FUMIGANT USE IN CALIFORNIA

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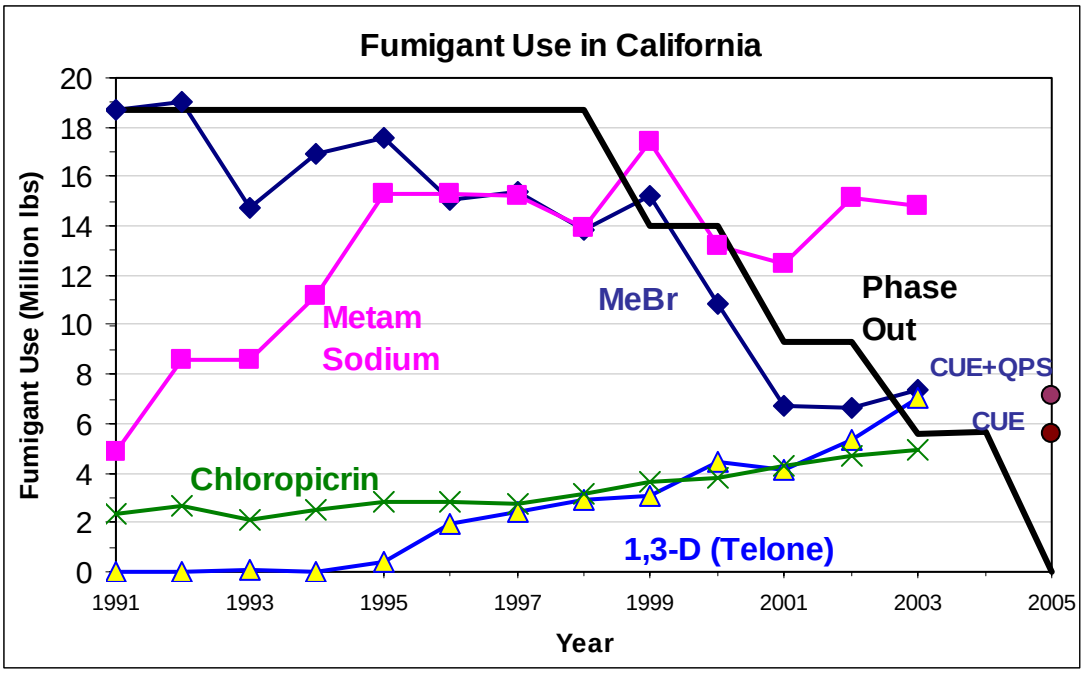
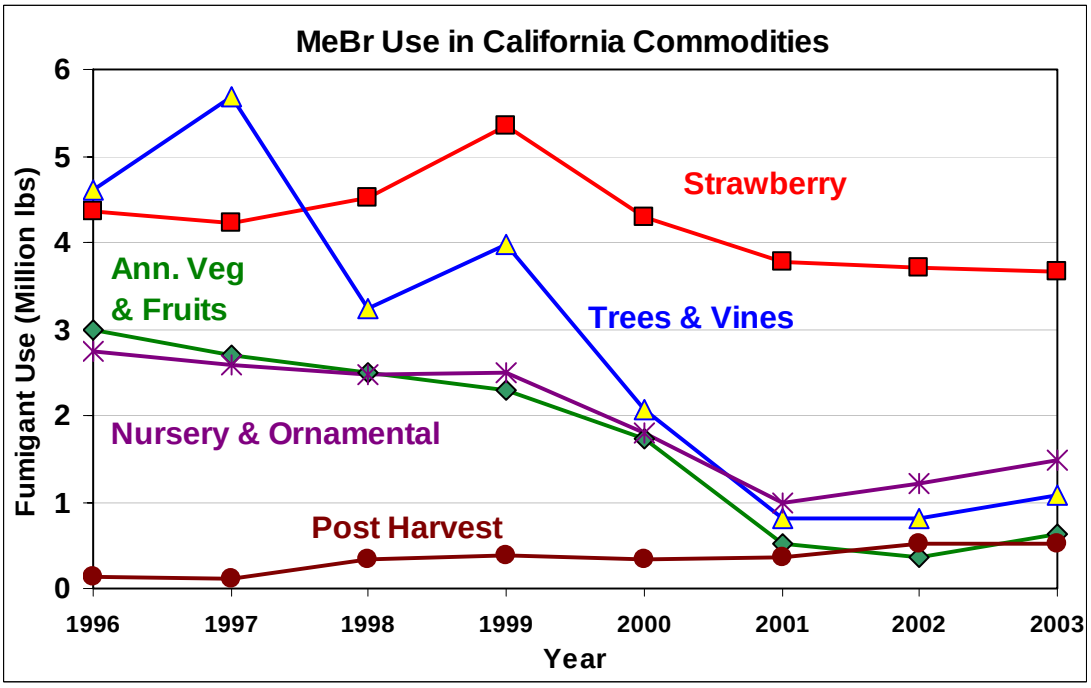
The Pesticide Use Reporting (PUR) requirements in California allow accurate estimation of the use of fumigants in the state. The PUR database compiled by CA Dept of Pesticide Regulation (CDPR) was used to generate the information in this paper. The figure below shows the use trends since 1991 for the 4 primary soil fumigants, methyl bromide (MeBr), 1,3-dichloropropene (1,3-D) (Telone® products), metam sodium, and chloropicrin, along with the MeBr phase out allowances based on reductions from 1991 use in California. Data for 2004 are not yet available.

Use of MeBr declined gradually since 1991. By 1999, the use was about 75% of the 1991 use, as required by the Montreal Protocol. In 2000 and 2001, the use of MeBr dropped dramatically - the result of a price increase to over $3.00 per lb (compared to about $1.00 before 1997) and restrictive California regulations - and remained below phaseout levels. MeBr use in 2003 exceeded the phaseout limit through use of material carryover from prior years. The MeBr reduction has been achieved primarily through full or partial substitution of alternative fumigants, and reduced fumigated acreage of some crops. On Jan 1, 2005, manufacture and importation of MeBr ceased for non-exempted uses. Manufacture and use above these phaseout levels is allowed for Quarantine and Preshipment (QPS) and, beginning in 2005, for Critical Uses (CUE). Certified nursery production is currently considered a Quarantine exemption by US EPA. The 2005 CUE allowance and estimated QPS use for California crops is shown on the figure. Allowed use in 2005 will be near 2001 – 2003 use levels, but will be restricted by commodity and use criteria.





Most MeBr use in California is for preplant soil fumigation; about 7% is for post-harvest commodity fumigation and less than 1% of use is for structural fumigation. In the mid-nineties, strawberries and perennial crops both used about 30% of the CA consumption, with the other 40% used for fruits and vegetables and nursery crops. As the phase out has progressed and the price increased, strawberry use has continued while use for other fruits and vegetables, orchards and vineyards has declined

dramatically. In 2003, over half of California MeBr use was for strawberries.

Use of metam sodium increased rapidly from 1991 through 1995 and its total use for soil fumigation was similar to that of MeBr until 2001 when MeBr use decreased. Metam sodium is the most widely used fumigant and it is applied to about twice as many acres as other fumigants combined. As a low cost fumigant alternative, it is used mainly on annual vegetable and fruit crops such as carrots, processing tomato and potato.

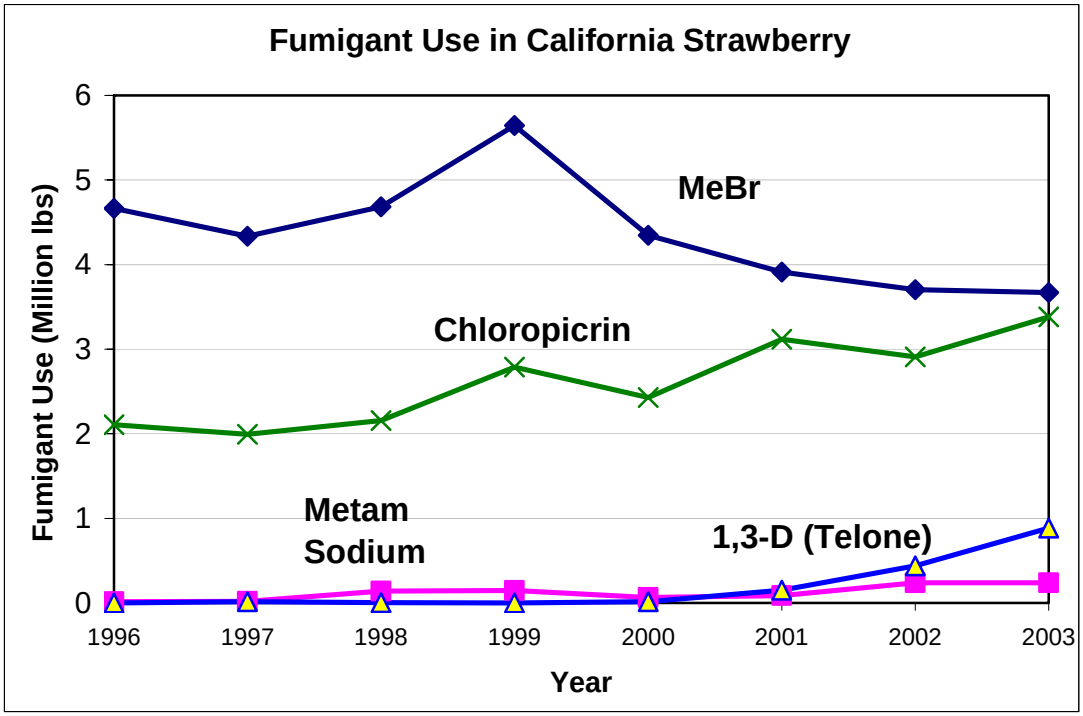
Since 1,3-D was re-introduced in California in 1995, use of this product has increased substantially for certain crops. As an effective nematicide, it is used mainly for replant of perennial fruit and nut trees and vineyards and on high value crops that suffer significant nematode damage (carrot, sweet potato, melon, potato, tomato). In 2003, twice as many orchards and vineyards and 6 times more fruit and vegetable (other than strawberry) acres were fumigated with 1,3-D than with MeBr, and its use was about equal to MeBr use.

Chloropicrin use remained fairly steady through the years until 1999 when its use increased, due to increasing proportions of chloropicrin in MeBr/chloropicrin mixtures. It is used as a fungicide for strawberry and some other annual crops in combination with MeBr and 1,3-D, and is used at very low concentrations as a "marker" for the remaining soil methyl bromide uses. It was used as the sole or primary fumigant on 4000 acres in 2003 – mostly for strawberries, melon, and peppers.

Over 90% of the California strawberry crop is fumigated and strawberry remains the predominate user of MeBr in California. The figure below shows that the proportion of MeBr use in strawberry has declined from about 70% to 45%. Growers have increased the proportion of chloropicrin in their mixture, and about 29% of acres were fumigated with alternatives in 2003, with the predominant being drip applied 1,3-D and chloropicrin (InLine).

In 2001, drip-irrigation-applied formulations of 1,3-D and chloropicrin were registered (*Telone EC, InLine, and Tri-Clor EC*). These products were used on 2000 ac. of strawberry, pepper, and melon in 2001, 6000 ac of these crops in 2002, and 8000 ac in 2003. About 20% of the CA strawberry crop was drip fumigated in 2003. Essentially all 1,3-D used for strawberries is drip applied.

The following tables give fumigant use in CA before (1996 – 1999) and after (2001 – 2003) the phaseout began. I have assembled the 1996 - 2003 California fumigant data into an ACCESS database. It contains 135,000 individual fumigation records. Some have been modified from original DPR records through error checking routines. If you desire additional or more detailed information (for example, for certain crops or locations), contact me.


Fumigant Use in California Strawberry
Fumigant Use (Million lbs)
6
5
4
3
2
1
0
MeBr
Chloropicrin
Metam
Sodium
1,3-D (Telone)
1996
1997
1998
1999
2000
2001
2002
2003
Year

Fumigant Use in California

Compiled by Tom Trout, USDA-ARS; based on CA Dept. of Pesticide Regulation Pesticide Use Reports Database

	Methyl Bromide				1,3-D (Telone)				Metam Sodium				Chloropicrin				Total Fumigant Use	
	1996-1999 Avg		2001-2003 Avg		1996-1999 Avg		2001-2003 Avg		1996-1999 Avg		2001-2003 Avg		1996-1999 Avg		2001-2003 Avg		1996-1999 Avg	2001-2003 Avg
Crop	Amount		Amount		Amount		Amount		Amount		Amount		Amount		Amount		Amount	Amount
	1000 lbs	***%***	*1000 lbs*	***%***	*1000 lbs*	***%***	*1000 lbs*	***%***	*1000 lbs*	***%***	*1000 lbs*	***%***	*1000 lbs*	***%***	*1000 lbs*	***%***	*1000 lbs*	*1000 lbs*
Grape	1,739	86%	173	9%	230	11%	687	34%	40	2%	52	3%	15	1%	119	6%	2,024	1,031
Tree Fruit (Prunus)	971	84%	117	10%	184	16%	733	63%	5	0%	2	0%	9	1%	6	1%	1,162	858
Citrus	135	70%	29	15%	24	12%	67	34%	34	17%	40	20%	1	1%	6	3%	194	142
Almond	767	84%	226	25%	123	14%	499	55%	16	2%	43	5%	4	0%	20	2%	910	789
Walnut	459	88%	114	22%	53	10%	186	36%	5	1%	7	1%	3	1%	14	3%	520	320
Bushberry	81	65%	168	134%	1	1%	25	20%	2	2%	5	4%	43	34%	139	111%	126	337
Other Perennial	224	82%	69	25%	30	11%	124	45%	16	6%	5	2%	8	3%	10	3%	274	207
Total Perennial Fruits and Nuts	**4,377**	84%	**895**	17%	**645**	12%	**2,321**	45%	**117**	2%	**153**	3%	**82**	2%	**314**	6%	**5,208**	**3,684**
Strawberry	**4,609**	68%	**3,717**	55%	**4**	0%	**492**	7%	**80**	1%	**206**	3%	**2,118**	31%	**3,064**	45%	**6,811**	**7,479**
Sweet Potato	596	58%	6	1%	155	15%	596	58%	281	27%	207	20%	4	0%	2	0%	1,036	810
Pepper	410	51%	113	14%	50	6%	131	16%	286	36%	667	84%	51	6%	173	22%	796	1,080
Melons	475	36%	91	7%	161	12%	236	18%	647	49%	692	53%	25	2%	102	8%	1,309	1,120
Tomato	336	8%	133	3%	118	3%	63	2%	3,546	86%	2,790	68%	103	3%	166	4%	4,104	3,152
Carrot	137	2%	1	0%	861	13%	861	13%	5,700	85%	5,549	83%	21	0%	51	1%	6,719	6,462
Potato	0	0%	0	0%	176	10%	135	8%	1,538	90%	1,357	79%	0	0%	0	0%	1,715	1,519
Leafy Vegetables	382	31%	104	9%	75	6%	126	10%	634	52%	589	48%	128	10%	87	7%	1,219	905
Cole Crops	24	8%	1	0%	75	27%	62	22%	177	63%	145	52%	5	2%	7	2%	280	194
Misc Vegetables	279	22%	55	4%	112	9%	114	9%	820	64%	1,024	80%	80	6%	88	7%	1,279	1,281
Total Annual Fruits and Veg. (not strawberry)	**2,639**	14%	**503**	3%	**1,784**	10%	**2,323**	13%	**13,630**	74%	**13,020**	71%	**416**	2%	**675**	4%	**18,456**	**16,524**
Field Crops	69	5%	13	1%	45	3%	28	2%	1,247	91%	331	24%	4	0%	4	0%	1,365	376
Nursery - Outdoor	1,484	80%	467	25%	89	5%	310	17%	139	7%	179	10%	144	8%	141	8%	1,855	1,096
Nursery - Greenhouse	10	89%	11	94%	0	0%	0	3%	0	2%	9	80%	1	10%	3	25%	11	22
Nursery - Strawberry	423	66%	454	71%	2	0%	6	1%	0	0%	0	0%	217	34%	283	44%	641	743
Cut Flowers	521	80%	220	34%	17	3%	15	2%	35	5%	66	10%	82	13%	92	14%	656	393
Ornamentals	136	58%	63	27%	4	2%	1	0%	89	38%	30	13%	4	2%	10	4%	233	103
Misc Agriculture	78	45%	16	9%	17	10%	4	3%	60	35%	16	9%	17	10%	5	3%	171	41
Misc Not-Agriculture	25	25%	26	26%	4	4%	1	1%	69	70%	118	119%	2	2%	0	0%	99	145
Total Soil Fumigation	**14,369**	40%	**6,384**	18%	**2,611**	7%	**5,502**	15%	**15,466**	44%	**14,127**	40%	**3,087**	9%	**4,590**	13%	**35,507**	**30,607**
Post Harvest	248	99%	457	182%	0	0%	0	0%	3	1%	19	7%	0	0%	0	0%	251	476
Structural	178	99%	15	9%	1	0%	1	1%	2	1%	2	1%	0	0%	0	0%	180	18
Misc Fumigation	99	95%	69	67%	0	0%	0	0%	5	5%	6	6%	0	0%	0	0%	104	76
Total Fumigation	**14,894**	41%	**6,926**	19%	**2,612**	7%	**5,503**	15%	**15,476**	43%	**14,154**	39%	**3,087**	9%	**4,590**	13%	**36,042**	**31,177**