

PESTICIDE USAGE IN NORTHERN IRELAND  
SURVEY REPORT 217

**NORTHERN IRELAND  
TOP FRUIT CROPS  
2006**



Agriculture, Fishing and Forestry

# PESTICIDE USAGE SURVEY REPORT 217

## Northern Ireland Top Fruit Crops 2006

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## The County Regions of Northern Ireland



## SUMMARY

This report presents information from a survey of the pesticide usage practices of top fruit growers in Northern Ireland in 2006. It is the fourth pesticide survey to be conducted on top fruit crops in the region.

The total area of top fruit crops grown in 2006 decreased by 2% to 1,455 hectares when compared with the previous survey in 2002. Approximately 96% of all top fruit crops were grown in County Armagh, with fruiting Bramley apple orchards accounting for 92% of the total top fruit grown in Northern Ireland.

Overall, an estimated 22 tonnes of pesticide active ingredients were applied to 28,914 spray hectares. The pesticide-treated area increased by 6% compared with 2002, but the quantity of active ingredients used decreased by 24%.

In common with previous years, fungicide usage exceeded that of insecticide/acaricides and herbicides, while fungicides applied to the pesticide-treated area increased by 6%, the quantity decreased by an estimated 24% compared with 2002. Fungicides, applied to 86% of the pesticide-treated area, accounted for 91% of the weight of pesticides applied. The fungicides dithianon and mancozeb were the active ingredients most commonly used on top fruit crops. An estimated 89% of all fungicide applications were applied to control apple scab (*Venturia inaequalis*).

Insecticide and acaricide applications decreased by 3% in pesticide-treated area in 2006 compared with 2002. Insecticides and acaricides were applied to 8% of the entire pesticide-treated area, accounting for 4% of the total weight of pesticides applied. The organophosphate insecticide chlorpyrifos was the most frequently used insecticide/acaricide. An estimated 33% of insecticide/acaricide applications were to control aphids.

Overall, while herbicides applied to the pesticide-treated area decreased by 10%, the quantity remained similar to that applied in 2002. Glyphosate was the herbicide active ingredient most frequently used for 'general weed control' under the tree canopy.

Growth regulators accounted for 3% of the pesticide-treated area but less than 1% of the total weight of pesticide usage. Paclobutrazol was the growth regulator active ingredient most frequently used.

An estimated 9 tonnes of 'other products', which included foliar feeds, trace elements and calcium-based products were also applied to the crops during this survey period, to treat potential nutritional disorders.

An estimated 260 top fruit orchards were surveyed in Northern Ireland in 2006 and orchard floor information for each orchard was recorded. Herbicides applied in ‘strips’, under the tree canopy with inter-row grass being mowed was, as in previous years, the most common weed-management practice (used in 68% of orchards). The inter-row areas of all orchards surveyed were mown for grass and weed control. An estimated 32% of orchards had no herbicides applied for grass and weed control.

Data was also collected on post-harvest storage treatments applied to top fruit crops in 2006. An estimated 13,624 tonnes of top fruit crops was stored, 13,216 tonnes of which was treated. The antioxidant fungicide diphenylamine was the most commonly used pesticide active ingredient applied to stored fruit. A total of seven products (six pesticide active ingredients and one trace element) were recorded in use on stored apple crops.

## DEFINITIONS AND NOTES

- ‘Basic area’ refers to the actual planted area of crop, which was treated with a given pesticide.
- ‘Treated area’ refers to the total area treated with a pesticide, which includes all repeated applications to the basic area.
- ‘Reasons for use’; the reasons reported for the use of pesticides are the growers stated reason for use and may sometimes be inappropriate.
- ‘Rounding’, due to rounding of figures, there may be slight differences in totals both within and between tables.
- Generally, orchards recorded in this survey are laid out with trees planted in rows and the area between rows, referred to in the report as the ‘inter-row’ area, is sown with grass. ‘Herbicide strips’, refers therefore to the area between the trees as opposed to the ‘inter-row’ area.
- The crops within the category ‘other top fruit crops’, include cider apples, plums, pears and other cooking apple orchards.
- ‘Spray applications’ refers to the number of treatments by any pesticide type to the treated areas.
- ‘Spray round’ refers to the number of times the crop was sprayed.

## 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 fourth survey of pesticide usage on top fruit crops in Northern Ireland. Results from the previous surveys reported on pesticide usage practices on top fruit crops in 1992 (Kidd *et al.*, 1994), 1997 (Kidd *et al.*, 2001) and 2002 (Kearns *et al.*, 2004) 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 2005 (Anon., 2006), 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 in each county, together with the numbers surveyed are shown in Table 1.

This survey covers the period from the end of the 2005 harvest to the end of the 2006 harvest.

The purpose of the survey was explained to selected growers in preliminary correspondence. A total of 86 holdings (representing 33% of the entire population) 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 number and area of crops sampled, together with the proportion of the crop area surveyed, are shown in Table 2. The data collected provided information on 132 examples of five crop types.

An estimated 96% of the total area of top fruit crops was grown in County Armagh, with Bramley apples accounting for 97% of the total area of top fruit crops grown (92% fruiting and 5% non-fruiting). Dessert apples accounted for 2% of the area grown. Cider apples, plums, pears and other cooking apple varieties collectively accounted for the remaining 1%. (Table 3, Figure 1).

### *Regional Pesticide Usage*

Regionally, County Armagh accounted for 95% of the total pesticide-treated area and 96% of the quantities of pesticides used. County Tyrone represented 4% of the area grown and 3% of the pesticide-treated area (Tables 4 & 5, Figure 3).

### *Pesticide Usage on Crops*

The estimated quantities of pesticide active ingredients used and the area of crop types treated with pesticides are shown in Tables 6 & 7. Bramley fruiting crops represented 92% of the pesticide-treated area and 93% of the weight of active ingredients applied. Non-fruiting Bramley crops, grown on 5% of the total area, accounted for 6% of the area treated with pesticides and 4% of the quantity of pesticide applied. An estimated 2% of all top fruit crops grown and treated were dessert apples. Collectively, other varieties of cooking apples, plums, pears and cider apples accounted for less than 1% of both the total quantity of pesticides used and the pesticide-treated area of top fruit crops.

### *Number of Spray Applications*

The mean number of spray applications of pesticides on to top fruit crops is shown in Table 8. All pesticide types were applied to all crops and pesticides were applied to 97% of the total area of top fruit crops grown. It should be noted that due to the small number of dessert apple crops in the sample, the mean number of spray applications indicated may not be typical of the number of actual spray applications.

All crops treated received fungicides, with a mean of 18 fungicide applications and 11 spray rounds. Approximately 86% of all crops received insecticide/acaricide applications, with a mean of two spray applications. On average, two applications of growth regulators were made to top fruit crops.

### **Total Pesticide Usage**

Approximately 22 tonnes of pesticide active ingredients were applied to 28,914 spray hectares of top fruit crops grown in Northern Ireland in 2006 (Tables 4 & 5, Figure 2). Fungicides were applied to 86% of the pesticide-treated area, representing 91% of the weight of pesticides applied. Herbicides were applied to 3% of the area treated with pesticides, accounting for 4% of the total weight of pesticides used.

Insecticides/acaricides, applied to 8% of the pesticide-treated area, represented 4% of the total pesticide usage weight. Growth regulators represented 3% and less than 1% of the total pesticide-treated area and weight of active ingredients used, respectively.

The pesticide types and active ingredients applied are shown in Tables 9 and 10. Dithianon (23%) and Mancozeb (22%) were the two most frequently used fungicides, representing 18% and 52% of the weight of fungicides used, respectively. Fungicide applications were primarily used to control apple scab (*V. inaequalis*) in orchards.

Glyphosate (54% of herbicide applications) was the most commonly applied herbicide active ingredient accounting for 56% of herbicide active ingredients used by weight.

The organophosphorus active ingredient chlorpyrifos accounted for 51% of the insecticide/acaricide-treated area and represented 92% of the weight of pesticides applied. Cypermethrin (26%) and tebufenpyrad (11%) collectively accounted for a further 37% of active ingredients applied to the insecticide/acaricide-treated area.

Growth regulators were applied to an estimated 990 spray hectares of top fruit crops. Paclobutrazol was applied to 60% of the area treated with growth regulators, accounting for 69% of the quantity of growth regulators applied. The growth regulator active ingredient prohexadione-calcium was recorded used for the first time on top fruit crops in Northern Ireland in 2006, applied to 33% of the treated area and accounting for 30% of the quantity of growth regulators used. Gibberellins were the only other active ingredient recorded in this group.

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

## **PESTICIDE USAGE ON INDIVIDUAL CROPS**

### **BRAMLEY APPLE CROPS: FRUITING (TABLE 13)**

The area of fruiting Bramley crops grown increased by 6% since 2002 to 1,341 hectares.

### Fungicides

The area of this crop treated with fungicides was similar to that recorded in 2002, representing an estimated 86% of the area of fruiting Bramley receiving pesticide application and accounting for 93% of the weight of pesticides applied (Table 7 and 6). An estimated 89% of all fungicide applications were to control apple scab (*V. inaequalis*). Control of canker (*Nectria galligena*) accounted for only 5% 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.

Dithianon, applied to 5,225 spray hectares, marginally replaced mancozeb as the most frequently used fungicide, accounting for 18% of the weight of fungicides applied. Mancozeb, applied to 22% of the fungicide-treated area, accounted for over half (52%) of the quantity of fungicides used on fruiting Bramley crops.

### Herbicides

Herbicides applied to Bramley fruiting crops accounted for 91% of the total herbicide-treated area of all fruit crops (Table 7), but only 3% of the pesticide-treated area of this crop type. 'General weed control', was the principal reason given for usage. In common with 2002, glyphosate was the most commonly applied herbicide, accounting for 54% and 57% of the herbicide-treated area and weight of herbicide active ingredients applied, respectively.

### Insecticide/Acaricides

Insecticides and acaricides applied for 'general insect control' or to control 'aphids', accounted for 36% and 33% of the insecticide/acaricide-treated area, respectively. A further 15% of active ingredients were applied to the treated area to control fruit-tree red spider mite (*Panonychus ulmi*).

Organophosphates accounted for 52% and 92% of the total area treated and quantity of insecticide/acaricide active ingredients, respectively. Pyrethroids were applied to 26% of the insecticide/acaricide-treated area but accounted for only 2% of the quantity used. Similar to 2002, the organophosphate chlorpyrifos was the principal insecticide/acaricide active ingredient recorded.

### Growth Regulators

Growth regulators were applied to 912 spray hectares of Bramley fruiting crops accounting for an estimated 92% of the total growth regulator-treated area (Table 7). Paclobutrazol was the active ingredient most frequently used, applied to 59% of the growth regulator-treated area and accounting for 67% of the quantity used. Prohexadione-calcium and gibberellins were applied to 35% and 6% of the area treated with growth regulators, respectively.

### **Other Products**

An estimated 8.5 tonnes of other products were applied to 4,346 spray hectares of this crop type (Table 18).

Calcium-based products applied as a 'storage aid', principally to prevent the nutritional disorder 'Bitter pit', were applied to 46% of the treated area of other products used on Bramley fruiting orchards. Approximately 4% of other products applied to the treated area were used to control apple scab (*V. inaequalis*). Seaweed extract products were applied to 29% of the area treated with other products for this crop.

### **BRAMLEY APPLE CROPS: NON-FRUITING (Table 14)**

The area of young Bramley orchards grown (5 years and under) decreased from 197 hectares in 2002 to 74 hectares in 2006. This was probably due to orchards coming into production recently, with limited new planting occurring.

### **Fungicides**

Fungicides were applied to 86% of the pesticide-treated area (88% of the weight of pesticides applied) (Tables 6 and 7). Apple scab (*V. inaequalis*) control accounted for 87% of the fungicide-treated area. Similar to Bramley fruiting crops, dithianon and mancozeb were the most extensively used fungicides, accounting for 22% and 21% of the fungicide-treated area (18% and 47% of the weight of fungicide) applied to this crop, respectively.

### **Herbicides**

Herbicides were applied to 4% of the pesticide-treated area (Table 7) of non-fruiting Bramley crops, for 'general weed control'. Glyphosate was the most frequently used herbicide, accounting for 47% and 49% of the area and quantity of herbicide applied, respectively.

### **Insecticide/Acaricides**

The organophosphate chlorpyrifos was the insecticide/acaricide active ingredient most commonly used, accounting for 58% of the insecticide/acaricide-treated area and 95% of the quantity used on Bramley non-fruiting crops. The principal reasons cited by growers for use of insecticides were control of 'aphids' (49%) and general insect control (38%).

### **Growth Regulators**

Of the three growth regulators recorded used on this crop paclobutrazol was the growth regulator active ingredient most frequently applied, accounting for 74% of growth regulator applications.

### **DESSERT APPLE CROPS: FRUITING (Table 15)**

The area of fruiting dessert apple crops recorded increased by 5% to 21 hectares between 2002 and 2006.

### **Fungicides**

Of the pesticide applications to fruiting dessert apple orchards, fungicides accounted for 91% of the weight of pesticide applied and 81% of the treated area (Tables 6 & 7). An estimated 83% of all fungicide applications were used to control apple scab (*V. inaequalis*) with a further 7% of applications to control canker (*N. galligena*). The active ingredients mancozeb (22%) and dithianon (19%) collectively accounted for 41% of the fungicide-treated area and 64% of the quantity of fungicides used.

### **Herbicides**

Herbicides accounted for 4% of both the weight of pesticide used and the area treated of this crop (Tables 6 & 7). 'General weed control' was the only reason recorded for herbicide usage on this crop. Glyphosate accounted for approximately 44% of the herbicide-treated area and 50% of the quantity of herbicide applied.

### **Insecticide/Acaricides**

Insecticide/acaricides, applied to 31 spray hectares of fruiting dessert orchards, accounted for 3% of the quantity of pesticide applied and 8% of the pesticide-treated area (Table 6 & 7). The active ingredients chlorpyrifos (35%) and cypermethrin (35%) collectively accounted for 70% of the insecticide/acaricide-treated area and 75% of the quantity used. An estimated 52% of all insecticide/acaricide applications were to control 'aphids' and 13% of applications were to control 'fruit-tree red spider mite' (*P. ulmi*).

### **Growth Regulators**

The only two growth regulators applied to 31 spray hectares of fruiting dessert orchards were paclobutrazol (81%) and prohexadione-calcium (19%).

### **DESSERT APPLE CROPS: NON-FRUITING (Table 16)**

The area of non-fruiting dessert apples orchards increased from the 4 hectares recorded in 2002 to 14 hectares in 2006.

### **Fungicides**

Approximately 95% of the spray area was treated with fungicides (99% of the weight of pesticides applied) (Tables 7 and 6). An estimated 87% of all applications to the fungicide-treated area were to control 'apple scab' (*V. inaequalis*), a further 13% of applications were to control canker (*N. galligena*). Mancozeb (27%) and fenbuconazole (23%) collectively accounted for 50% of applications to the fungicide-treated area and 77% of the quantity used.

### **Herbicides**

Only two spray hectares of orchards in total were treated with herbicides. The active ingredients mecoprop-P and paraquat were applied equally across the treated area, for 'general weed control'.

### ***Insecticide/Acaricides***

Insecticide/acaricides accounted for less than 1% of the weight of pesticide applied and 3% of the total pesticide-treated area of this crop (Tables 6 & 7). Four insecticide/acaricide active ingredients were recorded used on this crop, applied equally to the spray area, principally to control 'aphids'.

### ***Growth Regulators***

Paclobutrazol was the only growth regulator active ingredient recorded and was used on four spray hectares of non-fruiting dessert orchards.

### **OTHER TOP FRUIT CROPS (Table 17)**

An estimated five hectares of other crops, comprising cider apples (2.5ha), plums (0.9ha), pears (0.5ha) and miscellaneous varieties of cooking apples (1.4ha) were grown in this survey period.

### ***Fungicides***

Fungicides accounted for 98% of the quantity of pesticides used on these crops and were applied to 96% of the pesticide-treated area (Tables 6 & 7). Mancozeb and fenbuconazole were the active ingredients most commonly used, applied to 35% and 24% of the fungicide-treated area respectively. Scab (*V. inaequalis*) was the reason given for 94% of all fungicide applications.

### ***Herbicides***

The herbicide formulation dicamba/MCPA/mecoprop-P and the active ingredient glyphosate were the only herbicides applied to other top fruit crops. There was a combined herbicide-treated area of <0.5 hectares, and <0.5kg was applied.

### ***Insecticide/acaricides***

Insecticide/acaricide applications accounted for 3% (Table 7) of the treated area. Chlorpyrifos, cypermethrin and tebufenpyrad were the only active ingredients used. They were applied to two spray hectares in total of these crops, principally to control aphids.

### ***Growth Regulators***

Prohexadione-calcium was the only growth regulator active ingredient recorded, applied to one spray hectare of plums and pears.

## **COMPARISON WITH PREVIOUS SURVEYS**

Comparative information on pesticide usage on top fruit crops grown in Northern Ireland in 1992, 1996, 2002 and 2006 is included in Tables 19 and 20.

### *Area of top fruit crops grown (Table 19)*

Overall, the area of top fruit grown in Northern Ireland in 2006 decreased marginally (2%) compared with that recorded in 2002. The Bramley fruiting area increased by 76 hectares (6%), while the non-fruiting area reduced by 62% when compared with 2002. However, the movement of orchards from non-fruiting to fruiting would account for both the increase in the fruiting area and some of the decrease in the non-fruiting area. The data indicates a significant increase in the area of dessert apples grown, particularly the non-fruiting area, suggesting new planting is occurring. As in previous surveys 97% of the total top fruit area in Northern Ireland was used for Bramley apple production.

### *Comparison of pesticide usage (Table 20)*

Overall, there was a 6% increase in the total area of pesticide application to top fruit crops between 2002 and 2006. However, the quantity of pesticides applied in 2006 decreased by 24% when compared to 2002. This is probably due to fungicide usage, which had a similar increase in treated area and decrease in quantity applied. The area treated with herbicides decreased by 10%, though there was only a marginal (1%) decrease in weight of herbicides applied. Insecticide/acaricide applications decreased both in area treated and weight of active ingredients used, by 3% and 26% respectively. Applications of carbamate active ingredients have continually increased since 1996; conversely, the use of organophosphate active ingredients has progressively decreased during the same period. The weight of pyrethroids used in 2006 remained similar to 2002 but the area treated increased by 24%. The biopesticide spinosad applied to control 'codling moth' was recorded for the first time in 2006.

An estimated 990 spray hectares were treated with growth regulators in 2006, the highest recorded over the four survey years. The quantity of growth regulators increased by 18% when compared with 2002.

### *Storage of Top Fruit Crops (Tables 21-24)*

An estimated 13,624 tonnes of Bramley apples were stored after the 2006 harvest, of which 97% received a post-harvest treatment. Approximately 0.5 tonnes of pesticides were applied to 13,216 tonnes of apples, stored in bulk bins in controlled atmosphere stores.

Fungicides, antioxidants and calcium-based products (2%) were the only treatments recorded in use.

Fungicide applications accounted for 30% of stored apple crop treatments and 39% of the total quantity of active ingredients used. Metalaxyl-M was the most frequently used fungicide, accounting for 70% of the tonnage of apples treated with fungicides, but only 2% of the quantity of fungicides used. Conversely, captan accounted for 94% of the weight of pesticides used but only 8% of the tonnage of apples treated with fungicide.

The antioxidant diphenylamine, applied solely to control 'scald', was the most frequently used active ingredient, accounting for 67% of the treated tonnage and 59% of the quantity of all treatments applied.

An estimated 30% of all treatments applied to stored apples was to prevent 'storage rots'. The perceived reason given for all calcium applications was as a preventative against the nutritional disorder 'Bitter pit'.

A total of six active ingredients and one trace element were recorded in use on stored apples. The active ingredients recorded in use during apple storage in 2006 are shown in Table 22.

#### **Comparison with previous surveys of top fruit storage (Table 24)**

There was a 41% increase in the quantity of apples stored in 2006 compared with 2002 and this is also reflected in the data (Figure 4).

The use of antioxidants increased in relation to the increased quantity of apples stored and the application rate was similar to previous years. Diphenylamine was the only antioxidant used on stored apples.

Overall, fungicide usage was similar to 2002. However, the weight used of the active ingredient carbendazim, the most extensively used fungicide in 1996 and 2002, reduced significantly in 2006 and appears to be becoming replaced by the fungicide metalaxyl-M, which was recorded for the first time on stored apples in Northern Ireland in 2006.

## **ACKNOWLEDGEMENTS**

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## **REFERENCES**

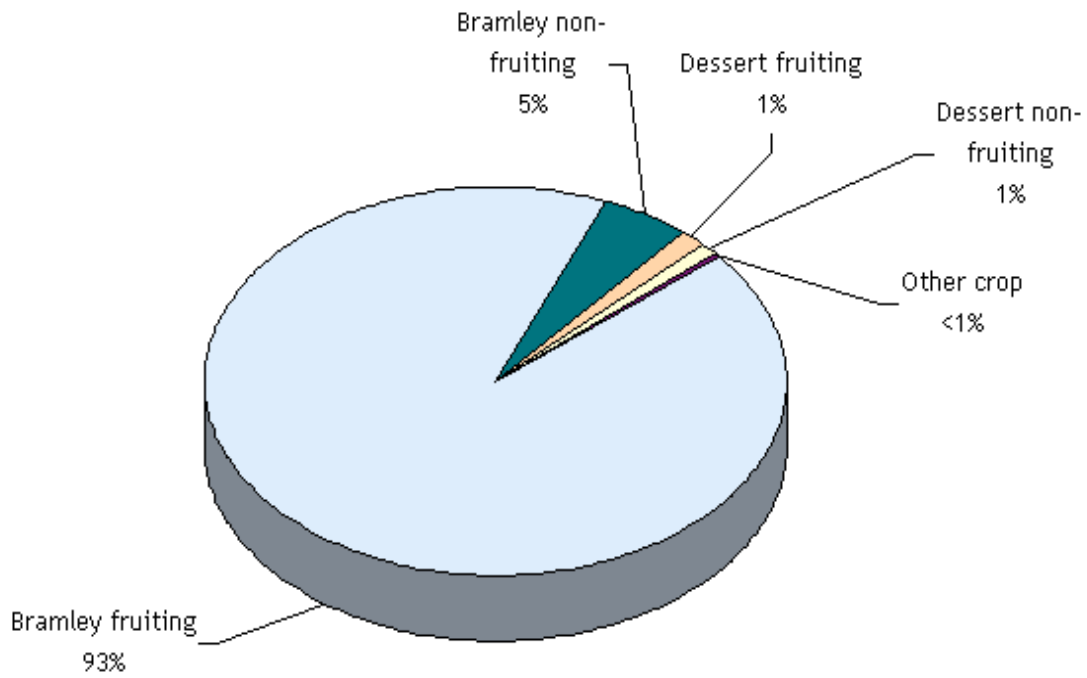
Kidd, S.L.B., Jess, S., McCallion, T. (1994) Top Fruit Crops 1992. *Pesticide Usage Survey Report 118* Belfast: HMSO.

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

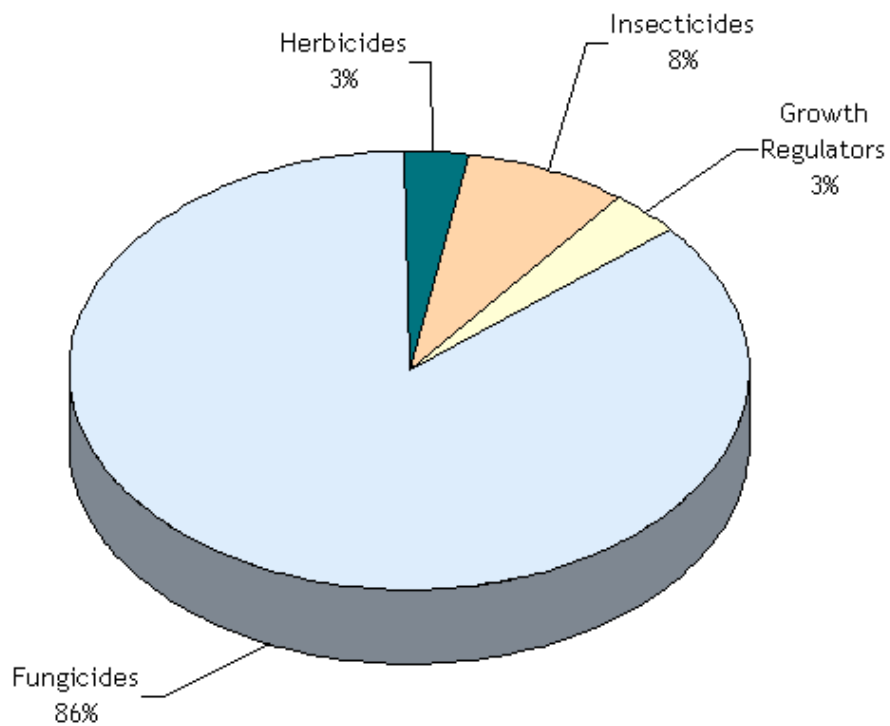
Kearns, C.A., Jess, S., Matthews, D., McCallion, T. (2004) Top Fruit Crops 2002. *Pesticide Usage Survey Report 147* Belfast: DARDNI



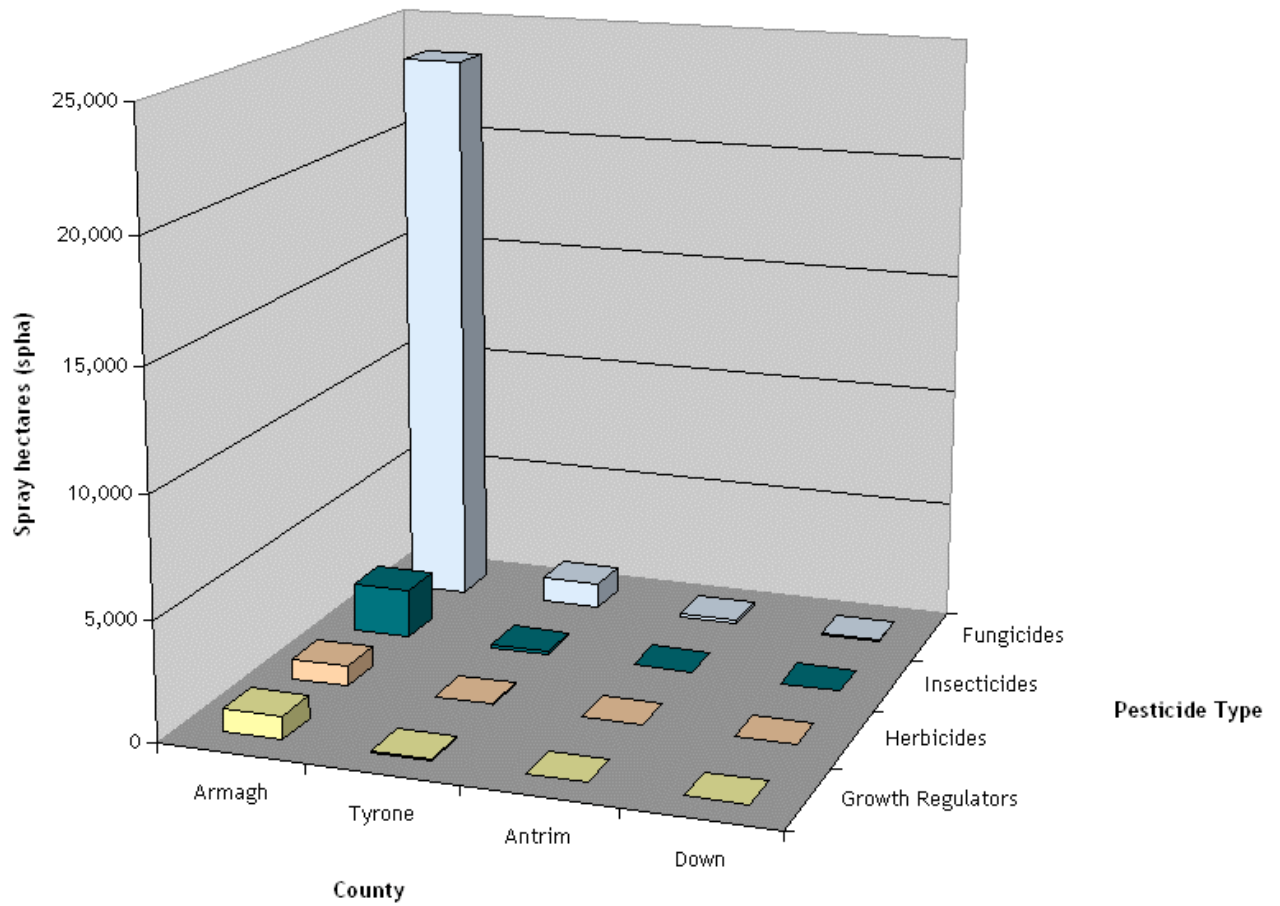
**Figure 1:** The utilisation of top fruit production area in Northern Ireland, 2006.



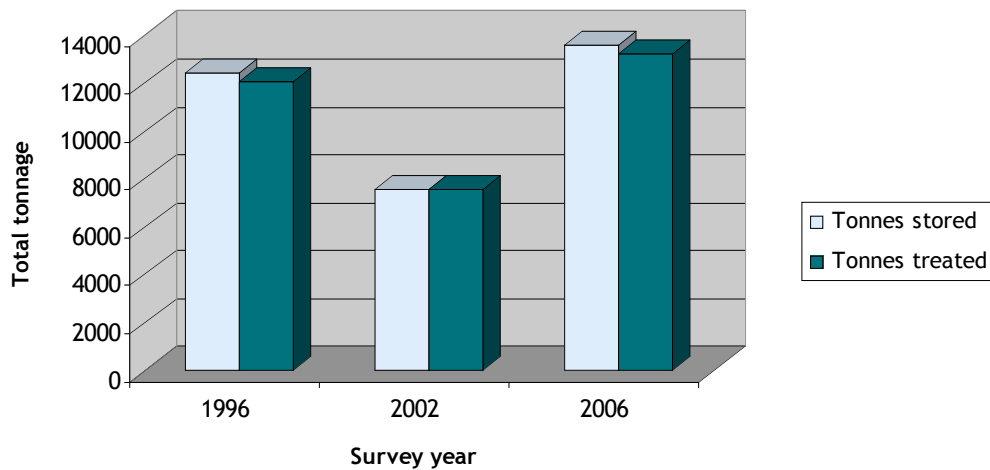
**Figure 2:** The proportional area (spray hectares) of top fruit crops treated with each pesticide type in Northern Ireland, 2006.



**Figure 3:** The area of top fruit crops treated (spray hectares) with each pesticide type in the county regions of Northern Ireland, 2006.



**Figure 4:** Bramley apples stored under controlled atmosphere in Northern Ireland 1996-2006 (tonnage stored and treated).



**Table 1:** The total number of farms in each size group with top fruit crops in 2006 and the number of holdings surveyed from each size group.

County	Size Group (hectares)										Total	
	<2		2 < 4		4 < 6		6 < 9		9+		A	B
	A	B	A	B	A	B	A	B	A	B	A	B
Antrim	8	.	.	.	.	.	1	1	1	.	10	1
Armagh	75	5	49	12	29	12	17	13	46	39	216	81
Down	10	2	.	.	1	.	.	.	.	.	11	2
Fermanagh	6	.	.	.	.	.	.	.	1	.	7	.
Londonderry	5	.	.	.	.	.	.	.	.	.	5	.
Tyrone	6	.	.	.	2	.	.	.	3	2	11	2
<b>Northern Ireland</b>	<b>110</b>	<b>7</b>	<b>49</b>	<b>12</b>	<b>32</b>	<b>12</b>	<b>18</b>	<b>14</b>	<b>51</b>	<b>41</b>	<b>260</b>	<b>86</b>

**Legend**

A = Total number of holdings in strata

B = Number of holdings surveyed

**Table 2:** Total number and area of crops surveyed (hectares) and the proportion (%) of the total area of top fruit crops surveyed in Northern Ireland, 2006.

Crop type	Number of Crops Surveyed	Surveyed area (ha)	Proportion of crop surveyed (%)
Bramley fruiting	85	874.5	65
Bramley non-fruiting	27	52.0	70
Dessert fruiting	11	13.9	66
Dessert non-fruiting	3	11.2	80
Other crop	6	3.2	64

**Table 3:** Estimated area (hectares) of top fruit crops grown regionally in Northern Ireland, 2006.

Crop type	County				Northern Ireland
	Antrim	Armagh	Down	Tyrone	
Bramley fruiting	8	1,295	4	33	1,341
Bramley non-fruiting	.	70	.	4	74
Dessert fruiting	.	17	1	2	21
Dessert non-fruiting	.	12	.	2	14
Other crop	.	4	1	.	5
<b>All Crops</b>	<b>8</b>	<b>1,398</b>	<b>7</b>	<b>42</b>	<b>1,455</b>

**Table 4:** Estimated area (spray hectares) of top fruit crops treated regionally in Northern Ireland, 2006 with pesticide type.

County	Pesticide Type				Northern Ireland
	Fungicides	Herbicides	Insecticides	Growth Regulators	
Antrim	151	3	17	.	171
Armagh	23,570	849	2,052	940	27,412
Down	51	.	4	.	55
Tyrone	1,064	47	116	50	1,277
<b>All pesticides</b>	<b>24,836</b>	<b>899</b>	<b>2,189</b>	<b>990</b>	<b>28,914</b>

**Table 5:** Estimated quantity (kilograms) of pesticide active ingredients applied to top fruit crops regionally in Northern Ireland in 2006, categorised by pesticide type.

County	Pesticide Type				Northern Ireland
	Fungicides	Herbicides	Insecticides	Growth Regulators	
Antrim	114	4	1	.	119
Armagh	19,393	833	837	120	21,183
Down	21	.	<0.5	.	22
Tyrone	604	38	40	6	688
<b>All pesticides</b>	<b>20,132</b>	<b>875</b>	<b>878</b>	<b>126</b>	<b>22,011</b>

**Table 6:** Estimated quantity (kilograms) of pesticide active ingredients applied to top fruit crops in Northern Ireland 2006 categorised by crop and pesticide type.

Crop Type	Pesticide Type				Total quantity (kg)
	Fungicides	Herbicides	Insecticides	Growth Regulators	
Bramley fruiting	18,829	794	826	115	20,565
Bramley non-fruiting	839	67	43	6	955
Dessert fruiting	256	12	8	4	281
Dessert non-fruiting	155	1	1	1	157
Other crop	53	<0.5	1	<0.5	54
<b>All crops</b>	<b>20,132</b>	<b>875</b>	<b>878</b>	<b>126</b>	<b>22,011</b>

**Table 7:** The total area (spray hectares) and the basic area (hectares), of top fruit crops in Northern Ireland 2006 treated with each pesticide type.

Crop Type	Pesticide Type									
	Fungicides		Herbicides		Insecticides		Growth regulators		All pesticides	
	(sp ha)	(ha)	(sp ha)	(ha)	(sp ha)	(ha)	(sp ha)	(ha)	(sp ha)	(ha)
Bramley fruiting	22,728	(1,298)	817	(379)	2,026	(1,126)	912	(493)	26,483	(1,298)
Bramley non-fruiting	1,452	(74)	64	(28)	121	(65)	42	(28)	1,679	(72)
Dessert fruiting	329	(19)	16	(6)	31	(19)	31	(15)	407	(19)
Dessert non-fruiting	261	(14)	2	(1)	8	(4)	4	(2)	276	(14)
Other crop	66	(4)	<0.5	.	2	(1)	1	(1)	69	(4)
<b>All Crops</b>	<b>24,836</b>	<b>(1,409)</b>	<b>899</b>	<b>(413)</b>	<b>2,189</b>	<b>(1,216)</b>	<b>990</b>	<b>(538)</b>	<b>28,914</b>	<b>(1,408)</b>

**Table 8:** The mean number of spray applications of pesticides applied to top fruit crops in Northern Ireland, 2006.

Crop Type	Pesticide Type							
	Fungicides		Herbicides & desiccants		Insecticides		Growth Regulators	
	A	B	A	B	A	B	A	B
Bramley fruiting	17.5	11.3	2.2	1.3	1.8	1.8	1.9	1.9
Bramley non-fruiting	19.7	11.6	2.3	1.5	1.9	1.8	1.5	1.5
Dessert fruiting	17.0	12.5	2.8	1.6	1.6	1.6	2.2	2.2
Dessert non-fruiting	18.3	9.9	3.0	3.0	2.0	2.0	2.0	2.0
Other crop	17.4	9.1	2.0	1.0	1.6	1.6	1.0	1.0

A = Application of treatment type

B = Spray applications

**Table 9:** Estimated area (spray hectares) of top fruit crops treated with pesticide formulations in Northern Ireland 2006.

Pesticide Type & Information	Crop type					Total area (sp ha)
	Bramley apples fruiting	Bramley apples non-fruiting	Dessert apples fruiting	Dessert apples non-fruiting	Other crops	
<b>Fungicides</b>						
Boscalid/pyraclostrobin	186	2	6	2	<0.5	196
Captan	1,686	169	26	6	1	1,888
Captan/penconazole	368	8	.	.	.	376
Carbendazim	1,244	113	36	23	2	1,417
Copper oxychloride	346	13	5	.	<0.5	364
Difenoconazole	58	.	.	.	.	58
Dithianon	5,225	321	64	33	9	5,651
Dodine	1,361	34	23	31	7	1,456
Fenbuconazole	2,868	132	42	61	16	3,119
Kresoxim-methyl	271	13	5	.	1	289
Mancozeb	5,004	305	71	71	23	5,473
Myclobutanil	757	72	.	2	1	832
Penconazole	680	74	4	10	1	769
Pyrimethanil	2,081	157	35	12	4	2,290
Sulphur	17	1	1	.	.	18
Tolyfluanid	578	39	11	10	3	640
<b>All fungicides</b>	<b>22,728</b>	<b>1,452</b>	<b>329</b>	<b>261</b>	<b>66</b>	<b>24,836</b>
<b>Herbicides</b>						
Amitrole	18	1	.	.	.	18
Dicamba/MCPA/mecoprop-P	270	22	6	.	<0.5	298
Dicamba/mecoprop-P	8	.	.	.	.	8
Diuron	9	2	1	.	.	12
Glyphosate	444	30	7	.	<0.5	481
MCPA	29	.	.	.	.	29
Mecoprop-P	18	3	.	1	.	22
Paraquat	17	5	.	1	.	23
Thifensulfuron-methyl/tribenuron-Methyl	2	.	1	.	.	3
Triclopyr	2	2	1	.	.	5
<b>All herbicides</b>	<b>817</b>	<b>64</b>	<b>16</b>	<b>2</b>	<b>&lt;0.5</b>	<b>899</b>

**Table 9 (cont):** Estimated area (spray hectares) of top fruit crops treated with pesticide formulations in Northern Ireland 2006.

Pesticide Type & Information	Crop type					Total area (sp ha)
	Bramley apples fruiting	Bramley apples non-fruiting	Dessert apples fruiting	Dessert apples non-fruiting	Other crops	
<b>Insecticides</b>						
Bifenthrin	3	.	.	.	.	3
Chlorpyrifos	1,031	70	11	2	1	1,115
Clofentezine	8	.	1	.	.	9
Cypermethrin	511	43	11	2	1	567
Deltamethrin	19	4	.	2	.	25
Diflubenzuron	13	.	.	.	.	13
Dimethoate	9	.	.	.	.	9
Fenoxycarb	29	.	.	.	.	29
Fenpyroximate	27	.	.	.	.	27
Malathion	4	.	.	.	.	4
Pirimicarb	68	.	5	2	.	76
Spinosad	13	.	.	.	.	13
Tebufenpyrad	244	5	3	.	1	252
Thiacloprid	47	.	.	.	.	47
<b>All insecticides</b>	<b>2,026</b>	<b>121</b>	<b>31</b>	<b>8</b>	<b>2</b>	<b>2,189</b>
<b>Growth regulators</b>						
Gibberellins	59	8	.	.	.	66
Paclobutrazol	535	31	25	4	.	596
Prohexadione-calcium	318	3	6	.	1	328
<b>All growth regulators</b>	<b>912</b>	<b>42</b>	<b>31</b>	<b>4</b>	<b>1</b>	<b>990</b>
<b>All pesticides</b>	<b>26,483</b>	<b>1,679</b>	<b>407</b>	<b>276</b>	<b>69</b>	<b>28,914</b>

**Table 10:** Estimated quantities (kilograms) of pesticide active ingredients applied to top fruit crops in Northern Ireland 2006.

Pesticide Type & Information	Crop type					Total Quantity (Kg)
	Bramley apples fruiting	Bramley apples non-fruiting	Dessert apples fruiting	Dessert apples non-fruiting	Other crops	
<b>Fungicides</b>						
Boscalid/pyraclostrobin	65	<0.5	1	<0.5	<0.5	67
Captan	1,695	126	21	4	1	1,847
Captan/penconazole	125	3	.	.	.	128
Carbendazim	737	46	17	6	1	807
Copper oxychloride	541	24	14	.	<0.5	579
Difenoconazole	10	.	.	.	.	10
Dithianon	3,368	151	33	13	5	3,570
Dodine	1,001	17	14	9	2	1,043
Fenbuconazole	137	4	2	3	1	147
Kresoxim-methyl	37	1	<0.5	.	<0.5	38
Mancozeb	9,748	396	131	116	41	10,431
Myclobutanil	43	4	.	<0.5	<0.5	47
Penconazole	34	3	<0.5	<0.5	<0.5	38
Pyrimethanil	755	38	9	2	1	806
Sulphur	82	1	2	.	.	85
Tolyfluanid	449	24	11	3	1	487
<b>All fungicides</b>	<b>18,829</b>	<b>839</b>	<b>256</b>	<b>155</b>	<b>53</b>	<b>20,132</b>
<b>Herbicides</b>						
Amitrole	20	1	.	.	.	21
Dicamba/MCPA/mecoprop-P	255	18	6	.	<0.5	278
Dicamba/mecoprop-P	4	.	.	.	.	4
Diuron	11	6	<0.5	.	.	18
Glyphosate	452	33	6	.	<0.5	491
MCPA	19	.	.	.	.	19
Mecoprop-P	21	4	.	<0.5	.	26
Paraquat	12	4	.	<0.5	.	16
Thifensulfuron-methyl/tribenuron-methyl	<0.5	.	<0.5	.	.	<0.5
Triclopyr	<0.5	2	<0.5	.	.	2
<b>All herbicides</b>	<b>794</b>	<b>67</b>	<b>12</b>	<b>1</b>	<b>&lt;0.5</b>	<b>875</b>



**Table 10 (cont):** Estimated quantities (kilograms) of pesticide active ingredients applied to top fruit crops in Northern Ireland 2006.

Pesticide Type & Information	Crop type					Total Quantity (Kg)
	Bramley apples fruiting	Bramley apples non-fruiting	Dessert apples fruiting	Dessert apples non-fruiting	Other crops	
<b>Insecticides</b>						
Bifenthrin	<0.5	.	.	.	.	<0.5
Chlorpyrifos	760	41	6	<0.5	1	808
Clofentezine	2	.	<0.5	.	.	2
Cypermethrin	16	1	<0.5	<0.5	<0.5	17
Deltamethrin	<0.5	<0.5	.	<0.5	.	1
Diflubenzuron	1	.	.	.	.	1
Dimethoate	3	.	.	.	.	3
Fenoxycarb	4	.	.	.	.	4
Fenpyroximate	1	.	.	.	.	1
Malathion	<0.5	.	.	.	.	<0.5
Pirimicarb	12	.	1	<0.5	.	13
Spinosad	2	.	.	.	.	2
Tebufenpyrad	19	<0.5	<0.5	.	<0.5	19
Thiacloprid	6	.	.	.	.	6
<b>All insecticides</b>	<b>826</b>	<b>43</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>878</b>
<b>Growth Regulators</b>						
Gibberellins	<0.5	<0.5	.	.	.	<0.5
Paclobutrazol	77	5	4	1	.	87
Prohexadione-calcium	37	<0.5	<0.5	.	<0.5	38
<b>All growth regulators</b>	<b>115</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>&lt;0.5</b>	<b>126</b>
<b>All pesticides</b>	<b>20,565</b>	<b>955</b>	<b>281</b>	<b>157</b>	<b>54</b>	<b>22,011</b>

**Table 11:** The active ingredients most extensively used on top fruit crops in Northern Ireland 2006, prioritised by treated area (spray hectares).

	Active Ingredient	Treated Area (sp ha)
1.	Dithianon	5,651.1
2.	Mancozeb	5,473.4
3.	Fenbuconazole	3,118.6
4.	Pyrimethanil	2,289.6
5.	Captan	*2,263.7
6.	Dodine	1,456.1
7.	Carbendazim	1,417.1
8.	Penconazole	*1,144.6
9.	Chlorpyrifos	1,115.3
10.	Myclobutanil	831.7
11.	Tolyfluanid	639.9
12.	Pacllobutrazol	595.5
13.	Cypermethrin	567.4
14.	Glyphosate	481.2
15.	Copper oxychloride	364.2
16.	Mecoprop-p	*328
17.	Prohexadione-calcium	328
18.	MCPA	*327.5
19.	Dicamba	*306.4
20.	Kresoxim-methyl	289.3
21.	Tebufenpyrad	251.7
22.	Pyraclostrobin	*196.2
23.	Boscalid	*196.2
24.	Pirimicarb	75.6
25.	Gibberellins	66.3
26.	Difenoconazole	58.1
27.	Thiacloprid	46.6
28.	Fenoxycarb	28.7
29.	Fenpyroximate	27.3
30.	Deltamethrin	24.9
31.	Paraquat	23.3
32.	Amitrole	18.1
33.	Sulphur	18
34.	Diflubenzuron	13.3
35.	Spinosad	13.3
36.	Diuron	11.6
37.	Dimethoate	9
38.	Clofentezine	9
39.	Triclopyr	4.8
40.	Malathion	4.2
41.	Bifenthrin	2.7
42.	Thifensulfuron-methyl	2.6
43.	Tribenuron-methyl	2.6

\* 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 2006, prioritised by weight (kilograms).

	Active Ingredient	Quantity applied (kg)
1.	Mancozeb	10,431
2.	Dithianon	3,570.5
3.	Captan	*1967.9
4.	Dodine	1,043.2
5.	Chlorpyrifos	808.5
6.	Carbendazim	807.1
7.	Pyrimethanil	806.3
8.	Copper oxychloride	579.5
9.	Glyphosate	490.7
10.	Tolyfluanid	487.4
11.	MCPA	*203.9
12.	Fenbuconazole	146.8
13.	Mecoprop-p	*106.1
14.	Paclobutrazol	87.3
15.	Sulphur	85.3
16.	Myclobutanil	46.8
17.	Penconazole	*45.2
18.	Boscalid	*44.4
19.	Kresoxim-methyl	38.3
20.	Prohexadione-calcium	38.1
21.	Pyraclostrobin	*22.6
22.	Amitrole	20.9
23.	Tebufenpyrad	19.2
24.	Diuron	17.8
25.	Cypermethrin	17.2
26.	Dicamba	*16.9
27.	Paraquat	16.1
28.	Pirimicarb	13.1
29.	Difenoconazole	10
30.	Thiacloprid	6
31.	Fenoxycarb	4.3
32.	Dimethoate	2.5
33.	Triclopyr	2.3
34.	Clofentezine	2.2
35.	Spinosad	1.6
36.	Fenpyroximate	1.4
37.	Diflubenzuron	1.1
38.	Deltamethrin	0.6
39.	Gibberellins	0.3
40.	Thifensulfuron-methyl	0.3
41.	Malathion	0.2
42.	Bifenthrin	0.2
43.	Tribenuron-methyl	0.1

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

**Table 13:** Bramley apples (fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities used (kilograms) and reasons for use.

Pesticide type and formulation	Apple Scab	Canker	Clean Trees	Disease Prevention	Eye Rot	Powdery Mildew & Scab	Storage Aid	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Fungicide</b>										
Boscalid/pyraclostrobin	.	40	.	70	8	60	7	186	86	65
Captan	1,686	.	.	.	.	.	.	1,686	742	1,695
Captan/penconazole	368	.	.	.	.	.	.	368	80	125
Carbendazim	121	814	.	286	.	.	23	1,244	426	737
Copper oxychloride	.	65	261	20	.	.	.	346	252	541
Difenoconazole	33	.	.	25	.	.	.	58	49	10
Dithianon	5,225	.	.	.	.	.	.	5,225	1,154	3,368
Dodine	1,313	.	.	48	.	.	.	1,361	644	1,001
Fenbuconazole	2,779	.	.	88	.	.	.	2,868	725	137
Kresoxim-methyl	271	.	.	.	.	.	.	271	152	37
Mancozeb	4,970	.	.	34	.	.	.	5,004	976	9,748
Myclobutanil	694	.	.	49	.	14	.	757	400	43
Penconazole	618	.	.	.	.	62	.	680	262	34
Pyrimethanil	2,081	.	.	.	.	.	.	2,081	792	755
Sulphur	.	.	.	17	.	.	.	17	17	82
Tolyfluanid	106	181	.	228	23	.	39	578	320	449
<b>All fungicides</b>	<b>20,263</b>	<b>1,100</b>	<b>261</b>	<b>866</b>	<b>32</b>	<b>137</b>	<b>69</b>	<b>22,728</b>	<b>*1,298</b>	<b>18,829</b>

\* 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 (fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities used (kilograms) and reasons for use.**

Pesticide Type and formulation	General weed control	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Herbicides and Desiccants</b>				
Amitrole	18	18	18	20
Dicamba/MCPA/mecoprop-P	270	270	211	255
Dicamba/mecoprop-P	8	8	8	4
Diuron	9	9	9	11
Glyphosate	444	444	349	452
MCPA	29	29	18	19
Mecoprop-P	18	18	18	21
Paraquat	17	17	11	12
Thifensulfuron-methyl/tribenuron-methyl	2	2	1	<0.1
Triclopyr	2	2	2	<0.1
<b>All herbicides</b>	<b>817</b>	<b>817</b>	<b>*379</b>	<b>794</b>

Pesticide Type and formulation	Bud Improver	Growth Regulation	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Growth Regulators</b>					
Gibberellins	14	44	59	59	<0.1
Paclobutrazol	.	535	535	269	77
Prohexadione-calcium	.	318	318	192	37
<b>All growth regulators</b>	<b>14</b>	<b>897</b>	<b>912</b>	<b>*493</b>	<b>115</b>

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

**Table 13 (cont):** Bramley apples (fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities used (kilograms) and reasons for use.

Pesticide type and formulation	Aphids	Capsid	Caterpillar	Codling Moth	Earwig	Insect Control	Red Spider Mite	Sawfly	Tortrix Moth	Woolly Aphid	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Insecticides</b>													
Bifenthrin	.	.	.	.	.	.	3	.	.	.	3	3	.
Chlorpyrifos	240	47	51	.	.	541	31	14	106	.	1,031	737	760
Clofentezine	.	.	.	.	.	.	8	.	.	.	8	8	2
Cypermethrin	346	.	.	.	.	143	.	.	.	22	511	458	16
Deltamethrin	.	.	.	.	.	19	.	.	.	.	19	19	<0.1
Diflubenzuron	.	.	.	.	13	.	.	.	.	.	13	13	1
Dimethoate	.	.	.	.	.	9	.	.	.	.	9	9	3
Fenoxycarb	.	.	.	.	.	.	.	.	29	.	29	29	4
Fenpyroximate	.	.	.	.	.	.	27	.	.	.	27	27	1
Malathion	.	.	.	.	.	4	.	.	.	.	4	4	<0.1
Pirimicarb	53	.	.	.	.	15	.	.	.	.	68	60	12
Spinosad	.	.	.	13	.	.	.	.	.	.	13	13	2
Tebufenpyrad	.	.	.	.	.	.	244	.	.	.	244	244	19
Thiacloprid	31	.	.	.	.	.	.	.	.	15	47	47	6
<b>All insecticides</b>	<b>670</b>	<b>47</b>	<b>51</b>	<b>13</b>	<b>13</b>	<b>732</b>	<b>313</b>	<b>14</b>	<b>135</b>	<b>38</b>	<b>2,026</b>	<b>*1,126</b>	<b>826</b>

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

**Table 14: Bramley apples (non-fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities used (kilograms) and reasons for use.**

Pesticide type and formulation	Apple Scab	Canker	Clean Trees	Disease Prevention	Eye Rot	Powdery Mildew & Scab	Growth Regulation	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Fungicides</b>										
Boscalid/pyraclostrobin	.	.	.	.	2	.	.	2	2	<0.1
Captan	169	.	.	.	.	.	.	169	48	126
Captan/penconazole	8	.	.	.	.	.	.	8	2	3
Carbendazim	5	80	.	28	.	.	.	113	28	46
Copper oxychloride	.	1	13	.	.	.	.	13	13	24
Dithianon	321	.	.	.	.	.	.	321	60	151
Dodine	34	.	.	.	.	.	.	34	13	17
Fenbuconazole	109	.	.	23	.	.	.	132	33	4
Kresoxim-methyl	13	.	.	.	.	.	.	13	6	1
Mancozeb	304	.	.	1	.	.	.	305	62	396
Myclobutanil	70	.	.	1	.	1	.	72	28	4
Penconazole	74	.	.	.	.	.	.	74	16	3
Pyrimethanil	157	.	.	.	.	.	.	157	48	38
Sulphur	.	.	.	1	.	.	.	1	1	1
Tolyfluanid	.	10	.	26	2	.	.	39	25	24
<b>All fungicides</b>	<b>1,264</b>	<b>91</b>	<b>13</b>	<b>80</b>	<b>4</b>	<b>1</b>	<b>.</b>	<b>1,452</b>	<b>*74</b>	<b>839</b>
<b>Growth regulation</b>										
Gibberellins	.	.	.	.	.	.	8	8	8	<0.1
Pacllobutrazol	.	.	.	.	.	.	31	31	17	5
Prohexadione-calcium	.	.	.	.	.	.	3	3	3	<0.1
<b>All growth regulation</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>42</b>	<b>42</b>	<b>28</b>	<b>6</b>

\* 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 14 (cont): Bramley apples (non-fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities used (kilograms) and reasons for use.**

Pesticide type and formulation	General Weed Control	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Herbicides</b>				
Amitrole	1	1	1	1
Dicamba/MCPA/mecoprop-P	22	22	19	18
Diuron	2	2	2	6
Glyphosate	30	30	26	33
Mecoprop-P	3	3	3	4
Paraquat	5	5	3	4
Triclopyr	2	2	2	2
<b>All herbicides</b>	<b>64</b>	<b>64</b>	<b>*28</b>	<b>67</b>

Pesticide type and formulation	Aphids	Capsid	Insect Control	Red Spider Mite	Tortrix Moth	Woolly Aphid	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Insecticides</b>									
Chlorpyrifos	23	6	37	1	3	.	70	48	41
Cypermethrin	37	.	4	.	.	1	43	38	1
Deltamethrin	.	.	4	.	.	.	4	4	<0.1
Tebufenpyrad	.	.	.	5	.	.	5	5	<0.1
<b>All insecticides</b>	<b>60</b>	<b>6</b>	<b>46</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>121</b>	<b>*65</b>	<b>43</b>

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



**Table 15:** Dessert apples (fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities used (kilograms) and reasons for use.

Pesticide type and formulation	Apple Scab	Canker	Clean Trees	Disease Prevention	Eye Rot	Growth regulation	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Fungicides</b>									
Boscalid/pyraclostrobin	.	.	.	5	1	.	6	6	1
Captan	26	.	.	.	.	.	26	5	21
Carbendazim	4	19	.	12	.	.	36	8	17
Copper oxychloride	.	1	5	.	.	.	5	5	14
Dithianon	64	.	.	.	.	.	64	17	33
Dodine	23	.	.	.	.	.	23	11	14
Fenbuconazole	42	.	.	.	.	.	42	13	2
Kresoxim-methyl	5	.	.	.	.	.	5	3	<0.1
Mancozeb	70	.	.	1	.	.	71	17	131
Penconazole	4	.	.	.	.	.	4	2	<0.1
Pyrimethanil	35	.	.	.	.	.	35	10	9
Sulphur	.	.	.	1	.	.	1	1	2
Tolyfluanid	.	3	.	8	.	.	11	5	11
<b>All fungicides</b>	<b>274</b>	<b>23</b>	<b>5</b>	<b>27</b>	<b>1</b>	<b>.</b>	<b>329</b>	<b>*19</b>	<b>256</b>
<b>Growth regulation</b>									
Paclobutrazol	.	.	.	.	.	25	25	11	4
Prohexadione-calcium	.	.	.	.	.	6	6	4	<0.1
<b>All growth regulation</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>31</b>	<b>31</b>	<b>15</b>	<b>4</b>

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

**Table 15 (cont):** Dessert apples (fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities used (kilograms) and reasons for use.

Pesticide type and formulation	Aphids	Capsid	Insect Control	Red Spider Mite	General Weed Control	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Herbicides</b>								
Dicamba/MCPA/mecoprop-P	.	.	.	.	6	6	4	6
Diuron	.	.	.	.	1	1	1	<0.1
Glyphosate	.	.	.	.	7	7	4	6
Thifensulfuron-methyl/tribenuron-methyl	.	.	.	.	1	1	<0.1	<0.1
Triclopyr	.	.	.	.	1	1	1	<0.1
<b>All herbicides</b>	.	.	.	.	<b>16</b>	<b>16</b>	<b>*6</b>	<b>12</b>
<b>Insecticides</b>								
Chlorpyrifos	3	2	7	.	.	11	9	6
Clofentezine	.	.	.	1	.	1	1	<0.1
Cypermethrin	8	.	3	.	.	11	11	<0.1
Pirimicarb	5	.	.	.	.	5	5	1
Tebufenpyrad	.	.	.	3	.	3	3	<0.1
<b>All insecticides</b>	<b>16</b>	<b>2</b>	<b>9</b>	<b>4</b>	<b>.</b>	<b>31</b>	<b>*19</b>	<b>8</b>

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

**Table 16:** Dessert apples (Non-Fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities of pesticides used (kilograms) and reasons for use.

Pesticide type and formulation	Apple Scab	Canker	Disease Prevention	Growth Regulation	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Fungicides</b>							
Boscalid/pyraclostrobin	.	.	2	.	2	2	<0.1
Captan	6	.	.	.	6	2	4
Carbendazim	.	23	.	.	23	2	6
Dithianon	33	.	.	.	33	14	13
Dodine	31	.	.	.	31	14	9
Fenbuconazole	61	.	.	.	61	14	3
Mancozeb	71	.	.	.	71	14	116
Myclobutanil	2	.	.	.	2	2	<0.1
Penconazole	10	.	.	.	10	2	<0.1
Pyrimethanil	12	.	.	.	12	2	2
Tolyfluanid	.	10	.	.	10	10	3
<b>All fungicides</b>	<b>226</b>	<b>33</b>	<b>2</b>	<b>.</b>	<b>261</b>	<b>*14</b>	<b>155</b>
<b>Growth regulators</b>							
Pacllobutrazol	.	.	.	4	4	2	1
<b>All growth regulators</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>1</b>

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

**Table 16 (cont):** Dessert apples (Non-Fruiting): pesticide-treated area (spray hectares), basic area treated (hectares), quantities of pesticides used (kilograms) and reasons for use.

Pesticide type and formulation	Aphids	Insect Control	General weed control	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Herbicides</b>						
Mecoprop-P	.	.	1	1	1	<0.1
Paraquat	.	.	1	1	1	<0.1
<b>All herbicides</b>	<b>.</b>	<b>.</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>
<b>Insecticides</b>						
Chlorpyrifos	2	.	.	2	2	<0.1
Cypermethrin	2	.	.	2	2	<0.1
Deltamethrin	.	2	.	2	2	<0.1
Pirimicarb	2	.	.	2	2	<0.1
<b>All insecticides</b>	<b>6</b>	<b>2</b>	<b>.</b>	<b>8</b>	<b>*4</b>	<b>1</b>

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

**Table 17:** Other crops: pesticide-treated area (spray hectares), basic area treated (hectares), quantities of pesticide used (kilograms) and reasons for use.

Pesticide type and formulation	Apple Scab	Canker	Clean Trees	Eye Rot	Powdery Mildew & Scab	Growth Regulation	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Fungicides</b>									
Boscalid/pyraclostrobin	.	.	.	<0.1	.	.	<0.1	<0.1	<0.1
Captan	1	.	.	.	.	.	1	<0.1	1
Carbendazim	1	1	.	.	.	.	2	1	1
Copper oxychloride	.	.	<0.1	.	.	.	<0.1	<0.1	<0.1
Dithianon	9	.	.	.	.	.	9	4	5
Dodine	7	.	.	.	.	.	7	3	2
Fenbuconazole	16	.	.	.	.	.	16	3	1
Kresoxim-methyl	1	.	.	.	.	.	1	<0.1	<0.1
Mancozeb	23	.	.	.	.	.	23	4	41
Myclobutanil	.	.	.	.	1	.	1	1	<0.1
Penconazole	1	.	.	.	.	.	1	1	<0.1
Pyrimethanil	4	.	.	.	.	.	4	1	1
Tolyfluanid	.	3	.	.	.	.	3	3	1
<b>All fungicides</b>	<b>62</b>	<b>4</b>	<b>&lt;0.1</b>	<b>&lt;0.1</b>	<b>1</b>	<b>.</b>	<b>66</b>	<b>*4</b>	<b>53</b>
<b>Growth regulators</b>									
Prohexadione-calcium	.	.	.	.	.	1	1	1	<0.1
<b>All growth regulators</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>&lt;0.1</b>

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

**Table 17 (cont): Other crops: pesticide-treated area (spray hectares), basic area treated (hectares), quantities of pesticide used (kilograms) and reasons for use.**

Pesticide Type and formulation	Aphids	Insect Control	Red Spider Mite	Total Area Treated (sp ha)	Basic area treated (ha)	Total quantity applied (kg)
<b>Insecticides</b>						
Chlorpyrifos	1	<0.1	.	1	1	1
Cypermethrin	1	.	.	1	1	<0.1
Tebufenpyrad	.	.	1	1	1	<0.1
<b>All insecticides</b>	<b>1</b>	<b>&lt;0.1</b>	<b>1</b>	<b>2</b>	<b>*1</b>	<b>1</b>

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

**Table 18: All Crops: Estimated area treated (spray hectares) and quantity of other formulations applied (kilograms) to top fruit crops 2006.**

Formulation	Crop type										Total	
	Bramley apples fruiting		Bramley apples non-fruiting		Dessert apples fruiting		Dessert apples non-fruiting		Other crops		sp ha	kg
	sp ha	kg	sp ha	kg	sp ha	kg	sp ha	kg	sp ha	kg	sp ha	kg
Boron	212	54	10	3	.	.	.	.	1	0	222	57
Calcium	1,165	1,494	86	101	25	36	6	4	.	.	1,282	1,635
Calcium/nitrogen/phosphate	842	2,755	30	79	2	4	2	2	.	.	876	2,839
Copper sulphate	240	934	28	80	.	.	.	.	.	.	268	1,014
Nitrogen/phosphorus/potassium oxide	89	93	8	4	.	.	.	.	.	.	97	97
Phosphorus/calcium/zinc	114	110	.	.	.	.	.	.	.	.	114	110
Seaweed extract	1,249	2,513	52	90	15	23	16	15	2	3	1,335	2,645
Trace elements	97	184	13	20	3	4	4	3	0	1	117	211
Zinc	338	375	17	15	5	4	.	.	.	.	360	393
<b>All formulations</b>	<b>4,346</b>	<b>8,510</b>	<b>243</b>	<b>391</b>	<b>50</b>	<b>70</b>	<b>29</b>	<b>24</b>	<b>3</b>	<b>4</b>	<b>4,671</b>	<b>9,000</b>

**Table 19: Comparison of the area of apple crops grown (hectares) in Northern Ireland 1992-2006.**

Crop type	Survey Year				% change in area 2006/2002
	1992 (ha)	1996 (ha)	2002 (ha)	2006 (ha)	
<b>Bramley Apples</b>					
Bramley Apples (fruiting)	1,574	1,511	1,265	1,341	6%
Bramley Apples (non-fruiting)	158	189	197	74	-62%
<b>All Bramley Apples</b>	<b>1,732</b>	<b>1,701</b>	<b>1,462</b>	<b>1,415</b>	<b>-3%</b>
<b>Dessert Apples</b>					
Dessert Apples (fruiting)	57	13	20	21	5%
Dessert Apples (non-fruiting)	5	0.4	4	14	250%
<b>All Dessert Apples</b>	<b>62</b>	<b>13</b>	<b>24</b>	<b>35</b>	<b>46%</b>
<b>Total apple crops</b>	<b>1,794</b>	<b>1,714</b>	<b>1,486</b>	<b>1,450</b>	<b>-2%</b>

**Note:** Excludes other crops (eg. plums, pears, etc)

**Table 20:** Comparison of pesticide usage on top fruit crops in Northern Ireland 1992-2006, area treated (spray hectares) and the quantity applied (kilograms).

Pesticide type	Survey Year							
	1992		1996		2002		2006	
	Area (sp ha)	Quantity (Kg)	Area (sp ha)	Quantity (Kg)	Area (sp ha)	Quantity (Kg)	Area (sp ha)	Quantity (Kg)
<b>Fungicides</b>	20,272	13,549	21,620	20,672	23,473	26,756	24,836	20,132
<b>Herbicides</b>	761	865	1,190	1,652	1,000	881	899	875
<b>Insecticides &amp; acaricides</b>								
Carbamates	33	56	32	7	88	10	104	17
Organochlorines	153	101	30	19	.	.	.	.
Organophosphates	2,357	1,733	2,239	1,870	1,373	996	1,129	811
Pyrethroids	586	13	464	16	481	18	595	18
Acaricides	112	31	751	157	201	24	301	24
Biopesticides	.	.	.	.	.	.	13	2
Other insecticides	524	465	182	60	115	139	47	6
<b>All Insecticides &amp; acaricides</b>	<b>3,765</b>	<b>2,399</b>	<b>3,698</b>	<b>2,129</b>	<b>2,258</b>	<b>1,186</b>	<b>2,189</b>	<b>878</b>
<b>Growth regulators</b>	<b>134</b>	<b>69</b>	<b>713</b>	<b>137</b>	<b>610</b>	<b>107</b>	<b>990</b>	<b>126</b>
<b>Mixed activity a.i.'s</b>	<b>11</b>	<b>73</b>	<b>17</b>	<b>14</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>
<b>All pesticides</b>	<b>24,943</b>	<b>16,955</b>	<b>27,238</b>	<b>24,604</b>	<b>27,341</b>	<b>28,930</b>	<b>28,914</b>	<b>22,011</b>



**Table 21:** Estimated quantities of fruit treated (tonnes) of apples in storage, in Northern Ireland 2006, receiving treatment and the total weight of active ingredients applied (kg).

Pesticide formulation	Total quantity (t)	Total quantity applied (kg)
<b>Fungicides</b>		
Benomyl	332	2
Captan	477	195
Carbendazim	830	4
Metalaxyl-M	4,207	5
Thiophanate-methyl	129	1
<b>All fungicides</b>	<b>5,975</b>	<b>207</b>
<b>Antioxidant</b>		
Diphenylamine	13,216	307
<b>All antioxidants</b>	<b>13,216</b>	<b>307</b>
<b>Other products</b>		
Calcium	435	10
<b>All other products</b>	<b>435</b>	<b>10</b>
<b>All treatments</b>	<b>19,626</b>	<b>524</b>

**Table 22:** The active ingredients used in apple storage in Northern Ireland 2006, prioritised by weight (kilograms).

Active ingredient	Quantity used (kg)
Diphenylamine	307
Captan	195
Calcium	10
Metalaxyl-M	5
Carbendazim	4
Benomyl	2
Thiophanate-methyl	1

**Table 23:** Estimated quantities (treated tonnes) of Bramley fruiting apples in storage, in Northern Ireland 2006 receiving treatment and reason for use.

Active ingredient	Bitter pit	Scald	Storage rots	Total quantity applied (kg)
Benomyl	.	.	332	332
Calcium	435	.	.	435
Captan	.	.	477	477
Carbendazim	.	.	830	830
Diphenylamine	.	13,216	.	13,216
Metalaxyl-m	.	.	4,207	4,207
Thiophanate-methyl	.	.	129	129
<b>All treatments</b>	<b>435</b>	<b>13,216</b>	<b>5,975</b>	<b>19,626</b>

**Note:** Only Bramley fruiting apples were stored in Northern Ireland, 2006.

**Table 24:** Comparison of the estimated quantities of fruit treated (tonnes), receiving treatment and the total amount of active ingredients applied (kg) to Bramley apples in storage 1992-2006.

Pesticide formulation	Survey Year							
	1992		1996		2002		2006	
	Total quantity (t)	Total quantity applied (Kg)	Total quantity (t)	Total quantity applied (Kg)	Total quantity (t)	Total quantity applied (Kg)	Total quantity (t)	Total quantity applied (Kg)
<b>Antioxidants</b>								
Diphenylamine	2,154	71	10,496	611	7,778	195	13,216	307
Ethoxyquin	8,350	378	1,381	50	750	15	.	.
<b>All antioxidants</b>	<b>10,504</b>	<b>449</b>	<b>11,877</b>	<b>661</b>	<b>8,528</b>	<b>210</b>	<b>13,216</b>	<b>307</b>
<b>Fungicides</b>								
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
Thiophanate-methyl	436	5	1,146	40	.	.	129	1
Metalaxyl-M	.	.	.	.	.	.	4,207	5
<b>All fungicides</b>	<b>10,690</b>	<b>283</b>	<b>11,419</b>	<b>217</b>	<b>5,886</b>	<b>112</b>	<b>5,975</b>	<b>207</b>
<b>All treatments</b>	<b>21,194</b>	<b>732</b>	<b>23,296</b>	<b>878</b>	<b>14,414</b>	<b>322</b>	<b>19,191</b>	<b>514</b>
<i>Not treated</i>	<i>2,322</i>	<i>.</i>	<i>384</i>	<i>.</i>	<i>17</i>	<i>.</i>	<i>408</i>	<i>.</i>

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
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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
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