PESTICIDE USAGE IN SCOTLAND

SOFT FRUIT 1994

Scottish Agricultural Science Agency

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SUMMARY

This report presents information from a survey of pesticide usage on soft fruit crops in Scotland, covering the 12 month period October 1993 to September 1994. Data were collected during visits to 61 holdings, representing 33% of the total area of soft fruit crops grown in Scotland. The data have been raised to give estimates of pesticide usage for the whole of Scotland.

Since the last survey in 1990 the areas of raspberries and strawberries had decreased by 40% and 23% respectively whilst the area of blackcurrants had increased by 29%. Overall, the total Scottish soft fruit area had declined by 30% since 1990 to below 2,300 hectares.

Despite the decline in soft fruit area, pesticide usage, as measured by spray area, increased by 8% since 1990, due largely to a 34% increase in the total spray area of fungicides. Dichlofluanid remained by far the most extensively used fungicide, the total spray area declining by around 16% since 1990. The fungicides chlorothalonil, iprodione and bupirimate were also widely used showing large increases in spray area since 1990.

There was an overall 8% decrease in the total spray area of insecticides since 1990, representing an increase in use when the 30% fall in soft fruit area is taken into account. Fenitrothion was still the most extensively used insecticide, the total spray area declining by around 4% since 1990.

Herbicide use declined by 27%, approximately in line with the fall in soft fruit area. Simazine was still the principal herbicide followed by paraquat, either alone or formulated with diquat. Isoxaben and bromacil were also widely used.

INTRODUCTION

This is the fifth survey of pesticide usage on soft fruit crops in Scotland, the previous surveys being in 1975, 1980, 1986 and 1990 (References 1, 2, 3 and 4). A single sample was taken, as described in the method, which differed from previous surveys when three separate samples were drawn. For the first time pesticide usage data are presented for both fruiting and non-fruiting crops.

DEFINITIONS AND NOTES

Basic area (or basic hectares) is the planted area of crop which was treated with a given pesticide, irrespective of the number of times it was applied to that area.

Spray area (or spray hectares) is the basic area of a crop treated with a given pesticide multiplied by the number of treatments that area received.

The term formulation refers to one or more active ingredients characterising a product.

Fruiting crops were those harvested during 1994, including some strawberry crops planted in 1994, whilst non-fruiting crops were young plantations that were not harvested.

Strawberries grown under protection (glasshouses, polytunnels etc.) were not included in the survey, these are included in the protected crops survey.

The reasons given for the uses of pesticides were those given by growers and may sometimes not reflect label recommendations.

Due to rounding there may be slight differences in totals both within and between tables.

METHOD

Using the June 1993 Agricultural Census (Reference 5) a sample was drawn representing the whole of Scotland and was selected from holdings growing any of the soft fruit crops.

The country was divided into 11 land-use regions as shown in Figure 1 (Reference 6). Holdings were stratified by land-use region and by size group (based on the total area of soft fruit crops grown on the holding). The number of holdings sampled in each size group was based on the total area of soft fruit crops grown in each size group. Sampling within size groups was based on numbers of soft fruit growers within the 11 land-use regions which were later amalgamated into four : North, which included the fruit growing areas bordering the Moray Firth; East Central, which included the main Scottish soft fruit growing areas; West Central; and South which included Lothian, Tweed Valley and the South-West.

The period of the survey covered the 12 months from 1 October 1993 to 30 September 1994. With a few exceptions, each grower was visited by a surveyor, following an introductory letter and telephone call. A small number of growers in remote areas had to be interviewed by telephone, again by prior arrangement. In all, information was obtained from 61 holdings. Details of the numbers of holdings visited and their distribution are shown in Table 2.

The total area of soft fruit crops surveyed within each region and size group is shown in Table 35. For all soft fruit crops, sample data were raised to give national estimates of pesticide usage using raising factors (Table 37). These were based on the areas growing soft fruit crops in the 1994 Agricultural Census (Reference 7) within regions and size groups (Table 36). Adjustments (Table 38) were made for each crop within each region by applying the raising factors to the sample area of each crop grown and comparing this with the area from the 1994 Agricultural Census.

RESULTS

Distribution of crops (Table 1 and Figure 2)

The total area of soft fruit crops had declined by 30% from 3,281 hectares in 1990 to 2,293 hectares in 1994. The area of raspberries declined by 40% to 1,399 hectares and the area of strawberries declined by 23% to 503 hectares. In contrast the area of blackcurrants increased by 29% to 330 hectares. The combined area of gooseberries, redcurrants, whitecurrants, hybridberries etc., grouped together under the heading 'other soft fruit crops', remained relatively unchanged since 1990 with an increase of 1% in area to 62 hectares. Raspberries accounted for 61% of the total area of soft fruit crops grown in Scotland in 1994, strawberries 22%, blackcurrants 14% and other soft fruit crops 3%.

RASPBERRIES

The area of raspberries declined by 40% from 2,316 hectares in 1990 to 1,399 hectares in 1994. It was estimated that 1,235 hectares, 88% of the crop, were fruiting raspberries.

Insecticides/acaricides and molluscicides (Tables 3, 4 and 7)

There was an increase in the proportion of crop treated with insecticide/acaricide or molluscicide from 75% in 1990 to 85% in the present survey. Ninety percent of fruiting raspberries were treated but only 45% of non-fruiting. The main specified reason for insecticide/acaricide use was against the raspberry beetle.

As in 1990, fenitrothion was the most widely used insecticide. The proportion of crop treated increased from 62% in 1990 to 71% in this survey whilst the total spray area decreased from 1,896 spray hectares in 1990 to 1,748 spray hectares. It was used mainly on the fruiting crop against the raspberry beetle.

The proportion of crop treated with chlorpyrifos increased from 12% in 1990 to 16% in this survey whilst the total spray area decreased slightly from 300 spray hectares in 1990 to 256 spray hectares. It was used on 17% of fruiting raspberries and 8% of non-fruiting, mainly against the raspberry beetle and to a lesser extent against the clay coloured weevil.

The use of deltamethrin increased from 1% of the crop treated in 1990 to 11% (170 spray hectares). It was used solely on fruiting raspberries, mainly against earwigs, a potential contaminant in mechanically harvested raspberries.

Dimethoate which had not been recorded in the 1990 survey, was used solely on non-fruiting raspberries, being applied to 24% of the non-fruiting crop (60 spray hectares) mainly for the control of aphids.

Overall insecticide/acaricide use, in terms of spray hectares of formulations, decreased by 13% since 1990 whilst the crop area had decreased by 40%, representing a more intensive pattern of usage.

A small proportion (3%) of the fruiting crop was treated with molluscicide. During a wet harvest slugs may become a contaminant in mechanically harvested raspberries. Two percent of the crop was treated with metaldehyde and 1% with methiocarb. No molluscicides were recorded in 1990.

Fungicides and soil sterilants (Tables 3, 5 and 8)

There was little difference in the proportion of crop treated with fungicide compared with the last survey, 87% of the crop being treated. Ninety five percent of fruiting raspberries were treated compared with only 31% of non-fruiting. The main specified reason for fungicide use was against grey mould (*Botrytis cinerea*).

As in 1990, dichlofluanid was the most used fungicide. The proportion of crop treated decreased slightly from 83% in 1990 to 81% in this survey whilst the total spray area decreased considerably from 4,955 spray hectares in 1990 to 2,893 spray hectares in this survey, in line with the 40% decline in area grown. It was used solely on fruiting raspberries mainly against *Botrytis*.

Iprodione and chlorothalonil showed large increases in usage since 1990. Iprodione, used on 2% of the crop in 1990 and chlorothalonil, on 4%, were used on 42% (913 spray hectares) and 37% (1,131 spray hectares) respectively in the present survey. Both were used mainly on the fruiting crop, iprodione against *Botrytis* and chlorothalonil against *Botrytis* and mildew.

The formulation mancozeb/oxadixyl, not approved for use on raspberries in 1990, was used on 43% of the crop, for the control of *Phytophthora* root rot. In 1990 the main fungicide used for this purpose was the mancozeb/metalaxyl formulation which was not recorded in the present survey.

Benomyl, widely used in 1990, on 30% of the crop was used on 26% in the present survey.

Overall fungicide use, as measured by spray hectares of formulations, decreased by around 4% since 1990 whilst the crop area had decreased by 40%, representing a more intensive pattern of usage.

The soil sterilant dazomet was used pre-planting on a small proportion (3%) of non-fruiting raspberries.

Herbicides (Tables 3, 6 and 9)

There was little difference in the proportion of crop treated with herbicide compared with the last survey, 96% of the crop being treated.

Simazine remained the most popular herbicide. The proportion of crop treated (56%) was the same as that in 1990, whilst the total spray area decreased from 1,304 spray hectares in 1990 to 826 spray hectares in this survey. It was applied to 61% of fruiting raspberries but only 19% of non-fruiting, mainly for general weed control.

Paraquat remained the second most popular herbicide. It was used alone on 37% of the crop and in formulation with diquat on 27%.

The proportion of crop treated with bromacil increased slightly from 33% in 1990 to 37% in this survey whilst the total spray area decreased slightly from 760 spray hectares in 1990 to 521 spray hectares. It was applied to 33% of fruiting raspberries and was the main herbicide on the non-fruiting crop, applied to 67%.

Isoxaben was used on 23% of the crop (363 spray hectares) compared with 22% (561 spray hectares) in 1990. It was mainly applied to the fruiting crop for the control of annual broad-leaved weeds.

Overall herbicide use, as measured by spray hectares of formulations, decreased by 37% since 1990, approximately in line with the 40% decline in area grown.

STRAWBERRIES

The area of strawberries declined by 23% from 649 hectares in 1990 to 503 hectares in 1994. It was estimated that 485 hectares, 96% of the crop, were fruiting strawberries.

Insecticides/acaricides and molluscicides (Tables 3, 10 and 13)

Seventy three percent of the crop was treated with an insecticide/acaricide or molluscicide compared with only 60% in 1990. The main specified reasons for insecticide/acaricide use were against aphids and red spider mite.

As in 1990, the main insecticide/acaricide was chlorpyrifos, its use declining slightly from 52% of crop treated in 1990 to 48% in the present survey. The main specified reason for application was against red spider mite and caterpillars.

The second most popular insecticide, used solely on fruiting strawberries against aphids, was pirimicarb, showing an increase in usage from 1% of crop treated in 1990 to 14% in this survey.

Dicofol, which had been the second most popular insecticide/acaricide in 1990, used on 14% of the crop, was not recorded in the present survey although the dicofol/tetradifon formulation was used on 3% of the crop.

Overall insecticide/acaricide use, as measured by spray hectares of formulations, declined by 26% whilst the crop area declined by 23%.

The proportion of crop treated with the molluscicide methiocarb increased slightly from 14% in 1990 to 17%. A small proportion, 2% of the crop, was treated with metaldehyde which was not recorded in 1990.

A small proportion, 3% of the fruiting crop, was treated with a biological control agent (*Bacillus thuringiensis*). No biological control agents were recorded in 1990.

Fungicides and soil sterilants (Tables 3, 11 and 14)

There was a large increase in the proportion of crop treated with fungicide, from 76% in 1990 to 98% in the present survey, possibly a result of a higher proportion of strawberries fruiting in their first year. All fruiting strawberries were treated while only 42% of the non-fruiting crop was treated. The main specified reasons for fungicide use were against *Botrytis* and mildew.

As in 1990, dichlofluanid was the main fungicide, used mainly against *Botrytis*. The proportion of crop treated increased from 70% in 1990 to 94% in this survey, whilst the spray area increased from 1,308 spray hectares to 1,593 spray hectares.

Both iprodione and bupirimate showed large increases in usage since 1990. Iprodione, used on 4% of the crop in 1990 and bupirimate, on 1%, were applied to over 60% of the crop in the present survey. Iprodione was used mainly against *Botrytis* and to a lesser extent against mildew while bupirimate was used solely against mildew. Multiple applications of both fungicides resulted in each being applied to more than 1,000 spray hectares.

There were also marked increases in the proportion of crop treated with triadimefon (against mildew) up from 18% in 1990 to 69%, and fosetyl-aluminium (against red core) up from 14% in 1990 to 31% in the present survey.

Fenarimol, which had not been recorded in 1990, was used on 41% of the crop against mildew.

Vinclozolin, used on 26% of the crop in 1990, is no longer approved for use on soft fruit and was not recorded in this survey.

Overall fungicide use, as measured by spray hectares of formulations, more than doubled since 1990 despite the 23% reduction in crop area. This is due largely to the increase in the proportion of crop treated with fungicide and to the more widespread use of formulations applied several times through the season.

The soil sterilants dazomet and methyl bromide were used pre-planting on a small proportion of fruiting strawberries, each being used on 1% of the crop.

Herbicides (Tables 3, 12 and 15)

Ninety three percent of the crop was treated with herbicide compared with 96% in 1990. The main specified reason for herbicide use was general weed control followed by annual broad-leaved weeds.

As in previous surveys, simazine was the main herbicide. Its usage had declined from 62% of the crop treated (616 spray hectares) in 1990 to 56% (418 spray hectares) in this survey.

Paraquat, used alone or in formulation with diquat, was used on 280 spray hectares, similar to that in 1990, for general weed control and runner control.

The proportion of crop treated with napropamide increased from 25% in 1990 to 37% while phenmedipham, used on 28% of the crop in 1990, had decreased to 18% in this survey. Lenacil was used on roughly the same proportion (26%) of the crop as in the previous survey.

Overall herbicide use, as measured by spray hectares of formulations, decreased by 19%, roughly in line with the fall in planted area of 23%.

The area of blackcurrants increased by 29%, from 256 hectares in 1990, to 330 hectares in 1994. All blackcurrants recorded in the survey were fruiting.

Insecticides/acaricides and molluscicides (Tables 3 and 16)

There was little change in the proportion of crop treated with insecticide/acaricide or molluscicide since the last survey. All the crop was treated in the present survey compared with 98% in 1990. The main specified reason for insecticide/acaricide use was against big-bud mite.

As in 1990, endosulfan, used against big-bud mite, was the principal insecticide/acaricide, applied to 99% of the crop, similar to that in 1990, although it was used on a reduced spray area, 422 spray hectares in the present survey compared with 578 spray hectares in 1990.

The second most popular insecticide/acaricide was fenpropathrin which was not recorded in the last survey. It was used on 73% of the crop (391 spray hectares) also against big-bud mite.

Fenitrothion, the main insecticide/acaricide used against the blackcurrant leaf midge, was used on 52% of the crop compared with only 17% in 1990.

Overall insecticide/acaricide use, as measured by spray hectares of formulations, increased by 24%, roughly in line with the increase in planted area of 29%.

Metaldehyde, which had not been recorded in 1990, was the principal molluscicide, used on 44% of the crop. Methiocarb, the main molluscicide in 1990, declined in use from 18% of the crop treated to only 1% in the present survey.

Fungicides (Tables 3 and 17)

There was little change in the proportion of crop treated with fungicide since the last survey. All the crop was treated in the present survey compared with 98% in 1990. The main specified reasons for fungicide use were against mildew and *Botrytis*.

The two principal fungicides were chlorothalonil and dichlofluanid, both showing marked increases in usage since 1990. Dichlofluanid was used on 100% of the crop, against *Botrytis*, up from 40% in 1990. Chlorothalonil was used on 96% of the crop, against *Botrytis*, leaf spot and mildew, up from 60% in 1990.

Bupirimate usage, on 73% of the crop, against mildew, remained fairly similar to that in 1990. Penconazole, not approved for use on blackcurrants in 1990, was used on 44% of the crop against mildew.

- ***Herbicides (Tables 3 and 18)***

There was a reduction in the proportion of crop treated with herbicide, from 99% in 1990 to 91% in the present survey.

The main herbicide used was simazine on 81% of the crop (266 spray hectares) a similar proportion to that in 1990.

There was a substantial reduction in the proportion of crop treated with isoxaben, from 81% in 1990 to 51% in the present survey, although the spray area had only declined from 209 spray hectares to 168 spray hectares.

The diquat/paraquat formulation, used on only 2% of the crop in 1990 had increased to 44% in the present survey.

The other soft fruit crops consisted largely of gooseberries together with smaller areas of redcurrants, whitecurrants, blackberries, tayberries and other hybridberries, amounting to 62 hectares in total, similar to that in 1990. It was estimated that 52 hectares, 84% of the crop, were fruiting.

- ***Insecticides/acaricides and molluscicides (Tables 3, 19 and 22)***

There was a large increase in the proportion of crop treated with insecticide/acaricide or molluscicide, up from 52% in 1990 to 93% in the present survey.

As in 1990, the main insecticide was fenitrothion, used on 60% of the crop (37 spray hectares) up from 34% (22 spray hectares) in 1990. It was used mainly against the gooseberry sawfly.

Ten percent of the crop was treated with the molluscicide methiocarb. No molluscicides were recorded in 1990.

- ***Fungicides (Tables 3, 20 and 22)***

There was little difference in the proportion of crop treated with fungicide compared with the last survey, 90% of the crop being treated. All fruiting crops were treated compared with only 34% of the non-fruiting.

The main fungicides, as in 1990, were dichlofluanid, used mainly against *Botrytis*, on 70% of the crop and triadimefon, used against mildew, on 43% of the crop.

- ***Herbicides (Tables 3, 21 and 22)***

As in the previous survey all crops were treated with herbicide, the main one being simazine, used on 83% of the crop (62 spray hectares) similar to that in 1990.

COMPARISONS WITH PREVIOUS SURVEYS

Overall usage of pesticides, as measured by spray hectares of formulations, increased by 8% from 1990 despite a decline in soft fruit area of 30%. This continues the trend observed between 1986 and 1990 when there was an 18% increase in pesticide usage with little change in the planted area of soft fruit.

The increase in pesticide usage is largely due to a 34% increase in the total spray area of fungicides. This increase is due, firstly, to a large increase in the proportion of strawberries treated with fungicide (possibly a result of a higher proportion of strawberries fruiting in their first year compared with the previous survey) and secondly, to the more widespread use of formulations such as chlorothalonil (mainly on raspberries and blackcurrants), iprodione (on raspberries and strawberries) and bupirimate (mainly on blackcurrants and strawberries) which are used several times through the season. The increase in fungicide use between 1990 and 1994 continues the trend observed between 1986 and 1990, when there was a 30% increase in the spray area.

There was an 8% decrease in the total spray area of insecticides since 1990, representing an increase in use when the fall in area grown is taken into account. Despite the 8% decrease in total spray area, there was a 2% increase in the weight of active ingredients applied. This is largely due to the use of the nematicide, 1,3-dichloropropene, not recorded in 1990, used on a small proportion of strawberries, but at a high rate of application.

When the fall in area grown is taken into account there were relative increases since 1990 in the spray area of carbamates (mainly pirimicarb on strawberries), organophosphates (mainly fenitrothion on raspberries) and pyrethroids (mainly fenpropathrin on blackcurrants) and a decrease in the use of organochlorines (mainly endosulfan on blackcurrants).

Organophosphates remained by far the most popular insecticide/acaricide group as in previous surveys and accounted for 68% of the total spray area of all insecticide/acaricide formulations. This was down from 74% in 1990 and 91% in 1986.

Herbicide use declined by 27% (spray hectares) approximately in line with the fall in area grown, while the weight of active ingredients used increased by 4%. This was partly due to the use of sodium monochloroacetate on raspberries, which was not approved for use on this crop in 1990, used at a high rate of application.

Molluscicide use, as measured by spray hectares of formulations, increased by 64% on 1990, while there was a three-fold increase in the weight of molluscicide applied.

Soil sterilant usage, which had declined considerably between 1980 and 1990, increased from 4 spray hectares in 1990 to 15 spray hectares in this survey, although down from 26 spray hectares in 1986. As these pesticides are applied at very high rates, the quantity used increased from 1.7 tonnes in 1990 to 4.6 tonnes in this survey although down from 9.7 tonnes in 1986.

A small area (14 spray hectares of strawberries) was treated with a biological control agent (*Bacillus thuringiensis*) which had not been recorded in the previous surveys.

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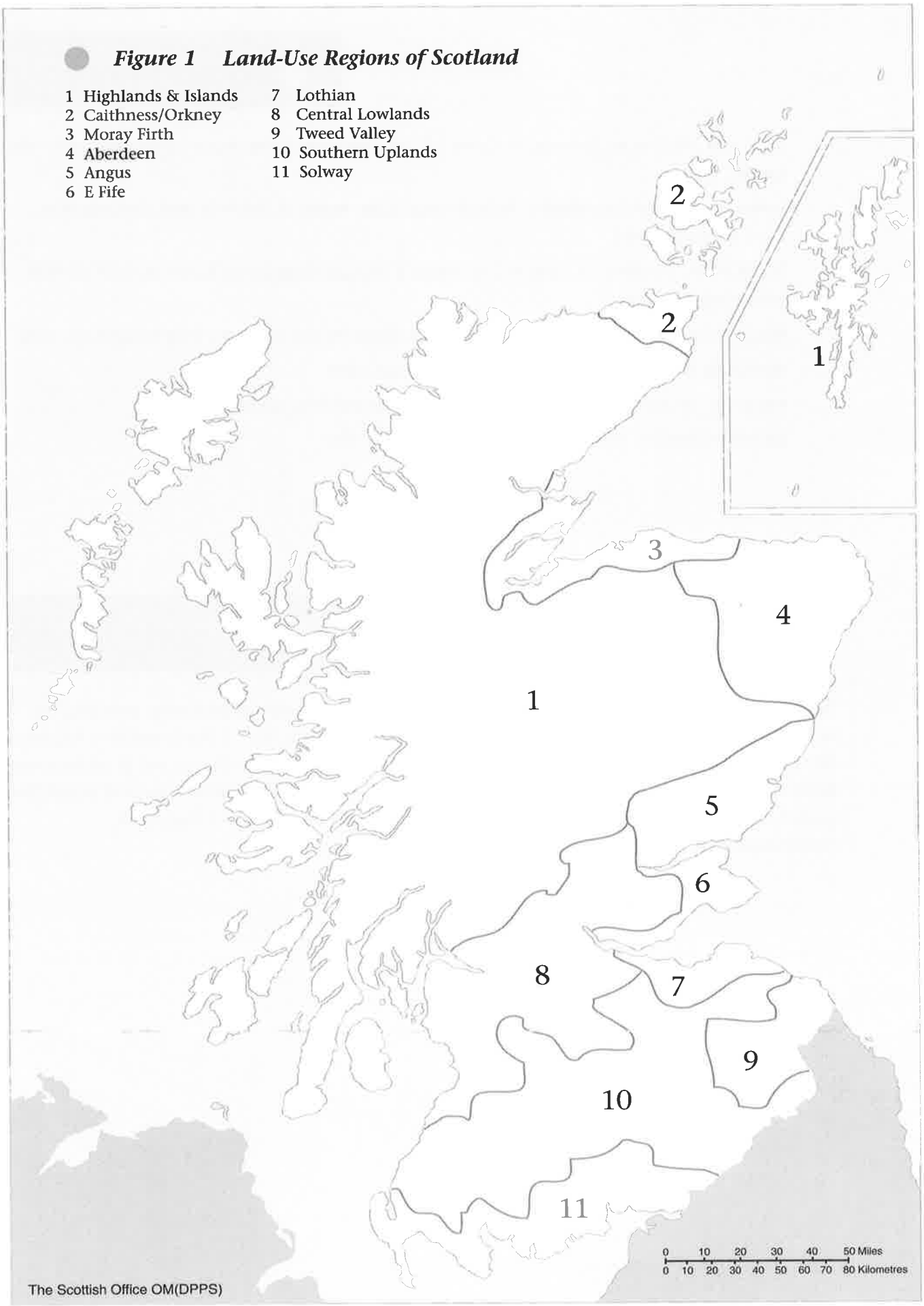
ACKNOWLEDGEMENTS

The authors express thanks to all the farmers and growers who took part in the survey, providing the information upon which this report is based. Thanks are also given to Mr P R Shave and Mr L A Thomas who collected some of the data, to Dr C J Griffiths for providing editorial assistance and to all those who made useful comments on the draft version of the report. In addition, the authors are most grateful for support from Mr D Marr of Information Technology Section, SASA, and to Mr I Nevison of Biomathematics & Statistics Scotland.

Figure 1 Land-Use Regions of Scotland

1 Highlands & Islands
2 Caithness/Orkney
3 Moray Firth
4 Aberdeen
5 Angus
6 E Fife
7 Lothian
8 Central Lowlands
9 Tweed Valley
10 Southern Uplands
11 Solway



Regions were amalgamated as follows:

North 1+2+3+4 East Central 5+6 West Central 8 South 7+9+10+11

Figure 2 Soft fruit areas (%) in 1994

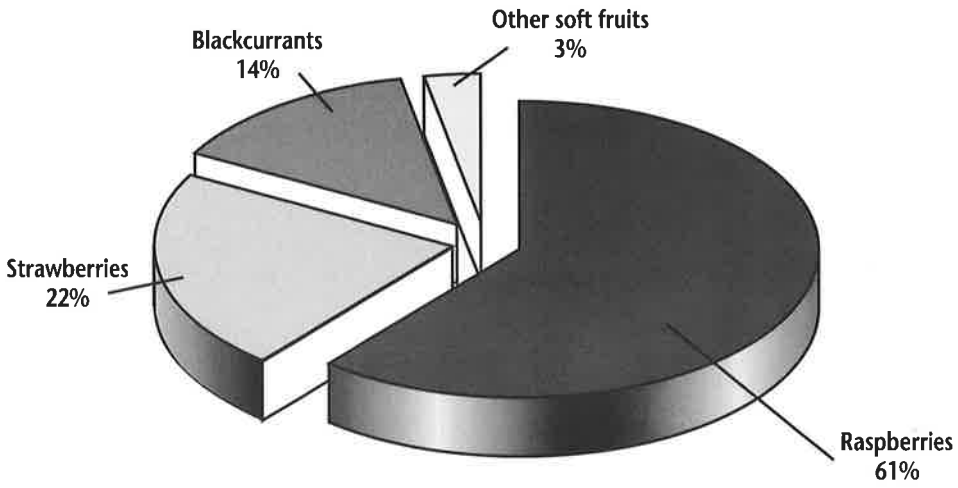


Figure 3 Percentages of soft fruit areas sampled

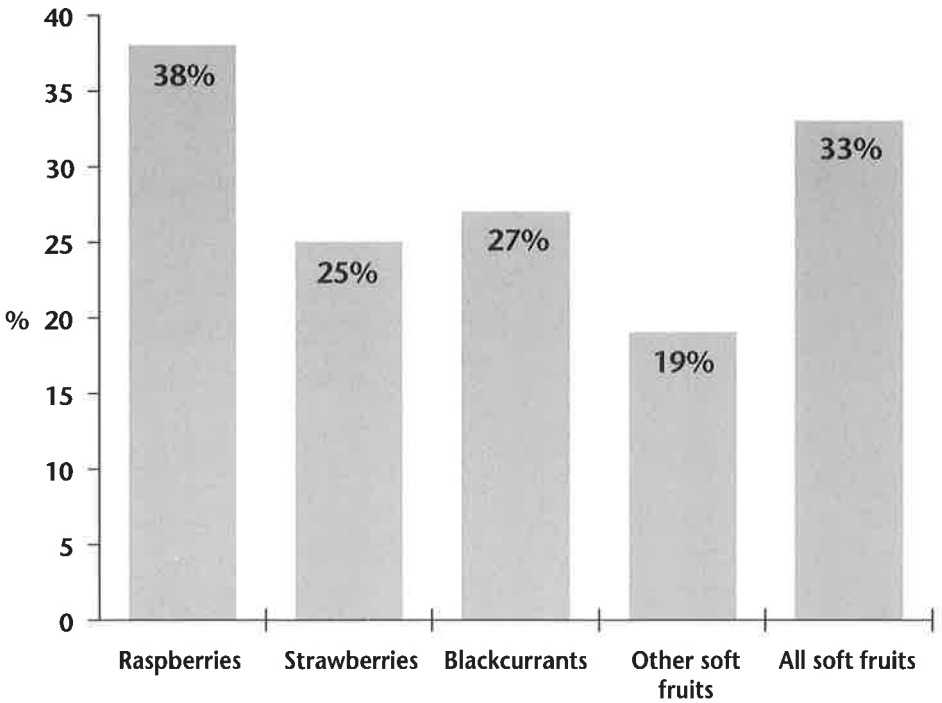


TABLE 1 Regional distribution of soft fruit crops in 1994 (hectares)

	North	East Central	West Central	South	Scotland 1994	Scotland 1990	% change
Raspberry	75	1,232	60	33	**1,399**	2,316	–40
Strawberry	96	322	39	45	**503**	649	–23
Blackcurrant	4	321	2	3	**330**	256	+29
Other soft fruit	7	34	15	6	**62**	61	+1
All soft fruits	182	1,908	116	87	**2,293**	3,281	–30

TABLE 2 Number of holdings surveyed in each region and size group*

Size group (ha)	North	East Central	West Central	South	Scotland
0.1 – 4.9	6	9	1	1	17
5.0 – 9.9	1	13	1	1	16
10.0 – 19.9	1	14	1	1	17
20 +		11			11
All groups	8	47	3	3	61

* size group refers to area of soft fruit grown on holding

TABLE 3 *Proportion (%) of each soft fruit crop treated with pesticides*

	Raspberry (fruiting)	*Raspberry (non-fruiting)*	*Raspberry (all)*	*Strawberry (fruiting)*	*Strawberry (non-fruiting)*	*Strawberry (all)*	*Blackcurrant (fruiting)*	*Other soft fruit (fruiting)*	*Other soft fruit (non-fruiting)*	*Other soft fruit (all)*	*All soft fruit crops*
Insecticide*/molluscicide	90	45	85	73	63	73	100	94	83	93	85
Fungicide	95	31	87	100	42	98	100	100	34	90	91
Herbicide	96	98	96	93	100	93	91	100	100	100	95
Soil sterilant		3	+	2		2					1
Biological				3		3					1
Any pesticide	96	98	96	100	100	100	100	100	100	100	98

* includes acaricides
'+' = <0.5%

TABLE 4 Raspberry (fruiting)

Usage of insecticides, acaricides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Insecticides/ acaricides	Raspberry beetle	Raspberry beetle & cane midge	Raspberry cane midge	Clay coloured weevil	Aphids	Earwigs	Double dart moth	Raspberry moth	General pests or no reason given	Slugs	Total spray area	% of fruiting crop treated	% of all raspberries treated
Azinphos-methyl/demeton-S-methyl sulphone				8							8	1	1
Carbaryl				18							18	1	1
Chlorpyrifos	86	25	8	58	23		19	15	9		243	17	16
Deltamethrin	24					85			61		170	12	11
Fenitrothion	896	148	38	90	94		29		427		1,722	79	71
Gamma-HCH			3								3	+	+
Malathion	9										9	1	1
Tar oils								25	27		51	4	4
All insecticides/acaricides	**1,014**	**173**	**48**	**174**	**117**	**85**	**48**	**40**	**524**		**2,224**	**90**	**85**
Molluscicides													
Metaldehyde										23	23	2	2
Methiocarb										15	15	1	1
All molluscicides										39	39	3	2
Area planted (ha)												1,235	

'+' = <0.5%

TABLE 5 Raspberry (fruiting)

Usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Fungicides	Botrytis	Phytophthora root rot	Mildew	Botrytis & mildew	Cane blight	Botrytis & cane blight	Cane spot & spur blight	Disease precaution	No reason given	Total spray area	% of fruiting crop treated	% of all raspberries treated
Benomyl	243				141		15		76	476	27	26
Bupirimate			180							180	13	11
Carbendazim	62				96	37		36	38	269	18	17
Chlorothalonil	755		63	229					82	1,128	42	37
Dichlofluanid	2,171		14	221	8			293	187	2,893	91	81
Fenarimol			141						16	157	7	6
Iprodione	846								63	910	48	42
Mancozeb/oxadixyl		825								825	45	43
Triadimefon	43		105					21	8	177	11	9
All fungicides	**4,120**	**825**	**503**	**450**	**245**	**37**	**15**	**349**	**471**	**7,016**	**95**	**87**
Area planted (ha)											1,235	

TABLE 6 Raspberry (fruiting)

Usage of herbicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	Annual bl weeds	Annual bl & annual grass weeds	Annual bl weeds & couch	Couch	Annual grass weeds	Annual bl weeds & docks	Perennial bl weeds	Vigour control	General weed control	No reason given	Total spray area	% of fruiting crop treated	% of all raspberries treated
Atrazine		16			17				8	20	**61**	5	6
Bromacil		37	67	21		16			180	86	**407**	33	37
Clopyralid	11						10				**20**	2	1
Dichlobenil							+				**+**	+	+
Diquat/paraquat	62	34					+		205	119	**421**	30	27
Fluazifop-P-butyl				+							**+**	+	+
Glyphosate							+			2	**2**	+	+
Isoxaben	275									77	**352**	25	23
Napropamide									59		**59**	5	4
Paraquat	55	68							151	251	**525**	40	37
Pendimethalin		23									**23**	2	2
Simazine	75	156							358	207	**796**	61	56
Sodium monochloroacetate								72			**72**	6	5
All herbicides	**478**	**334**	**67**	**21**	**17**	**16**	**11**	**72**	**961**	**762**	**2,739**	**96**	**96**
Area planted (ha)												1,235	

'+' = <0.5ha or <0.5%

TABLE 7 Raspberry (non-fruiting)

Usage of insecticides and acaricides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Insecticides/ acaricides	Aphids	Caterpillars	Clay coloured weevil & raspberry moth	Raspberry beetle	Clay coloured weevil	Raspberry cane midge	No reason given	Total spray area	% of non-fruiting crop treated	% of all raspberries treated
Azinphos-methyl/ demeton-S-methyl sulphone					2			2	1	1
Chlorpyrifos						4	9	13	8	16
Cypermethrin	6							6	4	+
Dimethoate	50	10						60	24	3
Fenitrothion	9		9	6	2			26	14	71
All insecticides/acaricides	**65**	**10**	**9**	**6**	**4**	**4**	**9**	**107**	**45**	**85**
Area planted (ha)									164	

'+' = <0.5%

TABLE 8 Raspberry (non-fruiting)

Usage of fungicides and soil sterilants, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Fungicides	Phytophthora root rot	Cane blight	Botrytis	No reason given	Soil sterilisation	Total spray area	% of non-fruiting crop treated	% of all raspberries treated
Benomyl		24	3			27	15	26
Carbendazim				9		9	5	17
Chlorothalonil			3			3	2	37
Iprodione			3			3	2	42
Mancozeb/oxadixyl	39					39	24	43
All fungicides	**39**	**24**	**9**	**9**		**81**	**31**	**87**
Soil sterilants								
Dazomet					5	5	3	+
All soil sterilants					**5**	**5**	**3**	+
Area planted (ha)							164	

'+' = <0.5%

TABLE 9 Raspberry (non-fruiting)

Usage of herbicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	Annual bl and annual grass weeds	Annual bl weeds	Annual bl weeds & docks	Annual & perennial grass weeds	Couch	Annual bl weeds & couch	General weed control	No reason given	Total spray area	% of non-fruiting crop treated	% of all raspberries treated
Atrazine								21	21	13	6
Bromacil	6	10	6		6	2	56	28	114	67	37
Diquat/paraquat							9	9	18	9	27
Fluazifop-P-butyl				6					6	4	+
Isoxaben								11	11	4	23
Paraquat	6						8	21	35	21	37
Simazine	8						22		30	19	56
All herbicides	**21**	**10**	**6**	**6**	**6**	**2**	**95**	**90**	**236**	**98**	**96**
Area planted (ha)										164	

'+' = <0.5%

TABLE 10 Strawberry (fruiting)

Usage of insecticides, acaricides, molluscicides and biological controls, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Insecticides/ acaricides	Aphids	Red spider mite	Caterpillars & red spider mite	Vine weevil	Aphids & red spider mite	Blossom weevil	Soil sterilisation	No reason given	Slugs	Total spray area	% of fruiting crop treated	% of all strawberries treated
1,3-dichloropropene							7			7	1	1
Bifenthrin		24						5		28	6	6
Carbofuran				5						5	1	1
Chlorpyrifos	5		36	14	5	9		255		324	47	48
Clofentezine								11		11	2	3
Cypermethrin								5		5	1	1
Deltamethrin								4		4	1	1
Dicofol/tetradifon		14								14	3	3
Dimethoate								3		3	1	1
Endosulfan								2		2	+	+
Fenitrothion		16			5					21	4	4
Pirimicarb	100									100	14	14
All insecticices/acaricides	**105**	**54**	**36**	**20**	**10**	**9**	**7**	**285**		**526**	**66**	**66**
Biological controls												
Bacillus thuringiensis								14		14	3	3
All biological controls								**14**		**14**	**3**	**3**
Molluscicides												
Metaldehyde									10	10	2	2
Methiocarb									94	94	17	17
All molluscicides									**104**	**104**	**19**	**19**
Area planted (ha)											485	

'+' = <0.5%

TABLE 11 Strawberry (fruiting)

Usage of fungicides and soil sterilants, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Fungicides	Botrytis	Mildew	Botrytis & mildew	Red core	Disease precaution	No reason given	Soil sterilisation	Total spray area	% of fruiting crop treated	% of all strawberries treated
Benomyl			5			5		9	2	2
Bupirimate		1,028				14		1,042	66	65
Chlorothalonil	257		35					292	36	35
Copper oxychloride/metalaxyl				6				6	1	1
Dichlofluanid	1,350	78	52		57	55		1,593	97	94
Fenarimol		380				21		401	42	41
Fenpropimorph		29				9		37	5	5
Fosetyl-aluminium				148		19		167	31	31
Iprodione	781		277		4	14		1,076	68	66
Sulphur			215					215	7	7
Thiram						57		57	7	7
Tridimefon		387			168	36		591	71	69
All fungicides	**2,388**	**1,902**	**583**	**155**	**230**	**231**		**5,488**	**100**	**98**
Soil sterilants										
Dazomet							6	6	1	1
Methyl bromide							4	4	1	1
All soil sterilants							**10**	**10**	**2**	**2**
Area planted (ha)									485	

TABLE 12 Strawberry (fruiting)

Usage of herbicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	Annual bl weeds	Annual bl & annual grass weeds	Runner control	Annual & perennial grass weeds	General weeds & runner control	Couch	Plant destruction	Thistles	General weed control	No reason given	Total spray area	% of fruiting crop treated	% of all strawberries treated
2,4-D/dicamba/triclopyr							5				5	1	1
Chlorthal-dimethyl										15	15	3	4
Clopyralid	13							2	3		18	4	4
Diphenamid										7	7	1	1
Diquat			7								7	1	1
Diquat/paraquat			65		10				15	34	124	21	20
Fluazifop-P-butyl				47		9					56	11	10
Glyphosate									20		20	4	4
Isoxaben	60									14	75	14	14
Lenacil									16	98	114	23	26
Linuron		32									32	7	6
Napropamide	45	23							39	160	267	38	37
Paraquat		41	43						57	13	154	27	27
Pendimethalin		20									20	4	4
Penmedipham	121								48		170	16	18
Propachlor	27									29	56	9	10
Propyzamide		5		3					34	73	114	21	20
Simazine	3	48							136	219	406	57	56
Trifluralin									8		8	2	3
All herbicides	**270**	**169**	**115**	**51**	**10**	**9**	**5**	**2**	**376**	**662**	**1,668**	**93**	**93**
Area planted (ha)												485	

TABLE 13 Strawberry (non-fruiting)

Usage of insecticides, acaricides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Insecticides/ acaricides	Caterpillars	General pests	No reason given	Slugs	Total spray area	% of non-fruiting crop treated	% of all strawberries treated
Chlorpyrifos	2	4	5		11	63	48
Clofentezine			5		5	29	3
Fenpropathrin			5		5	29	1
All insecticides/acaricides	**2**	**4**	**15**		**21**	**63**	**66**
Molluscicides							
Methiocarb				4	4	21	17
All molluscicides				**4**	4	**21**	**19**
Area planted (ha)						17	

TABLE 14 Strawberry (non-fruiting)

Usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Fungicides	Mildew	Red core	No reason given	Total spray area	% of non-fruiting crop treated	% of all strawberries treated
Bupirimate			25	25	29	65
Fenarimol	2			2	13	41
Fenpropimorph	2			2	13	5
Fosetyl-aluminium		4	5	9	42	31
All fungicides	**4**	**4**	**30**	39	**42**	**98**
Area planted (ha)					17	

TABLE 15 Strawberry (non-fruiting)

Usage of herbicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	Annual bl weeds	Annual bl & annual grass weeds	General weed control	No reason given	Total spray area	% of non-fruiting crop treated	% of all strawberries treated
Chlorthal-dimethyl	2			4	6	34	4
Lenacil		2	5	19	26	92	26
Paraquat				2	2	13	27
Pendimethalin		1			1	8	4
Phenmedipham	4		14	21	39	79	18
Propachlor	2			19	22	42	10
Simazine				12	12	42	56
Trifluralin				5	5	29	3
All herbicides	**8**	**4**	**19**	**82**	**113**	**100**	**93**
Area planted (ha)						17	

TABLE 16 Blackcurrant (fruiting)

Usage of insecticides, acaricides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Insecticides/ acaricides	Big-bud mite	Leaf midge	Big-bud mite & leaf midge	Aphids	No reason given	Slugs	Total spray area	% of crop treated
Chlorpyrifos				4	8		12	2
Endosulfan	325		94		3		422	99
Fenitrothion		172					172	52
Fenpropathrin	383				8		391	73
Oxydemeton-methyl		4					4	1
All insecticides/acaricides	**709**	**175**	**94**	**4**	**18**		1,001	**100**
Molluscicides								
Metaldehyde						145	145	44
Methiocarb						9	9	1
All molluscicides						**153**	153	**45**
Area planted (ha)								330

TABLE 17 Blackcurrant (fruiting)

Usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Fungicides	Mildew	Botrytis	Leaf spot & mildew	Botrytis, leaf spot & mildew	Leaf spot	Disease precaution	No reason given	Total spray area	% of crop treated
Bupirimate	521						16	536	73
Chlorothalonil		2	455	434	282			1,173	96
Copper oxychloride			94					94	28
Dichlofluanid		901				13	14	928	100
Fenarimol			2					2	+
Mancozeb	282							282	28
Penconazole	339							339	44
Triadimefon	15							15	2
Triforine							13	13	1
All fungicides	**1,156**	**903**	**551**	**434**	**282**	**13**	**43**	3,382	**100**
Area planted (ha)									330

'+' = <0.5%

TABLE 18 Blackcurrant (fruiting)

Usage of herbicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	Annual bl & annual grass weeds	Annual bl weeds	Perennial bl weeds	Couch & thistles	Couch, docks & thistles	General weed control	No reason given	Total spray area	% of crop treated
Dichlobenil	4		28	17		2		**51**	16
Diquat/paraquat						145	+	**145**	44
Diuron							95	**95**	29
Glyphosate					4			**4**	1
Isoxaben		143					25	**168**	51
Paraquat						9		**9**	1
Pendimethalin	1							**1**	+
Simazine	145					94	27	**266**	81
All herbicides	**150**	**143**	**28**	**17**	**4**	**249**	**148**	**739**	**91**
Area planted (ha)									330

'+' = <0.5% or <0.5ha

TABLE 19 Other soft fruit (fruiting)

Usage of insecticides, acaricides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Insecticides/acaricides	Gooseberry sawfly	Aphids & caterpillars	Raspberry beetle	General pests	No reason given	Slugs	Total spray area	% of fruiting crop treated	% of all 'other soft fruit' treated
Chlorpyrifos	4	2			11		16	14	12
Endosulfan					6		6	11	9
Fenitrothion	31		1	3	2		37	72	60
Fenpropathrin					4		4	3	2
All insecticides/acaricides	**35**	**2**	**1**	**3**	**23**		63	**94**	**85**
Molluscicides									
Methiocarb						3	3	3	10
All molluscicides						**3**	3	**3**	**10**
Area planted (ha)								52	

TABLE 20 Other soft fruit (fruiting)

Usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Fungicides	Botrytis	Mildew	Disease precaution	No reason given	Total spray area	% of fruiting crop treated	% of all 'other soft fruit' treated
Benomyl	1	12			13	26	22
Bupirimate		3		20	23	14	12
Chlorothalonil	5	3			8	10	9
Dichlofluanid	112	4	5	18	139	77	70
Fenarimol		2		3	5	6	11
Iprodione	7				7	9	8
Quinomethionate		32			32	21	17
Triadimefon		58			58	52	43
Triforine				19	19	7	6
All fungicides	**125**	**115**	**5**	**59**	**304**	**100**	**90**
Area planted (ha)						52	

TABLE 21 Other soft fruit (fruiting)

Usage of herbicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	Annual bl weeds	Annual bl & annual grass weeds	General weed control	No reason given	Total spray area	% of fruiting crop treated	% of all 'other soft fruit' treated
Bromacil			2		2	4	3
Dichlobenil		2	13		14	28	23
Diquat/paraquat			3	1	4	8	15
Isoxaben	2			7	9	18	15
Paraquat			15	3	17	30	25
Pendimethalin		+			+	+	+
Simazine	21	3	22	12	57	89	83
All herbicides	**22**	**4**	**54**	**23**	104	**100**	**100**
Area planted (ha)						52	

'+' = < 0.5ha or < 0.5%

TABLE 22 Other soft fruit (non-fruiting)

Usage of insecticides, acaricides, molluscicides, fungicides and herbicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Insecticides/acaricides	Clay coloured weevil	Slugs	Botrytis	Mildew	General weed control	Total spray area	% of non-fruiting crop treated	% of all 'other soft fruit' treated
Azinphos-methyl / demeton-S-methyl sulphone	3					3	34	6
All insecticides	**3**					**3**	**34**	**85**
Molluscicides								
Methiocarb		10				10	48	10
All molluscicides		**10**				**10**	**48**	**10**
Fungicides								
Dichlofluanid			3			3	34	70
Fenarimol				3		3	34	11
All fungicides			**3**	**3**		**7**	**34**	**90**
Herbicides								
Diquat/paraquat					10	10	52	15
Lenacil					5	5	48	8
Simazine					5	5	52	83
All herbicides					**20**	**20**	**100**	**100**
Area planted (ha)							10	

TABLE 23 All soft fruit crops

Usage of insecticides, acaricides, biological controls and molluscicides (spray hectares of formulations)

Insecticides/acaricides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total spray area 1994	Spray area 1990
Pyrethroids												
Bifenthrin				28		28					28	
Cypermethrin		6	6	5		5					11	6
Deltamethrin	170		170	4		4					174	37
Fenpropathrin					5	5	391	4		4	400	6
Carbamates												
Carbaryl	18		18								18	119
Carbofuran				5		5					5	4
Pirimicarb				100		100					100	20
Organophosphates												
Azinphos-methyl/ demeton-S-methyl sulphone	8	2	11						3	3	14	168
Chlorpyrifos	243	13	255	324	11	335	12	16		16	618	751
Dimethoate		60	60	3		3					64	
Fenitrothion	1,722	26	1,748	21		21	172	37		37	1,978	2,056
Malathion	9		9								9	87
Oxydemeton-methyl							4				4	112
Organochlorines												
Endosulfan				2		2	422	6		6	430	578
Gamma-HCH	3		3								3	
Combination												
Dicofol/tetradifon				14		14					14	10
Others												
1, 3-dichloropropene				7		7					7	
Clofentezine				11	5	16					16	
Tar oils	51		51								51	65
All insecticides/acaricides	**2,224**	**107**	**2,331**	**526**	**21**	**546**	**1,001**	**63**	**3**	**67**	3,945	
Biological controls												
Bacillus thuringiensis				14		14					14	
Molluscicides												
Metaldehyde	23		23	10		10	145				178	
Methiocarb	15		15	94	4	98	9	3	10	13	134	190
All molluscicides	**39**		**39**	**104**	**4**	**108**	**153**	**3**	**10**	**13**	312	

TABLE 24 All soft fruit crops

Usage of fungicides and soil sterilants (spray hectares of formulations)

Fungicides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total spray area 1994	Spray area 1990
Benomyl	476	27	503	9		9		13		13	525	920
Bupirimate	180		180	1,042	25	1,067	536	23		23	1,807	438
Carbendazim	269	9	278								278	77
Chlorothalonil	1,128	3	1,132	292		292	1,173	8		8	2,605	668
Copper oxychloride							94				94	
Copper oxychloride/metalaxyl				6		6					6	21
Dichlofluanid	2,893		2,893	1,593		1,593	928	139	3	142	5,556	6,625
Fenarimol	157		157	401	2	403	2	5	3	8	570	452
Fenpropimorph				37	2	39					39	
Fosetyl-aluminium				167	9	176					176	92
Iprodione	910	3	913	1,076		1,076		7		7	1,996	61
Mancozeb							282				282	3
Mancozeb/oxadixyl	825	39	864								864	
Penconazole							339				339	
Quinomethionate								32		32	32	
Sulphur				215		215					215	
Thiram				57		57					57	
Triadimefon	177		177	591		591	15	58		58	841	996
Triforine							13	19		19	32	117
All fungicides	**7,016**	**81**	**7,097**	**5,488**	**39**	**5,527**	**3,382**	**304**	**7**	**311**	**16,316**	
Soil sterilants												
Dazomet		5	5	6		6					11	4
Methyl bromide				4		4					4	
All soil sterilants		**5**	**5**	**10**		**10**					15	

TABLE 25 All soft fruit crops

Usage of herbicides (spray hectares of formulations)

Herbicides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total spray area 1994	Spray area 1990
2, 4-D/dicamba/triclopyr				5		5					5	
Atrazine	61	21	82								82	230
Bromacil	407	114	521					2		2	523	760
Chlorthal-dimethyl				15	6	21					21	26
Clopyralid	20		20	18		18					38	85
Dichlobenil	+		+				51	14		14	66	40
Diphenamid				7		7					7	2
Diquat				7		7					7	28
Diquat/paraquat	421	18	440	124		124	145	4	10	14	722	1,047
Diuron							95				95	
Fluazifop-P-butyl	+	6	6	56		56					62	28
Glyphosate	2		2	20		20	4				26	73
Isoxaben	352	11	363	75		75	168	9		9	614	874
Lenacil				114	26	140			5	5	144	165
Linuron				32		32					32	
Napropamide	59		59	267		267					326	164
Paraquat	525	35	560	154	2	157	9	17		17	743	1,122
Pendimethalin	23		23	20	1	22	1	+		+	46	17
Phenmedipham				170	39	209					209	415
Propachlor				56	22	78					78	91
Propyzamide				114		114					114	125
Simazine	796	30	827	406	12	418	266	57	5	62	1,573	2,184
Sodium monochloroacetate	72		72								72	
Trifluralin				8	5	13					13	44
All herbicides	**2,739**	**236**	**2,975**	**1,668**	**113**	**1,781**	**739**	**104**	**20**	**124**	**5,619**	

'+' = < 0.5ha

TABLE 26 All soft fruit crops

Usage of insecticides, acaricides, biological controls and molluscicides (spray hectares of active ingredients)

Insecticides/acaricides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total spray area 1994	Spray area 1990
Pyrethroids												
Bifenthrin				28		28					28	
Cypermethrin		6	6	5		5					11	6
Deltamethrin	170		170	4		4					174	37
Fenpropathrin					5	5	391	4		4	400	6
Carbamates												
Carbaryl	18		18								18	119
Carbofuran				5		5					5	4
Pirimicarb				100		100					100	20
Organophosphates												
Azinphos-methyl	8	2	11						3	3	14	168
Chlorpyrifos	243	13	255	324	11	335	12	16		16	618	751
Demeton-S-methyl sulphone	8	2	11						3	3	14	168
Dimethoate		60	60	3		3					64	
Fenitrothion	1,722	26	1,748	21		21	172	37		37	1,978	2,056
Malathion	9		9								9	87
Oxydemeton-methyl							4				4	112
Organochlorines												
Dicofol				14		14					14	192
Endosulfan				2		2	422	6		6	430	578
Gamma-HCH	3		3								3	
Others												
1, 3-dichloropropene				7		7					7	
Clofentezine				11	5	16					16	
Tar oils	51		51								51	65
Tetradifon				14		14					14	51
All insecticides/acaricides	**2,232**	**110**	**2,342**	**540**	**21**	**561**	**1,001**	**63**	**7**	**70**	**3,973**	
Biological controls												
Bacillus thuringiensis				14		14					14	
Molluscicides												
Metaldehyde	23		23	10		10	145				178	
Methiocarb	15		15	94	4	98	9	3	10	13	134	190
All molluscicides	**39**		**39**	**104**	**4**	**108**	**153**	**3**	**10**	**13**	**312**	

TABLE 27 All soft fruit crops

Usage of fungicides and soil sterilants (spray hectares of active ingredients)

Fungicides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total spray area 1994	Spray area 1990
Benomyl	476	27	503	9		9		13		13	525	920
Bupirimate	180		180	1,042	25	1,067	536	23		23	1,807	438
Carbendazim	269	9	278								278	77
Chlorothalonil	1,128	3	1,132	292		292	1,173	8		8	2,605	668
Copper oxychloride				6		6	94				100	21
Dichlofluanid	2,893		2,893	1,593		1,593	928	139	3	142	5,556	6,625
Fenarimol	157		157	401	2	403	2	5	3	8	570	452
Fenpropimorph				37	2	39					39	
Fosetyl-aluminium				167	9	176					176	92
Iprodione	910	3	913	1,076		1,076		7		7	1,996	61
Mancozeb	825	39	864				282				1,146	483
Metalaxyl				6		6					6	501
Oxadixyl	825	39	864								864	
Penconazole							339				339	
Quinomethionate								32		32	32	
Sulphur				215		215					215	
Thiram				57		57					57	
Triadimefon	177		177	591		591	15	58		58	841	996
Triforine							13	19		19	32	117
All fungicides	**7,841**	**120**	**7,961**	**5,494**	**39**	**5,533**	**3,382**	**304**	**7**	**311**	**17,187**	
Soil sterilants												
Dazomet		5	5	6		6					11	4
Methyl bromide				4		4					4	
All soil sterilants		**5**	**5**	**10**		**10**					15	

TABLE 28 All soft fruit crops

Usage of herbicides (spray hectares of active ingredients)

Herbicides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total spray area 1994	Spray area 1990
2, 4-D				5		5					5	
Atrazine	61	21	82								82	231
Bromacil	407	114	521					2		2	523	760
Chlorthal-dimethyl				15	6	21					21	26
Clopyralid	20		20	18		18					38	101
Dicamba				5		5					5	1
Dichlobenil	+		+				51	14		14	66	40
Diphenamid				7		7					7	2
Diquat	421	18	440	131		131	145	4	10	14	730	1,075
Diuron							95				95	
Fluazifop-P-butyl	+	6	6	56		56					62	28
Glyphosate	2		2	20		20	4				26	73
Isoxaben	352	11	363	75		75	168	9		9	614	874
Lenacil				114	26	140			5	5	144	165
Linuron				32		32					32	
Napropamide	59		59	267		267					326	164
Paraquat	946	54	1,000	278	2	280	154	21	10	32	1,465	2,169
Pendimethalin	23		23	20	1	22	1	+		+	46	17
Phenmedipham				170	39	209					209	415
Propachlor				56	22	78					78	91
Propyzamide				114		114					114	125
Simazine	796	30	827	406	12	418	266	57	5	62	1,573	2,184
Sodium monochloroacetate	72		72								72	
Triclopyr				5		5					5	16
Trifluralin				8	5	13					13	44
All herbicides	**3,160**	**254**	**3,414**	**1,803**	**113**	**1,915**	**884**	**108**	**31**	**139**	**6,352**	

'+' = < 0.5ha

TABLE 29 All soft fruit crops

Quantities (kg) of insecticides, acaricides, biological controls and molluscicides used

Insecticides/acaricides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total kg 1994	Total kg 1990
Pyrethroids												
Bifenthrin				1		1					1	
Cypermethrin		+	+	+		+					+	+
Deltamethrin	2		2	+		+					2	+
Fenpropathrin					1	1	34	+		+	35	1
Carbamates												
Carbaryl	19		19								19	253
Carbofuran				8		8					8	2
Pirimicarb				28		28					28	3
Organophosphates												
Azinphos-methyl	2	1	3						1	1	4	46
Chlorpyrifos	134	8	142	366	8	373	6	8		8	529	418
Demeton-S-methyl sulphone	1	+	1						+	+	1	39
Dimethoate		16	16	1		1					18	
Fenitrothion	901	11	912	15		15	88	19		19	1,034	1,131
Malathion	11		11								11	83
Oxydemeton-methyl							2				2	39
Organochlorines												
Dicofol				11		11					11	84
Endosulfan				1		1	186	4		4	191	542
Gamma-HCH	+		+								+	
Others												
1, 3-dichloropropene				1,517		1,517					1,517	
Clofentezine				2	1	3					3	
Tar oils	2,022		2,022								2,022	2,701
Tetradifon				4		4					4	6
All insecticides/acaricides	**3,093**	**36**	**3,129**	**1,955**	**9**	**1,964**	**316**	**31**	**1**	**32**	**5,441**	
Biological controls												
Bacillus thuringiensis				+		+					+	
Molluscicides												
Metaldehyde	13		13	4		4	61				78	
Methiocarb	3		3	38	1	39	2	1	2	3	47	41
All molluscicides	**16**		**16**	**43**	**1**	**44**	**63**	**1**	**2**	**3**	**125**	

'+' = < 0.5kg

TABLE 30 All soft fruit crops

Quantities (kg) of fungicides and soil sterilants used

Fungicides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total kg 1994	Total kg 1990
Benomyl	266	15	281	4		4		7		7	292	644
Bupirimate	46		46	279	9	288	131	8		8	473	110
Carbendazim	118	3	121								121	35
Chlorothalonil	1,310	3	1,313	481		481	1,611	12		12	3,417	1,002
Copper oxychloride				9		9	120				129	62
Dichlofluanid	4,407		4,407	2,451		2,451	805	156	6	162	7,825	12,369
Fenarimol	5		5	15	+	15	+	+	+	+	20	23
Fenpropimorph				27	2	29					29	
Fosetyl-aluminium				500	27	527					527	277
Iprodione	501	2	503	499		499		4		4	1,006	56
Mancozeb	3,481	114	3,594				871				4,466	3,005
Metalaxyl				4		4					4	360
Oxadixyl	622	20	642								642	
Penconazole							17				17	
Quinomethionate								5		5	5	
Sulphur				86		86					86	
Thiram				69		69					69	
Triadimefon	6		6	29		29	1	3		3	39	55
Triforine							3	4		4	8	28
All fungicides	**10,760**	**157**	**10,917**	**4,453**	**37**	**4,490**	**3,560**	**199**	**6**	**205**	**19,173**	
Soil sterilants												
Dazomet		1,755	1,755	1,545		1,545					3,300	1,650
Methyl bromide				1,328		1,328					1,328	
All soil sterilants		**1,755**	**1,755**	**2,873**		**2,873**					4,628	

'+' = <0.5kg

TABLE 31 All soft fruit crops

Quantities (kg) of herbicides used

Herbicides	Raspberry (fruiting)	Raspberry (non-fruiting)	Raspberry (all)	Strawberry (fruiting)	Strawberry (non-fruiting)	Strawberry (all)	Black-currant (fruiting)	Other soft fruit (fruiting)	Other soft fruit (non-fruiting)	Other soft fruit (all)	Total kg 1994	Total kg 1990
2, 4-D				3		3					3	
Atrazine	114	30	144								144	220
Bromacil	507	129	636					2		2	638	659
Chlorthal-dimethyl				55	35	90					90	135
Clopyralid	4		4	2		2					6	11
Dicamba				1		1					1	+
Dichlobenil	1		1				140	30		30	171	188
Diphenamid				12		12					12	4
Diquat	75	3	78	32		32	16	+	1	2	128	149
Diuron							29				29	
Fluazifop-P-butyl	+	2	2	17		17					19	5
Glyphosate	2		2	20		20	7				28	131
Isoxaben	39	1	40	9		9	17	1		1	68	72
Lenacil				133	37	170			11	11	181	297
Linuron				27		27					27	
Napropamide	72		72	583		583					655	482
Paraquat	289	19	309	141	1	142	29	18	2	20	500	622
Pendimethalin	28		28	32	2	34	1	+		+	63	31
Phenmedipham				44	18	63					63	121
Propachlor				236	68	304					304	298
Propyzamide				43		43					43	162
Simazine	1,216	48	1,264	261	6	266	498	88	7	96	2,124	2,056
Sodium monochloroacetate	781		781								781	
Triclopyr				1		1					1	16
Trifluralin				8	5	14					14	36
All herbicides	**3,127**	**232**	**3,359**	**1,662**	**172**	**1,834**	**739**	**140**	**21**	**161**	6,093	

'+' = < 0.5kg

TABLE 32 Principal active ingredients

Area (spray hectares) treated with the 20 most used active ingredients on all soft fruit crops

		1994	1990
1	Dichlofluanid	5,556	6,625
2	Chlorothalonil	2,605	668
3	Iprodione	1,996	61
4	Fenitrothion	1,978	2,056
5	Bupirimate	1,807	438
6	Simazine	1,573	2,184
7	Paraquat	1,465	2,169
8	Mancozeb	1,146	483
9	Oxadixyl	864	
10	Triadimefon	841	996
11	Diquat	730	1,075
12	Chlorpyrifos	618	751
13	Isoxaben	614	874
14	Fenarimol	570	452
15	Benomyl	525	920
16	Bromacil	523	760
17	Endosulfan	430	578
18	Fenpropathrin	400	6
19	Penconazole	339	
20	Napropamide	326	164

TABLE 33 Principal active ingredients

Quantity (kg) of the 20 most used active ingredients on all soft fruit crops

		1994	1990
1	Dichlofluanid	7,825	12,369
2	Mancozeb	4,466	3,005
3	Chlorothalonil	3,417	1,002
4	Dazomet	3,300	1,650
5	Simazine	2,124	2,056
6	Tar oils	2,022	2,701
7	1, 3-dichloropropene	1,517	
8	Methyl bromide	1,328	
9	Fenitrothion	1,034	1,131
10	Iprodione	1,006	56
11	Sodium monochloroacetate	781	
12	Napropamide	655	482
13	Oxadixyl	642	
14	Bromacil	638	659
15	Chlorpyrifos	529	418
16	Fosetyl-aluminium	527	277
17	Paraquat	500	622
18	Bupirimate	473	110
19	Propachlor	304	298
20	Benomyl	292	644

TABLE 34 All soft fruit crops

Comparison of pesticide usage on soft fruit crops 1986-1994, spray hectares of formulations and quantities (kg of active ingredients) used

	1986		1990		1994	
	sp ha of formulations	kg	sp ha of formulations	kg	sp ha of formulations	kg
Insecticides/acaricides						
Pyrethroids	25	2	53	3	614	39
Organophosphates	3,990	2,327	3,174	1,717	2,686	1,599
Organochlorines	231	185	770	626	432	202
Carbamates			144	260	123	55
Others	118	2,129	138	2,707	88	3,547
All insecticides/acaricides	**4,364**	**4,643**	**4,279**	**5,313**	**3,943**	**5,442**
Molluscicides	**368**	**87**	**190**	**41**	**312**	**125**
Fungicides	**9,379**	**14,282**	**12,197**	**18,932**	**16,316**	**19,173**
Herbicides	**6,393**	**10,338**	**7,657**	**5,846**	**5,619**	**6,093**
Soil sterilants	**26**	**9,678**	**4**	**1,650**	**15**	**4,628**
Biological controls					**14**	+
All pesticides	**20,530**	**39,028**	**24,327**	**31,782**	**26,219**	**35,461**
Area of all soft fruit crops (ha)	3,126		3,281		2,293	

'+' = <0.5kg

TABLE 35 Sampled areas

Areas (ha) of soft fruit crops grown in sample

Size group (ha)	North	East Central	West Central	South	Scotland
0.1 – 4.9	11	33	+	3	48
5.0 – 9.9	5	95	8	7	115
10.0 – 19.9	11	197	13	14	235
20+		359			359
All sizes	28	684	21	24	756

'+' = <0.5ha

TABLE 36 Census areas

Areas (ha) of soft fruit crops grown in Scotland

Size group (ha)	North	East Central	West Central	South	Scotland
0.1 – 4.9	99	281	52	34	465
5.0 – 9.9	53	329	40	25	447
10.0 – 19.9	30	514	24	28	596
20+		785			785
All sizes	182	1,908	116	87	2,293

TABLE 37 Raising factors

Size group (ha)	North	East Central	West Central	South
0.1 – 4.9	8.67	8.45	258.50	12.04
5.0 – 9.9	9.78	3.47	5.12	3.53
10.0 – 19.9	2.68	2.61	1.88	1.95
20+		2.19		

TABLE 38 Adjustment factors

	North	East Central	West Central	South
Raspberry	1.08	0.85	0.83	0.83
Strawberry	1.02	1.28	1.04	1.02
Blackcurrant	1.24	1.63	2.52	2.42
Other soft fruit	0.46	1.94	2.60	3.43

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December 1995