

Pesticide User Habits Survey 2016

Public purchasing, use, storage and disposal of pesticides in plant protection products

Executive summary

An online survey designed to determine gardener user habits in relation to purchase, storage, use and disposal of plant protection products was carried out from 8 August to 30 September 2016 by the Health and Safety Executive. This followed a similar approach to the first online survey carried out in 2013 by Resource Futures. The survey was limited to responses about plant protection products (amateur pesticides to protect and control plants).

The questionnaire remained largely the same as in previous years and retained the expanded disposal section that was introduced in the 2013 survey. This section split all possible answers by product type (eg ready-to-use and concentrate). Questions were asked to ascertain whether respondents disposed of containers with product still in the container, whether they removed the lid/cap/trigger spray handle, whether they rinsed the container before disposal, and about the disposal route of rinsings. One additional question asked respondents how they obtained information about disposal of products.

Of the respondents to the survey, 495 used plant protection products and these included gardeners in all age categories and all gardener 'types' although the highest category of respondents were the keen and regular gardeners (46%) and those aged over 44 (69%). The most popular types of product purchased were weedkillers, slug/snail killers and insecticides. The majority of respondents purchased between one and two products a year.

The most popular storage location continued to be the garden shed (59%), followed by the garage (35%). Of respondents, 27% stated they used some form of safety precaution for storing plant protection products (ie high shelf or locked cupboard). Just over half of the respondents stored products for up to two years (53%), 13% of whom stored products for less than a year.

In terms of product use, 63% of respondents stated they read the instructions on how to use the product before purchasing and 52% would read before they used the product for the first time. The majority (97%) of respondents stated the instructions for use provided with the product were clear, and the same percentage of respondents claimed to follow the instructions either 'very closely' or 'fairly closely'. Around a third of the respondents (38%) used ready-to-use products only, compared to 18% using concentrate products only, while 40% stated they used both ready-to-use and concentrate products. The majority of respondents who used concentrate products used the measuring device/cap provided to measure the volume of concentrate product required when diluting (77%).

The majority of respondents obtained information from the product label about disposal methods, 84% for those using ready-to-use products and 85% for those using concentrate products.

The majority of respondents did not dispose of excess/unwanted plant protection product before disposing of the container (82% for ready-to-use and 88% for concentrate products). For those disposing of the container with ready-to-use product in the container, nearly half disposed in the normal household bin (49%).

The highest proportion of respondents using ready-to-use plant protection products disposed of the empty container in the household recycling bin/bag used for kerbside collection (54%), while 38% of respondents disposed of the empty container in the normal household bin. Similarly, the largest percentage of respondents using concentrate products disposed of the empty container in household recycling bin/bag used for kerbside collection (45%), while 37% of respondents disposed of the empty container in the normal household bin.

This report set outs the findings from the 2016 survey in detail, and also compares them to previous years (2007, 2010 and 2013).

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1. Introduction

The Health and Safety Executive (HSE) carried out an online survey to identify the user habits of amateur plant protection product users. This follows previous surveys carried out in 2007, 2010 and 2013 to inform our Chemicals Regulation Division on user habits and disposal of amateur plant protection products. The survey contributes to the knowledge base for continuing research and communications on amateur use of plant protection products by providing robust information on the purchasing, use, storage and disposal by domestic gardeners in the UK. This continues to support the ongoing work of the Amateur Liaison Group (ALG) which involves HSE and other stakeholders encouraging best practice in use, storage, and safe disposal of unused plant protection products and empty containers.

Importantly, the survey continues to highlight whether any changes in user habits have occurred over recent years. Where the survey results indicate a change in behaviour, this can support the development of communication resources to provide consumer advice on best practice.

The specific objectives of the project were to:

- develop an online survey (in HSE) and disseminate through the Amateur Liaison Group;
- collate and analyse online survey responses;
- compare findings from 2016 with surveys undertaken in 2007, 2010 and 2013;
- present the findings to the Amateur Liaison Group and Pesticides Forum.

2. Background

Plant protection products are pesticides which include weedkillers, slug and snail killers (eg pellets), fungicides, insecticides (including acaricides), lawn treatments which contain moss killers and weedkillers, animal repellents and hormone rooting substances.

Plant protection products are regulated in the European Union (EU) by Regulation (EC) No 1107/2009 which came into force in June 2011. The Regulation repealed and replaced earlier EU and national legislation and aims to harmonise the arrangements for authorising plant protection products within the EU. HSE is the competent authority regulating plant protection products in the UK. More information can be found at www.hse.gov.uk/pesticides.

3. Methods

The 2013 survey significantly updated the disposal section of the questionnaire to provide more detailed information on the disposal route of plant protection products, rinsings and containers separately for those that use ready-to-use, concentrate products and those that use both. Three additional questions were added for the 2016 survey as mentioned in Table 3.1 below.

Table 3.1 Minor amendments to the 2016 survey questionnaire

2007/2010/2013 Question	2016 Question	Amendment / reason
N/A	How would you normally find out about how to dispose of the plant protection product/s?	Additional question requested by WRAP (The Waste and Resources Action Programme) to understand where respondents obtained information about disposal in the first place.
N/A	Are you a professional gardener?	Respondents answering yes to this question did not continue through the rest of the survey. This is because the survey is about the behaviours of amateur gardeners, and results from professional gardeners are likely to skew the results.
N/A	Have you ever been trained in the use of plant protection products?	Those that answered no to the question above but yes to this question continued through the remaining questionnaire.
Where do you do your gardening?	N/A	A new response option was added: public/community gardens

3.1 Online survey

Previous surveys in 2007, 2010 and 2013 have been carried out by Resource Futures using face to face surveys. An additional online survey was added in 2013. HSE carried out this online survey in 2016 using Survey Monkey, which was open for responses from Monday 8 August to Friday 30 September 2016.

The online survey was advertised through the Amateur Liaison Group members to invite amateur users of plant protection products to respond. Advertising of the survey took the form of providing links on websites and posting tweets via Twitter.

A total of 495 completed surveys were received from those confirming that they use plant protection products and are not professional gardeners.

3.2 Comparison of survey results

The report includes a comparison of the results over the survey years 2007, 2010, 2013 and 2016 in Table 5.1. The table provides analysis of differences of key variables to show whether an increase or decrease in percentages occurred between survey years.

4. 2016 Survey results

The following represents the results from the 2016 survey. Each question has been analysed below.

4.1 Respondent characteristics

4.1.1 Number of respondents

In total, 557 people responded to say that they used plant protection products and went on to complete the survey. Of these respondents, 62 were professional gardeners and have been excluded from the analysis. A further 120 had been trained in the use of plant protection products; this group has been included in the analysis but where their responses strongly influence the overall picture this has been noted in the report.

Sample size = 495

4.1.2 Location and age of respondents

A regional breakdown of respondents is provided in Table 4.1 and an age breakdown in Table 4.2. No analysis of regional or age variation has been completed as there is no known reason to expect any systematic differences across groups.

Table 4.1 Regional distribution of respondents in 2016

Region	Number of respondents	% of respondents
Scotland	15	3%
Northern Ireland	5	1%
North East	21	4%
Yorkshire and Humber	105	21%
North West	56	11%
West Midlands	42	9%
East Midlands	41	8%
Wales	18	4%
East of England	53	11%
London	21	4%
South East	75	15%
South West	43	9%

Table 4.2 Age distribution of respondents in 2016

Perception	Number of respondents	% of respondents
16-24	6	1%
25-44	151	30%
45-64	279	57%
65 plus	54	11%
Not answered	6	1%

Respondents in the 25-44 age group are similar to 2013 and an increase on 2007/2010 figures, possibly due to the questionnaire being available online in 2013 and 2016. However, there continues to be a decrease in the 65 and over age group. This is possibly due to the 2016 questionnaire only being available online, compared to previous surveys when the questionnaire was also conducted face to face in garden centres.

Table 4.3 Comparison of respondents in the 25-44 and 65 and over age group from 2007 to 2016

	2007	2010	2013	2016
25-44	18%	20%	28%	30%
65 and over	31%	34%	21%	11%

4.1.3 Gardener type

Table 4.4 shows how respondents feel about gardening. This information has been collected to give an idea of who is in our sample of responses and again no comparison between these groups has been made yet. However, the data could be interrogated this way.

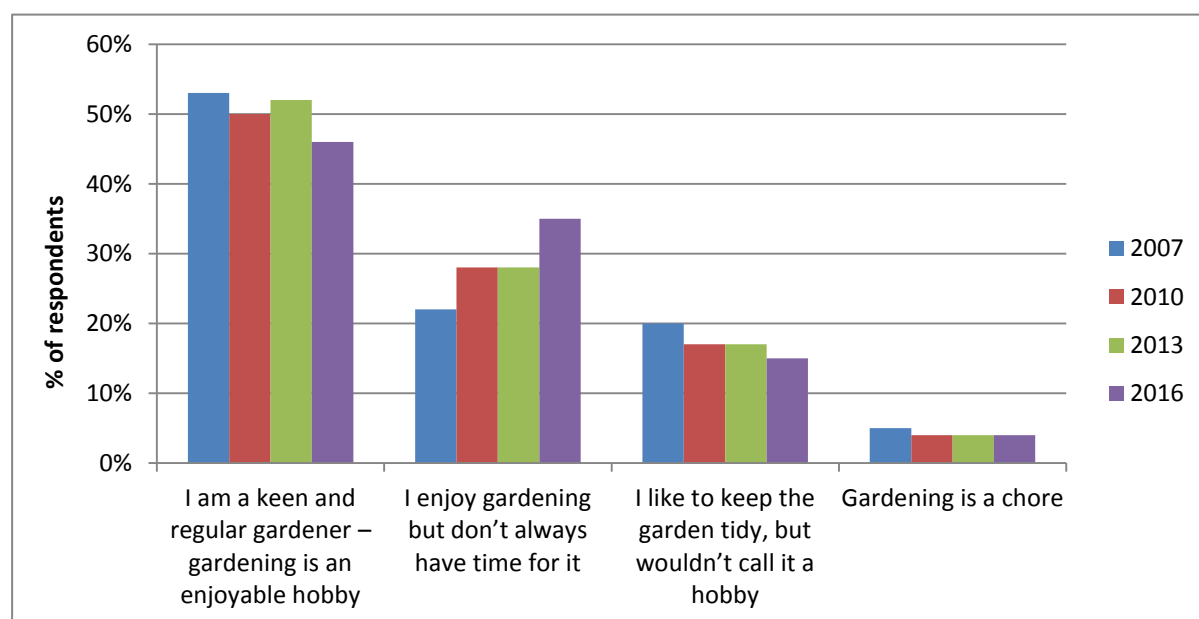
Note that the likelihood of being a keen gardener is similar between trained plant protection product users and amateurs (47% and 46% respectively).

Table 4.4 Attitudes to gardening in 2016

Perception	Number of respondents	% of respondents
I am a keen and regular gardener – gardening is an enjoyable hobby	225	46%
I enjoy gardening but don't always have time for it	174	35%
I like to keep the garden tidy, but wouldn't call it a hobby	74	15%
Gardening is a chore	21	4%

Figure 4.1 shows that “gardening is a chore” has remained low among survey respondents since the surveys started in 2007 (5 to 4%). However, it would seem that increasingly respondents “enjoy gardening but don't always have time for it”.

Figure 4.1 Comparison of attitudes to gardening by respondents (2007, 2010, 2013 and 2016)



4.1.4 Home and allotment gardening

Table 4.5 shows where respondents do their gardening. There is a small continuing increase in allotment gardening from 4% in 2007/2010 to 12% in 2013 and 16% in 2016, possibly due to the trend in ‘grow your own’.


Table 4.5 Where respondents do their gardening (2016)

Location (respondents tick all that apply)	Number of respondents	% of respondents
Private gardens	474	79%
Allotments	96	16%
Public/community gardens	27	5%

A typical respondent...

Aged 45-64

Gardens in privately owned garden



Keen and regular gardener

Lives in Yorkshire

4.2 Purchasing habits

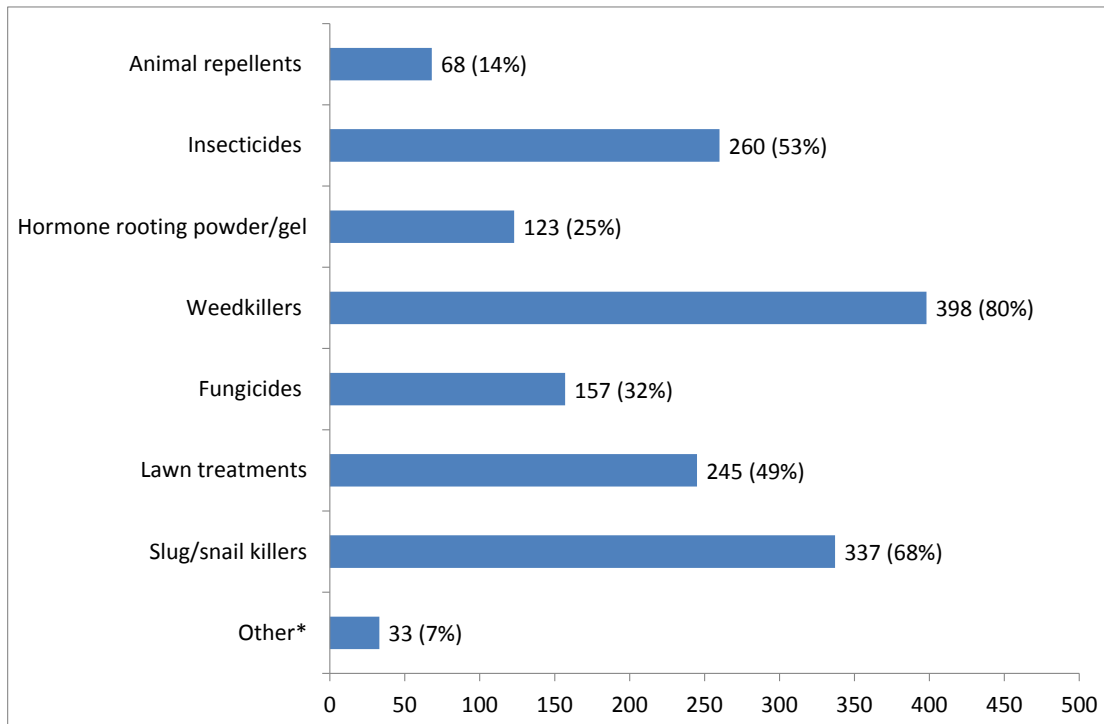
The questions in this section were asked of all 495 respondents. They were asked:

“What types of pesticides do you use?”
“How many do you purchase per year?”
“Where do you buy them from?”

4.2.1 Types of product

Figure 4.2 shows the results of the types of plant protection products used by respondents. Note that the types being used varied very little between the trained users and amateurs.

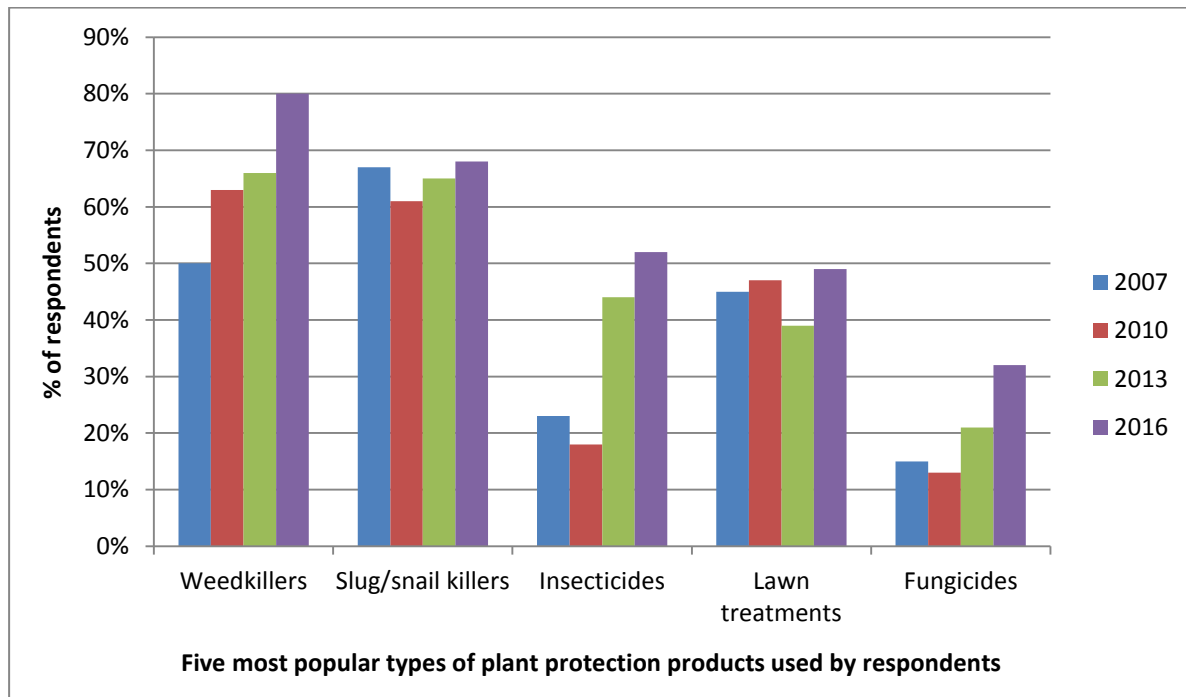
Figure 4.2 Types of plant protection products used (2016) (respondents tick all that apply)



* Most common 'other' responses were nematodes and ant killer (neither of which are plant protection products for regulatory purposes).

There is a continued increase in the use of weedkillers, insecticides and fungicides, while lawn treatments and slug/snail killers are relatively similar compared to previous years as can be seen in Figure 4.3.

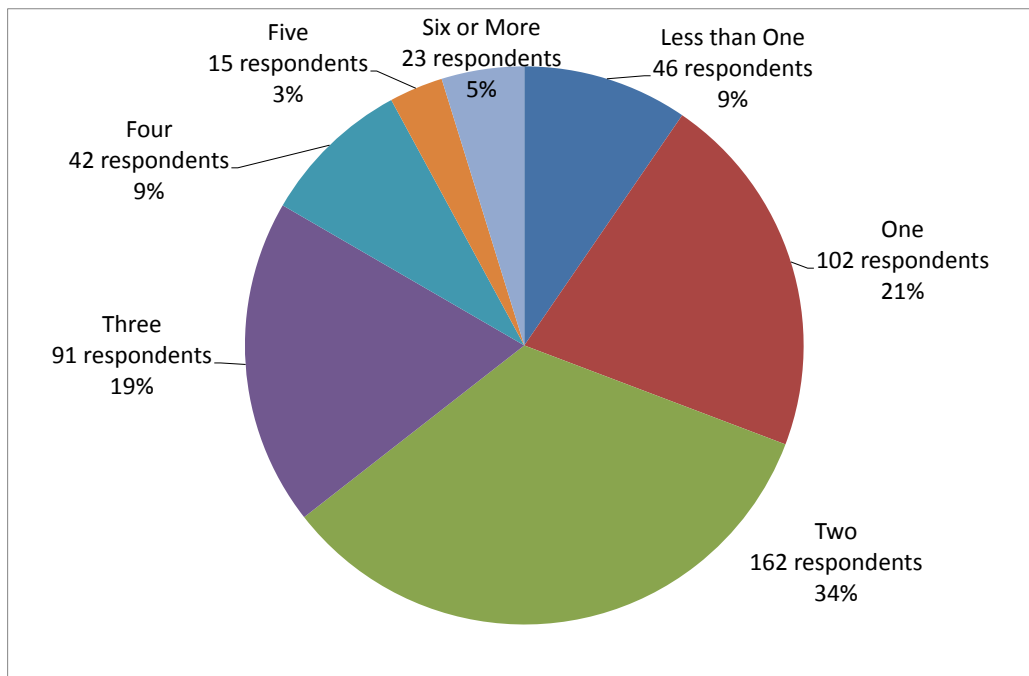
Figure 4.3 Comparison of the five most popular types of plant protection products used by respondents (2007, 2010, 2013 and 2016)



4.2.2 Quantities of product purchased

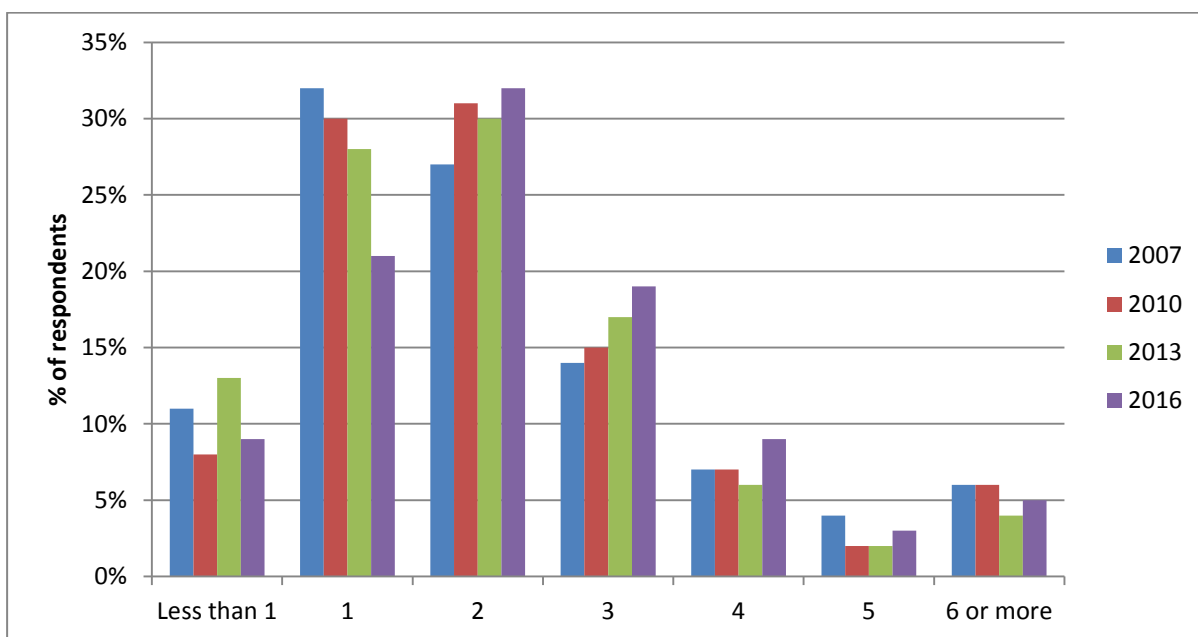
The responses are shown in Figure 4.4. Note there was an almost identical distribution in terms of how many plant protection products were purchased per year between trained users and amateurs (eg the most common number purchased is 2 in each group – making 33% of the amateur group and 36% of the trained group).

Figure 4.4 Number of plant protection products purchased per year on average (2016)



As shown in Figure 4.5, there continued to be a decrease in purchasing only one product from 32%, 30%, 28% in 2007, 2010 and 2013 respectively to 21% in 2016, while there were increases in purchasing 2, 3 and 4 plant protection products per year on average.

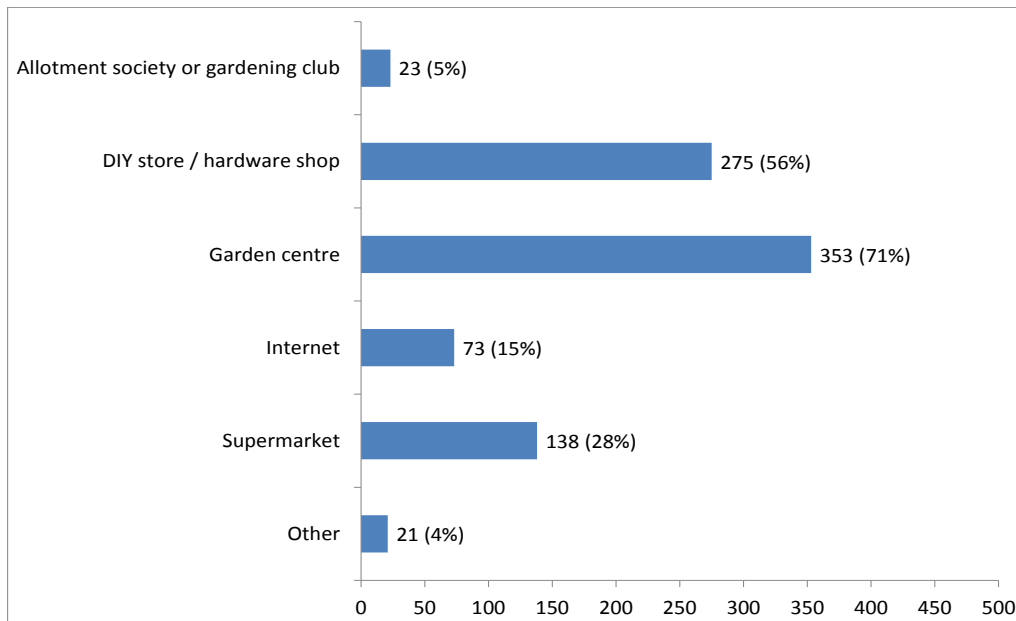
Figure 4.5 Comparison of number of plant protection products purchased in 2007, 2010, 2013 and 2016



4.2.3 Purchase locations

Respondents were asked where they usually bought their plant protection products. The highest proportion bought their products from garden centres.

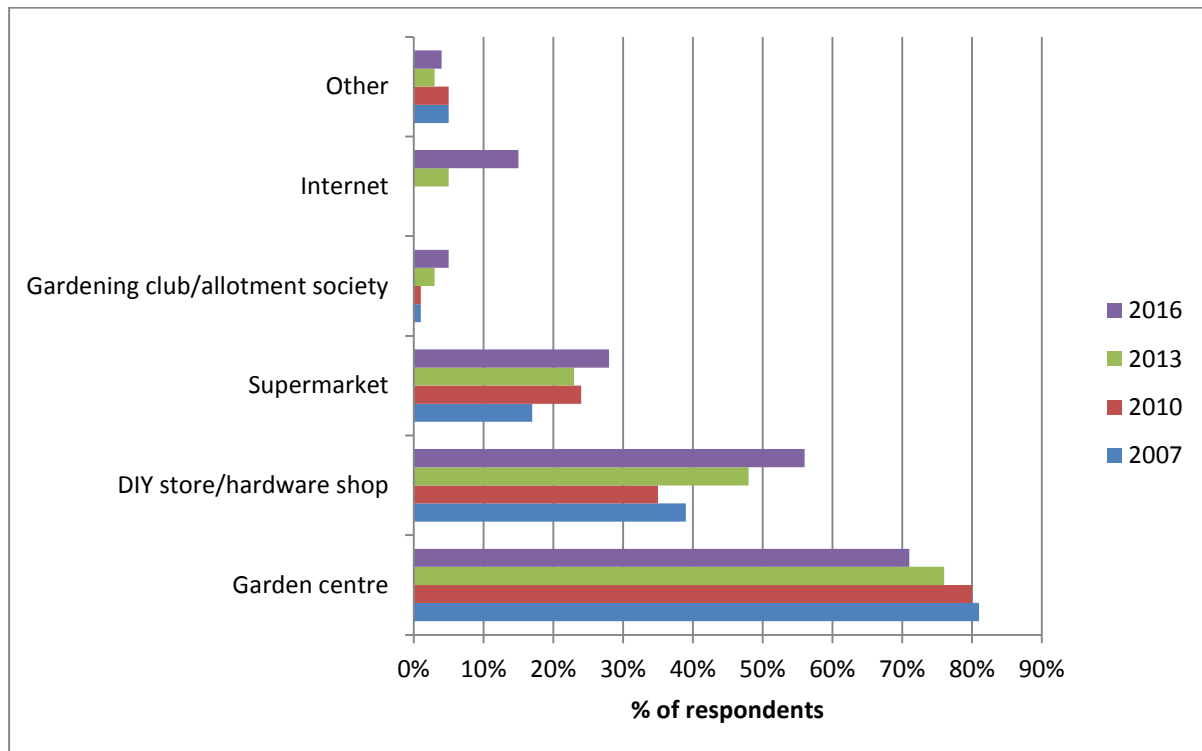
Figure 4.6 Where plant protection products are purchased (2016) (respondents tick all that apply)



** Most common others were general/discount stores or agricultural/farm suppliers.*

Figure 4.7 compares the purchase location in the survey years since 2007. Garden centres continue to be the most popular location, although this is gradually reducing, with DIY/hardware shops increasing in a close second. Supermarkets continue to be the third location of choice to purchase products. In addition, the internet increased from 5% in 2013 to 15% in 2016.

Figure 4.7 Comparison of main purchase locations for plant protection products (2007, 2010, 2013 and 2016)



4.3 Storage

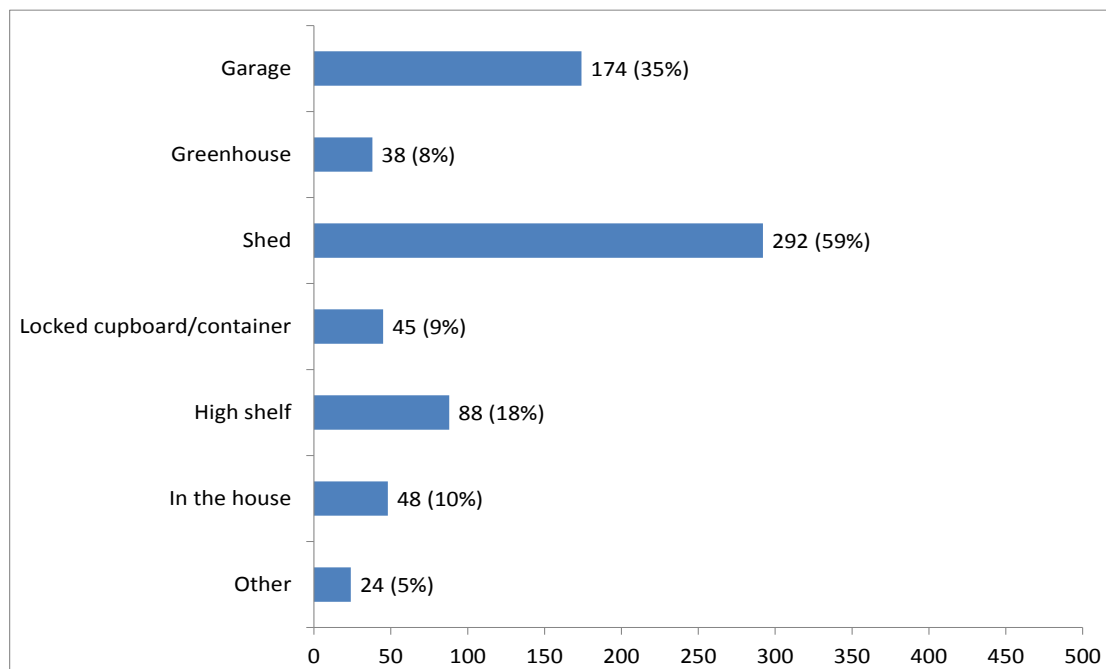
The questions in this section were asked of all 495 respondents. They were asked:

“Where do you store them?”
“How long would you store them?”

4.3.1 Storage location

Figure 4.8 shows that the shed (59%) was the most popular storage location followed by the garage (35%). Of the respondents, 18% stored products securely on a high shelf, while 9% stored them in a locked cupboard or container.

Figure 4.8 Where plant protection products are stored (2016) (respondents tick all that apply)



* Most common 'other' responses were cellar and outhouse

Storage in the garage, greenhouse, shed and house continue to be similar to previous survey years. Table 4.6 shows there was an increase in those storing plant protection products securely (locked cupboard/cabinet and/or high shelf) indicating good practice in keeping plant protection products out of the reach of children and pets.

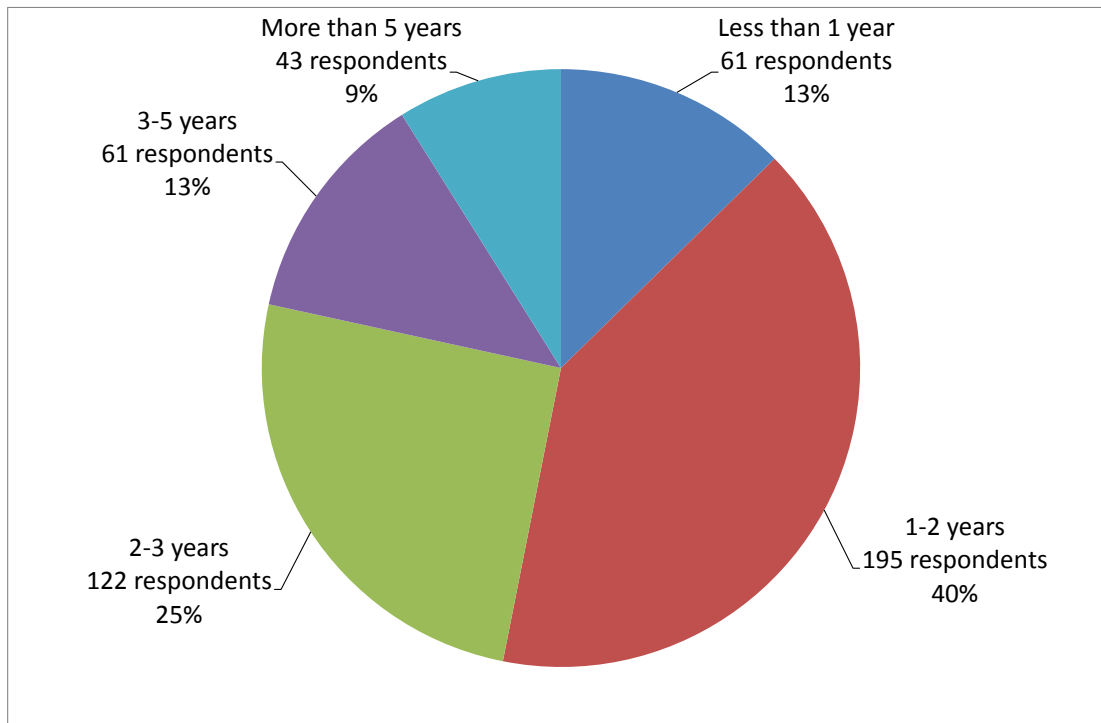
Table 4.6 Respondents storing plant protection products securely (2007, 2010, 2013 and 2016)

2007	2010	2013	2016
11%	4%	14%	27%

4.3.2 Length of storage

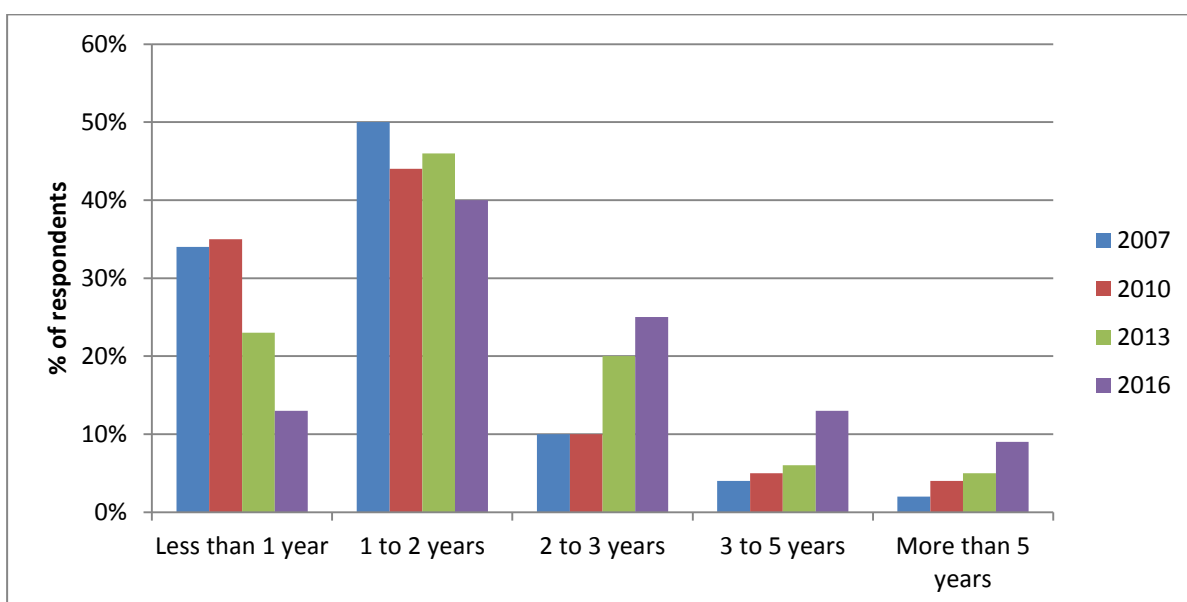
The highest proportion of respondents store products for 1-2 years (40%), while 25% store products for 2-3 years as shown in Figure 4.9.

Figure 4.9 How long plant protection products are typically stored (2016)



Comparison of storage lengths over the survey years in Figure 4.10 shows that storing for up to two years continued to decrease while storing for more than two years continued to increase. Storage for more than two years is not encouraged as products may deteriorate and not be as effective and labels may also deteriorate making it difficult to read the instructions for safe use and disposal.

Figure 4.10 Comparison of length of storage of plant protection products (2007, 2010, 2013 and 2016)



4.4 Use

4.4.1 Product instructions

The questions in this section were asked of all 495 respondents. They were asked:

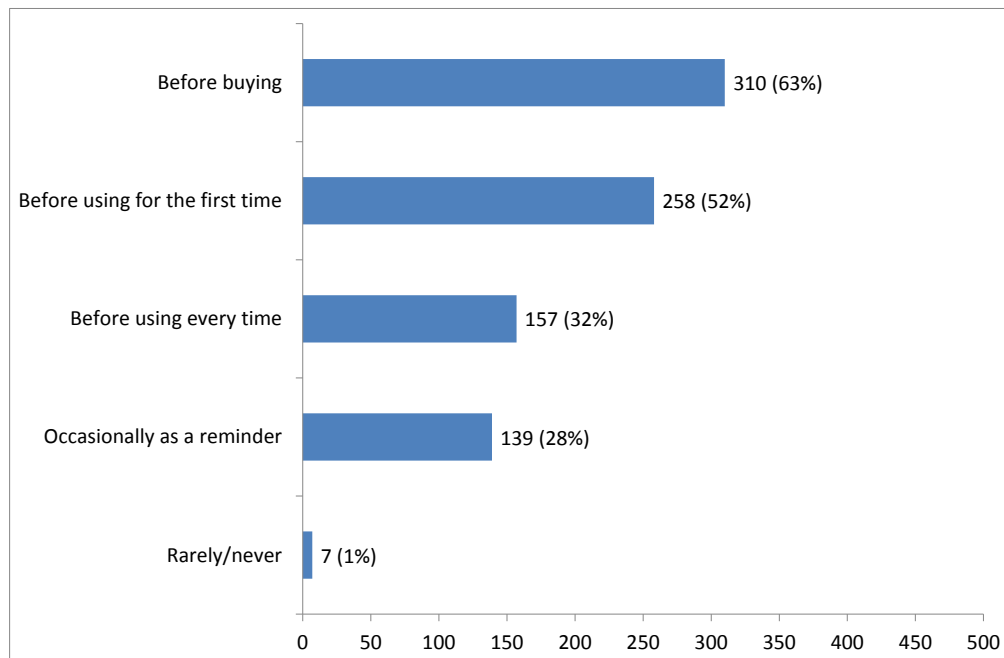
“When would you read pesticide instructions on the label?”
“How clear do you think the instructions are?”
“How closely do you follow the instructions?”

There was a wide variety in terms of which combinations of answers people gave. However, the following pattern is a reasonable summary:

- The vast majority of respondents do read the instructions either at the point of buying or at the point of using for the first time (with a similar frequency between the two). Around half of the respondents read them at both these points.
- On subsequent uses, around half of the respondents would read the instructions again every time and around half would read them occasionally as a reminder. Very few people do not consult the instructions or consult them only rarely.

Note there was a very similar distribution in terms of when instructions are read between the trained users and amateurs. For example, 65% of those with training read before buying compared with 64% of amateurs; 31% of those with training read before every use, compared with 33% of amateurs.

Figure 4.11 When are the instructions on the product label read? (2016) (respondents tick all that apply)



There continues to be an increase in reading product instructions before using for the first time (from 38% in 2013 to 52% in 2016), and occasionally as a reminder (from 19% in 2013 to 28% in 2016) as indicated in Figure 4.12.

Reading product instructions before using every time continued to be similar to 2013 (29% in 2013 to 32% in 2016), which indicates an improvement in good practice is being maintained.

This generally indicates a continuing trend in good practice, which may be due to addition of the caption “Use pesticides safely. Read the label” that was required to be added to the front of product labels and adverts from 2012 onwards.

Figure 4.12 Comparison of how often respondents read plant protection product labels (2007, 2010, 2013 and 2016)

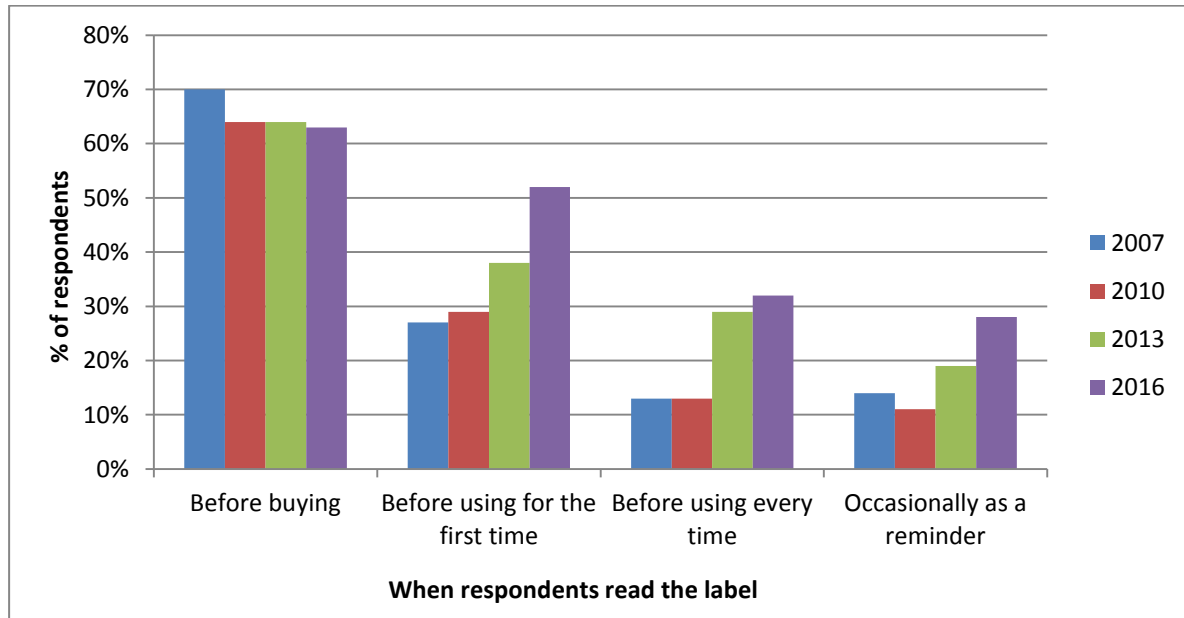
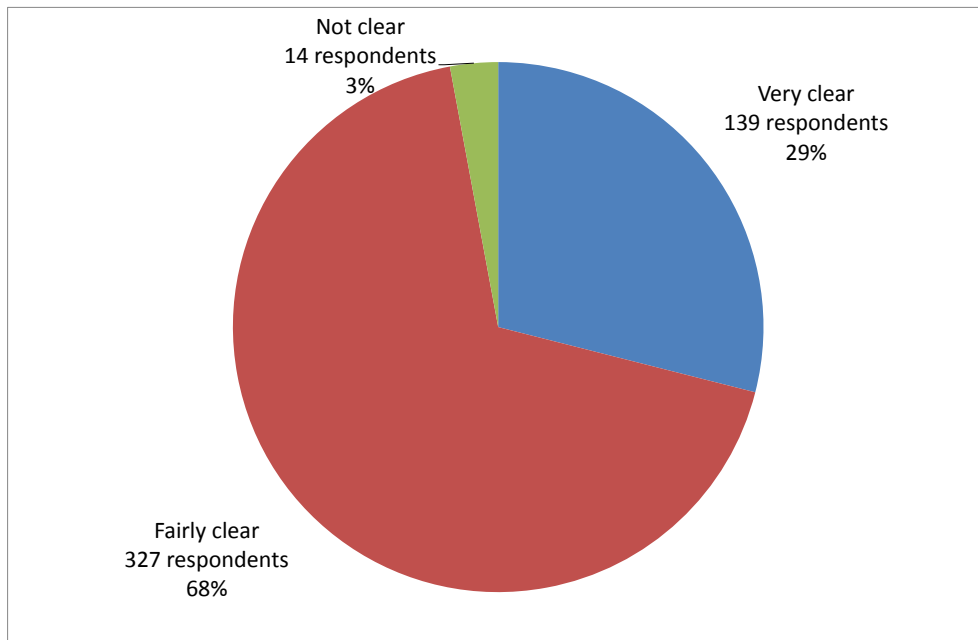


Figure 4.13 shows respondents' perception of clarity of product labels. Note that the perception of clarity of instructions on plant protection product labels was fairly similar between trained users and amateurs. For example, 27% of amateurs said the instructions are very clear, compared with a slightly higher 33% amongst those with training. In both cases only 3% say the instructions are not clear at all.

A total of 97% respondents (very clear and fairly clear) is similar to 2007 when 95% of respondents answered 'yes' when asked if they found product labels clear.

Figure 4.13 Respondents views on the clarity of instructions on product labels

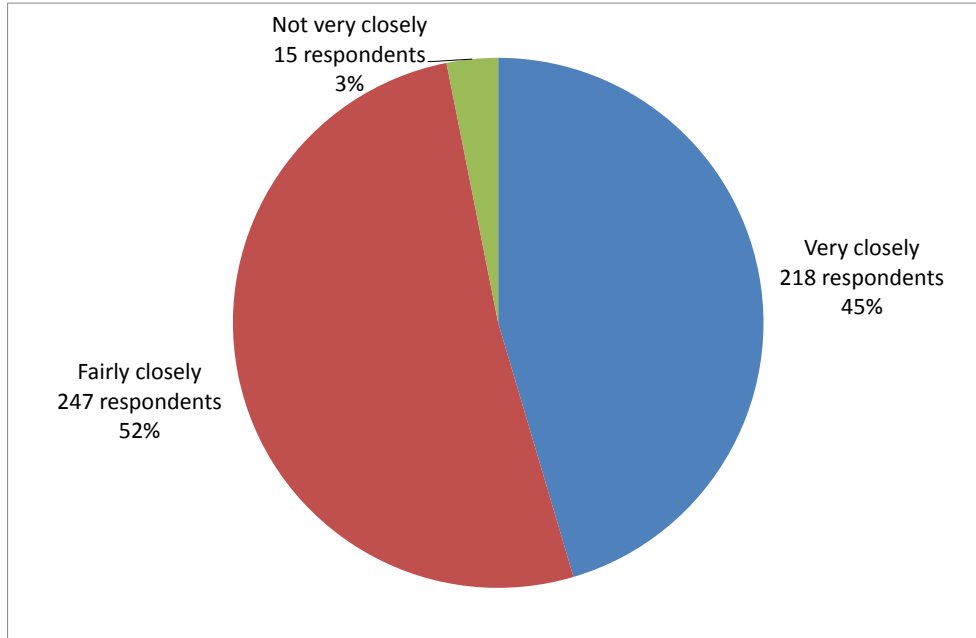


The final question about product instructions asked respondents how closely they followed the instructions. As can be seen in Figure 4.14, most respondents follow the instructions fairly closely (52%) or very closely (45%).

Note that trained users were slightly more likely to say that they followed the instructions very closely (52%, compared with 44% of the amateurs).

In 2013 the percentage of responses for very closely and fairly closely were reversed with 51% and 44% respectively. The combined percentage for those respondents following the label instructions very and fairly closely in 2013 and 2016 is similar (95% and 97% respectively).

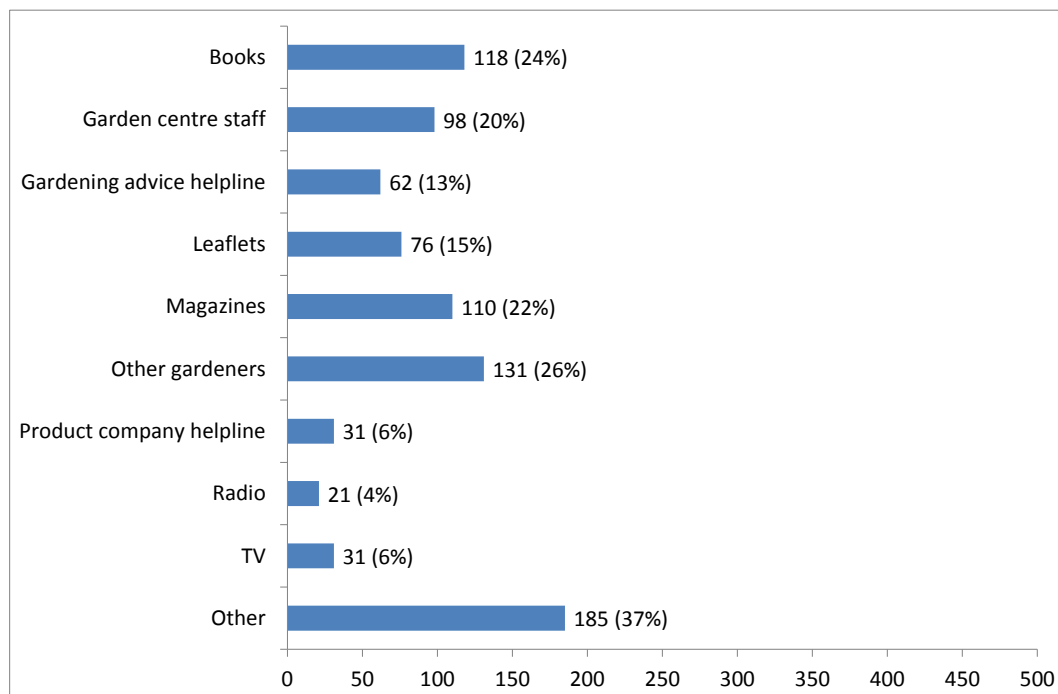
Figure 4.14 How closely respondents follow the instructions on the plant protection product labels (2016)



4.4.2 Other sources of information

In addition to product label information all 495 respondents were asked where else they get information on how to use plant protection products. Figure 4.15 shows that many different options are used by respondents.

Figure 4.15 Other sources of information on how to use plant protection products in 2016 (respondents tick all that apply)



* 144 (78%) of all the 'other' responses referred to the internet in some way – in particular there were 67 mentions of the RHS website (36% of all the 'other' responses), 36 mentions of product manufacturers' websites (19% of all the 'other' responses) and 41 generic references to the internet, including websites and search engines (22% of all the 'other' responses). In total, 29% of respondents mentioned websites.

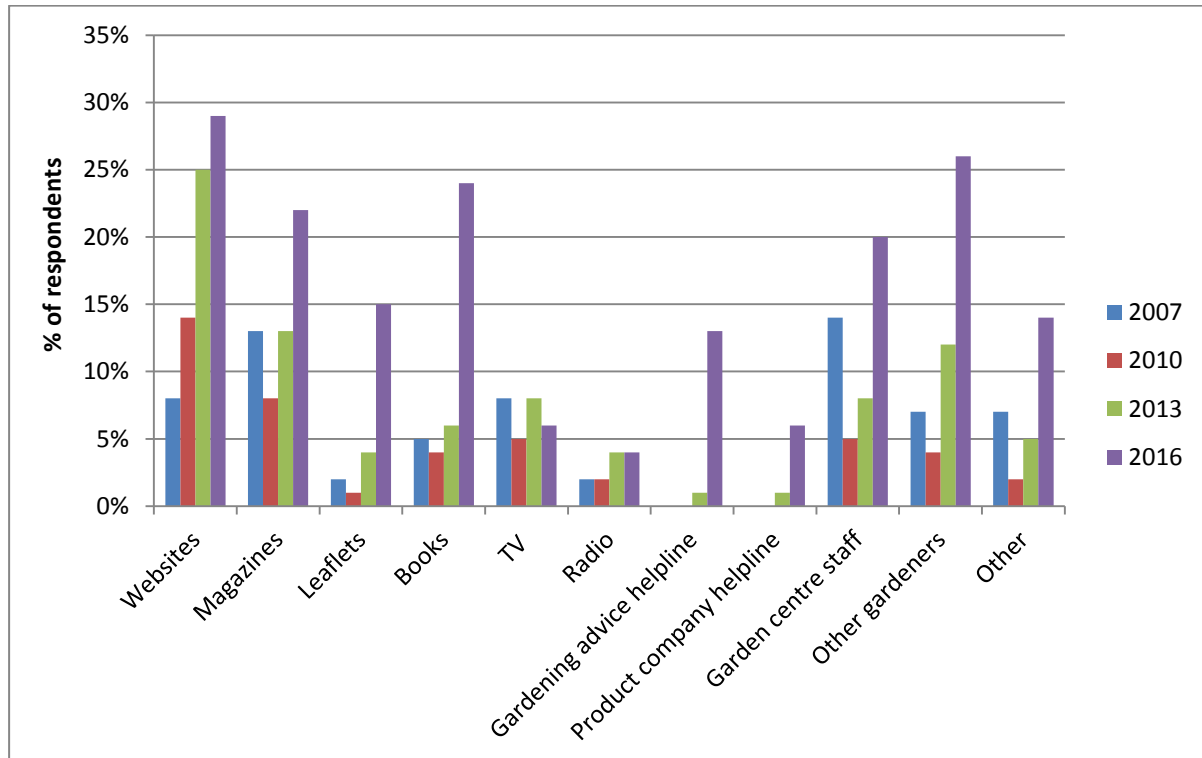
Table 4.7 shows the split of the 144 responses that referred to the internet under 'other'. As can be seen almost half of those that refer to the internet for further information use the RHS's website.

Table 4.7 Specific source of websites used in 2016 for plant protection products

Category	Total in category	Specific responses	Number of responses	Percentage of category
Websites	144	Generic sites/search engines	41	28%
		RHS	67	47%
		Product/manufacture's website	36	25%

Comparison with previous survey years, as shown in Figure 4.16, shows that most types of additional sources of information increased in 2016, some by more than double.

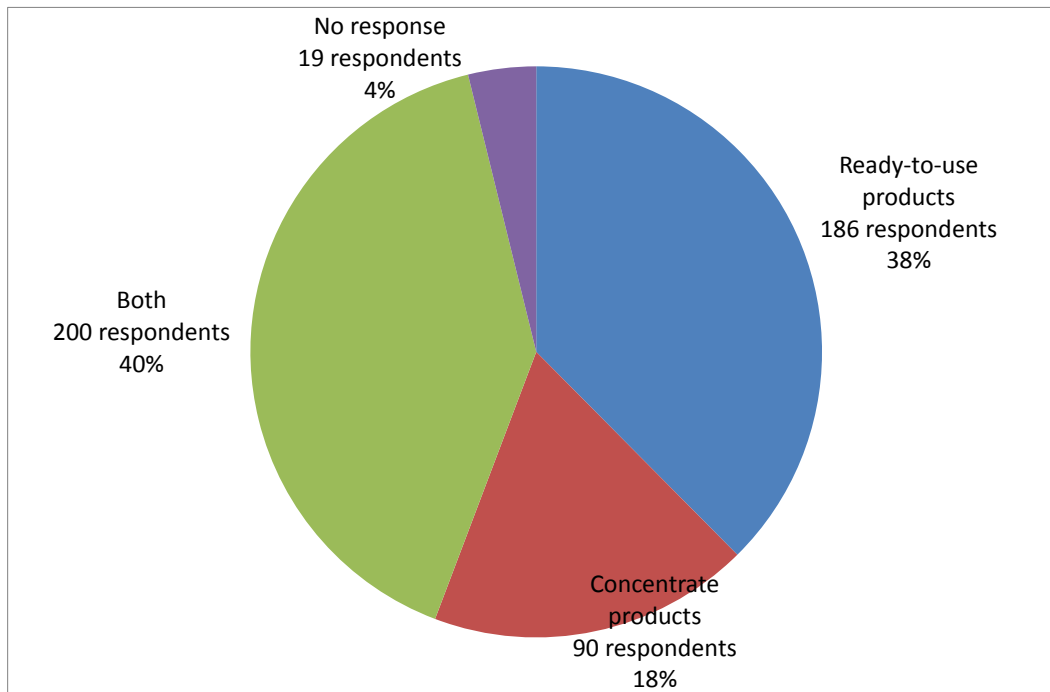
Figure 4.16 Comparison of other sources of information used for plant protection products (2007, 2010, 2013 and 2016)



4.4.3 Ready-to-use and concentrate products

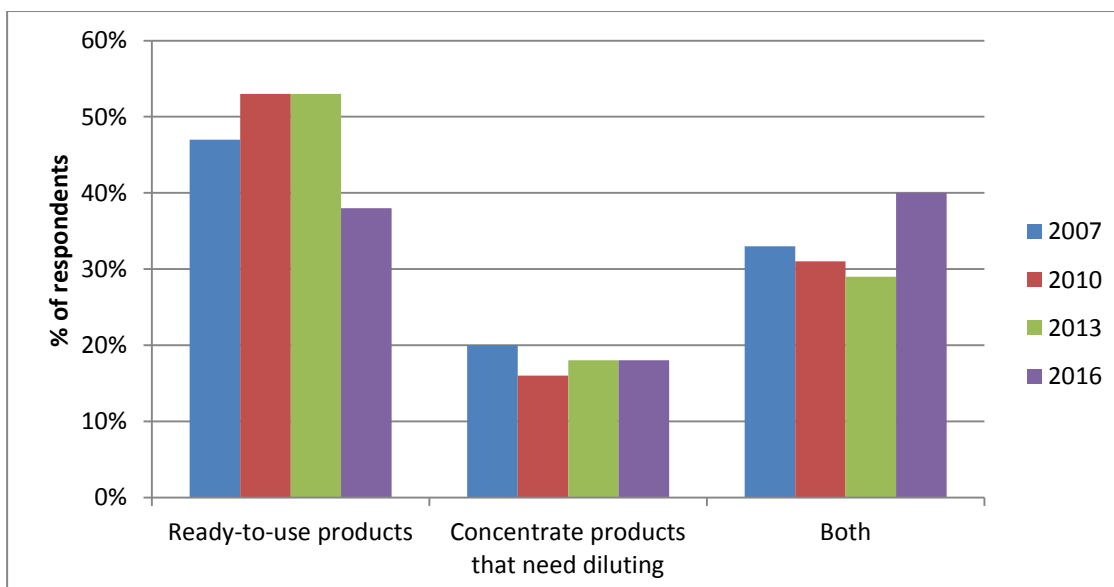
As with previous survey years, respondents were asked whether they used only ready-to-use products, only concentrate products that need diluting before use, or both types of products. Figure 4.17 shows the results.

Figure 4.17 Types of product used (2016)



Comparison of results with previous survey years shows that the results were similar for all responses until 2016 when the purchase of ready-to-use only products decreased and the purchase of both ready-to-use and concentrate products rose as shown in Figure 4.18.

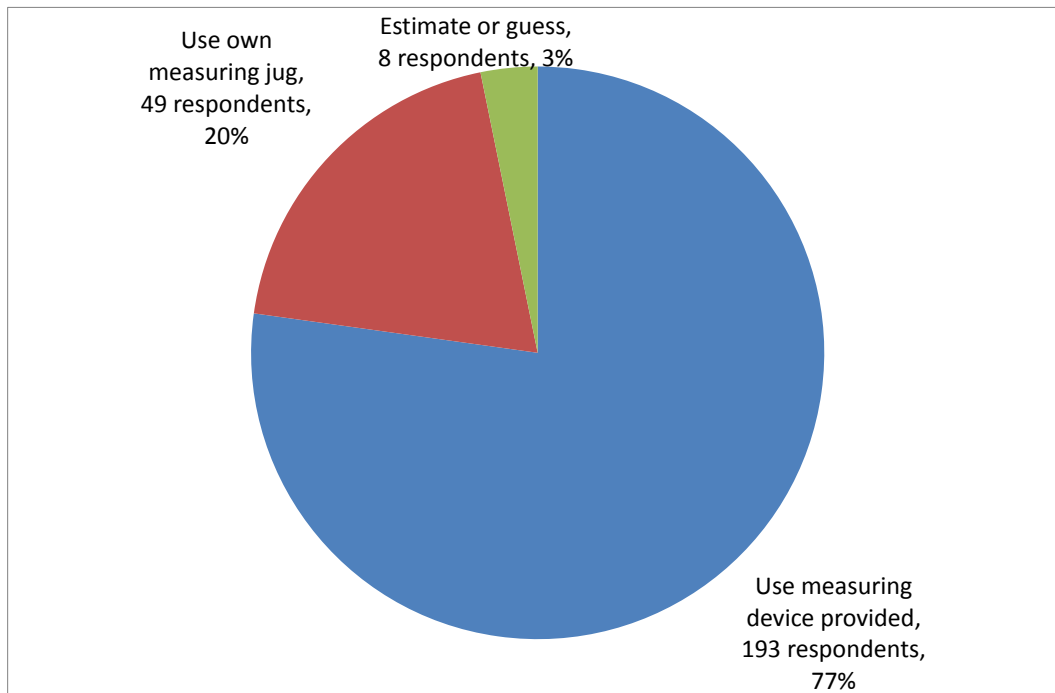
Figure 4.18 Comparison of use of ready to use and concentrate products (2007, 2010, 2013 and 2016)



4.4.4 Measuring out concentrate product for diluting

One question asked respondents who use concentrate products (n=252) how they would measure the concentrate product for diluting. Figure 4.19 shows the results, which are similar to previous survey years.

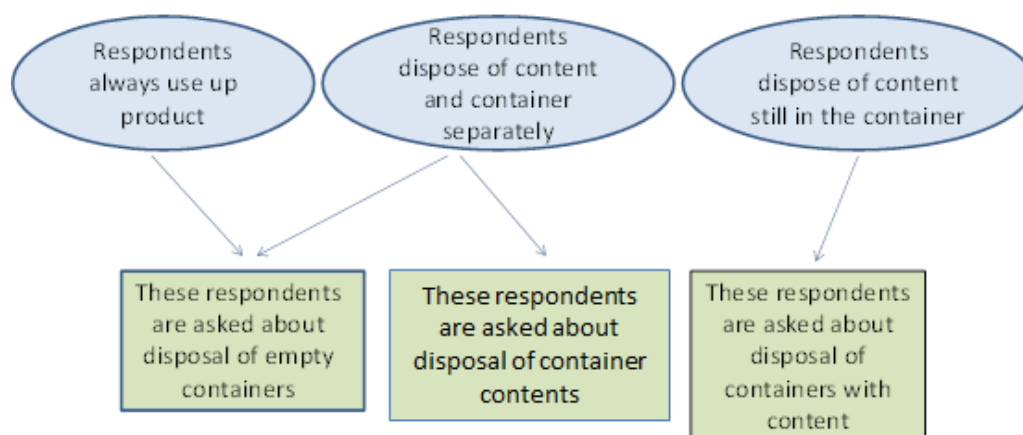
Figure 4.19 Method of measuring out concentrate product for diluting



n=252 respondents

4.5 Disposal

At this point in the survey, respondents were asked whether they disposed of the content and container of a plant protection product together or separately. Their answers route them towards appropriate questions as shown in the flowchart below.



4.5.1 Information on method of disposal

A new question for 2016 asked respondents where they find information about disposal methods for ready-to-use and concentrate products. Empty, plastic ready-to-use product containers can be recycled whereas concentrate ones are not currently allowed to be recycled. The correct disposal information can be found on product labels.

In total, 385 respondents (78%) use ready-to-use products and 286 respondents (58%) use concentrate products.

Table 4.8 shows that the majority of respondents find disposal information from the product label; 84% for ready-to-use and 85% for concentrate products.

Table 4.8 Where respondents find disposal information for ready-to-use and concentrate products (2016) (respondents tick all that apply)

Response	Ready-to-use products		Concentrate products	
	Number	Percentage	Number	Percentage
Manufacturer's website	56	15%	69	24%
Product label	325	84%	243	85%
Council website	80	21%	62	22%
Council leaflet	19	5%	15	5%
Friends, family or neighbours	11	3%	5	2%

4.5.2 Disposal of unused/unwanted plant protection product before disposing of the container

Depending on the type of product respondents used, they were asked if they used up the contents or, if they had content left over at the point of disposal, whether they disposed of the content and container separately or together in the original container.

Table 4.9 shows that the majority of respondents use up both types of plant protection products: 81% for concentrate and 77% for ready to-use. This is similar to 2013 results when 80% of respondents used up ready-to-use and concentrate products, as shown in Figure 4.21.

Seventy (18%) respondents using ready-to-use products would dispose of leftover content while it was still in the container, while a total of 20 respondents (5%) would dispose of the content and the container separately.

Of those disposing of ready-to-use contents and container separately, 13 (3%) dispose of the ready-to-use content by spraying/emptying onto waste/spare ground; one uses the sink; one uses the drain; one uses a normal household waste bin (non-recycling); and four use council facilities (described as tip, depot, reclamation centre, waste disposal plant).

Among those using concentrate products, 34 (12%) respondents would dispose of leftover content while it was still in the container, while a total of 19 (7%) would dispose of the content and the container separately.

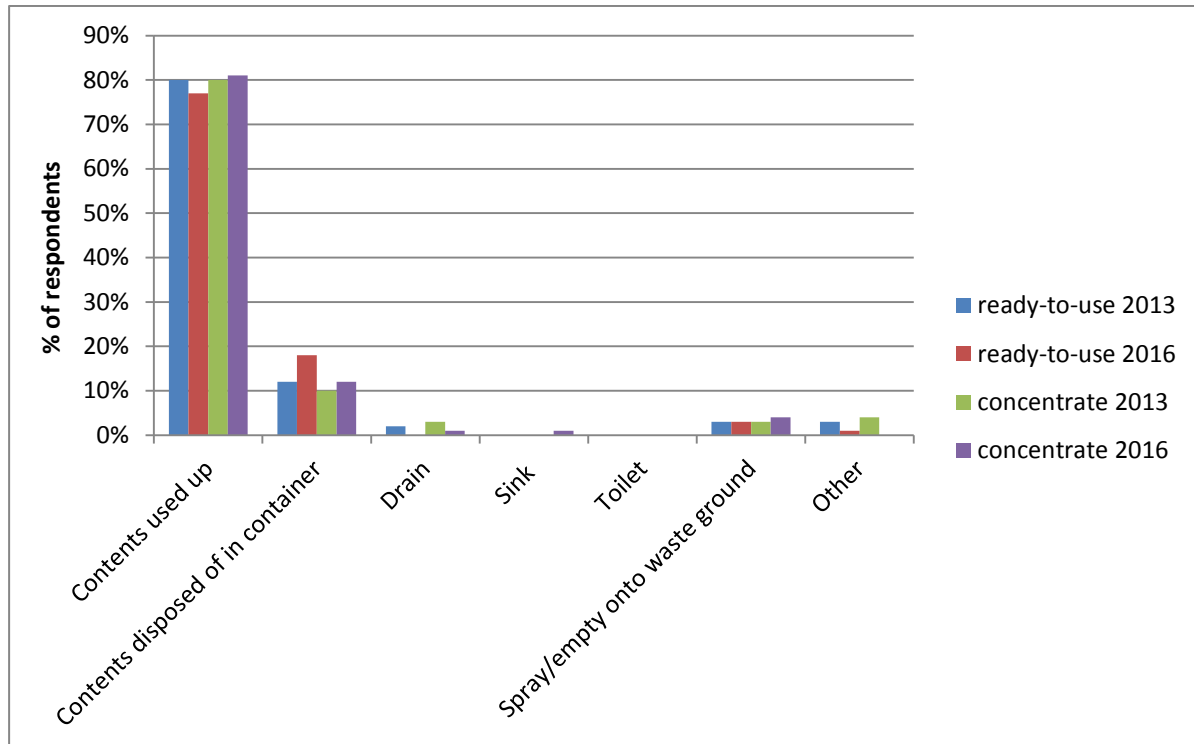
Of the 19 respondents disposing of concentrate content and container separately, 12 dispose of the contents by spraying/emptying onto waste/spare ground; two use the sink; three use the drain; one uses a hazardous waste facility and one uses the council tip (these last two are reported as 'Other' in Table 4.9).

The percentage of responses for 2016 is similar to those in 2013 as shown in Figure 4.21.

Table 4.9 Disposal routes of unused/unwanted plant protection product before disposing of the container (2016)

Response	Ready-to-use		Concentrate	
	frequency	percentage	frequency	percentage
Contents used up	295	77%	232	81%
Contents disposed of in container	70	18%	34	12%
Contents disposed to drain	1	0%	3	1%
Contents disposed to sink	1	0%	2	1%
Contents disposed to toilet	0	0%	0	0%
Contents sprayed/emptied onto waste ground	13	3%	12	4%
Other	5	1%	2	1%

Figure 4.21 Comparison of disposal routes of unused/unwanted plant protection product before disposing of the container (2013 and 2016)



4.5.3 Disposal of containers with plant protection product still in the container

Seventy (18%) respondents using ready-to-use products say that they dispose of the content while it is still in the container. Table 4.10 shows that 49% (34) of the 70 respondents, dispose of plant protection products with some or all of the contents in the product container to the normal household bin. This is the same for 2013 when 49% also disposed of the contents still in the product container (see Figure 4.22).

Of the 285 respondents using concentrate products, 34 (12%) say that they dispose of the content while it is still in the container. Table 4.11 shows that 47% (16), of the 34 respondents, dispose of plant protection products with some or all of the contents in the product container to the normal household bin. This percentage is higher than for 2013 when 38% of respondents (31 out of 82) disposed of plant protection products with some or all of their contents still in the product container to the normal household bin (landfill/non-recycling) (see Figure 4.23).

Disposal to the normal household bin would appear to indicate no improvement in good practice. However, it is not clear from the survey what type of unused/unwanted product is being disposed of to the normal household bin, so it is not possible to know if this disposal route is allowed on the label of the product being disposed of in this way. Only granular ferrous sulphate products (for moss control in lawns) or ferrous sulphate plus fertiliser products (for lawn feed and moss control) are allowed to be disposed of in the normal household bin. All other products should be disposed of as household hazardous waste via local authorities, often at household waste recycling centres (HWRCs).

Table 4.10 Disposal methods used for ready-to-use product containers with plant protection product still in the container (2016)

Response	Number	Percentage
Normal household waste (non-recycling) - kerbside/street collection	34	49%
Household recycling - kerbside/street collection	1	1%
Normal waste - landfill HWRC	10	14%
Plastic recycling - HWRC	3	4%
Glass recycling - HWRC	2	3%
Hazardous chemical waste disposal - HWRC	29	41%
Plastic recycling point - supermarkets/carparks etc	1	1%
Other	0	0%

Multiple answers (n=70 respondents)

Comparison with 2013 shows an increase in respondents disposing of ready-to-use contents still in the container as hazardous household waste from 21% in 2013 to 41% in 2016, while disposing to household recycling has reduced from 16% in 2013 to 1% in 2016. Both of these results indicate an improvement in good practice and respondents following product label instructions for most ready-to-use products regarding disposal.

Figure 4.22 Comparison of disposal methods used for ready-to-use product containers with plant protection product still in the container (2013 and 2016)

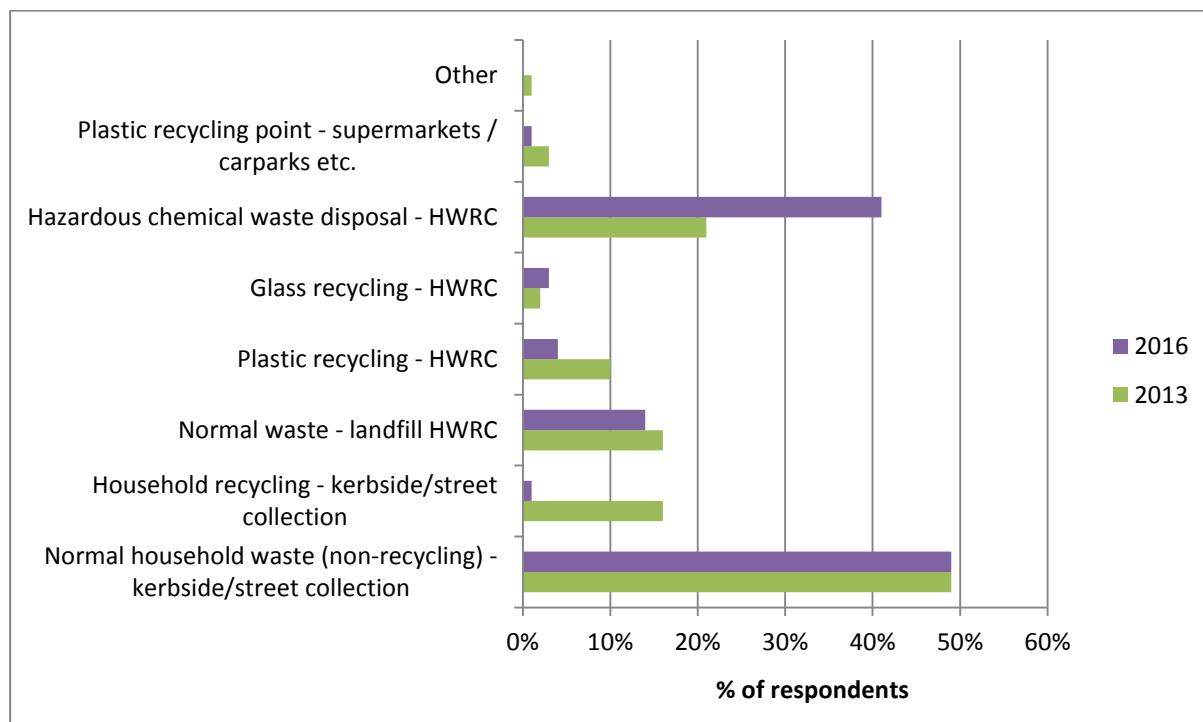


Table 4.11 Disposal methods used for concentrate product containers with plant protection product still in the container (2016)

Response	Number	Percentage
Normal household waste (non-recycling) - kerbside/street collection	16	47%
Household recycling - kerbside/street collection	4	12%
Normal waste - landfill HWRC	6	18%
Plastic recycling - HWRC	1	3%
Glass recycling - HWRC	1	3%
Hazardous chemical waste disposal - HWRC	12	35%
Plastic recycling point - supermarkets/carparks etc	0	0%
Other	1	3%

Multiple answers (n=34 respondents)

Comparison of results for 2013 and 2016 for disposal of concentrate product still in the container shows an increase in disposing to the normal household bin from 38% in 2013 to 48% in 2016 (as shown in Figure 4.23). This could indicate poor practice if the label of the products being disposed of in this way states that disposal should be as hazardous waste via a local authority.

Figure 4.23 Comparison of disposal methods used for concentrate product containers with plant protection product still in the container (2013 and 2016)

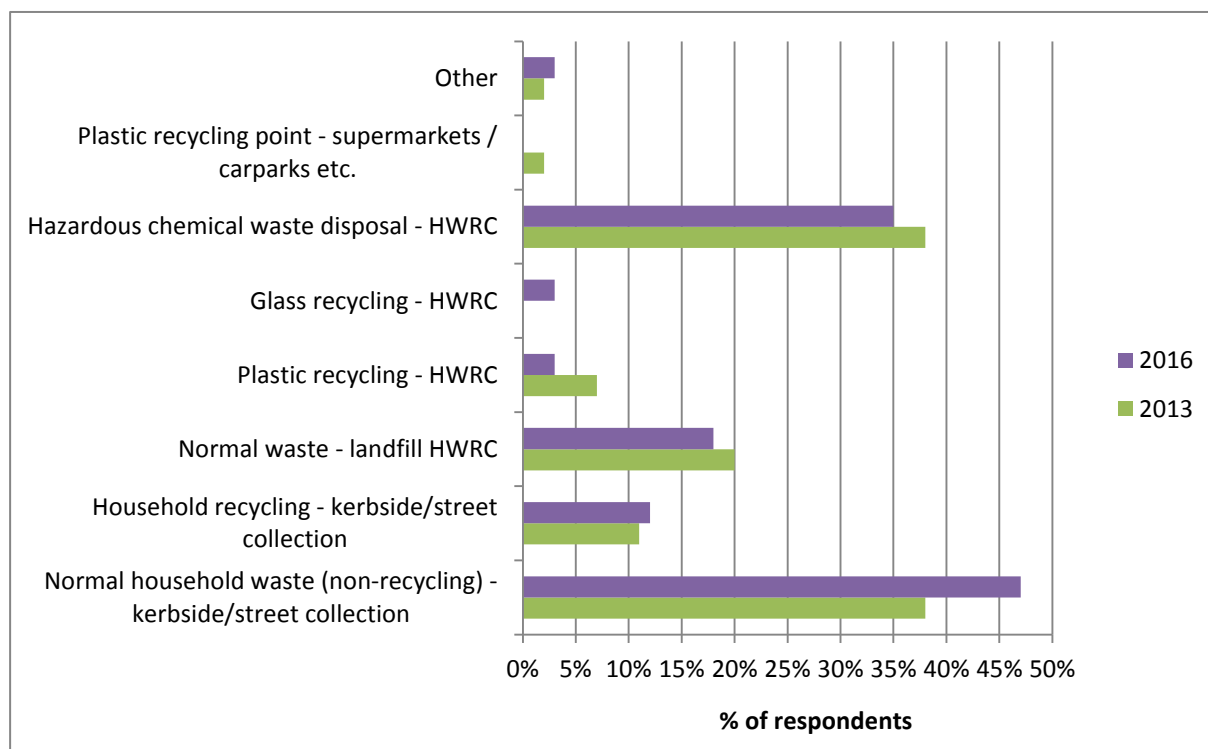
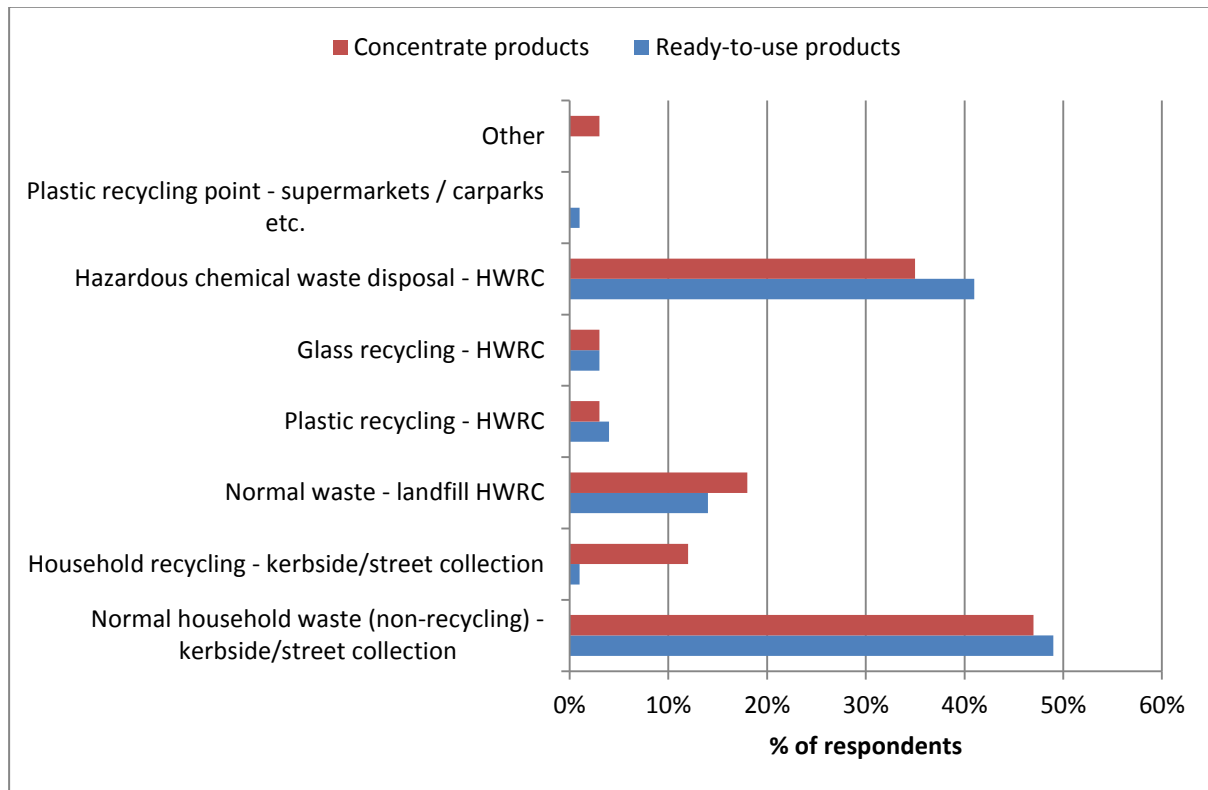


Figure 4.24 compares the results for ready-to-use and concentrate products, showing that correct disposal for most products as household hazardous waste is slightly higher for ready-to-use products than concentrate ones.

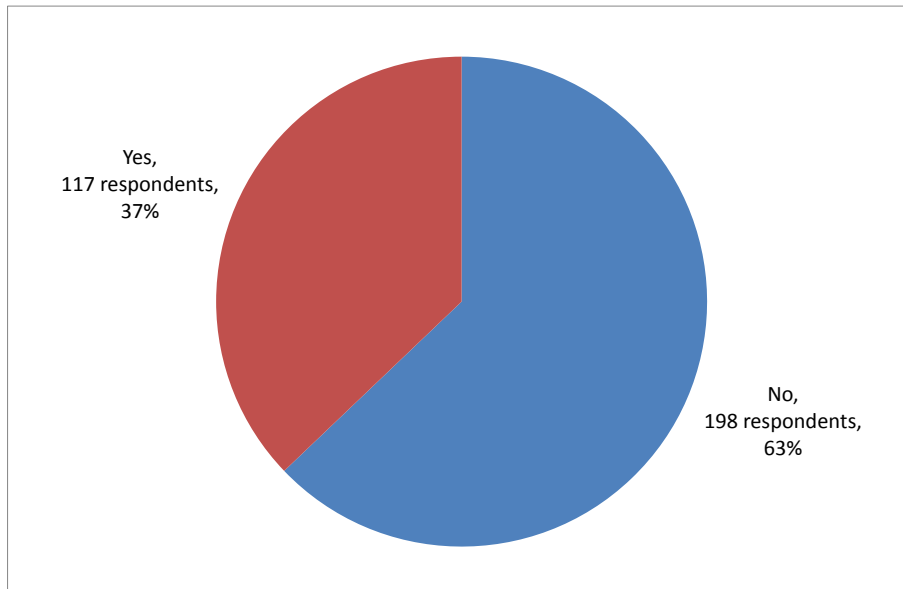
Figure 4.24 Comparison of disposal methods used for ready-to-use and concentrate containers with plant protection product still in the container (2016)



4.5.4 Rinsing out of empty product containers

Of the respondents using ready-to-use products, 315 (82%) say they are left with an empty container, either because they dispose of the content separately (20 respondents, 5%) or because they use the product up (295 respondents, 77%). Figure 4.25 shows how many respondents rinse the empty ready-to-use container.

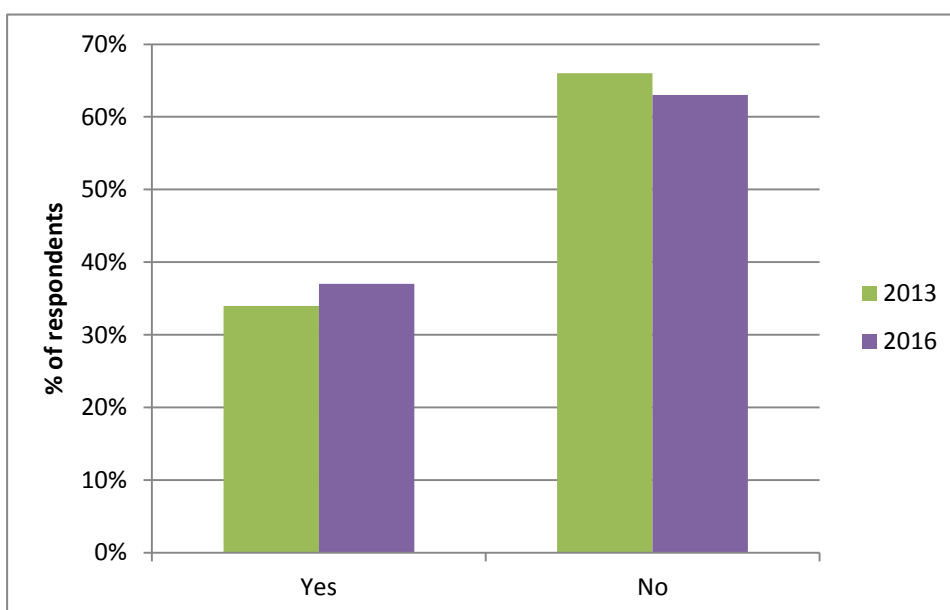
Figure 4.25 Do respondents rinse out empty ready-to-use plant protection product containers? (2016)



n=315 respondents

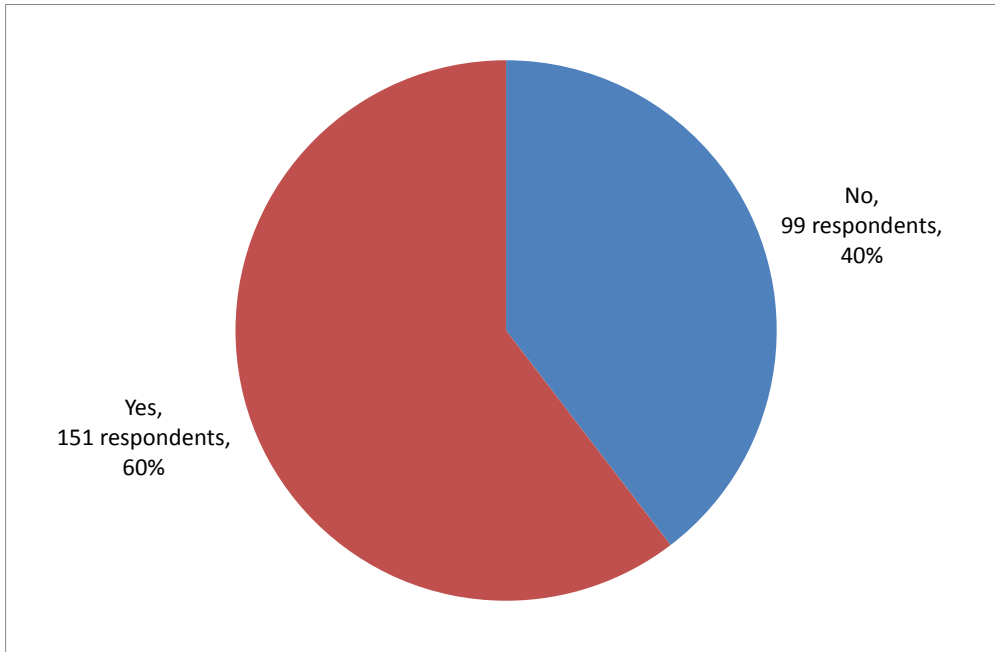
Responses are similar to those in 2013 as shown in Figure 4.26 when this question was first asked of respondents using ready-to-use products.

Figure 4.26 Comparison of whether respondents using ready-to-use products rinse out the empty plant protection product container before disposal (2013 and 2016)



Of the respondents using concentrate products, 252 (88%) say that they are left with an empty container, either because they dispose of the content separately (20 respondents, 7%) or because they use the product up (232 respondents, 81%). Figure 4.27 shows how many respondents rinse the empty container.

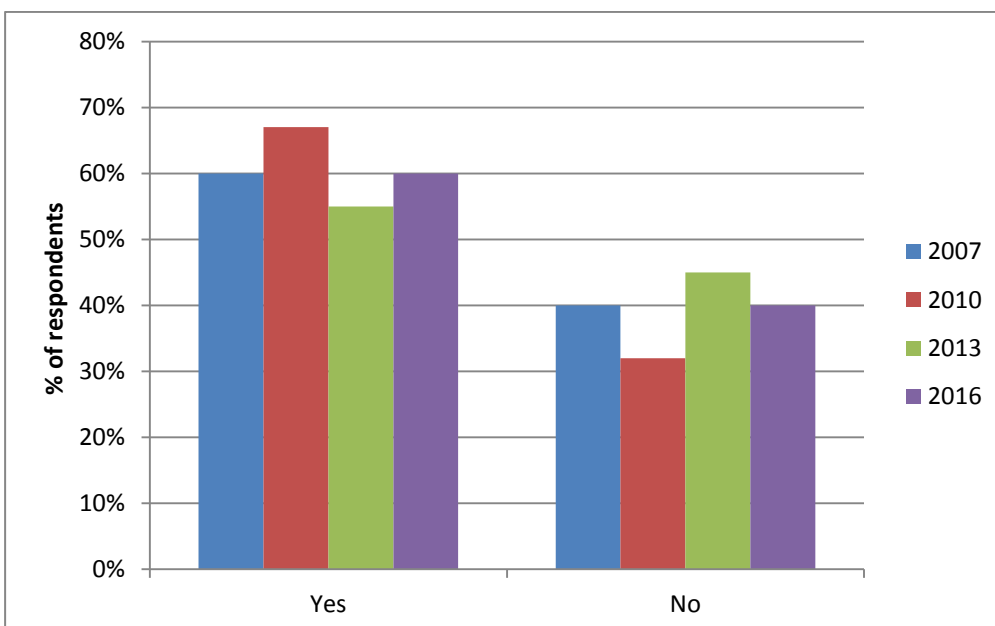
Figure 4.27 Do respondents rinse out empty concentrate plant protection product containers? (2016)



n=252 respondents

Responses are generally similar to those in 2007, 2010 and 2013 as shown in Figure 4.28

Figure 4.28 Comparison of whether respondents using concentrate products rinse out the empty plant protection product container before disposal (2007, 2010, 2013 and 2016)



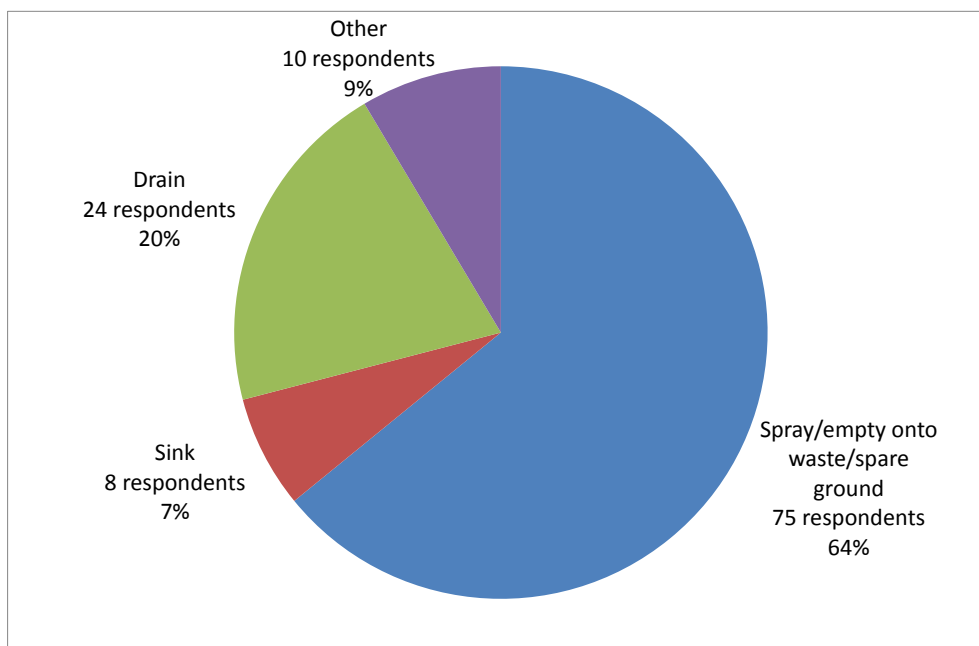
4.5.5 Disposal of liquid from rinsing empty product containers

For respondents who stated they did rinse out containers before disposal, a follow-up question was asked to find out where they disposed of the rinsing. This has only been asked since 2013 for ready-to-use products.

Figure 4.29 shows that most respondents (n=75, 64%) rinsing out ready-to-use containers spray/empty the rinsing onto waste/spare ground. However, over a quarter of respondents (n=32) dispose of the rinsings to either the sink (7%) or drain (20%). Although local authorities often ask householders to rinse out plastic containers before recycling, rinsing of empty ready-to-use plant protection product containers is not necessary before disposal of the container. In addition, disposal of rinsings to water drainage systems indicates that respondents are not following instructions on the product label regarding disposal and environmental protection which indicates poor practice and risks contaminating water and the environment.

However, comparison with 2013 results indicates that disposal to the sink/toilet/drain has reduced from 40% to 27% showing an improvement in complying with product labels and good practice. See Figure 4.30 for further information.

Figure 4.29 What do people do with the liquid from rinsing out empty ready-to-use plant protection product containers? (2016)



(n=117 respondents)* *The majority of 'other' respondents said they spray the leftover liquid onto the area they had been treating in the first place.*

Figure 4.30 Comparison of disposal of liquid from rinsing empty ready-to-use plant protection product containers (2013 and 2016)

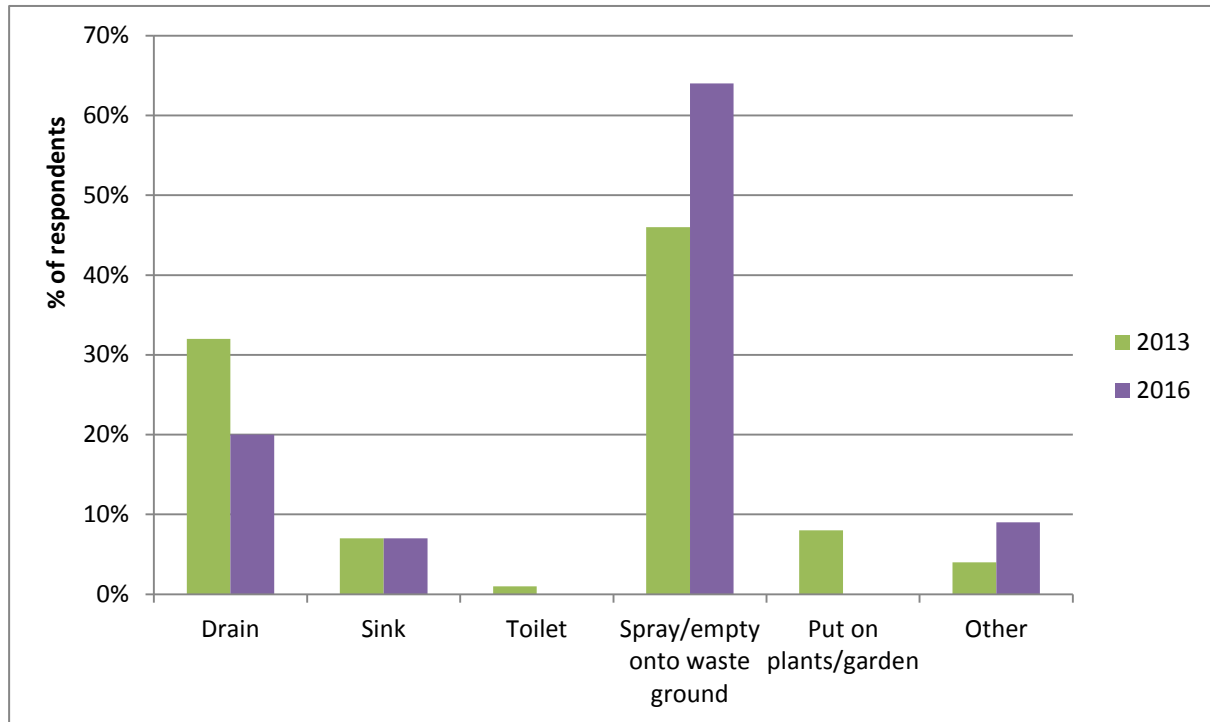
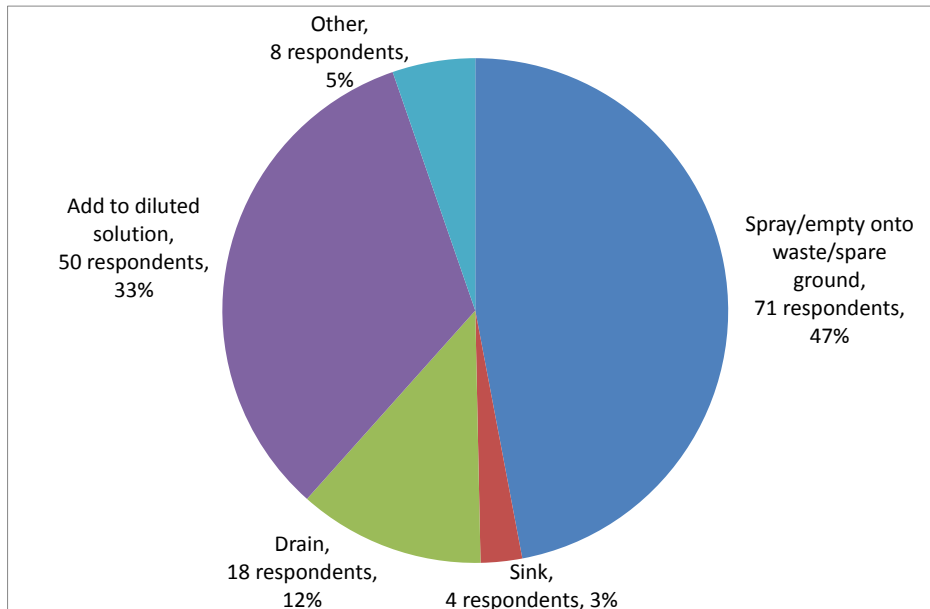


Figure 4.31 provides the results for the 151 respondents who rinse out empty concentrate product containers. Almost half (47%) spray/empty the rinsing onto waste/spare ground; 33% add the rinsing to the diluted solution for spraying onto plants mentioned on the product label which is similar to 2013 (34%); while 15% of respondents (22) dispose of rinsings to a combination of the drain or sink.

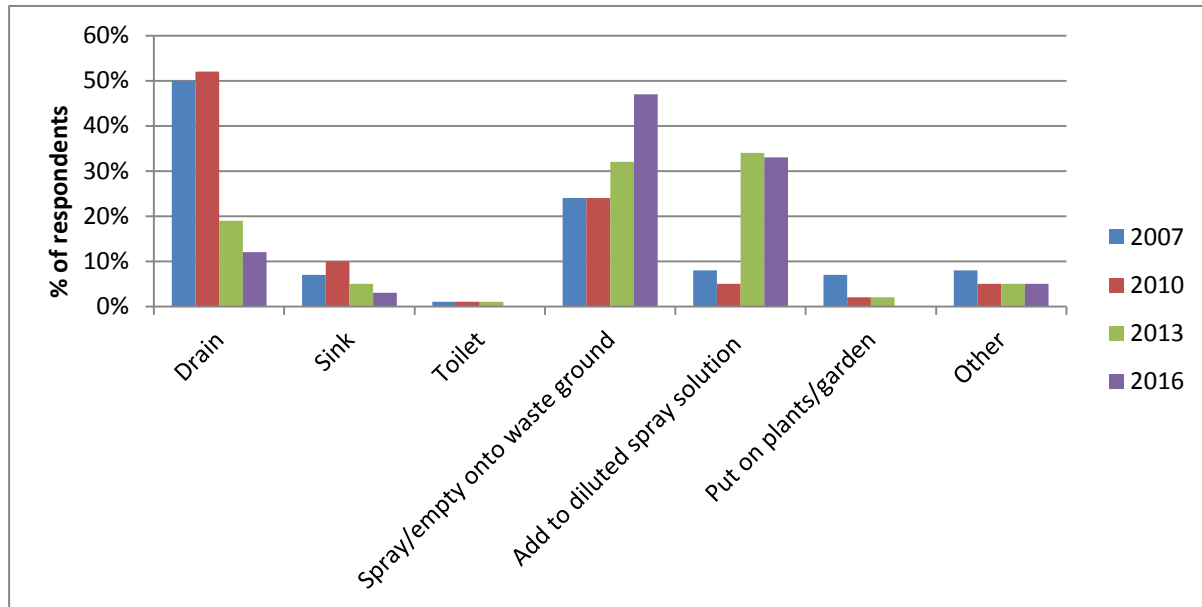
Figure 4.31 What do people do with the liquid from rinsing out empty concentrate plant protection product containers? (2016)



(n=151 respondents) * The majority of 'other' respondents said they spray the leftover liquid onto the area they had been treating in the first place.

Figure 4.32 provides a comparison with previous surveys years (2007, 2010 and 2013) and shows a continuing reduction in disposing of rinsings to water drainage systems from the highest level of 63% in 2010 down to 25% in 2013 and 15% in 2016. This indicates an improvement in complying with product label instructions and good practice to prevent contamination of water and the environment.

Figure 4.32 Comparison of disposal of liquid from rinsing empty concentrate plant protection product containers (2007, 2010, 2013 and 2016)



4.5.6 Disposal of empty product containers

Of the respondents using ready-to-use products, 315 (82%) say they are left with an empty container, either because they dispose of the content separately (20 respondents, 5%) or because they use the product up (295 respondents, 77%).

Table 4.12 shows that over half of respondents recycle empty plastic product containers: 54% via kerbside/street collection; 11 % at a household waste recycling centre (HWRC); and 1% supermarket/car park recycling points. Figure 4.33 shows that this is similar to 2013 (52%, 12% and 2% respectively).

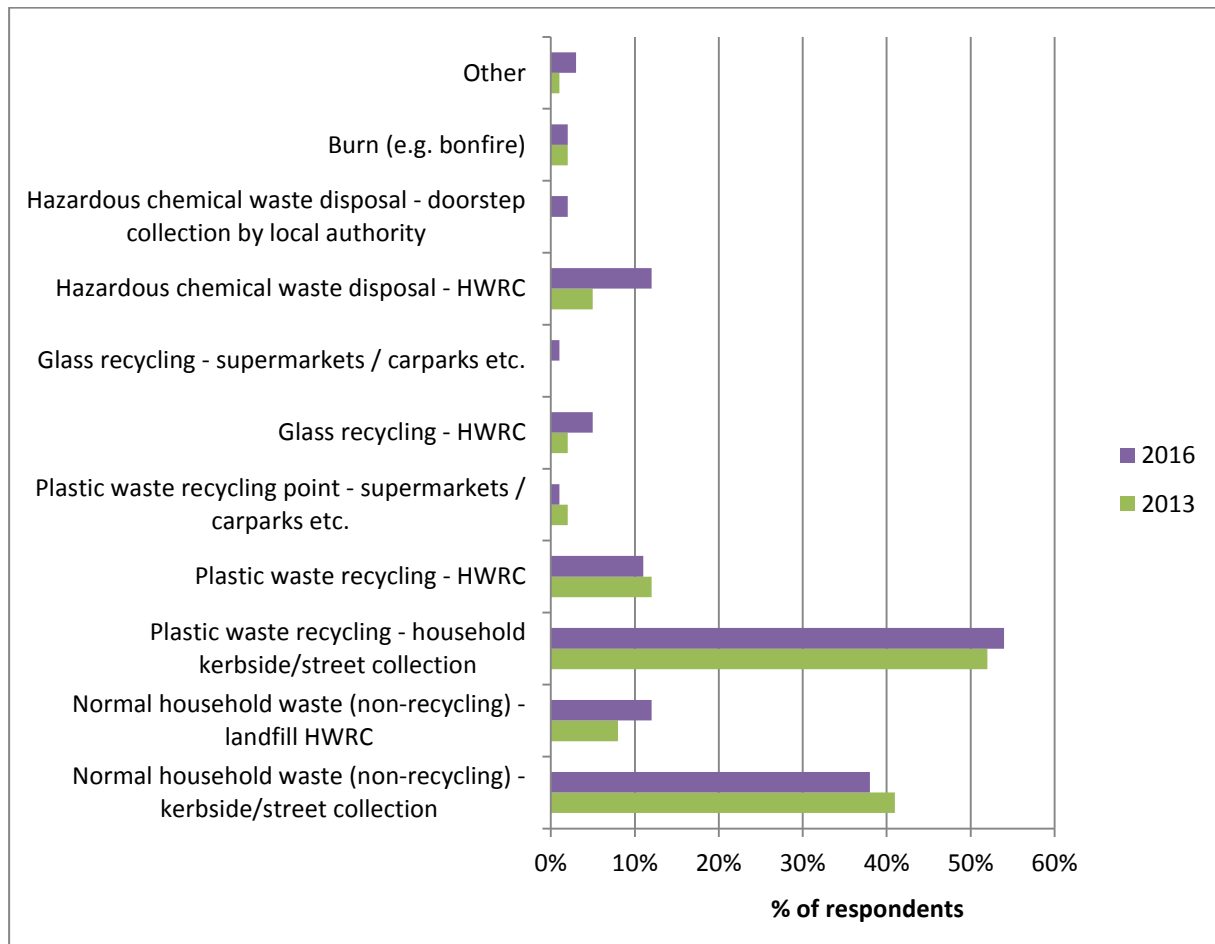
There was an increase in those who dispose of empty containers as hazardous waste at their HWRC from 5% of respondents in 2013 to 12% in 2016. This is not necessary as empty ready-to-use product containers are allowed to be recycled.

Table 4.12 Disposal methods for empty ready-to-use plant protection product containers (2016)

Response	Number	Percentage
Normal household waste (non-recycling) - kerbside/street collection	121	38%
Normal household waste (non-recycling) - landfill HWRC	38	12%
Plastic waste recycling - household kerbside/street collection	170	54%
Plastic waste recycling - HWRC	34	11%
Plastic waste recycling point - supermarkets/carparks etc	4	1%
Glass recycling – HWRC	17	5%
Glass recycling - supermarkets/carparks etc	3	1%
Hazardous chemical waste disposal - HWRC	39	12%
Hazardous chemical waste disposal - doorstep collection by local authority	5	2%
Burn (eg bonfire)	5	2%
Other	11	3%

Multiple answers (n=315 respondents, 447 responses)

Figure 4.33 Comparison of disposal methods for empty ready-to-use plant protection product containers in 2013 and 2016



Of the respondents using concentrate products, 252 (88%) say they are left with an empty container, either because they dispose of the content separately (20 respondents, 7%) or because they use the product up (232 respondents, 81%).

Table 4.13 shows that 37% of respondents dispose of empty concentrate containers to the normal household bin (non-recycling) as directed on the product label, which is similar to 2013 (39%). However, many respondents indicate that they recycle empty containers contrary to product instructions to dispose of them in the household bin, with 45% recycling plastic containers via the kerbside/street collection. This may indicate confusion caused by plastic containers having an embossed recycling symbol added to the container by the manufacturers and consumers wanting to recycle as much as possible. However, recycling of plastic containers has reduced slightly in 2016 for all collection routes when compared with 2013 responses.

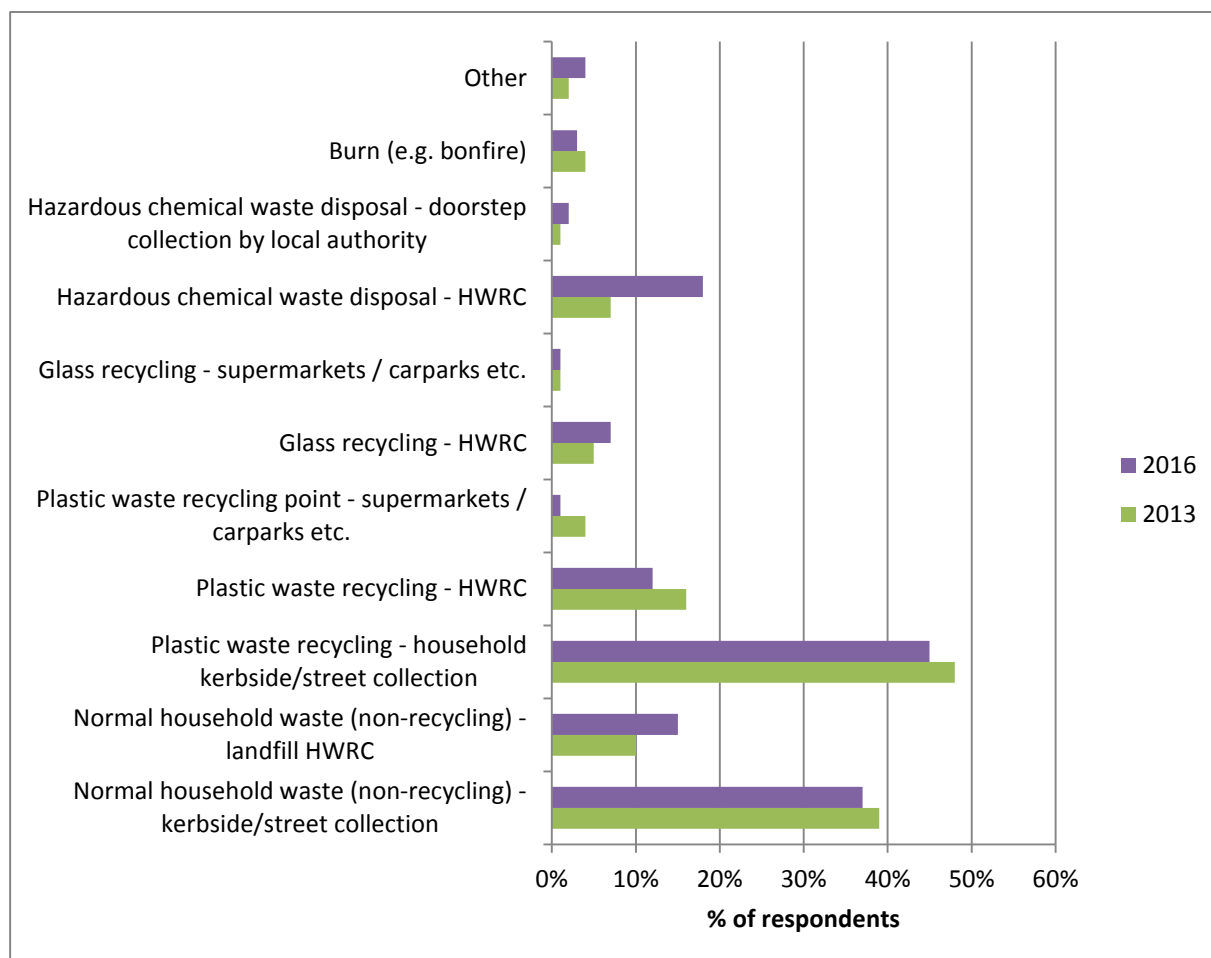
Similarly to empty ready-to-use containers, there was an increase in respondents disposing of empty concentrate containers as hazardous waste at household waste recycling centres (HWRC) from 7% in 2013 to 18% of in 2016 as shown in Figure 4.34.

Table 4.13 Disposal methods for empty concentrate plant protection product containers

Response	Number	Percentage
Normal household waste (non-recycling) - kerbside/street collection	93	37%
Normal household waste (non-recycling) - landfill HWRC	38	15%
Plastic waste recycling - household kerbside/street collection	114	45%
Plastic waste recycling - HWRC	31	12%
Plastic waste recycling point - supermarkets/carparks etc	2	1%
Glass recycling – HWRC	17	7%
Glass recycling - supermarkets/carparks etc	3	1%
Hazardous chemical waste disposal - HWRC	46	18%
Hazardous chemical waste disposal - doorstep collection by local authority	5	2%
Burn (eg bonfire)	7	3%
Other	11	4%

Multiple answers (n=252 respondents, 367 responses)

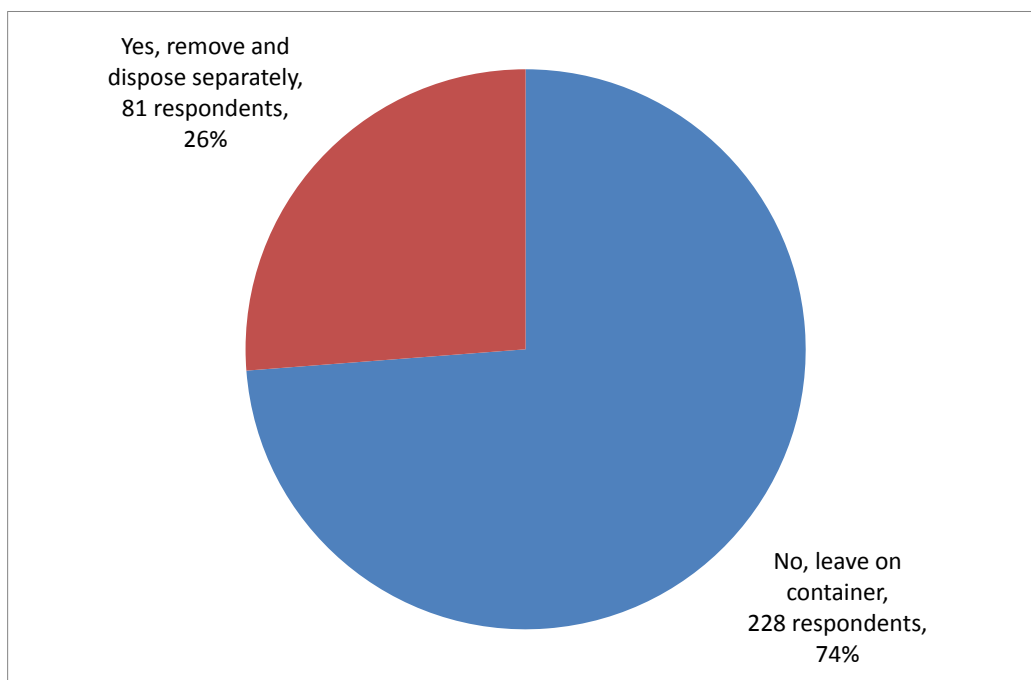
Figure 4.34 Comparison of disposal methods for empty concentrate plant protection product containers in 2013 and 2016



4.5.7 Removal of lid/cap/trigger spray handle before disposal of the container

Respondents who use ready-to-use products were asked whether they removed the lid/cap/trigger spray handle from the empty container before disposal. The majority (74%) did not remove them before disposal of the container.

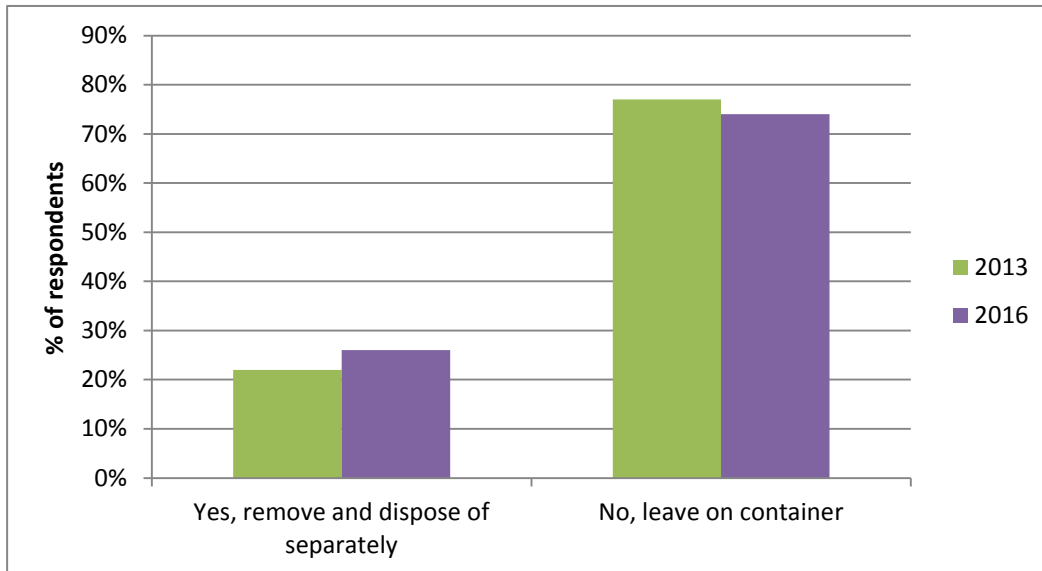
Figure 4.35 Do people remove the lid/trigger spray handle from the empty ready-to-use plant protection product container before disposing of it?



n=315 respondents

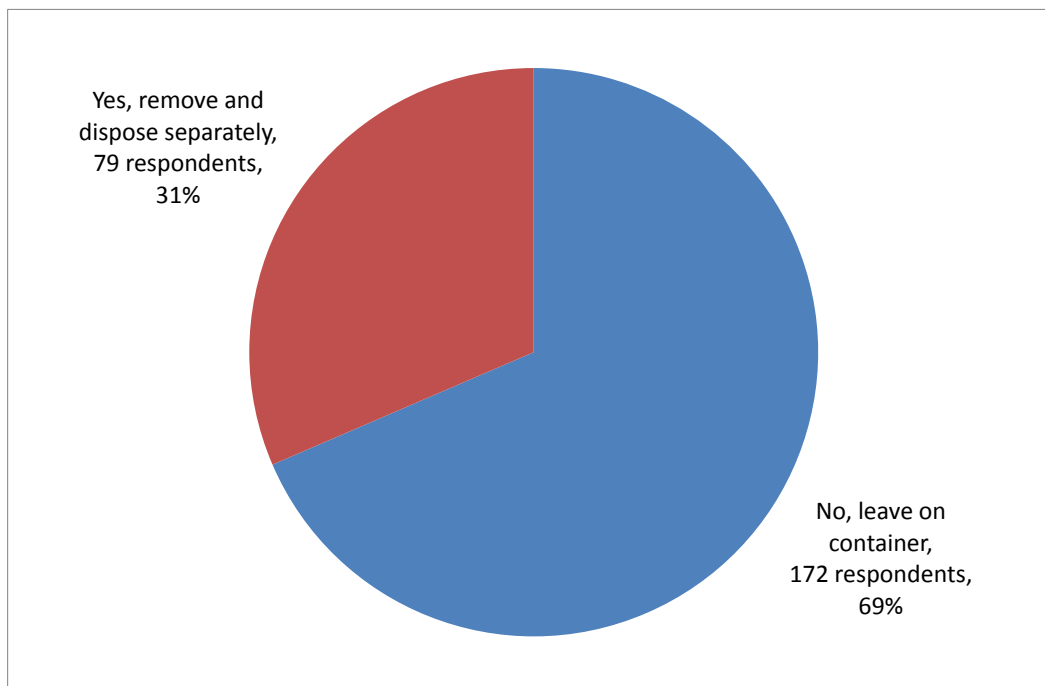
This is similar to 2013 (the first time this question was asked) when 77% did not remove them, and 22% did.

Figure 4.36 Removal of lid/cap/trigger handle from ready-to-use plant protection product containers before disposal in 2013 and 2016



Respondents using concentrate products were asked the same question and the majority 69% did remove the lid/cap/trigger spray handle from the empty container.

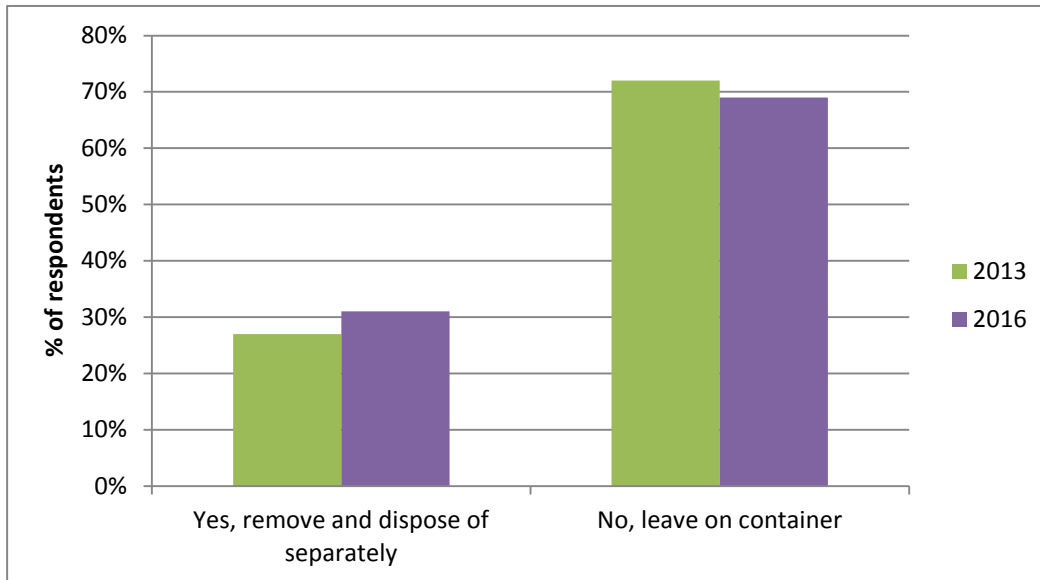
Figure 4.37 Do people remove the lid/trigger spray handle from the empty concentrate plant protection product container before disposing of it?



n=252 respondents

As shown in Figure 4.38, this is similar to 2013 results when 72% removed them.

Figure 4.38 Removal of lid/cap/trigger handle from concentrate plant protection product containers before disposal in 2013 and 2016



5. Summary and discussion

Key survey findings in 2016 can be summarised as follows:

5.1 Respondent profile

- Almost half (46%) of respondents identified themselves as 'keen and regular gardeners', with a further 35% stating they 'enjoy gardening but don't always have the time for it'. Only 4% of respondents saw gardening as 'a chore'.
- Of all respondents, 79% carried out their gardening in private gardens, while 16% stated they carried out gardening at an allotment. A new category for 2016 included public/community gardening at 5 %.
- As in previous survey years, the majority of respondents were over the age of 45 (68%), with only 1% of respondents aged between 16 and 24.

5.2 Purchasing habits

- The most frequently purchased products were weedkillers, slug/snail killers and insecticides. The percentage of weedkillers (80%), insecticides (53%) and fungicides (32%) purchased saw a rise from 2013 figures (66%, 44% and 21% respectively).
- Over half of respondents purchased between one and two products a year, as in previous years.
- However, respondents appear to be purchasing more products per year with a decrease in those purchasing one, or fewer, product per year (41% in 2013, 30% in 2016).
- A reduction was also seen in one, or fewer, product purchased per year by 'keen and regular' and 'gardening is a chore' respondents.
- The most popular purchase location for plant protection products continued to be garden centres (71%) although this has been reducing gradually over the reporting years. The second highest purchase location continued to be DIY/hardware stores which increased from 48% in 2013 to 56% in 2016. Purchases via the internet rose from 5% in 2013 to 15% in 2016.

5.3 Storage

- As with previous survey years, the shed was the most popular location to store plant protection products (59%). A further 35% of respondents stored plant protection products in the garage. Of respondents, 27% cited some form of safety precaution such as a high shelf or locked cupboard (an increase from 14% in 2013), indicating an increase in good practice.
- The largest percentage of respondents stored plant protection products for one to two years (40%), with a further 13% storing for less than one year. This is a decrease from previous years, with increases in respondents keeping plant protection products for longer periods of time (2-3 years, 3-5 years and more than 5 years).

5.4 Product usage

- Of respondents, 63% stated they read the instructions on how to use the product before purchase, and 52% of respondents stated they would read before they used the product for the first time, indicating an increase from 38% in 2013. Only 1% of respondents would rarely or never read the instructions, whereas 32% of respondents read the label again before using every time. This would indicate an overall improvement in good practice.
- The majority of respondents (97%) stated the instructions for use were 'very clear' or 'fairly clear'.
- The majority of respondents (97%) stated that they followed the instructions either 'very closely' or 'fairly closely.' This is similar to 2013.
- Other than the product label, the most popular source of additional information was websites (29%) with the most popular sites being the Royal Horticultural Society (RHS) and product manufacturers' websites. The next most popular source of information was other gardeners (26%).
- Less than half of the respondents (38%) used ready-to-use products only. This is a reduction from previous years (2010 and 2013) where over half (53%) used ready-to-use products only. Of the respondents, 40% stated they used both ready-to-use and concentrate products which is an increase over previous years (33% in 2007, 31% in 2010 and 29% in 2013).
- Of the respondents who purchased concentrate products that need diluting, the majority (77%) used the measuring device/cap provided with the product to measure the volume of concentrate product required. This has continued to decrease since 2010 (91%) and 2013 (86%). There was also a decrease in those estimating or guessing measurements for diluting (3%) down from 10% in 2013. Moreover, there was a reduction in those using their own measuring device (20%) compared to 2013 (26%). However, it should be noted that respondents were previously allowed to provide more than one answer compared to those answering in 2016, when only one response was allowed.

5.5 Disposal

- The majority of respondents find information about disposal on the plant protection product label (84% for ready-to-use products and 85% for concentrate products).
- The majority of respondents did not dispose of excess/unwanted plant protection product before disposing of the container (77% used up the product for ready-to-use and 81% for concentrate products).
- For those disposing of ready-to-use product in the container (18%) nearly half disposed of to the normal household bin (49%, 34 respondents), while 41%, 29 respondents disposed of to a hazardous chemical waste disposal facility, an increase from 2013 (23%), which would indicate an improvement in good practice.
- For concentrate products, the highest percentage disposed of the concentrate product in the container to either the normal household bin (47%, 16 respondents), or a hazardous chemical waste disposal facility at a household waste recycling centre (HWRC) (35%, 12 respondents), which is good practice and indicates that they are following label instructions.

- Of the respondents using ready-to-use products, 63% did not rinse out the empty container before disposal, indicating that they are following disposal information on the label. However, of those rinsing out empty ready-to-use containers (37%, 117 respondents), 27% of these (32 respondents) dispose of the rinsings to the drain or sink indicating that they are not following the product label and risk polluting water and the environment. However, comparison with 2013 results, when 40% of respondents disposed of rinsings to the drain/toilet/sink, shows an improvement in complying with product labels and good practice.
- Of respondents using concentrate products, 60% did rinse out the empty container before disposal, 33% of whom added the rinsings to the diluted solution for spraying indicating good practice. However, 15% (22 respondents) disposed of the rinsings to the drain or sink indicating that they are not following the product label and risk pollution to water and the environment. It should be noted that this shows a continuing improvement in complying with product labels and good practice compared to previous years when 58% in 2007, 63% in 2010, and 25% in 2013 disposed of rinsings to the drain/toilet/sink.
- The majority (66%) of respondents using ready-to-use products recycle empty plastic containers, indicating that they are following the disposal information on the product label. Of the respondents, 38% dispose of empty ready-to-use containers in the normal household bin indicating that they have not followed the disposal information on the product label.
- Similarly, the highest percentage of respondents using concentrate products recycle empty plastic containers indicating that they are not following the product label. Of the respondents, 37% disposed of empty concentrate containers to the normal household bin, which indicates that they are following current label instructions for concentrate products.
- For both ready-to-use and concentrate products the majority of respondents did not remove the lid/cap/trigger spray handle from the container before disposal (74% and 69% respectively).

5.6 Comparison of findings

Table 5.1 below compares the findings from the surveys in 2007 and 2010 with this year's survey.

Table 5.1 Comparison with previous survey results (2007, 2010, 2013)

Question	2007 responses	2010 responses	2013 responses	2016 responses
Percentage of "keen and regular gardeners"	53%	50%	52%	46%
Percentage of respondents over 45	81%	80%	71%	69%
Top three most frequently purchased products	Slug pellets (67%) Weed killers (50%) Lawn treatments (45%)	Slug pellets (61%) Weed killers (63%) Lawn treatments (47%)	Slug pellets (65%) Weed killers (66%) Insecticide (44%)	Slug pellets (67%) Weed killers (50%) Insecticide (52%)
Number of products purchased per year	Most purchase one or two products: One (32%) Two (27%)	Most purchase one or two products: One (30%) Two (31%)	Most purchase one or two products: One (28%) Two (30%)	Most purchase one or two products: One (21%) Two (34%)
One product or fewer purchased per year by gardener category	Keen and regular: 39% Gardening is a chore: 59%	Keen and regular: 35% Gardening is a chore: 38%	Keen and regular: 40% Gardening is a chore: 56%	Keen and regular: 28% Gardening is a chore: 33%
Not reading/understanding instructions	Rarely or never read: 6% Instructions are unclear: 3% Do not follow: 2% Only sometimes follow: 6%	Rarely or never read: 4% Instructions are unclear: 5% Do not follow: 3% Only sometimes follow: 5%	Rarely or never read: 3% Instructions are unclear: 5% Do not follow: 1% Only sometimes follow: 3%	Rarely or never read: 1% Instructions are unclear: 3% Do not follow very closely: 3%
Other sources of instructions	Garden centre staff: 14% Magazines: 13% Websites: 8% TV: 8%	Garden centre staff: 5% Magazines: 8% Websites: 14% TV: 5%	Garden centre staff: 8% Magazines: 13% Websites: 25% TV: 8%	Garden centre staff: 20% Magazines: 22% Websites: 29% TV: 6%
Percentage only using 'ready-to-use' products	47% Younger age groups more likely to use these Keen gardeners: 44%	53% Younger age groups more likely to use these Keen gardeners: 50%	53% Those aged over 65 more likely to use these Keen gardeners: 48%	38% Younger age groups more likely to use these Keen gardeners: 32%

Question	2007 responses	2010 responses	2013 responses	2016 responses
Percentage estimating the amount of product diluted	10% Likelihood becomes slightly lower with ascending age	8% Likelihood becomes slightly lower with ascending age	10% Likelihood becomes slightly lower with ascending age	3% Likelihood becomes slightly lower with ascending age
Percentage rinsing empty containers	Concentrate products: 60%	Concentrate products: 67%	Concentrate products: 55% Ready-to-use products: 34%	Concentrate products: 60% Ready-to-use products: 37%
Where rinsings are poured (from rinsing empty plant protection product containers)	<u>Concentrate products:</u> Drain: 50% Waste ground: 24% Sink: 7%	<u>Concentrate products:</u> Drain: 52% Waste ground: 24% Sink: 10%	<u>Concentrate products:</u> Drain: 19% Waste ground: 32% Sink: 5% Add to diluted solution 34% <u>Ready-to-use products:</u> Drain: 32% Waste ground: 46% Sink: 7%	<u>Concentrate products:</u> Drain: 12% Waste ground: 47% Sink: 3% Add to diluted solution 33% <u>Ready-to-use products:</u> Drain: 20% Waste ground: 64% Sink: 7%
Storage location	Shed: 60% Garage: 31% Home: 4%	Shed: 60% Garage: 33% Home: 5%	Shed: 58% Garage: 32% Home: 9%	Shed: 59% Garage: 35% Home: 10%
Secure storage location (locked cupboard/cabinet or high shelf)	11%	4%	14%	27%
Storage duration	One season: 34% 1-2 years: 50% 2-3 years: 10% 3+ years: 6%	One season: 35% 1-2 years: 44% 2-3 years: 10% 3+ years: 9%	One season: 23% 1-2 years: 46% 2-3 years: 20% 3+ years: 11%	One season: 13% 1-2 years: 40% 2-3 years: 25% 3+ years: 22%
Percentage of all respondents disposing of unwanted plant protection products	14%	11%	Concentrate products: 20% Ready-to-use products: 20%	Concentrate products: 19% Ready-to-use products: 23%

Question	2007 responses	2010 responses	2013 responses	2016 responses
Disposal of containers WITH plant protection product	Results not available	Results not available	<p><u>Concentrate products:</u> Residual waste bin: 38% Hazardous chemical waste disposal facility at HWRC: 38% Household recycling collection: 11% Landfill via HWRC: 20%</p> <p><u>Ready-to-use products:</u> Residual waste bin: 49% Hazardous chemical waste disposal facility at HWRC: 21% Household recycling collection: 16% Landfill via HWRC: 16%</p>	<p><u>Concentrate products:</u> Residual waste bin: 47% Hazardous chemical waste disposal facility at HWRC: 35% Household recycling collection: 12% Landfill via HWRC: 18%</p> <p><u>Ready-to-use products:</u> Residual waste bin: 49% Hazardous chemical waste disposal facility at HWRC: 41% Household recycling collection: 1% Landfill via HWRC: 14%</p>
Disposal of empty containers	<p><u>All containers:</u> Residual waste bin: 48% Recycling container: 35% Household Waste Recycling Centre: 18%</p>	<p><u>All containers:</u> Residual waste bin: 38% Recycling container: 44% Household Waste Recycling Centre: 21%</p>	<p><u>Concentrate products:</u> Residual waste bin: 39% Household recycling collection: 48% Plastic recycling at HWRC: 16%</p> <p><u>Ready-to-use products:</u> Residual waste bin: 41% Household recycling collection: 52% Plastic recycling at HWRC: 12%</p>	<p><u>Concentrate products:</u> Residual waste bin: 37% Household recycling collection: 45% Plastic recycling at HWRC: 12%</p> <p><u>Ready-to-use products:</u> Residual waste bin: 38% Household recycling collection: 54% Plastic recycling at HWRC: 11%</p>

