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PESTICIDE USAGE IN NORTHERN IRELAND
SURVEY REPORT 241

NORTHERN IRELAND TOP FRUIT CROPS 2010

A National Statistics Publication

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PESTICIDE USAGE SURVEY REPORT 241

NORTHERN IRELAND TOP FRUIT CROPS 2010

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Agri-food and Biosciences Institute for Northern Ireland

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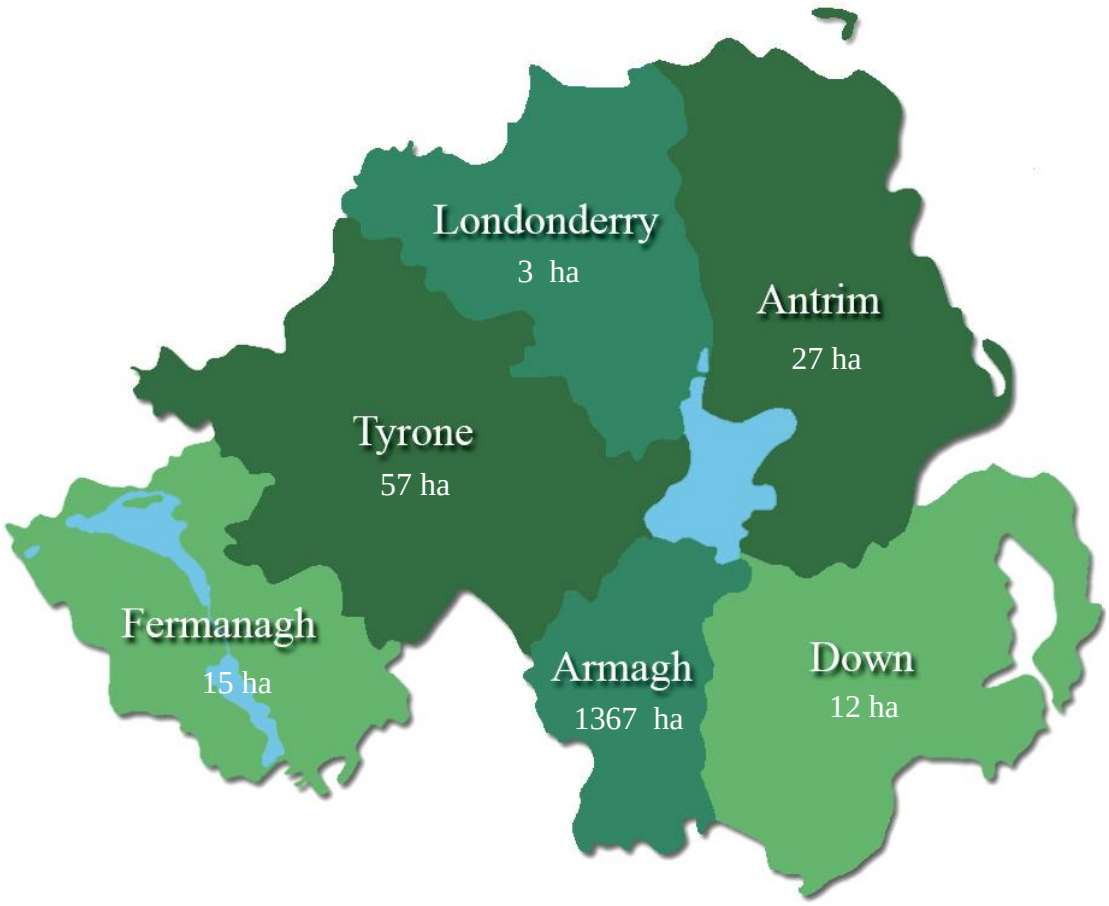
The County Regions of Northern Ireland

with the total area (ha) of Top Fruit grown.

(source June 2009 Northern Ireland Farm Census)



SUMMARY

This report presents information from a survey of the pesticide usage practices of top fruit growers in Northern Ireland in 2010. It is the sixth pesticide survey to be conducted on top fruit crops in the region since 1992. An estimated 217 top fruit orchards were surveyed in Northern Ireland in 2010 with information on crop applications, storage treatments and orchard floor treatments being recorded. The total area of top fruit crops grown in 2010 increased by 2% to 1,516 hectares when compared with the previous survey in 2008. Approximately 93% 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.

Overall, an estimated 30 tonnes of pesticide active ingredients were applied to 34,763 spray hectares. The pesticide-treated area increased by 6% compared with 2008, and the weight of active ingredients applied increased by 14%.

In common with previous years, fungicides were the most frequently applied pesticide. When compared to 2008, fungicide application in area treated and weight applied increased by 5% and 14%, respectively. During 2010, fungicides were applied to 82% of the pesticide-treated area and accounted for 90% of the weight of pesticides used. The fungicides dithianon and mancozeb were the active ingredients 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 2% when compared with 2008. Insecticides and acaricides were applied to 7% of the entire pesticide-treated area, accounting for 3% of the total weight of pesticides used. The organophosphate insecticide chlorpyrifos was the most frequently applied insecticide/acaricide. An estimated 46% of insecticide/acaricide applications were for ‘insect control’, with a further 38% to control aphids.

Overall, the area treated and weight of herbicides applied increased by 36% and 50%, respectively, when compared with 2008. This can mainly be attributed to the increase in glyphosate usage and area treated with this product. Glyphosate was also the herbicide active ingredient most frequently used, applied to the ground beneath the tree canopy with ‘general weed control’ given as the reason for use.

Growth regulators accounted for 7% of the pesticide-treated area and 1% of the total weight of pesticide applied. Prohexadione-calcium and paclobutrazol were the growth regulator active ingredients most frequently used.

An estimated 16 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 33% decrease when compared to 2008. The majority of applications were to treat potential nutritional disorders.

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 (used in 69% of orchards). The remaining 31% of orchards surveyed did not apply herbicides for grass or weed control.

Data were also collected on post-harvest storage treatments applied to top fruit crops (only Bramley fruiting apples were stored in Northern Ireland in 2010). An estimated 17,237 tonnes of top fruit crops were stored, 16,567 tonnes of which were treated. The antioxidant fungicide diphenylamine was the most commonly used pesticide active ingredient applied to stored fruit. A total of three pesticide active ingredients were recorded in use on stored top fruit crops in 2010, with 1-Methylcyclopropene being encountered for the first time for treatment of stored apples.

Results for new orchard plantations ("non-fruiting crops") have been combined with results for established orchard plantations ("fruiting crops") due to their relatively small number. This method was also used in the 2008 report.

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 a given 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.
- Non-fruiting and fruiting crops were combined and recorded only as 'Bramley' and 'Dessert apples' in this years' survey which covered all ages of top fruit crops.
- No Plum crops were recorded during this survey period.
- 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'.
- 'Reasons for use'; the reasons reported for the use of pesticides are the growers' stated reasons for use and may not reflect label recommendations.
- '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*).
- The active ingredient flutriafol has been used as a fungicide though no current approval exists for use on top fruit crops.

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 Advisory 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 sixth 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) and 2008 (Kirbas *et al*., 2009) 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 2009 (Anon., 2010), a sample of holdings to be surveyed was selected. The sample was stratified into four county regions of Northern Ireland, (there is limited top fruit production in counties Londonderry and Fermanagh which were 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.

The period for survey comprises the end of the 2009 harvest to the end of the 2010 harvest.

The purpose of the survey was explained to selected growers in preliminary correspondence. A total of 72 holdings (representing 33% of total growers) were visited and data collected by personal interview. The growers' perceived 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 software.

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 93% of the total area of top fruit crops was grown in County Armagh, with Bramley apples accounting for 98% of the total area of top fruit crops grown. Dessert apples accounted for the remaining 2% of the area grown. (Table 3, Figure 1).

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

Regionally, County Armagh accounted for 93% of the total pesticide-treated area and 91% of the weight of pesticides applied. 5% of the area grown and 8% of the pesticide-treated area were in County Tyrone.

Pesticide Usage on Crops (Tables 6 & 7)

The estimated weights of pesticide active ingredients applied and the area of crop types treated with pesticides are shown in Tables 6 & 7. Bramley apples represented 99% of both the pesticide-treated area and the weight of active ingredients applied. Dessert apples accounted for less than 1% of the top fruit crops grown, and 1% of 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 (with the exception of dessert apples which did not receive growth regulators) and pesticides were applied to 99% of the total area of top fruit crops grown.

All crops treated received fungicides with a mean of 11 fungicide applications and 7 spray rounds. On average, two applications of herbicides, insecticides and growth regulators were made to top fruit crops. All crops received applications of 'other products', with a mean of 14 applications and 9 spray rounds.

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

Approximately 30 tonnes of pesticide active ingredients were applied to 34,763 spray hectares of top fruit crops grown in Northern Ireland in 2010 (Tables 4 & 5, Figures 2 & 3). Fungicides were applied to 82% of the pesticide-treated area, representing 90% of the weight of pesticides applied. Herbicides were applied to 4% of the area treated, accounting for 6% of the total weight of pesticides used.

Insecticides/acaricides, applied to 7% of the pesticide-treated area, represented 3% of the total weight of pesticides used. Growth regulators represented 7% and 1% of the total pesticide-treated area and weight of active ingredients applied, respectively.

The pesticide types and active ingredients applied are shown in Tables 9 and 10. Dithianon was applied to 22% of the fungicide-treated area, accounting for 19% of the weight of fungicides applied. Mancozeb, whilst only applied to 19% of the fungicide-treated area, represented 39% of the weight of fungicides applied. This was due to the relatively high application rate for this product. Fungicide applications were primarily used to control apple scab (*V. inaequalis*) in orchards.

Glyphosate (63% of herbicide applications) was the most commonly applied herbicide active ingredient accounting for 65% of the weight of herbicide active ingredients applied. The organophosphorus active ingredient chlorpyrifos accounted for 39% of the insecticide/acaricide-treated area and represented 83% of the weight of insecticides applied. Cypermethrin, which represented 37% of the insecticide/acaricide-treated area, accounted for only 3% of the weight of insecticides applied. Clofentezine accounted for 9% and 8% of the insecticide/acaricide-treated area and weight of insecticides applied, respectively.

Growth regulators were applied to an estimated 2,314 spray hectares of top fruit crops. Prohexadione-calcium was applied to 54% of the area treated with growth regulators, accounting for 62% of the weight of growth regulators applied. Paclobutrazol was applied to 45% of the treated area, accounting for 37% of the weight of growth regulators applied. Gibberellins were the only other active ingredient recorded in this group, accounting for less than 1% of both the area treated and weight of growth regulators applied.

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

PESTICIDE USAGE ON INDIVIDUAL CROPS

BRAMLEY APPLE CROPS (TABLE 13)

Approximately 1,491 hectares of Bramley apple crops were grown in Northern Ireland in 2010, representing a 2% increase when compared to 2008. Results from fruiting and non-fruiting orchards were combined and recorded only as “Bramley” in this survey. This comprised all ages of orchards ranging from under 5 years to 35 years and above.

Fungicides

The area of Bramley crops treated with fungicides was similar to that recorded in 2008. An estimated 82% of the area of Bramley apples received fungicide applications and accounted for 90% of the weight of pesticides applied (Tables 6 & 7). Approximately 86% of all fungicide applications were to control apple scab (*V. inaequalis*). Control of canker (*Nectria galligena*) accounted for only 1% of applications to the fungicide-treated area of this crop. This may be due to the limited number of active ingredients recommended for the control of this disease.

Herbicides

Herbicides applied to inter-row spaces between Bramley apple trees represented 99% of the total herbicide treated area of all top fruit crops (Tables 6 & 7) but only 4% of the pesticide-treated area of this crop type (Table 4). 'General weed control' was the principal reason given for usage. In common with 2008, glyphosate was the most frequently applied herbicide, accounting for 63% and 65% of the herbicide-treated area and weight of herbicide active ingredients applied, respectively.

Insecticides/acaricides

Insecticides and acaricides applied for 'insect control' and to control 'aphids' accounted for 46% and 38% of the insecticide/acaricide-treated area, respectively. A further 14% of active ingredients were applied to the treated area to control fruit-tree red spider mite (*Panonychus ulmi*).

Organophosphates accounted for 38% and 83% of the total area treated and weight of insecticide/acaricide active ingredients applied, respectively (Table 17). Pyrethroids were applied to 39% of the insecticide/acaricide-treated area but accounted for only 3% of the weight used. In common with 2008, the organophosphate chlorpyrifos was the principal insecticide/acaricide active ingredient recorded, accounting for 39% of the insecticide/acaricide treated area and 83% of the weight applied (Table 13).

Growth regulators

An estimated 226 kg of growth regulator active ingredients were applied to 2,314 spray hectares of Bramley crops (Table 7). Prohexadione-calcium was the active ingredient most frequently used, representing 54% of the growth regulator treated area and accounting for 62% of the weight applied. Paclobutrazol and gibberellins were applied to 45% and 1% of the area treated with growth regulators, respectively.

Other products

An estimated 16 tonnes of 'other products' were applied to 8,439 spray hectares of Bramley apples (Table 15). 'Other products' 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 39% of the treated area of 'other products' used on Bramley apple orchards, primarily as foliar feeds and trace elements. Seaweed extract products were applied to 21% of the area treated, representing 22% of the weight of 'other products' applied.

'Foliar feeds' was the reason recorded most often for the use of 'other products', accounting for 61% of the treated area of Bramley apple orchards.

Bramley apple crops defined by age of orchard (Table 22, Figures 19, 20 & 21)

Data collected in relation to Bramley apple production included the age of each individual orchard and was recorded in six age groups, from trees less than 5 years old up to those which were 35 years old and above.

The most frequently recorded age of orchard was 35 years old and above and accounted for 41% of the total grown area (ha) of Bramley apple crops and 47% of the total weight (tonnes) harvested. Orchards between 25 to 34 years old accounted for 14% of both the area grown and weight of Bramley apples harvested. The 15-to 24-year old orchards represented 11% of the total grown area of Bramley apples and 13% of the weight harvested. Orchards which were 10-to 14-years old accounted for 15% of the area grown and 16% of the weight of apples harvested. Bramley orchards which were between 5-and 9-years old represented 10% of the total area grown and 9% of the weight of Bramleys harvested. The final category, orchards less than 5-years old, accounted for 9% of the grown area but only 1% of the weight harvested. This was due to many of the trees being newly planted (Table 22, Figures 18 & 19).

Although there were differences between the different age of orchards in relation to grown area and tonnes harvested, the yield figures (tonnes per hectare) are relatively the same, regardless of the age of orchard. The one exception to this was the orchards less than 5 years old, which produced less fruit (Table 22, Figure 20). There was no bias towards any particular age group of trees in relation to pesticide applications, except for the youngest trees which received less pesticide than the other age groups. The highest yielding orchards were 35 years and above which produced 38 tonnes per hectare. The total weight of Bramley apples harvested in 2010 was estimated at 49,205 tonnes (Table 22).

DESSERT APPLE CROPS (TABLE 14)

Approximately 25 hectares of dessert apples were grown in 2010. In contrast to 2008, no plum crops were recorded grown during this survey period. Non-fruiting and fruiting crops were combined and recorded only as “Dessert apples” in this year’s survey which covered all ages in this crop ranging from under 5 years to 35 years and above. For comparative reasons, the overall combined dessert fruiting and non-fruiting crops show an increase of 32% from 19 hectares in 2008 to 25 hectares in 2010.

Fungicides

Of the pesticide applications to dessert apple orchards, fungicides accounted for 89% of the weight of pesticide applied and 84% of the area treated (Tables 6 & 7). An estimated 60% of all fungicide applications were used to control apple scab (*V. inaequalis*) with a further 19% of applications to control powdery mildew (*Podosphaera leucotricha*). The active ingredients fenbuconazole (24%) and mancozeb (22%) collectively accounted for 46% of the fungicide-treated area and 45% of the weight of fungicides applied (Table 14).

Herbicides

Herbicides accounted for 3% of the treated area of this crop and 7% of the weight of pesticide applied (Tables 6 & 7). 'General weed control' was the only reason recorded for herbicide usage on this crop. Glyphosate accounted for approximately 88% of the herbicide-treated area and 93% of the weight of herbicide applied.

Insecticides/acaricides

Insecticide/acaricides, applied to 29 spray hectares of dessert apple orchards, accounted for 4% of the weight of pesticide applied and 13% of the pesticide-treated area (Tables 6 & 7). The active ingredient pirimicarb accounted for 42% of the insecticide/acaricide treated area and 52% of the weight applied, whilst chlorpyrifos accounted for 10% of the treated area and 45% of the weight of active ingredients applied. An estimated 48% of all insecticide/acaricide applications were for 'insect control' with 42% being applied to control 'aphids'. The remaining 10% of applications were used for the control of 'leaf hopper' (*Edwardsiana rosae*) (Table 14).

No other products were recorded in use on dessert apples.

COMPARISON WITH PREVIOUS SURVEYS

Comparative information on pesticide usage on top fruit crops grown in Northern Ireland in 1992, 1996, 2002, 2006, 2008 and 2010 is included in Tables 16, 17a & 17b and Figures 6 – 16.

Area of top fruit crops grown (Table 16)

Overall, the area of top fruit grown in Northern Ireland in 2010 increased marginally (2%) compared with that recorded in 2008. The overall Bramley apple area increased by 28 hectares (2%). The data indicates a 32% increase in the overall area of dessert apples grown (previous surveys included plum orchards), from 19 hectares to 25 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 & b, Figures 6 – 13)

There was a 6% increase in the total area of pesticide application to top fruit crops between 2008 and 2010. The weight of pesticides applied in 2010 increased by 14% when compared to 2008 (Figures 6 & 7). Herbicide applications increased by 36% for total area treated and 50% for total weight of active ingredients applied which can be mainly attributed to the increase in glyphosate usage.

Insecticide/acaricide applications decreased by 2% and 28%, in area treated and weight of active ingredients applied, respectively (Figure 10). Applications of carbamate active ingredients reduced by 9% for total area treated although the total weight applied remained

unchanged from 2008. The area treated with organophosphates also fell by 25%, with 31% less weight of active ingredients being applied than in 2008. The area treated with pyrethroids increased from 496 spray hectares in 2008 to 983 spray hectares in 2010 although the quantity applied marginally increased from 23 kg to 27 kg during the same period.

An estimated 2,313 spray hectares were treated with growth regulators in 2010. This was the highest recorded over the six surveys, showing an increase of 12% in area treated since 2008. The weight of growth regulators applied increased by 3% between 2008 and 2010.

The active ingredients most extensively used in 2010 are shown in Table 17b, which also provides the trend in application from 1992 -2010.

Storage of top fruit crops (Tables 18 - 21, Figures 12 - 14)

An estimated 17,237 tonnes of Bramley apples were stored from the 2010 harvest, of which 96% received a post-harvest treatment. Approximately 0.5 tonnes of pesticide active ingredients were applied to 16,567 tonnes of apples all of which were stored in bulk bins in controlled atmosphere stores.

Fungicides, antioxidants and an ethylene inhibitor were the only products recorded in use on stored apples.

Fungicide applications accounted for 2% of stored apple crop treatments and less than 1% of the total weight of active ingredients used. As was the case in 2008, cyprodinil/fludioxonil was used to treat storage rots. No other fungicides were recorded in this survey for storage diseases.

The ethylene inhibitor 1-methylcyclopropene accounted for 2% of treated tonnage and less than 1% of the weight of all treatments applied. The reason given for the use of this product was as a preventative against ‘storage scald’.

The antioxidant diphenylamine, applied solely as a treatment for ‘storage scald’, was the most frequently used active ingredient accounting for 96% of stored apple crop treatments and 99% of the weight of active ingredients applied.

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

Comparison with previous surveys of top fruit storage (Table 21, Figure 15)

There was a 2% decrease in both the weight of apples stored and the quantity of apples treated in 2010 compared with 2008 (Figure 15). The quantity of stored apples treated with antioxidants decreased by 4% in 2010 compared with 2008. Diphenylamine was the only antioxidant used on stored apples.

Overall, fungicide usage increased by 20% when compared to 2008. The only fungicide active ingredient applied in 2010 was cyprodinil/fludioxinil, the same as 2008 (Table 21).

The only other product used on stored apples was the ethylene inhibitor 1-methylcyclopropene, which was recorded for the first time on stored apples in Northern Ireland in 2010.

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 Mr Graeme Cross (DARDNI Food Development Service) and Mr John Mansfield and Mr Andrew Lavery (NIHPBS, AFBI) for their invaluable information on husbandry and pesticide practices during cultivation of top fruit crops.

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Figure 1 The utilisation of top fruit production area in Northern Ireland, 2010.

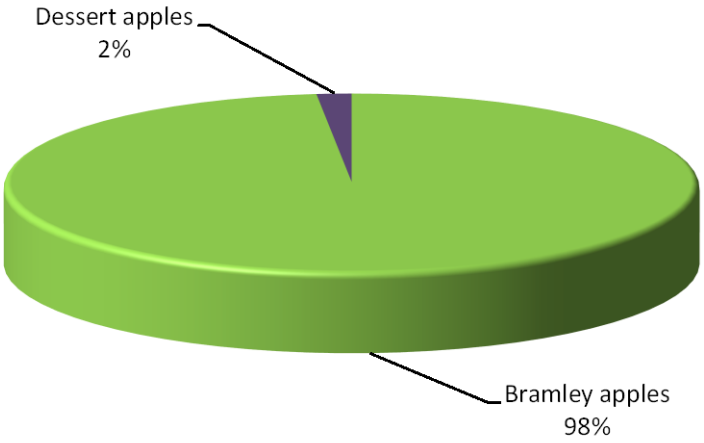

Figure 2 The proportional area (spha) of top fruit crops treated with each pesticide type in Northern Ireland, 2010.

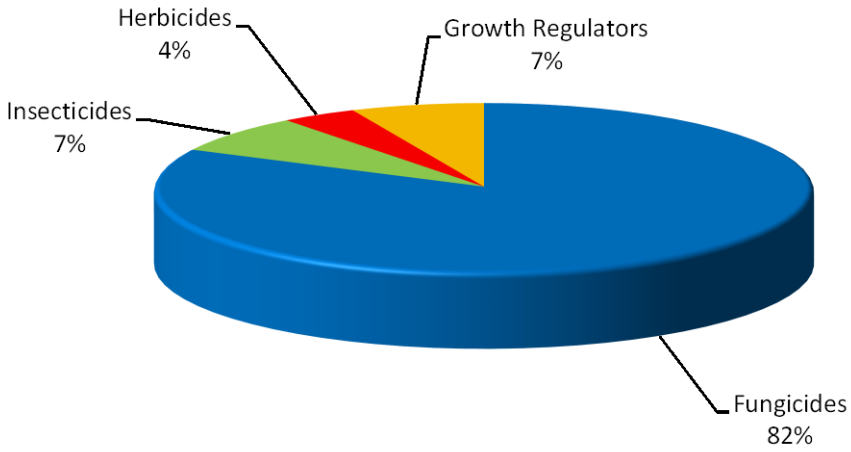

Figure 3 The proportion of top fruit crops treated with each pesticide type by weight (kg) of active ingredients in Northern Ireland, 2010.

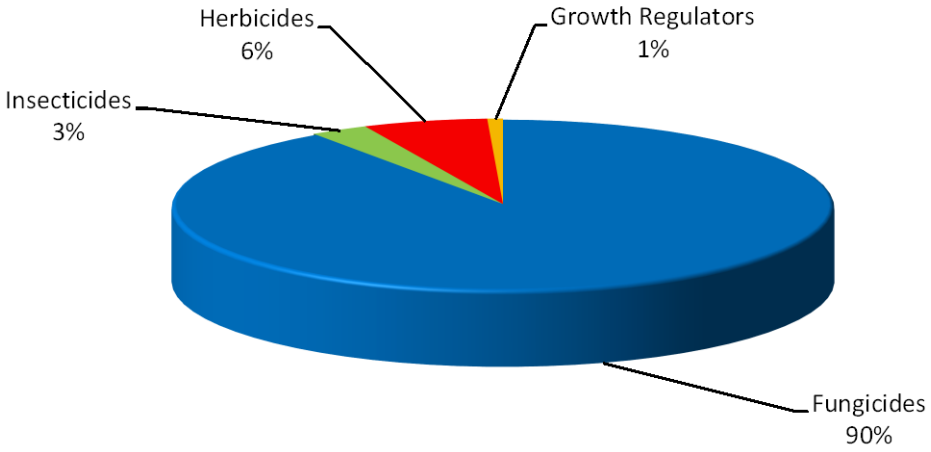

Figure 4 The area (spha) of top fruit crops treated with each pesticide type in the county regions of Northern Ireland, 2010.

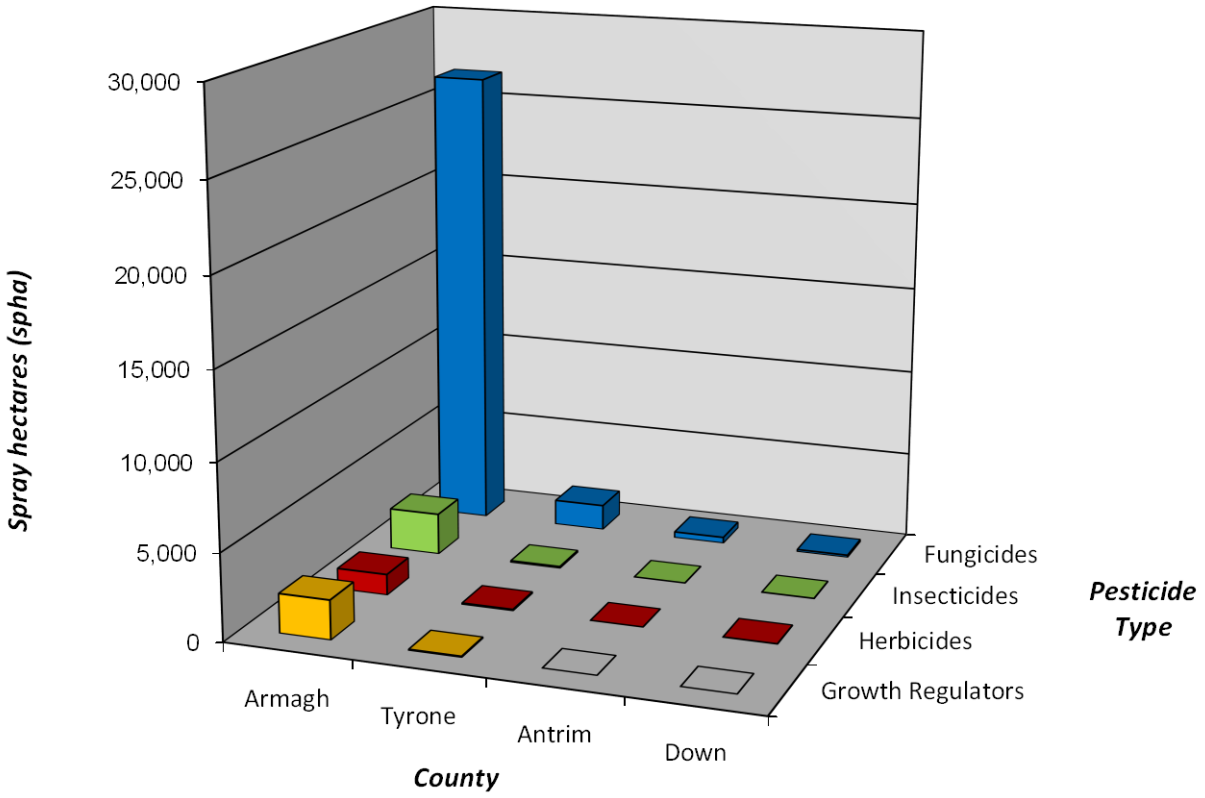

Figure 5 The weight (kg) of each pesticide type applied to top fruit crops in the county regions of Northern Ireland, 2010.

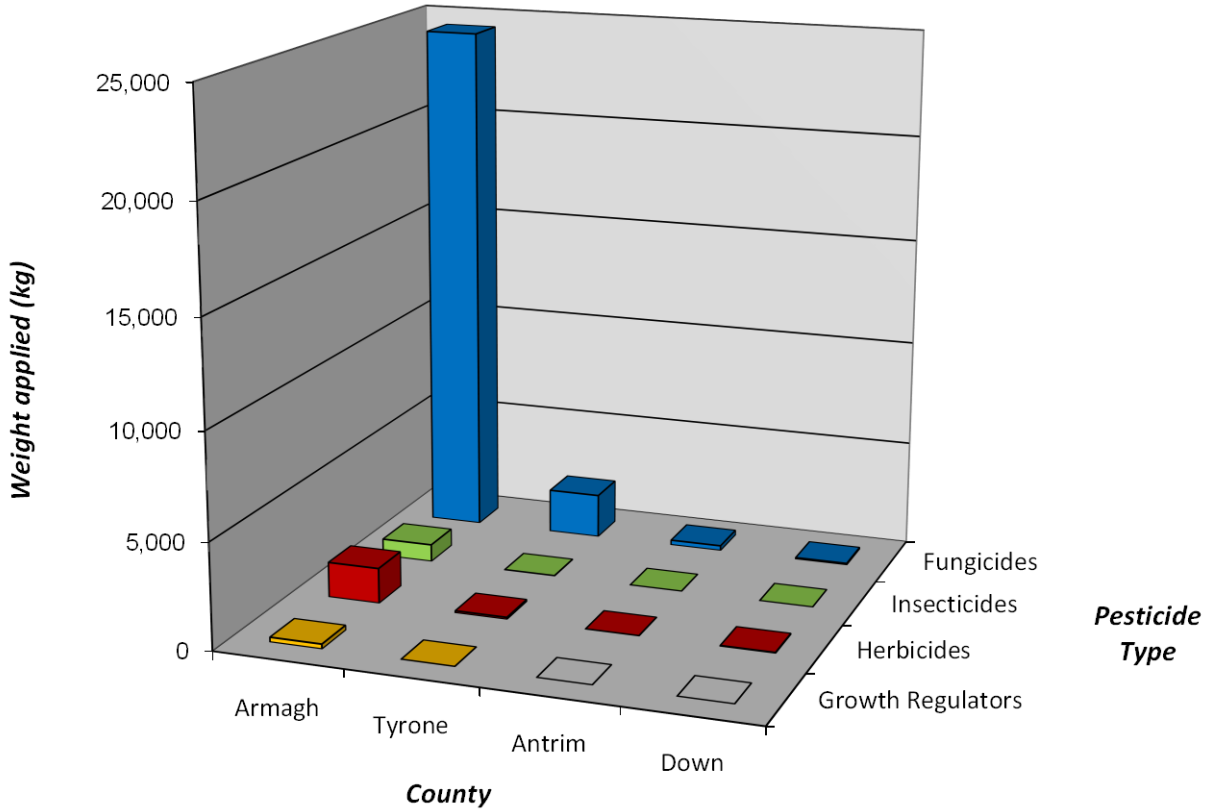

Figure 6 **Comparison of pesticide usage on top fruit crops in Northern Ireland 1992-2010, by area treated (spha).** *Bars show Standard Error.*

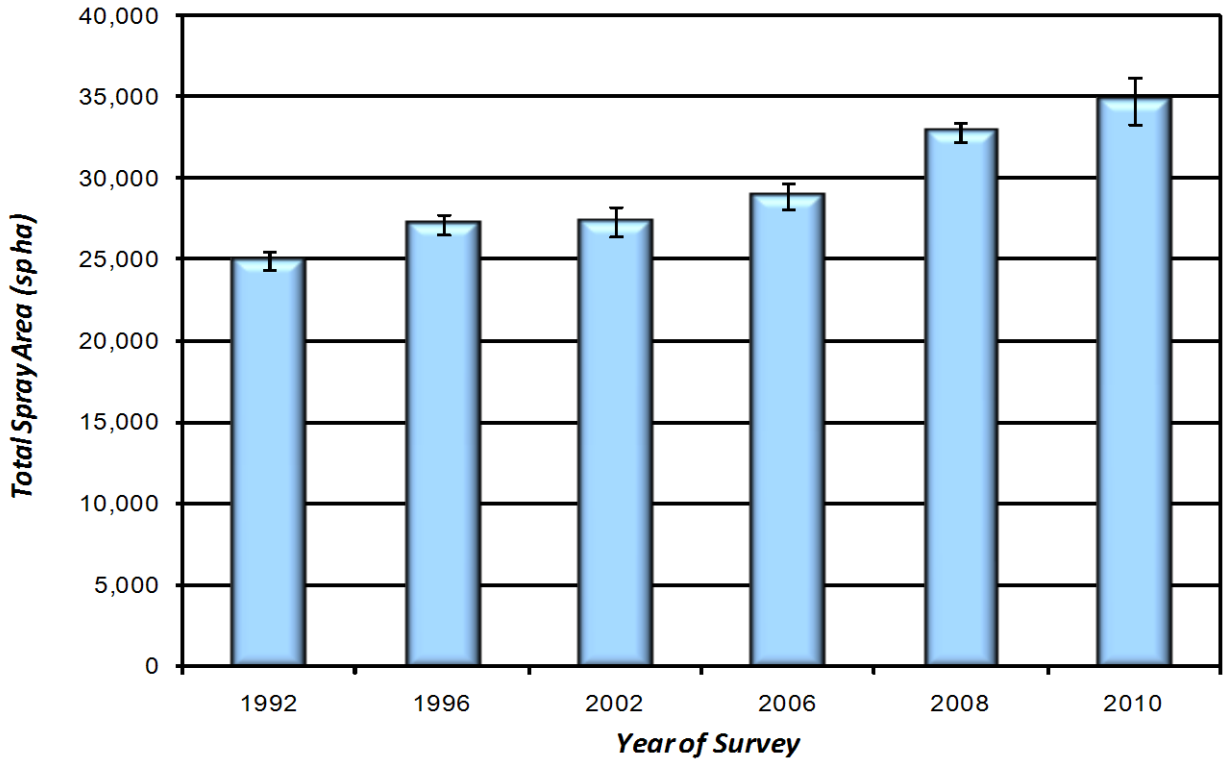

Figure 7 **Comparison of pesticide usage on top fruit crops in Northern Ireland 1992-2010, by total weight applied (kg).** *Bars show Standard Error.*

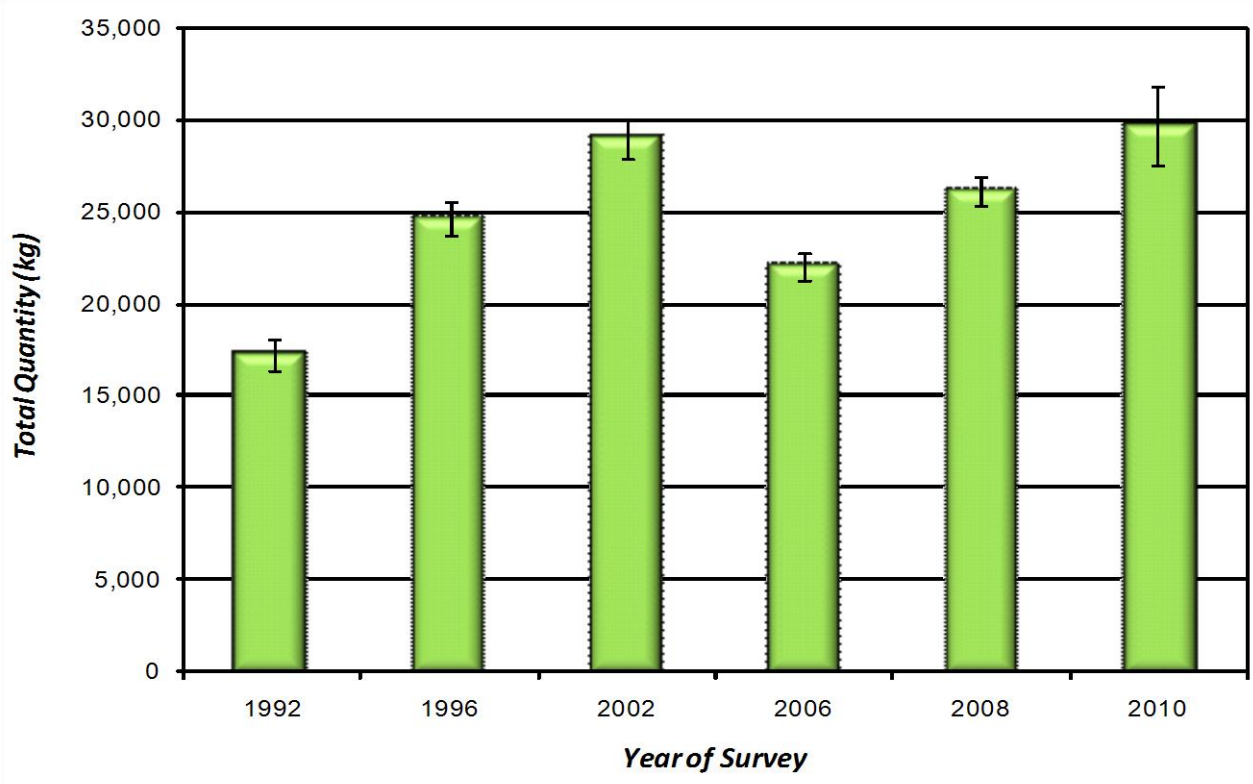

Figure 8 **Comparison of pesticide types used on top fruit crops in Northern Ireland 1992-2010, by spray area (spha).**

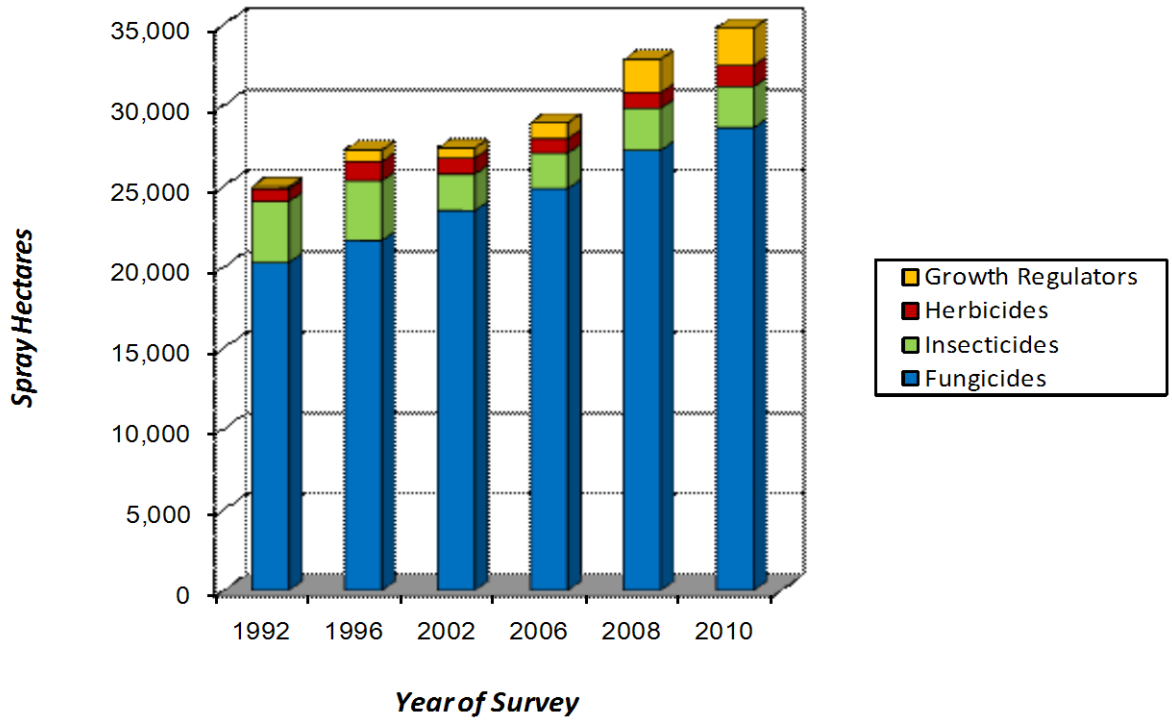

Figure 9 **Comparison of pesticide types used on top fruit crops in Northern Ireland 1992-2010, by weight applied (kg).**

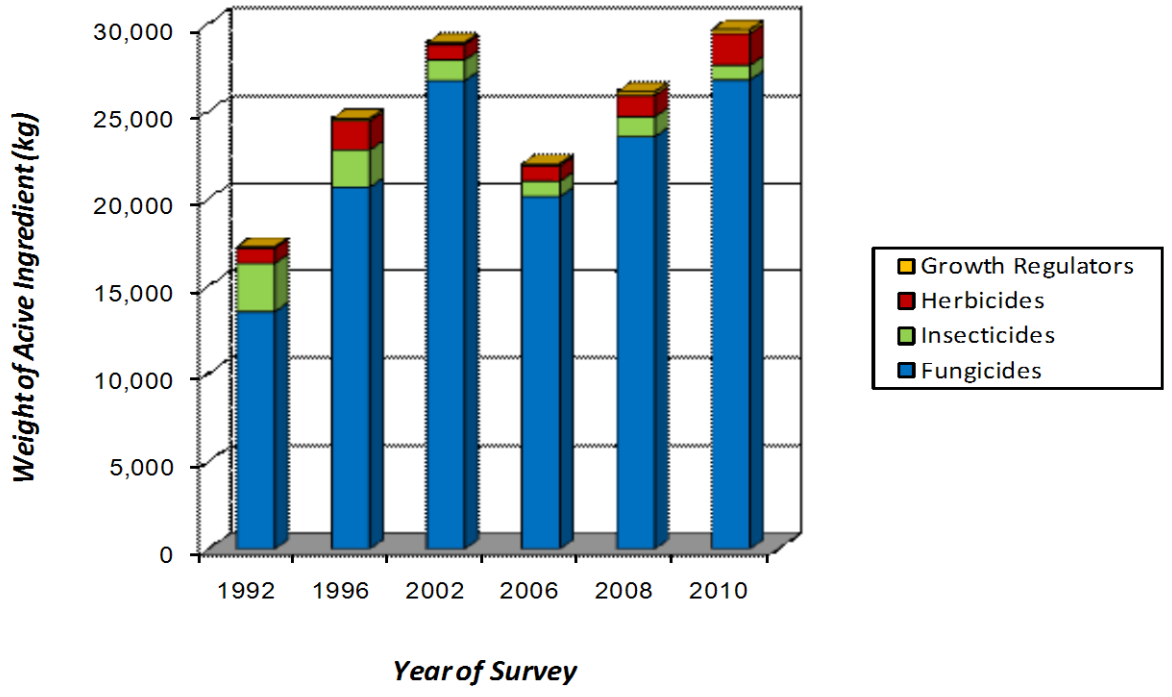

Figure 10 **Comparison of insecticide types used on top fruit crops in Northern Ireland 1992-2010, by area treated (spha).**

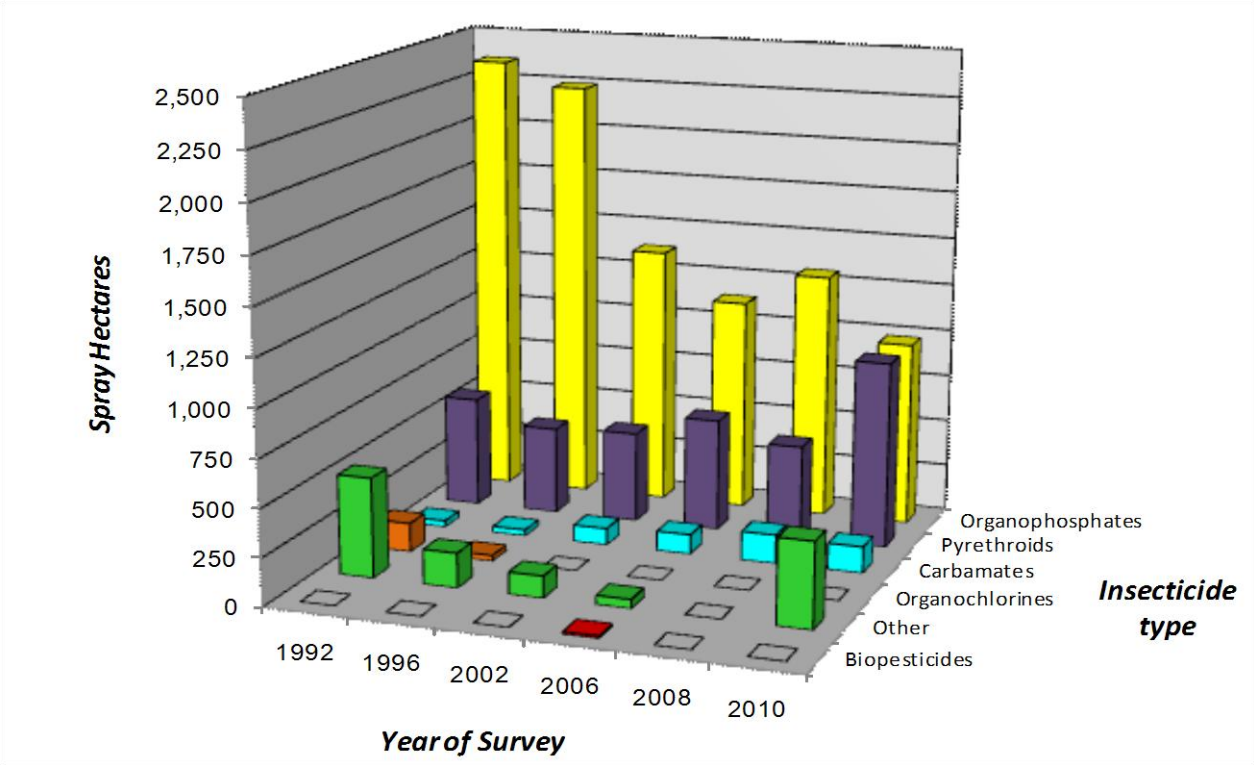

Figure 11 **Comparison of insecticide types used on top fruit crops in Northern Ireland 1992-2010, by weight of active ingredients applied (kg).**

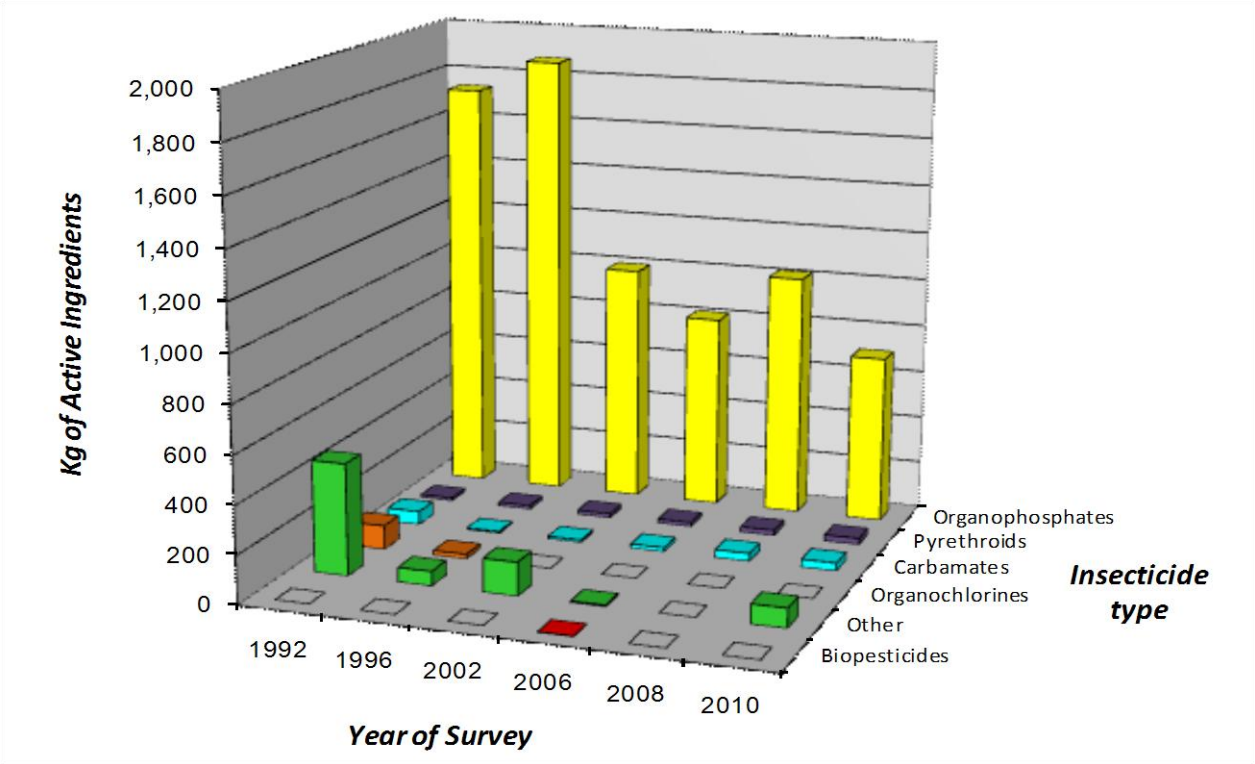

Figure 12 **Comparison of application rates for pesticide types used on top fruit crops in Northern Ireland 1992-2010 (kg/spha).**

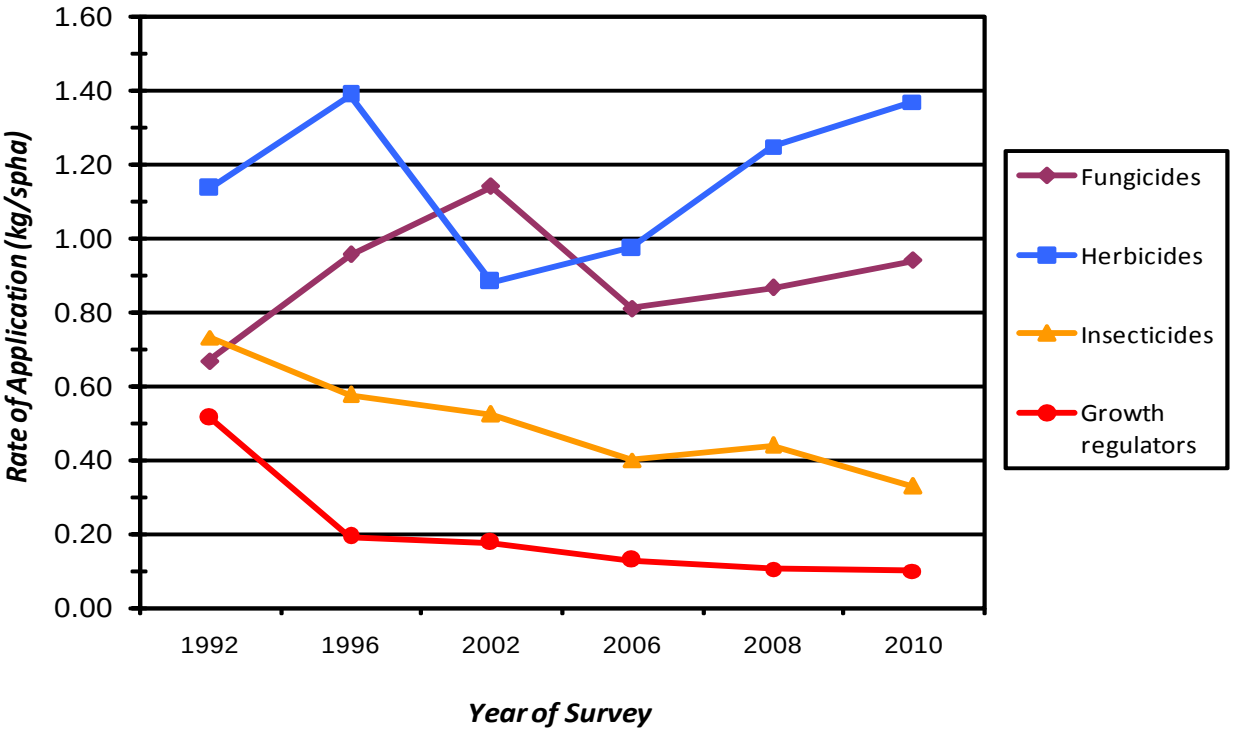

Figure 13 **Weight of fungicides applied per hectare of total top fruit crop, Northern Ireland 1992-2010 (kg/ha).**

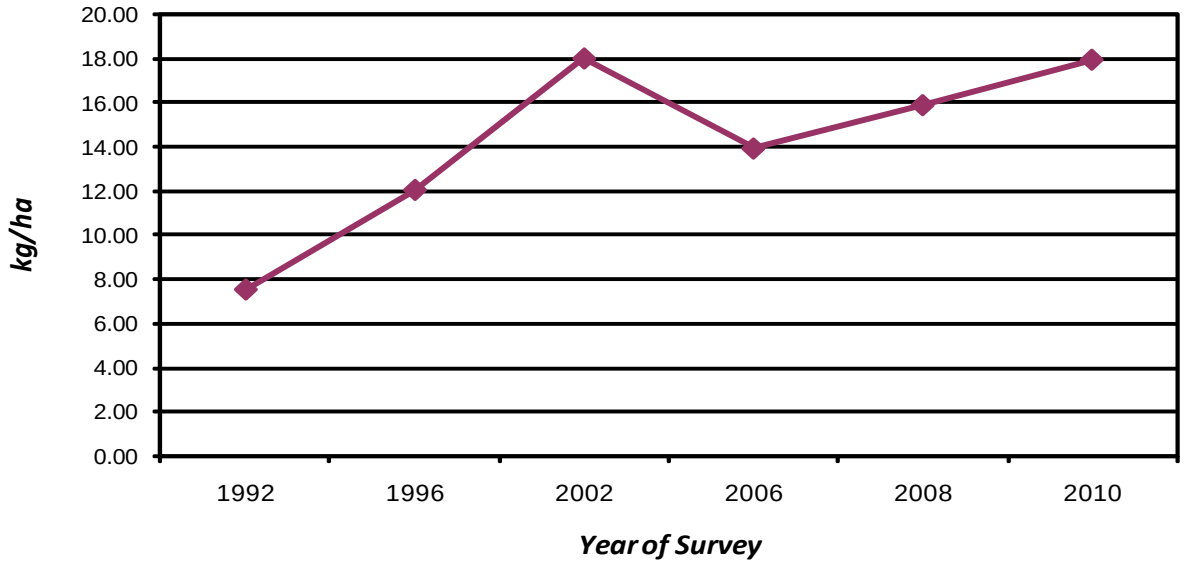

Figure 14 **Weight of herbicides, insecticides and growth regulators applied per hectare of total top fruit crop, Northern Ireland 1992-2010 (kg/ha).**

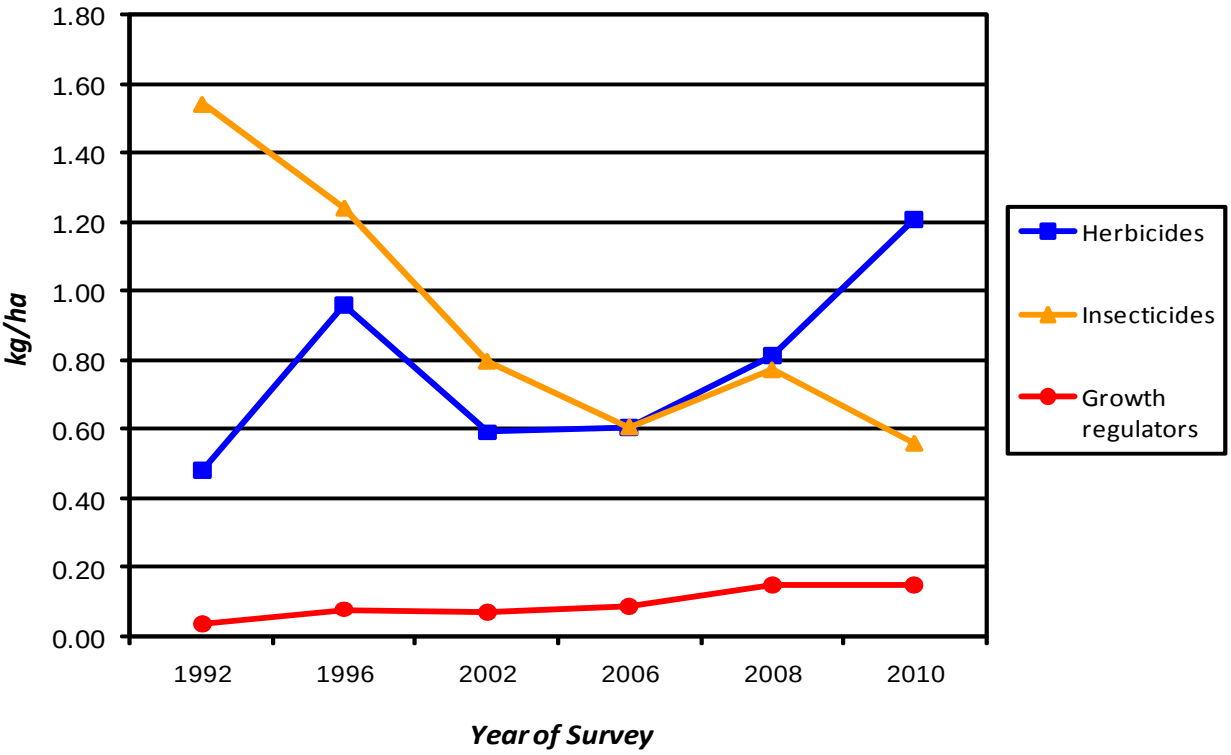

Figure 15 **Comparison of storage and treatment of Bramley apples in Northern Ireland 1992-2010.**

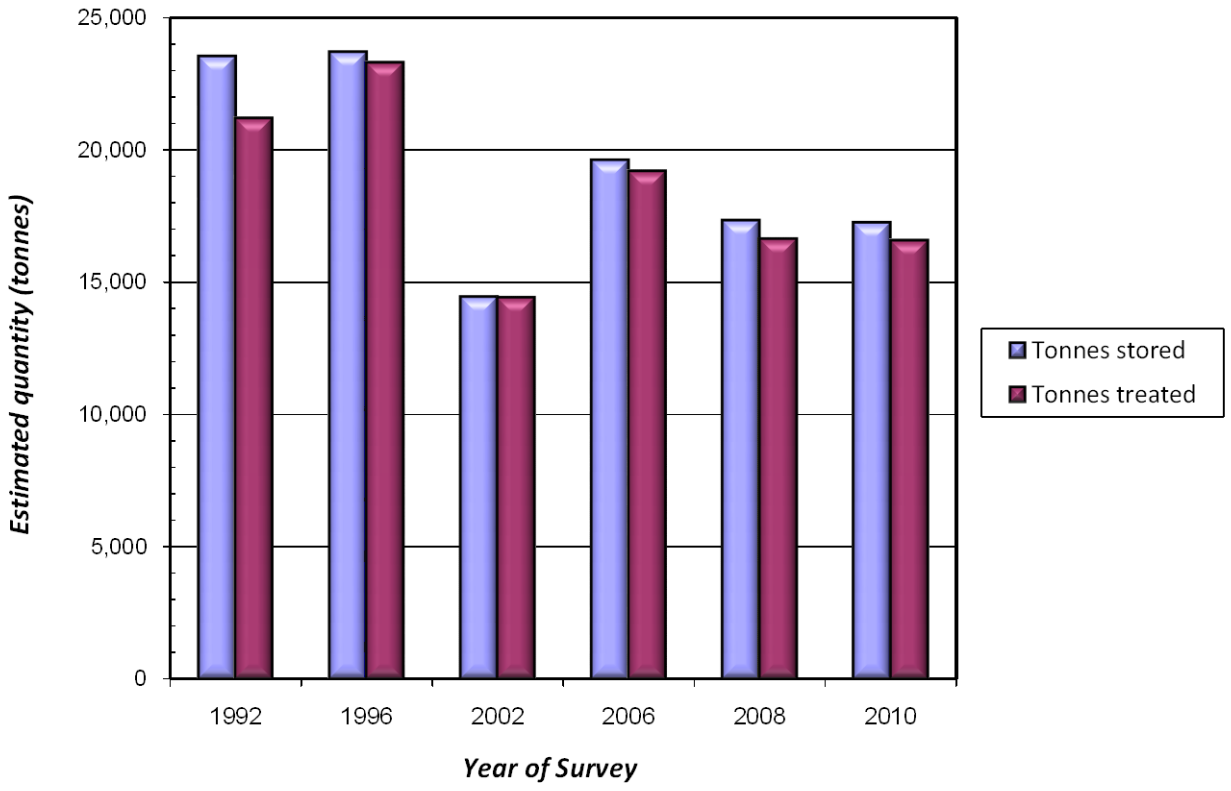

Figure 16 Proportion of stored Bramley apples treated in Northern Ireland, 2010.

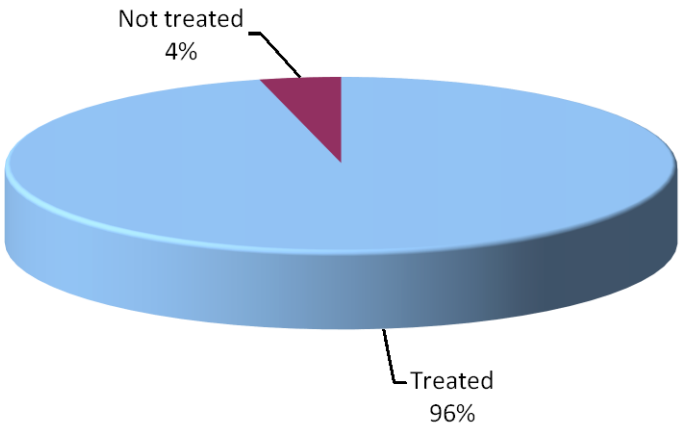

Figure 17 Storage method for Bramley apple crops in Northern Ireland, 2010.

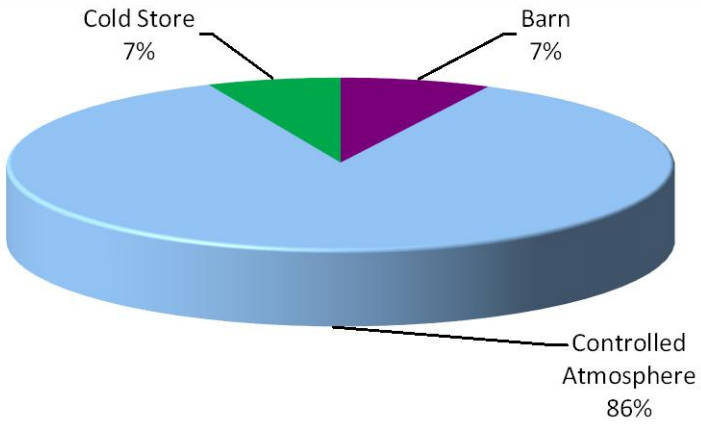

Figure 18 Weight of active ingredient (kg) by pesticide group applied to stored Bramley apples in Northern Ireland, 1992-2010.

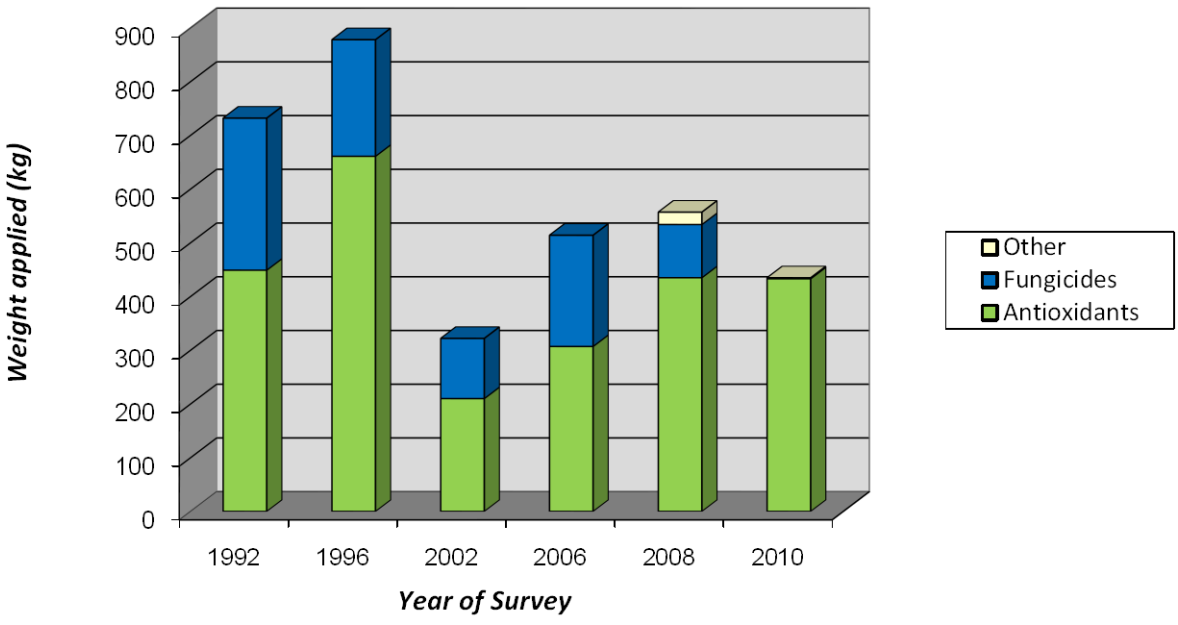

Figure 19 Total grown area (ha) of Bramley apple crops per age of orchard (years) in Northern Ireland, 2010.

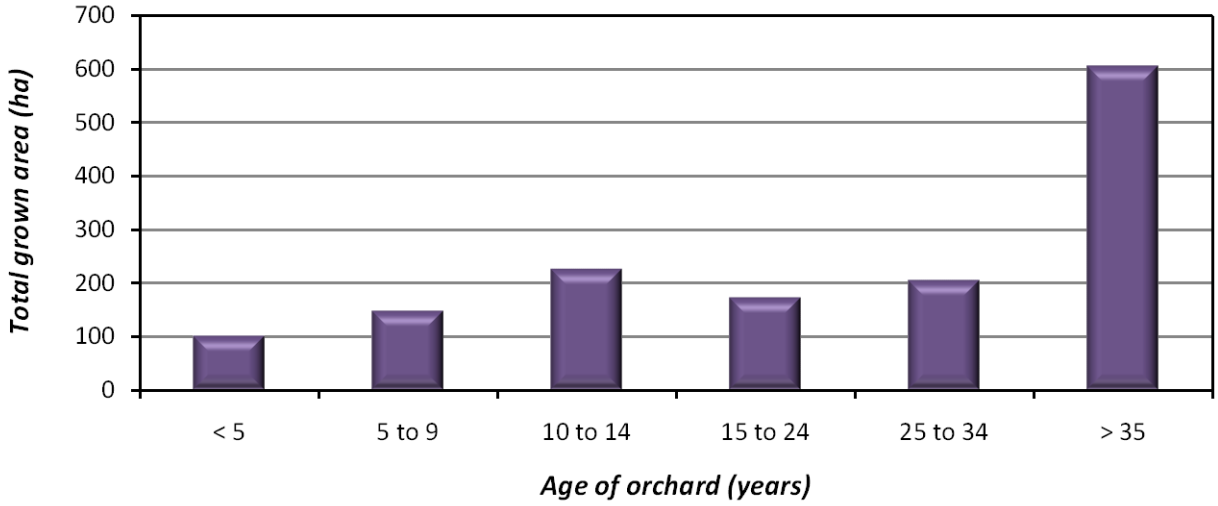

Figure 20 Total quantity (tonnes) of Bramley apple crops harvested per age of orchard (years) in Northern Ireland, 2010.

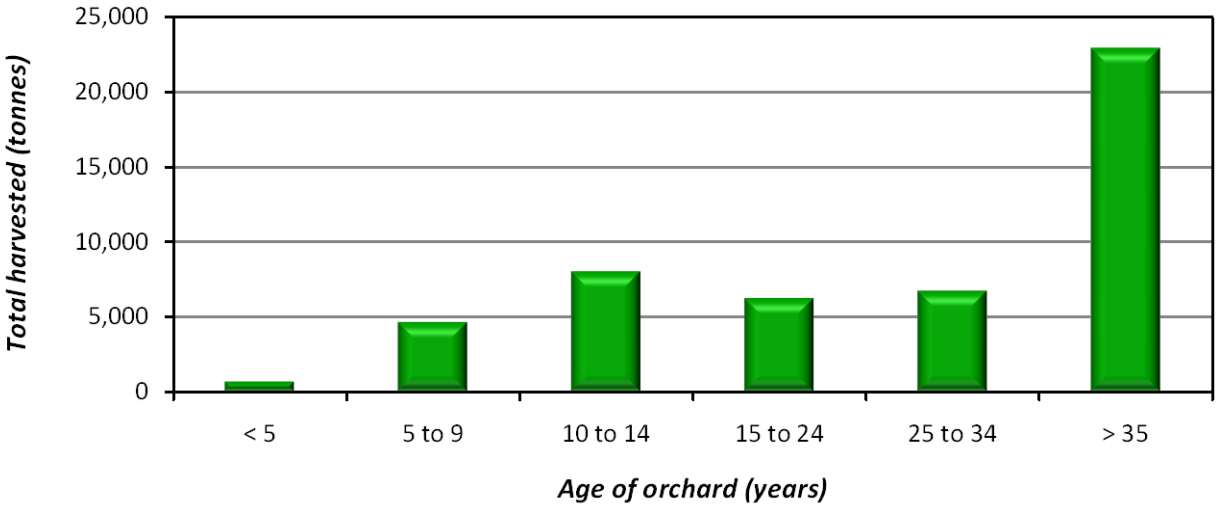

Figure 21 Total yield (tonnes per hectare) of Bramley apple crops per age of orchard (years) in Northern Ireland, 2010.

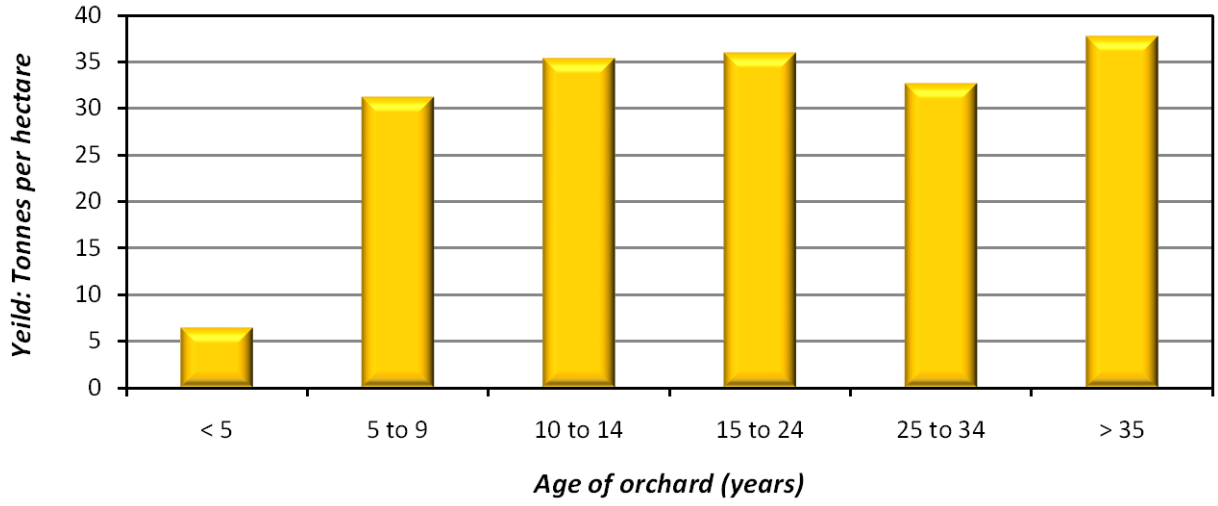

Table 1 The total number of farms in each size group with top fruit crops in 2010 and the number of holdings surveyed from each size group.

	Size Group (hectares)											
	<2		2 < 4		4 < 9		9 < 14		14+		Total	
County	A	B	A	B	A	B	A	B	A	B	A	B
Armagh	57	**4**	35	**9**	40	**16**	22	**15**	32	**22**	186	**66**
All other counties	22	**.**	1	**.**	4	**4**	1	**.**	3	**2**	31	**6**
Northern Ireland	79	**4**	36	**9**	44	**20**	23	**15**	35	**24**	217	**72**

Legend

A = Total number of holdings in strata

B = Number of holdings surveyed

Table 2 Estimated area of crops grown (ha), total area of crops surveyed (ha) and the proportion (%) of the total area of top fruit crops surveyed in Northern Ireland, 2010.

Crop type	Grown area (ha)	Surveyed area (ha)	Proportion of crop surveyed (%)
Bramley apples	1,491	889	60%
Dessert apples	25	9	36%

Table 3 Estimated area (ha) of top fruit crops grown regionally in Northern Ireland, 2010.

	County		
Crop type	Armagh	All other counties	Northern Ireland
Bramley apples	1,387	105	1,491
Dessert apples	25	.	25
All Crops	**1,412**	**105**	**1,517**

Table 4 Estimated area (spha) of top fruit crops treated regionally in Northern Ireland, 2010, categorised by each pesticide type.

	Pesticide Type				
County	**Fungicides**	**Herbicides**	**Insecticides**	**Growth regulators**	**Northern Ireland**
Antrim	347	10	16	.	373
Armagh	26,644	1,199	2,402	2,252	32,497
Down	126	24	24	.	174
Tyrone	1,476	80	100	61	1,717
Total	**28,593**	**1,314**	**2,543**	**2,313**	**34,763**

Table 5 Estimated quantity (kg) of pesticide active ingredients applied to top fruit crops regionally in Northern Ireland, 2010, categorised by pesticide type.

	Pesticide Type				
County	**Fungicides**	**Herbicides**	**Insecticides**	**Growth regulators**	**Northern Ireland**
Antrim	232	12	4	.	249
Armagh	24,397	1,665	820	222	27,104
Down	72	36	1	.	109
Tyrone	2,094	91	17	4	2,206
All pesticides	**26,795**	**1,804**	**843**	**226**	**29,669**

Table 6 Estimated quantity (kg) of pesticide active ingredients applied to top fruit crops in Northern Ireland, 2010, categorised by crop and pesticide type.

	Pesticide Type				
Crop Type	**Fungicides**	**Herbicides**	**Insecticides**	**Growth Regulators**	**Total quantity (kg)**
Bramley apples	26,649	1,792	837	226	29,504
Dessert apples	146	12	7	.	165
All Crops	**26,795**	**1,804**	**843**	**226**	**29,669**

Table 7 The basic area (ha) and the total area (spha) of top fruit crops in Northern Ireland, 2010 treated with each pesticide type.

	Pesticide Type									
	Fungicides		Herbicides		Insecticides		Growth regulators		All pesticides	
Crop Type	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)
Bramley apples	1,464	28,404	555	1,306	1,175	2,515	810	2,314	4,004	34,538
Dessert apples	25	189	4	8	14	29	.	.	43	226
All Crops	**1,489**	**28,593**	**559**	**1,314**	**1,189**	**2,544**	**810**	**2,314**	**4,047**	**34,763**

Table 8 The mean number of spray applications of pesticides applied to Top Fruit crops in Northern Ireland, 2010.

	Pesticide Type									
	Fungicides		Herbicides		Insecticides		Growth Regulators		Other products	
Crop Type	A	B	A	B	A	B	A	B	A	B
Bramley apples	16.5	10.8	2.1	1.4	1.9	1.8	2.3	2.3	8.2	6.4
Dessert apples	5.4	3.3	2.0	1.3	1.9	1.9	.	.	19.7	11.0

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, 2010.

	Crop type		
Pesticide Type & Information	**Bramley apples**	**Dessert apples**	**Total area (spha)**
Fungicides			
Boscalid/pyraclostrobin	674	6	680
Captan	3,153	21	3,174
Copper oxychloride	320	.	320
Copper sulphate/lime sulphur	6	.	6
Cyprodinil/fludioxonil	97	.	97
Difenoconazole	52	.	52
Dithianon	6,323	33	6,356
Dithianon/pyraclostrobin	258	3	261
Dodine	1,267	.	1,267
Fenbuconazole	3,547	45	3,592
Flutolanil	335	.	335
Flutriafol	67	12	79
Kresoxim-methyl	216	.	216
Mancozeb	5,384	42	5,426
Myclobutanil	1,433	.	1,433
Penconazole	1,410	9	1,419
Potassium bicarbonate	77	.	77
Pyrimethanil	3,377	12	3,389
Sulphur	410	6	416
All fungicides	**28,404**	**189**	**28,593**
Herbicides			
Clopyralid/fluroxypyr/triclopyr	6	.	6
Clopyralid/triclopyr	7	.	7
Dicamba/MCPA/mecoprop-P	405	1	406
Dicamba/mecoprop-P	27	.	27
Diquat	30	.	30
Glufosinate-ammonium	1	.	1
Glyphosate	822	7	829
MCPA	9	.	9
All herbicides	**1,306**	**8**	**1,314**

Table 9 (cont) Estimated area (spha) of top fruit crops treated with pesticide formulations in Northern Ireland, 2010.

	Crop type		
Pesticide Type & Information	**Bramley apples**	**Dessert apples**	**Total area (spha)**
Insecticides			
Chlorantraniliprole	11	.	11
Chlorpyrifos	973	3	976
Clofentezine	237	.	237
Cypermethrin	919	11	929
Deltamethrin	51	3	54
Pirimicarb	128	12	139
Tebufenpyrad	197	.	197
All insecticides	**2,515**	**29**	**2,543**
Growth Regulators			
Gibberellins	22	.	22
Paclobutrazol	1,041	.	1,041
Prohexadione-calcium	1,251	.	1,250
All growth regulators	**2,314**	**.**	**2,313**
All pesticides	**34,539**	**226**	**34,763**

Table 10 Estimated quantities (kg) of pesticide active ingredients applied to top fruit crops in Northern Ireland 2010.

	Crop type		
Pesticide Type & Information	**Bramley apples**	**Dessert apples**	**Total Quantity (kg)**
Fungicides			
Boscalid/pyraclostrobin	198	3	201
Captan	5,773	25	5,798
Copper oxychloride	763	.	763
Copper sulphate/lime sulphur	7	.	7
Cyprodinil/fludioxonil	49	.	49
Difenoconazole	6	.	6
Dithianon	4,980	17	4,997
Dithianon/pyraclostrobin	87	1	88
Dodine	1,092	.	1,092
Fenbuconazole	220	3	223
Flutolanil	33	.	33
Flutriafol	8	1	9
Kresoxim-methyl	21	.	21
Mancozeb	10,269	63	10,332
Myclobutanil	116	.	116
Penconazole	67	<1	67
Potassium bicarbonate	369	.	369
Pyrimethanil	1,290	4	1,294
Sulphur	1,301	29	1,330
All fungicides	**26,649**	**146**	**26,795**
Herbicides			
Clopyralid/fluroxypyr/triclopyr	4	.	5
Clopyralid/triclopyr	2	.	2
Dicamba/MCPA/mecoprop-P	572	1	573
Dicamba/mecoprop-P	20	.	20
Diquat	12	.	12
Glufosinate-ammonium	1	.	1
Glyphosate	1,165	11	1,176
MCPA	16	.	16
All herbicides	**1,792**	**12**	**1,804**

Table 10 (cont) **Estimated quantities (kg) of pesticide active ingredients applied to top fruit crops in Northern Ireland 2010.**

	Crop type		
Pesticide Type & Information	**Bramley apples**	**Dessert apples**	**Total Quantity (kg)**
Insecticides			
Chlorantraniliprole	<1	.	<1
Chlorpyrifos	700	3	703
Clofentezine	64	.	64
Cypermethrin	26	<1	27
Deltamethrin	<1	<1	<1
Pirimicarb	29	3	33
Tebufenpyrad	16	.	16
All insectcides	**837**	**6**	**843**
Growth Regulators			
Gibberellins	<1	.	<1
Paclobutrazol	84	.	84
Prohexadione-calcium	142	.	142
All growth regulators	**226**	**.**	**226**
All pesticides	**29504**	**165**	**29669**

Table 11 The active ingredients most extensively used on top fruit crops in Northern Ireland 2010, ranked by treated area (spha).

No.	Active ingredient	Treated area (spha)
1	Dithianon	6617
2	Mancozeb	5426
3	Fenbuconazole	3592
4	Pyrimethanil	3388
5	Captan	3175
6	Myclobutanil	1433
7	Penconazole	1419
8	Dodine	1266
9	Prohexadione-calcium	1250
10	Paclobutrazol	1041
11	Chlorpyrifos	976
12	Pyraclostrobin	940
13	Cypermethrin	929
14	Glyphosate	828
15	Boscalid	680
16	Dicamba	434
17	Mecoprop-P	434
18	Sulphur	416
19	MCPA	415
20	Flutolanil	335
21	Copper oxychloride	320
22	Clofentezine	237
23	Kresoxim-methyl	216
24	Tebufenpyrad	197
25	Pirimicarb	139
26	Cyprodinil	97
27	Fludioxonil	97
28	Flutriafol	79
29	Potassium bicarbonate	77
30	Deltamethrin	54
31	Difenoconazole	52
32	Diquat	30
33	Gibberellins	22
34	Clopyralid	13
35	Triclopyr	13
36	Chlorantraniliprole	11
37	Lime sulphur	6
38	Copper sulphate	6
39	Fluroxypyr	5
40	Glufosinate-ammonium	1

**** Active ingredients not always sprayed as separate actives but also in formulated mixtures, as indicated by Table 9.***

Table 12 The active ingredients most extensively used on top fruit crops in Northern Ireland 2010, ranked by weight (kg).

No.	Active ingredient	Quantity applied (kg)
1	Mancozeb	10,333
2	Captan	5,798
3	Dithianon	5,063
4	Sulphur	1,330
5	Pyrimethanil	1,293
6	Glyphosate	1,176
7	Dodine	1,092
8	Copper oxychloride	763
9	Chlorpyrifos	702
10	MCPA	486
11	Potassium bicarbonate	369
12	Fenbuconazole	223
13	Prohexadione-calcium	142
14	Boscalid	133
15	Myclobutanil	116
16	Mecoprop-P	94
17	Pyraclostrobin	90
18	Paclobutrazol	84
19	Penconazole	67
20	Clofentezine	64
21	Pirimicarb	33
22	Flutolanil	33
23	Dicamba	30
24	Cyprodinil	29
25	Cypermethrin	27
26	Kresoxim-methyl	21
27	Fludioxonil	20
28	Tebufenpyrad	16
29	Diquat	12
30	Flutriafol	9
31	Difenoconazole	6
32	Triclopyr	4
33	Lime sulphur	4
34	Copper sulphate	4
35	Fluroxypyr	2
36	Clopyralid	1
37	Glufosinate-ammonium	<1
38	Chlorantraniliprole	<1
39	Deltamethrin	<1
40	Gibberellins	<1

**** Active ingredients not always sprayed as separate actives but also in formulated mixtures, as indicated by Table 9.***

Table 13 Bramley apples: pesticide-treated area (spha), basic area treated (ha), quantities used (kg) and reasons for use.

	Reason for use												
Pesticide Type and formulation	**Apple scab**	**Canker**	**Clean Trees**	**Disease prevention**	**Foliar feed**	**General fungal control**	**Powdery mildew & scab**	**Red spider mite**	**Storage rots**	**Trace element**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Fungicides													
Boscalid/pyraclostrobin	276	6	.	.	.	41	79	.	272	.	674	347	198
Captan	3,044	.	.	.	.	.	109	.	.	.	3,153	1,007	5,774
Copper oxychloride	61	91	152	15	.	.	.	.	.	.	319	269	763
Copper sulphate/lime sulphur	.	6	.	.	.	.	.	.	.	.	6	6	8
Cyprodinil/fludioxonil	64	.	.	.	.	8	.	.	26	.	98	93	49
Difenoconazole	52	.	.	.	.	.	.	.	.	.	52	33	6
Dithianon	6,323	.	.	.	.	.	.	.	.	.	6,323	1,141	4,980
Dithianon/pyraclostrobin	244	.	.	.	.	.	.	.	14	.	258	152	87
Dodine	1,267	.	.	.	.	.	.	.	.	.	1,267	573	1,092
Fenbuconazole	2,537	.	.	.	.	.	1,009	.	.	.	3,546	969	220
Flutolanil	96	239	.	.	.	.	.	.	.	.	335	48	33
Flutriafol	.	.	.	.	.	55	12	.	.	.	67	20	8
Kresoxim-methyl	83	.	.	.	.	.	133	.	.	.	216	94	21
Mancozeb	4,736	.	.	.	.	11	637	.	.	.	5,384	1,074	10,269
Myclobutanil	1,002	.	.	.	.	.	431	.	.	.	1,433	517	116
Penconazole	1,079	.	.	.	.	76	255	.	.	.	1,410	649	67
Potassium bicarbonate	.	.	.	.	77	.	.	.	.	.	77	26	369
Pyrimethanil	3,377	.	.	.	.	.	.	.	.	.	3,377	1,103	1,290
Sulphur	253	.	.	.	.	.	19	56	.	82	410	190	1,301
All fungicides	**24,494**	**342**	**152**	**15**	**77**	**191**	**2,684**	**56**	**312**	**82**	**28,404**	***1464**	**26,649**

**** As in Table 7 rather than the sum of the above***

Note 'Clean trees' refers to a winter wash applied to remove any lichens, dormant spores etc. on the trees.

Table 13 (cont) Bramley apples: pesticide-treated area (spha), basic area treated (ha), quantities used (kg) and reasons for use.

	Reason for use							
Pesticide Type and formulation	**Dandelions**	**General weed control**	**Nettles**	**Thistles and buttercups**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**	
Herbicides								
Clopyralid/fluroxypyr/triclopyr	.	.	6	.	6	6	5	
Clopyralid/triclopyr	.	7	.	.	7	7	2	
Dicamba/MCPA/mecoprop-P	.	405	.	.	405	287	572	
Dicamba/mecoprop-P	4	24	.	.	27	21	20	
Diquat	.	30	.	.	30	30	12	
Glufosinate-ammonium	.	1	.	.	1	1	1	
Glyphosate	.	822	.	.	821	495	1,164	
MCPA	4	.	.	5	9	9	17	
All herbicides	**8**	**1,289**	**6**	**5**	**1,306**	***555**	**1,793**	

	Reason for use							
Pesticide Type and formulation	**Aphids**	**Caterpillar**	**Insect control**	**Leaf hopper**	**Red spider mite**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Insecticides								
Chlorantraniliprole	.	.	11	.	.	11	11	<1
Chlorpyrifos	283	23	653	14	.	973	737	700
Clofentezine	.	.	54	.	182	236	197	64
Cypermethrin	581	.	338	.	.	919	679	27
Deltamethrin	17	.	34	.	.	51	51	<1
Pirimicarb	86	.	41	.	.	127	118	30
Tebufenpyrad	.	.	30	.	168	198	197	16
All Insecticides	**967**	**23**	**1,161**	**14**	**350**	**2,515**	***1175**	**836**

**** As in Table 7 rather than the sum of the above***

Table 13 (cont) **Bramley apples: pesticide-treated area (spha), basic area treated (ha), quantities used (kg) and reasons for use.**

	Reason for use			
Pesticide Type and formulation	**Growth regulation**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Growth regulators				
Gibberellins	22	22	11	1
Paclobutrazol	1,041	1,041	334	84
Prohexadione-calcium	1,251	1,251	648	142
All Growth regulators	**2,314**	**2,314**	***810**	**226**

**** As in Table 7 rather than the sum of the above***

Table 14 Dessert apples: pesticide-treated area (spha), basic area treated (ha), quantities used (kg) and reasons for use.

	Reason for use							
Pesticide Type and formulation	**Apple scab**	**General fungal control**	**Powdery mildew**	**Red spider mite**	**Storage rots**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Fungicides								
Boscalid/pyraclostrobin	.	.	.	.	6	6	3	3
Captan	21	.	.	.	.	21	3	25
Dithianon	33	.	.	.	.	33	12	17
Dithianon/pyraclostrobin	.	.	.	.	3	3	3	1
Fenbuconazole	9	.	36	.	.	45	11	3
Flutriafol	.	12	.	.	.	12	3	1
Mancozeb	30	11	.	.	.	42	25	63
Penconazole	9	.	.	.	.	9	3	1
Pyrimethanil	10	2	.	.	.	12	3	4
Sulphur	.	.	.	6	.	6	3	29
All fungicides	**113**	**25**	**36**	**6**	**9**	**189**	***25**	**146**

**** As in Table 7 rather than the sum of the above***

Table 14 (cont) **Dessert apples: pesticide-treated area (spha), basic area treated (ha), quantities used (kg) and reasons for use.**

	Reason for use						
Pesticide Type and formulation	**General weed control**	**Aphids**	**Insect control**	**Leaf hopper**	**Total area treated (spha)**	**Basic area treated (ha)**	**Total quantity applied (kg)**
Herbicides							
Dicamba/MCPA/mecoprop-P	1	.	.	.	1	1	1
Glyphosate	7	.	.	.	7	4	12
All herbicides	**8**	**.**	**.**	**.**	**8**	***4**	**13**
Insecticides							
Chlorpyrifos	.	.	.	3	3	3	3
Cypermethrin	.	9	2	.	11	11	<1
Deltamethrin	.	.	3	.	3	3	<1
Pirimicarb	.	3	9	.	12	12	3
All insecticides	**.**	**12**	**14**	**3**	**29**	***14**	**7**

**** As in Table 7 rather than the sum of the above***

Table 15 Estimated area treated (spha) and quantity (kg) of 'other products' applied to top fruit crops 2010.

	Crop type					
	Bramley apples		**Dessert apples**		**Total**	
Formulation	**spha**	**kg**	**spha**	**kg**	**spha**	**kg**
Boron	754	149	6	2	760	151
Calcium	1,142	1,505	9	7	1,151	1,512
Calcium chloride	449	1,039	.	.	449	1,039
Calcium/nitrogen	417	719	18	30	435	749
Calcium/nitrogen/phosphate	1,264	4,100	24	65	1,288	4,165
Copper sulphate	126	819	3	15	129	834
Magnesium	11	12	.	.	11	12
Magnesium sulphate	29	159	.	.	29	159
Manganese	65	21	.	.	65	21
Natural plant growth promoters	718	1,795	.	.	718	1,795
Nitrogen/phosphate/potassium oxide	858	986	.	.	858	986
Nitrogen/phosphoric acid	107	337	.	.	107	337
Nitrogen/phosphorus pentoxide/potassium oxide	76	24	.	.	76	24
NPK fertiliser	153	510	.	.	153	510
Potassium	11	29	.	.	11	29
Seaweed extract	1,812	3,564	36	55	1,848	3,619
Trace elements	46	125	.	.	46	125
Zinc	402	286	.	.	402	286
Total	**8,439**	**16,178**	**96**	**174**	**8,535**	**16,352**

Table 16 Comparison of area (ha) of top fruit crops grown in Northern Ireland, 1992-2010.

	Survey Year						
Crop Type	**1992 (ha)**	**1996 (ha)**	**2002 (ha)**	**2006 (ha)**	**2008* (ha)**	**2010* (ha)**	**% change in area 2010/2008**
Bramley apples							
Bramley apples (fruiting)	1,574	1,511	1,265	1,341	1,463	1,491	+2%
Bramley apples (non-fruiting)	158	189	197	74	N/A	N/A	N/A
All Bramley apples	**1,732**	**1,701**	**1,462**	**1,415**	**1,463**	**1,491**	**+2%**
Dessert apples and plums*							
Dessert apples and plums (fruiting)	57	13	20	21	19	25	+24%
Dessert apples and plums (non-fruiting)	5	0.4	4	14	N/A	N/A	N/A
All dessert apples and plums	**62**	**13**	**24**	**35**	**19**	**25**	**+24%**
Total crops	**1,794**	**1,714**	**1,486**	**1,450**	**1,482**	**1,516**	**+2%**

**** Note: In 2008 and 2010 fruiting and non-fruiting crops were recorded together. Also, plums were not recorded in 2010.***

Table 17a Comparison of pesticide usage on top fruit crops in Northern Ireland 1992-2010, area treated (spha) and the quantity applied (kg).

	Survey Year											
	1992		1996		2002		2006		2008		2010	
Pesticide Type	Area (spha)	Quantity (kg)	Area (spha)	Quantity (kg)	Area (spha)	Quantity (kg)	Area (spha)	Quantity (kg)	Area (spha)	Quantity (kg)	Area (spha)	Quantity (kg)
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
Herbicides	761	865	1,190	1,652	1,000	881	899	875	965	1,206	1,314	1,805
Growth regulators	134	69	713	137	610	107	990	126	2,066	219	2,313	226
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
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
Pyrethroids	586	13	464	16	481	18	595	18	496	23	983	27
Acaricides	112	31	751	157	201	24	301	24	645	93	.	.
Biopesticides	.	.	.	.	.	.	13	2	.	.	.	.
Other insecticides	524	465	182	60	115	139	47	6	.	.	445	81
All Insecticides	**3,765**	**2,399**	**3,698**	**2,129**	**2,258**	**1,186**	**2,189**	**878**	**2,598**	**1,165**	**2,543**	**843**
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**

Table 17b Comparison of application ratios of the active ingredients most extensively used on top fruit crops in Northern Ireland, 1992-2010.

		Quantity per unit of basic crop area (kg/ha)					
No.	**Active Ingredient**	**1992 (kg/ha)**	**1996 (kg/ha)**	**2002 (kg/ha)**	**2006 (kg/ha)**	**2008 (kg/ha)**	**2010 (kg/ha)**
1.	Mancozeb	2.168	5.893	11.383	7.219	6.677	6.816
2.	Captan	1.854	1.927	1.286	1.362	1.696	3.825
3.	Dithianon	1.401	2.387	3.307	2.471	3.963	3.340
4.	Sulphur	.	0.001	0.174	0.059	0.669	0.878
5.	Pyrimethanil	.	0.003	0.344	0.558	1.090	0.853
6.	Glyphosate	0.148	0.447	0.296	0.340	0.572	0.776
7.	Dodine	0.121	0.483	0.259	0.722	0.557	0.720
8.	Copper oxychloride	0.677	0.424	0.733	0.401	0.684	0.503
9.	Chlorpyrifos	0.329	0.311	0.400	0.560	0.684	0.463
10.	MCPA	0.029	0.078	0.104	0.141	0.171	0.320
11.	Potassium bicarbonate	.	.	.	.	.	0.243
12.	Fenbuconazole	.	0.021	0.118	0.102	0.140	0.147
13.	Prohexadione-calcium	.	.	.	0.026	0.109	0.093
14.	Boscalid	.	.	.	0.031	0.121	0.088
15.	Myclobutanil	0.275	0.092	0.014	0.032	0.025	0.077
16.	Mecoprop-P	.	.	0.013	0.073	0.030	0.062
17.	Pyraclostrobin	.	.	.	0.016	0.108	0.059
18.	Paclobutrazol	0.007	0.079	.	0.060	0.038	0.056
19.	Penconazole	0.091	0.127	0.043	0.031	0.048	0.044
20.	Clofentezine	0.009	0.057	0.004	0.002	0.031	0.042
21.	Pirimicarb	.	0.004	0.007	0.009	0.022	0.022
22.	Flutolanil	.	.	.	.	.	0.022
23.	Dicamba	0.011	0.017	0.006	0.012	0.009	0.020
24.	Cyprodinil	.	.	.	.	0.006	0.019
25.	Cypermethrin	.	0.006	0.009	0.012	0.009	0.018
26.	Kresoxim-methyl	.	.	.	0.027	0.021	0.014
27.	Fludioxonil	.	.	.	.	0.004	0.013
28.	Tebufenpyrad	.	0.019	0.011	0.013	0.027	0.011
29.	Diquat	.	.	.	.	0.003	0.008
30.	Flutriafol	.	.	.	.	.	0.006

Table 17b (cont) Comparison of application ratios of the active ingredients most extensively used on top fruit crops in Northern Ireland, 1992-2010.

		Quantity per unit of basic crop area (kg/ha)					
No.	**Active Ingredient**	**1992 (kg/ha)**	**1996 (kg/ha)**	**2002 (kg/ha)**	**2006 (kg/ha)**	**2008 (kg/ha)**	**2010 (kg/ha)**
31.	Difenoconazole	.	.	0.006	.	0.002	0.004
32.	Triclopyr	0.017	0.021	0.012	0.002	0.008	0.003
33.	Lime sulphur	0.150	.	.	.	.	0.002
34.	Copper sulphate	0.304	0.083	0.237	.	.	0.002
35.	Fluroxypyr	.	.	.	.	0.006	0.001
36.	Clopyralid	.	.	.	.	0.004	0.001
37	Glufosinate-ammonium	0.007	0.002	0.003	.	0.001	0.001
38.	Chlorantraniliprole	.	.	.	.	.	<0.001
39.	Deltamethrin	0.001	.	0.002	.	.	<0.001
40.	Gibberellins	.	.	.	<0.001	<0.001	<0.001

Note: Based on active ingredients recorded in the 2010 survey and their comparable amounts from previous years.

Table 18 Estimated quantities (tonnes) of fruit treated of apples in storage, in Northern Ireland 2010, receiving treatment and the total amount (kg) of active ingredients applied .

Pesticide formulation	Total quantity (tonnes)	Total quantity applied (kg)
Antioxidant		
Diphenylamine	15,966	432.83
All antioxidants	**15,966**	**432.83**
Fungicides		
Cyprodinil/fludioxonil	256	0.96
All fungicides	**256**	**0.96**
Other products		
1-Methylcyclopropene	345	0.76
All other products	**345**	**0.76**
All treatments	**16,567**	**434.55**

Table 19 The active ingredients used in apple storage in Northern Ireland 2010, ranked by weight (kg).

Active ingredient	Quantity used (kg)
Diphenylamine	432.83
Cyprodinil/fludioxonil	0.96
1-Methylcyclopropene	0.76
Total active ingredients	**434.55**

Table 20 Estimated quantities (treated tonnes) of bramley fruiting apples in storage in Northern Ireland, 2010, receiving treatment and reason for use.

	Reason for use		
Active ingredient	**Storage scald**	**Storage rots**	**Total treated tonnes**
Diphenylamine	15,966	.	15,966
Cyprodinil/fludioxonil	.	256	256
1-Methylcyclopropene	345	.	345
All treatments	**16,311**	**256**	**16,567**

Note: Only Bramley fruiting apples were stored in Northern Ireland, 2010.

Table 21 Comparison of the estimated quantities (tonnes) of fruit receiving treatment and the total weight (kg) of active ingredients applied to Bramley apples in storage 1992-2010.

	Survey Year											
	1992		1996		2002		2006		2008		2010	
Pesticide formulation	**Total quantity stored (t)**	**Total quantity applied (Kg)**	**Total quantity stored (t)**	**Total quantity applied (Kg)**	**Total quantity stored (t)**	**Total quantity applied (Kg)**	**Total quantity stored (t)**	**Total quantity applied (Kg)**	**Total quantity stored (t)**	**Total quantity applied (Kg)**	**Total quantity stored (t)**	**Total quantity applied (Kg)**
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
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**
Other products												
1-Methylcyclopropene	.	.	.	.	.	.	.	.	.	.	345	1
All other products	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**345**	**1**
All treatments	**21,194**	**732**	**23,296**	**878**	**14,414**	**322**	**19,191**	**514**	**16,844**	**436**	**16,567**	**435**
Stored without treatment	***2,322***	**.**	***384***	**.**	***17***	**.**	***408***	**.**	***689***	**.**	***670***	**.**
Total stored	**23,516**	**.**	**23,680**	**.**	**14,431**	**.**	**19,599**	**.**	**17,533**	**.**	**17,237**	**.**

Table 22 Total grown area (ha), total quantity harvested (tonnes) and total yield (tonnes/ha) of Bramley apple crops in Northern Ireland, 2010.

Age of orchard (years)	Total grown area (ha)	Total quantity harvested (tonnes)	Yield (tonnes/ha)
< 5	130	652	**5**
5 to 9	148	4,629	**31**
10 to 14	227	8,023	**35**
15 to 24	173	6,229	**36**
25 to 34	206	6,722	**33**
> 35	607	22,950	**38**
Total	**1,491**	**49,205**	**33**

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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

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Report No.	Report title	ISBN
178	Top Fruit Crops 2002	1-855 27 618 6
194	Arable Crops 2002	1-855 27 674 7
198	Grassland & Fodder Crops 2003	1-855 27 797 2
199	Hardy Nursery Stock Crops 2003	1-855 27 789 1
201	Protected Ornamental Crops 2003	1-855 27 739 5
206	Arable Crops 2004	1-855 27 833 2
207	Vegetable crops 2004	1-855 27 869 3
208	Grassland & Fodder Crops 2005	1-855 27 998 8
209	Sheep Treatments 2005	1-855 27 999 5
216	Arable Crops 2006	1-848 07 035 6
217	Top Fruit Crops 2006	1-848 07 019 6
218	Soft Fruit Crops 2006	1-848 07 036 3
222	Vegetable Crops 2007	1-848 07 062 2
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
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239	Hardy Nursery Stock Crops 2009	1-848 07 187 2
240	Soft Fruit Crops 2010	1-848 07 251 0
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