

PESTICIDE USAGE IN NORTHERN IRELAND  
SURVEY REPORT 240

## **NORTHERN IRELAND SOFT FRUIT CROPS 2010**



Agriculture, Fishing and Forestry

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# PESTICIDE USAGE SURVEY REPORT 240

## NORTHERN IRELAND SOFT FRUIT CROPS 2010

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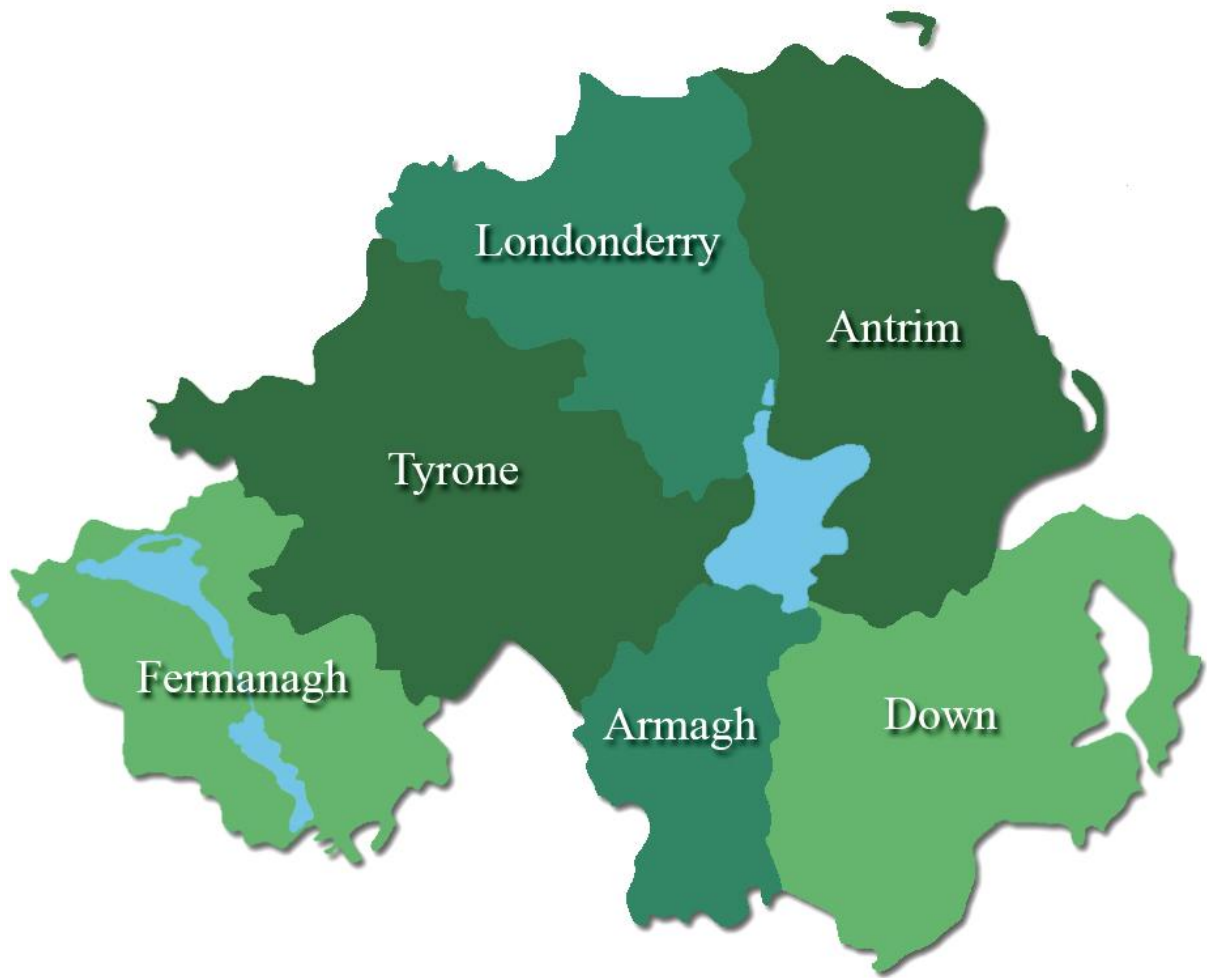
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## The County Regions of Northern Ireland



## SUMMARY

This report presents information from a survey of pesticide usage practices on soft fruit crops in Northern Ireland in 2010. It is the fourth pesticide survey to be conducted on soft fruit crops in the region. Data was collected from 27 growers representing 84% of all soft fruit holdings in Northern Ireland. No soft fruit crops were grown in County Fermanagh during this survey period. The data have been raised to give estimates of regional pesticide usage.

Compared with the previous survey carried out in 2006, the total area of soft fruit crops has decreased by 37% to an estimated 17 hectares, with the quantity of pesticide used decreasing by 69%. The area treated with pesticides (spray hectares) decreased by 44% between 2006 and 2010.

A total of 58 kilograms of pesticides were applied to 117 spray hectares of soft fruit crops in 2010. Strawberries were the most commonly produced soft fruit, with 55 kilograms of pesticides being applied to 113 spray hectares.

Fungicide usage decreased by 39% compared with 2006. Fungicides were applied to 70% of the total pesticide-treated area representing 70% of the total weight of pesticides used in 2010. Myclobutanil and iprodione were the most commonly used fungicides.

Herbicide usage decreased by an estimated 75% compared with 2006. Herbicide active ingredients were applied to 5% of the total pesticide-treated area (17% of the total weight of pesticides used) with glyphosate being the most commonly used herbicide. Approval for the use of the herbicide simazine expired on 31/12/07 but the product has been recorded in use on soft fruit during this period.

Insecticide usage decreased by 44% compared with 2006, and 49% compared with 1998. Insecticide active ingredients accounted for 18% of the total pesticide-treated area and 10% of the total weight of pesticides applied in 2010. The contact and ingested organophosphorus insecticide chlorpyrifos was the most frequently applied, replacing pyrethroids as the most commonly used insecticide type.

Biopesticides (including macro-organisms) were applied to 6% of the treated area in 2010, compared with 5% in 2006 and 1% in 1998. Applications were principally to control grey mould (*Botrytis* spp.), with *Bacillus subtilis* being the most commonly used biopesticide.

The three most frequently used active ingredients were the fungicides myclobutanil, iprodione and pyrimethanil. The area treated with myclobutanil in 2010 was 52% less than in 2006, with approximately 14 hectares treated in 2010 compared with 29 hectares in 2006.

## 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, including all repeated applications to the 'basic area', and is referred to in spray hectares (spha).
- 'Protected crops' refers to all crops grown under permanent protection, i.e. glasshouse or polytunnel, for the entire duration of their production cycle.
- 'Semi-protected crops' refers to all crops grown outdoors which were covered at various times during production with cloches and / or Spanish or French tunnels.
- 'Non-protected crops' refers to all crops grown outdoors in field conditions without any protection during their production cycle.
- 'Reasons for use'; the reasons reported for the use of pesticides are the growers' stated reasons for use and may sometimes not reflect label recommendations.
- Some treatments to soft fruit are restricted to the plants or to the ground between them. For the purposes of this report, where a field or crop is referred to, it is assumed the entire field / area was treated with the exception of herbicide usage where 40% of the total area treated for all crops is accounted for by the inter-row area within these crops.
- 'Rounding'; due to rounding of figures, there may be slight differences in totals both within and between tables.
- 'Biopesticides' are recorded by area treated (spha) only, as they are applied in units other than weight or volume (e.g. million per hectare) and this does not translate readily into a conventional weight.
- 'Other crops' refers to blackberries, blueberries, tayberries and redcurrants combined.
- 'Other products' refers to natural products (mainly comprised of natural ingredients) and cleaning agents, both of which have a physical action and, as such, are exempt from UK pesticide regulations.

## 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 cyclical 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 soft fruit crops in Northern Ireland. Results from the previous surveys, which reported on pesticide usage practices on soft fruit crops in 1990 (Kidd *et al*; 1994), 1998 (Kearns *et al*; 2002) and 2006 (Kearns *et al*; 2008), are included in the report for comparative purposes.

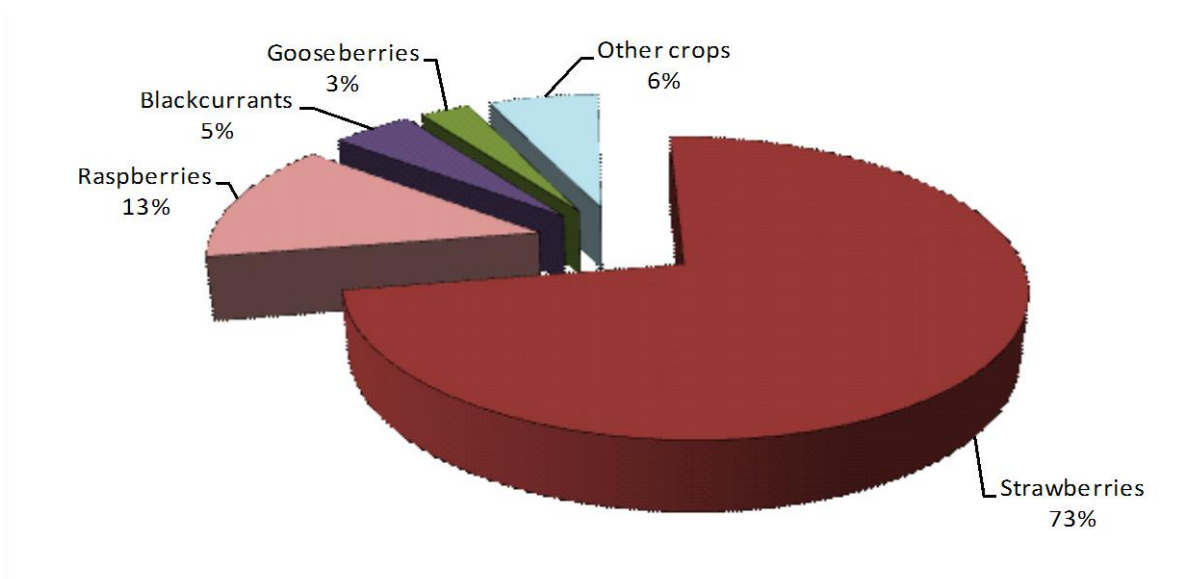
A list of published Northern Ireland Pesticide Usage Survey reports is shown in Appendix 1.

Soft fruit grown under permanent protection (glasshouse, polytunnel etc.), in the field under semi-protection (cloches, Spanish and French tunnels) and in the field without any protection were recorded in this survey. The principal pests and diseases recorded were aphids, two-spotted spider mites (*Tetranychus urticae*), grey mould (*Botrytis cinerea*) and powdery mildew (*Sphaerotheca* spp.).

The soft fruit industry in Northern Ireland has continually decreased in size from an estimated 75 hectares in 1990 to approximately 17 hectares in 2010. 29% of crops were grown under permanent protection, 24% were grown under semi-protection and the remaining 47% were unprotected (Figure 3). Previous reports had included semi-protected crops with protected crops.

The crop types recorded in this survey (area grown in hectares (ha)) were strawberries (10.46 ha), raspberries (1.94 ha), gooseberries (0.43 ha), blackcurrants (0.67 ha) and 'other crops' (blackberries, blueberries, tayberries and redcurrants), (0.92 ha). (Figure 1).

**Figure 1 The proportional distribution of soft fruit crops grown in Northern Ireland, 2010, by crop group.**

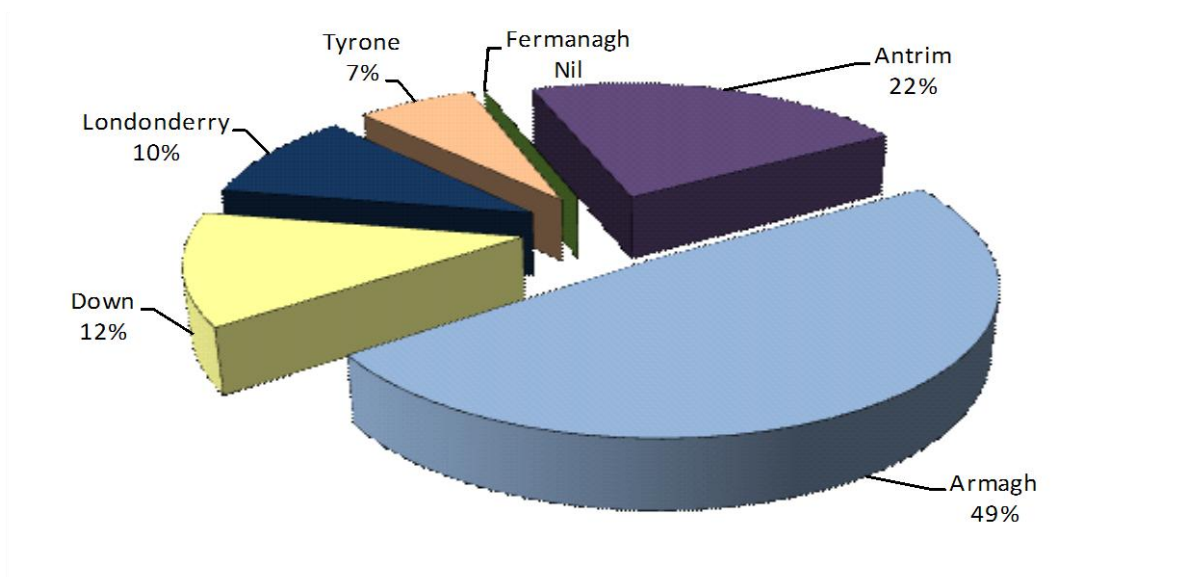




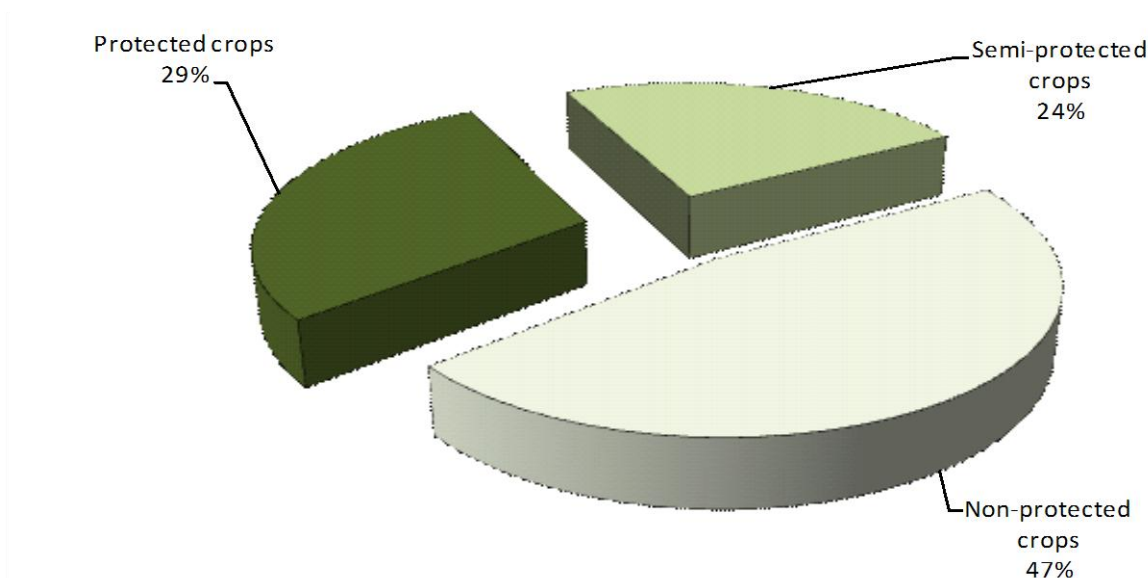
## METHODS

Using the Northern Ireland Agricultural Census, June 2009 (Anon; 2010), a list of growers from the Department of Agriculture and Rural Development Northern Ireland (DARDNI), the College of Agriculture, Food and Rural Enterprise (CAFRE), and details of growers from previous surveys, the population of soft fruit growers was established and holdings to be surveyed selected. A preliminary letter was sent to growers explaining the purpose of the survey. Of a possible 32 growers, 27 participated in the survey. Growers were visited during November and December 2010 and data relating to pesticide usage were collected by personal interview. This survey covers the period from September 2009 to September 2010. The growers' stated reasons for pesticide use were also included, but may not always be appropriate. The sample data were raised to reflect the number of growers in the population, and collected data were analysed using SPSS software. (Table 1, Figure 2).

**Figure 2 The regional distribution of soft fruit crops grown in Northern Ireland, 2010.**



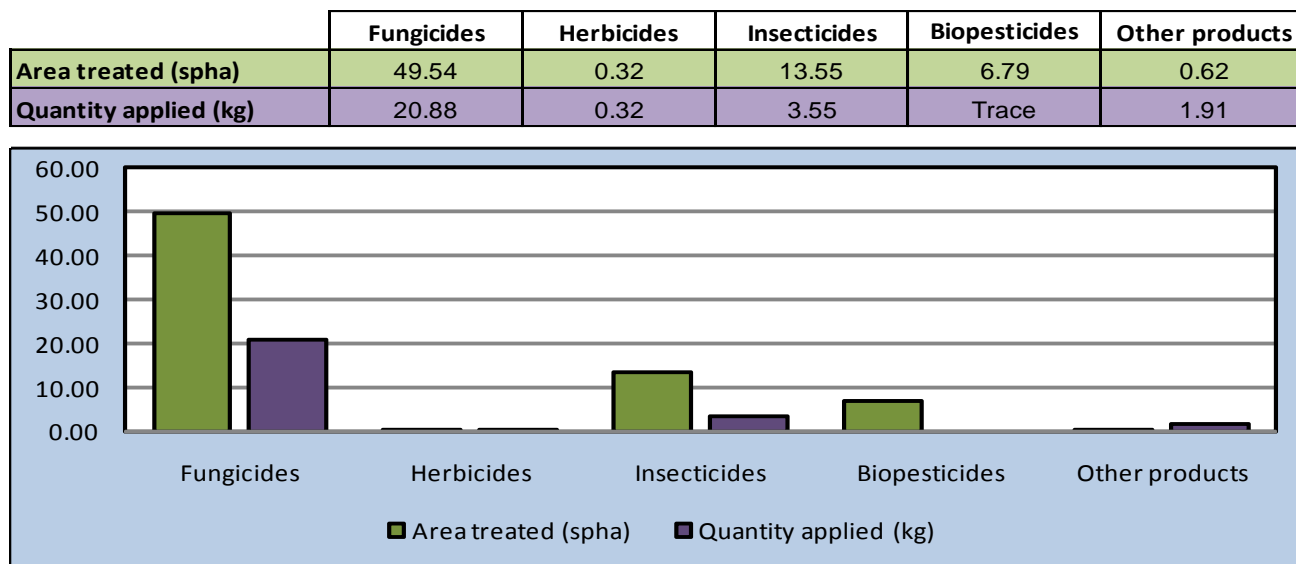
**Figure 3 The proportion of soft fruit crops grown in Northern Ireland, 2010 by method of protection.**



## PESTICIDE USAGE ON CROPS

### STRAWBERRIES (PROTECTED) Table 11

**Figure 4** Estimated area treated (spha) and quantity (kg) of pesticides applied to protected strawberries grown in Northern Ireland, 2010.



Protected strawberries accounted for 28% of all soft fruit crops grown in Northern Ireland in 2010 and for 46% of the weight of pesticides applied (Tables 2 & 5).

Fungicides accounted for 70% of the pesticide-treated area and 79% of the weight of pesticides applied (Tables 4 & 5). Fungicides used to control strawberry powdery mildew (*Podosphaera aphanis*) and grey mould (*Botrytis cinerea*) were applied to 94% of the fungicide-treated area. The active ingredient myclobutanil was the principal fungicide used to control strawberry powdery mildew (*Podosphaera aphanis*), and was the fungicide active ingredient most extensively used on protected strawberries overall, being used to treat 65% of the total area.

Herbicides accounted for <1% of the pesticide-treated area and 1% of the weight of pesticides applied. Glyphosate was the only herbicide active ingredient used, being applied to pathways and hard-standing areas within glasshouses and polytunnels for general weed control. In 1998 and 2006 paraquat was the most frequently used herbicide active ingredient. Approval for paraquat expired in 2007.

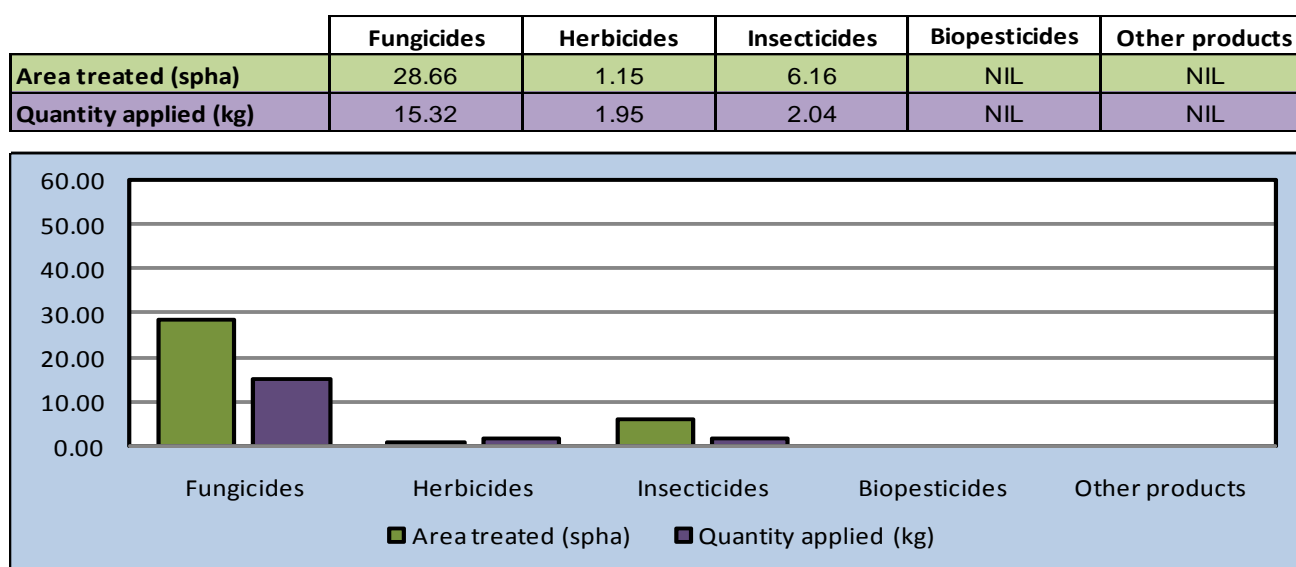
Insecticides were applied to 19% of the pesticide-treated area, representing 13% of the weight of pesticides applied. Two-spotted spider mite (*Tetranychus urticae*) (52%) and aphids (46%) were the main reasons given for application of insecticides. Chlorpyrifos was the most extensively used insecticide active ingredient, accounting for 28% of the insecticide-treated area and 68% of the weight of insecticides applied. Clofentezine, a selective ovicidal tetrazine acaricide was also extensively used.

Biopesticides accounted for 10% of applications to the pesticide-treated area. *Bacillus subtilis* was applied to 58% of the area treated to control grey mould (*Botrytis cinerea*).

‘Other products’ were applied to 1% of the pesticide-treated area, representing 7% of the total weight of pesticides applied. ‘Natural product’, a formulation made from plant extracts and used as a physical pesticide, accounted for 61% of the area treated and 75% of the weight applied. The sole reason recorded for using ‘natural product’ was to control aphids.

## STRAWBERRIES (SEMI-PROTECTED) Table 12

**Figure 5** Estimated area treated (spha) and quantity (kg) of pesticides applied to semi-protected strawberries grown in Northern Ireland, 2010.



This crop accounted for 23% of all soft fruit grown in the province in 2010 and 33% of the weight of pesticides applied (Tables 2 & 5).

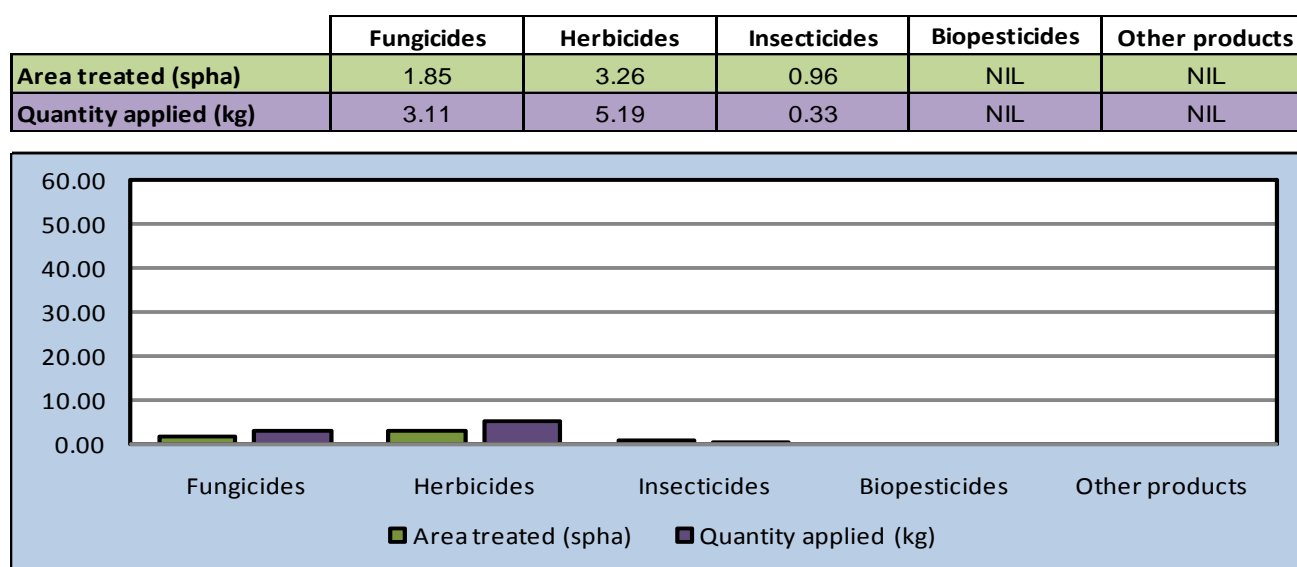
Fungicides accounted for 80% of the pesticide-treated area, 79% of the weight of pesticides applied (Tables 4 & 5). Pesticides applied to control strawberry powdery mildew (*Podosphaera aphanis*) accounted for 65% of the fungicide-treated area, with applications for the control of grey mould (*Botrytis cinerea*) accounting for a further 29%. Potassium bicarbonate, the most commonly used active ingredient, was applied to 25% of the fungicide-treated area. Fosetyl-aluminium accounted for 24% of the weight of fungicide active ingredients applied to semi-protected strawberries, primarily for control of root and crown rot (*Phytophthora* spp.)

Herbicides accounted for 3% of the pesticide-treated area and 10% of the weight of pesticides applied (Tables 4 & 5). Glyphosate, the active ingredient most extensively used, was applied to 77% of the herbicide-treated area. Simazine (18%) and lenacil (5%) were the only other recorded herbicide active ingredients used on semi-protected strawberries, with ‘general weed control’ being the only reason stated for use.

Insecticides accounted for 17% of the pesticide-treated area and 11% of the weight of pesticides applied (Tables 4 & 5). An estimated 77% of insecticides were applied to control aphids, with the remaining 23% of applications to control two-spotted spider mite (*Tetranychus urticae*). The most extensively used active ingredient was pirimicarb, accounting for 54% of the insecticide-treated area and 45% of the weight of pesticides applied. Chlorpyrifos, which was applied to 10% of the insecticide-treated area, accounted for 35% of the weight of pesticides applied.

## STRAWBERRIES (NON-PROTECTED) Table 13

**Figure 6** Estimated area treated (spha) and quantity (kg) of pesticides applied to non-protected strawberries grown in Northern Ireland, 2010.



Non-protected strawberries accounted for 22% of all soft fruit crops grown in Northern Ireland in 2010 and 15% of the weight of pesticides applied (Tables 2 & 5). Only 5% of the total pesticides applied to strawberries were applied to non-protected crops, accounting for 16% of the total weight of pesticides applied to all strawberry crops (Figure 6).

Fungicides accounted for 30% of the pesticide-treated area and 36% of the weight of pesticide applied. Pesticides applied to control grey mould (*Botrytis cinerea*) accounted for 59% of the fungicide-treated area. Fosetyl-aluminium, the most commonly used active ingredient, was applied to 35% of the fungicide-treated area representing 51% of the weight of fungicides applied, primarily for the control of root and crown rot (*Phytophthora* spp.).

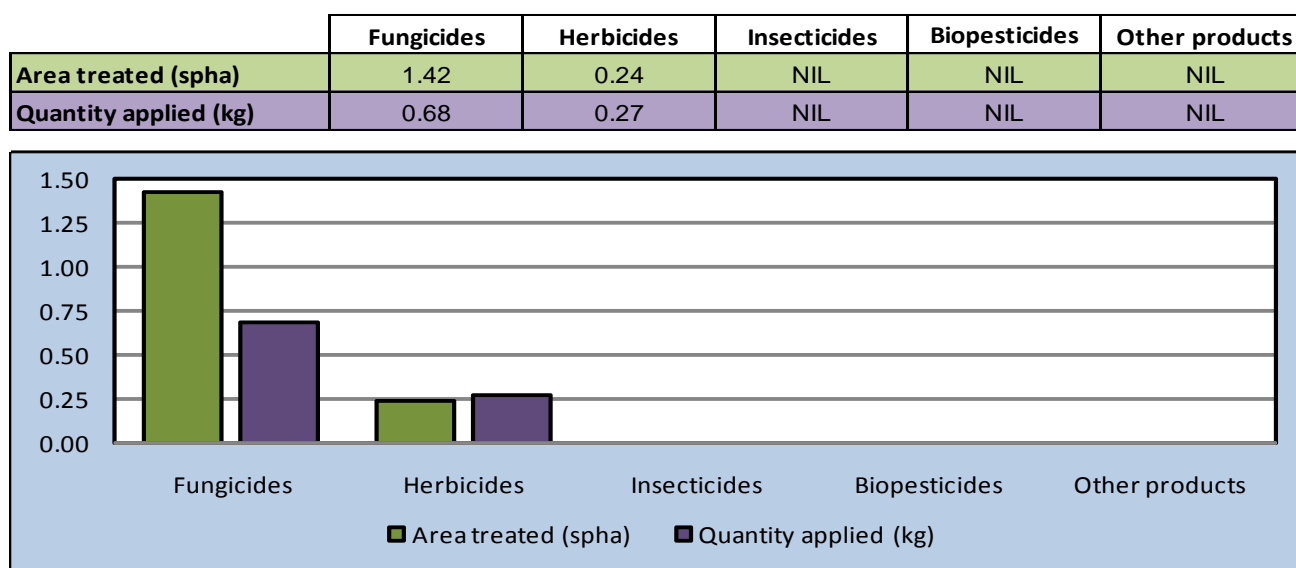
Herbicides were applied to 54% of the pesticide-treated area and represented 60% of the weight of pesticides applied (Tables 4 & 5). Glyphosate was applied to 28% of the herbicide-treated area accounting for 21% of the weight of pesticides applied, whilst lenacil was applied to 20% of the herbicide-treated area and accounted for 28% of the weight of herbicide applied. The reason stated for all herbicide use was 'general weed control'.

The only insecticide applied to non-protected strawberries was dimethoate for ‘general insect control’, accounting for 16% of the pesticide-treated area but only 4% of the weight of pesticides applied.

The biopesticide *Bacillus subtilis* was applied to <1% of the pesticide-treated area, for ‘general fungus control’.

## RASPBERRIES (PROTECTED) Table 14

**Figure 7** Estimated area treated (spha) and quantity (kg) of pesticides applied to protected raspberries grown in Northern Ireland, 2010.



Protected raspberries accounted for only 1% of all soft fruit crops grown in Northern Ireland in 2010, usage on this crop accounting for 2% of the weight of pesticides applied to soft fruit (Tables 2 & 5).

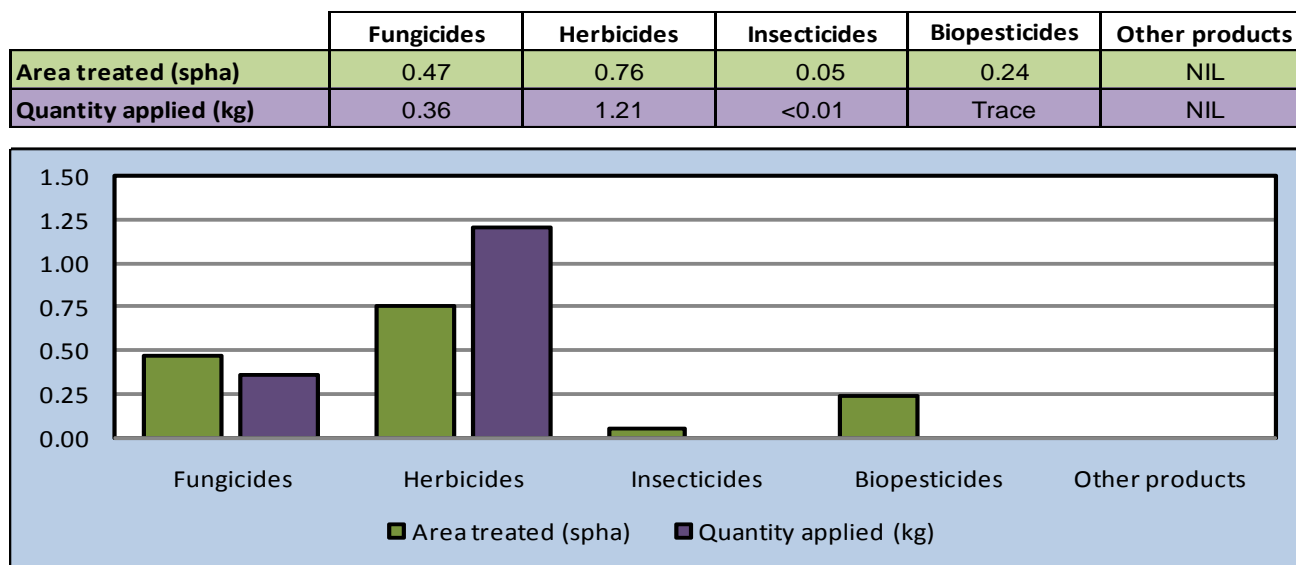
Fungicides were applied to 86% of the pesticide-treated area which accounted for 72% of the weight of pesticides applied. Boscalid/pyraclostrobin and iprodione were both used for the control of grey mould (*Botrytis cinerea*), whilst myclobutanil was applied to control powdery mildew (*Sphaerotheca* spp.) (Table 14).

Simazine was the only herbicide active ingredient used and was applied to the floor area where protected raspberries were being grown, principally around pathways and hard-standing areas, representing 14% of the pesticide-treated area and 28% of the weight of pesticides applied. ‘General weed control’ was the only reason stated for use.

No other products were recorded in use on protected raspberries.

## RASPBERRIES (NON-PROTECTED) Table 15

**Figure 8** Estimated area treated (spha) and quantity (kg) of pesticides applied to non-protected raspberries grown in Northern Ireland, 2010.



Non-protected raspberries accounted for 12% of all soft fruit crops grown in Northern Ireland in 2010, but only 3% of the weight of all pesticides applied to soft fruit crops (Tables 2 & 5).

The protectant hydroxylanilide fungicide fenhexamid was the only fungicide active ingredient applied to non-protected raspberries, for controlling grey mould (*Botrytis* spp.). It was applied to 11.7% of the total grown area of these crops and a total of 0.36 kgs was used.

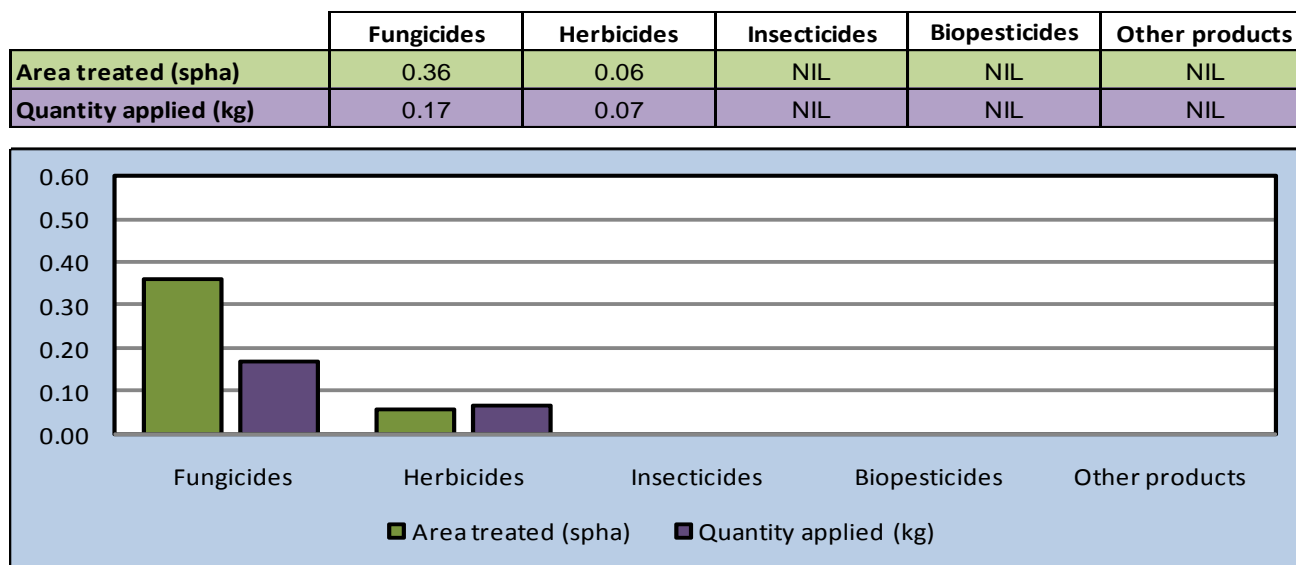
The herbicides glyphosate, lenacil and diquat were applied to the base of non-protected raspberries, all for 'general weed control'. Glyphosate represented 72% of the herbicide-treated area and 65% of the weight of herbicides applied.

The pyrethroid insecticide deltamethrin was the only insecticide applied to non-protected raspberries. It was used to control aphids (*Amphorophora idaei*), representing 3% of the total pesticide-treated area but <1% of the total weight of pesticides applied.

The biopesticide *Bacillus subtilis* was applied to 16% of the pesticide-treated area, for 'general fungus control'.

## GOOSEBERRIES (SEMI-PROTECTED) Table 16

**Figure 9** Estimated area treated (spha) and quantity (kg) of pesticides applied to semi-protected gooseberries grown in Northern Ireland, 2010.



This crop accounted for only 1% of all soft fruit crops grown in the province in 2010 and <1% of the weight of pesticides applied (Tables 2 & 5).

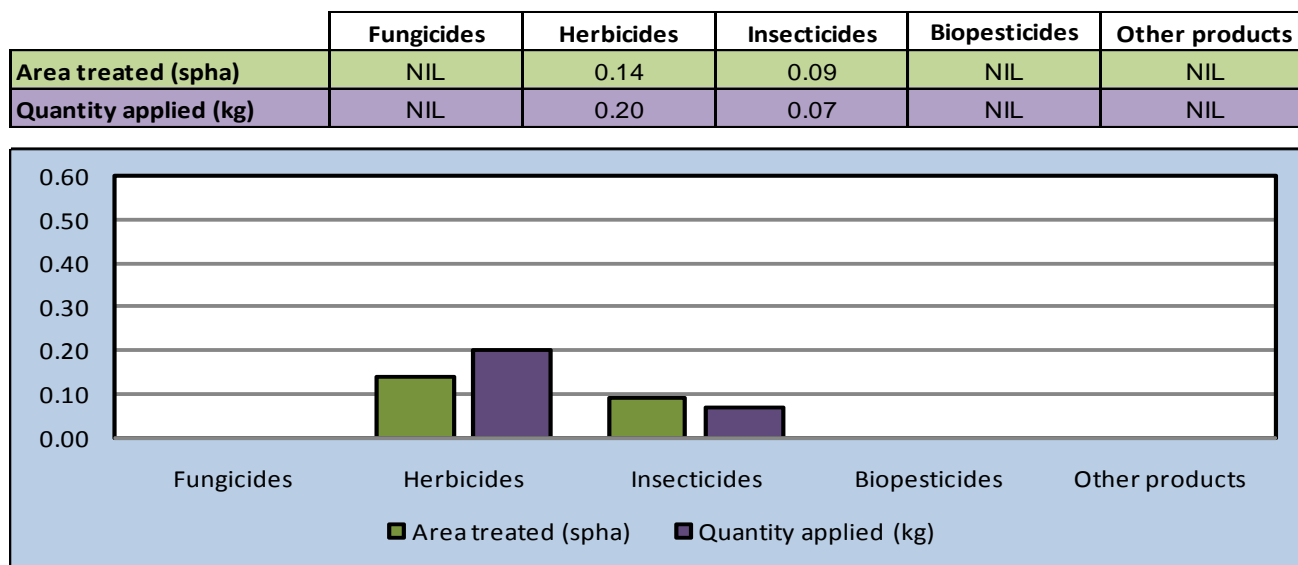
Fungicides were applied to 86% of the pesticide-treated area, which accounted for 71% of the weight of pesticides applied. As was the case for protected raspberries, boscalid/pyraclostrobin and iprodione were both used for the control of grey mould (*Botrytis* spp.) whilst myclobutanil was applied to control powdery mildew (*Sphaerotheca* spp.) (Table 16).

The soil acting, triazine herbicide simazine was the only herbicide active ingredient used. It was applied to the base of semi-protected gooseberries, representing 14% of the pesticide-treated area and 29% of the weight of pesticides applied. 'General weed control' was the only reason stated for use.

No other products were recorded in use on semi-protected gooseberries.

## GOOSEBERRIES (NON-PROTECTED) Table 17

**Figure 10** Estimated area treated (spha) and quantity (kg) of pesticides applied to non-protected gooseberries grown in Northern Ireland, 2010.



Non-protected gooseberries accounted for 2% of all soft fruit crops grown in Northern Ireland in 2010, 1% less than in 2006, and <1% of the weight of pesticides applied to soft fruit crops (Tables 2 & 5).

Glyphosate, a translocated non-residual glycine derivative herbicide, was applied to 36% of the total area of non-protected gooseberries for 'general weed control', mainly around the base of the plants and between each row, and represented 61% of the pesticide-treated area and 74% of the weight of pesticides applied to this crop.

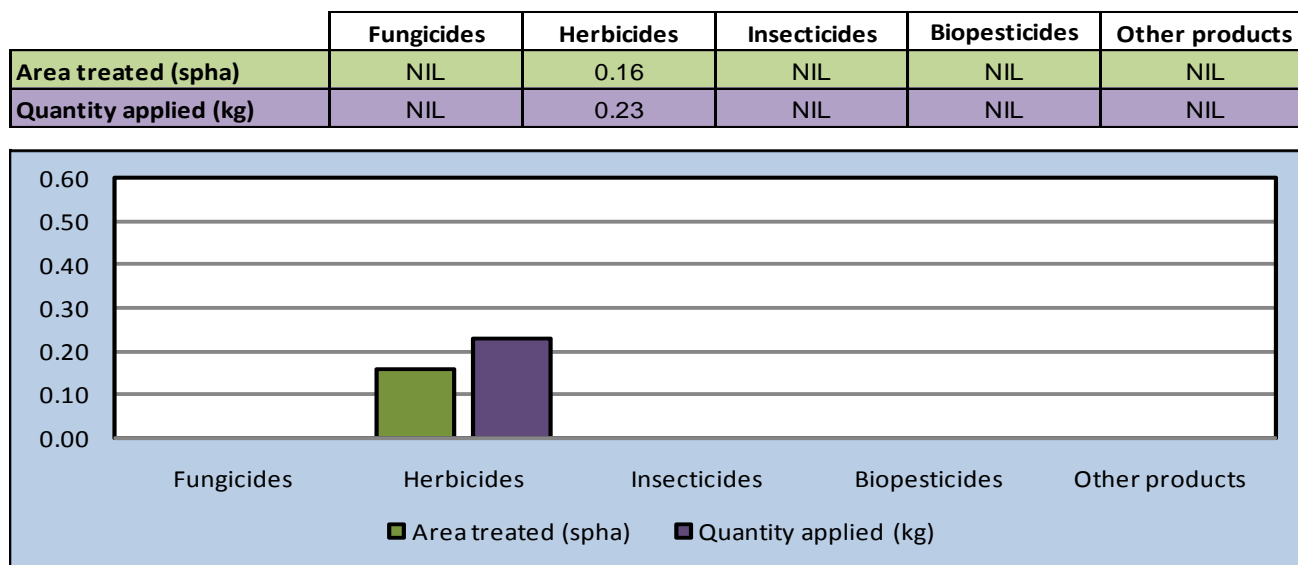
The contact and ingested organophosphorus insecticide chlorpyrifos was the only insecticide active ingredient used on non-protected gooseberries, accounting for 39% of the pesticide-treated area and 26% of the weight of pesticides applied. Control of aphids (*Aphis grossulariae*) was the only reason stated for use.

No other products were recorded in use on non-protected gooseberries.



## BLACKCURRANTS (NON-PROTECTED) Table 18

**Figure 11** Estimated area treated (spha) and quantity (kg) of pesticides applied to non-protected blackcurrants grown in Northern Ireland, 2010.

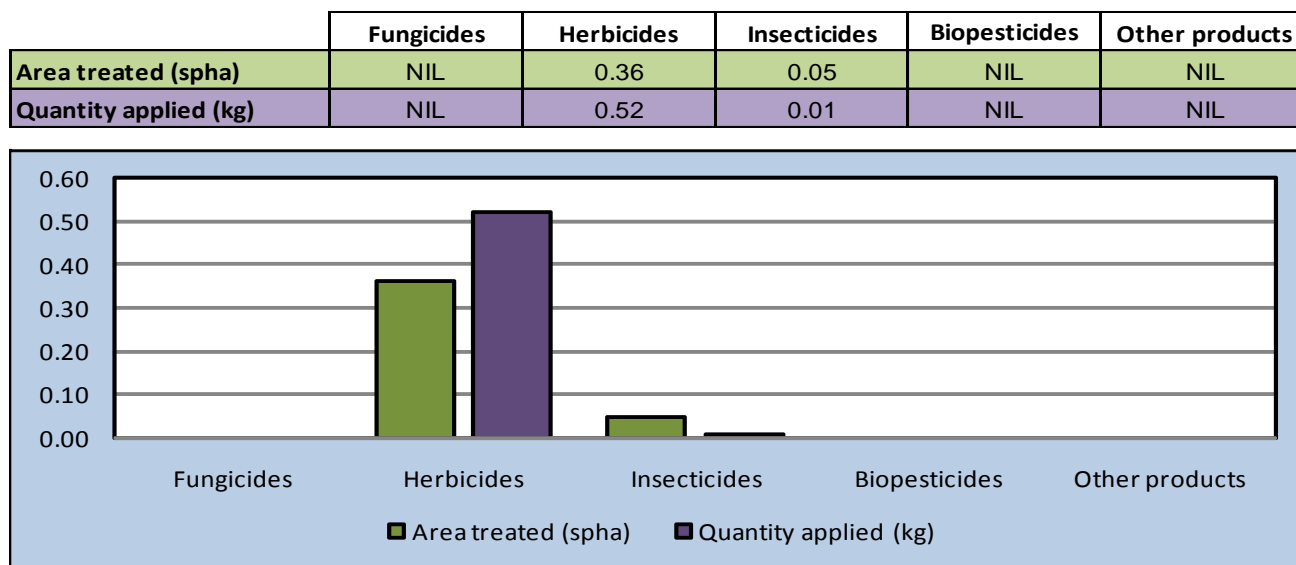


Non-protected blackcurrants accounted for 5% of all soft fruit crops grown in Northern Ireland in 2010, an increase of 2% when compared with 2006, although the quantity of pesticides used has remained the same at 1% of the total. (Tables 2 & 5).

The only pesticide active ingredient applied to this crop was glyphosate, mainly around the base of the plant and to the inter-row area between the plants. The sole reason stated for use was 'general weed control'. This represents a significant change when compared to 2006 when five different herbicide active ingredients were applied to this crop, namely dichlobenil, glyphosate, paraquat, pendimethalin and propyzamide. Collectively these accounted for 0.6 spray hectares of treated area and 0.8 kilograms of quantity applied, less than that recorded in 2010.

## OTHER CROPS (NON-PROTECTED) Table 19

**Figure 12** Estimated area treated (spha) and quantity (kg) of pesticides applied to non-protected 'other crops' grown in Northern Ireland, 2010.



'Other crops', which include blackberries, blueberries, tayberries and redcurrants, accounted for 6% of all soft fruit crops grown in Northern Ireland in 2010 (Table 2). All of these crops were grown without protection.

Glyphosate was the only herbicide active ingredient used on these crops, applied to 88% of the pesticide-treated area and accounting for 98% of the weight of pesticides applied. Applications were confined to the base area of the plants and the inter-row area between them. 'General weed control' was the reason given for the use of this product.

The pyrethroid insecticide deltamethrin was the only insecticide applied to 'other crops', for controlling aphids, and accounted for 12% of the pesticide-treated area but only 2% of the weight of pesticides applied.

## COMPARISON WITH PREVIOUS SURVEYS

Comparative information on pesticide usage on soft fruit crops grown in Northern Ireland in 1990, 1998, 2006 and 2010 is shown in Tables 20 & 21 and Figures 13, 14 & 15.

In the twenty years since the first Northern Ireland Soft Fruit Crops Survey in 1990 (Kidd *et al*; 1994), the area of soft fruit grown has decreased by 77%, from 75 hectares in 1990 to 17 hectares in 2010, and the quantity of pesticides applied has decreased by 88%, from 499 kilograms in 1990 to 58 kilograms in 2010. Between 2006 and 2010, the total area of soft fruit crops grown in Northern Ireland decreased by 37% from 27 hectares to 17 hectares.

Many of the growers interviewed regarded this decline as a result of prevailing economic conditions, citing less expensive imports being readily available to the marketplace as the main reason, but they also agreed that many retailers still recognise the importance of promoting locally-grown fresh produce, thus underpinning the sustainability and development of the soft fruit industry within Northern Ireland through their support.

Strawberries, the soft fruit crop most commonly grown, decreased by 45% from 22 hectares in 2006 to 12 hectares in 2010. The treated area (spha) also decreased by 41% as did the quantities (kg) of pesticide applied by 51%

Although the area of raspberries grown in 2010 decreased by only 21% compared with 2006, the quantity of pesticides applied decreased by a substantial 96% over the same period. In 2006, the soil fumigant dazomet was applied at a high rate of product per hectare as a ground preparation for raspberries, whilst no similar products were recorded in 2010. This largely explains the reduced quantities of pesticides applied in the second survey period.

The area of blackcurrants increased by 16% between 2006 and 2010, but the area treated (spha) reduced by 92% and the weight of pesticides applied (kg) decreased by 88%. Gooseberries and 'other crops' reduced in area, compared with 2006, by 43% and 14% respectively, with the weight of pesticides applied to both decreasing by 81%.

## ACKNOWLEDGEMENTS

We, the authors, wish to thank all of the growers who participated in this survey, without whose co-operation the completion of this report would not have been possible. We are also grateful for the invaluable assistance of Mr David Williams who worked tirelessly on key aspects of this report. We are particularly grateful for the support of Dr. Anne Stone (Edible Crops Development Adviser, CAFRE) for her invaluable advice and her contribution to the compilation of the list of soft fruit growers.

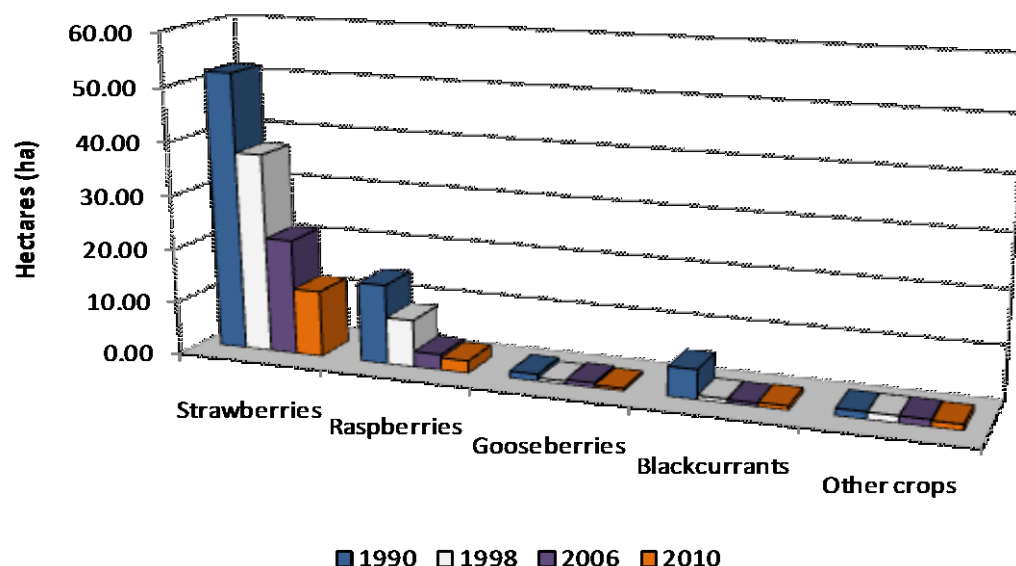
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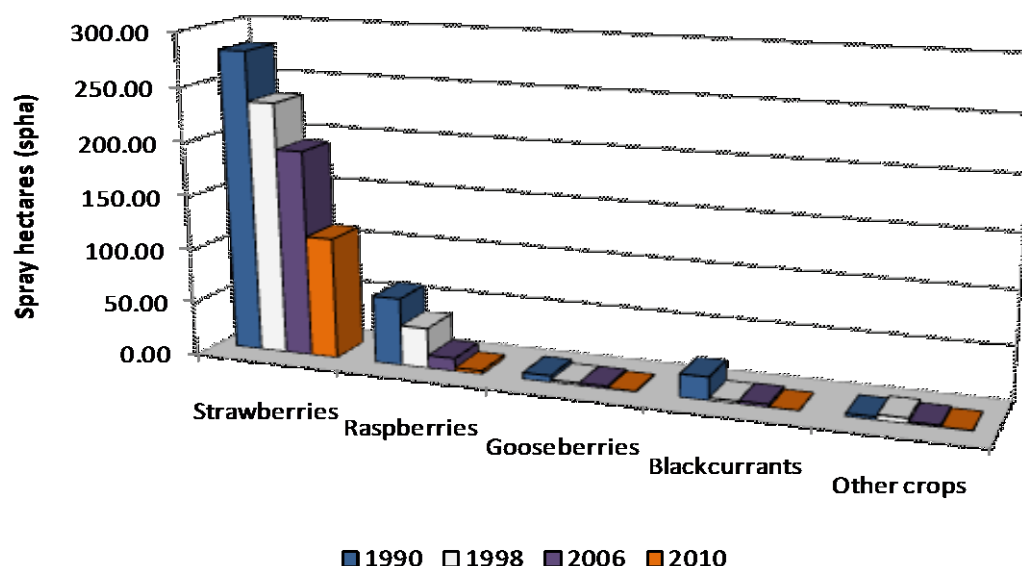
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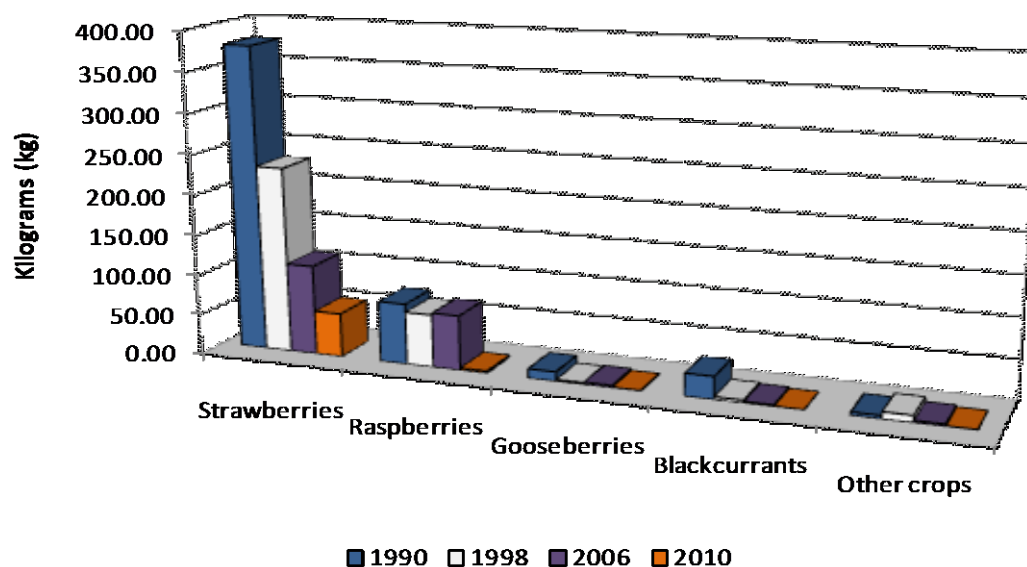
**Figure 13** Comparison of soft fruit crops grown between 1990 and 2010 in hectares (ha).



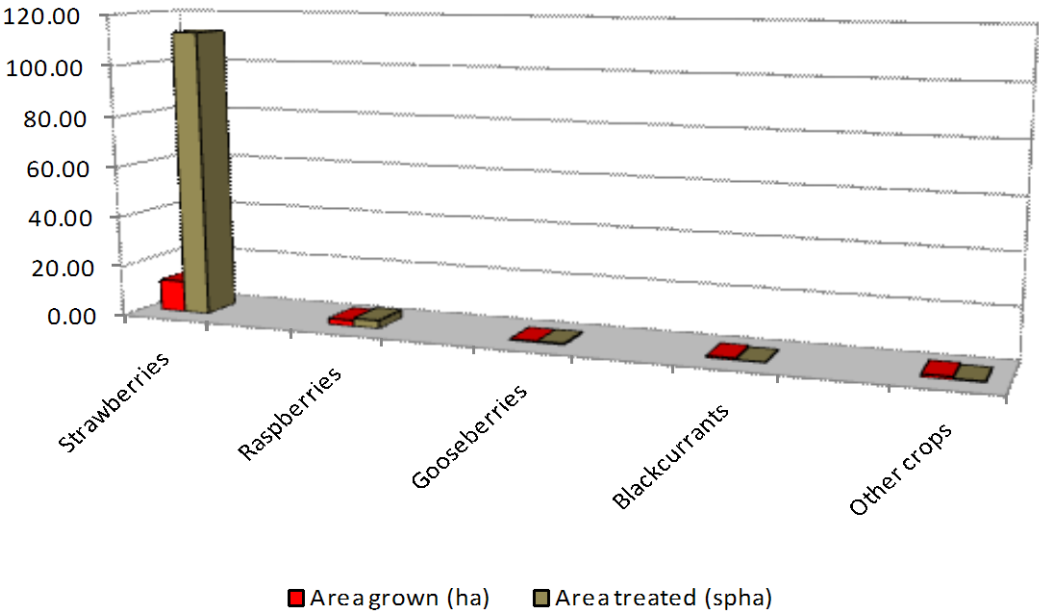
**Figure 14** Comparison of soft fruit crops treated between 1990 and 2010 in spray hectares (spha).



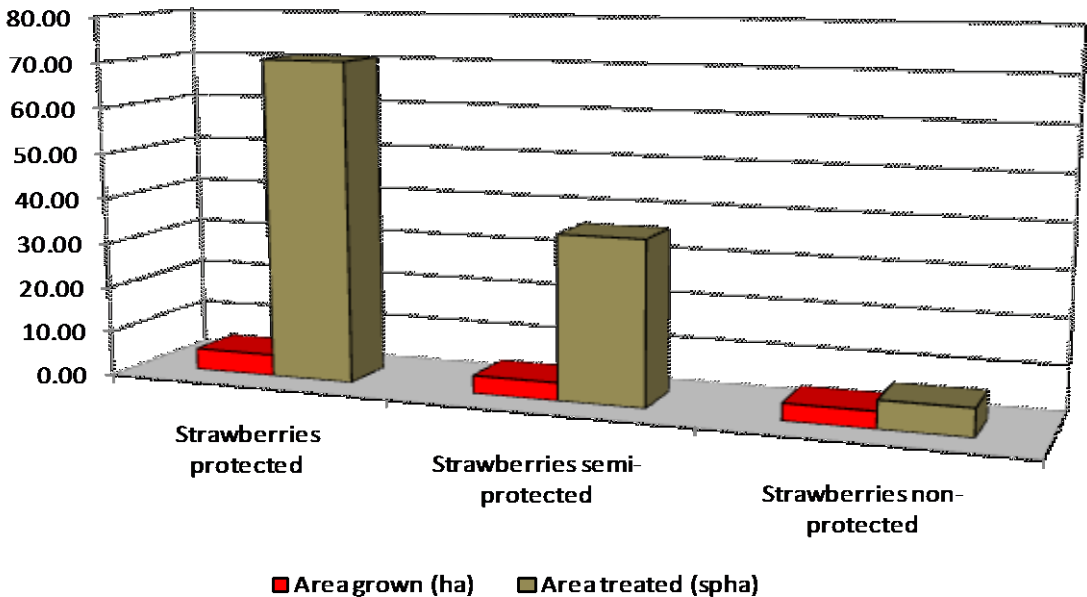
**Figure 15** Comparison of soft fruit crops treated between 1990 and 2010 in kilograms (kg).



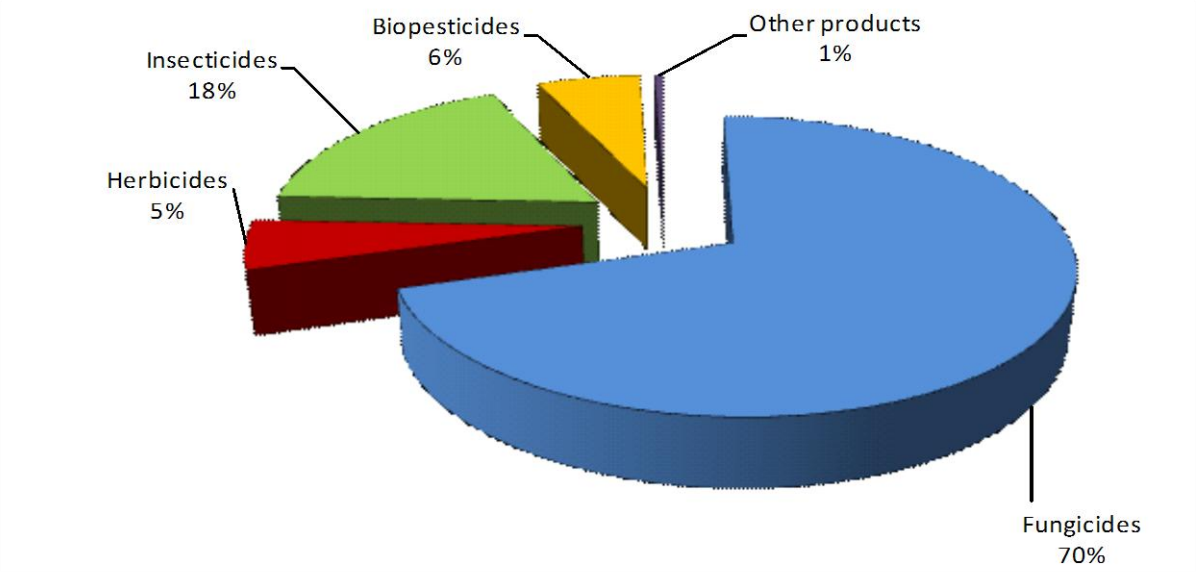
**Figure 16** Estimated area grown (ha) and area treated (spha) of soft fruit crops in Northern Ireland, 2010.



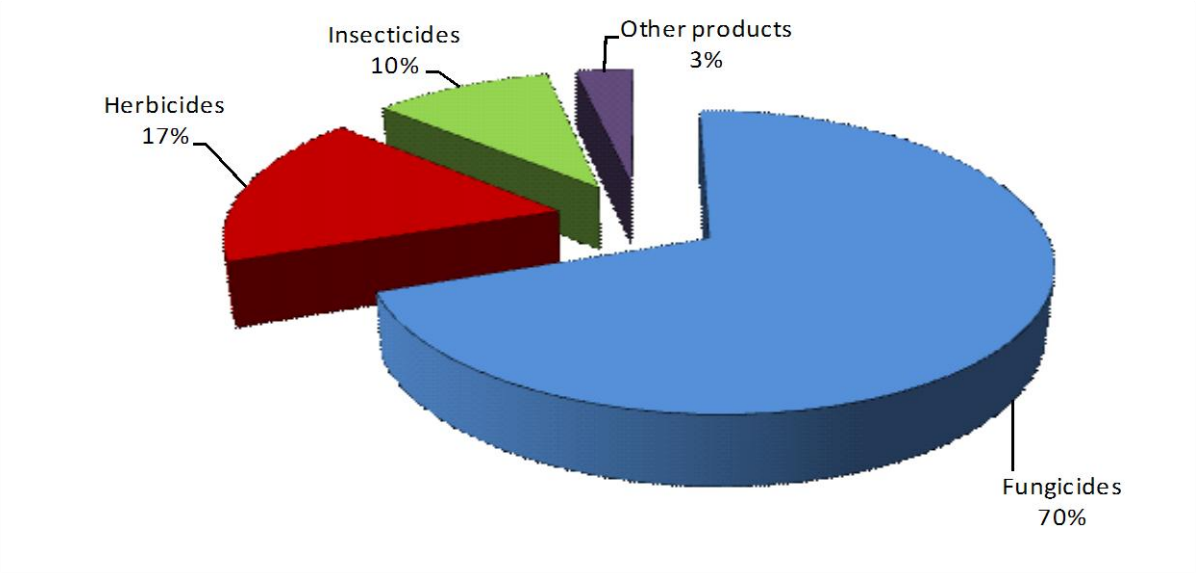
**Figure 17** Estimated area grown (ha) and area treated (spha) of strawberries in Northern Ireland, 2010.



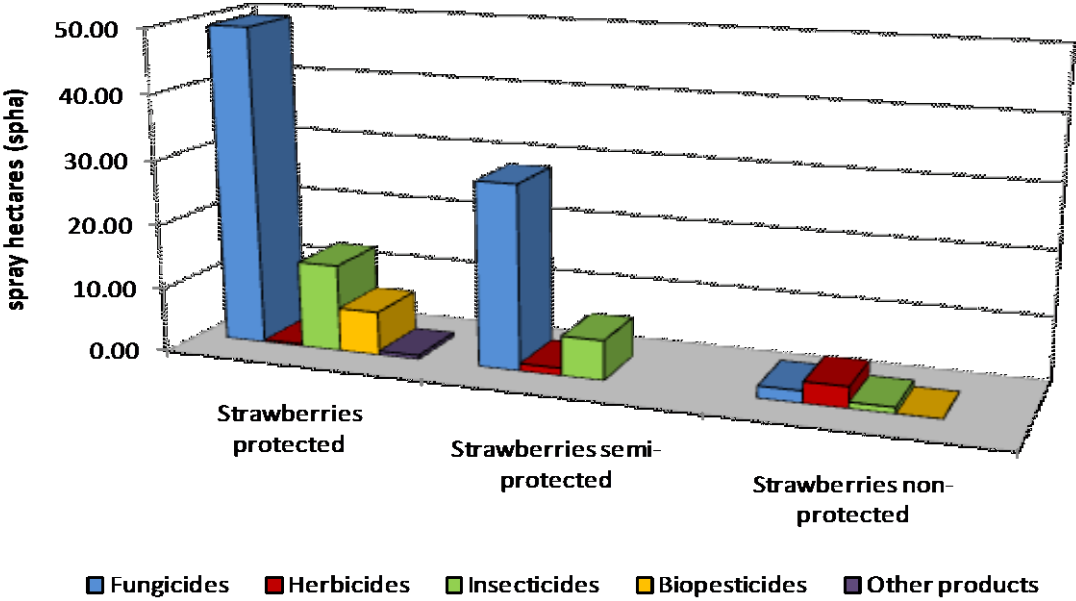
**Figure 18** Estimated area (spha) of soft fruit crops treated with each pesticide group, 2010, by proportion.



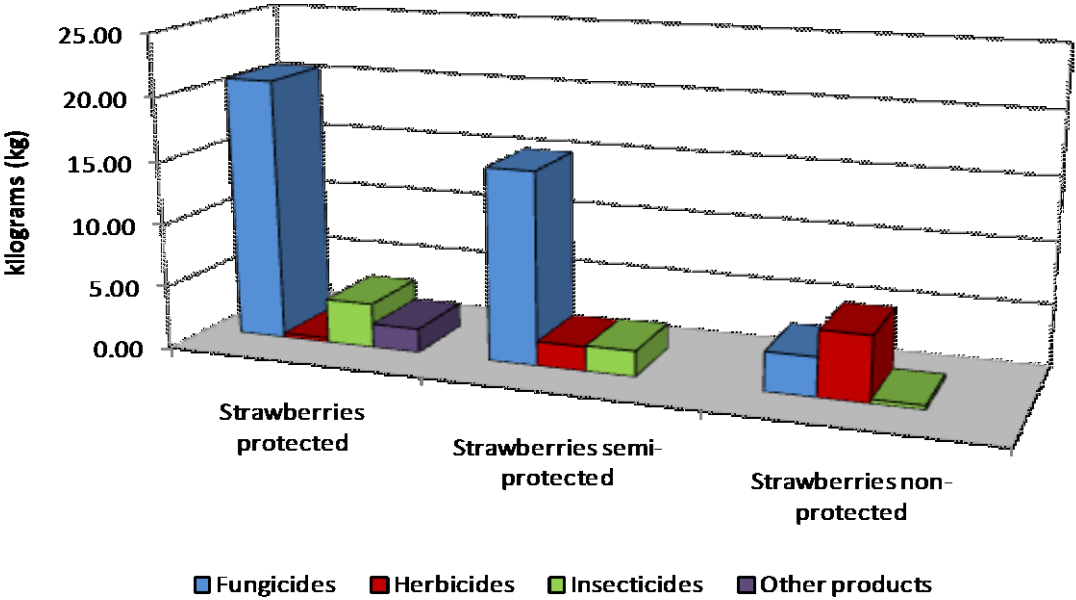
**Figure 19** Estimated quantities (kg) of pesticides applied to soft fruit crops, 2010, by proportion.



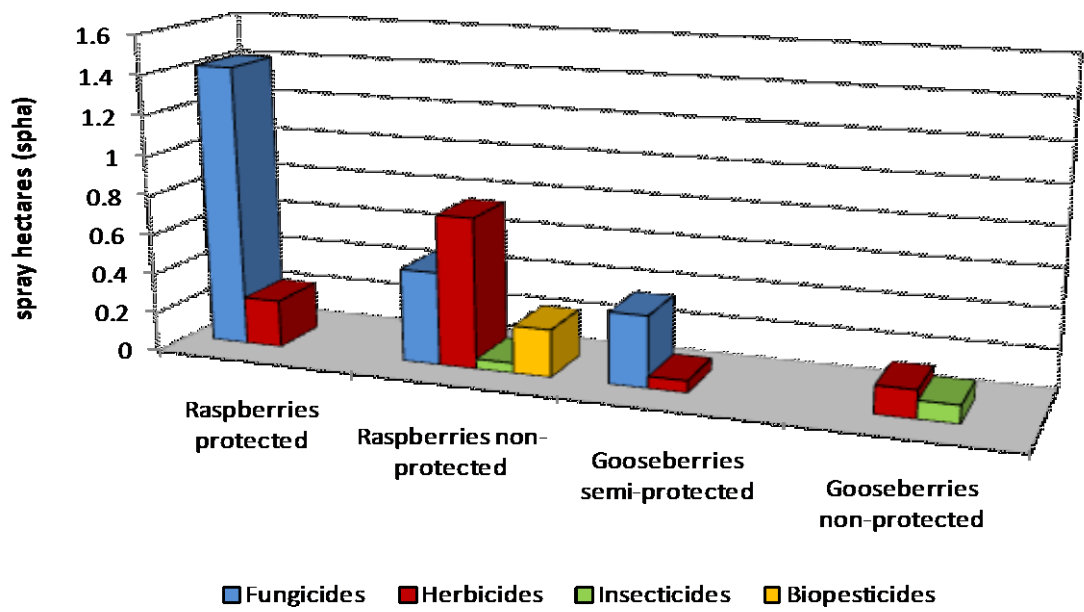
**Figure 20** Estimated area of strawberries treated (spha) with each pesticide type in Northern Ireland, 2010.



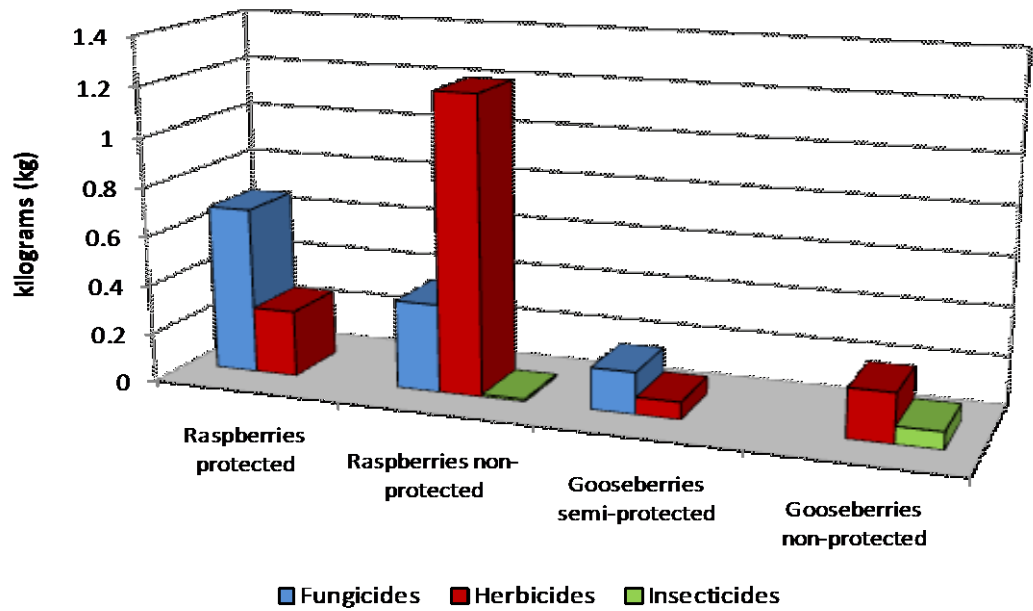
**Figure 21** Estimated quantity (kg) of pesticides applied to strawberry crops in Northern Ireland, 2010.



**Figure 22** Estimated area of raspberries and gooseberries treated (spha) with each pesticide type in Northern Ireland, 2010.

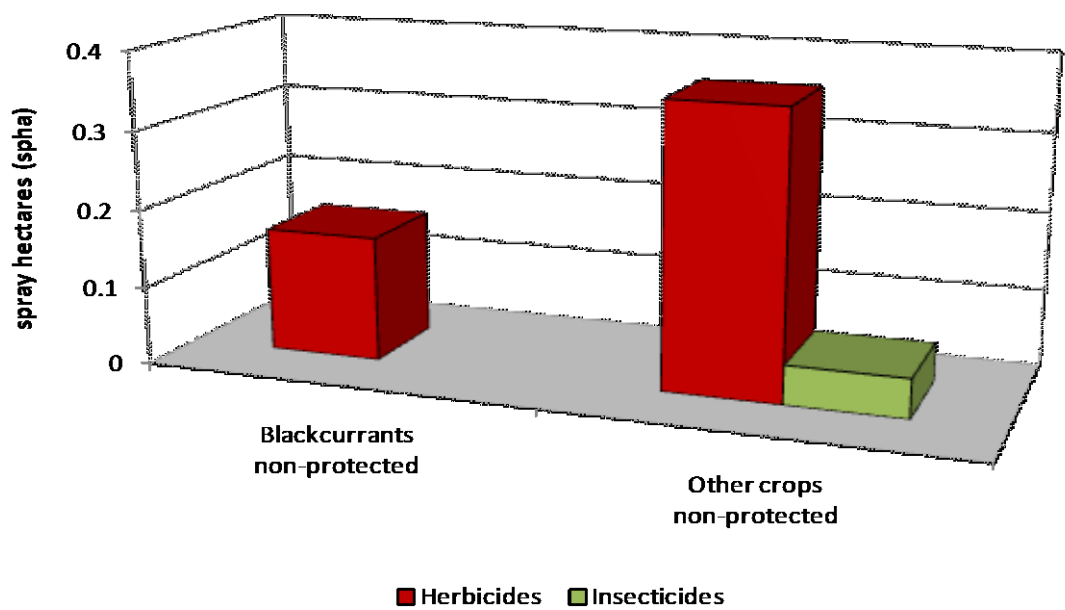


**Figure 23** Estimated quantity (kg) of pesticides applied to raspberry and gooseberry crops in Northern Ireland, 2010.

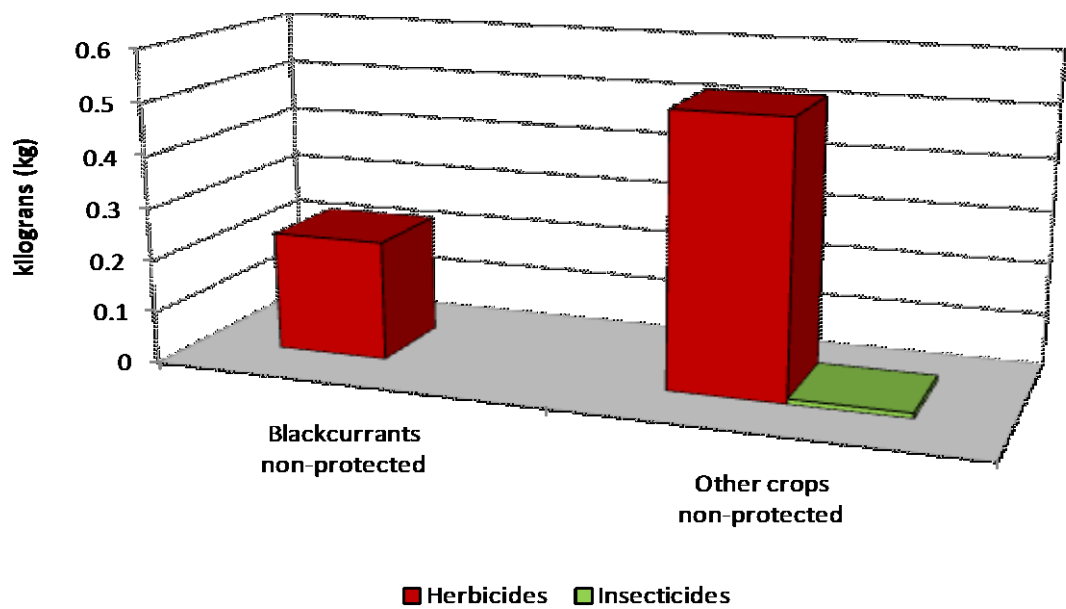




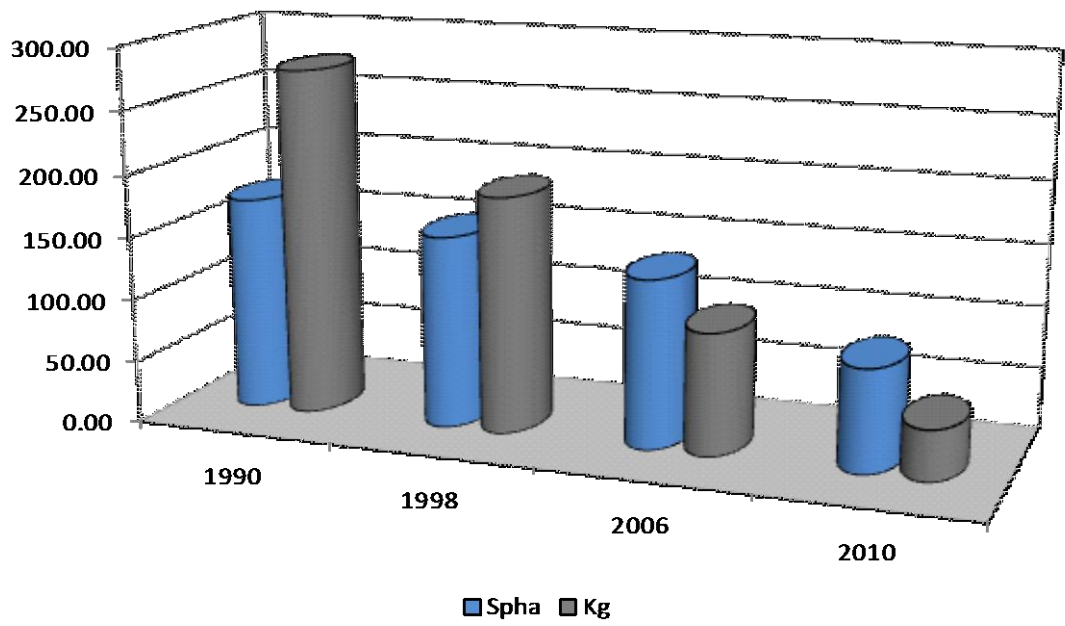
**Figure 24** Estimated area of blackcurrants and 'other crops' treated (spha) with each pesticide type in Northern Ireland, 2010.



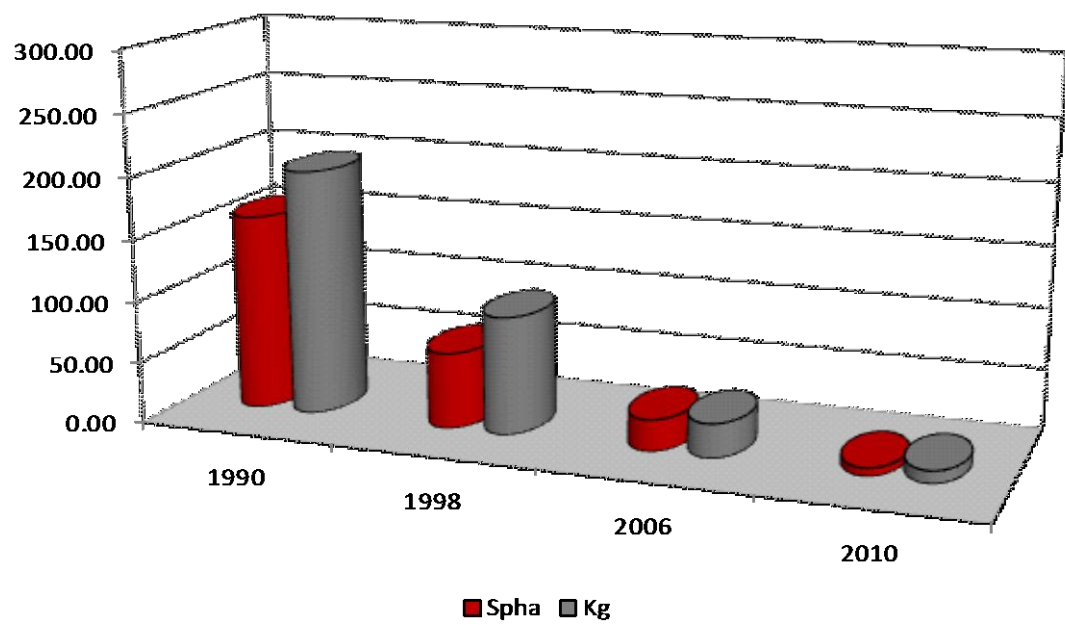
**Figure 25** Estimated quantity (kg) of pesticides applied to blackcurrants and 'other crops' in Northern Ireland, 2010.



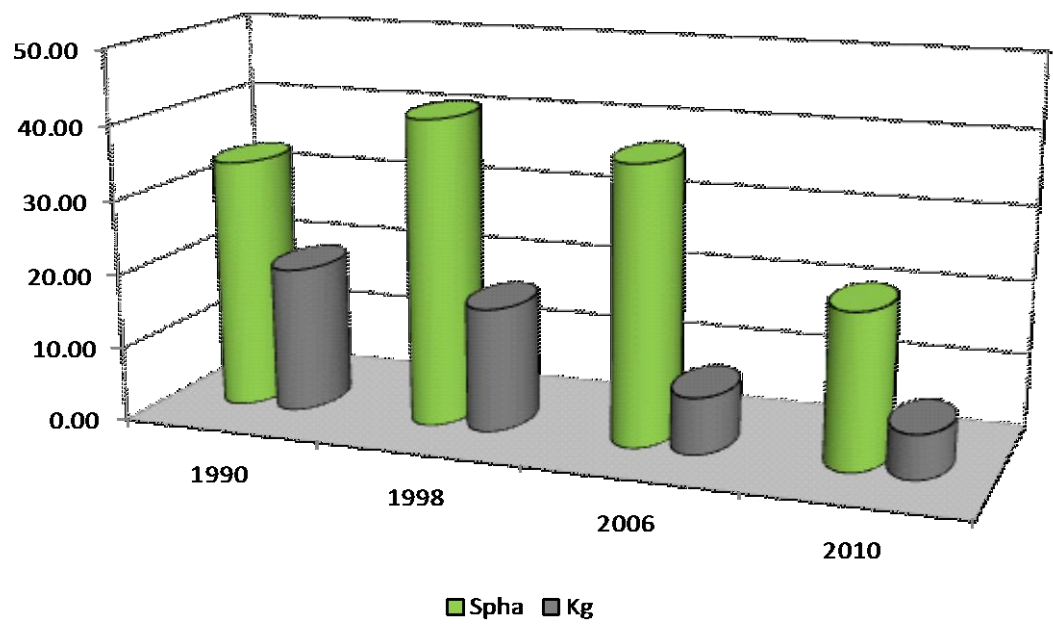
**Figure 26** Comparison of fungicide usage in soft fruit crops recorded in surveys, by area treated (spha) and quantities applied (kg).



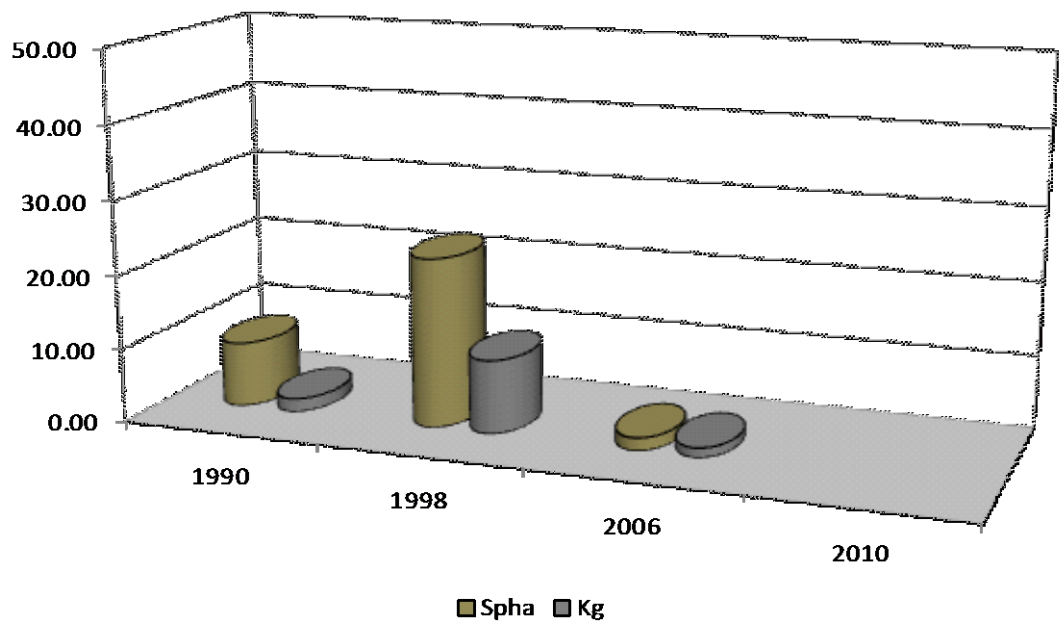
**Figure 27** Comparison of herbicide usage in soft fruit crops recorded in surveys, by area treated (spha) and quantities applied (kg).



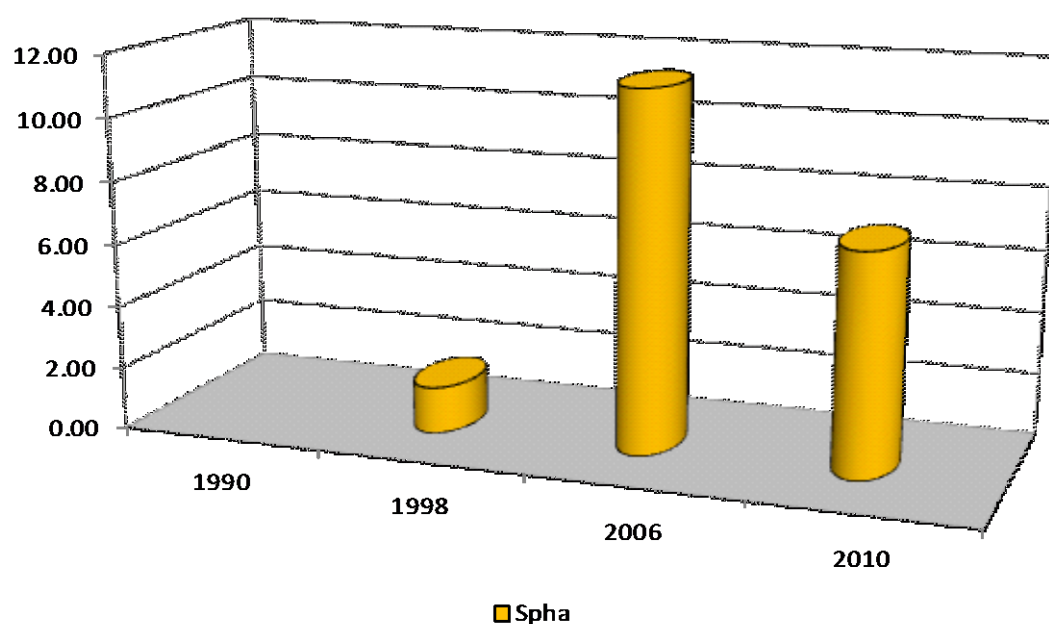
**Figure 28** Comparison of insecticide usage in soft fruit crops recorded in surveys, by area treated (spha) and quantities applied (kg).



**Figure 29** Comparison of molluscicide usage in soft fruit crops recorded in surveys, by area treated (spha) and quantities applied (kg).

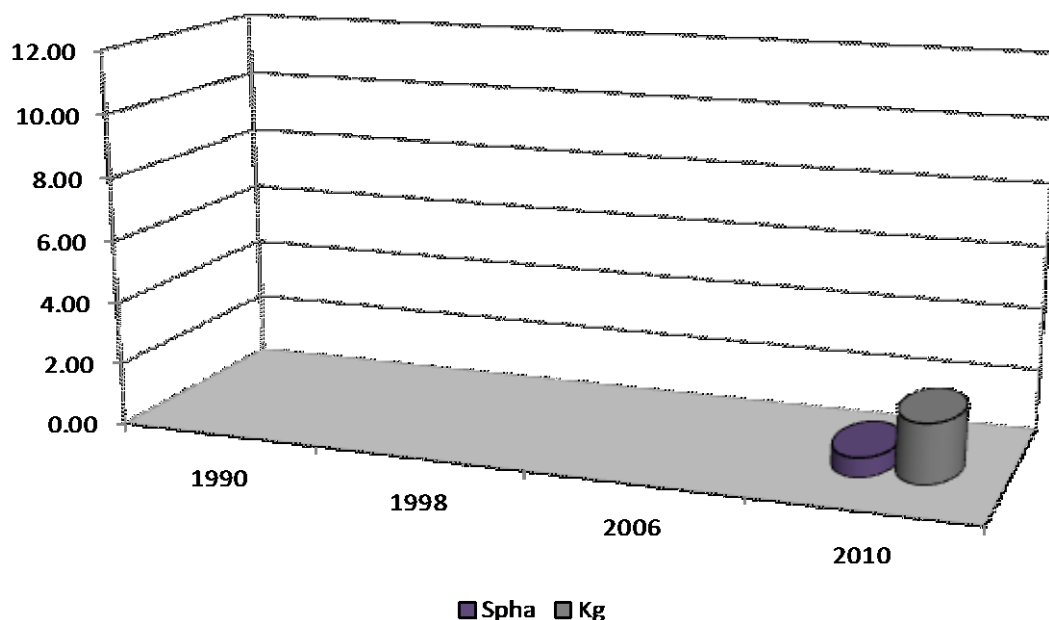


**Figure 30** Comparison of biopesticide usage in soft fruit crops recorded in surveys, by area treated (spha).\*



\* Quantities (kg) are not recorded for biopesticides (see definitions and notes).

**Figure 31** Comparison of 'other products' applied to soft fruit crops recorded in surveys, by area treated (spha) and quantities applied (kg).



**Table 1** Number of holdings in each region, and area (ha) of soft fruit crops sampled, in Northern Ireland, 2010.

<i>County</i>	Total number of holdings	Number of holdings sampled	Area of holdings sampled (ha)	Raised area of population (ha)
Antrim	6	5	3.19	3.78
Armagh	17	14	7.01	8.31
Down	4	3	1.81	2.15
Londonderry	2	2	1.44	1.70
Tyrone	4	3	0.97	1.15
<b>Northern Ireland</b>	<b>32</b>	<b>27</b>	<b>14.42</b>	<b>17.09</b>

**Table 2** Number and area (ha) of soft fruit crops surveyed in Northern Ireland, 2010.

<i>Crop &amp; Location</i>	No. of crops Surveyed	Surveyed area (ha)
Strawberries protected	19	3.99
Strawberries semi-protected	8	3.33
Strawberries non-protected	16	3.14
Raspberries protected	2	0.20
Raspberries non-protected	6	1.74
Gooseberries semi-protected	1	0.10
Gooseberries non-protected	3	0.33
Blackcurrants non-protected	5	0.67
Other crops non-protected	5	0.92
<b>All crops</b>	<b>65</b>	<b>14.42</b>

**Table 3** Estimated area (ha) of protected, semi-protected and non-protected soft fruit crops grown in Northern Ireland, 2010.

<i>Crop Type</i>	Protected crops	Semi-protected crops	Non-protected crops	Total
Strawberries	4.73	3.94	3.72	12.40
Raspberries	0.24	.	2.06	2.30
Gooseberries	.	0.12	0.39	0.51
Blackcurrants	.	.	0.79	0.79
Other crops	.	.	1.09	1.09
<b>All crops</b>	<b>4.97</b>	<b>4.06</b>	<b>8.06</b>	<b>17.09</b>

**Table 4** Basic area treated (ha) and total pesticide-treated area (spha) of soft fruit crops in Northern Ireland 2010 treated with each pesticide type.

<i>Crop types</i>	Fungicides		Herbicides		Insecticides		Biopesticides		Other products		All pesticides	
	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)	(ha)	(spha)
<b><i>Protected</i></b>												
Strawberries	4.73	49.54	0.32	0.32	4.17	13.55	1.73	6.79	0.24	0.62	4.73	70.82
Raspberries	0.24	1.42	0.24	0.24	.	.	.	.	.	.	0.24	1.66
<b>All protected</b>	<b>4.97</b>	<b>50.96</b>	<b>0.56</b>	<b>0.56</b>	<b>4.17</b>	<b>13.55</b>	<b>1.73</b>	<b>6.79</b>	<b>0.24</b>	<b>0.62</b>	<b>4.97</b>	<b>72.48</b>
<b><i>Semi-protected</i></b>												
Strawberries	3.31	28.66	1.03	1.15	2.95	6.16	.	.	.	.	3.63	35.97
Gooseberries	0.06	0.36	0.06	0.06	.	.	.	.	.	.	0.06	0.42
<b>All semi-protected</b>	<b>3.37</b>	<b>29.02</b>	<b>1.09</b>	<b>1.21</b>	<b>2.95</b>	<b>6.16</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>3.69</b>	<b>36.39</b>
<b><i>Non-protected</i></b>												
Strawberries	0.71	1.85	1.28	3.26	0.96	0.96	<0.01	<0.01	.	.	2.39	6.08
Raspberries	0.24	0.47	0.57	0.76	0.05	0.05	0.08	0.24	.	.	0.86	1.52
Gooseberries	.	.	0.14	0.14	0.09	0.09	.	.	.	.	0.14	0.16
Blackcurrants	.	.	0.16	0.16	.	.	.	.	.	.	0.16	0.23
Other crops	.	.	0.36	0.36	0.05	0.05	.	.	.	.	0.36	0.41
<b>All non-protected</b>	<b>0.95</b>	<b>2.32</b>	<b>2.51</b>	<b>4.68</b>	<b>1.15</b>	<b>1.15</b>	<b>0.09</b>	<b>0.25</b>	<b>.</b>	<b>.</b>	<b>3.91</b>	<b>8.40</b>
<b><i>All crops</i></b>												
Strawberries	8.75	80.05	2.63	4.73	8.08	20.67	1.73	6.80	0.24	0.62	10.75	112.87
Raspberries	0.48	1.89	0.81	1.00	0.05	0.05	0.08	0.24	.	.	1.10	3.18
Gooseberries	0.06	0.36	0.20	0.20	.	.	.	.	.	.	0.20	0.56
Blackcurrants	.	.	0.14	0.14	0.09	0.09	.	.	.	.	0.16	0.23
Other crops	.	.	0.36	0.36	0.05	0.05	.	.	.	.	0.36	0.41
<b>Total</b>	<b>9.29</b>	<b>82.30</b>	<b>4.16</b>	<b>6.43</b>	<b>8.29</b>	<b>20.86</b>	<b>1.81</b>	<b>7.04</b>	<b>0.24</b>	<b>0.62</b>	<b>12.57</b>	<b>117.27</b>

**Table 5** Total quantity (kg) of pesticide type applied to soft fruit crops in Northern Ireland, 2010.

<i>Crop &amp; location</i>	Fungicides	Herbicides	Insecticides	Biopesticides	Other products	All pesticides
<b><i>Protected</i></b>						
Strawberries	20.88	0.32	3.55	Trace	1.91	26.66
Raspberries	0.68	0.27	.	.	.	0.95
<b>All Protected</b>	<b>21.56</b>	<b>0.59</b>	<b>3.55</b>	<b>Trace</b>	<b>1.91</b>	<b>27.61</b>
<b><i>Semi-protected</i></b>						
Strawberries	15.32	1.95	2.04	.	.	19.32
Gooseberries	0.17	0.07	.	.	.	0.24
<b>All semi-protected</b>	<b>15.50</b>	<b>2.02</b>	<b>2.04</b>	<b>.</b>	<b>.</b>	<b>19.56</b>
<b><i>Non-protected</i></b>						
Strawberries	3.11	5.19	0.33	.	.	8.63
Raspberries	0.36	1.21	<0.01	Trace	.	1.57
Gooseberries	.	0.20	0.07	.	.	0.27
Blackcurrants	.	0.23	.	.	.	0.23
Other crops	.	0.52	<0.01	.	.	0.52
<b>All non-protected</b>	<b>3.47</b>	<b>7.35</b>	<b>0.40</b>	<b>Trace</b>	<b>.</b>	<b>11.22</b>
<b><i>All crops</i></b>						
Strawberries	39.31	7.46	5.92	Trace	1.91	54.61
Raspberries	1.04	1.48	<0.01	Trace	.	12.52
Gooseberries	0.17	0.27	0.07	.	.	30.51
Blackcurrants	.	0.23	.	.	.	25.23
Other crops	.	0.52	<0.01	.	.	45.52
<b>All crops</b>	<b>40.52</b>	<b>9.96</b>	<b>5.99</b>	<b>Trace</b>	<b>1.91</b>	<b>58.39</b>

**Table 6** The proportional area (%) of each crop treated with pesticides and the mean number of spray applications, Northern Ireland 2010.

<i>Crop Type</i>	Fungicides		Herbicides		Insecticides		Biopesticides		Other products		All pesticides	
	%	sp app.	%	sp app.	%	sp app.	%	sp app.	%	sp app.	%	sp app.
Strawberries	83.7	7.69	25.1	1.93	77.3	2.64	16.5	2.44	2.3	3.00	97.4	4.71
Raspberries	24.5	4.67	41.7	1.33	2.8	1.00	4.1	3.00	.	.	74.9	2.36
Gooseberries	13.9	6.00	47.3	1.00	22.3	1.00	.	.	.	.	70.4	2.25
Blackcurrants	.	.	23.7	1.00	.	.	.	.	.	.	29.8	1.00
Other crops	.	.	39.1	1.00	5.8	1.00	.	.	.	.	38.0	1.00
<b>All crops</b>	<b>64.4</b>	<b>7.43</b>	<b>28.9</b>	<b>1.64</b>	<b>57.5</b>	<b>2.44</b>	<b>12.6</b>	<b>2.50</b>	<b>1.7</b>	<b>3.00</b>	<b>86.6</b>	<b>4.24</b>



**Table 7** Estimated area (spha) of soft fruit crops treated with pesticide formulations in Northern Ireland, 2010 and comparable data from 2006.

	Crop type						
Pesticide type & formulation	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (spha)	2006 data (spha)
Fungicides							
Azoxystrobin	7.80	.	.	.	.	7.80	6.76
Boscalid/pyraclostrobin	5.05	0.47	0.12	.	.	5.64	0.58
Bupirimate	4.72	.	.	.	.	4.72	6.88
Chlorothalonil	1.55	.	.	.	.	1.55	4.46
Cyprodinil/fludioxonil	1.44	.	.	.	.	1.44	.
Dimethomorph	1.55	.	.	.	.	1.55	.
Fenhexamid	6.61	0.47	.	.	.	7.09	5.24
Fosetyl-aluminium	3.94	.	.	.	.	3.94	5.48
Iprodione	11.77	0.47	0.12	.	.	12.36	29.89
Kresoxim-methyl	0.07	.	.	.	.	0.07	.
Mepanipyrim	1.90	.	.	.	.	1.90	4.35
Myclobutanil	13.29	0.47	0.12	.	.	13.88	28.98
Potassium bicarbonate	7.41	.	.	.	.	7.41	.
Pyrimethanil	7.90	.	.	.	.	7.90	9.81
Quinoxifen	0.72	.	.	.	.	0.72	0.25
Sulphur	2.20	.	.	.	.	2.20	.
Thiram	1.91	.	.	.	.	1.91	1.62
Tolylfluanid	0.22	.	.	.	.	0.22	24.86
All fungicides	80.05	1.90	0.36	.	.	82.31	129.16

**Table 7 (cont)** Estimated area (spha) of soft fruit crops treated with pesticide formulations in Northern Ireland, 2010 and comparable data from 2006.

	<i>Crop type</i>						
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (spha)	2006 data (spha)
<b><i>Herbicides</i></b>							
Diquat	<0.01	0.02	.	.	.	0.02	0.97
Glyphosate	1.96	0.55	0.14	0.16	0.36	3.17	2.72
Isoxaben	0.22	.	.	.	.	0.22	1.21
Lenacil	0.71	0.19	.	.	.	0.90	2.50
Pendimethalin	0.22	.	.	.	.	0.22	1.57
Propachlor	0.41	.	.	.	.	0.41	.
Propyzamide	0.41	.	.	.	.	0.41	2.05
Simazine	0.79	0.24	0.06	.	.	1.09	3.33
<b>All herbicides</b>	<b>4.73</b>	<b>1.00</b>	<b>0.20</b>	<b>0.16</b>	<b>0.36</b>	<b>6.44</b>	<b>14.35</b>
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (spha)	2006 data (spha)
<b><i>Insecticides</i></b>							
Abamectin	1.07	.	.	.	.	1.07	1.71
Bifenthrin	1.38	.	.	.	.	1.38	12.89
Chlorpyrifos	4.42	.	0.09	.	.	4.52	6.62
Clofentezine	3.46	.	.	.	.	3.46	3.56
Deltamethrin	.	0.05	.	.	0.05	0.11	.
Dimethoate	0.96	.	.	.	.	0.96	0.02
Etoxazole	2.69	.	.	.	.	2.69	.
Pirimicarb	4.14	.	.	.	.	4.14	9.97
Tebufofenpyrad	1.68	.	.	.	.	1.68	0.83
Thiacloprid	0.86	.	.	.	.	0.86	.
<b>All insecticides</b>	<b>20.67</b>	<b>0.05</b>	<b>0.09</b>	<b>.</b>	<b>0.05</b>	<b>20.87</b>	<b>35.60</b>

**Table 7 (cont)** Estimated area (spha) of soft fruit crops treated with pesticide formulations in Northern Ireland, 2010 and comparable data from 2006.

	<i>Crop type</i>						
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (spha)	2006 data (spha)
<b>Biopesticides</b>							
<i>Aphelinus and Aphidius spp.</i>	0.24	.	.	.	.	0.24	.
<i>Bacillus subtilis</i>	3.91	0.24	.	.	.	4.15	.
<i>Phytoseiulus persimilis</i>	0.85	.	.	.	.	0.85	5.25
<i>Steinernema kraussei</i>	1.79	.	.	.	.	1.79	.
<b>All Biopesticides</b>	<b>6.80</b>	<b>0.24</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>7.03</b>	<b>5.25</b>
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (spha)	2006 data (spha)
<b>Other products</b>							
Acetic acid/hydrogen peroxide/peracetic acid	0.18	.	.	.	.	0.18	.
Natural product	0.38	.	.	.	.	0.38	.
Sodium hypochlorite	0.06	.	.	.	.	0.06	.
<b>All other products</b>	<b>0.62</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>0.62</b>	<b>.</b>
<b>All pesticides</b>	<b>112.86</b>	<b>3.18</b>	<b>0.65</b>	<b>0.16</b>	<b>0.41</b>	<b>117.27</b>	<b>184.36</b>

**Table 8** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2010 and comparable data from 2006.

	Crop type						
Pesticide type & formulation	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (kg)	2006 data (kg)
Fungicides							
Azoxystrobin	1.60	.	.	.	.	1.60	4.98
Boscalid/pyraclostrobin	2.82	0.29	0.07	.	.	3.18	0.15
Bupirimate	1.28	.	.	.	.	1.28	2.31
Chlorothalonil	1.55	.	.	.	.	1.55	6.19
Cyprodinil/fludioxonil	0.90	.	.	.	.	0.90	.
Dimethomorph	0.16	.	.	.	.	0.16	.
Fenhexamid	2.20	0.36	.	.	.	2.56	3.38
Fosetyl-aluminium	7.94	.	.	.	.	7.94	12.31
Iprodione	7.27	0.36	0.09	.	.	7.71	17.44
Kresoxim-methyl	0.01	.	.	.	.	0.01	.
Mepanipyrim	0.59	.	.	.	.	0.59	1.64
Myclobutanil	0.78	0.04	0.01	.	.	0.84	2.00
Potassium bicarbonate	2.07	.	.	.	.	2.07	.
Pyrimethanil	4.02	.	.	.	.	4.02	8.23
Quinoxifen	0.09	.	.	.	.	0.09	0.06
Sulphur	4.13	.	.	.	.	4.13	.
Thiram	1.57	.	.	.	.	1.57	4.10
Tolylfluanid	0.34	.	.	.	.	0.34	29.69
All fungicides	39.31	1.04	0.17	.	.	40.52	92.48

**Table 8 (cont)** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2010 and comparable data from 2006.

	<i>Crop type</i>						
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (kg)	2006 data (kg)
<b>Herbicides</b>							
Diquat	<0.01	0.01	.	.	.	0.01	0.49
Glyphosate	3.01	0.79	0.20	0.23	0.52	4.75	2.90
Isoxaben	0.06	.	.	.	.	0.06	.
Lenacil	1.56	0.41	.	.	.	1.97	4.18
Pendimethalin	0.44	.	.	.	.	0.44	3.10
Propachlor	0.98	.	.	.	.	0.98	.
Propyzamide	0.52	.	.	.	.	0.52	2.56
Simazine	0.89	0.27	0.07	.	.	1.22	3.83
<b>All herbicides</b>	<b>7.46</b>	<b>1.48</b>	<b>0.27</b>	<b>0.23</b>	<b>0.52</b>	<b>9.96</b>	<b>17.06</b>
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (kg)	2006 data (kg)
<b>Insecticides</b>							
Abamectin	<0.01	.	.	.	.	<0.01	0.02
Bifenthrin	0.03	.	.	.	.	0.03	0.31
Chlorpyrifos	3.33	.	0.07	.	.	3.40	3.57
Clofentezine	0.53	.	.	.	.	0.53	0.69
Deltamethrin	.	<0.01	.	.	<0.01	<0.01	.
Dimethoate	0.33	.	.	.	.	0.33	<0.01
Etoxazole	0.09	.	.	.	.	0.09	.
Pirimicarb	1.11	.	.	.	.	1.11	2.12
Tebufenpyrad	0.43	.	.	.	.	0.43	0.10
Thiacloprid	0.06	.	.	.	.	0.06	.
<b>All insecticides</b>	<b>5.92</b>	<b>&lt;0.01</b>	<b>0.07</b>	<b>.</b>	<b>&lt;0.01</b>	<b>5.99</b>	<b>6.81</b>

**Table 8 (cont)** Estimated quantities (kg) of pesticide active ingredients applied to soft fruit crops in Northern Ireland, 2010 and comparable data from 2006.

	<i>Crop type</i>						
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (spha)	2006 data (spha)
<b>Biopesticides</b>							
<i>Aphelinus and Aphidius spp.</i>	Trace	.	.	.	.	Trace	.
<i>Bacillus subtilis</i>	Trace	Trace	.	.	.	Trace	.
<i>Phytoseiulus persimilis</i>	Trace	.	.	.	.	Trace	Trace
<i>Steinernema kraussei</i>	Trace	.	.	.	.	Trace	.
<b>All Biopesticides</b>	<b>Trace</b>	<b>Trace</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>Trace</b>	<b>Trace</b>
	<i>Crop type</i>						
<i>Pesticide type &amp; formulation</i>	Strawberries	Raspberries	Gooseberries	Blackcurrants	Other crops	All crops (kg)	2006 data (kg)
<b>Other products</b>							
Acetic acid/hydrogen peroxide/peracetic acid	1.51	.	.	.	.	1.51	.
Natural product	0.38	.	.	.	.	0.38	.
Sodium hypochlorite	0.02	.	.	.	.	0.02	.
<b>All other products</b>	<b>1.91</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>1.91</b>	<b>.</b>
<b>All pesticides</b>	<b>54.61</b>	<b>2.52</b>	<b>0.51</b>	<b>0.23</b>	<b>0.52</b>	<b>58.39</b>	<b>116.35</b>

**Table 9** The active ingredients most extensively used on soft fruit crops in Northern Ireland 2010 ranked by treated area (spha).

No.	Active ingredient	Treated area (spha)
1	Myclobutanil	13.88
2	Iprodione	12.36
3	Pyrimethanil	7.90
4	Azoxystrobin	7.80
5	Potassium bicarbonate	7.41
6	Fenhexamid	7.09
7	Boscalid	5.64
8	Bupirimate	4.72
9	Chlorpyrifos	4.52
10	<i>Bacillus subtilis</i>	4.15
11	Pirimicarb	4.14
12	Fosetyl-aluminium	3.94
13	Clofentezine	3.46
14	Glyphosate	3.17
15	Etoxazole	2.69
16	Sulphur	2.20
17	Thiram	1.91
18	Mepanipyrim	1.90
19	<i>Steinernema kraussei</i>	1.79
20	Tebufenpyrad	1.68
21	Dimethomorph	1.55
22	Chlorothalonil	1.55
23	Cyprodinil	1.44
24	Bifenthrin	1.38
25	Simazine	1.09
26	Abamectin	1.07
27	Dimethoate	0.96
28	Lenacil	0.90
29	Thiacloprid	0.86
30	<i>Phytoseiulus persimilis</i>	0.85
31	Quinoxifen	0.72
32	Propachlor	0.41
33	Propyzamide	0.41
34	<i>Aphelinus and Aphidius spp.</i>	0.24
35	Pendimethalin	0.22
36	Isoxaben	0.22
37	Tolylfluanid	0.22
38	Deltamethrin	0.11
39	Kresoxim-methyl	0.07
40	Diquat	0.02

**Table 10** The active ingredients most extensively used on soft fruit crops in Northern Ireland 2010 ranked by weight (kg).

No.	Active ingredient	Quantity applied (kg)
1	Fosetyl-aluminium	7.94
2	Iprodione	7.71
3	Glyphosate	4.75
4	Sulphur	4.13
5	Pyrimethanil	4.02
6	Chlorpyrifos	3.40
7	Boscalid	3.18
8	Fenhexamid	2.56
9	Potassium bicarbonate	2.07
10	Lenacil	1.97
11	Azoxystrobin	1.60
12	Thiram	1.57
13	Chlorothalonil	1.55
14	Bupirimate	1.28
15	Simazine	1.22
16	Pirimicarb	1.11
17	Propachlor	0.98
18	Cyprodinil	0.90
19	Myclobutanil	0.84
20	Mepanipyrim	0.59
21	Clofentezine	0.53
22	Propyzamide	0.52
23	Pendimethalin	0.44
24	Tebufenpyrad	0.43
25	Tolylfluanid	0.34
26	Dimethoate	0.33
27	Dimethomorph	0.16
28	Etoxazole	0.09
29	Quinoxifen	0.09
30	Thiacloprid	0.06
31	Isoxaben	0.06
32	Bifenthrin	0.03
33	Kresoxim-methyl	0.01
34	Diquat	0.01
35	Abamectin	<0.01
36	Deltamethrin	<0.01
37	<i>Bacillus subtilis</i>	Trace
38	<i>Steinernema kraussei</i>	Trace
39	<i>Phytoseiulus persimilis</i>	Trace
40	<i>Aphelinus and Aphidius spp.</i>	Trace



**Table 11** Strawberries (protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use						All reasons (spha)	Total area of protected strawberries grown = 4.73 ha		
	Blackspot	Botrytis	Botrytis & mildew	Powdery mildew	Red core	Root rot		Basic area treated (ha)	Percentage of grown area treated	Quantity applied (kg)
<b>Pesticide type &amp; formulation</b>										
<b>Fungicides</b>										
Azoxystrobin	.	.	.	3.97	.	.	3.97	2.01	42.5%	0.6
Boscalid/pyraclostrobin	.	3.27	0.31	.	.	.	3.58	1.21	25.6%	1.9
Bupirimate	.	.	.	2.56	.	.	2.56	0.95	20.1%	0.5
Chlorothalonil	.	.	.	0.11	.	.	0.11	0.11	2.3%	0.1
Cyprodinil/fludioxonil	0.07	0.54	.	.	.	.	0.61	0.61	12.9%	0.4
Dimethomorph	.	.	.	.	0.83	.	0.83	0.83	17.5%	0.1
Fenhexamid	.	5.34	.	0.48	.	.	5.82	1.31	27.7%	1.6
Fosetyl-aluminium	.	0.31	.	.	1.67	0.48	2.46	1.50	31.7%	2.7
Iprodione	.	8.93	.	.	.	.	8.93	2.62	55.4%	5.1
Kresoxim-methyl	.	0.07	.	.	.	.	0.07	0.07	1.5%	<0.1
Mepanipyrim	.	0.57	1.09	0.24	.	.	1.90	1.30	27.5%	0.6
Myclobutanil	.	0.24	.	10.47	.	.	10.71	3.08	65.1%	0.5
Potassium bicarbonate	.	.	.	0.21	.	.	0.21	0.21	4.4%	0.1
Pyrimethanil	.	3.01	.	2.23	.	.	5.24	1.95	41.2%	1.9
Sulphur	.	.	.	0.65	.	.	0.65	0.65	13.7%	3.1
Thiram	.	1.44	.	0.47	.	.	1.91	0.60	12.7%	1.6
<b>All fungicides</b>	<b>0.07</b>	<b>23.71</b>	<b>1.40</b>	<b>21.38</b>	<b>2.50</b>	<b>0.48</b>	<b>49.54</b>	<b>4.73</b>	<b>100.0%</b>	<b>20.9</b>

**Table 11 (cont)** Strawberries (protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use									Total area of protected strawberries grown = 4.73 ha		
	Aphids	Botrytis	Capsids	Disinfect house	General weed control	House preparation	Two-spotted spider mite	Vine weevil	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	Quantity applied (kg)
<b>Herbicides</b>												
Glyphosate	.	.	.	.	0.32	.	.	.	0.32	0.32	6.8%	0.3
<b>All herbicides</b>	.	.	.	.	<b>0.32</b>	.	.	.	<b>0.32</b>	<b>0.32</b>	<b>6.8%</b>	<b>0.3</b>
<b>Insecticides</b>												
Abamectin	.	.	.	.	.	.	1.07	.	1.07	1.01	21.4%	<0.1
Bifenthrin	.	.	.	.	.	.	0.66	.	0.66	0.57	12.1%	<0.1
Chlorpyrifos	3.66	.	.	.	.	.	.	0.12	3.78	2.00	42.3%	2.6
Clofentezine	.	.	.	.	.	.	2.74	.	2.74	2.20	46.5%	0.4
Etoxazole	1.01	.	.	.	.	.	1.68	.	2.69	2.21	46.7%	0.1
Pirimicarb	0.79	.	.	.	.	.	.	.	0.79	0.67	14.2%	0.2
Tebufenpyrad	.	.	.	.	.	.	0.96	.	0.96	0.96	20.3%	0.2
Thiacloprid	0.74	.	0.12	.	.	.	.	.	0.86	0.86	18.2%	0.1
<b>All insecticides</b>	<b>6.20</b>	.	<b>0.12</b>	.	.	.	<b>7.11</b>	<b>0.12</b>	<b>13.60</b>	<b>4.17</b>	<b>88.2%</b>	<b>3.6</b>
<b>Biopesticides</b>												
<i>Aphelinus and Aphidius spp.</i>	.	.	.	.	.	.	0.24	.	0.24	0.24	5.1%	Trace
<i>Bacillus subtilis</i>	.	3.91	.	.	.	.	.	.	3.91	0.55	11.6%	Trace
<i>Phytoseiulus persimilis</i>	.	.	.	.	.	.	0.85	.	0.85	0.85	18.0%	Trace
<i>Steinernema kraussei</i>	.	.	.	.	.	.	.	1.79	1.79	1.31	27.7%	Trace
<b>All biopesticides</b>	.	<b>3.91</b>	.	.	.	.	<b>1.09</b>	<b>1.79</b>	<b>6.80</b>	<b>1.73</b>	<b>36.6%</b>	<b>Trace</b>

**Table 11 (cont)** Strawberries (protected): pesticide-treated area (spha), grown area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use									Total area of protected strawberries grown = 4.73 ha		
	Aphids	Botrytis	Capsids	Disinfect house	General weed control	House preparation	Two-spotted spider mite	Vine weevil	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	Quantity applied (kg)
<b>Pesticide type &amp; formulation</b>												
<b>Other products</b>												
Acetic acid/hydrogen peroxide/peracetic acid	.	.	.	0.11	.	0.07	.	.	0.18	0.18	3.8%	1.5
Natural product	0.38	.	.	.	.	.	.	.	0.38	0.06	1.3%	0.4
Sodium hypochlorite	.	.	.	.	.	0.06	.	.	0.06	0.06	1.3%	<0.1
<b>All other products</b>	<b>0.38</b>	<b>.</b>	<b>.</b>	<b>0.11</b>	<b>.</b>	<b>0.13</b>	<b>.</b>	<b>.</b>	<b>0.62</b>	<b>0.24</b>	<b>5.1%</b>	<b>1.9</b>

**Table 12** Strawberries (semi-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use						All reasons (spha)	Total area of semi-protected strawberries grown = 3.94 ha		Quantity (kg)
	Botrytis	Crown rot	General fungus control	Grey mould	Powdery mildew	Red core		Basic area treated (ha)	Percentage of grown area treated	
<b>Pesticide type &amp; formulation</b>										
<b>Fungicides</b>										
Azoxystrobin	.	.	.	.	3.83	.	3.83	3.11	94.0%	1.0
Boscalid/pyraclostrobin	1.29	.	.	.	.	.	1.29	0.86	26.0%	0.8
Bupirimate	.	.	.	.	2.16	.	2.16	2.16	65.3%	0.8
Chlorothalonil	1.44	.	.	.	.	.	1.44	1.44	43.5%	1.4
Cyprodinil/fludioxonil	0.72	.	.	.	.	.	0.72	0.72	21.8%	0.4
Dimethomorph	.	.	.	.	.	0.72	0.72	0.72	21.8%	0.1
Fenhexamid	0.72	.	.	.	.	.	0.72	0.72	21.8%	0.5
Fosetyl-aluminium	.	0.12	0.72	.	.	.	0.84	0.84	25.4%	3.7
Iprodione	2.73	.	.	.	.	.	2.73	1.58	47.7%	2.0
Myclobutanil	.	.	.	.	2.59	.	2.59	2.30	69.5%	0.2
Potassium bicarbonate	.	.	.	.	7.20	.	7.20	2.16	65.3%	2.0
Pyrimethanil	1.50	.	.	0.06	0.72	.	2.28	2.22	67.1%	1.8
Quinoxifen	.	.	.	.	0.72	.	0.72	0.72	21.8%	0.1
Sulphur	.	.	.	.	1.44	.	1.44	0.72	21.8%	0.5
<b>All fungicides</b>	<b>8.40</b>	<b>0.12</b>	<b>0.72</b>	<b>0.06</b>	<b>18.66</b>	<b>0.72</b>	<b>28.68</b>	<b>3.31</b>	<b>84.0%</b>	<b>15.3</b>

**Table 12 (cont)** Strawberries (semi-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use				Total area of semi-protected strawberries grown = 3.94 ha		
Pesticide type & formulation	Aphids	General weed control	Two-spotted spider mite	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	Quantity (kg)
Herbicides							
Glyphosate	.	0.88	.	0.88	0.88	26.6%	1.6
Lenacil	.	0.06	.	0.06	0.06	1.8%	0.1
Simazine	.	0.21	.	0.21	0.15	4.5%	0.2
All herbicides	.	1.15	.	1.15	1.03	26.1%	1.9
Insecticides							
Bifenthrin	0.72	.	.	0.72	0.72	21.8%	<0.01
Chlorpyrifos	0.64	.	.	0.64	0.32	9.7%	0.7
Clofentezine	.	.	0.72	0.72	0.72	21.8%	0.1
Pirimicarb	3.35	.	.	3.35	2.63	79.5%	0.9
Tebufenpyrad	.	.	0.72	0.72	0.72	21.8%	0.2
All insecticides	4.72	.	1.44	6.15	2.95	74.9%	1.9

**Table 13** Strawberries (non-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use						Total area of non-protected strawberries grown = 3.72 ha		Quantity (kg)
	Botrytis	Crown rot	General fungus control	Grey mould	Powdery mildew	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	
<b>Pesticide type &amp; formulation</b>									
<b>Fungicides</b>									
Boscalid/pyraclostrobin	0.18	.	.	.	.	0.18	0.18	4.8%	0.12
Cyprodinil/fludioxonil	0.11	.	.	.	.	0.11	0.11	3.0%	0.07
Fenhexamid	0.07	.	.	.	.	0.07	0.07	1.9%	0.06
Fosetyl-aluminium	0.18	0.46	.	.	.	0.64	0.45	12.1%	1.59
Iprodione	0.11	.	.	.	.	0.11	0.11	3.0%	0.09
Pyrimethanil	0.19	.	.	0.19	.	0.38	0.19	5.1%	0.31
Sulphur	.	.	.	.	0.11	0.11	0.11	3.0%	0.55
Tolyfluanid	0.22	.	.	.	.	0.22	0.22	5.9%	0.34
<b>All fungicides</b>	<b>1.08</b>	<b>0.46</b>	<b>.</b>	<b>0.19</b>	<b>0.11</b>	<b>1.85</b>	<b>0.71</b>	<b>19.1%</b>	<b>3.11</b>

**Table 13 (cont)** Strawberries (non-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use					Total area of non-protected strawberries grown = 3.72 ha	
Pesticide type & formulation	General fungus control	General insect control	General weed control	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	Quantity (kg)
Herbicides							
Diquat	.	.	<0.01	<0.01	<0.01	0.3%	<0.01
Glyphosate	.	.	0.77	0.77	0.77	20.7%	1.11
Isoxaben	.	.	0.22	0.22	0.22	5.9%	0.06
Lenacil	.	.	0.65	0.65	0.65	17.5%	1.43
Pendimethalin	.	.	0.22	0.22	0.22	5.9%	0.44
Propachlor	.	.	0.41	0.41	0.41	11.0%	0.98
Propyzamide	.	.	0.41	0.41	0.41	11.0%	0.52
Simazine	.	.	0.58	0.58	0.29	7.8%	0.65
All herbicides	.	.	3.26	3.26	1.28	34.4%	5.19
Insecticides							
Dimethoate	.	0.96	.	0.96	0.96	25.8%	0.33
All insecticides	.	0.96	.	0.96	0.96	25.8%	0.33
Biopesticides							
Bacillus subtilis	<0.01	.	.	<0.01	<0.01	0.3%	Trace
All biopesticides	<0.01	.	.	<0.01	<0.01	0.3%	Trace

**Table 14** Raspberries (protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use				Total area of protected raspberries grown = 0.24 ha		
Pesticide type & formulation	Botrytis	General weed control	Powdery mildew	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	Quantity (kg)
Fungicides							
Boscalid/pyraclostrobin	0.47	.	.	0.47	0.24	100.0%	0.29
Iprodione	0.47	.	.	0.47	0.24	100.0%	0.36
Myclobutanil	.	.	0.47	0.47	0.24	100.0%	0.04
All fungicides	0.95	.	0.47	1.42	0.24	100.0%	0.68
Herbicides							
Simazine	.	0.24	.	0.24	0.24	100.0%	0.27
All herbicides	.	0.24	.	0.24	0.24	100.0%	0.27



**Table 15** Raspberries (non-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use						Total area of non-protected raspberries grown = 2.06 ha		
Pesticide type & formulation	Aphids	Botrytis	General fungus control	General weed control	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	Quantity (kg)	
Fungicides									
Fenhexamid	.	0.47	.	.	0.47	0.24	11.7%	0.36	
All fungicides	.	0.47	.	.	0.47	0.24	11.7%	0.36	
Herbicides									
Diquat	.	.	.	0.02	0.02	0.02	1.0%	0.01	
Glyphosate	.	.	.	0.55	0.55	0.55	26.7%	0.79	
Lenacil	.	.	.	0.19	0.19	0.19	9.2%	0.41	
All herbicides	.	.	.	0.76	0.76	0.57	27.7%	1.21	
Insecticides									
Deltamethrin	0.05	.	.	.	0.05	0.05	2.4%	<0.01	
All insecticides	0.05	.	.	.	0.05	0.05	2.4%	<0.01	
Biopesticides									
Bacillus subtilis	.	.	0.24	.	0.24	0.08	3.9%	Trace	
All biopesticides	.	.	0.24	.	0.24	0.08	3.9%	Trace	

**Table 16** Gooseberries (semi-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use				Total area of semi-protected gooseberries grown = 0.12 ha		
Pesticide type & formulation	Botrytis	General weed control	Powdery mildew	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	Quantity (kg)
Fungicides							
Boscalid/pyraclostrobin	0.12	.	.	0.12	0.06	50.0%	0.07
Iprodione	0.12	.	.	0.12	0.06	50.0%	0.09
Myclobutanil	.	.	0.12	0.12	0.06	50.0%	0.01
All fungicides	0.24	.	0.12	0.36	0.06	50.0%	0.17
Herbicides							
Simazine	.	0.06	.	0.06	0.06	50.0%	0.07
All herbicides	.	0.06	.	0.06	0.06	50.0%	0.07

**Table 17** Gooseberries (non-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

	Reason for use			Total area of non-protected gooseberries grown = 0.39 ha		Quantity (kg)
	Aphids	General weed control	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	
<b>Pesticide type &amp; formulation</b>						
<b>Herbicides</b>						
Glyphosate	.	0.14	0.14	0.14	35.9%	0.20
All herbicides	.	0.14	0.14	0.14	35.9%	0.20
<b>Insecticides</b>						
Chlorpyrifos	0.09	.	0.09	0.09	23.1%	0.07
All insecticides	0.09	.	0.09	0.09	23.1%	0.07

**Table 18** Blackcurrants (non-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

Pesticide type & formulation	Reason for use		Total area of non-protected blackcurrants grown = 0.79 ha		Quantity (kg)
	General weed control	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	
<b>Herbicides</b>					
Glyphosate	0.16	0.16	0.16	20.3%	0.23
All herbicides	0.16	0.16	0.16	20.3%	0.23

**Table 19** Other crops (non-protected): pesticide-treated area (spha), basic area treated (ha), percentage of grown area treated, quantity applied (kg) and reasons for use.

Pesticide type & formulation	Reason for use			Total area of non-protected 'other crops' grown = 1.09 ha		Quantity (kg)
	Aphids	General weed control	All reasons (spha)	Basic area treated (ha)	Percentage of grown area treated	
<b>Herbicides</b>						
Glyphosate	.	0.36	0.36	0.36	33.0%	0.52
All herbicides	.	0.36	0.36	0.36	33.0%	0.52
<b>Insecticides</b>						
Deltamethrin	0.05	.	0.05	0.05	4.6%	<0.01
All insecticides	0.05	.	0.05	0.05	4.6%	<0.01

**Table 20** Comparison of pesticide usage on soft fruit crops 1990-2010, spray hectares (spha) of formulation and quantities of active ingredient (kg) used.

<i>Pesticide type</i>	1990		1998		2006		2010	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
Fungicides	171.37	277.61	154.09	189.10	134.88	97.65	82.30	40.52
Herbicides	159.40	199.54	61.80	95.60	25.57	27.60	6.45	9.96
Insecticides	33.71	19.61	41.25	16.70	37.37	7.65	20.86	5.99
Molluscicides	8.83	1.79	22.96	10.00	1.72	1.29	.	.
Biopesticides	.	.	1.50	.	11.40	.	7.04	.
Other products	.	.	.	.	.	.	0.62	1.91
<b>Total</b>	<b>373.31</b>	<b>498.55</b>	<b>281.60</b>	<b>311.40</b>	<b>210.94</b>	<b>134.19</b>	<b>117.27</b>	<b>58.39</b>

**Table 21** Comparison of pesticide usage on strawberry crops\* 1990-2010, spray hectares (spha) of formulation and quantities of active ingredient (kg) used.

<i>Pesticide type</i>	1990		1998		2006		2010	
	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)	(spha)	(kg)
Fungicides	135.67	229.57	132.16	156.41	121.53	81.42	80.05	39.31
Herbicides	112.80	133.31	41.11	52.60	22.00	22.25	4.73	7.46
Insecticides	23.64	14.56	37.49	12.82	35.62	6.84	20.67	5.92
Molluscicides	8.42	1.70	22.47	9.91	1.72	1.29	.	.
Biopesticides	.	.	1.45	.	11.31	.	6.79	.
Other products	.	.	.	.	.	.	0.62	1.91
<b>Total</b>	<b>280.53</b>	<b>379.14</b>	<b>234.68</b>	<b>231.74</b>	<b>192.18</b>	<b>111.80</b>	<b>112.86</b>	<b>54.60</b>

*\*Combined total of protected, semi-protected & non-protected strawberries.*

## Northern Ireland Pesticide Usage Survey Published Reports Appendix 1

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

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

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
238	Grassland & Fodder Crops 2009	1-848 07 186 5
239	Hardy Nursery Stock Crops 2009	1-848 07 187 2

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