

IP assets of private seed company – Monsanto

M Elangovan & P Kiran Babu¹*

**Senior Scientist & 1-Research Associate, Directorate of Sorghum Research (DSR), Hyderabad 500030 (AP), India*

From Wikipedia, the free encyclopedia

Monsanto Company Inc.

MONSANTO



Type	Public
Traded as	NYSE: MON
S&P 500 Component	Industry
Agribusiness	Founded
St. Louis, Missouri, U.S. (1901)	
Founder(s)	John Francis Queeny
Headquarters	Creve Coeur, Missouri, U.S.
Key people	Hugh Grant (Chairman, President and CEO)
Products	Herbicides, pesticides, crop seeds
Revenue	▲ US\$ 11.822 billion (FY 2011) ^[1]
Operating income	▲ US\$ 2.502 billion (FY 2011) ^[1]
Net income	▲ US\$ 1.659 billion (FY 2011) ^[1]
Total assets	▲ US\$ 19.844 billion (FY 2011) ^[1]
Total equity	▲ US\$ 11.716 billion (FY 2011) ^[1]
Employees	20,600 (August 2011) ^[2]
Website	Monsanto.com

Monsanto Company (NYSE: MON) is a publicly traded American multinational agricultural biotechnology corporation headquartered in Creve Coeur, Missouri.^{[3][4]} It is a leading producer of genetically engineered (GE) seed and of the herbicide glyphosate, which it markets under the Roundup brand.^[5] Founded in 1901 by John Francis Queeny, by the 1940s it was a major producer of plastics, including polystyrene and synthetic fibers. Notable achievements by Monsanto and its scientists as a chemical company included breakthrough research on catalytic asymmetric hydrogenation and being the first company to mass-produce light emitting diodes (LEDs). The company also formerly manufactured controversial products such as the insecticide DDT, PCBs, Agent Orange, and recombinant bovine somatotropin.

Monsanto was among the first to genetically modify a plant cell, along with three academic teams, which was announced in 1983,^[6] and was among the first to conduct field trials of genetically modified crops, which it did in 1987. It remained one of the top 10 U.S. chemical companies until it divested most of its chemical businesses between 1997 and 2002, through a process of mergers and spin-offs that focused the company on biotechnology.

Monsanto was a pioneer in applying the biotechnology industry business model to agriculture, using techniques developed by Genentech and other biotech drug companies in the late 1970s in California.^[7] In this business model, companies invest heavily in research and development, and recoup the expenses through the use and enforcement of biological patents.^{[8][9][10][11]} Monsanto's application of this model to agriculture, along with a growing movement to create a global, uniform system of plant breeders' rights in the 1980s, came into direct conflict with customary practices of farmers to save, reuse, share and develop plant varieties.^[12] Its seed patenting model has also been criticized as biopiracy and a threat to biodiversity.^{[13][14][15]} Monsanto's role in these changes in agriculture (which include its litigation and its seed commercialization practices^[16]), its current and former agbiotech products, its lobbying of government agencies, and its history as a chemical company, have made Monsanto controversial.

History

Monsanto was founded in St. Louis, Missouri, in 1901, by John Francis Queeny, a 30-year veteran of the pharmaceutical industry. He funded the start-up with his own money and capital from a soft drink distributor and gave the company his wife's maiden name. His father-in-law was Emmanuel Mendes de Monsanto, a wealthy financier of a sugar company active in Vieques, Puerto Rico, and based in St. Thomas in the Danish West Indies. The company's first product was the artificial sweetener saccharin, which was sold to the Coca-Cola Company.

In 1919 Monsanto expanded to Europe by entering a partnership with Graesser's Chemical Works at Cefn Mawr near Ruabon, Wales to produce vanillin, aspirin and its raw ingredient salicylic acid, and later rubber processing chemicals. This site was later sold and closed in 2010. In the 1920s Monsanto expanded into basic industrial chemicals like sulfuric acid and PCBs, and Queeny's son Edgar Monsanto Queeny took over the company in 1928.

In 1946 it developed "All" laundry detergent and began to market it; they sold the product line to Lever Brothers in 1957.^[17] Also in the 1940s, Monsanto operated the Dayton Project, and later Mound Laboratories in Miamisburg, Ohio, for the Manhattan Project, the development of the first nuclear weapons and, after 1947, the Atomic Energy Commission. In 1947 one of its factories was destroyed in the Texas City Disaster.^[18] Monsanto acquired American Viscose from England's Courtauld family in 1949. In 1954 Monsanto partnered with German chemical giant Bayer to form Mobay and market polyurethanes in the United States

Monsanto began manufacturing DDT in 1944, along with some 15 other companies.^[19] This insecticide was much welcomed in the fight against malaria-transmitting mosquitoes. Due to DDT's toxicity, its use in the United States was banned in 1972. In 1977 Monsanto stopped producing PCBs; the United States Congress banned domestic PCB production two years later.^{[20][21]} In the 1960s and 1970s, Monsanto was also one of the most important producers of Agent Orange for United States Armed Forces operations in Vietnam.

In the mid-1960s, William Standish Knowles and his team invented a way to selectively synthesize enantiomers via asymmetric hydrogenation. This was an important advancement because it was the first method for the catalytic production of pure chiral compounds.^[22] Using this method, Knowles' team designed the "first industrial process to chirally synthesize an important compound" —L-dopa, which is currently the main drug used

to treat Parkinson's disease.^[23] In 2001 Knowles and Ryōji Noyori won the Nobel Prize in Chemistry. In the mid-1960s chemists at Monsanto developed the Monsanto process for making acetic acid, which until 2000 was the method most widely used to make this important industrial chemical. In 1965 Monsanto chemists invented AstroTurf, which the company then commercialized.

In 1968 it became the first company to start mass production of (visible) light emitting diodes (LEDs), using gallium arsenide phosphide. This ushered in the era of solid-state lights. From 1968 to 1970, sales doubled every few months. Their products (discrete LEDs and seven-segment numeric displays) became the standards of industry. The primary markets then were electronic calculators, digital watches, and digital clocks.^[24] Monsanto was a pioneer of optoelectronics in the 1970s.

Between 1968 and 1974, the company assumed title sponsorship of the PGA Tour event in Pensacola, Fla., that was renamed the Monsanto Open. Notable winners included World Golf Hall of Fame member Gene Littler, in 1971.

In 1979 Monsanto established the Edgar Monsanto Queeny safety award in honor of its former CEO (1928-1960), an annual \$2,000 prize given to a member of the American Society of Safety Engineers to encourage accident prevention.^[25]

Monsanto scientists became the first to genetically modify a plant cell in 1982. Five years later, Monsanto conducted the first field tests of genetically engineered crops.

In 1985 Monsanto acquired G. D. Searle & Company, a life sciences company focusing on pharmaceuticals, agriculture, and animal health. In 1993 Monsanto's Searle division filed a patent application for Celebrex,^{[26][27]} which in 1998 became the first selective COX-2 inhibitor to be approved by the U.S. Food and Drug Administration (FDA).^[28] Celebrex became a blockbuster drug and was often mentioned as a key reason for Pfizer's acquisition of Monsanto's pharmaceutical business in 2002.^[29] In 1994 Monsanto introduced a recombinant version of bovine somatotropin, brand-named Posilac.^[30] Monsanto later sold this business off to Eli Lilly and Company.

In 1996 Monsanto purchased Agracetus, the biotechnology company that had generated the first transgenic varieties of cotton, soybeans, peanuts, and other crops, and which Monsanto had already been licensing technology from since 1991.^[31] Monsanto first entered the maize seed business when it purchased 40% of DEKALB in 1996; it purchased the remainder of the corporation in 1998.^[32] In 1998 Monsanto purchased Cargill's seed business, which gave it access to sales and distribution facilities in 51 countries.^[33] In 2005, it finalized the purchase of Seminis Inc, a leading global vegetable and fruit seed company, for \$1.4 billion.^[34] This made it the world's largest conventional seed company at the time.

In 2007 Monsanto and BASF announced a long-term agreement to cooperate in the research, development, and marketing of new plant biotechnology products.^{[35][36]} In October 2008, the company's Canadian division, Monsanto Canada Inc., was named one of Canada's Top 100 Employers by Mediacorp Canada Inc., and was featured in *Maclean's* news magazine.^[37] In January 2010, Forbes magazine named Monsanto company of the year for 2009.^[38]

Spin-offs and mergers

Through a series of transactions, the Monsanto that existed from 1901 to 2000 and the current Monsanto are legally two distinct corporations. Although they share the same name and corporate headquarters, many of the same executives and other employees, and responsibility for liabilities arising out of activities in the industrial chemical business, the agricultural chemicals business is the only segment carried forward from the pre-1997 Monsanto Company to the current Monsanto Company. This was accomplished beginning in the 1980s:

- **1985:** Monsanto purchased G. D. Searle & Company for \$2.7 billion in cash.^{[39][40]} In this merger, Searle's aspartame business became a separate Monsanto subsidiary, the NutraSweet Company. CEO of NutraSweet, Robert B. Shapiro, became CEO of Monsanto from 1995 to 2000.
- **1996:** Acquired Agracetus, a majority interest in Calgene, creators of the Flavr Savr tomato, and 40% of DEKALB Genetics Corporation. It purchased the remainder of Dekalb in 1998.^{[41][42]}
- **1997:** Monsanto spun off its industrial chemical and fiber divisions into Solutia Inc.^[43] This transferred the financial liability related to the production and contamination with PCBs at the Illinois and Alabama plants. In January,

Monsanto announced the purchase of Holden's Foundations Seeds, a privately held seed business. By acquiring Holden's, Monsanto became the biggest American producer of foundation corn, the parent seed from which hybrids are made.^[44] The combined purchase price was \$925 million. Also, in April, Monsanto purchased the remaining shares of Calgene.

- **1999:** Monsanto sold off NutraSweet Co. and two other companies.
- **2000 (spring):** Monsanto merged with Pharmacia & Upjohn, and the agricultural division became a wholly owned subsidiary of the "new" Pharmacia; the medical research divisions, which included products such as Celebrex, remained in Pharmacia.^[45]
- **2000 (October):** Pharmacia spun off its Monsanto subsidiary into a new company, the "new Monsanto".^[46] As part of the deal, Monsanto agreed to indemnify Pharmacia against any liabilities that might be incurred from judgments against Solutia. As a result, the new Monsanto continues to be a party to numerous lawsuits that relate to operations of the old Monsanto.
- **2005:** Monsanto acquired Emergent Genetics and its Stoneville and NexGen cotton brands. Emergent was the third largest U.S. cotton seed company, with about 12 percent of the U.S. market. Monsanto's goal was to obtain "a strategic cotton germplasm and traits platform."^[47]
- **2007:** In June, Monsanto completed its purchase of Delta and Pine Land Company, a major cotton seed breeder, for \$1.5 billion.^[48] As a condition for approval of the purchase from the Department of Justice, Monsanto was obligated to divest its Stoneville cotton business, which it sold to Bayer, and to divest its NexGen cotton business, which it sold to Americot.^[49] Monsanto also exited the pig breeding business by selling Monsanto Choice Genetics to Newsham Genetics LC in November, divesting itself of "any and all swine-related patents, patent applications, and all other intellectual property".^[50]
- **2008:** Monsanto purchased the Dutch seed company De Ruiter Seeds for €546 million,^[51] and sold its POSILAC bovine somatotropin brand and related business to Elanco Animal Health, a division of Eli Lilly in August for \$300 million plus "additional contingent consideration".^[52]

Corporate governance - Current members of the board of directors of Monsanto are:

David L. Chicoine, president of South Dakota State University

Hugh Grant, the president and CEO of Monsanto

Arthur H. Harper, managing partner of GenNx360 Capital Partners

Gwendolyn King, president of Podium Prose, a speakers bureau

Laura K. Ipsen, senior VP and general manager of Connected Energy Networks at Cisco Systems, Inc.

C. Steven McMillan, former chairman and CEO of the Sara Lee Corporation

William U. Parfet, chief executive officer of MPI Research Inc.

Janice L. Fields, president of McDonald's USA

George H. Poste, chief executive of Health Technology Networks

Jon R. Moeller, chief financial officer of The Procter & Gamble Company.^{[53][54]}

Products and associated issues

Current products - Glyphosate herbicides

Monsanto chemist John E. Franz invented glyphosate in 1970.^[55] Monsanto is the largest producer of glyphosate herbicides in the United States through its Roundup product line, which is used to kill weeds, especially annual broadleaf weeds and grasses that compete with commercial crops. Monsanto's last commercially relevant United States patent on glyphosate expired in 2000 and it is now produced by many companies in the US and around the world. As of 2009, sales of Roundup herbicides represent about 10% of Monsanto's yearly revenue.^[56]

In 2007 glyphosate was the most used herbicide in the US agricultural sector, with 180 to 185 million pounds (82,000 to 84,000 tonnes) applied, and the 2nd most used in home and garden market where users applied 5 to 8 million pounds (2,300 to 3,600 tonnes); additionally industry, commerce and government applied 13 to 15 million pounds (5,900 to 6,800 tonnes).^[57] While glyphosate has been approved by regulatory bodies worldwide and is less toxic than all the herbicides it replaced,^[58] concerns about its effects on humans and the environment persist.^[59]

Seeds

As of 2012, Monsanto's line of seed products includes agricultural seeds and vegetable seeds. Many of Monsanto's agricultural seed products are genetically modified for resistance to herbicides, such as glyphosate,

which Monsanto sells under the brand, "Roundup" – Monsanto calls these seeds "Roundup Ready". Monsanto's introduction of this system (planting glyphosate-resistant seed and then applying glyphosate once plants emerged) provided farmers with an opportunity to dramatically increase the yield from a given plot of land, since this allowed them to plant rows closer together.^[60] Without it, farmers had to plant rows far enough apart to control post-emergent weeds with mechanical tillage.^[60] Farmers have widely adopted the technology – for example over 90% of maize (Mon 832), soybean (MON-Ø4Ø32-6), cotton, sugar beet, and canola planted in the United States are glyphosate-resistant, as described in the GM crops article. Monsanto has also developed a Roundup Ready wheat (MON 71800).

As of 2009, the overall Roundup line of products including the GM seeds represented about 50% of Monsanto's business.^[61] The patent on the first type of *Roundup Ready* crop that Monsanto produced (soybeans) expires in 2014.^[62] Monsanto has broadly licensed the patent to other seed companies that include the glyphosate resistance trait in their seed products.^[63] About 150 companies have licensed the technology,^[64] including Syngenta^[65] and Dupont / Pioneer.^[66]

In addition, Monsanto invented and sells agricultural seeds that are genetically modified to make a crystalline insecticidal protein from *Bacillus thuringiensis*, known as Bt. In 1995 Monsanto's potato plants producing Bt toxin were approved for sale by the Environmental Protection Agency, after having approved by the U.S. FDA, making it the first pesticide-producing crop to be approved in the United States.^[67] Monsanto has subsequently developed Bt maize (MON 802, MON 809, MON 863, MON 810), Bt soybean,^[68] and Bt cotton.

Monsanto also produces seed that has multiple modifications, also known as "stacked traits" —for instance, cotton that make one or more Bt proteins and is resistant to glyphosate. One of these, created in collaboration with Dow, is called SmartStax. In 2011 Monsanto launched the Genuity brand for its stacked-trait products.^[69]

As of 2012 the agricultural seed lineup includes Roundup Ready alfalfa; Roundup Ready canola; cotton with Bt, Roundup Ready, or both traits; sorghum hybrids; soybeans with various oil profiles, most with the Roundup Ready trait; Roundup Ready sugarbeet; and a wide range of wheat products, many of which incorporate the nontransgenic "clearfield" imazamox-tolerant^[70] trait from BASF.^[71]

Along with other ag-biotech companies, Monsanto has been working on developing drought-resistant GM crops.^[72] Monsanto's vegetable seed lineup includes "4,000 distinct seed varieties representing more than 20 species" that are created through breeding, not through genetic engineering.^[73]

Former products - Polychlorinated biphenyls (PCBs)

Until it stopped production in 1977, Monsanto was the source of 99% of the polychlorinated biphenyls (PCBs) used by U.S. industry.^[21] PCBs are a persistent organic pollutant, and cause cancer in animals and likely in humans as well, among other health effects;^[74] PCBs were initially widely welcomed due to the electrical industry's need for durable, safer (than flammable mineral oil) cooling and insulating fluid for industrial transformers and capacitors. PCBs were also commonly used as stabilizing additives in the manufacture of flexible PVC coatings for electrical wiring and electronic components to enhance the heat and fire resistance of the PVC.^[75] They were known to be highly toxic from the beginning, but it was assumed that they would be contained in the products in which they were used. However, as leaks of transformers occurred, and toxicity problems arose near factories, their durability and toxicity became widely recognized as serious problems. PCB production was banned by the U.S. Congress in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001.^{[21][76][77]}

United States

In 1926, Monsanto founded and incorporated a company town named Monsanto, later renamed Sauget, Illinois. In the late 1960s, the Monsanto plant in Sauget was the nation's largest producer of PCBs, which remain in the water along Dead Creek in Sauget. An EPA official referred to Sauget as "one of the most polluted communities in the region" and "a soup of different chemicals"^[78]

In 2002, the *Washington Post* carried a front page report on Monsanto's legacy of environmental damage in Anniston, Alabama, related to its legal production of PCBs. Plaintiffs in a lawsuit pending at that time provided documentation showing that the local Monsanto factory knowingly discharged both mercury and PCB-laden waste into local creeks for over 40 years.^[79] In another story published in 2002, the *New York Times* reported

that during 1969 alone Monsanto had dumped 45 tons of PCBs into Snow Creek, a feeder for Choccolocco Creek which supplies much of the area's drinking water and that the company buried millions of pounds of PCB in open-pit landfills located on hillsides above the plant and surrounding neighbourhoods.^[80] In August 2003, Solutia and Monsanto agreed to pay plaintiffs \$700 million to settle claims by over 20,000 Anniston residents related to PCB contamination.^[81]

As of 2012, Monsanto is associated with 11 "active" Superfund sites and 20 "archived" sites in the US, in the EPA's Superfund database.^[82] Monsanto has been sued, and has settled, multiple times for damaging the health of its employees or residents near its Superfund sites through pollution and poisoning.^{[83][84]}

United Kingdom

A UK government report showed that 67 chemicals, including Agent Orange derivatives, dioxins and PCBs exclusively made by Monsanto, are leaking from the Brofiscin quarry, near Groesfaen in Wales, an unlined porous quarry that was not authorized to take chemical wastes. It emerged that the groundwater had been polluted since the 1970s.^{[85][86]} The government was criticised for failing to publish information about the scale and exact nature of this contamination. The UK Environment Agency estimated that it would cost £100m to clean up the site, called "one of the most contaminated" in the UK.^[87]

rBGH (recombinant bovine growth hormone)

Monsanto developed and sold recombinant bovine somatotropin (also known as rBST and rBGH), a synthetic hormone that increases milk production by 11–16% when injected into cows.^{[88][89]} In October 2008, Monsanto sold this business, in full, to Eli Lilly for a price of \$300 million plus additional consideration.^[90] The use of rBST has been controversial, with respect to its effects on cows to which it is administered and with respect to the milk produced by those cows.^[91]

In some markets, milk from cows that are not treated with rBST is sold with labels indicating it is rBST-free; this milk has proved popular with consumers.^[92] In reaction to this, in early 2008 a pro-rBST advocacy group called "American Farmers for the Advancement and Conservation of Technology" (AFACT),^[93] made up of dairies and originally affiliated with Monsanto, formed and began lobbying to ban such labels. AFACT stated that "absence" labels can be misleading and imply that milk from cows treated with rBST is inferior.^[92] The organization was dissolved in 2011 but its website is still accessible.^[94]

Potential products - Terminator seeds

Genetic use restriction technology, colloquially known as "terminator technology", produces plants that have sterile seeds. If put into use, it would prevent the spread of those seeds into the wild. It also would prevent farmers from planting seeds they harvest, requiring them to repurchase seed for every planting, although they also need to do this for hybrid seeds, because second-generation seeds are inferior, and in cases of patented transgenic seeds, where patent-holders like Monsanto enter into contracts with farmers who agree not to plant harvested seeds as a condition of purchase.

Terminator technology has been developed by governmental labs, university researchers, and companies, sometimes in collaboration and sometimes independently.^{[95][96][97]} The technology has never been known to have been used commercially.^{[98][99]} Rumors that Monsanto and other companies intended to introduce terminator technology have caused protests, for example in India.^{[100][101]} In 1999, Monsanto pledged not to commercialize terminator technology, and has kept that pledge on its website to the present day.^{[98][102]} The Delta and Pine Land Company intended to commercialize the technology,^[97] but D&PL was acquired by Monsanto in 2007.^[103]

Legal actions and controversies

Monsanto is notable for its involvement in high profile lawsuits, as both plaintiff and defendant. It has been involved in a number of class action suits, where fines and damages have run into the hundreds of millions of dollars, usually over health issues related to its products. Monsanto has also made frequent use of the courts to defend its patents, particularly in the area of agricultural biotechnology, as have other companies in the field, such as Dupont Pioneer^{[104][105]} and Syngenta.^[106]

Patent applications and Patents–Filings & Litigation

Filings

In 2003 Monsanto filed patent applications with claims on breeding techniques for pigs.^{[107][108]} Greenpeace claimed that Monsanto was trying to claim ownership on ordinary breeding techniques^[109] and the

filings became the target for demonstrations in Germany.^[110] A UK news article indicated that "the practices it (Monsanto) wants to protect involve identifying genes that result in desirable traits, breeding pigs to achieve those traits and using a specialised device to inseminate sows deeply in a way that uses less sperm than is typically required".^[111] In Europe, the European Patent Office rejected some claims as relating to an essentially biological process excluded from patent protection,^[112] but an application with claims from this set of filings was granted in 2008 and was later revoked.^[113] In 2007 Monsanto sold Monsanto Choice Genetics (the Monsanto entity driving these patent filings) to Newsham Genetics LC of West Des Moines, Iowa. The transaction was completed in November 2007, and Monsanto is no longer in the swine breeding business nor interested in patent filings on pigs or pig breeding.^[50]

Patents

Notable patents owned or controlled by Monsanto included or have included:

US Patent 4,535,060, Inhibition resistant 5-enolpyruvyl-3-phosphoshikimate synthetase, production and use^[114]

US Patent 4,769,061, Inhibition resistant 5-enolpyruvyl-3-phosphoshikimate synthase, production and use^[115]

US Patent 4,940,835, Glyphosate-resistant plants^[116]

Canadian Patent 1,313,830 (equivalent to US Patent 4,940,835, and the patent at issue in the Schmeiser case^[117])[¹¹⁸]

US Patent 5,164,316, DNA construct for enhancing the efficiency of transcription^[119]

US Patent 5,188,642, Glyphosate-resistant plants^[120]

US Patent 5,196,525, DNA construct for enhancing the efficiency of transcription^[121]

US Patent 5,322,938, DNA sequence for enhancing the efficiency of transcription^[122]

US Patent 5,352,605, Chimeric genes for transforming plant cells using viral promoters^[123]

US Reissued Patent 39247, Glyphosate-tolerant 5-enolpyruvylshikimate-3-phosphate synthases^[124]

US Patent 5,352,605 and US Reissued Patent 39247 have been especially important to Monsanto's GM soybean business; the '605 patent expired in 2011 and '247 reissued patent expires in 2014.^[125] The expiration of the '247 patent will mean that glyphosate resistant soybeans will be "generic", which has generated a great deal of discussion in the soybean industry.^{[126][127][128][129]}

Litigation - As plaintiff

Since the mid-1990s, Monsanto indicates that it has filed suit against 145 individual U.S. farmers for patent infringement and/or breach of contract in connection with its genetically engineered seed but has proceeded through trial against only eleven farmers, all of which it won.^[130] The Center for Food Safety has listed 112 lawsuits by Monsanto against farmers for claims of seed patent violations.^[131] The usual claim involves violation of a technology agreement that prohibits farmers from saving seed from one season's crop to plant the next, a common farming practice.^[132] One farmer received an eight-month prison sentence for conspiracy to commit fraud during litigation with Monsanto^[133] in addition to having to pay damages.^[134]

Monsanto sued the Pilot Grove Cooperative Elevator in Pilot Grove, Missouri, on the grounds that by cleaning harvested seeds covered by Monsanto's patents so that farmers could replant them, the elevator was inducing them to infringe Monsanto's patents. The Pilot Grove Cooperative Elevator had been cleaning conventional seeds for decades before the development of genetic engineering and developments in patent law led to the existence of issued patents that cover seeds.^[135] In one case in 2002, Monsanto mistakenly sued Gary Rinehart of Eagleville, Missouri for patent violation. Rinehart was not a farmer or seed dealer, but sharecropped land with his brother and nephew, who were violating the patent. Monsanto dropped the lawsuit against him when it discovered the mistake.^[135]

In 1997 Percy Schmeiser discovered that canola growing on his farm was Roundup resistant. He had initially discovered that some canola growing by a roadside along one of his fields was Roundup resistant when he was killing weeds along the road; this led him to spray a 3- to 4-acre section of his adjacent field and 60% of the canola survived. Schmeiser harvested the seed from the surviving, Roundup resistant plants, and planted the seed in 1998. Monsanto sued Schmeiser for patent infringement for the 1998 planting. Schmeiser claimed that because the 1997 plants grew from seed that was blown into his field from neighboring fields, that he owned the

harvest and was entitled to do with it whatever he wished, including saving the seeds from the 1997 harvest and planting them in 1998. The initial Canadian Federal Court rejected Schmeiser's defense and held for Monsanto, finding that in 1998 Schmeiser had intentionally planted the seeds he had harvested from the wind-seeded crops in 1997, and so patent infringement had indeed occurred.^[136] Schmeiser appealed and lost again.^[137] Schmeiser appealed to the Supreme Court which took the case and held for Monsanto by a 5-4 vote in late May 2004.^[117] With this ruling, the Canadian courts followed the U.S. Supreme Court in its decision on patent issues involving plants and genes. Schmeiser won a partial victory, as the Supreme Court reversed on damages, finding that because Schmeiser did not gain any profit from the infringement, he did not owe Monsanto any damages nor did he have to pay Monsanto's substantial legal bills. The case caused Monsanto's enforcement tactics to be highlighted in the media over the years it took to play out.^[138] The case is widely cited or referenced by the anti-GM community in the context of a fear of a company claiming ownership of a farmer's crop based on the inadvertent presence of GM pollen grain or seed.^{[139][140]} "The court record shows, however, that it was not just a few seeds from a passing truck, but that Mr Schmeiser was growing a crop of 95–98% pure Roundup Ready plants, a commercial level of purity far higher than one would expect from inadvertent or accidental presence. The judge could not account for how a few wayward seeds or pollen grains could come to dominate hundreds of acres without Mr Schmeiser's active participation, saying ' . . . none of the suggested sources could reasonably explain the concentration or extent of Roundup Ready canola of a commercial quality evident from the results of tests on Schmeiser's crop'" – in other words, the original presence of Monsanto seed on his land in 1997 was indeed inadvertent, but the crop in 1998 was entirely purposeful.^[141]

In 2007 Monsanto sued Indiana farmer Vernon Hugh Bowman,^[142] who in 1999 bought seed for his second planting from a grain elevator – the same elevator that he and others sold their transgenic crops to. The elevator sold the soybeans as commodities, not as seeds for planting.^{[142][143]} He tested the new seeds, and found that as he had expected, some were resistant to glyphosate. He replanted his harvest in subsequent years for his second seasonal planting, supplementing them with more soybeans he bought at the elevator.^[142] He informed Monsanto of his activities.^[142] Monsanto stated that he was infringing their patents because the soybeans he bought from the elevator were new products that he purchased for use as seeds without a license from Monsanto; Bowman stated that he had not infringed due to patent exhaustion on the first sale of seed to whatever farmers had produced the crops that he bought from the elevator, on the grounds that for seed, all future generations are embodied in the first generation that was originally sold.^[143] In 2009 the district court ruled in favor of Monsanto; on appeal, the Federal Circuit upheld the verdict.^[142] Bowman has appealed to the United States Supreme Court, which accepted the case on October 5, 2012.^[144] If the Supreme Court reverses the judgement, it would also affect other self-replicating technologies (such as DNA and cell lines) used by the biotechnology industry; patent infringement could potentially be avoided by growing or otherwise duplicating the patented articles.^[145]

In 2009 Monsanto sued Dupont for patent infringement of Roundup Ready patents.^[146] Dupont had licensed the patents from Monsanto already, but had added additional glyphosphate-resistance genes to its seed, which Monsanto claimed was not allowed in the license. Dupont counter-sued, claiming that Monsanto's patent was invalid. The jury handed down a verdict on August 1, 2012, finding that Dupont not only infringed, but willfully infringed, and awarded a verdict of \$1 billion, the fourth-largest patent verdict in the history of the United States.^[147] Dupont indicated it would appeal the decision.

As defendant

In 2006 the Public Patent Foundation filed requests with the United States Patent and Trademark Office to revoke four patents that Monsanto has used in patent lawsuits against farmers, namely U.S. Patents Nos. 5,164,316, 5,196,525, 5,322,938, and 5,352,605. In the first round of reexamination, some claims in all four patents were rejected by the Patent Office in four separate rulings dating from February through July 2007.^[148] On March 30, 2011 the Public Patent Foundation filed claims in federal U.S. district court in Manhattan, challenging the validity of 23 of Monsanto's patents on genetically modified seed, on behalf of the Organic Seed Growers and Trade Association and 82 other farming associations.^[149] The group contended that they were being forced to sue pre-emptively to protect themselves from being accused of patent infringement should their fields ever become contaminated by Monsanto's genetically modified seed.^[150] On February 24, District Court Judge Naomi Buchwald dismissed the lawsuit and in her ruling criticized the plaintiffs for a "transparent effort to create a controversy where none exists."^{[151][152]} Plaintiffs plan to appeal the decision.^{[153][154]}

In February 2012, two NGOs, Navdanya and No Patent on Seeds, filed documents opposing an EU patent awarded to Monsanto covering virus resistant traits of melons.^[155] Monsanto had acquired DeRuiter, a seed company, in 2008, which originally filed the patent application.^[156] The activists claim it was not an invention of Monsanto but rather bio-piracy, because the virus-resistant plants originated in India and were registered in international seed banks; they further claimed that conventional breeding methods were used to transfer the virus resistance genes from an Indian melon to other melons and that European law prohibits patents on conventional breeding.^[14]

Investigations - 2009 antitrust investigation

In 2009, Monsanto came under scrutiny from the U.S. Justice Department, which began investigating whether the company's activities in the soybean markets were breaking anti-trust rules.^{[16][193]} In 2010, the DOJ created a website through which comments on "Agriculture and Antitrust Enforcement Issues in Our 21st Century Economy" could be submitted; over 15,000 comments were submitted including a letter by 14 State Attorneys General. The comments are publicly available.^[194] On November 16, 2012, Monsanto announced that it had received written notification from the U.S. Department of Justice that the Antitrust Division had concluded its inquiry and that the D.O.J had closed the inquiry without taking any enforcement action.^{[195][196]} Opponents of Monsanto's seed patenting and licensing practices expressed frustration that the Department of Justice released no information about the results of the inquiry.^[197]

Not a party, but involved - 1997 WTVT news story

This is a case where Monsanto was not a party, but was alleged to have been involved in the events under dispute. In 1997, the news division of WTVT (Channel 13), a Fox-owned station in Tampa, Florida, planned to air an investigative report by Steve Wilson and Jane Akre on the health risks associated with Monsanto's bovine growth hormone product, Posilac.^[198] Just before the story was to air, Fox received a threatening letter from Monsanto, saying the reporters were biased and that the story would damage the company.^[198] Fox tried to work with the reporters to address Monsanto's concerns, and the negotiations between Fox and the reporters broke down.^[198] Both reporters were eventually fired. Wilson and Akre alleged the firing was for retaliation, while WTVT contended they were fired for insubordination. The reporters then sued Fox/WTVT in Florida state court under the state's whistleblower statute. In 2000, a Florida jury found that while there was no evidence Fox/WTVT had bowed to any pressure from Monsanto to alter the story, Akre, but not Wilson, was a whistleblower and was unjustly fired.^[198] Fox appealed the decision stating that under Florida law, a whistleblower can only act if "a law, rule, or regulation" has been broken and argued that the FCC's news distortion policy did not fit that definition.^[199] The appeals court overturned the verdict, finding that Akre was not a whistleblower because of the Florida "legislature's requirement that agency statements that fit the definition of a "rule" (must) be formally adopted (rules). Recognizing an uncodified agency policy developed through the adjudicative process as the equivalent of a formally adopted rule is not consistent with this policy, and it would expand the scope of conduct that could subject an employer to liability beyond what Florida's Legislature could have contemplated when it enacted the whistle-blower's statute."

Industrial Bio-Test Laboratories scandal

In 1981, four executives of Industrial Bio-Test Laboratories (IBT), an American contract research organization were indicted in federal court on various counts including scientific misconduct and fraud, and were convicted in 1983.^[200] IBT was an industrial product safety testing laboratory that was used by pharmaceutical companies, chemical manufacturers and other industrial clients, operated one of the largest facility of its kind in the US, and performed more than one-third of all toxicology testing in the United States.^[201] One of convicted executives was Paul Wright, a toxicologist, who had spent 18 months at IBT in the 1970s while IBT was testing an antimicrobial product that Monsanto was developing, triclocarban (TCC).^[202] The revelations of misconduct by IBT Labs led to the establishment of Good Laboratory Practice standards and regulations for industrial testing.^[203]

In 1991, Philip Smith, a former assistant toxicologist at IBT, testified in a trial in which Monsanto was being sued by workers at Westinghouse over PCBs, that final toxicology reports on PCBs provided to Monsanto by IBT contained falsified data.^[204]

Legal actions & controversies outside North America

Argentina: GM soy was approved for cultivation in Argentina in 1996. When Argentina approved the cultivation of GMO in 1996 14 million acres were used for soy production and by 2008 that area grew to 42 million

acres.^[205] The growth was driven by Argentine investors' interest in buying or leasing land on which to grow soy for the export market.^[205] The consolidation has led to a decrease in production of many staples such as milk, rice, maize, potatoes and lentils, and about 150,000 small farmers have left the countryside because they could no longer make a living (as they could not afford GM soya) or were driven off their land.^{[205][206][207]}

The Guardian newspaper interviewed a Monsanto representative and reported that the representative "said that any problems with GM soya were to do with use of the crop as a monoculture, not because it was GM. 'If you grow any crop to the exclusion of any other you are bound to get problems.'"^[206]

In 2005 and 2006 Monsanto addressed unlicensed use of its patented "Roundup Ready" technology by farmers and companies in Argentina by enforcing its patents on soymeal imported into Spain from Argentina, which obligated Spanish customs officials to seize the soymeal shipments.^[208]

Brazil: Brazil had originally approved GM crops in 1998 but Brazilian advocacy groups had successfully sued to overturn the approval.^[209] In 2003 Brazil allowed a one-year exemption when GM soy was found in fields planted in the state of Rio Grande do Sul.^[209] This was a controversial decision, and in response, the Landless Workers' Movement protested by invading and occupying several Monsanto farm plots used for research, training and seed-processing.^[210] In 2005 Brazil passed a law creating a regulatory pathway for GM crops, and the agriculture minister Roberto Rodrigues stated that "Brazilian soy farmers, who have used cloned or smuggled versions of the biotechnology company's Roundup Ready variety for years, will no longer have to worry about breaking the law or facing legal action from Monsanto as long as regulators approve the seeds for planting."^[211]

China: Monsanto was criticized by Chinese economist Lang Xianping for having controlled the Chinese soybean market, and for trying to do the same to Chinese corn and cotton.^[212]

Haiti: After the 2010 Haiti Earthquake, Monsanto donated \$255,000 to Haiti for disaster relief^[213] and 60,000 seed sacks (475 tons) of hybrid (non-GM) corn and vegetable seeds worth \$4 million.^[214] However, a Catholic Relief Services (CRS) rapid assessment of seed supply and demand for the 5 most common food security crops found that the Haitians had enough seed and recommended that imported seeds should be introduced only on a small scale.^[215]

The announcement of the donation initially raised concerns that the donation would include genetically modified seeds, but Monsanto representatives said no such seeds were included and the donation comprised conventional seed and hybrid seeds, which are produced by manually cross-pollinating plants.^[214] A report by Haiti Grassroots Watch (HGW) investigated the donation and responses to it.^[216] Emmanuel Prophete, head of Haiti's Ministry of Agriculture's Service National Semencier (SNS), that HGW that SNS was not opposed to the hybrid maize seeds because it at least doubles the yield of corn. Louise Sperling, Principal Researcher at the International Center for Tropical Agriculture (CIAT) told HGW that she was not opposed to hybrids, but noted that most hybrids require extra water and better soils and that most of Haiti was not appropriate for maize hybrids.

Another concern was that some of the seeds were coated with the highly toxic fungicides Maxim or thiram. In the United States, pesticides containing thiram are banned in home garden products because most home gardeners do not own adequate protection.^[217] HGW found that the coated seeds were handled in a dangerous manner by the recipients and judged that such seeds should not have been donated.^[216]

The seeds were donated free of charge, and were in turn sold at a reduced price in local markets.^[214] However, farmers feared that they were being given seeds that would "threaten local varieties"^[213] and an estimated 8–12,000 farmers attended a protest of the donation on June 4, 2010 organized by a Haitian farmers' association, the Peasant Movement of Papay, where a small pile of seeds was symbolically burned.^{[218][219]}

India: Monsanto has had a controversial history in India, starting with the accusation that Monsanto used terminator genes in its seeds, causing demonstrations against the company. Later, its GM cotton seed was the subject of NGO agitation because of its higher cost. Indian farmers cross GM varieties with local varieties using plant breeding to yield better strains, an illegal practice termed "seed piracy".^{[220][221]} In 2009, high prices of Bt Cotton were blamed for forcing farmers of the district Jhabua into severe debts when the crops died due to lack of rain.^[222]

Bt resistance: In 2009, Monsanto scientists initially discovered that insects had developed resistance to the Bt Cotton planted in Gujarat and when studies were completed, Monsanto communicated this to the Indian government and its customers, stating that "Resistance is natural and expected, so measures to delay resistance are important. Among the factors that may have contributed to pink bollworm resistance to the Cry1Ac protein in Bollgard I in Gujarat are limited refuge planting and early use of unapproved Bt cotton seed, planted prior to GEAC approval of Bollgard I cotton, which may have had lower protein expression levels."^[223] The company advised farmers to switch to its second generation of Bt cotton – Bollgard II – which had two resistance genes instead of one.^[224] However, this advice was criticized; an article in The Hindu reported that "an internal analysis of the statement of the Ministry of Environment and Forests says it 'appears that this could be a business strategy to phase out single gene events [that is, the first generation Bollgard I product] and promote double genes [the second generation Bollgard II] which would fetch higher price.'"^[225]

Andhra Pradesh state government: In the early 2000s, farmers in the state of Andhra Pradesh, were in economic crisis due to high interest rates and crop failures, leading to widespread social unrest and suicides.^[226] Monsanto was one focus of protests with respect to the price of Bt seed and yields of Bt seed. In 2005, the Genetic Engineering Approval Committee, the Indian regulatory authority, released a study on field tests of certain Bt cotton strains in Andhra Pradesh and ruled that Monsanto could not market those strains in Andhra Pradesh because the yields were poor, and extended the ban on one of them, Mech-12 Bt, to all of south India.^[227] At about the same time, the state agriculture minister barred the company from selling any Bt cotton seeds in the state, because Monsanto refused a request by the state government to provide a compensation package of about Rs 4.5 crore (about 1 Million US\$) to indebted farmers in some districts, and because the government blamed Monsanto's Bt seeds for crop failures.^[228] The order was later lifted. In 2006, the Andhra Pradesh state government tried to convince Monsanto to reduce the price at which it sold Bt seeds. When Monsanto did not reduce the price enough to satisfy the government, the state filed several cases against Monsanto and its Mumbai based licensee Maharashtra Hybrid Seeds.^[229]

Child labor: As in much of the developing world and especially in agricultural areas, child labor is widespread in India's agricultural sector, which employs ~60% of India's child labor. Child labor is especially used in seed production.^[230] The seed production is done mostly through child labor—it is carried out on plots owned by small farmers, who sell the seed to "seed organizers", who in turn sell the seed to public and private seed agencies and companies.^[230] The public and private agencies and companies include Indian state corporations, Mahyco-Monsanto, Syngenta, and others.^[231] Monsanto's website states that the company complies with all child labor laws and that they are working towards minimizing its occurrence.^[232]

Farmer suicides: In the late 1990s and early 2000s, public attention was drawn to suicides by indebted farmers in India following crop failures.^[233] Some, including Vandana Shiva, claimed that the crop failures could "often be traced to" Monsanto's Bt cotton, and that the seeds increased farmers' indebtedness.^{[233][234]} However, a 2008 report by the International Food Policy Research Institute showed that there was no evidence for an increased suicide rate following the 2002 introduction of Bt cotton, but instead that the rate had been consistent since 1997. The report concluded that while the cotton may have been a factor in specific suicides, the contribution was likely marginal compared to socio-economic factors.^{[235][236]} Various studies identify the important factors as insufficient or risky credit systems, the difficulty of farming semi-arid regions, poor agricultural income, absence of alternative income opportunities, a downturn in the urban economy which forced non-farmers into farming, and the absence of suitable counseling services.^{[235][237][238]} Monsanto has referred to these third-party studies and added that Indian farmers are the "fastest-growing users of biotech crops in the world."^[239]

False advertising: In 1996, the New York Times reported that: "Dennis C. The company withdrew the spots, but also said that the phrase in question was permissible under E.P.A. guidelines."^[240] In 1999 Monsanto was condemned by the UK Advertising Standards Authority (ASA) for making "confusing, misleading, unproven and wrong" claims about its products over the course of a £1 million advertising campaign. The ASA ruled that Monsanto had presented its opinions "as accepted fact" and had published "wrong" and "unproven" scientific claims.^[241] Monsanto responded with an apology and claimed it was not intending to deceive and instead "did not take sufficiently into account the difference in culture between the UK and the USA in the way some of this information was presented."^[242]

In 2001, French environmental and consumer rights campaigners brought a case against Monsanto for misleading the public about the environmental impact of its herbicide Roundup, on the basis that glyphosate, Roundup's main ingredient, is classed as "dangerous for the environment" and "toxic for aquatic organisms" by the European Union. Monsanto's advertising for Roundup had presented it as biodegradable and as leaving the soil clean after use. In 2007, Monsanto was convicted of false advertising and was fined 15,000 euros. Monsanto's French distributor Scotts France was also fined 15,000 euros. Both defendants were ordered to pay damages of 5,000 euros to the Brittany Water and Rivers Association and 3,000 euros to the CLCV (Consommation Logement Cadre de vie), one of the two main general consumer associations in France.^{[243][244]} Monsanto appealed and the court upheld the verdict; Monsanto appealed again to the French Supreme Court, and in 2009 it also upheld the verdict.^[245]

In August 2012 a Brazilian Regional Federal Court ordered Monsanto to pay a \$250,000 fine for false advertising. In 2004, advertising that related to the use of GM soya seed, and the herbicide glyphosate used in its cultivation, claimed it was beneficial to the conservation of the environment. The federal prosecutor maintained that Monsanto misrepresented the amount of herbicide required and stated that "there is no scientific certainty that soybeans marketed by Monsanto use less herbicide." The presiding judge condemned Monsanto and called the advertisement "abusive and misleading propaganda." The prosecutor held that the goal of the advertising was to prepare the market for the purchase of genetically modified soybean seed (sale of which was then banned) and the herbicide used on it, at a time when the approval of a Brazilian Biosafety Law, enacted in 2005, was being discussed in the country.^{[246][247]}

Political contributions and lobbying

United States: Monsanto lobbies the United States Congress and the U.S. Department of Agriculture about regulations that would affect the production and distribution of genetically engineered produce.^[248] In 2011, Monsanto spent about \$6.3 million.^[249] For comparison, the US Chamber of Commerce spent the most in lobbying in 2011, with \$66.4 million, and the 20th highest spender, Pfizer, spent \$12.9 million.^[250] US diplomats in Europe have worked directly for Monsanto.^[251] In 2008, Monsanto spent \$8.8 million for lobbying. \$1.5 million was to outside lobbying firms with the remainder used by in-house lobbyists.^[252] In 2011, total money spent on lobbying was about \$6.3 million, more than any other agribusiness firm except the tobacco company Altria,^[249] and \$2 million of which was spent on matters concerning "Foreign Agriculture Biotechnology Laws, Regulations, and Trade."

Monsanto gave \$186,250 to federal candidates in the 2008 election cycle through its political action committee (PAC) – 42% to Democrats, 58% to Republicans. For the 2010 election cycle they gave \$305,749 – 48% to Democrats, 52% to Republicans.^[253]

Monsanto spent \$8.1 million opposing the passage of Proposition 37 in the US state of California, making it the largest donor against the initiative. Proposition 37, which was rejected by a 53.7% majority in November 2012,^[254] would have mandated the disclosure of genetically modified crops used in the production of California food products. Biotechnology labeling is not required by the United States Food and Drug Administration (FDA), but it has been adopted by over 40 countries. According to public disclosures, the Council for Biotechnology Information and The Grocery Manufacturers Association, have each made matching donations of \$375,000 to fight the initiative.^{[255][256]}

Michael R. Taylor, a former Monsanto Vice President for Public Policy^{[257][258][259]} and the current Senior Advisor to the Commissioner of the US Food and Drug Administration,^{[260][261]} was described by Business week during his tenure as Monsanto's VP for Public Policy as "Monsanto's chief rep in Washington."^[262]

Monsanto is a member of the Washington D.C based Biotechnology Industry Organization (BIO), the world's largest biotechnology trade association, which provides "advocacy, business development, and communications services."^{[263][264]} Between 2010 and 2011 BIO spent a total of \$16.43 million on lobbying initiatives.^{[265][266]}

UK: During the late 1990s, Monsanto lobbied to raise permitted glyphosate levels in soya beans and was successful in convincing Codex Alimentarius and both the UK and American governments to lift levels to 20 milligrams per 1 kilogram of soya.^[267] When asked how negotiations with Monsanto were conducted Lord Donoughue, then the Labour Party Agriculture minister in the House of Lords, stated that all information relating to the matter would be "kept secret."^[267] During a period of 24 months prior to the 1997 British election Monsanto representatives had 22 meetings at the departments of Agriculture and the Environment.^[268] British newspapers revealed that Stanley Greenberg, an election advisor to Tony Blair, went on to work as a Monsanto

consultant.^[268] It was also reported that a former Labour spokesperson, David Hill, became Monsanto's media adviser at the lobbying firm Bell Pottinger.^[268] The Labour government was challenged in parliament about "trips, facilities, gifts and other offerings of financial value provided by Monsanto to civil servants" but only stated that Department of Trade and Industry had two working lunches with Monsanto.^[269] It was also revealed that Peter Luff, then a Conservative Party MP and Chairman of the Agriculture Select Committee, had received up to £10,000 a year from Bell Pottinger on behalf of Monsanto.^{[269][270][271]}

Continental Europe: In January 2011, John Vidal of *The Guardian* reported on Wikileaks documents that suggested US diplomats in Europe were responding to a request for help from Spanish government; the article says: "In addition, the cables show US diplomats working directly for GM companies such as Monsanto. 'In response to recent urgent requests by [Spanish rural affairs ministry] state secretary Josep Puxeu and Monsanto, post requests renewed US government support of Spain's science-based agricultural biotechnology position through high-level US government intervention.'"^{[251][272]} The documents show that in 2009, when the Spanish government's policy allowing MON810 corn to be grown, as allowed under European law, was under pressure from EU interests, Monsanto's Director for Biotechnology for Spain and Portugal requested that the US government support Spain on the matter.^{[251][273][274]} The reports also indicated that Spain and the US had worked closely together to "persuade the EU not to strengthen biotechnology laws."^{[251][272]} Spain was viewed as an EU member that was a key supporter of GM and there was a widespread belief in biotechnology industry that "if Spain falls, the rest of Europe will follow."^{[275][276]} The documents also revealed that in response to an attempt by France to ban a Monsanto's MON810 in late 2007, the then US ambassador to France, Craig Roberts Stapleton, in a bid to "help strengthen European pro-biotech voices," asked Washington to "calibrate a targeted retaliation list that [would cause] some pain across the EU," in particular those countries that did not support the use of GM crops.^{[251][277]} This activity transpired after the US, Australia, Argentina, Brazil, Canada, India, Mexico and New Zealand had brought an action against Europe via the World Trade Organization with respect to the EU's banning of GMOs; in 2006, the WTO had ruled against the EU.^{[278][279][280]}

Monsanto is a member of EuropaBio, the leading biotechnology trade group in Europe. One of EuropaBio's initiatives is "Transforming Europe's position on GM food", and it has stated that there is "an urgent need to reshape the terms of the debate about GM in Europe."^{[281][282]} In an effort to transform European policy relating to the production and distribution of genetically modified foods within the EU, EuropaBio proposed the recruitment of high profile "ambassadors" that might affect opinion on GM policy by lobbying European leaders directly. The organisation also aimed to introduce the ambassadors to high-level European bureaucrats and MEPs with the goal of making a stronger case for GM within the EU.^{[281][283][284]}

Public officials' connections to Monsanto: Former Monsanto employees currently hold positions in US government agencies such as the Food and Drug Administration (FDA), United States Environmental Protection Agency (EPA) and the Supreme Court. These include:

- Michael A. Friedman, MD, was Senior Vice President of Research and Development, Medical and Public Policy for Pharmacia, and later served as an FDA deputy commissioner.^{[285][286]}
- Linda J. Fisher was an assistant administrator at the United States Environmental Protection Agency (EPA) before she was a vice president at Monsanto from 1995 to 2000. In 2001, Fisher became the deputy administrator of the EPA.^[135]
- Michael R. Taylor was an assistant to the Food and Drug Administration (FDA) commissioner before working as an attorney for King & Spalding, a private-sector law firm that represented Monsanto among other clients.^{[287][288]} He later served as deputy commissioner for policy to the FDA on food safety between 1991 and 1994 during which time the FDA approved rBST.^[135] He was accused of a conflict of interest, but a federal investigation cleared him. Following his tenure at the FDA, Taylor returned to Monsanto as Vice President for Public Policy.^{[257][258][259]} On July 7, 2009, Taylor entered government as Senior Advisor to the Commissioner of the US Food and Drug Administration for the Obama administration.^{[261][289]}
- United States Supreme Court Justice Clarence Thomas worked as an attorney for Monsanto in the 1970s. Thomas wrote the majority opinion in the 2001 Supreme Court decision *J. E. M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.*^[290] which found that "newly developed plant breeds are patentable under the general utility patent laws of the United States."^{[135][290][291]}

Public officials with indirect connections or who worked for Monsanto after leaving public office include:

- Mickey Kantor served on Monsanto's board after serving in government as a trade representative.^[135]

- William D. Ruckelshaus served as the first head of the Environmental Protection Agency(EPA) in 1970, was subsequently acting Director of the Federal Bureau of Investigation, and then Deputy Attorney General of the United States. From 1983 to 1985, he returned as EPA administrator. After leaving government he joined the Board of Directors of Monsanto; he is currently retired from that board.^[292]
- Former Secretary of Defense Donald Rumsfeld was chairman and chief executive officer of G. D. Searle & Company, which Monsanto purchased in 1985. Rumsfeld's stock and options in Searle were \$12 million USD at the time of the transaction.^[135]

Sponsorships: Monsanto has been the corporate sponsor of many attractions at Disneyland and Walt Disney World.

At Disneyland they include:

- Hall of Chemistry (1955 to 1966)^[293]
- Fashions and Fabrics through the Years (from 1965 to 1966)^[293]
- Monsanto House of the Future (from 1957 to 1967)^{[294][295]}
- Adventure Thru Inner Space (from 1967 to 1986)^[296]

And at Walt Disney World they include:

- Magic Eye Theatre at Epcot^[citation needed]
- Circle-Vision 360°^[citation needed]

All attractions that the company has ever sponsored (except for the Magic Eye Theatre, in the Future World section of Epcot) were located in Tomorrow land.^[citation needed] Echoing Monsanto's sponsorship of Tomorrowland, in the second episode of the first season of *Futurama*, "The Series Has Landed", a Moon carnival ride named "The Goophy Gopher Revue" is said to have been sponsored/owned by "Monsanto".^[297]

Books

Carson, Rachel *Silent Spring* Houghton Mifflin 1962 ISBN 0-618-24906-0.

Shiva, Vandana *Stolen Harvest: The Hijacking of the Global Food Supply* South End Press 2000 ISBN 0896086070

Smith, Jeffrey M: *Seeds of Deception*. YES Books, 2003. (Book ISBN 0-9729665-8-7).

Smith, Jeffrey M: 'Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods *Chelsea Green 2007. ISBN 0972966528*