

PESTICIDE USAGE IN SCOTLAND

SURVEY REPORT 87

**ARABLE CROPS
1990**

J P SNOWDEN & H M BOWEN

**Agricultural Scientific Services
Scottish Office Agriculture and Fisheries Department
East Craigs, EDINBURGH**

J M DICKSON

**Scottish Agricultural Statistics Service
The King's Buildings
Mayfield Road
EDINBURGH**

Scottish Office Agriculture and Fisheries Department

CONTENTS

Summary	1
Introduction	1
Definitions and notes	1
Method	1
Pesticide usage	2
Pesticide usage on winter barley	3
Pesticide usage on spring barley	4
Pesticide usage on winter wheat	5
Pesticide usage on spring wheat	6
Pesticide usage on winter oats	7
Pesticide usage on spring oats	7
Pesticide usage on peas for combining	8
Pesticide usage on winter oilseed rape	9
Pesticide usage on spring oilseed rape	11
Pesticide usage on seed potatoes	11
Pesticide usage on ware potatoes	12
References	13
Acknowledgements	13
Figure 1 showing agricultural regions	14
Tables of pesticide usage	15
Comparison with previous surveys	82

SUMMARY

This was the fifth survey of pesticide usage on arable crops. Changes in cropping since the 1988 survey included increases in wheat and oilseed rape, and decreases in winter barley, spring barley, oats, peas for combining and both seed and ware potatoes (previously surveyed in 1987).

Usage of insecticides increased, particularly on winter barley, where a 16-fold increase was recorded. Aphid control was the main reason for use of insecticides, while leatherjacket and slug control decreased.

There had been a further increase in the use of fungicides, particularly on winter barley, winter wheat and oats. As in the previous 2 surveys, fenpropimorph was the principal fungicide.

Overall, herbicide and growth regulator usage was similar to that recorded in 1988 although metsulfuron-methyl dislodged MCPA as the principal herbicide. Chlormequat remained the most commonly used growth regulator.

INTRODUCTION

This is the fifth survey of pesticides used on arable crops. The previous four were in 1974, 1977, 1982 and 1988 (references 1, 2, 3 and 4). Crops surveyed included cereals, oilseed rape, and potatoes, surveyed separately in 1987 (reference 5). Turnips and swedes for stockfeeding, which had been included in previous arable crop surveys, will in future be surveyed together with other forage and fodder crops.

DEFINITIONS AND NOTES

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

Demeton-S-methyl sulphone and oxydemeton-methyl are both referred to as demeton-S-methyl because growers do not always differentiate between the 2 compounds.

Similarly, 2-methoxyethylmercury acetate and phenylmercury acetate are both referred to as organo-mercury.

The use of sulphur on oilseed rape has been recorded as a fungicidal one. However, its main use in this crop is not for disease control but to correct or prevent sulphur deficiency.

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

METHOD

Using the 1989 Agricultural Census (reference 6), 2 samples were drawn representing the whole of Scotland. The first sample was selected from holdings growing any of the combine crops and the second from holdings

growing potatoes. This was necessary to provide adequate coverage of potatoes, as the distribution of these over the country was different from that of combine crops.

The country was divided into 11 land-use regions (Fig 1, reference 7) and the samples were drawn from census returns of holdings growing at least 1 ha of the relevant crops. Holdings were stratified by land-use region and by farm size group. Sampling fractions within size groups were based on area of crops grown rather than number of holdings, so that smaller size groups would not dominate the sample.

Data on all combine crops and potatoes were obtained from all holdings visited irrespective of the sample. The survey period was from the end of the 1989 harvest to the end of the 1990 harvest. Details of the numbers of holdings visited are given in Table 1 and the areas sampled in Table 2.

For all crops except potatoes (see below) sample data were raised to give national estimates of pesticide usage using raising factors. These were based on the areas growing combine crops in the 1990 Agricultural Census (reference 8) within regions and size groups. Land-use regions 1 and 2 were amalgamated, as were regions 10 and 11. Adjustments were made for each crop within each region by applying the first adjustment factors to the sample area of each crop grown and comparing this with the area from the 1990 Agricultural Census. A second adjustment was made for crops where no holdings were sampled in one or more regions.

Sample data for potatoes were raised separately. Land-use regions 1 and 2 were amalgamated, as were regions 9, 10 and 11. Initially data was collected for seed, ware and early potatoes. Because of limited data in the last category, it was amalgamated with the ware potatoes.

PESTICIDE USAGE

The area of each crop grown is shown in Table 2.

The proportions of crops not treated with the different groups of pesticides are given in Table 3. Since 1988 there have been minor changes, mainly the increased use of insecticides, especially on winter barley, and a larger proportion of all the cereal crops receiving no pesticide at all.

As in 1988, a large number of farmers were unable to specify precise reasons for usage of pesticides, particularly fungicides. In the tables, they are recorded as 'no reason given'.

Although data on seed potatoes and ware potatoes were recorded and are presented separately, amalgamated data for all potatoes are also provided in Tables 43, 44 and 45. A summary of the areas of each crop treated with each formulation is shown in Tables 48, 49 and 50, with each active ingredient in Tables 51, 52 and 53, and the estimated quantities applied in Tables 54, 55 and 56. The principal 50 chemicals ordered both by total spray area and by tonnes of active ingredient are shown in Tables 57 and 58, both these tables include seed dressings data. Regional data are shown in Tables 59 and 60, and comparisons with previous surveys in Tables 61-63.

WINTER BARLEY

There has been a slight decrease in area grown from 69,240 ha in 1988 to 66,992 ha.

Insecticides and molluscicides (Tables 4, 51)

The proportion of the crop treated increased dramatically from 6% in 1988 to 43% in 1990, and the total spray area increased more than 16-fold to nearly 57,000 sp.ha.

Nearly all insecticide use was against aphids, mainly with cypermethrin and fenvalerate which accounted for 44% and 21% of the total insecticide spray area. No leatherjacket control was recorded. In 1988, chlorpyrifos had been the most commonly used insecticide, mainly for leatherjacket control, followed by deltamethrin and demeton-S-methyl against aphids.

Methiocarb and metaldehyde were each used on less than 0.5% of the crop for slug control. In 1988, more than 3% of the crop had been treated, mainly with methiocarb.

Fungicides (Tables 5, 52)

Usage in 1990 was similar to that in 1988 at 96% of the crop treated. The total spray area of active ingredients increased by more than 30% to 345,000 sp.ha, despite the 3% decrease in crop grown.

Of the diseases specified, the principal one was mildew accounting for 31% of the spray area, similar to that recorded in 1988. Other reasons were control of Rhynchosporium, rust and mixed and other diseases. Unspecified reasons accounted for 62% of the spray area.

The most used fungicide was fenpropimorph which accounted for 25% of the fungicide spray area of active ingredients (13% in 1988), and was used mainly for mildew control. Tridemorph (16%), which had been the most popular in 1988, and carbendazim (15%) were also widely used.

Herbicides and growth regulators (Tables 6, 53)

Usage of herbicides in 1990 was similar to that in 1988 at around 96% of the crop treated. The total spray area of active ingredients increased by 12% to 140,000 sp.ha despite the small decrease in crop grown.

As in 1988, the main reason for use was for annual weed control which accounted for 60% of the spray area.

By far the most used formulation was diflufenican/isoproturon which was applied to 36% of the crop (10% in 1988), mainly for control of annual and grass weeds.

Isoproturon, alone and in mixtures was the most used herbicide accounting for 25% of the total spray area of active ingredients, followed by diflufenican (18%). The use of mecoprop, the main herbicide in 1988 (20%), had declined to 11% (including mecoprop-P). Metsulfuron-methyl, MCPA, trifluralin remained the main alternatives.

Total usage of growth regulators was broadly similar to that in 1988. As then, chlormequat and 2-chloroethylphosphonic acid were the main active ingredients.

The percentage of basic area treated more than once with each formulation is shown in Table 7.

Seed dressings (Tables 46, 47)

The proportion of seed dressings decreased from nearly 100% of seed treated in 1988 to 91% in 1990.

As in 1988, organo-mercury dressings were the most popular and were applied to 67% of seed compared with 61% in 1988.

Ethirimol/flutriafol/thiabendazole, (18%), and fuberidazole/triadimenol (7%) formulations were also used.

SPRING BARLEY

The area grown was 270,817 ha, a reduction of almost 50,000 ha since 1988.

Insecticides and molluscicides (Tables 8, 51)

The proportion of the crop treated increased slightly from 10% in 1988 to 13% in 1990. The total spray area of active ingredients also increased by almost 22% to 42,277 sp.ha, despite the 15% reduction in area of crop grown.

Aphid control increased from 11,000 sp.ha to 36,000 sp.ha, since 1988, and leatherjacket control decreased from almost 19,500 sp.ha to 3,500 sp.ha.

Dimethoate was by far the most commonly used insecticide, applied to 22,000 sp.ha and accounting for 53% of the total spray area of active ingredients, followed by demeton-S-methyl and chlorpyrifos (each 12%). In 1988, chlorpyrifos had been the principal insecticide, used only for leatherjacket control, followed by demeton-S-methyl. Dimethoate had been recorded on only 600 sp.ha.

As in 1988, methiocarb was the only molluscicide recorded for slug control. There was a slight decrease from 1% of the crop treated to less than 0.5%.

Fungicides (Tables 9, 52)

Usage in 1990 was similar to that in 1988 at 81% of the crop treated. The total spray area of active ingredients decreased by 12%, slightly less than the 15% reduction in crop grown.

As in 1988, the main reason for usage of fungicides was mildew control, followed by rust, mixed and other diseases, and Rhynchosporium. Unspecified reasons accounted for 46% of the spray area.

The 3 most commonly used fungicides were the same as in 1988. Fenpropimorph was again the principal fungicide, accounting for 38% of the total spray area of active ingredients, followed by tridemorph (18%) and fenpropodim (16%).

Herbicides and growth regulators (Tables 10, 53)

The proportion of the crop treated with herbicides decreased slightly from 98% in 1988 to 95% in 1990. The total spray area of active ingredients

decreased from 740,500 sp.ha to 629,500 a reduction of 15%, in line with the reduction in crop grown.

As in 1988, the main reason for use of herbicides was for annual weed control. Metsulfuron-methyl and MCPA had exchanged positions as the principal herbicide used on spring barley. Metsulfuron-methyl now accounted for 21% of the total spray area of active ingredients (18% in 1988) followed by MCPA, 17% (24% in 1988). Usage of mecoprop remained roughly the same as in 1988 at 14%.

Wild oat control increased from 8,200 sp.ha in 1988 to nearly 14,000 sp.ha in 1990. As in 1988, flamprop-M-isopropyl and difenzoquat were the only herbicides used.

Usage of growth regulators remained similar to that in 1988, taking into account the reduction in crop grown. As in 1988, chlormequat was the principal growth regulator followed by 2-chloroethylphosphonic acid.

The percentage of basic area treated more than once with each formulation is shown in Table 11.

Seed dressings (Tables 46, 47)

Use of seed dressings decreased slightly from 100% of seed treated in 1988 to 97% in 1990. Organo-mercury dressings were again the most commonly used and were applied to 82% of the seed, a slight decrease since 1988 (79%). There were slight decreases in the use of ethirimol/flutriafol /thiabendazole, 7%, and fuberidazole/triadimenol, 5%. As in 1988, small quantities of seed received either ethirimol alone or gamma-HCH, alone or with an organo-mercury compound.

WINTER WHEAT

The area grown increased by almost 11,000 ha from 98608 ha in 1988 to 109,514 ha in 1990 (the 1988 area refers to winter and spring sown varieties).

Insecticides and molluscicides (Tables 12, 51)

The proportion of the crop treated increased from 30% in 1988 to 41% in 1990. The total spray area of active ingredients increased more than 3-fold to almost 54,000, although the area of crop grown increased by only 11%.

As in 1988, the main reason for insecticides was for aphid control. Synthetic pyrethroids were very popular and cypermethrin, accounting for 34% of the total spray area of active ingredients, was the principal insecticide, followed by dimethoate 19%, fenvalerate, deltamethrin (each 11%) and cyfluthrin (5%). Usage of pirimicarb, the most common in 1988 (35%) had declined to only 6% of the total spray area.

Molluscicide treatments declined from 17,000 sp.ha in 1988 to 10,500 sp.ha. Again, methiocarb was the most popular, followed by metaldehyde.

Fungicides (Tables 13, 52)

The proportion of the crop treated decreased slightly from 99% in 1988 to 97% in 1990. The total spray area of active ingredients increased by

almost 34% from 540,000 sp.ha to 723,000 sp.ha, although the area of crop grown increased by only 11%.

As in 1988, the main specified reasons for fungicide use were mildew, 17% of the spray area, followed by rust, 9%. Unspecified reasons accounted for 69%.

In 1988, chlorothalonil and carbendazim each accounted for 16% of the total spray area. In 1990, usage of carbendazim increased to 20%, while that of chlorothalonil declined to 8%. Fenpropimorph, 13%, was again commonly used.

Herbicides and growth regulators (Tables 14, 53)

The proportion of the crop treated with herbicides declined very slightly from 96% in 1988 to 94% in 1990. The total spray area of active ingredients increased by more than 8% to 244,500 sp.ha, a slightly smaller percentage increase than the increase in crop grown.

As in 1988, the main reason for use of herbicides was for annual weed control. Metsulfuron-methyl, which accounted for 20% of the total spray area of active ingredients, had overtaken the mecoprops (18%) as the principal herbicide. The grass herbicide, isoproturon (13%), mainly in formulation with diflufenican (8%), was the next most popular. Ioxynil and bromoxynil were again commonly used, depending on the weed flora.

The total spray area of growth regulators increased by more than 35% since 1988 to 186,000 sp.ha. Again, chlormequat was the most commonly used.

The percentage of basic area treated more than once with each formulation is shown in Table 15.

Seed dressings (Tables 46, 47)

As in 1988, all wheat seed was treated, and again, organo-mercury compounds were the most popular, although their use has decreased from 86% of seed treated to 69%. Usage of fuberidazole/triadimenol increased from 15% to 23%. Small quantities received ethirimol/flutriafol /thiabendazole, fonofos, and chlorfenvinphos.

SPRING WHEAT

This is the first time that this crop has been recorded in Scotland. The area grown, 1400 ha, is an estimated figure and is based on data collected from only 5 holdings, mainly in Lothian, land-use region 7. Data for this crop should therefore be treated with caution.

Insecticides and molluscicides

None were recorded.

Fungicides (Tables 16, 52)

97% of the crop was treated with fungicides.

The most popular was fenpropimorph which accounted for 41% of the total spray area, followed by carbendazim, triadimenol and flutriafol, each at 12%. The only specified reasons for the use of fungicides were to control mildew and ear diseases.

Herbicides and growth regulation (Tables 17, 53)

97% of the crop received herbicides. Mecoprop and metsulfuron-methyl were the most commonly used, each accounting for 31% of the total spray area to control annual weeds.

Growth regulators were applied to 37% of the crop, 2-chloroethyl phosphonic acid and chlormequat were the only chemicals used.

The repeated use of each formulation is shown in Table 18.

Seed dressings (Tables 46, 47)

All spring wheat seed was treated. Organo-mercury compounds accounted for 98% of the seed and the remaining 2% received fuberidazole/triadimenol.

WINTER OATS

This is the first time that this crop has been recorded in Scotland. The area grown, 1,400 ha, is an estimated figure, and is based on data collected from only 9 holdings. Data for this crop should therefore be treated with caution.

Insecticides and molluscicides (Tables 19, 51)

71% of the crop received insecticides for aphid control. Only synthetic pyrethroids were recorded, cyfluthrin, deltamethrin and cypermethrin being the most commonly used.

No molluscicides were recorded.

Fungicides (Tables 19, 52)

98% of the crop received fungicides. The only specified reason was for mildew control. Tridemorph was the principal fungicide, accounting for 48% of the total spray area.

Herbicides and growth regulators (Tables 20, 53)

Herbicides were applied to 98% of the crop. Metsulfuron-methyl was the principal herbicide, accounting for 29% of the total spray area, followed by isoxaben and mecoprop, each 16%. Again the main reason was to control annual broad leaved weed.

69% of the crop received growth regulator. Only chlormequat was recorded.

The repeated use of each formulation is shown in Table 21.

Seed dressings (Tables 46, 47)

All winter oat seed was treated. Organo-mercury compounds were applied to 95% of the seed and fuberidazole/triadimenol to the remaining 5%.

SPRING OATS

The area grown had decreased by 21% to 27,500 ha since the last survey.

Insecticides and molluscicides (Tables 22, 51)

The proportion of the crop treated increased slightly from 10% in 1988 to 14% in 1990. The total spray area increased by more than 71% to 5,695 sp.ha.

The main reason for use of insecticides was for aphid control 90%, with 10% for leatherjacket control. A larger range of insecticides was recorded than in 1988 when only chlorpyrifos, for leatherjacket control and cypermethrin, for aphid control, were used. In 1990, cypermethrin accounting for 41% of the total spray area, and dimethoate (32%) were the principal insecticides, both for aphid control. Again only chlorpyrifos was used for control of leatherjackets.

As in 1988, no molluscicide usage was recorded.

Fungicides (Tables 23, 52)

The proportion of the crop treated increased from 25% in 1988 to 57% in 1990. The total spray area of fungicides of active ingredients to over 24,000 sp.ha.

As in 1988, the main specified reason for fungicide usage was mildew control. The principal fungicide recorded was sulphur, accounting for 30% of the total spray area, followed by fenpropimorph, 23%. Usage of tridemorph which had been the most common in 1988 (44%) has declined to 18%.

Herbicides and growth regulators (Tables 24, 53)

The proportion of the crop treated with herbicides decreased from 92% in 1988 to 71% in 1990. The total spray area of active ingredients decreased by nearly 40% to 38,000 sp.ha, a larger proportion than the decrease of 21% in crop grown.

As in 1988, nearly all herbicides were used for annual weed control. MCPA remained the principal herbicide, accounting for 32% of the total spray area of active ingredients (35% in 1988), followed by metsulfuron-methyl, 25%, (18% in 1988) and the mecoprops, 19% (13% in 1988).

Usage of growth regulators was roughly similar to that in 1988, 34% of the crop being treated. Chlormequat was the only chemical recorded.

The repeated use of formulations is shown in Table 25.

Seed dressings (Tables 46, 47)

Only 72% of spring oat seed received a dressing, compared with 89% in 1988. Organo-mercury, mainly alone (69%) or with gamma-HCH (less than 0.5%) was the principal chemical. Small quantities of fuberidazole/triadimenol were also used.

PEAS

The area grown had almost halved since 1988 to 4392 ha.

Insecticides and molluscicides (Tables 26, 51)

The proportion of the crop treated increased from 1% in 1988 to 9% in 1990. In comparison, the total spray area of active ingredients increased almost 5-fold to 385 sp.ha, despite the 50% decline in crop grown.

In 1988, pirimicarb had been the only insecticide recorded, for aphid control. In 1990, fenvalerate and dimethoate were used for unspecified reasons.

As in 1988, no molluscicides were recorded.

Fungicides (Tables 26, 52)

The proportion of the crop treated increased slightly from 60% in 1988 to 69% in 1990. The total spray area of active ingredients decreased by only 22% despite the 50% decrease in crop grown.

As in 1988, a large proportion of reasons were unspecified. Botrytris was the only specified reason recorded.

As in 1988, chlorothalonil was the principal fungicide accounting for 26% of the total spray area of active ingredients, followed by sulphur, 21%, and carbendazim, 17%. Use of vinclozolin, benomyl and iprodione which were popular in 1988 declined slightly.

Herbicides and growth regulators (Tables 27, 53)

Usage of herbicides, including desiccants, declined very slightly from 100% of the crop treated in 1988 to 98% in 1990.

The 50% drop in total spray area of active ingredients to 12,000 sp.ha was in line with the decrease in the crop area.

Cyanazine, on nearly half the crop area, was the main herbicide, followed by terbutryn on 43% of crop area and terbuthylazine on 34%. Desiccation was mainly with diquat, used on 63% of the crop, followed by glyphosate on 18%.

Only 2% of the crop area received a growth regulator, chlormequat, compared with 4% in 1988.

The repeated use of formulations is shown in Table 28.

Seed dressings (Tables 46, 47)

As in 1988, all pea seed was treated, although again, detailed information could not be obtained from some growers, 32% (48% in 1988). Drazoxolon was again the most commonly used dressing, applied to 54% of the seed, followed by metalaxyl/thiabendazole/thiram, 11%, and thiram alone, 3%.

WINTER OILSEED RAPE

Since the last survey, oilseed rape has been subdivided into winter and spring sown crops in the Census. In 1990, 37,763 ha of winter sown crops were grown, compared with an area of 41,514 ha in 1988 which included both winter and spring sown varieties. Because nearly all the data collected

in 1988 was from winter sown crops this is used for comparison with the winter sown crops in 1990.

Insecticides and molluscicides (Tables 29, 51)

The proportion of the crop treated increased from 30% in 1988 to 37% in 1990. Consequently, the total spray area of active ingredients increased by almost 19% to 15,300 sp.ha despite the 9% decrease in crop grown.

The main differences in reasons for use since 1988 were the decline in molluscicides from 20% of the crop treated to 8% in 1990, and the increase in insecticides from 10% to 37%. Cypermethrin, the principal insecticide accounting for 35% of the total spray area of active ingredients, and used mainly for aphid control, had not been recorded used on this crop in 1988. Alphacypermethrin, the most commonly used in 1988, remained popular in 1990, accounted for 31% of the total spray area, and was used to control mainly seed weevils and pollen beetles. Deltamethrin, 18%, was used mainly for aphid control.

Methiocarb remained the principal molluscicide.

Fungicides (Tables 30, 52)

The proportion of the crop treated increased slightly from 92% in 1988 to 95% in 1990. The total spray area of active ingredients increased by 27% to 181,000 sp.ha.

As in 1988, a large proportion of reasons for use of fungicides were unspecified. Light leaf spot remained the main specified reason, and again, carbendazim was the principal fungicide, accounting for 30% of the total spray area of active ingredients. Sulphur, 19%, and vinclozolin, 9%, remained popular. The use of prochloraz increased to 17%, mainly to control light leaf spot and botrytis.

Herbicides and growth regulators (Tables 31, 53)

The proportion of the crop treated with herbicides, including desiccants, decreased from 98% in 1988 to 94% in 1990. The fall in total spray area of active ingredients of 8% was in line with the decrease in crop grown.

As in 1988, metazachlor was the principal herbicide, accounting for 21% of the total spray area of active ingredients. Clopyralid, 20%, and benazolin, 17%, remained the main alternatives. Diquat and glyphosate were again used as desiccants.

Chlormequat was again the only growth regulator, used on 16% of the crop (9% in 1988).

The repeated use of formulations is shown in Table 32.

Seed dressings (Tables 46, 47)

More detailed information on seed dressings was obtained compared with 1988. Fenpropimorph/gamma-HCH/thiram was by far the most commonly used treatment, applied to 74% of the seed. Small quantities of captan/gamma-HCH and metalaxyl were also used.

SPRING OILSEED RAPE

This crop has only recently been included in the Agricultural Census. In 1990, 7,414 ha were grown.

Insecticides and molluscicides (Tables 33, 51)

70% of the crop was treated with insecticides. The main specified reasons for use were pollen beetle and aphid control.

Cypermethrin was the principal insecticide accounting for 40% of the total spray area, for the control of both insect pests, followed by deltamethrin, 22%.

No molluscicide use was recorded.

Fungicides (Tables 34, 52)

65% of the crop was treated with fungicides. The only specified reason for use was to control light leaf spot. Sulphur was by far the most used fungicide, 54% of the total spray area, followed by carbendazim, 24%.

Herbicides and growth regulators (Tables 35, 53)

83% of the crop received herbicides, including desiccants. Metazachlor and clopyralid were the principal herbicides and each accounted for 25% of the total spray area. Diquat was by far the most commonly used desiccant, on 26% of the crop.

No growth regulators were recorded.

The repeated use of formulations is shown in Table 36.

Seed dressings (Tables 46, 47)

The only specified seed dressing was fenpropimorph/gamma-HCH/thiram, used on 79% of seed, while no detailed information was obtained for the remaining seed.

SEED POTATOES

The area grown has declined by 8% since 1987 to 15,834 ha.

Insecticides, nematicides and molluscicides (Tables 37, 51)

The proportion of the crop treated increased from 39% in 1987 to 82% in 1990, and the total spray area increased almost 3-fold to 43,500 sp.ha. As in 1987, the main reason for use was for aphid control, and again, demeton-S-methyl and pirimicarb were the principal insecticides. Small quantities of aldicarb and thiabendazole/iodophor had been used in 1987, but no nematicides were recorded in 1990.

As in 1987, methiocarb was the only molluscicide recorded, applied to 4% of the crop.

Fungicides (Tables 37, 52)

Usage of fungicides remained roughly the same as in 1987 and around 97% of

the crop was treated, while the total spray area of active ingredients increased by 4% to 112,500 sp.ha, despite the 8% decline in crop grown. As in 1987, all sprays were for blight control. Mancozeb was the principal fungicide, accounting for 33% of the total spray area, followed by cymoxanil and the fentins at 13% and maneb, 12%.

Herbicides and desiccants (Tables 38, 53)

The proportion of the crop treated with herbicides and desiccants decreased slightly from 100% of the crop in 1987 to 97% in 1990, but the total spray area increased by 7% despite the decrease in crop grown.

Paraquat and linuron were again the principal herbicides, while sulphuric acid was by far the most used desiccant. There was a marked decline in the use of diquat as a desiccant, from 28% of the crop treated in 1987 to 2% in 1990. In 1987, daminozide had been used on 1% of the crop, but in 1990, no growth regulators were recorded.

The repeated use of formulations is shown in Table 39.

Seed dressings (Tables 46, 47)

The proportion of tubers treated with pre-planting fungicide remained roughly the same as in 1987 at 55%.

As in 1987, tolclofos-methyl was the principal chemical, accounting for 30% of the tubers treated. Its popularity has been diminished somewhat by the introduction of pencycuron which was used on 11%.

WARE POTATOES

The area of crop grown has declined by 4% since 1987 to 11,394 ha.

Insecticides, nematocides and molluscicides (Tables 40, 51)

The proportion of the crop treated increased from 36% in 1987 to 42% in 1990, while the total spray area increased by 51% to 13,000 sp.ha, despite the decrease of 4% in crop grown.

As in 1987, dimethoate was the most commonly used insecticide for aphid control, accounting for 45% of the total spray area. Demeton-S-methyl and pirimicarb were the main alternatives. Aldicarb continued to be used for nematode control, 209 ha, being treated, compared with 360 ha in 1987.

Methiocarb was the main molluscicide, and as in 1987, was applied to 10% of the crop.

Fungicides (Tables 40, 52)

Usage of fungicides remained roughly the same as in 1987, at around 91% of the crop treated, and there was little change in the total spray area of active ingredients of 73,000 sp.ha.

Mancozeb was by far the most used fungicide, accounting for 39% of the total spray area, followed by the fentins at 15% and metalaxyl, 12%.

Herbicides and desiccants (Tables 41, 53)

As in 1987 95% of the crop was treated. The area of crop planted declined by 4% and the total spray area of active ingredients by 18% to 27,000 sp.ha.

Paraquat was again by far the most used active ingredient, and accounted for 35% of the total spray area.

Sulphuric acid remained the most commonly used desiccant. In 1987, maleic hydrazide had been used on 1% of the crop, but in 1990 no growth regulators were recorded.

The repeated use of formulations is shown in Table 42.

Seed dressings (Tables 46, 47)

Usage of pre-planting fungicides remained roughly similar to that found in 1987 at 30% of the tubers treated.

In 1987, tolclofos-methyl was by far the most used chemical, but in 1990, it was used on only 12% of the tubers, while 17% were treated with pencycuron.

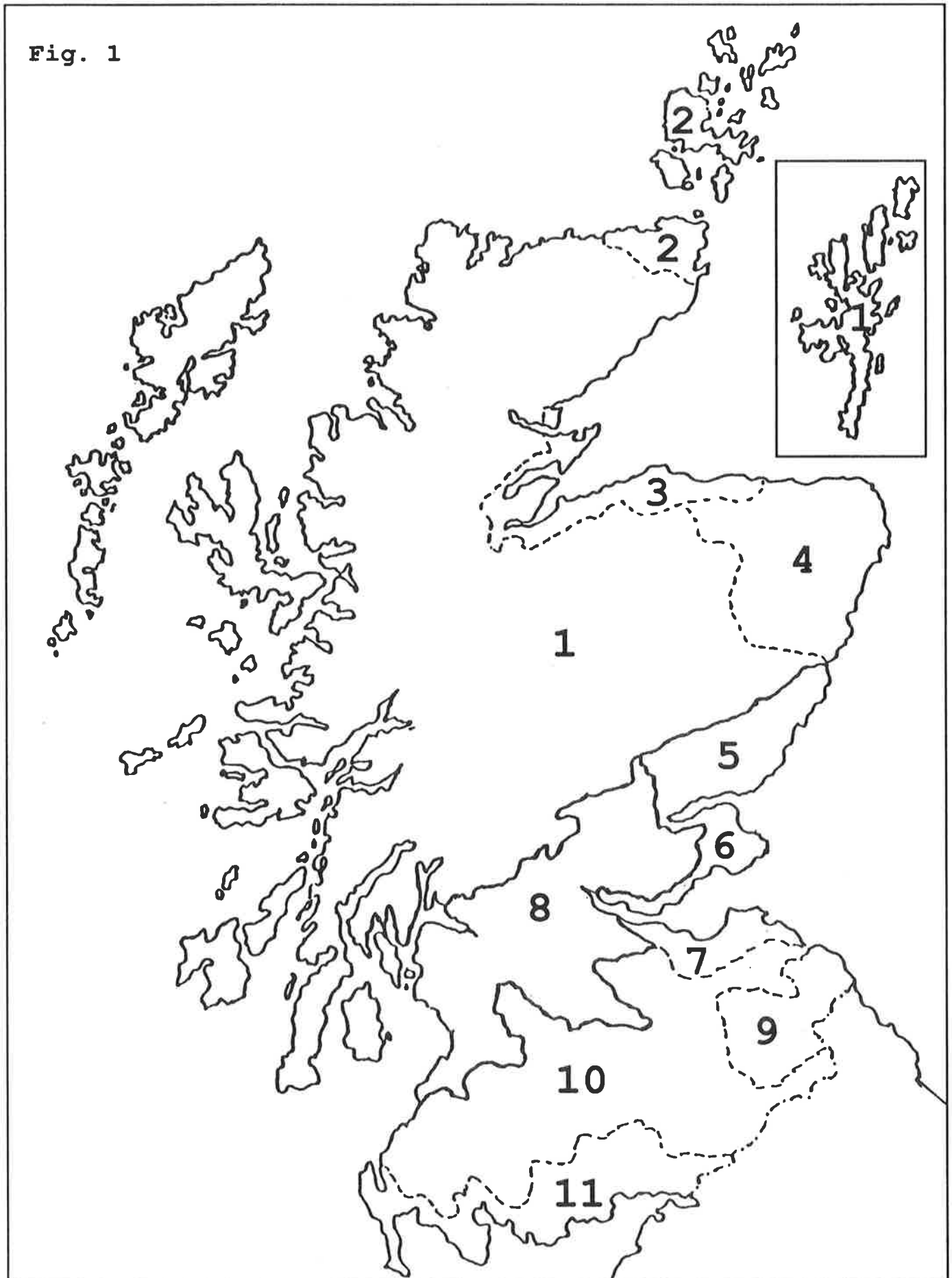
REFERENCES

1. Chapman, P. J., Sly, J. M. A. and Cutler, J. R. 1977 Pesticide usage survey report 11, Arable Farm Crops 1974, London: MAFF.
2. Steed, J. M., Sly, J. M. A., Tucker, G. G. and Cutler, J. R. 1979 Pesticide usage survey report 18, Arable Farm Crops 1977, London: MAFF.
3. Bowen, H. M. and Wood, J. Pesticide usage survey report 45, Arable Crops 1982; DAFS, Edinburgh, 1989.
4. Snowden, J. P., Bowen, H. M. and Dickson, J. M. Pesticide usage survey report 77, Arable Crops 1988; SOAFD, Edinburgh 1991.
5. Snowden, J. P., Bowen, H. M. and Dickson, J. M. Pesticide usage survey report 74, Potatoes 1987; DAFS, Edinburgh 1990.
6. Agricultural Statistics, Scotland 1989; HMSO, Edinburgh 1990.
7. Wood, H. J. An Agricultural Atlas of Scotland. George Gill and Sons, London 1931.
8. Agricultural Statistics, Scotland 1990; HMSO, Edinburgh 1991.

ACKNOWLEDGEMENTS

The authors wish to thank the farmers who provided the information for this report. Thanks are also given to Mr P R Shave and Mr L A Thomas for collecting some of the data and to Mr G Hosie for providing editorial assistance.

Fig. 1



- 1. Highlands and 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

TABLE 1: Number of holdings sampled in each region and size group

size group (ha)	High & Islands	Caith & Orkney	Moray Firth	Abdn	Angus	East Fife	Lothian	Central Lowland	Tweed Valley	South Uplands	Solway	Scotland
1-19.9	2	4	2	8	3	1	2	3	0	3	2	30
20-49.9	3	2	7	17	11	3	3	10	4	1	5	66
50-99.9	1	3	9	21	16	14	4	14	8	2	2	94
100-149.9	2	1	5	13	8	5	7	7	10	1	4	63
150+	1	2	7	10	17	4	17	4	11	3	2	78
All groups	9	12	30	69	55	27	33	38	33	10	15	331

TABLE 2: Areas of crops surveyed and census areas (hectares)

Crop	Surveyed area	Census area
Winter barley	5,372	66,992
Spring barley	13,514	270,817
Wheat	9,409	110,914
Oats	1,353	28,982
Peas	303	4,392
Winter oilseed rape	3,462	37,763
Spring oilseed rape	284	7,414
Seed potatoes	751	15,834
Ware potatoes	781	11,394
All arable crops	35,229	554,502

TABLE 3: Proportions of crop grown not treated with pesticides (%)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes
Insecticides, molluscicides, etc	43	83	59	100	29	86	91	63	30	18	58
Fungicides	4	19	3	3	2	43	31	5	35	3	9
Herbicides	4	5	6	3	2	29	2	6	17	3	5
Growth regulators	33	79	14	63	31	66	98	84	100	100	100
Any pesticide	3	4	3	3	2	15	2	2	3	3	5

TABLE 4: Winter barley: usage of insecticides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Aphids	Slugs	No reason given	Total spray area	% crop treated
INSECTICIDES					
SYNTHETIC PYRETHROIDS					
Cyfluthrin	6797	.	1186	7984	9
Cypermethrin	24551	.	389	24940	26
Deltamethrin	6420	.	152	6572	8
Fenvalerate	11771	.	.	11771	13
SYSTEMIC ORGANOPHOSPHATES					
Demeton-S-methyl	1334	.	.	1334	1
Dimethoate	2622	.	.	2622	4
NON-SYSTEMIC ORGANOPHOSPHATES					
Chlorpyrifos	38	.	.	38	+
CARBAMATES					
Pirimicarb	264	.	.	264	+
OTHER					
Unknown insecticide	860	.	.	860	1
MOLLUSCICIDES					
Metalddehyde	.	128	.	128	+
Methiocarb	.	302	.	302	+
Total insecticides and molluscicides	54656	430	1728	56814	
Area planted (ha)					66992

'+' = less than 0.5%

TABLE 5: Winter barley: usage of fungicides, the reasons for their use (spray hectares of formulation) and the percentage of the crop treated.

	Rust	Mildew	Rhyncho- sporium	Mixed & other diseases	No reason given	Total spray area	% crop treated
Benomyl	•	354	•	•	•	354	1
Carbendazim	•	1104	3131	1383	8093	13711	18
Carbendazim/flusilazole	1323	2177	657	•	16791	20948	22
Carbendazim/flutriafol	•	1607	•	589	2130	4326	6
Carbendazim/maneb/tridemorph	•	2634	670	1329	3277	7910	9
Carbendazim/prochloraz	•	284	•	1324	619	2227	3
Carbendazim/propiconazole	•	•	•	•	2260	2260	3
Carbendazim/triadimefon	•	•	•	•	1696	1696	1
Chlorothalonil	•	•	•	•	1751	1751	2
Fenpropidin	•	9958	•	225	12901	23084	26
Fenpropimorph	731	33671	•	181	39951	74534	61
Fenpropimorph/prochloraz	•	1183	•	•	9526	10709	14
Mancozeb	•	205	•	•	259	463	1
Maneb	1195	1004	2637	382	10274	15492	14
Maneb/zineb	•	•	•	•	454	454	1
Prochloraz	42	287	106	•	3132	3568	5
Propiconazole	2005	4327	•	876	20055	27263	30
Propiconazole/tridemorph	•	•	•	•	1856	1856	3
Sulphur	•	•	•	•	8427	8427	10
Thiophanate-methyl	•	395	366	182	•	942	1
Triadimefon	•	•	•	•	6202	6202	5
Triadimenol	79	582	•	181	2794	3635	5
Triadimenol/tridemorph	47	2071	•	•	4418	6959	9
Tridemorph	•	22670	•	•	14958	37628	36
Unknown fungicides	•	409	265	•	220	893	1
Other fungicides	•	•	42	•	365	407	1
Total fungicides	5846	84921	7875	6652	172406	277700	66992
Area planted (ha)							

Formulations used on less than 0.1% of the total spray area were carbendazim/mancozeb, carbendazim/maneb, carbendazim/maneb/sulphur, chlorothalonil/flutriafol.

TABLE 6: Winter barley: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

HERBICIDES	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
Benazolin/bromoxynil/ioxynil	340	.	.	.	.	.	.	340	+
Bifenox/isoproturon	227	383	.	.	.	.	280	890	1
Bromoxynil/fluroxypyr/ioxynil	560	.	.	.	.	.	.	560	1
Bromoxynil/ioxynil	1646	.	.	.	.	.	285	1931	3
Bromoxynil/ioxynil/isoproturon/mecoprop	417	.	.	.	.	.	.	417	1
Bromoxynil/ioxynil/mecoprop	.	.	.	.	.	.	152	152	+
Chlorotoluron	.	309	677	174	.	.	265	1426	2
Cyanazine/isoproturon	.	.	173	.	.	.	1240	1412	2
Difenzoquat	.	.	.	913	.	.	.	913	1
Diflufenican/isoproturon	14120	494	7443	.	.	.	3398	25455	36
Flamprop-M-isopropyl	.	.	.	2256	.	.	.	2256	3
Fluroxypyr	1365	.	.	.	.	.	.	1365	2
Glyphosate	.	1381	159	.	808	.	20	2367	3
Imazamethabenz-methyl	.	.	.	120	.	.	.	120	+
Isoproturon	851	992	.	.	.	.	797	2639	4
Isoproturon/isoxaben	.	.	2309	.	.	.	.	2309	3
Isoproturon/trifluralin	876	.	340	.	.	.	191	1407	2
Isoxaben	616	.	.	.	.	.	.	616	1
Isoxaben/methabenzthiazuron	220	.	.	.	.	.	907	1127	2
Linuron/trietazine/trifluralin	586	.	.	.	.	.	.	586	1
Linuron/trifluralin	1028	.	1014	.	.	.	389	2431	4
MCPA	6342	.	.	.	.	.	.	6342	9
Mecoprop	9840	.	2124	.	.	.	202	12166	18
Mecoprop-P	2930	.	.	.	.	.	.	2930	4
Methabenzthiazuron	179	1151	.	.	.	.	465	1795	3
Metsulfuron-methyl	12197	.	.	.	.	.	.	12197	18
Metsulfuron-methyl/thifensulfuron-methyl	394	.	.	.	.	.	.	394	1

TABLE 6 (Cont'd): Winter barley: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES (Cont'd)									
Paraquat	.	.	509	.	.	.	.	509	1
Pendimethalin	2033	.	1233	.	.	.	3652	6918	10
Terbutryn	235	.	.	.	.	.	.	235	+
Trifluralin	471	.	942	.	.	.	1282	2695	4
Unknown herbicide	79	.	.	.	.	.	338	417	1
Other herbicides	.	.	.	.	.	.	.	287	.
Total herbicides	57731	4710	16935	3464	904	.	13862	97605	
GROWTH REGULATORS									
2-chloroethylphosphonic acid	.	.	.	.	.	11526	.	11526	17
2-chloroethylphosphonic acid /mepiquat chloride	.	.	.	.	.	18470	.	18470	27
Chlormequat	.	.	.	.	.	48847	.	48847	54
Total growth regulators	.	.	.	.	.	78843	.	78843	
Area planted (ha)									66992

Formulations used on less than 0.1% of the total spray area were benazolin/bromoxynil/ioxynil/mecoprop, bromoxynil/fluoxypyr, clopyralid/fluoxypyr/ioxynil, dicamba/MCPA/mecoprop, dichlorprop/MCPA, diquat.

'+' = less than 0.5%

TABLE 7: Repeated use of pesticides on winter barley (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area (ha)
INSECTICIDES					
Cyfluthrin	68	29	3	•	5755
Cypermethrin	61	37	2	•	17211
Deltamethrin	77	23	•	•	5243
Demeton-S-methyl	76	•	24	•	836
Fenvalerate	68	32	•	•	8695
FUNGICIDES					
Carbendazim	90	6	4	•	11743
Carbendazim/flusilazole	72	18	7	3	14475
Carbendazim/maneb/tridemorph	72	28	•	•	6028
Carbendazim/triadimefon	56	•	44	•	882
Chlorothalonil	97	3	•	•	1652
Fenpropidin	73	27	1	•	17717
Fenpropimorph	46	33	16	5	40735
Fenpropimorph/prochloraz	89	7	4	•	9165
Maneb	51	38	11	•	9480
Propiconazole	65	35	•	•	19855
Sulphur	83	6	11	•	6431
Thiophanate-methyl	98	2	•	•	888
Triadimefon	52	•	48	•	3151
Triadimenol	93	7	•	•	3307
Triadimenol/tridemorph	86	14	•	•	5887
Tridemorph	59	32	9	1	24128
HERBICIDES					
Diflufenican/isoproturon	99	1	•	•	24390
Imazamethabenz-methyl	97	3	•	•	2243
Mecoprop	99	1	•	•	11747
GROWTH REGULATORS					
2-chloroethylphosphonic acid /mepiquat chloride	99	1	•	•	17812
Chlormequat	71	26	3	•	36171

TABLE 8: Spring barley: usage of insecticides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Aphids	Slugs	Leather jackets	Bibionids	No reason given	Total spray area	% crop treated
INSECTICIDES							
SYNTHETIC PYRETHROIDS							
Alphacypermethrin	555	.	.	.	.	555	+
Cyfluthrin	640	.	.	.	.	640	+
Cypermethrin	2183	.	.	.	.	2183	1
Deltamethrin	3093	.	.	.	.	3093	1
Fenvalerate	1853	.	.	.	.	1853	1
SYSTEMIC ORGANOPHOSPHATES							
Demeton-S-methyl	3203	.	.	.	1634	4837	2
Dimethoate	21929	.	.	.	.	21929	7
NON-SYSTEMIC ORGANOPHOSPHATES							
Chlorpyrifos	1498	.	3087	167	.	4751	2
Quinalphos	.	.	165	.	.	165	+
ORGANOCHLORINE							
Gamma-HCH	.	.	236	.	.	236	+
CARBAMATE							
Pirimicarb	325	.	.	.	.	325	+
OTHER							
Unknown insecticide	666	.	.	.	.	666	+
MOLLUSCICIDE							
Methiocarb	.	1044	.	.	.	1044	+
Total insecticides molluscicides	35945	1044	3487	167	1634	42277	
Area planted (ha)							270817

'+' = less than 0.5%

TABLE 9: Spring barley: usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Rust	Mildew	Rhyncho- sporium	Mixed & other diseases	No reason given	Total spray area	% crop treated
Carbendazim	.	.	2311	1285	4886	8482	2
Carbendazim/flusilazole	.	1018	.	.	4705	5723	2
Carbendazim/triadimefon	.	.	.	.	860	860	+
Chlorothalonil	.	1221	.	.	266	1487	1
Chlorothalonil/flutriafol	.	937	.	.	.	937	+
Copper oxychloride	.	.	.	.	391	391	+
Fenpropidin	719	45049	.	.	18532	64300	20
Fenpropimorph	.	84243	1597	26	54812	140679	42
Fenpropimorph/prochloraz	88	1979	.	550	7969	10585	3
Ferbam/maneb/zineb	.	.	.	.	1119	1119	+
Flusilazole	.	475	.	.	3013	3488	1
Mancozeb	.	132	.	1285	2147	3565	1
Maneb	.	.	298	.	1536	1834	1
Prochloraz	.	766	96	182	1584	2628	1
Propiconazole	145	7985	.	1860	10430	21725	8
Propiconazole/tridemorph	2963	1200	.	.	623	4787	2
Sulphur	.	.	.	.	17651	17651	6
Triadimefon	.	.	.	.	960	960	+
Triadimenol	.	272	.	.	1805	2077	1
Triadimenol/tridemorph	294	1810	.	.	13179	15284	5
Tridemorph	.	31609	.	.	20916	52525	15
Other fungicides	.	327	88	.	.	416	+
Total fungicides	5514	179025	4390	5189	167384	361502	270817
Area planted (ha)							

Formulations used on less than 0.1% of the total spray area were carbendazim/prochloraz and thiophanate-methyl.

'+' = less than 0.5%

TABLE 10: Spring barley: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

HERBICIDES	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
2,4-DB/benazolin/MCPA	8821	.	.	.	.	.	913	9734	3
2,4-DB/bentazone/cyanazine	1898	.	.	.	.	.	.	1898	1
2,4-DB/linuron/MCPA	7325	.	.	.	.	.	.	7325	3
2,4-DB/MCPA	2871	.	.	.	.	.	.	2871	1
Benazolin/bromoxynil/ioxynil	5715	.	.	.	.	.	423	6138	2
Benazolin/bromoxynil/ioxynil/mecoprop	1334	.	.	.	.	.	978	2312	1
Bentazone/MCPA/MCPB	6338	.	.	.	.	.	354	6692	2
Bromoxynil/dichlorprop/ioxynil/MCPA	1918	.	.	.	.	.	.	1918	1
Bromoxynil/fluroxypyr	2060	.	.	.	.	.	.	2060	1
Bromoxynil/fluroxypyr/ioxynil	23834	.	.	.	.	.	369	24203	9
Bromoxynil/ioxynil	5359	.	.	.	.	.	2161	7520	3
Bromoxynil/ioxynil/isoproturon/mecoprop	1358	.	.	.	.	.	.	1358	+
Clopyralid/dichlorprop/MCPA	552	.	.	.	.	.	212	764	+
Clopyralid/ioxynil	1841	.	.	.	.	.	.	1841	1
Dicamba/dichlorprop/ioxynil	951	.	.	.	.	.	.	951	+
Dicamba/MCPA/mecoprop	6661	.	4	.	.	.	2209	8875	3
Dicamba/mecoprop	335	.	.	.	.	.	2558	2893	1
Dichlorprop	5595	.	83	.	.	.	.	5677	2
Dichlorprop/MCPA	11252	.	526	.	.	.	.	11779	4
Difenzoquat	.	.	.	1720	.	.	.	1720	1
Flamprop-M-isopropyl	.	.	.	12051	.	.	.	12051	4
Fluroxypyr	1490	.	.	.	.	.	305	1795	1
Glyphosate	146	8165	515	.	6641	.	235	15702	6

TABLE 10 (Cont'd): Spring barley: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES (Cont'd)									
Ioxynil/isoproturon/mecoprop	493	.	.	.	.	.	.	493	+
MCPA	50276	.	2753	.	.	.	853	53882	19
MCPA/MCPB	2231	.	.	.	.	.	.	2231	1
MCPB	298	.	451	.	.	.	.	750	+
Mecoprop	59763	.	12517	.	.	.	2551	74831	27
Mecoprop-P	16210	.	132	.	.	.	605	16947	6
Metsulfuron-methyl	109182	.	.	.	.	.	2405	111586	40
Metsulfuron-methyl /thifensulfuron-methyl	21785	.	.	.	.	.	1056	22841	8
Other herbicides	861	151	129	.	87	.	.	1228	.
Total herbicides	358752	8316	17111	13771	6728	.	18189	422868	.
GROWTH REGULATORS									
2-chloroethylphosphonic acid	.	.	.	.	.	11138	.	11138	4
2-chloroethylphosphonic acid /mepiquat chloride	.	.	.	.	.	12703	.	12703	5
Chlormequat	.	.	.	.	.	49748	.	49748	17
Total growth regulators	.	.	.	.	.	73589	.	73589	.
Area planted (ha)									270817

Formulations used on less than 0.1% of the total spray area were asulam, bromoxynil/clopyralid/fluroxypyr/ioxynil, bromoxynil/dichlorprop, clopyralid/cyanazine, clopyralid/fluroxypyr/ioxynil, cyanazine/isoproturon, diquat, isoproturon.

'+' = less than 0.5%

TABLE 11: Repeated use of pesticides on Spring barley (percentage of the basic area treated more than once)

INSECTICIDE	Once	Twice	Three times	Four or more times	Basic area (ha)
Dimethoate	80	20	.	.	18014
FUNGICIDES					
Carbendazim	70	30	.	.	6354
Carbendazim/flusilazole	96	4	.	.	5430
Fenpropidin	84	14	2	.	53491
Fenpropimorph	83	15	2	.	114908
Fenpropimorph/prochloraz	71	29	.	.	8008
Maneb	94	6	.	.	1696
Propiconazole	96	4	.	.	20418
Propiconazole/tridemorph	94	6	.	.	4428
Sulphur	99	1	.	.	17257
Triadimenol/tridemorph	80	20	.	.	12455
Tridemorph	82	14	4	.	41911
HERBICIDES					
2,4-DB/MCPA	97	3	.	.	2695
Bromoxynil/ioxynil	99	1	.	.	7274
Dichlorprop	86	14	.	.	4898
Mecoprop	99	1	.	.	72847
Mecoprop-P	99	1	.	.	16495
Metsulfuron-methyl	99	1	.	.	108214
GROWTH REGULATOR					
Chlormequat	94	6	.	.	45955

TABLE 12: Winter wheat: usage of insecticides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Aphids	Slugs	Leather jackets	Frit fly	No reason given	Total spray area	% crop treated
INSECTICIDES							
SYNTHETIC PYRETHROIDS							
Alphacypermethrin	334	.	.	.	.	334	+
Cyfluthrin	3275	.	.	.	.	3275	3
Cypermethrin	18491	.	.	.	.	18491	15
Deltamethrin	5541	.	.	.	368	5909	5
Fenvalerate	6102	.	.	.	.	6102	5
SYSTEMIC ORGANOPHOSPHATES							
Demeton-S-methyl	3910	.	.	.	.	3910	4
Dimethoate	9327	.	.	.	1098	10425	9
NON-SYSTEMIC ORGANOPHOSPHATES							
Chlorpyrifos	.	.	1762	143	.	1905	2
Quinalphos	.	.	227	.	.	227	+
CARBAMATE							
Pirimicarb	3010	.	.	.	.	3010	3
OTHER							
Unknown insecticide	.	.	244	.	.	244	+
MOLLUSCICIDES							
Metaldehyde	.	3143	.	.	.	3143	2
Methiocarb	.	7479	.	.	.	7479	6
Total insecticides molluscicides	49990	10622	2233	143	1466	64455	109514
Area planted (ha)							

'+' = less than 0.5%

TABLE 13: Winter wheat: usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Rust	Mildew	Ear diseases	Septoria	Mixed & other diseases	No reason given	Total spray area	% crop treated
Carbendazim	415	2532	664	.	2033	13048	18691	14
Carbendazim/Flusilazole	7604	2552	.	.	717	41489	52362	32
Carbendazim/Flutriafol	2896	4448	.	791	698	15728	24560	21
Carbendazim/mancozeb	323	.	.	.	.	6815	7138	6
Carbendazim/maneb	1083	.	2411	791	.	2138	6423	6
Carbendazim/maneb/sulphur	.	.	601	.	1237	1876	3713	3
Carbendazim/maneb/tridemorph	.	.	198	.	.	1201	1399	1
Carbendazim/prochloraz	.	2033	.	.	.	2123	4156	4
Carbendazim/propiconazole	599	.	.	.	.	240	839	1
Carbendazim/triadimefon	.	688	.	.	.	21425	22113	6
Chlorothalonil	404	2077	.	886	2426	26060	31853	22
Chlorothalonil/fenpropimorph	.	.	.	.	546	273	819	1
Chlorothalonil/flutriafol	5782	1153	.	301	2079	17823	27137	22
Fenpropidin	1304	12033	.	.	636	16424	30396	21
Fenpropimorph	3158	21812	.	.	898	46215	72083	41
Fenpropimorph/prochloraz	1658	2180	546	.	.	15337	19721	17
Flusilazole	.	.	.	.	.	1847	1847	2
Mancozeb	766	2291	48	74	230	5409	8818	7
Maneb+zinc	9143	2472	664	.	1860	31755	45894	20
Prochloraz	.	.	.	.	.	701	701	1
Propiconazole	31	1289	.	.	310	10122	11752	10
Propiconazole/tridemorph	2909	5819	.	.	192	16214	25135	18
Sulphur	246	.	.	.	.	3291	3538	3
Thiophanate-methyl	.	496	.	.	.	28467	28963	18
Triadimefon	604	2579	.	.	995	6699	995	1
							9882	6

TABLE 13 (Cont'd): Winter wheat: usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Rust	Mildew	Ear diseases	Septoria	Mixed & other diseases	No reason given	Total spray area	% crop treated
Triadimenol	813	1735	.	.	1148	9679	13376	10
Triadimenol/tridemorph	5675	5136	.	.	1380	6890	19080	13
Tridemorph	.	16823	.	.	.	12462	29286	18
Unknown fungicides	.	496	.	.	.	197	693	1
Other fungicides	.	.	.	.	.	686	686	1
Total fungicides area planted (ha)	45414	90644	5131	2842	17384	362635	524049	109514

Formulations used on less than 0.1% of the total spray area were ferbam/maneb/zineb, nuarimol, zineb poly.

TABLE 14: Winter wheat: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES									
Benazolin/bromoxynil/ioxynil	516	.	.	.	.	.	.	516	+
Benazolin/bromoxynil/ioxynil/mecoprop	1760	.	.	.	.	.	430	2191	2
Bifenox/isoproturon	485	42	.	.	.	.	593	1121	1
Bromoxynil/fluroxypyr	748	.	.	.	.	.	.	748	1
Bromoxynil/fluroxypyr/ioxynil	2562	.	.	.	.	.	109	2671	2
Bromoxynil/ioxynil	4736	.	.	.	.	.	3840	8576	8
Bromoxynil/ioxynil/isoproturon/mecoprop	776	.	.	.	.	.	.	776	1
Bromoxynil/ioxynil/mecoprop	1530	.	.	.	.	.	349	1879	2
Chlorotoluron	.	327	.	99	.	.	1104	1531	1
Clopyralid/mecoprop	194	.	.	.	.	.	.	194	+
Cyanazine/fluroxypyr	528	.	.	.	.	.	.	528	+
Cyanazine/isoproturon	.	.	143	.	.	.	278	421	+
Dicamba/MCPA/mecoprop	531	.	.	.	.	.	.	531	+
Dichlorprop/MCPA	1092	.	.	.	.	.	.	1092	1
Difenzoquat	.	.	.	1161	.	.	.	1161	1
Diflufenican/isoproturon	7563	65	4754	.	.	.	7599	19981	18
Fenoxaprop-ethyl	.	.	.	660	.	.	.	660	1
Flamprop-M-isopropyl	.	.	.	2129	.	.	.	2129	2
Fluroxypyr	3434	.	.	.	.	.	.	3434	3
Glyphosate	142	2765	19	.	638	.	.	3563	3
Imazamethabenz-methyl	.	.	.	988	.	.	.	988	1
Ioxynil/isoproturon/mecoprop	399	.	554	.	.	.	.	953	1
Isoproturon	2353	1310	917	.	.	.	1472	6052	5
Isoproturon/trifluralin	2236	.	226	.	.	.	.	2462	2
Isoxaben	1192	.	.	.	.	.	524	1715	2
Isoxaben/methabenzthiazuron	659	.	143	.	.	.	.	801	1

TABLE 14 (Cont'd): Winter wheat: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES (Cont'd)									
Linuron/trifluralin	690	.	237	.	.	.	593	1519	1
MCPA	5716	.	311	.	.	.	403	6430	6
Mecoprop	26929	.	3450	.	.	.	1222	31601	28
Mecoprop-P	5478	.	.	.	.	.	717	6195	5
Methabenzthiazuron	.	1021	.	.	.	.	.	1021	1
Metsulfuron-methyl	39469	.	.	.	.	.	795	40263	35
Metsulfuron-methyl									
/thifensulfuron-methyl	7434	.	.	.	.	.	122	7555	7
Paraquat	163	.	734	.	.	.	.	897	1
Pendimethalin	2093	.	1315	.	.	.	5844	9251	8
Trifluralin	159	219	803	.	.	.	3199	4380	4
Unknown herbicide	197	81	.	.	.	.	.	278	+
Other herbicides	260	.	258	86	.	.	65	772	
Total herbicides	122126	5831	13862	5123	638	.	29257	176836	
GROWTH REGULATORS									
2-chloroethylphosphonic acid	.	.	.	.	.	16641	.	16641	12
2-chloroethylphosphonic acid /chlormequat	.	.	.	.	.	3236	.	3236	3
2-chloroethylphosphonic acid /mepiquat chloride	.	.	.	.	.	23949	.	23949	21
Chlormequat	.	.	.	.	.	115258	.	115258	79
Total growth regulators	.	.	.	.	.	159084	.	159084	109514
Area planted (ha)									

Formulations used on less than 0.1% of the total spray area were clopyralid/cyanazine, clopyralid/fluroxypyr/ioxynil, dichlorprop, diquat/paraquat, isoproturon/isoxaben, isoproturon/metsulfuron-methyl, linuron/trietazine/trifluralin, MCPB.

'+' = less than 0.5%

TABLE 15: Repeated use of pesticides on Winter wheat (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area (ha)
INSECTICIDES					
Cypermethrin	90	10	.	.	16456
Fenvalerate	99	1	.	.	5985
MOLLUSCICIDES					
Metalddehyde	80	20	.	.	2594
Methiocarb	95	5	.	.	6959
FUNGICIDES					
Carbendazim	82	18	.	.	15490
Carbendazim/flusilazole	70	17	12	2	35217
Carbendazim/flutriafol	94	6	.	.	22818
Carbendazim/triadimefon	23	3	17	57	6862
Chlorothalonil	76	19	5	.	24206
Chlorothalonil/flutriafol	91	9	.	.	24289
Fenpropidin	72	26	1	1	22815
Fenpropimorph	59	29	9	3	45140
Fenpropimorph/prochloraz	95	5	.	.	18488
Mancozeb	92	8	.	.	8008
Maneb	48	11	26	14	21387
Prochloraz	90	10	.	.	10530
Propiconazole	84	7	6	3	19337
Sulphur	75	16	5	4	20021
Thiophanate-methyl	29	71	.	.	571
Triadimefon	59	28	14	.	6254
Triadimenol	78	18	3	.	10531
Triadimenol/tridemorph	76	18	6	.	14344
Tridemorph	72	18	5	5	19649

TABLE 15 (Cont'd): Repeated use of pesticides on Winter wheat (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area
HERBICIDES (Cont'd)					
Fluroxypyr	98	2	.	.	3248
Glyphosate	98	2	.	.	3351
Mecoprop	98	2	.	.	30267
Metsulfuron-methyl	97	3	.	.	38109
GROWTH REGULATORS					
2-chloroethylphosphonic acid	93	1	.	6	12975
Chlormequat	71	28	1	.	86987

TABLE 16: Spring wheat: usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mildew	Ear diseases	No reason given	Total spray area (ha)	% crop treated
Carbendazim/flusilazole	.	.	29	29	2
Carbendazim/flutriafol	.	.	336	336	22
Chlorothalonil	.	.	157	157	11
Fenpropidin	.	.	336	336	22
Fenpropimorph	.	.	1192	1192	72
Maneb	.	25	.	25	2
Propiconazole	.	.	29	29	2
Triadimenol	.	.	363	363	24
Tridemorph	54	.	.	54	4
Total fungicides	54	25	2441	2521	1396
Area planted (ha)					

TABLE 17: Spring wheat: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES					
Bromoxynil/fluroxypyr/ioxynil	25	.	.	25	2
Bromoxynil/ioxynil	.	.	336	336	22
MCPA	336	.	.	336	22
Mecoprop	878	.	.	878	61
Mecoprop-P	157	.	.	157	11
Metsulfuron-methyl	878	.	.	878	61
Metsulfuron-methyl /thifensulfuron-methyl	157	.	.	157	11
Total herbicides	2432	.	336	2768	
GROWTH REGULATORS					
2-chloroethylphosphonic acid	.	334	.	334	22
Chlormequat	.	211	.	211	15
Total growth regulators Area planted (ha)	.	545	.	545	1396

TABLE 18: Repeated use of pesticides on Spring wheat (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area
FUNGICIDE					
Fenpropimorph	85	15	.	.	1012

TABLE 19: Winter oats: usage of insecticides and fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Aphids	Mildew	No reason given	Total spray area	% crop treated
INSECTICIDES					
SYNTHETIC PYRETHROIDS					
Cyfluthrin	423	.	.	423	30
Cypermethrin	319	.	.	319	23
Deltamethrin	419	.	.	419	29
Fenvalerate	97	.	.	97	7
Total insecticides	1259	.	.	1259	
FUNGICIDES					
Chlorothalonil	.	.	241	241	17
Fenpropimorph	.	152	339	490	35
Sulphur	.	.	7	7	+
Triadimenol/tridemorph	.	226	601	827	57
Tridemorph	.	558	78	636	27
Total fungicides	.	936	1265	2201	
Area planted (ha)					1399

+ = less than 0.5%

TABLE 20: Winter oats: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mixed weeds	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES						
Bromoxynil/ioxynil	419	.	.	.	419	29
Isoxaben	498	.	.	.	498	35
Mecoprop	493	.	.	.	493	35
Mecoprop-P	339	.	.	.	339	24
Metsulfuron-methyl	894	.	.	.	894	62
Paraquat	.	76	.	.	76	5
Terbutryn	76	.	.	.	76	5
Trifluralin	.	.	.	241	241	17
Total herbicides	2719	76	.	241	3035	
GROWTH REGULATOR						
Chlormequat	.	.	1221	.	1221	69
Area planted (ha)						1399

TABLE 21: Repeated use of pesticides on Winter oats (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area (ha)
FUNGICIDES					
Tridemorph	37	63	.	.	385
GROWTH REGULATOR					
Chlormequat	75	25	.	.	964

TABLE 22: Spring oats: usage of insecticides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Aphids	Leather jackets	Total spray area	% crop treated
INSECTICIDES				
SYNTHETIC PYRETHROIDS				
Alphacypermethrin	47	.	47	+
Cypermethrin	2321	.	2321	5
Deltamethrin	401	.	401	1
SYSTEMIC ORGANOPHOSPHATES				
Demeton-S-methyl	261	.	261	1
Dimethoate	1804	.	1804	4
NON-SYSTEMIC ORGANOPHOSPHATE				
Chlorpyrifos	.	585	585	2
CARBAMATE				
Pirimicarb	276	.	276	1
Total insecticides	5110	585	5695	
Area planted (ha)				27583

'+' = less than 0.5%

TABLE 23: Spring oats: usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Rust	Mildew	Mixed & other diseases	No reason given	Total spray area	% crop treated
Chlorothalonil/flutriafol	.	.	.	338	338	1
Copper oxychloride	.	.	.	181	181	1
Fenpropidin	.	1788	.	745	2533	9
Fenpropimorph	.	4435	.	1053	5488	19
Fenpropimorph/prochloraz	.	.	192	.	192	1
Maneb	.	.	.	181	181	1
Propiconazole	.	672	.	286	958	3
Sulphur	.	.	.	7265	7265	15
Triadimenol	.	.	.	67	67	+
Triadimenol/tridemorph	34	185	.	1882	2101	8
Tridemorph	.	1657	.	682	2339	8
Total fungicides	34	8737	192	12679	21642	27583
Area planted (ha)						

'+' = less than 0.5%

TABLE 24: Spring oats: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES							
2,4-DB/benzazolin/MCPA	206	.	.	.	.	206	1
2,4-DB/MCPA	588	.	.	.	.	588	2
Benazolin/bromoxynil		.	.	.	49	334	1
/ioxynil/mecoprop	284	.	.	.	.	459	2
Bromoxynil/fluroxypyr/ioxynil	459	.	.	.	132	931	3
Bromoxynil/ioxynil	799	.	.	.	.	117	+
Clopyralid/cyanazine	117	.	.	.	.	278	1
Clopyralid/fluroxypyr/ioxynil	278	.	.	.	.	75	+
Dicamba/dichlorprop/ioxynil	75	.	.	.	.	558	2
Dicamba/MCPA/mecoprop	421	.	.	.	137	333	1
Dicamba/mecoprop	108	.	.	.	103	103	+
Dichlorprop	.	.	.	.	.	664	2
Dichlorprop/MCPA	664	.	.	.	.	104	+
Fluroxypyr	104	.	.	.	.	405	1
Glyphosate	.	129	.	.	276	9945	33
MCPA	9636	.	308	.	.	130	+
MCPB	130	.	.	.	.	5563	19
Mecoprop	5157	.	406	.	.	528	2
Mecoprop-P	528	.	.	.	.	9200	32
Metsulfuron-methyl	9200	.	.	.	.
Metsulfuron-methyl		.	.	.	.
/thifensulfuron-methyl	255	.	.	.	.	255	1
Total herbicides	29008	129	714	.	922	30773	
GROWTH REGULATOR							
Chlormequat	.	.	.	10194	.	10194	34
Area planted (ha)	.	.	.		.		27583

'+' = less than 0.5%

TABLE 25: Repeated use of pesticides on Spring oats (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area (ha)
INSECTICIDES					
Cypermethrin	21	79	.	.	1279
Dimethoate	56	44	.	.	1183
FUNGICIDES					
Fenpropimorph	97	3	.	.	5111
Sulphur	27	73	.	.	4164
Tridemorph	94	6	.	.	2128
GROWTH REGULATOR					
Chlormequat	94	6	.	.	9278

TABLE 26: Peas: usage of insecticides and fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Botrytis	No reason given	Total spray area	% crop treated
INSECTICIDES				
SYNTHETIC PYRETHROID				
Fenvalerate	.	279	279	6
SYSTEMIC ORGANOPHOSPHATE				
Dimethoate	.	107	107	2
Total insecticides	.	385	385	
FUNGICIDES				
Benomyl	.	781	781	13
Carbendazim	.	1166	1166	18
Carbendazim/mancozeb	.	567	567	13
Chlorothalonil	166	2475	2641	50
Iprodione	251	327	577	12
Sulphur	.	2118	2118	33
Vinclozolin	166	1498	1664	37
Unknown fungicide	.	223	223	3
Total fungicides	583	9154	9737	4392
Area planted (ha)				

TABLE 27: Peas: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES									
Alloxydim-sodium	.	42	.	.	.	.	.	42	1
Bentazone/MCPB	.	.	.	.	.	.	382	382	9
Cyanazine	481	.	705	.	.	.	952	2138	48
Diclofop-methyl	.	.	.	21	.	.	.	21	+
Diquat	.	.	.	.	2807	.	.	2807	63
Fluazifop-P-butyl	.	.	.	115	.	.	.	115	2
Glyphosate	.	42	.	.	812	.	.	854	19
Pendimethalin	.	.	.	.	.	.	840	840	19
Sethoxydim	.	.	.	.	.	.	107	107	2
Sulphuric acid	.	.	.	.	53	.	.	53	1
Terbuthylazine/terbutryn	736	.	.	.	.	.	765	1501	34
Terbutryn/trietazine	.	.	.	.	.	.	366	366	8
Unknown herbicide	.	.	705	.	.	.	.	705	16
Total herbicides	1217	84	1410	136	3671	.	3412	9930	
GROWTH REGULATOR									
Chlormequat	.	.	.	.	.	107	.	107	2
Area planted (ha)									4392

'+' = less than 0.5%

TABLE 28: Repeated use of pesticides on Peas (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area (ha)
FUNGICIDES					
Benomyl	66	34	.	.	574
Carbendazim	54	46	.	.	782
Chlorothalonil	81	19	.	.	2178
Iprodione	90	10	.	.	507
Sulphur	73	7	19	.	1426
Unknown fungicide	.	100	.	.	111

TABLE 29: Winter oilseed rape: usage of insecticides and molluscicides and the reasons for their use (spray hectares of formulations) and the percentage of the crop treated

	Flea beetle	Aphids	Slugs	Pollen beetle	Seed weevil	Seed weevil	No reason given	Total spray area	% crop treated
INSECTICIDES									
SYNTHETIC PYRETHROIDS									
Alphacypermethrin	244	282	.	909	1089	842	1388	4754	12
Cyfluthrin	.	.	.	218	.	.	132	351	1
Cypermethrin	.	3528	.	860	.	.	1023	5411	11
Deltamethrin	.	1846	.	.	443	.	680	2969	8
Fenvalerate	.	281	.	.	198	124	224	827	2
NON-SYSTEMIC ORGANOPHOSPHATE									
Triazophos	.	.	.	.	228	.	258	485	1
ORGANO-CHLORINE									
Gamma-HCH	.	.	.	.	.	.	284	284	1
OTHER									
Unknown insecticide	.	237	.	.	.	.	.	237	1
MOLLUSCICIDES									
Metaldehyde	.	.	256	.	.	.	.	256	1
Methiocarb	.	.	2683	.	.	.	.	2683	7
Total insecticides and molluscicides	244	6173	2939	1988	1958	966	3990	18257	37763
Area planted (ha)									

TABLE 30: Winter oilseed rape: usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Botrytis	Mildew	Lt leaf spot	Alternaria	Sclerotinia	Mixed & other diseases	No reason given	Total spray area	% crop treated
Benomyl	.	.	902	.	.	.	977	1879	4
Carbendazim	.	.	19403	.	.	.	26538	45941	71
Carbendazim/chlorothalonil	.	.	.	.	.	.	366	366	1
Carbendazim/flusilazole	.	.	.	.	.	.	1495	1495	2
Carbendazim/mancozeb	.	.	625	.	.	.	310	935	2
Carbendazim/maneb	.	.	496	.	.	.	311	807	2
Carbendazim/maneb/sulphur	.	.	198	.	.	.	.	198	1
Carbendazim/prochloraz	221	128	1234	.	.	371	2365	4318	9
Chlorothalonil	.	366	718	.	.	.	1314	2398	6
Cymoxanil/mancozeb	.	162	.	.	.	.	257	420	1
Ferbam/maneb/zineb	.	.	.	235	.	.	257	492	1
Iprodione	546	.	.	656	.	.	303	1504	4
Iprodione/thiophanate-methyl	606	.	405	78	.	.	6886	7975	20
Mancozeb	.	263	.	.	.	.	2298	2560	7
Maneb	.	3096	.	.	.	.	7823	10919	19
Manganese zinc	.	.	.	.	.	.	.	.	.
/ethylenebisdithiocarbamate/ofurace	.	.	.	.	.	.	258	258	1
Prochloraz	3827	.	6310	.	.	195	16732	27064	49
Sulphur	.	2296	.	.	.	.	32154	34450	69
Thiophanate-methyl	.	.	1844	.	.	.	540	2384	5
Vinclozolin	198	.	1143	558	1004	1049	11935	15887	41
Unknown fungicide	.	.	524	.	.	.	371	895	2
Other fungicide	.	.	.	.	.	.	78	78	+
Total fungicides	5397	6311	33803	1526	1004	1615	113565	163222	37763
Area planted (ha)									

Formulation used on less than 0.1% of total spray area was fenpropimorph.

'+' = less than 0.5%

TABLE 31: Winter oilseed rape: usage of herbicides and growth regulators, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	Growth regulation	No reason given	Total spray area	% crop treated
HERBICIDES									
Benazolin/clopyralid	11508	.	.	.	.	.	2607	14115	36
Carbetamide	176	909	155	371	.	.	.	1612	4
Clopyralid	2163	.	14	.	.	.	270	2446	6
Clopyralid/propyzamide	235	.	.	.	.	.	270	505	1
Cyanazine	.	.	.	.	.	.	304	304	1
Diquat	.	.	.	.	3580	.	.	3580	9
Fluazifop-P-butyl	.	4296	.	.	.	.	248	4544	12
Glyphosate	.	.	.	.	3573	.	.	3573	9
Metazachlor	8306	.	2864	.	.	.	6996	18167	47
Propyzamide	5078	1855	4949	.	.	.	2108	13990	35
Quizalofop-ethyl	.	3320	.	420	.	.	2385	6125	16
Sethoxydim	.	92	.	.	.	.	.	92	+
TCA	.	164	.	.	.	.	.	164	+
Trifluralin	.	.	.	.	.	.	440	440	1
Unknown herbicide	.	319	.	.	.	.	.	319	1
Total herbicides	27466	10955	7982	791	7152	.	15628	69973	
GROWTH REGULATOR									
Chlormequat	.	.	.	.	.	6702	.	6702	16
OTHER									
Di-1-p-menthene	.	.	.	.	72	.	.	72	+
Area planted (ha)									37763

'+' = less than 0.5%

TABLE 32: Repeated use of pesticides on winter oilseed rape (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area (ha)
INSECTICIDE					
Cypermethrin	76	24	.	.	4249
FUNGICIDES					
Benomyl	84	16	.	.	1570
Carbendazim	41	50	8	.	26899
Carbendazim/flusilazole	17	83	.	.	807
Carbendazim/prochloraz	79	21	.	.	3516
Chlorothalonil	93	7	.	.	2200
Iprodione/thiophanate-methyl	95	5	.	.	7438
Maneb	58	33	9	.	6989
Prochloraz	64	32	1	3	18607
Sulphur	75	20	5	.	25819
Thiophanate-methyl	72	28	.	.	1831
Unknown fungicide	59	41	.	.	626
HERBICIDES					
Metazachlor	99	1	.	.	17587
Propyzamide	97	3	.	.	13269
GROWTH REGULATOR					
Chlormequat	94	6	.	.	6210

TABLE 33: Spring oilseed rape: usage of insecticides and molluscicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated

	Flea beetle	Aphids	Pollen beetle	Seed weevil pollen beetle	No reason given	Total spray area	% crop treated
INSECTICIDES							
SYNTHETIC PYRETHROIDS							
Alphacypermethrin	.	.	604	.	.	604	8
Cypermethrin	.	1748	1032	.	.	2779	19
Deltamethrin	.	.	361	.	1138	1499	19
Fenvalerate	.	.	576	.	114	690	9
NON-SYSTEMIC ORGANOPHOSPHATE							
Triazophos	.	.	.	.	978	978	13
ORGANO-CHLORINE							
Gamma-HCH	175	.	109	62	.	345	5
Total insecticides	175	1748	2682	62	2230	6896	
Area planted (ha)							7414

TABLE 34: Spring oilseed rape: usage of fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Light Leaf spot	No reason given	Total spray area	% crop treated
Carbendazim	823	751	1573	20
Mancozeb	978	.	978	13
Sulphur	.	3590	3590	43
Vinclozolin	361	.	361	4
Unknown fungicide	141	.	141	2
Total fungicides Area planted (ha)	2303	4340	6643	7414

TABLE 35: Spring oilseed rape: usage of herbicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mixed weeds	Desiccation	No reason given	Total spray area	% crop treated
Benazolin/clopyralid	1408	.	.	11	1419	18
Clopyralid	891	.	.	.	891	12
Diquat	.	.	2440	.	2440	32
Glyphosate	.	.	105	.	105	1
Metazachlor	2313	.	.	.	2313	30
Trifluralin	171	431	.	.	601	8
Total herbicides Area planted (ha)	4783	431	2545	11	7770	7414

TABLE 36: Repeated use of pesticides on Spring oilseed rape (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four or more times	Basic area (ha)
INSECTICIDE					
Cypermethrin	8	92	.	.	1421
FUNGICIDE					
Sulphur	92	8	.	.	3246

TABLE 37: SEED Potatoes: usage of insecticides, molluscicides, nematocides and fungicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

	Aphids	Slugs	Blight	Total spray area	% crop treated
INSECTICIDES					
SYNTHETIC PYRETHROID					
Deltamethrin	370	.	.	370	2
SYSTEMIC ORGANOPHOSPHATES					
Demeton-S-methyl	16437	.	.	16434	37
Dimethoate	10297	.	.	10297	19
CARBAMATE					
Pirimicarb	15800	.	.	15800	37
MOLLUSCICIDE					
Methiocarb	.	762	.	762	4
Total insecticides and molluscicides	42901	762	.	43663	
FUNGICIDES					
Benalaxyl/mancozeb	.	.	2285	2285	9
Chlorothalonil	.	.	2356	2356	9
Cymoxanil/mancozeb	.	.	12586	12586	39
Cymoxanil/mancozeb/oxadixyl	.	.	2423	2423	7
Fentin acetate/maneb	.	.	8466	8466	45
Fentin hydroxide	.	.	5899	5899	32
Fentin hydroxide/maneb+zinc	.	.	346	346	2
Mancozeb	.	.	7371	7371	25
Mancozeb/metalaxyl	.	.	9229	9229	37
Mancozeb/oxadixyl	.	.	3584	3584	11
Maneb	.	.	4771	4771	15
Manganese zinc /ethylenebisdithiocarbamate/ofurace	.	.	5776	5776	14
Unknown fungicide	.	.	402	402	1
Total fungicides			65493	65493	
Area planted (ha)					15834

TABLE 38: SEED potatoes: usage of herbicides and desiccants, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Desiccation	No reason given	Total spray area	% crop treated
Diquat	.	.	.	366	.	366	2
Diquat/paraquat	766	.	510	.	.	1277	8
EPTC	.	106	.	.	.	106	1
Linuron	11672	.	471	.	2041	14183	87
Metribuzin	366	.	695	.	.	1061	7
Paraquat	9354	.	2350	.	1658	13561	83
Sethoxydim	.	58	.	.	.	58	+
Sodium chlorate	.	.	.	1165	.	1165	4
Sulphuric acid	.	.	.	23218	.	23218	90
Terbuthylazine/terbutryn	.	.	.	.	307	307	2
Total herbicides	22158	164	4026	26444	4204	55301	
Area planted (ha)							15834

'+' = less than 0.5%

TABLE 39: Repeated use of pesticides on SEED potatoes (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four times	Five or more times	Basic area (ha)
INSECTICIDES						
Demeton-S-methyl	18	21	49	2	11	5875
Dimethoate	4	12	41	38	5	3045
Pirimicarb	23	42	8	6	22	5846
MOLLUSCICIDES						
Methiocarb	65	35	.	.	.	560
FUNGICIDES						
Benalaxyl/mancozeb	59	26	14	.	.	1398
Chlorothalonil	68	4	28	.	.	1419
Cymoxanil/mancozeb	37	46	8	2	7	6198
Cymoxanil/mancozeb/oxadixyl	44	.	56	.	.	1105
Fentin acetate/maneb	89	7	3	.	.	7125
Fentin hydroxide	86	14	.	.	.	5009
Mancozeb	27	65	5	3	.	3916
Mancozeb/metalaxyl	64	19	17	.	.	5882
Mancozeb/oxadixyl	23	50	27	.	.	1724
Maneb	44	39	3	7	6	2436
Manganese zinc						
/ethylenebisdithiocarbamate/ofurace	22	37	28	.	12	2268
Unknown fungicide	.	100	.	.	.	199
HERBICIDES/DESICCANTS						
Sodium chlorate	31	69	.	.	.	657
Sulphuric acid	41	59	.	.	.	14231

TABLE 40: WARE potatoes: usage of insecticides, molluscicides, nematocides and fungicides, the reasons for their use (spray hectares of formulations) and the percentage of crop treated

	Aphids	Slugs	Nematodes	Blight	Total spray area	% crop treated
INSECTICIDES						
SYNTHETIC PYRETHROIDS						
Cypermethrin	45	.	.	.	45	+
Deltamethrin	151	.	.	.	151	1
SYSTEMIC ORGANOPHOSPHATES						
Demeton-S-methyl	2803	.	.	.	2803	16
Dimethoate	5943	.	.	.	5943	25
CARBAMATES						
Aldicarb	.	.	209	.	209	2
Pirimicarb	1599	.	.	.	1599	9
MOLLUSCICIDES						
Metaldehyde	.	35	.	.	35	+
Methiocarb	.	2276	.	.	2276	10
Total insecticides and molluscicides	10541	2311	209	.	13062	
FUNGICIDES						
Benalaxyl/mancozeb	.	.	.	273	273	1
Cymoxanil/mancozeb	.	.	.	6186	6186	33
Fentin acetate/maneb	.	.	.	3842	3842	29
Fentin hydroxide	.	.	.	5667	5667	36
Fentin hydroxide/maneb+zinc	.	.	.	264	264	1
Mancozeb	.	.	.	10479	10479	37
Mancozeb/metalaxyl	.	.	.	8905	8905	39
Mancozeb/oxadixyl	.	.	.	2681	2681	9
Maneb	.	.	.	1551	1551	5
Manganese zinc /ethylenebisdithiocarbamate/ofurace	.	.	.	4998	4998	30
Other fungicide	.	.	.	30	30	
Total fungicides	.	.	.	44875	44875	
Area planted (ha)						11394

Formulation used on less than 0.1% of the total spray area was cymoxanil/mancozeb/oxadixyl
'+' = less than 0.5%

TABLE 41: WARE potatoes: usage of herbicides and desiccants, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	No reason given	Total spray area	% crop treated
Alloxydim-sodium	.	.	.	44	.	.	44	+
Diquat	.	.	.	.	1279	.	1279	12
Diquat/paraquat	.	.	1022	.	.	.	1022	10
Fentin hydroxide/metoxuron	.	.	.	.	928	.	928	9
Glyphosate	.	102	.	.	.	.	102	1
Linuron	2465	.	345	.	.	91	2902	27
Metribuzin	463	.	1170	.	.	.	1633	16
Monolinuron/paraquat	868	223	198	.	.	238	1528	14
Paraquat	4057	29	1360	.	.	1476	6922	65
Sethoxydim	.	29	.	.	.	.	29	+
Sulphuric acid	.	.	.	.	5718	.	5718	45
Terbutylazine/terbutryn	240	.	.	.	.	673	914	9
Terbutryn/trietazine	30	.	.	.	.	291	321	3
Unknown herbicide	73	.	.	.	.	.	73	1
Other herbicide	.	.	.	.	20	.	20	+
Total herbicides	8196	382	4096	44	7945	2770	23432	
Area planted (ha)								11394

Formulation used on less than 0.1% of the total spray area was sodium chlorate.

+ = less than 0.5%

TABLE 42: Repeated use of pesticides on WARE potatoes (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four times	Five or more times	Basic area (ha)
INSECTICIDES						
Deltamethrin	46	54	.	.	.	98
Demeton-S-methyl	73	2	16	.	8	1562
Dimethoate	25	42	16	9	6	2488
Pirimicarb	68	4	5	22	.	856
MOLLUSCICIDE						
Methiocarb	55	.	19	20	7	1009
FUNGICIDES						
Benalaxyl/mancozeb	.	.	100	.	.	91
Cymoxanil/mancozeb	42	39	15	3	.	3329
Fentin acetate/maneb	79	21	.	.	.	2961
Fentin hydroxide	63	29	4	.	4	3649
Fentin hydroxide/maneb+zinc	.	100	.	.	.	126
Mancozeb	5	61	8	19	7	3764
Mancozeb/metalaxyl	48	13	21	10	8	3942
Mancozeb/oxadixyl	.	46	28	26	.	911
Maneb	22	37	.	18	23	512
Manganese zinc /ethylenebisdithiocarbamate/ofurace	62	13	25	.	.	2977
HERBICIDE/DESICCANT						
Sulphuric acid	78	22	.	.	.	4498

TABLE 43: ALL potatoes: usage of insecticides, molluscicides, nematocides and fungicides, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated

	Aphids	Slugs	Nematodes	Blight	Total spray area	% crop treated
INSECTICIDES						
SYNTHETIC PYRETHROID						
Deltamethrin	521	.	.	.	521	2
SYSTEMIC ORGANOPHOSPHATES						
Demeton-S-methyl	19237	.	.	.	19237	29
Dimethoate	16240	.	.	.	16240	21
CARBAMATES						
Aldicarb	.	.	209	.	209	1
Pirimicarb	17399	.	.	.	17399	26
MOLLUSCICIDE						
Methiocarb	.	3038	.	.	3038	6
Other insecticides etc	45	35	.	.	80	
Total insecticides and molluscicides	53442	3073	209	.	56725	
FUNGICIDES						
Benalaxyl/mancozeb	.	.	.	2558	2558	6
Chlorothalonil	.	.	.	2356	2356	5
Cymoxanil/mancozeb	.	.	.	18772	18772	37
Cymoxanil/mancozeb/oxadixyl	.	.	.	2453	2453	4
Fentin acetate/maneb	.	.	.	12309	12309	39
Fentin hydroxide	.	.	.	11567	11567	33
Fentin hydroxide/maneb+zinc	.	.	.	610	610	2
Mancozeb	.	.	.	17849	17849	30
Mancozeb/metalaxyl	.	.	.	18133	18133	38
Mancozeb/oxadixyl	.	.	.	6265	6265	10
Maneb	.	.	.	6321	6321	11

TABLE 43 (CONT'D): All potatoes: usage of insecticides, molluscicides, nematocides and fungicides, the reasons for their use (spray hectares of formulations)

	Aphids	Slugs	Nematodes	Blight	Total spray area	% crop treated
Manganese zinc	.	.	.			
/ethylenebisdithiocarbamate	.	.	.	10774	10774	20
/ofuracé	.	.	.	402	402	1
Unknown fungicide						
Total fungicides				110368	110368	
Area planted (ha)						27228

Formulations used on less than 0.1% of the total spray area were cypermethrin and metaldehyde.

TABLE 44: ALL potatoes: usage of herbicides and desiccants, the reasons for their use (spray hectares of formulations) and the percentage of the crop treated.

	Mainly annual weeds	Mainly grass weeds	Mixed weeds	Wild oats	Desiccation	No reason given	Total spray area	% crop treated
Diquat	.	.	.	.	1645	.	1645	6
Diquat/paraquat	766	.	1532	.	.	.	2298	9
EPTC	.	106	.	.	.	.	106	+
Fentin hydroxide/metoxuron	.	.	.	.	928	.	928	3
Glyphosate	.	102	.	.	.	.	102	+
Linuron	14137	.	816	.	.	2132	17085	64
Metribuzin	829	.	1865	.	.	.	2694	10
Monolinuron/paraquat	868	223	198	.	.	238	1528	6
Paraquat	13410	29	3710	.	.	3333	20482	76
Sethoxydim	.	87	.	.	.	.	87	+
Sodium chlorate	.	.	.	.	1184	.	1184	3
Sulphuric acid	.	.	.	.	28936	.	28936	72
Terbutylazine/terbutryn	240	.	.	.	.	980	1220	5
Terbutryn/trietazine	30	.	.	.	.	291	321	1
Other herbicide	73	.	.	44	.	.	117	.
Total herbicides	30354	546	8121	44	32693	6974	78733	
Area planted (ha)								27228

Formulation used on less than 0.1% of the total spray area were alloxym-sodium and unknown herbicide.

• less than 0.5%

TABLE 45: Repeated use of pesticides on ALL potatoes (percentage of the basic area treated more than once)

	Once	Twice	Three times	Four times	Five or more times	Basic area (ha)
INSECTICIDES						
Deltamethrin	89	11	.	.	.	464
Demeton-S-methyl	30	17	42	1	10	7437
Dimethoate	14	26	30	25	6	5533
Pirimicarb	29	37	8	8	19	6702
MOLLUSCICIDE						
Methiocarb	59	12	12	13	4	1569
FUNGICIDES						
Benalaxyl/mancozeb	56	25	20	.	.	1489
Chlorothalonil	68	4	28	.	.	1419
Cymoxanil/mancozeb	39	44	11	3	4	9527
Cymoxanil/mancozeb/oxadixyl	46	.	54	.	.	1135
Fentin acetate/maneb	86	11	2	.	.	10086
Fentin hydroxide	76	20	2	.	2	8658
Fentin hydroxide/maneb+zinc	73	27	.	.	.	462
Mancozeb	16	63	6	11	3	7680
Mancozeb/metalaxyl	57	17	18	4	3	9824
Mancozeb/oxadixyl	15	49	27	9	.	2635
Maneb	40	39	3	9	9	2948
Manganese zinc						
/ethylenebisdithiocarbamate/ofurace	45	24	26	.	5	5245
Unknown fungicide	.	100	.	.	.	199
HERBICIDE/DESICCANT						
Sodium chlorate	32	68	.	.	.	672
Sulphuric acid	50	50	.	.	.	18730

TABLE 46: Areas (ha) and proportions (%) of arable crops treated with seed dressings

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops
Captan/gamma-HCH	77 (+)	.	.	.	77 (+)
Chlorfenvinphos	.	.	371 (+)	.	.	.	.	.	.	.	.	371 (+)
Drazoxolon	2360 (54)	.	.	.	.	2360 (+)
Ethirimol	.	884 (+)	.	.	.	.	.	.	.	.	.	884 (+)
Ethirimol/flutriafol
/thiabendazole	12223 (18)	18217 (7)	1849 (2)	25 (2)	76 (5)	.	.	.	.	.	.	32391 (6)
Fenpropimorph/gamma-HCH
/thiram	28068 (74)	5855 (79)	.	.	33922 (6)
Fonofos	.	.	645 (1)	.	.	.	.	.	.	.	.	645 (+)
Fuberidazole/triadimenol	4931 (7)	14821 (5)	25177 (23)	.	.	342 (1)	.	.	.	.	.	45270 (8)
Gamma-HCH	891 (1)	170 (+)	.	.	.	.	.	.	.	.	.	1061 (+)
Gamma-HCH/organo-mercury	.	1422 (1)	.	.	.	63 (+)	.	.	.	.	.	1485 (+)
Maneb/zinc oxide	860 (5)	.	860 (+)
Metalaxyl	420 (1)	.	.	.	420 (+)
Metalaxyl/thiabendazole
/thiram	478 (11)	.	.	.	.	478 (+)
Organo-mercury	44858 (67)	221374 (82)	75404 (69)	1371 (98)	1324 (95)	18995 (69)	.	.	.	.	.	363327 (66)
Pencycuron	1754 (11)	1742 (17)	3496 (1)
Thiabendazole	1356 (9)	.	1356 (+)
Thiram	115 (+)
Tolclofos-methyl	115 (+)
Unknown fungicide	.	.	197 (+)	.	.	236 (1)	705 (16)	641 (2)	978 (13)	4685 (30)	1244 (12)	5929 (1)
Unknown insecticide	195 (1)	.	.	.	2757 (+)
Unknown seed dressing	1214 (2)	7073 (3)	4620 (4)	.	.	181 (1)	715 (16)	7708 (20)	719 (10)	.	.	195 (+)
No information	.	432 (+)	.	.	.	.	.	.	.	102 (1)	.	22232 (4)
	534 (+)

'+' = less than 0.5%

TABLE 47: Quantities of active ingredients (Kg) used in arable seed dressings

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops
Captan	.	.	68	.	.	.	.	3	.	.	.	3
Chlorfenvinphos	.	.	.	.	.	.	.	.	.	.	.	68
Drazoxolon	5511	8562	927	13	24	.	359	.	.	.	.	359
Ethirimol	.	.	.	.	.	.	.	.	.	.	.	15036
Fenpropimorph	413	586	.	1	2	.	.	162	43	.	.	205
Flutriafol	.	.	.	.	.	.	.	.	.	.	.	1071
Fonofos	52	152	166	.	.	3	.	.	.	.	.	166
Fuberidazole	41	137	272	.	.	7	.	.	.	.	.	479
Gamma-HCH	.	.	.	.	.	.	.	2071	547	.	.	2803
Maneb	242	1162	417	8	7	102	.	.	.	13153	.	13153
Organo-mercury	.	.	.	.	.	.	.	.	.	.	.	1936
Metalaxyl	.	.	.	.	.	.	86	2	.	.	.	88
Pencycuron	138	195	23	.	.	.	44	.	.	1791	1344	3135
Thiabendazole	.	.	.	.	1	.	95	.	.	701	.	1102
Thiram	.	.	.	.	.	.	.	274	73	.	.	443
Tolclofos-methyl	437	1264	2267	.	.	26	.	.	.	3927	462	4389
Triadimenol	.	.	.	.	.	.	.	.	.	.	.	3994
Zinc oxide	.	.	.	.	.	.	.	.	.	411	.	411

TABLE 48: Usage of insecticides and molluscicides on arable crops (spray hectares of formulations)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops
INSECTICIDES												
SYNTHETIC PYRETHROIDS												
Alphacypermethrin	•	555	334	•	•	47	•	4754	604	•	•	6294
Cyfluthrin	7984	640	3275	•	423	•	•	351	•	•	•	12673
Cypermethrin	24940	2183	18491	•	319	2321	•	5411	2779	•	45	56489
Deltamethrin	6572	3093	5909	•	419	401	•	2969	1499	370	151	21383
Fenvalerate	11771	1853	6102	•	97	•	279	827	690	•	•	21619
SYSTEMIC ORGANOPHOSPHATES												
Demeton-S-methyl	1334	4837	3910	•	•	261	•	•	•	16434	2803	29579
Dimethoate	2622	21929	10425	•	•	1804	107	•	•	10297	5943	53127
NON-SYSTEMIC ORGANOPHOSPHATES												
Chlorpyrifos	38	4751	1905	•	•	585	•	•	•	•	•	7279
Quinalphos	•	165	227	•	•	•	•	•	•	•	•	392
Triazophos	•	•	•	•	•	•	•	485	978	•	•	1463
ORGANOCHLORINE												
Gamma-HCH	•	236	•	•	•	•	•	284	345	•	•	865
CARBAMATE												
Aldicarb	•	•	•	•	•	•	•	•	•	•	209	209
Pirimicarb	264	325	3010	•	•	276	•	•	•	15800	1599	21274
OTHER												
Unknown insecticide	860	666	244	•	•	•	•	237	•	•	•	2007
All insecticides	56385	41233	53832	•	1258	5695	386	15318	6895	42901	10750	234653
MOLLUSCICIDES												
Metaldehyde	128	•	3143	•	•	•	•	256	•	•	35	3562
Methiocarb	302	1044	7479	•	•	•	•	2683	•	762	2276	14546
All molluscicides	430	1044	10622	•	•	•	•	2939	•	762	2311	18108

TABLE 49: Usage of fungicides on arable crops (spray hectares of formulations)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All Crops
Benalaxyl/mancozeb	.	.	.	.	.	.	.	.	.	2285	273	2558
Benomyl	354	.	.	.	.	.	781	1879	.	.	.	3014
Carbendazim	13711	8482	18691	.	.	.	1166	45941	1573	.	.	89564
Carbendazim/chlorothalonil	.	.	.	.	.	.	.	366	.	.	.	366
Carbendazim/flusilazole	20948	5723	52362	29	.	.	.	1495	.	.	.	80557
Carbendazim/flutriafol	4326	.	24560	336	.	.	.	.	.	.	.	29222
Carbendazim/mancozeb	137	.	7138	.	.	.	567	935	.	.	.	8777
Carbendazim/maneb	42	.	6423	.	.	.	.	807	.	.	.	7272
Carbendazim/maneb/sulphur	76	.	3713	.	.	.	.	198	.	.	.	3987
Carbendazim/maneb/tridemorph	7910	.	1399	.	.	.	.	.	.	.	.	9309
Carbendazim/prochloraz	2227	100	4156	.	.	.	.	4318	.	.	.	10801
Carbendazim/propiconazole	2260	.	839	.	.	.	.	.	.	.	.	3099
Carbendazim/triadimefon	1696	860	22113	.	.	.	.	.	.	.	.	24669
Chlorothalonil	1751	1487	31853	157	241	.	2641	2398	.	2356	.	42884
Chlorothalonil/fenpropimorph	.	.	819	.	.	.	.	.	.	.	.	819
Chlorothalonil/flutriafol	152	937	27137	.	.	338	.	.	.	.	.	28564
Copper oxychloride	.	391	.	.	.	181	.	.	.	.	.	572
Cymoxanil/mancozeb	.	.	.	.	.	420	.	.	.	12586	6186	19192
Cymoxanil/mancozeb/oxadixyl	.	.	.	.	.	.	.	.	.	2423	30	2453
Fenpropidin	23084	64300	30396	336	.	2533	.	.	.	.	.	120649
Fenpropimorph	74534	140679	72083	1192	490	5488	.	78	.	.	.	294544
Fenpropimorph/prochloraz	10709	10585	19721	.	.	192	.	.	.	.	.	41207
Fentin acetate/maneb	.	.	.	.	.	.	.	.	.	8467	3842	12309
Fentin hydroxide	.	.	.	.	.	.	.	.	.	5900	5667	11567
Fentin hydroxide/maneb+zinc	.	.	.	.	.	.	.	.	.	346	264	610
Ferbam/maneb/zineb	.	1119	281	.	.	492	.	.	.	.	.	1892
Flusilazole	.	3488	1847	.	.	.	.	.	.	.	.	5335
Iprodione	.	.	.	.	.	.	577	1504	.	.	.	2801
Iprodione/thiophanate-methyl	.	.	.	.	.	.	.	7975	.	.	.	7975
Mancozeb	463	3565	8818	.	.	.	.	2560	978	7371	10479	34234

TABLE 49 (CONT'D): Usage of fungicides on arable crops (spray hectares of formulations)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All Crops
Mancozeb/metalaxyl	.	.	.	.	.	.	.	.	.	9229	8905	18134
Mancozeb/oxadixyl	.	.	.	.	.	.	.	.	.	3584	2681	6265
Maneb	15492	1834	45894	25	.	181	.	10919	.	4771	1551	80667
Maneb+zinc	.	.	701	.	.	.	.	.	.	.	.	701
Maneb/zineb	454	.	.	.	.	.	.	.	.	.	.	454
Manganese zinc	.	.	.	.	.	.	.	.	.	.	.	.
/ethylenebisdithiocarbamate/ofurace	.	.	.	.	.	.	.	258	.	5776	4998	11032
Nuarimol	.	.	216	.	.	.	.	.	.	.	.	216
Prochloraz	3568	2628	11752	.	.	.	.	27064	.	.	.	45012
Propiconazole	27263	21725	25135	29	.	958	.	.	.	.	.	75110
Propiconazole/tridemorph	1856	4787	3538	.	.	.	.	.	.	.	.	10181
Sulphur	8427	17651	28963	.	7	7265	2118	34450	3590	.	.	102471
Thophanate-methyl	942	316	995	.	.	.	.	2384	.	.	.	4637
Triadimefon	6202	960	9882	.	.	.	.	.	.	.	.	17044
Triadimenol	3635	2077	13376	363	.	67	.	.	.	.	.	19518
Triadimenol/tridemorph	6959	15284	19080	.	827	2101	.	.	.	.	.	44251
Tridemorph	37628	52525	29286	54	636	2339	.	.	.	.	.	122468
Vinclozolin	.	.	.	.	.	.	1664	15887	361	.	.	17912
Zineb poly	.	.	189	.	.	.	.	.	.	.	.	189
Unknown fungicide	893	.	693	.	.	.	223	895	141	402	.	3247
Total spray area	277699	361503	524049	2521	2201	21643	9737	163223	6643	65496	44876	1479591

TABLE 50: Usage of herbicides, desiccants, growth regulators and other pesticides (spray formulations) hectares of

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All Crops
2,4-DB/benzazolin/MCPA	.	9734	.	.	.	206	.	.	.	.	.	9940
2,4-DB/bentazone/cyanazine	.	1898	.	.	.	.	.	.	.	.	.	1898
2,4-DB/linuron/MCPA	.	7325	.	.	.	.	.	.	.	.	.	7325
2,4-DB/MCPA	.	2871	.	.	.	588	.	.	.	.	.	3459
Alloxydim-sodium	.	.	.	.	.	.	42	.	.	.	44	86
Asulum	.	38	.	.	.	.	.	.	.	.	.	38
Benazolin/bromoxynil/ioxynil	340	6138	516	.	.	.	.	.	.	.	.	6994
Benazolin/bromoxynil /ioxynil/mecoprop	83	2312	2191	.	.	334	.	.	.	.	.	4920
Benazolin/clopyralid	.	.	.	.	.	.	.	14115	1419	.	.	15534
Bentazone/MCPA/MCPB	.	6692	.	.	.	.	.	.	.	.	.	6692
Bentazone/MCPB	.	.	.	.	.	.	382	.	.	.	.	382
Bifenox/isoproturon	890	.	1121	.	.	.	.	.	.	.	.	2011
Bromoxynil/clopyralid /fluroxypyr/ioxynil	.	262	.	.	.	.	.	.	.	.	.	262
Bromoxynil/dichlorprop	.	19	.	.	.	.	.	.	.	.	.	19
Bromoxynil/dichlorprop /ioxynil/MCPA	.	1918	.	.	.	.	.	.	.	.	.	1918
Bromoxynil/fluroxypyr	10	2060	748	.	.	.	.	.	.	.	.	2818
Bromoxynil/fluroxypyr/ioxynil	560	24203	2671	25	.	459	.	.	.	.	.	27918
Bromoxynil/ioxynil	1931	7520	8576	336	419	931	.	.	.	.	.	19713
Bromoxynil/ioxynil /isoproturon/mecoprop	417	1358	776	.	.	.	.	.	.	.	.	2551
Bromoxynil/ioxynil/mecoprop	152	.	1879	.	.	.	.	.	.	.	.	2031
Carbetamide	.	.	.	.	.	.	.	1612	.	.	.	1612
Chlorotoluron	1426	.	1531	.	.	.	.	.	.	.	.	2957
Clopyralid	.	.	.	.	.	.	.	2446	891	.	.	3337
Clopyralid/cyanazine	.	167	103	.	.	117	.	.	.	.	.	387
Clopyralid/dichlorprop/MCPA	.	764	.	.	.	.	.	.	.	.	.	764

TABLE 50 (CONT'D): Usage of herbicides, desiccants, growth regulators and other pesticides (spray hectares of formulations)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All Crops
Clopyralid/fluroxypyr/ioxynil	43	363	59	278	.	.	.	.	.	.	.	743
Clopyralid/ioxynil	.	1841	.	.	.	.	.	.	.	.	.	1841
Clopyralid/mecoprop	.	.	194	.	.	.	.	.	.	.	.	194
Clopyralid/propyzamide	.	.	.	.	.	.	505	.	.	.	.	505
Cyanazine	.	.	.	.	.	.	2138	304	.	.	.	2442
Cyanazine/fluroxypyr	.	.	528	.	.	.	.	.	.	.	.	528
Cyanazine/isoproturon	1412	50	421	.	.	.	.	.	.	.	.	1883
Dicamba/dichlorprop/ioxynil	.	951	.	75	.	.	.	.	.	.	.	1026
Dicamba/MCPA/mecoprop	42	8875	531	558	.	.	.	.	.	.	.	10006
Dicamba/mecoprop	.	2893	.	333	.	.	.	.	.	.	.	3226
Dichlorprop	.	5677	83	103	.	.	.	.	.	.	.	5863
Dichlorprop/MCPA	12	11779	1092	664	.	.	.	.	.	.	.	13547
Diclofop-methyl	.	.	.	.	.	.	21	.	.	.	.	21
Difenzoquat	913	1720	1161	.	.	.	.	.	.	.	.	3794
Diflufenican/isoproturon	25455	.	19981	.	.	.	.	.	.	.	.	45436
Diquat	97	87	.	.	.	.	2807	3580	2440	366	1279	10656
Diquat/paraquat	.	.	32	.	.	.	.	.	.	1277	1022	2331
EPTC	.	.	.	.	.	.	.	.	.	106	.	106
Fenoxaprop-ethyl	.	.	660	.	.	.	.	.	.	.	.	660
Fentin hydroxide/metoxuron	.	.	.	.	.	.	.	.	.	.	928	928
Flamprop-M-isopropyl	2256	12051	2129	.	.	.	.	.	.	.	.	16436
Fluazifop-P-butyl	.	.	.	.	.	.	115	4544	.	.	.	4659
Fluroxypyr	1365	1795	3434	104	.	.	.	.	.	.	.	6698
Glyphosate	2367	15702	3563	405	.	.	854	3573	105	.	102	26671
Imazamethabenz-methyl	120	.	988	.	.	.	.	.	.	.	.	1108
Ioxynil/isoproturon/mecoprop	.	493	953	.	.	.	.	.	.	.	.	1446
Isoproturon	2639	243	6052	.	.	.	.	.	.	.	.	8934
Isoproturon/isoxaben	2309	.	143	.	.	.	.	.	.	.	.	2452
Isoproturon/metsulfuron-methyl	.	.	65	.	.	.	.	.	.	.	.	65
Isoproturon/trifluralin	1407	.	2462	.	.	.	.	.	.	.	.	3869
Isoxaben	616	.	1715	.	498	.	.	.	.	.	.	2829

TABLE 50 (CONT'D): Usage of herbicides, desiccants, growth regulators and other pesticides (spray hectares of formulations)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All Crops
Isoxaben/methabenzthiazuron	1127	.	801	.	.	.	.	.	.	14183	2902	1928
Linuron	.	.	.	.	.	.	.	.	.	.	.	17085
Linuron/trietazine/trifluralin	586	.	133	.	.	.	.	.	.	.	.	719
Linuron/trifluralin	2431	.	1519	.	.	.	.	.	.	.	.	3950
MCPA	6342	53882	6430	336	.	9945	.	.	.	.	.	76935
MCPA/MCPB	.	2231	.	.	.	.	.	.	.	.	.	2231
MCPB	.	750	68	.	130	.	.	.	.	.	.	948
Mecoprop	12166	74831	31601	878	493	5563	.	.	.	.	.	125532
Mecoprop-P	2930	16947	6195	157	339	528	.	.	.	.	.	27096
Metazachlor	.	.	.	.	.	.	18167	.	2313	.	.	20480
Methabenzthiazuron	1795	.	1021	.	.	.	.	.	.	.	.	2816
Metribuzin	.	.	.	.	.	.	.	1061	.	.	1633	2694
Metsulfuron-methyl	12197	111586	40263	878	894	9200	.	.	.	.	.	175018
Metsulfuron-methyl /thifensulfuron-methyl	394	22841	7555	157	.	255	.	.	.	.	.	31202
Monolinuron/paraquat	.	.	.	.	.	.	.	.	.	.	1528	1528
Paraquat	509	.	897	.	76	.	.	.	.	13561	6922	21965
Pendimethalin	6918	.	9251	.	.	840	.	.	.	.	.	17009
Propyzamide	.	.	.	.	.	.	13990	.	.	.	.	13990
Quizalofop-ethyl	.	.	.	.	.	.	6125	.	.	.	.	6125
Sethoxydim	.	.	.	.	.	.	92	.	.	58	29	286
Sodium chlorate	.	.	.	.	.	.	.	.	.	1165	20	1185
Sulphuric acid	.	.	.	.	.	.	53	.	.	23218	5718	28989
TCA	.	.	.	.	.	.	.	164	.	.	.	164
Terbuthylazine/terbutryn	.	.	.	.	.	.	1501	.	.	307	914	2722
Terbutryn	235	.	.	.	76	.	.	.	.	.	.	311
Terbutryn/trietazine	.	.	.	.	.	.	366	.	.	.	321	687
Tri-allate	.	.	86	.	.	.	.	.	.	.	.	86
Trifluralin	2695	.	4380	.	241	.	.	440	601	.	.	8357
Unknown herbicide	417	.	278	.	.	.	705	319	.	.	73	1792
Total spray area (ha)	97604	422867	176836	2767	3036	30776	9931	69976	7769	55302	23431	900295

TABLE 50 (CONT'D): Usage of herbicides, desiccants, growth regulators and other pesticides (spray hectares of formulations)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All Crops
GROWTH REGULATORS												
2-chloroethylphosphonic acid	11526	11138	16641	334	.	.	.	.	.	.	.	39639
2-chloroethylphosphonic acid /chlormequat	.	.	3236	.	.	.	.	.	.	.	.	3236
2-chloroethylphosphonic acid /mepiquat	18469	12703	23949	.	.	.	.	.	.	.	.	55121
Chlormequat	48847	49748	115258	211	1221	10194	107	6702	.	.	.	232288
Total spray area (ha)	78842	73589	159084	545	1221	10194	107	6702	.	.	.	330284
OTHER												
Di-1-p-menthene	.	.	.	.	.	.	.	72	.	.	.	72

TABLE 51: Usage of insecticides and molluscicides on arable crops (spray hectares of active ingredients)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops 1988*
INSECTICIDES												
SYNTHETIC PYRETHROIDS												
Alphacypermethrin		555	334			47		4754	604			6294
Cyfluthrin	7984	640	3275		423			351				12673
Cypermethrin	24940	2183	18491		319	2321		5411	2779		45	56489
Deltamethrin	6572	3093	5909		419	401		2969	1499	370	151	21383
Fenvalerate	11771	1853	6102		97		279	827	690			21619
SYSTEMIC ORGANOPHOSPHATES												
Demeton-S-methyl	1334	4837	3910			261				16434	2803	16918
Dimethoate	2622	21929	10425			1804	107			10297	5943	8910
NON-SYSTEMIC ORGANOPHOSPHATES												
Chlorpyrifos	38	4751	1905			585						29289
Quinalphos		165	227									98
Triazophos								485	978			1463
ORGANOCHLORINE												
Gamma-HCH		236						284	345			1703
CARBAMATES												
Aldicarb	264	325	3010			276				15800	209	580
Pirimicarb											1599	11895
OTHER												
Unknown insecticide	860	666	244					237				1831
All insecticides	56385	41233	53832		1258	5695	386	15318	6895	42901	10750	234653
MOLLUSCICIDES												
Metalddehyde	128		3143					256			35	808
Methiocarb	302	1044	7479					2683		762	2276	36878
All molluscicides	430	1044	10622					2939		762	2311	18108

* = excluding turnips and swedes in 1988, and including potato data for 1987

TABLE 52: Usage of fungicides on arable crops (spray hectares of active ingredients)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops 1988*
Benalaxyl												
Benomyl	354						781	1879		2285	273	2558
Carbendazim	53333	15165	141396	365			1733	54059	1573			3014
Chlorothalonil	1903	2425	59809	157	241	338	2641	2763		2356		267624
Copper oxychloride		391				181						72633
Cymoxanil								420		15008	6216	572
Fentin acetate										8466	3842	21644
Fentin hydroxide										6245	6859	12308 }
Fenpropidin	23084	64300	30396	336		2533						13104 }
Fenpropimorph	85243	151264	92623	1192	490	5680						120649
Ferbam		1119	281					78				336570
Flusilazole	20948	9211	54208	29				492				1892
Flutriafol	4478	937	51698	336		338		1495				85891
Iprodione							577	9479				57787
Mancozeb	600	3565	15956				567	3915	978	37476	28553	10056
Maneb	23974	2953	57710	25		181		12416		13237	5393	91610
Maneb+zinc			701							346	264	115889
Manganese zinc /ethylenebisdithiocarbamate												1311
Metalaxyl								258		5776	4998	11032
Nuarimol			216							9229	8905	18134
Ofurace								258				216
Prochloraz	16504	13313	35630			192		31382		5776	4998	11032
Oxadixyl										6007	2711	97020
Propiconazole	31379	26512	29511	29		958						8718
Sulphur	8503	17651	32676		7	7265	2118	34648	3590			88389
Thiophanate-methyl	942	316	995					10359				106458
Triadimefon	7898	1820	31995									44801
Triadimenol	10594	17361	32456	363	827	2168						12612
Tridemorph	54353	72596	53303	54	1463	4440						41713
Vinclozolin							1664	15887				62212
Zineb	454	1119	281					492	361			186209
Zineb poly			189									17912
Unknown fungicide	893		693				223	895	141	402		2346
All fungicides	345437	402018	722723	2886	3028	24274	10304	181175	6643	112609	73012	1884109

'+' = excluding turnips and swedes in 1988, and including potato data for 1987.

TABLE 53: Usage of herbicides, desiccants, growth regulators and other pesticides and other pesticides (spray hectares of active ingredients)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops 1988*
HERBICIDES AND DESICCANTS												
2,4-DB		21828				794	42				44	28761
Alloxydim-sodium		38										86
Asulam		18183	2706			540		14115	1419			31227
Benazolin	424	8590					382					11954
Bentazone	890		1121									2075
Bifenox	3494	45789	17356	361	419	1724						69318
Bromoxynil								1612				4502
Carbetamide	1426		1531									1986
Chlorotoluron	43	3398	356			394		17066	2310			36369
Chlorpyralid	1412	2116	1052			117	2138	304				15702
Cyanazine	42	12719	531			966						26779
Dicamba	12	21108	1175			842						52009
Dichlorprop							21					148
Diclofop-methyl	913	1720	1161									3209
Difenzoquat	25455		19981						2440	1643	2300	12781
Diflufenican	97	87	32				2807	3580		106		26841
Diquat												430
EFTC												
Fenoxaprop-ethyl			660									
Flamprop-M-isopropyl	2256	12051	2129									9265
Fluazifop-P-butyl							115	4544				1144
Fluroxypyr	1979	28683	7440	25		840						33618
Glyphosate	2367	15702	3563			405		3573	105		102	27923
Imazamethabenz-methyl	120		988				854					
Ioxynil	3527	47358	17620	361	419	2077						80211
Isoproturon	34530	2144	31972									23504
Isoxaben	4052		2659		498							1560
Linuron	3017	7325	1652								2902	40726
MCPA	6396	106071	8053	336		11960				14183		217951
MCPB		9673	68			130						14863
Mecoprop	12860	90761	38125	878	493	6786	382					202319
Mecoprop-p	2930	16947	6195	157	339	528						27096
Metazachlor								18167	2313			20480
												17990

TABLE 53 (Cont'd): Usage of herbicides, desiccants, growth regulators and other pesticides (spray hectares of active ingredients)

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops
HERBICIDES AND DESICCANTS (Cont'd)												
Metoxuron	2922	.	1822	.	.	.	.	.	.	.	928	748
Methabenzthiazuron	.	.	.	.	.	.	.	.	.	.	.	711
Methribuzin	12591	134427	47883	1035	894	9454	.	.	.	1061	1633	3729
Metsulfuron-methyl	509	.	929	.	76	.	.	.	.	.	1528	213266
Monolinuron	6918	.	9251	.	.	.	.	.	.	14837	9471	2144
Paraquat	.	.	.	.	.	.	840	.	.	.	.	26343
Pendimethalin	.	.	.	.	.	.	.	14494	.	.	.	17009
Propyzamide	.	.	.	.	.	.	.	6125	.	.	.	16824
Quizalofop-ethyl	.	.	.	.	.	.	.	92	.	.	.	13549
Sethoxydim	.	.	.	.	.	.	107	.	.	58	29	1835
Sodium chlorate	.	.	.	.	.	.	.	.	.	1164	20	297
Sulphuric acid	.	.	.	.	.	.	53	.	.	23218	5718	20786
TCA	.	.	.	.	.	.	.	164	.	.	.	284
Terbutylazine	235	.	.	.	.	.	1501	.	.	306	914	5876
Terbutryn	394	.	.	.	76	.	1866	.	.	306	1235	6947
Thifensulfuron-methyl	.	22841	7555	157	.	255	.	.	.	.	.	17378
Tri-allate	.	.	86	.	.	.	.	.	.	.	.	91
Trietazine	586	.	133	.	.	.	366	.	.	.	321	3908
Trifluralin	7119	.	8494	.	241	.	.	440	601	.	.	15859
Unknown herbicides	417	.	278	.	.	.	705	319	.	.	73	2625
All herbicides	139933	629559	244557	3310	3455	37812	12179	84595	9188	56882	27218	1248688
GROWTH REGULATORS												
2-chloroethylphosphonic acid	29995	23841	43827	334	.	.	.	.	.	.	.	93338
Chloromequat	48847	49748	118494	211	1221	10194	107	6702	.	.	.	198972
Mepiquat chloride	18469	12703	23949	.	.	.	.	.	.	.	.	68020
All growth regulators	97311	86292	186270	545	1221	10194	107	6702	.	.	.	388642
OTHER												
Di-1-p-menthene	.	.	.	.	.	.	.	72	.	.	.	72
	.	.	.	.	.	.	.	.	.	.	.	541

'*' = excluding turnips and swedes in 1988, and including potato data for 1987.

TABLE 54: Quantities (kg) of insecticide and molluscicide active ingredients

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops 1988*
INSECTICIDES												
SYNTHETIC PYRETHROIDS												
Alphacypermethrin	97	16	7	.	5	1	.	75	6	.	.	105
Cyfluthrin	532	8	51	.	7	46	.	4	.	.	.	165
Cypermethrin	58	33	417	.	7	5	.	141	51	.	1	1228
Deltamethrin	231	27	48	.	2	5	.	27	10	3	1	181
Fenvalerate	216	32	112	.	3	.	8	26	15	.	.	427
SYSTEMIC ORGANOPHOSPHATES												
Demeton-S-methyl	802	854	659	.	.	76	.	.	.	3704	689	3574
Dimethoate	20	6152	3283	.	.	449	36	.	.	3108	1736	3156
NON-SYSTEMIC ORGANOPHOSPHATES												
Chlorpyrifos	.	2441	1403	.	.	441	.	.	.	.	.	4305
Quinalphos	.	83	114	.	.	.	.	.	.	.	.	197
Triazophos	.	.	.	.	.	.	.	194	411	.	.	605
ORGANOCHLORINE												
Gamma-HCH	.	283	.	.	.	.	.	80	114	.	.	477
CARBAMATES												
Aldicarb	37	23	393	.	.	39	.	.	.	1887	704	1376
Pirimicarb	1993	9952	6487	.	17	1057	44	547	607	8702	3302	32708
All insecticides	120	122	1327	.	.	.	.	120	.	.	33	1600
MOLLUSCICIDES												
Metoldehyde	62	1118	1118	.	.	.	.	476	.	125	233	6715
Methiocarb	182	122	2445	.	.	.	.	596	.	125	266	3736

* = excluding turnips and swedes in 1988, and including potato data for 1987

TABLE 55: Quantities (kg) of fungicide active ingredients

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops	All crops 1988*
Benalaxyl										272	44	316	701
Benomyl	88						429	637				1154	1055
Carbendazim	5818	1777	16540	52			296	14374	229			39086	36315
Chlorothalonil	500	915	25636	79	60	208	1596	1531		1903		32428	74136
Copper oxychloride		49				23						72	
Cymoxanil								26		1333	597	1956	355
Fentin acetate										2201	1090	3291	
Fentin hydroxide										1493	1807	3300	8850
Fenpropidin	13191	37023	12623	189		1591						64617	49065
Fenpropimorph	32460	71088	34174	807	193	2638						141389	155904
Ferbam		28	28					49				105	133
Flusilazole	1461	387	4241	4				131				6224	
Flutriafol	432	91	4603	32		33						5191	2616
Iprodione							381	4111				4492	7345
Mancozeb	352	4079	12451				306	2709	978	47629	35961	104465	102989
Maneb	23319	1927	63708	37		145		12810		8420	3448	113814	119934
Maneb+zinc			776							282	216	1274	1822
Manganese zinc													
/ethylenedisithiocarbamate								346		7741	5763	13850	24497
Metalaxyl										1366	1311	2677	3669
Nuarimol			7									7	37
Ofurace													
Oxadixyl								30			504	1204	2121
Prochloraz	3861	2903	9669			43					542	1670	1351
Propiconazole	3000	2846	3218	1		61		7634				24110	28493
Sulphur	22099	68907	83294		16	10710	4354	150370	17399			9126	17356
Thiophanate-methyl	450	97	466					3967				357149	166712
Triadimefon	587	142	4029									4980	7271
Triadimenol	905	1850	2467	45	95	186						4758	1522
Tridemorph	15707	23992	12774	19	535	1365						54392	99892
Vinclozolin							599	8132	135			8866	10836
Zineb	363	28	28					49				468	1111
Zineb poly			226									226	4651
All fungicides	124593	218129	290958	1265	899	17003	7961	206935	18741	74438	51283	1012205	

* = excluding turnips and swedes in 1988, and including potato data for 1987

TABLE 56: Quantities (kg) of herbicide, growth regulator and other active ingredients

HERBICIDES	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops	All crops 1988*
2,4-DB	.	22805	.	.	.	384	.	.	.	.	41	23230	30271
Alloxydim-sodium	.	.	.	.	.	.	63	.	.	.	.	63	.
Asulam	.	63	.	.	.	.	.	.	.	.	.	63	.
Benazolin	30	2110	226	.	.	54	.	3968	256	.	.	6644	7289
Bentazone	.	7421	.	.	.	.	306	.	.	.	.	7727	11503
Bifenox	508	.	563	.	.	.	.	.	.	.	.	1071	1273
Bromoxynil	629	8831	3120	68	159	258	.	2965	.	.	.	13065	14317
Carbetamide	.	.	.	.	.	.	.	.	.	.	.	2965	9453
Chlorotoluron	3352	.	4011	.	.	.	.	.	.	.	.	7363	5299
Clopyralid	2	195	13	.	.	21	.	882	123	.	.	1236	1971
Cyanazine	425	3434	409	.	.	29	2130	75	.	.	.	6502	15993
Dicamba	6	799	48	.	.	77	.	.	.	.	.	930	1993
Dichlorprop	22	26235	1606	.	.	1457	.	.	.	.	.	29320	75059
Diclofop-methyl	.	.	.	.	.	.	28	.	.	.	.	28	196
Diflufeniquat	685	1290	871	.	.	.	.	.	.	.	.	2846	2407
Diflufenican	2108	.	1514	.	.	.	.	.	.	.	.	3622	1224
Diquat	42	49	7	.	.	.	1467	1705	1208	593	871	5942	13855
EPTC	.	.	.	.	.	.	.	.	.	473	.	473	1918
Fenoxaprop-ethyl	.	.	89	.	.	.	.	.	.	.	.	89	.
Famprop-M-isopropyl	1101	6230	1108	.	.	.	.	.	.	.	.	8439	4775
Fluazifop-P-butyl	.	.	.	.	.	.	.	.	.	.	.	527	.
Fluroxypyr	259	5656	1183	3	.	119	20	507	.	.	.	7220	5205
Glyphosate	2255	14720	3500	.	.	389	805	3454	101	.	98	25322	35361
Imazamethabenz-methyl	61	.	504	.	.	.	.	.	.	.	.	565	.
Ioxynil	582	8586	2810	68	159	299	.	.	.	.	.	12504	14605
Isoproturon	32057	2085	29438	.	.	.	.	.	.	.	.	63580	26320
Isoxaben	254	.	175	.	22	.	.	.	.	.	.	451	67
Linuron	1256	751	782	.	.	.	.	.	.	.	2658	17976	26818
MCPA	6520	72672	5052	411	.	10798	.	.	.	.	.	95453	185471
MCPB	.	10624	115	.	.	218	.	.	.	.	.	11263	21152
Mecoprop	16426	98923	47838	736	543	7767	306	.	.	.	.	172233	310330
Mecoprop-p	1665	10872	4915	66	203	249	.	.	.	.	.	1797	.
Metazachlor	.	.	.	.	.	.	.	14589	1157	.	.	15746	22559

TABLE 56 (Cont'd): Quantities (kg) of herbicide, growth regulators and other active ingredients

	Winter barley	Spring barley	Winter wheat	Spring wheat	Winter oats	Spring oats	Peas	Winter oilseed rape	Spring oilseed rape	Seed potatoes	Ware potatoes	All crops 1988*
Methabenzthiazuron	4477	.	2815	.	.	.	.	.	.	.	.	1145
Metoxuron	.	.	.	.	.	.	.	.	.	.	1814	1496
Metribuzin	.	.	.	.	.	.	.	.	.	555	680	3005
Metsulfuron-methyl	47	511	286	6	3	39	.	.	.	.	.	892
Monolinuron	.	.	.	.	.	.	.	.	.	.	1109	989
Paraquat	142	.	541	.	21	.	.	.	.	7133	5242	1563
Pendimethalin	6914	.	7204	.	.	.	886	12477	.	.	.	15624
Propyzamide	.	.	.	.	.	.	.	516	.	.	.	15004
Quizalofop-ethyl	.	.	.	.	.	.	.	31	.	.	.	12477
Sethoxydim	.	.	.	.	.	.	36	20	.	25	112	199
Sodium chlorate	.	.	.	.	.	.	.	14228	.	322	322	6422
Sulphuric acid	.	.	.	.	.	.	6795	3426538	.	914109	914109	3728000
TCA	.	.	.	.	.	.	.	2363	.	.	.	4347442
Terbutylazine	.	.	.	.	.	.	.	.	.	.	.	2363
Terbutryn	258	.	.	.	.	.	630	129	.	423	423	1806
Thifensulfuron-methyl	8	741	253	6	113	6	1928	300	.	1314	1314	2531
Tri-allate	.	.	146	.	.	.	.	.	.	.	.	3913
Trietazine	149	.	34	.	.	.	457	.	.	.	.	1014
Trifluralin	6755	.	8231	.	232	.	.	485	664	.	327	146
All herbicides	88995	305603	129407	1364	1455	22164	15857	44017	3509	3462498	929033	5003902
GROWTH REGULATORS												
2-chloroethylphosphonic acid	6656	5070	10313	80	.	.	.	.	.	.	.	22119
Chlormequat	45293	42626	119069	173	1462	11847	151	8995	.	.	.	229616
Mepiquat chloride	6477	4182	8912	.	.	.	.	.	.	.	.	19571
All growth regulators	58426	51878	138294	253	1462	11847	151	8995	.	.	.	271306
OTHER												
Di-1-p-menthene	.	.	.	.	.	.	.	9	.	.	.	9
*' = excluding turnips and swedes in 1988, and including potato data for 1987												68

TABLE 57: Estimated area (sp. 1000 ha) treated with the 50 most extensively used active ingredients, including seed dressing on all the arable crops surveyed.

		1990	1988*
1	Fenpropimorph	370	252
2	Organo-mercury	365	409
3	Carbendazim	268	201
4	Chlormequat	236	199
5	Metsulfuron-methyl	206	213
6	Prochloraz	194	83
7	Tridemorph	186	238
8	Mecoprop	149	202
9	MCPA	133	218
10	Fenpropidin	121	77
11	Maneb	116	111
12	Triadimenol	109	118
13	Sulphur	106	45
14	2-chloroethylphosphonic acid	98	93
15	Mancozeb	92	67
16	Flutriafol	90	65
17	Propiconazole	88	138
18	Flusilazole	86	.
19	Chlorothalonil	73	108
20	Ioxynil	71	80
21	Bromoxynil	69	71
22	Isoproturon	69	24
23	Cypermethrin	56	1
24	Mepiquat chloride	55	68
25	Diflufenican	45	13
26	Fuberidazole	45	55
27	Triadimefon	42	9
28	Fluroxypyr	39	34
29	Benazolin	37	31
30	Dimethoate	37	9
31	Gamma-HCH	37	10
32	Thiram	35	6
33	Ethirimol	33	39
34	Thiabendazole	33	39
35	Thifensulfuron-methyl	31	17
36	Demeton-S-methyl	30	17
37	Linuron	29	41
38	Sulphuric acid	29	21
39	Glyphosate	27	28
40	Mecoprop-P	27	.
41	Paraquat	26	26
42	Clopyralid	24	36
43	2,4-DB	23	29
44	Dichlorprop	23	52
45	Cymoxanil	22	4
46	Fenvalerate	22	+
47	Deltamethrin	21	1
48	Pirimicarb	21	12
49	Metazachlor	20	18
50	Metalaxyl	19	27

'*' - excluding turnips and swedes and including potato data for 1987.
 '+' - less than sp.500 ha.

TABLE 58: Estimated amount (tonnes) of the 50 active ingredients, including seed dressings used most by weight, on all the arable crops surveyed.

		1990	1988*
1	Sulphuric acid	4347	3728
2	Sulphur	357	167
3	Chlormequat	230	210
4	Mecoprop	172	310
5	Fenpropimorph	142	156
6	Maneb	114	120
7	Mancozeb	104	103
8	MCPA	95	185
9	Fenpropidin	65	49
10	Isoproturon	64	26
11	Tridemorph	54	100
12	Carbendazim	39	36
13	Chlorothalonil	32	74
14	Dichlorprop	29	75
15	Glyphosate	25	35
16	Prochloraz	24	28
17	2,4-DB	23	30
18	2-chloroethylphosphonic acid	22	26
19	Mepiquat chloride	20	34
20	Linuron	18	27
21	Mecoprop-P	18	.
22	Trifluralin	16	16
23	Metazachlor	16	23
24	Dimethoate	16	3
25	Ethirimol	15	18
26	Pendimethalin	15	23
27	Sodium chlorate	15	6
28	Manganese zinc ethylenebisdithiocarbamate	14	24
29	Paraquat	13	16
30	Bromoxynil	13	14
31	Ioxynil	13	15
32	Propyzamide	12	12
33	MCPB	11	21
34	Triadiminol	10	7
35	Propiconazole	9	17
36	Vinclozolin	9	11
37	Flamprop-M-isopropyl	8	5
38	Bentazone	8	12
39	Chlorotoluron	7	5
40	Methabenzthiazuron	7	1
41	Fluroxypyr	7	5
42	Benazolin	7	7
43	Cyanazine	7	10
44	Flutriafol	6	4
45	Flusilazole	6	.
46	Demeton-S-methyl	6	4
47	Diquat	6	14
48	Thiophanate-methyl	5	7
49	Triadimefon	5	2
50	Iprodione	4	7

'*' - excluding turnips and swedes and including potato data for 1987

TABLE 59: Area of arable crops grown in Scotland in 1990 (hectares)

	High & Islands	Caith & Orkney	Moray Firth	Abdn	Angus	East Fife	Lothian	Central Lowland	Tweed Valley	South Uplands	Solway	Scotland
Winter barley	730	422	4,505	18,152	12,563	5,840	5,495	5,655	9,389	1,066	3,174	66,992
Spring barley	7,071	6,740	32,224	58,045	44,947	18,278	15,751	43,809	23,754	6,967	13,232	270,817
Wheat	382	88	8,379	18,598	20,829	13,901	18,241	9,313	19,111	1,052	1,020	110,914
Oats	1,686	2,034	5,475	7,160	3,609	1,194	686	3,477	2,611	236	815	28,982
Peas	60	4	645	93	651	351	1,155	146	1,255	13	19	4,392
Winter oilseed rape	168	141	2,435	8,570	11,004	5,080	3,612	2,270	4,188	144	153	37,763
Spring oilseed rape	67	35	550	2,408	1,354	676	709	795	734	35	50	7,414
Seed potatoes	301	120	1,140	2,604	7,181	1,001	376	2,079	832	30	170	15,834
Ware potatoes	401	155	584	1,038	2,923	1,659	1,646	1,842	809	70	268	11,394
All arable crops	10,866	9,739	55,937	116,668	105,061	47,980	47,671	69,386	62,683	9,614	18,901	554,502

TABLE 60: Usage of pesticides on arable crops in Scotland in 1990 (spray hectares of formulations)

	High & Islands	Caith & Orkney	Moray Firth	Abdn	Angus	East Fife	Lothian	Central Lowland	Tweed Valley	South Uplands	Solway	Scotland
Insecticides and molluscicides	5,841	689	10,066	23,991	63,908	34,328	32,464	20,636	53,024	2,984	4,837	252,768
Fungicides	19,201	5,099	147,308	322,516	324,935	155,171	127,190	111,813	230,805	18,634	16,918	1,479,590
Herbicides and desiccants	16,715	8,030	97,785	173,290	173,807	79,016	91,950	111,129	108,999	12,344	27,233	900,297
Growth regulators	2,035	1,982	27,128	94,026	61,324	32,314	27,027	22,293	55,504	4,414	2,242	330,289
All seed treatments	8,201	9,020	54,033	111,410	95,481	44,452	46,924	62,883	62,425	8,461	16,877	520,165
All pesticides	51,988	24,825	336,320	725,233	719,455	345,281	325,555	328,754	510,735	46,815	68,150	3,483,111

COMPARISON WITH PREVIOUS SURVEYS

CEREALS (TABLE 61)

The area grown remained fairly constant between 1982 and 1988, but fell by 9% between 1988 and 1990. Overall, there was a 5% increase in total pesticide usage of spray hectares of active ingredients between 1988 and 1990. All pesticide groups showed an increase except for molluscicides and seed dressings.

Between 1988 and 1990, usage of insecticides, mainly for aphid control, increased almost 3-fold. There was a dramatic increase in the use of pyrethroids, mainly cypermethrin and fenvalerate. Systemic organophosphates also showed an increase, dimethoate being the most popular.

There was an 18% increase in usage of fungicides over the same period, but a slight decrease in quantities used, reflecting the lower dose rates employed. Fenpropimorph, carbendazim and tridemorph remain the 3 principal fungicides in use.

Herbicide usage between 1988 and 1990 declined in line with the fall in area grown. Metsulfuron-methyl remained the most commonly used. Use of isoproturon, alone and in formulations especially with diflufenican, showed a marked increase since 1988.

TABLE 61: Comparison of pesticide usage on cereals 1982-1990, spray hectares of formulations, spray hectares of active ingredients and quantities used (kg)

	1982		1988			1990		
	sp.ha. of a.i.'s	kg	sp.ha. of forms.	sp.ha. of a.i.'s	kg	sp.ha. of forms.	sp.ha. of a.i.'s	kg
Insecticides								
Pyrethroids	.	.	1,162	1,162	21	97,729	97,729	1,738
Systemic organophosphates	623	150	14,493	14,493	3,497	47,122	47,122	12,491
Non-systemic organophosphates	847	550	30,241	30,241	16,970	7,671	7,671	4,502
Organochlorines	5,452	6,280	1,703	1,703	1,916	236	236	283
Carbamates	292	40	5,895	5,895	539	3,875	3,875	492
Others	.	.	999	999	.	1,770	1,770	.
Total insecticides	7,214	7,020	54,493	54,493	22,943	158,404	158,404	19,506
Molluscicides	443	100	23,585	23,585	4,950	12,096	12,096	2,749
Fungicides	669,865	317,420	1,076,558	1,270,959	660,554	1,189,616	1,500,366	652,847
Herbicides	1,116,968	1,249,760	820,107	1,153,453	805,790	733,886	1,058,626	548,988
Growth regulators	50,217	47,940	288,630	356,650	262,836	323,475	381,833	262,160
Seed dressings	621,616	84,951	522,122	652,020	26,602	458,954	570,490	23,226
Total pesticides	2,466,323	1,707,191	3,785,495	3,511,160	1,783,675	2,876,431	3,681,815	1,509,476
Area grown	525,842		522,136			477,705		

OILSEED RAPE (TABLE 62)

The area grown in 1988 was considerably more than in 1982 when it was a comparatively new crop in Scotland, and a further increase, 9%, was seen in 1990. Overall, there was a 39% increase of spray hectares of active ingredients of all pesticides between 1988 and 1990.

Usage of insecticides increased nearly 5-fold between 1988 and 1990. Pyrethroids, mainly cypermethrin and alphacypermethrin, were the most commonly used. Molluscicide usage was highest in 1988.

There was a 32% increase in fungicide usage over the same period. Carbendazim remains the most popular, mainly for control of light leaf spot.

A small decrease in herbicide usage relative to the area grown was recorded in 1990 compared with 1988, which may be due partly to a larger proportion of spring sown varieties.

TABLE 62: Comparisons of pesticide usage on oilseed rape 1982-1990, spray hectares of formulations, spray hectares of active ingredients and quantities used (kg)

	1982			1988			1990		
	sp.ha. of forms.	sp.ha. of a.i.'s	kg	sp.ha. of forms.	sp.ha. of a.i.'s	kg	sp.ha. of forms.	sp.ha. of a.i.'s	kg
Insecticides									
Pyrethroids	.	.	.	4,164	4,164	44	19,884	19,884	355
Non-systemic organophosphates	189	315	58	57	57	72	1,463	1,463	605
Organochlorines	69	69	26	.	.	.	629	629	194
Others	.	.	.	.	.	.	237	237	.
Total insecticides	258	384	84	4,221	4,221	116	22,213	22,213	1,154
Molluscicides	122	122	58	9,322	9,322	1,670	2,939	2,939	596
Fungicides	82	82	41	126,908	142,501	140,063	169,866	187,818	225,676
Herbicides	3,191	4,043	14,823	73,043	92,447	60,910	77,745	93,783	47,526
Growth regulators	.	.	.	3,776	3,776	5,995	6,702	6,702	8,995
Seed dressings	1,606	4,818	253	41,940	54,047	1,099	44,661	112,584	3,175
Total pesticides	5,259	9,450	15,259	259,210	306,314	209,853	324,126	426,039	287,122
Area grown	1,606			41,514			45,177		

POTATOES (TABLE 63)

There has been a gradual decline in areas of potatoes grown with a 12% reduction between 1982 and 1987 and a further 6% drop between 1987 and 1990. Overall, the total pesticide usage of spray hectares of active ingredients increased by 11% since 1987, due mainly to an increase in the use of aphicides, where there was a 3-fold increase.

The principal aphicides are the systemic organophosphates, demeton-S-methyl and dimethoate, and the carbamate, pirimicarb. Molluscicide usage was highest in 1987.

Usage of fungicides in 1990 remained roughly similar to that in 1987. Mancozeb, alone and in mixtures, is by far the most commonly used fungicide, followed by the fentins, cymoxanil and maneb.

Herbicide and desiccant usage in 1990 was in line with the drop in area grown since 1987.

Chemicals used on tubers before planting were first recorded in 1987, but overall usage remained roughly similar in 1990. Tolclofos-methyl remains the principal chemical in use.

TABLE 63: Comparison of pesticide usage on potatoes 1982-1990, spray hectares of formulations, spray hectares of active ingredients and quantities used (kg)

	1982		1987		1990		kg	
	sp.ha. of a.i.'s	kg	sp.ha. of forms.	sp.ha. of a.i.'s	sp.ha. of forms.	sp.ha. of a.i.'s		
Insecticides								
Pyrethroids					521	521	5	
Systemic organophosphates	6,352	1,910	11,462	11,462	35,477	35,477	9,237	
Non-systemic organophosphates	.	.	16	16	.	.	.	
Organochlorines	.	.	47	47	.	.	.	
Carbamates	3,473	640	6,499	6,499	17,608	17,608	2,762	
Others	.	.	955	955	80	80	.	
Total insecticides	9,825	2,550	18,979	18,979	53,686	53,686	12,004	
Molluscicides	566	120	5,068	5,068	3,038	3,038	391	
Fungicides	114,721	100,150	106,535	180,612	110,368	185,621	125,721	
Herbicides	39,867	31,670	48,376	55,220	46,040	51,407	33,788	
Desiccants	37,008	2,989,370	30,622	31,376	3,743,195	32,693	32,693	4,357,743
Growth regulators	.	.	355	355	.	.	.	
Seed dressings	.	.	12,568	13,089	11,929	11,641	12,501	21,789
Total pesticides	201,987	3,124,220	222,503	304,689	3,949,193	257,466	338,946	4,551,436
Area grown	32,888		28,959			27,228		