

Regional IPM Competitive Grants Program—Northeast Region

Final Project Report (includes 1-Year Extension (6/1/08-5/31/09))

A. Grant Data

- Today's date: August June 30, 2009
- Category: *Northeast Regional IPM Competitive Grants Program (RIPM)*
- Project Title: Implementation of the IPM and Environmental Education Curriculum
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- Team members: Richard A. Ashley, Professor Emeritus (deceased), University of Connecticut; Dale B. Schimmel, Curriculum Liaison, Wachusett Regional School District; Cheryl-leigh B. Kusmer, Teacher and Social Studies Consultant (Emeritus), University of Connecticut
- States involved: Connecticut and Massachusetts
- Grant #: 2006-41530-03486
- Year the grant was awarded: 2006
- Length of grant: 2 years (6/1/06 – 5/31/08) plus a 1-year extension through 5/31/09
- Funding amount: \$62,412

B. Nontechnical Summary

The Integrated Pest Management (IPM) and Environmental Education Curriculum is a science-based curriculum that teaches the concepts and methods of IPM to school children and 4-H youth. The development and implementation of the IPM curriculum is funded in part by a USDA CSREES Regional Integrated Pest Management Grant for the Northeast Region. The IPM curriculum for K-12 students teaches the principals of IPM, including an introduction to IPM, what pests are (insects, weeds, and pathogens), how to control pests (mechanical, biological, chemical, and cultural controls), and how to protect the environment by keeping our food and water safe to eat and drink and preserving biological diversity.

The IPM curriculum is broad-based in terms of pests and crops that are addressed. It engages students, their families, and other citizens in learning about pests, including insects, rodents, weeds and invasive plants, and diseases that are potential threats to plants, humans, and other animals in and around homes, public buildings, agricultural lands, and natural areas. The curriculum also provides information on beneficial organisms, such as ladybugs. The importance of selecting nonpesticidal tactics to manage pests and protect the environment is stressed. A diversity of crops is addressed in the IPM curriculum, whether the crops are part of a backyard vegetable patch, a town butterfly garden, or other type of residential, community, or natural area.

Training sessions for the IPM and Environmental Education Curriculum were developed by Donna Ellis and Cheryl Kusmer for grades 2-3, and a new workshop was created for the grades 4-5 curriculum. The Project Director and team members developed a new IPM Curriculum for

grades 4 and 5, which was published in 2007 and available for distribution in 2008. The curriculum modules are developed and implemented through training sessions to be included in science programs, but they also contain strands that link the subject areas to social studies, language arts, math, and art. Stakeholders include Connecticut and Massachusetts public, private, and parochial school teachers, science coordinators, curriculum specialists, IPM and other environmental leaders, home school families, and 4-H. IPM Curriculum workshops for grades K-1, 2-3, 4-5, and 7-8 were presented to teachers, IPM leaders, and other environmental personnel from Connecticut, Massachusetts, the Northeast Region, and other states in the U.S. during professional education conferences, workshops, and other training sessions.

Widespread implementation of the IPM and Environmental Education Curriculum will result in a citizenry that is better prepared to make decisions to safeguard the environment. Citizens will understand the role of IPM in protecting the environment and will appreciate the contribution that farmers make to protect the environment. It is likely that homeowners and gardeners will apply IPM principles when faced with pest management needs in their own homes or in their daily lives. Everyone in the Northeastern Region will benefit from a citizenry that understands IPM and the positive impact it has on the environment.

C. Introduction

The National Road Map for Integrated Pest Management (IPM) lists the areas where citizens live, work, and play as the locations where they are most likely to be exposed to pests and pest control methods. IPM training programs need to effectively deliver information on pest control to ensure that the use of IPM practices will have minimal impacts on the environment. A key educational need for IPM development in the National Road Map is to create public awareness and understanding of IPM, including health, environmental, and economic impacts, through education programs in schools.

The Community IPM Working Group in the Northeast surveyed and prioritized the pest management needs requested by stakeholders in the region. The stakeholder-identified needs addressed a wide array of surroundings, including homes, lawns, and gardens, and school buildings and landscapes. The Working Group also identified a need for teaching IPM in schools, and the third highest-ranked priority was to develop IPM curricula for schools.

Gardening is now the second most popular leisure activity in the United States. Homeowners and other citizens make pest management decisions every day so they can grow healthy plants. In a 2003 market research study by the National Gardening Association, 84 million households in the United States, representing 78% of all households, were involved in lawn and garden activities. These households spent \$38.4 billion on lawns and gardens, and this figure continues to increase annually. Proper care and maintenance of residential landscapes requires knowledge and decision-making about pest management, selection of nonpesticidal tactics, and protection of environmental quality to reduce human health risks. This knowledge begins with IPM.

The University of Connecticut Integrated Pest Management Program objective is to reduce dependence on pesticides while maintaining crop productivity, crop quality, and the quality of life we enjoy. In Connecticut, over 590 commercial producers and grounds keepers managing

approximately 37,000 acres have been trained in IPM practices. This training has resulted in reducing the use of pesticides being applied to Connecticut crops and landscapes by more than 80 tons. In urban states like Connecticut and Massachusetts, where the majority of land is owned and managed by individuals other than farmers, IPM education must be extended to include the general population.

In 2001, development of the K-12 IPM and Environmental Education Curriculum began. To date, curricula for grades K-1, 2-3, 4-5, and 7-8 have been published, and the curriculum for grades 5-6 is underway. Curricula for the remaining grades will be completed over the next two years. The topics that the IPM and Environmental Education Curriculum teaches address the Connecticut Science Framework as well as the National Science Education Standards. In addition, it is integrated with other curricular areas, such as language arts, social studies, mathematics, art, economics, and technology.

The IPM and Environmental Education Curriculum is relevant to current environmental concerns and events that affect citizens in Connecticut, in the Northeastern Region, and in the nation. The curriculum lessons teach students and other citizens about insects, weeds and invasive plants, and diseases that may occur in homes, yards and gardens, schools, and communities. Using the steps of IPM, participants research pest situations and make decisions on the best way to manage pest populations and safeguard human health using nonpesticidal tactics.

The IPM Curriculum is broad-based in terms of pests and crops that are addressed. It engages students, their families, and other citizens in learning about pests, including insects, rodents, weeds and invasive plants, and diseases that are potential threats to plants, humans, and other animals. The curriculum also provides information on beneficial organisms, such as lady beetles. The importance of selecting nonpesticidal tactics to manage pests and protect the environment is stressed. A diversity of crops is addressed in the IPM curriculum.

Despite the overwhelmingly positive response received thus far by teachers and environmental leaders who have received training on the IPM and Environmental Education Curriculum, the project continues in the introductory stage of the essential outreach efforts to teach educators about this new and exciting curriculum. IPM has traditionally been a program where farmers and other producers were trained to learn about agricultural pests, identify harmful weeds, insects, and pathogens that could lower crop values, and make informed decisions on pest management. Today, however, there is a critical need to transition IPM beyond the agricultural community and to provide educational outreach for all citizens. More and more non-agricultural property owners control much of the land in the Northeastern Region and apply high percentages of pesticides. Homeowners, community leaders, and civic groups have a stake in the health of the environment. They need IPM education. Reaching the targeted stakeholders in environmental protection through teaching the concepts and use of IPM by educating students in school systems is the best approach. Extension outreach using the IPM and Environmental Education Curriculum is a very effective way to impact these landowners by teaching them how to manage pests and protect the environment.

D. Objectives

Objective 1: To continue to develop and provide educational outreach by training science teachers and IPM leaders on the new IPM and Environmental Education Curriculum.

Training will include the following areas:

- a) Environmental concerns in the Northeast Region
- b) Principles of IPM as presented in the curriculum
- c) Impacts of IPM on solving environmental problems
- d) Implementation of IPM methods that can be used to contribute to the restoration and preservation of the home and agricultural environment

A copy of the curriculum will be provided during training.

Narrative: We achieved project objectives during the first two years of the grant and the 1-year extension through 5/31/09. Training sessions for the IPM and Environmental Education Curriculum were developed by Donna Ellis and Cheryl Kusmer for grades K-1 and 7-8. A new training workshop was created for the grades 2-3 IPM curriculum module in Year 1. The Principal Investigator and team members developed a new IPM and Environmental Education Curriculum for grades 4 and 5, which was published in 2007 and made available in the spring of 2008. A training workshop was developed by Donna Ellis and Cheryl Kusmer at the end of Year 2 for grades 4-5 and was presented at a workshop in May 2008. During the 1-year extension for the grant, three curriculum training workshops were presented by Donna Ellis and Cheryl Kusmer to educators in Connecticut. One large school district in Connecticut adapted the IPM and Environmental Education Curriculum for a new comprehensive science curriculum, and the teachers in the school district were extremely enthusiastic about the lessons and accompanying hands-on activities now available to teach environmental science to their students.

Objective 2: To implement the K-12 IPM and Environmental Education Curriculum in order to produce environmentally-aware citizenry

Narrative: Project objectives have been achieved. IPM Curriculum workshops for grades K-1, 2-3, 4-5, and 7-8 were presented to teachers, IPM leaders, and other environmental personnel. The curriculum kits, including supplemental materials, were distributed to those who attended the training sessions. Trainees learned about the curriculum lessons in great detail and participated in hands-on demonstrations from highlighted lessons during the workshops. An IPM Curriculum feedback survey was developed and disseminated to area educators in 2008. Results were compiled and tabulated and are presented in **Sections F.** and **G.** of this report.

E. Approach

IPM curriculum training is being developed to continue to provide educational outreach to teachers and IPM leaders on the new IPM and Environmental Education Curriculum. The training includes environmental concerns in the Northeastern Region; principles of IPM; impacts

of IPM on environmental problems; pests found in homes, schools, and communities, and IPM methods that can be used for pest management, with emphasis on nonpesticidal tactics and reduction of pesticide usage in the environment. Training sessions on the new IPM and Environmental Education Curriculum are occurring throughout the two-year project period and the 1-year extension through 2009. During Year 1, the project continued to build from existing curriculum training programs developed for the grades K-1 and 7-8 to include new IPM materials and information which were created for the grade 2-3 curriculum. In Year 2, training sessions were developed and presented for the grade 4-5 curriculum, which was published in 2007 and made available in the spring of 2008. During the 1-year extension, IPM Curriculum training workshops were presented to teachers and other educators.

A follow up evaluative form (IPM Curriculum feedback survey) and cover letter were sent in Year 2 to teachers and other educators who have received the IPM and Environmental Education Curriculum and/or who have attended training sessions or workshops. The feedback survey was initially emailed to educators at their respective schools or agencies. The response rate unfortunately was low, with a possible explanation that problems arose with emails being blocked by spam filters at schools and other organizations. A significant amount of the surveys were therefore unable to be delivered electronically to the recipients. The 1-year extension of the grant allowed an additional opportunity to disseminate the IPM Curriculum survey via U.S. mail.

To implement the K-12 IPM and Environmental Education Curriculum in order to produce environmentally-aware citizenry, training sessions were presented to educators and environmental leaders from Connecticut, Massachusetts, and other states in the Northeastern Region and the U.S. During the training sessions, IPM curriculum kits and supplemental materials are distributed to workshop participants. As the curriculum is introduced during the workshop, participants learn about the lesson content in great detail, including focus areas and skills, curriculum objectives, essential questions and understandings, involvement activities, and assessments. Participants also participate in hands-on demonstrations of selected activities included in the curriculum lessons to gain valuable participatory experience that will assist them in the classroom or area where the lesson is to be taught to the students. Workshop participants learn how these activities help teach the principles of IPM to students and other citizens.

F. Progress

The Principal Investigator and team members developed a new IPM and Environmental Education Curriculum for grades 4 and 5, which was published in 2007 and made available in the spring of 2008. A training workshop was developed by Donna Ellis and Cheryl Kusmer at the end of Year 2 for grades 4-5 and was presented at a workshop in May 2008. Additional curriculum training workshops were presented to teachers, IPM leaders, and other environmental personnel through May 2009. The IPM curriculum was disseminated to schools in Connecticut, Massachusetts, other New England states, and other states throughout the U.S. Please see **Section G. Results** for additional information on progress achieved.

G. Results

A new training workshop was created for the grades 2-3 IPM curriculum module in Year 1. The Principal Investigator and team members developed a new IPM and Environmental Education Curriculum for grades 4 and 5, which was published in 2007 and made available in the spring of 2008. A second training workshop was developed by Donna Ellis and Cheryl Kusmer at the end of Year 2 for grades 4-5 and was presented at a workshop in May 2008. IPM Curriculum workshops for grades grades K-1, 2-3, 4-5, and 7-8 were presented to teachers, IPM leaders, and other environmental personnel through 2009. The curriculum kits, including supplemental materials, were distributed to those who attended the training sessions. Trainees learned about the curriculum lessons in great detail and participated in hands-on demonstrations from highlighted lessons during the workshops.

During Year 2, 32 curriculum kits were distributed at six workshop training sessions and educational conferences. Two hundred and sixty educators and other professionals received training in Connecticut and Massachusetts. The training was provided to a diverse audience that included environmental organizations, college students, and state leaders. During the 1-year extension for the grant, three curriculum training workshops were presented to 90 educators and other professionals by Donna Ellis and Cheryl Kusmer in Connecticut. One large school district in Connecticut adapted the IPM and Environmental Education Curriculum for a new comprehensive science curriculum, and the teachers in the school district were extremely enthusiastic about the lessons and accompanying hands-on activities now available to teach environmental science to their students. Twenty curriculum kits were distributed to this school district.

The IPM and Environmental Education Curriculum continues to be extremely well received by Connecticut and Massachusetts teachers, 4-H program leaders, and other environmental educators in the region. The curriculum for grades was published during 2007 after a series of lengthy delays, and full curriculum kits just became available in the spring of 2008. The kits include a box of 21 lessons with handouts, overheads, and a comprehensive introduction to IPM and two supplemental boxes containing books, DVDs, picture card sets, posters, and brochures.

The curriculum was presented at the University of Connecticut to 60 horticultural students taking IPM courses in 2008 and 2009, with some of the students planning to become teachers after obtaining their college degrees. During the effective period of the grant, information on the IPM curriculum and training workshops was disseminated to approximately 13,500 educators and citizens at area events, including Celebrating Agriculture Day, Connecticut Agriculture Day at the Capitol, Cooperative Extension Legislative Reception at the (CT) Capitol, University of Connecticut Cornucopia-Fest, 4-H programs for youth of all ages, University of Connecticut Faculty and Staff workshops, and a Leader's Forum held at the University.

An IPM curriculum workshop was presented at Confratute in 2007, a nationally-recognized summer institute on enrichment learning and teaching, which is held at the University of Connecticut and attended by teachers throughout the U.S. and in other countries. Teachers from Connecticut, New York, Rhode Island, Maryland, Minnesota, Texas, and Malaysia attended the workshop, and they commented that the IPM Curriculum meets the needs of their schools to

teach relevant science by promoting critical thinking and scientific inquiry. Comments received from workshop attendees during the reporting period included:

“Thank you so much for having created such an informative, hands on program.”

“It’s teacher friendly! Terrific!”

“Great materials – and so much stuff! There is a lot of information that can be integrated into what I’m doing already.”

“This was terrific. The background info was enough and the program seems fabulous! I can’t wait to use it! Thank you!”

“I think it is great that you are making a program that will create eco-conscious citizens. We need more programs like this!”

“Great workshop! There are many cross-curricular applications.”

“Great class – very active. Kids will love the games. Thanks.”

Another exciting aspect of the IPM and Environmental Education Curriculum is that it is being adopted not only by traditional K-12 teachers, but also by 4-H leaders, environmental educators who are affiliated with the Connecticut Outdoor and Environmental Education Association, and has received attention from Connecticut legislators and agricultural organizations. During 2009, 400 area 4-H youth in Connecticut learned about IPM and environmental science as many lessons from the curricula for grades K/1 and 2/3 were used in summer programs.

We were contacted by several school districts in Connecticut to use the IPM and Environmental Education Curriculum, as some school districts lack a sound curriculum that not only addresses the required science standards but is engaging for teachers and students alike. For example, the Simsbury school district in Connecticut, with 5,000 K-12 students is adapting the IPM and Environmental Education Curriculum for a new comprehensive science curriculum currently under development, and the teachers in this school district were extremely enthusiastic about the lessons and accompanying hands-on activities now available to teach environmental science to their students.

A 12-month no-cost extension for the grant was requested and approved to allow sufficient time to complete two of the objectives during Year 2:

- 1) With the delayed publication of the curriculum for grades 4 and 5 not available until spring 2008, a separate training session was recently developed and implemented for this curriculum and presented at a training workshop in May 2008. Three additional IPM and Environmental Education Curriculum training workshops were presented during the extended period for the grant. Educational materials provided to area educators during the three workshops also included draft lessons for the grades 5/6 IPM Curriculum and these received excellent evaluations by the workshop participants.

- 2) A University of Connecticut IPM Curriculum feedback survey was developed during the reporting period. The survey was emailed to teachers and other educators who have received the IPM and Environmental Education Curriculum and/or who have attended training sessions or workshops, who have had sufficient time to become familiar with the materials, and have taught some of the IPM lessons to their students or other participants. Teachers and other educators were asked for their feedback on: 1) the relevancy of the curriculum materials, 2) the extent of their use of the materials, and 3) the number of citizens, including children and their families, who were impacted by the curriculum. The survey was also made available on the University of Connecticut IPM website at www.hort.uconn.edu/ipm/misc/curriculumfeedbackform.html so that teachers could complete it online. Despite the two delivery options, however, a low number of surveys were returned. Problems arose with emails being blocked by spam filters at schools and other organizations, and thus a significant amount of the surveys were not able to be delivered electronically to the recipients.

An alternative strategy was planned, to send the surveys via U.S. mail to the target group as the new school year began in the fall of 2008. A 12-month no-cost extension for the grant was requested and approved to allow sufficient time to mail out the surveys, receive the completed forms, and summarize the results. The survey data will also be used to maintain a database of contacts in the region as curricula and new training sessions are developed and implemented. Teachers, educators, and other IPM or environmental leaders who attended training sessions or workshops for the IPM and Environmental Education Curriculum were asked to complete evaluation forms, providing feedback on the following areas:

- the effectiveness of the training
- how relevant the materials are for current or future environmental science classes or programs
- the number of students or other participants that the educators will in turn teach about the IPM and Environmental Education Curriculum

Forty-three surveys were completed and returned to the University of Connecticut. Survey comments were gathered from educators who are using the curriculum and have had sufficient time in their classrooms to become familiar with the materials and have taught some of the IPM lessons to their students. Survey results are summarized as follows:

- Approximately 4,600 participants utilized the IPM curriculum and were impacted by IPM
- 100% of the respondents strongly agreed that young people should be introduced to the concepts of IPM
- 100% of the respondents gave an overall rating of the IPM and Environmental Education Curriculum as very good to excellent
- 100% of the respondents rated the science relevancy of the curriculum as very good to excellent

- 95% rated the application of the IPM curriculum to science standards as very good to excellent
- 89% of the participants rated as very good to excellent the ability of the IPM curriculum in providing student interest

This grant recently provided an opportunity for obtaining an additional, related grant through the Northeastern IPM Center in which the Connecticut IPM and Environmental Science Curriculum will be promoted throughout the Northeast (K. Murray, Pincipal Investigator).

It is with great sadness that we reported the passing of Dr. Richard Ashley, Co-Project Director, in March 2008. Dr. Ashley was instrumental in the development of the IPM and Environmental Education Curriculum at the University of Connecticut, and he will be deeply missed.

H. Impacts

To date, more than 282 IPM curriculum kits, which include lesson plans, assessments, and supplemental materials, have been disseminated via workshop training sessions and educational conferences to schools in Connecticut, Massachusetts, other New England states, and other states throughout the U.S., with some schools receiving more than one curriculum module for different grade levels. More than 350 educators and other professionals received training in Connecticut and Massachusetts. The training was provided to a diverse audience that included environmental organizations, such as the Connecticut Outdoor and Environmental Education Association, and youth leadership groups, such as the STRETCH Leadership Program in Windham, CT developed by Leadership Greater Hartford to foster the skills necessary for individuals to become better community leaders. More than 4,600 participants utilized the IPM curriculum and were impacted by IPM. Information on the IPM curriculum and training workshops was disseminated to approximately 13,500 educators and citizens at area events.

A change in required, standardized testing in Connecticut has recently occurred following a new Core Science Framework that was adopted by the state in 2005. One of the components of the new framework is environmental science, and beginning in 2008 this subject will begin to be included in the Connecticut Mastery Test in Science that is administered to students in grades K-10. As a result, teachers throughout the state have been focusing on reworking their curriculum to implement these new standards in the classroom. A key component of the IPM curriculum is that the majority of the revised Connecticut Science Standards for life science and environmental science are covered in the lessons.

As Principal Investigator for this grant, I would like to express my sincere appreciation to the Northeastern IPM Center for their generous support, which provided an opportunity to promote the concepts and methods of IPM and the University of Connecticut IPM and Environmental Education Curriculum to science teachers, educators, and other environmental leaders.

Submitted by,
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August 30, 2009