International Agricultural Trade and Policy Center

THE IMPACT OF THE PHASE OUT OF METHYLBROMIDE ON THE U.S. VEGETABLE INDUSTRY

By

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Abstract: Methyl bromide is a critical soil fumigant used in the production of several fresh fruit and vegetables grown in the U.S. The U.S. Clean Air Act of 1992, as amended in 1998, requires that methyl bromide be phased out of use by 2005. A mathematical programming model of the North American vegetable market indicates that the elimination of methyl bromide will have significant impacts on U.S. growers of fruit and vegetables that rely on methyl bromide for soil fumigation purposes. The schedule for eliminating methyl bromide has resulted in a 50% decline in methyl bromide availability and has resulted in significant increases in the price of methyl bromide. The vegetable industry has not felt the impact that the reduction in methyl bromide may have, however, as increases in price have partially offset the decline in overall availability. Increases in price have reduced the use of methyl bromide for lower valued uses, and new application technologies have reduced the required application rate of methyl bromide for effective control of pests and diseases. Larger impacts on the fruit and vegetable industry are expected as the 20% reduction in 2003 and the total elimination in 2005 are imposed.

Keywords: methyl bromide, Montreal Protocol, U.S. Clean Air Act, North American Vegetable Market, strawberries, tomatoes, bell peppers, eggplant, cucumbers, squash, watermelons.

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Methyl bromide is a critical soil fumigant used in the production of several fresh fruit and vegetables grown in the U.S. Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (the international agreement that monitors ozone depleting substances and provides international regulations on their production and use, also known as the Montreal Protocol) declared at their November, 1992 meeting that methyl bromide had an ozone depletion potential (OPD) of 0.7, well above the 0.2 ODP required to be declared as a Class I ozone depleting substance. The U.S. Clean Air Act of 1992, as amended in 1998, requires that methyl bromide be phased out of use on a schedule that is synchronous with the schedule for developed countries that are party to the Montreal Protocol. That schedule called for a:

-25% reduction in methyl bromide use in 1999 from 1991 base levels;

-a second 25% reduction in use in 2000;

-a 20% reduction in 2003 and;

-complete phase out scheduled for January 1, 2005.

Research by VanSickle et al. (2000) indicated that the complete phase out of methyl bromide would have a $218 million impact on growers in Florida and a $218 million impact on California growers. These losses are partially offset in the marketplace as Mexico is expected to increase their revenues by $134.

Historical Perspective

Methyl bromide has been a critical soil fumigant in the production of many agricultural commodities for many years. Soil treatment accounted for 76% of the methyl bromide use globally in 1992 with post harvest treatments accounting for roughly 22% (TEAP, 1997). Strawberries and tomatoes have been the two most critical crops for soil fumigation purposes, accounting for 35% of the soil fumigation use. While significant progress has been made in developing alternatives to methyl bromide, no alternative has been identified which permits a seamless transition where comparative advantage is minimally impacted by the elimination of methyl bromide and the effected producers can continue to compete with other producers of those crops.

The phase out of methyl bromide has resulted in a 50% reduction in use with the first two 25% reductions already occurring. The VanSickle model was used to estimate the impact this phase out was expected to have and then used to predict the impacts that the 20% reduction in 2003 would have on the industry and the complete phase out in 2005.

The VanSickle et al. model is a spatial equilibrium model that accounts for production of those fruit and vegetable crops that depend on methyl bromide as a pre-plant soil fumigant and those crops that are competitive with crops that use methyl bromide. Crops that were identified as being potentially impacted by the phase out of methyl bromide included tomatoes, bell peppers, cucumbers, squash, eggplant, watermelons and strawberries. Producing areas included in the model for these crops included Florida, California, Mexico, Texas, South Carolina, Virginia, Maryland, Alabama and Tennessee. Florida was separated into four producing areas: Dade County,

Palm Beach County, Southwest Florida (near Immokalee) and West Central Florida (the Palmetto-Ruskin area). Mexico was included with two separate producing areas: the states of Sinaloa and Baja California. California was separated into two producing areas for strawberries: Southern California (Orange, Ventura, San Diego and Loa Angeles Counties) and Northern California (the balance of the California crop).

The model is summarized in VanSickle et al. (2000). The model estimated baseline acreage and production for each of the crops in each of the areas. The model was baselined in 1993/94 since that season was judged to be characteristic of a more normal season without weather events or international trading practices that would have distorted the results. The baseline solution for the model performed reasonably well in replicating the observed pattern of shipments and acres planted for the 1993/94 season. The baseline solutions for acreage, production, revenues and prices are contained in tables 1 though 4.

The model was used to estimate the impacts that the phase out of methyl bromide has had and will have on the North American market. Alternative production practices where methyl bromide is not used were modeled for costs and productivity and then included in the North American model along with those production practices used in 1993/94. The model was solved to determine the optimum allocation of production of the crops in each area given the resulting comparative advantages of producers in each of the regions for each of the crops. The results specified the amount of methyl bromide used in acre units of production for the crops. The phase out was then replicated by restricting the number of acre units using methyl bromide to 75% of the baseline (1999 reduction), 50% of the baseline (2001 reduction) and then 30% of the baseline (scheduled 2003

reduction). The total banning of methyl bromide would be the same as that reported by VanSickle et al.

The results for the acres planted, production and revenues for each producing area under each of these assumptions are contained in tables 1 through 3. The tables split acres, production and revenues between that produced using methyl bromide and that produced without the use of methyl bromide (i.e., using an alternative production practice).

The results of the model do fairly well in replicating the evolution of the industry after the first two reductions in methyl bromide use. For Florida, the model predicts a significant decline in acreage planted to tomatoes in Dade County and in Southeast Florida. This has in fact occurred with Dade County declining in acreage planted to tomatoes from 5,030 acres in the 1993/94 season to 3,658 acres in the 2000/01 season. Palm Beach County has declined from 5,875 acres in 1993/94 to 4,255 acres in 2000/01. The model also correctly predicted the significant increase in acres planted to tomatoes in Southwest Florida. Tomatoes were a significant crop in 1993/94 in Southwest Florida with 21,600 acres planted to tomatoes, but the acreage declined significantly in the 1996/97 and 1997/98 seasons, primarily as a result of the low prices during the period when Mexico was selling fresh market tomatoes at prices below fair market value. The suspension agreement signed with Mexico in December, 1996 helped to offset some of those losses and acreage continued to increase through the 1999/2000 season when acreage was 18,700 aces planted compared to only 14,600 acres in 1997/98.

The model also performs well in predicting the significant declines in acreage that occurred in Florida in the bell peppers and cucumbers and in predicting modest increases in the acreage planted to strawberries. Overall, the model does follow the trends in production from the baseline and the expected impacts of the reduction in methyl bromide use in 1999 and again in 2001. The impacts are not as severe as expected, but those impacts were not expected to be as severe as the model predicts because of how the methyl bromide phase out has been implemented. The phase out of methyl bromide use has been implemented by restricting the volume of methyl bromide that can be produced and sold. Soil fumigation use of methyl bromide amounted to 76% of the total use of methyl bromide in 1992, with post harvest use accounting for about 22% and other uses accounting for the remaining use. In addition, soil fumigation use of methyl bromide amounted to only 75% of the global use of methyl bromide in 1992 (TEAP, 1997) and the crops included in the VanSickle model accounted for less than 42% of the methyl bromide used for soil fumigation. The high value nature of the crops included in the VanSickle model and the economic impact a total ban is expected to have on those producers therefore suggests that much of the expected impact has been delayed as significant use of methyl bromide for soil fumigation has been shifted from crops with lower expected benefits to the crops in the VanSickle model that require methyl bromide for maintaining comparative advantage. The price of methyl bromide has increased significantly since 1991, increasing from an average price of $0.95 per pound for a mix of 98:2 (98% methyl bromide, 2% Chloropicrin) to an average price of $2.65 per pound in 2002 for a 67:33 mix. This increase has allocated the use of methyl bromide to the higher value uses, of which pre-plant soil fumigation for fruit and vegetable production is

expected to be the higher value uses for methyl bromide. The reduction in availability has also led fruit and vegetable producers to use new technologies (Raven Systems vs. the older calibration systems) that allow the growers to use less methyl bromide to insure same effective control of the pests and diseases. For these reasons, the reduction in methyl bromide production of 50% has not had its greatest impact on the crops included in the VanSickle model. Therefore, the 2003 phase out of an additional 20% of the methyl bromide use will be expected to have more significant impacts than the first 50% and the complete banning of methyl bromide will have its largest impact in 2005 if it is completed phased out of use.

Conclusions

The continued phase out of methyl bromide is expected to continue the trends identified in the first two scheduled reductions, but be much more severe. The model predicts a continued decline in tomato production in Dade County, Florida and in the tomato, bell pepper and cucumber production in Southeast Florida. Southwest Florida is expected to increase production of these crops to offset some of these losses, but the larger increases will come in Mexican production of these crops.

The expected impact on the U.S. market through the 2005 elimination will be most felt in the strawberry market. Overall, there is an expected decline in strawberry production of 22% and a decline in revenues to strawberry producers of $138. California strawberry producers are expected to suffer the largest individual decline with an expected $161 million decline in revenues. Tomato producers in Florida will be hard hit with an expected decline in revenues of $146 million in the Dade County, Palm Beach County and West Central Producing areas. The Southwest area is expected to increase

production, however, by $83 million to offset part of this decline, resulting in a net decline of $63 million in Florida. Bell pepper producers will suffer the largest decline in Florida, a $115 million loss in revenues.

The model tracks the changes in the North American vegetable industry very well and indicates that there is still work that needs to be done in identifying better alternatives to methyl bromide. The model tracks the industry trends through the 2001 reduction in methyl bromide use, but the larger expected impacts are expected to occur in 2003 and again in 2005. The best information available today indicates that more research needs to be done to find alternatives that will reduce the impact on producers who rely on methyl bromide in the production of fresh fruit and vegetables.

References

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Table1. Planted acreage in the baseline model with a ban on methyl bromide

Crop/ Area	Baseline Acreage			75%			50%			30%			No Methyl Bromide
	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	
Tomatoes													
Florida	40,167		40,167	37,327	5,352	42,679	24,885	18,840	43,725	14,931	29,617	44,548	45,536
Dade	5,148		5,148	3,861		3,861	2,574		2,574	1,545		1,545	
Palm Beach	7,977		7,977	5,983		5,983	3,989		3,989	2,393		2,393	
West Central	17,209		17,209	12,907	559	13,466	8,605	4,824	13,428	5,163	8,231	13,394	13,332
Southwest	9,832		9,832	14,576	4,793	19,369	9,717	14,017	23,734	5,830	21,386	27,217	32,204
California		34,994	34,994		34,704	34,704		34,687	34,687		34,677	34,677	34,660
Alabama/Tennessee		1,809	1,809		1,269	1,269		1,167	1,167		1,114	1,114	1,037
South Carolina		6,141	6,141		6,273	6,273		6,531	6,531		6,736	6,736	7,043
Virginia/Maryland		4,694	4,694		4,875	4,875		4,783	4,783		4,705	4,705	4,588
Mexico		45,350	45,350		49,944	49,944		50,440	50,440		50,848	50,848	51,502
Sinaloa		40,856	40,856		45,466	45,466		45,972	45,972		46,399	46,399	47,084
Baja		4,495	4,495		4,479	4,479		4,468	4,468		4,449	4,449	4,418
Total	40,167	92,987	133,154	37,327	102,417	139,744	24,885	116,449	141,333	14,931	127,697	142,627	144,367
Peppers													
Florida	23,759		23,759	17,819		17,819	11,879	1,068	12,948	7,128	2,606	9,734	6,316
Palm Beach	14,310		14,310	10,732		10,732	7,155		7,155	4,293		4,293	1,271
West Central	9,449		9,449	7,087		7,087	4,724	1,068	5,793	2,835	2,606	5,441	5,045
Texas		5,156	5,156		7,112	7,112		9,002	9,002		10,578	10,578	12,651
Mexico													
Sinaloa		13,339	13,339		15,949	15,949		19,474	19,474		22,543	22,543	25,719
Total	23,759	18,495	42,254	17,819	23,060	40,879	11,879	29,544	41,423	7,128	35,728	42,855	44,686
Cucumbers													
Florida	15,500		15,500	13,514	246	13,760	11,585	1,968	13,553	10,043	3,343	13,385	12,355
Palm Beach	7,277		7,277	5,458		5,458	3,639		3,639	2,183		2,183	
West Central	7,839		7,839	7,768		7,768	7,755		7,755	7,744		7,744	7,723
Southwest	383		383	288	246	534	192	1,968	2,159	115	3,343	3,458	4,632
Mexico													
Sinaloa		10,249	10,249		10,439	10,439		10,474	10,474		10,503	10,503	10,561
Total	15,500	10,249	25,748	13,514	10,685	24,199	11,585	12,442	24,027	10,043	13,846	23,888	22,916

Table1. Planted acreage in the baseline model with a ban on methyl bromide

Crop/ Area	Baseline Acreage			75%			50%			30%			No Methyl Bromide
	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	
Squash													
Florida	12,316		12,316	10,243	2,095	12,338	7,985	4,458	12,442	6,180	6,342	12,522	12,807
Dade	2,867		2,867	3,157		3,157	3,261		3,261	3,345		3,345	3,417
Southwest	9,448		9,448	7,086	2,095	9,181	4,724	4,458	9,182	2,835	6,342	9,177	9,390
Mexico													
Sinaloa		11,063	11,063		11,052	11,052		11,085	11,085		11,113	11,113	11,136
Total	12,316	11,063	23,378	10,243	13,146	21,295	7,985	15,543	21,296	6,180	17,455	21,297	23,943
Eggplant													
Florida													
Palm Beach	3,590		3,590	2,693		2,693	1,795		1,795	1,077		1,077	940
Mexico													
Sinaloa		2,606	2,606		3,246	3,246		4,164	4,164		4,522	4,522	4,727
Total	3,590	2,606	6,196	2,693	3,246	5,939	1,795	4,164	5,959	1,077	4,522	5,599	5,667
Watermelon													
Florida	18,854		18,854	14,141	2,452	16,593	9,427	7,591	17,019	5,656	11,701	17,358	18,181
West Central	9,251		9,251	6,939		6,939	4,626		4,626	2,775		2,775	
Southwest	9,603		9,603	7,202	2,452	9,654	4,801	7,591	12,393	2,881	11,701	14,582	18,181
Total	18,854		18,854	14,141	2,452	16,593	9,427	7,591	17,019	5,656	11,701	17,358	18,181
Strawberries													
Florida													
West Central	6,177		6,177	4,633	2,521	7,154	3,088	4,877	7,966	1,853	6,258	8,111	8,302
California	20,005		20,005	15,004		15,004	10,002	2,460	12,462	6,001	5,744	11,746	10,717
Northern	8,949		8,949	6,712		6,712	4,475		4,475	2,685		2,685	
Southern	11,056		11,056	8,292		8,292	5,528	2,460	7,988	3,317	5,744	9,061	10,717
Total	26,182		26,182	19,636	2,521	22,158	13,091	7,337	20,428	7,855	12,002	19,857	19,019

Table 2a. Production of crops in the baseline model and in the methyl bromide ban model

	Baseline Production			75%			50%			30%		
Crop	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total
Tomatoes	63,248	101,712	164,960	47,436	112,603	160,039	31,624	128,858	160,482	18,974	141,868	160,842
Peppers	23,286	13,232	36,518	17,465	16,388	33,853	11,643	21,064	32,707	6,986	25,584	32,570
Cukes	3,064	8,772	11,837	2,298	8,932	11,231	1,532	9,532	11,064	919	10,011	10,930
Squash	2,598	3,222	5,821	1,949	3,789	5,738	1,299	4,377	5,677	779	4,847	5,627
Eggplant	5,385	3,205	8,591	4,039	3,992	8,031	2,693	5,122	7,814	1,616	5,562	7,178
Watermelon	5,848	0	5,848	4,386	667	5,053	2,924	2,065	4,989	1,754	3,183	4,937
Strawberries	67,662	0	67,662	50,746	4,501	55,247	49,176	15,346	64,522	20,298	26,676	46,974

Table2b. Baseline production and %age changes in production of crops

	Baseline Production			75%			50%			30%		
Crop	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total
Tomatoes	101,041	63,919	164,960	-9.59%	6.60%	-2.98%	-19.17%	16.46%	-2.71%	-26.84%	24.34%	-2.50%
Peppers	23,286	13,232	36,518	-15.94%	8.64%	-7.30%	-31.88%	21.45%	-10.44%	-44.64%	33.83%	-10.81%
Cukes	3,064	8,772	11,837	-6.47%	1.35%	-5.12%	-12.94%	6.42%	-6.53%	-18.12%	10.46%	-7.66%
Squash	2,598	3,222	5,821	-11.16%	9.74%	-1.42%	-22.32%	19.85%	-2.47%	-31.25%	27.92%	-3.33%
Eggplant	5,385	3,205	8,591	-15.67%	9.16%	-6.51%	-31.35%	22.31%	-9.03%	-43.88%	27.44%	-16.44%
Watermelon	5,848	0	5,848	-25.00%	11.41%	-13.59%	-50.00%	35.31%	-14.69%	-70.00%	54.42%	-15.58%
Strawberries	67,662	0	67,662	-25.00%	6.65%	-18.35%	-27.32%	22.68%	-4.64%	-70.00%	39.42%	-30.58%

Table 2c. Production of crop/area in the baseline model and in the methyl bromide ban model

Crop/ Area	Baseline Production			75%			50%			30%		
	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total
Tomatoes												
Florida	63,248		63,248	47,436	6,237	53,673	31,624	21,826	53,450	18,974	34,282	53,256
Dade	6,693		6,693	5,020		5,020	3,346		3,346	2,008		2,008
Palm Beach	10,370		10,370	7,778		7,778	5,185		5,185	3,111		3,111
West Central	20,920		20,920	15,690	629	16,319	10,460	5,426	15,886	6,276	9,260	15,536
Southwest	25,265		25,265	18,949	5,608	24,556	12,632	16,400	29,032	7,579	25,022	32,601
California		37,793	37,793		37,480	37,480		37,462	37,462		37,451	37,451
Alabama/Tennessee		1,140	1,140		799	799		736	736		702	702
South Carolina		6,510	6,510		6,649	6,649		6,923	6,923		7,140	7,140
Virginia/Maryland		3,239	3,239		3,364	3,364		3,301	3,301		3,246	3,246
Mexico		53,031	53,031		58,074	58,074		58,612	58,612		59,047	59,047
Sinaloa		44,941	44,941		50,012	50,012		50,570	50,570		51,039	51,039
Baja		8,090	8,090		8,062	8,062		8,042	8,042		8,008	8,008
Total	63,248	101,712	164,960	47,436	112,603	160,039	31,624	128,858	160,482	18,974	141,868	160,842
Peppers												
Florida	23,286		23,286	17,465		17,465	11,643		11,643	6,986		6,986
Palm Beach	14,310		14,310	10,732		10,732	7,155		7,155	4,293		4,293
West Central	8,976		8,976	6,732		6,732	4,488	863	5,351	2,693	2,105	4,798
Texas		3,094	3,094		4,267	4,267		5,401	5,401		6,347	6,347
Mexico												
Sinaloa		10,138	10,138		12,121	12,121		14,800	14,800		17,133	17,133
Total	23,286	13,232	36,518	17,465	16,388	33,853	11,643	21,064	32,707	6,986	25,584	32,570
Cucumbers												
Florida	3,064	3,136	6,200	2,298	3,191	5,489	1,532	3,771	5,303	919	4,234	5,154
Palm Beach	2,911		2,911	2,183		2,183	1,455		1,455	873		873
West Central		3,136	3,136		3,107	3,107		3,102	3,102		3,098	3,098
Southwest	153		153	115	84	199	77	669	746	46	1,136	1,183
Mexico												
Sinaloa		5,637	5,637		5,742	5,742		5,761	5,761		5,777	5,777
Total	3,064	8,772	11,837	2,298	8,932	11,231	1,532	9,532	11,064	919	10,011	10,930

Table 2c. Production of crop/area in the baseline model and in the methyl bromide ban model

Crop/ Area	Baseline Production			75%			50%			30%		
	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total	With MB	W/O MB	Total
Squash												
Florida	2,598	788	3,387	1,949	1,358	3,306	1,299	1,939	3,238	779	2,402	3,182
Dade		788	788		868			897	897		920	920
Southwest	2,598		2,598	1,949	490	2,438	1,299	1,042	2,341	779	1,483	2,262
Mexico												
Sinaloa		2,434	2,434		2,431	2,431		2,439	2,439		2,445	2,445
Total	2,598	3,222	5,821	1,949	3,789	5,738	1,299	4,377	5,677	779	4,847	5,627
Eggplant												
Florida												
Palm Beach	5,385		5,385	4,039		4,039	2,693		2,693	1,616		1,616
Mexico												
Sinaloa		3,205	3,205		3,992	3,992		5,122	5,122		5,562	5,562
Total	5,385	3,205	8,591	4,039	3,992	8,031	2,693	5,122	7,814	1,616	5,562	7,178
Watermelon												
Florida	5,848		5,848	4,386	667	5,053	2,924	2,065	4,989	1,754	3,183	4,937
West Central	2,775		2,775	2,082		2,082	1,388		1,388	833		833
Southwest	3,073		3,073	2,305	667	2,972	1,536	2,065	3,601	922	3,183	4,105
Total	5,848		5,848	4,386	667	5,053	2,924	2,065	4,989	1,754	3,183	4,937
Strawberries												
Florida												
West Central	12,972		12,972	9,729	4,501	14,229	15,192	8,706	23,898	3,891	11,171	15,062
California	54,690		54,690	41,018		41,018	33,984	6,639	40,624	16,407	15,505	31,912
Northern	17,388		17,388	13,041		13,041	8,694		8,694	5,216		5,216
Southern	37,302		37,302	27,976		27,976	25,290	6,639	31,930	11,191	15,505	26,695
Total	67,662		67,662	50,746	4,501	55,247	49,176	15,346	64,522	20,298	26,676	46,974

Table3a. Revenues in the baseline model and in the methyl bromide ban model

Crop/ Area	Baseline Revenues	Methyl Bromide Acreage 75%	50%	30%
Tomatoes				
Florida	561,433,660	503,277,410	500,482,320	498,039,670
Dade	60,554,770	46,871,910	31,240,020	18,738,850
Palm Beach	94,846,790	74,745,300	49,715,800	29,774,220
West Central	184,527,800	151,963,300	148,042,700	144,889,800
Southwest	221,504,300	229,696,900	271,483,800	304,636,800
California	276,830,700	274,536,300	274,404,100	274,325,200
Alabama/Tennessee	10,712,340	7,514,738	6,913,479	6,596,034
South Carolina	64,234,140	65,612,730	68,308,810	70,457,060
Virginia/Maryland	32,036,000	33,274,020	32,649,170	32,114,650
Mexico	412,231,930	451,756,240	455,979,620	459,401,620
Sinaloa	352,150,200	391,886,300	396,253,700	399,928,800
Baja	60,081,730	59,869,940	59,725,920	59,472,820
Total	1,357,478,770	1,335,971,438	1,338,737,499	1,340,934,234
Peppers				
Florida	204,520,480	161,927,240	119,882,710	89,390,940
Palm Beach	125,712,900	100,020,100	68,457,530	41,718,910
West Central	78,807,580	61,907,140	51,425,180	47,672,030
Texas	23,594,760	32,542,950	41,192,080	48,405,600
Mexico				
Sinaloa	84,960,010	101,580,200	124,033,200	143,582,600
Total	313,075,250	296,050,390	285,107,990	281,379,140
Cucumbers				
Florida	65,764,932	61,129,923	59,845,946	58,736,893
Palm Beach	23,047,360	18,338,090	12,430,330	7,556,993
West Central	41,486,200	41,111,890	41,042,800	40,986,760
Southwest	1,231,372	1,679,943	6,372,816	10,193,140
Mexico				
Sinaloa	51,131,240	52,081,350	52,256,740	52,398,980
Total	116,896,172	113,211,273	112,102,686	111,135,873

Table3a. Revenues in the baseline model and in the methyl bromide ban model

Crop/ Area	Baseline Revenues	Methyl Bromide Acreage		
		75%	50%	30%
Squash				
Florida	36,060,293	36,104,610	35,857,660	35,632,230
Dade	9,919,373	10,921,210	11,280,210	11,572,510
Southwest	26,140,920	25,183,400	24,577,450	24,059,720
Mexico				
Sinaloa	29,791,520	29,761,840	29,852,560	29,926,450
Total	65,851,813	65,866,450	65,710,220	65,558,680
Eggplant				
Florida				
Palm Beach	41,784,010	32,285,880	21,867,800	13,743,660
Mexico				
Sinaloa	24,431,470	30,432,680	39,041,830	42,399,270
Total	66,215,480	62,718,560	60,909,630	56,142,930
Watermelon				
Florida	63,323,470	59,932,870	59,737,290	59,569,060
West Central	30,051,530	24,688,080	16,616,260	10,045,920
Southwest	33,271,940	35,244,790	43,121,030	49,523,140
Strawberries				
Florida				
West Central	94,564,970	112,577,800	120,193,300	119,166,400
California	475,844,900	386,242,100	327,136,590	300,973,570
Northern	182,648,800	144,385,400	99,535,390	60,726,470
Southern	293,196,100	241,856,700	227,601,200	240,247,100
Total	570,409,870	498,819,900	447,329,890	420,139,970

Table3b. Revenues in the baseline model and changes in revenues from the methyl bromide ban model

Crop/ Area	Baseline Revenues	Methyl Bromide Acreage		
		75%	50%	30%
Tomatoes				
Florida	561,433,660	(58,156,250)	(60,951,340)	(63,393,990)
Dade	60,554,770	(13,682,860)	(29,314,750)	(41,815,920)
Palm Beach	94,846,790	(20,101,490)	(45,130,990)	(65,072,570)
West Central	184,527,800	(32,564,500)	(36,485,100)	(39,638,000)
Southwest	221,504,300	8,192,600	49,979,500	83,132,500
California	276,830,700	(2,294,400)	(2,426,600)	(2,505,500)
Alabama/Tennessee	10,712,340	(3,197,602)	(3,798,861)	(4,116,306)
South Carolina	64,234,140	1,378,590	4,074,670	6,222,920
Virginia/Maryland	32,036,000	1,238,020	613,170	78,650
Mexico	412,231,930	39,524,310	43,747,690	47,169,690
Sinaloa	352,150,200	39,736,100	44,103,500	47,778,600
Baja	60,081,730	(211,790)	(355,810)	(608,910)
Total	1,357,478,770	(21,507,332)	(18,741,271)	(16,544,536)
Peppers				
Florida	204,520,480	(42,593,240)	(84,637,770)	(115,129,540)
Palm Beach	125,712,900	(25,692,800)	(57,255,370)	(83,993,990)
West Central	78,807,580	(16,900,440)	(27,382,400)	(31,135,550)
Texas	23,594,760	8,948,190	17,597,320	24,810,840
Mexico				
Sinaloa	84,960,010	16,620,190	39,073,190	58,622,590
Total	313,075,250	(17,024,860)	(27,967,260)	(31,696,110)
Cucumbers				
Florida	65,764,932	(4,635,009)	(5,918,986)	(7,028,038)
Palm Beach	23,047,360	(4,709,270)	(10,617,030)	(15,490,367)
West Central	41,486,200	(374,310)	(443,400)	(499,440)
Southwest	1,231,372	448,571	5,141,444	8,961,768
Mexico				
Sinaloa	51,131,240	950,110	1,125,500	1,267,740
Total	116,896,172	(3,684,899)	(4,793,486)	(5,760,298)

Table3b. Revenues in the baseline model and changes in revenues from the methyl bromide ban model

Crop/ Area	Baseline Revenues	Methyl Bromide Acreage		
		75%	50%	30%
Squash				
Florida	36,060,293	44,317	(202,633)	(428,063)
Dade	9,919,373	1,001,837	1,360,837	1,653,137
Southwest	26,140,920	(957,520)	(1,563,470)	(2,081,200)
Mexico				
Sinaloa	29,791,520	(29,680)	61,040	134,930
Total	65,851,813	14,637	(141,593)	(293,133)
Eggplant				
Florida				
Palm Beach	41,784,010	(9,498,130)	(19,916,210)	(28,040,350)
Mexico				
Sinaloa	24,431,470	6,001,210	14,610,360	17,967,800
Total	66,215,480	(3,496,920)	(5,305,850)	(10,072,550)
Watermelon				
Florida	63,323,470	(3,390,600)	(3,586,180)	(3,754,410)
West Central	30,051,530	(5,363,450)	(13,435,270)	(20,005,610)
Southwest	33,271,940	1,972,850	9,849,090	16,251,200
Strawberries				
Florida				
West Central	94,564,970	18,012,830	25,628,330	24,601,430
California	475,844,900	(38,263,400)	(148,708,310)	(174,871,330)
Northern	182,648,800	(51,339,400)	(83,113,410)	(121,922,330)
Southern	293,196,100	(71,589,970)	(65,594,900)	(52,949,000)
Total	570,409,870	(71,589,970)	(123,079,980)	(150,269,900)

Note Parentheses contain negative numbers

Table4a. Average wholesale prices in the baseline and the methyl bromide ban model

Crop	Baseline Price	Methyl Bromide Acreage		
		75%	50%	30%
Tomatoes	9.10	9.20	9.19	9.18
Peppers	9.60	9.87	9.97	10.00
Cukes	10.98	11.08	11.11	11.14
Squash	13.84	13.89	13.92	13.94
Eggplant	8.29	8.42	8.48	8.61
Watermelon	14.49	15.40	15.48	15.55
Strawberries	9.98	10.79	10.85	10.85

Table 4b. Baseline average wholesale prices and %age changes

Crop	Baseline Price	Methyl Bromide Acreage		
		75%	50%	30%
Tomatoes	9.10	1.12%	1.04%	0.97%
Peppers	9.60	2.81%	3.84%	4.08%
Cukes	10.98	0.99%	1.25%	1.47%
Squash	13.84	0.32%	0.54%	0.72%
Eggplant	8.29	1.52%	2.22%	3.88%
Watermelon	14.49	6.26%	6.85%	7.33%
Strawberries	9.98	8.10%	8.71%	8.71%