides and acaricides	**1,807**	**4**	**1,811**
Growth Regulators			
Gibberellins	259	.	259
Paclobutrazol	592	.	592
Prohexadione-calcium	565	8	573
All growth regulators	**1,415**	**8**	**1,423**

Table 9 cont **Estimated area (spha) of top fruit crops treated with pesticide formulations in Northern Ireland, 2014.**

	Crop type		
Pesticide group and active substance	**Bramley apples**	**Other top fruit**	**Total area**
Other			
Boron	766	.	766
Calcium	790	4	794
Calcium chloride	129	.	129
Calcium oxide/Zinc	1,538	.	1,538
Calcium/nitrogen	95	.	95
Calcium/nitrogen/phosphate	1,449	16	1,464
Copper sulphate	99	.	99
Magnesium	252	.	252
Magnesium sulphate	40	8	48
Manganese	239	.	239
Nitrogen	62	.	62
Nitrogen/phosphate/potassium oxide	391	.	391
Nitrogen/Phosphorus pentoxide	267	.	267
Nitrogen/phosphorus pentoxide/potassium oxide	51	.	51
NPK fertiliser	49	.	49
Phosphorus pentoxide/Potassium oxide	26	.	26
Potassium nitrate	124	.	124
Seaweed extract	621	.	621
Trace elements	46	.	46
Zinc	91	.	91
All other	**7,124**	**28**	**7,152**
All pesticides	**40,836**	**100**	**40,936**

Table 10 **Estimated quantities (kg) of pesticide active substances applied to top fruit crops in Northern Ireland, 2014.**

	Crop type		
Pesticide group and active substance	**Bramley apples**	**Other top fruit**	**Total quantity**
Fungicides			
Boscalid/pyraclostrobin	251	2	253
Captan	6,397	13	6,410
Copper oxychloride	307	.	307
Cyprodinil/fludioxonil	101	.	101
Difenoconazole	32	.	32
Dithianon	1,849	9	1858
Dithianon/pyraclostrobin	391	.	391
Dodine	2,257	6	2263
Fenbuconazole	139	.	139
Fludioxonil	7	.	7
Flutriafol	1	.	1
Kresoxim-methyl	18	.	18
Mancozeb	9,100	12	9,112
Myclobutanil	121	.	121
Penconazole	36	.	36
Pyrimethanil	1,023	5	1,028
Sulphur	1,671	.	1,671
All fungicides	**23,701**	**47**	**23,748**
Herbicides			
Clopyralid/Triclopyr	3	.	3
Dicamba/MCPA/mecoprop-P	519	.	519
Dicamba/mecoprop-P	15	.	15
Glyphosate	925	4	929
MCPA	185	.	185
All herbicides	**1,647**	**4**	**1,651**
Insecticides and acaricides			
Chlorantraniliprole	3	.	3
Chlorpyrifos	531	.	531
Clofentezine	7	.	7
Cypermethrin	10	<1	10
Deltamethrin	0	.	0
Dimethoate	2	.	2
Methoxyfenozide	27	.	27
Paraffin oil	19	.	19
Pirimicarb	31	.	31
Spirodiclofen	4	.	4
Tebufenpyrad	1	.	1
All insecticides and acaricides	**637**	**<1**	**637**

Table 10 cont **Estimated quantities (kg) of pesticide active substances applied to top fruit crops in Northern Ireland, 2014.**

	Crop type		
Pesticide group and active substance	**Bramley apples**	**Other top fruit**	**Total quantity**
Growth Regulators			
Gibberellins	1	.	1
Paclobutrazol	70	.	70
Prohexadione-calcium	54	1	55
All growth regulators	**125**	**1**	**125**
Other			
Boron	376	.	376
Calcium	858	4	863
Calcium chloride	164	.	164
Calcium oxide/Zinc	328	.	328
Calcium/nitrogen	135	.	135
Calcium/nitrogen/phosphate	4,075	31	4,106
Copper sulphate	17	.	17
Magnesium	249	.	249
Magnesium sulphate	91	18	109
Manganese	80	.	80
Nitrogen	28	.	28
Nitrogen/phosphate/potassium oxide	365	.	365
Nitrogen/Phosphorus pentoxide	1,443	.	1,443
Nitrogen/phosphorus pentoxide/potassium oxide	16	.	16
NPK fertiliser	82	.	82
Phosphorus pentoxide/Potassium oxide	53	.	53
Potassium nitrate	1,211	.	1,211
Seaweed extract	638	.	638
Trace elements	92	.	92
Zinc	70	.	70
All other	**10,372**	**54**	**10,426**
All pesticides	**36,482**	**106**	**36,588**

Table 11 **The active substances most extensively used on top fruit crops ranked by treated area (spha) in Northern Ireland, 2014.**

No.	Active substance	Treated area
1	Mancozeb	5,529
2	Captan	4,577
3	Dithianon	4,566
4	Pyrimethanil	2,904
5	Fenbuconazole	2,815
6	Dodine	2,730
7	Pyraclostrobin	1,909
8	Myclobutanil	1,780
9	Glyphosate	1,116
10	Boscalid	880
11	Sulphur	868
12	MCPA	791
13	Penconazole	739
14	Chlorpyrifos	669
15	Dicamba	662
16	Mecoprop-P	662
17	Paclobutrazol	592
18	Prohexadione-calcium	573
19	Cypermethrin	445
20	Difenoconazole	383
21	Fludioxonil	306
22	Copper oxychloride	304
23	Cyprodinil	269
24	Gibberellins	259
25	Pirimicarb	248
26	Kresoxim-methyl	195
27	Methoxyfenozide	185
28	Chlorantraniliprole	103
29	Clofentezine	37
30	Spirodiclofen	35
31	Tebufenpyrad	34
32	Deltamethrin	22
33	Flutriafol	21
34	Paraffin oil	17
35	Dimethoate	15
36	Clopyralid	9
37	Triclopyr	9

Table 12 **The active substances most extensively used on top fruit crops ranked by weight (kg) in Northern Ireland, 2014.**

No.	Active substance	Quantity applied
1	Mancozeb	9,112
2	Captan	6,410
3	Dodine	2,263
4	Dithianon	2,151
5	Sulphur	1,671
6	Pyrimethanil	1,028
7	Glyphosate	929
8	MCPA	602
9	Chlorpyrifos	531
10	Copper oxychloride	307
11	Pyraclostrobin	183
12	Boscalid	168
13	Fenbuconazole	139
14	Myclobutanil	121
15	Mecoprop-P	91
16	Paclobutrazol	70
17	Cyprodinil	61
18	Prohexadione-calcium	55
19	Fludioxonil	48
20	Penconazole	36
21	Difenoconazole	32
22	Pirimicarb	31
23	Methoxyfenozide	27
24	Dicamba	26
25	Paraffin oil	19
26	Kresoxim-methyl	18
27	Cypermethrin	10
28	Clofentezine	7
29	Spirodiclofen	4
30	Chlorantraniliprole	3
31	Triclopyr	2
32	Dimethoate	2
33	Tebufenpyrad	1
34	Flutriafol	1
35	Gibberellins	1
36	Clopyralid	1
37	Deltamethrin	0.05

**** Active substances 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).**

Pesticide group and active substance	*Reason for use*																
	Apple scab	Canker	Disease prevention	General fungal control	Gloeosporium rot	Mildew	Powdery mildew	Red spider control	Rot control	Scab & mildew	Scab killer	Scab protection	Storage aid	Storage scab	Total area treated (spha)	Basic area treated (ha)	Total quantity applied (kg)
Fungicides																	
Boscalid/pyraclostrobin	765	.	.	45	.	.	.	.	28	.	.	.	.	35	872	499	251
Captan	3,223	.	.	.	1,164	.	.	.	.	.	.	97	.	52	4,536	1,174	6,354
Copper oxychloride	131	23	98	51	.	.	.	.	.	.	.	.	.	.	304	109	307
Cyprodinil/fludioxonil	208	.	.	.	26	.	.	.	.	.	.	.	35	.	269	122	101
Difenoconazole	383	.	.	.	.	.	.	.	.	.	.	.	.	.	383	219	32
Dithianon	3,224	129	.	.	.	.	.	.	.	23	.	139	.	.	3,515	919	1,840
Dithianon/pyraclostrobin	1,006	.	.	.	.	.	.	.	.	23	.	.	.	.	1,029	661	391
Dodine	2,629	.	.	.	.	.	.	.	.	.	.	83	.	.	2,713	1,236	2,248
Fenbuconazole	2,534	.	.	.	.	.	.	.	.	77	28	167	.	.	2,805	857	138
Fludioxonil	.	.	.	.	.	.	.	.	.	.	.	.	37	.	37	37	7
Flutriafol	21	.	.	.	.	.	.	.	.	.	.	.	.	.	21	21	1
Kresoxim-methyl	79	.	.	.	.	.	117	.	.	.	.	.	.	.	195	64	18
Mancozeb	5,299	.	.	.	.	.	.	.	.	.	.	222	.	.	5,521	1,249	9,100
Myclobutanil	1,421	.	24	.	.	11	138	.	.	89	28	56	.	.	1,765	761	120
Penconazole	577	.	.	.	.	136	26	.	.	.	.	.	.	.	739	408	36
Pyrimethanil	2,771	.	.	.	.	.	.	.	.	.	28	83	.	.	2,882	1,184	1,019
Sulphur	253	.	296	201	.	11	.	83	.	23	.	.	.	.	868	310	1,671
All fungicides	**24,525**	**153**	**418**	**297**	**1,189**	**158**	**281**	**83**	**28**	**235**	**83**	**846**	**72**	**87**	**28,454**		**23,634**

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 substance	**Broad leaved weeds**	**General weed control**	**Grass weeds**	**Scutch and chickweed**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Herbicides							
Clopyralid/Triclopyr	.	9	.	.	9	9	3
Dicamba/MCPA/mecoprop-P	60	565	.	.	625	447	519
Dicamba/mecoprop-P	.	37	.	.	37	37	15
Glyphosate	.	1,032	60	18	1,110	802	924
MCPA	.	165	.	.	165	122	185
All herbicides	**60**	**1,808**	**60**	**18**	**1,947**		**1,646**

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	**Aphid control**	**Aphids**	**Black fly**	**Blastobasis**	**Capsids**	**Caterpillars**	**Codling moth**	**Insect control**	**Pest control**	**Red spider control**	**Red spider mite**	**Rust mite**	**Wooly aphid**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Insecticides and acaricides																
Chlorantraniliprole	.	.	.	32	.	.	53	17	.	.	.	.	.	103	103	3
Chlorpyrifos	.	264	.	.	14	90	16	246	28	.	.	.	12	670	598	532
Clofentezine	.	.	.	.	.	.	.	.	.	.	37	.	.	37	37	7
Cypermethrin	.	346	.	.	.	.	.	96	.	.	.	.	.	441	392	10
Deltamethrin	.	.	.	.	.	.	.	.	.	.	.	.	22	22	22	0
Dimethoate	.	.	15	.	.	.	.	.	.	.	.	.	.	15	8	2
Methoxyfenozide	.	.	.	.	.	.	185	.	.	.	.	.	.	185	62	27
Paraffin oil	.	.	.	.	.	.	.	.	.	.	.	.	17	17	17	19
Pirimicarb	28	208	.	.	.	.	.	12	.	.	.	.	.	248	248	31
Spirodiclofen	.	.	.	.	.	.	.	.	.	.	14	21	.	35	35	5
Tebufenpyrad	.	.	.	.	.	.	.	.	.	22	13	.	.	34	34	2
All Insecticides and acaricides	**28**	**817**	**15**	**32**	**14**	**90**	**255**	**372**	**28**	**22**	**63**	**21**	**51**	**1,807**		**637**

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 substance	**Growth regulation**	**Total area Treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Growth regulators				
Gibberellins	259	259	129	1
Paclobutrazol	592	592	204	70
Prohexadione-calcium	565	565	377	54
All Growth regulators	**1,415**	**1,415**		**125**

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	**Aphids**	**Apple scab**	**General weed control**	**Growth regulation**	**Total area Treated (spha)**	**Basic area treated (ha)**	**Total quantity Applied (kg)**
Fungicides							
Boscalid/pyraclostrobin	.	8	.	.	8	4	2
Captan	.	8	.	.	8	4	13
Dithianon	.	12	.	.	12	4	9
Dodine	.	8	.	.	8	4	6
Mancozeb	.	8	.	.	8	4	12
Pyrimethanil	.	12	.	.	12	4	5
All fungicides	**.**	**56**	**.**	**.**	**56**		**47**
Herbicides							
Glyphosate	.	.	4	.	4	2	4
All herbicides	**.**	**.**	**4**	**.**	**4**		**4**
Insecticides and acaricides							
Cypermethrin	4	.	.	.	4	4	0.1
All insecticides and acaricides	**4**	**.**	**.**	**.**	**4**		**0.1**
Growth Regulators							
Prohexadione-calcium	.	.	.	8	8	4	0.6
All growth regulators	**.**	**.**	**.**	**8**	**8**		**0.6**

Table 15 **Estimated area treated (spha) and quantity of 'other' products applied (kg) to Bramley apple crops, 2014.**

Formulation	*Crop type*			
	Bramley apples		Total	
	spha	kg	spha	kg
Boron	766	376	766	376
Calcium	790	858	794	863
Calcium chloride	129	164	129	164
Calcium oxide/Zinc	1,538	328	1,538	328
Calcium/nitrogen	95	135	95	135
Calcium/nitrogen/phosphate	1,449	4,075	1,464	4,106
Copper sulphate	99	17	99	17
Magnesium	252	249	252	249
Magnesium sulphate	40	91	48	109
Manganese	239	80	239	80
Nitrogen	62	28	62	28
Nitrogen/phosphate/potassium oxide	391	365	391	365
Nitrogen/Phosphorus pentoxide	267	1,443	267	1,443
Nitrogen/phosphorus pentoxide/potassium oxide	51	16	51	16
NPK fertiliser	49	82	49	82
Phosphorus pentoxide/Potassium oxide	26	53	26	53
Potassium nitrate	124	1,211	124	1,211
Seaweed extract	621	638	621	638
Trace elements	46	92	46	92
Zinc	91	70	91	70
Total	7,124	10,372	7,152	10,426

Table 16 **Comparison of area (ha) of top fruit crops grown in Northern Ireland, 1992-2014.**

	Survey year								
Crop Type	**1992**	**1996**	**2002**	**2006**	**2008***	**2010***	**2012***	**2014***	**% change in area grown 2012/2014**
Bramley apples									
Bramley apples (fruiting)	1,574	1,511	1,265	1,341	1,463	1,491	1,503	1,510	+<1%
Bramley apples (non-fruiting)	158	189	197	74	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%**
Other top fruit crops									
Other top fruit crops (fruiting)	57	13	20	21	19	25	3	9	200%
Other top fruit crops (non-fruiting)	5	0.4	4	14	N/A	N/A	N/A	N/A	N/A
All other top fruit crops	**62**	**13**	**24**	**35**	**19**	**25**	**3**	**9**	**+200%**
Total crops	**1,794**	**1,714**	**1,486**	**1,450**	**1,482**	**1,516**	**1,506**	**1,519**	**+<1%**

**** Note: In 2008, 2010, 2012 and 2014 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, 1992-2014.**

Pesticide Type	*Survey year*															
	1992		1996		2002		2006		2008		2010		2012		2014	
	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
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
Growth regulators	134	69	713	137	610	107	990	126	2,066	219	2,313	226	2,151	195	1,423	125
Mixed activity a.i.'s	11	73	17	14	.	.	.	.	.	.	.	.	.	.	.	.
Insecticides (by classification)																
Carbamates	33	56	32	7	88	10	104	17	152	33	139	33	86	23	248	31
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
Pyrethroids	586	13	464	16	481	18	595	18	496	23	983	27	980	26	460	10
Acaricides	112	31	751	157	201	24	301	24	645	93	.	.	96	35	.	.
Biopesticides	.	.	.	.	.	.	13	2	.	.	.	.	.	.	.	.
Other insecticides	524	465	182	60	115	139	47	6	.	.	445	81	126	14	411	61
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**
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**

Legend

A = Area treated (spha)

B = Quantity of pesticides applied (kg)

* does not include 'other' pesticide types

Table 17b **Comparison of application ratios (kg/ha) of the active substances most extensively used on top fruit crops in Northern Ireland, 1992-2014.**

		Survey year							
No.	**Active substance**	**1992**	**1996**	**2002**	**2006**	**2008**	**2010**	**2012**	**2014**
1	Mancozeb	2.2	5.9	11.4	7.2	6.7	6.8	7.8	6.0
2	Captan	1.9	1.9	1.3	1.4	1.7	3.8	4.3	4.2
3	Dodine	0.1	0.5	0.3	0.7	0.6	0.7	1.0	1.5
4	Dithianon	1.4	2.4	3.3	2.5	4.0	3.3	2.6	1.4
5	Sulphur	.	<0.1	0.2	0.1	0.7	0.9	4.2	1.1
6	Pyrimethanil	.	<0.1	0.3	0.6	1.1	0.9	1.1	0.7
7	Glyphosate	0.1	0.4	0.3	0.3	0.6	0.8	0.5	0.6
8	MCPA	<0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.4
9	Chlorpyrifos	0.3	0.3	0.4	0.6	0.7	0.5	0.5	0.3
10	Copper oxychloride	0.7	0.4	0.7	0.4	0.7	0.5	0.1	0.2
11	Pyraclostrobin	.	.	.	<0.1	0.1	0.1	0.1	0.1
12	Boscalid	.	.	.	<0.1	0.1	0.1	0.1	0.1
13	Fenbuconazole	.	<0.1	0.1	0.1	0.1	0.1	0.1	0.1
14	Myclobutanil	0.3	0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1
15	Mecoprop-P	.	.	<0.1	0.1	<0.1	0.1	<0.1	0.1
16	Paclobutrazol	<0.1	0.1	.	0.1	<0.1	0.1	0.1	<0.1
17	Cyprodinil	.	.	.	.	<0.1	<0.1	<0.1	<0.1
18	Prohexadione-calcium	.	.	.	<0.1	0.1	0.1	0.1	<0.1
19	Fludioxonil	.	.	.	.	<0.1	<0.1	<0.1	<0.1
20	Penconazole	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Difenoconazole	.	.	<0.1	.	<0.1	<0.1	<0.1	<0.1
22	Pirimicarb	.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
23	Methoxyfenozide	.	.	.	.	.	.	<0.1	<0.1
24	Dicamba	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
25	Paraffin oil								<0.1
26	Kresoxim-methyl	.	.	.	<0.1	<0.1	<0.1	<0.1	<0.1
27	Cypermethrin	.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
28	Clofentezine	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Spirodiclofen	.	.	.	.	.	.	<0.1	<0.1
30	Chlorantraniliprole	.	.	.	.	.	<0.1	<0.1	<0.1

Table 17b (cont) **Comparison of application ratios (kg/ha) of the active substances most extensively used on top fruit crops in Northern Ireland, 1992-2014.**

		Survey year							
No.	**Active substance**	**1992**	**1996**	**2002**	**2006**	**2008**	**2010**	**2012**	**2014**
31	Triclopyr								<0.1
32	Dimethoate								<0.1
33	Tebufenpyrad	.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
34	Tebufenpyrad								<0.1
35	Flutriafol								<0.1
36	Gibberellins	.	.	.	<0.1	<0.1	<0.1	<0.1	<0.1
37	Clopyralid								<0.1
38	Deltamethrin	<0.1	.	<0.1	.	.	<0.1	<0.1	<0.1
39	Lime sulphur	0.2	.	.	.	.	<0.1	0.1	.
40	Copper sulphate	0.3	0.1	0.2	.	.	<0.1	0.1	.
41	Lime	.	.	.	.	.	.	0.1	.
42	Glufosinate-ammonium	<0.1	<0.1	<0.1	.	<0.1	<0.1	<0.1	.
43	Tebuconazole	.	.	.	.	.	.	<0.1	.

Table 18 **Estimated quantities (tonnes) of stored apples receiving treatment, and the total amount of active substances applied (kg) in Northern Ireland, 2014.**

Pesticide formulation	Quantity treated	Quantity applied
Other products		
1-methylcyclopropene	9,706	*N/A
All other products	**9,706**	***N/A**
All treatments	**9,706**	***N/A**

*Due to the application method it was not possible to calculate the weight of active substance applied

Table 19 **Estimated quantities (tonnes) of Bramley apples treated in storage and reason for use of each active substance in Northern Ireland, 2014.**

	Reason for use			
Active substance	**Antioxidant**	**Storage aid**	**Storage scab**	**Total**
1-methylcyclopropene	8,389	1,080	237	9,706
All treatments	**8,389**	**1,080**	**237**	**9,706**

1-methylcyclopropene is categorised as an ethylene inhibitor although growers' perceived 'reasons for use' can be as an antioxidant

Table 20 **Comparison of the estimated quantities (tonnes) of Bramley apples stored and the total weight of active substances applied (kg) in Northern Ireland, 1992-2014.**

Pesticide formulation	*Survey year*															
	1992		1996		2002		2006		2008		2010		2012		2014	
	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	.	.
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**	**.**	**.**
Other products																
1-methylcyclopropene	.	.	.	.	.	.	.	.	.	.	345	1	8,502	<1	9,706	N/A
All other products	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**345**	**1**	**8,502**	**<1**	**9,706**	**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**
Stored without treatment	***2,322***	**.**	***384***	**.**	***17***	**.**	***408***	**.**	***689***	**.**	***670***	**.**	***1,167***	**.**	***1,366***	***N/A***
Total stored	**23,516**	**.**	**23,680**	**.**	**14,431**	**.**	**19,599**	**.**	**17,533**	**.**	**17,237**	**.**	**10,159**	**.**	**11,072**	**N/A**

Table 21 **Total grown area (ha), total quantity harvested (tonnes) and total yield (tonnes/ha) of Bramley apple crops in Northern Ireland, 2014.**

Age of orchard (years)	Total grown area (ha)	Total quantity harvested (tonnes)	Yield (tonnes/ha)
Bramley apples			
< 5	86	1,218	14
5 to 9	199	4,959	25
10 to 14	209	5,454	26
15 to 24	227	5,999	26
25 to 34	264	6,634	25
> 35	526	13,971	27
Total Bramley apples	**1,510**	**38,235**	**143**
Dessert apples			
< 5	2.4	4	2
10 to 14	2.4	140	58
Total dessert apples	**5**	**144**	**30**
'Other' crop			
5 to 9	4.0	37	9
Total 'other' crop	**4**	**37**	**9**
Total top fruit	**1,519**	**38,416**	**25**

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
199	Hardy Nursery Stock Crops 2003	1-855 27 789 1

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Report No.	Report title	ISBN
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

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