

## Dataset Information:

Title	Pesticides Use
<b>Abstract</b>	The FAOSTAT Pesticides Use domain contains statistics on the agricultural use of major pesticide groups and of relevant chemical families. Data are disseminated by country, with global coverage, over the period 1990-2020, with annual updates. Data are disseminated in quantity (metric tonnes) of active ingredients.
<b>Supplemental</b>	<p>The FAOSTAT Pesticides Use domain contains information on the use of major pesticide groups:</p> <ol style="list-style-type: none"><li>1. Insecticides (Chlorinated hydrocarbons, Organo-phosphates, Carbamates-insecticides, Pyrethroids, Botanical and biological products and Others not elsewhere classified);</li><li>2. Mineral Oils;</li><li>3. Herbicides (Phenoxy hormone products, Triazines, Amides, Carbamates-herbicides, Dinitroanilines, Urea derivatives, Sulfonyl urea, Bipiridils, Uracil, Others not elsewhere classified);</li><li>4. Fungicides and Bactericides (Inorganic, Dithiocarbamates, Benzimidazoles, Triazoles Diazoles, Diazines Morpholines, Others not elsewhere classified);</li><li>5. Seed Treatment-Fungicides (Dithiocarbamates, Benzimidazoles, Triazoles Diazoles, Diazines Morpholines, Botanical products and biological, Others not elsewhere classified);</li><li>6. Seed Treatment-Insecticides (Organo-phosphates, Carbamates-insecticides, Pyrethroids, Others not elsewhere classified);</li><li>7. Plant Growth Regulators;</li><li>8. Rodenticides (Anti-coagulants, Cyanide Generators, Hypercalcaemics, Narcotics, Others not elsewhere classified);</li><li>9. Other Pesticides NES (not elsewhere specified);</li><li>10. Disinfectants.</li></ol>
<b>International Standards</b>	<p>The FAOSTAT Pesticides Use domain is compliant with the <b>System of Environmental-Economic Accounting for Agriculture Forestry and Fisheries (SEEA AFF)</b> in terms of: i) Definitions; ii) Classifications; and iii) Applicability: the FAOSTAT Pesticides Use data can be used to compile SEEA AFF Table 4.7 <i>“Physical flow account for pesticides”</i>.</p> <p>The FAOSTAT Pesticides Use domain is compliant with the Framework for the Development of Environmental Statistics (FDES 2013), FDES Component 1. <i>Environmental Conditions and Quality</i>; Component 2. <i>Environmental Resources and their use</i> and in Component 3. <i>Residuals</i> and FDES, Table 4.2 <i>“Core Set of Environmental Statistics”</i>.</p>
<b>Creation Date</b>	1990
<b>Last Update</b>	2020
<b>Data Type</b>	Pesticides use statistics
<b>Category</b>	Agriculture
<b>Time Period</b>	1990–2020
<b>Periodicity</b>	Annual
<b>Geographical Coverage</b>	World
<b>Spatial Unit</b>	Country
<b>Language</b>	Multilingual (EN, FR, ES)

## Methodology and Data Quality Information:

**Data Collection** National data are collected from 203 countries and territories via the FAO Pesticides Use Questionnaire, <http://www.fao.org/economic/ess/ess-home/questionnaires/en/>. The data collected via questionnaire may be complemented with official government data sources, for instance from national statistical yearbooks and ministerial data portals, as well as with secondary data sources, such as country studies from other International Organizations. Data are flagged in the domain according to source. Several countries may report pesticides sales data or pesticides trade imports data in the Questionnaire, as a proxy for pesticides use. No data adjustments are made in such instances, albeit they may impact time series occasionally. Use of proxies are recorded in the “Country Notes” available on the FAOSTAT Pesticides Use domain.

**Completeness** The database covers 175 countries and territories.

Below is the reporting rate (defined as the number of countries who provide data) for the 2020 dispatch of the FAO Pesticides Use Questionnaire:

Region	Reporting Rate
Africa	13%
Americas	58%
Asia	41%
Europe	83%
Oceania	11%
<b>Global</b>	<b>41%</b>

Below is the imputation rate (defined as the number of imputations over the total number of records) for the Pesticides Use database:

Region	Imputation Rate
Africa	43%
Americas	39%
Asia	40%
Europe	17%
Oceania	40%
<b>World</b>	<b>33%</b>

**National Focal Points** The FAO Questionnaire is sent to National Focal Points in National Institutions, typically National Statistical Offices, Ministries of Agriculture or other relevant Agencies.

**Methods: Data gap filling** The following gap-filling methodology was applied to reported statistics in connection with: 1. Data errors (data reported in formulated products, rather than in active ingredients; and 2. Incomplete time series of subcomponents, for the purpose of computing aggregates of pesticides totals by country.

Data in formulated products (FP) was adjusted to active ingredients (AI) in the following manner.

In cases of a temporary break in time series at time points  $i$  and  $k$ , i.e., for series of the kind  $\{A_i, FP_{i+1}, \dots, FP_{k-1}, A_k\}$ , the average of the relative rate of change

before and after the more recent break occurrence was applied to the break point (1), and the time series was adjusted backwards (or forward, in cases when the final end point in the complete time-series was in FP), using the relative growth rate of the FP data in the series (2):

$$\widehat{AI}_{k-1} = AI_k + \frac{1}{2} \left( \frac{AI_k - AI_{k+1}}{AI_k} + \frac{FP_{k-2} - FP_{k-1}}{FP_{k-1}} \right) * \Delta t * AI_k \quad (1)$$

where:

$\widehat{AI}_{k-1}$  is the reconstructed AI value at time k-1;

$\Delta t$  is the time interval in years (for this work,  $\Delta t = 1$ );

and:

$$\widehat{AI}_j = \widehat{AI}_{j+1} + \left( \frac{FP_{j+1} - FP_j}{FP_{j+1}} \right) * \Delta t * \widehat{AI}_{j+1} \quad (2)$$

where  $j = k-2, k-3, \dots, i$

The above equations were not applied in cases where the country reported statistics in formulated products were lower than those in active ingredients. In such cases, data in formulated products were not considered valid, and a simple linear interpolation between available points was performed, similarly to what done in point 2 below.

In all cases, mean country conversion factors, CF, from FP to AI were calculated as the average of the  $\widehat{AI}_j/FP$  ratios of available values after time series reparation:

$$CF = \frac{1}{k - i - 1} \sum_{j=i}^{k-1} \frac{\widehat{AI}_j}{FP_j}$$

Regional and global conversion factors were calculated by pesticide type, using the weighted average of the country conversion factors, with the average value of  $\widehat{AI}$  across the repaired time series break as weighting variable.

CFs were used to convert data in formulated products to active ingredients in those cases where only data in formulated products were reported. Because the subset of countries where data repair into AI was performed could not be considered representative of their regions, we used global CFs only, by pesticides type where possible, and a global generic CF when not possible (see country notes for actual values used).

Pesticides totals by country were estimated by filling gaps in countries time series of relevant pesticides sub-components and then summing them up. Gap filling was performed by linearly interpolating between available values, or by carrying forward or backward last available values in a time series. Gap-filled values by pesticides sub-components are not disseminated.

**Useful Links** <http://www.fao.org/economic/ess/ess-home/questionnaires/en/>  
<http://www.fao.org/economic/ess/ess-publications/ess-yearbook/en/#.WEA2U7IrJhE>

**Distribution Information:**

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