CALIFORNIA'S USE OF IPM IN MANAGING PESTS IN SCHOOLS

Laurie Brajkovich, Ann Hanger, Belinda Messenger and Sewell Simmons Department of Pesticide Regulation, Pest Management and Licensing Branch, Sacramento, CA, USA describe the successful introduction of IPM pest management strategies in California's schools

Keywords: California, school IPM, pest management, pesticides, children's health

The Healthy Schools Act of 2000 was enacted in the State of California to address concerns about children's health and their potential exposure to pesticides. The law requires that public schools provide notifications to parents and staff, maintain a list of parents desiring further notifications, post warning signs, and keep pesticide use records. Results from a 2007 pest management survey indicated that a majority of California's schools had implemented at least three of these four requirements, with about two-thirds being in full compliance. School districts with Integrated Pest Management (IPM) programs generally used less-toxic pesticides and used other more ecologically sound pest management practices. Most districts reported that their IPM program resulted in more effective pest management.

Introduction

Before 2001, knowledge about the kinds and amounts of pesticides used in schools was limited. For many parents, this lack of information was worrisome. To address these concerns, the Healthy Schools Act (HSA) established right-to-know requirements for pesticide use in public schools and child day care facilities. Schools using pesticides must provide notifications to parents and staff, maintain a list of parents requesting further notifications, post warning signs, and keep use records. The law also directed the California Department of Pesticide Regulation (DPR) to collect pesticide use information from schools and to support schools in their IPM efforts. IPM in California schools emphasizes long-term pest prevention or suppression of pest problems while minimizing pesticide use. The HSA was amended (AB 2865) in 2006 to include privately owned child day care facilities.

The amended HSA requires private child day care facilities to comply with new pesticide use recordkeeping and notification requirements. In addition, licensed pest control businesses are required to submit detailed reports of their pesticide applications at private child day care facilities (these requirements do not apply to family child day care homes). While this article is focused on pest management and HSA requirements in schools, DPR has prepared an informational handout, "*What You Need to Know About the Healthy Schools Act and Child Care Facilities*" (http://apps.cdpr.ca.gov/schoolipm/childcare/ab2865_faq.pdf).

DPR's School IPM Program supports school districts by organizing IPM trainings, creating an IPM Guidebook, developing a School IPM Web site (www.cdpr.ca.gov/schoolipm), and providing other IPM implementation assistance. To track the progress of the HSA implementation and DPR's School IPM program, DPR surveyed California public school districts in 2001, 2002, 2004, and 2007. The results from those surveys reveal patterns of pest management practices used for two of the most common school pest problems, ants and weeds. The surveys also revealed the levels of adoption for various IPM programs and related policies (including those required by the HSA) and compared the practices of those schools that have an IPM program with those that do not.

Figure 1. A California law passed in 2000 requires that public schools inform parents about pesticide use and designate integrated pest management coordinators

DOI: 10.1564/21feb07

© 2010, Research Information Ltd. All rights reserved

Figure 2. Integrated pest management is a widely accepted approach to pest management that results in effective suppression of pest populations while minimizing hazards to human health and the environment

Measuring use of IPM

There currently are no set standards for measuring success of IPM programs due to the diverse nature of pest management systems. To define and measure IPM progress in California schools, DPR developed a series of school IPM surveys. After review of IPM literature and discussions with school IPM coordinators, DPR categorized four activities as central to a successful school IPM program: (1) monitoring pest populations; (2) emphasizing pest prevention; (3) keeping records; and (4) using pesticides, preferably the least hazardous, only as a last resort. The surveys focused on these four activities.

DPR's latest school IPM survey was sent to all 974 public school IPM coordinators in April 2007. Over half of the school districts responded. The survey was intended to: measure compliance with the HSA requirements; measure adoption of IPM programs, policies, and practices; identify barriers to IPM adoption; examine changes over time relative to prior surveys; and identify demographic and geographic factors.

To keep the survey as short as possible and maximize response rates, DPR focused the questions on two representative categories of pest problems: weeds and ants. Weeds and ants were chosen because they collectively represent landscape and structural pest management issues, and because they were ranked first and third most serious school pest problems in the initial 2001 survey (gophers were #2).

Weed management

Weed management is the greatest resource commitment in most school pest management programs. School districts vary widely in their weed management approaches. Results from the surveys indicate that school districts have steadily increased their use of more IPM-compatible weed management practices. IPM-compatible practices are those that are consistent with IPM principles such as prevention, monitoring, and the use of low-exposure pesticide applications only when necessary. Locations where weeds cause the most reported problems for schools has shifted from fence lines and athletic fields/playgrounds in 2001 to fence lines and landscaping in the last three survey years.

One of the biggest recurring needs for herbicide use is weed control along fence lines in unpaved areas. Some California schools have eliminated this problem by retrofitting fence lines with a concrete mowing strip that covers the soil under and beside the fence.

In landscaped areas, the need for weed control is minimized by the use of mulches. California schools are increasingly using mulches for weed control (25% in 2001 to 60% in 2007). Generally, selective weed control is most often accomplished with mechanical or physical practices, although some herbicides are used for weed control in large landscape plantings. Non-chemical practices are preferred, but are not always feasible for treating extensive areas or for sites where the use of equipment is hazardous or limited by physical features.

The most successful preventive strategies for turf weed control in schools involve proper selection of turfgrass species for each environmental setting; proper irrigation, fertilization, drainage, mowing and aeration; and proper selection and placement of ornamental plants that will not limit turf growth. For example, reducing excessive irrigation in a lawn improves the competitiveness of some turf types and reduces the amount of common weeds like plantain (*Plantago* spp.), nutsedge (*Cyperus* spp.), and dallisgrass (*Paspalum dilatatum*). Half of California schools used irrigation management according to the 2007 survey, up from 17% in 2002. Physical practices such as hand pulling and mowing are also commonly used alternatives to herbicides. In fact, 94% of California schools report using physical practices, up from 61% in 2001 (Figure 3). While proper maintenance practices do not eliminate all weeds in a lawn, they will prevent most weed problems. Herbicide use without incorporating preventive strategies frequently leads to unhealthy turf and more herbicide use.

Ant management

Ants are the most universal indoor pest in California schools and prevention is a critical part of an ant IPM program. The trend in schools is toward IPM-compatible ant management, such as using ant baits and pest prevention instead of aerosol

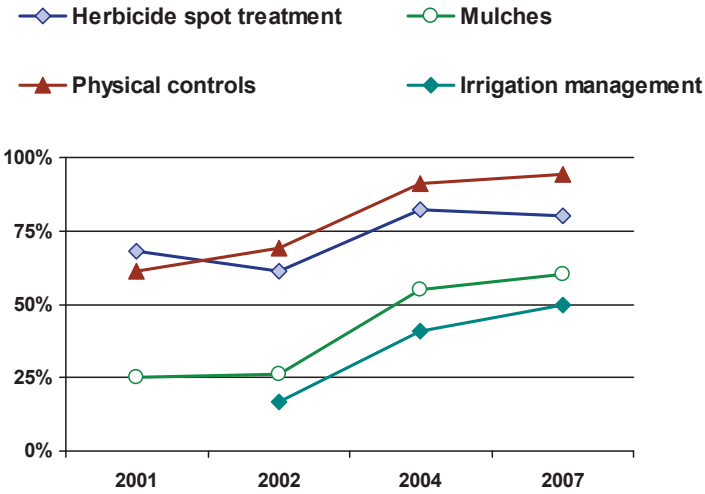

Figure 3. Graph showing the percent use of IPM-compatible weed management practices in California schools from 2001 to 2007. Note: the 2001 survey did not ask about irrigation management.

insecticides. Results of the four surveys from 2001 to 2007 indicate that ant management practices have become more IPM-compatible. In fact, in 2001, 23% of schools reported that the practice most frequently used to manage ants was aerosol pesticide sprays. By 2007, that number had dropped to 5%. When ant problems occur, schools are using more soapy water sprays (from 14% in 2001 to 51% in 2007) and other IPM-compatible practices. (Figure 4)

Ant baiting is considered an IPM-compatible ant management practice because bait formulations kill the entire ant colony and children are not likely to be exposed to pesticides in baits (as opposed to sprays). Good sanitation and other preventive practices are the keys to managing ants and are essential to the long-term success of a baiting program. Throughout California school districts, there has been increased use of ant baits (from 37% in 2001 to 69% in 2007). Active ingredients commonly used in ant baits in California have included abamectin, boric acid, fipronil and hydramethylnon.

Pest prevention in school buildings consists of effective indoor maintenance that excludes pests, reduces shelter, and removes sources of food and water. Inspection and monitoring of facilities at regular intervals with a continual awareness of potential pest problems is an important key to pest prevention. While inspection and monitoring involves substantial time and commitment, schools with a regular inspection and monitoring program tend to have lower maintenance costs and fewer pest problems.

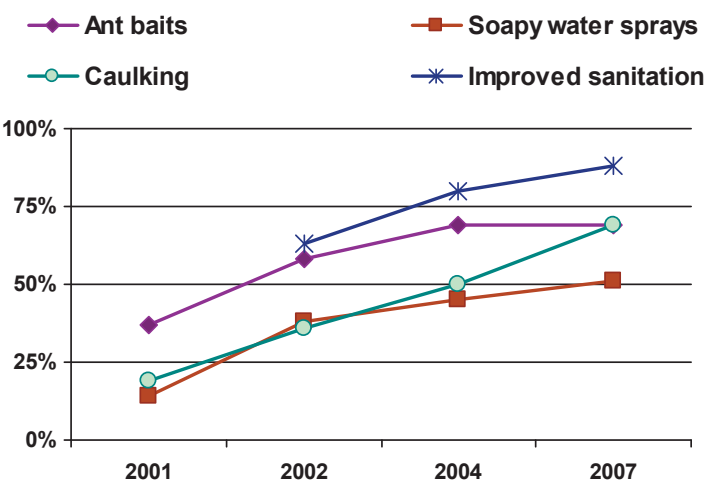

Figure 4. Graph showing the percent use of IPM-compatible ant management practices in California schools from 2001 to 2007. Note: the 2001 survey did not ask about improved sanitation

Outdoor maintenance practices most essential to ant prevention are focused on building exteriors and adjacent areas, lunch areas, landscaped areas, and refuse/recycling areas. Ants in lunch areas and refuse/recycling areas are attracted primarily by the availability of food. In all of these areas, sanitation is the major maintenance requirement for prevention. The vast majority of California schools (88%) use sanitation to prevent ant problems. California schools are increasingly using caulk/sealant as a preventive measure to exclude ants (19% in 2001 to 69% in 2007). Reducing favorable conditions in building perimeters and eliminating pest access to buildings will limit ant problems.

DPR's California School IPM Program

DPR's School IPM Program promotes effective, long-term pest prevention by helping school districts integrate IPM into their existing maintenance and operations activities. DPR promotes voluntary adoption of IPM in public schools primarily by training, outreach, and assistance with HSA implementation. DPR regularly presents a hands-on train-the-trainer program that teaches basic IPM principles and practices to district IPM coordinators. The training focuses on building and landscape pest management and emphasizes solutions targeting pests common to the region where the workshop is held. DPR provides school district staff with tools to implement their own IPM training and with easy and inexpensive ways they can "build pest problems out".

DPR established a comprehensive school IPM Web site (www.cdpr.ca.gov/schoolipm) in 2000 to provide information on pests, IPM, pesticides, and other topics. The program Web site features an interactive resource called Health and Environmental impact LookuP Resource (HELPR), which provides useful information on pesticides for parents and teachers. DPR also developed a variety of technical resources including: a model IPM program guidebook to help districts adopt an IPM program tailored to pests and conditions in California; fact sheets on ants, cockroaches, and rats and mice that explain pest biology and IPM solutions; interactive training DVDs; IPM curricula; recordkeeping calendars with useful tips for managing pests using IPM; teacher pest-prevention awareness posters; and articles on IPM-related topics in trade journals. DPR also gives presentations promoting IPM policies, programs, and practices at meetings attended by maintenance and operations directors, facility planners, school administrators, educators, and parents.

To date, DPR's training program has reached nearly three-quarters of the State's approximately 1,000 school districts. In 2007, more schools used DPR's IPM information resources, such as the School IPM Web site, brochures, handouts, and presentations than in 2002. This suggests that school district personnel are not only being trained in IPM practices, they are also learning about and using related resources introduced

Figure 5. To implement the training requirement of the Healthy Schools Act, DPR conducts IPM training for school districts throughout the state. Each training session provides training on the management of the major pests of school buildings and grounds

during the training. Specifically, more school district personnel attended presentations on school IPM by DPR, more attended training workshops on school IPM, and, although more were aware of the resource, significantly fewer were using information provided by licensed pest control businesses.

Healthy Schools Act compliance and adoption of IPM

School district compliance with the HSA increased significantly between 2002 and 2007, with most of the change occurring between 2002 and 2004. As of 2007, a majority of California's schools had implemented at least three of the four HSA requirements, with about two-thirds being in full compliance. Almost all California school districts using pesticides post warning signs and provide written notification of pesticide use, while approximately three-quarters maintain a registry of parents who wish to be notified of pesticide use and keep pesticide use records up to four years (Figure 7).

Most districts adopted an IPM program early on — roughly 70% of school districts in 2002, 2004, and 2007, replied that they had adopted an IPM program. The three significant factors in predicting IPM program adoption are: population area type; number of students enrolled in the district; and IPM coordinator experience. Districts in large or small towns, the urban fringes of mid-sized cities, and rural areas, those with more than 200 enrolled students, and those with more experienced IPM coordinators were more likely to adopt an IPM program (Figure 8). These district characteristics also influence pesticide use and compliance with the HSA requirements.

Although districts increasingly felt that adopting an IPM program resulted in more effective pest management (41% in 2002, 49% in 2004, and a high of 62% in 2007), there was no significant change in adopting certain voluntary IPM policies and practices between 2004 and 2007 (Figure 9). For example, a slightly increasing number of districts monitored pests during the year, inspected buildings for pest problems, and kept records of pest sightings. However, a slightly decreasing number of districts kept records of pest monitoring results, had written policies requiring use of the least toxic pest management practices, and had written policies requiring monitoring of pest levels. Only 11% of the districts had adopted six or more of the seven listed voluntary IPM policies and practices. Half of the districts (52%) adopted between two and four of these practices, indicating the importance of continuing IPM outreach efforts to school districts.

Progress toward IPM

A comparison of the 2002, 2004, and 2007 surveys shows that California schools are making progress toward adopting more-accountable, less-hazardous pest management practices, in accordance with the goals of the HSA. School district

Figure 6. The full-day workshops focus on pest prevention and reduced risk practices. The program utilizes a hands-on, "walk-through", and demonstration format to train school district staff

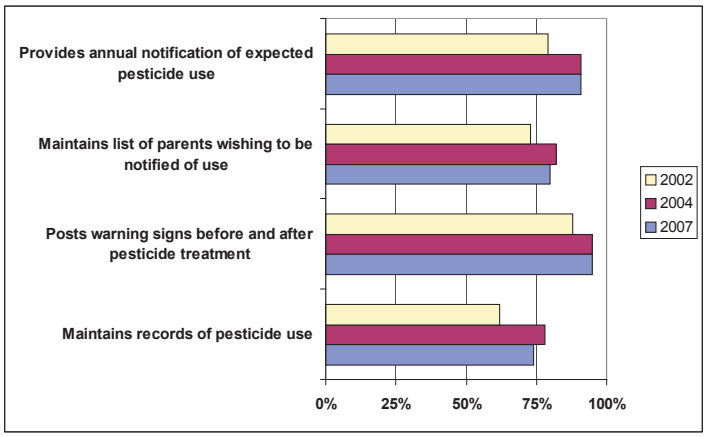

Figure 7. Percent of districts officially adopting practices required for compliance with the Healthy Schools Act (2002, 2004, and 2007)

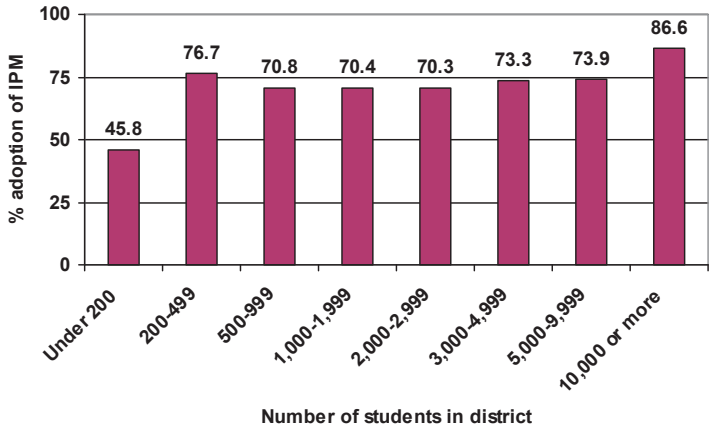

Figure 8. IPM program adoption correlated strongly with the number of students in the district in the 2007 survey

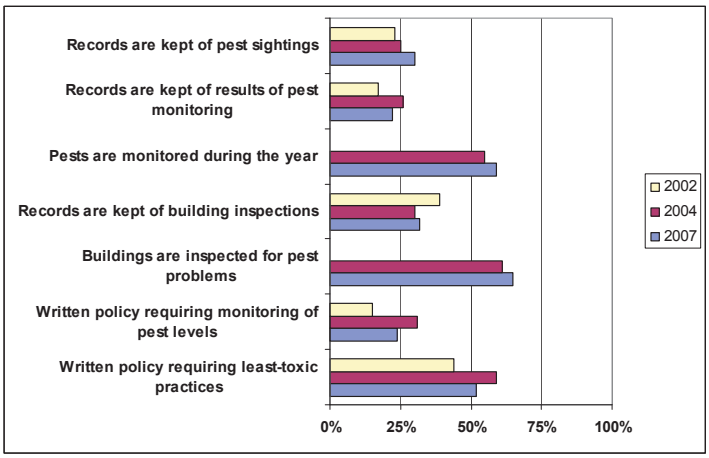

Figure 9. Percent of districts adopting voluntary IPM policies, practices and activities (2002, 2004, and 2007 surveys)

compliance with each of the four Healthy Schools Act requirements increased significantly between 2002 and 2007. Survey results show that the California School IPM Program training workshops, Web site, and handouts have successfully encouraged significant improvement in school districts' compliance with all the HSA requirements.

Schools show marked improvements in ant management. When the California School IPM Program did its first survey in 2001, the most often used approaches to ant management were ant baits and insecticidal sprays. In 2007, the most common of ant management practices were sanitation, caulking, and ant baits, three practices consistent with IPM. Between 2001 and 2007, use of insecticidal sprays to manage ants dropped dramatically, while use of baits, soapy water sprays, caulking, and improved sanitation increased each year of the survey, signaling a measurable shift toward IPM use.

School districts have also increased their use of more IPM-compatible weed management practices. Use of more IPM-compatible practices for managing weeds increased significantly from 2001 to 2007, such as spot treatment with herbicides, mulching, hand-pulling, irrigation management, and turf selection. The practices used most often in 2004 and 2007 to manage weeds on athletic fields and playgrounds were spot treatment with herbicides and physical practices.

Figure 10. Less-toxic practices to prevent school pests include: left, designing buildings to prevent roosting pigeons that can carry diseases (Photo courtesy of Ingrid Carmean) and right, installing mowing strips to prevent weed growth along fence lines. (Photo courtesy of Phil Boise)

Although there was a small increase in the percent of districts specifying broadcast treatment with herbicides as the practice most often used on athletic fields, overall, districts significantly improved their weed management practices between 2004 and 2007.

A common misconception is that IPM costs more to implement than conventional pest management practices. Pinning down a dollar figure for IPM costs and benefits can be a difficult task, especially with unknown benefits such as the long-term avoidance of new pest infestations and the reduction of human health risks. However, more than two-thirds of California school districts reported that IPM did not impact costs or even reduced the cost of pest management.

In summary, more California schools are using IPM-compatible practices. The HSA has been instrumental in advancing IPM implementation and awareness of pesticide use in California schools. To further this trend, DPR's School IPM program will continue to promote and facilitate the voluntary adoption of IPM programs for school districts and assist them with their HSA compliance efforts. DPR will continue to conduct school IPM workshops statewide in order to increase the number of districts with trained staff. DPR is planning to begin training individual districts, emphasizing IPM practices specific to the pest of concern to the district. With this additional localized training in combination with other outreach efforts, DPR anticipates an increase in the adoption of IPM by school districts and a reduction in the use of hazardous pesticides.

References

California Department of Pesticide Regulation. 2009. 2007 Integrated Pest Management Survey of California School Districts. Sacramento, CA. http://apps.cdpr.ca.gov/schoolipm/overview/surveys.cfm

California Department of Pesticide Regulation. 2003. California School IPM Guidebook, second edition. http://apps.cdpr.ca.gov/schoolipm/managing_pests/guidebook.cfm

California Department of Pesticide Regulation. 2009. School Integrated Pest Management Web site: www.cdpr.ca.gov/schoolipm

Geiger, C. & D. Tootelian. 2005. Healthy Schools Act spurs integrated pest management in California public schools. *California Agriculture* **59**(**4**): 235–41.

Healthy School Act. 2006. California Education Code, Division 1, Part 10.5, Chapter 5, Article 4 (commencing with Section 17608) and Division 4, Part 27, Chapter 6, Article 4 (Section 48980.3); Food and Agricultural Code, Division 7, Chapter 2, Article 17 (commencing with Section 13180); Health and Safety Code, Division 2, Chapter 3.4, Article 1 (Section 1596.794) and Article 2 (Section 1596.845).

Laurie Brajkovich is a Senior Environmental Scientist at the California Department of Pesticide Regulation, Sacramento, California. Baccalaureate degree was obtained at California State University Sacramento in Environmental Science. She has ten years experience in managing environmental compliance both in private industry and with state regulatory agencies.

Ann Hanger is an Environmental Scientist with the California Department of Pesticide Regulation. In addition to School IPM, her current projects include analyzing legislation pertaining to pest management issues and working on regulations involving the licensing and certification of pesticide applicators and businesses.

Belinda Messenger is a Staff Environmental Scientist at the California Department of Pesticide Regulation. She received her baccalaureate in Botany and Plant Sciences and her doctorate in Plant Pathology from the University of California at Riverside. She is in charge of the California Child Care IPM Program "Growing Up Green" and works with child care providers to encourage implementation of IPM in the child care setting.

Sewell Simmons is an Environmental Scientist with the California Department of Pesticide Regulation. He has worked in School IPM since the mid-1990's, and has a special interest in pest prevention through facility design, maintenance and construction practices. Sewell also has experience on IPM projects in cropland, rangeland, parklands, rights-of-way and residential areas.

Similar articles that appeared in *Outlooks on Pest Management* include – 2003 **14(1)** 36; 2006 **17(6)** 270; 2007 **18(3)** 124