Table 1. Reliance on and Applications of Glyphosate (Round Up) and Total Herbicides per Acre Following the Commercialization of GE Crops in 1996 in the U.S.

	1991	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Corn																				
Percent Acres Treated	2%	4%	4%	5%	9%	9%	13%	9%	20%	***27%***	34%	***41%***	***48%***	***55%***	***62%***	76%	***76%***	***77%***	***77%***	77%
One-time Rate of Application	0.92	0.68	0.52	0.64	0.59	0.59	0.66	0.64	0.69	***0.70***	0.70	***0.72***	***0.74***	***0.76***	***0.78***	0.82	***0.82***	***0.83***	***0.83***	0.84
Number of Applications	1	1	1	1	1.2	1.1	1.1	1.1	1.195	***1.25***	1.31	***1.30***	***1.30***	***1.29***	***1.29***	1.28	***1.26***	***1.23***	***1.21***	1.19
Rate per Crop Year	0.92	0.68	0.52	0.64	0.71	0.65	0.73	0.70	0.82	***0.87***	0.92	***0.94***	***0.96***	***0.98***	***1.00***	1.05	***1.03***	***1.02***	***1.01***	0.99
% Change in Rate per Crop Year		-26%	-24%	23%	11%	-8%	12%	-3%	17%	***5%***	5%	***2%***	***2%***	***2%***	***2%***	4%	***-1%***	***-1%***	***-1%***	-2%
Total Herbicide Applied (pounds/acre)	2.76	2.66	2.63	2.47	2.25	2.08	2.22	1.86	2.05	***2.05***	2.05	***2.10***	***2.14***	***2.18***	***2.22***	2.26	***2.24***	***2.23***	***2.21***	2.19
Cotton																				
Percent Acres Treated	3%	13%	14%	30%	36%	56%	57%	***64%***	70%	***72%***	74%	***83%***	91%	***94%***	***96%***	99%	***99%***	***99%***	***99%***	***99%***
One-time Rate of Application	0.64	0.63	0.61	0.68	0.65	0.67	0.62	***0.66***	0.69	***0.70***	0.71	***0.74***	0.78	***0.81***	***0.83***	0.86	***0.86***	***0.86***	***0.86***	***0.86***
Number of Applications	1.10	1.00	1.30	1.50	1.60	1.70	1.80	***1.90***	2.00	***2.09***	2.18	***2.28***	2.37	***2.22***	***2.07***	1.93	***1.93***	***1.93***	***1.93***	***1.93***
Rate per Crop Year		0.63	0.79	1.02	1.04	1.14	1.12	***1.25***	1.38	***1.46***	1.55	***1.69***	1.85	***1.79***	***1.73***	*1.66*	***1.66***	***1.66***	***1.66***	***1.66***
% Change in Rate per Crop Year			26%	29%	2%	10%	-2%	***12%***	11%	***6%***	6%	***10%***	9%	***-3%***	***-4%***	*-0.04*	***0%***	***0%***	***0%***	***0%***
Total Herbicide Applied (pounds/acre)	1.85	1.88	2.10	1.85	1.88	1.84	1.90	***1.95***	1.99	***2.02***	2.05	***2.33***	2.61	***2.64***	***1.77***	2.69	***2.69***	***2.69***	***2.69***	***2.69***
Soybeans																				
Percent Acres Treated	5%	25%	28%	46%	62%	62%	73%	83%	***86%***	89%	91%	96%	***96.6%***	***96.8%***	***97.1%***	***97.4%***	***97.7%***	98%	***98%***	***98%***
One-time Rate of Application	0.8	0.63	0.61	0.69	0.69	0.68	0.65	0.74	***0.73***	0.73	0.76	0.79	***0.82***	***0.84***	***0.86***	***0.88***	***0.90***	0.92	***0.92***	***0.92***
Number of Applications	1	1.1	1.3	1.3	1.3	1.3	1.3	1.4	***1.45***	1.5	1.5	1.7	***1.69***	***1.68***	***1.68***	***1.67***	***1.66***	1.65	***1.65***	***1.65***
Rate per Crop Year	0.80	0.69	0.79	0.90	0.90	0.88	0.85	1.03	***1.06***	1.09	1.13	1.35	***1.38***	***1.41***	***1.44***	***1.47***	***1.50***	1.53	***1.53***	***1.53***
% Change in Rate per Crop Year		-13%	14%	13%	0%	-1%	-4%	22%	***3%***	3%	4%	19%	***2%***	***2%***	***2%***	***2%***	***2%***	2%	***2%***	***2%***
Total Herbicide Applied (pounds/acre)	1.19	1.17	1.18	1.08	1.04	1.05	0.96	1.20	***1.13***	1.07	1.17	1.42	***1.54***	***1.66***	***1.78***	***1.90***	***2.03***	2.15	***2.15***	***2.15***

Source: National Agricultural Statistic Service (NASS), Agricultural Chemical Usage, Field Crop Summary, multiple years. Data in years not covered by a NASS survey are interpolated or extrapolated, and are shown in bold italics.

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Table 2. Reliance on Glyphosate and Relatively High-Risk Herbicides in Corn Weed Management Systems: 1991-2014

	1991	1996	1998	2000	2002	2004	2006	2008	2010	2011	2012	2013	2014	Percent Change 1996-2014
Percent Acres Treated														
2,4-D	8.0%	11.0%	12.0%	8.0%	4.5%	***5.7%***	***6.9%***	***8.1%***	9.3%	***9.0%***	***8.7%***	***8.3%***	8%	-21%
Dicamba	16%	25%	24%	29%	22%	***18.6%***	***14.7%***	***10.7%***	7%	***7.7%***	***8.5%***	***9.4%***	10.2%	-66%
Paraquat	1%	2%	2%	1%	0.29%	***0.7%***	***1.1%***	***1.6%***	2%	***1.8%***	***1.5%***	***1.3%***	1%	-25%
Atrazine	66%	71%	69%	68%	62%	***73.8%***	***85.5%***	***97.3%***	109%	***95.5%***	***82.0%***	***68.5%***	55%	15%
Glyphosate	2%	4%	5%	9%	9%	***25.8%***	***42.5%***	***59.3%***	76%	***76.3%***	***76.5%***	***76.8%***	77%	1813%
All Herbicides	198%	243%	243%	273%	250%	***255.1%***	***259.8%***	***264.5%***	269%	***282.1%***	***294.9%***	***307.8%***	320.7%	22%
Average Number Herbicides Applied per Acre	1.98	2.43	2.43	2.73	2.50	***2.55***	***2.60***	***2.64***	2.69	***2.82***	***2.95***	***3.08***	3.21	22%
Rate of Application (pounds a.i. per acre)														
2,4-D	0.49	0.39	0.39	0.39	0.44	***0.42***	***0.40***	***0.38***	0.36	***0.41***	***0.47***	***0.52***	0.57	20%
Dicamba	0.33	0.32	0.35	0.23	0.21	***0.20***	***0.18***	***0.17***	0.15	***0.15***	***0.15***	***0.15***	0.15	-53%
Paraquat	0.42	0.54	0.48	0.52	0.59	***0.60***	***0.62***	***0.63***	0.64	***0.62***	***0.60***	***0.58***	0.55	11%
Atrazine	1.06	0.99	0.99	1	1.04	***1.01***	***0.98***	***0.96***	0.93	***0.92***	***0.92***	***0.91***	0.91	-7%
Glyphosate	0.92	0.68	0.64	0.59	0.64	***0.68***	***0.73***	***0.77***	0.82	***0.82***	***0.83***	***0.83***	0.84	22%
Weighted Averge Rate All Herbicides	1.35	1.06	0.97	0.74	0.70	***0.71***	***0.72***	***0.73***	0.74	***0.71***	***0.68***	***0.65***	0.62	-36%
Number of Applications														
2,4-D	1	1	1	1	1	***1.0***	***1.1***	***1.1***	1.12	***1.10***	***1.09***	***1.08***	1.06	9%
Dicamba	1	1	1	1	1	***1.0***	***1.1***	***1.1***	1.17	***1.13***	***1.10***	***1.06***	1.03	10%
Paraquat	1	1	1	1	1	***1.0***	***1.1***	***1.1***	1.1	***1.08***	***1.05***	***1.03***	1	5%
Atrazine	1.1	1.1	1.1	1	1	***1.0***	***1.1***	***1.1***	1.1	***1.10***	***1.10***	***1.10***	1.1	0%
Glyphosate	1	1	1	1.1	1.1	***1.1***	***1.2***	***1.2***	1.28	***1.26***	***1.23***	***1.21***	1.19	23%
Rate per Crop Year (pounds a.i. per acre)														
2,4-D	0.51	0.40	0.42	0.40	0.44	***0.43***	***0.43***	***0.42***	0.41	***0.46***	***0.51***	***0.56***	0.61	27%
Dicamba	0.33	0.32	0.36	0.23	0.21	***0.21***	***0.20***	***0.19***	0.19	***0.18***	***0.17***	***0.16***	0.15	-47%
Paraquat	0.42	0.56	0.50	0.52	0.59	***0.62***	***0.64***	***0.67***	0.70	***0.66***	***0.63***	***0.59***	0.55	12%
Atrazine	1.14	1.07	1.09	1.07	1.12	***1.09***	***1.06***	***1.03***	1	***1.01***	***1.01***	***1.01***	1.02	-5%
Glyphosate	0.93	0.71	0.68	0.70	0.71	***0.79***	***0.88***	***0.96***	1.04	***1.03***	***1.02***	***1.00***	0.99	43%
Weighted Averge Rate per Crop Year All Herbicides	1.40	1.09	1.02	0.77	0.73	***0.75***	***0.78***	***0.81***	0.83	***0.80***	***0.76***	***0.72***	0.69	-30%
Acre-Treatments														
2,4-D	5,486,400	7,722,000	8,566,800	5,909,600	2,300,933	***3,848,106***	***5,395,278***	***6,942,451***	8,489,623	***8,080,605***	***7,671,587***	***7,262,568***	6,853,550	-1%
Dicamba	10,972,800	17,550,000	17,133,600	21,422,300	11,513,605	***10,263,873***	***9,014,140***	***7,764,408***	6,514,675	***7,003,177***	***7,491,679***	***7,980,181***	8,468,683	-57%
Paraquat	685,800	1,404,000	1,427,800	738,700	149,594	***561,408***	***973,222***	***1,385,036***	1,796,850	***1,549,213***	***1,301,575***	***1,053,938***	806,300	-7%
Atrazine	49,789,080	54,826,200	54,185,010	50,231,600	31,744,000	***48,290,081***	***64,836,163***	***81,382,244***	97,928,325	***85,641,531***	***73,354,738***	***61,067,944***	48,781,150	34%
Glyphosate	1,371,600	2,808,000	3,569,500	7,313,130	5,068,800	***23,648,625***	***42,228,450***	***60,808,275***	79,388,100	***77,944,873***	***76,501,645***	***75,058,418***	73,615,190	2624%
All Herbicides	139,999,839	175,234,527	178,784,782	202,171,490	128,646,524	***158,251,943***	***187,857,362***	***217,462,780***	247,068,199	***254,978,442***	***262,888,684***	***270,798,927***	278,709,170	50%

Method to calculate: You have to caluclate weights applied to each rate. That "weight" equals the share of total acre-treatments accounted for by each pesticide. The sum of these weights must =100%. Multiple the (%acre-treatments pesticidex, relative to total acre-treatents) times the rate for pesticide x. Then, sum up these values. Same method below applied to Rate per Crop Year.

Table 3. Reliance on Glyphosate and Relatively High-Risk Herbicides in Soybean Weed Management Systems

	1991	1996	1998	2000	2002	2004	2006	2008	2010	2011	2012	Percent Change 1996-2012
Percent Acres Treated												
2,4-D	1.0%	13.4%	7.5%	5.0%	5.1%	4.0%	10.2%	12.1%	14.1%	15.0%	16.0%	19%
Dicamba						0.2%	0.1%	0.4%	0.7%	0.8%	1.0%	326%
Paraquat	2%	1%	1%	0.3%	2%	0.3%	1%	1.7%	2.3%	2.7%	3%	200%
Glyphosate	5%	25%	46%	62%	83%	89%	96%	96.8%	97.4%	97.7%	98%	292%
Rate of Application (pounds a.i. per acre)												
2,4-D	0.15	0.43	0.38	0.44	0.39	0.43	0.48	0.49	0.49	0.50	0.50	17%
Dicamba						0.26	0.25	0.22	0.20	0.18	0.17	-36%
Paraquat	1	1	1	1	1.1	1	1	1.07	1.13	1.17	1.2	20%
Glyphosate	0.8	0.63	0.69	0.68	0.74	0.73	0.79	0.84	0.88	0.90	0.92	47%
Number of Applications												
2,4-D	1.1	1	1	1	1	1.075	1	1	1	1	1	0%
Dicamba						1	1	1	1	1	1	0%
Paraquat	0.53	0.56	0.45	0.36	0.41	0.67	0.492	0.45	0.41	0.40	0.38	-33%
Glyphosate	1	1.1	1.3	1.3	1.4	1.5	1.7	1.68	1.67	1.66	1.65	50%
Rate per Crop Year (pounds a.i. per acre)												
2,4-D	0.17	0.43	0.38	0.44	0.39	0.46	0.48	0.49	0.50	0.50	0.50	17%
Dicamba						0.26	0.25	0.22	0.20	0.18	0.17	-36%
Paraquat	0.53	0.56	0.45	0.36	0.45	0.67	0.49	0.48	0.47	0.46	0.45	-19%
Glyphosate	0.80	0.69	0.90	0.88	1.03	1.09	1.35	1.41	1.47	1.50	1.53	120%

Table 4. Reliance on Glyphosate and Relatively High-Risk Herbicides in Cotton Weed Management Systems												
	1991	1996	1998	2000	2002	2004	2006	2008	2010	2011	2012	Percent Change 1996-2012
Percent Acres Treated												
2,4-D	0.8%	0.9%	1.00%	1%	4%	6%	8%	8.3%	7%	7%	7%	654%
Dicamba		1.0%	0.6%	0.3%	0.6%	1.5%	3.1%	5.4%	8.1%	8%	8%	705%
Paraquat	12%	17%	19%	13%	16%	15%	17%	22.3%	29%	29%	29%	71%
Glyphosate	3%	13%	30%	56%	64%	72%	83%	94%	99%	99%	99%	662%
Rate of Application (pounds a.i. per acre)												
2,4-D	0.73	0.72	0.71	0.83	0.68	0.67	0.54	0.55	0.68	0.68	0.68	-6%
Dicamba		0.64	0.47	0.27	0.22	0.21	0.20	0.20	0.22	0.22	0.22	-66%
Paraquat	1.1	1.1	1	1	1	1.05	1.1	1.1	1.1	1.1	1.1	0%
Glyphosate	0.64	0.63	0.68	0.67	0.7	0.7	0.7	0.8	0.9	0.86	0.86	37%
Number of Applications												
2,4-D	1	1	1	1	1.05	1.01	1.05	1.07	1.07	1.07	1.07	7%
Dicamba		1.1	1.05	1	1	1.02	0.72	0.6	1	1	1	-9%
Paraquat	0.26	0.28	0.27	0.29	0.27	0.32	0.35	0.38	0.39	0.39	0.39	38%
Glyphosate	1.1	1	1.5	1.7	1.9	2.1	2.3	2.2	1.9	1.9	1.9	93%
Rate per Crop Year (pounds a.i. per acre)												
2,4-D	0.73	0.72	0.71	0.83	0.71	0.68	0.56	0.59	0.72	0.72	0.72	1%
Dicamba	0.00	0.70	0.49	0.27	0.22	0.21	0.15	0.12	0.22	0.22	0.22	-69%
Paraquat	0.29	0.31	0.27	0.29	0.27	0.33	0.38	0.41	0.43	0.43	0.43	38%
Glyphosate	0.70	0.63	1.02	1.14	1.25	1.46	1.69	1.79	1.66	1.66	1.66	163%