Agri-environmental indicator - consumption of pesticides

Statistics Explained

Data from April 2025
Planned update: 13 May 2026

Highlights

In 2023, sales of pesticides in the EU declined further, reaching a relative low of about 292 000 tonnes. The lowest level since the start of the data series in 2011.

The group 'fungicides and bactericides' was the most sold group of pesticides in the EU in 2023, accounting for 39% of total sales.

France, Spain, Germany and Italy recorded the highest volumes sold in most major groups. These countries are also the main agricultural producers in the EU, with collectively 52% of the total EU utilised agricultural area (UAA) and 49% of the total EU arable land

This article is a fact sheet of the European Union (EU) agri-environmental indicator on the **consumption of pesticides** . It consists of an overview of recent data, complemented by information on definitions, measurement methods and context needed to interpret them correctly. The consumption of pesticides article is part of a set of similar fact sheets providing a complete picture of the state of the agri-environmental indicators in the EU. Data on sales of pesticides cover agricultural and non-agricultural uses.

Analysis at EU and country level

Sales of pesticides in the EU reached a relative low of about 292 000 tonnes in 2023[1]. This followed on from a sharp decline in sales in 2022 (see Figure 1). This downturn can be partially attributed to the rising costs of pesticides, driven in large part by the war in Ukraine and the resulting instability on markets[2]. A slowdown in economy in 2023[3]was also observed and could also be a factor explaining this downturn. Nevertheless, fluctuations in the sales of pesticides are also impacted by prevailing agro-meteorological and economic conditions.

[1] It should be noted that during this reference period, < 1% of the total sales volume were confidential values and could therefore not be included.

[2] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Performance_of_the_agricultural_sector

[3] For details about the slowdown in 2023, see https://ec.europa.eu/eurostat/statistics-explained/index.php?title=National_accounts_and_GDP

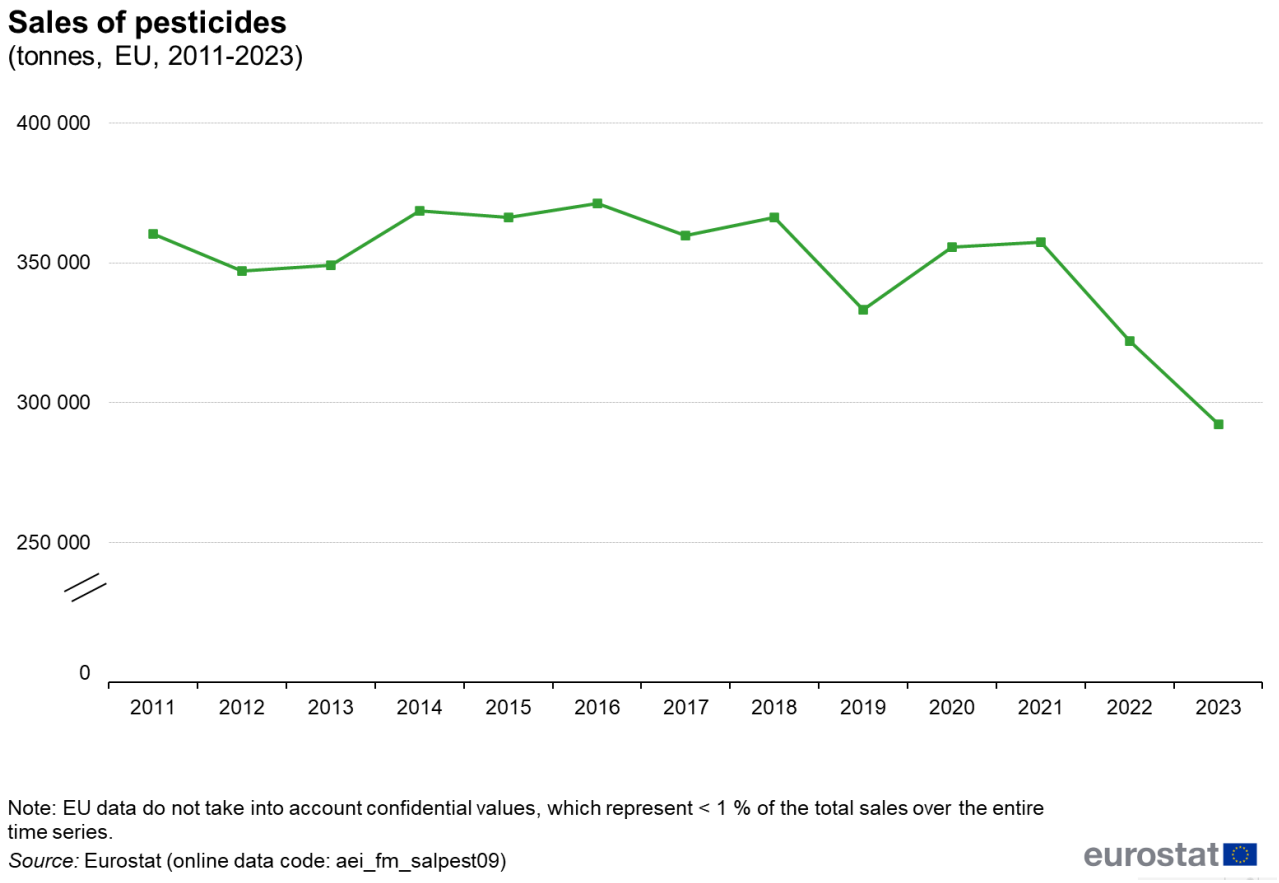

Figure 1: Sales of pesticides Source: Eurostat (aei_fm_salpest09)

Pesticide sales are reported for six major groups of substances (see below under ' **Indicator definition'**). 'Fungicides and bactericides' and 'herbicides, haulm destructors and moss killers' were the pesticide groups that recorded the highest sales volumes each year over the reference period. In 2023, these groups accounted for 39% and 36% of total sales respectively (see Table 1). 'Insecticides and acaricides' represented 17% of total sales in 2023, while 'molluscicides', 'plant growth regulators' and 'other plant protection products' represented less than 10% of total sales. Four EU countries (France, Spain, Germany and Italy) recorded the highest volumes sold in most major groups. These countries are also the main agricultural producers in the EU, with collectively 52%[4]of the total EU utilised agricultural area (UAA) and 49%[5]of the total EU arable land .

[4] https://ec.europa.eu/eurostat/databrowser/view/ef_m_farmleg__custom_16230043/default/table?lang=en

[5] https://ec.europa.eu/eurostat/databrowser/view/ef_lus_main__custom_16229957/default/table?lang=en

Sales of pesticides
(tonnes, 2011 and 2023)

	Fungicides and bactericides		Herbicides, haulm destructors and moss killers		Insecticides and acaricides		Molluscicides		Plant growth regulators		Other plant protection products	
	2011	2023	2011	2023	2011	2023	2011	2023	2011	2023	2011	2023
Belgium	2 408	1 502	2 505	2 195	654	453	18	12	245	379	467	261
Bulgaria	(c)	1 224	(c)	1 955	(c)	216	:	(c)	(c)	(c)	:	(c)
Czechia	1 627	1 284	3 473	2 350	291	95	13	13	1 183	425	462	405
Denmark	633	547	3 692	2 566	45	32	4	8	173	148	3	14
Germany	10 473	9 341	17 955	13 138	11 832	15 949	255	100	3 123	1 771	219	194
Estonia	49	118	357	516	(c)	(c)	(c)	(c)	32	67	(c)	(c)
Ireland	620	403	2 812	1 716	48	5	4	13	188	118	20	18
Greece	1 700	1 414	1 449	1 624	1 095	755	8	2	21	167	1 708	255
Spain	31 330	23 562	13 835	15 131	8 045	9 978	(c)	(c)	(c)	(c)	19 450	4 053
France	24 496	26 115	29 252	29 906	2 190	5 773	331	419	2 532	1 952	2 461	1 249
Croatia	:	605	:	526	:	54	:	4	:	22	:	14
Italy	43 574	24 342	8 327	5 198	2 494	4 221	97	11	390	505	15 443	5 293
Cyprus	895	561	170	133	159	69	2	1	3	3	6	58
Latvia	149	206	724	1 087	34	35	:	(c)	164	310	6	(c)
Lithuania	362	558	1 773	1 629	26	40	(c)	(c)	403	755	(c)	(c)
Luxembourg	92	(c)	102	44	(c)	(c)	1	0	(c)	5	(c)	(c)
Hungary	(c)	2 308	(c)	3 273	(c)	485	(c)	0	(c)	167	(c)	209
Malta	95	(c)	6	3	4	2	1	(c)	0	0	(c)	(c)
Netherlands	4 246	2 298	3 011	2 414	1 898	1 601	20	14	206	695	1 532	241
Austria	1 544	1 719	1 505	1 163	248	2 247	33	8	59	54	58	61
Poland	6 081	5 881	12 408	11 367	991	680	(c)	37	1 593	(c)	689	(c)
Portugal	9 979	4 812	1 996	1 862	883	643	3	11	4	9	1 159	521
Romania	3 455	3 239	6 771	5 126	815	459	1	8	335	133	49	193
Slovenia	797	526	264	119	39	36	1	3	1	6	20	5
Slovakia	(c)	504	1 080	971	75	84	0	(c)	113	181	(c)	(c)
Finland	1 474	2 237	1 452	954	32	12	(c)	1	59	41	(c)	6
Sweden	218	212	2 136	1 694	29	38	1	(c)	21	(c)	11	20
Iceland	:	1	:	1	:	0	:	0	:	0	:	0
Norway	105	79	680	502	5	11	1	2	38	30	17	26
Switzerland	933	716	919	429	261	226	38	19	33	31	91	109
Montenegro	:	62	:	12	:	12	:	0	:	0	:	0
Türkiye	:	19 551	:	15 509	:	15 303	:	297	:	1 984	:	4 932

(:) not available
(c) confidential
Note: definition of 2011 values differs for Luxembourg.
Source: Eurostat (online data code: aei_fm_salpest09)

eurostat

Table 1: Sales of pesticides Source: Eurostat (aei_fm_salpest09)

Twenty-one EU countries (Belgium, Czechia, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Hungary, the Netherlands, Austria, Portugal, Romania, Slovenia, Slovakia, Finland and Sweden) had total sales data available for both 2011 and 2023. The analysis by country below takes into account just this group of 21 countries.

Between 2011 and 2023, there were contrasting developments in the volume of pesticide sales across EU countries (see Figure 2). There were lower sales in 16 countries, with the 5 sharpest rates of decline recorded in Portugal and Italy (both down -44%), followed by Ireland and Slovenia (both down -38%) and Czechia (-35%). By contrast, Latvia, Austria, Lithuania, Finland and France recorded increases in sales of pesticides in 2023 compared with 2011. It should be noted that the volumes of pesticides sold in Lithuania and Latvia in absolute terms are very low (see Table 1). It should also be noted that in Germany and Austria, large volumes of inert gases, such as carbon dioxide or nitrogen, used in the storage of agricultural products inflate the total volume of pesticides sold[6][7].

[6] https://www.baes.gv.at/zulassung/pflanzenschutzmittel/gesetzliche-grundlagen/

[7] https://www.bvl.bund.de/DE/Arbeitsbereiche/04_Pflanzenschutzmittel/01_Aufgaben/02_ZulassungPSM/06_HarmonisierteRisikoindikatoren/psm_HRI_node.html

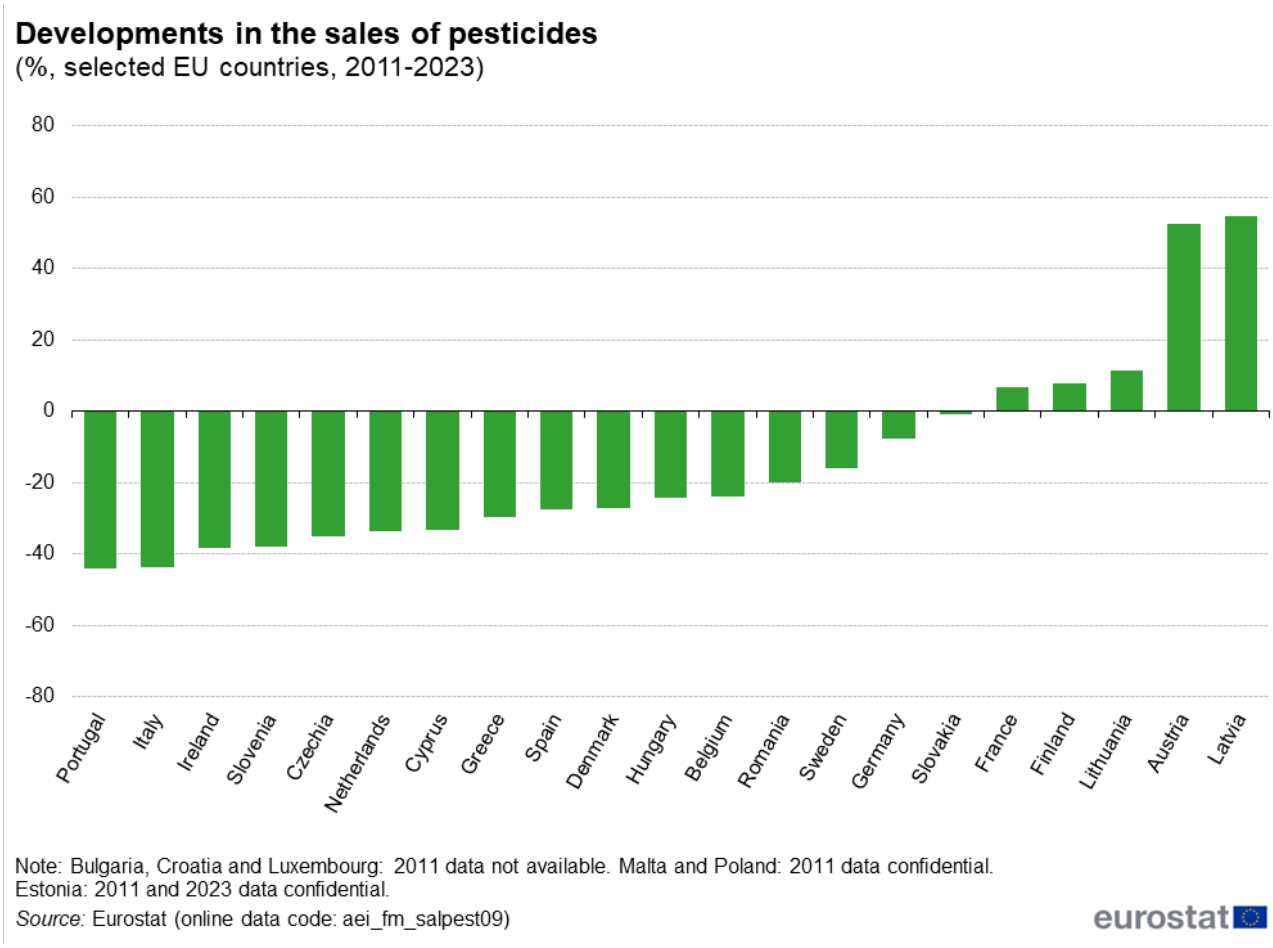

Figure 2: Developments in the sales of pesticides Source: Eurostat (aei_fm_salpest09)

Eurostat also publishes data at a second level of aggregation, under the 'category of products' as defined in the legislation. It provides a more detailed breakdown of pesticide categories.

In 2023, inorganic fungicides accounted for 62.9% of the 'fungicides and bactericides' sold in the EU (Figure 3). These inorganic fungicides refer to copper compounds, inorganic sulphur and other inorganic fungicides, many of which are also permitted in organic farming.

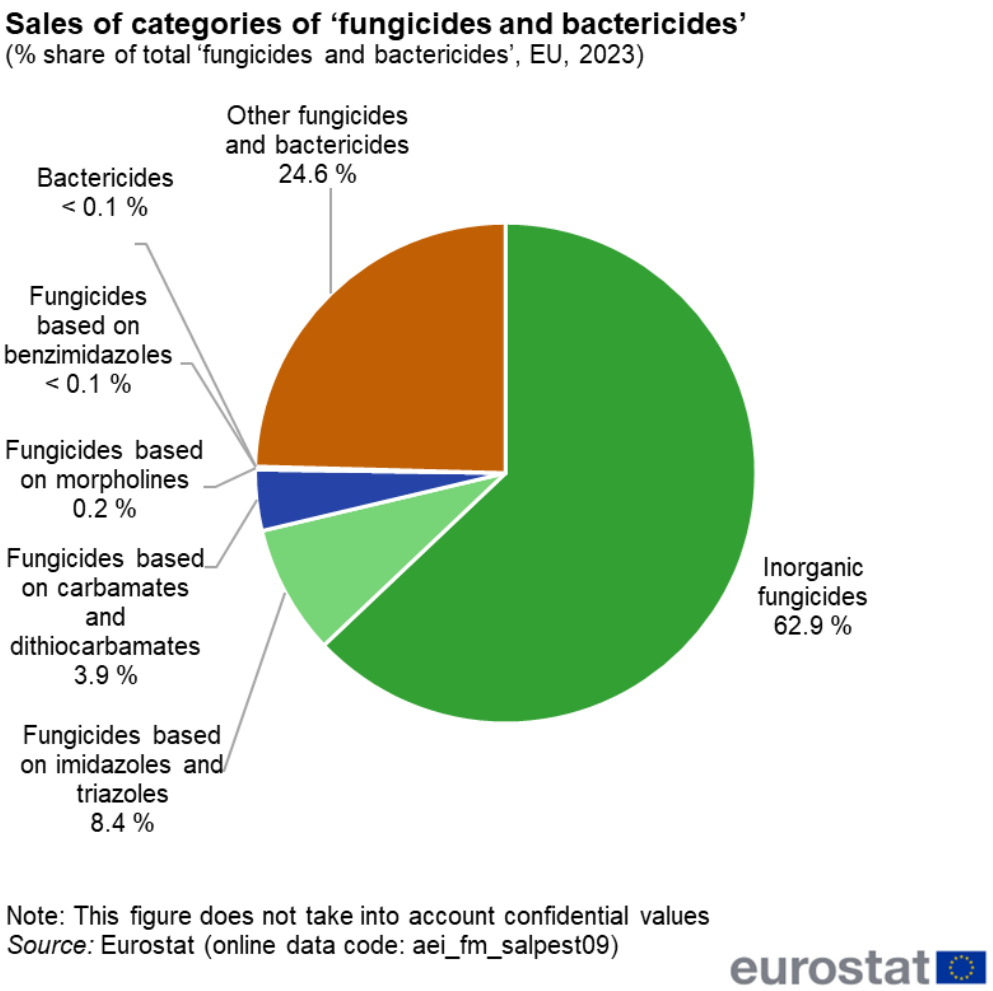

Figure 3: Sales of categories of 'fungicides and bactericides' Source: Eurostat (aei_fm_salpest09)

'Organophosphorus herbicides' (including glyphosate) accounted for 34.9% of EU sales of the substance group 'herbicides, haulm destructors and moss killers' in 2023 (Figure 4). The next largest shares by category within this substance group were 'herbicides based on amides and anilides' (18.5% of sales) and 'other herbicides' such as aryloxyphenoxy-propionic, pyridyloxyacetic-acid and triketone herbicides (which accounted for a further 14.5% of sales).

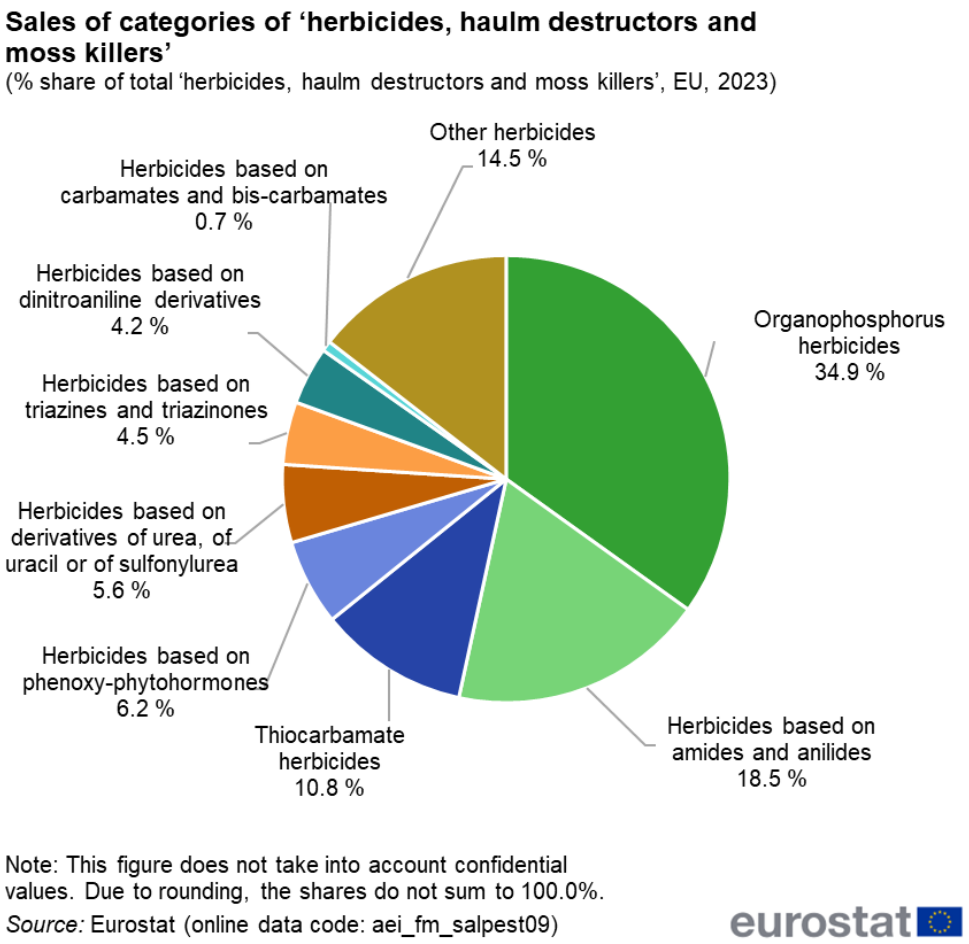

Figure 4: Sales of categories of 'herbicides, haulm destructors and moss killers' Source: Eurostat (aei_fm_salpest09)

Almost 95% of sales in the substance group 'insecticides and acaricides' in 2023 were from the category of products 'other insecticides' (Figure 5). This category includes 17 chemical classes such as pyridylmethylamine insecticides, insecticides produced by fermentation and the straight chain lepidopteran pheromones (with about 40 different insect attractants). The next largest category within the group was 'insecticides based on pyrethroids' (accounting for 4.1% of all sales of insecticides and acaricides).

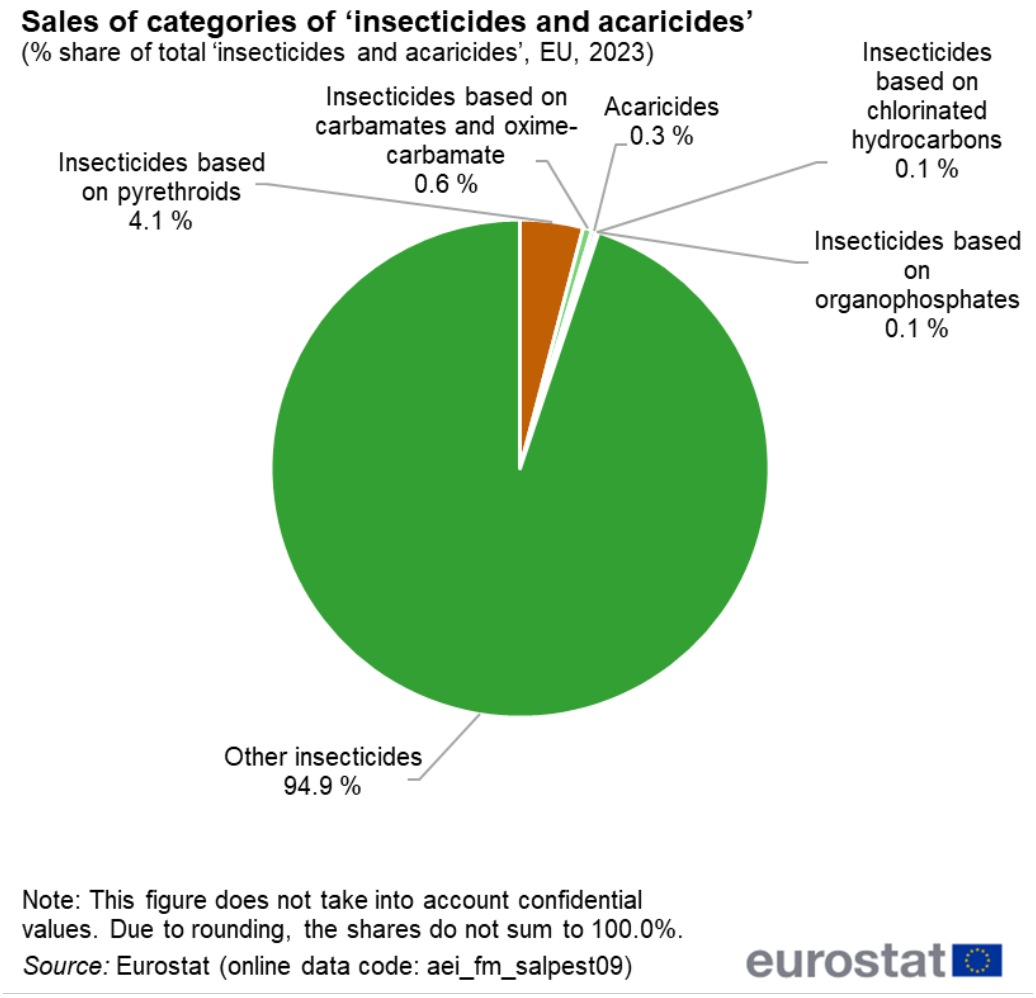

Figure 5: Sales of categories of 'insecticides and acaricides' Source: Eurostat (aei_fm_salpest09)

Source data for tables and graphs

- Consumption of pesticides: tables and figures

Data sources

Indicator definition

For the purpose of this article, the term 'pesticides' refers to plant protection products and covers the following categories:

- 'fungicides and bactericides',
- 'herbicides, haulm destructors and moss killers',
- 'insecticides and acaricides',
- 'molluscicides',
- 'plant growth regulators',
- 'other plant protection products'.

The volumes of pesticides sold, which can be used in agriculture and in other sectors such as forestry or on public/private areas, are used as the basis for the indicator 'Consumption of pesticides'. The consumption of pesticides in agriculture would best be indicated by figures on actual use of active substances in farms or by

application rates. These data are, however, not collected annually or comparable between the countries. The statistics presented in this article refer exclusively to the quantities sold of different pesticide categories.

Main indicators:

- Sold quantities of different pesticide categories
- Used quantities of different pesticide categories in agriculture (available every 5 years but nor comparable between countries)

Links with other indicators

This indicator is linked with other agri-environmental indicators, available on the Eurostat webpage .

Data used and methodology

The new pesticides statistics regulation - Regulation (EU) 2022/2379 on statistics on agricultural input and output (SAIO), with its Implementing Regulation (EU) 2023/1537 – entered into force in 1 January 2025. However, this Regulation will only apply for reference year 2025 onwards, not affecting the data presented in this article, which covers reference years 2011 to 2023.

The data collection from reference years 2011 until 2024 is based on Regulation (EC) No 1185/2009 concerning statistics on pesticides, which established a common framework for the systematic production of Community statistics on sales and use of plant protection products. The 'Harmonised classification of substances' classifies each active substance in a major group, category of products and chemical class. Eurostat is permitted to publish non-confidential aggregated national data (i.e. major groups, categories of products and chemical classes), but cannot disseminate data on individual active substances. Some classifications of active substances changed in reference year 2016 through the amendment by Commission Regulation (EU) 2017/269 . Some newly approved substances were included in the data collection, while some substances received a different classification (for example changed from the major group 'insecticides and acaricides' to 'other plant protection products', or from the latter major group to 'fungicides and bactericides'). Eurostat and reporting countries are working towards creating a harmonised dataset for the whole of a time series that starts in 2011. Where this work is not yet finalised, the aggregated data are flagged with the flag 'd' (definition differs) in Eurostat's dissemination database. This is also explained in the methodological notes attached to the dataset.

In 2021, another update was made to the Annex III of Regulation (EC) No 1185/2009 (Commission Regulation (EU) 2021/2010). Newly approved substances were included in the data collection, but there were no changes in the classification and no impacts in the dissemination database.

Since 2022, pesticide sales data have also been categorised in different risk groups (low-risk, candidate for substitution, non-approved, chemical and non-chemical active substances) and published for each Member State on Eurostat's website .

Plant protection products are preparations consisting of or containing one or more active substances, in the form in which they are supplied to the user, intended to:

- protect plants or plant products against all harmful organisms or prevent the action of such organisms, unless the main purpose of these products is considered to be for reasons of hygiene rather than for the protection of plants or plant products;
- influence the life processes of plants, such as substances influencing their growth, other than as a nutrient, (e.g. growth regulators);
- preserve plant products, in so far as such substances or products are not subject to special Community provisions on preservatives (e.g. extending the life of cut flowers);
- destroy undesired plants or parts of plants, except algae unless the products are applied on soil or water to protect plants; or
- check or prevent undesired growth of plants, except algae unless the products are applied on soil or water to protect plants.

Nevertheless, there is no common definition adopted by all Member States and there can be significant differences in the range of products used in different countries, so comparability is limited. Additional information on the

situation in specific countries is required for any detailed assessment.

Data refer to amounts of active substances, which are the substances in a commercial product that cause the desired effect on target organisms (fungi, weeds, pests, etc.). Base data is generally in kg of active ingredient sold per year for each of the main functional categories of products ('herbicides, haulm destructors and moss killers', 'fungicides and bactericides', 'insecticides and acaricides' and others). To date, there has been no harmonised way by which to convert the units that micro-organisms are often expressed in, colony-forming unit (CFU) or international unit (IU), into kilogram (kg). This limits the possibility to monitor the use of these pesticide active substances, and micro-biological substances are not included in the data used for this article.

Data on sales of pesticides cover agricultural and non-agricultural uses. Although using a total active ingredient volume as a pesticide indicator provides a broad indication of loading, it overlooks factors governing pesticide fate[8] and intrinsic properties, which are often key parameters for determining long-term environmental impact. Total active ingredient values also do not discriminate between pesticides with transitory effects and those which are more persistent in the environment which may pose a greater risk to environmental and ecological quality objectives. There is no absolute relationship between the loading of active substances and the potential threat to the environment and human and animal health. Indicators of the intensity of pesticide use can, however, be a first step towards risk evaluation.

Pesticide sales statistics are affected by confidentiality restrictions. The impact of these restrictions on the data varies according to the Member States, the type of pesticides and the year.

Member States are obliged to publish their national pesticide statistics on the Internet. The links to these websites are available in the quality report for each Member State, available in Pesticide sales quality report (click tab 'National metadata' to access the files).

Context

Pesticides fight crop pests and reduce competition from weeds, thus improving yields and protecting the availability, quality, reliability and price of products to the benefit of farmers and consumers. Pesticide use is partly influenced by economics (the most profitable crops are the ones most economically viable to treat), and partly by local soil and climatic conditions that determine the vulnerability of a site to pest infestation. It also depends on the type of farming (conventional or organic). Annual variations can depend on weather conditions, pest outbreaks, sales prices, etc.

Member States monitor pesticide residues in food and feed relative to European maximum residue levels (MRLs) and in 2022[9] 96.3 % of the 110 000 or so samples analysed fell within legal levels.

The environmental risk of pesticide use varies considerably from one pesticide to another, depending on the intrinsic characteristics of their active substances (toxicity, persistence, etc.) and use patterns (applied volumes, application period and method, crop and soil type, etc.). Measuring the real use of pesticides would allow a better estimate of the risks by crop and region for different compartments of the environment or for human health. At the moment, statistical data on the agricultural use of pesticides are available by Member State, but are not harmonised on a European scale. Under Regulation (EC) No 1185/2009 concerning pesticide statistics, countries deliver data on the agricultural use of pesticides by crop every 5 years. However, the choice of crops monitored and the reference year vary between countries.

EU harmonised pesticide statistics are also needed for creating harmonised risk indicators . To calculate highly accurate risk indicators, it would be necessary to establish toxicity and ecotoxicity levels for each active substance and combine these with relevant data on the quantities used and other information. The way in which pesticides are used (quantities, time and method of application, type of crop, type of soil, etc.) influences their effect on human health and the environment. However, apart from the crop type, statistics on these factors are not yet available. Risk indicators have therefore been developed based on pesticide sales statistics and other data.

[8] Pesticide fate (and hence environmental risk) is primarily governed by vapour pressure, sorption characteristics, solubility in water, and environmental persistence (Binks et al., 2002).

[9] https://www.efsa.europa.eu/en/efsajournal/pub/8753

Policy relevance and context

Due to their potential toxicity, often even at very low levels, the application of pesticides has been strictly controlled by Community legislation since 1991 (by national legislation prior to 1991). Policy control measures in the EU are driven by the objectives of protecting human health and the environment (consumers, operator safety, protection of water quality and biodiversity).

In 2009, the Sustainable Use Directive (Directive 2009/128/EC), the so-called 'SUD', established a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticide use on human health and the environment and promoting the use of integrated pest management and of alternative approaches or techniques such as non-chemical alternatives to pesticides. Instructions to adopt National Action Plans , develop obligatory systems for training and education, set up a framework for equipment inspections, examine alternative pest management methods, secure water protection, and apply harmonised risk indicators are fundamental. Following up on the Sustainable Use Directive, Member States have introduced country specific measures setting objectives and timetables to reduce risks and impact of pesticide use. The latest Report from the Commission to the European Parliament and the Council on the implementation of the SUD details the progress towards the full implementation of the requirements.

Article 15(4) of Directive 2009/128/EC requires the European Commission to calculate risk indicators at Union level using statistical data collected in accordance with Union legislation concerning statistics on plant protection products and other relevant data, in order to estimate trends in risks from pesticide use. Member States are also obliged to calculate the harmonised risk indicators (Article 15(2) of the Directive). The first harmonised risk indicators were introduced through amendment C(2019) 3580 . The indicators are published on the SUD webportal .

The most important legal acts with regard to pesticides are the following:

- Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides;
- Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market;
- Directive 2009/127/EC of the European Parliament and of the Council of 21 October 2009 amending Directive 2006/42/EC with regard to machinery for pesticide application;
- Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (Drinking Water Directive) which stipulates a maximum concentration of 0.1 μg/l (which in practice means the absence) for any single pesticide and its relevant metabolites (maximum of 0.5 μg/l for total pesticides) in potable water;
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive) which identifies a large number of particularly toxic, persistent or bioaccumulative polluting substances in Annex VIII including organophosphate compounds.

Other relevant legislation include:

- Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy;
- Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin.

Agri-environmental context

The use of pesticides plays an important role in agricultural production by ensuring less weed and pest damage to crops. However, their use can have negative environmental impacts on water quality, terrestrial and aquatic biodiversity (persistence and toxic effects on non-target species, etc.). The Sustainable Use Directive promotes the use of integrated pest management and of alternative approaches and techniques such as non-chemical alternatives to pesticides. Integrated Pest Management (IPM) is a strategy that promotes a safer and more sustainable management of pesticides. IPM strategies are evolving because of new emerging pests and climate change, and involve crop rotation, hygiene measures to prevent pest spread, protecting and enhancing beneficial

organisms, using adequate cultivation techniques, appropriate cultivars or seeds. Farmers must implement IPM and give preference to non-chemical methods if they provide satisfactory pest control. The main purpose is to reduce the dependency on pesticides in agriculture.

Contamination of the environment from pesticides may result from spray drift, volatilisation, surface run-off, and subsurface loss via leaching/drainflow. The persistence of pesticides in the environment differs greatly and is dependent on factors such as their susceptibility to attack by micro-organisms and enzymes, soil temperature and water content. In the last decade, much work has been carried out in the agricultural sector to limit the negative effects of pesticides. Organic farming is increasing year-by-year and covered 10.5 % of the EU's Utilised Agricultural Area (UAA) in 2022. Only a limited number of pesticide active substances are permitted to be used in organic farming; those listed in Annex II of Commission Implementing Regulation (EU) 2021/1165 on organic production. There is a consistent upward trend in the number of approved non-chemical, low-risk and basic active substances, from less than 60 in 2009 to almost 120 in 2019[10].

Footnotes

Explore further

Other articles

- Agri-environmental indicators – fact sheets

Database

- Agriculture , see:

Agriculture and environment (aei)

Pesticides (aei_pes)

Pesticide sales (aei_fm_salpest09)
Pesticide use in agriculture (aei_pestuse)
Harmonised risk indicator 1 for pesticides by categorisation of active substances (aei_hri)
Pesticide sales by categorisation of active substances (aei_pestsal_rsk)

Thematic section

- Agriculture
- Agri-environmental indicators

Publications

- Key figures on the European food chain – 2024 edition (Statistical book)

Methodology

- Pesticide sales (ESMS metadata file – aei_fm_salpest09_esms)
- Pesticide use in agriculture (ESMS metadata file – aei_pestuse_esms)
- Harmonised risk indicator 1 for pesticides by categorisation of active substances (ESMS metadata file – aei_hri_esms)

[10] COM(2020) 204 final : Report from the Commission to the European Parliament and the Council on the experience gained by Member States on the implementation of national targets established in their National Action Plans and on progress in the implementation of Directive 2009/128/EC on the sustainable use of pesticides.

Legislation

- Regulation (EC) No 1185/2009 concerning pesticide statistics, as amended by Commission Regulation (EU) 2021/2010 of 17 November 2021
- Summaries of EU Legislation: Pesticide statistics
- Commission Communication COM(2006) 508 final – Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy
- Commission Staff working document accompanying COM(2006) 508 final

External links

- **European Commission**
- DG Agriculture and Rural Development
  - Pesticides and plant protection
- DG Environment
  - Chemicals
- DG Health and Food Safety
  - Pesticides
    - Sustainable use of pesticides
    - Biocides
    - Plant health and biosecurity
- CropLife Europe
- European Food Safety Authority
- Pesticides