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Tim Stock
Oregon State University

Alexander Kowalewski
Oregon State University

Micah Gould
Oregon State University

Paul Jepson
Oregon State University

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Abstract

Since 2011, Oregon State University has conducted integrated pest management (IPM) training specific to public schools. School personnel receive onsite training on key IPM practices as well as associated materials. To determine which practices and materials school employees are using as a result of the program, we administered a survey to 2016 training attendees. We found that all returning attendees had been implementing practices and using materials as a result of the training. The most common practice was sealing holes to keep pests out. Additionally, the majority of respondents reported a reduction in pesticide use. Our approach may serve as a reference for Extension specialists in developing school IPM programs in other states.

Keywords: school integrated pest management, Extension training program, training survey, pest management practices, pest management resource materials

Tim Stock
Senior Instructor and Associate Director
Integrated Plant Protection Center
tim.stock@oregonstate.edu

Alexander Kowalewski
Assistant Professor and Turf Specialist
Department of Horticulture
alec.kowalewski@oregonstate.edu

Micah Gould
Graduate Assistant
Department of Horticulture
gouldm@oregonstate.edu

Paul Jepson
Professor and Director
Integrated Plant Protection Center
paul.jepson@oregonstate.edu

Oregon State University
Corvallis, Oregon

Introduction

In 2009, the governor of Oregon signed a bill into law that required all Oregon schools (primarily public and private elementary through secondary schools) to begin implementing integrated pest management (IPM) strategies effective July 1, 2012 (Oregon Legislative Assembly, 2009). A primary purpose of the law is to protect the health and safety of students (Chapter 634—Pesticide Control, Oregon Revised Statutes, 2017). The law requires that schools develop and implement an IPM plan, designate an IPM coordinator, provide annual IPM training for the IPM coordinator and periodic training for school employees, and use a state-accepted list of low-impact pesticides for use inside schools and on school grounds (Chapter 634—Pesticide Control, Oregon Revised Statutes, 2017). The situation in Oregon is not unique, and the concern for student health not unwarranted. As of 2014, 15 states across the United States had implemented pesticide restrictions pertaining to public schools (Hurley et al., 2014). With regard to student health, there is increasing evidence of links between pests in schools and incidence of asthma in students (Nalyanya, Gore, Linker, & Schal, 2009; Phipatanakul, Eggleston, Wright,

Wood, & the National Cooperative Inner-City Asthma Study, 2000; Sheehan et al., 2017). Because of these increasing restrictions and concerns, there is a clear need for implementation of IPM in schools.

In 2011, our Oregon State University (OSU) School IPM Program team responded to the new law. We developed a training and began providing it annually to school IPM coordinators. The training occurs on-site at schools and involves hands-on learning activities, is needs based, and is reinforced by supporting resource materials.

Because the training is conducted at schools, trainers can employ experiential, hands-on learning activities and lead school-specific pest inspections. This attention to experiential learning and pertinence to the learner meets general needs of adult learners as demonstrated in the literature (Franz, 2007; Franz, Piercy, Donaldson, Westbrook, & Richard, 2010). More specifically, a University of Florida survey of school district employees responsible for indoor pest control indicated that they learned best through hands-on training (F. Oi, personal communication, September 4, 2012). Additionally, outdoor, hands-on training and field demonstrations were identified as preferred training methods in agriculture (Franz et al., 2010), and these methods may be relevant to pest management training at schools because of similarities between the outdoor agricultural and school grounds settings.

Topics for the annual training for school IPM coordinators are based on stakeholder needs and include indoor and outdoor rodent and insect management as well as hardscape, landscape, and turfgrass weed management. Since 2011 we have distributed needs surveys annually at the training events, and we use findings from these surveys to adjust the training agenda to meet stakeholder needs the following year.

Our team also developed resource materials for use by the school IPM coordinators. These resource materials include fact sheets and publications on IPM for specific school pests, model IPM plans, and a low-impact-pesticides list (see resource examples at http://blogs.oregonstate.edu/schoolipm/pests/, http://blogs.oregonstate.edu/schoolipm/files/2017/09/Large-IPM-Plan.pdf, http://blogs.oregonstate.edu/schoolipm/files/2017/09/Small-IPM-Plan.pdf, and http://blogs.oregonstate.edu/schoolipm/pesticides/).

As of January 2016, 97% of Oregon's 197 school districts had been trained. To evaluate the effectiveness of a needs-based, hands-on training program such as ours, we conducted a survey of the 2016 training attendees.

Survey Objectives

Our purpose was to identify the IPM practices and resource materials being used in Oregon schools as a result of OSU's school IPM coordinator training. Our specific objectives were as follows:

- Determine the numbers of returning trainees and new trainees (i.e., those yet to receive training).
- Determine which IPM practices and materials were being used in schools as a result of the program.
- Determine whether schools were reducing pesticide use inside schools and on school grounds as a result of the program.

Methodology and Results

Prior to initiation of the 2016 school IPM coordinator training, we designed a survey to ascertain which key IPM practices and OSU resource materials school IPM coordinators and other school employees were using as a result

of the training program. In 2016, 361 trainees attended OSU school IPM coordinator training sessions held at 11 locations across the state (OSU School IPM Program, n.d.). We administered surveys before the start of each training, and we collected completed surveys from 317 of the 361 trainees. Of the 317 respondents, 240 (75.7%) had attended the training before, and 77 (24.3%) had not attended the training previously.

Survey of Returning Attendees

Of the 240 survey respondents who were returning attendees, the majority of the respondents, 100% reported that their schools were implementing key IPM practices and/or using OSU materials as a result of the OSU training program. The most common practice being implemented in their schools was sealing holes to keep pests out. Regarding reductions in pesticide use inside and outside schools as a result of the OSU school IPM coordinator training program, the majority of school employees returning for training reported a reduction in pesticide use inside and outside schools. Results from the survey of returning attendees are shown in Table 1.

Table 1.

Key Integrated Pest Management (IPM) Practices and Materials Used in Schools of Past Training Attendees (n = 240) as a Result of the Oregon State University (OSU) School IPM Program

Key IPM practice/resource	Number and percentage of respondents
Sealed holes around penetrations through walls, cracks, crevices, or other locations to keep pests out	198 (82.5%)
Installed or replaced more external door sweeps to keep pests out	158 (65.8%)
Kept records of pest complaints and pest management actions	158 (65.8%)
Consulted and used pesticides from the "OSU Low-Impact Pesticide List"	157 (65.4%)
Used OSU Model IPM Plan template to create own IPM plan	155 (64.6%)
Shared pest fact sheets with school staff	132 (55.0%)
Changed how school personnel set traps for mice and/or rats	122 (50.8%)
Used pest fact sheets and/or other printed materials from OSU to educate staff	115 (47.9%)
Changed turf fertilization practices	93 (38.8%)
Changed irrigation practices	87 (36.3%)
Changed turf mowing practices	87 (36.3%)
Reduced use of pesticides to manage pests inside school buildings	160 (66.7%)
Reduced use of pesticides to manage pests in the landscape or turf	143 (59.6%)

Survey of New Attendees

New attendees, who were a small portion of the respondents to our survey, also reported that their schools were implementing key IPM practices and/or using OSU resource materials as a result of the OSU training program. Specifically, 58 of the 77 new attendee respondents (75.3%) indicated that this was the case. Although a relevant question was not explicitly included in the survey, we learned through communication with the new attendees that they had received this information from prior IPM coordinators who had attended past training

events or that they were school employees working with existing IPM coordinators who had attended past training events. The most common IPM practice being implemented in their schools was keeping records of pest complaints and pest management actions. Regarding pesticide reductions, of the trainees new to the OSU school IPM coordinator training program, a minority reported reduced pesticide use on school grounds. Results from the survey of new attendees are shown in Table 2.

Table 2.

Key Integrated Pest Management (IPM) Practices and Materials Used in Schools of New Training Attendees (n = 77) as a Result of the Oregon State University (OSU) School IPM Program

Key IPM practice/resource	Number and percentage of respondents
Kept records of pest complaints and pest management actions	29 (37.7%)
Sealed holes around penetrations through walls, cracks, crevices, or other locations to keep pests out	28 (36.4%)
Used OSU Model IPM Plan template to create own IPM plan	24 (31.2%)
Installed or replaced more external door sweeps to keep pests out	19 (24.7%)
Changed how school personnel set traps for mice and/or rats	19 (24.7%)
Consulted and used pesticides from the "OSU Low-Impact Pesticide List"	15 (19.5%)
Changed turf fertilization practices	14 (18.2%)
Changed turf mowing practices	12 (15.6%)
Shared pest fact sheets with school staff	12 (15.6%)
Changed irrigation practices	10 (13.0%)
Used pest fact sheets and/or other printed materials from OSU to educate staff	7 (9.1%)
Reduced use of pesticides to manage pests inside school buildings	30 (39.0%)
Reduced use of pesticides to manage pests in the landscape or turf	24 (31.2%)

Discussion and Conclusion

Our survey results showed that the vast majority of school IPM training participants were returning attendees and that all of the returning attendees' schools were implementing IPM practices and using materials as a result of the OSU school IPM coordinator training program. The results also implied that most schools of attendees who had never had the training also were benefiting from increased IPM adoption because of the work of past training attendees from the schools. The most common practice being implemented in schools of employees who had attended training in the past was sealing holes to keep pests out, whereas the most common practice being implemented in the schools of new attendees was keeping records of pest complaints and pest management actions. Regarding reductions in pesticide use resulting from the OSU school IPM coordinator training program, the majority of school employees returning for training reported a reduction in pesticide use.

The results of our survey indicate that a training program for school IPM coordinators developed with attention to particular elements—on-site hands-on learning activities, continued assessment of stakeholder needs, and provision of supporting resource materials—has fostered increased adoption of key IPM practices. Further, the findings suggest that our approach may serve as a reference for Extension specialists in developing school IPM

programs in other states.

Author Notes

Tim Stock is now coordinator of the OSU School IPM Program; Alexander Kowalewski is an associate professor; Micah Gould has taken a position in the private sector; and Paul Jepson has stepped down from directorship of the Integrated Plant Protection Center.

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