

**PESTICIDE USAGE
IN NORTHERN IRELAND**

Survey Report 201

**Protected Ornamental Crops
2003**

A National Statistics Publication



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PESTICIDE USAGE SURVEY REPORT 201

NORTHERN IRELAND PROTECTED ORNAMENTAL CROPS

2003

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The County Regions Of Northern Ireland



SUMMARY

This report presents information from a survey of the pesticide usage practices on ornamental protected crops grown in Northern Ireland in 2003.

Sample data were collected from 65 growers and the total area of protected non-edible crops grown was 366,584 m². Ornamental crops accounted for 49% of the area grown, bedding and pot plants 43%, cut flowers 7% and other crops (i.e. trees and bulbs grown under protection) <1%. An estimated 59% of all protected non-edible crops were grown in County Down. A total of 630kg of pesticides active ingredients was applied to 2,103,703 treated m² (210spha).

Fungicides, applied to 53% of the total pesticide-treated area, accounted for 48% of the weight of pesticides applied. Iprodione, mainly used on bedding and pot plants, was the fungicide active ingredient most frequently used.

Insecticides and acaricides were applied to 32% of the pesticide-treated area, representing 3% of the total weight of pesticides applied. The pyrethroid deltamethrin was the insecticide/acaricide active ingredient most extensively used, primarily on bedding and pot plants.

Herbicides accounted for 10% of the pesticide-treated area, representing 3% of the weight of pesticides applied. Quinoclamine was the herbicide / algicide active ingredient most frequently used, primarily to control liverwort and moss on protected nursery stock plants, with oxadiazon also extensively used.

Growth regulators were applied to 4% of the total pesticide-treated area accounting for 3% of the weight of pesticides used. Daminozide and paclobutrazol were the most extensively used growth regulators.

The only molluscicide recorded in use was metaldehyde and this active ingredient represented less than 1% of both the pesticide-treated area and the total quantity of pesticides used.

Mixed formulations, containing fungicide/insecticide mixtures, soil sterilants and phenolic derivatives, accounted for less than 1% of the total pesticide-treated area but represented 43% of the total weight of pesticide used. This was mainly due to the use of the soil sterilant dazomet, which is used at a high rate per unit area.

No biological controls were recorded used in this survey period.

INTRODUCTION

As a participant in the UK Working Party on Pesticide Usage Surveys, the Department of Agriculture and Rural Development (DARD), conducts a programme of cyclical surveys to examine pesticide usage in all sectors of the agricultural and horticultural industries. The data collected provides information for consideration by the Advisory Committee on Pesticides. The information may also be used by those involved in residue testing, for public information, provision of data for research and evaluation of trends in pesticide usage.

This is the second survey of pesticide usage on protected ornamental crops in Northern Ireland. Results from the previous surveys reported on pesticide usage practices on protected crops (edible & ornamental) in 1991 (Kidd *et al*,1997)

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

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.
- ‘Spm²’ refers to the treated area in square metres, (‘Spha’ refers to the treated area in hectares). This is an estimated figure throughout the report, as some growers only knew the total pesticide usage and their holding area, but the sprays may / may not have been applied to whole or part of the area, therefore the area may be an over estimate on this basis.
- ‘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.
- Spot treatments were taken as 25% of the area
- General nursery area includes hardy and ornamental nursery holdings.

METHODS

The total population of nursery stock growers in Northern Ireland was developed using the Northern Ireland Agricultural Census, June 2003 (Anon., 2004) and a comprehensive list of growers held by DARD advisory staff. From this, 151 growers, representing 65% of the estimated population of general (includes hardy and protected ornamental crops) nursery stock growers were sampled. As there was no initial information to identify which holdings had protected or non-protected crops, this was determined following data entry. Of the 151 growers sampled, 65 grew protected crops. The sample was stratified into the six county regions of Northern Ireland. The total number of holdings in each county, together with the numbers surveyed are shown in Table 1 (Figure 1). The estimated total area of protected ornamental crops grown in Northern Ireland is shown in Table 2.

This survey represents the period from September 2002 to September 2003.

The purpose of the survey was explained to selected growers in preliminary correspondence. Holdings were then visited and data collected by personal interview. The grower's perceived reasons for pesticide use were also included, but may not always seem appropriate. The collected data were analysed using SPSS software.

RESULTS AND DISCUSSION

REGIONAL PESTICIDE USAGE

While 51% of the total pesticide- treated area was attributed to County Down, only 10% of the total quantity of pesticides was used there. Conversely, County Antrim, accounting for 46% of the total quantity of pesticide usage represented only 13% of the total pesticide-treated area. County Armagh accounted for 30% and 35% of the total pesticide-treated area and quantities of pesticides used, respectively. (Tables 3 & 4, 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 5 & 6. The protected crops were grouped into the following categories; Bedding and pot plants (accounting for 40% of the total pesticide-treated area and 28% of the total quantity of pesticides applied), Cut flowers (9% and 39%, respectively), Protected ornamental crops (51% and 25%, respectively) and others (accounting for less than 1% of the treated area and 7% of the quantity of pesticides applied).

TOTAL PESTICIDE USAGE

A total of 629 kilograms of pesticide active ingredients were applied to 2,103,703 spray m² (210spha) of protected ornamental crops grown in Northern Ireland in 2003 (Tables 3 and 4, Figure 2). Fungicides were applied to 53% of the pesticide-treated area, representing 48% of the weight of pesticides applied. Herbicides were applied to 10% of the area treated with pesticides, accounting for 3% of the total weight of pesticides used.

Insecticides/acaricides, applied to 32% of the pesticide-treated area, represented 3% of the total pesticide usage by weight. Growth regulators represented 4% and 3% of the total pesticide-treated area and weight of active ingredients used, respectively.

Molluscicides accounted for less than 1% of the pesticide-treated area and of the weight of pesticides applied.

Iprodione was the most frequently used fungicide, applied to 25% of the total fungicide-treated area, accounting only for 2% of the weight of fungicides used. Fosetyl-aluminium, applied to only 2% of the fungicide-treated area, represented 50% of the weight of fungicides used (Tables 7&8).

The pyrethroid insecticide, deltamethrin, accounted for 27% of the insecticide/acaricide-treated area but represented less than 1% of the quantity of insecticides/acaricides applied. The general purpose insecticide nicotine, applied to 8% of the insecticide/acaricide-treated area represented 53% of the weight of insecticides/acaricides used.

Mixed formulations (of insecticides and fungicides) also represented less than 1% of the pesticide-treated area but accounted for 43% of the quantity of pesticides applied.

The herbicide/algicide quinclamine was the active ingredient most extensively used on the herbicide-treated area (48%) and accounted for 72% of the weight of herbicides used. The herbicide formulation isoxaben / trifluralin was also frequently used.

The growth regulators daminozide (38%) and paclobutrazol (36%) collectively accounted for 74% of active ingredients applied to the area treated with growth regulators.

A total of 89 products comprising 65 active ingredients were recorded in use during this survey. The fifty active ingredients most frequently recorded, prioritised by application area and quantity applied, are shown in Tables 9 & 10, respectively.

BEDDING AND POT PLANTS (Table 11)

The area of bedding and pot plants grown was estimated to be 159,119 m² (Table 2). A total of 835,941 spray m² of bedding and pot plants was treated with pesticides, with an estimated 177 kgs of pesticide active ingredients applied to the treated area (Tables 5 & 6).

Fungicides

An estimated 65% of the area of this crop receiving pesticide applications was treated with fungicides (93% of the weight of pesticides applied). An estimated 69% of fungicide applications had 'general disease control' given as the principal reason for usage, with Botrytis (18%) and mildew (*Peronospora spp.*) (8%) collectively accounting for a further 26% of pesticide usage. Iprodione was the most frequently used fungicide, applied to 199,514 spray m² and accounting for 3% of the weight of fungicides applied. This active ingredient was also the most extensively used fungicide, applied to bedding and pot plants in 1991. Chlorothalonil (18%) and the fungicide mixture metalaxyl/thiram (14%) collectively accounted for a further 32% of principally prophylactic applications.

Herbicides

All herbicides were applied to the treated area for 'general weed control'. Paraquat was the most commonly applied herbicide, accounting for 93% of the herbicide-treated area and 85% of the weight of herbicides applied to bedding and pot plants. Glyphosate was the only other herbicide recorded.

Insecticide/Acaricides

Insecticides and acaricides applied for 'general insect control' and to control aphids accounted for 56% and 38% of the insecticide/acaricide-treated area, respectively. The pyrethroid active ingredient deltamethrin, accounted for 59% of the insecticide/acaricide-treated area but represented only 2% of the weight of insecticides/acaricides applied to this crop category.

Growth Regulators

Bedding and pot plants accounted for an estimated 86% of the total growth regulator-treated area. Paclobutrazol, daminozide and chlormequat were the three active ingredients recorded used on these crops (Table 7).

Other Products

The mixed formulation bupirimate/pirimicarb/triforine was applied to 2,151spm² to control 'disease' on bedding and pot plant crops (Table 5).

Metaldehyde was the only molluscicide recorded, used on less than 1% of the pesticide-treated area of this crop type (Table 5).

CUT FLOWERS (Table 12)

The area of cut flowers grown in this survey period was recorded at approximately 3 hectares, representing 7% of the area of non-edible protected crops grown in Northern Ireland in 2003 (Table 2).

No herbicides were recorded in use on cut flower crops.

Fungicides

Fungicides were applied to 39% of the pesticide-treated area (less than 1% of the weight of pesticides applied). As with bedding and pot plant crops, iprodione was the fungicide active ingredient most extensively used on cut flower crops. An estimated 99% of all fungicide applications to cut flower crops was to control rust (*Puccinia lagenophorae* and *P.horiana*, with the latter mainly affecting chrysanthemums).

Insecticide/Acaricides

Of the pesticide applications to cut flowers, insecticides/acaricides accounted for 52% of the pesticide-treated area and 3% of the quantity applied to cut flower crops. Nicotine was the active ingredient most extensively used applied to 25% of the treated area and accounting for 67% of the weight of insecticides used. The principal reason (52%) cited by growers for use of insecticides was to control aphids. The active ingredients pymetrozine (15%) and spinosad (15%) collectively accounted for 30% of the insecticide/acaricide-treated area and 10% of the quantity of insecticides/acaricides used (Tables 5 & 6).

Growth Regulators

Daminozide was the only growth regulator applied to 5% of the total pesticide treated area of cut flowers (Table 5).

Other Products

Metaldehyde was the only molluscicide active ingredient applied to 1,120spm² of cut flower crops. The soil sterilant dazomet was applied to approximately 3% of the pesticide-treated area of these crops (Table 5).

ORNAMENTAL CROPS (Table 13)

Ornamental crops (shrubs, conifers, hedging, alpine, heathers, herbaceous plants, roses and any mixed areas of ornamental crops under protection) were grown on 49% (180,787m²) of the total area of protected non-edible crops grown in Northern Ireland in 2003 (Table 2).

Fungicides

Fungicide applications to ornamental crops represented 45% of total fungicide use on non-edible protected crops (Table 5). This also represented 46% of the pesticide-treated area of ornamental crops. Pyrifenoxy, the most widely used active substance, was applied to 81,290 spm² (16% of the fungicide-treated area).

Herbicides

An estimated 205,000 spm² (19%) of ornamental crops received a herbicide treatment. While quinclamine was the most extensively used herbicide active ingredient (48% of the herbicide-treated area of ornamental crops) applied chiefly to control liverwort and moss, the herbicide mix of isoxaben/trifluralin (45% of the herbicide-treated area) was the most extensively used as a general weed control.

Insecticide/Acaricides

Insecticide/acaricides accounted for 34% of the pesticide-treated area and 4% of the quantity of pesticide applied to ornamental crops. The pyrethroid bifenthrin was the active ingredient most frequently used on these crops accounting for 28% of the insecticide/acaricide-treated area and 3% of the quantity applied, with 20% of applications being applied to control red spider mite (*Tetranychus urticae*).

Growth Regulators

Of the ornamental crops grown, an estimated 3,168spm² received growth regulators. Paclobutrazol was the active ingredient most extensively used accounting for 89% of the growth regulator-treated area and 47% of the quantity of active ingredients used.

Other Products

The fungicide/insecticide mix, bupirimate/pirimicarb/triforine applied to control blackspot (*Diplocarpon rosae*) and aphids was applied to an estimated 1,130spm².

Phenolic derivatives applied as hygiene measures were also applied to 53% of the area of ornamental crops treated with other products.

Metaldehyde was the only molluscicide recorded in use on protected ornamental crops.

OTHER CROPS (Table 14)

An estimated 823 m² of other crops, which included trees and bulbs grown under protection were recorded grown during this survey period (Table 2)

Carbendazim, applied to 2% of the pesticide-treated area of these, crops was the only fungicide recorded. The soil sterilant dazomet was applied to 85% of the pesticide-treated area. The molluscicide metaldehyde was applied to 14% of the pesticide-treated area of crops grown in this category.

PESTICIDE APPLICATIONS TO COMPOST AND SITE (Tables 15 & 16)

The survey indicated that it is common practice for growers to purchase compost with pesticides incorporated. This compost may subsequently be mixed with other types before planting occurs and it is extremely difficult to estimate total pesticide use in compost accurately. Consequently, the following data refers only to compost treatments applied by the grower or those composts for which the application rate could be verified precisely.

The herbicide active ingredient glyphosate, applied to pathways, car parks and around the site of general nursery holdings as a general weed control, accounted for 51% of the total herbicide-treated area of nursery site applications and 45% of the weight of herbicides applied. Paraquat and oxadiazon, collectively accounted for a further 24% of applications and 23% of the weight applied.

The only molluscicide active ingredient recorded used on nursery sites was metaldehyde, applied to 124,274 spm² to control slugs.

An estimated 933 spm² received applications of the mixed formulation bupirimate/pirimicarb/triforine, to control whitefly.

A total of 351kg of insecticides were applied to approximately 5000m³ of compost to control vine weevil (*Otiorhynchus sulcatus*). The organophosphorus insecticide chlorpyrifos accounted for 75% of the treated area and over 99% of the weight of pesticides applied to compost. Fipronil was the only other insecticide active ingredient recorded used on compost.

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Kidd, S.L.B., Jess, S., McCallion, T. (1997). Protected crops (edible and ornamental) 1991. *Pesticide Usage Survey Report 110* Belfast. HMSO.

Figure 1 The proportional distribution of protected ornamental crops grown in Northern Ireland, 2003.

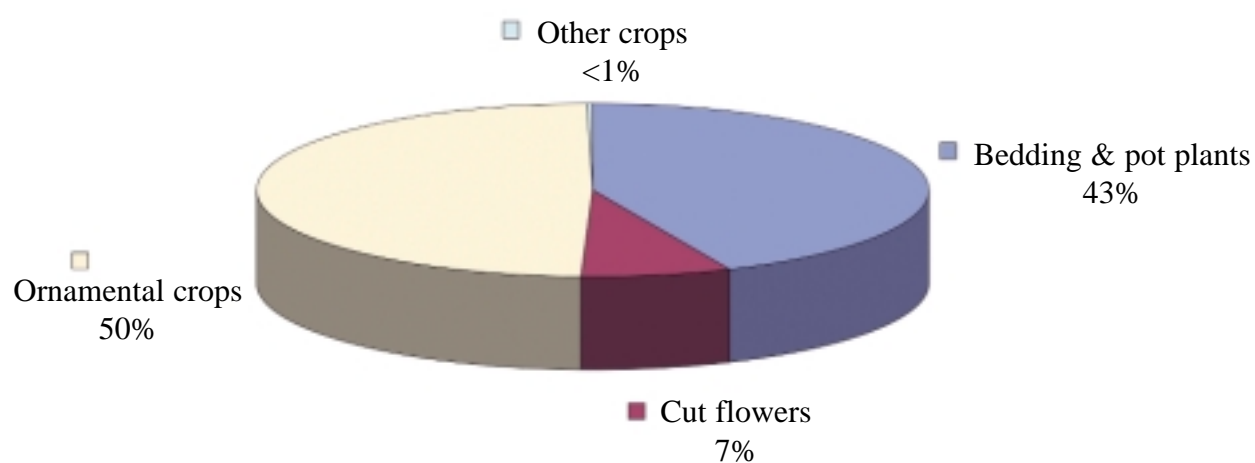


Figure 2 The regional distribution of protected crops grown in Northern Ireland, 2003.

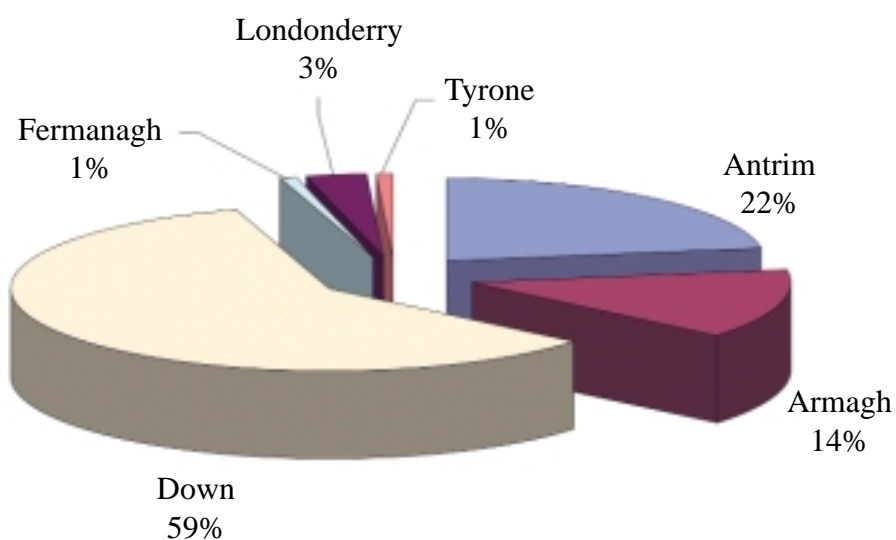


Figure 3 The area of protected ornamental crops treated with each pesticide type in the county regions of Northern Ireland, 2003.

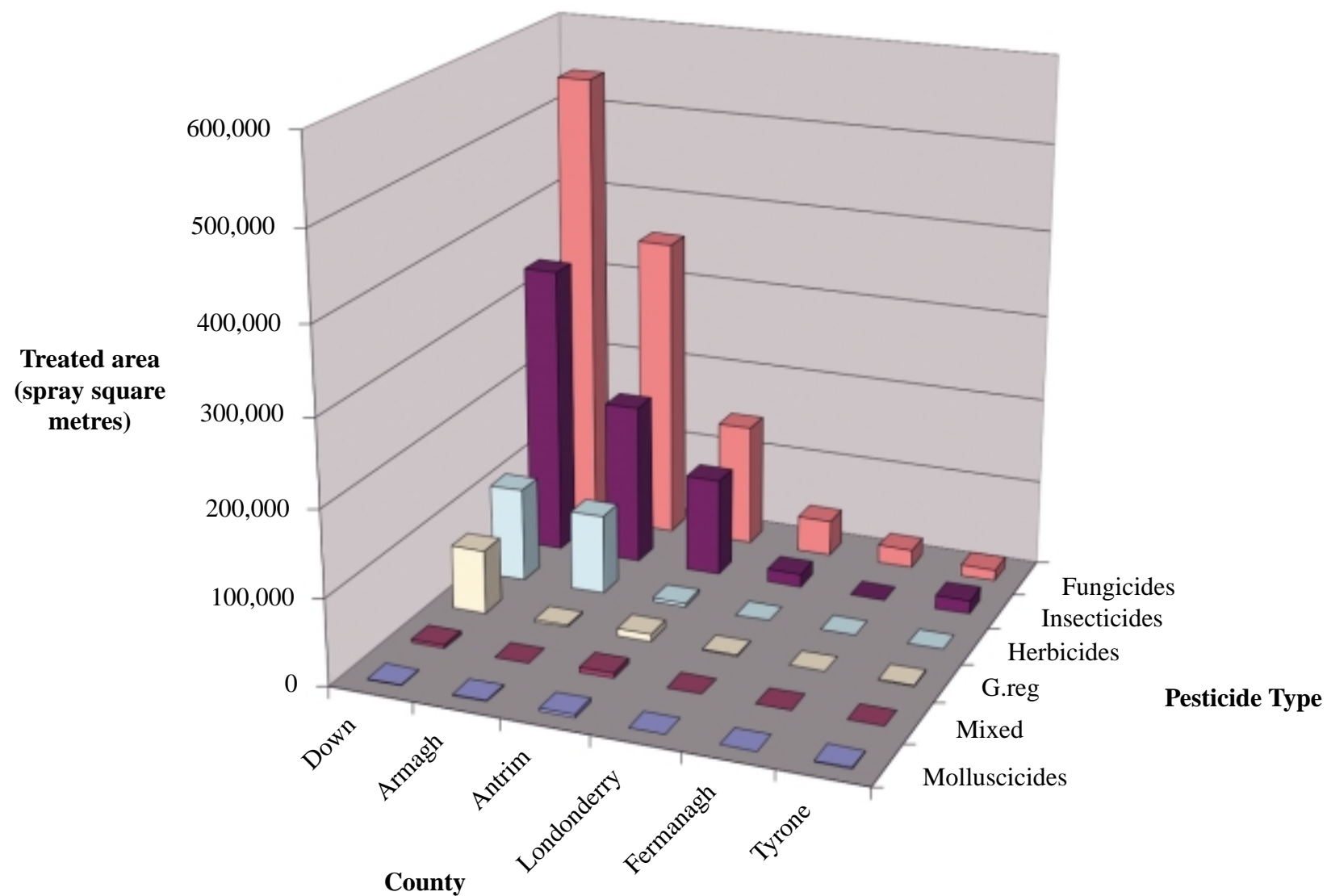


Table 1 The total number of protected and hardy nursery stock growers and the number of growers sampled in Northern Ireland in 2003.

| <i>County</i> | Number of growers surveyed | Number of growers sampled | (%) |
|-------------------------|-------------------------------|------------------------------|-----------|
| Antrim | 52 | 35 | 67 |
| Armagh | 36 | 23 | 64 |
| Down | 85 | 57 | 67 |
| Fermanagh | 12 | 5 | 42 |
| Londonderry | 33 | 23 | 70 |
| Tyrone | 15 | 8 | 53 |
| Northern Ireland | 233 | 151 | 65 |

Table 2 Estimated area (m²) of protected ornamental crops grown regionally in Northern Ireland 2003.

| <i>Crop type</i> | <i>County</i> | | | | | | Northern Ireland |
|----------------------|---------------|---------------|----------------|------------------|--------------------|---------------|-----------------------------|
| | Antrim | Armagh | Down | Fermanagh | Londonderry | Tyrone | |
| Bedding & pot plants | 32,985 | 18,632 | 98,020 | 3,094 | 5,111 | 1,278 | 159,119 |
| Cut flowers | 10,319 | 1,620 | 11,408 | . | 2,508 | . | 25,855 |
| Ornamental crops | 38,299 | 30,247 | 107,220 | . | 3,381 | 1,640 | 180,787 |
| Other | 722 | . | 101 | . | . | . | 823 |
| All crops | 82,324 | 50,499 | 216,749 | 3,094 | 11,000 | 2,918 | 366,584 |

Table 3 Estimated area (spm²) of protected ornamental crops treated regionally with each pesticide type in Northern Ireland 2003.

| <i>Crop type</i> | <i>Pesticide type</i> | | | | | | <i>Northern Ireland</i> |
|-----------------------|-----------------------|-------------------|---------------------|----------------------|--------------------------|---------------------------|-------------------------|
| | <i>Fungicides</i> | <i>Herbicides</i> | <i>Insecticides</i> | <i>Molluscicides</i> | <i>Growth regulators</i> | <i>Mixed Formulations</i> | |
| Antrim | 144,157 | 4,168 | 114,518 | 3,920 | 8,390 | 6,294 | 281,448 |
| Armagh | 355,425 | 93,416 | 188,563 | 1,051 | 2,220 | 352 | 641,028 |
| Down | 541,185 | 109,835 | 339,089 | 1,234 | 74,830 | 3,792 | 1,069,965 |
| Fermanagh | 21,656 | . | . | . | . | . | 21,656 |
| Londonderry | 41,892 | . | 15,246 | 198 | 1,192 | . | 58,527 |
| Tyrone | 12,730 | . | 15,824 | 1,061 | 1,465 | . | 31,079 |
| All pesticides | 1,117,045 | 207,420 | 673,240 | 7,464 | 88,097 | 10,437 | 2,103,703 |

Table 4 Estimated quantity (kg) of pesticide active ingredients applied to protected ornamental crops treated regionally with each pesticide type in Northern Ireland 2003.

| <i>Crop type</i> | <i>Pesticide type</i> | | | | | | <i>Northern Ireland</i> |
|-----------------------|-----------------------|-------------------|---------------------|----------------------|--------------------------|---------------------------|-------------------------|
| | <i>Fungicides</i> | <i>Herbicides</i> | <i>Insecticides</i> | <i>Molluscicides</i> | <i>Growth regulators</i> | <i>Mixed Formulations</i> | |
| Antrim | 11.62 | 0.98 | 6.68 | 0.71 | 0.54 | 270.59 | 291.12 |
| Armagh | 201.59 | 13.93 | 0.85 | 0.22 | 1.10 | 0.01 | 217.70 |
| Down | 35.39 | 3.18 | 6.61 | 0.14 | 17.66 | 0.32 | 63.31 |
| Fermanagh | 0.38 | . | . | . | . | . | 0.38 |
| Londonderry | 1.55 | . | 1.99 | 0.33 | 0.19 | . | 4.05 |
| Tyrone | 50.83 | . | 1.48 | 0.48 | 0.01 | . | 52.80 |
| All pesticides | 301.36 | 18.09 | 17.61 | 1.88 | 19.49 | 270.93 | 629.36 |

Table 5 Estimated area (spm²) of pesticide active ingredients applied to protected ornamental crops treated with each pesticide type in Northern Ireland 2003.

| <i>Crop type</i> | <i>Pesticide type</i> | | | | | | <i>Northern Ireland</i> |
|----------------------|-----------------------|-------------------|---------------------|----------------------|--------------------------|---------------------------|-------------------------|
| | <i>Fungicides</i> | <i>Herbicides</i> | <i>Insecticides</i> | <i>Molluscicides</i> | <i>Growth regulators</i> | <i>Mixed Formulations</i> | |
| Bedding & pot plants | 541,799 | 2,043 | 210,356 | 4,080 | 75,512 | 2,151 | 835,941 |
| Cut flowers | 72,374 | . | 95,613 | 1,120 | 9,417 | 5,280 | 183,804 |
| Ornamental crops | 502,859 | 205,377 | 367,271 | 2,163 | 3,168 | 2,385 | 1,083,223 |
| Other | 13 | . | . | 101 | . | 622 | 735 |
| All crops | 1,117,045 | 207,420 | 673,240 | 7,464 | 88,097 | 10,437 | 2,103,703 |

Table 6 Estimated quantity (kg) of pesticide active ingredients applied to protected ornamental crops treated with each pesticide type in Northern Ireland 2003.

| <i>Crop type</i> | <i>Pesticide type</i> | | | | | | <i>Northern Ireland</i> |
|----------------------|-----------------------|-------------------|---------------------|----------------------|--------------------------|---------------------------|-------------------------|
| | <i>Fungicides</i> | <i>Herbicides</i> | <i>Insecticides</i> | <i>Molluscicides</i> | <i>Growth regulators</i> | <i>Mixed Formulations</i> | |
| Bedding & pot plants | 165.83 | 0.13 | 3.88 | 0.91 | 6.53 | 0.08 | 177.35 |
| Cut flowers | 1.37 | . | 7.88 | 0.4 | 12.77 | 224.65 | 247.07 |
| Ornamental crops | 134.16 | 17.96 | 5.85 | 0.56 | 0.19 | 0.93 | 159.66 |
| Other | . | . | . | 0.01 | . | 45.27 | 45.28 |
| All crops | 301.36 | 18.09 | 17.61 | 1.88 | 19.49 | 270.92 | 629.36 |

Table 7 Estimated area (spm²) of protected ornamental crops treated with pesticide formulations in Northern Ireland 2003.

| | Crop type | | | | |
|---|---------------------------------|--------------------|-------------------------|--------------------|---------------------------|
| <i>Pesticide type & formulation</i> | <i>Bedding & pot plants</i> | <i>Cut Flowers</i> | <i>Ornamental crops</i> | <i>Other crops</i> | <i>Total area (sp m²)</i> |
| <i>Fungicides</i> | | | | | |
| Azoxystrobin | 2,736 | 9,431 | 18,431 | . | 30,598 |
| Benomyl | 7,547 | . | 44,093 | . | 51,640 |
| Bupirimate | 3,957 | . | 3,184 | . | 7,140 |
| Bupirimate/triforine | 36,373 | . | 2,700 | . | 39,073 |
| Carbendazim | 34,292 | . | 51 | 13 | 34,355 |
| Chlorothalonil | 97,958 | 367 | 59,705 | . | 158,029 |
| Chlorothalonil/metalaxyl | 20,560 | . | 43,636 | . | 64,197 |
| Copper oxychloride | . | . | 4,313 | . | 4,313 |
| Copper-ammonium carbonate | 510 | . | 25,438 | . | 25,947 |
| Cyproconazole/propiconazole | . | 14,667 | . | . | 14,667 |
| Dichlofluanid | 4,625 | . | 58 | . | 4,683 |
| Etridiazole | 740 | . | 388 | . | 1,128 |
| Fenarimol | . | . | 25,438 | . | 25,438 |
| Fosetyl-aluminium | 21,474 | . | 1,971 | . | 23,445 |
| Furalaxyl | 22,015 | 43 | 5,053 | . | 27,111 |
| Iprodione | 199,514 | 26,700 | 48,470 | . | 274,685 |
| Mancozeb | 1,566 | . | 50,875 | . | 52,441 |
| Metalaxyl/thiram | 76,374 | . | . | . | 76,374 |
| Myclobutanil | 1,874 | . | 23,869 | . | 25,743 |
| Oxycarboxin | . | . | 231 | . | 231 |
| Penconazole | 3,249 | . | . | . | 3,249 |
| Prochloraz | . | 4 | 44,126 | . | 44,130 |
| Propamocarb hydrochloride | 33 | . | 55 | . | 88 |
| Propiconazole | 2,660 | 21,163 | . | . | 23,823 |
| Pyrifenox | 3,293 | . | 81,290 | . | 84,583 |
| Thiram | . | . | 4,196 | . | 4,196 |
| Tolclofos-methyl | 158 | . | 1,413 | . | 1,571 |
| Vinclozolin | . | . | 11,563 | . | 11,563 |
| Zineb | 293 | . | 2,313 | . | 2,605 |
| All fungicides | 541,799 | 72,374 | 502,859 | 13 | 1,117,045 |
| <i>Herbicides</i> | | | | | |
| Glufosinate-ammonium | . | . | 252 | . | 252 |
| Glyphosate | 153 | . | 252 | . | 405 |
| Isoxaben/trifluralin | . | . | 91,737 | . | 91,737 |
| Oxadiazon | . | . | 13,908 | . | 13,908 |
| Paraquat | 1,890 | . | . | . | 1,890 |
| Quinoclamine | . | . | 99,228 | . | 99,228 |
| All herbicides | 2,043 | . | 205,377 | . | 207,420 |

Table 7 (cont.) Estimated area (spm²) of protected ornamental crops treated with pesticide formulations in Northern Ireland 2003.

| Pesticide type & formulation | Crop type | | | | Total area (sp m²) |
|---------------------------------|-------------------------|----------------|---------------------|----------------|-----------------------|
| | Bedding & pot plants | Cut Flowers | Ornamental crops | Other crops | |
| Insecticides/acaricides | | | | | |
| Abamectin | 1,078 | 864 | 54,688 | . | 56,631 |
| Aldicarb | 1,282 | . | 23 | . | 1,305 |
| Bifenthrin | 14,505 | . | 102,730 | . | 117,235 |
| Buprofezin | 3,629 | . | 584 | . | 4,213 |
| Chlorpyrifos | . | . | 595 | . | 595 |
| Clofentezine | . | . | 23,125 | . | 23,125 |
| Cypermethrin | 11,551 | 11,373 | 53,042 | . | 75,966 |
| Deltamethrin | 125,031 | 8,880 | 46,957 | . | 180,868 |
| Dichlorvos | 182 | 12,077 | 284 | . | 12,544 |
| Dicofol/tetradifon | . | . | 10,406 | . | 10,406 |
| Diflubenzuron | . | . | 18,546 | . | 18,546 |
| Dimethoate | 3,629 | . | 548 | . | 4,177 |
| Fatty acids | . | 144 | 88 | . | 232 |
| Fenbutatin oxide | . | . | 15,676 | . | 15,676 |
| Fipronil | . | . | 1,767 | . | 1,767 |
| Gamma-HCH | 826 | . | . | . | 826 |
| Imidacloprid | 14,284 | 463 | 1,234 | . | 15,981 |
| Malathion | 6,658 | 5,900 | 5,429 | . | 17,988 |
| Nicotine | 1,890 | 24,062 | 25,836 | . | 51,788 |
| Permethrin | 1,397 | 1,467 | . | . | 2,864 |
| Pirimicarb | 8,785 | 1,654 | . | . | 10,440 |
| Pymetrozine | 1,504 | 14,404 | 527 | . | 16,435 |
| Spinosad | 876 | 14,324 | 44 | . | 15,245 |
| Teflubenzuron | 13,248 | . | 3,381 | . | 16,629 |
| Tetradifon | . | . | 1,760 | . | 1,760 |
| All insecticides/acaricides | 210,356 | 95,613 | 367,271 | . | 673,240 |
| Molluscicides | | | | | |
| Metaldehyde | 4,080 | 1,120 | 2,163 | 101 | 7,464 |
| All molluscicides | 4,080 | 1,120 | 2,163 | 101 | 7,464 |
| Growth regulators | | | | | |
| Chlormequat | 22,455 | . | . | . | 22,455 |
| Daminozide | 23,737 | 9,417 | 289 | . | 33,443 |
| 4-indol-3-yl-butyric acid | . | . | 69 | . | 69 |
| Paclobutrazol | 29,320 | . | 2,810 | . | 32,130 |
| All growth regulators | 75,512 | 9,417 | 3,168 | . | 88,097 |

Table 7 (cont.) **Estimated area (spm²) of protected ornamental crops treated with pesticide formulations in Northern Ireland 2003.**

| Pesticide type & formulation | Crop type | | | | Total area (sp m²) |
|--|-------------------------|----------------|---------------------|----------------|-----------------------|
| | Bedding & pot plants | Cut Flowers | Ornamental crops | Other crops | |
| Other products & mixed formulations | | | | | |
| Bupirimate/pirimicarb/triforine | 2,151 | . | 1,130 | . | 3,281 |
| Cresylic acid | . | . | 1,255 | . | 1,255 |
| Dazomet | . | 5,280 | . | 622 | 5,902 |
| All other products & mixed formulations | 2,151 | 5,280 | 2,385 | 622 | 10,437 |
| All pesticides | 835,941 | 183,804 | 1,083,223 | 735 | 2,103,703 |

Table 8 Estimated quantities (kg) of protected ornamental crops treated with pesticide formulations in Northern Ireland 2003.

| Pesticide type & formulation | Crop type | | | | Total quantity (sp kg) |
|---------------------------------|-------------------------|----------------|---------------------|----------------|---------------------------|
| | Bedding & pot plants | Cut Flowers | Ornamental crops | Other crops | |
| Fungicides | | | | | |
| Azoxystrobin | 0.07 | 0.24 | 0.52 | . | 0.83 |
| Benomyl | 1.62 | . | 2.36 | . | 3.98 |
| Bupirimate | 0.16 | . | 0.04 | . | 0.20 |
| Bupirimate/triforine | 0.60 | . | 0.04 | . | 0.64 |
| Carbendazim | 0.96 | . | <0.01 | <0.01 | 0.96 |
| Chlorothalonil | 4.96 | 0.18 | 7.36 | . | 12.50 |
| Chlorothalonil/metalaxyl | 3.28 | . | 5.02 | . | 8.30 |
| Copper oxychloride | . | . | 0.58 | . | 0.58 |
| Copper-ammonium carbonate | <0.01 | . | 0.15 | . | 0.15 |
| Cyproconazole/propiconazole | . | 0.30 | . | . | 0.30 |
| Dichlofluanid | 0.09 | . | 0.12 | . | 0.21 |
| Etridiazole | 0.64 | . | 0.98 | . | 1.61 |
| Fenarimol | . | . | 0.11 | . | 0.11 |
| Fosetyl-aluminium | 139.38 | . | 11.18 | . | 150.57 |
| Furalaxyl | 1.81 | <0.01 | 0.27 | . | 2.08 |
| Iprodione | 4.38 | 0.40 | 1.06 | . | 5.84 |
| Mancozeb | 0.08 | . | 1.30 | . | 1.37 |
| Metalaxyl/thiram | 6.21 | . | . | . | 6.21 |
| Myclobutanil | 0.01 | . | 0.01 | . | 0.02 |
| Oxycarboxin | . | . | 0.09 | . | 0.09 |
| Penconazole | 0.02 | . | . | . | 0.02 |
| Prochloraz | . | 0.01 | 101.47 | . | 101.48 |
| Propamocarb hydrochloride | 0.26 | . | 0.39 | . | 0.66 |
| Propiconazole | 0.03 | 0.24 | . | . | 0.26 |
| Pyrifenox | 1.12 | . | 0.04 | . | 1.16 |
| Thiram | . | . | 0.28 | . | 0.28 |
| Tolclofos-methyl | 0.16 | . | 0.14 | . | 0.29 |
| Vinclozolin | . | . | 0.58 | . | 0.58 |
| Zineb | 0.01 | . | 0.08 | . | 0.09 |
| All fungicides | 165.83 | 1.37 | 134.16 | <0.01 | 301.36 |
| Herbicides | | | | | |
| Glufosinate-ammonium | . | . | 0.01 | . | 0.01 |
| Glyphosate | 0.02 | . | 0.03 | . | 0.05 |
| Isoxaben/trifluralin | . | . | 0.02 | . | 0.02 |
| Oxadiazon | . | . | 4.86 | . | 4.86 |
| Paraquat | 0.11 | . | . | . | 0.11 |
| Quinoclamine | . | . | 13.04 | . | 13.04 |
| All herbicides | 0.13 | . | 17.96 | . | 18.09 |

Table 8 (cont.) Estimated quantities (kg) of protected ornamental crops treated with pesticide formulations in Northern Ireland 2003.

| Pesticide type & formulation | Crop type | | | | Total quantity (sp kg) |
|---------------------------------|-------------------------|----------------|---------------------|----------------|---------------------------|
| | Bedding & pot plants | Cut Flowers | Ornamental crops | Other crops | |
| Insecticides/acaricides | | | | | |
| Abamectin | <0.01 | <0.01 | 0.02 | . | 0.02 |
| Aldicarb | 0.74 | . | 0.01 | . | 0.75 |
| Bifenthrin | 0.04 | . | 0.18 | . | 0.21 |
| Buprofezin | 0.01 | . | <0.01 | . | 0.01 |
| Chlorpyrifos | . | . | 0.03 | . | 0.03 |
| Clofentezine | . | . | 0.46 | . | 0.46 |
| Cypermethrin | 0.05 | 0.05 | 0.24 | . | 0.34 |
| Deltamethrin | 0.08 | 0.01 | 0.02 | . | 0.12 |
| Dichlorvos | 0.02 | 0.94 | 0.02 | . | 0.98 |
| Dicofol/tetradifon | . | . | 0.05 | . | 0.05 |
| Diflubenzuron | . | . | 0.56 | . | 0.56 |
| Dimethoate | 0.01 | . | 0.08 | . | 0.08 |
| Fatty acids | . | 0.06 | 0.04 | . | 0.10 |
| Fenbutatin oxide | . | . | 0.18 | . | 0.18 |
| Fipronil | . | . | 0.10 | . | 0.10 |
| Gamma-HCH | 0.05 | . | . | . | 0.05 |
| Imidacloprid | 1.28 | <0.01 | 0.17 | . | 1.45 |
| Malathion | 0.50 | 0.66 | 0.39 | . | 1.56 |
| Nicotine | 0.90 | 5.27 | 3.16 | . | 9.33 |
| Permethrin | <0.01 | <0.01 | . | . | 0.01 |
| Pirimicarb | 0.11 | 0.07 | . | . | 0.18 |
| Pymetrozine | 0.03 | 0.28 | 0.01 | . | 0.32 |
| Spinosad | 0.03 | 0.54 | <0.01 | . | 0.57 |
| Teflubenzuron | 0.04 | . | 0.11 | . | 0.15 |
| Tetradifon | . | . | 0.01 | . | 0.01 |
| All insecticides/acaricides | 3.88 | 7.88 | 5.85 | . | 17.61 |
| Molluscicides | | | | | |
| Metaldehyde | 0.91 | 0.40 | 0.56 | 0.01 | 1.88 |
| All molluscicides | 0.91 | 0.40 | 0.56 | 0.01 | 1.88 |
| Growth regulators | | | | | |
| Chlormequat | 1.02 | . | . | . | 1.02 |
| Daminozide | 5.38 | 12.77 | 0.10 | . | 18.26 |
| 4-indol-3-yl-butyric acid | . | . | <0.01 | . | <0.01 |
| Paclobutrazol | 0.12 | . | 0.09 | . | 0.21 |
| All growth regulators | 6.53 | 12.77 | 0.19 | . | 19.49 |

Table 8 (cont.) **Estimated quantities (kg) of protected ornamental crops treated with pesticide formulations in Northern Ireland 2003.**

| Pesticide type & formulation | Crop type | | | | Total quantity (sp kg) |
|--|-------------------------|----------------|---------------------|----------------|---------------------------|
| | Bedding & pot plants | Cut Flowers | Ornamental crops | Other crops | |
| Other products & mixed formulations | | | | | |
| Bupirimate/pirimicarb/triforine | 0.08 | . | 0.04 | . | 0.11 |
| Cresylic acid | . | . | 0.89 | . | 0.89 |
| Dazomet | . | 224.65 | . | 45.27 | 269.92 |
| All other products & mixed formulations | 0.08 | 224.65 | 0.93 | 45.27 | 270.93 |
| All pesticides | 177.35 | 247.07 | 159.66 | 45.28 | 629.36 |

Table 9 **The fifty active ingredients most extensively used on ornamental crops in Northern Ireland 2003 prioritised by treated area (spm²).**

| | Active ingredient | Treated area (sp m²) |
|----|---------------------------|--|
| 1 | Iprodione | 274,688 |
| 2 | Chlorothalonil | 222,225 |
| 3 | Deltamethrin | 180,870 |
| 4 | Metalaxyl | 140,570 |
| 5 | Bifenthrin | 117,236 |
| 6 | Quinoclamine | 99,228 |
| 7 | Trifluralin | 91,737 |
| 8 | Isoxaben | 91,737 |
| 9 | Pyrifenox | 84,582 |
| 10 | Thiram | 80,572 |
| 11 | Cypermethrin | 75,965 |
| 12 | Abamectin | 56,630 |
| 13 | Mancozeb | 52,440 |
| 14 | Nicotine | 51,784 |
| 15 | Benomyl | 51,641 |
| 16 | Bupirimate | 49,494 |
| 17 | Prochloraz | 44,130 |
| 18 | Triforine | 42,355 |
| 19 | Propiconazole | 38,497 |
| 20 | Carbendazim | 34,353 |
| 21 | Daminozide | 33,443 |
| 22 | Paclobutrazol | 32,131 |
| 23 | Azoxystrobin | 30,599 |
| 24 | Furalaxyl | 27,110 |
| 25 | Copper-ammonium carbonate | 25,948 |
| 26 | Myclobutanil | 25,746 |
| 27 | Fenarimol | 25,438 |
| 28 | Fosetyl-aluminium | 23,447 |
| 29 | Clofentezine | 23,125 |
| 30 | Chlormequat | 22,455 |
| 31 | Diflubenzuron | 18,546 |
| 32 | Malathion | 17,988 |
| 33 | Teflubenzuron | 16,630 |
| 34 | Pymetrozine | 16,436 |
| 35 | Imidacloprid | 15,982 |
| 36 | Fenbutatin oxide | 15,675 |
| 37 | Spinosad | 15,244 |
| 38 | Cyproconazole | 14,670 |
| 39 | Oxadiazon | 13,909 |
| 40 | Pirimicarb | 13,720 |
| 41 | Dichlorvos | 12,544 |
| 42 | Tetradifon | 12,166 |
| 43 | Vinclozolin | 11,563 |
| 44 | Dicofol | 10,406 |
| 45 | Metaldehyde | 7,464 |
| 46 | Dazomet | 5,902 |
| 47 | Dichlofluanid | 4,682 |
| 48 | Copper oxychloride | 4,313 |
| 49 | Buprofezin | 4,212 |
| 50 | Dimethoate | 4,176 |

Table 10 **The fifty active ingredients most extensively used on ornamental crops in Northern Ireland 2003 prioritised by weight (kg).**

| | Active ingredient | Quantity applied (kg) |
|----|---------------------------|------------------------------|
| 1 | Dazomet | 269.92 |
| 2 | Fosetyl-aluminium | 150.56 |
| 3 | Prochloraz | 101.48 |
| 4 | Chlorothalonil | 19.71 |
| 5 | Daminozide | 18.26 |
| 6 | Quinoclamine | 13.04 |
| 7 | Nicotine | 9.33 |
| 8 | Iprodione | 5.84 |
| 9 | Thiram | 5.45 |
| 10 | Oxadiazon | 4.86 |
| 11 | Benomyl | 3.98 |
| 12 | Metalaxyl | 2.12 |
| 13 | Furalaxyl | 2.08 |
| 14 | Metaldehyde | 1.88 |
| 15 | Etridiazole | 1.61 |
| 16 | Malathion | 1.56 |
| 17 | Imidacloprid | 1.45 |
| 18 | Mancozeb | 1.37 |
| 19 | Pyrifeno | 1.16 |
| 20 | Chlormequat | 1.02 |
| 21 | Dichlorvos | 0.98 |
| 22 | Carbendazim | 0.96 |
| 23 | Cresylic acid | 0.89 |
| 24 | Azoxystrobin | 0.83 |
| 25 | Aldicarb | 0.75 |
| 26 | Copper oxychloride | 0.58 |
| 27 | Vinclozolin | 0.58 |
| 28 | Spinosad | 0.57 |
| 29 | Bupirimate | 0.56 |
| 30 | Diflubenzuron | 0.56 |
| 31 | Clofentezine | 0.46 |
| 32 | Propiconazole | 0.45 |
| 33 | Triforine | 0.36 |
| 34 | Cypermethrin | 0.34 |
| 35 | Pymetrozine | 0.32 |
| 36 | Tolclofos-methyl | 0.29 |
| 37 | Bifenthrin | 0.21 |
| 38 | Pirimicarb | 0.21 |
| 39 | Dichlofluanid | 0.21 |
| 40 | Paclobutrazol | 0.20 |
| 41 | Fenbutatin oxide | 0.18 |
| 42 | Copper-ammonium carbonate | 0.15 |
| 43 | Teflubenzuron | 0.15 |
| 44 | Cyproconazole | 0.12 |
| 45 | Deltamethrin | 0.12 |
| 46 | Paraquat | 0.11 |
| 47 | Fenarimol | 0.11 |
| 49 | Fipronil | 0.10 |
| 50 | Zineb | 0.09 |

Table 11 Bedding and pot plants: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | Black spot | <i>Botrytis</i> | Disease Control | Leaf spot | Damping off | Mildew | Total area treated (sp m ²) | Total quantity applied (kg) |
|--------------------------------|---------------|-----------------|-----------------|---------------|--------------|---------------|---|-----------------------------|
| <i>Fungicides</i> | | | | | | | | |
| Azoxystrobin | . | . | . | . | . | 2,736 | 2,736 | 0.07 |
| Benomyl | . | 7,547 | . | . | . | . | 7,547 | 1.62 |
| Bupirimate | . | . | 2,436 | . | . | 1,520 | 3,957 | 0.16 |
| Bupirimate/triforine | . | . | 21,656 | 14,716 | . | . | 36,373 | 0.60 |
| Carbendazim | 217 | 27,675 | 6,400 | . | . | . | 34,292 | 0.96 |
| Chlorothalonil | . | 5,193 | 90,083 | . | . | 2,682 | 97,958 | 4.96 |
| Chlorothalonil/metalaxyl | 5,852 | . | 840 | . | . | 13,868 | 20,560 | 3.28 |
| Copper-ammonium carbonate | . | . | 510 | . | . | . | 510 | <0.01 |
| Dichlofluanid | . | . | . | . | . | 4,625 | 4,625 | 0.09 |
| Etridiazole | . | . | 740 | . | . | . | 740 | 0.64 |
| Fosetyl-aluminium | . | . | 21,323 | . | 36 | 115 | 21,474 | 139.38 |
| Furalaxyl | . | 46 | 20,005 | . | 1,964 | . | 22,015 | 1.81 |
| Iprodione | . | 56,302 | 137,860 | . | . | 5,352 | 199,514 | 4.38 |
| Mancozeb | . | . | 1,566 | . | . | . | 1,566 | 0.08 |
| Metalaxyl/thiram | 4,383 | . | 62,390 | . | . | 9,600 | 76,374 | 6.21 |
| Myclobutanil | . | . | 1,874 | . | . | . | 1,874 | 0.01 |
| Penconazole | . | . | 2,151 | . | . | 1,098 | 3,249 | 0.02 |
| Propamocarb hydrochloride | . | . | 33 | . | . | . | 33 | 0.26 |
| Propiconazole | . | . | 2,660 | . | . | . | 2,660 | 0.03 |
| Pyrifenox | . | . | 1,370 | . | . | 1,922 | 3,293 | 1.12 |
| Tolclofos-methyl | . | . | . | . | 158 | . | 158 | 0.16 |
| Zineb | . | . | 293 | . | . | . | 293 | 0.01 |
| All fungicides | 10,453 | 96,762 | 374,190 | 14,716 | 2,158 | 43,520 | 541,799 | 165.83 |

Table 11 (cont.) Bedding and pot plants: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | General weed control | Thrips | Vine weevil | Whitefly | Insect control | Aphids | Total area treated (sp m ²) | Total quantity applied (kg) |
|------------------------------------|----------------------|--------------|--------------|--------------|----------------|---------------|---|-----------------------------|
| <i>Herbicides & desiccants</i> | | | | | | | | |
| Glyphosate | 153 | . | . | . | . | . | 153 | 0.02 |
| Paraquat | 1,890 | . | . | . | . | . | 1,890 | 0.11 |
| All herbicides | 2,043 | . | . | . | . | . | 2,043 | 0.13 |
| <i>Insecticides/acaricides</i> | | | | | | | | |
| Abamectin | . | 338 | . | 740 | . | . | 1,078 | <0.01 |
| Aldicarb | . | . | . | 622 | . | 660 | 1,282 | 0.74 |
| Bifenthrin | . | . | . | . | 9,560 | 4,945 | 14,505 | 0.04 |
| Buprofezin | . | . | . | . | . | 3,629 | 3,629 | 0.01 |
| Cypermethrin | . | . | 1,566 | 1,804 | . | 8,181 | 11,551 | 0.05 |
| Deltamethrin | . | . | . | . | 86,174 | 38,857 | 125,031 | 0.08 |
| Dichlorvos | . | . | . | . | 182 | . | 182 | 0.02 |
| Dimethoate | . | . | . | . | 3,629 | . | 3,629 | 0.01 |
| Gamma-HCH | . | . | . | . | 826 | . | 826 | 0.05 |
| Imidacloprid | . | . | 1,061 | . | 12 | 13,212 | 14,284 | 1.28 |
| Malathion | . | . | . | 2,824 | 2,922 | 912 | 6,658 | 0.50 |
| Nicotine | . | . | . | . | 1,890 | . | 1,890 | 0.90 |
| Permethrin | . | . | . | . | . | 1,397 | 1,397 | <0.01 |
| Pirimicarb | . | . | . | . | . | 8,785 | 8,785 | 0.11 |
| Pymetrozine | . | . | . | 1,504 | . | . | 1,504 | 0.03 |
| Spinosad | . | 876 | . | . | . | . | 876 | 0.03 |
| Teflubenzuron | . | . | . | . | 13,248 | . | 13,248 | 0.04 |
| All insecticides/acaricides | . | 1,214 | 2,627 | 7,494 | 118,443 | 80,578 | 210,356 | 3.88 |

Table 11 (cont.) Bedding and pot plants: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | Slugs | Growth regulation | Disease control | Total area treated (sp m ²) | Total quantity applied (kg) |
|-----------------------------------|--------------|----------------------|--------------------|---|-----------------------------------|
| <i>Molluscicides</i> | | | | | |
| Metaldehyde | 4,080 | . | . | 4,080 | 0.91 |
| All molluscicides | 4,080 | . | . | 4,080 | 0.91 |
| <i>Growth regulators</i> | | | | | |
| Chlormequat | . | 22,455 | . | 22,455 | 1.02 |
| Daminozide | . | 23,737 | . | 23,737 | 5.38 |
| Paclobutrazol | . | 29,320 | . | 29,320 | 0.12 |
| All growth regulators | . | 75,512 | . | 75,512 | 6.53 |
| <i>Mixed formulations</i> | | | | | |
| Bupirimate/pirimicarb/triforine | . | . | 2,151 | 2,151 | 0.08 |
| All mixed formulations | . | . | 2,151 | 2,151 | 0.08 |

Table 12 Cut flowers: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | <i>Botrytis</i> | Disease Control | Leaf spot | Rust | White Rust | Damping off | Total area treated (sp m ²) | Total quantity applied (kg) |
|-----------------------------------|-----------------|--------------------|-----------|---------------|---------------|----------------|---|-----------------------------------|
| <i>Fungicides</i> | | | | | | | | |
| Azoxystrobin | . | . | . | 9,431 | . | . | 9,431 | 0.24 |
| Chlorothalonil | . | 367 | . | . | . | . | 367 | 0.18 |
| Cyproconazole/propiconazole | . | . | . | 14,667 | . | . | 14,667 | 0.30 |
| Furalaxyl | . | . | . | . | . | 43 | 43 | <0.01 |
| Iprodione | 300 | . | . | . | 26,400 | . | 26,700 | 0.40 |
| Prochloraz | . | . | 4 | . | . | . | 4 | 0.01 |
| Propiconazole | . | . | . | 13,875 | 7,288 | . | 21,163 | 0.24 |
| All fungicides | 300 | 367 | 4 | 37,972 | 33,688 | 43 | 72,374 | 1.37 |

Table 12 (cont.) Cut flowers: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | Thrips | White fly | Insect control | Aphids | Slugs | Growth regulation | Sterilant | Total area treated (sp m ²) | Total quantity applied (kg) |
|------------------------------------|---------------|--------------|----------------|---------------|--------------|-------------------|--------------|---|-----------------------------|
| <i>Fungicides</i> | | | | | | | | | |
| Abamectin | 864 | . | . | . | . | . | . | 864 | <0.01 |
| Cypermethrin | . | . | 10,560 | 813 | . | . | . | 11,373 | 0.05 |
| Deltamethrin | . | . | 367 | 8,513 | . | . | . | 8,880 | 0.01 |
| Dichlorvos | . | . | 12,077 | . | . | . | . | 12,077 | 0.94 |
| Fatty acids | . | . | . | 144 | . | . | . | 144 | 0.06 |
| Imidacloprid | . | . | . | 463 | . | . | . | 463 | <0.01 |
| Malathion | 495 | . | 367 | 5,039 | . | . | . | 5,900 | 0.66 |
| Nicotine | . | . | 5,280 | 18,782 | . | . | . | 24,062 | 5.27 |
| Permethrin | . | . | . | 1,467 | . | . | . | 1,467 | <0.01 |
| Pirimicarb | . | . | 367 | 1,288 | . | . | . | 1,654 | 0.07 |
| Pymetrozine | . | 1,019 | . | 13,385 | . | . | . | 14,404 | 0.28 |
| Spinosad | 14,324 | . | . | . | . | . | . | 14,324 | 0.54 |
| All insecticides/acaricides | 15,683 | 1,019 | 29,017 | 49,893 | . | . | . | 95,613 | 7.88 |
| <i>Molluscicides</i> | | | | | | | | | |
| Metaldehyde | . | . | . | . | 1,120 | . | . | 1,120 | 0.40 |
| All molluscicides | . | . | . | . | 1,120 | . | . | 1,120 | 0.40 |
| <i>Growth regulators</i> | | | | | | | | | |
| Daminozide | . | . | . | . | . | 9,417 | . | 9,417 | 12.77 |
| All growth regulators | . | . | . | . | . | 9,417 | . | 9,417 | 12.77 |
| <i>Other products</i> | | | | | | | | | |
| Dazomet | . | . | . | . | . | . | 5,280 | 5,280 | 224.65 |
| All other products | . | . | . | . | . | . | 5,280 | 5,280 | 224.65 |

Table 13 Ornamental crops: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | Black spot | Botrytis | Disease control | Leaf spot | Rust | Damping off | Mildew | Total area treated (sp m ²) | Total quantity applied (kg) |
|--------------------------------|------------|--------------|-----------------|-----------|------------|--------------|---------------|---|-----------------------------|
| <i>Fungicides</i> | | | | | | | | | |
| Azoxystrobin | . | . | 18,431 | . | . | . | . | 18,431 | 0.52 |
| Benomyl | . | . | 44,093 | . | . | . | . | 44,093 | 2.36 |
| Bupirimate | . | . | 2,659 | . | . | . | 524 | 3,184 | 0.04 |
| Bupirimate/triforine | 777 | . | . | . | . | . | 1,924 | 2,700 | 0.04 |
| Carbendazim | . | . | . | . | 51 | . | . | 51 | <0.01 |
| Chlorothalonil | . | . | 59,705 | . | . | . | . | 59,705 | 7.36 |
| Chlorothalonil/metalaxyl | . | . | 43,636 | . | . | . | . | 43,636 | 5.02 |
| Copper oxychloride | . | . | 4,313 | . | . | . | . | 4,313 | 0.58 |
| Copper-ammonium carbonate | . | . | 25,438 | . | . | . | . | 25,438 | 0.15 |
| Dichlofluanid | . | . | 58 | . | . | . | . | 58 | 0.12 |
| Etridiazole | . | . | 388 | . | . | . | . | 388 | 0.98 |
| Fenarimol | . | . | 25,438 | . | . | . | . | 25,438 | 0.11 |
| Fosetyl-aluminium | . | 1,138 | 388 | . | . | 4 | 442 | 1,971 | 11.18 |
| Furalaxyl | . | . | 69 | . | . | 4,984 | . | 5,053 | 0.27 |
| Iprodione | . | 1,757 | 46,482 | . | . | 231 | . | 48,470 | 1.06 |
| Mancozeb | . | . | 50,875 | . | . | . | . | 50,875 | 1.30 |
| Myclobutanil | . | . | 2,313 | . | 240 | . | 21,316 | 23,869 | 0.01 |
| Oxycarboxin | . | . | 231 | . | . | . | . | 231 | 0.09 |
| Prochloraz | . | . | 44,063 | 64 | . | . | . | 44,126 | 101.47 |
| Propamocarb hydrochloride | . | . | 35 | . | . | 20 | . | 55 | 0.39 |
| Pyrifenox | . | . | 46,250 | . | . | . | 35,040 | 81,290 | 0.04 |
| Thiram | . | . | 2,333 | . | . | . | 1,864 | 4,196 | 0.28 |
| Tolclofos-methyl | . | . | . | . | . | 1,413 | . | 1,413 | 0.14 |
| Vinclozolin | . | . | 11,563 | . | . | . | . | 11,563 | 0.58 |
| Zineb | . | . | 2,313 | . | . | . | . | 2,313 | 0.08 |
| All fungicides | 777 | 2,895 | 431,071 | 64 | 291 | 6,652 | 61,110 | 502,859 | 134.16 |

Table 13 (cont.) Ornamental crops: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | General weed control | Liverwort/ moss | Red spider mite | Thrips | Vine weevil | Insect control | Aphids | Total area treated (sp m ²) | Total quantity applied (kg) |
|------------------------------------|----------------------|-----------------|-----------------|--------------|--------------|----------------|---------------|---|-----------------------------|
| <i>Herbicides & desiccants</i> | | | | | | | | | |
| Glufosinate-ammonium | 252 | . | . | . | . | . | . | 252 | 0.01 |
| Glyphosate | 252 | . | . | . | . | . | . | 252 | 0.03 |
| Isoxaben/trifluralin | 91,737 | . | . | . | . | . | . | 91,737 | 0.02 |
| Oxadiazon | 13,908 | . | . | . | . | . | . | 13,908 | 4.86 |
| Quinoclamine | 11,956 | 87,273 | . | . | . | . | . | 99,228 | 13.04 |
| All herbicides | 118,104 | 87,273 | . | . | . | . | . | 205,377 | 17.96 |
| <i>Insecticides/acaricides</i> | | | | | | | | | |
| Abamectin | . | . | . | 344 | . | 54,344 | . | 54,688 | 0.02 |
| Aldicarb | . | . | . | . | . | 23 | . | 23 | 0.01 |
| Bifenthrin | . | . | 45,277 | . | . | 50,037 | 7,416 | 102,730 | 0.18 |
| Buprofezin | . | . | . | . | . | . | 584 | 584 | <0.01 |
| Chlorpyrifos | . | . | . | . | 528 | . | 67 | 595 | 0.03 |
| Clofentezine | . | . | 23,125 | . | . | . | . | 23,125 | 0.46 |
| Cypermethrin | . | . | . | . | . | 46,024 | 7,018 | 53,042 | 0.24 |
| Deltamethrin | . | . | . | . | . | 23,163 | 23,794 | 46,957 | 0.02 |
| Dichlorvos | . | . | . | . | . | 284 | . | 284 | 0.02 |
| Dicofol/tetradifon | . | . | . | . | . | 10,406 | . | 10,406 | 0.05 |
| Diiflubenzuron | . | . | . | . | . | 18,546 | . | 18,546 | 0.56 |
| Dimethoate | . | . | . | . | . | . | 548 | 548 | 0.08 |
| Fatty acids | . | . | . | . | . | . | 88 | 88 | 0.04 |
| Fenbutatin oxide | . | . | 3,509 | . | . | 12,167 | . | 15,676 | 0.18 |
| Fipronil | . | . | . | . | 1,767 | . | . | 1,767 | 0.10 |
| Imidacloprid | . | . | . | . | . | 408 | 826 | 1,234 | 0.17 |
| Malathion | . | . | . | 2,504 | . | 2,693 | 231 | 5,429 | 0.39 |
| Nicotine | . | . | . | 1,119 | . | 3,958 | 20,759 | 25,836 | 3.16 |
| Pymetrozine | . | . | . | . | . | . | 527 | 527 | 0.01 |
| Spinosad | . | . | . | 44 | . | . | . | 44 | <0.01 |
| Teflubenzuron | . | . | . | . | . | 3,381 | . | 3,381 | 0.11 |
| Tetradifon | . | . | . | . | . | 1,760 | . | 1,760 | 0.01 |
| All insecticides/acaricides | . | . | 71,911 | 4,012 | 2,295 | 227,196 | 61,858 | 367,271 | 5.85 |

Table 13 (cont.) Ornamental crops: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | Slugs | Growth regulation | General weed control | Vine weevil | Blackspot & Aphids | Sterilant | Total area treated (sp m ²) | Total quantity applied (kg) |
|--|--------------|-------------------|----------------------|-------------|--------------------|------------|---|-----------------------------|
| <i>Molluscicides</i> | | | | | | | | |
| Metaldehyde | 2,163 | . | . | . | . | . | 2,163 | 0.56 |
| All molluscicides | 2,163 | . | . | . | . | . | 2,163 | 0.56 |
| <i>Growth regulators</i> | | | | | | | | |
| Daminozide | . | 289 | . | . | . | . | 289 | 0.10 |
| 4-indol-3-yl-butyric acid | . | 69 | . | . | . | . | 69 | <0.01 |
| Paclobutrazol | . | 2,810 | . | . | . | . | 2,810 | 0.09 |
| All growth regulators | . | 3,168 | . | . | . | . | 3,168 | 0.19 |
| <i>Other products & mixed formulations</i> | | | | | | | | |
| Bupirimate/pirimicarb/triforine | . | . | . | . | 1,130 | . | 1,130 | 0.04 |
| Cresylic acid | . | . | 104 | 392 | . | 759 | 1,255 | 0.89 |
| All other products & mixed formulations | . | . | 104 | 392 | 1,130 | 759 | 2,385 | 0.93 |

Table 14 Other crops: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| <i>Pesticide type & formulation</i> | Disease control | Slugs | Sterilant | Total area treated (sp m²) | Total quantity applied (kg) |
|---|----------------------------|--------------|------------------|--|--|
| <i>Fungicides</i> | | | | | |
| Carbendazim | 13 | . | . | 13 | <0.01 |
| All fungicides | 13 | . | . | 13 | <0.01 |
| <i>Molluscicides</i> | | | | | |
| Metaldehyde | . | 101 | . | 101 | 0.01 |
| All molluscicides | . | 101 | . | 101 | 0.01 |
| <i>Other products</i> | | | | | |
| Dazomet | . | . | 622 | 622 | 45.27 |
| All other products | . | . | 622 | 622 | 45.27 |

Table 15 Nursery site: pesticide-treated area (spm²), quantities used (kg) and reasons for use.

| Pesticide type and formulation | Weeds on site | | Slugs | | Whitefly | | Total quantity applied (kg) | Total area treated (sp m ²) |
|------------------------------------|---------------|----------------------|-------------|----------------------|----------------|----------------------|-----------------------------------|---|
| | (kg) | (sp m ²) | (kg) | (sp m ²) | (kg) | (sp m ²) | | |
| <i>Herbicides & desiccants</i> | | | | | | | | |
| Chlorthal-Dimethyl | 0.43 | 4,625 | . | . | . | . | 0.43 | 4,625 |
| Clopyralid/triclopyr | 0.17 | 1,920 | . | . | . | . | 0.17 | 1,920 |
| Dichlobenil | 12.50 | 22,383 | . | . | . | . | 12.50 | 22,383 |
| Diquat/paraquat | 1.90 | 16,393 | . | . | . | . | 1.90 | 16,393 |
| Glufosinate-ammonium | 14.61 | 108,067 | . | . | . | . | 14.61 | 108,067 |
| Glyphosate | 67.41 | 550,194 | . | . | . | . | 67.41 | 550,194 |
| Isoxaben | 0.50 | 19,777 | . | . | . | . | 0.50 | 19,777 |
| Oxadiazon | 24.27 | 125,504 | . | . | . | . | 24.27 | 125,504 |
| Paraquat | 11.08 | 125,649 | . | . | . | . | 11.08 | 125,649 |
| Paraquat/diquat/amitrole/simazine | 6.12 | 15,559 | . | . | . | . | 6.12 | 15,559 |
| Propyzamide | 1.51 | 23,143 | . | . | . | . | 1.51 | 23,143 |
| Quinoclamine | 1.59 | 8,209 | . | . | . | . | 1.59 | 8,209 |
| Simazine | 7.78 | 49,886 | . | . | . | . | 7.78 | 49,886 |
| All herbicides | 149.85 | 1,071,310 | . | . | . | . | 149.85 | 1,071,310 |
| <i>Molluscicides</i> | | | | | | | | |
| Metaldehyde | . | . | 6.44 | 124,274 | . | . | 6.44 | 124,274 |
| All molluscicides | . | . | 6.44 | 124,274 | . | . | 6.44 | 124,274 |
| <i>Mixed formulations</i> | | | | | | | | |
| Bupirimate/pirimicarb/triforine | . | . | . | . | <0.1 | 933 | <0.1 | 933 |
| All mixed formulations | . | . | . | . | <0.1 | 933 | <0.1 | 933 |

Table 16 Compost: pesticide-treated area (cubic metres), quantities used (kg) and reasons for use.

| <i>Pesticide type & formulation</i> | Vine weevil (kg) | cubic metres | Total quantity applied (kg) | Total area treated cubic metres |
|---|-----------------------------|---------------------|--|--|
| <i>Insecticides/acaricides</i> | | | | |
| Chlorpyrifos | 349.52 | 3744 | 349.52 | 3744 |
| Fipronil | 1.54 | 1254 | 1.54 | 1254 |
| All insecticides/acaricides | 351.06 | 4997 | 351.06 | 4997 |

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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| 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 and Fodder Crops 1997 | 1-855.27.506.6 |
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| 194 | Arable Crops 2002 | 1-85527.674.7 |

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