Agri-Food and Biosciences Institute

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PESTICIDE USAGE IN NORTHERN IRELAND
SURVEY REPORT 208

Grassland and Fodder Crops 2005

Agriculture, Fishing and Forestry

A National Statistics Publication

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IN NORTHERN IRELAND

Survey Report 208

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Department of Agriculture & Rural Development for Northern Ireland

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PESTICIDE USAGE SURVEY REPORT 208

NORTHERN IRELAND

GRASSLAND AND FODDER CROPS

2005

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SUMMARY

This is the fifth survey examining pesticide usage practices on grassland and fodder crops in Northern Ireland, providing data comparative to that obtained from previous surveys in 1989 (Jess *et al.*, 1992), 1993 (Jess *et al.*, 1995), 1997 (Jess *et al.,* 2000) and 2003 (Withers *et al*., 2005). In this survey information on all aspects of pesticide usage was collected from 294 farms throughout the Province, representing 2.2% of the total area of grassland and fodder crops grown. Quantitative data obtained were adjusted to provide estimates of total pesticide usage.

Overall, the area of grassland and fodder crops grown in 2005 decreased by 3% and 6% when compared to 1997 and 2003, respectively. The area of established grassland crops also decreased by 4% throughout this period. Conversely, the area of fodder crops grown in Northern Ireland in 2003 had increased four-fold since 1997 with a further increase of 28% being recorded in 2005. This was principally due to the increase in fodder maize production. A fourth cut of silage was recorded for the first time in 2005.

The area of grassland and fodder crops receiving pesticide treatment decreased by 28% when compared to that recorded in 2003. However, there was an increase of 17%, 41% and 7% when compared to that recorded in 1989, 1993 and 1997, respectively. A total of 86 tonnes of pesticides was applied to 128,786 spray hectares of grassland and fodder crops during 2005. This represented a 16% reduction in the weight of pesticides applied compared to 2003. Herbicides accounted for 92% of the pesticide-treated area, representing 98% of the weight of pesticides applied. Seed treatments accounted for a further 4% of the treated area. The weight of active ingredients applied as seed treatments represented less than 1% of the total active ingredients. Fungicides, insecticides and growth regulators collectively accounted for the remainder of the total pesticide usage. No molluscicide use was recorded during this survey.

The areas of enclosed grazing and grass silage treated with pesticides decreased when compared to the 2003 survey, returning to a level similar to that recorded in 1997. However, the weight of pesticide applied to enclosed grazing was comparable to that recorded in 2003. Pesticide usage on sown grassland crops decreased significantly when compared with 2003, returning to levels similar to those recorded in 1997. The increase in the area of fodder crops grown when compared to 2003 was mainly attributed to a 66% increase in the area of fodder maize grown. Although the pesticide treated area of the maize crop decreased by 10% the weight of pesticides applied more than doubled from 2.6t to 5.7t.

Herbicides remained the most extensively used pesticide type on grassland and fodder crops. However, the trend for increased use of herbicides since 1989 seems to have reversed, as it decreased by 21% in 2005 when compared with 2003. In contrast, the trend for reduced weight of herbicide applied since 1989 continued. The formulation of fluroxypyr/triclopyr was the most frequently-used herbicide, principally applied to the first-cut of grass silage to control docks (*Rumex* spp.).

A total of sixty-one products comprising thirty nine active ingredients was recorded in use in this survey.

DEFINITIONS AND NOTES

- 'Basic area'. This refers to the actual planted area of crop which was treated with a given pesticide.

- 'Treated area'. This refers to the total area treated with a pesticide, which includes all repeated applications to the basic area. This is measured in 'spray-hectares'.

- 'Reasons for use'. This refers to the perceived reasons reported by the farmer for the use of a particular pesticide. These reasons may sometimes be inappropriate.

- 'Rounding'. Due to rounding of figures there may be slight differences in totals both within and between tables.

- 'Spray applications'. This refers to the number of treatments by any pesticide type to the treated areas.

- 'General weed control'. This refers to post emergence weed control.

- 'Ground preparation'. This refers to treatments applied before or during seed bed preparation.

- 'Sealer'. This refers to the application of herbicides to the crop, usually during sowing, to kill weed seedlings as they emerge.

- 'Grass silage'. Prior to 1997, the survey areas of grass silage from multiple cuts were reported as a single crop. However, in keeping with 1997 & 2003 the 2005 survey areas and pesticide treatments on individual cuts of silage were recorded separately.

- 'Rough grazing'. Is defined as land containing semi-natural vegetation including heathland, heather moorland, bog and rough grassland suitable only for use as grazing.

- 'Enclosed grazing'. Is defined as land which has been improved by management practices such as liming, top dressing and fencing etc., where there is not a significant presence of sensitive plant species, and could be cultivated for other purposes.

- 'Arable silage'. Is defined as arable crops which have been ensiled and have not been combined for grain.

- 'Arable silage (undersown)'. Is defined as arable crops grown as a nurse crop for a green cover crop, such as ryegrass, and have been ensiled rather than combined for grain.

- 'Cereals (undersown)'. Are defined as cereal crops which have been grown as a nurse crop for a green cover crop, such as ryegrass, and have been combined for grain.

INTRODUCTION

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

This is the fifth survey of pesticide usage on grassland and fodder crops in Northern Ireland. The previous surveys of this sector were conducted in 1989 (Jess *et al.*, 1992), 1993 (Jess *et al.*, 1995) , 1997 (Jess *et al.,* 2000), and 2003 (Withers *et al.*, 2005), data from which are included in this report for comparative purposes.

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

METHODS

The sample of holdings to be surveyed was selected from each of the six counties, on the basis of the total area of grassland and fodder crops grown, using data from the Northern Ireland Agricultural Census, June 2004 (Anon., 2005). This comprised the areas grown of established grassland crops and sown grassland and fodder crops.

In each region the sample holdings were stratified into six size groups according to the total area of grassland and fodder crops grown. Holdings were selected at random from within each of the size groups, the number of holdings being proportional to the total area of grassland and fodder crops grown.

The purpose of the survey was explained to the occupiers of selected holdings in preliminary correspondence. A total of 294 holdings were surveyed by telephone interview from October 2005 to March 2006. The data collected included; the area of crops grown, area treated, the target crop, pesticides used and the number of treatments applied. The growers' perceived reasons for pesticide use, including inappropriate usage, were also recorded. Holdings selected in the original sample which proved unable to provide data were replaced with those from the same county and size group held on a reserve list. During analysis, the sample data were raised to the total population level using raising factors calculated from the ratio of the number of farms sampled to the number of farms in the population within each region and size group. A further adjustment factor corrected the data in accordance with the areas of grassland and fodder crops published in the Northern Ireland Agricultural Census, June 2005 (Anon., 2006). The total number of farms in each size group and the number of farms sampled are shown in Table 1.

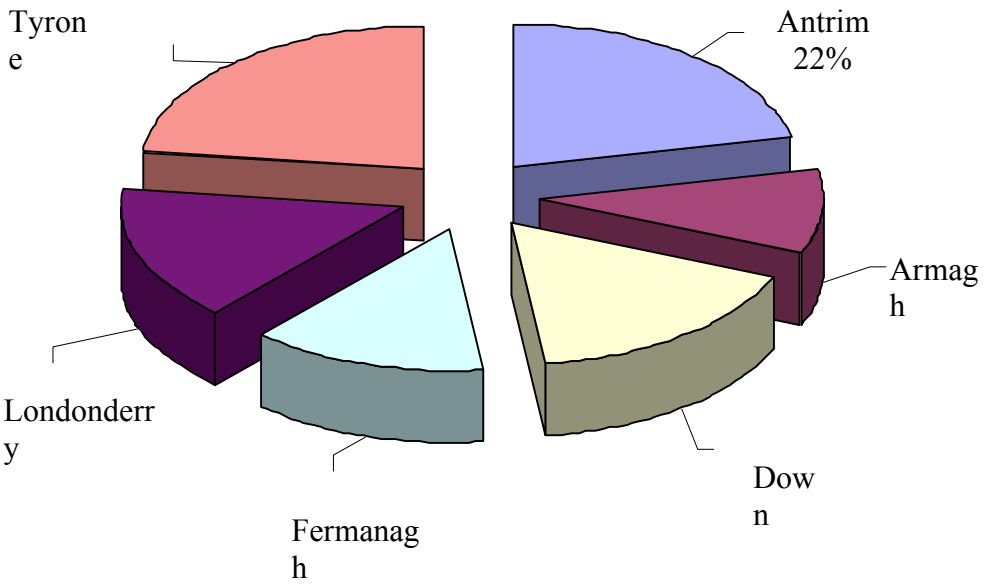
The collected data were entered using Oracle, a relational database programme. Validated data were downloaded for analysis using SPSS software.

RESULTS AND DISCUSSION

CROPS

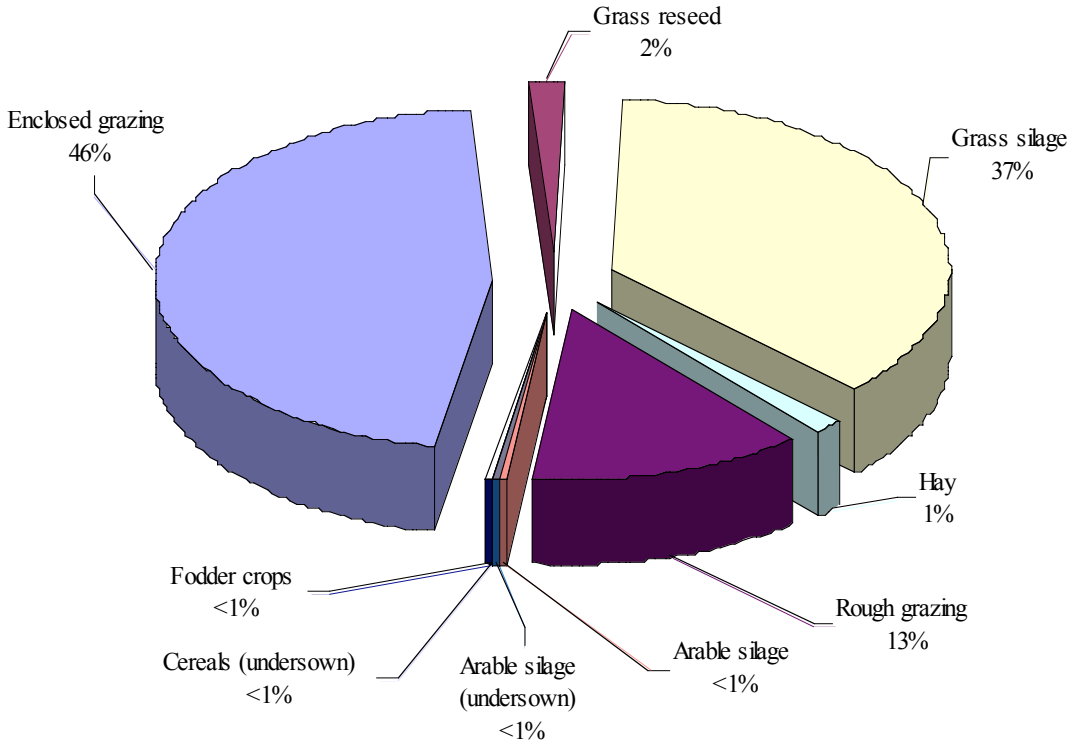
Information collected from 294 farms provided data concerning 1,120 examples of fourteen grassland and fodder crop types (Table 2). The area surveyed represented approximately 2% of the total area of grassland and fodder crops grown in Northern Ireland in 2005. Areas of grassland and fodder crops grown in the six counties were estimated using raising factors discussed earlier (Table 3, Figure 1). Collectively, Counties Antrim and Tyrone accounted for approximately 45% of the area of grassland and fodder crops grown, with Counties Down and Londonderry together accounting for a further 32%. Counties Fermanagh and Armagh accounted for 13% and 10%, respectively.

Figure 1 The proportional distribution of grassland and fodder crops grown regionally in Northern Ireland in 2005.



Land used for enclosed and rough grazing represented 46% and 13% of the total area of grassland and fodder crops, respectively (Table 3, Figure 2). The area assigned to first-cut silage production was 23% with total silage production accounting for 37% of the grassland and fodder crop area. The area for hay production represented a further 1% of the total area of grassland and fodder crops. Reseeds, comprising arable silage (both undersown and non-undersown), undersown cereals and grass reseeds, collectively accounted for 2% of the total area. Fodder crops, including small areas of fodder beet, kale, maize, rape and turnip, accounted for less than 1% of the total area of grassland and fodder crops.

Figure 2 The proportional distribution of grassland and fodder crops grown in Northern Ireland in 2005.



REGIONAL PESTICIDE USAGE

County Antrim, which contributed 22% of the estimated area of grassland and fodder crops grown regionally in Northern Ireland in 2005 (Table 3), was the only county recorded where all five pesticide groups were applied, representing 31% and 29% of the pesticide-treated area and weight applied, respectively (Tables 4 & 5). County Tyrone accounted for 19% of the pesticide-treated area and 25% of the total weight of pesticides used on grassland and fodder crops. Approximately 50% of all herbicide applications were recorded in Counties Antrim and Tyrone. Fungicides, herbicides, insecticides and seed treatments were recorded in Counties Down and Londonderry, accounting for 30% of the pesticide-treated area and 21% of the weight of pesticides applied. County Armagh represented 12% of the pesticide-treated area and 16% of the weight pesticides applied. County Fermanagh recorded 13% of the total land used for grassland and fodder crops, accounting for 7% of the total pesticide-treated area and 9% of the total weight of pesticide applied.

PESTICIDE USAGE ON CROPS

Established grassland crops represented 80% and 81% of the pesticide-treated area and weight of active ingredients applied to grassland and fodder crops in Northern Ireland in 2005, respectively (Tables 6 & 7). Sown crops, including arable silage, reseeds and fodder crops, accounted for the remaining 20% and 19% of the pesticide-treated area and weight of pesticides applied, respectively. Grassland, used for

enclosed grazing or silage production, including grass, arable and fodder maize, represented 94% of the total treated area of grassland and fodder crops and 93% of the total weight of pesticides applied. A majority of crop types received herbicide treatment, with the exceptions of fourth-cut silage, fodder kale, rape and turnip. The use of fungicides was confined to arable crops. Seed treatments were applied to arable silage, undersown arable silage, undersown cereals and grass reseeds. Fourth-cut grass silage, fodder turnip and kale received no applications of any pesticide type. Grassland used for rough grazing represented 4% of the total pesticide-treated area (Tables 6 & 7).

PROPORTION OF CROPS TREATED

The proportion of each crop treated with the different pesticide groups and the number of pesticide applications to each crop type is shown in Table 8. Approximately 9% of the total area of grassland and fodder crops grown in 2005 received at least a single treatment with pesticides. Generally, pesticide application was confined to seed treatment and a single herbicide application. More than 12% of the area assigned for first-cut grass silage production received herbicide treatments. However, 10% and 4% of the areas assigned for 2nd and 3rd silage cuts received herbicides, respectively. Approximately 94% of the area of arable silage was treated with a herbicide, receiving on average, 1.4 applications. It was estimated that 84% of maize crop area received herbicide and 80% was sown with treated seed. Fungicides were applied to 20% of the arable silage crop area. All fodder beet crops received, on average, 2 applications of herbicides and 31% of the fodder rape crop area was sown with treated seed.

TOTAL PESTICIDE USAGE

An estimated total of 85.9 tonnes of pesticides were applied to 128,786 spray hectares of grassland and fodder crops during 2005 (Tables 9 & 10). Herbicides accounted for 92% of the pesticide-treated area and represented approximately 98% of the weight of pesticides applied. Seed treatments and fungicides accounted for a further 4% and 2% of the treated area respectively. The weight of seed treatment and fungicide active ingredients applied both represented less than 1% of the total active ingredients used. Insecticides and growth regulators collectively accounted for the remainder of the total pesticide usage. No molluscicides were recorded in use during the survey period.

Fungicides were recorded in use only on arable crops. The most extensively used fungicide was the active ingredient epoxiconazole, used only on arable silage representing 29% of the fungicide treated area but only 5% of the weight of fungicides applied.

Grassland used for silage production and enclosed grazing accounted for 82% of the total area of herbicide applications. The most extensively used herbicide formulation on grassland and fodder crops was fluroxypyr/triclopyr, accounting for 30% of the herbicide-treated area. The herbicide most frequently used on fodder crops was the triazine herbicide atrazine, accounting for 53% of the herbicide-treated area of fodder crops. Atrazine was used exclusively on fodder maize.

Chlorpyrifos, deltamethrin, esfenvalerate and lambda-cyhalothrin were the only insecticide active ingredients recorded. Chlorpyrifos was the most extensively used insecticide representing 51% of the insecticide-treated area and 97% of the weight of insecticide active ingredients applied. It was applied to

control leatherjackets (*Tipula spp*.) on enclosed grazing and cutworms (*Agrotis spp.*) on both enclosed grazing and arable silage.

The single active ingredients chlormequat and trinexapac-ethyl were the only growth regulators recorded. Trinexapac-ethyl was applied to arable silage whereas chlormequat was applied to both undersown and non-undersown arable silage.

Fodder maize accounted for 43% of the grassland and fodder crops sown with treated seed. The remainder comprised arable silage (28%), undersown arable silage (16%), grass reseeds (7%), undersown cereals (6%) and fodder rape (1%). The seed treatment fludioxonil, applied either as a single active ingredient or in formulation with metalalaxyl-M, accounted for approximately 64% of the total area sown with treated seed whereas methiocarb represented 27%.

The thirty-nine active ingredients recorded in use on grassland and fodder crops, ranked by spray area and weight applied, are shown in Tables 11 and 12, respectively. The top eleven active ingredients in each category were herbicides including triclopyr, MCPA, fluroxpyr, mecoprop-P, dicamba, glyphosate, and metsulfuron-methyl.

PESTICIDE USAGE ON ESTABLISHED GRASSLAND CROPS

Enclosed grazing (Table 13)

Herbicides and insecticides were the only pesticides applied to enclosed grazing areas. Control of dock (*Rumex* spp.) and rushes (*Juncus* spp.) accounted for 41% and 26% of the herbicide application to this crop, respectively. Eleven herbicides were used to control docks with approximately 62% of applications using the formulation fluroxypyr/triclopyr. The phenoxyacetic herbicide MCPA was most extensively used for the control of rushes (*Juncus* spp.) contributing 65% of herbicide applications for this purpose.

Chlorpyrifos was used to control leatherjackets (*Tipula spp*.) and cutworms (*Agrotis spp.*) on this crop.

Grass silage first cutting (Table 14)

An estimated 259,213 hectares of first-cut grass silage were grown in Northern Ireland in 2005 with County Tyrone accounting for 22% (Table 3). Approximately 14% of land allocated to the first cutting of grass silage received applications of pesticide. Herbicides and insecticides were the only pesticide groups applied to this area. Herbicides to control docks (*Rumex* spp.) accounted for 75% of the area of application. The formulation fluroxypyr/triclopyr was most extensively used for this purpose.

Insecticide applications were exclusively for the control of leatherjackets (*Tipula spp*.).

Grass silage second cutting (Table 15)

The area of grassland allocated for second cutting of grass silage was estimated to be 135,426 hectares, representing 52% of that in the first cut (Table 3). Herbicides were the only pesticide applied to grassland areas in the interval between the first and second cutting of grass silage. Dock (*Rumex* spp.) control accounted for 93% of herbicide applications. Approximately 6% of herbicide applications were for

general weed control with the remaining 1% to control rushes (*Juncus* spp.). The formulation fluroxypyr/triclopyr was the most extensively used herbicide formulation comprising 49% of all herbicide applications to this crop type.

Grass silage third cutting (Table 16)

Approximately 10% of ground allocated for second-cut grass silage production was cut on a third occasion, totalling 13,791 hectares (Table 3). Mecoprop was the only pesticide recorded, used to treat 539 spray hectares to control docks (*Rumex spp*.) .

Grass silage fourth cutting

Fourth-cut grass silage was recorded for the first time and was estimated to be 1275 hectares. This represented 9% of ground allocated for third cut silage. No pesticides were recorded as applied to this area.

Hay (Table 17)

An estimated 16,744 hectares were allocated to hay production in Northern Ireland in 2005 (Table 3). Less than 2% of this crop received a single application of herbicide, the only pesticide group applied to this crop type. MCPA was used to control rushes (*Juncus* spp.) on 260 hectares of this crop.

Rough grazing (Table 18)

Approximately 3% of the rough grazing area received herbicide treatment, the only pesticide group applied to this crop type (Table 8). Control of rushes (*Juncus* spp.), was the principal single reason given for pesticide application, accounting for 77% of the treated area. MCPA was the most frequently-used herbicide active ingredient for this purpose. Briars (*Rubus spp*.), thistles (*Cirsium spp*.) and docks (*Rumex spp*.) were also controlled.

PESTICIDE USAGE ON SOWN CROPS

Arable silage (Table 19)

Approximately 2,667 hectares of arable silage were grown in Northern Ireland in 2005 (Table 3). An estimated 41% was grown in County Down and 37% in County Antrim. Applications of herbicides and desiccants to arable silage accounted for 41% of the pesticide-treated area (78% of the weight of pesticide applied), seed treatments 23% (1%), fungicides 15% (11%), insecticides 15% (6%) and growth regulators 6% (6%) (Tables 9 & 10).

The herbicide most extensively used was glyphosate, applied exclusively for weed control during ground preparation. However, the formulation dicamba/MCPA/mecoprop-P and the single active ingredient mecoprop-p were also commonly used. Approximately 65% of herbicides were applied for general weed control with 24% ground preparation and 11% to control chickweed.

The systemic protectant and curative triazole fungicide epoxiconazole, applied as a single active ingredient, was the most extensively used fungicide accounting for 48% of the fungicide-treated area and 10% of the weight applied.

Chlorpyrifos was applied to control cutworms (*Agrotis spp.*) with deltamethrin, esfenvalerate and lambda-cyhalothrin applied for 'general insect control'.

Chlormequat and trinexapac-ethyl were applied as single active ingredients for growth regulation.

Approximately 58% of the arable silage area was sown with treated seed (Table 8). The formulation fludioxonil/metalaxyl-M was the most extensively-used seed treatment representing 73% of the area sown with treated seed and 55% of the weight of seed treatment active ingredients applied (Table 9 & 10).

Arable silage (undersown) (Table 20)

Herbicides accounted for 69% of the pesticide-treated area of undersown arable silage (92% of the weight of pesticide applied), seed treatments 20% (<1%), fungicides 6% (6%), insecticides 4% (<1%) and growth regulators 2% (2%) (Tables 9 & 10). The single active ingredient glyphosate, used primarily for weed control during ground preparation, accounted for 34% of the herbicide-treated area and 59% of the weight of herbicide active ingredients applied. Approximately 66% of herbicides were applied for 'general weed control'.

The single active ingredient chlorothalonil, along with the formulation propiconazole/tebuconazole were the only fungicides used.

Esfenvalerate and chlormequat were the only insecticides and growth regulators applied, respectively.

Cereals (undersown) (Table 21)

Fungicides, herbicides and seed treatments were applied to this crop type (Table 9 & 10). Fungicides were applied to 21% of undersown cereals for 'general disease control' in the cereal component of the crop. Three active ingredients were recorded, used either individually or in formulation.

Herbicides were applied to 66% of undersown cereal crops. 'General weed control' was the primary reason provided for herbicide applications and the single active ingredient metsulfuron-methyl was most frequently used, accounting for 36% of the herbicide-treated area.

Approximately 21% of undersown cereals were sown with fludioxonil-treated seed (Tables 8, 9 & 10).

Grass reseeds (Table 22)

Herbicides were generally applied as one spray application to 23% of grass reseeds (Table 8). Glyphosate, used during 'pre-sowing ground preparation', accounted for 76% of herbicide usage.

The seed treatment fludioxonil was applied to 2% of grass reseeds, representing 7% of the pesticide-treated area and less than 1% of the weight of pesticides applied (Tables 8, 9 & 10).

PESTICIDE USAGE ON FODDER CROPS

A total of 3,092 hectares of fodder crops were grown in Northern Ireland in 2005. This represented less than 1% of the total area of grassland and fodder crops grown. County Antrim accounted for 52% of the total fodder crops grown, which was entirely due to the production of fodder maize. Counties Londonderry, Down and Armagh accounted for 23%, 22% and 3%, respectively (Table 3). No fodder crops were grown in Counties Fermanagh and Tyrone. Pesticide usage on fodder crops represented approximately 5% of the pesticide-treated area and 7% of the total weight of pesticides used (Table 9 & 10).

Fodder beet (Table 23)

Fodder beet had not been recorded as grown during 2003. However, 85 hectares were grown in 2005, exclusively in County Down. This received two spray applications of the single active ingredient metamitron for general weed control.

Fodder kale

The growing of fodder kale was confined to 17 hectares in County Down, representing less than 1% of the total area of fodder crops sown in Northern Ireland in 2005. This compared with 335 hectares grown in 2003 and 45 hectares grown in 1997. No pesticide applications were recorded for fodder kale.

Fodder maize (Table 24)

Fodder maize had not been recorded in previous surveys conducted in 1989 and 1993, and only 10 hectares was recorded in 1997. However, in 2003, 1,463 hectares of fodder maize were recorded, with 92% occurring in County Tyrone. In 2005 2,423 hectares were recorded, with 66% being grown in County Antrim, 30% in County Londonderry and 4% in County Armagh (Table 3). Pesticide usage on fodder maize represented 96% and 90% of the pesticide-treated area and weight of pesticides applied to fodder crops, respectively. In 2005, approximately 80% of fodder maize was sown using seed treated with the single active ingredient methiocarb along with the formulation fludioxonil/metalaxyl-M (Tables 8, 9 &10). The herbicide atrazine was applied to 2,028 spray hectares of fodder maize and pendimethalin 1,138 spray hectares.

Fodder rape

In 2005, an approximate total of 192 hectares of fodder rape was grown entirely in County Down representing 6% of the area of fodder crops grown (Table 3). Fodder rape was previously been recorded in 1997 and 2003. No pesticide sprays were applied and 31% of fodder rape was sown with seed treated with thiram (Tables 8, 9 &10).

Fodder turnip

No pesticides or seed treatments were applied to the 375 hectares of fodder turnips grown exclusively in Co Down during 2005.

COMPARISON WITH PREVIOUS SURVEYS

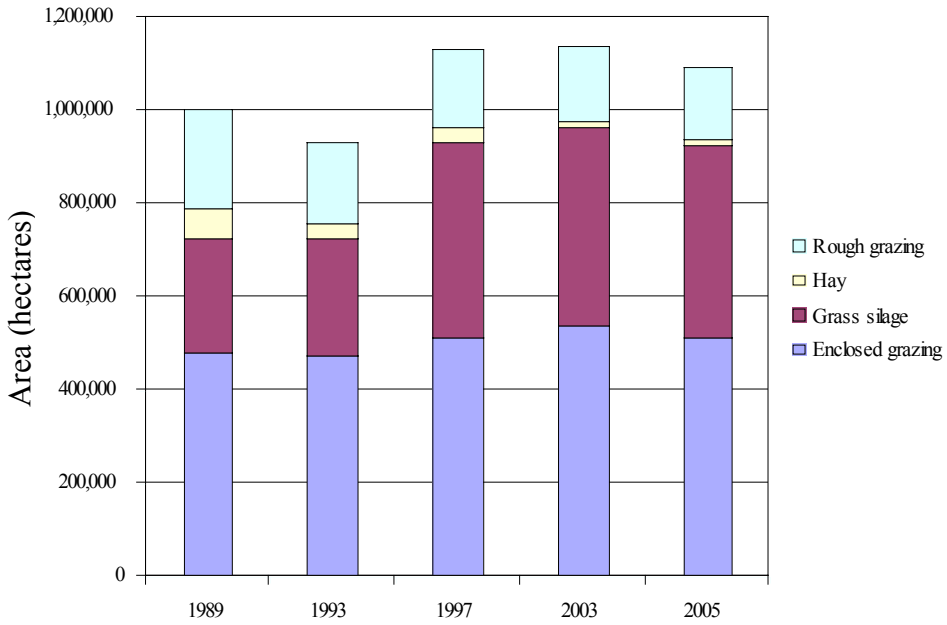
Comparison of the areas of grassland and fodder crops surveyed (Table 25)

Overall, the area of grassland and fodder crops grown decreased by 3% and 6% when compared to that previously recorded in 1997 and 2003. Areas of established grassland crops showed a small reduction of 4% to those recorded in these years. The areas of sown crops have decreased by 46% and the area of fodder crops grown in Northern Ireland in 2005 increased by 28% when compared with 2003. This represents an approximate six fold increase when compared with 1997.

Established grassland crops (Figure 3)

The decline in the area of rough grazing ground recorded between 1989 and 2003 continued with a further 8% reduction observed in 2005. However, the area of hay grown in 2005 increased by 40% when compared to that grown in 2003 but was only approximately 50% of that grown in 1997 and 1993. The area of grassland used for enclosed grazing and grass silage had remained relatively constant between 1989 and 1993, but increased by 28% in 1997. During 2003 this showed a further increase of 4%. However, in 2005 these crops returned to levels similar to those recorded in 1997. In keeping with 1997 and 2003, the areas and pesticide treatments on individual grass silage cuttings were recorded separately.

Figure 3 Comparison of the area of established grassland crops grown in Northern Ireland, 1989 - 2005.

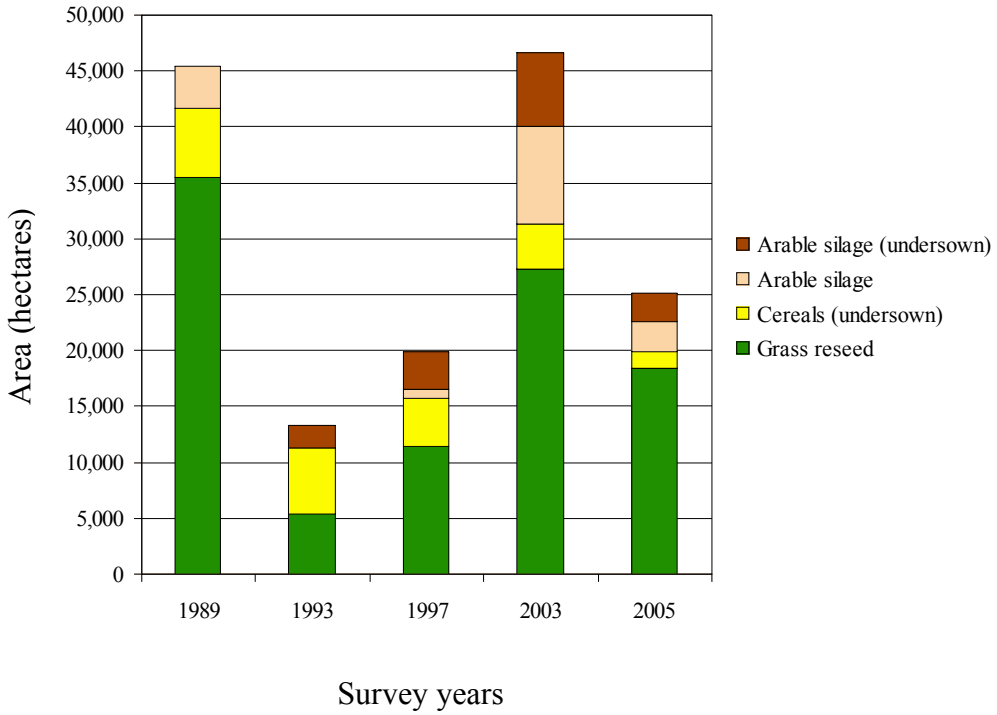


Sown crops (Figure 4)

In Northern Ireland the area of sown crops grown had increased from 19,830 hectares in 1997 to 46,600 hectares during 2003, with all sown crops, except for undersown cereals, showing increased production. However, 2005 data show a reversal of this with all sown crops showing a 46% decrease to 25,197

hectares being recorded. The arable silage area, which had increased by more than eleven-fold between 1997 and 2003, reduced by three-fold when compared with 2003. No arable silage production was recorded in 1993. Undersown arable silage production, which had increased by 97% between 1997 and 2003, reduced over two-fold whenever compared with 2003. Grass reseeds decreased by 33% to 18,350 hectares when compared with 2003 and were 48% below the 35,434 hectares first recorded in 1989.

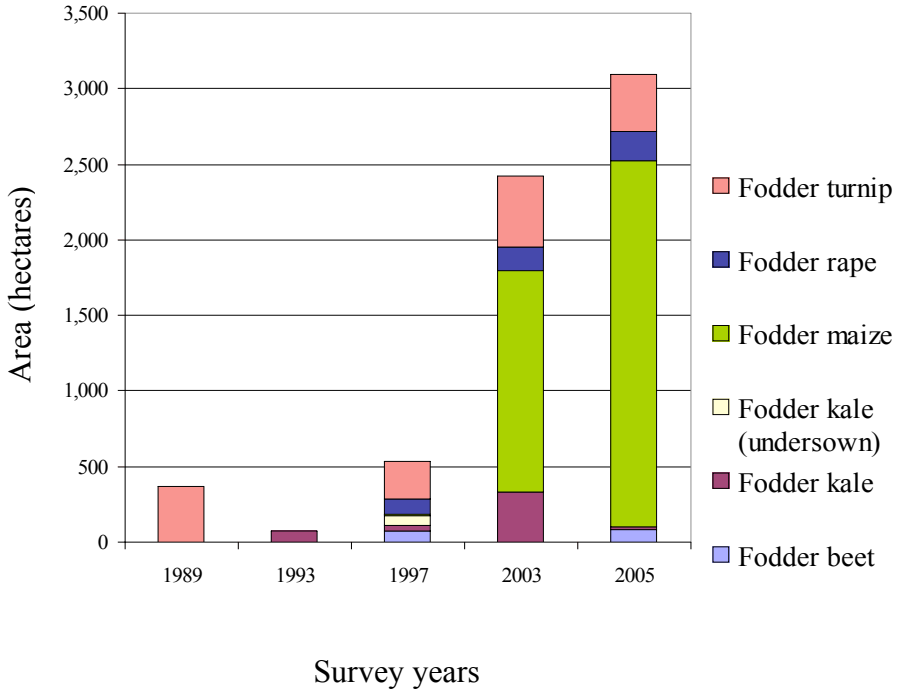
Figure 4 The area of sown crops grown in Northern Ireland, 1989 - 2005.



Fodder crops (Figure 5)

Approximately 3,092 hectares of fodder crops were grown in 2005. This was a 28% increase compared to that recorded in 2003. This increase was mainly due to a significant increase in fodder maize production, from 10 hectares in 1997, 1,463 hectares in 2003 to 2,423 hectares in 2005. The area of fodder kale grown, which had increased by more than seven-fold when between 1997 and 2003, decreased to the lowest recorded area of 17 hectares, exclusively grown in County Down. During 2005, the area of fodder rape grown increased by 22% when compared with 2003. However, the area of fodder turnips grown decreased by 19% over the same period. Undersown kale was not recorded as grown in the 2003 survey.

Figure 5 The area of fodder crops grown in Northern Ireland, 1989 - 2005.



Comparison of pesticide usage (Table 26 & Figures 6, 7, 8, 9, 10 & 11)

The area of grassland and fodder crops receiving pesticide treatment decreased by 28% when compared to 2003. However this represented increases of 7%, 41% and 17% when compared to previous surveys conducted in 1997, 1993 and 1989, respectively. In contrast, the weight of pesticides applied in 2005 decreased by 16% (compared to 2003), 49% (1997), 36% (1993) and 30% (1989). This was due to the significant reduction of pesticides applied to sown crops, although applications to established grassland crops also reduced. However, the weight of pesticide applied per spray hectare increased by 16% when compared with 2003.

During 2005, the pesticide-treated area and weight of pesticides applied to established grassland crops reduced by 18% and 10%, respectively, when compared with 2003. This was due to reductions in applications to both enclosed grazing and grass silage. However, these reductions were partially offset by increases in applications to areas of hay and rough grazing.

Pesticide usage on sown grassland crops had increased significantly in 2003 when compared with previous surveys conducted in 1993 and 1997 but had decreased when compared with 1989, although the areas grown during 2003 are similar to the earlier survey. During 2005, pesticide applications returned to levels similar to 1997. This trend was repeated with the weight of pesticides applied and a 54% decrease was observed when comparing 2003 to 2005. The pesticide-treated area of arable silage decreased by 72% when compared with 2003 while the weight of pesticide applied decreased by 74% during the same period. This also reflected the reduction in area grown.

The pesticide-treated area of fodder crops had increased significantly from 1,370 spray hectares in 1997 to 7,496 spray hectares in 2003 due to the significant increase in the production of fodder maize. However, in

Figure 6 The area treated (spray hectares) of established grassland crops in Northern Ireland, 1989 - 2005.

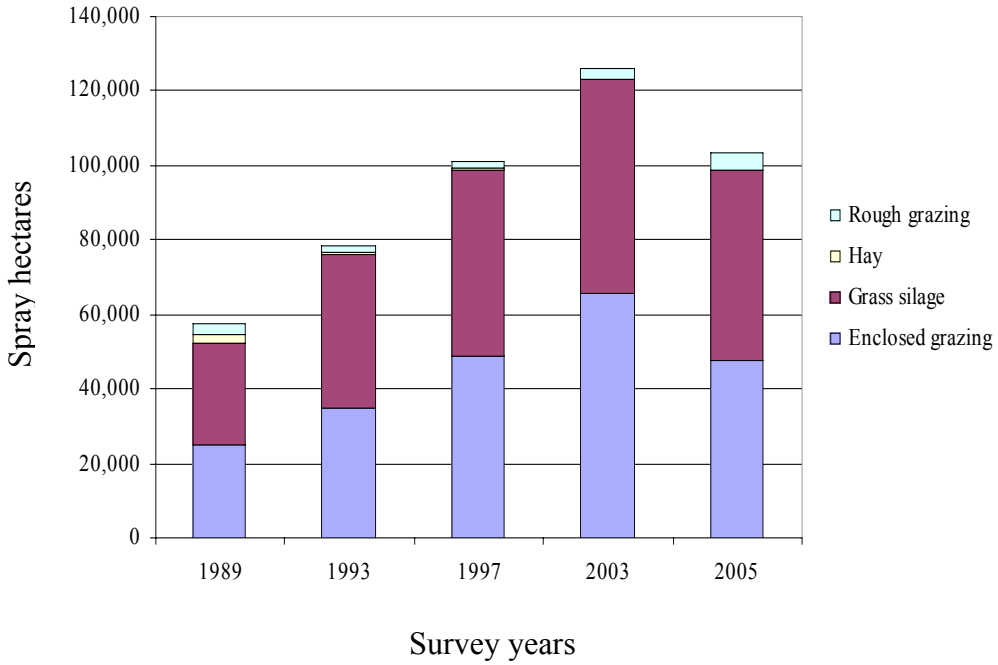
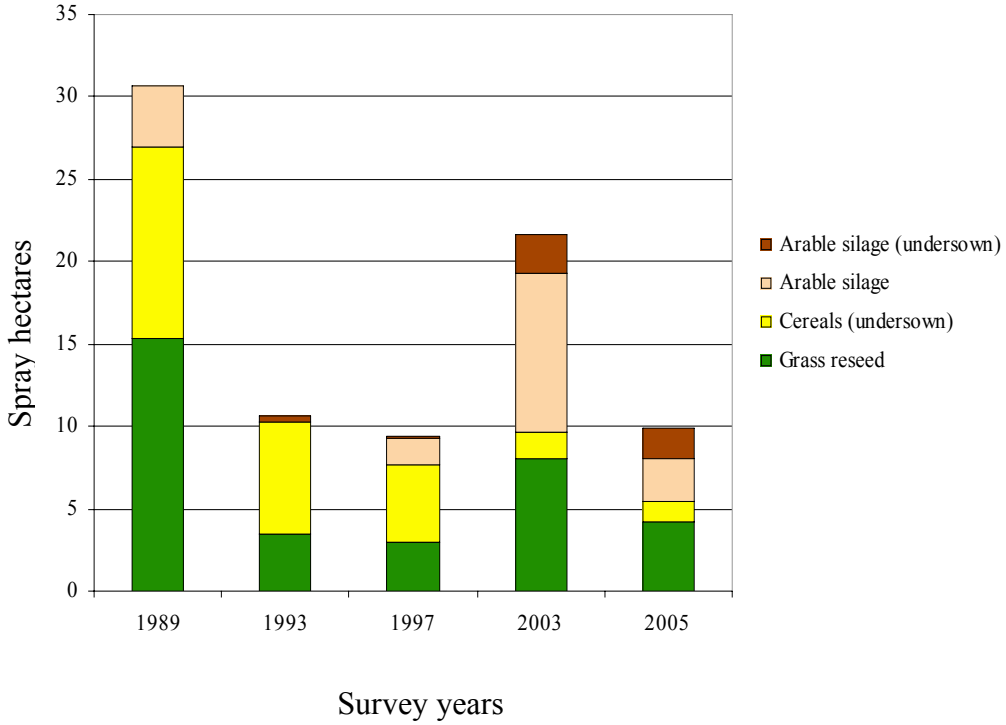


Figure 7 The area treated (spray hectares) of sown crops in Northern Ireland, 1989 - 2005.



2005 the pesticide-treated area decreased by 17% to 6,222 spray hectares when compared to 2003. This reduction can partially be attributed to a decrease in seed treatments being applied to fodder maize. The weight of pesticide applied increased from 3.4 tonnes to 6.4 tonnes. This was due to a 66% increase in the area of fodder maize grown along with a 74% increase in atrazine application rates.

Figure 8 The area treated (spray hectares) of fodder crops in Northern Ireland, 1989 - 2005.

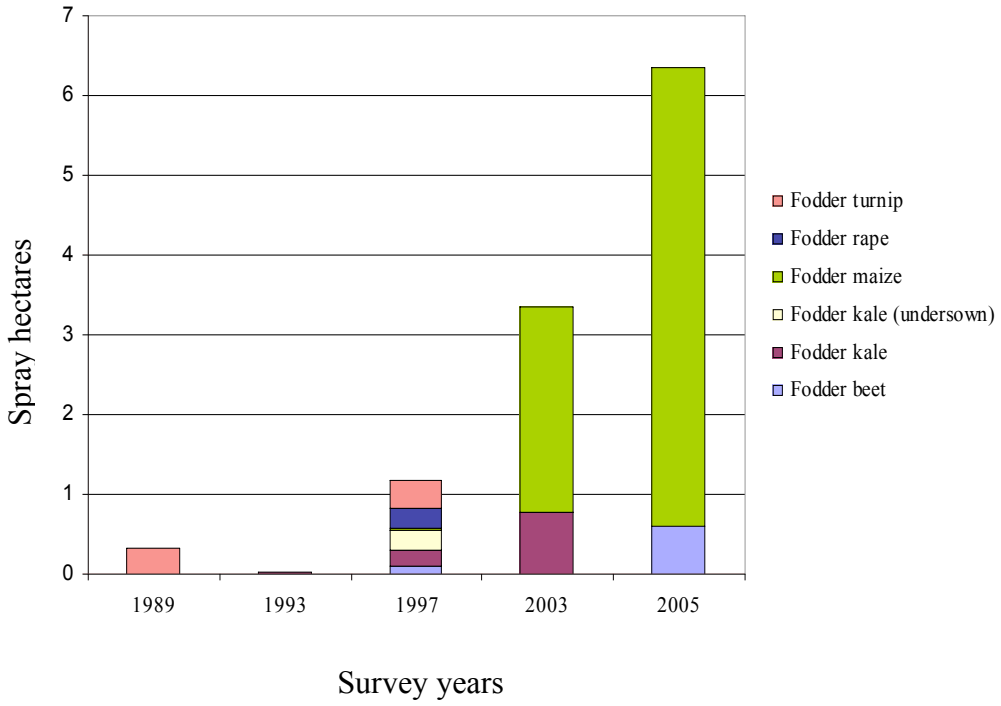
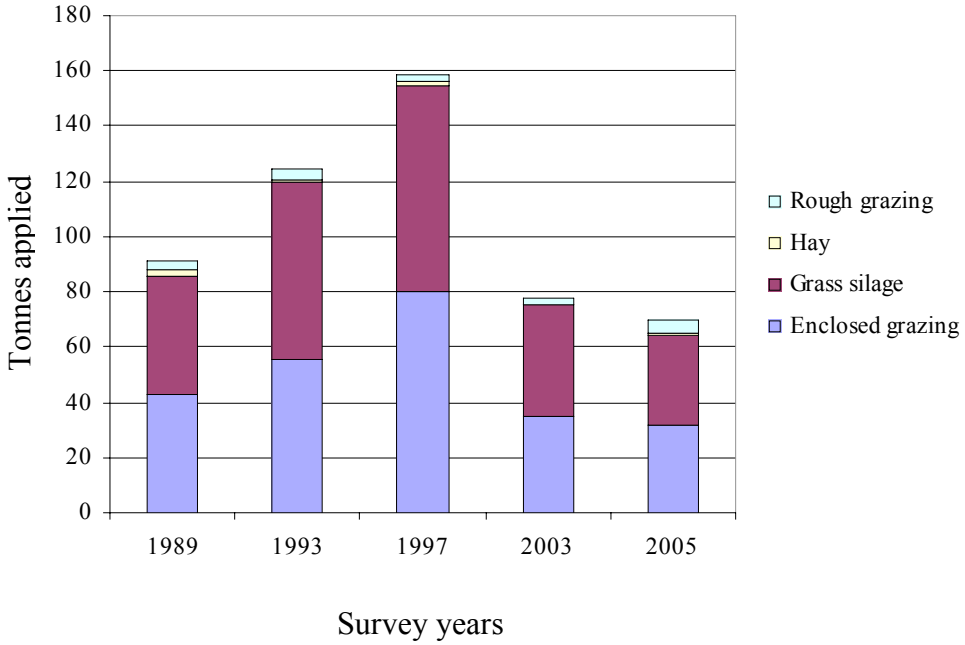


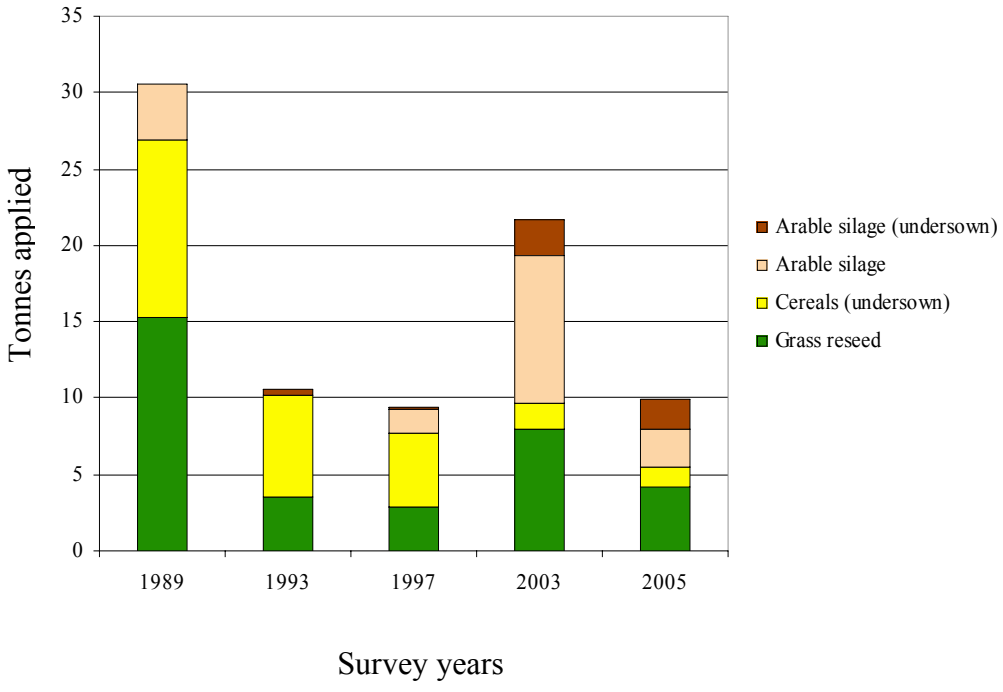
Figure 9 The weight of pesticides applied (tonnes) to established grassland crops in Northern Ireland, 1989 - 2005.



A comparison of usage of different pesticide types on grassland and fodder crops between 1989 and 2005, with relative differences, are shown in Tables 27 and 28. Fungicide usage, which had increased in the four-year period 1997 to 2003 decreased by 78% during 2005. This was due to the overall decrease of the area of sown crops grown along with reduced applications. Propiconazole was the only fungicide active ingredient recorded in 1989, and triadimenol/tridemorph were the fungicides recorded in use in 1993. In 1997 the fungicides propiconazole/tridemorph and tebuconazole, used on undersown cereals, and mancozeb, applied to undersown fodder kale, were recorded. In 2003, ten fungicides were specified as applied to undersown and non-undersown arable silage and undersown cereals. Of these, tebuconazole was the most extensively used. During 2005, seven fungicides were applied to these arable crops with epoxiconazole the most extensively used.

Herbicides remained the most extensively used pesticide type on grassland and fodder crops. Applications of this pesticide type had increased when 2003 data was compared with 1989, 1993 and 1997, along with the weight applied decreasing over these periods. However, between 2003 and 2005 a 21% reduction in herbicide-treated area was recorded along with a further 14% reduction of weight of herbicides applied. In 2005, triclopyr, MCPA and fluoxypyr were the most frequently used herbicide active ingredients. The main reason given for herbicide applications was dock (*Rumex* spp.) control.

Figure 10 The weight of pesticides applied (tonnes) to sown crops in Northern Ireland, 1989 - 2005.

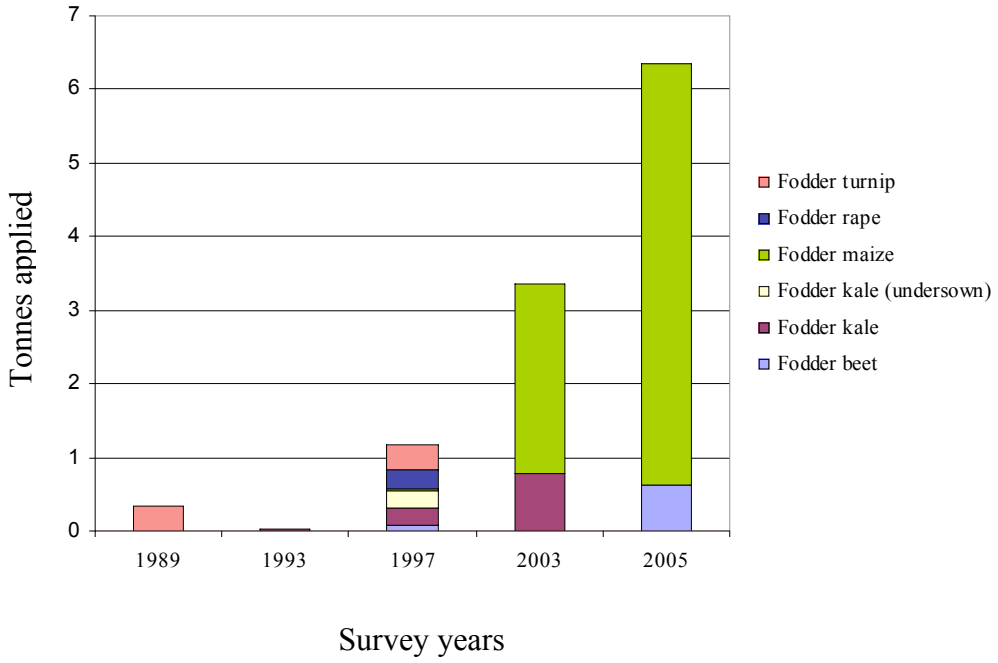


In 1989, chlorfenvinphos was used on fodder turnips to control cabbage root fly (*Delia radicum*) and a small area of grass undersown with cereals was treated with deltamethrin. No insecticide was recorded in use on any crop type in 1993. Insecticide usage in 1997 was minimal and restricted to 8 hectares of fodder turnips receiving treatments of γ-HCH for flea beetle (*Phyllotreta* spp.) control. During 2003 insecticide application increased significantly. Cypermethrin was applied to both arable silage and undersown cereals

to control aphids and chlorpyrifos was applied to fodder kale and grass reseeds to control caterpillars and leatherjackets (*Tipula spp.*), respectively. In 2005, insecticide applications again increased significantly. Chlorpypifos was applied to enclosed grazing to control leatherjackets (*Tipula spp.*) and cutworm (*Agrotis spp.*). Although the area of arable silage grown reduced, the insecticide-treated area increased with 'general insect control' being the main reason for use.

Prior to 1997, growth regulators had not been recorded in use on grassland and fodder crops. However, in 1997, 2-chloroethylphosphonic acid was applied to 4% of undersown cereal crops for straw/stem length regulation. Applications of growth regulators increased significantly in 2003, with chlormequat the only growth regulator recorded as used. This was applied to 1,615 spray hectares of arable silage and 255 spray hectares of undersown arable silage. In 2005, growth regulator applications reduced almost four-fold when compared with 2003. Chlormequat was applied to 83 hectares of undersown arable silage. However, both trinexapac-ethyl and chlormequat applications were recorded on a total of 403 hectares of non-undersown arable silage.

Figure 11 The weight of pesticides applied (tonnes) to fodder crops in Northern Ireland, 1989 - 2005.



In 2003 the area of crops sown with treated seed increased by 75% when compared with 1997. However, during 2005 a 69% reduction was observed when compared with the previous survey and was 85% less than first recorded in 1989. The weight of seed treatment applied in 2005 showed a 34%, 62% and 81% decrease when compared to 2003, 1997 and 1989, respectively. In contrast, this has more than doubled when compared to seed treatments in 1993.

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Table 1 **Number of farms in each size class with grassland and fodder crops in the Northern Ireland June 2005 census and the number of samples from each class.**

	Size group (hectares)													
	< 10		10 < 20		20 <30		30 < 50		50 < 100		100+		Total	
County	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled	Holdings in strata	Holdings sampled
Antrim	798	3	843	4	664	3	929	12	974	20	432	21	4,640	63
Armagh	1,070	2	1,071	5	614	3	592	9	345	2	70	6	3,762	27
Down	1,285	3	1,182	7	751	4	854	8	692	19	210	8	4,974	49
Fermanagh	430	3	751	3	573	5	694	7	539	11	183	7	3,170	36
Londonderry	654	3	737	3	497	5	651	7	645	13	297	15	3,481	46
Tyrone	1,108	3	1,492	9	1,109	11	1,313	15	1,090	20	351	15	6,463	73
Northern Ireland	**5,345**	**17**	**6,076**	**31**	**4,208**	**31**	**5,033**	**58**	**4,285**	**85**	**1,543**	**72**	**26,490**	**294**

Table 2 **The total number and area (hectares) of crops sampled, and the proportion (%) of the total area of grassland and fodder crops surveyed in Northern Ireland, 2005.**

CROP	Number of crops surveyed	Survey area (ha)	Proportion of crops surveyed (%)
Established grassland crops			
Enclosed grazing	281	10,455	2.0
Grass silage 1st cut	269	5,039	1.9
Grass silage 2nd cut	178	2,939	2.2
Grass silage 3rd cut	25	404	2.9
Grass silage 4th cut	1	49	3.8
Hay	76	245	1.5
Rough grazing	151	4,645	3.1
Sown crops			
Arable silage	10	77	2.9
Arable silage (undersown)	15	73	2.7
Cereals (undersown)	10	44	2.9
Grass reseed	86	356	1.9
Fodder crops	18	60	1.9
All crops	**1,120**	**24,385**	**2.2**

Table 3 **Estimated area (hectares) of grassland and fodder crops grown regionally in Northern Ireland 2005.**

CROP	County						
	Antrim	Armagh	Down	Fermanagh	Londonderry	Tyrone	Northern Ireland
Established grassland crops							
Enclosed grazing	108,924	43,493	90,584	65,898	81,299	126,848	517,045
Grass silage 1st cutting	48,852	34,669	43,409	39,912	34,983	57,388	259,213
Grass silage 2nd cutting	27,276	22,329	24,168	17,022	19,638	24,992	135,426
Grass silage 3rd cutting	2,051	1,544	7,644	1,400	864	288	13,791
Grass silage 4th cutting	.	.	1,275	.	.	.	1,275
Hay	4,606	1,838	3,242	3,283	2,220	1,554	16,744
Rough grazing	43,752	2,514	10,704	20,665	29,192	41,758	148,586
Sown crops							
Arable silage	994	156	1,095	.	422	.	2,667
Arable silage (undersown)	658	.	.	.	1,519	506	2,683
Cereals (undersown)	759	123	52	.	564	.	1,497
Grass reseed	3,730	3,219	3,299	2,086	1,914	4,102	18,350
Fodder crops							
Fodder beet	.	.	85	.	.	.	85
Fodder kale	.	.	17	.	.	.	17
Fodder maize	1,602	101	.	.	719	.	2,423
Fodder rape	.	.	192	.	.	.	192
Fodder turnip	.	.	375	.	.	.	375
All crops	**243,204**	**109,986**	**186,141**	**150,267**	**173,333**	**257,437**	**1,120,368**

Table 4 **Estimated area (spray hectares) of grassland and fodder crops treated regionally with each pesticide type in Northern Ireland 2005.**

	County						
Pesticide type	**Antrim**	**Armagh**	**Down**	**Fermanagh**	**Londonderry**	**Tyrone**	**Northern Ireland**
Fungicides	1,119	.	319	.	339	.	1,776
Herbicides	34,696	15,828	13,806	9,148	20,523	24,497	118,499
Insecticides	437	.	212	.	1,396	453	2,498
Growth regulators	486	.	.	.	.	.	486
Seed treatments	3,008	123	642	.	1,755	.	5,527
Total	**39,746**	**15,951**	**14,979**	**9,148**	**24,013**	**24,950**	**128,786**

Table 5 **Estimated quantity (kilograms) of pesticides applied to grassland and fodder crops regionally in Northern Ireland 2005.**

	County						
Pesticide type	**Antrim**	**Armagh**	**Down**	**Fermanagh**	**Londonderry**	**Tyrone**	**Northern Ireland**
Fungicides	371	.	46	.	85	.	502
Herbicides	23,946	13,760	6,825	7,361	10,952	21,377	84,221
Insecticides	158	.	1	.	442	66	667
Growth regulators	159	.	.	.	.	.	159
Seed treatments	226	1	6	.	71	.	304
Total	**24,860**	**13,761**	**6,879**	**7,361**	**11,550**	**21,443**	**85,854**

Table 6 **The total area (spray hectares) and the basic area (hectares), (in parentheses), of grassland and fodder crops treated, in Northern Ireland 2005, with each pesticide type.**

	Pesticide type											
	Fungicides		Herbicides		Insecticides		Growth Regulators		Seed treatments		All pesticides	
CROP	sp ha	(ha)	sp ha	(ha)	sp ha	(ha)	Sp ha	(ha)	sp ha	(ha)	sp ha	(ha)
Established grassland crops												
Enclosed grazing	.	.	46,237	(36,883)	1,166	(1,166)	.	.	.	.	47,403	(37,184)
Grass silage 1st cutting	.	.	36,408	(31,105)	134	(134)	.	.	.	.	36,543	(31,240)
Grass silage 2nd cutting	.	.	14,059	(13,248)	.	.	.	.	.	.	14,059	(13,248)
Grass silage 3rd cutting	.	.	539	(539)	.	.	.	.	.	.	539	(539)
Grass silage 4th cutting	.	.	.	.	.	.	.	.	.	.	.	
Hay	.	.	260	(260)	.	.	.	.	.	.	260	(260)
Rough grazing	.	.	4,637	(4,622)	.	.	.	.	.	.	4,637	(4,622)
Sown crops												
Arable silage	1,055	(509)	2,775	(2,089)	1,037	(931)	403	(403)	1,544	(1,544)	6,814	(2,511)
Arable silage (undersown)	241	(241)	2,949	(2,181)	161	(161)	83	(83)	867	(867)	4,301	(2,181)
Cereals (undersown)	480	(480)	1,530	(1,133)	.	.	.	.	312	(312)	2,323	(1,133)
Grass reseed	.	.	5,303	(4,258)	.	.	.	.	383	(383)	5,685	(4,641)
Fodder crops												
Fodder beet	.	.	85	(85)	.	.			.	.	170	(85)
Fodder kale	.	.	.	.	.	.	.	.	.	.	.	
Fodder maize	.	.	2,028	(2,028)	.	.	.	.	2,362	(1,927)	5,993	(2,028)
Fodder rape	.	.	.	.	.	.	.	.	59	(59)	59	(59)
Fodder turnip	.	.	.	.	.	.	.	.	.	.	.	.
All crops	**1,776**	**(1,231)**	**118,499**	**(98,431)**	**2,498**	**(2,392)**	**486**	**(486)**	**5,527**	**(5,091)**	**128,786**	**(99,730)**

Table 7 **Total weight (kilograms) of each pesticide type applied to grassland and fodder crops in Northern Ireland 2005.**

CROP	Fungicides	Herbicides	Insecticides	Growth regulators	Seed treatments	Total
Established grassland crops						
Enclosed grazing	.	31,312	519	.	.	31,832
Grass silage 1st cutting	.	23,729	.	.	.	23,729
Grass silage 2nd cutting	.	8,688	.	.	.	8,688
Grass silage 3rd cutting	.	324	.	.	.	324
Grass silage 4th cutting	.	.	.	.	.	.
Hay	.	340	.	.	.	340
Rough grazing	.	4,700	.	.	.	4,700
Sown crops						
Arable silage	271	1,984	148	121	20	2,544
Arable silage (undersown)	110	1,708	1	38	7	1,865
Cereals (undersown)	120	1,168	.	.	3	1,291
Grass reseed	.	4,192	.	.	2	4,194
Fodder crops						
Fodder beet	.	612	.	.	.	612
Fodder kale	.	.	.	.	.	.
Fodder maize	.	5,464	.	.	271	5,735
Fodder rape	.	.	.	.	1	1
Fodder turnip	.	.	.	.	.	.
All crops	**502**	**84,221**	**667**	**159**	**304**	**85,854**

Table 8 **The proportional area (%) of each crop treated with pesticides and the number of spray applications (in parentheses) in Northern Ireland, 2005.**

CROP	Fungicides		Herbicides		Insecticides		Growth regulators		Seed treatments	All pesticides	
	%	sp apps	%	sp apps	%	sp apps	%	sp apps	%	%	sp apps
Established grassland crops											
Enclosed grazing	.	.	7.1	(1.0)	0.2	(1.0)	.	.	.	7.2	(1.0)
Grass silage 1st cutting	.	.	12.0	(1.1)	>0.1	(1.0)	.	.	.	12.1	(1.1)
Grass silage 2nd cutting	.	.	9.8	(1.0)	.	.	.	.	.	9.8	(1.0)
Grass silage 3rd cutting	.	.	3.9	(1.0)	.	.	.	.	.	3.9	(1.0)
Grass silage 4th cutting	.	.	.	.	.	.	.	.	.	.	.
Hay	.	.	1.6	(1.0)	.	.	.	.	.	1.6	(1.0)
Rough grazing	.	.	3.1	(1.0)	.	.	.	.	.	3.1	(1.0)
Sown crops											
Arable silage	19.1	(2.0)	78.3	(1.4)	34.9	(1.2)	15.1	(1.0)	57.9	94.2	(1.4)
Arable silage (undersown)	9.0	(1.0)	81.3	(1.4)	6.0	(1.0)	3.1	(1.0)	32.3	81.3	(1.3)
Cereals (undersown)	32.1	(1.0)	75.6	(1.2)	.	.	.	.	20.9	75.6	(1.1)
Grass reseed	.	.	23.2	(1.0)	.	.	.	.	2.1	25.3	(1.0)
Fodder crops											
Fodder beet	.	.	100.0	(2.0)	.	.	.	.	.	100.0	(2.0)
Fodder kale	.	.	.	.	.	.	.	.	.	.	.
Fodder maize	.	.	83.7	(1.7)	.	.	.	.	79.5	83.7	(1.7)
Fodder rape	.	.	.	.	.	.	.	.	30.8	30.8	.
Fodder turnip	.	.	.	.	.	.	.	.	.	.	.
											.
All crops	**0.1**	**(1.3)**	**8.8**	**(1.1)**	**0.2**	**(1.1)**	**>0.1**	**(1.0)**	**0.5**	**8.9**	**(1.1)**

Table 9 **Estimated area (spray hectares) of grassland and fodder crops treated with pesticide formulations in Northern Ireland in 2005.**

Pesticide type & formulation	Enclosed grazing	Silage 1st cut	Silage 2nd cut	Silage 3rd cut	Hay	Rough grazing	Arable silage	Arable silage (undersown)	Cereals (undersown)	Grass reseed	Fodder maize	Fodder beet	Fodder rape	All crops
Fungicides														
Azoxystrobin	.	.	.	.	.	.	106	.	.	.	.	.	.	106
Chlorothalonil	.	.	.	.	.	.	166	83	.	.	.	.	.	250
Cyproconazole/propiconazole	.	.	.	.	.	.	106	.	.	.	.	.	.	106
Epoxiconazole	.	.	.	.	.	.	509	.	.	.	.	.	.	509
Fluquinconazole/prochloraz	.	.	.	.	.	.	166	.	.	.	.	.	.	166
Propiconazole	.	.	.	.	.	.	.	.	339	.	.	.	.	339
Propiconazole/tebuconazole	.	.	.	.	.	.	.	108	142	.	.	.	.	250
Unknown fungicide	.	.	.	.	.	.	.	50	.	.	.	.	.	50
All fungicides	**.**	**.**	**.**	**.**	**.**	**.**	**1,055**	**241**	**480**	**.**	**.**	**.**	**.**	**1,776**
Herbicides														
Amidosulfuron	211	211	.	.	.	.	.	.	.	.	.	.	.	423
Asulam	169	1,008	.	.	.	407	.	.	.	.	.	.	.	1,584
Atrazine	.	.	.	.	.	.	.	.	.	.	2,028	.	.	2,028
Benazolin/2,4-DB/MCPA	286	.	.	.	.	.	.	.	308	.	.	.	.	594
Clopyralid/fluroxypyr/triclopyr	563	.	.	.	.	622	.	.	.	.	.	.	.	1,185
Clopyralid/triclopyr	349	288	.	.	.	24	.	.	.	.	.	.	.	662
2,4-D	202	.	.	.	.	.	.	.	.	.	.	.	.	202
2,4-D/dicamba/triclopyr	204	.	407	.	.	.	.	.	.	.	.	.	.	611
2,4-D/MCPA	60	.	.	.	.	.	.	.	.	.	.	.	.	60
2,4-DB/linuron/MCPA	.	.	.	.	.	.	.	.	123	.	.	.	.	123
Dicamba/MCPA/mecoprop-P	2,817	1,093	1,959	.	.	.	591	56	64	.	.	.	.	6,580
Dicamba/mecoprop-P	1,394	4,404	2,750	.	.	.	.	.	.	.	.	.	.	8,548
Diquat	.	1,352	.	.	.	.	.	.	.	84	.	.	.	1,436
Fluroxypyr	.	.	.	.	.	.	106	.	.	.	.	.	.	106
Fluroxypyr/triclopyr	11,988	16,287	6,818	.	.	.	.	.	.	144	.	.	.	35,237

Table 9 (contd.) **Estimated area (spray hectares) of grassland and fodder crops treated with pesticide formulations in Northern Ireland in 2005.**

Pesticide type & formulation	Enclosed grazing	Silage 1st cut	Silage 2nd cut	Silage 3rd cut	Hay	Rough grazing	Arable silage	Arable silage (undersown)	Cereals (undersown)	Grass reseed	Fodder maize	Fodder beet	Fodder rape	All crops
Herbicides (contd.)														
Glyphosate	1,204	.	.	.	.	.	661	996	339	4,030	465	.	.	7,694
Isoproturon	.	.	.	.	.	.	283	.	.	.	.	.	.	283
MCPA	20,724	4,648	95	.	260	3,522	.	381	.	.	.	.	.	29,630
MCPB	.	.	.	.	.	.	.	108	142	.	.	.	.	250
Mecoprop	672	1,163	539	539	.	.	.	83	.	192	.	.	.	3,189
Mecoprop-P	336	5,313	1,141	.	.	.	544	.	.	.	.	.	.	7,335
Metamitron	.	.	.	.	.	.	.	.	.	.	.	170	.	170
Metsulfuron-methyl	1,494	588	349	.	.	.	483	711	556	382	.	.	.	4,561
Pendimethalin	.	.	.	.	.	.	106	.	.	.	1,138	.	.	1,244
Triclopyr	.	54	.	.	.	.	.	.	.	.	.	.	.	54
Unknown herbicide	3,564	.	.	.	.	61	.	614	.	471	.	.	.	4,711
All herbicides	**46,237**	**36,408**	**14,059**	**539**	**260**	**4,637**	**2,775**	**2,949**	**1,530**	**5,303**	**3,630**	**170**	**.**	**118,499**
Insecticides														
Chlorpyrifos	1,031	.	.	.	.	.	236	.	.	.	.	.	.	1,268
Deltamethrin	.	.	.	.	.	.	212	.	.	.	.	.	.	212
Esfenvalerate	.	.	.	.	.	.	422	161	.	.	.	.	.	582
Lambda-cyhalothrin	.	.	.	.	.	.	166	.	.	.	.	.	.	166
Unknown insecticide	134	134	.	.	.	.	.	.	.	.	.	.	.	269
All insecticides	**1,166**	**134**	**.**	**.**	**.**	**.**	**1,037**	**161**	**.**	**.**	**.**	**.**	**.**	**2,498**
Growth regulators														
Chlormequat	.	.	.	.	.	.	166	83	.	.	.	.	.	250
Trinexapac-ethyl	.	.	.	.	.	.	236	.	.	.	.	.	.	236
All growth regulators	**.**	**.**	**.**	**.**	**.**	**.**	**403**	**83**	**.**	**.**	**.**	**.**	**.**	**486**

Table 9 (contd.) **Estimated area (spray hectares) of grassland and fodder crops treated with pesticide formulations in Northern Ireland in 2005.**

Pesticide type & formulation	Enclosed grazing	Silage 1st cut	Silage 2nd cut	Silage 3rd cut	Hay	Rough grazing	Arable silage	Arable silage (undersown)	Cereals (undersown)	Grass reseed	Fodder maize	Fodder beet	Fodder rape	All crops
Seed treatments														
Fludioxonil	.	.	.	.	.	.	1,122	867	312	383	.	.	.	2,684
Fludioxonil/metalaxyl-m	.	.	.	.	.	.	.	.	.	.	869	.	.	869
Imazalil/triticonazole	.	.	.	.	.	.	422	.	.	.	.	.	.	422
Thiram	.	.	.	.	.	.	.	.	.	.	.	.	59	59
Methiocarb	.	.	.	.	.	.	.	.	.	.	1,494	.	.	1,494
All seed treatments	**.**	**.**	**.**	**.**	**.**	**.**	**1,544**	**867**	**312**	**383**	**2,362**	**.**	**59**	**5,527**
All pesticides	**47,403**	**36,543**	**14,059**	**539**	**260**	**4,637**	**6,814**	**4,301**	**2,323**	**5,685**	**5,993**	**170**	**59**	**128,786**

Table 10 **Estimated weight (kilograms) of pesticides applied to grassland and fodder crops in Northern Ireland in 2005.**

Pesticide type & formulation	Enclosed grazing	Silage 1st cut	Silage 2nd cut	Silage 3rd cut	Hay	Rough grazing	Arable silage	Arable silage (undersown)	Cereals (undersown)	Grass reseed	Fodder maize	Fodder beet	Fodder rape	All crops
Fungicides														
Azoxystrobin	.	.	.	.	.	.	16	.	.	.	.	.	.	16
Chlorothalonil	.	.	.	.	.	.	166	83	.	.	.	.	.	250
Cyproconazole/propiconazole	.	.	.	.	.	.	17	.	.	.	.	.	.	17
Epoxiconazole	.	.	.	.	.	.	26	.	.	.	.	.	.	26
Fluquinconazole/prochloraz	.	.	.	.	.	.	46	.	.	.	.	.	.	46
Propiconazole	.	.	.	.	.	.	.	.	85	.	.	.	.	85
Propiconazole/tebuconazole	.	.	.	.	.	.	.	27	35	.	.	.	.	62
All fungicides	**.**	**.**	**.**	**.**	**.**	**.**	**271**	**110**	**120**	**.**	**.**	**.**	**.**	**502**
Herbicides														
Amidosulfuron	10	10	.	.	.	.	.	.	.	.	.	.	.	19
Asulam	213	1,270	.	.	.	513	.	.	.	.	.	.	.	1,996
Atrazine	.	.	.	.	.	.	.	.	.	.	3,346	.	.	3,346
Benazolin/2,4-DB/MCPA	352	.	.	.	.	.	.	.	378	.	.	.	.	730
Clopyralid/fluroxypyr/triclopyr	360	.	.	.	.	420	.	.	.	.	.	.	.	780
Clopyralid/triclopyr	305	251	.	.	.	4	.	.	.	.	.	.	.	560
2,4-D	249	.	.	.	.	.	.	.	.	.	.	.	.	249
2,4-D/dicamba/triclopyr	275	.	550	.	.	.	.	.	.	.	.	.	.	825
2,4-D/MCPA	142	.	.	.	.	.	.	.	.	.	.	.	.	142
2,4-DB/linuron/MCPA	.	.	.	.	.	.	.	.	90	.	.	.	.	90
Dicamba/MCPA/mecoprop-P	3,311	750	2,491	.	.	.	738	52	60	.	.	.	.	7,402
Dicamba/mecoprop-P	1,132	3,126	1,577	.	.	.	.	.	.	.	.	.	.	5,835
Diquat	.	608	.	.	.	.	.	.	.	38	.	.	.	646
Fluroxypyr	.	.	.	.	.	.	11	.	.	.	.	.	.	11
Fluroxypyr/triclopyr	4,864	5,652	2,334	.	.	.	.	.	.	65	.	.	.	12,915
Glyphosate	780	.	.	.	.	.	545	1,004	321	3,972	431	.	.	7,053

Table 10 (contd.) **Estimated weight (kilograms) of pesticides applied to grassland and fodder crops in Northern Ireland in 2005.**

Pesticide type & formulation	Enclosed grazing	Silage 1st cut	Silage 2nd cut	Silage 3rd cut	Hay	Rough grazing	Arable silage	Arable silage (undersown)	Cereals (undersown)	Grass reseed	Fodder maize	Fodder beet	Fodder rape	All crops
Herbicides (contd.)														
Isoproturon	.	.	.	.	.	.	220	.	.	.	.	.	.	220
MCPA	18,087	5,030	124	.	340	3,763	.	408	.	.	.	.	.	27,752
MCPB	.	.	.	.	.	.	.	216	317	.	.	.	.	533
Mecoprop	849	698	324	324	.	.	.	25	.	115	.	.	.	2,334
Mecoprop-P	379	6,300	1,288	.	.	.	364	.	.	.	.	.	.	8,330
Metamitron	.	.	.	.	.	.	.	.	.	.	.	612	.	612
Metsulfuron-methyl	5	1	1	.	.	.	2	3	2	2	.	.	.	15
Pendimethalin	.	.	.	.	.	.	105	.	.	.	1,687	.	.	1,792
Triclopyr	.	35	.	.	.	.	.	.	.	.	.	.	.	35
All herbicides	**31,312**	**23,729**	**8,688**	**324**	**340**	**4,700**	**1,984**	**1,708**	**1,168**	**4,192**	**5,464**	**612**	**.**	**84,221**
Insecticides														
Chlorpyrifos	519	.	.	.	.	.	128	.	.	.	.	.	.	647
Deltamethrin	.	.	.	.	.	.	1	.	.	.	.	.	.	1
Esfenvalerate	.	.	.	.	.	.	2	1	.	.	.	.	.	3
Lambda-cyhalothrin	.	.	.	.	.	.	17	.	.	.	.	.	.	17
All insecticides	**519**	**.**	**.**	**.**	**.**	**.**	**148**	**1**	**.**	**.**	**.**	**.**	**.**	**667**
Growth regulators														
Chlormequat	.	.	.	.	.	.	77	38	.	.	.	.	.	115
Trinexapac-ethyl	.	.	.	.	.	.	44	.	.	.	.	.	.	44
All growth regulators	**.**	**.**	**.**	**.**	**.**	**.**	**121**	**38**	**.**	**.**	**.**	**.**	**.**	**159**

Table 10 (contd.) **Estimated weight (kilograms) of pesticides applied to grassland and fodder crops in Northern Ireland in 2005.**

Pesticide type & formulation	Enclosed grazing	Silage 1st cut	Silage 2nd cut	Silage 3rd cut	Hay	Rough grazing	Arable silage	Arable silage (undersown)	Cereals (undersown)	Grass reseed	Fodder maize	Fodder beet	Fodder rape	All crops
Seed treatments														
Fludioxonil	.	.	.	.	.	.	11	7	3	2	.	.	.	24
Fludioxonil/metalaxyl-m	.	.	.	.	.	.	.	.	.	.	1	.	.	1
Imazalil/triticonazole	.	.	.	.	.	.	9	.	.	.	.	.	.	9
Thiram	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Methiocarb	.	.	.	.	.	.	.	.	.	.	270	.	.	270
All seed treatments	**.**	**.**	**.**	**.**	**.**	**.**	**20**	**7**	**3**	**2**	**271**	**.**	**1**	**304**
All pesticides	**31,832**	**23,729**	**8,688**	**324**	**340**	**4,700**	**2,544**	**1,865**	**1,291**	**4,194**	**5,735**	**612**	**1**	**85,854**

Table 11 **The thirty active ingredients used most extensively on grassland and fodder crops in Northern Ireland in 2005, ranked by area treated (spray hectares).**

	Active ingredient	Treated area (sp ha)
1	Triclopyr	37,750
2	MCPA	36,987
3	Fluroxypyr	36,529
4	Mecoprop-P	22,462
5	Dicamba	15,739
6	Glyphosate	7,694
7	Metsulfuron-methyl	4,561
8	Mecoprop	3,189
9	Atrazine	2,028
10	Clopyralid	1,847
11	Asulam	1,584
12	Diquat	1,436
13	Chlorpyrifos	1,268
14	Pendimethalin	1,244
15	2,4-D	873
16	2,4-DB	717
17	Propiconazole	695
18	Benazolin	594
19	Esfenvalerate	582
20	Epoxiconazole	509
21	Amidosulfuron	423
22	Isoproturon	283
23	Chlorothalonil	250
24	MCPB	250
25	Chlormequat	250
26	Tebuconazole	250
27	Trinexapac-ethyl	236
28	Deltamethrin	212
29	Metamitron	170
30	Fluquinconazole	166

Table 12 **The thirty active ingredients used most extensively on grassland and fodder crops in Northern Ireland in 2005, ranked by weight applied (kilograms).**

	Active ingredient	Weight (kg)
1	MCPA	30,526
2	Mecoprop-P	16,457
3	Triclopyr	7,447
4	Glyphosate	7,053
5	Fluroxypyr	6,728
6	Atrazine	3,346
7	Dicamba	2,721
8	Mecoprop	2,334
9	Asulam	1,996
10	Pendimethalin	1,792
11	2,4-D	783
12	Chlorpyrifos	647
13	Diquat	646
14	2,4-DB	634
15	Metamitron	612
16	MCPB	533
17	Clopyralid	285
18	Chlorothalonil	250
19	Isoproturon	220
20	Propiconazole	127
21	Chlormequat	115
22	Benazolin	64
23	Trinexapac-ethyl	44
24	Prochloraz	35
25	Tebuconazole	31
26	Epoxiconazole	26
27	Amidosulfuron	19
28	Lambda-cyhalothrin	17
29	Azoxystrobin	16
30	Metsulfuron-methyl	15

Table 13 **Enclosed grazing: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	Rag -wort	Leather-jackets	Docks	Chick-weed	Thistles & nettles	Rushes	Docks & thistles	Rushes & thistles	Thistles	Butter-cup	Nettles	Docks & nettles	Cut-worm	All reasons	Basic area (ha) of treatment	Weight (kg)
Herbicides																	
Amidosulfuron	.	.	.	211	.	.	.	.	.	.	.	.	.	.	211	211	10
Asulam	.	.	.	.	.	.	169	.	.	.	.	.	.	.	169	169	213
Benazolin/2,4-DB/MCPA	.	.	.	286	.	.	.	.	.	.	.	.	.	.	286	286	352
Clopyralid/fluroxypyr/triclopyr	.	.	.	120	.	.	.	.	.	.	.	443	.	.	563	563	360
Clopyralid/triclopyr	.	.	.	18	.	.	.	123	.	208	.	.	.	.	349	349	305
2,4-D	.	202	.	.	.	.	.	.	.	.	.	.	.	.	202	202	249
2,4-D/dicamba/triclopyr	.	.	.	204	.	.	.	.	.	.	.	.	.	.	204	204	275
2,4-D/MCPA	.	60	.	.	.	.	.	.	.	.	.	.	.	.	60	60	143
Dicamba/MCPA/mecoprop-P	.	.	.	2,817	.	.	.	.	.	.	.	.	.	.	2,817	2,817	3,311
Dicamba/mecoprop-P	.	.	.	1,394	.	.	.	.	.	.	.	.	.	.	1,394	1,394	1,132
Fluroxypyr/triclopyr	166	.	.	11,721	.	.	.	.	.	.	.	.	102	.	11,988	11,529	4,864
Glyphosate	.	.	.	.	.	.	1,204	.	.	.	.	.	.	.	1,204	1,204	780
MCPA	1,682	1,568	.	224	.	4,770	7,958	.	1,703	568	2,253	.	.	.	20,724	20,614	18,087
Mecoprop	.	.	.	.	672	.	.	.	.	.	.	.	.	.	672	672	849
Mecoprop-P	.	.	.	336	.	.	.	.	.	.	.	.	.	.	336	336	379
Metsulfuron-methyl	.	.	.	1,494	.	.	.	.	.	.	.	.	.	.	1,494	1,494	5
Unknown herbicide	.	.	.	.	.	.	2,829	.	.	735	.	.	.	.	3,564	3,564	.
All herbicides	**1,848**	**1,830**	**.**	**18,825**	**672**	**4,770**	**12,160**	**123**	**1,703**	**1,511**	**2,253**	**443**	**102**	**.**	**46,237**	**45,669**	**31,312**
Insecticides																	
Chlorpyrifos	.	.	218	.	.	.	.	.	.	.	.	.	.	814	1,031	1,031	519
Unknown insecticide	.	.	134	.	.	.	.	.	.	.	.	.	.	.	134	134	.
All insecticides	**.**	**.**	**352**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**814**	**1,166**	**1,166**	**519**

Table 14 **Grass silage 1st cutting: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	Leather-jackets	Docks	Chickweed	Rushes	Docks & thistles	Thistles	Buttercup	Rushes & docks	Docks & chickweed	Docks & nettles	All reasons	Basic area (ha) of treatment	Weight (kg)
Herbicides														
Amidosulfuron	.	.	211	.	.	.	.	.	.	.	.	211	211	10
Asulam	.	.	1,008	.	.	.	.	.	.	.	.	1,008	1,008	1,270
Clopyralid/triclopyr	.	.	.	.	.	11	278	.	.	.	.	288	288	251
Dicamba/MCPA/mecoprop-P	.	.	235	.	.	.	.	.	858	.	.	1,093	1,093	750
Dicamba/mecoprop-P	2,162	.	2,242	.	.	.	.	.	.	.	.	4,404	3,323	3,126
Diquat	1,352	.	.	.	.	.	.	.	.	.	.	1,352	1,352	608
Fluroxypyr/triclopyr	.	.	15,663	.	.	.	.	.	.	623	.	16,287	15,755	5,652
MCPA	.	.	1,448	955	695	.	263	1,287	.	.	.	4,648	4,648	5,030
Mecoprop	.	.	539	.	.	.	.	.	.	623	.	1,163	1,163	698
Mecoprop-P	.	.	5,313	.	.	.	.	.	.	.	.	5,313	5,313	6,300
Metsulfuron-methyl	.	.	588	.	.	.	.	.	.	.	.	588	588	1
Triclopyr	.	.	.	.	.	.	.	.	.	.	54	54	54	35
All herbicides	**3,514**	**.**	**27,247**	**955**	**695**	**11**	**541**	**1,287**	**858**	**1,247**	**54**	**36,408**	**34,796**	**23,729**
Insecticides														
Unknown insecticide	.	134	.	.	.	.	.	.	.	.	.	134	134	
All insecticides	**.**	**134**		**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**134**	**134**	

Table 15 **Grass silage 2nd cutting: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	Docks	Rushes	All reasons	Basic area (ha) of treatment	Weight (kg)
Herbicides						
2,4-D/dicamba/triclopyr	.	407	.	407	407	550
Dicamba/MCPA/mecoprop-P	.	1,878	81	1,959	1,959	2,491
Dicamba/mecoprop-P	811	1,939	.	2,750	2,345	1,577
Fluroxypyr/triclopyr	.	6,818	.	6,818	6,818	2,334
MCPA	.	.	95	95	95	124
Mecoprop	.	539	.	539	539	324
Mecoprop-P	.	1,141	.	1,141	1,141	1,288
Metsulfuron-methyl	.	349	.	349	349	1
All herbicides	**811**	**13,072**	**176**	**14,059**	**13,654**	**8,688**

Table 16 **Grass silage 3rd cutting: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	Docks	All reasons	Basic area (ha) of treatment	Weight (kg)
Herbicides				
Mecoprop	539	539	539	324
All herbicides	**539**	**539**	**539**	**324**

Table 17 **Hay: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	Rushes	All reasons	Basic area (ha) of treatment	Weight (kg)
Herbicides				
MCPA	260	260	260	340
All herbicides	**260**	**260**	**260**	**340**

Table 18 **Rough grazing: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	Rushes	Briars	Thistles	Rushes & docks	All reasons	Basic area (ha) of treatment	Weight (kgs)
Herbicides							
Asulam	.	.	.	407	407	407	513
Clopyralid/fluroxypyr/triclopyr	.	.	622	.	622	622	420
Clopyralid/triclopyr	.	24	.	.	24	24	4
MCPA	3,522	.	.	.	3,522	3,506	3,763
Unknown herbicide	62	.	.	.	62	62	.
All herbicides	**3,583**	**24**	**622**	**407**	**4,637**	**4,622**	**4,700**

Table 19 **Arable silage: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	General disease control	Ground preparation	Chickweed	Growth regulator	Cutworm	General insect control	All reasons	Basic area (ha) of treatment	Weight (kgs)
Fungicides										
Azoxystrobin	.	106	.	.	.	.	.	106	106	16
Chlorothalonil	.	167	.	.	.	.	.	167	167	167
Cyproconazole/propiconazole	.	106	.	.	.	.	.	106	106	17
Epoxiconazole	.	509	.	.	.	.	.	509	509	26
Fluquinconazole/prochloraz	.	167	.	.	.	.	.	167	167	46
All fungicides	**.**	**1,055**	**.**	**.**	**.**	**.**	**.**	**1,055**	**1,055**	**271**
Herbicides										
Dicamba/MCPA/mecoprop-P	591	.	.	.	.	.	.	591	591	738
Fluroxypyr	106	.	.	.	.	.	.	106	106	11
Glyphosate	.	.	661	.	.	.	.	661	661	545
Isoproturon	283	.	.	.	.	.	.	283	283	220
Mecoprop-P	237	.	.	308	.	.	.	544	544	364
Metsulfuron-methyl	483	.	.	.	.	.	.	483	483	2
Pendimethalin	106	.	.	.	.	.	.	106	106	105
All herbicides	**1,806**	**.**	**661**	**308**	**.**	**.**	**.**	**2,775**	**2,775**	**1,984**
Insecticides										
Chlorpyrifos	.	.	.	.	.	237	.	237	237	128
Deltamethrin	.	.	.	.	.	.	213	213	106	1
Esfenvalerate	.	.	.	.	.	.	422	422	422	2
Lambda-cyhalothrin	.	.	.	.	.	.	167	167	167	17
All insecticides	**.**	**.**	**.**	**.**	**.**	**237**	**801**	**1,037**	**931**	**148**

Table 19 (contd.) **Arable silage: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	General disease control	Ground preparation	Chickweed	Growth regulator	Cutworm	General insect control	All reasons	Basic area (ha) of treatment	Weight (kgs)
Growth regulators										
Chlormequat	.	.	.	.	167	.	.	167	167	77
Trinexapac-ethyl	.	.	.	.	237	.	.	237	237	44
All growth regulators	**.**	**.**	**.**	**.**	**403**	**.**	**.**	**403**	**403**	**121**

Table 20 **Arable silage (undersown): pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	General disease control	Ground preparation	Chickweed	Growth regulator	General insect control	All reasons	Basic area (ha) of treatment	Weight (kgs)
Fungicides									
Chlorothalonil	.	83	.	.	.	.	83	83	83
Propiconazole/tebuconazole	.	108	.	.	.	.	108	108	27
Unknown fungicide	.	50	.	.	.	.	50	50	.
All fungicides	**.**	**241**	**.**	**.**	**.**	**.**	**241**	**241**	**110**
Herbicides									
Dicamba/MCPA/mecoprop-P	56	.	.	.	.	.	56	56	53
Glyphosate	.	.	875	121	.	.	996	875	1,004
MCPA	381	.	.	.	.	.	381	381	408
MCPB	108	.	.	.	.	.	108	108	216
Mecoprop	83	.	.	.	.	.	83	83	25
Metsulfuron-methyl	711	.	.	.	.	.	711	711	3
Unknown herbicide	615	.	.	.	.	.	615	615	.
All herbicides	**1,954**	**.**	**875**	**121**	**.**	**.**	**2,949**	**2829**	**1,708**
Insecticides									
Esfenvalerate	.	.	.	.	.	161	161	161	1
All insecticides	**.**	**.**	**.**	**.**	**.**	**161**	**161**	**161**	**1**
Growth Regulators									
Chlormequat	.	.	.	.	83	.	83	83	38
All growth regulators	**.**	**.**	**.**	**.**	**83**	**.**	**83**	**83**	**38**

Table 21 **Cereals (undersown): pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	General disease control	Ground preparation	All reasons	Basic area (ha) of treatment	Weight (kgs)
Fungicides						
Propiconazole	.	339	.	339	339	85
Propiconazole/tebuconazole	.	142	.	142	142	35
All fungicides	**.**	**480**	**.**	**480**	**480**	**120**
Herbicides						
Benazolin/2,4-DB/MCPA	308	.	.	308	308	378
2,4-DB/linuron/MCPA	123	.	.	123	123	90
Dicamba/MCPA/mecoprop-P	64	.	.	64	64	60
Glyphosate	.	.	339	339	339	321
MCPB	142	.	.	142	142	317
Metsulfuron-methyl	556	.	.	556	556	3
All herbicides	**1,192**	**.**	**339**	**1,530**	**1,530**	**1,168**

Table 22 **Grass reseed: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	Docks	Ground preparation	Chickweed	Rushes	All reasons	Basic area (ha) of treatment	Weight (kgs)
Herbicides								
Diquat	.	.	.	.	84	84	84	38
Fluroxypyr/triclopyr	.	144	.	.	.	144	144	65
Glyphosate	.	.	4,030	.	.	4,030	4,030	3,972
Mecoprop	.	.	.	192	.	192	192	115
Metsulfuron-methyl	382	.	.	.	.	382	382	2
Unknown herbicide	150	.	.	321	.	471	471	.
All herbicides	**531**	**144**	**4,030**	**514**	**84**	**5,303**	**5,303**	**4,192**

Table 23 **Fodder beet: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	All reasons	Basic area (ha) of treatment	Weight (kgs)
Herbicides				
Metamitron	170	170	85	612
All herbicides	**170**	**170**	**85**	**612**

Table 24 **Fodder maize: pesticide-treated area (spray-hectares), weight of pesticide applied (kilograms) and reason for use.**

Pesticide type & formulation	General weed control	Ground preparation	Sealer	All reasons	Basic area (ha) of treatment	Weight (kgs)
Herbicides						
Atrazine	1,927	.	101	2,028	2,028	3,346
Glyphosate	.	465	.	465	465	432
Pendimethalin	1,138	.	.	1,138	1,138	1,687
All herbicides	**3,064**	**465**	**101**	**3,630**	**3,630**	**5,464**

Table 25 **Comparison of the area (hectares) of grassland and fodder crops grown in Northern Ireland, 1989-2005.**

	Survey year				
	1989	1993	1997	2003	2005
Crop	Area grown (ha)	Area grown (ha)	Area grown (ha)	Area grown (ha)	Area grown (ha)
Established grassland crops					
Enclosed grazing	481,059	476,209	512,819	537,735	517,045
Grass silage	243,149	252,502	422,650	430,542	409,704
Hay	66,001	33,017	32,303	11,997	16,744
Rough grazing	212,930	173,239	165,005	162,330	148,586
All established grassland crops	**1,003,139**	**934,967**	**1,132,777**	**1,142,603**	**1,092,079**
Sown crops					
Arable silage	3,762	.	766	8,720	2,667
Arable silage (undersown)	.	2,073	3,308	6,512	2,683
Cereals (undersown)	6,213	5,907	4,284	4,086	1,497
Grass reseed	35,434	5,380	11,472	27,282	18,350
All sown crops	**45,409**	**13,360**	**19,830**	**46,600**	**25,197**

Table 25 (contd.) **Comparison of the area (hectares) of grassland and fodder crops grown in Northern Ireland, 1989-2005.**

	Survey year				
	1989	1993	1997	2003	2005
Crop	Area grown (ha)	Area grown (ha)	Area grown (ha)	Area grown (ha)	Area grown (ha)
Fodder crops					
Fodder beet	.	.	70	.	85
Fodder kale	.	72	45	335	17
Fodder kale (undersown)	.	.	58	.	.
Fodder maize	.	.	10	1,463	2,423
Fodder rape	.	.	99	157	192
Fodder turnip	371	.	250	464	375
					.
All fodder crops	**371**	**72**	**532**	**2,419**	**3,092**
All crops	**1,048,919**	**948,400**	**1,153,138**	**1,191,622**	**1,120,368**

Table 26 **Comparison of pesticide usage on grassland & fodder crops in Northern Ireland 1989-2005, area treated (spray hectares) and weight applied (tonnes).**

	Survey year									
	1989		1993		1997		2003		2005	
Crop	Area (sp ha)	Weight (t)	Area (sp ha)	Weight (t)	Area (sp ha)	Weight (t)	Area (sp ha)	Weight (t)	Area (sp ha)	Weight (t)
Established grassland crops										
Enclosed grazing	25,252	43.11	35,051	55.38	48,536	80.41	65,821	34.96	47,403	31.83
Grass silage	26,921	42.17	41,091	64.57	50,209	74.49	57,309	40.38	51,141	32.74
Hay	2,673	2.82	490	0.57	843	1.34	238	0.23	260	0.34
Rough grazing	2,736	3.48	1,866	3.75	1,710	2.75	2,591	1.99	4,637	4.70
All established grassland crops	**57,582**	**91.58**	**78,498**	**124.27**	**101,298**	**158.99**	**125,959**	**77.56**	**103,441**	**69.61**
Sown crops										
Arable silage	8,138	3.66	.	.	2,299	1.59	24,175	9.68	6,814	2.54
Arable silage (undersown)	.	.	3,632	0.38	2,830	0.15	9,186	2.40	4,301	1.86
Cereals (undersown)	11,190	11.62	5,212	6.70	4,804	4.73	4,421	1.60	2,323	1.29
Grass reseed	32,344	15.33	4,090	3.51	7,377	2.91	6,912	8.01	5,685	4.19
All sown crops	**51,672**	**30.61**	**12,934**	**10.59**	**17,310**	**9.39**	**44,694**	**21.69**	**19,123**	**9.89**
Fodder crops										
Fodder beet	.	.	.	.	227	0.09	.	.	170	0.61
Fodder kale	.	.	98	0.02	105	0.21	670	0.78	.	
Fodder kale (undersown)	.	.	.	.	203	0.25	.	.		
Fodder maize	.	.	.	.	20	0.03	6,669	2.58	5,993	5.73
Fodder rape	.	.	.	.	164	0.25	157	0.00	59	0.00
Fodder turnip	621	0.33	.	.	651	0.35	.	.	.	
All fodder crops	**621**	**0.33**	**98**	**0.02**	**1,370**	**1.18**	**7,496**	**3.36**	**6,222**	**6.35**
All crops	**109,875**	**122.47**	**91,529**	**134.87**	**119,978**	**169.55**	**178,149**	**102.61**	**128,786**	**86**

Table 27 **Comparison of pesticide usage on grassland and fodder crops in Northern Ireland 1989-2005, area treated (spray hectares), weight applied (kilograms) and the area grown (hectares).**

	Survey year									
	1989		1993		1997		2003		2005	
Pesticide type	**Area (sp ha)**	**Weight (kg)**	**Area (sp ha)**	**Weight (kg)**	**Area (sp ha)**	**Weight (kg)**	**Area (sp ha)**	**Weight (kg)**	**Area (sp ha)**	**Weight (kg)**
Fungicides	251	235	180	59	421	161	7,933	2,417	1,776	502
Herbicides	73,637	120,551	85,151	134,680	109,253	168,545	149,630	97,976	118,499	84,221
Insecticides										
Carbamates	.	.	.	.	.	.	.	.		.
Organochlorines	.	.	.	.	*8*	*4*	.	.	.	.
Organophosphates	*91*	*51*	.	.	.	.	*415*	*379*	*1,268*	*647*
Pyrethroids	*258*	*4*	.	.	.	.	*558*	*14*	*960*	*21*
Unknow insecticides	.	.	.	.	.	.	.	.	*269*	.
All insecticides	349	55	.	.	8	4	974	393	2,498	667
Growth regulators	.	.	.	.	176	42	1,870	1,369	486	159
Seed treatments	35,635	1,624	6,199	129	10,121	793	17,741	458	5,527	304
All pesticides	**109,874**	**122,465**	**91,529**	**134,869**	**119,978**	**169,545**	**178,148**	**102,613**	**128,786**	**85,854**
Area grown (ha)	***1,048,919***		***948,400***		***1,153,138***		***1,191,622***		***1,120,368***	

Table 28 **The proportional differences (%) of pesticide usage on grassland and fodder crops in Northern Ireland during 2005 compared to 1989, 1993, 1997 and 2003.**

	Survey year comparison							
	1989 cf 2005		1993 cf 2005		1997 cf 2005		2003 cf 2005	
Pesticide type	**Area**	**Weight**	**Area**	**Weight**	**Area**	**Weight**	**Area**	**Weight**
Fungicides	608	114	887	751	322	212	-78	-79
Herbicides	61	-30	39	-37	8	-50	-21	-14
Insecticides	616	1113	.	.	31125	16575	156	70
Growth regulators	.	.	.	.	176	279	-74	-88
Seed treatments	-84	-81	-11	136	-45	-62	-69	-34
All pesticides	**17**	**-30**	**41**	**-36**	**7**	**-49**	**-28**	**-16**
Area grown (ha)	7%		18%		-3%		-6%	

Northern Ireland Pesticide Usage Survey Published reports — Appendix 1

Report No.	Report title	ISBN
99	Grassland & Fodder Crops 1989	1-855 27 079 X
105	Arable Crops 1990	1-855 27 130 3
106	Soft Fruit Crops 1990	1-855 27 149 4
109	Vegetable Crops 1991	1-855 27 137 0
110	Protected Crops 1991 (edible & ornamental)	1-855 27 283 0
111	Mushroom Crops 1991	1-855 27 150 8
117	Arable Crops 1992	1-855 27 193 1
118	Top Fruit Crops 1992	1-855 27 194 X
124	Grassland & Fodder crops 1993	1-855 27 221 0
131	Forestry 1993	1-855 27 282 2
132	Arable Crops 1994	1-855 27 314 4
139	Vegetable Crops 1995	1-855 27 346 2
140	Mushroom Crops 1995	1-855 27 347 0
146	Arable Crops 1996	1-855.27.469.8
147	Top fruit 1996	1-855.27.470.1
156	Grassland and Fodder Crops 1997	1-855.27.506.6
157	Sheep Treatments 1997	1-855.27.425.6
167	Soft Fruit 1998	1-85527.540.6
168	Arable Crops 1998	1-85527.536.8

169	Vegetable Crops 1999	1-85527.561.9
170	Mushroom Crops 1999	1-85527.549.X
177	Arable Crops 2000	1-85527.670.4
178	Top Fruit Crops 2002	1-855.27.618.6
194	Arable Crops 2002	1-85527.674.7
199	Hardy Nursery Stock Crops 2003	1-85527.789.1
201	Protected Ornamental Crops 2003	1-85527.739.5
206	Arable Crops 2004	1-85527.833.2
207	Vegetable Crops 2004	1-85527.869.3

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