

## Community Education for Better Termite Control in Hawaii

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**Abstract.** We describe a program initiated in fall 2001 in Hawaii's public schools to increase both student and community awareness and knowledge of effective termite prevention and management. Program staff spend approximately 15 hours in the classroom, with an additional 15 hours of teacher follow-up; and implement progressively more sophisticated curricula tailored to each grade level and meeting state standards for science instruction, culminating in an activity in which students share their knowledge with the greater community. Teachers may earn professional development credits by participation in a workshop consisting of 20 hours of training and 45 hours of classroom implementation. As of spring 2005, over 50 teachers in over 30 schools had participated in the program, directly addressing over 2000 public school students. Adult education classes are also offered in conjunction with the classroom program, and attendance at these classes has increased four-fold since inception of the program. Steps to create a sustainable statewide program are described.

**Key words:** Isoptera, Rhinotermitidae, *Coptotermes formosanus*, termite IPM, termite education

### Introduction

Education is an essential component of effective urban pest management programs. With respect to termites, individual property owners must be sufficiently knowledgeable to make informed decisions on which measures would be most effective in their particular situation to prevent termite attack and mitigate any existing infestations.

Area-wide pest management is a laudable goal, and achievable in agricultural settings (c.f., Kaplan 2004) but difficult to implement in the urban environment with numerous individual property owners. One approach to area-wide termite management taken in New Orleans, Louisiana, as part of the national United States Department of Agriculture, Agricultural Research Service (USDA-ARS) program Operation Fullstop was to identify a neighborhood of particular historical and cultural significance (the French Quarter), and offer property owners financial support for termite control in return for compliance by the property owner and the pest control contractor with certain requirements for participation in the program (Ring et al. 2001, Morgan 2004). Such financial incentives are effective, but developing such a program over a large and disjunct area, such as an island state, is a daunting task.

Our approach to area-wide management of termites in Hawaii was to develop and implement an educational/outreach program targeting the public schools and adult continuing education programs as windows into local communities. Our objectives were to enhance community awareness of termite problems and management options, to achieve wider implementation of effective termite prevention and control techniques by homeowners; and to increase the baseline knowledge of effective termite management in the next generation of Hawaii homeowners. To facilitate implementation in the public schools, we developed

elementary and middle school curricula meeting the state standards for science education, and implemented teacher workshops meeting Hawaii Department of Education certification requirements for professional development credits. Simultaneously, community workshops on termite management were offered in the evening through adult education offices in various school districts.

Beneficial corollaries of this program have been increased student and teacher interest in and knowledge of science and science careers, especially in the areas of entomology and biology, in addition to a positive impact on termite management within the participating schools and surrounding communities. Our goal is a sustainable state-wide educational program that will be teacher driven and self-perpetuate in Hawaii's classrooms and communities.

### **Methods**

Key components of this project are (1) the development of curricula addressing termite biology and control for multiple grade levels, that include a knowledge sharing activity to transfer information from the classroom to the surrounding community; (2) development of workshops to train teachers in implementation of the curricula; and (3) development of complementary adult education classes for each community.

In Fall 2001, we began the process of curriculum development as a pilot project in cooperation with an interested science teacher at Moanalua Middle School on the island of Oahu, Hawaii. In 2002 and 2003, we began working with additional elementary and middle schools on Oahu as a result of contacts made with receptive principals and teachers. Curricula was developed for grades K–3, 4–6 and 7–8 that met the Hawaii state science education standards. These curricula continued to be fine-tuned through classroom experience in 2003 and 2004. As outcome indicators, pre and post-curriculum self-evaluations of students' knowledge of the concepts addressed in the class work were developed. In the lower grades (K–6), these consist of six concepts, and increase to 15 concepts in grades 7–8.

In 2004, a professional development workshop for teachers was designed, and approved by the Hawaii Department of Education Professional Development and Educational Research Institute for two professional development credits for teachers completing 65 hours of training and implementation and submitting a portfolio tracking impact on teacher/student learning. This was one of the first workshops to comply with updated requirements by the Department of Education, and the Department requested permission to use it as a model for other workshop proposals. The first "Termites: Educate to Eradicate" workshop was implemented in Fall 2004.

In 2003, we also began to offer complementary adult education evening classes in termite biology and control through the Hawaii Department of Education Community Schools for Adults in the school districts where our curricula were in use. This effort continued in 2004 and 2005, and pre and post-session questionnaires focusing on key concepts were developed to assess outcomes, and surveys were conducted to obtain feedback to improve the classes.

### **Results and Discussion**

The first two years of this project included a relatively long period of building trust and establishing our educational credentials with public school teachers and principals. School administrators were initially confused about our role as educators versus pest control advisors; and teachers were wary of being asked to take on additional duties with respect to

science education (in which most did not have a strong background) and of squeezing additional curricula into their already-full class schedules. Once we implemented classroom instruction, however, teachers quickly began to see our efforts as both an aid to science education and added assistance to them in the classroom. As a result, in 2003 through 2004, our program was implemented in 22 Oahu public schools, across eight grade levels with 50 teachers, and directly addressing 1473 students. In Spring 2005, we added an additional nine schools, and were actively working with 22 teachers and 634 students through the spring semester. Concept surveys demonstrate an increase in student awareness and knowledge as a result of the program.

Early portions of the curricula for each grade level focus on the scientific method, insect biology, and termite biology; and later lessons address termite prevention and control. Topics such as insect diversity and classification, scientific observations, termite biology and life cycle, social vs. non-social insects, termite castes, termite identification, termite dissection and microscope techniques, and termite prevention and control are presented in growing complexity across each grade level. Students not only complete a worksheet on termite prevention in the classroom, but also take home and complete a home inspection worksheet with their parents or guardians. The instructional sequence culminates in a project designed to share their newfound knowledge with others in the school and with the surrounding community. Knowledge is shared at parent-teacher nights, Parent Teacher Association meetings, and other school and community events. In the lower grades, student activities include displays (interactive termite games are a favorite), posters, brochures, termite "magazines," and skits; while in grades 7–8, the students learn to apply computer and Microsoft PowerPoint presentation techniques.

The innovation of student and teachers in the sharing knowledge final project is exemplified by the 1st and 2nd grade students of Halau Lokahi, a public charter school located in Palama Settlement, a lower economic Kalihi neighborhood on Oahu. Students created flyers on termite management and hand delivered them to groups of elderly residents. Students took the opportunity to communicate what they had learned, while discussing how termite damage affects their homes.

The first teacher workshop was implemented in the 2004–2005 school year, with 13 teachers participating. This workshop requires 20 hours of instruction, 45 hours of classroom implementation, and completion of a portfolio to obtain professional development credits. Six of the teachers enrolled earned two professional development credits from the Department of Education by completing the portfolio. Workshops are planned annually.

Adult education classes offered in 2003 and 2004 enjoyed stable attendance, although we determined that additional efforts to promote the classes in the community were needed beyond the announcements made by the school district. As a result, in 2004, we began publicizing the classes much more extensively through the university public relations office and through contacts in print and broadcast journalism. Increased media attention, as well as the growing numbers of students and teachers participating in the program, has resulted in a four-fold increase in attendance at adult seminars held to date in 2005. The pre and post-seminar surveys of attendees demonstrate success in increasing their knowledge, and also have served as a reminder to us of key points that may need additional emphasis during future presentations.

This program has grown steadily since its inception in Fall 2001. As of this writing (spring 2005), we have worked with over 50 teachers in eight grade levels, in over 30 public schools on Oahu. We have taught over 2000 students; and their activities to share their knowledge, along with our adult education classes, have spread the impact of our program from the classroom into the larger community. In fall 2005, we will be partnering with four teachers in grade levels 2–4 on the island of Maui.

In order to achieve our goal of a sustainable program, we are currently preparing to publish our curricula through the Curriculum Research and Development Group in the College of Education at the University of Hawaii at Manoa, and are filming interactive DVD lessons. Direct in-class instruction is being gradually phased out for third-year partners. However, these teachers are still able to obtain assistance and program support if needed. We also anticipate that participation in teacher training seminars will become a requirement for partnering teachers. If this proves logistically difficult, use of evening courses for initial teacher preparation, coupled with increased reliance upon teacher-to-teacher mentoring could provide a sustainable model. With these steps, we believe that this program will continue to successfully fill a need in Hawaii's schools and communities for many years to come.

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