



Department of Pesticide Regulation



Paul Helliker
Director

MEMORANDUM

Arnold Schwarzenegger
Governor

TO: Bob Rollins
Agricultural Program Supervisor III
Environmental Monitoring Branch

FROM: Don J. Weaver, Ph.D.
Senior Environmental Research Scientist
Environmental Monitoring Branch
(916) 324-4132

Craig Nordmark
Associate Environmental Research Scientist
Environmental Monitoring
(916) 324-4138

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SUBJECT: SUMMARY OF RESULTS FOR FISCAL YEAR 2003/04 GROUND WATER
PROTECTION LIST MONITORING FOR IMIDACLOPRID AND THREE OF
ITS DEGRADATES

SUMMARY

Imidacloprid, including three degradates, was chosen for monitoring from active ingredients on the Ground Water Protection list. Thirty-three wells were sampled in six counties during October and November 2003. No residues of imidacloprid or imidacloprid degradates were detected in any of the wells. Four wells contained residues of one or more other herbicides or herbicide degradates.

BACKGROUND

Sixty-two pesticide active ingredients (AIs) are currently on the Ground Water Protection list (Title 3, California Code of Regulations section 6800[b]), which is a list of AIs that have the potential to pollute ground water through normal agricultural use. From 1992 through 2003, a total of 24 AIs (1)(2)(3)(4)(5)(6)(7)(8)(9)(10), were monitored with 40 or more wells sampled for each. A revised monitoring protocol, approved in fiscal year (FY) 1997 (11), is used to select AIs for monitoring based on information about their physico-chemical characteristics, cultural practices for crops on which they are applied, detections in ground water, and any other pertinent information.

The insecticide imidacloprid, along with the imidacloprid guanidine degradate, the urea degradate and the guanidine-olefin degradate, was selected for monitoring during FY 2003/04.



METHODS

Wells were sampled during October and November 2003. Pesticide use report information for 1997-2001 was used to identify counties with the greatest use of imidacloprid (pounds applied). Pesticide use was combined with information on depth to ground water and availability of wells to identify the areas where monitoring should be conducted. Areas containing clusters of high use sections were considered first. Those sections that had shallow depth to ground water were targeted as primary locations for monitoring. Although areas of high use were identified in Kern, Kings, Imperial, and Riverside Counties, they were not selected for monitoring because ground water levels were too deep or wells were not available for monitoring.

Sampling crews drove through the targeted sections of land in each county with the goal of sampling one or more wells per section. If no useable wells were found in a targeted section, attempts were made to locate a well in an adjacent section. For each well sampled, two primary samples, two backup samples, and one field blank sample were collected.

The California Department of Food and Agriculture laboratory performed analyses for imidacloprid, the imidacloprid urea compound (DIJ 9817), and the imidacloprid guanidine compound (BEG 5322), each with a reporting limit of 0.05 parts per billion (ppb) and for the imidacloprid guanidine-olefin compound (NTN 35884) with a reporting limit of 0.10 ppb. A second sample was analyzed using a single analytical screen for atrazine, simazine, diuron, prometon, bromacil, hexazinone, norflurazon, deethylatrazine deisopropylatrazine (ACET), and didealkylated triazine (DACT), each with a reporting limit of 0.05 ppb.

Use of imidacloprid was documented from pesticide use reports for 1997-2001. The total number of pounds applied was determined for each section in which a well was sampled and also for the eight adjoining sections surrounding the monitored section. Land use characteristics were also determined for each section of land in which a well was sampled. The percentage of each land use type was determined based on 1994-1999 Department of Water Resources maps.

RESULTS

A total of 33 wells were sampled in six counties and no imidacloprid or imidacloprid degradate residues were found (Table 1). Residues of certain herbicides were found in three wells in Fresno County, and one well in Tulare County. Simazine, ACET, DACT, and diuron were found in one well each in Tulare and Fresno Counties. Two additional wells in Fresno County contained residues of simazine, ACET, and DACT.

The analytical method used by the California Department of Food and Agriculture laboratory is unequivocal for the nine compounds included in the analytical screen; thus, no verification of those results is necessary.

Imidacloprid use data and land use characteristics are presented by county in Tables 2-7. Each table contains the total number of pounds of imidacloprid, simazine, bromacil, norflurazon, and diuron applied during the years 1997-2001 for the section in which a well was sampled (in section) and also total use for that section plus the eight adjoining sections (9-section). For Ventura County (Table 7), data is also included for atrazine.

DISCUSSION

Imidacloprid is used to control insects on a wide variety of vegetable, field, and fruit crops in California. Quantities applied in the state between 1995 and 2002 have increased nearly four-fold. To date, no detections have been reported in California ground water. Unpublished reports from Long Island, New York have shown that after imidacloprid was applied to sandy soils there, some residues were found in ground water.

In the current study, no imidacloprid residues were detected in ground water in areas where use of the insecticide was high, and where ground water depth and soils created conditions favorable for contamination. The highest statewide use of imidacloprid was in Fresno County, with most concentrated use being in the western part of the county. However, no wells to sample were found in that area. As a result, wells were sampled in other areas that are known to have ground water contaminated by certain herbicide residues. These wells were all part of a network that was being monitored over several years. The one well sampled in Tulare County was also a part of the network and contained herbicide residues.

The greatest number of wells was sampled in the coastal areas of the state in Monterey, San Luis Obispo, Santa Barbara, and Ventura Counties. Monterey County had the second highest statewide use of imidacloprid and 15 wells were sampled there. Many of the wells were located in high imidacloprid use areas with shallow ground water and medium textured soils, conditions conducive to ground water pollution in some areas of the state. Despite those conditions, very few detections of any pesticide have been made in ground water of Monterey County or the other coastal counties monitored in this study.

With the use of imidacloprid in California on the increase, there is still a potential for ground water pollution after residues have more time to move through the soil. Therefore, additional sampling may be needed in the future.

Attachments

REFERENCES CITED

Weaver, D. and Marade J. July 15, 1992. Memorandum to K. S. Goh: Summary of results for FY 1991/92 ground water protection list monitoring.

Weaver, D. and J. Marade. August 23, 1993. Memorandum to J. S. Sanders: Summary of results for FY 1992/93 ground water protection list monitoring.

Weaver, D. and J. Marade. August 19, 1994. Memorandum to K. S. Goh: Summary of results for FY 1993/94 ground water protection list monitoring.

Weaver, D. and J. Marade. June 30, 1995. Memorandum to K. S. Goh: Summary of results for FY 1994/95 ground water protection list monitoring.

Weaver, D. and J. Marade. August 21, 1996. Memorandum to K. S. Goh: Summary of results for FY 1995/96 ground water protection list monitoring.

Weaver, D. and J. Marade. June 30, 1997. Memorandum to K. S. Goh: Summary of results for FY 1996/97 ground water protection list monitoring.

Weaver, D. and J. Marade. June 30, 1998. Memorandum to K. S. Goh: Summary of results for FY 1997/98 ground water protection list monitoring.

Weaver, D. and J. Marade. March 19, 1999. Memorandum to K. S. Goh: Summary of results for FY 1998/99 ground water protection list monitoring.

Weaver, D. and C. Nordmark. May 6, 2002. Memorandum to Bob Rollins: Summary of results for FY 2000/2001 ground water protection list monitoring for alachlor, metolachlor and two degradates of each.

Weaver, D. and C. Nordmark. June 30, 2002. Memorandum to Bob Rollins: Summary of results for FY 2000/2001 ground water protection list monitoring for fenamiphos, fenamiphos sulfoxide, and fenamiphos sulfone.

Weaver, D. April 8, 1997. Revised protocol for selecting ground water protection list active ingredients to be monitored under certain agricultural conditions.

Table 1. Detections of pesticides in wells sampled for imidacloprid and three degradates during 2003-2004 Ground Water Protection List Monitoring. Data are presented only for imidacloprid and for compounds that were detected in at least one well sample ^a.

County	Township/Range- Section	Concentration, parts per billion				
		Imidacloprid + 3 Degradates	Simazine	ACET	DACT	Diuron
Fresno	14S/22E-31	ND ^b	0.104	0.489	0.588	0.071
	14S/23E-34	ND	0.135	0.127	0.367	ND
	15S/21E-09	ND	0.090	0.377	0.372	ND
Monterey	14S/02E-26	ND	ND	ND	ND	ND
	15S/03E-07	ND	ND	ND	ND	ND
	15S/03E-09	ND	ND	ND	ND	ND
	15S/03E-15	ND	ND	ND	ND	ND
	15S/03E-17	ND	ND	ND	ND	ND
	15S/03E-26	ND	ND	ND	ND	ND
	15S/04E-26	ND	ND	ND	ND	ND
	15S/05E-31	ND	ND	ND	ND	ND
	16S/04E-04	ND	ND	ND	ND	ND
	16S/04E-15	ND	ND	ND	ND	ND
	16S/05E-19	ND	ND	ND	ND	ND
	17S/06E-31	ND	ND	ND	ND	ND
	18S/06E-05	ND	ND	ND	ND	ND
	18S/06E-07	ND	ND	ND	ND	ND
	18S/06E-13	ND	ND	ND	ND	ND
San Luis Obispo	11N/35W-24	ND	ND	ND	ND	ND
	11N/35W-26	ND	ND	ND	ND	ND
	32S/13E-33	ND	ND	ND	ND	ND
	32S/13E-33	ND	ND	ND	ND	ND

Table 1. Continued.

County	Township/Range- Section	Concentration, parts per billion				
		Imidacloprid + 3 Degradates	Simazine	ACET	DACT	Diuron
Santa Barbara	07N/34W-31	ND	ND	ND	ND	ND
	10N/33W-20	ND	ND	ND	ND	ND
	10N/33W-21	ND	ND	ND	ND	ND
	10N/34W-09	ND	ND	ND	ND	ND
	10N/34W-18	ND	ND	ND	ND	ND
	10N/35W-09	ND	ND	ND	ND	ND
	10N/35W-12	ND	ND	ND	ND	ND
Tulare	17S/25E-05	ND	0.132	0.566	0.503	0.199
Ventura	01N/21W-17	ND	ND	ND	ND	ND
	01N/21W-21	ND	ND	ND	ND	ND
	01N/22W-02	ND	ND	ND	ND	ND

^a All samples were analyzed by the CDFA laboratory for imidacloprid, imidacloprid guanidine degradate (BEG 5322), imidacloprid urea degradate (DIJ 9817), and the imidacloprid guanidine olefin degradate (NTN 35884). Each was also analyzed for diuron, prometon, bromacil, norflurazon, atrazine, the atrazine degradate deethylatrazine (DEA), simazine, the atrazine/simazine degradates deisopropylatrazine (ACET), and didealkylated triazine (DACT).

^b ND = none detected at the reporting limit (RL) of 0.05 parts per billion for all chemicals except the imidacloprid guanidine olefin degradate which had an RL of 0.1 part per billion. The RL is the smallest amount that can be reliably detected in a laboratory test and is set by the testing laboratory for each chemical.

Contact GWPP@cdpr.ca.gov for tables that have been removed and references not currently available on the web. Tables that have been removed are listed below.

Table 2. Fresno County - Use of imidacloprid and selected herbicides and land use characteristics for sections of land in which wells were sampled for 2003 Ground Water Protection List monitoring

Table 3. Monterey County - Use of imidacloprid and selected herbicides and land use characteristics for sections of land in which wells were sampled for 2003 Ground Water Protection List monitoring.

Table 4. San Luis Obispo County - Use of imidacloprid and selected herbicides and land use characteristics for sections of land in which wells were sampled for 2003 Ground Water Protection List monitoring.

Table 5. Santa Barbara County - Use of imidacloprid and selected herbicides and land use characteristics for sections of land in which wells were sampled for 2003 Ground Water Protection List monitoring.

Table 6. Tulare County - Use of imidacloprid and selected herbicides and land use characteristics for sections of land in which wells were sampled for 2003 Ground Water Protection List monitoring.

Table 7. Ventura County - Use of imidacloprid and selected herbicides and land use characteristics for sections of land in which wells were sampled for 2003 Ground Water Protection List monitoring.