

**PESTICIDE USAGE  
IN NORTHERN IRELAND**

**Survey Report 178**

**Top Fruit Crops  
2002**

**A National Statistics Publication**



Department of  
**Agriculture and  
Rural Development**

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# PESTICIDE USAGE SURVEY REPORT 178

## NORTHERN IRELAND TOP FRUIT CROPS

2002

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## The County Regions Of Northern Ireland



## SUMMARY

This report presents information from a survey of the pesticide usage practices of top fruit growers in Northern Ireland in 2002.

The total area of top fruit crops decreased by 14% compared with the previous survey in 1996, to 1,488 hectares in 2002. Approximately 92% of all top fruit crops were grown in County Armagh, with fruiting Bramley apple orchards accounting for 85% of the total top fruit grown in Northern Ireland.

Overall, an estimated 28.9 tonnes of pesticide active ingredients were applied to 27,341 spray hectares. The pesticide-treated area remained similar to that recorded in 1996, despite the 14% decrease in area grown. The 18% increase in quantity of active ingredients used represents a 36% increase in relative terms.

Fungicide usage, far outweighed insecticide/acaricides and herbicides. Fungicides, applied to 86% of the pesticide-treated area, accounted for 92% of the weight of pesticides applied. The fungicide mancozeb was the active ingredient most commonly used on top fruit crops. An estimated 88% of all fungicide applications were applied to control apple scab (*Venturia inaequalis*).

Insecticide and acaricide usage during 2002 decreased when compared with 1996. These pesticides were applied to 8% of the pesticide-treated area, accounting for 4% of the total weight of pesticide usage. The organophosphate chlorpyrifos was the insecticide/acaricide active ingredient most frequently used.

Herbicides accounted for 4% of the pesticide-treated area, representing 3% of the weight of pesticides applied. Glyphosate was the herbicide active ingredient most frequently used for 'general weed control' under the tree canopy and between rows.

An estimated 13 tonnes of 'other products', which included foliar feeds, trace elements and calcium-based products were also applied to the crops during this survey period, to address potential nutritional disorders.

An estimated 303 top fruit orchards were recorded in Northern Ireland in 2002 and orchard floor information for each orchard was calculated. Herbicide application in 'strips' under the tree canopy with inter-row grass being mowed was the most common weed-management practice (used on 62% of orchards). Mowing was the most common method of inter-row grass and weed control, practised in 94% of orchards. An estimated 38% of orchards had no herbicides applied for grass and weed control.

Data was also collected on post-harvest storage treatments applied to top fruit crops in 2002. An estimated 7,779 tonnes of top fruit crops (Bramley 97% and Dessert apples 3%) were stored. With the exception of 17 tonnes, all stored fruit were treated. The antioxidant fungicide diphenylamine was the most commonly used pesticide active ingredient applied to stored fruit. A total of six products (five fungicides and one trace element) were recorded in use on stored apple crops.

## INTRODUCTION

As a participant in the UK Working Party on Pesticide Usage Surveys, 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. 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 third survey of pesticide usage on top fruit crops in Northern Ireland. Results from the previous surveys reported on pesticide usage practices on top fruit crops in 1992 (Kidd *et al.*, 1994) and 1997 (Kidd *et al.*, 2001), are included in the report for comparative purposes.

A list of published Northern Ireland Pesticide Usage Survey reports is 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.
- ‘Reasons for use’; the reasons reported for the use of pesticides are the growers stated reason for use and may sometimes be inappropriate.
- ‘Rounding’; due to rounding of figures, there may be slight differences in totals both within and between tables.
- Generally, orchards recorded in this survey are laid out with trees planted in rows and the area between rows, referred to in the report as the ‘inter-row’ area, being grassed. ‘Herbicide strips’ refers to the area between the trees within the rows as opposed to the ‘inter-row’ area.
- The crops within the category ‘other top fruit crops’, includes areas of plum and cider apple orchards.



## **METHODS**

Using the Northern Ireland Agricultural Census, June 2002 (Anon., 2003), a sample of holdings was selected. The sample was stratified into four county regions of Northern Ireland, (there is limited top fruit production in counties Londonderry and Antrim and they were omitted from this survey) and into five size groups based on the total area of top fruit crops grown in each county. The total number of holdings in each county, together with the numbers surveyed and their relevant raising factors, are shown in Table 1 (Figure 1).

This survey covers the period from the end of the 2001 harvest to the end of the 2002 harvest.

The purpose of the survey was explained to selected growers in preliminary correspondence. A total of 92 holdings was visited and data collected by personal interview. The grower's perceived reasons for pesticide use were also included, but may not always seem appropriate. Holdings selected in the original sample, which were unable to provide data were replaced with those from the same county and size group held on a reserve list.

The collected data were analysed using SPSS software.

## **RESULTS AND DISCUSSION**

### **CROPS**

The number and area of crops sampled, together with the proportion of the crop area surveyed, are shown in Table 2. The data collected provided information on 146 examples of five crop types.

An estimated 92% of the total area of top fruit crops was grown in County Armagh, with Bramley apples accounting for 98% of the total area of top fruit crops grown (85% fruiting and 13% non-fruiting). Fruiting dessert apples, plums and cider apples collectively accounted for the remainder (Table 3, Figure 1).

### **REGIONAL PESTICIDE USAGE**

Regionally, County Armagh accounted for 93% and 96% of the total pesticide-treated area and quantities of pesticides used, respectively. County Tyrone represented 6% and 4% of the area grown and the pesticide-treated area (Tables 4 & 5, Figure 3).

## **PESTICIDE USAGE ON CROPS**

The estimated quantities of pesticide active ingredients used and the area of crop types treated with pesticides are shown in Tables 6 & 7. Bramley fruiting crops, grown on 85% of the total area of top fruit, accounted for 86% of the pesticide-treated area and 90% of the weight of active ingredients applied. Non-fruiting Bramley crops, grown on 13% of the total area, accounted for 12% of the area treated with pesticides and 9% of the quantity of pesticide applied. Fruiting dessert apple crops represented 1% of both the area grown and the treated area, while accounting for less than 1% of the total weight of pesticides used on top fruit crops in 2002. Non-fruiting dessert apples, plums and cider apples accounted for less than 1% of both the total quantity of pesticides used and the pesticide-treated area of top fruit crops.

## **PROPORTION OF CROPS TREATED**

The proportional area of crops treated with pesticides and the mean number of spray applications are shown in Table 8. Pesticides were applied to 97% of the total area of top fruit crops. An estimated 96% of all top fruit crops, received fungicides with a mean of 17 applications. Approximately 82% of all crops received insecticide/acaricide applications, with a mean of two spray applications.

Herbicides, applied to the orchard floor, were used on 26% of the area of top fruit crops, with non-fruiting dessert orchards, plum and cider orchards receiving no herbicide treatments.

Growth regulators were applied to 15% of Bramley fruiting orchards and 18% of Bramley non-fruiting crops only, on average by two applications.

## **TOTAL PESTICIDE USAGE**

Approximately 28.9 tonnes of pesticide active ingredients were applied to 27,341 spray hectares of top fruit crops grown in Northern Ireland in 2002 (Tables 4 & 5, Figure 2). Fungicides were applied to 86% of the pesticide-treated area, representing 92% of the weight of pesticides applied. Herbicides were applied to 4% of the area treated with pesticides, accounting for 3% of the total weight of pesticides used.

Insecticides/acaricides, applied to 8% of the pesticide-treated area, represented 4% of the total pesticide usage by weight. Growth regulators represented 2% and less than 1% of the total pesticide-treated area and weight of active ingredients used, respectively.

The pesticide types and active ingredients applied are shown in Tables 9 and 10.

Mancozeb (28%) and dithianon (23%) were the two most frequently used fungicides, representing 62% and 18% of the weight of fungicides used respectively. Fungicide applications were primarily used to control apple scab (*V. inaequalis*) in orchards.

Glyphosate (48%) was the most commonly applied herbicide active ingredient, accounting for 49% of herbicide active ingredients used by weight.

The organophosphorus active ingredient, chlorpyrifos, accounted for 36% of the insecticide/acaricide-treated area and represented 49% of the weight of pesticides applied. Fenitrothion (18%) and cypermethrin (18%) collectively accounted for a further 36% of active ingredients applied to the insecticide/acaricide-treated area.

Paclobutrazol was the only growth regulator active ingredient recorded used in 2002, applied solely to Bramley crops.

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

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

The area of fruiting Bramley crops grown decreased by 16% since 1996 to 1,265 hectares.

#### **Fungicides**

An estimated 86% of the area of this crop receiving pesticide application was treated with fungicides (93% of the weight of pesticides applied), compared with 80% (84%) recorded in 1996 (Table 6 and 7). Fungicide applications to control apple scab (*V. inaequalis*) accounted for 88% of the fungicide-treated area, with a further 8% being attributed to the control of canker (*Nectria galligena*).

Mancozeb, applied to 5,916 spray hectares, was the most frequently used fungicide, and accounted for 64% of the weight of fungicides applied. This compares with 2,919 spray hectares in 1996, accounting for 49% of the quantity of fungicides applied to fruiting crops of Bramley. Dithianon was also frequently used accounting for 22% of the fungicide-treated area.

## Herbicides

Herbicides applied to Bramley fruiting crops accounted for 89% of the total herbicide-treated area, with 'general weed control', being the principal reason given for usage. Glyphosate was the most commonly applied herbicide, accounting for 48% of both the herbicide-treated area and weight of herbicide active ingredients applied to this crop, (Tables 9 and 10).

## Insecticide/Acaricides

Insecticides and acaricides applied as a 'general insect control' and to control 'aphids' accounted for 51% and 40% of the insecticide/acaricide-treated area, respectively. A further 9% of active ingredients was applied to control fruit tree red spider mite (*Panonychus ulmi*).

Organophosphates accounted for 63% of the total area treated with insecticide/acaricide active ingredients. Chlorpyrifos was the principal insecticide/acaricide active ingredient recorded.

## Growth Regulators

Bramley fruiting crops accounted for an estimated 85% of the total growth regulator-treated area. Paclobutrazol was the only active ingredient recorded in use on this crop.

## Other Products

An estimated 11.7 tonnes of other products were applied to 5,369 spray hectares of this crop type.

Calcium and calcium chloride-based products, applied to prevent the nutritional disorder 'Bitter Pit', were applied to 17% of the treated area of 'other products' used on Bramley fruiting orchards. Approximately 3% of 'other products' applied to the treated area were used to control apple scab (*V. inaequalis*)

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

The area of young Bramley orchards (5 years and under) was approximately 197 hectares, representing a 4% increase in area compared with 1996. Proportionally, the distribution of pesticide usage was similar to that recorded on Bramley fruiting crops.

### **Fungicides**

Fungicides were applied to 85% of the pesticide-treated area (91% of the weight of pesticides applied). Apple scab (*V. inaequalis*) control accounted for 85% of the fungicide-treated area. A further 13% of fungicide applications were applied to control canker (*N. galligena*). Dithianon was the most extensively used fungicide accounting for 26% of the fungicide-treated area (27% of the weight of fungicide applied) to this crop. Mancozeb accounted for 16% of applications to the treated area but accounted for 37% of the quantity of fungicides used on young Bramley orchards.

### **Herbicides**

The only reason provided for all herbicide applications was 'general weed control'. Glyphosate and paraquat were the herbicides most frequently used, collectively accounting for 72% of the herbicide-treated area.

### **Insecticide/Acaricides**

The organophosphate chlorpyrifos was the insecticide/acaricide active ingredient most commonly used, accounting for 35% of the insecticide/acaricide-treated area and 53% of the quantity used on Bramley non-fruiting crops. The principal reason cited by growers for use of insecticides was to control 'aphids'.

### **Growth Regulators**

Paclobutrazol was the only growth regulator active ingredient used on this crop, applied to 91 Spray hectares.

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

The area grown of fruiting dessert apple crops has increased by 54% since 1996. No growth regulators were recorded applied to this crop.

### **Fungicides**

Of the pesticide applications to fruiting dessert apple orchards, fungicides accounted for 84% of the treated area and 93% of the weight of pesticide applied. An estimated 96% of all fungicide applications were used to control apple scab (*V. inaequalis*). Ten fungicide active ingredients were recorded in use on this crop type. The active ingredients dithianon (18%) and mancozeb (17%) collectively accounted for 35% of the fungicide-treated area and 66% of the quantity of fungicides used.

### **Herbicides**

Herbicides accounted for 3% of applications to the treated area and 5% of herbicide usage. 'General weed control', was the only reason recorded for herbicide usage on this crop. Glyphosate accounted for approximately 56% of both the treated area and weight of herbicide applications.

### **Insecticide/Acaricides**

Insecticide/acaricides, applied to 35 spray hectares of fruiting dessert orchards, accounted for 13% of the pesticide-treated area and 1% of the quantity of pesticide applied. The pyrethroid cypermethrin was the most frequently used active ingredient was applied on 51% of the insecticide/acaricide-treated area.

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

All four hectares of non-fruiting dessert apples recorded in this survey received pesticide treatments. No herbicides or growth regulators were recorded on this crop.

### **Fungicides**

Approximately 91% of the spray area was treated with fungicides (99% of the weight of pesticides applied). 96% of all applications to the fungicide-treated area were to control ‘apple scab’ (*V. inaequalis*). Mancozeb and dithianon were the principal fungicide active ingredients used.

### **Insecticide/Acaricides**

Insecticide/acaricides accounted for 8% of the total pesticide-treated area (1% of the weight of pesticide applied) of this crop. Cypermethrin and dimethoate were the only insecticide/acaricide active ingredients recorded and were applied equally to the spray area to control ‘aphids’.

## **OTHER TOP FRUIT CROPS (included plums and cider apples) (Table 17)**

Approximately three hectares of other crops, comprising plums and cider apples were grown in this survey period.

### **Fungicides**

Fungicides were applied to 94% (Table 7) of the pesticide-treated area. Dithianon and mancozeb were the active ingredients most commonly used.

### **Insecticide/Acaricides**

Insecticide/acaricide applications accounted for 6% (Table 7) of the treated area. Cypermethrin and fenitrothion were the only active ingredients recorded and were applied to control aphids.

## COMPARISON WITH PREVIOUS SURVEYS

Comparative information on pesticide usage on top fruit crops grown in Northern Ireland in 1992, 1996 and 2002 is shown in Tables 18 & 19.

### Area of top fruit crops grown (Table 18)

Overall, there was a 14% reduction in the area of top fruit grown in Northern Ireland in 2002 compared with that recorded in 1996. The largest reduction (69%) was observed in the area cropped with plums and cider apples. A significant increase in the area of dessert apples, together with a 4% increase in young orchards recorded, compared with 1996, suggests that replanting of orchards is occurring. As in previous surveys, 98% of the total top fruit area in Northern Ireland was used for Bramley apple production.

### Comparison of pesticide usage.

The total quantity of pesticides used on top fruit crops in 2002 increased by 18%, while the pesticide-treated area remained similar to that recorded in 1996.

Overall, fungicide usage increased by 9% in treated area and 29% in the quantity of fungicide active ingredients used, compared with 1996. Herbicide applications decreased both in treated area and quantity of active ingredients used by 16% and 47%, respectively. Insecticide/acaricide usage also decreased by approximately 39% in treated area and 44% by weight of application. Applications of carbamate active ingredients increased significantly in area treated and the quantity applied by almost two-fold and 42%, respectively. Organophosphate usage decreased in area treated by an estimated 39% and in overall quantity used by 47%, while there was a slight increase in the use of pyrethroids by quantity (13%) and area treated (4%). There was also an 85% reduction in the quantity of acaricides used on top fruit crops, with the acaricide-treated area also decreasing by 73%. No organochlorine active ingredients were recorded used on top fruit crops in 2002.

The area treated with growth regulators decreased by 14% compared with 1996, whilst the quantity of active ingredients also decreased by 22%.



## **STORAGE OF TOP FRUIT CROPS (Tables 20-23)**

Approximately 7,800 tonnes of apples were recorded stored after the 2002 harvest, of which 97% were Bramley apples and 3% were dessert apples. An estimated 0.3 tonnes of pesticides were applied to 7,762 tonnes of apples (7,565 tonnes of Bramley and 197 tonnes of dessert apples). Only 17 tonnes of apples recorded stored during this period were untreated.

Fungicides/antioxidants and calcium-based products (1%) were the only treatments recorded in use.

Fungicides/antioxidants accounted for 99% of both the stored apple crop treated and the total quantity of active ingredients used. The antioxidant diphenylamine was the most frequently used active ingredient accounting for 54% of the treated area and 61% of the quantity of fungicides/antioxidants used. The fungicide carbendazim accounted for a further 37% of the fungicide/antioxidant-treated area and 14% of the quantity of active ingredients used on all stored apples.

The perceived reason given for an estimated 53% of all treatments applied to stored apples was to prevent 'scald', with a further 46% of treatments being applied to prevent general 'storage rots'. All calcium applications were applied as a preventative against the nutritional disorder 'Bitter pit'.

A total of five active ingredients and one trace element were recorded in use on stored apples. Records of active ingredients during storage recorded in 2002 are shown in Table 22.

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

Storage methods were similar to those recorded in 1996, with top fruit generally stored in bulk bins in controlled atmosphere stores. The harvest this survey year was poor and this was reflected in the overall tonnage stored.

In common with 1996 the fungicide carbendazim was the most extensively used fungicide and diphenylamine was the most extensively used antioxidant. The fungicide active ingredient captan was recorded in use for the first time on stored apples in Northern Ireland in 2002.

## ACKNOWLEDGEMENTS

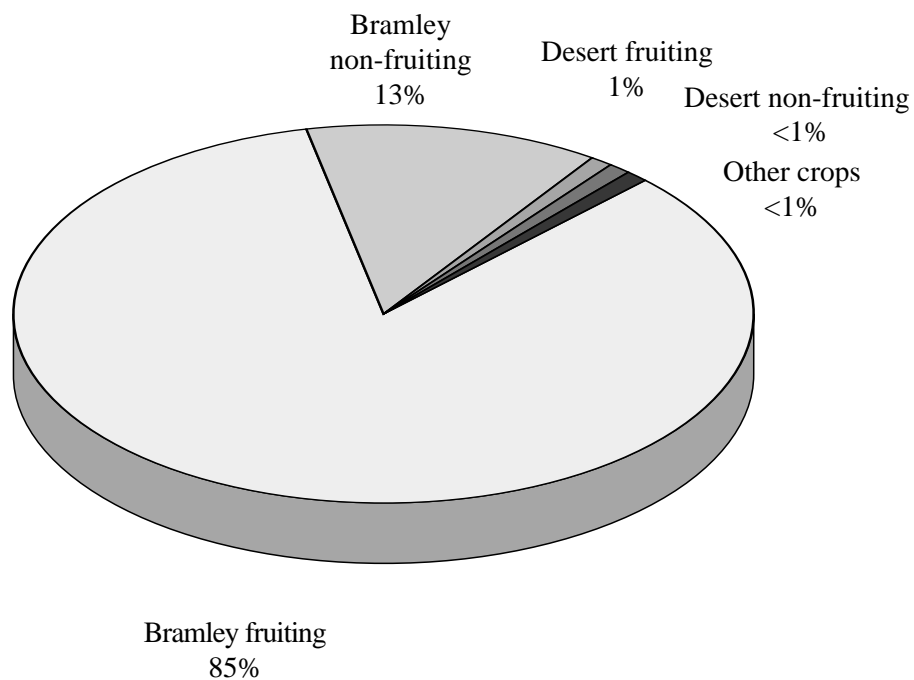
We, the authors, wish to thank all of the growers who participated in this survey. We are also grateful to Ms Julie Morgan who collected some of the data. We are particularly grateful for support from Mr Kieran Lavelle (DARD Food Development Service) for assistance with the selection of the sample, Mr Andrew Lavery and Mr John Mansfield, NIHPBS, DARDNI for their invaluable information on pesticide practices during cultivation of top fruit crops.

## REFERENCES

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

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

**Figure 1 The utilisation of top fruit production area in Northern Ireland, 2002.**



**Figure 2 The proportional area (spray hectares) of top fruit crops treated with each pesticide type in Northern Ireland, 2002.**

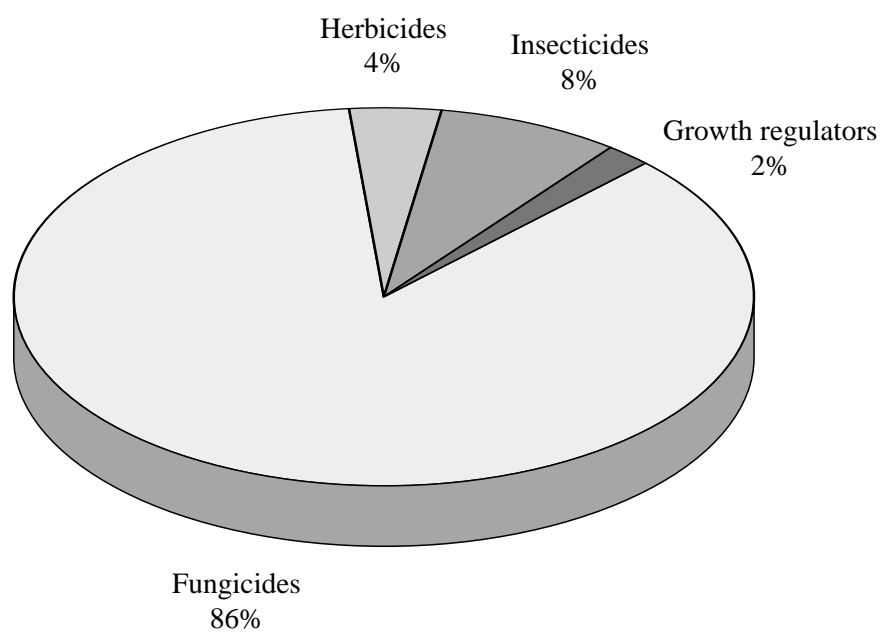
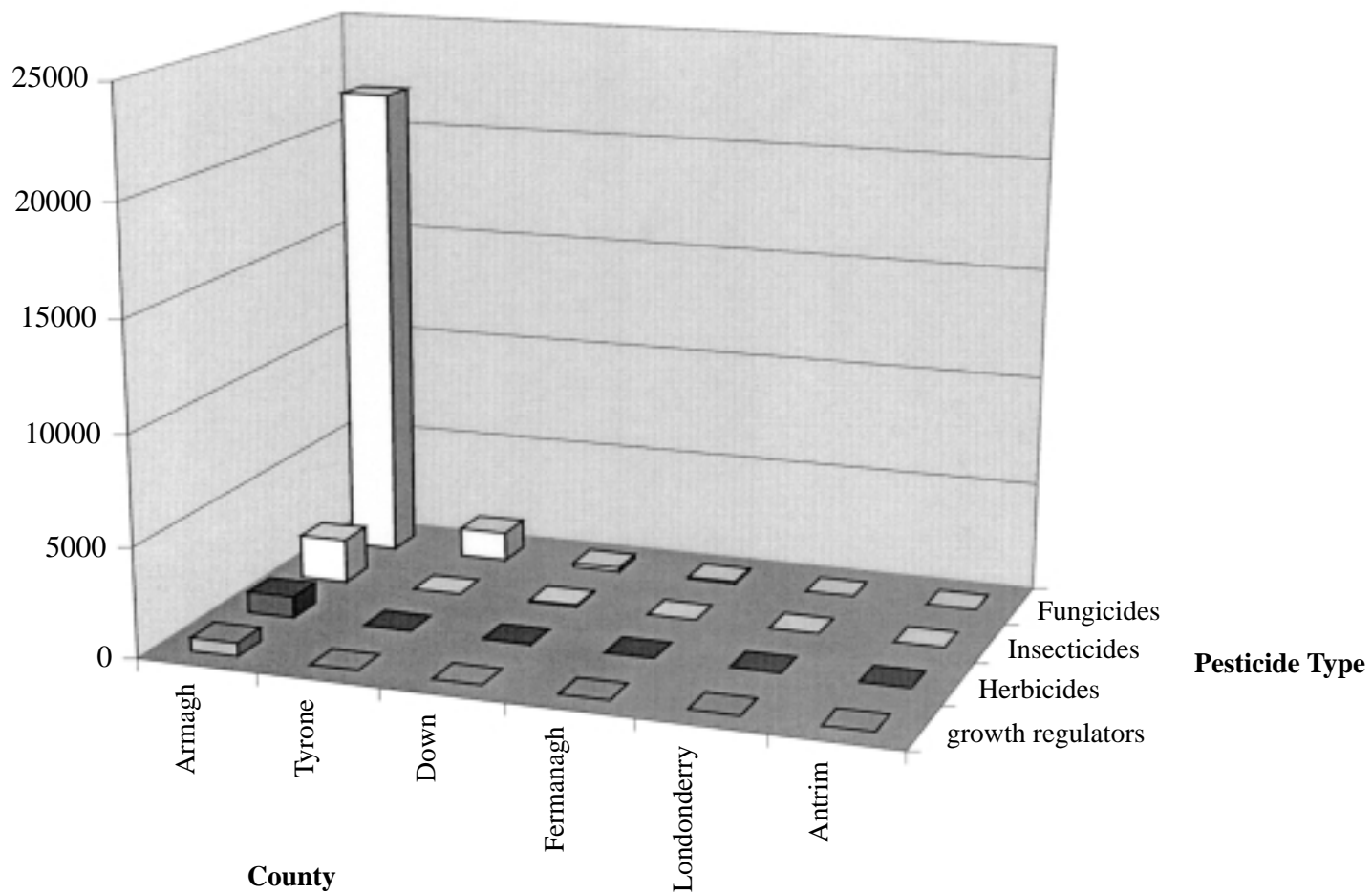


Figure 3 The area of top fruit crops treated (spray hectares) with each pesticide type in the county regions of Northern Ireland, 2002



**Table 1** The total number of farms in each size group with top fruit crops in 2002 and the number of holdings surveyed from each size group.

County	Size group (hectares)											
	<2		2<4		4<6		6<9		9+		Total	
	A	B	A	B	A	B	A	B	A	B	A	B
Antrim	10	0	0	0	1	0	0	0	1	0	12	0
Armagh	98	5	53	9	30	12	27	11	43	46	251	83
Down	10	1	0	0	0	1	1	0	0	0	11	2
Fermanagh	8	1	0	0	0	0	0	0	1	1	9	2
Londonderry	3	0	0	0	0	0	0	0	0	0	3	0
Tyrone	9	0	3	2	2	1	1	0	2	2	17	5
<b>Northern Ireland</b>	<b>138</b>	<b>7</b>	<b>56</b>	<b>11</b>	<b>33</b>	<b>14</b>	<b>29</b>	<b>11</b>	<b>47</b>	<b>49</b>	<b>303</b>	<b>92</b>

**Legend**

A = Total number of holdings in strata

B = Number of holdings surveyed

**Table 2** Total number and area of crops surveyed (hectares) and the proportional (%) of the total area of top fruit crops surveyed in Northern Ireland, 2002.

Crop	Number of crops surveyed	Surveyed area (ha)	Proportion of crop surveyed (%)
Bramley fruiting	85	906.3	72
Bramley non-fruiting	46	133.7	68
Dessert fruiting	9	13.6	69
Dessert non-fruiting	3	4.0	100
Other crop	3	2.8	100

**Table 3** Estimated area (hectares) of top fruit crops grown regionally in Northern Ireland 2002.

Crop type	County				Northern Ireland
	Armagh	Down	Fermanagh	Tyrone	
Bramley fruiting	1,174	13	18	60	1,265
Bramley non-fruiting	165	4	.	28	197
Dessert fruiting	17	1	.	2	20
Dessert non-fruiting	4	.	.	.	4
Other crop	3	.	.	.	3
<b>All crops</b>	<b>1,363</b>	<b>18</b>	<b>18</b>	<b>89</b>	<b>1,488</b>























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

<b>Pesticide type and formulation</b>	<b>Aphids</b>	<b>Insect control</b>	<b>Red spider mite (<i>P.ulmi</i>)</b>	<b>Growth regulation</b>	<b>Total area treated (sp ha)</b>	<b>Basic area treated (ha)</b>	<b>Total quantity applied (kgs)</b>
<i>Insecticides</i>							
Bifenthrin	14	.	.	.	14	14	<0.5
Chlorpyrifos	285	414	.	.	700	582	509
Clofentezine	.	24	.	.	24	24	6
Cypermethrin	99	206	12	.	316	245	12
Deltamethrin	.	20	.	.	20	20	3
Dimethoate	43	35	.	.	78	78	51
Fenitrothion	259	129	.	.	388	323	283
Fenpropathrin	.	7	.	.	7	7	<0.5
Fenpyroximate	.	.	22	.	22	22	1
Lambda-cyhalothrin	.	15	.	.	15	7	<0.5
Pirimicarb	61	.	.	.	61	61	7
Pirimiphos-methyl	16	36	.	.	51	39	45
Sulphur	.	93	10	.	103	28	119
Tebufenpyrad	.	.	122	.	122	115	11
<b>All insecticides</b>	<b>776</b>	<b>979</b>	<b>166</b>	<b>.</b>	<b>1,921</b>	<b>*1,039</b>	<b>1,047</b>
<i>Growth regulators</i>							
Paclobutrazol	.	.	.	520	520	190	85
<b>All growth regulators</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>520</b>	<b>520</b>	<b>*190</b>	<b>85</b>

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



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

Pesticide type and formulation	Apple scab	Canker	Clean trees	Powdery mildew & scab	Total area treated (sp ha)	Basic area treated (ha)	Total quantity applied (kgs)
<i>Fungicides</i>							
Captan	75	.	.	.	75	47	141
Captan/penconazole	305	.	.	.	305	103	193
Carbendazim	107	378	.	.	486	106	235
Copper oxychloride	10	1	54	.	65	55	107
Dithianon	735	.	.	.	735	144	638
Dodine	76	.	.	.	76	40	56
Fenbuconazole	244	.	.	.	244	78	13
Kresoxim-methyl	64	.	.	.	64	31	4
Mancozeb	458	.	.	.	458	115	858
Myclobutanil	52	.	.	1	54	35	2
Penconazole	9	.	.	.	9	9	<0.5
Pyrifenox	62	.	.	.	62	12	4
Pyrimethanil	215	.	.	.	215	74	75
Sulphur	4	.	.	.	4	4	14
<b>All fungicides</b>	<b>2,417</b>	<b>379</b>	<b>54</b>	<b>1</b>	<b>2,852</b>	<b>*183</b>	<b>2,340</b>
<i>Growth regulators</i>							
Pesticide type and formulation	Growth regulation				Total area treated (sp ha)	Basic area treated (ha)	Total quantity applied (kgs)
Pacllobutrazol	91	.	.	.	91	35	21
<b>All growth regulators</b>	<b>91</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>91</b>	<b>*35</b>	<b>21</b>

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

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

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

Pesticide type and formulation	General weed control	Aphids	Insect control	Red spider mite ( <i>P.ulmi</i> )	Total area treated (sp ha)	Basic area treated (ha)	Total quantity applied (kgs)
<i>Herbicides &amp; desiccants</i>							
2,4-D	3	.	.	.	3	2	2
Dicamba/MCPA/mecoprop-P	2	.	.	.	2	2	2
Dicamba/MCPA/mecoprop	18	.	.	.	18	14	15
Glufosinate-ammonium	2	.	.	.	2	1	1
Glyphosate	46	.	.	.	46	36	41
Mecoprop-p	1	.	.	.	1	1	1
Paraquat	29	.	.	.	29	24	11
Simazine	1	.	.	.	1	1	2
Triclopyr	1	.	.	.	1	1	1
Unknown herbicide	1	.	.	.	1	1	<0.5
<b>All herbicides</b>	<b>104</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>104</b>	<b>*59</b>	<b>75</b>
<i>Insecticides</i>							
Bifenthrin	.	3	.	.	3	3	0
Chlorpyrifos	.	53	49	.	102	95	71
Clofentezine	.	.	<0.5	.	<0.5	<0.5	<0.5
Cypermethrin	.	43	15	2	60	49	1
Dimethoate	.	12	.	.	12	12	5
Fenitrothion	.	2	8	.	10	9	7
Fenpropathrin	.	.	1	.	1	1	<0.5
Fenpyroximate	.	.	.	6	6	6	<0.5
Lambda-cyhalothrin	.	8	5	.	13	11	<0.5
Pirimicarb	.	23	.	.	23	23	3
Pirimiphos-methyl	.	.	25	.	25	19	22
Sulphur	.	.	8	4	12	5	20
Tebufenpyrad	.	.	.	26	26	26	5
<b>All insecticides</b>	<b>.</b>	<b>144</b>	<b>111</b>	<b>37</b>	<b>293</b>	<b>*165</b>	<b>135</b>

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

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

Pesticide type and formulation	Apple scab	Canker	Clean trees	Total area treated (sp ha)	Basic area treated (ha)	Total quantity applied (kgs)
<i>Fungicides</i>						
Captan/penconazole	25	.	.	25	12	20
Carbendazim	.	8	.	8	3	2
Copper oxychloride	2	.	1	3	2	1
Dithianon	42	.	.	42	16	34
Dodine	8	.	.	8	4	2
Fenbuconazole	28	.	.	28	15	1
Kresoxim-methyl	23	.	.	23	10	2
Mancozeb	39	.	.	39	8	51
Pyrifenox	14	.	.	14	4	<0.5
Pyrimethanil	38	.	.	38	10	15
<b>All fungicides</b>	<b>220</b>	<b>8</b>	<b>1</b>	<b>230</b>	<b>*17</b>	<b>129</b>

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

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

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

<b>Pesticide type and formulation</b>	<b>General weed control</b>	<b>Aphids</b>	<b>Insect control</b>	<b>Red spider mite (<i>P.ulmi</i>)</b>	<b>Total area treated (sp ha)</b>	<b>Basic area treated (ha)</b>	<b>Total quantity applied (kgs)</b>
<i>Herbicides &amp; desiccants</i>							
2,4-D	1	.	.	.	1	1	1
Dicamba/MCPA/mecoprop	1	.	.	.	1	1	1
Glyphosate	5	.	.	.	5	4	4
Paraquat	1	.	.	.	1	1	1
Triclopyr	<0.5	.	.	.	<0.5	<0.5	<0.5
<b>All herbicides</b>	<b>9</b>	<b>.</b>	<b>.</b>	<b>.</b>	<b>9</b>	<b>*6</b>	<b>7</b>
<i>Insecticides</i>							
Chlorpyrifos	.	2	.	.	2	2	<0.5
Cypermethrin	.	2	16	.	18	14	<0.5
Deltamethrin	.	.	9	.	9	9	<0.5
Fenitrothion	.	<0.5	.	.	<0.5	<0.5	<0.5
Fenpyroximate	.	.	.	<0.5	<0.5	<0.5	<0.5
Pirimicarb	.	4	.	.	4	4	<0.5
Pirimiphos-methyl	.	.	<0.5	.	<0.5	<0.5	<0.5
<b>All insecticides</b>	<b>.</b>	<b>8</b>	<b>26</b>	<b>&lt;0.5</b>	<b>35</b>	<b>*17</b>	<b>2</b>

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

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

Pesticide type and formulation	Apple scab	Canker	Aphids	Total area treated (sp ha)	Basic area treated (ha)	Total quantity applied (kgs)
<i>Fungicides</i>						
Captan	4	.	.	4	4	3
Carbendazim	.	4	.	4	4	1
Dithianon	36	.	.	36	4	9
Mancozeb	44	.	.	44	4	74
Myclobutanil	4	.	.	4	4	<0.5
<b>All fungicides</b>	<b>88</b>	<b>4</b>	<b>.</b>	<b>92</b>	<b>*4</b>	<b>87</b>
<i>Insecticides</i>						
Cypermethrin	.	.	4	4	4	<0.5
Dimethoate	.	.	4	4	4	1
<b>All insecticides</b>	<b>.</b>	<b>.</b>	<b>8</b>	<b>8</b>	<b>*4</b>	<b>1</b>

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

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

Pesticide type and formulation	Apple scab	Clean trees	Aphids	Total area treated (sp ha)	Basic area treated (ha)	Total quantity applied (kgs)
<i>Fungicides</i>						
Copper oxychloride	.	1	.	1	<0.5	<0.5
Dithianon	6	.	.	6	2	5
Dodine	1	.	.	1	<0.5	<0.5
Fenbuconazole	6	.	.	6	2	<0.5
Mancozeb	1	.	.	1	<0.5	6
<b>All fungicides</b>	<b>14</b>	<b>1</b>	<b>.</b>	<b>15</b>	<b>*2</b>	<b>12</b>
<i>Insecticides</i>						
Cypermethrin	.	.	1	1	1	<0.5
Fenitrothion	.	.	<0.5	<0.5	<0.5	<0.5
<b>All insecticides</b>	<b>.</b>	<b>.</b>	<b>1</b>	<b>1</b>	<b>*1</b>	<b>&lt;0.5</b>

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

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

**Table 18 Comparison of the area of top fruit crops grown (hectares) in Northern Ireland 1992-2002.**

Crop type	Survey year			% change in area 2002 / 1996
	1992 (ha)	1996 (ha)	2002 (ha)	
<i>Bramley Apples</i>				
Bramley Apples (fruiting)	1,574	1,511	1,265	-16%
Bramley Apples (non-fruiting)	158	189	197	4%
<b>All Bramley Apples</b>	<b>1,732</b>	<b>1,701</b>	<b>1,462</b>	<b>-14%</b>
<i>Dessert Apples</i>				
Dessert apples (fruiting)	57	13	20	54%
Dessert apples (non-fruiting)	5	0.4	4	900%
<b>All dessert apples</b>	<b>62</b>	<b>13.4</b>	<b>24</b>	<b>79%</b>
Other top fruit crops				
Plums	1	9	-	-
*other crops	-	-	2.8	-
<b>All other top fruit crops</b>	<b>1</b>	<b>9</b>	<b>2.8</b>	<b>-69%</b>
<b>Total top fruit crops</b>	<b>1,794</b>	<b>1,723</b>	<b>1,488</b>	<b>-14%</b>

Note: \*other crops: includes plums and cider apples

**Table 19 Comparison of pesticide usage on top fruit crops in Northern Ireland 1992-2002, area treated (spray hectares) and the quantity applied (kilograms).**

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

**Table 20** Storage methods used for apples in Northern Ireland in 2002, tonnage stored and treated.

Store type	Bulk		Bulk bins		All crops	
	tonnes stored	tonnes treated	tonnes stored	tonnes treated	tonnes stored	tonnes treated
*C.A. store	1,844	1,894	5,455	5,388	7,300	7,283
Cold store	279	279	200	200	479	479
<b>All Storage Methods</b>	<b>2,124</b>	<b>2,174</b>	<b>5,655</b>	<b>5,588</b>	<b>7,779</b>	<b>7,762</b>

\*Controlled Atmosphere

**Table 21** Estimated quantities of fruit treated (tonnes) of apples in storage, in Northern Ireland 2002, receiving treatment and the total amount of active ingredients applied(kilograms).

Pesticide Formulation	Total quantity (t)	Total quantity applied (kg)
<b>Fungicides</b>		
Benomyl	385	4
Captan	117	64
Carbendazim	5,384	44
Diphenylamine	7,778	195
Ethoxyquin	750	15
<b>All Fungicides</b>	<b>14,415</b>	<b>322</b>
<b>Other product</b>		
Calcium	167	4
<b>All other products</b>	<b>167</b>	<b>4</b>
<b>Total- All Treatments</b>	<b>14,582</b>	<b>325</b>

**Table 22** The active ingredients used in apple storage in Northern Ireland 2002, prioritised by weight (kilograms).

Active ingredient	Quantity used (kg)
Diphenylamine	195
Captan	64
Carbendazim	44
Ethoxyquin	15
Benomyl	4



**Table 23** Estimated quantities (treated tonnes) of bramley apples in storage, in Northern Ireland 2002, receiving treatment and reasons for use.

<i>Crop type</i>	<b>Active ingredient</b>	<b>Bitterpit</b>	<b>Scald</b>	<b>Storage rots</b>	<b>Total quantity applied (kg)</b>
<i>Bramley fruiting</i>	Benomyl	.	.	385	385
	Captan	.	117	.	117
	Carbendazim	.	.	5,344	5,344
	Diphenylamine	.	6,706	875	7,581
	Ethoxyquin	.	750	.	750
	Calcium	167	.	.	167
	<b>All Bramley fruiting</b>		<b>167</b>	<b>7,573</b>	<b>6,605</b>
<i>Desert fruiting</i>	Carbendazim	.	.	40	40
	Diphenylamine	.	197	.	197
	<b>All Dessert fruiting</b>		<b>.</b>	<b>197</b>	<b>40</b>
<b>All treatments</b>		<b>167</b>	<b>7,770</b>	<b>6,645</b>	<b>14,582</b>

**Table 24 Comparison of the estimated quantities of fruit treated (tonnes), receiving treatment and the total amount of active ingredients applied (kg) to Bramley apples in storage 1992-2002.**

Pesticide formulation	Survey year					
	1992		1996		2002	
	Total quantity (t)	Total quantity applied (kg)	Total quantity (t)	Total quantity applied (kg)	Total quantity (t)	Total quantity applied (kg)
<b>Antioxidants</b>						
Diphenylamine	2,154	71	10,496	611	7,778	195
Ethoxyquin	8,350	378	1,381	50	750	15
<b>All antioxidants</b>	<b>10,504</b>	<b>449</b>	<b>11,877</b>	<b>661</b>	<b>8,528</b>	<b>210</b>
<b>Fungicides</b>						
Benomyl	4,166	124	.	.	385	4
Carbendazim	1,789	39	6,372	87	5,384	44
Carbendazim/metalaxyl	4,299	115	3,901	90	.	.
Captan	.	.	.	.	117	64
Thiophanate-methyl	436	5	1,146	40	.	.
<b>All Fungicides</b>	<b>10,690</b>	<b>283</b>	<b>11,419</b>	<b>217</b>	<b>5,886</b>	<b>112</b>
<b>All treatments</b>	<b>21,194</b>	<b>732</b>	<b>23,296</b>	<b>878</b>	<b>14,414</b>	<b>322</b>
<i>Not treated</i>	2,322	.	384	.	17	.

**Northern Ireland Pesticide Usage Survey Published Reports****Appendix 1**

<b>Report No.</b>	<b>Report title</b>	<b>ISBN</b>
99	Grassland & Fodder Crops 1989	1-85527-079-X
105	Arable Crops 1990	1-85527 130 3
106	Soft Fruit Crops 1990	1-85527 149 4
109	Vegetable Crops 1991	1-85527 137 0
110	Protected Crops 1991 (edible & ornamental)	1-85527 283 0
111	Mushroom Crops 1991	1-85527 150 8
117	Arable Crops 1992	1-85527 193 1
118	Top Fruit Crops 1992	1-85527 194 X
124	Grassland & Fodder crops 1993	1-85527 221 0
131	Forestry 1993	1-85527 282 2
132	Arable Crops 1994	1-85527 314 4
139	Vegetable Crops 1995	1-85527 346 2
140	Mushroom Crops 1995	1-85527 347 0
146	Arable Crops 1996	1-85527 469 8
147	Top Fruit Crops 1996	1-85527 470 1
157	Sheep Treatments 1997	1-85527 425 6
167	Soft fruit 1998	1-85527.540.6
168	Arable Crops 1998	1-85527.536.8
169	Vegetable Crops 1999	1-85527.561.9
170	Mushroom Crops 1999	1-85527.549.X

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