

Pesticides Industry Sales and Usage

2008 – 2012

Market Estimates



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By

Donald Atwood

Claire Paisley-Jones

Biological and Economic Analysis Division

Office of Pesticide Programs

Office of Chemical Safety and Pollution Prevention

U.S. Environmental Protection Agency Washington, DC 20460

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Contact Us

For questions on this report, please contact: OPP_Usage_and_Label_Use_Team@epa.gov

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1 Introduction

1.1 Purpose of Report

The U.S. Environmental Protection Agency (EPA) is responsible for regulating the production and use of pesticides in the United States under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). This report provides economic information on the U.S. sectors that produce and use pesticides covered by these federal regulatory statutes and programs. Economic profile information covers a variety of topics, particularly the pesticide market with respect to dollar values and quantities of active ingredient. The EPA Office of Pesticide Programs has issued such market reports since 1979 (EPA 1979). The intended audience of this document includes those entities seeking an overview of sales and usage in the pesticide industry, which may include federal and state agencies, researchers, academia, and the general public.

Neither EPA nor any other federal agency has a program devoted specifically to collecting information for the purpose of estimating the overall pesticide market in terms of dollars spent and quantities of active ingredients used on an annual basis. Therefore, this information must be compiled from external sources (see Data Sources). The data in this report represent approximate values rather than precise values with known statistical properties.

This report is intended only to present objective economic profile and trend information reflecting the best information available to EPA on pesticide sales and use. It does not interpret, offer conclusions, or make inferences about the data. Detailed analysis of causal factors or implications, such as potential impacts on human health, the environment, or the economy, falls beyond the scope of this report.

We caution the reader not to infer too much from changes in the amount of pesticides used from year to year. Changes in the amount of pesticides used are not necessarily correlated with changes in the level of pest control or changes in the human health and environmental risks associated with pesticide use. Yearly variation in pesticide sales may reflect for example, changes in survey methodology, changes in the price of pesticides, or the introduction and adoption of new pesticide/chemistries with associated higher prices. Similarly, yearly variation in pounds of pesticides applied may be influenced by factors such as survey methodology, pesticide pricing, increased usage of newer pesticide chemistries with similar toxicity at reduced application rates, or changes in application methodology (*e.g.*, seed treatment vs. post emergence applications).

1.2 Data Sources

The agency based its estimates of pesticide usage and expenditures on data from public and proprietary databases and market research reports that have met EPA requirements for environmental data as evidenced by their documented quality systems, including prescribed quality assurance and quality control activities to ensure the quality of the data (EPA 2008). Public data sources include several reports developed by the United States Department of Agriculture's National Agricultural Statistics Service (USDA/NASS). These publications cover a broad range of pesticide sales and usage information. The associated data quality measures for each report are published on the USDA/NASS website (https://www.nass.usda.gov/Publications/Methodology_and_Data_Quality). Proprietary data sources include agricultural and non-agricultural pesticide survey data and research reports of pesticide usage statistics collected and sold by private market research firms. The survey methodology is documented in the firms' quality assurance documents, and results are deemed statistically valid by the Agency's standards. These data, produced by well-known organizations, also serve pesticide registrants and other private sector firms analysing the U.S. and world pesticide markets. The methods used by the various public and proprietary data sources vary from large statistically based grower/user samples or panels to use of more limited interview/survey approaches of growers, applicators, pesticide suppliers, and pest management consultants. No single source provides data on all use sites. Each source and its method were considered on their merits when judging the usefulness and relevance to making annual market estimates

for this report. Comparisons across data sources were done where appropriate. Data presented in this report are merged, averaged, and rounded so that the presented information is not proprietary, business confidential, or trade secret.

It should be noted that additional pesticide usage may have occurred that is not included in this document because the available studies do not survey all sites (*e.g.*, small acreage crops). Furthermore, usage data on a particular site may be noted in data sources, but not quantified, because of small sample size or other factors. In these instances, usage data associated with the site are not reported in this document, and may therefore underestimate actual usage. Lack of reported usage data for a pesticide or use site does not imply zero usage.

This report presents data at both the producer and user levels. Producer level data are obtained by surveying companies that manufacture and formulate pesticides to determine the amount of pesticides sold in a given year in terms of dollars and pounds active ingredient (a.i.) by pesticide type (see Sections 2.1 and 3.1). User level data are obtained by surveying persons or businesses that purchase and apply pesticides, such as farmers, commercial pesticide applicators, and homeowners to determine the amount of pesticides applied in a given year in terms of dollars and pounds a.i. (see Sections 2.2 – 2.3, 3.2 – 3.7, and 4).

1.3 Scope of Report

This report profiles the U.S. pesticide industry, on an annual basis, for the years 2008-2012. Data were estimated using several different parameters (*e.g.*, pesticide type, pesticide group, market sector) and appear in tabular form. The scope of the report is largely inclusive of the U.S. pesticide industry and includes data on expenditures (sales in dollars), volume (pounds applied), firms, individuals involved in production and use of pesticides, number of pesticides, and number of certified applicators, among other topics. Data on expenditures and sales are reported in nominal terms for the year indicated (*i.e.*, not adjusted or indexed for inflation). Data on pesticide usage are reported only as pounds applied and not acres treated. The report includes graphical representations of the data where useful for illustration purposes.

Following the Introduction (Section 1), Section 2 of the report summarizes world and U.S. pesticide expenditures, and Section 3 summarizes world and U.S. pesticide usage. Section 4 presents summary-level information on pesticide users and producers.

1.4 Data Reporting Changes

Since the last publication of this report (EPA 2011), there have been several changes in data sources and calculation methods used to derive the estimates of pesticide usage and expenditures. These changes were the result of discontinued private market research data sources and the availability of more current data that more accurately reflected pesticide sales and usage statistics for the reported timeframes.

The previous proprietary source of data for producer level expenditures on pesticides and pounds of pesticide applied in the world and U.S. markets has been discontinued and has been replaced with a new source. Thus, the grouping and trends in these data (Sections 2.1 and 3.1) may vary slightly from those reported in previous versions of this document.

Additionally, in previous versions of this report, some user level data were updated by calculating a percent change in the market and applying that percent change to the values presented in previous reports. In this report, no data are extrapolated with the exception of the 2009 Industrial/Commercial/ Government category values. Because of a lack of data, the 2009 values are an average of the 2012 and 2007 values for this category. All data presented are based on the best available estimates for each reported year. Not all of the included data sources for user level data report yearly; therefore, data are only reported for years for which data are available. Several studies used to determine the cost and quantity of non-agricultural pesticide use have also been discontinued. Therefore, in order to update this report, the

values in these categories were calculated differently than in previous versions. In order to maintain continuity in the data, and to prevent the false appearance of changes in usage patterns, the values for 2005 and 2007 were recalculated using the same methods and sources used to update this report, and thus vary slightly from the values reported for these timeframes in previous versions of this publication.

2 2008 - 2012 Sales

2.1 World and U.S. Pesticide Expenditures

World pesticide expenditures at the producer level totalled nearly \$56 billion in 2012 (see Figure 2.1). Between 2008 and 2012, expenditures on herbicides consistently accounted for the largest portion of total expenditures in all years (approximately 45%), followed by expenditures on insecticides, fungicides, and other pesticides, respectively (see Table 2.1).

U.S. pesticide expenditures at the producer level totalled nearly \$9 billion in 2012 (see Figure 2.1). Between 2008 and 2012, U.S. expenditures accounted for 18-16% of total world pesticide expenditures. Most recently, in 2012, U.S. expenditures accounted for 21% of world expenditures on herbicides (including plant growth regulators [PGRs]), 14% of world expenditures on insecticides, 10% of world expenditures on fungicides, and 23% of world expenditures on fumigants (Table 2.1). Figure 2.1 displays the distribution of pesticide expenditures by pesticide type in the U.S. and world markets. See Section 2.2 for a more detailed look at U.S. expenditures on pesticides from 2008 to 2012.

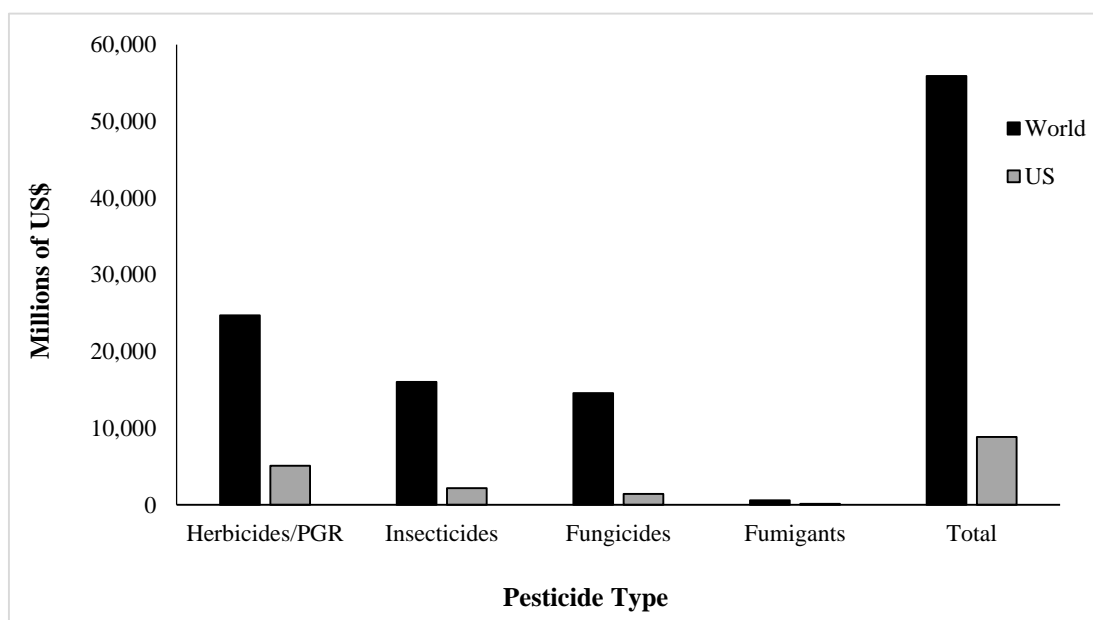


Figure 2.1. World and U.S. Pesticide Expenditures at Producer Level by Pesticide Type, 2012 Estimates

Source: Phillips McDougall, AgriService (2008-2012). (<http://phillipsmcdougall.co.uk/agriservice/>)

Table 2.1. World and U.S. Pesticide Expenditures at the Producer Level by Pesticide Type, 2008 - 2012 Estimates

Year and Pesticide Type	World Market		U.S. Market		U.S. Percentage of World Market
	Millions of \$	%	Millions of \$	%	
2012					
Herbicides/PGR*	24,727	44	5,115	58	21
Insecticides	16,023	29	2,184	25	14
Fungicides	14,565	26	1,430	16	10
Fumigants	606	1	137	2	23
Total	55,921		8,866		16
2011					
Herbicides/PGR	23,322	44	4,904	58	21
Insecticides	15,055	28	2,125	25	14
Fungicides	13,898	26	1,348	16	10
Fumigants	554	1	145	2	26
Total	52,829		8,522		16
2010					
Herbicides/PGR	21,131	45	4,755	58	23
Insecticides	13,356	28	2,038	25	15
Fungicides	12,106	26	1,232	15	10
Fumigants	578	1	138	2	24
Total	47,171		8,163		17
2009					
Herbicides/PGR	21,376	46	5,058	59	24
Insecticides	12,382	27	2,009	23	16
Fungicides	11,692	25	1,166	14	10
Fumigants	557	1	122	1	22
Total	46,007		8,355		18
2008					
Herbicides/PGR	23,516	48	5,364	63	23
Insecticides	12,486	26	1,882	22	15
Fungicides	12,249	25	1,186	14	10
Fumigants	591	1	123	1	21
Total	48,842		8,555		18

Source: Phillips McDougall, AgriService (2008-2012). (<http://phillipsmcdougall.co.uk/agriservice/>) **Note:** Insecticide and fungicide values include seed treatment uses. Totals may not be exact due to rounding. Table data do not cover wood preservatives, specialty biocides, chlorine/hypochlorites, vertebrate pesticides or other chemicals used as pesticides (e.g., sulfur and petroleum oil).

*PGR – Plant Growth Regulator

2.2 User Expenditures on Conventional Pesticides in the United States

U.S. expenditures at the user level for conventional pesticides totalled nearly \$14 billion in 2012 and nearly \$13 billion in 2009 (see Figure 2.2 and Table 2.2). Conventional pesticides are defined here as all active ingredients other than biological pesticides and antimicrobial pesticides. Pesticides included in the estimates are herbicides (including PGRs), insecticides, fungicides, fumigants, sulfur and oils, and other pesticides. Other pesticides include chemicals that may be used as pesticides but are not primarily produced as pesticides for the agricultural market (*e.g.*, sulfuric acid and phosphoric acid), as well as rodenticides and repellents used in the home and industrial markets. The estimates exclude expenditures on wood preservatives and specialty biocides, which are discussed separately in section 3.7 of this report.

Increases in spending in the agricultural sector on all pesticide types, as well as increases in spending in the home and garden sector on insecticides, fungicides, and other pesticides, resulted in an overall increase in total pesticide expenditures in 2012. Expenditures in the agriculture sector accounted for approximately two-thirds of total pesticide expenditures in both 2012 and 2009. Within the agricultural sector, the majority of pesticide expenditures were on herbicides, which accounted for approximately 59% of the market in 2012 and 63% in 2009. In the remaining sectors, the majority of expenditures were on insecticides, which accounted for approximately 80% of expenditures in the home and garden sector and 50% of expenditures in the industrial/commercial/governmental sector in both 2009 and 2012 (see Table 2.2). Figure 2.2 displays the distribution of expenditures by pesticide type and sector in 2012.

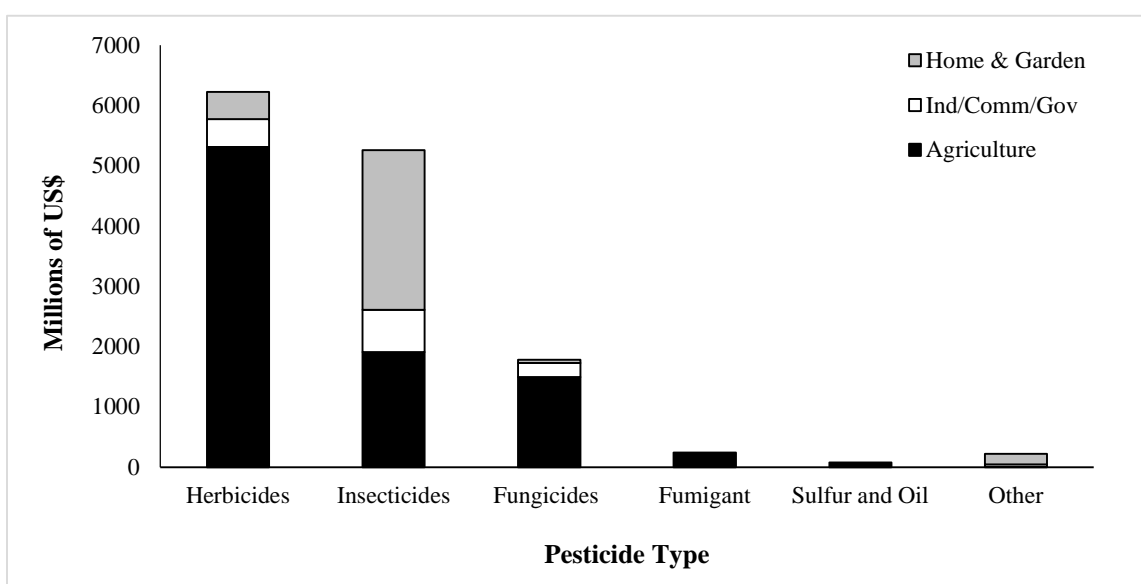


Figure 2.2. User Expenditures on Pesticides in the United States by Pesticide Type and Market Sector, 2012 Estimates

Sources: Agricultural Market Research Proprietary Data (2005-2012).
 Non-Agricultural Market Research Proprietary Data (2005-2012)
 USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Table 2.2. User Expenditures on Conventional Pesticides in the United States by Pesticide Type and Market Sector - 2012, 2009, 2007, and 2005 Estimates

Year and Market Sector	Herbicides/PGR		Insecticides		Fungicides		Fumigant		Sulfur and Oil ¹		Other ²		Total	
	Mil \$	%	Mil \$	%	Mil \$	%	Mil \$	%	Mil \$	%	Mil \$	%	Mil \$	%
2012														
Agriculture ³	5,313	85	1,909	36	1,499	84	245	100	82	100	7	3	9,055	66
Ind/Comm/Gov	460	7	700	13	230	13	—	—	—	—	40	18	1,430	10
Home & Garden	450	7	2,650	50	55	3	—	—	—	—	175	79	3,330	24
Total	6,223		5,259		1,784		245		82		222		13,815	
2009														
Agriculture ³	5,192	85	1,618	34	1,128	79	229	100	70	100	4	2	8,241	64
Ind/Comm/Gov ⁴	470	8	708	15	248	17	—	—	—	—	35	18	1,490	12
Home & Garden	475	8	2,500	52	50	4	—	—	—	—	155	80	3,180	25
Total	6,147		4,833		1,443		229		70		189		12,911	
2007*														
Agriculture ³	4,135	82	1,428	31	820	73	227	100	66	100	6	4	6,682	59
Ind/Comm/Gov	480	10	715	15	265	23	—	—	—	—	30	20	1,490	13
Home & Garden	420	8	2,500	54	45	4	—	—	—	—	115	76	3,080	27
Total	5,035		4,643		1,130		227		66		151		11,252	
2005*														
Agriculture ³	4,352	84	1,314	31	699	70	197	100	63	100	5	3	6,630	61
Ind/Comm/Gov	460	9	675	16	260	26	—	—	—	—	30	21	1,425	13
Home & Garden	395	8	2,200	53	40	4	—	—	—	—	109	76	2,744	25
Total	5,207		4,189		999		197		63		144		10,799	

Sources: Agricultural Market Research Proprietary Data (2005-2012).
 Non-Agricultural Market Research Proprietary Data (2005-2012)
 USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Note: Includes the cost of insecticides, herbicides, fungicides, and other pesticides, excluding the cost of custom application. Insecticide and fungicide values include seed treatment uses. Totals may not be exact due to rounding.

¹ "Sulfur and Oil" includes sulfur, petroleum distillate, and petroleum oil.

² "Other" includes chemicals used as pesticides which are not primarily produced as pesticides for the agricultural market (e.g., sulfuric acid and phosphoric acid) as well as rodenticides and repellent use in the home and industrial markets. It does not cover specialty biocides or wood preservatives.

³ USDA/NASS data incorporated into agricultural expenditures to account for malathion expenditures in the Boll Weevil Eradication Program (BWEP).

⁴ Due to lack of data, the values presented for 2009 for the Industrial/Commercial/ Government category are an average of the 2012 and 2007 values. This value may over or underestimate actual 2009 usage, due to fluctuations in annual usage.

* Updated values for 2007 and 2005 presented for continuity. See Data Reporting Changes.

2.3 Pesticide Farm Expenditures in the United States

Pesticides are a significant component of total farm production expenditures and an important element of farm budgeting and management. Farm expenditures includes the cost of pesticides (as reported in sections 2.1 and 2.2 of this report) as well as the cost of pesticide application. Based on available USDA/NASS Census of Agriculture data, which is published every five years, U.S. pesticide expenditures in 2007 and 2012 totalled 4.2% and 5% of total farm expenditures, respectively (see Table 2.3). Both farm expenditures and pesticide expenditures increased in 2012. Total farm production expenditures include all farm-related expenses. Pesticide expenses include insecticides, herbicides, fungicides, and other pesticides, including costs of custom application.

Table 2.3. Pesticide Farm Expenditures in the United States

Expenditure (Million \$)	2012	2007
Total	\$328,900	\$241,000
Pesticides	\$16,500	\$10,000
Crop	\$14,900	\$8,900
Livestock	\$1,600	\$1,100
Pesticides as % of Total	5%	4.2%

Source: USDA/NASS. 2007 and 2012. Census of Agriculture: United States Summary and State Data, Volume 1, Part 51 (<http://www.agcensus.usda.gov/Publications/2007> and <http://www.agcensus.usda.gov/Publications/2012>).

Note: Pesticide expenses include insecticides, herbicides, fungicides, and other pesticides, including cost of custom application.

3 2008 - 2012 Usage

3.1 World and U.S. Pesticide Usage

World pesticide usage at the producer level totalled nearly 6 billion pounds annually in both 2011 and 2012 (see Figure 3.1 and Table 3.1). Between 2008 and 2012, herbicides accounted for the largest portion of global usage (approximately 50% annually in all years), followed by fumigants, insecticides, and fungicides, respectively.

U.S. pesticide usage totalled over 1.1 billion pounds annually in both 2011 and 2012, with herbicides accounting for nearly 50% of total U.S. pesticide usage in 2011 and nearly 60% of usage in 2012 (see Table 3. 1). On average across all reported years (2008-2012), U.S. pesticide use accounted for approximately 23% of total pounds of pesticides applied, 25% of total pounds of herbicides applied, 43% of total pounds of fumigants applied, 12% of fungicides applied, and 6% of insecticides applied worldwide. Figure 3.1 displays the distribution of pounds of pesticides applied at the producer level by pesticide type in 2012. For a more detailed look at U.S. pesticide usage, see tables 3.2 through 3.7.

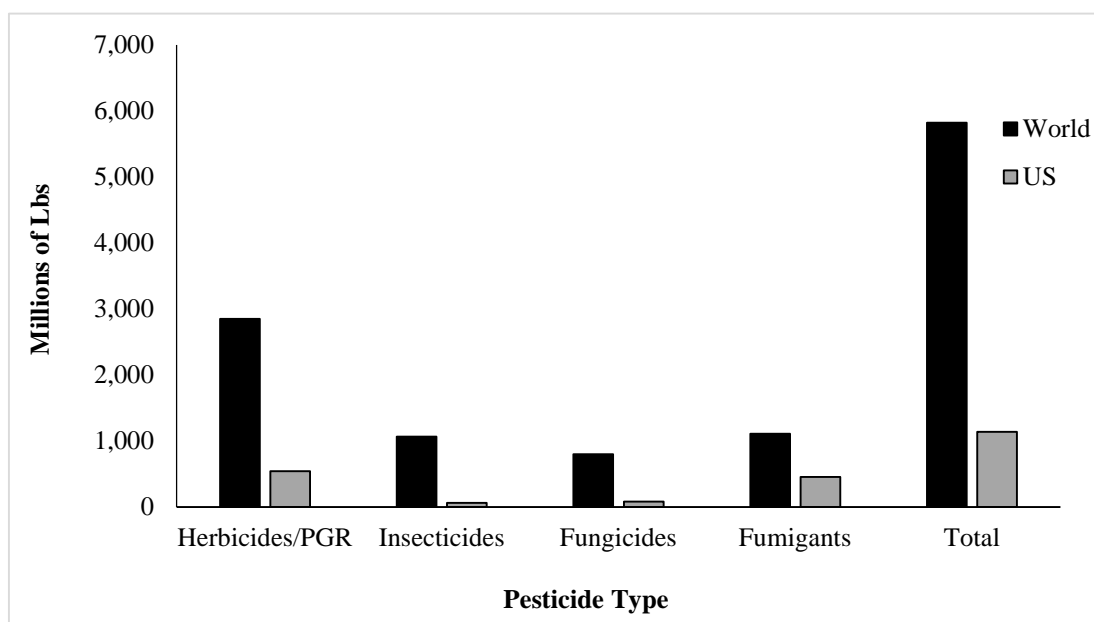


Figure 3.1. World and U.S. Pesticide Amounts of Active Ingredient at Producer Level by Pesticide Type, 2012 Estimates

Source: Phillips McDougall, AgriService, (2008-2012). (<http://phillipsmcdougall.co.uk/agriservice/>).

Table 3.1. World and U.S. Amount of Pesticide Active Ingredient Used at the Producer Level by Pesticide Type 2008 - 2012 Estimates

Year and Pesticide Type	World Market		U.S. Market		U.S. Percentage of World Market
	Mil lbs	%	Mil lbs	%	
2012					
Herbicides/PGR	2,847	49	678	57	24
Insecticides	1,065	18	64	5	6
Fungicides	799	14	105	9	13
Fumigants	1,110	19	435	37	39
Total	5,821		1,182		20
2011					
Herbicides/PGR	2,508	46	609	48	24
Insecticides	1,070	20	62	5	6
Fungicides	735	14	98	8	13
Fumigants	1,100	20	513	40	47
Total	5,414		1,282		24
2010					
Herbicides/PGR	2,120	41	570	46	27
Insecticides	996	19	63	5	6
Fungicides	811	16	90	7	11
Fumigants	1,249	24	526	42	42
Total	5,177		1,249		24
2009					
Herbicides/PGR	2,189	44	560	49	26
Insecticides	1,016	20	70	6	7
Fungicides	784	16	72	6	9
Fumigants	1,019	20	448	39	44
Total	5,008		1,151		23
2008					
Herbicides/PGR	2,083	43	540	48	26
Insecticides	972	20	63	6	6
Fungicides	737	15	80	7	11
Fumigants	1,058	22	452	40	43
Total	4,850		1,135		23

Source: Phillips McDougall, AgriService, (2008-2012). (<http://phillipsmcdougall.co.uk/agriservice/>).

Note: Insecticide and fungicide values include seed treatment uses. Totals may not be exact due to rounding. Table data do not cover wood preservatives, specialty biocides, chlorine/hypochlorites, vertebrate pesticides, or other chemicals used as pesticides (e.g., sulfur and petroleum oil).

3.2 Pesticide Usage in the United States: Conventional

Pesticide usage in the agricultural sector accounted for nearly 90% of the total pesticide usage between 2005 and 2012, with the two non-agricultural sectors (industry/commercial/government and home & garden) cumulatively accounting for the remaining percent of the total use in each year (see Figure 3.2 and Table 3.2). Usage in the agriculture sector also accounted for the majority of the total usage of each pesticide type. On average across all reported years (2008-2012), approximately 90% of herbicides, 85% of fungicides, 60% of insecticides, 100% of sulfur and oil, and approximately 60% of other pesticides applied in the U.S. were applied in the agricultural sector. Within all sectors, the majority of usage in 2012 was from herbicides, which accounted for approximately 62% of pesticides applied in the agricultural sector, 54% of pesticides applied in the professional sector, and 47% of pesticides applied in the home and garden sector. Figure 3.2 displays the distribution of usage by pesticide type and sector in 2012. Table 3.2 shows the breakout of conventional pesticide usage at the user level by pesticide type and market sector. Pesticide usage is reported as pounds applied and does not reflect acres treated.

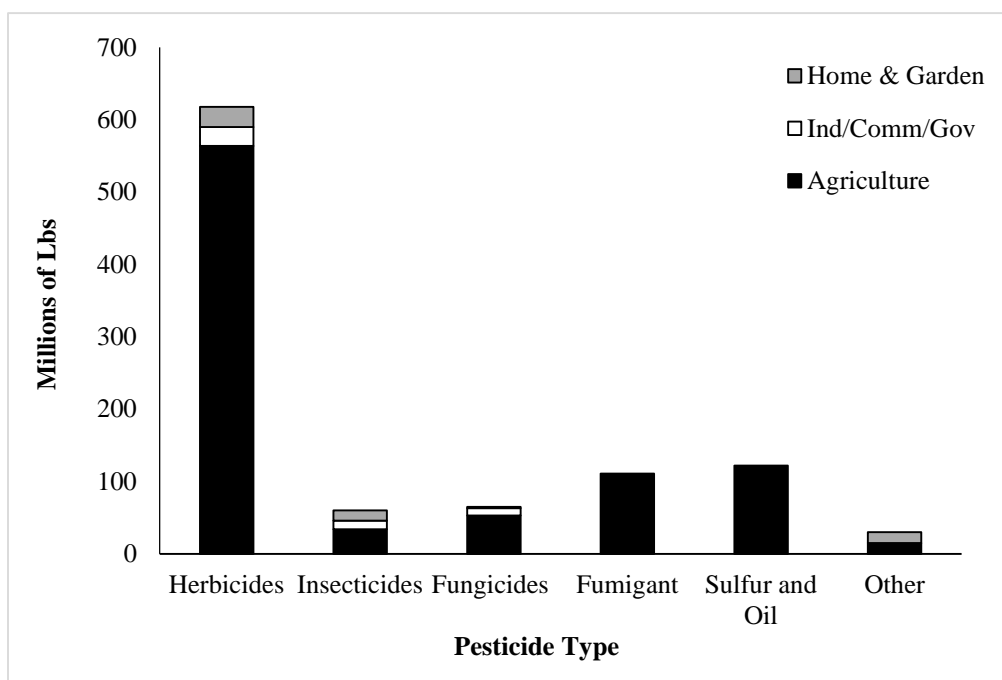


Figure 3.2. Conventional Pesticide Active Ingredient Usage in the United States by Pesticide Type and Market Sector, 2012 Estimates.

Sources: Agricultural Market Research Proprietary Data (2005-2012).
 Non-Agricultural Market Research Proprietary Data (2005-2012)
 USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Table 3.2. Conventional Pesticide Active Ingredient Usage in the United States by Pesticide Type and Market Sector, 2012, 2009, 2007, and 2005 Estimates

Year and Market Sector	Herbicides/ PGR		Insecticides		Fungicides		Fumigant		Sulfur and Oil ¹		Other ²		Total	
	Mil lbs	%	Mil lbs	%	Mil lbs	%	Mil lbs	%	Mil lbs	%	Mil lbs	%	Mil lbs	%
2012														
Agriculture ³	564	91	34	57	53	82	111	100	122	100	15	50	899	89
Ind/Comm/Gov	26	4	12	20	10	15	—	—	—	—	—	—	48	5
Home & Garden	28	5	14	23	2	3	—	—	—	—	15	50	59	6
Total	618		60		65		111		122		30		1,006	
2009														
Agriculture ³	464	90	33	55	46	81	106	100	126	100	15	58	790	89
Ind/Comm/Gov ⁴	23	4	12	19	9	15	—	—	—	—	—	—	43	5
Home & Garden	31	6	15	25	2	4	—	—	—	—	11	42	59	7
Total	518		60		57		106		126		26		892	
2007*														
Agriculture ³	441	90	36	57	47	84	115	100	155	100	20	65	814	89
Ind/Comm/Gov ³	20	4	11	17	7	13	—	—	—	—	—	—	38	4
Home & Garden	31	6	16	25	2	4	—	—	—	—	11	35	60	7
Total	492		63		56		115		155		31		912	
2005*														
Agriculture ³	420	89	36	57	50	83	100	100	185	100	21	68	812	89
Ind/Comm/Gov	19	4	11	17	8	13	—	—	—	—	—	—	38	4
Home & Garden	31	7	16	25	2	3	—	—	—	—	10	32	59	6
Total	470		63		60		100		185		31		909	

Sources: Agricultural Market Research Proprietary Data (2005-2012).
Non-Agricultural Market Research Proprietary Data (2005-2012)

USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Note: Insecticide and fungicide values include seed treatment uses. Totals may not be exact due to rounding.

¹ “Sulfur and Oil” includes sulfur, petroleum distillate, and petroleum oil.

² “Other” includes chemicals used as pesticides which are not primarily produced as pesticides for the agricultural market (e.g., sulfuric acid and phosphoric acid) as well as rodenticides and repellent use in the home and industrial markets. It does not cover specialty biocides or wood preservatives.

³ USDA/NASS data incorporated into agricultural expenditures to account for malathion expenditures in the Boll Weevil Eradication Program (BWEP).

⁴ Due to lack of data, the values presented for 2009 are an average of the 2012 and 2007 values for the Industrial/Commercial/Government category. This value may over or underestimate actual 2009 usage, due to fluctuations in annual usage.

* Updated values for 2007 and 2005 presented for continuity. See Data Reporting Changes.

3.3 Share of U.S. Conventional Pesticide Active Ingredient Usage in the Agricultural and Non-Agricultural Market Sectors

Table 3.3 shows the agricultural and non-agricultural market share of total conventional pesticides consumed in 2012, 2009, 2007, and 2005. The agricultural sector accounts for nearly 90% of the total amount of conventional pesticides used in all years.

Table 3.3. Share of U.S. Conventional Pesticide Active Ingredient Usage in the Agricultural and Non-Agricultural Market Sectors: 2012, 2009, 2007, and 2005 Estimates

Year	U. S.	Agricultural Market Sector		Non-Agricultural Market Sector	
	Mil lbs	Mil lbs	% of U.S.	Mil lbs	% of U.S.
2012	854	762	89	92	11
2009	735	649	88	86	12
2007*	726	639	88	87	12
2005*	693	606	87	87	13

Source: EPA estimates based on Table 3.2.

Note: Table data excludes sulfur and oil, other chemicals used as pesticides (e.g., sulfuric acid and insect repellents), as well as wood preservatives, specialty biocides, and chlorine/hypochlorites.

* Updated values for 2007 and 2005 presented for continuity.

3.4 Most Commonly Used Conventional Pesticide Active Ingredients in the U.S. Agricultural Market Sector

Table 3.4 shows the 25 most commonly used conventional pesticide active ingredients in the agricultural sector in 2012, and their ranking and usage range in selected earlier years. Glyphosate was the most used active ingredient in 2012 (270 million to 290 million pounds used), as it has been since 2001. Twelve of the top 25 active ingredients used in the agricultural sector in 2012 are herbicides; four are fungicides; two are insecticides; five are fumigants; and two are plant growth regulators. These rankings rely on the estimated pounds of conventional pesticides used in the agricultural sector, taken from public and proprietary databases. As noted previously, data only reflect pounds applied and not acres treated. Absence of a pesticide from this list should not be construed as lack of importance in agricultural crop production.

Table 3.4. Most Commonly Used Conventional Pesticide Active Ingredients in the Agricultural Market Sector in 2012, and their Rankings and Usage Rate Range in 2012, 2009, 2007, and 2005 Estimates (Ranked by Range[‡] in Millions of Pounds of Active Ingredient)

Active Ingredient	Type	2012		2009		2007*		2005*	
		Rank	Range	Rank	Range	Rank	Range	Rank	Range
Glyphosate	H	1	270-290	1	209-229	1	170-190	1	147-167
Atrazine	H	2	64-74	2	59-69	2	70-80	2	66-76
Metolachlor-S	H	3	34-44	6	24-34	4	27-37	5	25-35
Dichloropropene	Fum	4	32-42	4	27-37	6	24-34	4	28-38
2,4-D	H	5	30-40	5	24-34	7	22-32	7	21-31
Metam	Fum	6	30-40	3	30-40	3	48-58	3	36-46
Acetochlor	H	7	28-38	7	23-33	5	25-35	6	24-34
Metam Potassium	Fum	8	16-26	8	14-24	13	6-10	—	0-3
Chloropicrin	Fum	9	8-18	9	6-16	9	5-15	10	5-15
Chlorothalonil	F	10	6-16	11	6-10	12	6-10	13	6-10
Pendimethalin	H	11	6-16	10	6-16	10	6-10	9	5-15
Ethephon	PGR	12	7-11	12	6-10	11	6-10	11	7-11
Mancozeb	F	13	5-9	16	3-7	19	3-7	16	5-9
Chlorpyrifos	I	14	4-8	13	5-9	14	6-10	15	5-9
Metolachlor	H	15	4-8	22	1-5	—	0-4	—	0-3
Hydrated Lime	F	16	3-7	15	4-8	20	2-6	—	1-5
Propanil	H	17	3-7	17	3-7	18	3-7	18	3-7
Dicamba	H	18	3-7	25	1-5	—	1-5	22	1-5
Trifluralin	H	19	3-7	18	3-7	17	4-8	14	6-10
Decan-1-ol	PGR	20	3-7	—	1-5	—	1-5	—	0-4
Copper Hydroxide	F	21	3-7	20	2-6	15	5-9	12	7-11
Acephate	I	22	2-6	—	1-5	22	1-5	23	1-5
Paraquat	H	23	2-6	—	1-5	25	1-5	24	1-5
Methyl Bromide	Fum	24	2-6	14	5-9	8	8-18	8	9-19
Glufosinate	H	25	2-6	—	1-5	—	1-5	—	0-4

Sources: Agricultural Market Research Proprietary Data, (2007, 2009, and 2012).
 USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Note: This list is limited to conventional pesticides, and does not include sulfur, petroleum oil, and other chemicals used as pesticides (e.g., sulfuric acid and insect repellents), wood preservatives, specialty biocides, or chlorine/hypochlorites. H indicates herbicide; I, insecticide; Fum, fumigant; F, fungicide; and PGR, plant growth regulator. A dash (—) indicates that the pesticide was not one of the 25 most commonly used (pesticides) in the given year.

[‡] Values presented as a range to retain the proprietary nature of the data. Ranking based on actual values.

* Updated values for 2007 and 2005 presented for continuity.

3.5 Most Commonly Used Conventional Pesticide Active Ingredients in the U.S. Non-Agricultural Market Sector

Tables 3.5 and 3.6 show the 10 most commonly used conventional pesticide active ingredients in the two non-agricultural sectors (home & garden and industry/commercial/government) for 2012, and their rank and usage range in 2009. In 2012, six of the top 10 active ingredients used in the home and garden sector are herbicides, and four are insecticides. Five of the top 10 active ingredients used in the industry/commercial/government sector in 2012 are herbicides, one is a fungicide, and four are insecticides. Because some applicators apply pesticides in both markets, there may be some usage reported in one market that may have occurred in the other. The rankings are based on non-agricultural market research proprietary data and present the best available data.

Table 3.5. Most Commonly Used Conventional Pesticide Active Ingredients in the Home and Garden Market Sector in 2012, and their Rankings and Usage Rate Range in 2012, and 2009 Estimates (Ranked by Range[‡] in Millions of Pounds of Active Ingredient)

Active Ingredient	Type	2012		2009	
		Rank	Range	Rank	Range
2,4-D	H	1	7-9	1	8-11
Glyphosate	H	2	4-6	2	5-8
*MCP	H	3	2-4	4	4-6
Pendimethalin	H	4	2-4	5	3-5
Carbaryl	I	5	2-4	3	4-6
Acephate	I	6	1-3	10	<1
Permethrin and other pyrethroids	I	7	1-3	6	2-4
Dicamba	H	8	1-3	7	1-3
*MCPA	H	9	1-3	—	—
Malathion	I	10	1-3	6	2-4

Sources: Non-Agricultural Market Research Proprietary Data, (2012 and 2009).
USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Note: H indicates herbicide, and I indicates insecticide. A dash (—) indicates that an estimate is not available.

*MCP - Methylchlorophenoxypropionic acid

*MCPA - 2-methyl-4-chlorophenoxyacetic acid

[‡] Values presented as a range to retain the proprietary nature of the data. Ranking based on actual values.

Table 3.6. Most Commonly Used Conventional Pesticide Active Ingredients in the Industry/ Commercial/ Government Market Sector in 2012 and their Rankings and Usage Rate Range in 2012, and 2009 Estimates (Ranked by Range[‡] in Millions of Pounds of Active Ingredient)

Active Ingredient	Type	2012		2009	
		Rank	Range	Rank	Range
Glyphosate	H	1	7-9	1	4-6
Chlorothalonil	F	2	5-7	3	2-4
2,4-D	H	3	4-6	2	3-5
Pendimethalin	H	4	2-4	4	1-3
Prodiamine	H	5	0-2	12	0-2
Sulfuryl fluoride	I	6	0-2	7	1-3
Acephate	I	7	0-2	13	0-2
Simazine	H	8	0-2	24	0-2
*Bti	I	9	0-2	43	0-2
Bifenthrin	I	10	0-2	34	0-2

Source: EPA estimates based on Non-Agricultural Market Research Proprietary Data (2012 and 2009).

Note: H indicates herbicide, I indicates insecticide, and F indicates fungicide.

* *Bacillus thuringiensis serotype israelensis*

[‡] *Values presented as a range to retain the proprietary nature of the data. Ranking based on actual values.*

3.6 Organophosphate Insecticides Usage in the United States

Since the passage of the Food Quality Protection Act (FQPA) in 1996, this class of conventional pesticides has been a primary focus of EPA reregistration and registration review activities. Table 3.7 compares usage of all active ingredients from 2000 to 2012 with all organophosphate (OP) insecticide usage over the same time period. This time period is displayed to provide a broad view of the decreasing trend in OP usage due in part to EPA action. OP insecticides with the most usage include acephate, chlorpyrifos, malathion, naled, phorate, dicofol, phosmet, dimethoate, terbufos, ethion, and tetrachlorvinphos (see Table 3.8). For more information on the active ingredients included in this pesticide class and their registration status, refer to U.S. EPA's Office of Pesticide Programs Special Docket EPA-HQ-OPP-2007-0151 at www.regulations.gov.

The estimates of organophosphate insecticide usage rely on public and proprietary databases. The amount of OP insecticides used in the U.S. has declined more than 70% since 2000, from an estimated 70 million pounds to 20 million pounds in 2012 (see Table 3.8 and Figure 3.3). OP usage as a percentage of total insecticide use has decreased from 71% in 2000 to 33% in 2012. The decrease in OP usage reflects a shift in usage to other classes of pesticides (i.e., pyrethroids, neonicotinoids, and other new chemistries) because of the phasing out and use restrictions placed on OP insecticides as a result of pesticide registration review. The decrease also reflects reduced malathion usage due to the gradual completion of the Boll Weevil Eradication Program (BWEP).

Table 3.7. Organophosphate Insecticide Active Ingredients Usage in the United States All Market Sectors, 2000–2012 Estimates

Year	All Insecticides ¹	Organophosphate Insecticides	
	Mil lbs	Mil lbs	% of All Insecticides
2000	99	70	71
2001	102	54	53
2002	90	47	52
2003	84	41	48
2004	77	40	52
2005	69	33	48
2006	66	30	46
2007	64	27	42
2008	65	28	43
2009	60	23	38
2010	56	21	38
2011	56	22	39
2012	60	20	33

Source: Agricultural Market Research Proprietary Data (2000-2012).
 Non-Agricultural Market Research Proprietary Data (2000-2012)
 USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

¹ Table data only includes conventional insecticides.

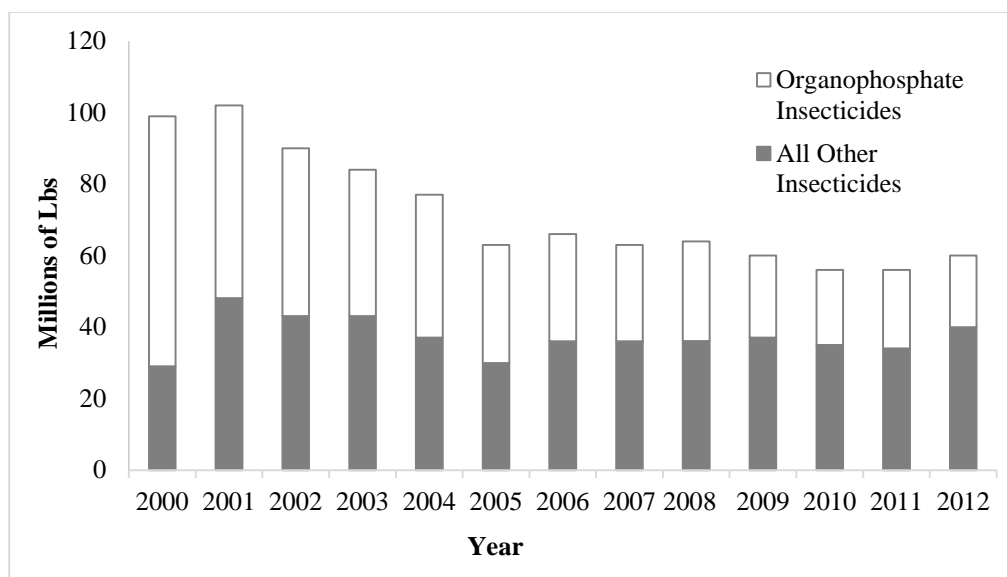


Figure 3.3. Total Amount of Organophosphate and All Other Insecticide Active Ingredients Usage in the United States in All Market Sectors, 2000–2012

Source: Agricultural Market Research Proprietary Data (2000-2012).
 Non-Agricultural Market Research Proprietary Data (2000-2012)
 USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Table 3.8. Most Commonly Used Organophosphate Insecticide Active Ingredients, All Market Sectors, 2005, 2007, 2009, and 2012 Estimates (Ranked by Range in Millions of Pounds of Active Ingredient)

Active Ingredient	2012		2009		2007*		2005*	
	Rank	Range	Rank	Range	Rank	Range	Rank	Range
Chlorpyrifos	1	5-8	1	6-9	1	6-9	2	6-9
Acephate	2	5-8	2	3-6	3	3-6	3	3-5
Malathion	3	1-4	3	2-5	2	5-7	1	10-13
Naled	4	1-2	4	1-2	4	1-2	5	1-2
Phorate	5	1-2	6	<1	7	1-2	6	1-2
Dicrathos	6	1-2	7	<1	5	1-2	7	1-2
Dimethoate	7	<1	8	<1	9	<1	9	<1
Terbufos	8	<1	9	<1	8	<1	—	—
Phosmet	9	<1	5	<1	6	1-2	4	1-3
Ethoprophos	10	<1	—	—	—	—	—	—

Source: Agricultural Market Research Proprietary Data (2005-2012).
 Non-Agricultural Market Research Proprietary Data (2005-2012)
 USDA/NASS Quick Stats (http://www.nass.usda.gov/Quick_Stats/)

Note: A dash (—) indicates that the organophosphate pesticide was not one of the 10 most commonly used in the given year.

* Updated values for 2007 and 2005 presented for continuity.

3.7 Pesticide Usage in the United States: Specialty Biocides and Wood Preservatives

Table 3.9 shows the total amount of specialty biocides and wood preservatives by end-use market in the United States in 2012. Specialty biocides include water treatment chemicals (recreational and industrial), disinfectants and sanitizers, waterborne wood preservatives, and products for other uses such as use in adhesives, sealants, and leather. Water treatment chemicals accounted for most specialty biocide usage in 2012, approximately 50%, followed by waterborne wood preservatives, which account for approximately 35% of the total amount of specialty biocides usage.

Table 3.9. Specialty Biocides Used in the United States by End-Use Market, 2012 Estimates

Year and End Use Market	Total	
	Mil lbs	%
2012		
Recreational and Industrial Water Treatment ¹	285	47
Disinfectants and Sanitizers ²	45	7
Other Specialty Biocides ³	60	10
Waterborne Wood Preservatives	212	35
Total	602	100

Source: Kline & Company, Specialty Biocides, 2012

Note: Totals may not be exact due to rounding.

- ¹ “Recreational and Industrial Water Treatment” does not include hypochlorite or chlorine use.
- ² “Disinfectants and Sanitizers” includes industrial/institutional applications and household cleaning products, and does not include hypochlorite or chlorine use.
- ³ “Other Specialty Biocides” includes biocides for adhesives and sealants, leather, synthetic latex polymers, metalworking fluids, paints and coatings, petroleum products, plastics, mineral slurries, textiles, and antifoulants.

4 Producers and Users

4.1 Pesticide Producers and Users in 2012

Table 4.1 lists 2012 estimates of the number of firms that are designated as pesticide producers, formulators, distributors, and establishments. Table 4.2 lists 2012 estimates of the number of exterminating and pest control firms and certified pesticide applicators. Table 4.3 lists 2012 estimates of farm land, acres harvested, and the number of farms using pesticides and fertilizers. Table 4.4 lists 2011 estimates of the number of households using pesticides.

Table 4.1. Number of U.S. Pesticide Producers, Formulators, and Distributors

Major Pesticide Producers	12
Other Pesticide Producers	100
Major Pesticide Formulators	120–150
Other Pesticide Formulators	1,550
Distributors	24,686
Establishments	42,160

Source: EPA Estimates

Note: Entities may operate as both a producer and a formulator. This may result in the number of entities being overestimated.

Table 4.2. Number of Exterminating and Pest Control Firms and Number of Certified Applicators

Exterminating and Pest Control Firms	23,413
Private ¹ Certified Applicators	474,525
Commercial ² Certified Applicators	425,086
Certified Applicators that Work for Federal Agencies	4,007

Sources: Kline & Company, Global Professional Pest Management Markets for Pesticides, 2012
Washington State University, Certification Plan and Reporting Database (CPARD), 2012
USDA, Office of Pest Management Policy (OPMP), Personal Communication, 2016

¹ Private certified applicators refer primarily to farmers or other persons producing an agricultural commodity and using restricted-use pesticides (RUPs).

² Commercial certified applicators refer to professional pesticide applicators.

Table 4.3. Land in Farms, Land Harvested, Number of Farms, and Farms Using Pesticides

Land in Farms (acres)	915 million
Land in Production (acres)	390 million
Land Harvested (acres)	315 million
Total Number of Farms	2.109 million
Total Number of Farms with Cropland	1.552 million
Total Number of Farms with Harvested Cropland	1.289 million
Number of Farms Using Chemicals for:	
Insects on Crops/Hay	361,286
Nematodes	58,865
Diseases on Crops/Orchards	121,682
Weed/Grass/Brush	794,320
Defoliation/Fruit Thinning	53,200
Any or all of the above	999,806
Any or all of the above plus fertilizer	1,187,446

Source: USDA/NASS. 2012. Census of Agriculture: United States Summary and State Data, Volume 1, Part 51 (<http://www.agcensus.usda.gov/Publications/2012>).

Table 4.4. Number of U.S. Households Using Pesticides by Pesticide Type

Pesticide Type	Households
Insecticides	82 million
Fungicides	16 million
Herbicides	52 million
Repellents	57 million
Disinfectants	66 million
Any Pesticides	88 million

Sources: EPA estimates based on the 2012 Kline & Company study and 2010 U.S. Census Bureau population estimate

5 Glossary

ACTIVE INGREDIENT (a.i.): The chemical or substance component of a pesticide product intended to kill, repel, attract, mitigate, or control a pest, or that acts as a plant growth regulator, desiccant, or nitrogen stabilizer. The remainder of a formulated pesticide product consists of one or more “inert ingredients” (*e.g.*, water, solvents, emulsifiers, surfactants, clay, and propellants), which are there for reasons other than pesticidal activity.

AGRICULTURAL SECTOR (OR MARKET): Pesticides applied by owner/operators and custom/commercial applicators to farms and facilities involved in the production of raw agricultural commodities, principally food, fiber, and tobacco; includes non-crop and post-harvest use as well as crop and field applications.

CERTIFIED APPLICATOR: A person who is authorized to apply “restricted-use” pesticides as a result of meeting requirements for certification under FIFRA-mandated programs. Applicator certification programs are conducted by states, territories, and tribes in accordance with national standards set by EPA. “Restricted-use pesticides” may be used only by or under the direct supervision of specially trained and certified applicators.

COMMERCIAL APPLICATOR: A person applying pesticides as part of a business, applying pesticides for hire, or applying pesticides as part of his or her job with another (not for hire) type of business, organization, or agency. Commercial applicators often are certified, but need to be so only if they apply restricted-use pesticides.

CONVENTIONAL PESTICIDES: Conventional pesticides are all active ingredients other than biological pesticides and antimicrobial pesticides. Conventional active ingredients are generally produced synthetically, *i.e.*, are synthetic chemicals that prevent, mitigate, destroy, or repel any pest; or that act as a plant growth regulator, desiccant, defoliant or nitrogen stabilizer.

ECONOMIC SECTORS (OR MARKETS): In this report, estimates of quantities used and user expenditures for pesticides are broken out separately for the three general economic user sectors (or markets) as follows: agriculture, industrial/commercial/governmental, and home and garden. These three sectors/markets are defined elsewhere in this glossary.

ESTABLISHMENT: The term “establishment” means any place where a pesticide or device or active ingredient used in producing a pesticide is produced, or held, for distribution or sale.

FDA: The U.S. Food and Drug Administration, a branch of the U.S. Department of Health and Human Services, is involved in regulation of pesticides in the United States, particularly in the enforcement of tolerances in food and feed products.

FFDCA: Federal Food, Drug, and Cosmetic Act, the law that controls pesticide residues in food and feed.

FIFRA: Federal Insecticide, Fungicide, and Rodenticide Act, the law that generally controls pesticide sale and use.

FQPA: The Food Quality Protection Act (FQPA) of 1996 amended the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA).

HOME AND GARDEN SECTOR (OR MARKET): Involves pesticides applied by homeowners to homes and gardens, including lawns and single- and multiple-unit housing. Does not include pesticides for home and garden applications by professional applicators.

INDUSTRIAL/COMMERCIAL/GOVERNMENTAL USER SECTOR (OR MARKET): Involves pesticides applied by professional applicators (by owners/operators/employees and custom/commercial applicators) to industrial, commercial, and governmental facilities, buildings, sites, and land, plus custom/commercial applications to homes and gardens, including lawns. May also be referred to as the “professional market” for pesticides.

NON-AGRICULTURAL SECTORS: General term referring to a combination of the home and garden and industrial/commercial/governmental sectors.

OTHER PESTICIDES: Chemicals registered as pesticides but that are produced and marketed mostly for other purposes (*i.e.*, multi-use chemicals). Notable examples are rodenticides, repellents, sulfur, petroleum products (*e.g.*, kerosene, oils, and distillates), salt, and sulfuric acid.

PESTICIDE: May be used to refer to an active ingredient (as defined above) or formulated pesticide product registered under FIFRA.

PESTICIDE USAGE: Refers to actual applications of pesticides, generally in terms of quantity applied or units treated.

PRIVATE APPLICATOR: A category of applicator certification for farmers and/or employees, such that they can legally apply restricted-use pesticides or supervise others doing so who are not certified.

PRODUCER LEVEL: Data covering companies that manufacture and formulate pesticides.

PROFESSIONAL MARKET: Sales of pesticides for application to industrial/commercial/governmental sector and to homes and gardens, by certified/commercial applicators.

PROPRIETARY DATA, AGRICULTURAL AND NON-AGRICULTURAL: Pesticide industry marketing research data that EPA purchases from private data research companies. These data are for EPA use only and cannot be divulged without vendor consent.

SPECIALTY BIOCIDES: Specialty biocides include biocides used for water treatment chemicals (recreational and industrial), disinfectants and sanitizers, waterborne wood preservatives, and products for other uses such as use in adhesives, sealants, and leather.

TOLERANCE: The maximum amount of a pesticide allowable in a food or feed product before it is considered adulterated, usually specified in parts per million.

USDA/NASS: The U.S. Department of Agriculture, National Agricultural Statistics Service. Publicly available data on U.S. agricultural pesticide use (www.nass.usda.gov).

USER LEVEL: Data covering persons or businesses that purchase and apply pesticides, such as farmers, commercial pesticide applicators, and homeowners.

WOOD PRESERVATIVES: Pesticide active ingredients intended to prevent wood degradation problems due to insects, fungal rot, or other pests.

6 References

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