Conversion factors and abbreviations for units of measurement used in tables 1 and 3

Length
1 foot (ft) = 0.3048 meter (m)
Area
1 acre = 0.4047 hectare (ha)
1 acre = 4,047 square meter (m2)
1 acre = 0.004047 square kilometer (km2)
1 hectare (ha) = 2.471044 acres
Volume
1 gallon (gal) = 3.785 liters (L)
Mass
1 pound (avoirdupois) = 0.45359 kilogram (kg)
1 kilogram (kg) = 0.001102311 short ton (2,000 lb)
1 megagram (Mg) = 1.102 short ton (2,000 lb)
1 megagram (Mg) = 0.9842 long ton (2,240 lb)
1 gallon (gal) = 3.785 liters (L)
Crop-specific units of mass
25.401 kilogram (kg) corn grain = 1 bushel corn grain
27.216 kilogram (kg) soybean = 1 bushel soybean
27.216 kilogram (kg) wheat = 1 bushel wheat
14.515 kilogram (kg) oats = 1 bushel oats

Table 1. Temporal changes in labor hours, acres planted, and farm equipment used in the production of corn, cotton, and wheat in the United States, 1850–1987.

[ft, foot; —, no data available. Data from Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm]

Year	Yield	Labor hours per 100 bushels (100 pounds for cotton)	Power source	Soil preparation for tillage
Corn	Bushels/acre			
1850	40	83	Human	Walking plow
1890	40	38	Horse	Two-bottom gang plow
1930	40	18	Horse	Two-bottom gang plow, 7-ft tandem disk
1945	50	11	Tractor	Three-bottom plow, 10-ft tandem disk
1975	89	3	Tractor, truck	Five-bottom plow, 20-ft tandem disk
1987	89	3	Tractor, truck	Five-bottom plow, 25-ft tandem disk
Lint cotton	Pounds/acre			
1945	250	42	Two mules	One-row plow
1965	500	5	Tractor	Fourteen-ft disk
1975	500	2.5	Tractor	Twenty-ft disk
1987	500	1.75	Tractor	Twenty-ft disk
Wheat	Bushels/acre			
1831	20	275	Human	Walking plow
1890	20	45	Horse/wagon	Gang plow
1930	20	18	Tractor/truck	Three-bottom gang plow, 10-ft tandem disk harrow
1955	25	9	Tractor/truck	Ten-ft plow
1965	30	5	Tractor/truck	Twelve-ft plow
1975	33	4	Tractor/truck	Thirty-ft sweep disk
1987	33	3	Tractor/truck	Thirty-five-ft sweep disk

Table 1. Temporal changes in labor hours, acres planted, and farm equipment used in the production of corn, cotton, and wheat in the United States, 1850–1987.

Soil bed preparation for weed control	Planting method	Harvesting method
Harrow	Hand broadcast	Hoe, sickle.
Disk and peg-tooth harrow	Two-row planter	Corn knives, early corn binders.
Four-section harrow, two-row cultivator	Two-row planter	Two-row pickers.
Four-section harrow, four-row cultivator	Four-row planters	—
Twenty-ft herbicide applicator	Planter	Twelve-ft self-propelled combine.
Twenty-five-ft herbicide applicator	Planter	Fifteen-ft self-propelled combine.
One-row cultivator, hand how	Hand planting	Hand pick.
Four-row bedder, cultivator	Planter	Two-row stalk cutter.
Four-row bedder, F-row cultivator with herbicide applicator	Four-row planter	Two-row harvester, two-row stalk cutter.
Six-row bedder, six-row cultivator with herbicide applicator	Six-row planter	Four-row harvester, four-row stalk cutter.
Brush harrow	Hand broadcast	Sickle, flail.
Harrow	Seeder	Binder, thresher.
—	—	Twelve-ft combine.
Twelve-ft role weeder, harrow	Fourteen-ft drill	Self-propelled combine.
—	Fourteen-ft drill	Fourteen-ft self-propelled combine.
—	Twenty-seven-ft drill	Twenty-two ft self-propelled combine.
—	Thirty-ft drill	Thirty-five-ft self-propelled combine.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

[Abbreviations: CAFO, confined animal feeding operation; CCC, Commodity Credit Corporation; CWA, Clean Water Act; DDT, Dichlorodiphenyltrichloroethane; EPA, U.S. Environmental Protection Agency; FDA, Food and Drug Administration; ; GM, genetically modified; TMDL, total maximum daily load; USDA, U.S. Department of Agriculture. Lack of information is indicated by blank table cells]

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1500	Corn, cotton, potatoes, and tobacco are domesticated by Native Americans in South and North America.				Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
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Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
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Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
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1596					
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1599					
1600	Early 1600s European colonists learn agricultural practices from American Indians.				Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1601					

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1602					
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Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
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Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1676					
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1687					
1688					
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1692					
1693				The first U.S. newspaper is printed in Boston, Mass.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1694					
1695					
1696					
1697					
1698					
1699					
1700	The national landscape undergoes large-scale deforestation and wetland drainage (1700s to early 1900s).				*Meyer, W.B., 1995, Past and present land use and land cover in the USA: U.S. Global Change Research Information Office, Consequences—the nature and implications of environmental change: accessed May 9, 2011, from http://www.gcrio.org/CONSEQUENCES/spring95.*
1701	Tobacco is the main export; commercial agriculture develops.				Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1702					

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1703					
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1709					
1710					
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1718		Spanish missionaries begin constructing irrigation ditches (acequias).			Nichols, D., 2007, The acequias of San Antonio and the beginnings of a modern water system: American Society of Civil Engineers, doi:10.1061/40928(251)8.
1719					
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Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1738					
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1752		The invention of the lightning rod results from electrical experiments conducted by Benjamin Franklin.			*Bellis, M., 2011, The inventions and scientific achievements of Benjamin Franklin: About.com, Inventors, accessed August 9, 2011, from http://inventors.about.com/od/fstartinventors/ss*
1753					
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1764					
1765	Soybeans are introduced into the American colonies, but are called "Chinese vetches."				*Gibson, L., and Benson, G., 2005, Origin, history and uses of soybean (Glycine max): Iowa State University Department of Agronomy, accessed May 5, 2011, from http://www.agron.iastate.edu/courses/agron212/Readings/Soy_history.htm.*
1766					

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1767					
1768					
1769					
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1772					
1773					
1774					
1775					
1776		The cradle, a scythelike tool for reaping grain, is adopted.			Drache, H. M., 1996, Legacy of the land: agriculture's story to the present: Danville, Ill., Interstate Publishers, p. 50.
1777					
1778					
1779					
1780					
1781					
1782					
1783					
1784					
1785					
1786					
1787					
1788					
1789				The Tariff Act of 1789 is passed, primarily to generate revenue and to provide some protection for industry.	*Tariff table—federal government, major tariff and trade legislation., 2011: U-S-history.com: accessed August 9, 2011, from http://www.u-s-history.com/pages/h963.html.*
1790				The first U.S. patent statute becomes law.	*History of the United States Patent Office., n.d.: accessed February 15, 2011, at http://www.myoutbox.net/popch00.htm.*
1790	Agricultural reformers experiment with crop rotation, manure, new crops, and improved livestock.				Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1791				The "Old Farmer's Almanac" and other almanacs, such as "Poor Richard's Almanac," provide rural farmers with information on tillage and other farm implements.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1792					
1793		The cotton gin is invented by Eli Whitney.			Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1793		A canal is built around falls in the Connecticut River to improve transportation of goods.			Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1794					
1795					
1796					
1797		The first patent for an iron plow is received by Charles Newbold.			Bellis, M., 2011, History of the plow—inventing the plow and the moldboard: About.com, Inventors, About.com, accessed January 17, 2011, from http://inventors.about.com/od/pstartinventions/a/plow.htm.
1798					
1799	Agriculture expands across the Appalachians and along the Gulf Coast (late 1700s).				Hurt, D.R., 1994, American agriculture: a brief history: Ames, Iowa State University Press, p. 48.
1800	Cotton becomes a main export in commercial agriculture.				Conkin, P.K., 2008, A revolution down on the farm—the transformation of American Agriculture since 1929: Lexington, The University Press of Kentucky.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1801			Early insecticides are used, including lime, tobacco, sulfur, copper, potash, soap, and soda.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1802					
1803				Louisiana Purchase.	*Kelly, M., n.d., Jefferson and the Louisiana Purchase: American History, About.com, accessed August 9, 2011, from http://americanhistory.about.com/od/thomasjefferson/a/tj_lapurchase.htm.*
1804			Industrialists realize the potential of guano as a fertilizer.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1805					
1806					
1807					
1808					
1809					
1810				The first American Farm Journal, the "Agricultural Museum," is published.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1810			Tillage is shown to benefit crops and soil.		*Gebhardt, M.R., Daniel, T.C., Schweizer, E.E., and Allmaras, R.R., 1985, Conservation tillage: New York, Science, v. 230(4726), p. 625–630, accessed from http://www.ncbi.nlm.nih.gov/pubmed/17797277.*
1811					
1812				War of 1812 with Britain.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1813					
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Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1818					
1819				The "American Farmer" and "Plough Boy" farm journals are published.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1819	United States ambassadors and military officers stationed around the world request to gather seed to take home, a precursor to the free seed program.				*Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press, accessed February 15, 2011, from http://deltafarmpress.com/us-seed-law-history-primer.*
1819		An iron plow with interchangeable parts is patented by Jethro Wood.			*Economic Research Service, 2000, A history of American agriculture, growing a Nation—the story of American agriculture: Economic Research Service: accessed May 5, 2011, from http://www.agclassroom.org/gan/timeline/index.htm.*
1820				The U.S. food canning industry is established (1819–25).	*Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm.*
1820					
1821					
1822			Organophosphate is synthesized.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1823					
1824					
1825		The header, a crop harvester, is invented.			Drache, H. M., 1996, Legacy of the land: agriculture's story to the present: Danville, Ill., Interstate Publishers, p. 108.
1826					

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1827					
1828					
1829					
1830		The first steam engine locomotive in the U.S. is designed and built by Peter Cooper in New York.			*America's first steam locomotive, 1830, 2005: accessed May 9, 2011, from http://www.eyewitnesstohistory.com/tomthumb.htm.*
1830				Passage of the Indian Removal Act authorizes the president to grant unsettled lands west of the Mississippi in exchange for American Indian lands within existing State borders.	*Library of Congress, 2010, Primary documents in American history—Indian Removal Act: The Library of Congress, accessed August 9, 2011, from http://www.loc.gov/rr/program/bib/ourdocs/Indian.html.*
1831				The rural farm journal "The American Agriculturalist" is published.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1832					
1833					
1834		The mechanical reaper is invented by Cyrus McCormick.			Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1835					
1836					
1837		The world's first self-polishing cast steel plow, "the grasshopper plow," made for breaking thick prairie ground, is patented by John Deere.			Bellis, M., 2011, History of the plow—inventing the plow and the moldboard: About.com, Inventors, About.com, accessed January 17, 2011, from http://inventors.about.com/od/pstartinventions/a/plow.htm.
1837					
1838					

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1839	The Commissioner of Patents secures funding to collect and distribute agricultural seed and statistics, which leads to free seed distribution through the U.S. Postal Service.				*Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press, accessed February 15, 2011, from http://deltafarmpress.com/us-seed-law-history-primer.*
1839		Agricultural tile drains are introduced by John Johnston in New York.			*Geneva Historical Society, 2012, John Johnston: "the father of tile drainage in the United States": Geneva, N.Y,. Geneva Historical Society, accessed May 9, 2011, from http://www.genevahistoricalsociety.com/Johnston.htm.*
1840		The growing use of factory made agricultural machinery increases farmers' need for cash and encourages commercial farming (1840s).			Bellis, M., 2011, History of the plow—inventing the plow and the moldboard: About.com, Inventors, About.com, accessed January 17, 2011, from http://inventors.about.com/od/pstartinventions/a/plow.htm.
1840				The first U.S. Agricultural Census is conducted.	*U.S. Census Bureau., 2011, Census of agriculture. U.S. Census Bureau History: U. S. Census Bureau: accessed September 27, 2011, from http://www.census.gov/history/www/programs/agriculture/census_of_agriculture.html.*
1840		Irrigation potential is realized in the Western States.			Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1841					
1842					
1843					
1844			First shipments of guano to the U.S.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1845			First shipments of sodium nitrate (fertilizer) to the U.S.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1845					
1846				The United States gains Oregon territory from Great Britain.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1847			Sulfuric acid is promoted as a fertilizer.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1847		Irrigation in Utah begins.			*Economic Research Service, 1984, History of agricultural price-support and adjustment programs, 1933–84: Bulletin Number 485, p. 47, accessed from http://www.ers.usda.gov/Publications/aib485/aib485fm.pdf.*
1848				The United States gains New Mexico and California from Mexico.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1849					
1850		One hundred patents for corn planters are introduced.			Drache, H. M., 1996, Legacy of the land: agriculture's story to the present. Danville, Ill., Interstate Publishers, p. 114.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1850	By the mid-1850s, potatoes in Idaho and fruits and vegetables in Oregon mark the development of successful agriculture in the Northwest.				Hurt, D. R., 1994, American agriculture: a brief history: Iowa State University Press, p. 184.
1850	Agriculture expands westward as Eastern farm soils become exhausted in the 1850s and later.				Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1851			Crop fertilization with guano increases.		Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1852					
1853		The introduction of mechanization for tilling, planting, reaping, and threshing continues.			Drache, H. M., 1996, Legacy of the land: agriculture's story to the present: Danville, Ill., Interstate Publishers, p. 115.
1854	Seeds are obtained through saving, neighbor exchange, a small number of suppliers, and the U.S. government.				Dillon, M., 2005, "And we have the seeds," Monsanto purchases world's largest vegetable seed company: Organic Seed Alliance, accessed February 15, 2011, from *http://www.seedalliance.org/index.php?page=SeminisMonsanto.*
1854		The self-governing windmill is perfected.			Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm.*

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1855		Over 10,000 steel plows per year are sold by the John Deere company.			Bellis, M., 2010, John Deere (1804–1886): About.com, Inventors, accessed June 9, 2010, from *http://inventors.about.com/library/inventors/bldeere.htm.*
1855	The U.S. Patent Office ships out over 1 million seed packages.				Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press, accessed February 15, 2011, from *http://deltafarmpress.com/us-seed-law-*
1856		The two-horse, straddle-row cultivator is patented.			Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm*
1857					
1858					
1859					
1860			The market grows for factories producing manure, bone, and lime for agricultural supplements.		Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1861				The Civil War begins.	Freeman, J., 2011, Timeline of the Civil War, 1861: Library of Congress, accessed August 8, 2011, from *http://memory.loc.gov/ammem/cwphtml/tl1861.html.*
1862		The change from hand power to horses characterizes the first American agricultural revolution			Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm.*

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1862				Passage of the Homestead Act provides 160 acres of land to each homesteader.	Follett, R.F., 2009, US agriculture's relationship to soil carbon: Journal of Soil and Water Conservation, v. 64, no. 6, p. 159A–165A: accessed from *http://www.jswconline.org/cgi/doi/10.2489/jswc.64.6.159A.*
1862				The U.S. Department of Agriculture (USDA) is formed, and the Morrill Act, which establishes land for agricultural colleges, is passed.	Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1863					
1864					
1865		Gang plows and sulky plows come into use (1865–75).			Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm.*
1865				USDA Secretary Isaac Newton urges Congress to enact legislation providing for the quarantine of imported animals.	Food Safety and Inspection Service, 2007, About FSIS: Food Safety and Inspection Service, accessed August 8, 2011, from *http://www.fsis.usda.gov/About_FSIS/Agency_History/index.asp.*
1866					
1867			An arsenic-based pesticide (Paris green) is used to successfully control outbreaks of the Colorado potato beetle.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1867			The first phosphate deposits are mined, in South Carolina.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1868		Steam tractors are field tested.			Bellis, M., 2011, History of the plow—inventing the plow and the moldboard: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/od/pstartinventions/a/plow.htm* .
1869		The spring-tooth harrow for seedbed preparation appears.			Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm.*
1869		The Transcontinental Railroad is completed.			Follett, R.F., 2009, US agriculture's relationship to soil carbon: Journal of Soil and Water Conservation, v. 64, no. 6, 159A–165A: accessed from *http://www.jswconline.org/cgi/doi/10.2489/jswc.64.6.159A*
1870		Silos come into use (1870s).			Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm.*
1870	The cattle industry expands into the West.				Food Safety and Inspection Service, 2011, Beef . . . from farm to table: Food Safety and Inspection Service, Meat Preparation Fact Sheet, accessed August 7, 2011, from http://www.fsis.usda.gov/Factsheets/Beef_from_Farm_to_Table/index.asp.
1870		Refrigerated rail transportation becomes important to the beef industry.			Food Safety and Inspection Service, 2011, Beef . . . from farm to table: Food Safety and Inspection Service, Meat Preparation Fact Sheet, accessed August 7, 2011, from *http://www.fsis.usda.gov/Factsheets/Beef_from_Farm_to_Table/index.asp.*
1870					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1871					
1872					
1873	Economic depression causes widespread farm bankruptcy.				Allen, W., 2008, The war on bugs. White River Junction, Vt., Chelsea Green Publishing.
1874	The availability of barbed wire allows fencing of rangeland, ending the era of unrestricted, open-range grazing.				Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm.*
1874		Glidden barbed wire is patented.			Economic Research Service, 2000, A history of American agriculture, growing a Nation—the story of American agriculture: Economic Research Service: accessed May 5, 2011, from *http://www.agclassroom.org/gan/timeline/index.htm.*
1875				The first state-supported agricultural station is established, in Connecticut.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1876					
1877					
1878					
1879	Soybeans are introduced for animal feed.				Soya.be, 2011, History of soybeans: Top Cultures, accessed May 9, 2011, from *http://www.soya.be/history-of-soybeans.php.*

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1880		The modern electric utility industry begins (early 1880s).			*McNerney, R.A., Spancake, L.R., Kanhouwa, S.P., and Liggett, W.D., 1996, The changing structure of the electric power industry: an update—history of the U.S. electric power Industry, 1882–1991: U.S. Department of Energy Information Administration–0562(96), 166 p., accessed from http://www.eia.gov/cneaf/electricity/page/electric_kid/append_a.html.*
1880					
1881					
1882					
1883					
1884		Horse-drawn combines are used in Pacific Coast wheat areas (1884–90).			Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm .*
1884				The Bureau of Animal Industry (BAI) , the forerunner of Food Safety Inspection Service, is established.	*Food Safety and Inspection Service, 2007, About FSIS: Food Safety and Inspection Service, accessed August 8, 2011, from http://www.fsis.usda.gov/About_FSIS/Agency_History/index.asp.*
1885					
1886					
1887					
1888					
1889			Cottony cushion scale disease is controlled on citrus with a natural predator, the Vedalia beetle, in California.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1889					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1890		Cream separators come into widespread use (1890–95).			Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm* .
1890		The internal combustion engine is invented.			Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1890				Passage of the Meat Inspection Act sets guidelines for cleanliness and animal inspections in meat processing plants.	*Food Safety and Inspection Service, 2007, About FSIS: Food Safety and Inspection Service: accessed August 8, 2011, from http://www.fsis.usda.gov/About_FSIS/Agency_History/index.asp.*
1891				The American Seed Trade Association is formed (late 1800s).	*Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press: accessed February 15, 2011, from http://deltafarmpress.com/us-seed-law-history-primer.*
1892		The gasoline tractor first operates successfully, in Iowa.			Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1892					
1893			Forty-two patented insecticides are in use.		Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1894					
1895					
1896					
1897					
1898					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1899					
1900	Pioneering new uses for peanuts, sweet potatoes, and soybeans are developed at the Tuskegee Institute in Alabama, helping to diversify Southern agriculture.				Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from *http://inventors.about.com/library/inventors/blfarm1.htm* .
1900	The USDA inherits the seed distribution program, sending out over 1 billion packages of free seed.				Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press, accessed February 15, 2011, from *http://deltafarmpress.com/us-seed-law-history-primer* .
1900			Information on plant genetics, proposed by Gregor Mendel, is used to accelerate plant breeding.		Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press, accessed February 15, 2011, from *http://deltafarmpress.com/us-seed-law-history-prime* r.
1900					
1901					
1902				The U.S. Reclamation Service, the precursor to the Bureau of Reclamation, is established and aids in the development of many large agricultural irrigation and drainage projects.	*U.S. Bureau of Reclamation, 2011, The Bureau of Reclamation a very brief history: U.S. Department of the Interior Bureau of Reclamation, accessed September 28, 2011, from http://www.usbr.gov/history/borhist.html.*
1902				Iowa surface ditch network statutes are authorized.	*Iowa Drainage District Association (n.d.), Facts about drainage and drainage districts: Iowa Drainage District Association, accessed June 27, 2011, from http://www.iowadrainage.org/Facts.html.*
1903					
1903					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1904	The use of soybeans as a rotation crop is shown to enhance other crops.				*Soya.be, 2011, History of soybeans: Top Cultures, accessed May 9, 2011, from http://www.soya.be/history-of-soybeans.php.*
1905					
1906				Passage of the Pure Food and Drug Act protects consumers from unsafe additives to food or false claims of health benefits.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1906				Congress authorizes the sale of surplus power from Western irrigation projects.	McNerney, R.A., Spancake, L.R., Kanhouwa, S.P., and Liggett, W.D., 1996, The changing structure of the electric power industry: an update—history of the U.S. electric power Industry, 1882–1991: U.S. Department of Energy Information Administration–0562(96), 166 p, accessed from http://www.eia.gov/cneaf/electricity/chg_stru_update/appa.html. http://www.eia.gov/cneaf/electricity/chg_stru_update/appa.html.
					http://www.eia.gov/cneaf/electricity/chg_stru_update/appa.html.
1907					
1908	The State of Iowa becomes the highest user and producer of drain tile.				The Clinton Mirror, 1910, Iowa led in tiling—first among all the states in producing drain tile—Geological Report figures: Clinton, Iowa, February 5, 1910, accessed May 9, 2011, from http://news.google.com/newspapers?nid=2281&dat=19100205&id=W9snAAAAIBAJ&
1908					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1909			The Haber-Bosch Process, which converts atmospheric nitrogen gas to ammonia (fertilizer), is invented.		Smil, V., 1999, Detonator of the population explosion: Nature, v. 400 (July), p. 415, accessed from http://www.nature.com/nature/journal/v400/n6743/abs/400415a0.html.
1910		Irrigation allows large-scale fruit and vegetable agriculture in the Central and Imperial Valleys, Calif.			Hurt, D.R., 1994, American agriculture: a brief history: Iowa State University Press, p. 185.
1910				Passage of the First National Pesticide Act regulates the composition of pesticides sold to consumers.	Toth, S.J., 1996, Federal pesticide laws and regulations: North Carolina Cooperative Extension Service fact sheet, 4 p., accessed from http://ipm.ncsu.edu/safety/factsheets/laws.pdf.
1910		Tractors are smaller and becoming affordable to the average farmer.			Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1911					
1912					
1913					
1914				Passage of the Smith and Lever Act establishes the Cooperative Extension Service to demonstrate practical uses of agricultural research techniques to farmers.	Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1914					
1915					
1916					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1917				U.S. involvement in World War I begins.	Library of Congress, 2011, U.S. entered World War I, April 6, 1917: The Library of Congress, America's Story, accessed August 8, 2011, from http://www.americaslibrary.gov/jb/jazz/jb_jazz_wwi_1.html.
1918					
1919					
1920	Tillage research is increasing in the U.S.				Gebhardt, M.R., Daniel, T.C., Schweizer, E.E., and Allmaras, R.R., 1985, Conservation tillage: New York, Science, v. 230(4726), p. 625–630, accessed from http://www.ncbi.nlm.nih.gov/pubmed/17797277.
1921				The Health Department of Boston, Mass. destroys arsenic-contaminated apples for the third year in row, and the public is not alerted to the problem.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1921		The airplane crop duster is first used.			Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1921			Manufacturing of synthetic ammonia by use of the Haber Bosch Process begins in the U.S.		*Beaton, J., 2011, History of fertilizer, in Efficient fertilizer use manual: Mosaic, p. 17, accessed from http://www.back-to-basics.net/efficient-fertilizer-use-manual.*
1921		Tractors are outperforming animals; the 50-horsepower tractor engine can pull the plow harrow and grain drill.			Bellis, M., 2011, History of the plow—inventing the plow and the moldboard. Inventors. About.com: accessed January 17, 2011, from http://inventors.about.com/od/pstartinventions/a/plow.htm.

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1921	Canola is grown for industrial oil (1920s).				Brown, J., Davis, J.B., Lauver, M., and Wysocki, D., 2008, Canola growers' manual: U.S. Canola Association, p. 66, accessed from http://www.uscanola.com/site/files/956/102387/363729/502632/Canola_Grower_Manual_FINAL_reduce.pdf.
1922				Passage of the Capper Volstead Act states farmers may act together to collectively market their products.	Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1922					
1923				The Middle Rio Grand Conservancy District (MRGCD) is formed, in New Mexico.	Middle Rio Grand Conservancy District., 2011, A little history—the MRGCD over the years: Middle Rio Grande Conservancy District, accessed December 9, 2011, from http://mrgcd.com/uploads/FileLinks/96e07640000684943bee9dd0800a87926/History of the Conservancy.pdf.
1923				Aldo Leopold publishes his first manual on erosion control.	Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.
1924				The USDA discontinues its free seed distribution program.	Bennet, D., 2006, U.S. seed law history: a primer. Delta Farm Press: accessed February 15, 2011, from http://deltafarmpress.com/us-seed-law-
1924	Increased knowledge of animal nutrition and availability of vitamin supplements allows for chickens to be raised in confined areas.				*Gordon, J. S., 1996, The chicken story: American Heritage, v. 47. no. 5, p. 52–67, accessed from http://www.americanheritage.com/content/chicken-story.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1924			"Copper Cross," the first commercial hybrid seed corn, is sold by Henry Wallace.		*IPTV, 2011, Henry A. Wallace—agricultural pioneer, visionary and leader: Iowa Pathways, Iowa Public Television: accessed August 8, 2011, from http://www.iptv.org/iowapathways/mypath.cfm?ounid=ob_000061*
1925					
1926			The first ammonium nitrate (fertilizer) is imported from Germany.		*Beaton, J., 2011, History of fertilizer, in Efficient fertilizer use manual: Mosaic, p. 17, accessed from http://www.back-to-basics.net/efficient-fertilizer-use-manual.*
1926		The cotton-stripper is developed for use in the High Plains.			*Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm.*
1926		A successful light tractor is developed.			*Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm.*
1926				Passage of the Cooperative Marketing Act allows farmers to form cooperatives and legally share information within their marketing systems.	*Purpose of Cooperative Marketing Act, 2009, Statue 17–1601: Kansas Statutes Annotated, accessed May 26, 2011, from http://kansasstatutes.lesterama.org/Chapter_17/Article_16/17-1601.html.*
1927				The Food and Drug Administration (FDA) is established as a scientific, regulatory, and public health agency controlled by the USDA.	*Swann, J. P., 2009, FDA's origin. U. S. Food and Drug Administration, accessed August 9, 2011, from http://www.fda.gov/AboutFDA/WhatWeDo/History/Origin/ucm124403.htm.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1928			Synthetic production of sodium nitrate (fertilizer) begins.		*Beaton, J., 2011, History of fertilizer, in Efficient fertilizer use manual: Mosaic, p. 17, accessed from http://www.back-to-basics.net/efficient-fertilizer-use-manual.*
1928		Congress authorizes the Boulder Canyon Project for irrigation, flood control, and electricity production in the Colorado River Basin.			*McNerney, R.A., Spancake, L.R., Kanhouwa, S.P., and Liggett, W.D., 1996, The changing structure of the electric power industry: an update—history of the U.S. electric power Industry, 1882–1991: U.S. Department of Energy Information Administration–0562(96)*
1929				The Great Depression begins.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1930		The all-purpose, rubber-tired tractor comes into wide use (1930s).			Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm.
1930				The Plant Patent Act allows patenting of plants, but is limited to asexual reproduction (grafting and cutting).	*Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press, accessed February 15, 2011, from http://deltafarmpress.com/us-seed-law-history-primer.*
1930	The series of droughts coined the "Dust Bowl" begins.				*Follett, R.F., 2009, US agriculture's relationship to soil carbon: Journal of Soil and Water Conservation, v. 64, no. 6, p. 159A–165A: accessed from http://www.jswconline.org/cgi/doi/10.2489/jswc.64.6.159A.*
1931					
1931					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1932	The change from using open pollinated corn to using hybrid corn commences.				*Larson, W.E., and Cardwell, V.B., 1999, History of U.S. corn production: University of Minnesota, accessed May 27, 2011, from http://www.mindfully.org/Farm/US-Corn-Production1999.htm.*
1933				The Tennessee Valley Authority (TVA) project creates a fertilizer research and development area in Muscle Shoals, Ala.	Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1933				The Soil Erosion Service (SES) , the precursor to Soil Conservation Service (SCS), is formed.	*Natural Resources Conservation Service, 2006, Hugh Hammond Bennett and the creation of the Soil Erosion Service: Natural Resources Conservation Service American Farmland Trust Farmland Information Center: accessed August 1, 2011, from http://www.farmlandi*
1933				The Agricultural Adjustment Act of 1933 establishes the Commodity Credit Corporation (CCC) to stabilize, support, and protect farm prices and supplies.	*U.S. Department of Agriculture, 1999, Commodity credit corporation: Farm Service Agency Fact Sheet, p. 4, accessed from http://printfu.org/read/commodity-credit-corporation-5d89.html?f=1qeYpurpn6Wih-SUpOGumK2nh6_e49LjzM7k64mx5svZ1tmMsuXX5NfX0ebS3eKIsOCfn*
1934		Eleven percent of farms have electricity.			Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1934			Hormones to increase yield in dairy and growth rates in beef cattle are discovered, however, they are not practical for use on large scale.		*Food Safety and Inspection Service, 2008, Food labeling—additives in beef and poultry products: Food Safety and Inspection Service, accessed August 7, 2008, from http://www.fsis.usda.gov/Fact_Sheets/Additives_in_Meat_&_Poultry_Products/index.asp.*
1935				Passage of the Rural Electrification Administration Act provides funds to aid the establishment of reliable, affordable electricity in rural areas.	Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1935		The Hoover Dam (Nevada) is completed.			Nevada Commission on Tourism, 2011, Hoover Dam history: accessed May 9, 2011, from http://hooverdam.travelnevada.com/history.aspx
1935				Passage of the Soil Conservation and Domestic Allotment Act broadens Soil Conservation Service (SCS, previously the Soil Erosion Service) funding to reduce wasting of the Nation's soil and water resources.	*Natural Resources Conservation Service, 2011, History of NRCS: Natural Resources Conservation Service: accessed August 1, 2011, from http://www.nrcs.usda.gov/wps/portal/nrcs/main/?ss=16&navtype=SubNavigation&cid=null&navid=210160000000000&pnavid=210000000*
1936					
1937					
1938				Passage of the Food, Drug, and Cosmetic Act sets standards for the identity, quality, and quantity of products.	*Food Safety and Inspection Service, 2008, Food labeling—additives in beef and poultry products: Food Safety and Inspection Service, accessed August 7, 2008, from http://www.fsis.usda.gov/Fact_Sheets/Additives_in_Meat_&_Poultry_Products/index.asp.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1939		World War II helps shift farming from animal to mechanical power.			Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1940					
1941		Frozen foods become popular (1941–45).			Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm.
1941		Thirty-five percent of farms have electricity.			Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1941				The Rural Electrification Administration Act is passed to aid the establishment of reliable, affordable electricity in rural areas.	Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1941				Passage of the Steagall Amendment adds additional price support for nonbasic agricultural commodities such as chickens and eggs.	*The National Agricultural Law Center., 2011, Farm bill definitions: accessed August 8, 2011, from http://www.nationalaglawcenter.org/assets/farmbills/glossary.html#steagall.*
1942					
1943			Nitrogen fertilizer, in the form of ammonia nitrate (an ammunitions compound), is widely available for agriculture.		*Beaton, J., 2011, History of fertilizer, in Efficient fertilizer use manual: Mosaic, p. 17, accessed from http://www.back-to-basics.net/efficient-fertilizer-use-manual.*
1944					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1945			Synthetic chemical insecticides (organochlorines and organophosphates) are introduced and widely accepted (1945–46).		*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
1945			2,4-Dichlorophenoxy acetic acid (2,4–D) and 2,4,5-Trichlorophenoxy acetic acid (2,4,5–T) are released as commercial herbicides.		*Ganzell, B., 2011, Farming in the 1940s, herbicides—2, 4-D & its cousins: Living History Farm, accessed August 8, 2011, from http://www.livinghistoryfarm.org/farminginthe40s/pests_03.htm.*
1946					
1947				Passage of the Federal Insecticide, Fungicide, and Rodenticide Act establishes Federal control over the sale, distribution, and use of pesticides.	Federal Wildlife and Related Laws Handbook—Soil and Water Resources Conservation Act of 1977 Chapter 4—Statute Summaries., 2011, New Mexico Center for Wildlife Law: accessed August 2, 2011, from http://wildlifelaw.unm.edu/fedbook/soilwate.html.
1947		Center-pivot irrigation is invented by Frank Zybach, of Nebraska.			*Ganzel, B., 2006, Farming in the 1950s & 60s—center pivots takeover: Living History Farm: accessed May 9, 2011, from http://www.livinghistoryfarm.org/farminginthe50s/water_03.html.*
1948			Ethyl parathion, a synthetic insecticide, is first registered for pesticide use.		*Environmental Protection Agency, 2000, R.E.D. Facts—Ethyl Parathion: U. S. Environmental Protection Agency, accessed from http://www.epa.gov/oppsrrd1/REDs/factsheets/0155fct.pdf*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1948			Paul Muller receives the Nobel Prize for his discovery of dichlorodiphenyltrichloroethane (DDT) as an insecticide (organochlorine).		*Harrison, K., 1997, DDT, in Banned insecticides: 3DChem.com, accessed August 8, 2011, from http://www.3dchem.com/molecules.asp?ID=90.*
1948				Passage of the Agricultural Act of 1948 shifts price supports from fixed to flexible.	*Economic Research Service, 1984, History of agricultural price-support and adjustment programs, 1933–84: Bulletin Number 485, p. 47, accessed from http://www.ers.usda.gov/Publications/aib485/aib485fm.pdf.*
1949					
1950	The average farm size increases and the numbers of farms decrease (1950s–70s).				Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1950				The Korean War begins.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1950		Eighty-five percent of farms have electricity.			Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1951			Synthetic hormone use in beef production begins with stilbestrol.		Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1951	Horses are largely replaced by self-propelled tractors (1950s).				Gardner, B.L., 2002, American Agriculture in the Twentieth Century: Harvard University Press.
1951					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1952	Research on tillage practices increases in the U.S.				*Gebhardt, M.R., Daniel, T.C., Schweizer, E.E., and Allmaras, R.R., 1985, Conservation tillage: New York, Science, v. 230(4726), p. 625–630, accessed from http://www.ncbi.nlm.nih.gov/pubmed/17797277.*
1953		The corn heading combine is introduced by John Deere.			Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1954				U.S. involvement in the Vietnam conflict begins.	Allen, W., 2008, The War on Bugs. White River Junction, VT: Chelsea Green Publishing.
1954				Passage of the Agricultural Act of 1954 authorizes a CCC reserve for foreign and domestic relief.	*Economic Research Service, 1984, History of agricultural price-support and adjustment programs, 1933–84: Bulletin Number 485, p. 47, accessed from http://www.ers.usda.gov/Publications/aib485/aib485fm.pdf.*
1955					
1956				Passage of the Agricultural Act of 1956 establishes the Soil Bank Program to reduce crop surpluses by taking cropland most subject to erosion out of production for up to 10 years.	*Mowery, D.C., and Rosenberg, N., 1998, Technology and other innovations 1950–1975: agricultural, chap. 19, in Mowery, D.C., and Rosenberg, N., Paths of innovation: technological change in 20th-Century America: Cambridge University Press, accessed August 1*
1957				The Great Plains Conservation Program establishes cost sharing and technical aid for soil and water conservation applied to all acres of a farm.	*National Archives and Records Administration, 2011, Electronic Code of Federal Regulations—Title 7: Agriculture: accessed August 8, 2011, from http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=db3053e8ff32d342674984862d73445d&rgn=div5&view=text&no*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1957		The first ice-pack processing line for chickens is introduced by Tyson foods.			*Tyson Foods, Inc., 2003, International directory of company histories—v. 50: St. James Press, accessed May 9, 2011, from http://www.fundinguniverse.com/company-histories/Tyson-Foods-Inc-Company-History.html.*
1957				Passage of the Poultry Products Inspection Act requires the Food Safety Inspection Service to inspect all domesticated birds processed for human consumption.	*Food Safety and Inspection Service, 2007, About FSIS: Food Safety and Inspection Service, accessed August 8, 2011, from http://www.fsis.usda.gov/About_FSIS/Agency_History/index.asp.*
1958				Passage of the Food Additives Amendment regulated the use of salt, nitrates, and organic acids in processed foods and includes the "Delaney Clause" specific to pesticide residues.	*Food Safety and Inspection Service, 2008, Food labeling—additives in beef and poultry products: Food Safety and Inspection Service, accessed August 7, 2008, from http://www.fsis.usda.gov/Fact_Sheets/Additives_in_Meat_&_Poultry_Products/index.asp.*
1959	Integrated Pest Management (IPM) practices are first promoted by the University of California.				Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1960			New chemical families (triazines, acetanilides and dinitroanilines) are discovered as herbicides (1960s).		*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1960					Bellis, M., 2011, History of American agriculture (1776-1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm.
1960		Ninety-seven percent of farms have electricity.			Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1961			The Green Revolution, promoting high yield agriculture from improved crop hybrids and fertilizer supplements, is led by Norman Borlaug.		*Ganzel, B., 2006, Farming in the 1950s & 60s—the 1950s worldwide boom in irrigation: Living History Farm, accessed February 2, 2010, from http://www.livinghistoryfarm.org/farminginthe50s/water_02.html.*
1961				The Emergency Feed Grain Program is established and includes voluntary acreage reduction with first Payment in Kind (PIK) provisions.	*Richardson, J.W., Anderson, D.P., and Smith, E.G., 1999, A brief summary of U.S. Farm Program provisions: Texas Agricultural Extension Service, Agricultural and Food Policy Center Working Paper 99–9, p. 7, accessed from http://www.afpc.tamu.edu/pubs/0/121*
1962				The Committee for Economic Development publishes "An Adaptive Program for Agriculture," which recognizes the increasing efficiency of corporate farms, the loss of small farms and labor jobs, and the effects of farm consolidation on the free market.	*Library of Congress., 1968, An adaptive program for agriculture—a statement on national policy: New York, no. 62–191–45, accessed from http://www.normeconomics.org/adaptive.html.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1962	Farmers experiment with no-till planting.				*Brock, B.G., Canterberry, J.H., and Naderman, G.C., 2000, Ten milestones in conservation tillage: history and role in the North Carolina Conservation Program, in Sutherland, J.L., ed., Proceedings of the 43rd annual meeting of the Soil Science Society of*
1962				Passage of the Food and Agricultural Act of 1962 establishes the Resource Conservation and Development Program, which authorizes conservation projects on a broad, multicounty basis.	*Food and nutrition: 1960–1969, chap. 6 of The United States Senate Committee on Agriculture, Nutrition, and Forestry 1825–1998: Superintendent of Documents 105–24, accessed September 28, 2011, from http://www.access.gpo.gov/congress/senate/sen_agriculture*
1962			By the 1960s, it is found DDT accumulates in animal tissues.		*Environmental Protection Agency, 2011, DDT—a brief history and status: U. S. Environmental Protection Agency, Pesticides, Topical & Chemical Fact Sheets, accessed September 27, 2011, from http://www.epa.gov/opp00001/factsheets/chemicals/ddt-brief-history-*
1962	Pigs and cows are raised on factory farms (1960s).				*Nierenburg, D., 2005, Happier meals: rethinking the global meat industry: Worldwatch Institute, Paper no. 171, accessed November 26, 2011, from http://www.worldwatch.org/node/819.*
1962				Publication of Rachel Carson's "Silent Spring" brings public attention to the environmental effects of pesticides.	Trautmann, N.M., Porter, K.S., and Wagenet, R.J., 1985, Modern agriculture: its effects on the environment: Ithaca, N.Y., Cornell University Cooperative Extension fact sheet, 4 p.
1963					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1964				Passage of the Food and Agricultural Act of 1964 establishes the wheat certificate program and a cotton PIK program.	*Economic Research Service, 1984, History of agricultural price-support and adjustment programs, 1933–84: Bulletin Number 485, p. 47, accessed from http://www.ers.usda.gov/Publications/aib485/aib485fm.pdf.*
1965			Herbicides use allows for exploration of conservation tillage practices.		*Gebhardt, M.R., Daniel, T.C., Schweizer, E.E., and Allmaras, R.R., 1985, Conservation tillage: New York, Science, v. 230(4726), p. 625–630, accessed from http://www.ncbi.nlm.nih.gov/pubmed/17797277.*
1965				Passage of the Agricultural Act of 1965, and its first 5-year program, establishes the Cropland Adjustment Program with 5–10 year contracts to retire land; however, the program could not be funded.	*Richardson, J.W., Anderson, D.P., and Smith, E.G., 1999, A brief summary of U.S. Farm Program provisions: Texas Agricultural Extension Service, Agricultural and Food Policy Center Working Paper 99–9, p. 7, accessed from http://www.afpc.tamu.edu/pubs/0/121*
1966			It is observed that a constant low dose of antibiotics promotes animal growth.		Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1967				Passage of the Wholesome Meat Act requires States to have meat inspection programs equal to those of the Federal government.	*Meat inspection, 2011: Texas A&M University, accessed August 2, 2011, from http://meat.tamu.edu/meatinsp.html.*
1968		Mechanization of farming helps reduce the agricultural labor force by one-half (1950–70).			Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky, p. 87.

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1969				Approximately 40 bills to regulate pesticides are introduced to Congress (mid-1960s).	Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.
1970				The Plant Variety Protection Act (PCPA) now includes patents for sexually reproducing plants; an exemption allows farmers to save and sell seed.	*Bennet, D., 2006, U.S. seed law history: a primer: Delta Farm Press, accessed February 15, 2011, from http://deltafarmpress.com/us-seed-law-history-primer.*
1970				Formation of the Environmental Protection Agency (EPA) consolidates several Federal agencies that previously dealt with environmental issues.	*U.S. Environmental Protection Agency, 2011, EPA history: U.S. Environmental Protection Agency, accessed August 2, 2011, from http://www.epa.gov/history/.*
1970	The ridge till practice for corn is adopted.				*Gebhardt, M.R., Daniel, T.C., Schweizer, E.E., and Allmaras, R.R., 1985, Conservation tillage: New York, Science, v. 230(4726), p. 625–630, accessed from http://www.ncbi.nlm.nih.gov/pubmed/17797277.*
1970	The USDA promotes the ideas "plant hedgerow to hedgerow" and "get big or get out," encouraging full production of farm acreage (1960–70s).				Anderson, R., and Jansen, B., 2010, Wisconsin conservation history: U.S. Department of Agriculture, Natural Resources Conservation Service Wisconsin, p 52.
1970				The first Earth Day is celebrated.	Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1970				Passage of the Agricultural Act of 1970 limits government payments to $55,000 per crop and provides a more flexible approach to supply control.	*Economic Research Service, 1984, History of agricultural price-support and adjustment programs, 1933–84: Bulletin Number 485, p. 47, accessed from http://www.ers.usda.gov/Publications/aib485/aib485fm.pdf.*
1971			Synthetic pyrethroids become important insecticides in agriculture (1970s).		*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
1971				The Clean Water Act (CWA) is passed to restore and maintain the integrity of the Nation's waterways through prevention of point and nonpoint pollution sources.	*Environmental Protection Agency, 2011, Clean Water Act (CWA): U.S. Environmental Protection Agency: accessed August 2, 2011, from http://www.epa.gov/agriculture/lcwa.html.*
1971				The Animal and Plant Health Inspection Service (APHIS) is established to consolidate regulatory functions of previous USDA agencies engaged in meat and poultry inspection, etc.	*Animal and Plant Health Inspection Service, 2011, About APHIS—history of APHIS: Animal and Plant Health Inspection Service, accessed August 2, 2011, from http://www.aphis.usda.gov/about_aphis/history.shtml.*
1972				Passage of the Federal Environmental Pesticide Control Act classifies pesticides as "general" or "restricted" use and requires certification for restricted use.	*U.S. Fish and Wildlife Service, 1996, Digest of federal resource laws of interest to the U.S. Fish and Wildlife Service: U.S. Fish and Wildlife Service, accessed August 2, 2011, from http://www.fws.gov/laws/lawsdigest/FEDENVP.HTML.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1972				DDT is banned in the U.S.	Environmental Protection Agency, 1972, DDT ban takes effect: U. S. Environmental Protection Agency press release, accessed August 8, 2011, from http://www.epa.gov/aboutepa/history/topics/ddt/01.html.
1973				Passage of Section 303(d) of the CWA requires States to list impaired waterways and develop Total Maximum Daily Loads (TMDLs) for the identified waters.	*U.S. Environmental Protection Agency, 2009, Fact sheet: Introduction to Clean Water Act (CWA) Section 303(d) Impaired Waters Lists: U.S. Environmental Protection Agency, TDML Program Results Analysis Fact Sheet, accessed from http://www.epa.gov/owow/tmdl*
1973				Passage of the Agricultural and Consumer Protection Act limits government payments to $22,000 per crop; disaster payments are introduced.	*Richardson, J.W., Anderson, D.P., and Smith, E.G., 1999, A brief summary of U.S. Farm Program provisions: Texas Agricultural Extension Service, Agricultural and Food Policy Center Working Paper 99–9, p. 7, accessed from http://www.afpc.tamu.edu/pubs/0/121*
1974			The first genetically modified organism, a form of *Escherichia coli* bacteria, is made.		*Kayotic Development, 1998, 1973: The first recombinant DNA organisms: Oracle ThinkQuest Education Foundation, accessed June 9, 2010, from http://library.thinkquest.org/24355/data/details/1973.html.*
1974	An edible canola hybrid is introduced.				*Brown, J., Davis, J.B., Lauver, M., and Wysocki, D., 2008, Canola growers' manual: U.S. Canola Association, p. 66, accessed from http://www.uscanola.com/site/files/956/102387/363729/502632/Canola_Grower_Manual_FINAL_reduce.pdf.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1975			Glyphosate (herbicide) is registered for commercial use.		*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1977				Passage of the Soil and Water Conservation Act provides appraisal of soil, water, and related resources and a program to assist landowners in conservation measures.	Federal Wildlife and Related Laws Handbook—Soil and Water Resources Conservation Act of 1977 Chapter 4—Statute Summaries., 2011, New Mexico Center for Wildlife Law: accessed August 2, 2011, from http://wildlifelaw.unm.edu/fedbook/soilwate.html.
1977				Passage of the Food and Agriculture Act of 1977 introduces a farmer-owned reserve for grains.	*Richardson, J.W., Anderson, D.P., and Smith, E.G., 1999, A brief summary of U.S. Farm Program provisions: Texas Agricultural Extension Service, Agricultural and Food Policy Center Working Paper 99–9, p. 7, accessed from http://www.afpc.tamu.edu/pubs/0/121.*
1977				The Food Safety and Quality Service is established and assigned the duties of meat and poultry product inspections, which formerly were under the Animal and Plant Health Inspection Service.	*Richardson, J.W., Anderson, D.P., and Smith, E.G., 1999, A brief summary of U.S. Farm Program provisions: Texas Agricultural Extension Service, Agricultural and Food Policy Center Working Paper 99–9, p. 7, accessed from http://www.afpc.tamu.edu/pubs/0/121.*
1978					

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1979			Imidazolinone and sulfonylurea herbicides are introduced (1980s).		*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
1979				Permethrin, an insecticide, is registered by the EPA for use on cotton.	*U.S. Environmental Protection Agency, 2006, Permethrin facts (Reregistration Eligibility Decision (RED) Fact Sheet): U.S. Environmental Protection Agency 738–F–06–012, accessed August 9, 2011, from http://www.epa.gov/oppsrrd1/REDs/factsheets/permethrin_fs.*
1979	Lake Michigan has a 90-percent reduction in DDT concentration since its ban.				*Harrison, K., 1997, DDT, in Banned insecticides: 3DChem.com, accessed August 8, 2011, from http://www.3dchem.com/molecules.asp?ID=90.*
1979				The Supreme Court rules that genetically modified lifeforms can be patented.	*Biewen, J., 2000, History of genetic engineering, in Engineering crops in a needy world: American Public Media, accessed May 27, 2011, from http://americanradioworks.publicradio.org/features/gmos_india/history.html.*
1979			Advances in genetics (recombinant gene technology) allow for the mass production of synthetic hormones for additives in animal feed.		*Food Safety and Inspection Service, 2008, Food labeling—additives in beef and poultry products: Food Safety and Inspection Service, accessed August 7, 2008, from http://www.fsis.usda.gov/Fact_Sheets/Additives_in_Meat_&_Poultry_Products/index.asp.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1979				Aldicarb, an insecticide, is observed in wells in Suffolk County, N.Y.	*Zaki, M.H., Moran, D., and Harris, D., 1982, Pesticides in groundwater: the aldicarb story in Suffolk County, NY: American Journal of Public Health, v. 72, no. 12, p. 1391–1395, accessed from http://dx.doi.org/doi:10.2105/AJPH.72.12.1391.*
1980		Improvements to no-till planting equipment increase the number of farmers converting to conservation tillage.			*Brock, B.G., Canterberry, J.H., and Naderman, G.C., 2000, Ten milestones in conservation tillage: history and role in the North Carolina Conservation Program, in Sutherland, J.L., ed., Proceedings of the 43rd annual meeting of the Soil Science Society of*
1980			By the 1980s, antibiotics are commonly added to feed for poultry and hogs and, to lesser extent, for beef		Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.
1980	Specialization and intensification of farming leads to increased numbers of confined animal feeding operations (CAFOs).				*U.S. Geological Survey, 2004, Concentrated animal feeding operations: what's the big stink?: accessed May 9, 2011, at http://www.nwhc.usgs.gov/information_desk/history/1998_CAFO.htm.*
1981				Passage of the Agriculture and Food Act contains cost-cutting measures on price supports and allotments.	*Economic Research Service, 1984, History of agricultural price-support and adjustment programs, 1933–84: Bulletin Number 485, p. 47, accessed from http://www.ers.usda.gov/Publications/aib485/aib485fm.pdf.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1982				The Rural Clean Water Program establishes a Federally sponsored program to address agricultural nonpoint source pollution.	Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.
1983				Passage of the Dairy and Tobacco Adjustment Act starts a voluntary dairy diversion program.	*Richardson, J.W., Anderson, D.P., and Smith, E.G., 1999, A brief summary of U.S. Farm Program provisions: Texas Agricultural Extension Service, Agricultural and Food Policy Center Working Paper 99–9, p. 7, accessed from http://www.afpc.tamu.edu/pubs/0/121.*
1984				The Chesapeake Bay Agreement establishes a partnership between the EPA and States in the region to restore the bay's living resources.	Chesapeake Bay Program, 2005, About the bay—bay history: accessed August 2, 2011, from http://archive.chesapeakebay.net/history.htm.
1985				Formation of the Conservation Reserve Program (CRP) volunteer program provides cost sharing for removing environmentally sensitive land from agricultural production (1985 Farm Bill).	*Hellerstein, D., 2010, Challenges facing USDA's Conservation Reserve Program: Economic Research Service, Amber Waves, v. 8, no. 2, p. 6., accessed from http://webarchives.cdlib.org/sw1vh5dg3r/http://ers.usda.gov/AmberWaves/June10/Features/ChallengesFacingCRP.htm.*
1985				Formation of the Environmental Quality Incentives Program (EQIP) provides technical, financial, and educational assistance for a wide range of agricultural environmental activities (1985 Farm Bill).	*Economic Research Service, 2011, Environmental Quality Incentives Program data: Economic Research Service, accessed August 2, 2011, from http://www.ers.usda.gov/Data/eqip/.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1985				Passage of the Food Security Act includes the wetland conservation "Swampbuster" provision requiring farmers to protect wetlands if they want to be eligible for farm program benefits (1985 Farm	*US Army Corps of Engineers Memphis District, 2011, Wetlands and agriculture: accessed August 3, 2011, from http://www.mvm.usace.army.mil/regulatory/regulations/clean_water.htm.*
1987	The first field tests of genetically engineered crops (tobacco and tomato) are conducted in the U.S.				*Biewen, J., 2000, History of genetic engineering, in Engineering crops in a needy world: American Public Media, accessed May 27, 2011, from http://americanradioworks.publicradio.org/features/gmos_india/history.html.*
1987				Section 319 of the CWA reauthorizes Federal leadership for State and local nonpoint pollution.	Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.
1989			The EPA finds 74 different pesticides in the groundwater of 38 States.		*Williams, W.M., Holden, P.W., Parsons, D.W., and Lorber, M.N., 1988, Pesticides in ground water data base: U.S. Environmental Protection Agency Office of Pesticide Programs Interim Report, accessed from http://nepis.epa.gov/Adobe/PDF/2000O1PT.PDF.*
1989		The release of Navigation Satellite Timing And Ranging (NAVSTAR) technology to civilians has potential uses for precision agriculture.			*Cenage Learning, 2011, History of precision agriculture: Delmar Cenage Learning, accessed May 27, 2011, from http://www.delmarlearning.com/companions/content/140188105X/trends/history_pre_agr.asp.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1990		More farmers begin to use low-input sustainable agriculture (LISA) techniques to decrease chemical applications.			*Bellis, M., 2011, History of American agriculture (1776–1990)—farm machinery and technology: About.com, Inventors, accessed January 17, 2011, from http://inventors.about.com/library/inventors/blfarm1.htm.*
1990				Passage of the Organic Foods Production Act establishes national standards for marketing organic products.	Baker, B., Swezey, S.L., Granatstein, D., Guldan, S., and Chaney, D., 2005, Organic farming compliance handbook—federal organic foods production act of 1990: U.S. Department of Agriculture Western Region, Sustainable Agriculture Research and Education Program, accessed November 25, 2011, from http://www.sarep.ucdavis.edu/organic/complianceguide/.
1990				Passage of the Food, Agriculture, Conservation, and Trade Act strengthens the previous Swampbuster provision and provides systems to restore wetlands and eligibility to farm program benefits (1990 Farm	*USLegal, Inc., 2010, Food Security Act: USLegal, Inc., accessed August 3, 2011, from http://farmers.uslegal.com/federal-grain-inspection/food-security-act/.*
1990	The numbers of organic farms increase (1990s).				Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.
1990				Formation of the Wetland Reserve Program (WRP) establishes long-term (30 year—permanent) contracts with landowners conserving wetlands (1990 Farm Bill).	*O'Brien, D., n.d., Summary and evolution of U.S. farm bill conservation titles—expanded discussions: The National Agricultural Law Center, accessed August 3, 2011, from http://www.nationalaglawcenter.org/assets/farmbills/conservation-expanded.html#sodbus.*

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1990			The U.S. Fish and Wildlife Service finds antibiotic-resistant bacteria in a refuge adjacent to a CAFO in Nebraska.		*Schwarz, M.S., Echols, K.R., Wolcott, M.J., and Nelson, K.J., 2004, Environmental contaminants associated with a swine concentrated animal feeding operation and implications for McMurtrey National Wildlife Refuge: U.S. Fish & Wildlife Service Division of Environmental Quality, Region 6, 98 p. accessed from http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1189&context=usfwspubs* .
1991					
1992		The Yield Monitor, an electronic tool combined with Global Positioning System (GPS) technology that collects data on crop performance for a given year, is			*Grisso, R., Alley, M., and McClellan, P., 2009, Precision farming tools : yield monitor: Virginia Cooperative Extension publication 442–502, 8 p., accessed from http://pubs.ext.vt.edu/442/442-502/442-502_pdf.pdf.*
1992				The FDA declares that genetically modified foods are "not inherently dangerous" and do not require special regulation.	*Biewen, J., 2000, History of genetic engineering, in Engineering crops in a needy world: American Public Media, accessed May 27, 2011, from http://americanradioworks.publicradio.org/features/gmos_india/history.html.*
1992				The EPA publishes in Section 303d of the CWA the first guidelines on TMDLs.	Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.

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Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1992				The U.S. Supreme Court rules State and local governments are allowed to pass pesticide restrictions that are more stringent than Federal regulations.	*Gale Group, Inc., 2011, Pesticides and agricultural chemicals, not elsewhere classified, in Gale's Encyclopedia of business, 2nd ed., Reference for business: accessed August 8, 2011, from http://www.referenceforbusiness.com/industries/Chemicals-Allied/Pesticides-Agricultural-Chemicals-Elsewhere-Classified.html.*
1993			The Gulf of Mexico hypoxic zone doubles in size in response to the Mississippi River Flood.		*Rabalais, N.N., Turner, R.E., and Wiseman, W.J., 2002, Gulf of Mexico hypoxia, a.k.a. "the dead zone:" Annual Review of Ecology and Systematics, v. 33, p. 235–263, accessed from http://dx.doi.org/doi:10.1146/annurev.ecolsys.33.010802.150513.*
1993					
1994				The FDA approves hormones for use to increase milk production.	Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1994	The genetically modified (GM) tomato "Flavr Savr" is introduced to commercial agriculture.				*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1994				The National Conservation Resource Service (NCRS), formerly the Soil Conservation Service, is formed and broadens conservation commitments to the Nation's soil and water resources.	*Natural Resources Conservation Service, 2011, History of NRCS: Natural Resources Conservation Service, accessed August 1, 2011, from http://www.nrcs.usda.gov/wps/portal/nrcs/main/?ss=16&navtype=SubNavigation&cid=null&navid=210160000000000&pnavid=210000000.*

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1994				An outbreak of pathogenic *Escherichia coli* (O157:H7) from ground beef consumption causes 400 illnesses and 4 deaths in the Pacific Northwest.	*Food Safety and Inspection Service, 2007, About FSIS: Food Safety and Inspection Service, accessed August 8, 2011, from http://www.fsis.usda.gov/About_FSIS/Agency_History/index.asp.*
1995			The GM "Flavr-Savr" tomato is not accepted by the market.		Allen, W., 2008, The war on bugs: White River Junction, Vt., Chelsea Green Publishing.
1995	A GM potato is introduced to commercial agriculture.				*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1995	GM canola is introduced to commercial agriculture (mid-1990s).				*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1995				The World Trade Organization (WTO) is established.	*World Trade Organization, 2011, Understanding the WTO : Basics : The GATT years : from Havana to Marrakesh: World Trade Organization, accessed May 27, 2011, from http://www.wto.org/english/thewto_e/whatis_e/tif_e/fact4_e.htm.*
1996	GM soybeans are introduced to commercial agriculture.				*GMO Compass, 2008, Crops—soybeans: GMO Compass, accessed September 29, 2011, from http://www.gmo-compass.org/eng/grocery_shopping/crops/19.genetically_modified_soybean.html.*

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1996				Passage of Food Quality Protection Act (FQPA) fundamentally changes the way the EPA regulates pesticides, requiring a complete reassessment of pesticide tolerances.	*U.S. Environmental Protection Agency, 2011, Food Quality Protection Act (FQPA) of 1996:. U.S. Environmental Protection Agency, accessed August 4, 2011, from http://www.epa.gov/pesticides/regulating/laws/fqpa/.*
1996	GM cotton is introduced to commercial agriculture.				*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1996			Widespread use of glyphosate-tolerant crops contributes to the rise in "no-till" tillage practices.		*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1996				Formation of the Environmental Quality Incentives Program (EQIP) provides technical, financial, and educational assistance for a wide range of agricultural and environmental activities.	*Zinn, J., 1998, Environmental Quality Incentive Program (EQIP) status and issues: Congressional Research Service Report for Congress, accessed November 28, 2011, at http://www.cnie.org/NLE/CRSreports/air/air-17.cfm.*
1996				Approximately 40 lawsuits are filed against the EPA and States for ignoring the TMDL section of the CWA (1995–2000).	Novotny, V., 2003, Water quality: diffuse pollution and watershed management: New York, John Wiley and Sons, Inc., 864 p.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1997	GM corn is introduced to commercial agriculture.				*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1998				Passage of the Harmful Algal Bloom and Hypoxia Research and Control Act requires a plan for controlling hypoxia in the northern Gulf of Mexico.	*Environmental Protection Agency, 2011, Mississippi River Gulf of Mexico Watershed Nutrient Task Force: U.S. Environmental Protection Agency, accessed August 3, 2011, from http://water.epa.gov/type/watersheds/named/msbasin/legislation.cfm.*
1998	GM papaya is planted in Hawaii.				*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1998	GM sugar beets are introduced to commercial agriculture.				*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
1998					

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
1999				Development of the Unified National Strategy for Animal Feeding Operations outlines a plan using existing legal regulatory authority to reduce water quality and public health impacts from improperly managed animal wastes.	*U.S. Environmental Protection Agency, 2002, Animal feeding operations unified strategy: U.S. Environmental Protection Agency, accessed August 3, 2011, from http://cfpub.epa.gov/npdes/afo/ustrategy.cfm.*
1999				The U.S. Geological Survey publishes "The Quality of Our Nation's Waters," a report focusing on nutrients and pesticides.	*U.S. Geological Survey, 1999, The quality of our nation's waters—nutrients and pesticides: U.S. Geological Survey Circular 1225, 82 p., accessed from http://pubs.usgs.gov/circ/circ1225/pdf/front.pdf.*
1999				The EPA restricts the use of azinphos-methyl and bans methyl parathion (organophosphate insecticides).	*Gale Group, Inc., 2011, Pesticides and agricultural chemicals, not elsewhere classified, in Gale's Encyclopedia of business, 2nd ed., Reference for business: accessed August 8, 2011, from http://www.referenceforbusiness.com/industries/Chemicals-Allied/Pesticides-Agricultural-Chemicals-Elsewhere-Classified.html.*
2000				A CCC Bioenergy Program is established to stimulate demand, alleviate crop surpluses, and encourage new production of biofuels.	*Duffield, J.A., and Collins, K., 2006, Evolution of renewable energy policy: Agricultural and Applied Economics Association, Choices—The Magazine of Food, Farm, and Resource Issues, v. 21, no. 1, p. 9–14, accessed August 5, 2011, from http://www.choicesmagazine.org/2006-1/biofuels/2006-1-02.htm.*

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
2001			*Bacillus thuringiensis* (Bt) plant-incorporated biopesticides (insecticide) are registered for use by the EPA.		U.S. Environmental Protection Agency, 2001, Biopesticides registration action document—*Bacillus thuringiensis* plant-incorporated protectants: U. S. Environmental Protection Agency Office of Pesticide Programs, p 27.
2002				Passage of the Farm Security and Rural Investment Act of 2002 creates a National Dairy Program and significantly increases spending for conservation programs, thus creating the Conservation Security Program and the Grasslands	*The National Agricultural Law Center., 2011, Farm bill definitions: accessed August 8, 2011, from http://www.nationalaglawcenter.org/assets/farmbills/glossary.html#steagall.*
2002				The organic labeling system is implemented by the USDA.	*Johnson, R., 2008, CRS Report for Congress, organic agriculture in the United States: program and policy issues: Congressional Research Service Order Code RL31595, 13 p., accessed from http://www.nationalaglawcenter.org/assets/crs/RL31595.pdf.*
2002				2002 is the final year the EPA tracks the use of pesticides.	*Ritter, S.K., 2009, Pinpointing trends in pesticide use: American Chemical Society, Chemical and Engineering News, v. 87, no. 7, accessed August 7, 2011, from http://pubs.acs.org/cen/coverstory/87/8707cover1a.html.*
2003			Major chicken producers renounce the use of antibiotics in feed for growth enhancement.		Conkin, P.K., 2008, A revolution down on the farm—the transformation of American agriculture since 1929: Lexington, The University Press of Kentucky.

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
2003		Subsurface drip irrigation systems for improved yield in corn are tested.			*Vories, E.D., Tacker, P.L., Lancaster, S.W., and Glover, R.E., 2009, Subsurface drip irrigation of corn in the United States Mid-South: Agricultural Water Management, v. 9, no. 6, p. 912–916, accessed from http://dx.doi.org/doi:10.1016/j.agwat.2008*
2004			Bt-resistant populations of bollworm are found during 2003–06 in Mississippi and Arkansas.		*Jensen, M.N., 2008, First documented case of pest resistance to biotech cotton: University of Arizona, UANews, accessed November 25, 2011, from http://uanews.org/node/18178.*
2005				Passage of the Energy Policy Act of 2005 supports the increased use of biofuels.	*U.S. Environmental Protection Agency, 2011, Summary of the Energy Policy Act of 2005: U.S. Environmental Protection Agency, accessed September 8, 2011, from http://www.epa.gov/lawsregs/laws/epa.html.*
2007				Energy Independence and Security Act (EISA) provisions designed to increase energy efficiency and the availability of renewable energy are passed.	*U.S. Environmental Protection Agency, 2011, Energy Independence and Security Act of 2007: key provisions affecting combined heat and power: U. S. Environmental Protection Agency, Combined Heat and Power Partnership, accessed September 29, 2011, from http://www.epa.gov/chp/documents/chp_energybill.pdf.*
2008		Wind farms generate electricity in 31 States.			*U.S. Energy Information Administration, 2011, Wind energy: U.S. Energy Information Administration, accessed June 8, 2011, from http://tonto.eia.doe.gov/kids/energy.cfm?page=wind_home-basics-k.cfm.*

Table 2. Timeline of selected agricultural events in the United States that are broadly related to environmental quality.

Year	Crop (landscape) and animal changes	Mechanical changes	Biological and chemical changes	Regulatory and societal changes	References
2008			Crop agriculture is the largest producer of nitrous oxide (greenhouse gas), producing 70 percent of annual emissions (2008).		*U.S. Environmental Protection Agency, 2010, Nitrous oxide—sources and emissions: U. S. Environmental Protection Agency, accessed September 29, 2011, from http://www.epa.gov/nitrousoxide/sources.html.*
2008				Formation of the Environmental (Ecosystems) Service Markets Program develops market and trading opportunities for farmers and landowners as a source of environmental offsets (2008 Farm Bill).	*Johnson, R., 2008, CRS Report for Congress, organic agriculture in the United States: program and policy issues: Congressional Research Service Order Code RL31595, 13 p., accessed from http://www.nationalaglawcenter.org/assets/crs/RL31595.pdf.*
2009			The use of woodchip bioreactors is introduced to remove chemicals from agricultural water.		*Jaynes, D., Kaspar, T., Moorman, T., and Parkin, T., 2006, In-field bioreactor for removing nitrate from tile drainage: Agricultural Research Service National Soil Tilth Laboratory, accessed from http://crops.confex.com/crops/viewHandout.cgi?uploadid=1343.*
2010			Ten weed species evolve resistance to glyphosate, an herbicide (1996–2010).		*National Research Council, 2010, The impact of genetically engineered crops on farm sustainability in the United States: The National Academies Press, p. 250, accessed from http://www.nap.edu/catalog.php?record_id=12804.*
2011	GM alfalfa is introduced to commercial agriculture.				*Animal and Plant Health Inspection Service, 2011, Biotechnology—roundup ready alfalfa: Animal and Plant Health Inspection Service, accessed November 26, 2011, from http://www.aphis.usda.gov/biotechnology/alfalfa.shtml.*

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

[Sources of information, referenced by column, used in table 3 are found in "Table 3 Sources of information." AI, active ingredient; lack of data is indicated by a blank table cell]

Year	Corn for grain (millions of hectares harvested)	Corn grain yield (kilograms per hectare)	Corn for silage (millions of hectares harvested)	Corn silage yield (kilograms per hectare)	Corn (millions of hectares planted)	Corn grain for human food (thousands of megagrams)	Corn grain for animal feed (thousands of megagrams)	Corn grain for seed (thousands of megagrams)	Corn grain for export (thousands of megagrams)
1850									
1851									
1852									
1853									
1854									
1855									
1856									
1857									
1858									
1859									
1860									
1861									
1862									
1863									
1864									
1865									
1866	12	1,525							
1867	13	1,550							
1868	14	1,644							
1869	15	1,368							
1870	16	1,839							
1871	17	1,707							
1872	18	1,845							
1873	18	1,437							
1874	19	1,393							
1875	21	1,739							

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Year	Corn for grain (millions of hectares harvested)	Corn grain yield (kilograms per hectare)	Corn for silage (millions of hectares harvested)	Corn silage yield (kilograms per hectare)	Corn (millions of hectares planted)	Corn grain for human food (thousands of megagrams)	Corn grain for animal feed (thousands of megagrams)	Corn grain for seed (thousands of megagrams)	Corn grain for export (thousands of megagrams)
1876	22	1,676							
1877	24	1,619							
1878	24	1,644							
1879	25	1,770							
1880	25	1,714							
1881	26	1,243							
1882	27	1,663							
1883	28	1,519							
1884	28	1,776							
1885	29	1,795							
1886	30	1,513							
1887	30	1,375							
1888	31	1,827							
1889	31	1,852							
1890	30	1,387							
1891	32	1,858							
1892	31	1,550							
1893	32	1,494							
1894	32	1,268							
1895	37	1,757							
1896	36	1,883							
1897	36	1,594							
1898	36	1,682							
1899	38	1,757							
1900	38	1,764							
1901	38	1,142							
1902	39	1,789							
1903	38	1,688							

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Year	Corn for grain (millions of hectares harvested)	Corn grain yield (kilograms per hectare)	Corn for silage (millions of hectares harvested)	Corn silage yield (kilograms per hectare)	Corn (millions of hectares planted)	Corn grain for human food (thousands of megagrams)	Corn grain for animal feed (thousands of megagrams)	Corn grain for seed (thousands of megagrams)	Corn grain for export (thousands of megagrams)
1904	39	1,770							
1905	39	1,939							
1906	39	1,990							
1907	39	1,707							
1908	39	1,688							
1909	41	1,638							
1910	41	1,751							
1911	41	1,532							
1912	41	1,827							
1913	41	1,425							
1914	40	1,619							
1915	41	1,764							
1916	41	1,513							
1917	45	1,644							
1918	41	1,500							
1919	35	1,682	1	17,037					
1920	36	1,877	1	17,037					
1921	37	1,745	1	17,261					
1922	34	1,651	1	16,813					
1923	35	1,745	2	16,813					
1924	34	1,387	2	15,019					
1925	35	1,720	1	17,934					
1926	34	1,613	2	15,692	40				
1927	34	1,657	2	15,692	40				
1928	35	1,651	2	16,813	41				
1929	34	1,613	2	16,364	40				
1930	35	1,287	2	13,899	42				
1931	37	1,538	2	15,692	44				

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Year	Corn for grain (millions of hectares harvested)	Corn grain yield (kilograms per hectare)	Corn for silage (millions of hectares harvested)	Corn silage yield (kilograms per hectare)	Corn (millions of hectares planted)	Corn grain for human food (thousands of megagrams)	Corn grain for animal feed (thousands of megagrams)	Corn grain for seed (thousands of megagrams)	Corn grain for export (thousands of megagrams)
1932	39	1,663	2	16,813	46				
1933	37	1,431	2	15,019	44				
1934	25	1,174	3	10,984	41				
1935	33	1,519	2	15,916	40				
1936	27	1,167	3	8,967	41				
1937	33	1,814	2	15,244	39				
1938	34	1,745	2	17,709	38				
1939	32	1,877	2	16,589	37				
1940	31	1,814	2	16,364	36				
1941	31	1,958	2	18,830	35				
1942	32	2,222	2	19,503	36				
1943	33	2,046	2	18,158	38				
1944	34	2,071	2	17,485	39				
1945	32	2,078	2	17,485	36				
1946	32	2,335	2	17,709	36				
1947	30	1,795	2	16,589	34				
1948	31	2,699	2	19,503	35				
1949	31	2,398	2	20,175	35				
1950	29	2,398	2	18,606	34				
1951	29	2,316	2	18,158	34				
1952	29	2,624	2	18,158	33				
1953	29	2,555	2	17,485	33				
1954	28	2,473	3	16,589	33				
1955	28	2,636	3	17,037	33				
1956	26	2,975	3	18,830	31				
1957	26	3,032	2	19,727	30				
1958	26	3,314	3	19,951	30				
1959	29	3,333	3	19,054	33				

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Year	Corn for grain (millions of hectares harvested)	Corn grain yield (kilograms per hectare)	Corn for silage (millions of hectares harvested)	Corn silage yield (kilograms per hectare)	Corn (millions of hectares planted)	Corn grain for human food (thousands of megagrams)	Corn grain for animal feed (thousands of megagrams)	Corn grain for seed (thousands of megagrams)	Corn grain for export (thousands of megagrams)
1960	29	3,433	3	20,399	33				
1961	23	3,917	3	23,762	27				
1962	23	4,061	3	23,986	26				
1963	24	4,262	3	24,210	28				
1964	22	3,948	3	21,744	27				
1965	22	4,651	3	23,538	26				
1966	23	4,588	3	25,331	27				
1967	25	5,028	3	25,331	29				
1968	23	4,990	3	26,676	26				
1969	22	5,392	3	28,245	26				
1970	23	4,544	3	26,004	27				
1971	26	5,530	4	27,797	30				
1972	23	6,088	3	29,366	27				
1973	25	5,731	4	28,470	29				
1974	26	4,513	4	23,986	32				
1975	27	5,423	4	26,452	32				
1976	29	5,523	5	23,538	34				
1977	29	5,699	4	28,245	34				
1978	29	6,339	3	30,711	33				
1979	29	6,873	3	32,280	33				
1980	30	5,712	4	26,900	34	16,231	107,501	513	60,736
1981	30	6,835	3	31,832	34	18,136	107,816	493	50,720
1982	29	7,105	3	32,056	33	21,337	116,165	368	46,264
1983	21	5,090	3	27,573	24	23,140	98,461	485	47,916
1984	29	6,697	3	31,160	33	26,569	104,513	539	46,998
1985	30	7,407	3	32,056	34	28,779	104,505	495	31,175
1986	28	7,494	3	31,608	31	30,906	118,355	424	37,910
1987	24	7,519	2	32,280	27	31,356	121,652	437	43,599

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Year	Corn for grain (millions of hectares harvested)	Corn grain yield (kilograms per hectare)	Corn for silage (millions of hectares harvested)	Corn silage yield (kilograms per hectare)	Corn (millions of hectares planted)	Corn grain for human food (thousands of megagrams)	Corn grain for animal feed (thousands of megagrams)	Corn grain for seed (thousands of megagrams)	Corn grain for export (thousands of megagrams)
1988	24	5,310	3	21,296	27	32,497	99,925	467	51,525
1989	26	7,300	3	29,142	29	34,320	111,319	480	60,132
1990	27	7,438	2	31,832	30	35,709	117,071	490	43,858
1991	28	6,816	2	29,590	31	38,439	121,872	513	40,233
1992	29	8,254	2	32,280	32	39,043	133,408	475	42,249
1993	25	6,321	3	26,676	30	40,467	118,873	511	33,741
1994	29	8,700	2	35,419	32	43,104	138,681	465	55,310
1995	26	7,124	2	32,953	29	40,844	119,194	512	56,589
1996	29	7,978	2	34,522	32	43,027	134,042	515	45,655
1997	29	7,953	2	36,091	32	46,120	138,447	519	38,214
1998	29	8,436	2	36,091	32	46,788	138,496	501	50,400
1999	29	8,398	2	35,419	31	48,648	143,332	514	49,191
2000	29	8,593	2	37,660	32	49,725	147,886	490	49,312
2001	28	8,674	2	37,212	31	51,865	148,564	509	48,383
2002	28	8,116	3	32,280	32	59,307	140,933	507	40,334
2003	29	8,925	3	36,540	32	64,222	146,849	522	48,257
2004	30	10,062	2	39,454	33	68,243	155,837	528	46,180
2005	30	9,283	2	40,350	33	76,179	155,329	505	54,201
2006	29	9,359	3	36,315	32	89,345	140,725	603	53,986
2007	35	9,459	2	39,230	38	112,283	148,792	555	61,912
2008	32	9,660	2	41,920	35	127,088	131,624	557	46,965
2009	32	10,338	2	43,265	35	150,280	130,573	567	50,462
2010	33	9,591	2	43,265	36			582	

[1.] Could have multiple genetic traits within one plant; therefore, the area could be greater than the total actually planted—for example, a crop with three stacked genes grown on 1 hectare would result in a value of

[2.] Average of selected states, see reference for details.

[3.] Compost, dried manure, sewage sludge, and other organic materials.

[4.] This value does not include other pesticidal agents, particularly petroleum oils and sulfur.

[5.] Table 4 lists the specific chemicals included in this category for the GfK data.

[6.] Other pesticides conventional rodenticides, mulluscicides, aquatics, fish/bird controls, and insect regulators.

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Corn grain for surplus (annual year end stock) (thousands of megagrams)	Corn grain for biofuel (thousands of megagrams)	Biofuel (ethanol) produced from corn (millions of liters)	Total corn area planted with any genetic trait (percent)	Total corn area planted with any genetic trait (millions of hectares)	Total corn area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Total corn area planted with insect-resistant genetic trait (millions of hectares)[1]	Soybean (millions of hectares planted)	Soybean (millions of hectares harvested)	Soybean yield (kilograms per hectare)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Corn grain for surplus (annual year end stock) (thousands of megagrams)	Corn grain for biofuel (thousands of megagrams)	Biofuel (ethanol) produced from corn (millions of liters)	Total corn area planted with any genetic trait (percent)	Total corn area planted with any genetic trait (millions of hectares)	Total corn area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Total corn area planted with insect-resistant genetic trait (millions of hectares)[1]	Soybean (millions of hectares planted)	Soybean (millions of hectares harvested)	Soybean yield (kilograms per hectare)

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							1	0	740
							1	0	787
							1	0	753
							1	0	820
							1	0	915
							1	0	894
							1	0	874
							2	0	1,016

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Corn grain for surplus (annual year end stock) (thousands of megagrams)	Corn grain for biofuel (thousands of megagrams)	Biofuel (ethanol) produced from corn (millions of liters)	Total corn area planted with any genetic trait (percent)	Total corn area planted with any genetic trait (millions of hectares)	Total corn area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Total corn area planted with insect-resistant genetic trait (millions of hectares)[1]	Soybean (millions of hectares planted)	Soybean (millions of hectares harvested)	Soybean yield (kilograms per hectare)
							1	0	1,016
							1	0	868
							2	1	1,002
							3	1	1,130
							2	1	962
							3	1	1,204
							3	1	1,372
							4	2	1,406
							4	2	1,089
							4	2	1,224
							6	4	1,278
							6	4	1,231
							5	4	1,264
							5	4	1,211
							5	4	1,379
							5	5	1,096
							5	4	1,432
							5	4	1,500
							6	6	1,459
							6	6	1,399
							6	6	1,392
							7	6	1,224
							8	7	1,345
							8	8	1,352
							9	8	1,466
							9	8	1,560
							10	10	1,627
							9	9	1,580

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Corn grain for surplus (annual year end stock) (thousands of megagrams)	Corn grain for biofuel (thousands of megagrams)	Biofuel (ethanol) produced from corn (millions of liters)	Total corn area planted with any genetic trait (percent)	Total corn area planted with any genetic trait (millions of hectares)	Total corn area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Total corn area planted with insect-resistant genetic trait (millions of hectares)[1]	Soybean (millions of hectares planted)	Soybean (millions of hectares harvested)	Soybean yield (kilograms per hectare)
							10	10	1,580
							11	11	1,688
							12	11	1,627
							12	12	1,641
							13	12	1,533
							14	14	1,648
							15	15	1,708
							17	16	1,648
							17	17	1,796
							17	17	1,843
							17	17	1,796
							18	17	1,849
							19	18	1,870
							23	23	1,870
							21	21	1,594
							22	22	1,944
							20	20	1,755
							24	23	2,058
							26	26	1,977
							29	28	2,159
35,361	889	5139					28	27	1,782
64,432	2,184	3685					27	27	2,024
89,490	3,556	4877					29	28	2,118
25,561	4,064	5319					26	25	1,762
41,866	5,893	5546					27	27	1,890
102,608	6,884	6141					26	25	2,293
124,000	7,366	6682					24	24	2,239
108,185	7,091	8101					24	23	2,280

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Corn grain for surplus (annual year end stock) (thousands of megagrams)	Corn grain for biofuel (thousands of megagrams)	Biofuel (ethanol) produced from corn (millions of liters)	Total corn area planted with any genetic trait (percent)	Total corn area planted with any genetic trait (millions of hectares)	Total corn area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Total corn area planted with insect-resistant genetic trait (millions of hectares)[1]	Soybean (millions of hectares planted)	Soybean (millions of hectares harvested)	Soybean yield (kilograms per hectare)
49,035	7,301	10616					24	23	1,816
34,151	8,165	12887					25	24	2,172
38,641	8,867	14780					23	23	2,293
27,949	10,116	18489					24	23	2,300
53,672	10,808	24685					24	24	2,529
21,594	11,640	35237					24	23	2,192
39,571	13,533	41404					25	25	2,784
10,819	10,051	5139					25	25	2,374
22,433	10,890	3685					26	26	2,529
33,220	12,389	4877					28	28	2,616
45,391	13,153	5319	17	5	0	4	29	29	2,616
43,627	14,373	5546	28	9	1	5	30	29	2,461
48,239	15,998	6141	29	9	2	5	30	29	2,562
40,551	17,965	6682	34	10	2	5	30	30	2,663
27,603	25,287	8101	39	12	3	6	30	29	2,556
24,336	29,657	10616	42	13	5	6	30	29	2,280
53,697	33,611	12887	49	16	7	6	30	30	2,838
49,968	40,726	14780	61	20	10	6	29	29	2,899
33,114	53,837	18489	66	21	13	5	31	30	2,885
41,255	77,453	24685	80	30	22	3	26	26	2,804
42,504	94,209	35237	87	31	27	1	31	30	2,670
43,379	116,036	41404	91	32	29	1	31	31	2,959
	127,005						31	31	2,925

[1] 3 hectares.

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Biodiesel production from soybean (millions of liters)	Biodiesel consumption (millions of liters)	Total soybean area planted with any genetic trait (percent)	Total soybean area planted with any genetic trait (millions of hectares)	Soybean area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Wheat (millions of hectares planted)	Wheat (millions of hectares harvested)	Wheat yield (kilograms per hectare)	Oats (millions of hectares planted)	Oats (millions of hectares harvested)
						6	740		3
						7	847		3
						8	868		4
						9	921		4
						8	814		4
						9	820		4
						9	794		5
						10	868		5
						11	874		5
						11	746		6

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Biodiesel production from soybean (millions of liters)	Biodiesel consumption (millions of liters)	Total soybean area planted with any genetic trait (percent)	Total soybean area planted with any genetic trait (millions of hectares)	Soybean area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Wheat (millions of hectares planted)	Wheat (millions of hectares harvested)	Wheat yield (kilograms per hectare)	Oats (millions of hectares planted)	Oats (millions of hectares harvested)
						11	733		6
						11	948		6
						14	908		6
						14	874		6
						15	888		7
						15	740		7
						15	1,016		8
						14	827		8
						16	995		9
						14	767		9
						15	948		10
						15	894		11
						14	814		11
						15	942		12
						15	820		11
						17	1,110		11
						17	955		11
						17	834		12
						16	908		12
						16	935		13
						17	861		12
						18	942		12
						20	1,022		12
						21	841		12
						20	820		13
						21	1,009		13
						19	1,002		13
						20	921		13

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Biodiesel production from soybean (millions of liters)	Biodiesel consumption (millions of liters)	Total soybean area planted with any genetic trait (percent)	Total soybean area planted with any genetic trait (millions of hectares)	Soybean area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Wheat (millions of hectares planted)	Wheat (millions of hectares harvested)	Wheat yield (kilograms per hectare)	Oats (millions of hectares planted)	Oats (millions of hectares harvested)
						17	868		13
						19	1,022		14
						19	1,076		14
						18	955		14
						18	962		14
						18	1,042		14
						19	921		15
						20	834		15
						20	1,016		15
						21	968		15
						23	1,083		15
						24	1,123		16
						22	800		16
						19	888		17
						25	995		17
					31	30	868		16
					28	25	908		17
					27	26	854		18
					27	25	928		16
					26	23	894		16
					23	21	1,076		17
					25	21	861		18
					25	23	989	18	17
					27	24	989	16	16
					29	24	1,036	16	16
					27	26	874	16	15
					27	25	955	17	16
					27	23	1,096	18	16

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Biodiesel production from soybean (millions of liters)	Biodiesel consumption (millions of liters)	Total soybean area planted with any genetic trait (percent)	Total soybean area planted with any genetic trait (millions of hectares)	Soybean area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Wheat (millions of hectares planted)	Wheat (millions of hectares harvested)	Wheat yield (kilograms per hectare)	Oats (millions of hectares planted)	Oats (millions of hectares harvested)
					27	23	881	18	17
					28	20	753	18	15
					26	18	814	16	12
					28	21	820	18	16
					30	20	861	17	14
					33	26	915	16	14
					32	28	894	16	15
					25	21	948	15	14
					25	22	1,029	16	14
					25	23	1,130	17	15
					21	20	1,311	17	15
					23	21	1,103	18	16
					27	24	1,190	18	16
					28	26	1,143	19	17
					29	27	1,157	19	17
					32	30	1,224	17	15
					32	29	1,204	18	16
					34	31	975	17	15
					29	25	1,110	18	16
					32	25	1,076	17	14
					32	29	1,237	17	15
					32	27	1,163	17	15
					25	22	1,217	19	16
					24	19	1,332	19	16
					25	20	1,358	18	13
					20	18	1,466	17	14
					23	21	1,849	15	13
					23	21	1,453	14	11

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Biodiesel production from soybean (millions of liters)	Biodiesel consumption (millions of liters)	Total soybean area planted with any genetic trait (percent)	Total soybean area planted with any genetic trait (millions of hectares)	Soybean area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Wheat (millions of hectares planted)	Wheat (millions of hectares harvested)	Wheat yield (kilograms per hectare)	Oats (millions of hectares planted)	Oats (millions of hectares harvested)
					22	21	1,755	13	11
					23	21	1,607	13	10
					20	18	1,681	12	9
					22	18	1,695	11	9
					23	20	1,735	10	8
					23	20	1,782	10	7
					22	20	1,769	9	7
					27	24	1,735	8	7
					25	22	1,910	9	7
					22	19	2,058	10	7
					20	18	2,085	10	8
					22	19	2,280	9	6
					22	19	2,199	8	5
					24	22	2,125	8	6
					29	26	1,836	7	5
					30	28	2,058	7	5
					33	29	2,038	7	5
					31	27	2,065	7	5
					27	23	2,112	7	5
					29	25	2,300	6	4
					33	29	2,253	5	4
					36	33	2,320	6	4
					35	32	2,387	6	4
					31	25	2,650	8	4
					32	27	2,609	5	3
					31	26	2,522	5	3
					29	25	2,313	6	3
					27	23	2,535	7	3

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Biodiesel production from soybean (millions of liters)	Biodiesel consumption (millions of liters)	Total soybean area planted with any genetic trait (percent)	Total soybean area planted with any genetic trait (millions of hectares)	Soybean area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Wheat (millions of hectares planted)	Wheat (millions of hectares harvested)	Wheat yield (kilograms per hectare)	Oats (millions of hectares planted)	Oats (millions of hectares harvested)
					27	22	2,293	6	2
					31	25	2,199	5	3
					31	28	2,656	4	2
					28	23	2,307	4	2
					29	25	2,643	3	2
					29	25	2,569	3	2
					28	25	2,529	3	2
					28	25	2,408	3	1
					30	25	2,441	2	1
					28	25	2,656	2	1
		41	12	11	27	24	2,905	2	1
		60	18	17	25	22	2,872	2	1
		67	20	19	25	21	2,825	2	1
34	38	76	23	22	24	20	2,704	2	1
38	61	84	25	24	24	19	2,354	2	1
53	53	89	27	26	25	21	2,973	2	1
106	102	91	27	27	24	20	2,905	2	1
344	344	92	27	27	23	20	2,825	2	1
946	988	94	29	28	23	19	2,596	2	1
1,855	1,355	96	25	25	24	21	2,704	2	1
2,566	1,196	97	29	29	26	23	3,020	1	1
2,014	1,283	95	30	30	24	20	2,993	1	1
1,177	840				22	19	3,120	1	1

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Oats yield (kilograms per hectare)	Cotton (millions of hectares planted)	Cotton (millions of hectares harvested)	Cotton yield (kilograms per hectare)	Total cotton area planted with any genetic trait (percent)	Total cotton area planted with any genetic trait (millions of hectares)	Cotton area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Cotton area planted with insect-resistant genetic trait (millions of hectares)[1]	Hay (millions hectares harvested)	Hay yield (kilograms per hectare)
1,051		3	137						
976		3	160						
925		3	169						
1,065		3	174						
929		4	233						
994		3	178						
994		4	204						
918		4	188						
764		4	176						
961		5	203						

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Oats yield (kilograms per hectare)	Cotton (millions of hectares planted)	Cotton (millions of hectares harvested)	Cotton yield (kilograms per hectare)	Total cotton area planted with any genetic trait (percent)	Total cotton area planted with any genetic trait (millions of hectares)	Cotton area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Cotton area planted with insect-resistant genetic trait (millions of hectares)[1]	Hay (millions hectares harvested)	Hay yield (kilograms per hectare)
803		5	188						
1,054		5	191						
1,004		5	188						
933		6	203						
915		6	214						
947		7	167						
1,015		6	234						
1,054		7	182						
1,044		7	174						
1,037		7	191						
1,001		7	184						
950		8	196						
997		8	191						
1,040		8	198						
771		8	220						
1,080		9	223						
918		8	189						
868		8	196						
911		9	245						
1,072		8	193						
918		9	196						
1,033		10	234						
1,029		10	250						
1,148		10	207						
1,094		10	219						
929		11	188						
1,230		11	207						
986		11	191						

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Oats yield (kilograms per hectare)	Cotton (millions of hectares planted)	Cotton (millions of hectares harvested)	Cotton yield (kilograms per hectare)	Total cotton area planted with any genetic trait (percent)	Total cotton area planted with any genetic trait (millions of hectares)	Cotton area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Cotton area planted with insect-resistant genetic trait (millions of hectares)[1]	Hay (millions hectares harvested)	Hay yield (kilograms per hectare)
1,108		12	240						
1,184		11	204						
1,090		13	226						
836		12	194						
868		13	229						
1,037	13	12	176						
1,076	13	13	197						
854	14	14	241						
1,302	13	13	225						
1,001	14	14	215						
1,029	15	14	242						
1,327	12	12	201						
1,044	14	13	186						
1,245	13	13	187						
1,205	15	14	184						
1,001	14	13	186					30	2,825
1,212	15	14	210					30	2,825
825	12	12	149					30	2,600
1,022	13	13	167					31	2,825
1,094	15	14	152					30	2,735
1,212	16	16	185					30	2,757
1,141	19	18	195					28	2,511
965	19	18	216					28	2,488
972	16	16	182					29	3,049
1,173	18	17	183					27	2,802
1,047	18	17	184					28	2,825
1,148	18	17	176					27	2,466
1,004	16	16	238					28	2,466

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Oats yield (kilograms per hectare)	Cotton (millions of hectares planted)	Cotton (millions of hectares harvested)	Cotton yield (kilograms per hectare)	Total cotton area planted with any genetic trait (percent)	Total cotton area planted with any genetic trait (millions of hectares)	Cotton area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Cotton area planted with insect-resistant genetic trait (millions of hectares)[1]	Hay (millions hectares harvested)	Hay yield (kilograms per hectare)
1,080	15	15	195					28	2,668
725	16	12	239					28	2,466
664	11	11	193					26	2,085
1,083	11	11	207					28	2,959
846	12	12	223					27	2,309
1,187	14	14	303					27	2,825
1,083	10	10	265					28	3,004
1,026	10	10	267					28	2,802
1,263	10	10	284					30	2,937
1,112	9	9	260					30	2,937
1,263	9	9	305					30	3,228
1,051	9	9	285					31	3,004
1,037	8	8	335					31	2,981
1,309	7	7	285					31	3,138
1,237	8	7	265					30	3,026
1,115	9	9	299					30	3,026
1,323	10	9	349					29	3,004
1,159	11	11	316					29	2,981
1,248	8	7	302					30	3,094
1,302	12	11	302					30	3,273
1,180	11	10	314					30	3,183
1,101	11	10	363					30	3,228
1,248	8	8	382					30	3,273
1,374	7	7	467					30	3,363
1,237	7	6	458					29	3,340
1,359	6	5	435					29	3,744
1,607	5	5	522					29	3,811
1,356	6	6	517					27	3,744

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Oats yield (kilograms per hectare)	Cotton (millions of hectares planted)	Cotton (millions of hectares harvested)	Cotton yield (kilograms per hectare)	Total cotton area planted with any genetic trait (percent)	Total cotton area planted with any genetic trait (millions of hectares)	Cotton area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Cotton area planted with insect-resistant genetic trait (millions of hectares)[1]	Hay (millions hectares harvested)	Hay yield (kilograms per hectare)
1,557	7	6	500					27	3,945
1,517	7	6	491					27	3,901
1,621	7	6	512					27	4,035
1,625	6	6	579					27	3,968
1,546	6	6	579					27	3,945
1,801	6	6	591					27	4,170
1,610	4	4	538					26	4,214
1,768	4	3	501					26	4,439
1,926	4	4	578					25	4,573
1,926	5	4	486					24	4,730
1,765	5	5	491					25	4,640
2,005	5	5	491					25	4,708
1,847	6	5	568					24	4,820
1,718	5	5	583					25	4,864
1,707	6	5	495					24	4,708
1,757	4	4	508					25	4,842
1,639	5	4	521					24	4,461
2,001	6	5	583					25	4,864
1,876	5	5	471					25	5,201
1,951	6	5	613					25	5,380
1,901	6	5	453					24	4,977
1,944	6	6	607					24	5,358
2,073	5	4	661					24	5,604
1,887	3	3	569					24	5,290
2,080	5	4	673					25	5,492
2,281	4	4	706					24	5,515
2,019	4	3	619					25	5,582
1,948	4	4	791					24	5,492

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Oats yield (kilograms per hectare)	Cotton (millions of hectares planted)	Cotton (millions of hectares harvested)	Cotton yield (kilograms per hectare)	Total cotton area planted with any genetic trait (percent)	Total cotton area planted with any genetic trait (millions of hectares)	Cotton area planted with glyphosate-tolerant genetic trait (millions of hectares)[1]	Cotton area planted with insect-resistant genetic trait (millions of hectares)[1]	Hay (millions hectares harvested)	Hay yield (kilograms per hectare)
1,410	5	5	694					26	4,349
1,948	4	4	688					25	5,178
2,156	5	5	711					25	5,380
1,815	6	5	731					25	5,515
2,346	5	5	785					24	5,582
1,951	5	5	679					24	5,515
2,048	6	5	794					24	5,716
1,958	7	6	602					24	5,784
2,070	6	5	790					25	5,492
2,134	6	5	754					25	5,604
2,159	5	4	701	40	2	1	0	24	5,649
2,138	6	5	680	57	3	2	1	26	5,671
2,303	6	5	708	67	4	3	0	24	5,694
2,206	6	6	790	73	5	4	0	26	5,515
2,023	6	5	745	71	4	4	0	26	5,246
2,331	5	5	818	73	4	4	0	26	5,559
2,321	6	5	958	80	4	4	0	25	5,716
2,260	6	6	931	85	5	5	0	25	5,470
2,145	6	5	912	84	5	5	0	25	5,201
2,156	4	4	985	89	4	4	0	25	5,402
2,285	4	3	911	87	3	3	0	24	5,447
2,421	4	3	871	89	3	3	0	24	5,537
2,306	4	4	910					24	5,447

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Beef cows that have calved (millions of head)	Dairy cattle that have calved (millions of head)	Milk produced (millions of liters)	Sheep and lambs (millions of head)	Hogs and pigs (millions of head)	Turkeys (thousands of head)	Chickens, broilers (millions of head)	Eggs produced (millions)	Nitrogen fertilizer applied (thousands of megagrams as N)—USGS	Nitrogen fertilizer applied (thousands of megagrams as N)—USDA

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Beef cows that have calved (millions of head)	Dairy cattle that have calved (millions of head)	Milk produced (millions of liters)	Sheep and lambs (millions of head)	Hogs and pigs (millions of head)	Turkeys (thousands of head)	Chickens, broilers (millions of head)	Eggs produced (millions)	Nitrogen fertilizer applied (thousands of megagrams as N)—USGS	Nitrogen fertilizer applied (thousands of megagrams as N)—USDA

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Beef cows that have calved (millions of head)	Dairy cattle that have calved (millions of head)	Milk produced (millions of liters)	Sheep and lambs (millions of head)	Hogs and pigs (millions of head)	Turkeys (thousands of head)	Chickens, broilers (millions of head)	Eggs produced (millions)	Nitrogen fertilizer applied (thousands of megagrams as N)—USGS	Nitrogen fertilizer applied (thousands of megagrams as N)—USDA
		337,773							
		343,296							
		353,235							
		360,226							
		362,766							
		374,670							
		379,098							
		389,965							

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Beef cows that have calved (millions of head)	Dairy cattle that have calved (millions of head)	Milk produced (millions of liters)	Sheep and lambs (millions of head)	Hogs and pigs (millions of head)	Turkeys (thousands of head)	Chickens, broilers (millions of head)	Eggs produced (millions)	Nitrogen fertilizer applied (thousands of megagrams as N)—USGS	Nitrogen fertilizer applied (thousands of megagrams as N)—USDA
		392,921							
		396,524							
		384,635							
		383,061							
		387,622							
		385,722							
		400,479							
		404,208							
		414,124							
		435,608							
		448,647							
		442,909							
		442,932							
		453,549						540	
		445,483						600	
		442,141						676	
		426,460						741	
		439,450						796	
		441,339						867	
		434,068						1,062	
		434,030						1,241	
		455,036						1,436	
		462,126						1,623	
		465,347						1,721	
		472,595						1,702	
		471,717						1,873	
		466,388						2,026	
		461,728						2,374	

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Beef cows that have calved (millions of head)	Dairy cattle that have calved (millions of head)	Milk produced (millions of liters)	Sheep and lambs (millions of head)	Hogs and pigs (millions of head)	Turkeys (thousands of head)	Chickens, broilers (millions of head)	Eggs produced (millions)	Nitrogen fertilizer applied (thousands of megagrams as N)—USGS	Nitrogen fertilizer applied (thousands of megagrams as N)—USDA
		465,968						2,436	2,484
		475,801						2,697	2,749
		477,860						2,996	3,057
		473,890						3,509	3,564
		480,570						3,892	3,949
		470,021						4,154	4,208
		453,867						4,785	4,832
		449,401						5,418	5,468
		443,697						6,110	6,158
		439,469						6,261	6,312
		442,871						6,718	6,767
		448,772						7,329	7,379
		454,295						7,238	7,278
		437,133						7,413	7,525
		437,493						8,258	8,307
		436,781						7,765	7,803
		454,881						9,404	9,445
		464,245						9,609	9,659
		459,730						8,990	9,040
		466,880						9,671	9,720
37	11	486,017	13	64	165	3,963	69,686	10,291	10,348
39	11	502,534	13	59	171	4,148	69,825	10,657	10,817
39	11	512,886	13	54	165	4,149	69,718	10,011	9,964
38	11	528,341	12	57	171	4,184	68,169	8,308	8,280
37	11	512,304	12	54	171	4,283	68,222	10,077	10,063
35	11	541,300	11	52	185	4,470	68,645	10,399	10,426
34	11	541,724	10	51	207	4,649	69,106	9,720	9,457
34	10	540,154	11	54	240	5,004	70,356	9,228	9,262

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Beef cows that have calved (millions of head)	Dairy cattle that have calved (millions of head)	Milk produced (millions of liters)	Sheep and lambs (millions of head)	Hogs and pigs (millions of head)	Turkeys (thousands of head)	Chickens, broilers (millions of head)	Eggs produced (millions)	Nitrogen fertilizer applied (thousands of megagrams as N)—USGS	Nitrogen fertilizer applied (thousands of megagrams as N)—USDA
33	10	548,954	11	55	242	5,238	69,878	9,505	9,536
32	10	544,635	11	54	261	5,517	67,503	9,063	9,609
32	10	559,124	11	54	282	5,864	68,134	10,017	10,048
33	10	559,033	11	58	285	6,137	69,465	10,205	10,239
33	10	570,956	11	58	290	6,402	70,749	10,347	10,384
33	10	570,157	10	58	288	6,694	71,936	10,303	10,335
35	10	581,384	10	60	287	7,018	73,903	11,439	11,469
35	9	587,780	9	58	292	7,326	74,764	10,598	10,631
35	9	582,913	8	56	303	7,597	76,377	11,196	11,161
34	9	590,804	8	61	301	7,764	77,532	11,176	11,206
34	9	595,237	8	62	286	7,934	79,777	11,140	11,170
34	9	615,399	7	59	270	8,146	82,946	11,268	11,296
34	9	633,583	7	59	270	8,284	84,717	11,161	11,189
33	9	625,782	7	60	273	8,390	86,093	10,432	10,464
33	9	643,688	7	60	275	8,591	87,252	10,869	10,895
32	9	644,767	6	60	270	8,493	87,516	10,944	10,970
33	9	646,599	6	61	256	8,741	89,198	11,796	11,819
33	9	669,684	6	61	250	8,872	90,343	11,164	11,191
33	9	688,045	6	63	256	8,868	91,788	10,903	10,926
33	9	702,700	6	68	267	8,907	91,101		11,970
32	9	719,082	6	67	273	9,009	90,040		11,395
32	9	716,629	6	66	247	8,551	90,359		10,372
		729,820	6						11,415

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphorous fertilizer applied (thousands of megagrams as P)—USGS	Phosphate fertilizer applied (thousands of megagrams as P_2O_5)—USDA	Potassium fertilizer (potash) applied (thousands of megagrams as K_2O)	Corn area treated with nitrogen (percent)[2]	Nitrogen applied to corn (thousands of megagrams as N)[2]	Nitrogen application rate to corn (kilograms N/ hectare)[2]	Corn area treated with phosphate (percent)[2]	Phosphate applied to corn (thousands of megagrams as P_2O_5)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphorous fertilizer applied (thousands of megagrams as P)—USGS	Phosphate fertilizer applied (thousands of megagrams as P_2O_5)—USDA	Potassium fertilizer (potash) applied (thousands of megagrams as K_2O)	Corn area treated with nitrogen (percent)[2]	Nitrogen applied to corn (thousands of megagrams as N)[2]	Nitrogen application rate to corn (kilograms N/ hectare)[2]	Corn area treated with phosphate (percent)[2]	Phosphate applied to corn (thousands of megagrams as P_2O_5)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphorous fertilizer applied (thousands of megagrams as P)—USGS	Phosphate fertilizer applied (thousands of megagrams as P_2O_5)—USDA	Potassium fertilizer (potash) applied (thousands of megagrams as K_2O)	Corn area treated with nitrogen (percent)[2]	Nitrogen applied to corn (thousands of megagrams as N)[2]	Nitrogen application rate to corn (kilograms N/ hectare)[2]	Corn area treated with phosphate (percent)[2]	Phosphate applied to corn (thousands of megagrams as P_2O_5)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphorous fertilizer applied (thousands of megagrams as P)—USGS	Phosphate fertilizer applied (thousands of megagrams as P_2O_5)—USDA	Potassium fertilizer (potash) applied (thousands of megagrams as K_2O)	Corn area treated with nitrogen (percent)[2]	Nitrogen applied to corn (thousands of megagrams as N)[2]	Nitrogen application rate to corn (kilograms N/ hectare)[2]	Corn area treated with phosphate (percent)[2]	Phosphate applied to corn (thousands of megagrams as P_2O_5)[2]
530							
609							
680							
726							
761							
764							
826							
864							
892							
878							
897							
883							
900							
902							
1,003							

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphorous fertilizer applied (thousands of megagrams as P)—USGS	Phosphate fertilizer applied (thousands of megagrams as P_2O_5)—USDA	Potassium fertilizer (potash) applied (thousands of megagrams as K_2O)	Corn area treated with nitrogen (percent)[2]	Nitrogen applied to corn (thousands of megagrams as N)[2]	Nitrogen application rate to corn (kilograms N/ hectare)[2]	Corn area treated with phosphate (percent)[2]	Phosphate applied to corn (thousands of megagrams as P_2O_5)[2]
1,011	2,333	1,953					
1,039	2,400	1,968					
1,102	2,546	2,060					
1,206	2,788	2,271					
1,328	3,064	2,477	85	1,472	65	78	955
1,383	3,186	2,572	88	1,951	84	82	1,212
1,521	3,535	2,922	91	2,355	96	86	1,475
1,696	3,905	3,304	92	2,762	104	87	1,685
1,757	4,040	3,441	92	2,826	117	89	1,683
1,839	4,233	3,531	93	2,982	123	87	1,623
1,801	4,149	3,661	94	3,193	126	90	1,938
1,894	4,357	3,838	94	3,384	120	88	1,836
1,915	4,413	3,925	96	3,361	129	90	1,809
2,004	4,613	4,218	93	3,475	128	86	1,803
2,009	4,626	4,611	94	3,423	115	87	1,907
1,777	4,089	4,040	94	3,524	118	86	1,781
2,062	4,743	4,726	97	4,727	142	90	2,313
2,217	5,107	5,293	96	4,700	143	88	2,289
2,003	4,623	5,013	95	4,435	141	87	2,192
2,207	5,086	5,665	96	4,785	151	89	2,267
2,124	4,928	5,665	96	4,758	146	87	2,189
2,142	4,930	5,733	97	5,069	154	90	2,301
1,903	4,367	5,108	97	4,862	151	88	2,124
1,642	3,754	4,383	96	3,592	154	88	1,539
1,946	4,446	5,259	97	4,890	155	87	2,066
1,832	4,226	5,038	97	5,140	157	86	1,953
1,650	3,790	4,584	95	4,361	148	84	1,782
1,579	3,636	4,388	96	3,805	148	83	1,520

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphorous fertilizer applied (thousands of megagrams as P)—USGS	Phosphate fertilizer applied (thousands of megagrams as P_2O_5)—USDA	Potassium fertilizer (potash) applied (thousands of megagrams as K_2O)	Corn area treated with nitrogen (percent)[2]	Nitrogen applied to corn (thousands of megagrams as N)[2]	Nitrogen application rate to corn (kilograms N/ hectare)[2]	Corn area treated with phosphate (percent)[2]	Phosphate applied to corn (thousands of megagrams as P_2O_5)[2]
1,629	3,746	4,511	97	4,082	154	87	1,684
1,560	3,735	4,389	97	4,174	147	84	1,631
1,714	3,942	4,720	97	4,308	148	85	1,715
1,657	3,811	4,537	97	4,277	143	82	1,695
1,664	3,827	4,574	97	4,433	142	82	1,682
1,752	4,024	4,664	97	3,963	138	82	1,525
1,786	4,101	4,779	97	4,176	145	83	1,579
1,748	4,014	4,652	97	3,772	146	81	1,357
1,793	4,107	4,770	98	4,380	149	85	1,628
1,822	4,184	4,921	99	4,347	146	84	1,618
1,824	4,187	4,809	98	4,396	149	83	1,511
1,682	3,859	4,494	98	4,218	149	82	1,433
1,705	3,914	4,511	98	4,453	152	84	1,599
1,683	3,862	4,469	96	3,855	143	78	1,408
1,830	4,200	4,520	96	4,282	154	79	1,543
1,696	3,893	4,491	96	4,273	152	79	1,526
1,907	4,377	5,008		4,347			1,569
1,833	4,208	4,693	96	4,557	155	81	1,616
1,771	4,063	4,285		4,255			1,539
	4,148	4,657		5,184			1,874
	3,853	4,227		4,739			1,713
	2,896	2,803		4,423			1,293
	3,719	4,044	97	5,089	157	78	1,754

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to corn (kilograms P_2O_5/ hectare)[2]	Corn area treated with potassium (potash; percent)[2]	Potassium (potash) applied to corn (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to corn (kilograms K_2O/ hectare)[2]	Soybean area treated with nitrogen (percent)[2]	Nitrogen applied to soybean (thousands of megagrams as N)[2]	Nitrogen application rate to soybean (kilograms N/ hectare)[2]	Soybean area treated with phosphate (percent)[2]	Phosphate applied to soybean (thousands of megagrams as P_2O_5)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to corn (kilograms P_2O_5/ hectare)[2]	Corn area treated with potassium (potash; percent)[2]	Potassium (potash) applied to corn (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to corn (kilograms K_2O/ hectare)[2]	Soybean area treated with nitrogen (percent)[2]	Nitrogen applied to soybean (thousands of megagrams as N)[2]	Nitrogen application rate to soybean (kilograms N/ hectare)[2]	Soybean area treated with phosphate (percent)[2]	Phosphate applied to soybean (thousands of megagrams as P_2O_5)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to corn (kilograms P_2O_5/ hectare)[2]	Corn area treated with potassium (potash; percent)[2]	Potassium (potash) applied to corn (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to corn (kilograms K_2O/ hectare)[2]	Soybean area treated with nitrogen (percent)[2]	Nitrogen applied to soybean (thousands of megagrams as N)[2]	Nitrogen application rate to soybean (kilograms N/ hectare)[2]	Soybean area treated with phosphate (percent)[2]	Phosphate applied to soybean (thousands of megagrams as P_2O_5)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to corn (kilograms P_2O_5/ hectare)[2]	Corn area treated with potassium (potash; percent)[2]	Potassium (potash) applied to corn (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to corn (kilograms K_2O/ hectare)[2]	Soybean area treated with nitrogen (percent)[2]	Nitrogen applied to soybean (thousands of megagrams as N)[2]	Nitrogen application rate to soybean (kilograms N/ hectare)[2]	Soybean area treated with phosphate (percent)[2]	Phosphate applied to soybean (thousands of megagrams as P_2O_5)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to corn (kilograms P_2O_5/ hectare)[2]	Corn area treated with potassium (potash; percent)[2]	Potassium (potash) applied to corn (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to corn (kilograms K_2O/ hectare)[2]	Soybean area treated with nitrogen (percent)[2]	Nitrogen applied to soybean (thousands of megagrams as N)[2]	Nitrogen application rate to soybean (kilograms N/ hectare)[2]	Soybean area treated with phosphate (percent)[2]	Phosphate applied to soybean (thousands of megagrams as P_2O_5)[2]
46	72	752	46	7	14	16	12	52
56	77	1,092	54	11	18	11	16	82
64	80	1,373	64	18	37	13	26	150
67	82	1,588	67	21	51	15	27	185
72	84	1,613	73	21	60	17	27	191
72	82	1,601	75	19	44	13	26	206
80	85	1,856	81	21	57	16	27	195
69	82	1,765	72	19	56	17	27	208
74	86	1,807	77	22	65	16	29	259
72	80	1,862	80	24	86	16	32	345
69	83	2,142	82	22	79	17	28	273
65	82	1,961	75	18	67	17	25	248
75	84	2,514	87	20	64	16	28	269
76	82	2,572	92	24	103	18	33	397
76	81	2,400	90	25	125	19	35	463
77	82	2,543	94	26	135	18	38	566
74	81	2,655	96	23	124	19	35	511
75	84	2,756	96	21	116	20	33	465
73	84	2,683	96	17	93	19	27	373
72	83	1,927	95	20	104	20	30	391
73	82	2,606	98	20	104	19	30	425
67	79	2,512	94	17	73	17	28	345
68	76	2,115	90	18	74	17	29	342
68	75	1,914	95	15	79	22	25	310

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to corn (kilograms P_2O_5/ hectare)[2]	Corn area treated with potassium (potash; percent)[2]	Potassium (potash) applied to corn (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to corn (kilograms K_2O/ hectare)[2]	Soybean area treated with nitrogen (percent)[2]	Nitrogen applied to soybean (thousands of megagrams as N)[2]	Nitrogen application rate to soybean (kilograms N/ hectare)[2]	Soybean area treated with phosphate (percent)[2]	Phosphate applied to soybean (thousands of megagrams as P_2O_5)[2]
71	78	2,037	95	16	94	25	26	333
66	75	1,992	91	17	84	20	28	356
67	77	2,176	94	17	107	27	24	296
67	73	2,037	91	16	107	28	22	283
64	72	2,047	89	15	89	25	22	290
63	71	1,863	89	14	76	24	21	276
64	72	1,922	90	13	91	28	20	263
63	70	1,633	87	17	140	33	22	337
64	73	1,938	89	15	105	27	25	357
64	72	1,970	91	20	159	28	28	445
61	66	1,825	92	17	128	26	24	376
61	67	1,756	91	18	126	24	26	400
64	66	1,742	89	18	146	27	24	388
64	65	1,713	93		134	27		406
67	68	1,882	95	20	141	24	26	426
66	64	1,781	95		140			406
		1,883		21	142	31	26	421
65	65	1,676	94		137			406
		1,725		18	99	18	23	363
		2,067			110			333
		1,530			109			396
		1,322			92			279
67	61	1,806	89		101			501

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to soybean (kilograms P_2O_5/ hectare)[2]	Soybean area treated with potassium (potash; percent)[2]	Potassium (potash) applied to soybean (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to soybean (kilograms K_2O/ hectare)[2]	Wheat area treated with nitrogen (percent)[2]	Nitrogen applied to wheat (thousands of megagrams as N)[2]	Nitrogen application rate to wheat (kilograms N/ hectare)[2]	Wheat area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to soybean (kilograms P_2O_5/ hectare)[2]	Soybean area treated with potassium (potash; percent)[2]	Potassium (potash) applied to soybean (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to soybean (kilograms K_2O/ hectare)[2]	Wheat area treated with nitrogen (percent)[2]	Nitrogen applied to wheat (thousands of megagrams as N)[2]	Nitrogen application rate to wheat (kilograms N/ hectare)[2]	Wheat area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to soybean (kilograms P_2O_5/ hectare)[2]	Soybean area treated with potassium (potash; percent)[2]	Potassium (potash) applied to soybean (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to soybean (kilograms K_2O/ hectare)[2]	Wheat area treated with nitrogen (percent)[2]	Nitrogen applied to wheat (thousands of megagrams as N)[2]	Nitrogen application rate to wheat (kilograms N/ hectare)[2]	Wheat area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to soybean (kilograms P_2O_5/ hectare)[2]	Soybean area treated with potassium (potash; percent)[2]	Potassium (potash) applied to soybean (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to soybean (kilograms K_2O/ hectare)[2]	Wheat area treated with nitrogen (percent)[2]	Nitrogen applied to wheat (thousands of megagrams as N)[2]	Nitrogen application rate to wheat (kilograms N/ hectare)[2]	Wheat area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to soybean (kilograms P_2O_5/ hectare)[2]	Soybean area treated with potassium (potash; percent)[2]	Potassium (potash) applied to soybean (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to soybean (kilograms K_2O/ hectare)[2]	Wheat area treated with nitrogen (percent)[2]	Nitrogen applied to wheat (thousands of megagrams as N)[2]	Nitrogen application rate to wheat (kilograms N/ hectare)[2]	Wheat area treated with phosphate (percent)[2]
34	12	64	41	47	320	30	36
36	17	106	44	48	387	35	38
38	24	166	46	49	385	36	38
41	27	210	47	53	566	39	43
41	27	233	50	56	566	40	43
46	27	250	54	56	516	43	44
41	28	279	57	61	526	44	44
44	27	256	54	57	557	45	41
47	31	336	57	62	710	52	44
47	32	452	62	63	813	54	45
46	28	367	62	66	978	52	46
45	26	341	59	63	985	52	43
47	30	410	67	71	1,320	57	50
50	34	546	67	64	1,160	59	44
50	36	655	69	61	949	58	38
52	39	846	75	65	1,137	61	44
52	36	799	78	67	1,424	65	43
52	35	815	85	70	1,625	65	47
48	29	634	76	70	1,615	66	45
50	32	648	78	72	1,497	67	48
52	32	709	81	76	1,693	69	49
48	30	619	81	77	1,584	67	48
48	31	603	80	79	1,549	67	48
53	28	554	84	80	1,481	69	50

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate application rate to soybean (kilograms P_2O_5/ hectare)[2]	Soybean area treated with potassium (potash; percent)[2]	Potassium (potash) applied to soybean (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to soybean (kilograms K_2O/ hectare)[2]	Wheat area treated with nitrogen (percent)[2]	Nitrogen applied to wheat (thousands of megagrams as N)[2]	Nitrogen application rate to wheat (kilograms N/ hectare)[2]	Wheat area treated with phosphate (percent)[2]
54	31	653	89	83	1,579	72	53
52	32	653	83	81	1,745	69	53
53	29	616	91	79	1,633	66	52
53	23	515	85	80	1,573	69	54
53	25	530	84	83	1,714	71	56
52	25	582	89	86	1,802	72	60
53	25	566	92	87	1,860	75	59
61	25	603	95	87	1,773	73	63
55	27	669	95	87	2,003	73	60
56	33	922	99	87	1,854	75	62
54	27	715	91	89	1,829	75	67
52	28	730	87	89	1,730	77	65
54	27	691	85	89	1,715	77	62
55		719	94	88	1,600	76	61
55	29	864	100	86	1,589	76	60
		750		86	1,637	76	59
77	23	792	136	87	1,775	101	62
		780			1,474		
52	25	685	90	85	1,297	73	65
		638			1,532		
		680			1,494		
		464		86	1,264	73	62
		702			1,207		

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to wheat (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to wheat (kilograms P_2O_5/ hectare)[2]	Wheat area treated with potassium (potash; percent)[2]	Potassium (potash) applied to wheat (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to wheat (kilograms K_2O/ hectare)[2]	Cotton area treated with nitrogen (percent)[2]	Nitrogen applied to cotton (thousands of megagrams as N)[2]	Nitrogen application rate to cotton (kilograms N/hectare)[2]	Cotton area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to wheat (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to wheat (kilograms P_2O_5/ hectare)[2]	Wheat area treated with potassium (potash; percent)[2]	Potassium (potash) applied to wheat (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to wheat (kilograms K_2O/ hectare)[2]	Cotton area treated with nitrogen (percent)[2]	Nitrogen applied to cotton (thousands of megagrams as N)[2]	Nitrogen application rate to cotton (kilograms N/hectare)[2]	Cotton area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to wheat (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to wheat (kilograms P_2O_5/ hectare)[2]	Wheat area treated with potassium (potash; percent)[2]	Potassium (potash) applied to wheat (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to wheat (kilograms K_2O/ hectare)[2]	Cotton area treated with nitrogen (percent)[2]	Nitrogen applied to cotton (thousands of megagrams as N)[2]	Nitrogen application rate to cotton (kilograms N/hectare)[2]	Cotton area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to wheat (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to wheat (kilograms P_2O_5/ hectare)[2]	Wheat area treated with potassium (potash; percent)[2]	Potassium (potash) applied to wheat (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to wheat (kilograms K_2O/ hectare)[2]	Cotton area treated with nitrogen (percent)[2]	Nitrogen applied to cotton (thousands of megagrams as N)[2]	Nitrogen application rate to cotton (kilograms N/hectare)[2]	Cotton area treated with phosphate (percent)[2]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to wheat (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to wheat (kilograms P_2O_5/ hectare)[2]	Wheat area treated with potassium (potash; percent)[2]	Potassium (potash) applied to wheat (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to wheat (kilograms K_2O/ hectare)[2]	Cotton area treated with nitrogen (percent)[2]	Nitrogen applied to cotton (thousands of megagrams as N)[2]	Nitrogen application rate to cotton (kilograms N/hectare)[2]	Cotton area treated with phosphate (percent)[2]
246	30	16	137	38	77	358	77	58
297	34	15	137	39	79	411	91	59
298	36	15	136	41	76	300	94	59
420	36	17	202	44	72	244	89	56
386	36	17	171	40	73	289	90	56
363	38	17	161	44	75	368	102	54
292	34	20	159	40	72	293	84	48
340	38	14	123	40	74	311	84	50
406	41	15	142	43	77	367	84	55
460	43	17	164	40	74	306	82	55
563	43	20	239	41	79	382	87	58
512	39	21	249	39	65	218	87	43
675	41	21	283	41	75	321	91	53
587	44	19	267	46	78	378	87	51
398	39	16	162	38	69	318	85	45
542	43	18	250	48	71	320	80	48
614	44	18	264	45	71	337	81	48
734	44	20	376	53	75	351	81	52
651	41	18	288	46	71	300	92	41
649	44	20	333	54	68	198	91	44
651	41	17	281	52	76	311	91	48
576	39	16	198	40	76	295	90	50
565	40	19	273	49	80	281	86	50
523	39	15	192	48	76	294	92	44

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to wheat (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to wheat (kilograms P_2O_5/hectare)[2]	Wheat area treated with potassium (potash; percent)[2]	Potassium (potash) applied to wheat (thousands of megagrams as K_2O)[2]	Potassium (potash) application rate to wheat (kilograms K_2O/hectare)[2]	Cotton area treated with nitrogen (percent)[2]	Nitrogen applied to cotton (thousands of megagrams as N)[2]	Nitrogen application rate to cotton (kilograms N/hectare)[2]	Cotton area treated with phosphate (percent)[2]
583	41	18	279	58	80	354	87	54
681	41	18	288	52	79	315	94	54
656	40	19	293	49	79	381	96	49
616	40	20	273	48	81	433	102	52
624	38	18	230	44	80	423	99	48
668	38	17	195	39	85	461	100	54
659	39	17	206	43	86	589	123	54
652	37	18	214	43	87	635	106	56
685	38	17	239	45	77	511	112	55
652	37	17	233	47	90	477	94	67
667	37	22	253	44	84	429	94	66
607	37	20	223	44	86	493	95	59
577	37	19	207	44	83	514	99	63
560	38	18	200	46	76	516	91	48
573	39	18	206	48		461		
591	39	17	212		82	461	103	62
632	50	18	196	35		455		
527			180			469		
488	36	19	125	31		507		
545			167		91	400	102	67
663			159			382		
435	35	18	86	24		313		
415			82		90	345	86	62

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to cotton (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to cotton (kilograms P_2O_5/ hectare)[2]	Cotton area treated with potassium (potash; percent)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Total nitrogen in manure applied to cropland (thousands of megagrams as N)	Total phosphorus in manure applied to cropland (thousands of megagrams as P)	Secondary and micronutrients for fertilizer (thousands of megagrams)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to cotton (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to cotton (kilograms P_2O_5/ hectare)[2]	Cotton area treated with potassium (potash; percent)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Total nitrogen in manure applied to cropland (thousands of megagrams as N)	Total phosphorus in manure applied to cropland (thousands of megagrams as P)	Secondary and micronutrients for fertilizer (thousands of megagrams)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to cotton (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to cotton (kilograms P_2O_5/ hectare)[2]	Cotton area treated with potassium (potash; percent)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Total nitrogen in manure applied to cropland (thousands of megagrams as N)	Total phosphorus in manure applied to cropland (thousands of megagrams as P)	Secondary and micronutrients for fertilizer (thousands of megagrams)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to cotton (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to cotton (kilograms P_2O_5/ hectare)[2]	Cotton area treated with potassium (potash; percent)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)[2]	Total nitrogen in manure applied to cropland (thousands of megagrams as N)	Total phosphorus in manure applied to cropland (thousands of megagrams as P)	Secondary and micronutrients for fertilizer (thousands of megagrams)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to cotton (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to cotton (kilograms P_2O_5/hectare)[2]	Cotton area treated with potassium (potash; percent)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/hectare)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/hectare)[2]	Total nitrogen in manure applied to cropland (thousands of megagrams as N)	Total phosphorus in manure applied to cropland (thousands of megagrams as P)	Secondary and micronutrients for fertilizer (thousands of megagrams)
							1,250
							1,083
							1,188
							1,324
191	55	43	159	62			1,338
209	62	44	161	64			1,380
152	62	45	122	65			1,325
132	62	40	94	62			1,267
158	64	43	123	65			1,467
174	67	39	120	64			1,210
143	62	36	112	64			1,177
149	59	39	127	65			1,103
192	62	41	159	68			1,188
165	59	39	137	69			1,330
191	59	46	157	62			1,932
93	56	33	78	62			1,704
145	58	37	110	63			2,083
168	59	31	100	58			2,291
148	61	31	102	61			1,703
152	56	27	75	49			1,940
145	52	30	91	52			2,083
155	52	30	90	52			2,020
97	52	30	85	62	5938	1732	1,595
71	50	30	56	58			1,461
116	54	32	86	59			1,773
112	52	34	85	58			1,788
100	49	39	89	56			1,470
98	49	33	70	50	5575	1621	1,520

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Phosphate applied to cotton (thousands of megagrams as P_2O_5)[2]	Phosphate application rate to cotton (kilograms P_2O_5/hectare)[2]	Cotton area treated with potassium (potash; percent)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/hectare)[2]	Potassium (potash) application rate to cotton (kilograms K_2O/hectare)[2]	Total nitrogen in manure applied to cropland (thousands of megagrams as N)	Total phosphorus in manure applied to cropland (thousands of megagrams as P)	Secondary and micronutrients for fertilizer (thousands of megagrams)
129	47	32	71	44			1,676
109	48	32	62	45			1,837
121	49	31	82	53			2,173
137	53	34	89	54			2,451
139	54	37	127	64	5643	1658	2,061
155	53	36	127	65			2,230
144	48	37	127	62			2,487
185	48	40	157	57			2,362
175	54	43	209	82			2,888
199	53	58	259	80	5844	1717	3,440
192	54	53	235	82			3,841
195	55	52	280	90			2,858
204	52	53	276	83			2,781
214	48	41	285	85	5917	1775	3,288
185			255				2,899
191	56	52	254	90			3,504
187			251				3,133
191			259		6056	1817	3,074
207			276				3,193
142	48	52	174	78			3,392
142			183				4,090
90			100				3,465
127	46	52	171	74			4,792

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Gypsum (thousands of megagrams as Ca_2SO_4)	Zinc compounds (thousands of megagrams)	Natural organic materials (thousands of megagrams)[3]	Total conventional pesticides applied (thousands of megagrams AI)—EPA	Total conventional pesticides applied[4] (thousands of megagrams AI)—Aspelin	Total conventional pesticides applied[4] (thousands of megagrams AI)—GfK[5]	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—Aspelin	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—GfK[5]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Gypsum (thousands of megagrams as Ca_2SO_4)	Zinc compounds (thousands of megagrams)	Natural organic materials (thousands of megagrams)[3]	Total conventional pesticides applied (thousands of megagrams AI)—EPA	Total conventional pesticides applied[4] (thousands of megagrams AI)—Aspelin	Total conventional pesticides applied[4] (thousands of megagrams AI)—GfK[5]	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—Aspelin	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—GfK[5]

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Gypsum (thousands of megagrams as Ca_2SO_4)	Zinc compounds (thousands of megagrams)	Natural organic materials (thousands of megagrams)[3]	Total conventional pesticides applied (thousands of megagrams AI)—EPA	Total conventional pesticides applied[4] (thousands of megagrams AI)—Aspelin	Total conventional pesticides applied[4] (thousands of megagrams AI)—GfK[5]	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—Aspelin	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—GfK[5]
				100		0	

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Gypsum (thousands of megagrams as Ca_2SO_4)	Zinc compounds (thousands of megagrams)	Natural organic materials (thousands of megagrams)[3]	Total conventional pesticides applied (thousands of megagrams AI)—EPA	Total conventional pesticides applied[4] (thousands of megagrams AI)—Aspelin	Total conventional pesticides applied[4] (thousands of megagrams AI)—GfK[5]	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—Aspelin	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—GfK[5]
				60		0	
				81		1	
				88		3	
				115		5	
				127		8	
				98		14	
				112		14	
				103		16	
				109		19	

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Gypsum (thousands of megagrams as Ca_2SO_4)	Zinc compounds (thousands of megagrams)	Natural organic materials (thousands of megagrams)[3]	Total conventional pesticides applied (thousands of megagrams AI)—EPA	Total conventional pesticides applied[4] (thousands of megagrams AI)—Aspelin	Total conventional pesticides applied[4] (thousands of megagrams AI)—GfK[5]	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—Aspelin	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—GfK[5]
				125		24	
			166	151		36	
			180				
			188				
			195	187		63	
			207				
			223				
			226	219		87	
			239				
			261				
			275	259		117	
			312				
			331				
			342	328		169	
			360				
			369				
			382	371		210	
			375				
			377				
			365	372		230	
			340				
			363				
			354	352		223	
942	31	175	342				
903	25	180	298				

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Gypsum (thousands of megagrams as Ca_2SO_4)	Zinc compounds (thousands of megagrams)	Natural organic materials (thousands of megagrams)[3]	Total conventional pesticides applied (thousands of megagrams AI)—EPA	Total conventional pesticides applied[4] (thousands of megagrams AI)—Aspelin	Total conventional pesticides applied[4] (thousands of megagrams AI)—GfK[5]	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—Aspelin	Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—GfK[5]
1,082	26	181	317	319		205	
1,065	34	235	327				
1,255	38	266	330				
1,417	37	412	325	327		205	
1,079	39	452	333		305		214
1,225	42	394	320		294		206
1,343	37	351	357	337	356	205	237
1,242	35	461	350		355		233
1,463	34	479			370		250
2,237	41	492		355	351	214	238
2,579	42	496			326		239
1,452	48	547			306		223
1,284	45	577			316		239
1,307	38	556			304		235
1,054	30	487			292		228
1,193	35	445			294		232
1,351	42	460			307		239
1,351	38	522			286		219
1,391	59	629			284		222
1,269	47	601			299		237
1,400	37	604			289		226
1,267	27	594			301		242
1,496	41	446					

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Glyphosate applied (thousands of megagrams AI)—GfK	Insecticides and acaricides applied (thousands of megagrams AI)—GfK[5]	Insecticides and acaricides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—GfK[5]	Nematicides and fumigants applied (thousands of megagrams AI)—Aspelin	Nematicides and fumigants applied (thousands of megagrams AI)—GfK[5]	Other conventional pesticides[6] applied (thousands of megagrams AI)—Aspelin	Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—Aspelin

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Glyphosate applied (thousands of megagrams AI)—GfK	Insecticides and acaricides applied (thousands of megagrams AI)—GfK[5]	Insecticides and acaricides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—GfK[5]	Nematicides and fumigants applied (thousands of megagrams AI)—Aspelin	Nematicides and fumigants applied (thousands of megagrams AI)—GfK[5]	Other conventional pesticides[6] applied (thousands of megagrams AI)—Aspelin	Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—Aspelin

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Glyphosate applied (thousands of megagrams AI)—GfK	Insecticides and acaricides applied (thousands of megagrams AI)—GfK[5]	Insecticides and acaricides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—GfK[5]	Nematicides and fumigants applied (thousands of megagrams AI)—Aspelin	Nematicides and fumigants applied (thousands of megagrams AI)—GfK[5]	Other conventional pesticides[6] applied (thousands of megagrams AI)—Aspelin	Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—Aspelin
	58		26		1		15	88

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Glyphosate applied (thousands of megagrams AI)—GfK	Insecticides and acaricides applied (thousands of megagrams AI)—GfK[5]	Insecticides and acaricides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—GfK[5]	Nematicides and fumigants applied (thousands of megagrams AI)—Aspelin	Nematicides and fumigants applied (thousands of megagrams AI)—GfK[5]	Other conventional pesticides[6] applied (thousands of megagrams AI)—Aspelin	Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—Aspelin
	29		20		2		9	70
	47		20		3		12	70
	46		24		4		13	116
	55		33		5		16	156
	50		44		8		17	176
	37		27		9		11	198
	50		25		10		14	222
	43		22		10		12	214
	42		25		10		12	251

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Glyphosate applied (thousands of megagrams AI)—GfK	Insecticides and acaricides applied (thousands of megagrams AI)—GfK[5]	Insecticides and acaricides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—GfK[5]	Nematicides and fumigants applied (thousands of megagrams AI)—Aspelin	Nematicides and fumigants applied (thousands of megagrams AI)—GfK[5]	Other conventional pesticides[6] applied (thousands of megagrams AI)—Aspelin	Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—Aspelin
	47		29		11		14	257
	71		17		12		16	223
	75		18		15		17	99
	78		21		16		18	115
	82		22		19		19	140
	89		24		25		20	101
	88		25		28		20	92
	69		27		29		17	78
	59		26		29		15	70

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Glyphosate applied (thousands of megagrams AI)—GfK	Insecticides and acaricides applied (thousands of megagrams AI)—GfK[5]	Insecticides and acaricides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—Aspelin	Fungicides applied (thousands of megagrams AI)—GfK[5]	Nematicides and fumigants applied (thousands of megagrams AI)—Aspelin	Nematicides and fumigants applied (thousands of megagrams AI)—GfK[5]	Other conventional pesticides[6] applied (thousands of megagrams AI)—Aspelin	Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—Aspelin
	47		25		29		13	67
	41		23		48		11	57
6		29		17		45		
8		28		16		44		
10	39	30	21	21	60	68	11	62
12		31		20		71		
13		28		21		71		
16	39	26	23	22	68	65	11	61
26		24		23		40		
33		25		21		37		
39		24		20		34		
46		24		20		25		
51		21		18		24		
59		21		21		20		
64		24		20		24		
71		20		22		24		
73		18		22		22		
82		19		21		22		
96		20		20		23		
99		17		21		20		

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—GfK[5]	Total population (millions)	Rural population (millions)	Total rural population (percent)	Land in farms (millions of hectares)	Number of farms (millions)	Average farm size (hectares)	Laborers on farms (millions)	Conservation Adjustment Program (millions of hectares)	Agricultural Conservation Program (millions of hectares)
	23			119	1	82			
	31			165	2	81			
	40			165	3	62			

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—GfK[5]	Total population (millions)	Rural population (millions)	Total rural population (percent)	Land in farms (millions of hectares)	Number of farms (millions)	Average farm size (hectares)	Laborers on farms (millions)	Conservation Adjustment Program (millions of hectares)	Agricultural Conservation Program (millions of hectares)
	50			217	4	54			
	63			228	5	55			
	76	46	60	340	6	59			
	78								
	79								
	81								

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—GfK[5]	Total population (millions)	Rural population (millions)	Total rural population (percent)	Land in farms (millions of hectares)	Number of farms (millions)	Average farm size (hectares)	Laborers on farms (millions)	Conservation Adjustment Program (millions of hectares)	Agricultural Conservation Program (millions of hectares)
	82								
	84								
	85								
	87								
	89								
	90								
	92	50	54	356	6	56	14		
	94								
	95								
	97								
	99								
	101						14		
	102								
	103								
	103								
	105								
	106	52	49	387	6	60	13		
	109								
	110								
	112								
	114								
	116			374	6		13		
	117								
	119								
	121								
	122								
	123	54	44	399	6	63	12		
	124								

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—GfK[5]	Total population (millions)	Rural population (millions)	Total rural population (percent)	Land in farms (millions of hectares)	Number of farms (millions)	Average farm size (hectares)	Laborers on farms (millions)	Conservation Adjustment Program (millions of hectares)	Agricultural Conservation Program (millions of hectares)
	125								
	126							4	
	126							14	
	127						13	12	
	128								13
	129								12
	130								12
	131								17
	132	57	43		6	70	11		17
	133								17
	135								16
	137								1
	138								3
	140						10		2
	141								1
	144								1
	147								
	149								
	152	54	36	486	6	87	10		
	155			487	5				
	158			488	5				
	160			488	5				
	163			488	5				
	166			486	5		8		
	169			484	5				
	172			482	4				
	175			480	4				
	178			479	4	117			

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—GfK[5]	Total population (millions)	Rural population (millions)	Total rural population (percent)	Land in farms (millions of hectares)	Number of farms (millions)	Average farm size (hectares)	Laborers on farms (millions)	Conservation Adjustment Program (millions of hectares)	Agricultural Conservation Program (millions of hectares)
	181	54	30	476	4	120	7		
	184			473	4	124			
	187			470	4	127			
	189			467	4	131			
	192			464	3	135			
	194			462	3	138	6		
	197			460	3	142			
	199			458	3	146			
	201			456	3	149			
	203			455	3	153			
	205	54	26	454	3	155	5		
	208			452	3	157			
	210			451	3	159			
	212								
	214								
	216			430	2	173	4		
	218			429	2	175			
	220			427	2	177			
	223			426	2	180			
	225			425	2	182			
	227	59	26	420	2	172	4		
	229			419	2	172			
	232			416	2	173			
	234			414	2	174			
	236			412	2	176			
	238			410	2	178	3		
	240			407	2	181			
	242			404	2	183			

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—GfK[5]	Total population (millions)	Rural population (millions)	Total rural population (percent)	Land in farms (millions of hectares)	Number of farms (millions)	Average farm size (hectares)	Laborers on farms (millions)	Conservation Adjustment Program (millions of hectares)	Agricultural Conservation Program (millions of hectares)
	244			402	2	183			
	247			401	2	185			
	249	62	25	400	2	187	3		
	252			397	2	188			
35	255			396	2	188			
33	258			392	2	178			
46	260			391	2	178			
53	263			390	2	177	3		
48	265			388	2	177			
54	268			387	2	176			
72	270			386	2	176			
86	273			384	2	176			
73	282	59	21	382	2	176	3		
73	286			381	2	177			
78	289			381	2	178			
84	291			379	2	178			
80	294			377	2	178			
83	297			376	2	179	1		
72	299			375	2	179			
69	302			373	2	169			
63	304			372	2	169			
57	307			372	2	169			
	309	51	17	372	2	169	1		

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Soil Bank (millions of hectares)	Cropland Adjustment Program (millions of hectares)	Acreage Reduction Program (millions of hectares)	Conservation Reserve Program (millions of hectares)	Wildlife Habitat Incentives Program (millions of hectares)	Wetland Reserve Program (hectares)	Environmental Quality Incentives Program (millions of hectares)	Area with surface drainage (millions of hectares)	Area with subsurface drainage (millions of hectares)	Irrigation (billions of liters per day)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Soil Bank (millions of hectares)	Cropland Adjustment Program (millions of hectares)	Acreage Reduction Program (millions of hectares)	Conservation Reserve Program (millions of hectares)	Wildlife Habitat Incentives Program (millions of hectares)	Wetland Reserve Program (hectares)	Environmental Quality Incentives Program (millions of hectares)	Area with surface drainage (millions of hectares)	Area with subsurface drainage (millions of hectares)	Irrigation (billions of liters per day)
							2	0	

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Soil Bank (millions of hectares)	Cropland Adjustment Program (millions of hectares)	Acreage Reduction Program (millions of hectares)	Conservation Reserve Program (millions of hectares)	Wildlife Habitat Incentives Program (millions of hectares)	Wetland Reserve Program (hectares)	Environmental Quality Incentives Program (millions of hectares)	Area with surface drainage (millions of hectares)	Area with subsurface drainage (millions of hectares)	Irrigation (billions of liters per day)
							4	1	
							8	1	
							12	2	
							18	2	
							17	2	
							17	3	

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Soil Bank (millions of hectares)	Cropland Adjustment Program (millions of hectares)	Acreage Reduction Program (millions of hectares)	Conservation Reserve Program (millions of hectares)	Wildlife Habitat Incentives Program (millions of hectares)	Wetland Reserve Program (hectares)	Environmental Quality Incentives Program (millions of hectares)	Area with surface drainage (millions of hectares)	Area with subsurface drainage (millions of hectares)	Irrigation (billions of liters per day)
							16	3	
							15	4	
							16	4	
							22	6	337
							25	7	416
5									
11									
11									
9									

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Soil Bank (millions of hectares)	Cropland Adjustment Program (millions of hectares)	Acreage Reduction Program (millions of hectares)	Conservation Reserve Program (millions of hectares)	Wildlife Habitat Incentives Program (millions of hectares)	Wetland Reserve Program (hectares)	Environmental Quality Incentives Program (millions of hectares)	Area with surface drainage (millions of hectares)	Area with subsurface drainage (millions of hectares)	Irrigation (billions of liters per day)
12							15	8	416
12		10							
10		16							
10		13							
7		15							
6		17					28	10	454
5	1	19							
4	2	10							
4	2	14							
1	2	20							
0	2	22					29	11	492
	1	14							
	1	24							
	1	7							
	1								
	1						29	12	530
	1								
	0								
		7					29	13	
		5							
							29	14	568
							29	14	
		5					29	15	
		32					29	15	
		11					29	15	
		12					29	15	511
		19	1						
		25	6						

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Soil Bank (millions of hectares)	Cropland Adjustment Program (millions of hectares)	Acreage Reduction Program (millions of hectares)	Conservation Reserve Program (millions of hectares)	Wildlife Habitat Incentives Program (millions of hectares)	Wetland Reserve Program (hectares)	Environmental Quality Incentives Program (millions of hectares)	Area with surface drainage (millions of hectares)	Area with subsurface drainage (millions of hectares)	Irrigation (billions of liters per day)
		22	10						
		12	12						
		11	13						507
		12	13						
		8	14		7,132				
		9	14		7,068				
			14		7,067				
			14		28,997				492
			14		64,363				
			13		39,210	3			
			12	0	85,978	3			
			12	1	48,141	3			
			13	1	57,872	3			526
			14	1	47,266	3			
			14	1	59,248	4			
			14	1	63,995	8			
			14	1	63,610	8			
			14	1	50,049	7			484
			15	1	32,368	9			
			15	2	22,902	7			
			14	2	20,369	7			
			14	2	67,881	5			
			13	3	106,272	5			

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Water for livestock (billions of liters per day)	Corn using "no till" tillage practice (percent)	Area of corn planted using conventional tillage (thousands of hectares)	Area of corn planted using reduced tillage (thousands of hectares)	Area of corn planted using ridge tillage (thousands of hectares)	Area of corn planted using mulch tillage (thousands of hectares)	Area of corn planted using "no till" tillage (thousands of hectares)	Area of soybean using "no till" tillage practice (percent)	Area of soybean planted using conventional tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Water for livestock (billions of liters per day)	Corn using "no till" tillage practice (percent)	Area of corn planted using conventional tillage (thousands of hectares)	Area of corn planted using reduced tillage (thousands of hectares)	Area of corn planted using ridge tillage (thousands of hectares)	Area of corn planted using mulch tillage (thousands of hectares)	Area of corn planted using "no till" tillage (thousands of hectares)	Area of soybean using "no till" tillage practice (percent)	Area of soybean planted using conventional tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Water for livestock (billions of liters per day)	Corn using "no till" tillage practice (percent)	Area of corn planted using conventional tillage (thousands of hectares)	Area of corn planted using reduced tillage (thousands of hectares)	Area of corn planted using ridge tillage (thousands of hectares)	Area of corn planted using mulch tillage (thousands of hectares)	Area of corn planted using "no till" tillage (thousands of hectares)	Area of soybean using "no till" tillage practice (percent)	Area of soybean planted using conventional tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Water for livestock (billions of liters per day)	Corn using "no till" tillage practice (percent)	Area of corn planted using conventional tillage (thousands of hectares)	Area of corn planted using reduced tillage (thousands of hectares)	Area of corn planted using ridge tillage (thousands of hectares)	Area of corn planted using mulch tillage (thousands of hectares)	Area of corn planted using "no till" tillage (thousands of hectares)	Area of soybean using "no till" tillage practice (percent)	Area of soybean planted using conventional tillage (thousands of hectares)
6								
6								

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Water for livestock (billions of liters per day)	Corn using "no till" tillage practice (percent)	Area of corn planted using conventional tillage (thousands of hectares)	Area of corn planted using reduced tillage (thousands of hectares)	Area of corn planted using ridge tillage (thousands of hectares)	Area of corn planted using mulch tillage (thousands of hectares)	Area of corn planted using "no till" tillage (thousands of hectares)	Area of soybean using "no till" tillage practice (percent)	Area of soybean planted using conventional tillage (thousands of hectares)
6								
6								
7								
8								
8								
8								

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Water for livestock (billions of liters per day)	Corn using "no till" tillage practice (percent)	Area of corn planted using conventional tillage (thousands of hectares)	Area of corn planted using reduced tillage (thousands of hectares)	Area of corn planted using ridge tillage (thousands of hectares)	Area of corn planted using mulch tillage (thousands of hectares)	Area of corn planted using "no till" tillage (thousands of hectares)	Area of soybean using "no till" tillage practice (percent)	Area of soybean planted using conventional tillage (thousands of hectares)
	7	12705	7243	713	6587	2169	8	11661
9	9	12886	7283	776	6258	2592	10	11413
	10	12064	7544	841	6608	3058	13	10407
	14	11384	7958	903	7079	4392	18	8801
	17	9462	7493	927	6968	5139	25	7239
	18	11530	7310	967	6105	5773	27	7486
9	18	10554	6608	901	5867	5280	30	7491
	16	8916	6559	792	5249	4189	28	6438
	16	9171	6516	783	5377	4252	30	5568
	16	8989	6184	574	4543	3807	32	5382
9	17	12259	7082	643	4917	5253	32	6697
	19	12615	7713	482	4950	6081	35	7120
	20	12227	7977	417	5438	6401	39	6174
8								

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Area of soybean planted using reduced tillage (thousands of hectares)	Area of soybean planted using ridge tillage (thousands of hectares)	Area of soybean planted using mulch tillage (thousands of hectares)	Area of soybean planted using "no till" tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Area of soybean planted using reduced tillage (thousands of hectares)	Area of soybean planted using ridge tillage (thousands of hectares)	Area of soybean planted using mulch tillage (thousands of hectares)	Area of soybean planted using "no till" tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Area of soybean planted using reduced tillage (thousands of hectares)	Area of soybean planted using ridge tillage (thousands of hectares)	Area of soybean planted using mulch tillage (thousands of hectares)	Area of soybean planted using "no till" tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Area of soybean planted using reduced tillage (thousands of hectares)	Area of soybean planted using ridge tillage (thousands of hectares)	Area of soybean planted using mulch tillage (thousands of hectares)	Area of soybean planted using "no till" tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Area of soybean planted using reduced tillage (thousands of hectares)	Area of soybean planted using ridge tillage (thousands of hectares)	Area of soybean planted using mulch tillage (thousands of hectares)	Area of soybean planted using "no till" tillage (thousands of hectares)

Table 3. Selected historic agricultural data important to environmental quality in the United States, 1850–2010.

Area of soybean planted using reduced tillage (thousands of hectares)	Area of soybean planted using ridge tillage (thousands of hectares)	Area of soybean planted using mulch tillage (thousands of hectares)	Area of soybean planted using "no till" tillage (thousands of hectares)
6214	302	5268	1949
6074	347	4891	2425
6374	350	5013	3204
5753	336	5318	4576
5319	331	5566	6061
5521	302	5018	6899
5388	273	5036	7811
4776	207	4822	6398
4948	257	5778	7168
5025	172	5406	7428
5318	277	6627	9067
6061	233	6241	10532
5426	237	7044	11869

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

[The pesticides are categorized by a primary use in the "Category of use" column. Other important uses are given in the "Other uses(s)" column. "Category of use" is the basis of the totals presented in table 3]

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Glyphosate	Growth regulator	Herbicide	99,451,919	108,804,464
Atrazine	Herbicide		29,176,136	26,229,189
Metam	Herbicide	Nematicide	15,923,900	115,902
Dichloropropene	Nematicide	Insecticide, fungicide	14,442,478	123,188
2,4-D	Herbicide	Growth regulator	13,372,735	23,270,883
Metolachlor-S	Herbicide		13,057,881	10,260,943
Acetochlor	Herbicide		12,822,419	8,635,331
Metam potassium	Herbicide		8,613,806	49,144
Sulfuric acid	Growth regulator	Herbicide	6,750,066	32,789
Chloropicrin	Nematicide	Insecticide	5,056,104	81,861
Pendimethalin	Herbicide		5,027,739	3,773,088
Chlorothalonil	Fungicide		3,779,841	3,068,812
Ethephon	Growth regulator		3,448,495	2,698,819
Chlorpyrifos	Insecticide		3,179,621	4,753,280
Methyl bromide	Nematicide	Fungicide	3,118,005	25,139
Hydrated lime	Fungicide		2,528,202	77,971
Mancozeb	Fungicide		2,492,309	1,602,867
Propanil	Herbicide		2,234,624	548,419
Trifluralin	Herbicide		2,196,388	2,443,554
Simazine	Herbicide		1,986,105	1,271,041
Copper hydroxide	Fungicide		1,953,747	1,306,757
Aldicarb	Nematicide	Insecticide	1,502,444	1,272,610
Metolachlor	Herbicide		1,496,615	1,028,922
Diuron	Herbicide	Growth regulator	1,446,368	1,333,177
Kaolin clay	Fungicide		1,398,455	35,596
Dicamba	Herbicide		1,390,889	8,688,053
Decan-1-ol	Growth regulator		1,386,352	114,890
Acephate	Insecticide		1,361,069	2,518,210
Captan	Fungicide		1,330,373	667,759
Paraquat	Growth regulator	Herbicide	1,264,584	2,491,442

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Glufosinate	Growth regulator	Herbicide	1,236,051	2,234,249
Alachlor	Herbicide		1,067,583	590,489
MCPA	Herbicide		979,243	2,645,887
Bromoxynil	Herbicide		877,192	3,562,492
Tribufos	Growth regulator		820,678	1,316,484
Mesotrione	Herbicide		819,514	6,363,390
Dimethenamid	Herbicide		819,316	1,066,058
Pyraclostrobin	Fungicide		817,259	8,113,712
Calcium polysulfide	Fungicide	Insecticide	801,754	64,009
Maneb	Fungicide		764,033	451,368
EPTC	Herbicide		742,926	230,299
Oryzalin	Herbicide		714,517	210,688
Dimethenamid-P	Herbicide		706,407	934,663
Metribuzin	Herbicide		623,435	1,712,922
Copper sulfate	Fungicide	Insecticide, herbicide	605,492	257,581
Ziram	Fungicide		583,259	141,791
Clothianidin	Insecticide		569,624	21,430,374
Ethalfluralin	Herbicide		540,600	568,658
Oxyfluorfen	Herbicide		540,034	970,830
Copper	Fungicide	Herbicide	528,852	232,640
Bentazone	Herbicide		515,268	789,509
Carbaryl	Insecticide		505,854	337,989
Propiconazole	Fungicide		497,836	5,573,106
Fomesafen	Herbicide		464,631	2,076,207
Azoxystrobin	Fungicide		459,074	4,798,432
Triclopyr	Herbicide		457,473	1,034,977
Tetrathiocarbonate	Nematicide	Fungicide	449,016	14,663
Phosmet	Insecticide		447,855	241,337
Thiamethoxam	Insecticide		431,826	18,906,096
Methomyl	Insecticide		395,852	734,099
MSMA	Herbicide		380,801	254,881
Clomazone	Herbicide		365,198	888,212

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Picloram	Herbicide		360,799	2,035,690
Carbofuran	Insecticide	Nematicide	357,150	473,627
Cryolite	Insecticide	Fungicide	352,084	44,936
Clopyralid	Herbicide		347,057	3,834,247
Maleic hydrazide	Growth regulator		334,346	136,399
Phorate	Insecticide		333,675	158,609
Imidacloprid	Insecticide		329,385	5,759,201
Flumioxazin	Herbicide		325,481	3,878,917
Dicrotophos	Insecticide		315,294	958,082
Thiophanate-methyl	Fungicide		310,983	513,079
Norflurazon	Herbicide		307,833	125,554
Sulfcarbamide	Growth regulator	Herbicide	298,585	120,268
Dimethoate	Insecticide		297,072	623,409
Terbufos	Nematicide	Insecticide	288,116	289,621
Clethodim	Herbicide		282,949	3,546,312
Thiobencarb	Herbicide		281,701	82,288
Cuprous oxide	Fungicide		270,220	77,393
Tebuconazole	Fungicide		259,972	4,790,306
Methyl iodide	Nematicide		256,958	2,183
Fluroxypyr	Herbicide		256,124	2,725,026
Prometryn	Herbicide		249,482	284,949
Sulfentrazone	Herbicide		245,436	1,661,567
Propargite	Insecticide		243,628	156,910
Asulam	Herbicide		242,434	78,629
Metiram	Fungicide		227,803	115,401
Malathion	Insecticide		226,390	153,046
Bensulide	Herbicide		213,741	52,099
DCPA	Herbicide		211,102	50,491
Oxamyl	Nematicide	Insecticide	201,481	320,253
Boscalid	Fungicide		196,852	786,385
Endosulfan	Insecticide		190,325	209,257
Iprodione	Fungicide		187,979	260,302

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Mepiquat	Growth regulator		186,056	4,366,401
Azinphos-methyl	Insecticide		184,824	191,889
Cyhalothrin-lambda	Insecticide		183,791	6,978,552
Flufenacet	Herbicide		182,020	498,994
Trifloxystrobin	Fungicide		180,629	3,158,602
Sodium chlorate	Growth regulator	Herbicide	179,548	71,595
Cyanamide	Growth regulator		165,557	8,793
Bifenthrin	Insecticide		162,128	2,455,597
Imazethapyr	Herbicide		161,329	2,580,960
Diazinon	Insecticide		159,778	159,554
Bromacil	Herbicide		156,978	99,444
Methyl parathion	Insecticide		156,079	291,158
Ethoprophos	Insecticide	Nematicide	137,771	32,331
Phosphoric acid	Fungicide		136,245	72,541
Fluometuron	Herbicide		131,499	160,223
Fenoxaprop	Herbicide		127,022	1,883,766
Mefenoxam	Fungicide		122,355	13,284,088
Tefluthrin	Insecticide		117,904	826,483
Propamocarb HCl	Fungicide		116,327	113,885
Quinclorac	Herbicide		112,837	351,025
Isoxaflutole	Herbicide		111,793	2,030,739
2,4-DB	Growth regulator	Herbicide	110,322	411,817
Quintozene	Fungicide		104,602	251,265
Permethrin	Insecticide		102,690	700,464
Fosetyl	Fungicide		101,960	36,627
Bacillus thuringiensis	Insecticide		100,637	906,482
Zinc	Fungicide		99,818	41,614
Hexazinone	Herbicide		98,385	186,758
Linuron	Herbicide		97,577	143,920
Sethoxydim	Herbicide		95,443	589,584
Tebupirimphos	Insecticide		95,360	679,070
Potassium bicarbonate	Fungicide		93,477	32,821

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Pinoxaden	Herbicide		92,489	1,849,980
Fentin	Fungicide		89,682	309,893
Methoxyfenozide	Insecticide		88,754	463,154
Cyprodinil	Fungicide		86,251	258,923
Dodine	Fungicide		84,092	103,161
Tri-Allate	Herbicide		82,920	71,521
Diquat	Growth regulator	Herbicide	82,555	201,727
Propazine	Herbicide		82,151	89,398
Propyzamide	Herbicide		80,421	97,469
Thidiazuron	Growth regulator		80,333	1,139,874
Fluazifop	Herbicide		79,259	742,979
Flutolanil	Fungicide		75,378	152,319
Copper oxychloride S	Fungicide		73,632	27,063
Pyrimethanil	Fungicide		71,851	127,959
Acifluorfen	Herbicide		70,223	235,258
Esfenvalerate	Insecticide		66,749	1,581,698
Cyfluthrin	Insecticide		65,470	3,300,408
Bifenazate	Insecticide		65,119	116,804
Aminopyralid	Herbicide		64,038	858,425
Tembotrione	Herbicide		59,159	754,329
Flumetsulam	Herbicide		53,230	1,519,895
Prothioconazole	Fungicide		52,402	473,852
Myclobutanil	Fungicide		52,122	521,336
Fenpropathrin	Insecticide		49,818	154,165
Triflumizole	Fungicide		49,793	173,930
Diflufenzopyr	Herbicide		49,626	1,365,761
Thifensulfuron	Herbicide		48,863	4,718,952
Chlorimuron	Herbicide		47,199	3,015,467
Pyrasulfotole	Herbicide		46,092	1,412,528
Zeta-cypermethrin	Insecticide		45,994	2,072,954
Myrothecium verrucaria	Nematicide		45,085	4,052
Spirodiclofen	Insecticide		44,885	146,001

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Cyhalofop	Herbicide		44,212	151,213
Cyclanilide	Growth regulator		42,327	659,017
Methamidophos	Insecticide		42,301	42,924
Lactofen	Herbicide		40,480	284,138
Buprofezin	Insecticide		39,371	51,370
Ametryn	Herbicide		39,347	102,078
Oxydemeton-methyl	Insecticide		37,440	65,495
Diflubenzuron	Insecticide		36,945	332,084
Rimsulfuron	Herbicide		36,881	1,769,024
Dicloran	Fungicide		36,391	16,251
Flumetralin	Growth regulator		35,967	51,058
Thiram	Fungicide		35,686	345,307
Tetraconazole	Fungicide		35,655	458,370
Formetanate	Insecticide		34,862	30,039
Napropamide	Herbicide		33,501	25,043
Fludioxonil	Fungicide		33,221	10,742,348
Hydrogen peroxide	Growth regulator		32,717	16,335
Spinosyn	Insecticide		31,927	372,634
Cypermethrin	Insecticide		31,854	433,077
Fenhexamid	Fungicide		30,536	50,714
Dicofol	Insecticide		29,603	23,839
Spiromesifen	Insecticide		29,477	199,181
Imazamox	Herbicide		29,174	947,117
Cloransulam-methyl	Herbicide		27,223	1,347,366
Imazaquin	Herbicide		25,665	245,390
Spinetoram	Insecticide		25,460	364,623
Acetamiprid	Insecticide		25,150	260,833
Difenoconazole	Fungicide		24,936	1,889,470
Fipronil	Insecticide		24,800	220,908
Chlorsulfuron	Herbicide		24,370	1,892,795
Quizalofop	Herbicide		24,247	464,177
Pyrithiobac-sodium	Herbicide		23,937	480,907

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Naled	Insecticide		23,497	22,161
Fluazinam	Fungicide		23,442	81,106
Cymoxanil	Fungicide		21,761	167,541
Butralin	Growth regulator		21,519	9,943
Carboxin	Fungicide		21,356	495,131
Clodinafop	Herbicide		21,271	443,805
Kresoxim-methyl	Fungicide		20,852	137,531
Abamectin	Insecticide	Nematicide	20,710	1,416,032
Metsulfuron	Herbicide		19,743	4,646,998
Tribenuron methyl	Herbicide		19,680	3,292,146
Thiodicarb	Insecticide		19,164	66,877
Spirotetramat	Insecticide		19,007	179,156
Fatty alcohols	Growth regulator		18,808	2,284
Chlorantraniliprole	Insecticide		18,790	236,803
Neem oil	Insecticide	Fungicide	18,735	6,993
Carfentrazone-ethyl	Herbicide	Growth regulator	18,523	1,305,847
Fenbutatin oxide	Insecticide		18,381	17,209
Fenamiphos	Nematicide	Insecticide	17,884	4,473
Molinate	Herbicide		17,308	10,086
Naptalam	Herbicide		16,872	8,981
Famoxadone	Fungicide		16,650	131,884
Chlorethoxyfos	Insecticide		16,572	81,502
Indoxacarb	Insecticide		16,261	204,088
Imazapic	Growth regulator	Herbicide	16,208	258,602
Diclofop	Herbicide		16,086	25,127
Nicosulfuron	Herbicide		16,064	719,196
Dimethomorph	Fungicide		16,048	76,841
Ferbam	Fungicide		15,578	1,874
Ethofumesate	Herbicide		15,330	48,728
Halosulfuron	Herbicide		15,089	483,719
Novaluron	Insecticide		14,968	189,424
Gibberellic acid	Growth regulator		14,561	255,654

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Cycloate	Herbicide		13,688	6,067
Metalaxyl	Fungicide		13,009	4,298,985
Fenamidone	Fungicide		12,703	52,753
Mandipropamid	Fungicide		12,424	92,233
Fenbuconazole	Fungicide		12,155	122,648
Methidathion	Insecticide		11,946	9,587
Streptomycin	Fungicide		11,482	60,384
Potassium oleate	Herbicide	Insecticide	11,058	10,516
Hexythiazox	Insecticide		10,945	72,949
Flucarbazone	Herbicide		10,863	688,832
Propoxycarbazone	Herbicide		10,774	481,749
Triasulfuron	Herbicide		10,732	616,291
Terbacil	Herbicide		9,930	17,782
Oxytetracycline	Fungicide		9,855	55,535
MCPB	Herbicide		8,664	20,844
Flumiclorac	Growth regulator	Herbicide	8,542	479,314
Butylate	Herbicide		8,502	2,072
Disulfoton	Insecticide		7,989	7,260
Tebufenozide	Insecticide		7,944	62,353
Pyridaben	Insecticide		7,941	21,231
Flubendiamide	Insecticide		7,694	85,028
Tralkoxydim	Herbicide		7,662	38,257
Flusilazole	Fungicide		7,536	84,413
Etoxazole	Insecticide		7,462	77,979
Thiacloprid	Insecticide		7,274	36,517
Topramezone	Herbicide		6,900	451,174
Pyriproxyfen	Insecticide		6,850	103,167
Dinotefuran	Insecticide		6,831	46,421
Fenpyroximate	Insecticide		6,751	54,042
Thiencarbazone-methyl	Herbicide		6,160	208,926
Dichlorprop	Herbicide		6,006	14,046
Sulfosulfuron	Herbicide		5,930	249,976

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Benfluralin	Herbicide		5,637	4,920
Flonicamid	Insecticide		5,492	60,923
Bensulfuron	Herbicide		5,304	152,854
Fenarimol	Fungicide		5,241	106,082
Metaldehyde	Insecticide		5,081	6,911
Pymetrozine	Insecticide		4,973	50,214
Phenmedipham	Herbicide		4,853	56,142
Prohexadione	Growth regulator		4,821	19,769
Prosulfuron	Herbicide		4,628	277,108
Dimethipin	Herbicide	Growth regulator	4,587	13,438
Imazamethabenz	Herbicide		4,398	20,096
Metconazole	Fungicide		4,326	63,618
Desmedipham	Herbicide		4,235	68,826
Zoxamide	Fungicide		3,894	25,639
Flutriafol	Fungicide		3,660	57,404
Pyroxsulam	Herbicide		3,343	198,455
Imazalil	Fungicide		3,322	1,410,993
Cyhalothrin-gamma	Insecticide		3,246	438,383
Primisulfuron	Herbicide		3,235	120,691
Copper oxychloride	Fungicide		3,059	8,808
Bispyribac	Herbicide		3,000	90,195
Penoxsulam	Herbicide		2,911	83,123
Profenofos	Insecticide		2,877	2,567
Mesosulfuron	Herbicide		2,830	375,668
Foramsulfuron	Herbicide		2,505	71,102
Naphthylacetic acid	Growth regulator		2,438	58,524
Fluthiacet-methyl	Herbicide	Growth regulator	2,251	625,338
Cyromazine	Insecticide		2,028	14,538
Trifloxysulfuron	Herbicide		1,989	233,721
Fluopicolide	Fungicide		1,935	16,946
Dichlobenil	Herbicide		1,872	1,070
Clofentezine	Insecticide		1,818	10,261

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Diclosulam	Herbicide		1,740	84,744
Aviglycine	Growth regulator		1,669	17,852
Cyazofamid	Fungicide		1,648	18,651
Imazapyr	Herbicide		1,577	108,872
Fluoxastrobin	Fungicide		1,480	7,307
Pyrethrins	Insecticide		1,431	84,943
Orthosulfamuron	Herbicide		1,394	22,107
6-Benzyladenine	Growth regulator		1,382	22,331
Hymexazol	Fungicide		1,081	42,146
Piperonyl butoxide	Insecticide		982	2,204
Chloridazon	Herbicide		861	672
Florasulam	Herbicide		811	196,991
Pinolene	Growth regulator		805	168
Emamectin	Insecticide		756	60,790
Isoxaben	Herbicide		710	1,072
Lindane	Insecticide		693	39,563
Triticonazole	Fungicide		677	195,394
Deltamethrin	Insecticide		666	29,191
Azadirachtin	Insecticide		653	51,032
Triflusulfuron	Herbicide		636	59,946
TCMTB	Fungicide		621	77,938
Acequinocyl	Insecticide		614	2,397
Benomyl	Fungicide		534	1,906
Acibenzolar	Fungicide		438	16,705
Cyproconazole	Fungicide		384	12,123
Coniothyrium minitans	Fungicide		372	1,721
Pyraflufen ethyl	Growth regulator		327	100,666
Tetraborohydrate	Fungicide	Insecticide	320	8,778
Pseudomonas fluorescens	Fungicide		306	1,546
Cytokinin	Growth regulator		274	87,846
Iodosulfuron	Herbicide		273	123,025
Rotenone	Insecticide		265	54,037

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Naphthylacetamide	Growth regulator		193	2,533
Triadimefon	Fungicide		162	1,206
Endothal	Growth regulator	Herbicide	158	2,164
Triadimenol	Fungicide		156	43,282
Copper octanoate	Fungicide		121	5,969
Tebuthiuron	Herbicide		79	176
Thiazopyr	Herbicide		64	113
Chloroneb	Fungicide		44	1,345
Vinclozolin	Fungicide		41	73
Harpin protein	Fungicide		15	18,686
Cydia pomonella	Insecticide		8	12,335
Thiabendazole	Fungicide		8	3,186
CPPU	Growth regulator		0	82
Aluminum phosphide	Insecticide	Nematicide	Not used	Not used
Amitraz	Insecticide		Not used	Not used
Amitrole	Herbicide		Not used	Not used
Ammonium sulfamate	Herbicide		Not used	Not used
Ampelomyces quisqualis	Fungicide		Not used	Not used
Anilazine	Fungicide		Not used	Not used
Arsenic acid	Growth regulator		Not used	Not used
Barban	Herbicide		Not used	Not used
Barium polysulfide	Insecticide		Not used	Not used
Bendiocarb	Insecticide		Not used	Not used
Bifenox	Herbicide		Not used	Not used
Bordeaux mixture	Fungicide		Not used	Not used
Burkholderia cepacia	Fungicide	Nematicide	Not used	Not used
Calcium chloride	Growth regulator		Not used	Not used
Captan	Fungicide		Not used	Not used
Carbophenothion	Insecticide		Not used	Not used
Chinomethionat	Insecticide		Not used	Not used
Chloramben	Herbicide		Not used	Not used
Chlordimeform	Insecticide		Not used	Not used

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Chlorfenapyr	Insecticide		Not used	Not used
Chlormequat	Growth regulator		Not used	Not used
Chlorobenzilate	Insecticide		Not used	Not used
Chloroxuron	Herbicide		Not used	Not used
Chlorpropham	Herbicide		Not used	Not used
Cinnamaldehyde	Insecticide	Fungicide	Not used	Not used
Collectotrichum spores	Herbicide		Not used	Not used
Copper sulfate tri-basic	Fungicide		Not used	Not used
Cyanazine	Herbicide		Not used	Not used
Dalapon	Herbicide		Not used	Not used
Daminozide	Growth regulator		Not used	Not used
Dazomet	Herbicide	Nematicide	Not used	Not used
Demeton	Insecticide		Not used	Not used
Diallate	Herbicide		Not used	Not used
Dichlone	Fungicide		Not used	Not used
Dienochlor	Insecticide		Not used	Not used
Diethatyl	Herbicide		Not used	Not used
Diflubenzuron	Insecticide		Not used	Not used
Dimethylarsinic acid	Growth regulator	Herbicide	Not used	Not used
Dinocap	Insecticide		Not used	Not used
Dinoseb	Herbicide		Not used	Not used
Diphenamid	Herbicide		Not used	Not used
Dithiopyr	Herbicide		Not used	Not used
DNOC	Growth regulator		Not used	Not used
DSMA	Herbicide		Not used	Not used
EPN	Insecticide		Not used	Not used
Ethametsulfuron	Herbicide		Not used	Not used
Ethion	Insecticide		Not used	Not used
Etridiazole	Fungicide		Not used	Not used
Fenoxycarb	Insecticide		Not used	Not used
Fensulfothion	Nematicide		Not used	Not used
Fenvalerate	Insecticide		Not used	Not used

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Fluchloralin	Herbicide		Not used	Not used
Flucythrinate	Insecticide		Not used	Not used
Fluridone	Herbicide		Not used	Not used
Fluvalinate	Insecticide		Not used	Not used
Fluvalinate-tau	Insecticide		Not used	Not used
Folpet	Fungicide		Not used	Not used
Fonofos	Insecticide		Not used	Not used
Fosamine	Herbicide		Not used	Not used
Gallex	Fungicide		Not used	Not used
Gamma aminobutyric acid	Growth regulator		Not used	Not used
Garlic juice	Insecticide		Not used	Not used
Gentamicin sulfate	Fungicide		Not used	Not used
Hydramethylnon	Insecticide		Not used	Not used
Hydroxypropanoic acid	Growth regulator		Not used	Not used
Indolyl-butyric acid	Growth regulator		Not used	Not used
Isazofos	Insecticide		Not used	Not used
Isofenphos	Insecticide		Not used	Not used
Isopropalin	Herbicide		Not used	Not used
Kinoprene	Insecticide		Not used	Not used
Lead arsenate	Insecticide		Not used	Not used
L-glutamic acid	Growth regulator		Not used	Not used
Mecoprop	Herbicide		Not used	Not used
Mefluidide	Growth regulator		Not used	Not used
Methazole	Herbicide		Not used	Not used
Methiocarb	Insecticide		Not used	Not used
Methoxychlor	Insecticide		Not used	Not used
Methyl isothiocyanate	Nematicide		Not used	Not used
Mevinphos	Insecticide		Not used	Not used
Monocrotophos	Insecticide		Not used	Not used
Naptha	Insecticide		Not used	Not used
Noruron	Herbicide		Not used	Not used
Nosema locustae Canning	Insecticide		Not used	Not used

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Oxadiazon	Herbicide		Not used	Not used
Paclobutrazol	Growth regulator		Not used	Not used
Parathion	Insecticide		Not used	Not used
Pebulate	Herbicide		Not used	Not used
Pelargonic acid	Growth regulator		Not used	Not used
Pelargonic acid	Growth regulator	Herbicide	Not used	Not used
Phosalone	Insecticide		Not used	Not used
Phosphamidon	Insecticide		Not used	Not used
Phytophthora spores	Herbicide		Not used	Not used
Pirimicarb	Insecticide		Not used	Not used
Polyhedrosis virus	Insecticide		Not used	Not used
Potassium carbonate	Growth regulator		Not used	Not used
Prodiamine	Herbicide		Not used	Not used
Profluralin	Herbicide		Not used	Not used
Prometon	Herbicide		Not used	Not used
Propachlor	Herbicide		Not used	Not used
Propoxur	Insecticide		Not used	Not used
Pyridate	Herbicide		Not used	Not used
Quinoxyfen	Fungicide		Not used	Not used
Ryanodine	Insecticide		Not used	Not used
Sabadilla	Insecticide		Not used	Not used
Silicates	Insecticide		Not used	Not used
Sodium arsenite	Herbicide	Fungicide	Not used	Not used
Sodium metaborate	Herbicide		Not used	Not used
Steinernema carpocap	Insecticide		Not used	Not used
Steinernema riobrave	Insecticide		Not used	Not used
Sulfallate	Herbicide		Not used	Not used
Sulfometuron	Herbicide		Not used	Not used
Sulfosate	Herbicide		Not used	Not used
Sulprofos	Insecticide		Not used	Not used
TCA	Herbicide		Not used	Not used
Temephos	Insecticide		Not used	Not used

Table 4. National pesticide use in crop agriculture in the United States in 2009, by active ingredient.

Conventional pesticides	Category of use	Other use(s)	Total use in 2009 (kilograms of active ingredient)	Total area treated (hectares)
Terbutryn	Herbicide		Not used	Not used
Tetraoxosulfate	Herbicide		Not used	Not used
Tralomethrin	Insecticide		Not used	Not used
Triazamate	Insecticide		Not used	Not used
Trichlorfon	Insecticide		Not used	Not used
Tridiphane	Herbicide		Not used	Not used
Triforine	Fungicide		Not used	Not used
Trimethacarb	Insecticide		Not used	Not used
Trinexapac	Growth regulator		Not used	Not used
Vernolate	Herbicide		Not used	Not used
Zineb	Fungicide		Not used	Not used
Sum of conventional pesticides			**300,988,733**	
Petroleum and sulfur				
Petroleum oil	Fungicide	Insecticide, herbicide	30,811,579	1,207,588
Sulfur	Fungicide	Insecticide	26,210,294	2,782,181
Petroleum distillate	Insecticide		1,430	121

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Corn for grain (millions of hectares harvested)	*National Agricultural Statistics Service, 2011, Quick stats—corn, grain—acres harvested: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/EBD8AFD0-3916-366D-AE9C-BB9E1EEDF855.*
Corn grain yield (kilograms per hectare)	*National Agricultural Statistics Service, 2010, Quick stats—corn, grain yield, measured in bushel/acre: National Agricultural Statistics Service, accessed January 10, 2011, from http://quickstats.nass.usda.gov/results/6B21A279-D304-3E76-B435-977C2D1E7B96?*
Corn for silage (millions of hectares harvested)	*National Agricultural Statistics Service, 2011, Quick stats—corn, silage—acres harvested: National Agricultural Statistics Service, accessed April 4, 2011, from http://quickstats.nass.usda.gov/results/9A239879-35FB-38F1-8A18-3BBF4EC285DC.*
Corn silage yield (kilograms per hectare)	*National Agricultural Statistics Service, 2011, Quick stats—corn, silage—production, measured in tons: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/1B65A944-001E-3DC6-BEE9-E848FD2FE9C8?piv*
Corn (millions of hectares planted)	*National Agricultural Statistics Service, 2011, Quick stats—corn acres planted: National Agricultural Statistics Service, accessed January 1, 2011, from http://quickstats.nass.usda.gov/results/6B21A279-D304-3E76-B435-977C2D1E7B96?pivot=short_desc.*
Corn grain for human food (thousands of megagrams)	*Economic Research Service, 2011, Table 31: Corn—food, seed, and industrial use (million bushels): Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable31-Full.xls.*
Corn grain for animal feed (thousands of megagrams)	*Economic Research Service, 2011, Table 31: Corn—food, seed, and industrial use (million bushels): Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable31-Full.xls.*
Corn grain for seed (thousands of megagrams)	*Economic Research Service, 2011, Table 31: Corn—food, seed, and industrial use (million bushels): Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable31-Full.xls.*
Corn grain for export (thousands of megagrams)	*Economic Research Service, 2011, Table 31: Corn—food, seed, and industrial use (million bushels): Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable31-Full.xls.*
Corn grain for surplus (annual year end stock) (thousands of megagrams)	*Economic Research Service, 2011, Table 31: Corn—food, seed, and industrial use (million bushels): Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable31-Full.xls.*
Corn grain for biofuel (thousands of megagrams)	*Economic Research Service, 2011, Table 31: Corn—food, seed, and industrial use (million bushels): Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable31-Full.xls.*
Biofuel (ethanol) produced from corn (millions of liters)	*U.S. Energy Information Administration, 2011, Annual Energy Review 2010: DOE/EIA–0384(2010), accessed from http://www.eia.gov/totalenergy/data/annual/txt/ptb1003.html.*

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Percent of total corn area planted with any genetic trait	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Total corn area planted with any genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Total corn area planted with glyphosate-tolerant genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Total corn area planted with insect-resistant (Bacillus thuringiensis) genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Soybean (millions of hectares planted)	*National Agricultural Statistics Service, 2011, Quick stats—soybeans acres planted: National Agricultural Statistics Service, accessed April 4, 2011, from http://quickstats.nass.usda.gov/results/9812ECE7-FCE1-3EBD-8509-74FD0FB0A144.*
Soybean (millions of hectares harvested)	*National Agricultural Statistics Service, 2011, Quick stats—soybeans—acres harvested: National Agricultural Statistics Service, accessed July 19, 2011, from http://quickstats.nass.usda.gov/results/6DC6E547-CF5C-30DE-BB93-87FF5E2A2124?pivot=short_desc.*
Soybean yield (kilograms per hectare)	*National Agricultural Statistics Service, 2011, Quick stats—soybeans, yield, measured in bushels/acre: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/CF9AC115-E038-34E3-B884-6A5FA9566643.*
Biodiesel production from soybean (millions of liters)	Energy Information Administration, 2011, U.S. biodiesel production, exports, and consumption (millions gallons): Energy Information Administration: accessed June 21, 2011, from http://www.afdc.energy.gov/afdc/data/docs/biodiesel_production_consumption.xls.
Biodiesel consumption (millions of liters)	Energy Information Administration, 2011, U.S. biodiesel production, exports, and consumption (millions gallons): Energy Information Administration: accessed June 21, 2011, from http://www.afdc.energy.gov/afdc/data/docs/biodiesel_production_consumption.xls.
Percent of total soybean area planted with any genetic trait	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Total soybean area planted with any genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Soybean area planted with glyphosate-tolerant genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Wheat (millions of hectares planted)	*National Agricultural Statistics Service, 2011, Quick stats—soybeans, yield, measured in bushels/acre: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/CF9AC115-E038-34E3-B884-6A5FA9566643.*
Wheat (millions of hectares harvested)	*National Agricultural Statistics Service, 2011, Quick stats—wheat—acres harvested: National Agricultural Statistics Service, accessed July 19, 2011, from http://quickstats.nass.usda.gov/results/E283A7A0-34BC-3705-A4D7-C9550DC0E257?pivot=short_desc.*
Wheat yield (kilograms per hectare)	*National Agricultural Statistics Service, 2011, Quick stats—wheat, yield, measured in bushels/acre: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/87C3A4D5-0A9D-3389-9380-BCAED0ED590B?pivot=*
Oats (millions of hectares planted)	*National Agricultural Statistics Service, 2011, Quick stats—cotton, yield, measured in pounds/acre: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/2242FCE4-F18F-38AD-96C2-DF793326CA81?pivot=*
Oats (millions of hectares harvested)	*National Agricultural Statistics Service, 2011, Quick stats—oats—acres harvested: National Agricultural Statistics Service, accessed July 19, 2011, from http://quickstats.nass.usda.gov/results/9B2EA819-0EED-34B9-B897-3754BF32ED9B?pivot=short_desc.*
Oats yield (kilograms per hectare)	*National Agricultural Statistics Service, 2011, Quick stats—oats, yield, measured in bushels/acre: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/F5D55CB8-46BB-39A7-B240-1C5FE5D69EA8?pivot=s*
Cotton (millions of hectares planted)	*National Agricultural Statistics Service, 2011, Quick stats—cotton acres planted: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/2242FCE4-F18F-38AD-96C2-DF793326CA81?pivot=short_desc.*
Cotton (millions of hectares harvested)	*National Agricultural Statistics Service, 2011, Quick stats—cotton—acres harvested: National Agricultural Statistics Service, accessed July 19, 2011, from http://quickstats.nass.usda.gov/results/86F896AD-EC18-39F1-B637-069622A636FC?pivot=short_desc.*
Cotton yield (kilograms per hectare)	*National Agricultural Statistics Service, 2011, Quick stats—cotton, yield, measured in pounds/acre: National Agricultural Statistics Service, accessed April 15, 2011, from http://quickstats.nass.usda.gov/results/2242FCE4-F18F-38AD-96C2-DF793326CA81?pivot=*
Percent of total cotton area planted with any genetic trait	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Total cotton area planted with any genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Cotton area planted with glyphosate-tolerant genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Cotton area planted with insect-resistant genetic trait (millions of hectares)	National summaries of seed trait data were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Hay (millions hectares harvested)	*Economic Research Service, 2011, Table 8: hay—production, harvested acreage, yield, and stocks: Economic Research Service, accessed July 19, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable08-Full.xls.*
Hay yield (kilograms per hectare)	*Economic Research Service, 2011, Table 8: hay—production, harvested acreage, yield, and stocks: Economic Research Service, accessed July 19, 2011, from http://www.ers.usda.gov/Data/FeedGrains/Yearbook/FGYearbookTable08-Full.xls.*
Beef cows that have calved (millions of head)	*U.S. Department of Agriculture, 1970, 1970 livestock and poultry inventory: U.S. Department of Agriculture: accessed from http://usda.mannlib.cornell.edu/usda/nass/LivePoulIn//1970s/1970/LivePoulIn-02-06-1970.pdf.*
Dairy cattle that have calved (millions of head)	U.S. Department of Agriculture, 2010, Livestock and poultry inventory: U.S. Department of Agriculture: accessed from http://usda.mannlib.cornell.edu/usda/current/htrl/htrl-09-17-2010.pdf.
Milk produced (millions liters)	*National Agricultural Statistics Service, 2010, Quick Stats—milk production, measured in lb: National Agricultural Statistics Service, accessed September 29, 2011, from http://quickstats.nass.usda.gov/results/EB04EBCF-30D8-3CC1-BC57-778C39D6FFFC?pivot=sho*
Sheep and lambs (millions of head)	U.S. Department of Agriculture, 2010, Livestock and poultry inventory: U.S. Department of Agriculture, accessed from http://usda.mannlib.cornell.edu/usda/current/htrl/htrl-09-17-2010.pdf.
Hogs and pigs (millions of head)	U.S. Department of Agriculture, 2010, Livestock and poultry inventory: U.S. Department of Agriculture, accessed from http://usda.mannlib.cornell.edu/usda/current/htrl/htrl-09-17-2010.pdf.
Turkeys (thousands of head)	U.S. Department of Agriculture, 2010, Livestock and poultry inventory: U.S. Department of Agriculture, accessed from http://usda.mannlib.cornell.edu/usda/current/htrl/htrl-09-17-2010.pdf.
Chickens—broilers (millions of head)	U.S. Department of Agriculture, 2010, Livestock and poultry inventory: U.S. Department of Agriculture, accessed from http://usda.mannlib.cornell.edu/usda/current/htrl/htrl-09-17-2010.pdf.
Eggs produced (millions)	U.S. Department of Agriculture, 2010, Livestock and poultry inventory: U.S. Department of Agriculture, accessed from http://usda.mannlib.cornell.edu/usda/current/htrl/htrl-09-17-2010.pdf.
Nitrogen fertilizer applied (thousands of megagrams as N)—USGS	*Ruddy, B.C., Lorenz, D.L., and Mueller, D.K., 2006, County-level estimates of nutrient inputs to the land surface of the conterminous United States, 1982–2001, U.S. Geological Survey Scientific Investigations Report 2006–5012, 17 p. Dataset available onlne at http://pubs.usgs.gov/sir/2006/5012/, and Dubrovsky, N.M., Burow, K.R., Clark, G.M., Gronberg, J.M., Hamilton P.A., Hitt, K.J., Mueller, D.K., Munn, M.D., Nolan, B.T., Puckett, L.J., Rupert, M.G., Short, T.M., Spahr, N.E., Sprague, L.A., and Wilber, W.G., 2010, The quality of our Nation's waters—*

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Nitrogen fertilizer applied (thousands of megagrams as N)—USDA	*Economic Research Service, 2011, Table 1. U.S. consumption of plant nutrients: Economic Research Service, accessed August 4, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table1.xls.*
Phosphorous fertilizer applied (thousands of megagrams as P)—USGS	*Ruddy, B.C., Lorenz, D.L., and Mueller, D.K., 2006, County-level estimates of nutrient inputs to the land surface of the conterminous United States, 1982–2001, U.S. Geological Survey Scientific Investigations Report 2006–5012, 17 p. Dataset available onlne at http://pubs.usgs.gov/sir/2006/5012/.*
Phosphorous fertilizer applied (thousands of megagrams as P_2O_5)—USDA	*Economic Research Service, 2011, Table 1. U.S. consumption of plant nutrients: Economic Research Service, accessed August 4, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table1.xls.*
Potassium fertilizer applied (thousands of megagrams as K_2O)	*Economic Research Service, 2011, Table 1. U.S. consumption of plant nutrients: Economic Research Service, accessed August 4, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table1.xls.*
Corn area treated with nitrogen (percent)	*Economic Research Service, 2011, Table 9. Percentage of corn acreage receiving nitrogen fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table9.xls.*
Nitrogen applied to corn (thousands of megagrams as N)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Nitrogen application rate to corn (kilograms N/ hectare)	*Economic Research Service, 2011, Table 10: nitrogen used on corn, rate per fertilized acre receiving nitrogen, selected states: Economic Research Service, accessed May 4, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table10.xls.*
Corn area treated with phosphate (percent)	*Economic Research Service, 2011, Table 11. Percentage of corn acreage receiving phosphate fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table11.xls.*
Phosphate applied to corn (thousands of megagrams as P_2O_5)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Phosphate application rate to corn (kilograms P_2O_5/ hectare)	*Economic Research Service, 2011, Table 12: Phosphate used on corn, rate per fertilized acre receiving phosphate fertilizer, selected states: Economic Research Service, accessed May 4, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table12.xl*
Corn area treated with potassium (potash; percent)	*Economic Research Service, 2011, Table 13. Percentage of corn acreage receiving potash fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table13.xls.*
Potassium (potash) applied to corn (thousands of megagrams as K_2O)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Potassium (potash) application rate to corn (kilograms K_2O/ hectare)	*Economic Research Service, 2011, Table 12: Phosphate used on corn, rate per fertilized acre receiving phosphate fertilizer, selected states: Economic Research Service, accessed May 4, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table12.xl*
Soybean area treated with nitrogen (percent)	*Economic Research Service, 2011, Table 21. Percentage of soybean acreage receiving nitrogen fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table21.xls.*
Nitrogen applied to soybean (thousands of megagrams as N)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Nitrogen application rate to soybean (kilograms N/ hectare)	*Economic Research Service, 2011, Table 22. Nitrogen used on soybeans, rate per fertilized acre receiving nitrogen, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table22.xls.*
Soybean area treated with phosphate (percent)	*Economic Research Service, 2011, Table 23. Percentage of soybean acreage receiving phosphate fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table23.xls.*
Phosphate applied to soybean (thousands of megagrams as P_2O_5)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Phosphate application rate to soybean (kilograms P_2O_5/ hectare)	*Economic Research Service, 2011, Table 24. Phosphate used on soybeans, rate per fertilized acre receiving phosphate, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table24.xls.*
Soybean area treated with potassium (potash; percent)	*Economic Research Service, 2011, Table 25. Percentage of soybean acreage receiving potash fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table25.xls.*
Potassium (potash) applied to soybean (thousands of megagrams as K_2O)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Potassium (potash) application rate to soybean (kilograms K_2O/hectare)	*Economic Research Service, 2011, Table 26. Potash used on soybeans, rate per fertilized acre receiving potash, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table26.xls.*
Wheat area treated with nitrogen (percent)	*Economic Research Service, 2011, Table 27. Percentage of wheat acreage receiving nitrogen fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table27.xls.*
Nitrogen applied to wheat (thousands of megagrams as N)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Nitrogen application rate to wheat (kilograms N/ hectare)	*Economic Research Service, 2011, Table 28. Nitrogen used on wheat, rate per fertilized acre receiving nitrogen, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table28.xls.*

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Wheat area treated with phosphate (percent)	*Economic Research Service, 2011, Table 29. Percentage of wheat acreage receiving phosphate fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table29.xls.*
Phosphate applied to wheat (thousands of megagrams as P_2O_5)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Phosphate application rate to wheat (kilograms P_2O_5/hectare)	*Economic Research Service, 2011, Table 30. Phosphate used on wheat, rate per fertilized acre receiving phosphate, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table30.xls.*
Wheat area treated with potassium (potash; percent)	*Economic Research Service, 2011, Table 31. Percentage of wheat acreage receiving potash fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table31.xls.*
Potassium (potash) applied to wheat (thousands of megagrams as K_2O)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Potassium (potash) application rate to wheat (kilograms K_2O/hectare)	*Economic Research Service, 2011, Table 32. Potash used on wheat, rate per fertilized acre receiving potash, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table32.xls.*
Cotton area treated with nitrogen (percent)	*Economic Research Service, 2011, Table 15. Percentage of cotton acreage receiving nitrogen fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table15.xls.*
Nitrogen applied to cotton (thousands of megagrams as N)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Nitrogen application rate to cotton (kilograms N/hectare)	*Economic Research Service, 2011, Table 16. Nitrogen used on cotton, rate per fertilized acre receiving nitrogen, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table16.xls.*
Cotton area treated with phosphate (percent)	*Economic Research Service, 2011, Table 17. Percentage of cotton acreage receiving phosphate fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table17.xls.*
Phosphate applied to cotton (thousands of megagrams as P_2O_5)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Phosphate application rate to cotton (kilograms P_2O_5/ hectare)	*Economic Research Service, 2011, Table 18. Phosphate used on cotton, rate per fertilized acre receiving phosphate, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table18.xls.*
Cotton area treated with potassium (potash; percent)	*Economic Research Service, 2011, Table 19. Percentage of cotton acreage receiving potash fertilizer, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table19.xls.*

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Potassium (potash) application rate to cotton (kilograms K_2O/ hectare)	*Economic Research Service, 2011, Table 2. Estimated U.S. plant nutrient use by selected crops: Economic Research Service, accessed June 16, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table2.xls.*
Potassium (potash) application rate to cotton (kilograms K_2O/hectare)	*Economic Research Service, 2011, Table 20. Potash used on cotton, rate per fertilized acre receiving potash, selected States: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table20.xls.*
Total nitrogen in manure applied to cropland (thousands of megagrams as N)	*FOR YEARS 1982–1997: Ruddy, B.C., Lorenz, D.L., and Mueller, D.K., 2006, County-level estimates of nutrient inputs to the land surface of the conterminous United States, 1982–2001, U.S. Geological Survey Scientific Investigations Report 2006–5012, 17 p. Dataset available online at http://pubs.usgs.gov/sir/2006/5012/.* *FOR YEARS 2001 and 2007: International Plant Nutrition Institute, 2011, A Nutrient Use Information System (NuGIS) for the U.S.: Norcross, Ga., International Plant Nutrition Institute, accessed January 2012, at www.ipni.net./nugis.*
Total phosphorus in manure applied to cropland (thousands of megagrams as P)	*FOR YEARS 1982–1997: Ruddy, B.C., Lorenz, D.L., and Mueller, D.K., 2006, County-level estimates of nutrient inputs to the land surface of the conterminous United States, 1982–2001, U.S. Geological Survey Scientific Investigations Report 2006–5012, 17 p. Dataset available online at http://pubs.usgs.gov/sir/2006/5012/.* *FOR YEARS 2001 and 2007: International Plant Nutrition Institute, 2011, A Nutrient Use Information System (NuGIS) for the U.S.: Norcross, Ga., International Plant Nutrition Institute, accessed January 2012, at www.ipni.net./nugis.*
Secondary and micronutrients for fertilizer (thousands of megagrams)	*Economic Research Service, 2011, Table 3. U.S. consumption of plant nutrients: Economic Research Service, accessed August 4, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table3.xls.*
Gypsum (thousands of megagrams as Ca_2SO_4)	*Economic Research Service, 2011, Table 6. U.S. consumption of selected secondary, micronutrients, and natural organic materials: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table6.xls.*
Zinc compounds (thousands of megagrams)	*Economic Research Service, 2011, Table 6. U.S. consumption of selected secondary, micronutrients, and natural organic materials: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table6.xls.*
Natural organic materials (thousands of megagrams)	*Economic Research Service, 2011, Table 6. U.S. consumption of selected secondary, micronutrients, and natural organic materials: Economic Research Service, accessed June 15, 2011, from http://www.ers.usda.gov/Data/FertilizerUse/Tables/Table6.xls.*
Total conventional pesticides applied (thousands of megagrams AI)—EPA	*U.S. Environmental Protection Agency, 2011, Table 10: U.S. conventional pesticide usage—agricultural sector, 1964–1995: U.S. Environmental Protection Agency, accessed January 24, 2011, from http://www.epa.gov/opp00001/pestsales/95pestsales/tables_charts1995_4.htm#table10.*
Total conventional pesticides applied (thousands of megagrams AI)—Aspelin	*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Total conventional pesticides applied (thousands of megagrams AI) —GfK	National summaries of pesticide use were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—Aspelin	*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
Herbicides and plant growth applied, including glyphosate (thousands of megagrams AI)—GfK	National summaries of pesticide use were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Glyphosate applied (thousands of megagrams of AI)—GfK	National summaries of pesticide use were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Insecticides and acaricides applied (thousands of megagrams AI)—GfK	National summaries of pesticide use were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Insecticides and acaricides applied (thousands of megagrams AI) —Aspelin	*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
Fungicides applied (thousands of megagrams AI) —Aspelin	*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
Fungicides applied (thousands of megagrams AI)—GfK	National summaries of pesticide use were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Nematocides and fumigants applied (thousands of megagrams AI)—Aspelin	*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
Nematocides and fumigants applied (thousands of megagrams AI)—GfK	National summaries of pesticide use were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.
Other conventional pesticides applied (thousands of megagrams AI)—Aspelin	*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—Aspelin	*Aspelin, A.L., 2003, Pesticide usage in the United States: trends during the 20th century: Raleigh, N.C., Center for Integrated Pest Management Technical Bulletin 105, p. 213, accessed from http://www.pestmanagement.info/pesticide_history/full_doc.pdf.*
Other pesticidal agents: petroleum oils and sulfur (thousands of megagrams AI)—GfK	National summaries of pesticide use were derived by the USGS from proprietary data sources (GfK Kynetec, Inc.) on 2009 agricultural pesticide use reported for multi-county areas referred to as Crop Reporting Districts.

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Total population (millions) (1850–2010)	*Texas State Library and Archives Commission, 2011, United States and Texas populations 1850–2010: Texas State Library and Archives Commission, accessed January 12, 2011, from http://www.tsl.state.tx.us/ref/abouttx/census.html.*
Rural population (millions) (1900–1990)	*U.S. Census Bureau, 1995, Table 1. urban and rural population: 1900 to 1990: U.S. Census Bureau: accessed August 4, 2011, from http://www.census.gov/population/www/censusdata/files/urpop0090.txt.*
Rural population (millions) (2000)	U.S. Census Bureau, 2000, United States-urban/rural and inside/outside metropolitan area: U.S. Census Bureau, American FactFinder, Geographic Comparison Table, accessed August 4, 2011, from http://factfinder.census.gov/servlet/GCTTable?_bm=y&-state=gct&-ds_name=DEC_2000_SF1_U&-_box_head_nbr=GCT-P1&-mt_name=&-_caller=geoselect&-
Rural population (millions) (2010)	*Economic Research Service, 2011, State Fact Sheets: United States, Data Sets: Economic Research Service, accessed August 4, 2011, from http://www.ers.usda.gov/statefacts/US.HTM.*
Percent of total population that is rural	= rural population / total population * 100
Land in farms (millions of hectares) (1910–1920)	U.S. Census Bureau, 1920, Farms and farm property: U.S. Census Bureau, 1920 census of population and housing, v. 5. Agriculture, chap. 1.
Land in farms (millions of hectares) (1925–2010)	*U.S. Department of Agriculture, [n.d.], Farms, land in farms, and livestock operations: U.S. Department of Agriculture, National Agricultural Statistics Service, accessed January 10, 2011, at http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1259.*
Number of farms (millions) (1910–1920)	U.S. Census Bureau, 1920, Farms and farm property: U.S. Census Bureau, 1920 census of population and housing, v. 5. Agriculture, chap. 1.
Number of farms (millions) (1925–2010)	*U.S. Department of Agriculture, [n.d.], Farms, land in farms, and livestock operations: U.S. Department of Agriculture, National Agricultural Statistics Service, accessed January 10, 2011, at http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1259.*
Average farm size (hectares) (1910–1920)	U.S. Census Bureau, 1920, Farms and farm property: U.S. Census Bureau, 1920 census of population and housing, v. 5. Agriculture, chap. 1.
Average farm size (hectares) (1910–1920)	*U.S. Department of Agriculture, [n.d.], Farms, land in farms, and livestock operations: U.S. Department of Agriculture, National Agricultural Statistics Service, accessed January 10, 2011, at http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1259.*
Laborers on farms (millions) (1925–2010)	*National Agricultural Statistics Service, 2000, U.S. number of farms & all farm workers 1910–2000: National Agricultural Statistics Service, accessed September 29, 2011, from http://www.nass.usda.gov/Charts_and_Maps/graphics/data/fl_frmwk.txt.*
Conservation Adjustment Program (millions of hectares)	Crosswhite, W.M., and Sandretto, CL., 1991, Trends in resource protection policies in agriculture, in Agricultural resources: cropland, water, and conservation situation and outlook report: U.S. Department of Agriculture, Economic Research Service, no. AR–23.
Agricultural Conservation Program (millions of hectares)	Crosswhite, W.M., and Sandretto, CL., 1991, Trends in resource protection policies in agriculture, in Agricultural resources: cropland, water, and conservation situation and outlook report: U.S. Department of Agriculture, Economic Research Service, no. AR–23.

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Soil Bank (millions of hectares)	Crosswhite, W.M., and Sandretto, CL., 1991, Trends in resource protection policies in agriculture, in Agricultural resources: cropland, water, and conservation situation and outlook report: U.S. Department of Agriculture, Economic Research Service, no. AR–23.
Cropland Adjustment Program (millions of hectares)	Crosswhite, W.M., and Sandretto, CL., 1991, Trends in resource protection policies in agriculture, in Agricultural resources: cropland, water, and conservation situation and outlook report: U.S. Department of Agriculture, Economic Research Service, no. AR–23.
Acreage Reduction Program (millions of hectares)	Crosswhite, W.M., and Sandretto, CL., 1991, Trends in resource protection policies in agriculture, in Agricultural resources: cropland, water, and conservation situation and outlook report: U.S. Department of Agriculture, Economic Research Service, no. AR–23.
Conservation Reserve Program (millions of hectares)	*Farm Service Agency, 2011, Conservation programs—CRP contract summary and statistics: Farm Service Agency, accessed August 2, 2011, from*
Wildlife Habitat Incentives Program (millions of hectares) (1998–2004)	*Gray, R.L., 2005, Fish and wildlife benefits of the Wildlife Habitat Incentives Program: Natural Resources Conservation Service, accessed from http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1097&context=usdafsfacpub.*
Wildlife Habitat Incentives Program (millions of hectares) (2005)	*Natural Resources Conservation Service, 2005, Wildlife Habitat Incentives Program FY-2005 number of acres: Natural Resources Conservation Service, accessed August 2, 2011, from http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_007993.pdf.*
Wildlife Habitat Incentives Program (millions of hectares) (2006)	*Natural Resources Conservation Service, 2006, Wildlife Habitat Incentives Program FY- 2006 number of acres: Natural Resources Conservation Service, accessed August 2, 2011, from http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_006843.pdf.*
Wildlife Habitat Incentives Program (millions of hectares) (2007)	*Natural Resources Conservation Service, 2007, Wildlife Habitat Incentives Program FY-2007 number of acres: Natural Resources Conservation Service, accessed August 8, 2011, from http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_007163.pdf.*
Wildlife Habitat Incentives Program (millions of hectares) (2008)	*Natural Resources Conservation Service, 2008, Wildlife Habitat Incentives Program FY-2008 number of acres: Natural Resources Conservation Service, accessed August 2, 2011, from http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_007681.pdf.*
Wildlife Habitat Incentives Program (millions of hectares) (2009)	*Natural Resources Conservation Service, 2009, Wildlife Habitat Incentives Program FY-2009 number of acres: Natural Resources Conservation Service, accessed August 2, 2011, from http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_007159.pdf.*
Wildlife Habitat Incentives Program (millions of hectares) (2010)	*Natural Resources Conservation Service, 2010, FY 2010 WHIP contracts and dollars obligated: Natural Resources Conservation Service, accessed August 8, 2011, from http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/whip/?&cid=stelpr*
Wetland Reserve Program (hectares)	Barnes, E., 2011, National easement staging tool (NEST), Beltsville, MD.
Environmental Quality Incentives Program (millions of hectares) (1997–2009)	*Natural Resources Conservation Service, 2011, FY 2010 EQIP contracts and dollars obligated: Natural Resources Conservation Service, Environmental Quality Incentives Program, accessed December 19, 2011, from http://www.nrcs.usda.gov/wps/portal/nrcs/detailf*

Sources of information used in table 3.

Time series data 1700s–2010 (where data is available)	Source of information
Environmental Quality Incentives Program (millions of hectares) (2010)	*Pavelis, G.A., ed., 1987, Farm drainage in the United States: history, status, and prospects: Economic Research Service, Miscellaneous Publication 1455, 170 p., accessed from http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED295043.*
Area with surface drainage (millions of hectares)	*Pavelis, G.A., ed., 1987, Farm drainage in the United States: history, status, and prospects: Economic Research Service, Miscellaneous Publication 1455, 170 p., accessed from http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED295043.*
Area with subsurface drainage (millions of hectares)	*Kenny, J.F., Barber, N.L., Hutson, S.S., Linsey, K.S., Lovelace, J.K., and Maupin, M A., 2009, Estimated use of water in the United States in 2005: U.S. Geological Survey Circular 1344, 52 p., accessed from http://pubs.usgs.gov/circ/1344/.*
Irrigation (billions of liters per day)	*Kenny, J.F., Barber, N.L., Hutson, S.S., Linsey, K.S., Lovelace, J.K., and Maupin, M A., 2009, Estimated use of water in the United States in 2005: U.S. Geological Survey Circular 1344, 52 p., accessed from http://pubs.usgs.gov/circ/1344/.*
Water for livestock (billions of liters per day)	*Kenny, J.F., Barber, N.L., Hutson, S.S., Linsey, K.S., Lovelace, J.K., and Maupin, M A., 2009, Estimated use of water in the United States in 2005: U.S. Geological Survey Circular 1344, 52 p., accessed from http://pubs.usgs.gov/circ/1344/.*
Percent of corn using "no till" tillage practice	*Baker, N.T., 2011, Tillage practices in the conterminous United States, 1989–2004—datasets aggregated by watershed: U.S. Geological Survey Data Series 573, 13 p: accessed from http://pubs.usgs.gov/ds/ds573/pdf/dataseries573final.pdf.*
Area of corn planted using conventional tillage (thousands of hectares)	*Baker, N.T., 2011, Tillage practices in the conterminous United States, 1989–2004—datasets aggregated by watershed: U.S. Geological Survey Data Series 573, 13 p: accessed from http://pubs.usgs.gov/ds/ds573/pdf/dataseries573final.pdf.*
Area of corn planted using reduced tillage (thousands of hectares)	*Baker, N.T., 2011, Tillage practices in the conterminous United States, 1989–2004—datasets aggregated by watershed: U.S. Geological Survey Data Series 573, 13 p: accessed from http://pubs.usgs.gov/ds/ds573/pdf/dataseries573final.pdf.*
Area of corn planted using ridge tillage (thousands of hectares)	*Baker, N.T., 2011, Tillage practices in the conterminous United States, 1989–2004—datasets aggregated by watershed: U.S. Geological Survey Data Series 573, 13 p: accessed from http://pubs.usgs.gov/ds/ds573/pdf/dataseries573final.pdf.*
Area of corn planted using mulch tillage (thousands of hectares)	*Baker, N.T., 2011, Tillage practices in the conterminous United States, 1989–2004—datasets aggregated by watershed: U.S. Geological Survey Data Series 573, 13 p: accessed from http://pubs.usgs.gov/ds/ds573/pdf/dataseries573final.pdf.*
Area of corn planted using "no till" tillage (thousands of hectares)	*Baker, N.T., 2011, Tillage practices in the conterminous United States, 1989–2004—datasets aggregated by watershed: U.S. Geological Survey Data Series 573, 13 p: accessed from http://pubs.usgs.gov/ds/ds573/pdf/dataseries573final.pdf.*
Percent of soybean using "no till" tillage practice	*Baker, N.T., 2011, Tillage practices in the conterminous United States, 1989–2004—datasets aggregated by watershed: U.S. Geological Survey Data Series 573, 13 p: accessed from http://pubs.usgs.gov/ds/ds573/pdf/dataseries573final.pdf.*
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