

## Pesticide-Exposure Matrix

Scenario #	Pest Type, Applier, Year	Method	Confidence Level
1	<u>Lawn weeds, consumer, 1976</u>	5	Low
2	<u>Lawn weeds, consumer, 1980</u>	2	Medium
3	<u>Lawn weeds, consumer, 1990</u>	2	Medium
4	<u>Lawn weeds, consumer, 2000</u>	2	Medium
5	<u>Lawn insects, consumer, 1976</u>	7	Low
6	<u>Lawn insects, consumer, 1980</u>	2	Medium
7	<u>Lawn insects, consumer, 1990</u>	2	Medium
8	<u>Lawn insects, consumer, 2000</u>	2	Medium
9	<u>Outdoor plant and tree weeds, consumer, 1976</u>	5	Low
10	<u>Outdoor plant and tree weeds, consumer, 1980</u>	5	Medium
11	<u>Outdoor plant and tree weeds, consumer, 1990</u>	3	Medium
12	<u>Outdoor plant and tree weeds, consumer, 2000</u>	3	Medium
13	<u>Outdoor plant and tree insects, consumer, 1976</u>	7	Low
14	<u>Outdoor plant and tree insects, consumer, 1980</u>	2	Medium
15	<u>Outdoor plant and tree insects, consumer, 1990</u>	2	Medium
16	<u>Outdoor plant and tree insects, consumer, 2000</u>	2	Medium
17	<u>Outdoor plant and tree diseases, consumer, 1976</u>	7	Low
18	<u>Outdoor plant and tree diseases, consumer, 1980</u>	2	Medium
19	<u>Outdoor plant and tree diseases, consumer, 1990</u>	2	Medium
20	<u>Outdoor plant and tree diseases, consumer, 2000</u>	2	Medium
21	<u>Indoor plants, consumer, 1976</u>	7	Low
22	<u>Indoor plants, consumer, 1980</u>	5	Medium
23	<u>Indoor plants, consumer, 1990</u>	5	Medium
24	<u>Indoor plants, consumer, 2000</u>	8	--
25	<u>Crawling insects, consumer, 1976</u>	6	Medium
26	<u>Crawling insects, consumer, 1980</u>	6	Medium
27	<u>Crawling insects, consumer, 1990</u>	6	Medium
28	<u>Crawling insects, consumer, 2000</u>	6	Medium
29	<u>Flying insects, consumer, 1976</u>	6	Medium
30	<u>Flying insects, consumer, 1980</u>	6	Medium
31	<u>Flying insects, consumer, 1990</u>	6	Medium
32	<u>Flying insects, consumer, 2000</u>	6	Medium
33	<u>Fleas/ticks on pets, consumer, 1976</u>	6	Medium
34	<u>Fleas/ticks on pets, consumer, 1980</u>	6	Medium
35	<u>Fleas/ticks on pets, consumer, 1990</u>	6	Medium
36	<u>Fleas/ticks on pets, consumer, 2000</u>	6	Medium
37	<u>Fleas/ticks in home, consumer, 1976</u>	6	Medium
38	<u>Fleas/ticks in home, consumer, 1980</u>	6	Medium

39	<u>Fleas/ticks in home, consumer, 1990</u>	6	Medium
40	<u>Fleas/ticks in home, consumer, 2000</u>	6	Medium
41	<u>Termites, consumer, 1976</u>	9	--
42	<u>Termites, consumer, 1980</u>	9	--
43	<u>Termites, consumer, 1990</u>	9	--
44	<u>Termites, consumer, 2000</u>	9	--
45	<u>Rodents, consumer, 1976</u>	4	High
46	<u>Rodents, consumer, 1980</u>	4	High
47	<u>Rodents, consumer, 1990</u>	4	High
48	<u>Rodents, consumer, 2000</u>	4	High
49	<u>Lawn weeds, professional, 1976</u>	4	Medium
50	<u>Lawn weeds, professional, 1980</u>	4	Medium
51	<u>Lawn weeds, professional, 1990</u>	1	High
52	<u>Lawn weeds, professional, 2000</u>	1	High
53	<u>Lawn insects, professional, 1976</u>	4	Medium
54	<u>Lawn insects, professional, 1980</u>	4	Medium
55	<u>Lawn insects, professional, 1990</u>	1	High
56	<u>Lawn insects, professional, 2000</u>	1	High
57	<u>Outdoor plant and tree weeds, professional, 1976</u>	4	Medium
58	<u>Outdoor plant and tree weeds, professional, 1980</u>	4	Medium
59	<u>Outdoor plant and tree weeds, professional, 1990</u>	1	High
60	<u>Outdoor plant and tree weeds, professional, 2000</u>	1	High
61	<u>Outdoor plant and tree insects, professional, 1976</u>	4	Low
62	<u>Outdoor plant and tree insects, professional, 1980</u>	4	Low
63	<u>Outdoor plant and tree insects, professional, 1990</u>	1	Medium
64	<u>Outdoor plant and tree insects, professional, 2000</u>	1	Medium
65	<u>Outdoor plant and tree diseases, professional, 1976</u>	4	Medium
66	<u>Outdoor plant and tree diseases, professional, 1980</u>	4	Medium
67	<u>Outdoor plant and tree diseases, professional, 1990</u>	7	Low
68	<u>Outdoor plant and tree diseases, professional, 2000</u>	1	High
69	<u>Indoor plants, professional, 1976</u>	9	--
70	<u>Indoor plants, professional, 1980</u>	9	--
71	<u>Indoor plants, professional, 1990</u>	9	--
72	<u>Indoor plants, professional, 2000</u>	9	--
73	<u>Crawling insects, professional, 1976</u>	4	Medium
74	<u>Crawling insects, professional, 1980</u>	4	Medium
75	<u>Crawling insects, professional, 1990</u>	4	Medium
76	<u>Crawling insects, professional, 2000</u>	4	Medium
77	<u>Flying insects, professional, 1976</u>	8	--
78	<u>Flying insects, professional, 1980</u>	8	--
79	<u>Flying insects, professional, 1990</u>	8	--
80	<u>Flying insects, professional, 2000</u>	4	Low
81	<u>Fleas/ticks on pets, professional, 1976</u>	6	Medium

82	<u>Fleas/ticks on pets, professional, 1980</u>	6	Medium
83	<u>Fleas/ticks on pets, professional, 1990</u>	6	Medium
84	<u>Fleas/ticks on pets, professional, 2000</u>	6	Medium
85	<u>Fleas/ticks in home, professional, 1976</u>	8	--
86	<u>Fleas/ticks in home, professional, 1980</u>	8	--
87	<u>Fleas/ticks in home, professional, 1990</u>	8	--
88	<u>Fleas/ticks in home, professional, 2000</u>	4	Medium
89	<u>Termites, professional, 1976</u>	4	Medium
90	<u>Termites, professional, 1980</u>	4	Medium
91	<u>Termites, professional, 1990</u>	4	High
92	<u>Termites, professional, 2000</u>	4	High
93	<u>Rodents, professional, 1976</u>	4	High
94	<u>Rodents, professional, 1980</u>	4	High
95	<u>Rodents, professional, 1990</u>	4	High
96	<u>Rodents, professional, 2000</u>	4	High

"--" = Probabilities were not estimated for these scenarios

<b>Scenario 1 - Lawn weeds - Consumer, 1976</b>									
<b>Method 5, Confidence low</b>									
Manufacturer (a)	Sales (\$ million) (a)	Product (a)	Sales (\$ million) (b)	Active Ingredient (a)	Sales (\$ million) (c)	Active Ingredient (d)	Sales (\$ millions) (calculated) (e)	Probability (calculated) (f)	
Ortho	11.5	Crabgrass	4.0	MSMA	4.0	2,4-D	15.3	75%	
				2,4-D	4.0	MSMA	5.7	28%	
		Weed-B-Gone	7.5	2,4-D	7.5	Dicamba	3.8	19%	
				MCPPP	2.5	Fenoprop	3.3	16%	
				Silvex (fenoprop)	2.5	MCPPP	2.5	12%	
Scott	3.0	Granule	3.0	2,4-D	3.0	DSMA	1.7	8%	
Amchem	2.5	Weedone	1.0	MSMA	1.0	Benefin	1.0	5%	
				DSMA	1.0	Dacthal	0.4	2%	
		Weedone Super	0.8	2,4-D	0.8	Other	2.0	10%	
				Dicamba	0.8				
				Silvex (fenoprop)	0.8				
				MSMA	0.7				
		Weedone granulated	0.7	MSMA	0.7				
				DSMA	0.7				
Lebanon	1.0	Greenview granulated	1.0	Benefin	1.0				
Famco	0.4	Crabgrass prev gran	0.4	Dacthal	0.4				
Other	2.0	Other	2.0	Other	2.0				
	20.4								

(a) Kline (Ramsey and Kollonitsch, 1977), except for "other," which was based on judgment. The Kline report lists three additional manufacturers (USS Agrichemicals, Occidental, Swift) (\$3 million total sales) but does not identify their products or active ingredients. We assumed that their active ingredients were similar in identity and proportion of sales to those listed here, and we do not list them on the table or include them in the calculations.

(b) Allocation of each manufacturer's sales to major products was based on judgment.

(c) Sales for each active ingredient are set equal to the sales for the product containing that active ingredient. Exception: For Ortho Weed-B-Gone, MCPPP and silvex (fenoprop) are each set at \$2.5 million rather than \$7.5 million because only one-third of Ortho Weed-B-Gone products contained these active ingredients.

(d) Eliminating duplicates.

(e) Combining active ingredient sales across all products in which it appears.

(f) Sales for each active ingredient divided by total sales (\$20.4 million).

**Scenario 2 - Lawn Weeds - Consumer, 1980**  
**Method 2, Confidence medium**

Active Ingredient (a)	Pounds Applied to Lawns (thousands)			Application Rate (lbs/acre) (b)	Lawn Acres Treated (thousands) (calculated) (c)	Probability (calculated) (d)
	Fertilizer/Herbicide Combination Products (a)	Straight Herbicide Products (a)	Total (calculated)			
2,4-D	1,300	700	2,000	0.61	3,279	57%
MCPP	650	350	1,000	0.35	2,857	50%
Dicamba	0	150	150	0.07	2,143	37%
Dacthal	420	180	600	1.00	600	10%
Bensulide	500	0	500	1.50	333	6%
Siduron	290	0	290	1.00	290	5%
MSMA	0	230	230	1.00	230	4%
Other	780	240	1,020	1.00	1,020	18%
					5,752	

- (a) Kline (Anonymous, 1982). The numbers presented here reflect a 49% reduction in the pounds of MCPP applied in straight insecticide products and a 17% reduction in the pounds of MCPP applied in fertilizer/herbicide combination products. We did this to reflect actual formulas and based on our judgment that MCPP volume was overstated relative to 2,4-D in the Kline report.
- (b) Meister Publishing Company manuals, C&P Press publications, and U.S. EPA Pesticide Product Label System.
- (c) We divided the pounds by the application rate to calculate the number of lawn acres treated with each active ingredient. To calculate the total number of lawn acres treated (5,752,000), we summed across all of the active ingredients except dicamba and MCPP because they are virtually always applied with 2,4-D, while 2,4-D is sometimes applied alone.
- (d) Lawn acres treated with each active ingredient divided by total number of lawn acres treated.

**Scenario 3 - Lawn Weeds - Consumer, 1990**  
**Method 2, Confidence medium**

Active Ingredient (a)	Pounds Applied to Lawns (thousands)			Application Rate (lbs/acre) (b)	Lawn Acres Treated (thousands) (calculated) (c)	Probability (calculated) (d)
	Fertilizer/Herbicide Combination Products (a)	Straight Herbicide Products (a)	Total (calculated)			
2,4-D	3,771	3,446	7,217	0.61	11,909	55%
Dicamba	163	345	508	0.05	10,160	47%
MCP	1,508	1,969	3,477	0.35	9,934	46%
Pendimethalin	4,949	350	5,299	1.50	3,533	16%
Dacthal	1,173	689	1,862	1.00	1,862	9%
Benefin	1,173	788	1,961	1.50	1,307	6%
Other	1,509	1,477	2,986	1.00	2,986	14%
					21,597	

- (a) Kline (Hodge and Rafter, 1992a). The numbers presented here reflect a 25% reduction in the pounds of 2,4-D, MCP, and dicamba applied to lawns in fertilizer/herbicide combinations. We further reduced the pounds of dicamba to reflect its ratio of use with MCP and 2,4-D in formulations. We added these pounds to pendimethalin. These changes were based on judgment.
- (b) Meister Publishing Company manuals, C&P Press publications, and U.S. EPA Pesticide Product Label System.
- (c) We divided the pounds by the application rate to calculate the number of lawn acres treated with each active ingredient. To calculate the total number of lawn acres treated (21,598,000), we summed across all of the active ingredients except dicamba and MCP because they are virtually always applied with 2,4-D, while 2,4-D is sometimes applied alone.
- (d) Lawn acres treated with each active ingredient divided by total number of lawn acres treated.

**Scenario 4 - Lawn Weeds - Consumer, 2000**

**Method 2, Confidence medium**

Active Ingredient (a)	Pounds Applied to Lawns (thousands)			Application Rate (lbs/acre) (b)	Lawn Acres Treated (thousands) (calculated) (c)	Probability (calculated) (d)
	Fertilizer/Herbicide Combination Products (a)	Straight Herbicide Products (a)	Total (calculated)			
2,4-D	3,300	4,200	7,500	0.61	12,295	49%
MCP	1,600	2,420	4,020	0.35	11,486	46%
Pendimethalin	8,120	0	8,120	1.25	6,496	26%
Dicamba	160	210	370	0.05	7,400	30%
Dacthal	1,800	0	1,800	1	1,800	7%
Benefin	1,800	895	2,695	1.5	1,797	7%
Other	2,500	1,200	3,700	1.5	2,467	10%
					24,854	

(a) Kline (Fugate et al., 2002). The numbers presented here for fertilizer/insecticide combinations reflect several changes, based on judgment: a 50% reduction in the pounds of 2,4-D and dicamba, an 82% reduction in the pounds of dicamba (to reflect its ratio of use with MCP and 2,4-D in formulations), and a 35% increase in the pounds of pendimethalin.

(b) Meister Publishing Company manuals and C&P Press publications

(c) We divided the pounds by the application rate to calculate the number of lawn acres treated with each active ingredient. To calculate the total number of lawn acres treated (24,854,000), we summed across all of the active ingredients except dicamba and MCP because they are virtually always applied with 2,4-D, while 2,4-D is sometimes applied alone.

(d) Lawn acres treated with each active ingredient divided by total number of lawn acres treated.

Scenario 5 - Lawn Insects - Consumer, 1976							
Method 7, Confidence low							
	Sales (a)		Products (a)	Active Ingredient	% of Sales (b)		Probability for Lawns (calculated) (c)
	(\$ million)	%			Lawn	Outdoor plants	
Lawn products	12	15%	Leading Products				
			Diazinon	Diazinon	5.0%	14.0%	33%
Other products	69	85%	Chlorpyrifos	Chlorpyrifos	4.0%	3.0%	27%
Garden	56	69%	Malathion	Malathion	1.0%	11.0%	7%
Nonplant	13	16%	Carbaryl	Carbaryl	1.0%	6.0%	7%
			Orthene	Acephate	1.0%	6.0%	7%
Total	81	100%	Tetrapropyl ester	Tetrapropyl ester	1.0%	2.0%	7%
			Other	Other	2.0%	6.0%	13%
			Secondary Products				
			Dylox	Trichlorfon		2.4%	
			Dimethoate	Dimethoate		2.4%	
			Disulfoton	Disulfoton		2.4%	
			Metasystox	Oxydemeton-methyl		2.4%	
			Methoxychlor	Methoxychlor		2.4%	
			Lindane	Lindane		2.0%	
			Other Products				
			Pyrethrins	Pyrethrins		3.0%	
			Kelthane	Dicofol		2.0%	
			Rotenone	Rotenone		2.0%	
			Total		15.0%	69.0%	
(a) Kline (Ramsey and Kollonitsch, 1977)							
(b) Active ingredient percentages are based on judgment, with the condition that the sum across active ingredients for lawns equals 15% and the sum across outdoor ingredients for outdoor plants equals 69% (from "Sales, %" column).							
(c) Percent of sales for each lawn active ingredient divided by the total percent of sales for lawns (15%).							

**Scenario 6 - Lawn Insects - Consumer, 1980**  
**Method 2, Confidence medium**

Active Ingredient (a)	Pounds applied to lawns, outdoor plants, and nonplants (thousands)		Pounds applied to lawns, outdoor plants, and nonplants (thousands) (b)			Application Rate for Lawns (lbs/acre) (c)	Lawn Acres Treated (thousands) (calculated) (d)	Probability for Lawns (calculated) (e)
	Fertilizer/ Insecticide Combination Products (a)	Straight Insecticide Products (a)						
	Lawn	Outdoor Plants	Nonplants					
Diazinon	1,200	800	1,400	480	120	3	467	63%
Chlorpyrifos	140	110	190	44	17	2	95	13%
Carbaryl	0	650	33	520	98	3	11	1%
Malathion	0	400	20	320	60	2	10	1%
Other	230	590	319	413	89	2	159	21%
	1,570	2,550	1,961	1,777	383		742	

(a) Kline (Anonymous, 1982)

(b) Allocation of active ingredient pounds separately to lawns, outdoor plants, and nonplants was done as follows:

Fertilizer/insecticide combination products: 100% is applied to lawns (judgment)

Straight insecticides: 15% of total is applied to lawns, 70% to outdoor plants, 15% to nonplants, from Kline (Anonymous, 1982)

Straight insecticides: Split of each active ingredient to lawns vs. outdoor plants vs. nonplants is based on judgment

(assumptions: diazinon: 25%-60%-15%, carbaryl and malathion: 5%-80%-15%, chlorpyrifos: 45%-40%-15%, other: 15%-70%-15%).

(c) Meister Publishing Company manuals

(d) Pounds applied to lawns divided by application rate for lawns.

(e) Lawn acres treated with each active ingredient divided by total lawn acres treated.

**Scenario 7 - Lawn Insects - Consumer, 1990**  
**Method 2, Confidence medium**

Active Ingredient (a)	Pounds applied to lawns, outdoor plants, and nonplants (thousands)		Pounds applied to lawns, outdoor plants, and nonplants (thousands) (b)			Application Rate for Lawns (lbs/acre) (c)	Lawn Acres Treated (thousands) (calculated) (d)	Probability for Lawns (calculated) (e)
	Fertilizer/Insecticide Combination Products (a)	Straight Insecticide Products (a)						
	Lawn	Outdoor Plants	Nonplants					
Chlorpyrifos	1,341	1,121	1,677	448	336	2	839	53%
Diazinon	670	2,243	1,231	1,009	673	3	410	26%
Malathion	0	1,495	150	897	449	2	75	5%
Carbaryl	0	1,869	187	1,121	561	3	62	4%
Other	168	748	392	299	224	2	196	12%
	2,179	7,476	3,637	3,775	2,243		1,582	

(a) Kline (Hodge and Rafter, 1992a)

(b) Allocation of active ingredient pounds separately to lawns, outdoor plants, and nonplants was done as follows:

Fertilizer/insecticide combination products: 100% is applied to lawns (judgment)

Straight insecticides: 20% of total is applied to lawns, 50% to outdoor plants, 30% to nonplants, based on Kline (Hodge and Rafter, 1992a) plus judgment.

Straight insecticides: Split of each active ingredient to lawns vs. outdoor plants vs. nonplants is based on judgment

(assumptions: diazinon: 25%-45%-30%, carbaryl and malathion: 10%-60%-30%, chlorpyrifos: 30%-40%-30%, other: 30%-40%-30%).

(c) Meister Publishing Weed Control manuals

(d) Pounds applied to lawns divided by application rate for lawns.

(e) Lawn acres treated with each active ingredient divided by total lawn acres treated.

**Scenario 8 - Lawn Insects - Consumer, 2000**  
**Method 2, Confidence medium**

Active Ingredient (a)	Pounds applied to lawns, outdoor plants, and nonplants (thousands)		Pounds applied to lawns, outdoor plants, and nonplants (thousands) (b)			Application Rate for Lawns (lbs/acre) (c)	Lawn Acres Treated (thousands) (calculated) (d)	Probability for Lawns (calculated) (e)
	Fertilizer/Insecticide Combination Products (a)	Straight Insecticide Products (a)						
	Lawn	Outdoor Plants	Nonplants					
Diazinon	1,000	3,016	1,754	1,357	905	3	585	26%
Chlorpyrifos	500	1,508	952	603	452	2	476	21%
Imidacloprid	135	0	135	0	0	0.3	450	20%
Malathion	0	2,011	201	1,207	603	2	101	4%
Carbaryl	0	2,514	251	1,508	754	3	84	4%
Other	865	1,005	1,167	402	302	2	583	26%
	2,500	10,054	4,460	5,077	3,016		2,278	

- (a) Kline (Hall and Dansbury, 2000). Fertilizer/insecticide combination products: we subtracted 35,000 lbs from "other" and accounted for it under "imidacloprid" (judgment).
- (b) Allocation of active ingredient pounds separately to lawns, outdoor plants, and nonplants was done as follows:  
 Fertilizer/insecticide combination products: 100% is applied to lawns (judgment)  
 Straight insecticides: 20% of total is applied to lawns, 50% to outdoor plants, 30% to nonplants (judgment)  
 Straight insecticides: Split of each active ingredient to lawns vs. outdoor plants vs. nonplants is based on judgment (assumptions: diazinon: 25%-45%-30%, carbaryl and malathion: 10%-60%-30%, chlorpyrifos: 30%-40%-30%, other: 30%-40%-30%).
- (c) Meister Publishing Company manuals
- (d) Pounds applied to lawns divided by application rate for lawns.
- (e) Lawn acres treated with each active ingredient divided by total lawn acres treated.

**Scenario 9 - Outdoor Plant/tree Weeds - Consumer, 1976**

**Method 5, Confidence low**

Manufacturer (a)	Sales (\$ million) (a)	Major Brands (a)	Active Ingredients (a)	Sales (\$ million) (b)	Active Ingredient (c)	Sales (\$ million) (d)	Probability (calculated) (e)
Ortho	2.5	Weed-B-Gone Poison Ivy Killer	2,4-D	1.0	2,4-D	1.6	40%
			MCPP	1.0	MCPP	1.6	40%
			2,4,5-T	0.5	2,4,5-T	0.5	13%
			Fenoprop	0.5	Fenoprop	0.5	13%
			Bensulide	0.5	Bensulide	0.5	13%
Amchem	0.5	Weedone	2,4-D	0.2	Chloramben	0.1	3%
			MCPP	0.2			
			Chloramben	0.1			
Swift	0.5	Vigoro, Swift	2,4-D	0.2			
			MCPP	0.2			
			Dicamba	0.1			
Occidental	0.5	Best	2,4-D	0.2			
			MCPP	0.2			
			Dicamba	0.1			
Other	4.0	Unknown	Similar to above	4.0			
	8.0						

(a) Kline (Ramsey and Kollonitsch, 1977). The major brands and active ingredients associated with "other" manufacturers are unknown. However, we believe that the "other" manufacturers used the same active ingredients, in the same proportions, as the knowns.

(b) Based on judgment. For example, we judged that 40% of the Amchem Weedone products contained 2,4-D (40% of \$0.5 million = \$0.2 million), 40% contained MCPP, and 20% contained chloramben.

(c) Eliminating duplicates.

(d) Combining active ingredient sales across all products in which it appears.

(e) Active ingredient sales divided by total sales by manufacturers whose products and active ingredients are known (\$4 million).

**Scenario 10 - Outdoor Plant/tree Weeds - Consumer, 1980**  
**Method 5, Confidence medium**

Manufacturer (a)	Percent of Sales (a)	Active Ingredient (b)	Percent of Sales (c)	Active Ingredient (d)	Percent of Sales (calculated) (e)	Probability (calculated) (f)
<b>Top Manufacturers</b>						
Ortho	30%	2,4-D	12%	2,4-D	19%	29%
		MCPP	10%	MCPP	10%	15%
		Paraquat	2%	Amitrol	10%	15%
		Dichlorbenil	2%	Prometon	5%	8%
		Dacthal	4%	Trifluralin	5%	8%
Union Carbide	8%	Amitrol	6%	Simazine	5%	8%
		Simazine	2%	Cacodylic acid	4%	6%
Estech	8%	2,4-D	4%	Dacthal	4%	6%
		Pramitol (prometon)	2%	Dichlorbenil	2%	3%
		Cacodylic acid	2%	Paraquat	2%	3%
<b>Second Tier</b>						
Second Tier	20%	2,4-D	3%	Other	34%	
		Amitrol	4%			
		Pramitol (prometon)	3%			
		Cacodylic acid	2%			
		Simazine	3%			
		Treflan (trifluralin)	5%			
Other	34%	Similar to above	34%			
<b>Total</b>	<b>100%</b>		<b>100%</b>			

(a) Kline (Anonymous, 1982)

(b) Kline (Anonymous, 1982) and U.S. EPA Pesticide Product Label System. The major active ingredients associated with "other" manufacturers are unknown. However, we believe that the "other" manufacturers used the same active ingredients, in the same proportions, as the knowns.

(c) Based on judgment.

(d) Eliminating duplicates.

(e) Combining active ingredient percent sales across all products in which it appears.

(f) We divided the percent sales of each active ingredient by 66% because the total for the known active ingredients is 66%; this effectively apportions the "other" active ingredients into each of the known active ingredients (under the assumption that the "others" are similar to the known).

<b>Scenario 11 - Outdoor Plant/tree Weeds - Consumer, 1990</b>										
<b>Method 3, Confidence medium</b>										
Manufacturer and Product (a)	Sales (\$ million) (a)	Unit Price (\$ per gal) (a)	Gal Used (million) (calculated) (b)	Application Rate (gal/acre) (c)	Acres Treated (million) (calculated) (d)	Active Ingredient	Acres Treated (million) (calculated) (e)	Active Ingredient (f)	Acres Treated (million) (calculated) (g)	Probability (calculated) (h)
Monsanto	90.0	48	1.9	0.5	3.8	Glyphosate	3.8	Glyphosate	4.0	42%
Chevron Ortho								2,4-D	2.2	23%
Kleenup	7.0	60	0.1	0.5	0.2	Glyphosate	0.2	MCPP	2.2	23%
Weed-B-gone	20.0	32	0.6	0.4	1.6	2,4-D	1.6	Diquat	1.0	11%
						MCPP	1.6	Dacthal	1.0	11%
Triox	4.3	24	0.2	0.5	0.4	Pramitol (prometon)	0.4	Trifluralin	1.0	10%
Lebanon	3.5	18	0.2	0.2	1.0	Trifluralin	1.0	Prometon	0.4	4%
VPG Fertilome	2.1	24	0.1	0.4	0.2	2,4-D	0.2			
						MCPP	0.2			
K Mart	2.0	24	0.1	0.4	0.2	2,4-D	0.2			
						MCPP	0.2			
Spectracide	2.0	24	0.1	0.4	0.2	2,4-D	0.2			
						MCPP	0.2			
Other	16.5	20	0.8	0.4	2.1	Dacthal	1.0			
						Diquat	1.0			
					9.6					

(a) Kline (Hodge and Rafter, 1992a)  
(b) Sales divided by unit price.  
(c) Meister Publishing Company manuals, C&P Press publications.  
(d) Gallons used divided by application rate in gallons per acre.  
(e) Assigning each product's acres treated to all of the active ingredients it contains.  
(f) Eliminating duplicates  
(g) Combining active ingredient acres treated across all products in which it appears.  
(h) Dividing each active ingredient's acres treated by the total number of acres treated (9.6 million).

**Scenario 12 - Outdoor Plant/tree Weeds - Consumer 2000**

**Method 3, Confidence medium**

Manufacturer and Product (a)	Sales (\$ million) (b)	Unit Price (\$ per gal) (a)	Gallons Used (million) (calculated) (c)	Application Rate (gal/acre) (d)	Acres Treated (million) (calculated) (e)	Active Ingredient	Acres Treated (million) (calculated) (f)	Active Ingredient (g)	Acres Treated (million) (calculated) (h)	Probability (calculated) (i)
Monsanto (Marketed by Scotts)	145.0	48.0	3.0	0.5	6.0	Glyphosate	6.0	Glyphosate	6.6	35%
Scotts Ortho	14.5							Trifluralin	6.0	31%
Kleeraway Grass & Weed Killer	4.0	63.9	0.1	0.5	0.1	Glyphosate	0.1	Dacthal	2.3	12%
Triox Vegetation Killer	2.0	17.0	0.1	2.0	0.1	Pramitol (prometon)	0.1	MCPP	2.0	11%
Triox Vegetation Killer Formula II	3.5	33.0	0.1	0.3	0.4	Oxyfluorfen	0.4	Dicamba	2.0	11%
						Imazapyr	0.4	2,4-D	2.0	11%
Groundclear Total Vegetation Killer	2.0	99.0	0.0	0.5	0.0	Glyphosate	0.0	Oryzalin	1.8	10%
						Imazapyr	0.0	Diquat	1.0	5%
Fence & Grass Edger Formula II	1.0	60.0	0.0	0.4	0.0	Glyphosate	0.0	Fluazifop	0.9	5%
						Oxyfluorfen	0.0	Imazapyr	0.7	3%
Brush-B-Gone	1.0	30.0	0.0	0.2	0.2	Trichlopyr	0.2	Prometon	0.3	2%
Grass Killer Formula II	1.0	30.0	0.0	0.2	0.2	Fluazifop	0.2	Oxyfluorfen	0.5	2%
Lebanon	21.6	18.0	1.2	0.2	6.0	Trifluralin	6.0	Trichlopyr	0.2	1%
VPG Fertilome	2.4	24.0	0.1	0.5	0.2	Glyphosate	0.2	Other	0.2	1%
						Imazapyr	0.2			
Enforcer										
Roots & All	3.5	48.0	0.1	0.5	0.1	Glyphosate	0.1			
Brush Killer	1.2	30.0	0.0	0.5	0.1	Triclopyr	0.1			
United Industries (Spectracide)										
Spot Weed Killer	10.0	15.0	0.7	0.3	2.0	2,4-D	2.0			
						MCPP	2.0			
						Dicamba	2.0			
Grass and Weed Killer	10.0	88.8	0.1	0.3	0.5	Diquat	0.5			
						Fluazifop	0.5			
Vegetation Killer	9.8	17.0	0.6	2.0	0.3	Pramitol (prometon)	0.3			
Green Light	1.3	20.0	0.5	0.3	1.7	Dacthal	1.7			
						Oryzalin	1.7			
PBI Gordon	1.3	25.0	0.1	0.2	0.3	Fluazifop	0.3			
						Dacthal	0.3			
Lilly/Miller, Cooke	1.3	25.0	0.1	0.3	0.2	Orazylin	0.2			
						Dichlobenil	0.2			
						Diquat	0.2			
Farnam	1.1	113.0	0.0	1.0	0.0	Glufosinate	0.0			
Other	4.5	20.0	0.2	0.3	0.8	Dacthal	0.4			
						Diquat	0.4			
<b>Total</b>					<b>19.1</b>					

(a) Kline (Hall and Dansbury, 2000)

(b) Manufacturer sales are from Kline (Hall and Dansbury, 2000); product sales were based on judgment.

(c) Sales divided by unit price.

(d) Meister Publishing Company manuals, C&P Press publications.

(e) Gallons used divided by application rate in gallons per acre.

(f) Assigning each product's acres treated to all of the active ingredients it contains.

(g) Eliminating duplicates.

(h) Combining active ingredient acres treated across all products in which it appears.

(i) Dividing each active ingredient's acres treated by the total number of acres treated (19.1 million).

**Scenario 13 - Outdoor Plant/tree Insects - Consumer, 1976**

**Method 7, Confidence low**

	Sales (a)		Products (a)	Active Ingredient	% of Sales (b)		Active Ingredient	Probability for Outdoor Plants (calculated) (c)
	(\$ million)	%			Lawn	Outdoor Plants		
Lawn products	12	15%	Leading Products					
Other products	69	85%	Malathion	Malathion	1.0	11.0	Diazinon	20%
Garden	56	69%	Diazinon	Diazinon	5.0	14.0	Malathion	16%
Nonplant	13	16%	Tetrapropyl ester	Tetrapropyl ester	1.0	2.0	Carbaryl	9%
			Chlorpyrifos	Chlorpyrifos	4.0	3.0	Acephate	9%
Total	81	100%	Carbaryl	Carbaryl	1.0	6.0	Pyrethrins	4%
			Orthene	Acephate	1.0	6.0	Chlorpyrifos	4%
			Other	Other	2.0	6.0	Dimethoate	3%
			Secondary Products				Trichloron	3%
			Dylox	Trichlorfon		2.4	Disulfoton	3%
			Dimethoate	Dimethoate		2.4	Oxydemeton-methyl	3%
			Disulfoton	Disulfoton		2.4	Methoxychlor	3%
			Metasystox	Oxydemeton-methyl		2.4	Lindane	3%
			Methoxychlor	Methoxychlor		2.4	Dicofol	3%
			Lindane	Lindane		2.0	Rotenone	3%
			Other Products				Tetrapropyl ester	3%
			Pyrethrins	Pyrethrins		3.0	Other	9%
			Kelthane	Dicofol		2.0		
			Rotenone	Rotenone		2.0		
			Total		15.0	69.0		

(a) Kline (Ramsey and Kollonitsch, 1977)

(b) Active ingredient percentages are based on judgment, with the condition that the sum across active ingredients for lawns equals 15% and the sum across outdoor ingredients for outdoor plants equals 69% (from "Sales, %" column).

(c) Percent of sales for each outdoor plant active ingredient divided by the total percent of sales for outdoor plants (69%).

**Scenario 14 - Outdoor Plant/tree Insects - Consumer, 1980**

**Method 2, Confidence medium**

Active Ingredient (a)	Pounds applied to lawns, outdoor plants, and nonplants (thousands)		Pounds applied to lawns, outdoor plants, and nonplants (thousands) (b)			Application Rate for Outdoor Plant/trees (lbs/acre) (c)	Outdoor Plant/tree Acres Treated (thousands) (calculated) (d)	Probability (calculated) (e)
	Fertilizer/ Insecticide Combination Products (a)	Straight Insecticide Products (a)						
	Lawn	Outdoor Plants	Nonplants					
Carbaryl	0	650	33	520	98	3	173	24%
Malathion	0	400	20	320	60	2	160	22%
Diazinon	1,200	800	1,400	480	120	3	160	22%
Chlorpyrifos	140	110	190	44	17	2	22	3%
Other	230	590	319	413	89	2	207	29%
	1,570	2,550	1,961	1,777	383		722	

(a) Kline (Anonymous, 1982)

(b) Allocation of active ingredient pounds separately to lawns, outdoor plants, and nonplants was done as follows:

Fertilizer/insecticide combination products: 100% is applied to lawns (judgment)

Straight insecticides: 15% of total is applied to lawns, 70% to outdoor plants, 15% to nonplants, based on Kline (Anonymous, 1982).

Straight insecticides: Split of each active ingredient to lawns vs. outdoor plants vs. nonplants is based on judgment.

(assumptions: diazinon: 25%-60%-15%, carbaryl and malathion: 5%-80%-15%, chlorpyrifos: 45%-40%-15%, other: 15%-70%-15%).

(c) Meister Publishing Company manuals

(d) Pounds applied to outdoor plants/trees divided by application rate for outdoor plants/trees.

(e) Outdoor plants/trees acres treated with each active ingredient divided by total outdoor plant/tree acres treated.

**Scenario 15 - Outdoor Plant/tree insects - Consumer, 1990**  
**Method 2, Confidence medium**

Active Ingredient (a)	Pounds applied to lawns, outdoor plants, and nonplants (thousands)		Pounds applied to lawns, outdoor plants, and nonplants (thousands) (b)			Application Rate for Outdoor Plants/trees (lbs/acre) (c)	Outdoor Plant/tree Acres Treated (thousands) (calculated) (d)	Probability (calculated) (e)
	Fertilizer/ Insecticide Combination Products (a)	Straight Insecticide Products (a)						
	Lawn	Outdoor Plants	Nonplants					
Malathion	0	1,495	150	897	449	2	448	29%
Carbaryl	0	1,869	187	1,121	561	3	374	24%
Diazinon	670	2,243	1,231	1,009	673	3	336	22%
Chlorpyrifos	1,341	1,121	1,677	448	336	2	224	15%
Other	168	748	392	299	224	2	150	10%
	2,179	7,476	3,637	3,774	2,243		1,532	

(a) Kline (Hodge and Rafter, 1992a)

(b) Allocation of active ingredient pounds separately to lawns, outdoor plants, and nonplants was done as follows:

Fertilizer/insecticide combinations: 100% is applied to lawns (judgment)

Straight insecticides: 20% of total is applied to lawns, 50% to outdoor nonplants, 30% to nonplants, based on Kline (Hodge and Rafter, 1992a) plus judgment.

Straight insecticides: Split of each active ingredient to lawns vs. outdoor plants vs. nonplants is based on judgment

(assumptions: diazinon: 25%-45%-30%, carbaryl and malathion: 10%-60%-30%, chlorpyrifos: 30%-40%-30%, other: 30%-40%-30%).

(c) Meister Publishing Company manuals

(d) Pounds applied to outdoor plants/trees divided by application rate for outdoor plants/trees.

(e) Outdoor plants/trees acres treated with each active ingredient divided by total outdoor plant/tree acres treated.

**Scenario 16 - Outdoor Plant/tree Insects - Consumer, 2000**  
**Method 2, Confidence medium**

Active Ingredient (a)	Pounds applied to lawns, outdoor plants, and nonplants (thousands)		Pounds applied to lawns, outdoor plants, and nonplants (thousands) (b)			Application Rate for Outdoor Plants/trees (lbs/acre) (c)	Outdoor Plant/tree Acres Treated (thousands) (calculated) (d)	Probability (calculated) (e)
	Fertilizer/Insecticide Combination Products (a)	Straight Insecticide Products (a)						
	Lawn	Outdoor Plants	Nonplants					
Malathion	0	2,011	201	1,207	603	2	604	29%
Carbaryl	0	2,514	251	1,508	754	3	503	24%
Diazinon	1000	3,016	1,754	1,357	905	3	452	22%
Chlorpyrifos	500	1,508	952	603	452	2	302	15%
Imidacloprid	135	0	135	0	0	0.3	0	0%
Other	865	1,005	1,166	402	302	2	201	10%
	2,500	10,054	4,459	5,077	3,016		2,061	

(a) Kline (Hall and Dansbury, 2000). Fertilizer/insecticide combination products: We subtracted 35,000 from "other" and accounted for it under "imidacloprid" (judgment).

(b) Allocation of active ingredient pounds separately to lawns, outdoor plants, and nonplants was done as follows:

Fertilizer/insecticide combinations: 100% is applied to lawns (judgment)

Straight insecticides: 20% of total is applied to lawns, 50% to outdoor plants, 30% to nonplants (judgment)

Straight insecticides: Split of each active ingredient to lawns vs. outdoor plants vs. nonplants is based on judgment

(assumptions: diazinon: 25%-45%-30%, carbaryl and malathion: 10%-60%-30%, chlorpyrifos: 30%-40%-30%, other: 30%-40%-30%).

(c) Meister Publishing Company manuals

(d) Pounds applied to outdoor plants/trees divided by application rate for outdoor plants/trees.

(e) Outdoor plants/trees acres treated with each active ingredient divided by total outdoor plant/tree acres treated.

**Scenario 17 - Outdoor plant/tree diseases - Consumer, 1976**

**Method 7, Confidence low**

According to Kline (Ramsey and Kollonitsch, 1977), Ortho was the largest manufacturer in this segment, with a 33% market share. Ortho's main active ingredients were captan, folpet, and sulfur. These active ingredients were used by other manufacturers as well.

Other active ingredients listed in Kline (Ramsey and Kollonitsch, 1977), and most likely used by both Ortho and other manufacturers, are chlorothanil, maneb, zineb, thiram, and ferbam.

Based on this information, we used judgment to derive the probabilities:

Active ingredient	Probability
Captan	20%
Folpet	20%
Sulfur	20%
Chlorothalinil	15%
Maneb	10%
Zineb	5%
Thiram	5%
Ferbam	5%

**Scenario 18 - Outdoor Plant/tree Diseases - Consumer, 1980**  
**Method 2, Confidence medium**

Active Ingredient (a)	Total pounds applied to lawns and outdoor plants/trees (thousands) (a)	Total pounds applied to lawns and outdoor plants/trees (thousands) (b)		Application Rate for Outdoor Plant/trees (lbs/100 gal) (c)	Outdoor Plant/tree Acres Treated (thousands) (calculated) (d)	Probability (calculated) (e)
		Outdoor plants/trees	Lawn			
Captan	200	129	71	1.2	108	21%
PCNB	175	75	100	1.5	50	10%
Sulfur	135	135	0	6.0	23	4%
Other	525					
Maneb	50	50	0	0.9	53	11%
Chlorothalonil	100	50	50	1.0	50	10%
Benomyl	75	25	50	0.5	50	10%
Thiram	50	50	0	1.0	50	10%
Ziram	50	50	0	1.5	33	7%
Other	200	175	25	2.0	88	17%
	1,035	739	296		504	

- (a) Kline (Anonymous, 1982). Active ingredients listed in the "other" category are identified by Kline but pounds are not given; these were estimated based on judgment.
- (b) Split of each active ingredient into lawn vs. outdoor plants/trees was based on judgment, with the condition that the total pounds for outdoor plant/tree active ingredients was 71% of the total poundage, and the total pounds for lawn active ingredients was 29% of the total poundage, reflecting the split of dollar sales given in Kline (Anonymous, 1982).
- (c) Hagan et al. (1993)
- (d) Pounds applied divided by application rate. We assume that 100 gallons of finished spray is applied to an acre, a common assumption.
- (e) Acres treated for each active ingredient divided by total acres treated.

**Scenario 19 - Outdoor Plant/tree Diseases - Consumer, 1990**  
**Method 2, Confidence medium**

Active Ingredient (a)	Total pounds applied to lawns and outdoor plants/trees (thousands) (a)	Total pounds applied to lawns and outdoor plants/trees (thousands) (b)		Application Rate for Outdoor Plant/trees (lbs/100 gal) (c)	Outdoor Plant/tree Acres Treated (thousands) (calculated) (d)	Probability (calculated) (e)
		Outdoor plants/trees	Lawn			
Captan	525	525	0	1.2	438	42%
Benomyl	225	100	125	0.5	200	19%
Chlorothalonil	450	100	350	1.0	100	10%
Other	300	300	0	1.0	300	29% (f)
	1,500	1,025	475		1,038	

(a) Kline (Hodge and Rafter, 1992a)

(b) Split of each active ingredient into lawn vs. outdoor plants/trees was based on judgment, with the condition that the total pounds for outdoor plant/tree active ingredients was 68% of the total poundage, and the total pounds for lawn active ingredients was 32% of the total poundage (also based on judgment).

(c) Hagan et al. (1993)

(d) Pounds applied divided by application rate. We assume that 100 gallons of finished spray is applied to an acre, a common assumption.

(e) Acres treated for each active ingredient divided by total acres treated.

(f) Based on judgment, we believe that "other" active ingredients are thiophanate (8%), sulfur (5%), PCNB (5%), and others (11%).

**Scenario 20 - Outdoor Plant/tree Diseases - Consumer, 2000**  
**Method 2, Confidence medium**

Active Ingredient (a)	Total pounds applied to lawns and outdoor plants/trees (thousands) (a)	Total pounds applied to lawns and outdoor plants/trees (thousands) (b)		Application Rate for Outdoor Plant/trees (lbs/100 gal) (c)	Outdoor Plant/tree Acres Treated (thousands) (calculated) (d)	Probability (calculated) (e)
		Outdoor plants/trees	Lawn			
Chlorothalonil	600	300	300	1.0	300	24%
Captan	280	280	0	1.2	233	19%
Triforine	80	80	0	0.4	213	17%
Other	1,040					
Thiophanate methyl	200	200	0	1.0	200	16%
Mycobutanil	50	50	0	0.3	167	13%
Sulfur	390	390	0	5.6	70	6%
Other	400	100	300	1.5	67	5%
	2,000	1,400	600		1,250	

- (a) Kline (Hall and Dansbury, 2000). Active ingredients listed in "other" category are identified by Kline but pounds are not given; these were estimated based on judgment.
- (b) Split of each active ingredient into lawn vs. outdoor plants/trees was based on judgment.
- (c) Hagan et al. (1993)
- (d) Pounds applied divided by application rate. We assume that 100 gallons of finished spray is applied to an acre, a common assumption.
- (e) Acres treated for each active ingredient divided by total acres treated.

<b>Scenario 21 - Indoor Plants (Insects Only) - Consumer 1976</b>	
<b>Method 7, Confidence low</b>	
Active Ingredient (a)	Probability (estimated) (b)
Pyrethrins	40%
Pyrethroids	30%
Rotenone	20%
Other	10%
(a) Kline (Ramsey and Kollonitsch, 1977)	
(b) Kline report noted which active ingredients were the most important but provided no quantification. Probabilities are based on judgment.	

**Scenario 22 - Indoor Plants (Insects Only) - Consumer 1980**

**Method 5, Confidence medium**

Manufacturer (a)	Sales (\$ millions) (a)	Active Ingredients (b)	Percent of Manufacturer's Sales (b)	Sales (\$ millions) (calculated)	Active Ingredients (c)	Sales (\$ millions) (c)	Active Ingredient (d)	Sales (\$ millions) (e)	Probability (calculated) (f)	Probability (adjusted) (g)
Ortho	1.5	Rotenone	10.0%	0.15	Rotenone	0.15	Pyrethrins	1.25	25%	38%
		Pyrethroids and pyrethrins	90.0%	1.35	Pyrethrins	0.50	Nicotine	0.75	15%	15%
					Allethrin	0.21	Methoprene	0.75	15%	15%
					Resmethrin	0.21	Allethrin	0.46	9%	14%
					Tetramethrin	0.21	Tetramethrin	0.46	9%	14%
					Other	0.22	Resmethrin	0.46	9%	14%
							Acephate	0.25	5%	8%
Dexol	1.5	Nicotine	50.0%	0.75	Nicotine	0.75	Methoprene	0.25	5%	5%
Other	2.0	Methoprene	50.0%	0.75	Methoprene	0.75	Dysiston	0.25	5%	5%
		Pyrethroids	37.5%	0.75	Allethrin	0.25	Rotenone	0.15	3%	3%
					Resmethrin	0.25	Other	0.22	4%	9%
					Tetramethrin	0.25				
					Pyrethrins	0.75				
					Dysiston	0.25				
					Orthene (acephate)	0.25	Acephate	0.25		
Total	5.0			5.0						

(a) Kline (Anonymous, 1982)

(b) Based on descriptive information in Kline (Anonymous, 1982) plus judgment.

(c) Sales for each active ingredient were assigned based on information in the Kline report (Anonymous, 1982) and judgment.

(d) Eliminating duplicates.

(e) Combining active ingredient sales across all manufacturers that produce it.

(f) Sales of each active ingredient divided by total sales (\$5 million).

(g) Probabilities for pyrethrins, allethrin, tetramethrin, and "other" active ingredients were adjusted up to reflect their presence in multiple products.

**Scenario 23 - Indoor Plants (Insects Only) - Consumer 1990**

**Method 5, Confidence medium**

Manufacturer (a)	Sales (\$ thousands) (a)	Active Ingredients (b)	Sales (\$ thousands) (c)	Active Ingredients (d)	Sales (\$ thousands) (e)	Probability (calculated) (f)	
Safer	1,344	Fatty acids	1,344	Pyrethrins	2,306	32%	
Ortho (Chevron)	1,000	Acephate	500	Resmethrin	2,050	28%	
		Resmethrin	500	Fatty acids	1,706	24%	
Hyponex (Scotts)	800	Pyrethrins	800	Phenothrin	1,164	16%	
		Resmethrin	800	Allethrin	1,144	16%	
Dexol	641	Dysiston	641	Dysiston	786	11%	
SC Johnson RAID	1,500	Pyrethrins	750	Tetramethrin	769	11%	
		Allethrin	750	Acephate	645	9%	
		Tetramethrin	375	Permethrin	145	2%	
		Resmethrin	750	Other	290	4%	
		Phenothrin	375				
United	1,183	Pyrethrins	394				
		Allethrin	394				
		Tetramethrin	394				
		Phenothrin	789				
Other	746	Fatty acids	362				
		Pyrethrins	362				
		Acephate	145				
		Dysiston	145				
		Permethrin	145				
		Other	290				
Total	7,214						

(a) Kline (Hodge and Rafter, 1992a)

(b) U.S. EPA Pesticide Product Label System

(c) Assignment of dollar sales to individual active ingredients was based on the U.S. EPA Pesticide Product Label System and judgment.

(d) Eliminating duplicates.

(e) Combining active ingredient sales across all manufacturers that produce it.

(f) Sales of each active ingredient divided by total sales.

<b>Scenario 24 - Indoor Plants (Insects Only) - Consumer 2000</b> <b>Method 8, Confidence NA</b>
Active Ingredient (a)
Pyrethrins Resmethrin Fatty acids Allethrin Acephate Bifenthrin Permethrin Tetramethrin
(a) Based on U.S. EPA Pesticide Product Label System, information in Kline (Hodge and Rafter, 1992a), literature review, and judgment.

**Scenario 25 - Crawling Insects - Consumer 1976**  
**Method 6, Confidence medium**

Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted)
Pyrethrins	1,542	55.0%	28% (c)
Propoxur	238	8.5%	25% (c)
Dichlorvos	181	6.5%	19% (c)
Diazinon	555	19.8%	15% (d)
Malathion	193	6.9%	7%
Chlorpyrifos	153	5.5%	5%
Resmethrin	219	7.8%	4% (c)
Allethrin	102	3.6%	4%
Carbaryl	59	2.1%	2%
Boric acid	58	2.1%	2%
Methoxychlor	53	1.9%	2%
Ronnel	48	1.7%	2%
Naled	30	1.1%	1%
Other	130	4.6%	5%
Total	2,806		

- (a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.
- (b) Number of products containing each active ingredient divided by the total number of products.
- (c) We modified the probability based on information on treatment of cockroaches, ants, and spiders from the U.S. EPA Survey (Whitmore et al., 1992).
- (d) We modified the probability based on judgment.

<b>Scenario 26 - Crawling Insects - Consumer 1980</b>			
<b>Method 6, Confidence medium</b>			
Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted)
Propoxur	259	7.7%	25% (c)
Pyrethrins	1,629	48.3%	24% (c)
Dichlorvos	199	5.9%	19% (c)
Diazinon	628	18.6%	14% (d)
Malathion	207	6.1%	6%
Chlorpyrifos	204	6.0%	6%
Allethrin	194	5.7%	6%
Resmethrin	334	9.9%	5% (c)
Phenothrin	160	4.7%	5%
Tetramethrin	155	4.6%	5%
Boric acid	83	2.5%	3%
Carbaryl	65	1.9%	2%
Methoxychlor	57	1.7%	2%
Ronnel	48	1.4%	1%
Naled	33	1.0%	1%
Other	182	5.4%	5%
Total	3,375		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) We modified the probability based on information on treatment of cockroaches, ants, and spiders from the U.S. EPA Survey (Whitmore et al., 1992).

(d) We modified the probability based on judgment.

<b>Scenario 27 - Crawling Insects - Consumer 1990</b>			
<b>Method 6, Confidence medium</b>			
Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted)
Propoxur	247	7.4%	22% (c)
Pyrethrins	1146	34.2%	17% (c)
Chlorpyrifos	537	16.0%	16%
Hydramethylnon	9	0.3%	14% (d)
Diazinon	423	12.6%	13%
Allethrin	407	12.1%	12%
Dichlorvos	128	3.8%	11% (c)
Permethrin	166	5.0%	10% (c)
Tetramethrin	215	6.4%	6%
Phenothrin	209	6.2%	6%
Resmethrin	406	12.1%	6% (c)
Boric acid	128	3.8%	4%
Fenvalerate	128	3.8%	4%
Malathion	88	2.6%	3%
Carbaryl	87	2.6%	3%
Cyfluthrin	12	0.4%	2% (c)
Bendiocarb	33	1.0%	1%
Hydroprene	23	0.7%	1%
Fenoxycarb	15	0.4%	1% (e)
Cypermethrin	11	0.3%	1% (e)
Other	212	6.3%	6%
Total	3351		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) We modified the probability based on information on treatment of cockroaches, ants, and spiders from the U.S. EPA Survey (Whitmore et al., 1992).

(d) Information from Kline (Hodge and Rafter, 1992a) and judgment.

(e) We modified the probability based on judgment.

<b>Scenario 28 - Crawling Insects - Consumer 2000</b>			
<b>Method 6, Confidence medium</b>			
Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted)
Permethrin	436	17.1%	17%
Pyrethrins	746	29.3%	15% (c)
Chlorpyrifos	321	12.6%	13%
Allethrin	250	9.8%	10%
Propoxur	80	3.1%	9% (c)
Diazinon	213	8.4%	8%
Tetramethrin	190	7.5%	7%
Hydramethylnon	15	0.6%	8% (d)
Fipronil	12	0.5%	8% (d)
Dichlorvos	52	2.0%	6% (c)
Sulfluramid	8	0.3%	6% (e)
Phenothrin	136	5.3%	5%
Resmethrin	213	8.4%	4% (c)
Boric acid	89	3.5%	3%
Carbaryl	80	3.1%	3%
Pyriproxifen	70	2.7%	3%
Esfenvalerate	68	2.7%	3%
Cyfluthrin	56	2.2%	2%
Deltamethrin	41	1.6%	2%
Fenvalerate	40	1.6%	2%
Malathion	39	1.5%	2%
Methoprene	9	0.4%	2% (e)
Hydroprene	8	0.3%	2% (c)
Prallethrin	29	1.1%	1%
Cypermethrin	28	1.1%	1%
Eugenol	10	0.4%	1% (e)
Other	196	7.7%	8%
Total	2546		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) We modified the probability based on information on treatment of cockroaches, ants, and spiders from the U.S. EPA Survey (Whitmore et al., 1992).

(d) Based on information from Kline (Hall and Dansbury, 2000; Fugate and Hall, 2002) and judgment.

(e) We modified the probability based on judgment.

<b>Scenario 29 - Flying Insects - Consumer 1976</b>			
<b>Method 6, Confidence medium</b>			
Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted) (c)
Pyrethrins	1,403	56.7%	19% (c)
Propoxur	142	5.7%	17% (c)
Resmethrin	259	10.5%	10%
Malathion	235	9.5%	9%
Dichlorvos	199	8.0%	8%
Diazinon	342	13.8%	7% (d)
Allethrin	150	6.1%	6%
Chlorpyrifos	84	3.4%	3%
Methoxychlor	68	2.7%	3%
Ronnel	45	1.8%	2%
Pyrethrum powder other than pyrethrins	34	1.4%	1%
Carbaryl	33	1.3%	1%
Naled	31	1.3%	1%
Tetramethrin	31	1.3%	1%
Other	118	4.8%	5%
	2,476		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) The adjustments are based on information on cockroaches, ant, and spiders from the U.S. EPA Survey (Whitmore et al., 1992). We did not use U.S. EPA Survey information for flying insects because insecticide use for flying insects in and around the home was combined with insecticide use for flying insects on pets and people.

(d) We modified the probability based on judgment.

**Scenario 30 - Flying Insects - Consumer 1980****Method 6, Confidence medium**

Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted)
Pyrethrins	1,501	50.7%	17% (c)
Propoxur	151	5.1%	15% (c)
Resmethrin	362	12.2%	12%
Malathion	249	8.4%	8%
Dichlorvos	226	7.6%	8%
Allethrin	242	8.2%	8%
Tetramethrin	158	5.3%	5%
Phenothrin	158	5.3%	5%
Diazinon	380	12.8%	4% (d)
Methoxychlor	74	2.5%	2%
Ronnel	46	1.6%	2%
Chlorpyrifos	119	4.0%	1% (d)
Carbaryl	39	1.3%	1%
Naled	35	1.2%	1%
Other	150	5.1%	5%
Total	2,962		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) The adjustments are based on information on cockroaches, ant, and spiders from the U.S. EPA Survey (Whitmore et al., 1992). We did not use U.S. EPA Survey information for flying insects because insecticide use for flying insects in and around the home was combined with insecticide use for flying insects on pets and people.

(d) We modified the probability based on judgment.

<b>Scenario 31 - Flying Insects - Consumer 1990</b>			
<b>Method 6, Confidence medium</b>			
Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted)
Propoxur	160	5.8%	17% (c)
Resmethrin	403	14.6%	15%
Allethrin	390	14.2%	14%
Pyrethrins	1,034	37.6%	13% (c)
Tetramethrin	219	8.0%	8%
Phenothrin	218	7.9%	8%
Permethrin	152	5.5%	6%
Chlorpyrifos	340	12.4%	4% (d)
Dichlorvos	120	4.4%	4%
Fenvalerate	114	4.1%	4%
Malathion	108	3.9%	4%
Diazinon	261	9.5%	3% (d)
Carbaryl	56	2.0%	2%
Bendiocarb	31	1.1%	1%
Other	180	6.5%	7%
Total	2,753		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) The adjustments are based on information on cockroaches, ant, and spiders from the U.S. EPA Survey (Whitmore et al., 1992). We did not use U.S. EPA Survey information for flying insects because insecticide use for flying insects in and around the home was combined with insecticide use for flying insects on pets and people.

(d) We modified the probability based on judgment.

**Scenario 32 - Flying Insects - Consumer 2000**  
**Method 6, Confidence medium**

Active Ingredient (a)	No. of Products (a)	Probability (calculated) (b)	Probability (adjusted)
Permethrin	421	19.6%	20%
Pyrethrins	708	33.0%	11% (c)
Resmethrin	219	10.2%	10%
Tetramethrin	212	9.9%	10%
Allethrin	284	13.3%	13%
Phenothrin	153	7.1%	7%
Propoxur	48	2.2%	7% (c)
Chlorpyrifos	208	9.7%	3% (d)
Diazinon	132	6.2%	2% (d)
Dichlorvos	52	2.4%	2%
Malathion	51	2.4%	2%
Pyriproxifen	50	2.3%	2%
Esfenvalerate	48	2.2%	2%
Cyfluthrin	43	2.0%	2%
Carbaryl	33	1.5%	2%
Deltamethrin	32	1.5%	1%
Fenvalerate	31	1.4%	1%
Cypermethrin	24	1.1%	1%
Prallethrin	23	1.1%	1%
Dimethoate	21	1.0%	1%
Bendiocarb	21	1.0%	1%
Tralomethrin	21	1.0%	1%
Other	80	3.7%	4%
Total	2,143		

- (a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.
- (b) Number of products containing each active ingredient divided by the total number of products.
- (c) The adjustments are based on information on cockroaches, ant, and spiders from the U.S. EPA Survey (Whitmore et al., 1992). We did not use U.S. EPA Survey information for flying insects because insecticide use for flying insects in and around the home was combined with insecticide use for flying insects on pets and people.
- (d) We modified the probability based on judgment.

**Scenario 33 - Fleas/ticks on Pets - Consumer 1976****Method 6, Confidence medium**

Active Ingredient (a)	Fleas (a)	No. of Products		Probability (calculated) (b)	Probability (adjusted)
		Ticks (a)	Total (calculated)		
Carbaryl	219	203	422	32.1%	32%
Pyrethrins	352	244	596	45.4%	30% (c)
Malathion	121	68	189	14.4%	14%
Rotenone	53	29	82	6.2%	6%
Cube resins	52	27	79	6.0%	6%
Methoxychlor	39	32	71	5.4%	5%
Tetrachlorvinphos	3	3	6	0.5%	5% (c)
Dichlorvos	36	21	57	4.3%	4%
Dichlorophene	24	17	41	3.1%	3%
Propoxur	22	17	39	3.0%	3%
Lindane	12	13	25	1.9%	2%
Resmethrin	19	3	22	1.7%	2%
Allethrin	10	5	15	1.1%	1%
Other	61	34	95	7.2%	7%
Total	789	525	1,314		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) The probabilities were modified based on information on treatment of dogs, cats, and kennels with individual active ingredients from the U.S. EPA Survey (Whitmore et al., 1992).

<b>Scenario 34 - Fleas/ticks on Pets - Consumer 1980</b>					
<b>Method 6, Confidence medium</b>					
Active Ingredient (a)	Fleas (a)	No. of Products		Probability (calculated) (b)	Probability (adjusted)
		Ticks (a)	Total (calculated)		
Carbaryl	241	225	466	31%	31%
Pyrethrins	380	269	649	43%	29% (c)
Malathion	130	73	203	14%	14%
Rotenone	55	29	84	6%	6%
Cube resins	53	27	80	5%	5%
Tetrachlorvinphos	3	3	6	0%	5% (c)
Dichlorvos	49	29	78	5%	5%
Methoxychlor	41	34	75	5%	5%
Propoxur	26	21	47	3%	3%
Dichlorophene	24	17	41	3%	3%
Allethrin	27	14	41	3%	3%
Resmethrin	33	4	37	2%	2%
Lindane	13	14	27	2%	2%
Phenothrin	9	9	18	1%	1%
Other	58	30	88	6%	6%
<b>Total</b>	<b>898</b>	<b>604</b>	<b>1,502</b>		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) The probabilities were modified based on information on treatment of dogs, cats, and kennels with individual active ingredients from the U.S. EPA Survey (Whitmore et al., 1992).

<b>Scenario 35 - Fleas/ticks on Pets - Consumer 1990</b>					
<b>Method 6, Confidence medium</b>					
Active Ingredient (a)	No. of Products			Probability (calculated) (b)	Probability (adjusted)
	Fleas (a)	Ticks (a)	Total (calculated)		
Pyrethrins	542	494	1,036	51.9%	34% (c)
Permethrin	162	161	323	16.2%	16%
Carbaryl	137	133	270	13.5%	14%
Allethrin	63	55	118	5.9%	6%
Tetrachlorvinphos	11	11	22	1.1%	6% (c)
Resmethrin	60	41	101	5.1%	5%
Phenothrin	45	42	87	4.4%	4%
Methoprene	5	5	10	0.5%	4% (c)
Malathion	48	29	77	3.9%	4%
Chlorpyrifos	42	33	75	3.8%	4%
Rotenone	43	31	74	3.7%	4%
Cube resins	41	30	71	3.6%	4%
Tetramethrin	24	22	46	2.3%	2%
Propoxur	21	19	40	2.0%	2%
Dichlorvos	19	10	29	1.5%	1%
Diazinon	12	12	24	1.2%	1%
Methoxychlor	11	10	21	1.1%	1%
Other	48	35	83	4.2%	4%
<b>Total</b>	<b>1,067</b>	<b>929</b>	<b>1,996</b>		

(a) From analysis of U.S. EPA Pesticide Product Information System data. The numbers do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

(c) The probabilities were modified based on information on treatment of dogs, cats, and kennels with individual active ingredients from the U.S. EPA Survey (Whitmore et al., 1992).

<b>Scenario 36 - Fleas/ticks on Pets - Consumer, 2000</b>					
<b>Method 6, Confidence medium</b>					
Products Distributed by Veterinarians for Application by Consumers:					
Company (a)	Product (a)	Active Ingredient(a)	Sales (\$ millions)(a)	% of Sales (calculated) (b)	% of Sales, Modified (c)
Meriel	Frontline	Fipronil	185	37%	23%
Bayer	Advantage	Imidacloprid	150	30%	19%
Novartis	Program/Sentinel	Lufenuron	130	26%	16%
Novartis	Sentinel	Milbemycin	50	10%	6%
Pfizer	Revolution	Selamectin	30	6%	4%
			495	100%	62%
Products Sold through Retail Channels:					
Active Ingredient (d)	Fleas (d)	No. of Products Ticks (d)	Total (calculated)	Probability (calculated) (e)	Probability, Modified (f)
Pyrethrins	449	433	882	33.7%	13%
Permethrin	275	274	549	31.4%	12%
Carbaryl	64	64	128	7.3%	3%
Allethrin	55	48	103	5.9%	2%
Phenothrin	39	35	74	4.2%	2%
Pyriproxyfen	30	37	67	3.8%	1%
Resmethrin	36	24	60	3.4%	1%
Other	181	152	333	19.1%	7%
Total	911	835	1746		
Final Probabilities (g)					
Fipronil	23%				
Pyrethrins	19%				
Imidacloprid	19%				
Lufenuron	16%				
Permethrin	12%				
Milbemycin	6%				
Selamectin	4%				
Carbaryl	3%				
Allethrin	2%				
Phenothrin	2%				
Pyriproxyfen	1%				
Resmethrin	1%				
Other	7%				
<p>(a) Kline (Fugate and Cyr, 1997; Cyr and Dansbury, 2000)</p> <p>(b) Sales for each active ingredient divided by total sales.</p> <p>(c) We multiplied the % of sales by 62% because products sold through veterinarians accounted for an estimated 62% of the market for consumer-applied flea/tick products in 2000 (Cyr and Dansbury, 2000).</p> <p>(d) From analysis of U.S. EPA Pesticide Product Information System data. Individual columns do not sum to the total number of products because many products contain more than one active ingredient.</p> <p>(e) Number of products containing each active ingredient divided by total number of products. Pyrethrins were scaled down by a factor of 1.5 based on information on treatment of dogs, cats, and kennels with individual active ingredients from the U.S. EPA Survey (Whitmore et al., 1992).</p> <p>(f) We multiplied the probabilities by 38% because products sold through retail channels accounted for an estimated 38% of the market for consumer-applied flea/tick products in 2000.</p> <p>(g) List for products distributed by veterinarians combined with list for products sold through retail channels.</p>					

<b>Scenario 37 - Fleas/ticks in the home - Consumer, 1976</b>				
<b>Method 6, Confidence medium</b>				
Active Ingredient (a)	Fleas (a)	No. of Products		Probability (calculated) (b)
		Ticks (a)	Total (calculated)	
Pyrethrins	846	580	1,426	55%
Diazinon	294	415	709	27%
Propoxur	146	177	323	12%
Malathion	121	95	216	8%
Dichlorvos	92	117	209	8%
Chlorpyrifos	46	107	153	6%
Carbaryl	60	48	108	4%
Ronnel	36	25	61	2%
Resmethrin	45	13	58	2%
Allethrin	20	11	31	1%
Other	60	49	109	4%
<b>Total</b>	<b>1,430</b>	<b>1,178</b>	<b>2,608</b>	

(a) From analysis of U.S. EPA Pesticide Product Information System data. Individual columns do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

**Scenario 38 - Fleas/ticks in the home - Consumer, 1980**  
**Method 6, Confidence medium**

Active Ingredient (a)	No. of Products			Probability (calculated) (b)
	Fleas (a)	Ticks (a)	Total (calculated)	
Pyrethrins	896	629	1,525	47%
Diazinon	333	468	801	25%
Propoxur	153	186	339	11%
Phenothrin	125	131	256	8%
Malathion	133	104	237	7%
Dichlorvos	100	126	226	7%
Tetramethrin	111	108	219	7%
Chlorpyrifos	64	154	218	7%
Carbaryl	69	56	125	4%
Allethrin	65	49	114	4%
Resmethrin	96	17	113	4%
Ronnel	36	25	61	2%
Other	62	61	123	4%
<b>Total</b>	<b>1,747</b>	<b>1,469</b>	<b>3,216</b>	

- (a) From analysis of U.S. EPA Pesticide Product Information System data. Individual columns do not sum to the total number of products because many products contain more than one active ingredient.
- (b) Number of products containing each active ingredient divided by the total number of products.

<b>Scenario 39 - Fleas/ticks in the home - Consumer, 1990</b>				
<b>Method 6, Confidence medium</b>				
Active Ingredient (a)	Fleas (a)	No. of Products		Probability (calculated) (b)
		Ticks (a)	Total (calculated)	
Pyrethrins	788	687	1,475	34%
Chlorpyrifos	429	489	918	21%
Diazinon	288	367	655	15%
Allethrin	271	239	510	12%
Phenothrin	182	175	357	8%
Propoxur	150	187	337	8%
Tetramethrin	171	157	328	8%
Permethrin	158	157	315	7%
Resmethrin	191	121	312	7%
Fenvalerate	120	125	245	6%
Dichlorvos	80	97	177	4%
Carbaryl	88	81	169	4%
Malathion	62	42	104	2%
Bendiocarb	29	30	59	1%
Other	107	95	202	5%
	2,244	2,115	4,359	

(a) From analysis of U.S. EPA Pesticide Product Information System data. Individual columns do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

<b>Scenario 40 - Fleas/ticks in the home - Consumer, 2000</b>				
<b>Method 6, Confidence medium</b>				
Active Ingredient (a)	Fleas (a)	No. of Products		Probability (calculated) (b)
		Ticks (a)	Total (calculated)	
Pyrethrins	557	507	1,064	29%
Permethrin	408	417	825	22%
Chlorpyrifos	260	292	552	15%
Diazinon	163	193	356	10%
Allethrin	191	165	356	10%
Tetramethrin	167	164	331	9%
Phenothrin	133	127	260	7%
Resmethrin	109	72	181	5%
Pyriproxyfen	85	83	168	5%
Carbaryl	75	72	147	4%
Esfenvalerate	58	64	122	3%
Propoxur	42	53	95	3%
Deltamethrin	37	39	76	2%
Fenvalerate	37	39	76	2%
Dichlorvos	36	39	75	2%
Cyfluthrin	30	39	69	2%
Prallethrin	27	28	55	1%
Bendiocarb	23	23	46	1%
Tralomethrin	22	21	43	1%
Other	80	56	136	4%
	1,890	1,784	3,674	

(a) From analysis of U.S. EPA Pesticide Product Information System data. Individual columns do not sum to the total number of products because many products contain more than one active ingredient.

(b) Number of products containing each active ingredient divided by the total number of products.

**Scenario 41 - Termites - Consumer, 1976**

**Method 9, Confidence NA**

Termites are not covered in Kline's consumer markets reports. There is no evidence that a significant number of homeowners purchased products to self-apply termiticides until the late 1990s (when a sulfuramid-based product was introduced), and the market remains very small.

**Scenario 42 - Termites - Consumer, 1980**

**Method 9, Confidence NA**

Termites are not covered in Kline's consumer markets reports. There is no evidence that a significant number of homeowners purchased products to self-apply termiticides until the late 1990s (when a sulfuramid-based product was introduced), and the market remains very small.

**Scenario 43 - Termites - Consumer, 1990**

**Method 9, Confidence NA**

Termites are not covered in Kline's consumer markets reports. There is no evidence that a significant number of homeowners purchased products to self-apply termiticides until the late 1990s (when a sulfuramid-based product was introduced), and the market remains very small.

**Scenario 44 - Termites - Consumer, 2000**

**Method 9, Confidence NA**

Termites are not covered in Kline's consumer markets reports. There is no evidence that a significant number of homeowners purchased products to self-apply termiticides until the late 1990s (when a sulfuramid-based product was introduced), and the market remains very small.

<b>Scenario 45 - Rodents - Consumer, 1976</b>	
<b>Method 4, Confidence high</b>	
Active Ingredient (a)	Probability = % of Sales (a)
Warfarin	82%
Fumarin	5%
Pival	5%
Diphacinone	4%
Pindone	4%
<p>(a) Percent of sales for warfarin is based on Kline (Ramsey and Kollonitsch, 1977). The other active ingredients are listed in the Kline report along with a statement that they control the remaining 18% of the market. Percentages for the others are based on judgment.</p>	

<b>Scenario 46 - Rodents - Consumer, 1980</b>	
<b>Method 4, Confidence high</b>	
Active Ingredient (a)	Probability = % of Sales (a)
Warfarin	83%
Fumarin	6%
Pival	4%
Diphacinone	4%
Pindone	3%
(a) Kline (Anonymous, 1982) plus judgment.	

<b>Scenario 47 - Rodents - Consumer, 1990</b>						
<b>Method 4, Confidence high</b>						
Product (a)	Active Ingredient	Sales (\$ million) (a)	Active Ingredient (b)	% of Sales (calculated) (c)	Active Ingredient (d)	Probability (calculated) (d)
d-Con	Brodifacoum	53.5	Brodifacoum	87.2%	Brodifacoum	87%
Enforcer	Brodifacoum	2.8	Other	12.8%	Warfarin	10%
Other	Other	8.3			Other	3%
		64.6				

(a) Kline (Hodge and Rafter, 1992a)  
(b) Deleting duplicates  
(c) Sales of each active ingredient divided by total sales.  
(d) According to Kline (Hodge and Rafter, 1992a), 77% of the "other" group, or 10% of the total, is warfarin.

**Scenario 48 - Rodents - Consumer, 2000****Method 4, Confidence high**

Manufacturer (a)	Active Ingredient	Sales (\$ million) (a)	Active Ingredient (b)	% of Sales (calculated) (c)	Active Ingredient (d)	Probability (calculated) (d)
Reckit & Coleman	Brodifacoum	68.0	Brodifacoum	87.6%	Brodifacoum	88%
Enforcer	Brodifacoum	5.0	Other	12.4%	Warfarin	7%
ConAgra	Brodifacoum	4.0			Other	5%
Verdant	Other	2.0				
Green Light	Other	2.0				
Bonide	Other	1.0				
Garden Grow	Other	0.6				
Dragon	Other	0.4				
All other	Other	4.9				
		87.9				

(a) Kline (Hall and Dansbury, 2000)

(b) Deleting duplicates

(c) Sales of each active ingredient divided by total sales.

(d) 60% of "other" active ingredients is estimated as warfarin (judgment).

**Scenario 49 - Lawn Weeds - Professional, 1976**  
**Method 4, Confidence medium**

Product (a)	Sales for Lawns and Outdoor Plants/trees (\$ millions) (a)	Active Ingredient	Sales (\$ millions) (b)	Active Ingredient (c)	Sales (\$ millions) (d)	Probability (calculated) (e) (f)
2,4-D	1.3	2,4-D	1.3	2,4-D	3.2	41%
Trimec	1.0	2,4-D	1.0	MCPPP	1.9	24%
		MCPPP	1.0	Dacthal	1.9	24%
		2,4,5-T	0.5	Dicamba	1.6	21%
		Dicamba	0.5	Benefin	0.7	9%
Banvel	0.2	Dicamba	0.2	Bensulide	0.3	4%
Combinations	0.9	2,4-D	0.9	EPTC	0.3	4%
		MCPPP	0.9	Dichlobenil	0.2	3%
		Dicamba	0.9	Other	1.0	13%
Dacthal	1.9	Dacthal	1.9			
Balan	0.7	Benefin	0.7			
Betasan	0.3	Bensulide	0.3			
Eptam	0.3	EPTC	0.3			
Casoron	0.2	Dichlobenil	0.2			
Other	1.0	Other	1.0			
	7.8					

(a) Kline (Garushenko et al., 1977)

(b) Applying a product's sales to each active ingredient it contains. Exceptions for dicamba and 2,4,5-T to reflect their lower frequency of use in Trimec formulations.

(c) Eliminating duplicates

(d) Combining active ingredient sales across all products in which it appears.

(e) Sales for individual active ingredient divided by total sales (\$7.8 million).

(f) We have no basis for splitting sales between lawns and outdoor plants/trees, so we are setting the probabilities for each equal to the probabilities for both combined. We do not consider this to be an important limitation.

**Scenario 50 - Lawn Weeds - Professional, 1980**

**Method 4, Confidence medium**

Product (a)	Sales (\$ millions) (a)	Active Ingredient	Sales (\$ millions) (b)	Active Ingredient (c)	Sales (\$ millions) (d)	Probability (calculated) (e)
2,4-D	10.0	2,4-D	10.0	2,4-D	16.0	33%
Trimec	6.0	2,4-D	6.0	MCP	10.0	21%
		MCP	6.0	Dicamba	8.0	17%
		Dicamba	6.0	Dacthal	4.0	8%
Dacthal	4.0	Dacthal	4.0	Bensulide	3.5	7%
MCP	4.0	MCP	4.0	Benefin	2.5	5%
Betasan	3.5	Bensulide	3.5	MSMA	1.0	2%
Balan	2.5	Benefin	2.5	Oxadiazon	1.0	2%
Banvel	2.0	Dicamba	2.0	Glyphosate	1.0	2%
MSMA	1.0	MSMA	1.0	Siduron	1.0	2%
Ronstar	1.0	Oxadiazon	1.0	Other	12.0	25%
Roundup	1.0	Glyphosate	1.0			
Tuperson	1.0	Siduron	1.0			
Other	12.0	Other	12.0			
	48.0					

(a) Kline (Goodbread et al., 1983)

(b) Applying a product's sales to each active ingredient it contains.

(c) Eliminating duplicates.

(d) Combining active ingredient sales across all products in which it appears.

(e) Sales for individual active ingredient divided by total sales (\$48 million).

**Scenario 51 - Lawn Weeds - Professional, 1990**

**Method 1, Confidence high**

Product (a)	Acres treated (thousands) (a)	Active Ingredient	Acres treated (thousands) (b)	Active Ingredient (c)	Acres treated (thousands) (d)	Probability (calculated) (e)
Trimec	2,844	2,4-D	2,844	2,4-D	4,151	39%
		MCP	2,844	Dicamba	3,597	34%
		Dicamba	2,844	MCP	2,844	26%
Roundup	2,287	Glyphosate	2,287	Glyphosate	2,287	21%
2,4-D	1,307	2,4-D	1,307	Pendimethalin	927	9%
Pendimethalin	927	Pendimethalin	927	Atrazine	758	7%
Atrazine	758	Atrazine	758	MCPA	453	4%
Banvel	754	Dicamba	754	Triclopyr	362	3%
MCPA	453	MCPA	453	Benefin	356	3%
Turflon	262	Trichlopyr	262	Trifluralin	160	1%
Balan	196	Benefin	196	Oryzalin	126	1%
Team	160	Trifluralin	160	MSMA	115	1%
		Benefin	160	Fenoxaprop	111	1%
Surflan	126	Oryzalin	126	Dacthal	94	1%
MSMA	115	MSMA	115	Other	240	2%
Acclaim	111	Fenoxaprop	111			
Turflon D II	100	Trichlopyr	100			
Dacthal	94	Dacthal	94			
Other	240	Other	240			
	10,733					

(a) Kline (Anonymous, 1991).

(b) Applying a product's treated acres to each active ingredient it contains.

(c) Eliminating duplicates.

(d) Combining active ingredient acres treated across all products in which it appears.

(e) Acres treated with each active ingredient divided by total acres treated (10,732,500).

**Scenario 52 - Lawn Weeds - Professional, 2000**

**Method 1, Confidence high**

Product (a)	Acre-treatments (thousands) (a)	Active Ingredient	Acre-treatments (thousands) (b)	Active Ingredient (c)	Acre-treatments (thousands) (d)	Probability (calculated) (e)
2,4-D	908	2,4-D	908	Dicamba	2,722	35%
Trimec	787	2,4-D	787	2,4-D	2,389	31%
		MCP	787	MCP	1,674	21%
		Dicamba	787	MCPA	1,241	16%
Roundup	773	Glyphosate	773	Pendimethalin	1,142	15%
Lesco Pre-M	681	Pendimethalin	681	Clopyralid	1,043	13%
Tri-Power	628	MCP	628	Glyphosate	773	10%
		MCPA	628	Triclopyr	591	8%
		Dicamba	628	Prodiamine	310	4%
Trupower	613	MCPA	613	Atrazine	187	2%
		Dicamba	613	MSMA	174	2%
		Clopyralid	613	Benefin	135	2%
Barricade	310	Prodiamine	310	Oxadiazon	134	2%
Momentum	298	2,4-D	298	Trifluralin	135	2%
		Triclopyr	298	Oryzalin	128	2%
		Dicamba	298	Other	916	12%
Pendulum	298	Pendimethalin	298			
Confront	293	Clopyralid	293			
		Triclopyr	293			
Lesco 3 Way	259	2,4-D	259			
		MCP	259			
		Dicamba	259			
Aatrex/atrazine	187	Atrazine	187			
MSMA	174	MSMA	174			
Andersons Pendimethalin	163	Pendimethalin	163			
Millenium	137	Clopyralid	137			
		2,4-D	137			
		Dicamba	137			
Team	135	Trifluralin	135			
		Benefin	135			
Ronstar	134	Oxadiazon	134			
Surflan	128	Oryzalin	128			
Other	916	Other	916			
	7,822					

(a) Kline (Fugate et al., 2001)

(b) Applying a product's acre-treatments to each active ingredient it contains.

(c) Eliminating duplicates.

(d) Combining active ingredient acre-treatments across all products in which it appears.

(e) Acre-treatments for individual active ingredient divided by total acre-treatments (7,822,000).

<b>Scenario 53 - Lawn Insects - Professional, 1976</b>			
<b>Method 4, Confidence medium</b>			
Product (a)	Sales for Lawns and Outdoor Plants/trees (\$ millions) (a)	Active Ingredient	Probability (calculated) (b) (c)
Chlorpyrifos	4.0	Chlorpyrifos	31%
Diazinon	2.3	Diazinon	18%
Malathion	2.0	Malathion	15%
Carbaryl	1.8	Carbaryl	14%
Lindane	1.0	Lindane	8%
Chlordane	0.8	Chlordane	6%
Kelthane	0.4	Dicofol	3%
Methoxychlor	0.3	Methoxychlor	2%
Other	0.4	Other	3%
	13.0		

(a) Kline (Garushenko et al., 1977)  
(b) Sales for each active ingredient divided by total sales.  
(c) We have no basis for splitting sales between lawns and outdoor plants/trees, so we are setting the probabilities for each equal to the probabilities for both combined. We do not consider this to be an important limitation.

<b>Scenario 54 - Lawn Insects - Professional, 1980</b>			
<b>Method 4, Confidence medium</b>			
Product (a)	Sales (\$ millions) (a)	Active Ingredient	Probability (calculated) (b)
Dursban	19.8	Chlorpyrifos	55%
Diazinon	7.2	Diazinon	20%
Sevin	3.0	Carbaryl	8%
Orthene	2.1	Acephate	6%
Malathion	1.8	Malathion	5%
Oftanol	1.1	Isofenphos	3%
Other	1.0	Other	3%
	36.0		

(a) Kline (Goodbread et al., 1983)  
(b) Sales for each active ingredient divided by total sales.

<b>Scenario 55 - Lawn Insects - Professional, 1990</b>			
<b>Method 1, Confidence high</b>			
Product (a)	Acres Treated (thousands) (a)	Active Ingredient	Probability (calculated) (b)
Chlorpyrifos	1,464	Chlorpyrifos	41%
Sevin	817	Carbaryl	23%
Diazinon	347	Diazinon	10%
Oftanol	317	Isofenphos	9%
Orthene	138	Acephate	4%
Malathion	103	Malathion	3%
Truimph	92	Isazophos	3%
Mocap	60	Ethoprop	2%
Dylox	58	Trichlorfon	2%
Other	138	Other	4%
	3,534		
(a) Kline (Anonymous, 1991)			
(b) Acres treated with each active ingredient divided by total acres treated.			

<b>Scenario 56 - Lawn Insects - Professional, 2000</b>			
<b>Method 1, Confidence high</b>			
Product (a)	Acre-Treatments (thousands) (a)	Active Ingredient	Probability (calculated) (b)
Merit	489	Imidacloprid	32%
Dursban	289	Chlorpyrifos	19%
Talstar	276	Bifenthrin	18%
Orthene	108	Acephate	7%
Dylox	84	Trichlorfon	5%
Malathion	65	Malathion	4%
Tempo	59	Cyfluthrin	4%
Diazinon	46	Diazinon	3%
Oftanol	38	Isofenphos	2%
Astro	23	Permethrin	1%
DeltaGard	14	Deltamethrin	1%
Sevin	14	Carbaryl	1%
Mach 2	13	Halofenozide	1%
Other	33	Other	2%
	1,551		
(a) Kline (Fugate et al., 2001)			
(b) Acre-treatments for each active ingredient divided by total acre-treatments.			

**Scenario 57 - Outdoor Plant/tree Weeds - Professional, 1976**  
**Method 4, Confidence medium**

Product (a)	Sales for Lawns and Outdoor Plants/trees (\$ millions) (a)	Active Ingredient	Sales (\$ millions) (b)	Active Ingredient (c)	Sales (\$ millions) (d)	Probability (calculated) (e) (f)
2,4-D	1.3	2,4-D	1.3	2,4-D	3.2	41%
Trimec	1.0	2,4-D	1.0	MCPP	1.9	24%
		MCPP	1.0	Dacthal	1.9	24%
		2,4,5-T	0.5	Dicamba	1.6	21%
		Dicamba	0.5	Benefin	0.7	9%
		Dicamba	0.2	Bensulide	0.3	4%
Banvel Combinations	0.9	2,4-D	0.9	EPTC	0.3	4%
		MCPP	0.9	Dichlobenil	0.2	3%
		Dicamba	0.9	Other	1.0	13%
		Dacthal	1.9	Dacthal	1.9	
Balan	0.7	Benefin	0.7			
Betasan	0.3	Bensulide	0.3			
Eptam	0.3	EPTC	0.3			
Casoron	0.2	Dichlobenil	0.2			
Other	1.0	Other	1.0			
	7.8					

(a) Kline (Garushenko et al., 1977)

(b) Applying a product's sales to each active ingredient it contains. Exceptions for dicamba and 2,4,5-T to reflect their lower frequency of use in Trimec formulations.

(c) Deleting duplicates.

(d) Combining active ingredient sales across all products in which it appears.

(e) Sales for individual active ingredient divided by total sales (\$7.8 million).

(f) We have no basis for splitting sales between lawns and outdoor plants/trees, so we are setting the probabilities for each equal to the probabilities for both combined. We do not consider this to be an important limitation.

<b>Scenario 58 - Outdoor Plants/tree Weeds - Professional, 1980</b>						
<b>Method 4, Confidence medium</b>						
Product (a)	Sales (\$ Millions) (a)	Active Ingredient	Sales (\$ Millions) (b)	Active Ingredient (c)	Sales (\$ Millions) (d)	Probability (calculated) (e)
Roundup	2.4	Glyphosate	2.4	2,4-D	3.5	29%
Trimec	2.3	2,4-D	2.3	Glyphosate	2.4	20%
		MCP	2.3	MCP	2.3	19%
		Dicamba	2.3	Dicamba	2.3	19%
		Simazine	1.7	Simazine	1.7	14%
Princep	1.7	Simazine	1.7	Simazine	1.7	14%
2,4-D	1.2	2,4-D	1.2	Trifluralin	0.6	5%
Treflan	0.6	Trifluralin	0.6	Diuron	0.5	4%
Karmex	0.5	Diuron	0.5	Other	3.4	28%
Other	3.4	Other	3.4			
	12.1					

(a) Kline (Goodbread et al., 1983)  
(b) Applying a product's sales to each active ingredient it contains.  
(c) Deleting duplicates.  
(d) Combining active ingredient sales across all products in which it appears.  
(e) Sales for each active ingredient divided by total sales (\$12.1 million).

**Scenario 59 - Outdoor Plant/tree Weeds - Professional, 1990**

**Method 1, Confidence high**

Product (a)	Acres Treated (Thousands) (a)	Active Ingredient	Acres Treated (Thousands) (b)	Active Ingredient (c)	Acres Treated (Thousands) (d)	Probability (calculated) (e)
Roundup	486	Glyphosate	486	Glyphosate	486	36%
Trimec	213	2,4-D	213	2,4-D	389	29%
		MCP	213	MCP	213	16%
		Dicamba	213	Dicamba	213	16%
		2,4-D	176	2,4-D	176	Oryzalin
Surflan	63	Oryzalin	63	Pendimethalin	58	4%
Pendimethalin	58	Pendimethalin	58	Trichlopyr	42	3%
Turflon	42	Trichlopyr	42	Sethoxydim	22	2%
Poast	22	Sethoxydim	22	Benefin	16	1%
Balan	9	Benefin	9	Trifluralin	7	1%
Team	7	Trifluralin	7	Other	282	21%
		Benefin	7			
Other	282	Other	282			
	1,358					

(a) Kline (Anonymous, 1991)

(b) Applying a product's acres treated to each active ingredient it contains.

(c) Deleting duplicates.

(d) Combining active ingredient acres treated across all products in which it appears.

(e) Acres treated for individual active ingredient divided by total acres treated (1,358,000).

<b>Scenario 60 - Outdoor Plant &amp; Tree Weeds - Professional, 2000</b>						
<b>Method 1, Confidence high</b>						
Product (a)	Acre-treatments (thousands) (a)	Active Ingredient	Acre-treatments (thousands) (b)	Active Ingredient (c)	Acre-treatments (thousands) (d)	Probability (calculated) (e)
Roundup	221	Glyphosate	221	Glyphosate	221	22%
Lesco Pre-M	194	Pendimethalin	194	Pendimethalin	194	19%
Team	84	Trifluralin	84	2,4-D	131	13%
		Benefin	84	MCP	138	13%
Trimec	80	2,4-D	80	Trifluralin	133	13%
		MCP	80	Dicamba	138	13%
		Dicamba	80	Benefin	84	8%
Princep	36	Simazine	36	Simazine	68	7%
Mec Amine-D	34	MCP	34	Triclopyr	51	5%
Simazine	32	Simazine	32	Clopyralid	14	1%
Turflon	31	Triclopyr	31	Prodiamine	26	3%
Treflan	28	Trifluralin	28	MCPA	24	2%
Barricade	26	Prodiamine	26	Dithiopyr	21	2%
Tri-Power	24	MCP	24	Oryzalin	14	1%
		MCPA	24	Oxidiazon	14	1%
		Dicamba	24	Glufosinate	12	1%
Dimension	21	Dithiopyr	21	MSMA	12	1%
Preen	21	Trifluralin	21	Atrazine	11	1%
Momentum	20	2,4-D	20	Other	81	8%
		Triclopyr	20			
		Dicamba	20			
2,4-D	17	2,4,D	17			
Millenium	14	Clopyralid	14			
		2,4-D	14			
		Dicamba	14			
Ronstar	14	Oxadiazon	14			
Surflan	14	Oryzalin	14			
Finale	12	Glufosinate	12			
MSMA	12	MSMA	12			
Aatrex/atrazine	11	Atrazine	11			
Other	81	Other	81			
	1,027					

(a) Kline (Fugate et al., 2001)  
(b) Applying a product's acre-treatments to each active ingredient it contains.  
(c) Deleting duplicates.  
(d) Combining active ingredient acre-treatments across all products in which it appears.  
(e) Acre-treatments for individual active ingredient divided by total acre-treatments (1,027,000).

<b>Scenario 61 - Lawn Insects - Professional, 1976</b>			
<b>Method 4, Confidence low</b>			
Product (a)	Sales for Lawns and Outdoor Plants/trees (\$ millions) (a)	Active Ingredient	Probability (calculated) (b) (c)
Chlorpyrifos	4.0	Chlorpyrifos	31%
Diazinon	2.3	Diazinon	18%
Malathion	2.0	Malathion	15%
Carbaryl	1.8	Carbaryl	14%
Lindane	1.0	Lindane	8%
Chlordane	0.8	Chlordane	6%
Kelthane	0.4	Dicofol	3%
Methoxychlor	0.3	Methoxychlor	2%
Other	0.4	Other	3%
	13.0		

(a) Kline (Garushenko et al., 1977)  
(b) Sales for each active ingredient divided by total sales.  
(c) We have no basis for splitting sales between lawns and outdoor plants/trees, so we are setting the probabilities for each equal to the probabilities for both combined. We do not consider this to be an important limitation.

**Scenario 62 - Outdoor Plant/tree Insects - Professional, 1980**  
**Method 4, Confidence low**

Active Ingredient (a)	Sales (\$ millions) (a)	Probability (calculated) (b)
Chlorpyrifos	4.9	25%
Diazinon	3.6	18%
Malathion	3.4	17%
Carbaryl	3.0	15%
Acephate	1.4	7%
Metasystox	1.0	5%
Lindane	0.6	3%
Other	1.9	10%
Total	19.8	

(a) Kline (Goodbread et al., 1983)

(b) Sales for each active ingredient divided by total sales.

<b>Scenario 63 - Outdoor Plant/tree Insects - Professional, 1990</b>			
<b>Method 1, Confidence medium</b>			
Product (a)	Acres Treated (thousands) (a)	Active Ingredient	Probability (calculated) (b)
Malathion	90	Malathion	31%
Dursban	47	Chlorpyrifos	16%
Diazinon	32	Diazinon	11%
Sevin	11	Carbaryl	4%
Orthene	10	Acephate	3%
Oftanol	9	Isofenphos	3%
Other	96	Other	33%
	295		

(a) Kline (Anonymous, 1991)  
(b) Acres treated with each active ingredient divided by total acres treated.

<b>Scenario 64 - Outdoor Plant/tree Insects - Professional, 2000</b>			
<b>Method 1, Confidence medium</b>			
Product (a)	Acre-treatments (thousands) (a)	Active Ingredient	Probability (calculated) (b)
Dursban	48	Chlorpyrifos	29%
Talstar	43	Bifenthrin	26%
Malathion	16	Malathion	10%
Merit	15	Imidacloprid	9%
Dimilin	15	Diflubenzuron	9%
Tempo	9	Cyfluthrin	5%
Diazinon	7	Diazinon	4%
Sevin	5	Carbaryl	3%
Orthene	4	Acephate	2%
Dylox	3	Trichlorfon	2%
Other	2	Other	1%
	167		
(a) Kline (Fugate et al., 2001)			
(b) Acre-treatments for each active ingredient divided by total acre-treatments.			

**Scenario 65 - Outdoor Plant/tree Diseases - Professional, 1976**  
**Method 4, Confidence medium**

Product (a)	Sales for Lawns and Outdoor Plants/trees (\$ millions) (a)	Sales (\$ millions) (b)		Active Ingredient	Probability for Outdoor Plants/trees (calculated) (c)
		Lawns	Outdoor plants/trees		
Benomyl	620	400	220	Captan	14%
Daconil	310	200	110	Benomyl	13%
Captan	240		240	Anilazine	11%
Dyrene	180		180	Thiram	9%
Thiram	150		150	Zineb	8%
Zineb	140		140	Copper sulfate	8%
Bordeaux	135		135	Cycloheximide	6%
Act-Dione	110		110	PCNB	6%
Terrachlor	105		105	Folpet	6%
Folpet	100		100	Chlorthalonil	6%
Other	410	205	205	Other	12%
	2,500	805	1,695		

(a) Kline (Garushenko et al., 1977)

(b) Judgment was used to allocate sales separately to lawns and outdoor plants/trees.

(c) Sales of each active ingredient used on outdoor plants/trees divided by total sales for outdoor plants/trees (\$1,695,000).

**Scenario 66 - Outdoor Plant/tree Diseases - Professional, 1990-1995**  
**Method 4, Confidence medium**

Product (a)	Sales (\$ thousands) (a)	Probability (calculated) (b)
Benomyl	2,325	70%
Captan	330	10%
Other	645	20%
	3,300	

(a) Kline (Goodbread et al., 1983)

(b) Sales for each active ingredient divided by total sales.

<b>Scenario 67 - Outdoor Plant/tree Diseases - Professional, 1990</b>	
<b>Method 7, Confidence low</b>	
Product (a)	Probability (a)
Benomyl	40%
Chlorothalonil	15%
Mancozeb	15%
Thiophanate methyl	8%
Sulfur	6%
PCNB	8%
Other	8%

(a) Products and probabilities were based on judgment.

**Scenario 68 - Outdoor Plant/tree Diseases - Professional, 2000**

**Method 1, Confidence high**

Product (a)	Acre-treatments (thousands) (a)	Active Ingredient	Active Ingredient (b)	Acre-treatments (thousands) (c)	Probability (calculated)(d)
Daconil	6	Chlorothalonil	Chlorothalonil	6	27%
Dithane	5	Mancozeb	Mancozeb	6	27%
Cleary's 3336	4	Thiophanate-methyl	Thiophanate-methyl	4	18%
Heritage	1	Azoxystrobin	Azoxystrobin	1	5%
Mancozeb	1	Mancozeb	Sulfur	1	5%
Sulfur products	1	Sulfur	Triadimefon	1	5%
Bayleton	1	Triadimefon	Other	3	14%
Other	3	Other			
	22				

(a) Kline (Fugate et al., 2001)

(b) Eliminating duplicates.

(c) Combining active ingredient acre-treatments across all products in which it appears.

(d) Acre-treatments for individual active ingredient divided by total acre-treatments (22,000).

**Scenario 69 - Indoor Plants - Professional, 1976**  
**Method 9, Confidence NA**

We did not estimate probabilities for this pest type because indoor plants are rarely treated by professional applicators.

**Scenario 70 - Indoor Plants - Professional, 1980**  
**Method 9, Confidence NA**

We did not estimate probabilities for this pest type because indoor plants are rarely treated by professional applicators.

**Scenario 71 - Indoor Plants - Professional, 1990**  
**Method 9, Confidence NA**

We did not estimate probabilities for this pest type because indoor plants are rarely treated by professional applicators.

**Scenario 72 - Indoor Plants - Professional, 2000**  
**Method 9, Confidence NA**

We did not estimate probabilities for this pest type because indoor plants are rarely treated by professional applicators.

Scenario 73 - Crawling Insects - Professional, 1976				
Method 4, Confidence medium				
Active Ingredient (a)	Total Sales for Termites, General Pests, and Dry Wood Pests (\$ Millions) (a)	Total Sales (\$ Millions) (c)		Probability for General Pests (Crawling Insects) (calculated) (d)
		Termites	General pests	
		Chlorpyrifos	9.0	
Diazinon	8.2		8.2	31%
Chlordane	17.2	15.4	1.8	7%
Vikane (sulfuryl fluoride) (b)	6.5	4.9	1.6	6%
Heptachlor	0.8	0.8		0%
Methyl bromide (b)	0.5	0.4	0.1	0%
Other	5.8		5.8	22%
Total	48.0	21.5	26.5	

(a) Kline (Garushenko et al., 1977). "General pests" are mainly ants, cockroaches, and spiders, which comprise the majority of crawling insect treatments.

(b) Fumigants used for dry wood pests (termites and powder post beetles).

(c) According to Kline (Garushenko et al., 1977), the termite market (excluding the dry wood pest fumigants Vikane and methyl bromide) was valued at \$16.2 million. We allocated this to chlordane and heptachlor using judgment. The splits of active ingredients between termites and general pests were based on judgment.

(d) Sales of each active ingredient used for general pest treatment divided by total sales for general pests (\$26.5 million).

<b>Scenario 74 - Crawling Insects - Professional, 1980</b>							
<b>Method 4, Confidence medium</b>							
Product (a)	Total Sales for Termites, General Pests, and Outdoor Pests		Sales (\$ million)		General Pests and Outdoor Pests (Crawling Insects)		
	Pests (\$ million) (a)	Active Ingredient	Termites (a, b)	General Pests and Outdoor Pests (c)	Active Ingredient (d)	Sales (\$ million) (calculated) (e)	Probability (calculated) (f)
Chlordane	19.2	Chlordane	19.2		Chlorpyrifos	20.0	24%
Dursban	18.5	Chlorpyrifos	4.1	14.4	Diazinon	17.3	20%
Diazinon	17.3	Diazinon		17.3	Bendiocarb	8.5	10%
Bendiocarb	8.5	Bendiocarb		8.5	Propoxur	5.1	6%
Termide	8.3	Chlordane and heptachlor	8.3		Carbaryl	4.3	5%
Sulfuryl fluoride	6.7	Sulfuryl fluoride	6.7		Malathion	3.7	4%
Killmaster	5.6	Chlorpyrifos		5.6	Pyrethrins	3.1	4%
Propoxur	5.1	Propoxur		5.1	Other	22.8	27%
Carbaryl	4.3	Carbaryl		4.3			
Malathion	3.7	Malathion		3.7			
Pyrethrins	3.1	Pyrethrins		3.1			
Heptachlor	0.4	Heptachlor	0.4				
Other	22.8	Other		22.8			
	123.5		38.7	84.8			

(a) Kline (Goodbread et al., 1983). "General pests" and "outdoor pests" are mainly ants, cockroaches, and spiders, treated indoors and outdoors, respectively (excluding the lawn and garden). These pests comprise the majority of crawling insect treatments.

(b) The Kline report (Goodbread et al., 1983) lists sales for "other" termite products as \$4.1 million. We assumed that this was all chlorpyrifos.

(c) Individual active ingredient sales for general/outdoor pests were calculated by subtracting termite sales from total sales.

(d) Deleting duplicates.

(e) Combining active ingredient sales across all products in which it appears.

(f) Sales for each active ingredient divided by total sales for general/outdoor pests (\$84.8 million).

<b>Scenario 75 - Crawling Insects - Professional, 1990</b>					
<b>Method 4, Confidence medium</b>					
Product (a)	Sales (\$ thousands)			Active Ingredient	Probability (calculated) (b)
	Cockroaches (a)	Ants (a)	Total (calculated)		
Dursban, Empire	13,704	5,529	19,233	Chlorpyrifos	23%
Demon, Cynoff	10,335	2,488	12,823	Cypermethrin	16%
Tempo	8,280	1,935	10,215	Cyfluthrin	12%
Ficam	2,627	3,669	6,296	Bendiocarb	8%
Diazinon	1,542	1,960	3,502	Diazinon	4%
Safrotin	2,056	503	2,558	Propetamphos	3%
Maxforce	0	1,081	1,081	Hydramethylnon	1%
Other	18,529	7,966	26,495	Other	32%
	57,072	25,130	82,201		

(a) Kline (Hodge and Rafter, 1992b)  
(b) Sales for each active ingredient divided by total sales.

Scenario 76 - Crawling Insects - Professional, 2000							
Method 4, Confidence medium							
Product (a)	Active Ingredient	Sales (\$ thousands)			Active Ingredient (b)	Sales (\$ thousand) (c)	Probability (calculated) (d)
		Cockroaches (a)	Ants (a)	Total (calculated)			
Advance	Sulfuramid		3,386	3,386	lambda-Cyhalothrin	14,774	14%
Ascend	Abamectin		583	583	Fipronil	14,596	14%
Avert dry	Abamectin	881		881	Cypermethrin	8,534	8%
Avert gel bait	Abamectin	1,642		1,642	Chlorpyrifos	7,569	7%
Avert gel form	Abamectin	1,216		1,216	Cyfluthrin	6,742	6%
Avert press bait	Abamectin	1,292		1,292	Bifenthrin	5,823	5%
Award	Fenoxycarb		449	449	Abamectin	5,614	5%
Catalyst	Propetamphos	1,023	296	1,319	Deltamethrin	5,481	5%
Conquer	Esfenvalerate	814	302	1,116	Hydramethylnon	4,592	4%
Cynoff	Cypermethrin	1,093	392	1,485	Sulfuramid	3,734	4%
Deltagard	Deltamethrin		1,052	1,052	Acephate	2,128	2%
Demand	lambda-Cyhalothrin	5,286	8,304	13,590	Bendiocarb	1,986	2%
Demand	lambda-Cyhalothrin	1,184		1,184	Permethrin	1,823	2%
Demon	Cypermethrin	2,618	1,276	3,894	Hydroprene	1,349	1%
Demon	Cypermethrin	1,789	1,366	3,155	Propetamphos	1,319	1%
Diazinon	Diazinon		479	479	Orthoboric acid	1,231	1%
Dragnet	Permethrin	1,095	728	1,823	Esfenvalerate	1,116	1%
Drax	Orthoboric acid		1,231	1,231	Tralomethrin	999	1%
Dursban	Chlorpyrifos	3,777	3,792	7,569	Other	16,656	16%
Ficam	Bendiocarb	749	1,237	1,986		106,066	
Fluorguard	Sulfuramid		348	348			
Gentrol	Hydroprene	1,349		1,349			
Maxforce granular baits	Hydramethylnon	457	3,846	4,303			
Maxforce	Fipronil	9,379	253	9,632			
Maxforce	Fipronil	1,865	1,979	3,844			
Maxforce FC	Fipronil	1,120		1,120			
Optem	Cyfluthrin	768		768			
Orthene	Acephate	1,089		1,089			
Orthene	Acephate	1,039		1,039			
Premise	Imidacloprid		292	292			
Saga	Tralomethrin	999		999			
Suspend	Deltamethrin	2,870	1,559	4,429			
Talstar	Bifenthrin	1,066	4,757	5,823			
Tempo	Cyfluthrin	3,131	1,235	4,366			
Tempo SC	Cyfluthrin	1,080	528	1,608			
Triad	NA		541	541			
Siege	Hydramethylnon		289	289			
Other	Other	9,312	5,583	14,895			
		59,983	46,083	106,066			

(a) Kline (Fugate et al., 2000). Some table entries are sums across brand names with like active ingredients.  
(b) Eliminating duplicate active ingredients and active ingredients that comprise <1% of the market.  
(c) Combining active ingredient sales across all products in which it appears.  
(d) Sales for each active ingredient divided by total sales (\$106,066,000)

<b>Scenario 77 - Flying Insects - Professional, 1976</b> <b>Method 8, Confidence NA</b>
Active Ingredient (a)
Pyrethrins Propoxur Bendiocarb Tetramethrin Allethrin Chlorpyrifos DDVP
(a) No Kline data. We are not able to estimate probabilities. List of active ingredients was based on the U.S. EPA Pesticide Product Label System, information on professional bee control products from Kline (Fugate et al., 2000), and judgment.

<b>Scenario 78 - Flying Insects - Professional, 1980</b> <b>Method 8, Confidence NA</b>
Active Ingredient (a)
Pyrethrins Propoxur Bendiocarb Tetramethrin Allethrin Chlorpyrifos DDVP
(a) No Kline data. We are not able to estimate probabilities. List of active ingredients was based on the U.S. EPA Pesticide Product Label System, information on professional bee control products from Kline (Fugate et al., 2000), and judgment.

<b>Scenario 79 - Flying Insects - Professional, 1990</b> <b>Method 8, Confidence NA</b>
Active Ingredient (a)
Cypermethrin Pyrethrins Tetramethrin Bendiocarb Allethrin Chlorpyrifos Propoxur DDVP
(a) No Kline data. We are not able to estimate probabilities. List of active ingredients was based on the U.S. EPA Pesticide Product Label System, information on professional bee control products from Kline (Fugate et al., 2000), and judgment.

<b>Scenario 80 - Flying Insects - Professional, 2000</b>		
<b>Method 4, Confidence low</b>		
Active Ingredient (a)	Sales (\$) (a)	Probability (calculated) (b)
Cypermethrin	533,337	59%
Pyrethrins	218,743	24%
lambda-Cyhalothrin	43,192	5%
Bendiocarb	34,307	4%
Allethrin	22,552	3%
Chlorpyrifos	21,751	2%
Other	24,773	3%
	898,655	

(a) Based on information on professional bee control products from Kline (Fugate et al., 2000). Sales are for 800 applicators in the Kline database and are not scaled up to the total market.

(b) Sales for each active ingredient divided by total sales.

<b>Scenario 81 - Fleas/ticks on Pets - Professional, 1976</b>
<b>Method 6, Confidence medium</b>
Same as Fleas/ticks on Pets - Consumer, 1976 (Scenario 33)
(a) Kline reports do not cover this pest type because the users are typically pet grooming shops, kennels, or veterinarians. We believe that the products used are similar to those used by consumers.

<b>Scenario 82 - Fleas/ticks on Pets - Professional, 1980</b> <b>Method 6, Confidence medium</b>
Same as Fleas/ticks on Pets - Consumer, 1980 (Scenario 34)
(a) Kline reports do not cover this pest type because the users are typically pet grooming shops, kennels, or veterinarians. We believe that the products used are similar to those used by consumers.

<b>Scenario 83 - Fleas/ticks on Pets - Professional, 1990</b> <b>Method 6, Confidence medium</b>
Same as Fleas/ticks on Pets - Consumer, 1990 (Scenario 35)
(a) Kline reports do not cover this pest type because the users are typically pet grooming shops, kennels, or veterinarians. We believe that the products used are similar to those used by consumers.

<b>Scenario 84 - Fleas/ticks on Pets - Professional, 2000</b> <b>Method 6, Confidence medium</b>
Same as Fleas/ticks on Pets - Consumer, 2000 (Scenario 36)
(a) Kline reports do not cover this pest type because the users are typically pet grooming shops, kennels, or veterinarians. We believe that the products used are similar to those used by consumers.

**Scenario 85 - Fleas/ticks in the Home - Professional, 1976**

**Method 8, Confidence NA**

Kline does not maintain data on professional treatment of fleas/ticks in the home.

We developed a list of likely active ingredients for this scenario based on:

(1) active ingredients used by consumers to treat fleas/ticks on their pets, and

(2) active ingredients used by professionals for general insect control.

We arranged them in order of decreasing probabilities based on judgment.

Pyrethrins

Carbaryl

Chlorpyrifos

Malathion

Methoxychlor

Dichlorvos

Dichlorophene

Propoxur

Lindane

Resmethrin

**Scenario 86 - Fleas/ticks in the Home - Professional, 1980**

**Method 8, Confidence NA**

Kline does not maintain data on professional treatment of fleas/ticks in the home.

We developed a list of likely active ingredients for this scenario based on:

- (1) active ingredients used by consumers to treat fleas/ticks on their pets, and
- (2) active ingredients used by professionals for general insect control.

We arranged them in order of decreasing probabilities based on judgment.

Pyrethrins

Carbaryl

Chlorpyrifos

Malathion

Dichlorvos

Methoxychlor

Propoxur

Dichlorophene

**Scenario 87 - Fleas/ticks in the Home - Professional, 1990**

**Method 8, Confidence NA**

Kline does not maintain data on professional treatment of fleas/ticks in the home.

We developed a list of likely active ingredients for this scenario based on:

- (1) active ingredients used by consumers to treat fleas/ticks on their pets, and
- (2) active ingredients used by professionals for general insect control.

We arranged them in order of decreasing probabilities based on judgment.

Pyrethrins

Chlorpyrifos

Permethrin

Bendiocarb

Propetamphos

Carbaryl

Methoprene

Fenoxycarb

Malathion

**Scenario 88 - Fleas/ticks in the Home - Professional, 2000**  
**Method 4, Confidence medium**

Product (a)	Active Ingredient	Sales (\$ thousands) (a)	Active Ingredient (b)	Sales (\$ thousands) (c)	Probability (calculated) (d)
Archer IGR	Pyridine	355	Methoprene	3,371	26%
Catalyst	Propetamphos	2,528	Propetamphos	2,528	19%
Demand CS	lambda-cyhalothrin	393	Permethrin	1,296	10%
Demon	Cypermethrin	163	Chlorpyrifos	1,083	8%
Diazinon	Diazinon	166	Deltamethrin	794	6%
Dragnet SFR	Permethrin	475	Pyriproxifen	550	4%
Dursban 50W	Chlorpyrifos	425	Bendiocarb	486	4%
Dursban Pro	Chlorpyrifos	658	lambda-Cyhalothrin	393	3%
Ficam W	Bendiocarb	486	Diazinon	371	3%
Flee	Permethrin	660	Pyridine	355	3%
Lindane	Lindane	118	Tralomethrin	244	2%
Nylar IGR	Pyriproxifen	134	Cypermethrin	163	1%
Nylar	Linalool	118	Cyfluthrin	122	1%
Precor 2000	Methoprene	817	Lindane	118	1%
Precor IGR	Methoprene	2,189	Linalool	118	1%
Precor IGR	Methoprene	365	Other	1,094	8%
Prelude	Permethrin	161		13,086	
Saga	Tralomethrin	244			
Suspend	Deltamethrin	794			
Tempo	Cyfluthrin	122			
Ultracide Aerosol	Pyriproxifen	416			
Diazinon 4E	Diazinon	205			
All other	Other	1,094			
		13,086			

(a) Kline (Fugate et al., 2000)

(b) Eliminating duplicates.

(c) Combining active ingredient sales across all products in which it appears.

(d) Sales for each active ingredient divided by total sales.

**Scenario 89 - Termites - Professional, 1976**

**Method 4, Confidence medium**

Active Ingredient (a)	Total Sales for Termites, General Pests, and Dry Wood Pests (\$ Millions) (a)	Total Sales (\$ Millions) (c)		Probability (Termites) (calculated) (d)
		Termites	General Pests	
Chlordane	17.2	15.4	1.8	72%
Vikane (sulfuryl fluoride) (b)	6.5	4.9	1.6	23%
Heptachlor	0.8	0.8		4%
Methyl bromide (b)	0.5	0.4	0.1	2%
Chlorpyrifos	9.0		9.0	0%
Diazinon	8.2		8.2	0%
Other	5.8		5.8	0%
Total	48.0	21.5	26.5	

(a) Kline (Garushenko et al., 1977)

(b) Fumigants used for dry wood pests (termites and powder post beetles).

(c) According to Kline (Garushenko et al., 1977), the termite market (excluding the dry wood pest fumigants Vikane and methyl bromide) was valued at \$16.2 million. We allocated this to chlordane and heptachlor using judgment. The splits of active ingredients between termites and general pests were based on judgment.

(d) Sales of each active ingredient used for termites divided by total sales for termites (\$21.5 million).

**Scenario 90 - Termites - Professional, 1980**  
**Method 4, Confidence medium**

Product (a)	Sales (\$ million) (a, b)	Active Ingredient	Sales (\$ million) (c)	Active Ingredient (d)	Sales (\$ million) (calculated) (e)	Probability (calculated) (f)
Chlordane	19.2	Chlordane	19.2	Chlordane	27.5	71%
Dursban	4.1	Chlorpyrifos	4.1	Heptachlor	8.7	22%
Termide	8.3	Chlordane	8.3	Sulfuryl fluoride	6.7	17%
		Heptachlor	8.3	Chlorpyrifos	4.1	11%
Sulfuryl fluoride	6.7	Sulfuryl fluoride	6.7			
Heptachlor	0.4	Heptachlor	0.4			
	38.7					

(a) Kline (Goodbread et al., 1983)

(b) Kline (Goodbread et al., 1983) lists sales for "other" products as 4.1 million. We assumed that this was all chlorpyrifos.

(c) Assigning each product's sales to all of the active ingredients it contains.

(d) Eliminating duplicates.

(e) Combining active ingredient sales across all products in which it appears.

(f) Sales for each active ingredient divided by total sales (\$38.7 million).

<b>Scenario 91 - Termites - Professional, 1990</b>			
<b>Method 4, Confidence high</b>			
Product (a)	Sales (\$ million) (a)	Active Ingredient	Probability (calculated) (b)
Dursban	58.7	Chlorpyrifos	62%
Demon	11.4	Cypermethrin	12%
Pryfon	11.1	Isophenfos	12%
Dragnet, Torpedo	9.7	Permethrin	10%
Tribute	1.7	Fenvalerate	2%
Other	1.9	Other	2%
	94.5		

(a) Kline (Hodge and Rafter, 1992b)  
(b) Sales for each active ingredient divided by total sales.

**Scenario 92 - Termites - Professional, 2000**

**Method 4, Confidence high**

Product (a)	Active Ingredient	Sales (\$ thousands) (a)	Active Ingredient (b)	Sales (\$ thousands) (c)	Probability (calculated) (d)
Biflex	Bifenthrin	590	Hexaflumuron	70,974	27%
Bio-Blast	Metarhizium	562	Chlorpyrifos	63,573	25%
Chlorpyrifos	Chlorpyrifos	2,411	Bifenthrin	49,592	19%
Cyrene	Chlorpyrifos	3,313	Imidacloprid	38,043	15%
Demon	Cypermethrin	3,119	Cypermethrin	13,415	5%
Demon	Cypermethrin	2,744	Permethrin	9,924	4%
Demon	Cypermethrin	522	Sulfuramid	5,616	2%
Dragnet	Permethrin	5,214	Diflubenzuron	1,327	1%
Dursban	Chlorpyrifos	33,423	Fenvalerate	2,436	1%
Dursban	Chlorpyrifos	19,743	Other	3,200	1%
Equity	Chlorpyrifos	3,112		258,100	
Exterra	Diflubenzuron	1,327			
Firstline	Sulfuramid	3,263			
Firstline	Sulfuramid	2,353			
Navigator	Chlorpyrifos	1,571			
Prelude	Permethrin	4,710			
Premise	Imidacloprid	35,278			
Premise	Imidacloprid	1,870			
Premise	Imidacloprid	895			
Prevail	Cypermethrin	3,526			
Prevail	Cypermethrin	2,805			
Prevail	Cypermethrin	699			
Sentricon	Hexaflumuron	70,974			
Talstar	Bifenthrin	49,002			
Tim-Bor	Inorganic borate	664			
Tribute	Fenvalerate	2,436			
Other	Other	1,974			
		258,100			

(a) Kline (Fugate et al., 2000)

(b) Eliminating duplicates and active ingredients with <1% of sales.

(c) Combining active ingredient sales across all products in which it appears.

(d) Sales for each active ingredient divided by total sales.

<b>Scenario 93 - Rodents - Professional, 1976</b>			
<b>Method 4, Confidence high</b>			
Product (a)	Sales (\$ thousands) (a)	Active Ingredient	Probability (calculated) (b)
Warfarin	1,300	Warfarin	39%
Diphacinone	1,000	Diphacinone	30%
Fumarin	340	Coumafuryl	10%
Rozol	330	Chlorophacinone	10%
Pival	300	Pindone	9%
Other	30	Other	1%
	3,300		

(a) Kline (Garushenko et al., 1977)  
(b) Sales for each active ingredient divided by total sales.

<b>Scenario 94 - Rodents - Professional, 1980</b>			
<b>Method 4, Confidence high</b>			
Product (a)	Sales (\$ thousands) (a)	Active Ingredient	Probability (calculated) (b)
Talon	3,000	Brodifacoum	25%
Warfarin	2,400	Warfarin	20%
Diphacinone	2,200	Diphacinone	18%
Rozol	1,000	Chlorophacinone	8%
Quick-acting poisons	400	Quick-acting poisons	3%
Other	3,000	Other	25%
	12,000		

(a) Kline (Goodbread et al., 1983)  
(b) Sales for each active ingredient divided by total sales.

<b>Scenario 95 - Rodents - Professional, 1990</b>		
<b>Method 4, Confidence high</b>		
Active Ingredient (a)	Sales (\$millions) (a)	Probability (calculated) (b)
Drodifacoum	4.9	36%
Bromadiolone	3.4	25%
Bromethalin	1.2	9%
Diphacinone	1.2	9%
Cholecalciferol	0.7	5%
Chlorophacinone	0.7	5%
Other	1.5	11%
	13.6	

(a) Kline (Hodge and Rafter, 1992b)  
(b) Sales for each active ingredient divided by total sales.

<b>Scenario 96 - Rodents - Professional, 2000</b>					
<b>Method 4, Confidence high</b>					
Product (a)	Active Ingredient	Sales (\$ million) (a)	Active Ingredient (b)	Sales (\$ million) (c)	Probability (calculated) (d)
Contrac All-Weather Blox	Bromadiolone	2,832	Bromadiolone	5,309	46%
Contrac all-Weather Cake	Bromadiolone	566	Brodifacoum	4,347	38%
Contrac Meal Bait	Bromadiolone	376	Diphacinone	693	6%
Contrac pellets	Bromadiolone	600	Difethialone	608	5%
Ditrac All Weather Block	Diphacinone	479	Other	478	4%
Ditrac Tracking Powder	Diphacinone	53		11,435	
Final Bait Blocks	Brodifacoum	199			
Final Rodenticide pellets	Brodifacoum	147			
Generation 20 gm blox	Difethialone	457			
Generation Pellets	Difethialone	151			
JT Eaton Bait Block	Diphacinone	100			
JT Eaton Bait Block	Diphacinone	61			
Maki miniblock	Bromadiolone	764			
Maki Parafin Blocks	Bromadiolone	71			
Maki Rat & Mouse Bait Pack	Bromadiolone	100			
Talon G	Brodifacoum	1,156			
Talon G Place Packs	Brodifacoum	360			
Weather Blok XT	Brodifacoum	2,485			
Other	Other	478			
		11,435			

(a) Kline (Fugate et al., 2000)  
(b) Eliminating duplicates.  
(c) Combining active ingredient sales across all products in which it appears.  
(d) Sales for each active ingredient divided by total sales.