FUMIGANT USE AND TRANSITION FROM METHYL BROMIDE TO ALTERNATIVES IN CALIFORNIA

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The purpose of this paper is to report fumigant use status and changes in response to the phase-out of methyl bromide (MeBr) and transition to alternatives. The data source is the 2010 Pesticide Use Reporting (PUR) database compiled by California Department of Pesticide Regulation. The period covered is from 2000 to 2009. Trout (2006) earlier made a similar report on fumigant use from 1991 to 2005. Methyl bromide was phased out as of January 2005 in the US. Thus this report covers the transition before and after the official phase-out of MeBr. Figure 1 shows the total amount used during 2000ī 2009 for the five primary fumigants: 1,3-dichloropropene (1,3-D) (Telone®), chloropicrin (CP), metam sodium (metam-Na), metam potassium (metam-K), and MeBr. Use of other compounds such as dazomet and sodium tetrathiocarbonate is minor (<1% of total) and thus are not included in the analysis in this report. There was no use of methyl iodide for the reporting period as it was registered at the end of 2010. A total of 30.8 million lbs of fumigants were used in 2009 with 43%, 21%, 18%, and 18% as metam-Na and -K salts, 1,3-D, CP, and MeBr, respectively. Nearly 100% of 1,3-D, CP, and metam-Na and -K salts are used in production agricultural applications (mostly soil fumigation). The majority of the MeBr was used for pre-plant soil fumigation, up to 8% was used for post-harvest commodity fumigation, and 5-20% was for other purposes. Total fumigated acres decreased by 27% from 2000 to 2009 and the changes in fumigation acreage are given in Table 1.

MeBr. Use of MeBr has been continually decreasing since 1991. After a large decline from 1991ī 2001 (Trout, 2006), the use of MeBr has dropped from about 7 million lbs in 2001 to 5.6 million lbs in 2009 (Figure 1). Since the phase-out in 2005, MeBr has been continuously used under the Critical Use Exemptions (CUE), and Quarantine and Pre-shipment (QPS) allowances. For pre-plant, major CUE users are orchard nursery seedlings, strawberry nurseries and productions, and ornamentals. Certified nursery production is considered a quarantine exemption by USEPA (Trout, 2006). The CUE allowance, as a result of decisions made by parties to the Montreal Protocol and the rulemakings by USEPA, has been steady declining (from 15.8 million lbs in 2005 to about 4 million lbs in 2010 for pre-plant and from 0.5 million lbs to 0.14 million lbs for post-harvest, respectively). The proposed rule for 2011 CUE use is about 76% of that in 2010. The 2012 critical use nomination (CUN) requests by USEPA for USA was 4.63% of historic baseline and a 42% reduction from the 2011 CUNs.

Uses of MeBr across the commodities are shown in Figure 2a. In 2009, strawberry was the largest use of MeBr (45% of total), followed by tree and vines (13%), nursery and ornamental (11%), post-harvest commodity fumigation (6%),

annual vegetables and fruits (2%), and with the remaining 7ī 24% for other purposes including landscape maintenance, regulatory pest control, rights of way, structural, and turf/sod etc. Major commodities in the post-harvest fumigation category include walnut, cherry, almond, grape, dried fruit, nectarine, plum, strawberry, fig, dried bean, and prune in 2009.

Metam-Na and metam-K salts. Use of metam-Na increased rapidly from 1991 through 1995 (Trout, 2006) and the use of metam-K began in 2001 (Figure 1). The decrease in metam-Na use is accompanied by the increase of metam-K use. The total use of these two products was relatively stable and fluctuated between 13ī 17 million lbs, accounting for 40ī 53% of total fumigant use in CA. The total acreage fumigated with metam products is equivalent to all other fumigants combined in 2009 (Table 1). Due to the relatively low cost, metam fumigants are widely used in many annual vegetable and fruit crops, which accounts for 85ī 92% of total use (Figure 2b). In 2009, the greatest uses of metam products were, in descending order, carrots, tomato and processing tomato, potato, pepper, onion, lettuce.

1,3-dichloropropene. Use of 1,3-D increased rapidly from 2000 to 2005, reflecting its importance in replacing MeBr. 1,3-D is an effective nematocide and has been used for many crops that are sensitive to nematode damage. The use of 1,3-D among commodities is shown in Figure 2c. In 2009, about 40%, 24%, 18% and 5% of 1,3-D were used in perennials (fruit and nut trees and vineyards mostly replanting), annual fruits/vegetables (carrots, sweet potatoes, potatoes, tomatoes, and melons), strawberries, and nursery/ornamentals, respectively. Although slowed down after 2005, use of 1,3-D continued to increase until 2009, when it dropped mainly due to short supply. Trout (2006) concluded that the slowing down of the increasing use rate was likely due to township caps, which limit 1,3-D use per township in CA.

Chloropicrin. Chloropicrin use has been steadily increasing since 2000. Chloropicrin is a good fungicide and is used in mixtures (sometimes as a warning agent) with MeBr and 1,3-D products . Strawberry uses up to 70% of CP and other sectors (perennials, annuals, and nursery/ornamental) have equal shares for the remainder (Figure 2d). Among perennials, raspberry tops the use of CP in 2009 followed by peach, almond, walnut and blackberry. The use in annual crops appears to follow a decreasing trend and the amount used in 2009 was 30% of that in 2000. Tomato, pepper, melon, and lettuce are the large uses in 2009.

References:

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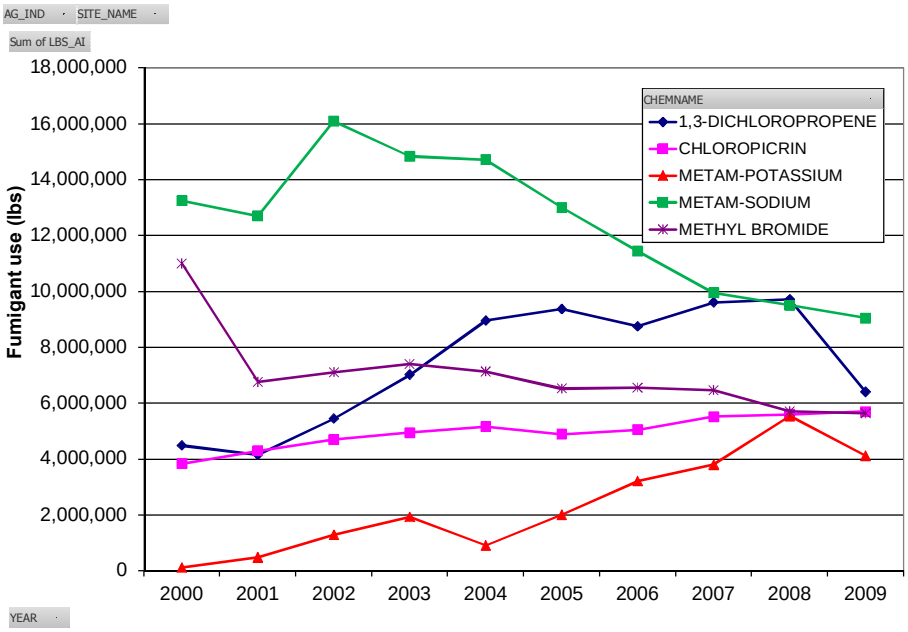

Figure 1. Total fumigant use in California from 2000ī 2009. Data source: 2000 Pesticide Use Reporting (PUR) database by California Department of Pesticide Regulation.

Table 1. Total acres of agricultural fields fumigated in California during the period of 2000-2009.

Year	1,3-dichloropropene	Chloropicrin	Metam-Na	Metam-K	Methyl bromde	**Total**
2000	33,244	68,063	534	146,847	75,839	324,528
2001	30,817	65,166	2,321	125,417	60,892	284,614
2002	42,172	58,907	9,073	141,415	53,140	304,707
2003	48,944	58,460	12,887	142,406	55,254	317,951
2004	56,618	60,932	10,229	128,427	57,385	313,592
2005	51,486	53,797	19,670	97,562	45,700	268,215
2006	49,885	56,129	27,299	102,451	50,677	286,441
2007	53,937	55,678	42,988	78,030	45,675	276,308
2008	57,922	53,964	56,009	71,815	35,685	275,396
2009	38,374	49,639	38,197	74,132	39,587	239,928

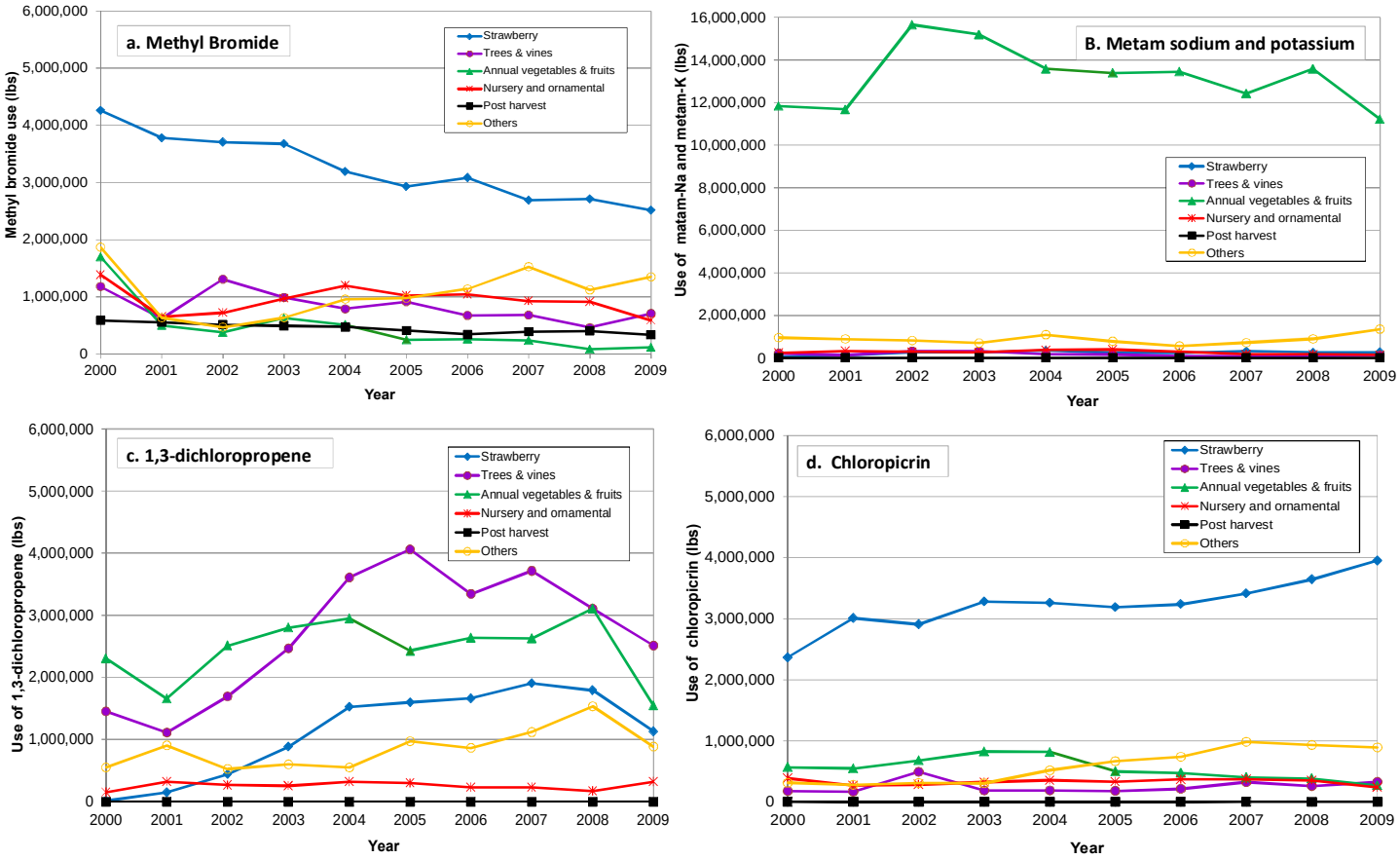

Figure 2. Use distribution among commodities of fumigants (a. methyl bromide; b. metam sodium and potassium; c. 1,3-dichloropropene; and d. chloropicrin) in California during the period of 2000ī 2009 .