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MEMORANDUM

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SUBJECT: CALCULATION OF METHOD USE FRACTIONS FOR 1,3-DICHLOROPROPENE

Introduction

As part of the volatile organic compound inventory, the fractions by method of application of 1,3-dichloropropene (1,3-d) mass utilized for field fumigations are ascertained. Application methods are broadly classified into as drip, deep shank (greater than 18" depth) and shallow shank. For 1,3-d, the availability of data from the California Data Management System (CDMS) report facilitates estimation of these factors, because, unlike the Pesticide Use Report, application method is explicitly entered into the use record. Recently, Dow AgroSciences provided a fresh update to the CDMS data, which included 2004, 2005, and 2006 use records (Shatley 2008). Review of the CDMS data sets has occurred from time to time (Roush 2007), resulting in improvements to the CDMS data set (Shatley 2008).

There are five nonattainment areas for which method use factors are required: San Joaquin, Sacramento Metro, Ventura, South Coast, and Southeast Desert. These areas are defined by maps (Segawa 2008). For purposes of this work nonattainment regions were defined by aggregating counties as follows:

- San Joaquin: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare
- Sacramento Metro: Sacramento, Solano, Yolo, Placers, El Dorado, and Sutter
- Ventura: Ventura
- South Coast: Los Angeles and Orange
- Southeast Desert: Riverside and San Bernardino

It is the goal of this work to calculate the method use factors within each of the five regions.



Methods

CDMS data consists of a structured database. Key fields for this work were: (1) date of application, (2) county, (3) pounds of 1,3-d applied, and (4) method of application. The rules focus on field fumigations between May 1 and October 31 (Segawa 2008). To restrict applications to those dates, two fields were introduced. The first utilized the worksheet function “month,” applied to the date of application (and with the cell formatted as numeric) to produce a single number, 1 through 12,

representing the month of application. The second field utilized a simple conditional on the month number (=IF(OR(B2<=4,B2>=11),0,1), which was an indicator variable: 1 if the date was from May through October and 0 otherwise. In this way, applications falling outside the May through October window could be segregated.

A third field was introduced next to the county field. The VLOOKUP table worksheet function was utilized to map the county names into the regions, according to Table 1. The specific function was “=VLOOKUP(D2,lookupcounty!\$A\$1:\$B\$44,2,FALSE).” For actual table use, the data was arranged in two parallel columns, each of length 44. The third argument ‘2’ instructs the function to return the corresponding value in the second column and the fourth argument, ‘FALSE’, instructs the function to find an exact match. This function enabled separation of the applications into the five regions of interest and into areas outside of the five regions.

Table 1. County mapping used with VLOOKUP function to define non-attainment regions. SJ=San Joaquin, SM=Sacramento Metro, VENT=Ventura, SC=Southcoast, SD=Southeast Desert, out=areas outside of non-attainment regions.

Butte	out	Riverside	SD
Colusa	out	Sacramento	SM
Contra Costa	out	San Benito	out
Del Norte	out	San Bernardino	SD
El Dorado	SM	San Diego	out
Fresno	SJ	San Joaquin	SJ
Glenn	out	San Luis Obispo	out
Humboldt	out	San Mateo	out
Imperial	out	Santa Barbara	out
Kern	SJ	Santa Clara	out
Kings	SJ	Santa Cruz	out
Lake	out	Shasta	out
Los Angeles	SC	Siskiyou	out
Madera	SJ	Solano	SM
Mendocino	out	Sonoma	out
Merced	SJ	Stanislaus	SJ
Modoc	out	Sutter	SM
Mono	out	Tehama	out
Monterey	out	Tulare	SJ
Napa	out	Ventura	VENT
Orange	SC	Yolo	SM
Placer	SM	Yuba	out

A fourth field was introduced next to the method. This field was also a VLOOKUP function performed a function similar to county mapping function, except that methods were mapped into the three basic method types: drip, deep shank, and shallow shank.

With these four added fields, a pivot table was utilized, which summarized the pounds of 1,3-d applied, grouping overall by the date use flag (1 or 0), the area, and the method.

This procedure was repeated for each of the three years, 2004-2006. The final factors were determined by normalizing the fraction of use in each category within each area.

Results

Method use factors show wide variation between areas in methods utilized to apply 1,3-d (Table 2). Within the May through October time period, drip irrigation was the most important method in the Southcoast, Southeast Desert, and Ventura regions. In the Sacramento Metro and San Joaquin regions, the deep shank method was most used. The shallow shank method was least used, which probably reflects use adjustment factors defined in permit conditions, which represent disincentives for the use of this method (DPR 2008). The factors in Table 2 for 2004 are substantially consistent with the factors previously calculated (Johnson 2006).

Table 2. Method use factors for 1,3-d for five non-attainment areas for 1,3-d for 2004, 2005, 2006. SC=South Coast, SD=Southeast Desert, SJ=San Joaquin, SM=Sacramento Metro, VENT=Ventura based on applications from May 1 through October 31.

		Deep Shank	Shallow Shank	Drip
2004	SC	0.000	0.000	1.000
	SD	0.000	0.040	0.960
	SJ	0.984	0.014	0.002
	SM	0.993	0.000	0.007
	VENT	0.039	0.022	0.939
2005	SC	0.024	0.001	0.975
	SD	0.097	0.000	0.903
	SJ	0.975	0.017	0.008
	SM	0.993	0.000	0.007
	VENT	0.044	0.006	0.950
2006	SC	0.000	0.000	1.000
	SD	0.158	0.001	0.841
	SJ	0.965	0.025	0.010
	SM	0.954	0.031	0.015
	VENT	0.066	0.000	0.934

References

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