

PESTICIDE USAGE SURVEY REPORT 323

POTATO STORES IN THE UNITED KINGDOM 2024



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- are produced according to sound methods.
- are managed impartially and objectively in the public interest.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

If you have any enquiries or feedback on the statistics included in this report, they can be directed to the contact given below:

Pesticide Usage Survey Team – e-mail: PUS@fera.co.uk

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DATA USES

The data are used for a number of purposes including:

- Quantifying pesticide usage and changes in the use of active substances over time.
- Policy, including assessing the economic and/or environmental implications of the introduction of new active substances and the withdrawal/non-authorisation of pesticide products (the data reported to organisations such as the OECD, enabling the UK to honour international agreements); evaluating changes in growing methods and Integrated Pest Management where this has an impact on pesticide usage.
- Informing the pesticide risk assessment (authorisation) process.
- Informing the targeting of monitoring programmes for residues in food and the environment.
- Contributing to assessing the impact of pesticide use, principally as part of the Pesticides Forum's Annual Report.
- Responding to enquiries (for example, Parliamentary Questions, correspondence, queries under the Freedom of Information Act or Environmental Information Regulations, etc.).
- Providing information to assist research projects which can support all the above activities.
- Training/teaching programmes which are designed to improve practice in the use of pesticides by the farming/training industries.
- Informing the Wildlife Incident Investigation Scheme (WIIS) programme to help identify potential misuse of pesticides.

REVISIONS POLICY

This report presents a comprehensive summary of data for potatoes harvested in 2024 and stored during 2024/2025. We will provide information on any revisions we make to the report or the datasets if any inaccuracies or errors occur. Details of any revisions, including the date upon which they were changed, will appear on the following website:

<https://pusstats.fera.co.uk/published-reports>

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OVERVIEW OF MAIN FINDINGS

This report presents information on all aspects of pesticide usage during storage of potatoes harvested in 2024 and stored during 2024/2025. Data were collected predominantly by postal survey and telephone from 48 farm stores and from 121 merchant stores in the United Kingdom.

A comparison is made between this survey and previous surveys conducted between 2014 and 2022.

The tonnage of ware potatoes stored each year is variable and dependent on the areas grown, weather conditions and annual yields (see Figure 1).

In 2024, there were 48 farm stores in the survey, this was lower than in 2022 when there were 62. However, the merchant stores have increased from 114 in 2022 to 121 in 2024. Overall, the total number of stores has decreased slightly from 176 to 169.

Data collected from both farm and merchant stores are combined, but data for seed and ware potatoes are presented separately in this report. This reflects changes in potato storage practice over time which has resulted in very little difference between the way in which farm and merchant stores are managed.

The estimated weight of ware potatoes stored from the 2024 harvest was approximately 3.2 million tonnes, of which this survey estimated that 44% received no post-harvest treatment (85% of the untreated crop was in refrigerated stores). The basic tonnage treated was 1.8 million tonnes, though some potatoes received multiple treatments. The total tonnage treated, which includes multiple treatments to the same tonnage, was 3.5 million tonnes.

The biggest change to stored ware potatoes in 2022 and 2024 has been the use of active substances such as spearmint oil and 1,4-dimethylnaphthalene, following the loss of authorisation for chlorpropham in 2020. In 2024, the main active substance used on ware potatoes was 1,4-dimethylnaphthalene, followed by spearmint oil. Other active substances encountered on ware potatoes in 2024 were ethylene, orange oil and imazalil. It should be noted that imazalil is not approved for use on ware potatoes – please see the ware potato section for further information.

The percentage of the untreated tonnage of ware potatoes decreased from 50% in 2022 to 45% in 2024.

1,4-dimethylnaphthalene, authorised in 2022 and used as a potato sprout suppressant, accounted for 69% of the total tonnage of ware potatoes treated (up from 41% in 2022), 20% were treated with spearmint oil, 10% with ethylene, 1% with orange oil and less than 1% each of imazalil and thiabendazole. A total of 86.8 tonnes of active substances were used to treat ware potatoes. 1,4-dimethylnaphthalene accounted for 49% of the total weight of active substances used, spearmint oil accounted for 47%, orange oil 4% and less than 1% with imazalil and thiabendazole. Ethylene gas does not normally have a weight of active substance associated with it and it is impossible to estimate the weight applied, as the amount used depends on the store capacity, crop volume, the quality of store construction and the duration of storage.

The use of maleic hydrazide in the field prevents the sprouting of potatoes in store. Between 2018 and 2024, the use of maleic hydrazide in the field increased by 50% in terms of area treated and 47% by weight applied, despite there being a 20% decrease in the area of ware potatoes grown. However, between 2022 and 2024, there was a decrease of 11% by area treated and 10% by weight applied of maleic hydrazide. There was a 7% decrease in the area of ware potatoes grown over the same period which would explain this recent decline in use.

The weight of active substances applied to ware potatoes in 2024 was 14% less than in 2022, but over twice that in 2014. This increase since 2014 is almost entirely due to the higher rate of spearmint oil, compared to chlorpropham, which was the main active substance used between 2014 and 2018, which makes it difficult to compare usage with previous years (see Figure 2).

From this survey, it is estimated that 20% of the 399,428 tonnes of the stored seed potatoes were treated, either on entry to the store or during the storage period, normally with a single application of a pesticide product. The formulations recorded were imazalil, thiabendazole, fludioxonil and flutolanil, accounting for 80%, 11%, 7% and 2% of the total tonnage treated respectively. A total of 1.6 tonnes of active substances were used, principally imazalil at 64% of the total weight and thiabendazole at 18%.

The total tonnage of stored seed potatoes in the United Kingdom decreased by 15% between 2022 and 2024, with the basic tonnage treated decreasing by 49% over the same period (Figure 3). This change resulted in a 29% decrease in the weight of active substances applied between the two years (Figure 4).

Over the longer term (since 2014), the tonnage of seed potatoes both stored and treated has varied with no clear trend. In 2024, the tonnage stored was 5% lower than in 2014, whilst the basic tonnage treated was 53% lower.

The weight of active substances applied to seed potatoes in 2024 was lower than those seen in previous years since 2014 (Figure 4).

INTRODUCTION

The Expert Committee on Pesticides (ECP) advises government on all aspects of pesticide use. In order to discharge this function, the Committee must regularly monitor the usage of all pesticides. It needs accurate data on the usage of individual pesticides.

As part of the on-going process for obtaining data, the Pesticide Usage Survey Teams of:

- Fera Science Ltd., a joint venture between Bridgepoint Group PLC and the Department for Environment, Food & Rural Affairs (Defra).
- SASA, a division of the Scottish Government's Agriculture and Rural Economy Directorate.
- Agri-Food & Biosciences Institute (AFBI), Department of Agriculture, Environment and Rural Affairs (DAERA)

conducted surveys of pesticide usage in potato storage from the 2024 harvest by contacting holdings throughout the United Kingdom during the winter of 2024/2025, with follow up contacts in May to July of 2025.

This was the eighth survey of usage on potato storage in the United Kingdom and the seventeenth survey of pesticide usage in potato stores carried out by the Great Britain Pesticide Usage Survey Teams. The previous report for the United Kingdom covered all pesticide usage on potatoes harvested and stored in 2022 (Garthwaite et. al., 2023). Other surveys of potato storage in the United Kingdom were conducted in 2010, 2012, 2014, 2016, 2018 and 2020.

Copies of published United Kingdom potato storage reports can be found here:

<https://pusstats.fera.co.uk/published-reports>

Since 2010 all surveys of pesticide usage in agriculture and horticulture have been fully co-ordinated by the survey teams of England & Wales, Scotland, and Northern Ireland. The methodology used for sample selection and the collection of data from sample holdings is identical in each region. Reports are produced of pesticide usage throughout the United Kingdom. All teams have undertaken United Kingdom Statistics Authority (UKSA) audits.

Information on all aspects of pesticide usage in the United Kingdom as a whole, or for Wales or the Defra regions of England, may be obtained from the Pesticide Usage Survey Team at Fera Science Ltd., Sand Hutton, York, UK YO41 1LZ.

For further information please contact:

The survey team – e-mail: PUS@fera.co.uk

Telephone: 0300 100 0321

Or visit the website: <https://pusstats.fera.co.uk/home>

Alternatively, please contact: Fera at: science@fera.co.uk

Further data relating specifically to Scotland may be obtained from the Pesticide Usage Survey Team at SASA. Also available at: <http://www.sasa.gov.uk/pesticides/pesticide-usage/pesticide-usage-survey-reports>

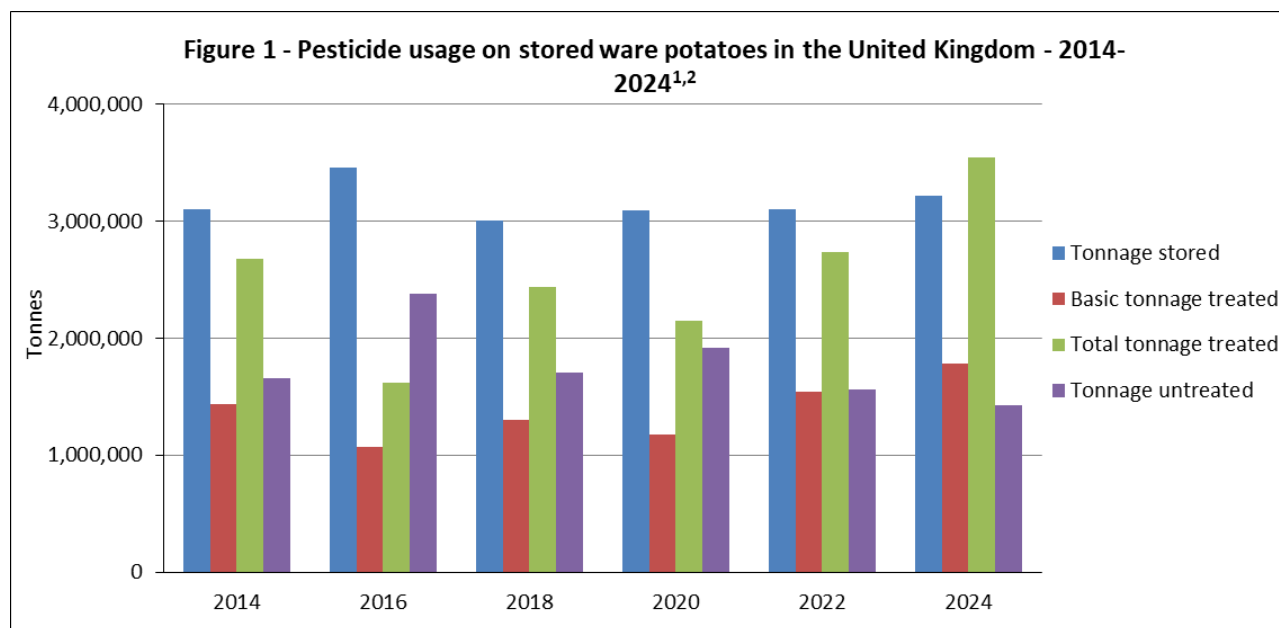
Copies of reports on pesticide usage in Northern Ireland may be obtained from His Majesty's Stationery Offices. Also available at: <https://www.afbini.gov.uk/articles/pesticide-usage-monitoring-reports>

DEFINITIONS AND APPROACHES USED IN THIS REPORT

- a) The term 'Applications' is used throughout this report to refer to the number of pesticide treatments applied to a store (whole or part).
- b) 'Basic tonnes treated' is the gross weight of potatoes treated with pesticides excluding repeat applications, i.e. the total tonnes stored minus the untreated tonnage ('Tonnes untreated').
- c) 'Total tonnage treated' is the gross weight of potatoes treated with pesticides including repeat applications, i.e., basic tonnes treated x number of applications.
- d) 'Bulk stores' include loose potatoes in a variety of stores, as opposed to those stored in boxes. Potatoes stored in bags are excluded from this survey.
- e) 'Unventilated ambient stores' include structures that are naturally ventilated and rely on convective ventilation.
- f) 'Ventilated ambient stores' include structures using forced air ventilation. They do not use refrigeration.
- g) 'Refrigerated stores' include structures using refrigeration; they may also have forced air ventilation.
- h) 'Merchant stores' include companies not involved in growing but purchasing potatoes from a third party. They also include farm owned stores storing potatoes from their own and other growers' holdings. They will have stored ware potatoes for a period of more than two months.
- i) A 'Farm store' holds only potatoes from the single holding where the store is located for a period of more than two months (ware potatoes only).
- j) In this report the term 'formulation(s)' is used to describe the pesticide active substance or mixture of active substances in a product(s).
- k) 'Seed potatoes' are those stored and used for planting the next season's crop. Prior to planting, seed potatoes are placed in a 'chitting house' where the tuber can produce shoots and rootlets prior to planting.
- l) For this report it has been assumed that 75% of all harvested seed potatoes are stored. These figures are based on statistics from the SASA Potato Department and previous estimates of storage. It is likely that most, but not all, seed potatoes will have been stored for two months or more. The crop is stored before export or sales to other merchants and growers.
- m) 'Ware potatoes' are those used for human consumption, including those processed by a manufacturer.
- n) 'Arable crops' include cereals, combinable peas & beans, oilseed rape, linseed, potatoes, and sugar beet.
- o) There is no standard recommended rate per tonne of potatoes for the use of ethylene. The application equipment is pre-set to maintain the required level of ethylene concentration in each store. Consequently, the quantity of ethylene used will vary according to the store capacity, crop volume, the quality of store construction and the duration of storage. In most cases the actual amount of ethylene used was not available and it was not considered appropriate to include the information available from only a limited number of stores.
- p) 'Storage' is defined as ware potatoes being in store for two months or longer. For seed potatoes, storage times may be shorter than this.

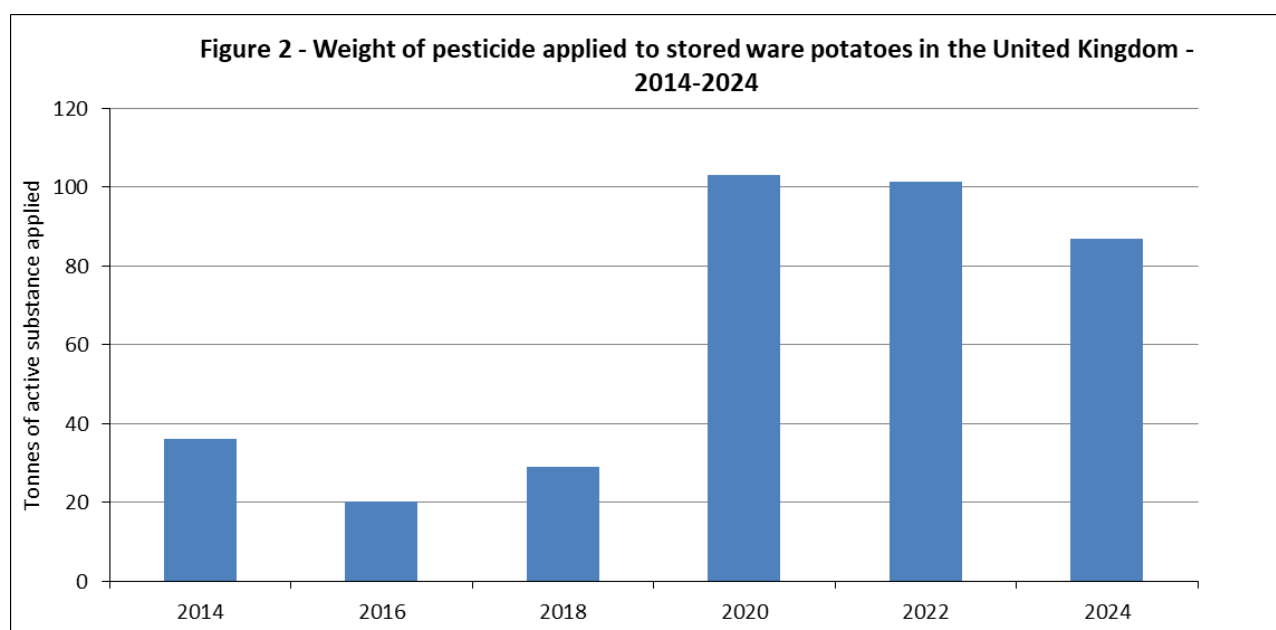
TRENDS

WARE POTATOES



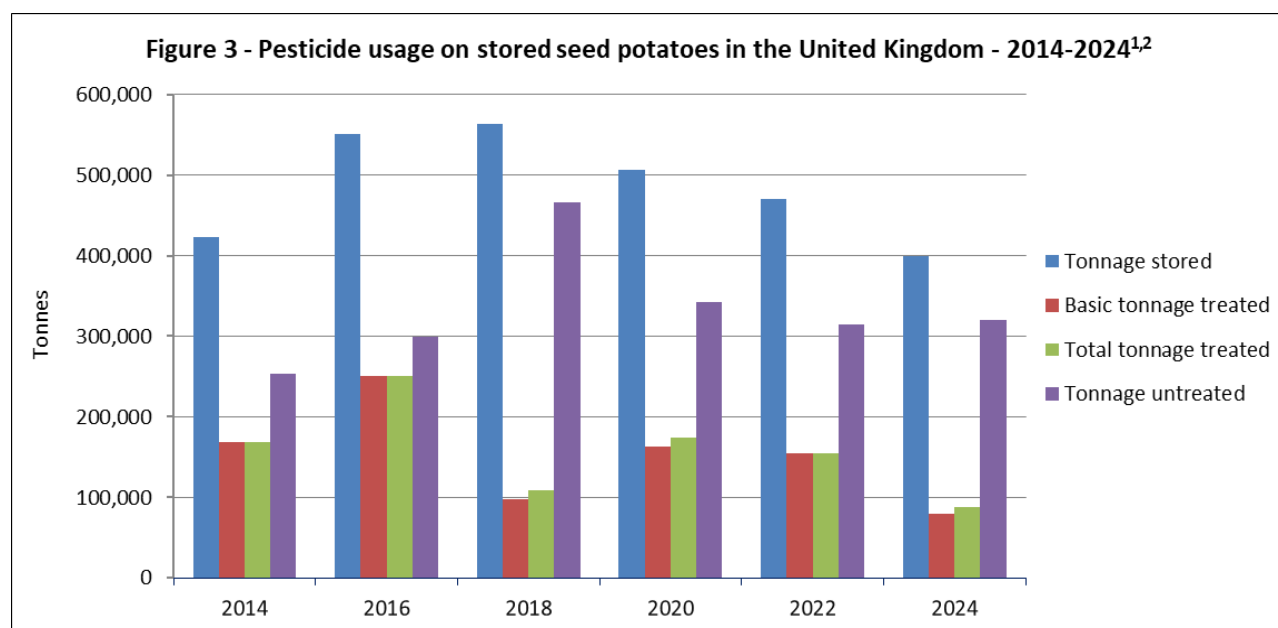
¹The basic tonnage treated is the tonnage stored minus the untreated tonnage

²The total tonnage treated includes repeat applications



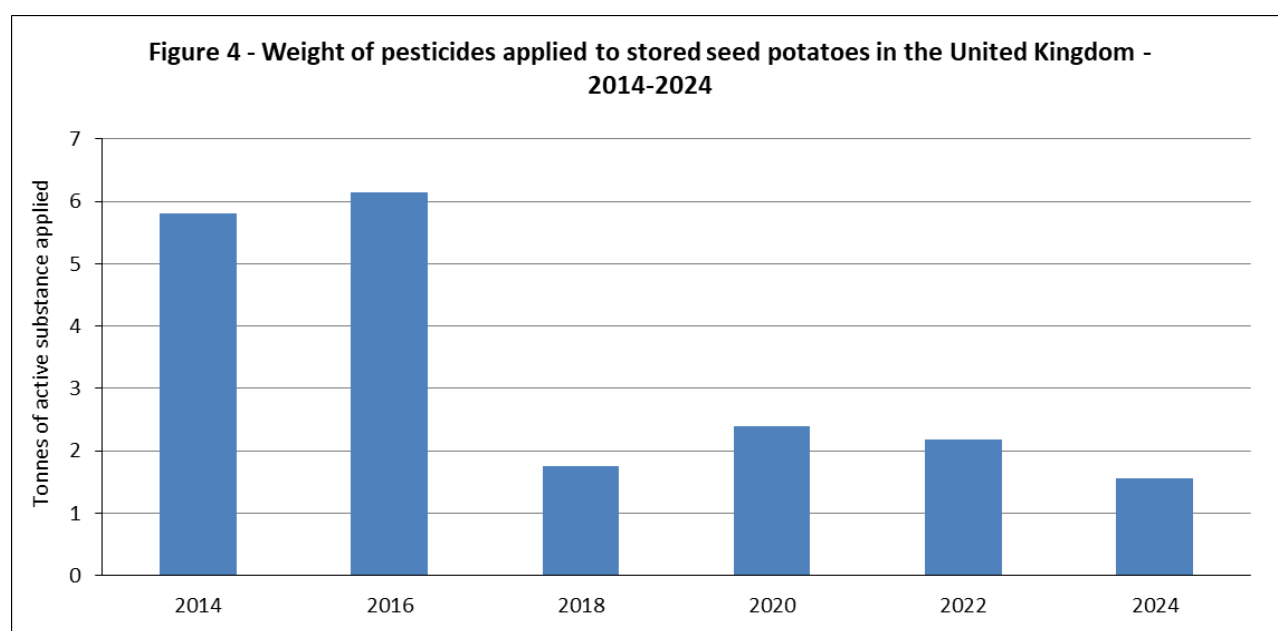
TRENDS (Cont.)

SEED POTATOES



¹The basic tonnage treated is the tonnage stored minus the untreated tonnage

²The total tonnage treated includes repeat applications

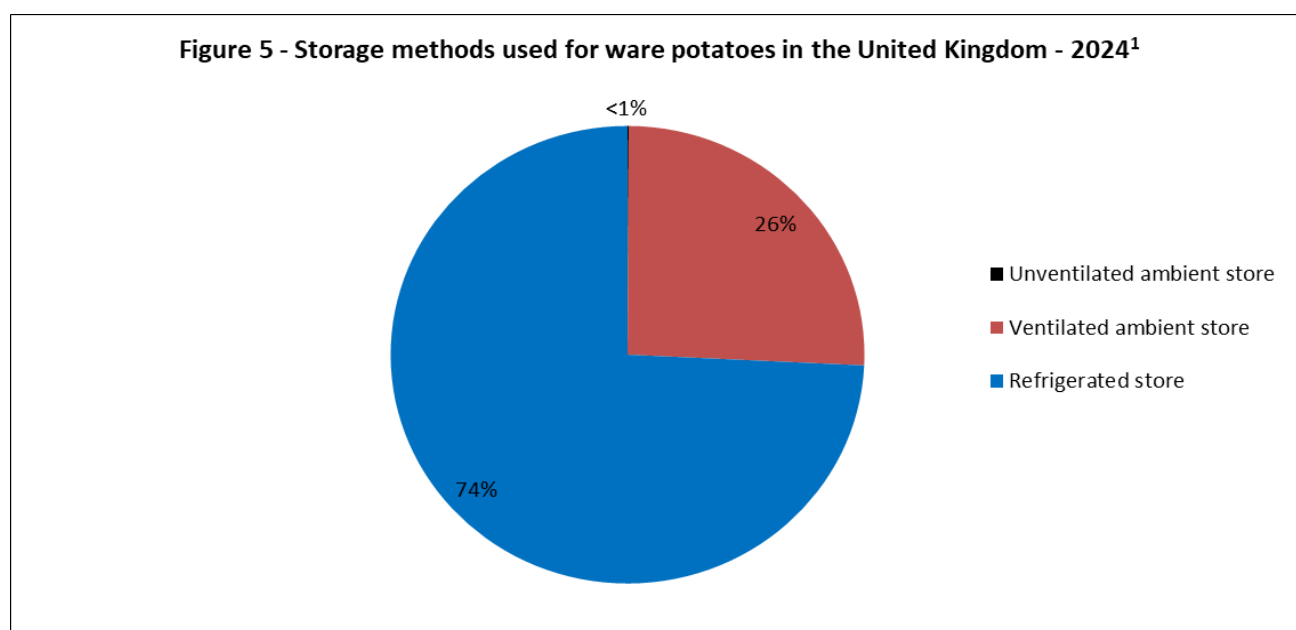


WARE POTATOES

- An estimated 3,218,792 tonnes of ware potatoes were stored in the United Kingdom (please see the methodology used to estimate the tonnes stored on page 14)
- 102,599 ha of ware potatoes were grown in the United Kingdom in 2024
- An estimated 1,787,265 tonnes were treated with an average of 1.99 treatments resulting in a total treated tonnage of 3,549,031 tonnes
- A further 1,431,527 tonnes (44%) remain untreated (85% of the untreated tonnage recorded was in refrigerated stores)

Ware potatoes – Storage methods

Approximately 86% of ware potatoes were stored in boxed stores, the remaining 14% in bulk stores.



¹ Please note - All Pie-Charts within this report should be read clockwise from the top, as both the pie segments and the contents of the key appear in the same order.

Ware potatoes – Pesticide Usage

Active substance	Total tonnes treated	Active substance (tonnes applied)
1,4-dimethylnaphthalene	2,432,566	42.63
Ethylene	352,546	.
Imazalil	1,070	0.01
Orange oil	49,757	3.29
Spearmint oil	712,842	40.83
Thiabendazole	250	0.01
Total	3,549,031	86.76

1,4-dimethylnaphthalene, spearmint oil and orange oil were normally applied as a fog in applications made by contractors during the storage period. Ethylene was applied as a gas throughout the storage period with its concentration monitored and maintained in store to prevent sprouting of tubers. All three active substances were

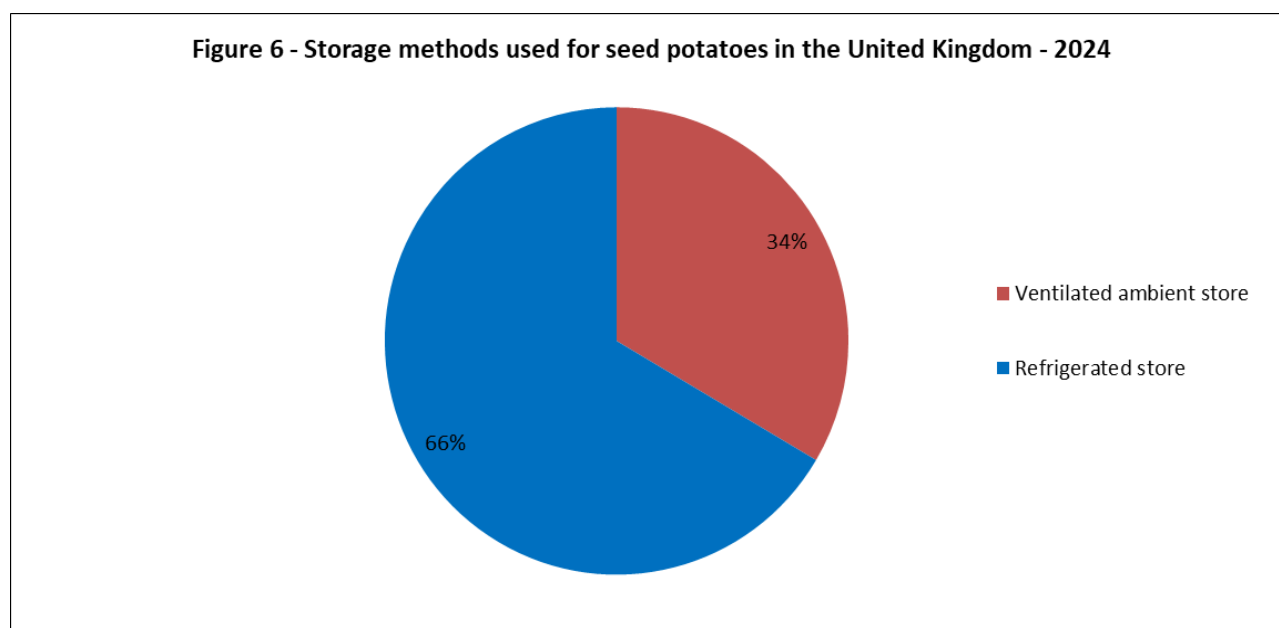
applied as sprout suppressants. Imazalil and thiabendazole were applied as a spray to the tubers. It should be noted that imazalil is not approved for usage on ware potatoes and that crops treated with imazalil should not be used for either animal or human consumption. It appears in this report as it was originally applied to seed potatoes at lifting on three surveyed holdings, these seed potatoes were then re-classified as ware once in store.

SEED POTATOES

- An estimated 399,428 tonnes of seed potatoes were stored in the United Kingdom (please see the methodology used to estimate the tonnes stored on page 14)
- 16,308 ha of seed potatoes were grown in the United Kingdom in 2024 (with 78% of the area grown in Scotland)
- An estimated 79,256 tonnes were treated, most with a single pesticide application. A single store received two separate pesticide applications
- A further 320,173 tonnes (80%) remain untreated (66% of these in refrigerated stores)

Seed potatoes – Storage methods

All seed potatoes encountered in the survey were stored in boxes.



Seed potatoes – Pesticide Usage

Four pesticide formulations (imazalil, thiabendazole, fludioxonil and flutolanil) were the only pesticides encountered in seed potato stores accounting for 64%, 18%, 9% and 9% of the total treated tonnage respectively.

Active substance	Total tonnes treated	Active substance (tonnes applied)
Fludioxonil	6,375	0.14
Flutolanil	1,539	0.14
Imazalil	71,341	1.01
Thiabendazole	9,299	0.28
Total	88,555¹	1.56

¹ The figure for total tonnage treated is greater than the basic tonnage treated of 79,256 tonnes (reported at the top of page 8, this is because the total tonnage treated includes repeat applications.

All four active substances encountered were applied as sprays for disease control – normally on the elevator as the seed potatoes entered store. Whilst fludioxonil has authorisation as both a storage treatment and as a seed treatment, the treatments within this report relate only to its use as a storage treatment.

Ethylene gas was not encountered in seed potato stores for the first time since 2014.

APPENDIX 1 – DISTRIBUTION OF SAMPLED STORES

Table 1. Number and distribution of ware and seed potato stores sampled in the United Kingdom - 2024		
Region	Farm Stores	Merchant Stores
East Midlands	9	11
Eastern	7	17
London & South East	3	0
North East	0	1
North West	1	3
Northern Ireland	9	0
Scotland	6	63
South West	1	5
Wales	0	1
West Midlands	3	3
Yorkshire & the Humber	9	17
Total	48	121

APPENDIX 2 - WARE POTATOES

Throughout all tables, “.” indicates that there was no recorded weight of either crops stored or pesticides used.

Table 2. Storage methods used for ware potatoes stored in the United Kingdom, 2024 (tonnes stored)				
	Unventilated	Ventilated	Refrigerated	Total
Bulk storage	820	215,683	230,417	446,921
Boxed storage	1,676	610,565	2,159,631	2,771,872
Total - all storage methods	2,496	826,248	2,390,048	3,218,792

Table 3. Storage pesticide use on ware potatoes at stores in the United Kingdom, 2024 (tonnes treated)									
	Unventilated ambient		Ventilated ambient		Refrigerated		Total		All storage methods
	Bulk	Box	Bulk	Box	Bulk	Box	Bulk	Box	
Active substance									
1,4-dimethylnaphthalene	.	.	237,811	849,003	169,068	1,176,684	406,879	2,025,687	2,432,566
Ethylene ¹	.	.	6,777	62,755	99,871	183,143	106,648	245,898	352,546
Imazalil	.	535	.	285	.	250	.	1,070	1,070
Orange oil	.	.	10,700	39,057	.	.	10,700	39,057	49,757
Spearmint oil	.	.	76,073	75,310	92,738	468,721	168,811	544,031	712,842
Thiabendazole	.	.	.	.	.	250	.	250	250
Total	.	535	331,361	1,026,410	361,677	1,829,048	693,038	2,855,993	3,549,031
Not treated	820	1,141	53,510	157,766	15,694	1,202,596	70,024	1,361,503	1,431,527

Table 4. Usage of individual active substances on stored ware potatoes in the United Kingdom, 2024				
	Tonnes treated	Tonnes (active substance)	% tonnes	% active substance
Active substance				
1,4-dimethylnaphthalene	2,432,566	42.63	69	49
Ethylene ¹	352,546	.	10	.
Imazalil	1,070	0.01	.	.
Orange oil	49,757	3.29	1	4
Spearmint oil	712,842	40.83	20	47
Thiabendazole	250	0.01	.	.
Total	3,549,031	86.76		

¹There is no standard recommended rate per tonne of potatoes for the use of ethylene. The application equipment is pre-set to maintain the required level of ethylene concentration in each store. Consequently, the quantity of ethylene used will vary according to the store capacity, crop volume, the quality of store construction and the duration of storage. In most cases the actual amount of ethylene used was not available and it was not considered appropriate to include the information available from only a limited number of stores.

APPENDIX 3 – SEED POTATOES

Table 5. Storage pesticide use on seed potatoes in the United Kingdom, 2024 (tonnes treated)

	Unventilated Ambient		Ventilated Ambient		Refrigerated		Total		All storage methods
	Bulk	Box	Bulk	Box	Bulk	Box	Bulk	Box	
Active substance									
Flutolanil	.	.	.	.	.	1,539	.	1,539	1,539
Fludioxonil	.	.	.	.	.	6,375	.	6,375	6,375
Imazalil	.	.	.	23,039	.	48,303	.	71,342	71,342
Thiabendazole	.	.	.	.	.	9,299	.	9,299	9,299
Total tonnage treated	.	.	.	23,039	.	65,516	.	88,555	88,555
Not treated	.	.	.	110,820	.	209,353	.	320,173	320,173
Total tonnage stored	.	.	.	133,859	.	265,569	.	399,428	399,428

Table 6. Usage of individual active substances on stored seed potatoes in the United Kingdom, 2024

	Total tonnes treated	Tonnes (active substance)	% tonnes treated	% active substance
Active substance				
Fludioxonil	6,375	0.14	7	9
Flutolanil	1,539	0.14	2	9
Imazalil	71,341	1.01	81	64
Thiabendazole	9,299	0.28	11	18
Total	88,555	1.56		

APPENDIX 4 - COMPARISON

Table 7. Comparison of production, storage, and treatment of potatoes in the United Kingdom - 2014-2024							
		2014	2016	2018	2020	2022	2024
Area grown (ha)	Ware	123,317	120,707	127,859	126,704	110,738	102,599
	Seed	17,214	16,733	16,478	16,363	15,846	16,308
Tonnes stored	Ware	3,098,269	3,454,294	3,003,620	3,096,086	3,103,547	3,218,792
	Seed	422,591	550,582	563,652	506,108	470,198	399,428
Basic tonnes treated¹	Ware	1,435,552	1,071,307	1,298,686	1,177,314	1,542,663	1,787,265
	Seed	168,884	250,770	97,751	163,127	155,305	79,256
Total tonnage treated²	Ware	2,677,280	1,623,981	2,435,656	2,149,001	2,736,179	3,549,031
	Seed	168,884	250,770	109,013	173,628	155,305	88,555
Tonnes untreated³	Ware	1,662,717	2,382,987	1,704,934	1,918,779	1,560,885	1,431,527
	Seed	253,707	299,812	465,901	342,981	314,893	320,173
Weight applied (tonnes)⁴	Ware	36	20	29	103	101	87
	Seed	6	6	2	2	2	2

¹ Basic tonnes treated = tonnes stored – tonnes untreated

² Total tonnage treated = basic tonnes treated x number of treatments

³ Tonnes untreated = potatoes stored which receive no pesticide treatments during storage

⁴ Weight applied refers to different active substances. The increase in weight applied for 2020 onwards reflects the introduction of new active substances and products after chlorpropham was withdrawn in 2020. Please see page 1 (Overview of main findings) for more details

APPENDIX 5 – INTENDED USE OF WARE POTATOES

Table 8. Pesticide use on the different types of ware potatoes encountered in the United Kingdom, 2024						
	Chipping	Crisping	Canning	Fresh market	Other uses	Total
Active substance						
1,4-dimethylnaphthalene	659,210	1,639,980	0	76,246	57,130	2,432,566
Ethylene	158,524	13,673	0	153,418	26,930	352,546
Imazalil	0	0	0	820	250	1,070
Orange oil	49,757	0	0	0	0	49,757
Spearmint oil	190,879	92,345	0	337,992	91,626	712,842
Thiabendazole	0	0	0	0	250	250
Treated tonnage	1,058,370	1,745,999	0	568,477	176,185	3,549,031
Tonnage stored	685,307	677,271	0	1,616,470	239,745	3,218,792

As can be seen from Table 8, 50%, of all ware potatoes stored, were intended for the fresh market, 21% for chipping and 21% for crisping.

Other intended uses accounted for 7% of the total tonnage of ware potatoes stored. The majority of these, 66%, were used for processing, including mash, pasties, and frozen jackets, with 1% each for restaurants and stockfeeding and the remaining 32% were of unknown use.

1,4-dimethylnaphthalene, spearmint oil and ethylene were the most extensively used active substances on chipping and crisping potatoes, with 1,4-dimethylnaphthalene being the principal active substance on both, followed by spearmint oil. Spearmint oil was the principal active substance used on fresh market potatoes, followed by ethylene and 1,4-dimethylnaphthalene. Use of orange oil was only encountered on chipping potatoes.

APPENDIX 6 - METHODOLOGY

METHODS

The samples of holdings to be surveyed were selected using data from the Agricultural Census Returns, June 2023 for England & Wales (Anon., 2024 a, b), for Scotland (Anon., 2024c) and Northern Ireland (Anon, 2024d).

The samples for the arable survey (Chantry et. al., 2024) were drawn from the June survey returns to represent the area of all arable crops grown throughout England, Scotland, Wales, and Northern Ireland. For England the sample was selected within each of the eight Government Office Regions (GORs). The Welsh Assembly Government provided a further sample, which represented the area grown in Wales and for Scotland, the country was divided into 11 land-use regions (Wood, 1931).

The samples for the arable survey were stratified according to the total area of all arable crops grown in each region and by farm size group based on the total area of arable crops on each farm. The area of arable crops sampled in each size group and each region was proportional to the total area of arable crops grown on holdings of each size group in each region. All three survey teams followed the same methodology for data collection and used the same forms and instructions for their completion. The size groups, based on the total arable area are as follows: <50ha (A); >50-<=100 ha (B); >100-<=150 ha (C); >150-<=250 ha (D); >250-<=500 ha (E) and >500 ha (F).

In England and Wales, most of the data on arable pesticide usage was collected by a sub-contractor, using the same sampling frame and stratification methodology indicated above. Whilst the sub-contractor collected detailed field pesticide usage, they did not collect supplementary data on potato storage.

To increase the data relating to potato storage in England and Wales a separate sample was taken using the same stratification indicated above (region and arable farm size group), but only included holdings who indicated on their 2023 June Survey returns that they were growing potatoes. A total of 725 holdings were selected, and an introductory letter was sent to each, explaining the purpose of the survey, and enclosing a postal reply form requesting the total area of arable cropping, the area of potatoes grown, and the tonnage of potatoes stored from the 2024 harvest.

Of the 100 positive responses received from the postal questionnaire in England & Wales, 53 grew potatoes, with 33 of these storing potatoes. The remaining 20 grew potatoes but didn't store in 2024. A further 17 indicated that they rented land for growing potatoes to other growers. All respondents growing and storing potatoes in 2024 were contacted by email and/or telephone to confirm the types of stores and storage treatment details. Of the 33 growers storing potatoes, 26 provided on farm storage information.

An additional 7 farm stores were encountered in the main arable survey for England & Wales resulting in a total of 33 farm stores in England & Wales.

A further questionnaire was sent to 86 merchants' stores in England & Wales, of which storage data were received from 58 stores.

The Pesticide Survey Unit at SASA provided information on 6 farm and 63 merchant potato stores in Scotland and the Pesticide Usage Survey Team at AFBI provided data on a further 9 farm potato stores in Northern Ireland.

Estimated tonnage stored

In surveys prior to 2022, the tonnages of both ware and seed potatoes going into store have been based on the AHDB Great Britain figures for crops in store in November. It has always been assumed that any potatoes being moved from November onwards have come from potato stores.

The AHDB data were based on a sample of 300 growers and all figures produced were estimates and not a census of GB storage. Stores that were not involved in any growing were not included in the figures and a percentage needed to be added to the storage estimates provided by AHDB (in 2020, 12% of the sampled tonnage was from non-growers). Tonnages for Northern Ireland accounted for 1% of the total tonnage of ware potatoes stored in the UK in 2018 and 2020.

However, in response to the horticulture and potato levy payers' votes in 2021 on the future of the statutory levy, the decision was made to wind down activity in these sectors and figures on potato storage and movement are no longer available from AHDB.

Therefore, it was necessary to look for additional sources of data. It was decided that the only other reliable data source for ware potatoes were the Defra UK production figures:

<https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2024/chapter-7-crops#potatoes>

When comparing the Defra UK production figures for ware potatoes with the AHDB GB figures for 2012 – 2020 (five survey years in total), the Defra UK figures were consistently larger by an average of 8%. This difference was in part due to the inclusion of Northern Ireland data, although this is only likely to comprise 1% – 2% of the total. The remaining difference is most likely to be potato stores from non-growers and therefore not included in the AHDB totals.

Based on six survey years (2010 – 2020) the average percentage of GB ware production going into store was 70%. This percentage has been used and applied to the Defra ware production figures for the United Kingdom.

For seed potatoes, estimated tonnages were produced by the SASA Potato Department and indicated that there were 313,206 tonnes produced in Scotland alone.

Our estimation figures for the United Kingdom are based on those produced by the SASA Potato Department and contained within the published report for Scotland (SASA, 2025). Scotland accounts for 78% of the total seed potato area grown in the United Kingdom and is likely to contribute a similar percentage to the total tonnage stored. Estimates for England and Wales were produced using an average yield (from the SASA Potato Department) multiplied by the area of seed potatoes grown. Based on the most recent six survey years (2010 – 2020) the average percentage of GB seed production going into store is 87%. This percentage has been used and applied to the estimated seed production figures for England & Wales. An additional figure for the tonnage of seed potatoes stored in Northern Ireland was provided by DAERA.

Raising factors for ware potatoes were calculated by dividing the United Kingdom estimated tonnage stored by the sampled stored tonnage. For ware potatoes the raising factor was 3.57, and for seed potatoes, 2.20. For each calculation, and to more accurately estimate quantities stored and pesticides applied, the raising factors used were to six decimal places.

The raising factors used have assumed that the sampled stores and their pesticide usage are representative of potato stores in the United Kingdom, and that the Defra and SASA estimates are without error. We appreciate that the absence of absolute figures for the tonnages of seed and ware potatoes stored in the United Kingdom, such as those available from the June Survey figures for cropping areas, does present a challenge when estimating national usage.

The Questionnaire

The questionnaire consisted of two forms, which were completed by an experienced surveyor during a telephone interview with the farmer, or for commercial stores, by a store representative following receipt of a comprehensive set of instructions.

Form 1 summarised the area of potatoes and arable crops grown on each holding during the 2024 growing season. It also indicated whether potatoes were stored and asked for contact details in order to follow up on storage information.

Form 2 detailed all aspects of pesticide usage in each store. A separate form was completed for each method of storage and treatment programme. Seed and ware potatoes were recorded separately.

Where necessary, further checks have been made to ensure that farm stores were only storing potatoes harvested from their own holding; this has been established following discussions with individual growers. In some cases purpose built stores may have been built in co-operation with individual merchants in order to store potatoes that they would ultimately purchase. These have remained as farm stores if the potatoes were only from their own holding.

In contrast to surveys conducted by the England & Wales survey team up to and including 2018, which were conducted mainly by visit, the 2024 survey for England & Wales was a combination of postal and telephone surveys. There are inherent problems with postal surveys, the main one of which is that response rates are unpredictable and can be quite low. However, the use of telephone interviews has proved successful in obtaining potato storage information in the 2020, 2022 and 2024 surveys.

However, whilst an 16% response rate was achieved overall, only 5% of the total responses were from farms growing and storing potatoes (33 stores in total). There were an additional 8 farms added to the merchant address list as they were growing potatoes on holdings other than their own.

The send out to 725 farms in England & Wales in 2024 resulted in information from 26 farm stores, compared with 36 farm stores from 661 send outs in 2022. There was also a decrease in the number of farm stores in Scotland, with 6 in 2024 compared to 16 in 2022. However, in Northern Ireland, the number of farm stores increased from 5 in 2022 to 9 in 2024.

Rounding

Due to the rounding of figures, the sum of constituent items in the tables may not agree exactly with the totals shown.

Error checking

Extensive checks are made on the data before, at the time of and following data entry. Data checking routines are used to verify the authenticity of the data collected including the authorisation and approval status of all crop/pesticide combinations, high and low rates of application, the methods of application used to apply pesticides, the timing of pesticide applications and untreated tonnages.

Further checks are made on the integrity of the relational database used to store the raw data collected ensuring that links to product databases are in place prior to the production of the report. The product databases used for the pesticide usage surveys are maintained alongside the commercial product database, *LIAISON*, which is used extensively by agronomists and the major farm management software companies.

Where inconsistencies are found, for example where there are high rates of application or non-approved product usage, these are checked first against the information collected and secondly with the grower and amended if necessary.

Reports are written and checked within the team after which they are sent to reviewers within the ECP Working Party on Pesticide Usage Surveys for their comments and checking.

The final report is pre-announced and published via the Government statistics release calendar and the Fera Science Ltd. website in line with the Code of Practice for Statistics.

Data limitations and use of data

Our experience has shown that the 'main contact plus reserves approach' delivers the highest quality data and minimises non-response bias; no other approach is likely to yield fit for purpose data to meet the quality requirements of the UKSA Code of Practice for Official Statistics. However, for this survey the collection of data over the telephone by an experienced surveyor has proved successful as the data required are relatively straightforward to collect. Drawing a fresh stratified random sample each year is clearly an appropriate survey methodology.

Whilst there are detailed data available on the cropped areas of ware and seed potatoes in the United Kingdom, there are no such figures for stored potatoes. The only data available on stored ware and seed potatoes are based on Defra estimates of ware production for the United Kingdom, estimates of seed production and storage by SASA, and estimates produced by AFBI for Northern Ireland. In the absence of any other data, it has been these figures that have been used to create raising factors and to make national estimates of pesticide usage.

As part of this survey Fera Science Ltd. has implemented the United Kingdom Statistics Authority Code of Practice for Statistics, published in 2009 and revised in 2018. Whilst all three pillars and 14 principles apply, we acknowledge the following:

- Honesty and integrity: people in organisations that release statistics should be truthful, impartial, and independent, and meet consistent standards of behaviour that reflect the wider public good.
- Data governance: organisations should look after people's information securely and manage data in ways that are consistent with relevant legislation and serve the public good.
- Efficiency and proportionality: statistics and data should be published in forms that enable their reuse. Producers should use existing data wherever possible and only ask for more where justified.
- Accessibility: statistics and data should be equally available to all, not given to some people before others. They should be published at a sufficient level of detail and remain publicly available.

In accordance with UKSA Code of Practice for Statistics, we work with Defra and HSE statisticians to build on our existing extensive and effective relationships with users of the surveys to further enhance user engagement. There is a broad spectrum of users and stakeholders across policy, research, agricultural supply industry (including consultancies), farming and horticultural businesses, civil society organisations and members of the public. Over the years we have an excellent record of listening to our users and incorporating their feedback into the way we collect and report our statistics.

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