PESTICIDE USAGE IN SCOTLAND

GRASSLAND AND FODDER CROPS 1997 (Revised 2009)

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Reason for Report Revision

This report has been reissued to correct inaccuracies in active ingredient application area data that were overestimated in the original report.

This issue only affects a limited number of active ingredients in relation to active ingredient application area. All formulation data and active ingredient weight data are unaffected. The amended tables are:

Table 35 – Grassland fungicide active ingredients
Table 36 – Grassland herbicide active ingredients
Table 40 – Principal active ingredients
Table 42 – Grassland comparison with previous years

Text relating to the data contained in these tables has also been revised.

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SUMMARY

This report presents information from a survey of pesticide usage on grassland and fodder crops in Scotland during 1997. The data have been raised to give estimates of national pesticide usage.

Since the last survey in 1993, the total area of grassland in Scotland had declined by 3% to just under 4,360,000 hectares. The area of rough grazing, by far the largest category of 'grassland' in Scotland, fell by 5% to 3,212,699 hectares. The area of grassland under 5 years old declined by 13% to 366,956 hectares, whilst the area of grassland 5 years old and over increased by 9% to 779,409 hectares.

The total area of fodder crops grown in Scotland during 1997 was 27,151 hectares, a 7% reduction compared with 1993. There was a substantial 21% reduction in the area of turnips and swedes, the main fodder crop grown in Scotland, to 15,217 hectares. There were also reductions in the areas of fodder rape, down 3% to 4,000 hectares; and kale and cabbage, down 6% to 3,222 hectares. In contrast, there was a 26% increase in the area of fodder beet to 629 hectares; and in the category 'other fodder crops' comprising mainly arable silage, the area doubled to 4,084 hectares.

Insecticide usage on grassland was minimal, with only a very small area treated with chlorpyrifos for control of leatherjackets.

Compared with the previous survey, there was increased usage of insecticide on fodder crops, where they accounted for 20% of all pesticide formulations by area treated. The carbamate insecticides remained the dominant insecticide group, accounting for almost half of all insecticide formulations by area treated. Carbofuran remained the most widely used insecticide; applied mainly to turnips and swedes, for the control of flea beetle and root fly, the area treated had doubled compared with the previous survey.

Fungicide usage on grassland was solely to the nurse crop of undersown grass. Fenpropimorph remained the most widely used formulation, although there was a substantial reduction in the area treated compared with the previous survey.

Fungicide usage on fodder crops was minimal. They were applied mainly to arable silage and turnips and swedes, sulphur being the main one recorded.

Herbicides dominated the treatments to grassland and fodder crops. On grassland they accounted for 80% of all pesticide formulations by area treated, and on fodder crops for 75%.

There was an increase in herbicide usage on all grassland categories except in the '5 years old and over' category. As in the previous survey, by far the most widely used herbicide on grassland was MCPA, both in terms of area sprayed and weight applied.

Herbicide usage on fodder crops increased compared with the previous survey, due largely to increased usage of metazachlor, applied mainly to turnips and swedes. There was a large reduction in the weight of herbicides applied, due to a substantial reduction in the use of propachlor on turnips and swedes. Once again trifluralin remained by far the dominant herbicide applied to fodder crops.

INTRODUCTION

This is the fifth survey of pesticide usage on grassland in Scotland, and the third on fodder crops. The previous surveys were in 1978, 1984, 1989 and 1993 (References 1 to 4). The surveys in 1978 and 1984 covered pesticide usage on grassland only, whilst information for both grassland and fodder crops was collected in 1989 and 1993. In 1989 however, turnips and swedes were not included as they had been reported in the previous years Arable Crops survey (Reference 5).

DEFINITIONS AND NOTES

Basic area (or basic hectares) is the area of a 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.

In this report the term ‘formulation’ is used to describe the pesticide active ingredient or mixture of active ingredients in a product.

The reasons reported for the uses of pesticides are those given by growers and may sometimes be inappropriate.

When viewing the pesticide tables for the individual crops, it should be borne in mind that some of the herbicides may not have been applied directly to the crop itself but as land preparation treatments prior to sowing/planting the crop, or as spot treatments.

Information about pesticides applied as seed treatments was collected for field sown crops in their first year. Where the seed was known to be treated but the product unknown this was recorded as an ‘unspecified seed treatment’. If the grower did not know if the seed was treated this was recorded as ‘no information about seed treatment’.

Grassland areas mentioned in this report exclude grass grown on set-aside land. Similarly pesticides applied to grass grown on set-aside land are not recorded in this survey but are included in the Arable Crops survey.

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

Data from the 1993 survey are provided for comparison purposes in some of the tables, although it should be borne in mind that there may be minor differences in the range of crops surveyed, together with changes in areas of each of the crops grown.

METHOD

Using the June 1996 Agricultural Census (Reference 6) three samples were drawn representing the whole of Scotland. The first sample was selected from holdings growing any of the fodder crops, the second from holdings with grassland, and the third from holdings with rough grazing.

As in previous surveys, the country was divided into 11 land-use regions (Fig 1, Reference 7). For each sample, holdings were stratified by land-use region and by size group (based on the total area of relevant 'crops' grown).

The number of holdings sampled in each size group was based on the total area of relevant 'crops' grown in that size group, while the number of holdings sampled in each region within each size group was based on the numbers of holdings within the individual regions.

The survey period for the fodder crops covered pesticide applications made during the 1997 growing season. As well as recording treatments applied directly to the crop itself, data were also collected on land preparation treatments prior to sowing the crop. For the grassland and rough grazing, the survey period covered pesticide applications made between 1 October 1996 and 30 September 1997.

For holdings selected in the first sample (those growing any of the fodder crops) information on pesticide usage was collected on all 'crops' (fodder crops, grassland and rough grazing). 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. When necessary, data were also collected from consultant agronomists, contractors and seed merchants. In all, information was obtained from 283 holdings. Details of the numbers of holdings visited and their distribution are given in Table 3 and the areas of crops surveyed are shown in Table 55.

Postal questionnaires were sent to holdings selected in the second and third samples. These had been necessary in order to cover the proportionately large areas of grassland and rough grazing in Scotland. In addition it was known that the pesticide usage on these 'crops' was limited and that the questionnaires would be relatively straightforward to complete. Details about pesticide applications to all grassland categories (including rough grazing) were included in the second sample, whilst details about pesticide applications to rough grazing only, were obtained from the third sample. Of 398 questionnaires sent out covering all the grassland categories, there were 120 (30%) usable replies; and of 188 rough grazing questionnaires, 102 (54%) usable replies.

For the fodder crops, sample data were raised to give estimates of national pesticide usage using raising factors (Table 57). These were based on the areas growing fodder crops in the 1997 Agricultural Census (Reference 8) within regions and size groups (Table 56). Adjustments (Table 58) 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 1997 Agricultural Census. A second adjustment was made for crops where no holdings were sampled in one or more regions (Table 59).

The same method of raising the sample data to national level was used for the grassland and rough grazing. For grassland sampled on farms with fodder crops, the raising factors (Table 46) were based on the grassland areas on farms with fodder crops, within regions, in the 1997 Agricultural Census (Table 45). For grass sampled in the postal survey, the raising factors (Table 50) were based on total grassland, excluding grassland on farms with fodder crops, within regions, in the 1997 Agricultural Census (Table 49). For rough grazing, the raising factors (Table 54) were based on the areas of rough grazing, within regions, in the 1997 Agricultural Census (Table 53).

GRASS UNDERSOWN

The estimated area of grass undersown to cereal crops declined by 11% compared with 1993, to 41,705 hectares. The most commonly encountered nurse crop was spring barley.

Insecticides (Tables 5, 28 and 34)

Only a very small area (155 hectares) was treated with insecticide. Chlorpyrifos for leatherjacket control was the only one recorded. In 1993 chlorpyrifos again was the only insecticide recorded but for control of frit fly.

Fungicides (Tables 6, 29 and 35)

Almost half of the undersown grass was treated with fungicide, for control of disease in the nurse crop, a similar proportion to that recorded in the previous survey.

The main fungicide formulation was fenpropimorph, applied to 13% of the crop area, primarily for mildew control (Tables 6 and 29). This was a substantial reduction on its level of usage in 1993, when it was applied to 29% of the crop area.

Also widely used in 1997, and increasing their use compared with the previous survey, were propiconazole, applied to 10% of the crop area, flusilazole to 9%, and carbendazim/flusilazole to 8%. All three were used against mildew and rhynchosporium in the nurse crop.

In terms of individual active ingredients, flusilazole and fenpropimorph were the main ones used, together accounting for nearly half of the total spray area of all fungicide active ingredients (Table 35).

Herbicides and growth regulators (Tables 7, 30 and 36)

The proportion of undersown grass treated with herbicide was 81%, the same as that recorded in the previous survey. The control of annual broad leaved weeds was the dominant reason recorded for herbicide application.

The principal herbicide formulations were 2,4-DB/benazolin/MCPA applied to 28% of the crop, MCPA to 27%, and 2,4-DB/linuron/MCPA to 19%. Together these three formulations accounted for nearly 70% of the total spray area of all herbicide formulations and were also the main herbicides recorded in the previous survey.

In terms of individual active ingredients, MCPA was by far the dominant one, accounting for 32% of the total spray area of all herbicide active ingredients, similar to its level in the previous survey.

A small proportion of the crop area, 1%, received growth regulator applied to the nurse crop. This compares with 4% recorded in the previous survey.

Seed treatments (Table 26)

No grass seed treatments were recorded in the present survey. In 1993, 5% of the seed was treated, 3% with benomyl, and 2% with metalaxyl/thiabendazole.

GRASS DIRECT SOWN

The area of grass direct sown in 1997 was an estimated 21,571 hectares. This figure excludes grass sown on set-aside land.

Insecticides

No insecticide usage was recorded. In 1993, 2% of the crop area was treated with chlorpyrifos for leatherjacket control.

Fungicides

As in previous surveys no fungicide usage was recorded.

Herbicides (Tables 8, 30 and 36)

Thirty percent of the direct sown grass was treated with herbicide in 1997, compared with 22% recorded in the previous survey. Annual broad leaved weed control was the main reason given by farmers for herbicide application, followed by thistle and dock control.

MCPA was the main herbicide formulation, applied to 13% of the crop area, mainly for thistle control, closely followed by 2,4-DB/benazolin/MCPA to 10%, mainly for the control of annual broad leaved weeds. Together they accounted for nearly two thirds of the total spray area of all herbicide formulations. Both formulations, in particular MCPA, had increased their usage compared with the previous survey, when MCPA was applied to only 4% of the crop area, and 2,4-DB/benazolin/MCPA to 6%.

In terms of individual active ingredients, MCPA dominated, followed by 2,4-DB and benazolin (similar to 1993), together accounting for nearly 80% of the total spray area of all herbicide active ingredients.

Seed treatments (Table 26)

No grass seed treatments were recorded in the present survey. In 1993, 3% of the seed was treated, 2% with benomyl, and 1% with metalaxyl/thiabendazole.

GRASS 1 TO 4 YEARS OLD

The area of grass between 1 and 4 years old was estimated to be 303,680 hectares in 1997. This combined with the area of direct sown grass, gives a total of 325,251 hectares of grass under 5 years old, representing a 13% fall in this category of grassland compared with 1993.

Insecticides (Tables 9, 28 and 34)

Only a very small area (192 hectares) was treated with insecticide, chlorpyrifos for leatherjacket control being the only one recorded. Similarly, in the previous survey, a small area had been treated with chlorpyrifos for the same reason.

Fungicides

As in previous surveys, no fungicide usage was recorded.

Herbicides (Tables 9, 30 and 36)

The proportion of this category of grassland treated with herbicide was 5%, very similar to the proportion treated (4%) in the previous two surveys. Again, dock control was the main reason for herbicide application, followed by thistle control.

The main formulations used were MCPA, dicamba/MCPA/mecoprop, fluroxypyr/triclopyr and fluroxypyr, each applied to approximately 1% of the grassland area. Apart from MCPA, which was used principally for thistle control, they were all used mainly for dock control. Together they accounted for over 60% of the total spray area of all herbicide formulations. The former two were the main formulations in the previous survey, while the fluroxypyr/triclopyr formulation was not recorded and there was only minimal use of fluroxypyr.

In terms of individual active ingredients the principal one was MCPA, accounting for 26% of the total spray area of all herbicide active ingredients, similar to its level in 1993.

GRASS 5 YEARS OLD AND OVER

There was a 9% increase in the area of this category of older grassland compared with 1993 to 779,409 hectares.

Insecticides

No insecticide usage was recorded in the present survey. In 1993, a very small area was treated with chlorpyrifos for leatherjacket control.

Fungicides

No fungicide usage was recorded.

Herbicides (Tables 10, 30 and 36)

The proportion of this category of grassland treated with herbicide was 3%, only slightly less than the 4% recorded in the previous survey.

The principal formulations in 1997 were MCPA, used mainly for thistle control, and dicamba/MCPA/mecoprop, for dock and thistle control. Each was applied to approximately 1% of the grassland area and were the main formulations recorded in the previous survey.

MCPA was the principal active ingredient in 1997, accounting for 28% of the total spray area of all herbicide active ingredients, followed by dicamba, accounting for 20%.

ROUGH GRAZING

This is by far the largest category of ‘grassland’ in Scotland. Compared with 1993, there was a 5% decline in area to 3,212,699 hectares.

Insecticides

As in previous surveys, no insecticide usage was recorded.

Fungicides

No fungicide usage was recorded.

Herbicides (Tables 11, 30 and 36)

Herbicide was applied to 8,476 hectares of rough grazing in 1997, a very small proportion in relation to the large area in Scotland. In the previous survey, 6,671 hectares was treated.

The principal formulation was asulam, used mainly for bracken control, followed by MCPA, mainly for thistle control, and glyphosate, used against a variety of weeds. These three formulations accounted for over 90% of the total spray area of all herbicide formulations and were the main ones recorded in the previous survey.

FODDER BEET

The area of fodder beet has steadily increased over recent years to 629 hectares in 1997, a 26% increase compared with 1993.

Insecticides (Tables 12, 31 and 37)

The proportion of fodder beet treated with insecticide was 78%, a substantial increase compared with 45% recorded in the previous survey.

Carbofuran was the only insecticide recorded in the present survey, applied to 78% of the crop area, for the control of root beetle. In 1993, chlorpyrifos was applied to 33% of the crop area, and carbofuran to 12%.

Fungicides

As in previous surveys, no fungicide usage was recorded.

Herbicides (Tables 13, 33 and 39)

All the fodder beet area was treated with herbicide, similar to that recorded in the previous survey.

By far the dominant herbicide was phenmedipham, applied to 91% of the crop area, compared with 81% in the previous survey. As much of the crop was treated with a programme of repeat applications of phenmedipham, this is reflected in a relatively high total spray area of 1,087 hectares.

Ethofumesate, applied to 78% of the crop area in the previous survey, was applied to only 9% in 1997.

Seed treatments (Table 26)

Seventy one percent of the fodder beet seed was treated with a combination of three formulations, namely hymexazol, methiocarb and thiram. Seven percent of the seed remained untreated and for 22% of the seed there was no information about the seed treatment.

FODDER RAPE

There was a slight decline of 3% in the area of fodder rape compared with 1993 to 4,000 hectares. These figures are based on the June Agricultural Census returns which do not always include some of the later sown crops after June. It is estimated that 905 hectares of fodder rape were not recorded in the Census, bringing the total area of fodder rape grown in Scotland to 4,905 hectares in 1997.

Insecticides and molluscicides (Tables 14, 31 and 37)

As in the previous survey, no insecticide usage was recorded.

A small proportion of the crop, 3%, was treated with molluscicides, 2% with metaldehyde, and 1% with methiocarb. No molluscicides were recorded in 1993.

Fungicides

As in the previous survey, no fungicide usage was recorded.

Herbicides (Tables 15, 33 and 39)

There was an increase in the proportion of crop area treated with herbicide, from 7% in 1993 to 21% in the present survey.

The most widely used herbicide was glyphosate, not applied directly to the crop itself, but as a land preparation treatment for destroying pasture or for the control of perennial weeds prior to sowing the rape crop. Glyphosate was the principal herbicide in the previous survey, applied to 7% of the crop area, compared with 11% in 1997.

The only other herbicides of note, applied during 1997, were metazachlor, to 5% of the crop area as a pre-emergence treatment for the control of annual broad leaved weeds, and paraquat, also to 5%, as a pre-sowing treatment to destroy pasture.

Seed treatments

As in the previous survey, no fodder rape seed treatments were recorded in 1997.

KALE

The areas of kale and cabbage, which are combined in the June Agricultural Census, declined by 6% compared with 1993 to 3,222 hectares in 1997. It is estimated that most (3,108 hectares) of this area was kale, and the remaining 114 hectares, cabbage. In addition it is estimated that a further 472 hectares of kale was sown after June (therefore not included in the Agricultural Census) bringing the total area of kale grown in Scotland, in 1997, to 3,580 hectares.

Insecticides and molluscicides (Tables 16, 31 and 37)

Twenty three percent of the crop area was treated with insecticide in 1997, a substantial increase compared with 1% recorded in the previous survey.

The principal insecticides recorded were dimethoate, applied to 9% of the crop area, for aphid control, chlorpyrifos, also to 9%, for control of leatherjackets, and gamma-HCH, to 7%, mainly against flea beetles. Chlorpyrifos and gamma-HCH were the only insecticides recorded in the previous survey, applied to very small areas.

A small proportion of the crop area, 1%, was treated with metaldehyde for slug control. No molluscicides were recorded in the previous survey.

Fungicides (Tables 17, 32 and 38)

Only a very small proportion of the crop area, 2%, received fungicide in 1997. Sulphur was the only one recorded, although it was not used for disease control but as a foliar feed. No fungicides were recorded in the previous survey.

Herbicides (Tables 18, 33 and 39)

Seventy percent of the crop area received herbicide in 1997, a similar proportion to that recorded in the previous survey.

The most widely used herbicide was trifluralin, applied to 43% of the crop area, for annual broad leaved weed control, followed by desmetryn, to 15%, and propachlor to 12%. Trifluralin usage remained similar to that recorded in the previous survey, while that of propachlor had declined (29% of the crop area treated in 1993) and that of desmetryn had increased (1% in 1993).

Seed treatments (Table 26)

The main seed treatments were gamma-HCH/thiram, applied in combination with iprodione, on 25% of the seed, and captan/gamma-HCH, on 24%. Thirty five percent of the seed remained untreated while for the remaining 16% of seed, there was either no information about whether the seed was treated or the treatment was unspecified.

CABBAGE

The areas of kale and cabbage, which are combined in the June Agricultural Census, declined by 6% compared with 1993, to 3,222 hectares. It is estimated that only 114 hectares of this area was cabbage.

Insecticides (Tables 19, 31 and 37)

Sixty three percent of the cabbage area was treated with insecticide.

Only three insecticides were recorded in 1997 : carbofuran, on 44% of the crop area, for control of root fly, chlorfenvinphos, on 16%, also for control of root fly, and gamma-HCH, on 16%, against flea beetle.

Fungicides

No fungicide usage was recorded in the present survey.

Herbicides (Tables 20, 33 and 39)

Seventy eight percent of the crop area was treated with herbicide, mainly for annual broad leaved weed control.

Trifluralin was applied to 69% of the crop area, metazachlor to 36%, and propachlor to 15%.

Seed treatments (Table 26)

It was estimated that 62% of the crop was field sown, with 41% grown from seed treated with captan/gamma-HCH, 4% with gamma-HCH/thiram, and for 17% of the crop there was no information about whether the seed was treated. The remaining 38% of the crop was grown from transplants.

TURNIPS AND SWEDES

The area of turnips and swedes, the main stock feeding crop in Scotland, has declined steadily over the past decade to 15,217 hectares in 1997, down a substantial 21% compared with 1993. It is estimated that a small proportion (113ha) of the area recorded on the June Agricultural Census was stubble turnips, which are reported on under 'other fodder crops'.

Insecticides (Tables 21, 31 and 37)

The proportion of the crop area treated with insecticide was 38% in 1997, compared with 22% in the previous survey.

The dominant insecticide recorded was carbofuran, primarily for flea beetle and root fly control, applied to 22% of the crop area and accounting for over half of the total spray area of all insecticides. In the previous survey also, carbofuran had been the main insecticide, although applied to only 10% of the crop area.

Fungicides (Tables 22, 32 and 38)

Only 4% of the crop area was treated with fungicide in the present survey, a similar proportion to that recorded in 1993.

Sulphur, as in the previous survey, was the main fungicide recorded, used against powdery mildew and as a foliar feed, on 2% of the crop area. Smaller areas were treated with triadimenol, tridemorph and triadimefon, specifically for powdery mildew control.

Herbicides (Tables 23, 33 and 39)

Almost all the turnip and swede area, 96%, was treated with herbicide in 1997, slightly more than the 92% recorded in the previous survey.

By far the most widely used herbicide was trifluralin, applied to 80% of the crop area, followed by metazachlor to 36% and propachlor to 23%. Together they accounted for over 90% of the total spray area of all herbicides, a similar proportion to that recorded in the previous survey.

Seed treatments (Table 26)

Nearly all the turnip and swede seed was treated. By far the most commonly used treatment was gamma-HCH/thiram, in combination with iprodione, on 81% of the seed. These two formulations have taken over from captan/gamma-HCH as the principal seed treatment, which was used on 81% of the seed in the previous survey but on only 5% in 1997.

OTHER FODDER CROPS

Arable silage (Tables 24, 25, 26, 32, 33, 38 and 39)

Arable silage was the predominant crop in this category. It is estimated that 4,075 hectares was returned on the June Agricultural Census under 'other crops for stock feeding'. In addition it is estimated that a further 105 hectares of arable silage was grown but returned as 'cereals for combining' on the June Agricultural Census, as this was the intended use but a late decision was made to ensile the crop. The total area of arable silage grown in Scotland during 1997 therefore, was an estimated 4,180 hectares, almost a three fold increase compared with the estimated area in the previous survey.

The arable silage encountered was either a single cereal (e.g. spring barley, winter wheat) or cereal mixtures with legumes, and pesticide treatments were generally only recorded on the former category.

Ten percent of the crop area was treated with fungicide, triadimenol/tridemorph the most widely used formulation, on 6% of the crop, against mildew.

Just over half of the crop area was treated with herbicide. The principal formulation was MCPA/MCPB, applied to 24% of the crop area, for annual broad leaved weed control.

A small proportion of the crop, 3%, was treated with growth regulator.

The main seed treatment was tebuconazole/triazoxide on 26% of the seed.

Stubble turnips (Tables 26, 33 and 39)

An estimated 770 hectares of stubble turnips were grown in Scotland during 1997. Most were sown in the autumn and therefore not returned by growers on the Agricultural Census.

No insecticides or fungicides were recorded on stubble turnips during 1997. Only a small proportion of the crop, 2%, was treated with herbicide, trifluralin and propachlor the only two recorded. No seed treatments were recorded in 1997.

Typhon (Tables 26, 33 and 39)

An estimated 38 hectares of typhon was grown in Scotland during 1997, although it should be noted that growers do not always differentiate between typhon and stubble turnips. The only pesticide recorded was trifluralin, on 23% of the crop area, for annual broad leaved weed control.

Fodder mixtures (Tables 26, 33 and 39)

An estimated 389 hectares of fodder mixtures e.g. rape/kale, rape/stubble turnips etc. were grown in Scotland during 1997, again mostly in the autumn and therefore not returned by growers on the Agricultural Census. It should be noted that a much greater area of fodder mixtures was encountered in the survey but were predominantly one type of crop and were therefore classed as the dominant crop and not as fodder mixtures (as the grower does in the Agricultural Census).

The only pesticides recorded on fodder mixtures were trifluralin on 40% of the crop area for general weed control, and glyphosate, on 2%, as a pre-sowing treatment to destroy pasture.

Grassland (Table 42)

The total area of grassland in Scotland in 1997 was just under 4,360,000 hectares, a 3% reduction compared with 1993. The area of rough grazing, by far the largest category of 'grassland' in Scotland, fell by 5% to 3,212,699 hectares. The area of grassland under 5 years old declined by 13% to 366,956 hectares, whilst the area of grassland 5 years old and over increased by 9% to 779,409 hectares.

Overall usage of pesticides, as measured by the spray area of formulations, declined by 8% compared with 1993, while the weight of active ingredients applied, declined by 14%. These reductions were due mainly to less herbicide and fungicide usage, as a result of the reduced area of undersown grass in 1997, where most of the pesticide usage is recorded.

Insecticide usage as in previous surveys was minimal, while fungicides were used solely on undersown grass.

Fungicide usage, in terms of spray area of formulations, declined by 16% compared with 1993, in relation to an 11% reduction in the area of undersown grass. This was due largely to a substantial reduction in the use of fenpropimorph, the most widely used formulation on undersown grass.

In terms of spray area of active ingredients, fungicide usage declined by 8% compared with 1993, representing an increase in usage when the 11% fall in area grown is taken into account. This was due to an increase in use of the formulation carbendazim/flusilazole, containing two active ingredients, thereby leading to a greater spray area of active ingredients.

The weight of fungicide active ingredients applied, declined by 50% compared with 1993, again due largely to the decline in usage of fenpropimorph which is applied at relatively high dose rates (a.i./ha).

Herbicides dominated the treatments to grassland, where they accounted for 85% of the total spray area of all active ingredients, and 95% by weight applied, similar proportions to that recorded in 1993.

In terms of spray area of formulations, herbicide use declined by 4% compared with 1993, due largely to a reduction on undersown grass, as a result of the decline in area grown. When the areas grown are taken into consideration, there was increased usage on all grass categories except the '5 years old and over' category.

As in the previous survey, by far the most widely used herbicide was MCPA, both in terms of area sprayed and weight applied.

Fodder crops (Table 43)

The total area of fodder crops grown in Scotland during 1997, and returned on the June Agricultural Census, was 27,151 hectares, a 7% reduction compared with 1993. This was due mainly to a substantial 21% reduction in the area of turnips and swedes, by far the largest fodder crop grown in Scotland, to 15,217 hectares. There were also reductions in the areas of fodder rape, down 3% to 4,000 hectares; and kale and cabbage, down 6% to 3,222 hectares. In contrast there was a 26% increase in the area of fodder beet to 629 hectares, and the area of 'other fodder crops' doubled to 4,084 hectares.

Despite the reduction in the total area of fodder crops, overall usage of pesticides increased by 20% in terms of spray area of formulations, and by 25% in terms of spray area of active ingredients. In contrast, the total weight of pesticides applied decreased by 18%. There were increases in the spray area of all pesticide groups, while the large reduction in the weight of pesticides applied was due to a large reduction in the weight of herbicides applied.

Insecticides accounted for 20% of the total spray area of all pesticide formulations, and 9% by weight applied. Their usage, as measured by the spray area of formulations, increased by 67% compared with 1993. There were increases in the spray area of all insecticide groups, but mainly in the carbamates, which remained the dominant insecticide group. The carbamates accounted for almost half of the total spray area of all insecticide formulations, while organophosphates accounted for 23%, pyrethroids 17%, and organochlorines 10%.

As in the previous survey, the carbamate insecticide, carbofuran was the most widely used insecticide. Applied mainly to turnips and swedes, for flea beetle and root fly control, the area treated had doubled compared with the previous survey.

Fungicide usage, as in previous surveys, was minimal. They accounted for only 4% of the total spray area of all pesticide formulations, and 6% by weight applied. They were applied mainly to arable silage and turnips and swedes. Sulphur was the main fungicide recorded, as in the previous survey.

Herbicides dominated the treatments to fodder crops, where they accounted for 75% of the total spray area of all pesticide formulations, and 85% by weight applied. Their usage, as measured by the spray area of formulations, increased by 7% compared with 1993, largely due to increased usage of metazachlor, applied mainly to turnips and swedes.

There was a substantial reduction in the use of propachlor on turnips and swedes, the spray area down 37% compared with 1993. This explains the large 23% reduction in the weight of herbicides applied, as propachlor is applied at relatively high dose rates (a.i./ha).

Trifluralin remained by far the dominant herbicide applied to fodder crops, the spray area declining in line with the reduction in area grown.

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Figure 1 Land-Use Regions of Scotland

Figure 2 Grassland areas (%) in 1997

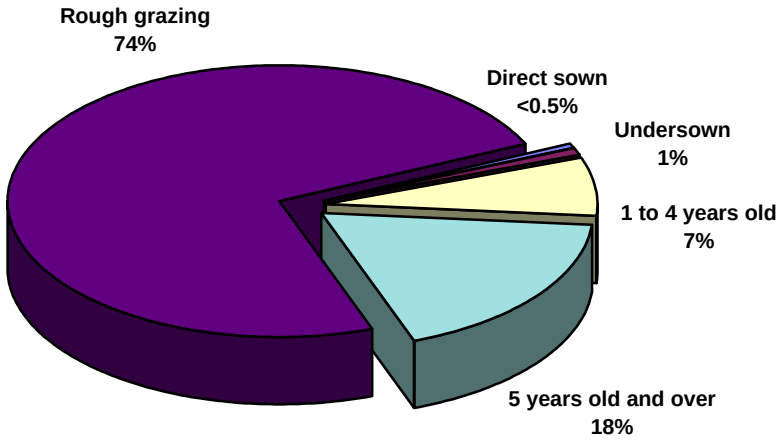

Figure 3 Fodder crop areas (%) in 1997

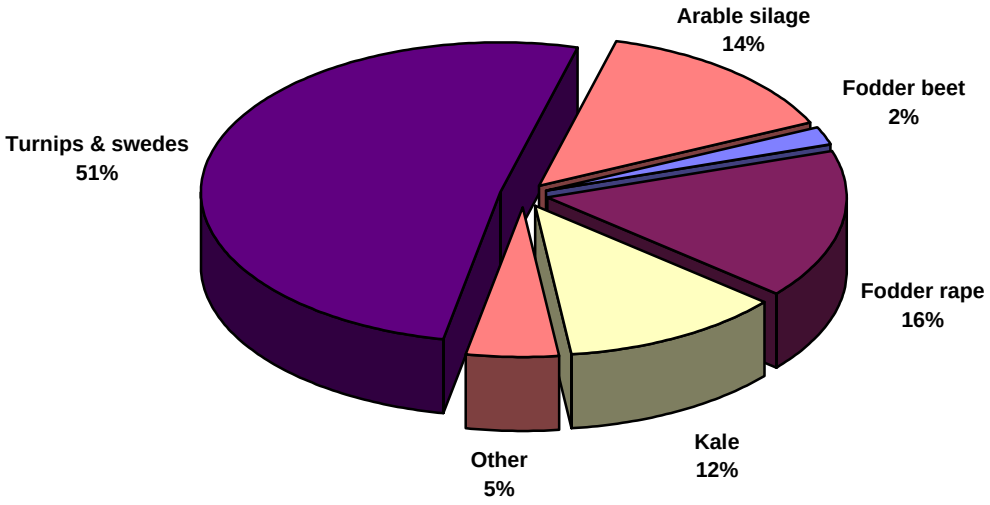

Figure 4 Grassland areas (%) treated with pesticides in 1997

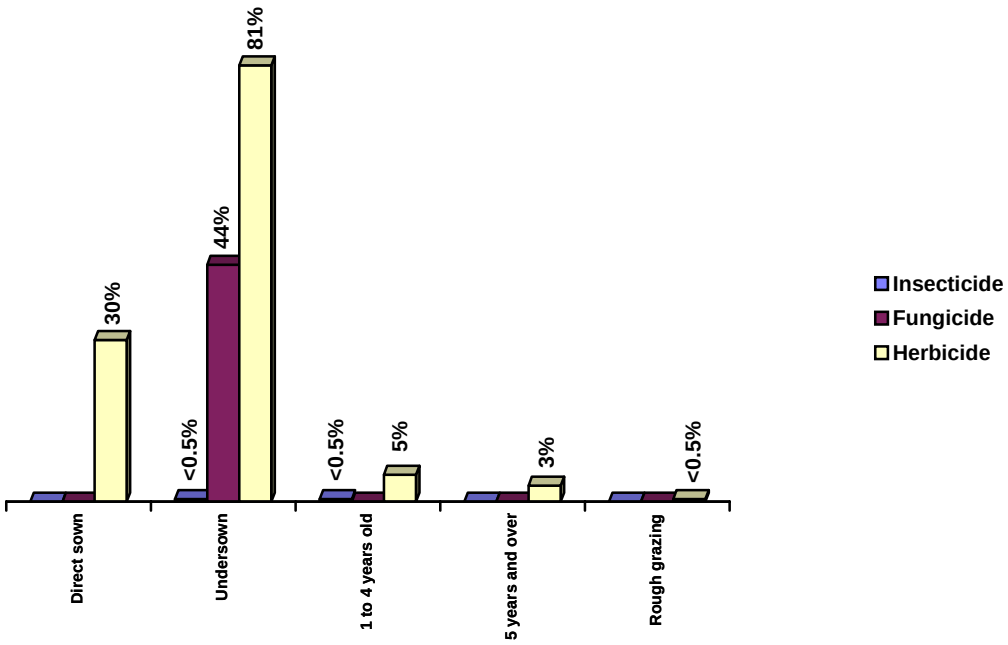

Figure 5 Fodder crop areas (%) treated with pesticides in 1997

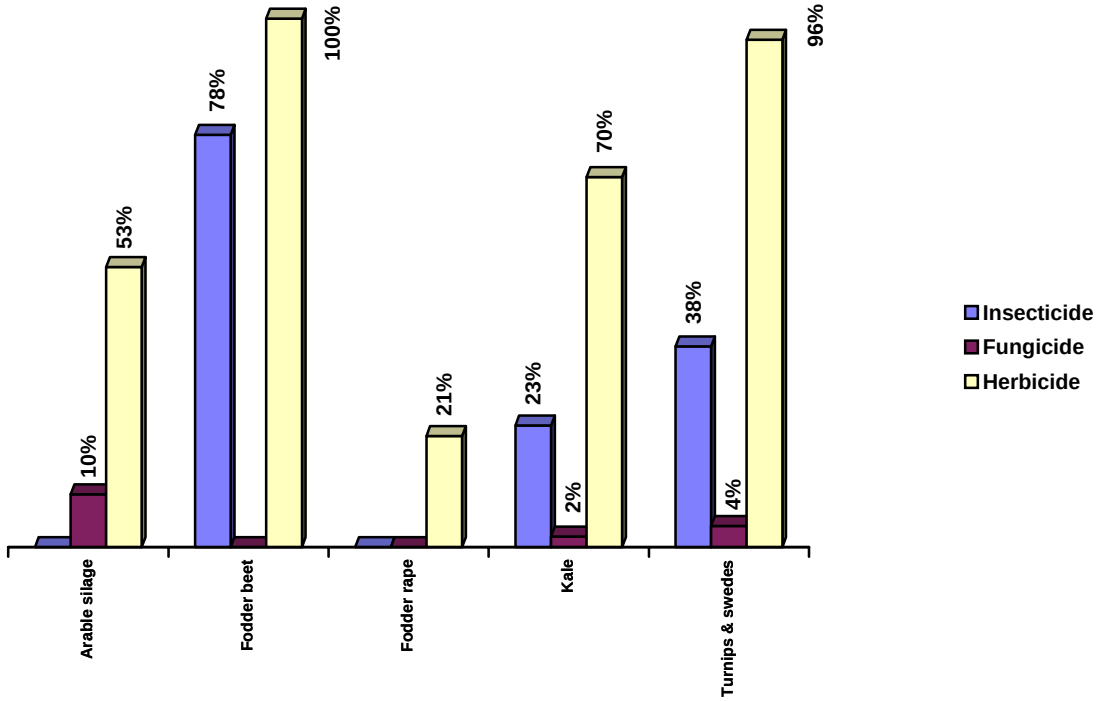

TABLE 1 Grassland crop areas (hectares) from the 1997 Agricultural Census

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*	*Scotland 1997*	*Scotland 1993*	*% change*
Grass undersown	1,618	2,348	5,984	13,614	7,722	285	590	4,466	1,674	978	2,426	**41,705**	46,740	-11
Grass under 5 years old	28,596	22,268	33,287	67,508	22,016	7,703	7,104	54,171	21,580	21,241	39,780	**325,251**	375,590	-13
Grass 5 years old and over	114,771	55,259	34,651	60,188	21,248	12,775	15,464	200,604	40,556	89,731	134,165	**779,409**	713,850	9
Rough grazing	2,215,835	78,507	172,206	54,256	39,236	4,561	19,754	158,549	44,250	346,428	79,116	**3,212,699**	3,377,580	-5

TABLE 2 Fodder crop areas (hectares) from the 1997 Agricultural Census

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*	*Scotland 1997*	*Scotland 1993*	*% change*
Fodder beet	24	*	*	*	32	140	25	60	62	*	260	**629**	500	26
Fodder rape	973	74	363	119	203	52	177	522	299	949	271	**4,000**	4,140	-3
Kale & cabbage	254	11	267	279	323	196	89	484	554	541	226	**3,222**	3,420	-6
Turnips & swedes	978	538	2,920	4,729	1,507	313	342	1,010	1,546	838	496	**15,217**	19,160	-21
Other fodder crops	769	397	268	240	227	87	90	453	221	399	934	**4,084**	2,060	98

To prevent disclosure of information about individual holdings, entries relating to less than 5 holdings have been replaced by an *.

contents

TABLE 3 Distribution of sample for fodder crops

Size (ha)	*Highlands & Islands*	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*	*Scotland*
0.1 - 4.9	17	6	19	26	9	3	1	14	5	5	6	**111**
5.0 - 9.9	7	3	12	21	9	4	2	3	9	5	5	**80**
10.0 - 14.9	5	1	9	7	6	2	1	4	7	6	1	**49**
15.0 - 19.9	0	0	3	5	1	0	1	2	4	4	0	**20**
20.0 +	3	0	1	3	1	0	1	2	5	6	1	**23**
All sizes	32	10	44	62	26	9	6	25	30	26	13	**283**

TABLE 4 Proportion (%) of each crop treated with pesticides

	Arable silage	*Cabbage*	*Fodder beet*	*Fodder mixture*	*Fodder rape*	*Kale*	*Stubble turnips*	*Turnips & swedes*	*Typhon*	*Grass direct sown*	*Grass undersown*	*Grass 1 to 4 years old*	*Grass 5 years old and over*	*Rough grazing*
Insecticides	0	63	78	0	0	23	0	38	0	0	+	+	0	0
Molluscicides	0	0	0	0	3	1	0	0	0	0	0	0	0	0
Fungicides	10	0	0	0	0	2	0	4	0	0	44	0	0	0
Herbicides	53	78	100	42	21	70	2	96	23	30	81	5	3	+
Growth regulators	3	0	0	0	0	0	0	0	0	0	1	0	0	0
Any pesticide	53	80	100	42	21	74	2	97	23	30	82	5	3	+

'+' = < 0.5%

contents

TABLE 5 Undersown grass

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

Insecticides	***Leather-jackets***	***Total spray area***	***% of crop treated***
Chlorpyrifos	155	**155**	+
All insecticides	**155**	**155**	+
Crop area (ha)			41,705

'+' = < 0.5%

contents

TABLE 6 Undersown grass

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

Fungicides	***Mildew***	***Rhyncho-sporium***	***Mildew & rhyncho-sporium***	***Disease precaution***	***Foliar feed***	***Foliar feed & mildew***	***No reason given***	***Total spray area***	***% of crop treated***
Carbendazim	67	500	0	0	0	0	721	**1,288**	3
Carbendazim/flusilazole	0	864	588	288	0	0	1,865	**3,605**	8
Carbendazim/maneb/tridemorph	0	0	0	147	0	0	0	**147**	+
Carbendazim/prochloraz	25	0	0	0	0	0	0	**25**	+
Carbendazim/propiconazole	92	106	0	0	0	0	169	**367**	1
Epoxiconazole	479	0	0	0	0	0	0	**479**	1
Epoxiconazole/fenpropimorph	0	0	87	0	0	0	0	**87**	+
Fenpropidin	488	0	0	0	0	0	285	**773**	2
Fenpropidin/propiconazole	0	202	0	0	0	0	0	**202**	+
Fenpropimorph	3,989	502	277	385	0	0	721	**5,874**	13
Fenpropimorph/kresoxim-methyl	0	0	0	94	0	0	0	**94**	+
Fenpropimorph/prochloraz	0	0	149	0	0	0	0	**149**	+
Fenpropimorph/propiconazole	196	0	0	0	0	0	0	**196**	+
Fenpropimorph/tridemorph	824	0	213	246	0	0	0	**1,283**	2
Flusilazole	371	1,447	664	246	0	0	1,496	**4,225**	9
Propiconazole	1,764	1,057	475	114	0	0	835	**4,245**	10
Propiconazole/tridemorph	0	0	172	0	0	0	0	**172**	+
Quinoxyfen	49	0	0	0	0	0	0	**49**	+
Sulphur	0	0	0	0	333	87	0	**420**	1
Tebuconazole/tridemorph	132	0	140	0	0	0	0	**272**	1
Triadimenol/tridemorph	546	0	0	0	0	0	0	**546**	1
Tridemorph	498	0	0	0	0	0	0	**498**	1
Unspecified fungicide	202	0	120	0	0	0	0	**322**	1
All fungicides	**9,724**	**4,678**	**2,884**	**1,520**	**333**	**87**	**6,092**	**25,318**	**44**
Crop area (ha)									41,705

‘+’ = < 0.5%

TABLE 7 Undersown grass

Herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	***Annual bl weeds***	***Annual & perennial bl weeds***	***Annual bl weeds & thistles***	***Perennial bl weeds***	***Thistles***	***Couch***	***Wild oats***	***General weed control***	***No reason given***	***Growth regulation***	***Total spray area***	***% of crop treated***
2,4-DB/benazolin/MCPA	6,987	488	202	226	0	0	0	3,512	265	0	**11,681**	28
2,4-DB/bentazone/cyanazine	197	0	0	0	0	0	0	0	0	0	**197**	+
2,4-DB/linuron/MCPA	7,058	0	0	0	0	0	0	0	1,039	0	**8,097**	19
Bentazone/MCPA/MCPB	1,661	0	0	0	0	0	0	0	1,757	0	**3,418**	8
Bromoxynil/ioxynil	324	0	0	0	0	0	0	0	0	0	**324**	1
Dicamba/MCPA/mecoprop	25	0	0	0	0	0	0	0	0	0	**25**	+
Flamprop-M-isopropyl	0	0	0	0	0	0	37	0	0	0	**37**	+
Glyphosate	0	0	0	0	0	106	0	0	0	0	**106**	+
MCPA	6,981	0	0	0	121	0	0	2,291	1,708	0	**11,102**	27
MCPA/MCPB	1,007	0	0	0	0	0	0	132	265	0	**1,405**	3
MCPB	2,192	0	0	0	0	0	0	0	0	0	**2,192**	5
Mecoprop	413	0	0	0	0	0	0	0	0	0	**413**	1
Mecoprop-P	988	0	0	0	0	0	0	721	0	0	**1,709**	4
Metsulfuron-methyl	321	0	0	0	0	0	0	0	0	0	**321**	1
Metsulfuron-methyl/ thifensulfuron-methyl	822	0	0	0	0	0	0	0	0	0	**822**	2
Unspecified herbicide	45	0	0	0	0	0	0	3,513	0	0	**3,558**	9
All herbicides	**29,024**	**488**	**202**	**226**	**121**	**106**	**37**	**10,170**	**5,034**	**0**	**45,407**	**81**
Growth regulators												
2-chloroethylphosphonic acid	0	0	0	0	0	0	0	0	0	89	**89**	+
Chlormequat/choline chloride	0	0	0	0	0	0	0	0	0	349	**349**	1
All growth regulators	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**438**	**438**	**1**
Crop area (ha)												41,705

'+' = < 0.5%

TABLE 8 Direct sown grass

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

Herbicides	***Annual bl weeds***	***Annual & perennial bl weeds***	***Thistles***	***Docks***	***Docks & thistles***	***Ragwort***	***Perennial weeds***	***Pasturekill***	***General weed control***	***Total spray area***	***% of crop treated***
2,4-DB/benazolin/MCPA	647	759	0	0	0	0	0	0	808	**2,214**	10
2,4-DB/linuron/MCPA	557	0	0	0	0	0	0	0	0	**557**	3
2,4-DB/MCPA	54	0	0	0	35	0	0	0	0	**89**	+
Dicamba/MCPA/mecoprop	0	0	0	0	0	43	0	0	0	**43**	+
Dicamba/mecoprop	0	230	0	0	0	0	0	0	0	**230**	1
Fluroxypyr	0	0	0	874	0	0	0	0	0	**874**	4
Fluroxypyr/triclopyr	0	0	0	9	0	0	0	0	0	**9**	+
Glyphosate	0	0	0	0	20	0	135	73	0	**227**	1
MCPA	825	0	1,529	97	0	0	0	0	277	**2,728**	13
MCPA/MCPB	358	0	0	0	0	0	0	0	0	**358**	2
MCPB	0	0	117	0	0	0	0	0	0	**117**	1
Mecoprop	45	0	0	0	0	0	0	0	0	**45**	+
Paraquat	0	0	0	0	0	0	0	45	0	**45**	+
Thifensulfuron-methyl	0	0	0	42	0	0	0	0	0	**42**	+
Tribenuron-methyl	0	0	0	0	13	0	0	0	0	**13**	+
All herbicides	**2,486**	**990**	**1,646**	**1,022**	**68**	**43**	**135**	**118**	**1,084**	**7,591**	**30**
Crop area (ha)											21,571

'+' = < 0.5%

contents

TABLE 9 Grass 1 to 4 years old

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

Insecticides	***Leather-jackets***	***Annual & perennial bl weeds***	***Docks***	***Thistles***	***Docks & thistles***	***Thistles & nettles***	***Nettles***	***Ragwort***	***Buttercup***	***Mixed perennial bl weeds***	***Total spray area***	***% of crop treated***
Chlorpyrifos	192	0	0	0	0	0	0	0	0	0	**192**	+
Herbicides												
2,4-D/dicamba/triclopyr	0	0	20	0	0	0	51	0	0	106	**177**	+
2,4-DB/benazolin/MCPA	0	275	728	0	0	0	0	0	0	11	**1,014**	+
2,4-DB/MCPA	0	0	0	196	0	0	0	0	0	0	**196**	+
Asulam	0	0	880	0	0	0	0	9	0	0	**888**	+
Clopyralid/fluroxypyr/triclopyr	0	0	0	0	0	65	125	0	0	0	**190**	+
Clopyralid/triclopyr	0	0	2	3	0	63	0	0	0	0	**67**	+
Dicamba/MCPA/mecoprop	0	0	2,269	120	0	0	0	0	0	11	**2,400**	1
Dicamba/MCPA/mecoprop-P	0	0	0	0	0	0	0	0	0	174	**174**	+
Dicamba/mecoprop	0	0	279	0	0	0	0	0	0	0	**279**	+
Dicamba/mecoprop-P	0	260	0	0	0	77	56	0	0	0	**392**	+
Fluroxypyr	0	11	821	0	1,049	0	0	0	0	0	**1,881**	1
Fluroxypyr/triclopyr	0	0	2,025	0	0	0	0	0	0	0	**2,025**	1
Glyphosate	0	0	4	26	0	86	5	474	0	0	**594**	+
MCPA	0	49	237	1,447	0	585	0	69	48	29	**2,464**	1
MCPA/MCPB	0	0	0	428	0	0	0	0	0	0	**428**	+
Mecoprop	0	227	0	69	0	0	0	0	0	0	**297**	+
Mecoprop-P	0	0	600	5	0	0	27	0	0	0	**632**	+
Metsulfuron-methyl	0	0	0	11	0	0	0	0	0	0	**11**	+
Tribenuron-methyl	0	0	0	80	0	0	0	0	0	0	**80**	+
Triclopyr	0	0	0	0	0	0	3	0	0	0	**3**	+
Unspecified herbicide	0	0	0	0	0	0	66	0	0	0	**66**	+
All herbicides		**821**	**7,865**	**2,386**	**1,049**	**875**	**333**	**551**	**48**	**331**	**14,260**	**5**
Crop area (ha)												303,680

'+' = < 0.5%

TABLE 10 Grass 5 years old and over

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

Herbicides	***Annual bl weeds***	***Annual & perennial bl weeds***	***Docks***	***Thistles***	***Docks & thistles***	***Thistles & nettles***	***Nettles***	***Ragwort***	***Rushes***	***Mixed perennial bl weeds***	***Total spray area***	***% of crop treated***
2,4-D	0	0	0	0	0	257	0	0	0	1,022	**1,279**	+
2,4-D/dicamba/triclopyr	0	0	0	5	0	2,286	0	0	0	33	**2,323**	+
2,4-DB/benazolin/MCPA	0	0	0	0	0	0	0	651	0	12	**663**	+
2,4-DB/linuron/MCPA	0	0	0	0	6	0	0	0	0	0	**6**	+
2,4-DB/MCPA	0	0	0	286	0	45	0	0	0	0	**331**	+
Clopyralid	0	0	0	1	0	0	0	0	0	0	**1**	+
Clopyralid/fluroxypyr/triclopyr	0	0	81	0	0	0	104	0	0	0	**185**	+
Clopyralid/triclopyr	0	0	15	18	0	21	18	0	0	0	**71**	+
Dicamba/MCPA/mecoprop	0	0	2,509	3	2,649	0	0	0	0	116	**5,278**	1
Dicamba/mecoprop	0	0	93	11	0	0	0	0	0	0	**103**	+
Dicamba/mecoprop-P	0	754	0	57	0	595	0	0	0	273	**1,678**	+
Dicamba/mecoprop/triclopyr	0	0	0	0	0	0	14	0	0	0	**14**	+
Fluroxypyr	9	18	79	0	1,415	0	0	0	0	301	**1,822**	+
Fluroxypyr/triclopyr	0	0	2,163	0	0	0	0	0	0	0	**2,163**	+
Glyphosate	0	0	1	116	0	2	19	123	0	13	**274**	+
MCPA	0	793	49	3,174	30	335	43	472	499	307	**5,702**	1
MCPA/MCPB	0	0	0	48	0	86	0	0	0	1,089	**1,223**	+
Mecoprop	0	0	44	15	0	0	0	0	0	0	**59**	+
Mecoprop-P	59	0	0	2	0	0	45	0	0	327	**432**	+
Metsulfuron-methyl	0	0	49	2	0	0	0	0	0	0	**51**	+
Metsulfuron-methyl/thifensulfuron-methyl	0	0	0	7	0	0	0	0	0	0	**7**	+
Thifensulfuron-methyl	0	0	749	0	0	0	0	0	0	0	**749**	+
Triclopyr	0	0	0	0	0	0	3	0	0	40	**44**	+
Unspecified herbicide	0	0	0	54	0	0	0	0	0	0	**54**	+
All herbicides	**67**	**1,565**	**5,832**	**3,798**	**4,100**	**3,627**	**245**	**1,246**	**499**	**3,532**	**24,512**	**3**
Crop area (ha)												779,409

'+' = < 0.5%

TABLE 11 Rough grazing

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

Herbicides	***Bracken***	***Thistles***	***Nettles & thistles***	***Rushes***	***Docks***	***Ragwort***	***Nettles***	***Rhodo-dendron***	***Gorse & nettles***	***No reason given***	***Total spray area***	***% of crop treated***
2,4-D	0	0	0	0	0	200	0	0	0	0	**200**	+
2,4-D/dicamba/triclopyr	0	1	2	0	0	0	0	0	0	0	**3**	+
2,4-DB/MCPA	0	19	0	0	0	0	0	0	0	0	**19**	+
Asulam	5,212	0	0	0	34	0	0	0	0	7	**5,252**	+
Clopyralid/fluroxypyr/triclopyr	0	0	0	0	3	0	2	0	0	0	**5**	+
Clopyralid/triclopyr	0	1	38	0	20	0	0	0	36	0	**95**	+
Dicamba/mecoprop-P	0	0	0	0	0	0	37	0	0	55	**92**	+
Fluroxypyr	0	0	0	0	0	0	15	0	0	0	**15**	+
Glyphosate	474	166	0	442	56	0	9	42	0	5	**1,195**	+
MCPA	0	739	311	59	183	0	0	0	0	0	**1,293**	+
MCPA/MCPB	0	276	0	0	0	0	0	0	0	0	**276**	+
Triclopyr	0	0	0	0	0	0	30	0	0	0	**30**	+
All herbicides	**5,687**	**1,204**	**351**	**501**	**296**	**200**	**93**	**42**	**36**	**67**	**8,476**	**+**
Crop area (ha)												3,212,699

'+' = < 0.5%

TABLE 12 Fodder beet

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

Insecticides	***Root beetle***	***No reason given***	***Total spray area***	***% of crop treated***
Carbofuran	445	44	**489**	78
All insecticides	**445**	**44**	**489**	**78**
Crop area (ha)				629

TABLE 13 Fodder beet

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

Herbicides	***Annual bl weeds***	***Volunteer potatoes***	***Couch***	***General weed control***	***Total spray area***	***% of crop treated***
Clopyralid	0	110	0	0	**110**	9
Ethofumesate	175	0	0	0	**175**	9
Glyphosate	0	0	58	27	**85**	14
Metamitron	284	0	0	0	**284**	22
Phenmedipham	1,087	0	0	0	**1,087**	91
All herbicides	**1,547**	**110**	**58**	**27**	**1,742**	**100**
Crop area (ha)						629

contents

TABLE 14 Fodder rape

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

Insecticides	***Slugs***	***Total spray area***	***% of crop treated***
None recorded			
Molluscicides			
Metaldehyde	86	**86**	2
Methiocarb	45	**45**	1
All molluscicides	**131**	**131**	**3**
Crop area (ha)			4,905

TABLE 15 Fodder rape

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

Herbicides	***Annual bl weeds***	***Annual & perennial bl weeds***	***Docks & thistles***	***Couch***	***Pasturekill***	***General weed control***	***Total spray area***	***% of crop treated***
Glyphosate	0	17	131	30	331	21	**530**	11
MCPA	9	0	0	0	0	0	**9**	+
Metazachlor	255	0	0	0	0	0	**255**	5
Paraquat	0	0	0	0	226	0	**226**	5
Trifluralin	0	0	0	0	0	23	**23**	+
All herbicides	**264**	**17**	**131**	**30**	**557**	**44**	**1,043**	**21**
Crop area (ha)								4,905

'+' = < 0.5%

TABLE 16 Kale

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

Insecticides	***Aphids***	***Flea beetle***	***Leather-jackets***	***Flea beetle & root fly***	***Root fly***	***No reason given***	***Slugs***	***Total spray area***	***% of crop treated***
Carbofuran	0	26	0	135	0	1	0	**162**	5
Chlorpyrifos	0	0	324	0	0	0	0	**324**	9
Cypermethrin	0	25	0	0	0	0	0	**25**	1
Deltamethrin	0	31	0	0	0	0	0	**31**	1
Dimethoate	648	0	0	0	0	0	0	**648**	9
Gamma-HCH	0	234	0	0	94	0	0	**328**	7
Pirimicarb	0	90	0	0	0	0	0	**90**	1
All insecticides	**648**	**405**	**324**	**135**	**94**	**1**	**0**	**1,608**	**23**
Molluscicides									
Metaldehyde	0	0	0	0	0	0	45	**45**	1
All molluscicides	**0**	**0**	**0**	**0**	**0**	**0**	**45**	**45**	**1**
Crop area (ha)									3,580

TABLE 17 Kale

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

Fungicides	***Foliar feed***	***Total spray area***	***% of crop treated***
Sulphur	75	**75**	2
All fungicides	**75**	**75**	**2**
Crop area (ha)			3,580

TABLE 18 Kale

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

Herbicides	***Annual bl weeds***	***Thistles***	***Couch***	***Nettles***	***Pasturekill***	***General weed control***	***Total spray area***	***% of crop treated***
Benazolin/clopyralid	324	0	0	0	0	0	**324**	9
Cycloxydim	0	0	40	0	0	0	**40**	1
Desmetryn	554	0	0	0	0	0	**554**	15
Fluroxypyr	0	0	0	12	0	0	**12**	+
Glyphosate	0	175	76	0	75	0	**326**	9
Metazachlor	120	0	0	0	0	30	**150**	4
Paraquat	337	0	0	0	32	0	**369**	10
Propachlor	419	0	0	0	0	0	**419**	12
Propaquizafop	0	0	31	0	0	0	**31**	1
Trifluralin	1,304	0	0	0	0	226	**1,530**	43
All herbicides	**3,058**	**175**	**147**	**12**	**108**	**256**	**3,756**	**70**
Crop area (ha)								3,580

'+' = < 0.5%

TABLE 19 Cabbage

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

Insecticides	***Root fly***	***Flea beetle***	***Caterpillars***	***No reason given***	***Total spray area***	***% of crop treated***
Carbofuran	50	0	0	1	**51**	44
Chlorfenvinphos	19	0	0	0	**19**	16
Gamma-HCH	0	19	0	0	**19**	16
Unspecified insecticide	0	0	3	0	**3**	2
All insecticides	**68**	**19**	**3**	**1**	**90**	**63**
Crop area (ha)						114

TABLE 20 Cabbage

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***	***Total spray area***	***% of crop treated***
Metazachlor	40	0	0	**40**	36
Propachlor	10	7	0	**17**	15
Trifluralin	13	7	59	**79**	69
All herbicides	**64**	**13**	**59**	**136**	**78**
Crop area (ha)					114

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TABLE 21 Turnips and swedes

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

Insecticides	***Flea beetle***	***Root fly***	***Flea beetle & root fly***	***Flea beetle & pigeon repellent***	***Flea beetle, pigeons & root fly***	***Pigeon repellent***	***Leather-jackets***	***Aphids***	***No reason given***	***Total spray area***	***% of crop treated***
Alpha-cypermethrin	273	0	0	0	0	0	0	0	0	**273**	2
Carbofuran	625	1,131	1,059	202	87	127	0	0	69	**3,299**	22
Carbosulfan	0	0	117	0	0	0	0	0	0	**117**	1
Chlorfenvinphos	83	386	0	0	0	0	0	0	0	**469**	3
Chlorpyrifos	234	0	0	0	0	0	221	67	0	**522**	3
Cypermethrin	409	73	0	0	0	0	0	0	0	**481**	3
Deltamethrin	302	121	0	0	0	0	0	0	0	**423**	2
Esfenvalerate	19	0	0	0	0	0	0	0	0	**19**	+
Gamma-HCH	293	248	0	0	0	0	0	0	0	**541**	3
Lambda-cyhalothrin	192	0	0	0	0	0	0	0	0	**192**	1
Unspecified insecticide	57	0	0	0	0	0	0	0	0	**57**	+
All insecticides	**2,487**	**1,958**	**1,176**	**202**	**87**	**127**	**221**	**67**	**69**	**6,394**	**38**
Crop area (ha)											15,104

'+' = < 0.5%

TABLE 22 Turnips and swedes

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

Fungicides	***Mildew***	***Mildew & foliar feed***	***Foliar Feed***	***Total spray area***	***% of crop treated***
Sulphur	177	86	77	**341**	2
Triadimefon	35	0	0	**35**	+
Triadimenol	141	0	0	**141**	1
Tridemorph	85	0	0	**85**	1
Unspecified fungicide	57	0	0	**57**	+
All fungicides	**495**	**86**	**77**	**659**	**4**
Crop area (ha)					15,104

'+' = < 0.5%

TABLE 23 Turnips and swedes

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***	***Couch***	***Thistles***	***Docks***	***Volunteer potatoes***	***Volunteer rape***	***Pasturekill***	***General weed control***	***Total spray area***	***% of crop treated***
Benazolin/clopyralid	77	0	0	0	0	0	0	0	0	**77**	1
Clopyralid	0	0	0	7	0	177	0	0	0	**184**	1
Cycloxydim	0	0	40	0	0	0	0	0	0	**40**	+
Glyphosate	24	0	449	106	74	0	0	105	62	**819**	5
Metazachlor	4,414	0	0	0	0	0	0	0	1,073	**5,487**	36
Paraquat	226	0	0	0	0	0	43	0	42	**310**	2
Propachlor	3,289	48	0	0	0	0	0	0	77	**3,414**	23
Propaquizafop	0	0	21	0	0	0	0	0	0	**21**	+
Tebutam	96	0	0	0	0	0	0	0	0	**96**	1
Trifluralin	9,765	208	0	0	0	0	0	0	2,061	**12,034**	80
All herbicides	**17,891**	**255**	**510**	**113**	**74**	**177**	**43**	**105**	**3,315**	**22,482**	**96**
Crop area (ha)											15,104

TABLE 24 Arable silage

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

Fungicides	***Mildew***	***Septoria***	***Eyespot & septoria***	***Rhyncho-sporium***	***Disease precaution***	***Total spray area***	***% of crop treated***
Carbendazim/flusilazole	0	0	0	28	0	**28**	1
Chlorothalonil	0	0	0	0	117	**117**	3
Cyproconazole/prochloraz	0	0	117	0	0	**117**	3
Epoxiconazole	0	0	0	0	117	**117**	3
Fenpropidin/fenpropimorph	117	0	0	0	0	**117**	3
Flusilazole	0	117	0	0	0	**117**	3
Sulphur	0	0	0	0	117	**117**	3
Tebuconazole	33	0	0	0	0	**33**	1
Triadimenol/tridemorph	237	0	0	0	0	**237**	6
All fungicides	**387**	**117**	**117**	**28**	**352**	**1,003**	**10**
Crop area (ha)							4,180

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TABLE 25 Arable silage

Herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

Herbicides	***Annual bl weeds***	***Annual bl weeds & thistles***	***Couch & desiccation***	***General weed control***	***Growth regulation***	***Total spray area***	***% of crop treated***
2,4-DB/benazolin/MCPA	131	0	0	60	0	**191**	5
2,4-DB/linuron/MCPA	92	0	0	0	0	**92**	2
Bentazone/MCPA/MCPB	40	0	0	0	0	**40**	1
Bromoxynil/ioxynil	33	0	0	0	0	**33**	1
Glyphosate	0	0	199	0	0	**199**	5
MCPA	392	28	0	0	0	**420**	10
MCPA/MCPB	1,002	0	0	0	0	**1,002**	24
Mecoprop	33	0	0	0	0	**33**	1
Mecoprop-P	225	0	0	0	0	**225**	5
Metsulfuron-methyl	117	0	0	0	0	**117**	3
Metsulfuron-methyl/ thifensulfuron-methyl	32	0	0	0	0	**32**	1
All herbicides	**2,096**	**28**	**199**	**60**	**0**	**2,382**	**53**
Growth regulators							
Chlormequat	0	0	0	0	235	**235**	3
All growth regulators	**0**	**0**	**0**	**0**	**235**	**235**	**3**
Crop area (ha)							4,180

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TABLE 26 Seed treatments

Areas (ha) and percentages of grassland and fodder crop areas treated

	Arable silage	*Cabbage*	*Fodder beet*	*Fodder mixture*	*Fodder rape*	*Kale*	*Stubble turnips*	*Turnips & swedes*	*Typhon*	*Grass direct sown*	*Grass undersown*	*All crops*
Captan/gamma-HCH	0	47 (41)	0	164 (42)	0	863 (24)	0	782 (5)	0	0	0	**1,856**
Fludioxonil	199 (5)	0	0	0	0	0	0	0	0	0	0	**199**
Fuberidazole/triadimenol	28 (1)	0	0	0	0	0	0	0	0	0	0	**28**
Gamma-HCH/thiram	0	4 (4)	0	0	0	904 (25)	0	13,799 (91)	9 (23)	0	0	**14,716**
Hymexazol	0	0	445 (71)	0	0	0	0	0	0	0	0	**445**
Iprodione	0	0	0	0	0	877 (24)	0	12,231 (81)	0	0	0	**13,108**
Methiocarb	0	0	445 (71)	0	0	0	0	0	0	0	0	**445**
Tebuconazole/triazoxide	1,077 (26)	0	0	0	0	0	0	0	0	0	0	**1,077**
Thiram	0	0	445 (71)	0	0	0	0	0	30 (77)	0	0	**475**
Unspecified seed treatment	117 (3)	0	0	0	0	239 (7)	0	0	0	0	0	**356**
No information about seed treatment	464 (11)	19 (17)	140 (22)	0	495 (10)	324 (9)	0	345 (2)	0	689 (3)	698 (2)	**3,173**
Crop grown from transplants	0	44 (38)	0	0	0	0	0	0	0	0	0	**44**
No seed treatment	2,295 (55)	0	44 (7)	225 (58)	4,410 (90)	1,249 (35)	770 (100)	180 (1)	0	20,882 (97)	41,007 (98)	**71,063**

TABLE 27 Seed treatments

Quantities (kg) of active ingredients used

	Arable silage	*Cabbage*	*Fodder beet*	*Fodder mixture*	*Fodder rape*	*Kale*	*Stubble turnips*	*Turnips & swedes*	*Typhon*	*Grass direct sown*	*Grass undersown*	*All crops*
Captan	0	+	0	3	0	16	0	1	0	0	0	**20**
Fludioxonil	2	0	0	0	0	0	0	0	0	0	0	**2**
Fuberidazole	+	0	0	0	0	0	0	0	0	0	0	**+**
Gamma-HCH	0	+	0	22	0	154	0	47	+	0	0	**223**
Hymexazol	0	0	5	0	0	0	0	0	0	0	0	**5**
Iprodione	0	0	0	0	0	9	0	11	0	0	0	**21**
Methiocarb	0	0	1	0	0	0	0	0	0	0	0	**1**
Tebuconazole	6	0	0	0	0	0	0	0	0	0	0	**6**
Thiram	0	+	2	0	0	12	0	15	1	0	0	**30**
Triadimenol	3	0	0	0	0	0	0	0	0	0	0	**3**
Triazoxide	6	0	0	0	0	0	0	0	0	0	0	**6**

'+' = < 0.5kg

TABLE 28 Grassland

Usage of insecticides (spray hectares of formulations)

Insecticides	*Grass direct sown*	*Grass undersown*	*Grass 1 to 4 years old*	*Grass 5 years old and over*	*Rough grazing*	*Total spray area*	*Spray area 1993*
Chlorpyrifos	0	155	192	0	0	**347**	1,187
All insecticides	**0**	**155**	**192**	**0**	**0**	**347**	

TABLE 29 Grassland

Usage of fungicides (spray hectares of formulations)

Fungicides	***Grass direct sown***	***Grass undersown***	***Grass 1 to 4 years old***	***Grass 5 years old and over***	***Rough grazing***	***Total spray area***	***Spray area 1993***
Carbendazim	0	1,288	0	0	0	**1,288**	1,205
Carbendazim/flusilazole	0	3,605	0	0	0	**3,605**	189
Carbendazim/maneb/tridemorph	0	147	0	0	0	**147**	0
Carbendazim/prochloraz	0	25	0	0	0	**25**	0
Carbendazim/propiconazole	0	367	0	0	0	**367**	309
Epoxiconazole	0	479	0	0	0	**479**	0
Epoxiconazole/fenpropimorph	0	87	0	0	0	**87**	0
Fenpropidin	0	773	0	0	0	**773**	2,751
Fenpropidin/propiconazole	0	202	0	0	0	**202**	769
Fenpropimorph	0	5,874	0	0	0	**5,874**	14,706
Fenpropimorph/kresoxim-methyl	0	94	0	0	0	**94**	0
Fenpropimorph/prochloraz	0	149	0	0	0	**149**	658
Fenpropimorph/propiconazole	0	196	0	0	0	**196**	0
Fenpropimorph/tridemorph	0	1,283	0	0	0	**1,283**	829
Flusilazole	0	4,225	0	0	0	**4,225**	581
Propiconazole	0	4,245	0	0	0	**4,245**	1,814
Propiconazole/tridemorph	0	172	0	0	0	**172**	988
Quinoxyfen	0	49	0	0	0	**49**	0
Sulphur	0	420	0	0	0	**420**	271
Tebuconazole/tridemorph	0	272	0	0	0	**272**	0
Triadimenol/tridemorph	0	546	0	0	0	**546**	700
Tridemorph	0	498	0	0	0	**498**	1,768
Unspecified fungicide	0	322	0	0	0	**322**	0
All fungicides	**0**	**25,318**	**0**	**0**	**0**	**25,318**	

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TABLE 30 Grassland

Usage of herbicides and growth regulators (spray hectares of formulations)

Herbicides	***Grass direct sown***	***Grass undersown***	***Grass 1 to 4 years old***	***Grass 5 years old and over***	***Rough grazing***	***Total spray area***	***Spray area 1993***
2,4-D	0	0	0	1,279	200	**1,479**	3,721
2,4-D/dicamba/triclopyr	0	0	177	2,323	3	**2,504**	1,875
2,4-DB/benazolin/MCPA	2,214	11,681	1,014	663	0	**15,572**	19,539
2,4-DB/bentazone/cyanazine	0	197	0	0	0	**197**	419
2,4-DB/linuron/MCPA	557	8,097	0	6	0	**8,660**	7,758
2,4-DB/MCPA	89	0	196	331	19	**635**	50
Asulam	0	0	888	0	5,252	**6,141**	5,126
Bentazone/MCPA/MCPB	0	3,418	0	0	0	**3,418**	3,054
Bromoxynil/ioxynil	0	324	0	0	0	**324**	1,165
Clopyralid	0	0	0	1	0	**1**	0
Clopyralid/fluroxypyr/triclopyr	0	0	190	185	5	**380**	0
Clopyralid/triclopyr	0	0	67	71	95	**234**	2,590
Dicamba/MCPA/mecoprop	43	25	2,400	5,278	0	**7,746**	10,545
Dicamba/MCPA/mecoprop-P	0	0	174	0	0	**174**	0
Dicamba/mecoprop	230	0	279	103	0	**613**	2,581
Dicamba/mecoprop-P	0	0	392	1,678	92	**2,163**	0
Dicamba/mecoprop/triclopyr	0	0	0	14	0	**14**	50
Flamprop-M-isopropyl	0	37	0	0	0	**37**	208
Fluroxypyr	874	0	1,881	1,822	15	**4,592**	1,262
Fluroxypyr/triclopyr	9	0	2,025	2,163	0	**4,197**	0
Glyphosate	227	106	594	274	1,195	**2,396**	4,115

cont....

TABLE 30 Grassland (continued)

Usage of herbicides and growth regulators (spray hectares of formulations)

Herbicides (cont.)	***Grass direct sown***	***Grass undersown***	***Grass 1 to 4 years old***	***Grass 5 years old and over***	***Rough grazing***	***Total spray area***	***Spray area 1993***
MCPA	2,728	11,102	2,464	5,702	1,293	**23,288**	25,968
MCPA/MCPB	358	1,405	428	1,223	276	**3,689**	2,586
MCPB	117	2,192	0	0	0	**2,309**	2,940
Mecoprop	45	413	297	59	0	**814**	1,259
Mecoprop-P	0	1,709	632	432	0	**2,773**	3,634
Metsulfuron-methyl	0	321	11	51	0	**383**	316
Metsulfuron-methyl/ thifensulfuron-methyl	0	822	0	7	0	**829**	649
Paraquat	45	0	0	0	0	**45**	329
Thifensulfuron-methyl	42	0	0	749	0	**791**	0
Tribenuron-methyl	13	0	80	0	0	**94**	0
Triclopyr	0	0	3	44	30	**77**	183
Unspecified herbicide	0	3,558	66	54	0	**3,679**	0
All herbicides	**7,591**	**45,407**	**14,260**	**24,512**	**8,476**	**100,246**	
Growth regulators							
2-chloroethylphosphonic acid	0	89	0	0	0	**89**	232
Chlormequat/choline chloride	0	349	0	0	0	**349**	0
All growth regulators	**0**	**438**	**0**	**0**	**0**	**438**	

contents

TABLE 31 Fodder crops

Usage of insecticides and molluscicides (spray hectares of formulations)

Insecticides	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Spray area 1993***
Alpha-cypermethrin	0	0	0	0	0	0	0	273	0	**273**	192
Carbofuran	0	51	489	0	0	162	0	3,299	0	**4,001**	2,050
Carbosulfan	0	0	0	0	0	0	0	117	0	**117**	119
Chlorfenvinphos	0	19	0	0	0	0	0	469	0	**488**	669
Chlorpyrifos	0	0	0	0	0	324	0	522	0	**846**	647
Cypermethrin	0	0	0	0	0	25	0	481	0	**506**	650
Deltamethrin	0	0	0	0	0	31	0	423	0	**455**	92
Dimethoate	0	0	0	0	0	648	0	0	0	**648**	0
Esfenvalerate	0	0	0	0	0	0	0	19	0	**19**	0
Gamma-HCH	0	19	0	0	0	328	0	541	0	**887**	454
Lambda-cyhalothrin	0	0	0	0	0	0	0	192	0	**192**	0
Pirimicarb	0	0	0	0	0	90	0	0	0	**90**	0
Unspecified insecticide	0	3	0	0	0	0	0	57	0	**59**	0
All insecticides	**0**	**90**	**489**	**0**	**0**	**1,608**	**0**	**6,394**	**0**	**8,581**	
Molluscicides											
Metaldehyde	0	0	0	0	86	45	0	0	0	**131**	0
Methiocarb	0	0	0	0	45	0	0	0	0	**45**	0
All molluscicides	**0**	**0**	**0**	**0**	**131**	**45**	**0**	**0**	**0**	**176**	

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TABLE 32 Fodder crops

Usage of fungicides (spray hectares of formulations)

Fungicides	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Spray area 1993***
Carbendazim/flusilazole	28	0	0	0	0	0	0	0	0	**28**	0
Chlorothalonil	117	0	0	0	0	0	0	0	0	**117**	0
Cyproconazole/prochloraz	117	0	0	0	0	0	0	0	0	**117**	0
Epoxiconazole	117	0	0	0	0	0	0	0	0	**117**	0
Fenpropidin/fenpropimorph	117	0	0	0	0	0	0	0	0	**117**	0
Flusilazole	117	0	0	0	0	0	0	0	0	**117**	0
Sulphur	117	0	0	0	0	75	0	341	0	**533**	235
Tebuconazole	33	0	0	0	0	0	0	0	0	**33**	0
Triadimefon	0	0	0	0	0	0	0	35	0	**35**	0
Triadimenol	0	0	0	0	0	0	0	141	0	**141**	79
Triadimenol/tridemorph	237	0	0	0	0	0	0	0	0	**237**	0
Tridemorph	0	0	0	0	0	0	0	85	0	**85**	129
Unspecified fungicide	0	0	0	0	0	0	0	57	0	**57**	0
All fungicides	**1,003**	**0**	**0**	**0**	**0**	**75**	**0**	**659**	**0**	**1,736**	

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TABLE 33 Fodder crops

Usage of herbicides and growth regulators (spray hectares of formulations)

Herbicides	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Spray area 1993***
2,4-DB/benazolin/MCPA	191	0	0	0	0	0	0	0	0	**191**	124
2,4-DB/linuron/MCPA	92	0	0	0	0	0	0	0	0	**92**	0
Benazolin/clopyralid	0	0	0	0	0	324	0	77	0	**401**	0
Bentazone/MCPA/MCPB	40	0	0	0	0	0	0	0	0	**40**	0
Bromoxynil/ioxynil	33	0	0	0	0	0	0	0	0	**33**	0
Clopyralid	0	0	110	0	0	0	0	184	0	**294**	18
Cycloxydim	0	0	0	0	0	40	0	40	0	**81**	2
Desmetryn	0	0	0	0	0	554	0	0	0	**554**	38
Ethofumesate	0	0	175	0	0	0	0	0	0	**175**	390
Fluroxypyr	0	0	0	0	0	12	0	0	0	**12**	0
Glyphosate	199	0	85	8	530	326	0	819	0	**1,966**	1,179
MCPA	420	0	0	0	9	0	0	0	0	**429**	49
MCPA/MCPB	1,002	0	0	0	0	0	0	0	0	**1,002**	0
Mecoprop	33	0	0	0	0	0	0	0	0	**33**	0
Mecoprop-P	225	0	0	0	0	0	0	0	0	**225**	0
Metamitron	0	0	284	0	0	0	0	0	0	**284**	294
Metazachlor	0	40	0	0	255	150	0	5,487	0	**5,933**	3,582
Metsulfuron-methyl	117	0	0	0	0	0	0	0	0	**117**	0
Metsulfuron-methyl/ thifensulfuron-methyl	32	0	0	0	0	0	0	0	0	**32**	0

cont....

TABLE 33 Fodder crops (continued)

Usage of herbicides and growth regulators (spray hectares of formulations)

Herbicides (cont.)	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Spray area 1993***
Paraquat	0	0	0	0	226	369	0	310	0	**905**	1,049
Phenmedipham	0	0	1,087	0	0	0	0	0	0	**1,087**	877
Propachlor	0	17	0	0	0	419	19	3,414	0	**3,869**	6,532
Propaquizafop	0	0	0	0	0	31	0	21	0	**52**	0
Tebutam	0	0	0	0	0	0	0	96	0	**96**	111
Trifluralin	0	79	0	156	23	1,530	19	12,034	9	**13,850**	14,875
All herbicides	**2,382**	**136**	**1,742**	**164**	**1,043**	**3,756**	**38**	**22,482**	**9**	**31,752**	
Growth regulators											
Chlormequat	235	0	0	0	0	0	0	0	0	**235**	0
All growth regulators	**235**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**235**	

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TABLE 34 Grassland

Usage of insecticides (spray hectares of active ingredients) and total weights applied (kg)

Insecticides	***Grass direct sown***	***Grass undersown***	***Grass 1 to 4 years old***	***Grass 5 years old and over***	***Rough grazing***	***Total spray area***	***Total kg***
Organophosphates							
Chlorpyrifos	0	155	192	0	0	**347**	243
All insecticides	**0**	**155**	**192**	**0**	**0**	**347**	**243**

TABLE 35 Grassland

Usage of fungicides (spray hectares of active ingredients) and total weights applied (kg)

Fungicides	***Grass direct sown***	***Grass undersown***	***Grass 1 to 4 years old***	***Grass 5 years old and over***	***Rough grazing***	***Total spray area***	***Total kg***
Carbendazim	0	4,525	0	0	0	**4,525**	380
Epoxiconazole	0	566	0	0	0	**566**	21
Fenpropidin	0	976	0	0	0	**976**	355
Fenpropimorph	0	7,596	0	0	0	**7,596**	2,720
Flusilazole	0	7,830	0	0	0	**7,830**	530
Kresoxim-methyl	0	94	0	0	0	**94**	5
Maneb	0	147	0	0	0	**147**	189
Prochloraz	0	175	0	0	0	**175**	38
Propiconazole	0	5,182	0	0	0	**5,182**	409
Quinoxyfen	0	49	0	0	0	**49**	3
Sulphur	0	420	0	0	0	**420**	1,405
Tebuconazole	0	272	0	0	0	**272**	25
Triadimenol	0	546	0	0	0	**546**	52
Tridemorph	0	2,918	0	0	0	**2,918**	548
Unspecified fungicide	0	322	0	0	0	**322**	
All fungicides	**0**	**31,617**	**0**	**0**	**0**	**31,617**	**6,679**

TABLE 36 Grassland

Usage of herbicides and growth regulators (spray hectares of active ingredients) and total weights applied (kg)

Herbicides	***Grass direct sown***	***Grass undersown***	***Grass 1 to 4 years old***	***Grass 5 years old and over***	***Rough grazing***	***Total spray area***	***Total kg***
2,4-D	0	0	177	3,602	203	**3,982**	3,880
2,4-DB	2,860	19,975	1,210	1,000	19	**25,064**	27,729
Asulam	0	0	888	0	5,252	**6,141**	22,589
Benazolin	2,214	11,681	1,014	663	0	**15,572**	2,857
Bentazone	0	3,615	0	0	0	**3,615**	3,111
Bromoxynil	0	324	0	0	0	**324**	55
Clopyralid	0	0	257	257	100	**614**	79
Cyanazine	0	197	0	0	0	**197**	25
Dicamba	273	25	3,423	9,397	95	**13,213**	2,165
Flamprop-M-isopropyl	0	37	0	0	0	**37**	15
Fluroxypyr	883	0	4,096	4,170	20	**9,169**	2,072
Glyphosate	227	106	594	274	1,195	**2,396**	2,529
Ioxynil	0	324	0	0	0	**324**	36
Linuron	557	8,097	0	6	0	**8,660**	776
MCPA	5,055	27,278	6,665	13,185	1,589	**53,771**	38,931
MCPB	474	6,617	428	1,223	276	**9,018**	11,553
Mecoprop	318	439	2,976	5,454	0	**9,187**	8,113
Mecoprop-P	0	1,709	1,199	2,110	92	**5,109**	3,594
Metsulfuron-methyl	0	1,144	11	58	0	**1,213**	3

cont....

TABLE 36 Grassland (continued)

Usage of herbicides and growth regulators (spray hectares of active ingredients) and total weights applied (kg)

Herbicides (cont.)	***Grass direct sown***	***Grass undersown***	***Grass 1 to 4 years old***	***Grass 5 years old and over***	***Rough grazing***	***Total spray area***	***Total kg***
Paraquat	45	0	0	0	0	**45**	18
Thifensulfuron-methyl	42	822	0	755	0	**1,620**	22
Tribenuron-methyl	13	0	80	0	0	**94**	1
Triclopyr	9	0	2,462	4,800	133	**7,405**	1,558
Unspecified herbicide	0	3,558	66	54	0	**3,679**	0
All herbicides	**12,972**	**85,948**	**25,547**	**47,008**	**8,974**	**180,450**	**131,711**
Growth regulators							
2-chloroethylphosphonic acid	0	89	0	0	0	**89**	21
Chlormequat	0	349	0	0	0	**349**	329
Choline chloride	0	349	0	0	0	**349**	16
All growth regulators	**0**	**786**	**0**	**0**	**0**	**786**	**366**

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TABLE 37 Fodder crops

Usage of insecticides and molluscicides (spray hectares of active ingredients) and total weights applied (kg)

Insecticides	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Total kg***
Pyrethroids											
Alpha-cypermethrin	0	0	0	0	0	0	0	273	0	**273**	4
Cypermethrin	0	0	0	0	0	25	0	481	0	**506**	13
Deltamethrin	0	0	0	0	0	31	0	423	0	**455**	3
Esfenvalerate	0	0	0	0	0	0	0	19	0	**19**	+
Lambda-cyhalothrin	0	0	0	0	0	0	0	192	0	**192**	1
Carbamates											
Carbofuran	0	51	489	0	0	162	0	3,299	0	**4,001**	2,364
Carbosulfan	0	0	0	0	0	0	0	117	0	**117**	36
Pirimicarb	0	0	0	0	0	90	0	0	0	**90**	19
Organophosphates											
Chlorfenvinphos	0	19	0	0	0	0	0	469	0	**488**	432
Chlorpyrifos	0	0	0	0	0	324	0	522	0	**846**	393
Dimethoate	0	0	0	0	0	648	0	0	0	**648**	233
Organochlorines											
Gamma-HCH	0	19	0	0	0	328	0	541	0	**887**	266
Unspecified											
Unspecified insecticide	0	3	0	0	0	0	0	57	0	**59**	0
All insecticides	**0**	**90**	**489**	**0**	**0**	**1,608**	**0**	**6,394**	**0**	**8,581**	**3,764**
Molluscicides											
Metaldehyde	0	0	0	0	86	45	0	0	0	**131**	36
Methiocarb	0	0	0	0	45	0	0	0	0	**45**	4
All molluscicides	**0**	**0**	**0**	**0**	**131**	**45**	**0**	**0**	**0**	**176**	**40**

'+' = < 0.5kg

TABLE 38 Fodder crops

Usage of fungicides (spray hectares of active ingredients) and total weights applied (kg)

Fungicides	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Total kg***
Carbendazim	28	0	0	0	0	0	0	0	0	**28**	1
Chlorothalonil	117	0	0	0	0	0	0	0	0	**117**	44
Cyproconazole	117	0	0	0	0	0	0	0	0	**117**	3
Epoxiconazole	117	0	0	0	0	0	0	0	0	**117**	7
Fenpropidin	117	0	0	0	0	0	0	0	0	**117**	8
Fenpropimorph	117	0	0	0	0	0	0	0	0	**117**	23
Flusilazole	146	0	0	0	0	0	0	0	0	**146**	12
Prochloraz	117	0	0	0	0	0	0	0	0	**117**	19
Sulphur	117	0	0	0	0	75	0	341	0	**533**	2,338
Tebuconazole	33	0	0	0	0	0	0	0	0	**33**	1
Triadimefon	0	0	0	0	0	0	0	35	0	**35**	4
Triadimenol	237	0	0	0	0	0	0	141	0	**378**	41
Tridemorph	237	0	0	0	0	0	0	85	0	**322**	111
Unspecified fungicide	0	0	0	0	0	0	0	57	0	**57**	
All fungicides	**1,503**	**0**	**0**	**0**	**0**	**75**	**0**	**659**	**0**	**2,237**	**2,612**

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TABLE 39 Fodder crops

Herbicides and growth regulators (spray hectares of active ingredients) and total weights applied (kg)

Herbicides	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Total kg***
2,4-DB	283	0	0	0	0	0	0	0	0	**283**	333
Benazolin	191	0	0	0	0	324	0	77	0	**592**	161
Bentazone	40	0	0	0	0	0	0	0	0	**40**	30
Bromoxynil	33	0	0	0	0	0	0	0	0	**33**	7
Clopyralid	0	0	110	0	0	324	0	261	0	**696**	51
Cycloxydim	0	0	0	0	0	40	0	40	0	**81**	26
Desmetryn	0	0	0	0	0	554	0	0	0	**554**	152
Ethofumesate	0	0	175	0	0	0	0	0	0	**175**	175
Fluroxypyr	0	0	0	0	0	12	0	0	0	**12**	5
Glyphosate	199	0	85	8	530	326	0	819	0	**1,966**	2,172
Ioxynil	33	0	0	0	0	0	0	0	0	**33**	7
Linuron	92	0	0	0	0	0	0	0	0	**92**	10
MCPA	1,744	0	0	0	9	0	0	0	0	**1,752**	704
MCPB	1,041	0	0	0	0	0	0	0	0	**1,041**	1,190
Mecoprop	33	0	0	0	0	0	0	0	0	**33**	19
Mecoprop-P	225	0	0	0	0	0	0	0	0	**225**	180
Metamitron	0	0	284	0	0	0	0	0	0	**284**	327
Metazachlor	0	40	0	0	255	150	0	5,487	0	**5,933**	3,439
Metsulfuron-methyl	150	0	0	0	0	0	0	0	0	**150**	1

cont....

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TABLE 39 Fodder crops (continued)

Herbicides and growth regulators (spray hectares of active ingredients) and total weights applied (kg)

Herbicides (cont.)	***Arable silage***	***Cabbage***	***Fodder beet***	***Fodder mixture***	***Fodder rape***	***Kale***	***Stubble turnips***	***Turnips & swedes***	***Typhon***	***Total spray area***	***Total kg***
Paraquat	0	0	0	0	226	369	0	310	0	**905**	615
Phenmedipham	0	0	1,087	0	0	0	0	0	0	**1,087**	381
Propachlor	0	17	0	0	0	419	19	3,414	0	**3,869**	10,953
Propaquizafop	0	0	0	0	0	31	0	21	0	**52**	5
Tebutam	0	0	0	0	0	0	0	96	0	**96**	158
Thifensulfuron-methyl	32	0	0	0	0	0	0	0	0	**32**	1
Trifluralin	0	79	0	156	23	1,530	19	12,034	9	**13,850**	14,572
All herbicides	**4,093**	**136**	**1,742**	**164**	**1,043**	**4,080**	**38**	**22,559**	**9**	**33,865**	**35,673**
Growth regulators											
Chlormequat	235	0	0	0	0	0	0	0	0	**235**	91
All growth regulators	**235**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**235**	**91**

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TABLE 40 Principal active ingredients

Area (spray hectares) treated with the 25 most used active ingredients, including seed treatments, on all crops surveyed

		1997	*1993*
1	MCPA	**55,524**	62,220
2	2,4-DB	**25,347**	27,983
3	Gamma-HCH	**17,459**	19,470
4	Benazolin	**16,164**	19,874
5	Thiram	**15,191**	2,147
6	Trifluralin	**13,850**	14,874
7	Dicamba	**13,213**	15,053
8	Iprodione	**13,108**	8,911
9	MCPB	**10,059**	8,513
10	Mecoprop	**9,220**	14,806
11	Fluroxypyr	**9,181**	1,261
12	Linuron	**8,752**	7,758
13	Flusilazole	**7,975**	770
14	Fenpropimorph	**7,714**	16,563
15	Triclopyr	**7,405**	4,699
16	Asulam	**6,141**	5,126
17	Metazachlor	**5,933**	3,582
18	Mecoprop-P	**5,334**	3,634
19	Propiconazole	**5,182**	3,340
20	Carbendazim	**4,553**	1,844
21	Glyphosate	**4,362**	5,294
22	Carbofuran	**4,001**	2,050
23	2,4-D	**3,982**	5,596
24	Propachlor	**3,869**	6,532
25	Bentazone	**3,655**	3,701

TABLE 41 Principal active ingredients

Quantity (kg) of the 25 most used active ingredients, including seed treatments, on all crops surveyed

		1997	*1993*
1	MCPA	39,635	45,075
2	2,4-DB	28,061	32,416
3	Asulam	22,589	10,533
4	Trifluralin	14,572	15,749
5	MCPB	12,743	11,078
6	Propachlor	10,953	19,005
7	Mecoprop	8,131	16,328
8	Glyphosate	4,701	3,519
9	2,4-D	3,880	8,168
10	Mecoprop-P	3,775	3,236
11	Sulphur	3,743	2,302
12	Metazachlor	3,439	2,881
13	Bentazone	3,141	3,217
14	Benazolin	3,018	3,306
15	Fenpropimorph	2,743	8,165
16	Carbofuran	2,364	2,424
17	Dicamba	2,165	3,174
18	Fluroxypyr	2,077	406
19	Triclopyr	1,558	3,057
20	Linuron	786	751
21	Tridemorph	659	1,449
22	Chlorpyrifos	636	1,223
23	Paraquat	633	904
24	Flusilazole	542	45
25	Gamma-HCH	490	590

TABLE 42 Grassland

Comparison of pesticide usage in 1989, 1993 and 1997, spray hectares of formulations, spray hectares of active ingredients and quantities (kg of a.i.'s) used

	1989**			1993			1997		
	sp. ha.'s of formulations	***sp. ha.'s of a.i.'s***	***kg***	***sp. ha.'s of formulations***	***sp. ha.'s of a.i.'s***	***kg***	***sp. ha.'s of formulations***	***sp. ha.'s of a.i.'s***	***kg***
Insecticides									
Pyrethroids	133	133	+	0	0	0	0	0	0
Organophosphates	4,956	4,956	3,099	1,186	1,186	809	347	347	243
Organochlorines	300	300	81	0	0	0	0	0	0
Carbamates	0	0	0	0	0	0	0	0	0
Unspecified	136	136	NA	0	0	0	0	0	0
All insecticides	**5,525**	**5,525**	**3,180**	**1,186**	**1,186**	**809**	**347**	**347**	**243**
Molluscicides	**131**	**131**	**30**	**0**	**0**	**0**	**0**	**0**	**0**
Fungicides	*	*	*	**30,126**	**34,424**	**13,271**	**25,318**	**31,617**	**6,679**
Herbicides	**118,542**	**237,628**	**151,798**	**104,531**	**194,459**	**145,579**	**100,246**	**180,450**	**131,711**
Growth regulators				**2,150**	**2,379**	**1,301**	**438**	**786**	**366**
All pesticides	**124,198**	**243,284**	**155,008**	**137,993**	**232,448**	**160,960**	**126,349**	**213,200**	**138,999**
Crop area (ha)		4,559,814			4,513,760			4,359,064	

'+' = < 0.5kg
'*' = not reported
'**' = data modified since report published
'NA' = not applicable

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TABLE 43 Fodder crops

Comparison of pesticide usage in 1989, 1993 and 1997, spray hectares of formulations, spray hectares of active ingredients and quantities (kg of a.i.'s) used

	1989*			1993			1997		
	sp. ha.'s of formulations	***sp. ha.'s of a.i.'s***	***kg***	***sp. ha.'s of formulations***	***sp. ha.'s of a.i.'s***	***kg***	***sp. ha.'s of formulations***	***sp. ha.'s of a.i.'s***	***kg***
Insecticides									
Pyrethroids	1,047	1,047	15	934	934	21	1,445	1,445	21
Organophosphates	3,905	3,919	2,524	1,317	1,317	850	1,982	1,982	1,058
Organochlorines	1,450	1,450	286	454	454	132	887	887	266
Carbamates	1,286	1,286	1,807	2,169	2,169	2,448	4,208	4,208	2,419
Unspecified	9	9	NA	257	257	NA	59	59	NA
All insecticides	**7,697**	**7,711**	**4,632**	**5,131**	**5,131**	**3,451**	**8,581**	**8,581**	**3,764**
Molluscicides	**0**	**0**	**0**	**0**	**0**	**0**	**176**	**176**	**40**
Fungicides	**519**	**519**	**3,225**	**557**	**557**	**1,602**	**1,736**	**2,237**	**2,612**
Herbicides	**43,265**	**43,265**	**112,003**	**29,733**	**30,279**	**46,395**	**31,752**	**33,865**	**35,673**
Growth regulators	**0**	**0**	**0**	**0**	**0**	**0**	**235**	**235**	**91**
All pesticides	**51,481**	**51,495**	**119,860**	**35,421**	**35,967**	**51,448**	**42,480**	**45,094**	**42,180**
Crop area (ha)		40,178			29,280			27,151	

'*' = includes turnip and swede data for 1988
'NA' = not applicable

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TABLE 44 Sampled areas of grassland

Area (ha) of grassland sampled on farms with fodder crops

	Highlands & Islands	***Caithness & Orkney***	***Moray Firth***	***Aberdeen***	***Angus***	***East Fife***	***Lothian***	***Central Lowlands***	***Tweed Valley***	***Southern Uplands***	***Solway***
Total grassland	2,383	989	2,729	3,904	1,306	543	817	2,142	4,447	3,905	2,310

TABLE 45 Census areas

Area (ha) of grassland in Scotland (on farms with fodder crops)

	Highlands & Islands	***Caithness & Orkney***	***Moray Firth***	***Aberdeen***	***Angus***	***East Fife***	***Lothian***	***Central Lowlands***	***Tweed Valley***	***Southern Uplands***	***Solway***
Total grassland	36,151	21,094	33,310	53,947	19,368	7,348	8,989	34,968	34,002	38,788	36,229

TABLE 46 Raising factors for grassland (on farms with fodder crops)

	Highlands & Islands	***Caithness & Orkney***	***Moray Firth***	***Aberdeen***	***Angus***	***East Fife***	***Lothian***	***Central Lowlands***	***Tweed Valley***	***Southern Uplands***	***Solway***
	15.2	21.3	12.2	13.8	14.8	13.5	11.0	16.3	7.6	9.9	15.7

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TABLE 47 First adjustment factors for grassland (on farms with fodder crops)

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
Grass under 5 years old	0.79	0.91	0.86	0.96	1.10	1.20	0.79	0.91	1.03	0.87	1.02
Grass 5 years old and over	1.16	1.06	1.27	1.08	0.91	0.88	1.20	1.05	0.98	1.07	0.99

TABLE 48 Sampled areas of grassland

Area (ha) of grassland sampled in postal survey

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
Total grassland	834	594	242	972	143	67	161	1,647	1,205	335	1,830

TABLE 49 Census areas

Area (ha) of grassland in Scotland (excluding grassland on farms with fodder crops)

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
Total grassland	107,215	56,432	34,628	73,749	23,896	13,129	13,578	219,807	28,134	72,183	137,715

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TABLE 50 Raising factors for grassland (in postal survey)

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
	128.6	94.9	143.2	75.8	167.3	195.8	84.5	133.5	23.3	215.2	75.2

TABLE 51 First adjustment factors for grassland (in postal survey)

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
Grass under 5 years old	2.40	0.90	0.61	1.40	1.12	0.35	0.69	1.09	1.02	0.40	1.09
Grass 5 years old and over	0.90	1.04	1.79	0.80	0.91	29.50	1.20	0.98	0.99	1.31	0.98

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TABLE 52 Sampled areas of rough grazing

Area (ha) of rough grazing sampled on farms with fodder crops and in postal survey

	Highlands & Islands	***Caithness & Orkney***	***Moray Firth***	***Aberdeen***	***Angus***	***East Fife***	***Lothian***	***Central Lowlands***	***Tweed Valley***	***Southern Uplands***	***Solway***
Total rough grazing	133,114	4,853	4,242	4,581	3,953	117	1,024	10,415	4,658	22,953	4,377

TABLE 53 Census areas

Area (ha) of rough grazing in Scotland

	Highlands & Islands	***Caithness & Orkney***	***Moray Firth***	***Aberdeen***	***Angus***	***East Fife***	***Lothian***	***Central Lowlands***	***Tweed Valley***	***Southern Uplands***	***Solway***
Total rough grazing	2,215,835	78,507	172,206	54,256	39,236	4,561	19,754	158,549	44,250	346,428	79,116

TABLE 54 Raising factors for rough grazing

	Highlands & Islands	***Caithness & Orkney***	***Moray Firth***	***Aberdeen***	***Angus***	***East Fife***	***Lothian***	***Central Lowlands***	***Tweed Valley***	***Southern Uplands***	***Solway***
	16.6	16.2	40.6	11.8	9.9	38.9	19.3	15.2	9.5	15.1	18.1

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TABLE 55 Sampled areas of fodder crops

Area (ha) of fodder crops grown in sample

Size (ha)	*Highlands & Islands*	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
0.1 - 4.9	26	12	57	78	25	7	1	36	13	15	21
5.0 - 9.9	46	22	88	142	69	24	12	18	60	35	42
10.0 - 14.9	61	11	91	82	68	22	12	44	85	73	12
15.0 - 19.9	0	0	69	88	16	0	16	34	68	66	
20.0 +	70	0	29	92	25	0	32	53	164	156	25

TABLE 56 Census areas

Area (ha) of fodder crops grown in Scotland

Size (ha)	*Highlands & Islands*	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
0.1 - 4.9	930	485	1,191	1,981	709	242	99	787	321	394	535
5.0 - 9.9	977	346	1,337	1,813	712	307	168	940	738	738	825
10.0 - 14.9	562	152	556	894	484	126	229	442	689	527	423
15.0 - 19.9	351	*	344	309	236	*	114	195	452	286	118
20.0 +	177	*	**	**	152	*	*	166	483	**	287

To prevent disclosure of information about individual holdings, entries relating to less than 5 holdings have been replaced by an *. Entries denoted by ** were necessary as complete area information for these regions would mean that undisclosed areas in Table 2 could be disclosed by deduction.

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TABLE 57 Raising factors for fodder crops

Size (ha)	*Highlands & Islands*	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
0.1 - 4.9	35.8	42.1	20.8	25.3	28.1	35.2	81.7	21.9	25.6	25.9	25.0
5.0 - 9.9	21.2	15.5	15.1	12.8	10.4	12.9	14.4	51.8	12.3	21.0	19.8
10.0 - 14.9	9.2	13.9	6.1	10.9	7.1	5.8	18.8	10.0	8.1	7.2	35.2
15.0 - 19.9	NA	NA	5.0	3.5	14.6	NA	7.1	5.8	6.6	4.4	NA
20.0 +	2.5	NA	13.7	4.1	6.0	NA	3.5	3.1	2.9	5.1	11.4

'NA' = not applicable

TABLE 58 First adjustment factors for fodder crops

	Highlands & Islands	*Caithness & Orkney*	*Moray Firth*	*Aberdeen*	*Angus*	*East Fife*	*Lothian*	*Central Lowlands*	*Tweed Valley*	*Southern Uplands*	*Solway*
Fodder beet	NA	NA	NA	NA	0.75	NA	NA	1.14	NA	0.20	5.15
Fodder rape	1.35	0.42	1.92	1.38	1.35	1.81	NA	0.85	0.68	0.99	0.31
Kale & cabbage	1.85	NA	2.19	1.29	5.36	0.57	0.46	0.99	0.76	1.46	1.28
Turnips & swedes	0.56	0.67	0.92	0.93	0.74	1.02	0.77	0.81	1.15	0.83	0.60
Other fodder crops	25.79	NA	0.82	NA	NA	NA	1.06	3.77	1.27	1.21	6.31

'NA' = not applicable

TABLE 59 Second adjustment factors for fodder crops

Fodder beet	1.71
Fodder rape	1.05
Kale & cabbage	1.00
Turnips & swedes	1.00
Other fodder crops	1.30

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