NYS IPM PROGRAM STAFF REPORTS FOR 2004 PROJECTS

TITLE: NYS Community IPM Education Initiative

PROJECT LEADER(S):
Claudia Coen, NYS IPM Program

COOPERATOR(S): Cornell and CCE: Carolyn Klass and Renee Anderson, Department of Entomology. Laurel Southard, Director of Undergraduate Research. Jennifer Grant, Carrie Koplinka-Loehr and Karen English, NYS IPM Program. Jenno Rivera and William G. Camp, Department of Education.
Others: Jim MaKinster, Hobart and William Smith Colleges. Ann Orman and Steve Hamil, Superintendents, Geneva City School District. Joe Demeis, Principle, West Street Elementary School, Geneva. Jerry Nyrop, Teacher, Geneva Middle School. Nicole Dardia, Teacher, Freeville Elementary School.

TYPE OF GRANT:
Public education

PROJECT LOCATION(S): Albany, Ontario, Schoharie, Suffolk, and Tompkins counties
Results from the ongoing teachers' survey will be most applicable in NY State but will have significance regionally and can be applied as a model nationally.

ABSTRACT:
Pesticide use in urban America is prolific. Children are vulnerable because they play close to the ground, put objects in their mouths, grow rapidly, ingest large quantities of sprayed foods, and are less efficient at detoxifying chemicals. Studies show risks are higher for children in cities. Urbanization trends distance our population from sustainable land-based lifestyles and expanding urban centers rely on imported food and fiber products. Our nation's welfare and standard of living depends on agriculture. The health and safety of our food supply depends on a strong "home-based" production system. Yet, school children learn little about food and fiber systems that incorporate a broad range of scientific and technological activities including IPM. The NRC recommends that K-12 students receive instruction about agriculture. Food and fiber systems standards and benchmarks are incorporated into the curriculum but IPM is not addressed. Survey results from Upstate NY revealed that primary factors influencing the quality and quantity of science taught in elementary schools were lack of time to prepare new lesson plans, resources, funds, confidence when teaching science, attitude towards science, and training. These sobering results compel us to confront issues related to attitudes toward teaching science. Studies underscore the importance of improving the level of confidence and science training for teachers. IPM is "real-world "science that is relevant to the every day lives of teachers and students and provides excellent opportunities for creating inquiry-based science curriculum (K-12), designed to improve science and agricultural literacy. Our program develops cross-professional, cooperative education programs designed to improve general science and agricultural literacy. We develop interdisciplinary curriculum that inspire teachers and students to discover IPM-based science. Our curriculum, rooted in biological and social sciences, uses a progressive decision making tree to select the most suitable action for solving everyday pest problems. Lessons learned by applying the tree are applicable to

all aspects of life. We support teachers as they bring IPM into the classroom with our "Teaching Tools Program". Our "IPM Education Trunk" is brimming with creative, interdisciplinary, interactive curricula that are grade appropriate, meet NYS Standards, and target a number of learning styles. NYS teachers can borrow trunks at no cost.

BACKGROUND AND JUSTIFICATION:

Due to modern trends of urbanization, the lives of more and more of our population are distanced from sustainable land-based lifestyles. Expanding urban centers rely on the products of our food and fiber industries, which are imported from outlying agricultural areas and from overseas. Our nation's general welfare and standard of living depends on agriculture, and certainly the health and safety of our food supply depends on a strong "home-based" production system of food and fiber. Today, 90% of the U.S. population is two or three generations removed from direct contact with food and fiber production, and less than 2% of our population actually produces food on farms (US Census Bureau 2002), while over 20% of our nation's workforce is in some way, shape, or form involved in processing, marketing, distribution, and sales of food and fiber products (Leising 1998). Yet, little is taught in our public schools about agriculture and the total food and fiber system, that incorporates a broad range of scientific and technological activities. NYS IPM is committed to improving the quality and quantity of science education in the public schools and literacy in food and fiber systems related to IPM. We believe that outreach by university based scientists is instrumental to improve the scientific literacy of our public school graduates; therefore researchers associated with food and fiber systems should be encouraged to share in the responsibility of information dissemination via the public school system

In response to the trend away from land-based lifestyles and agricultural literacy, the National Research Council (1985) established the Committee on Agricultural Education in Secondary Schools. This committee recommended that all K-12 students receive systematic instruction about agriculture. Educators and agriculturalists, however, were slow to develop a cohesive framework for food and fiber literacy. To counter this trend, Oklahoma State University undertook an initiative funded by the W.K. Kellogg Foundation to create a shared vision for food and fiber systems literacy. Their primary goal was to motivate students in K-12 to achieve higher levels of core academic competence while becoming agriculturally literate citizens and resource managers. Food and fiber systems standards and benchmarks were identified and incorporated into the curriculum using classroom activities that encouraged active learning. The project identified five core objectives around Food and Fiber Systems: (1) develop K-12 educational standards that align with national standards, (2) compile K-8 instructional materials to support the standards, (3) establish a model for teacher training, (4) field test and evaluate the educational standards and benchmarks, and (5) develop a web site and clearing house for K-12 educators.

We have chosen to focus substantial education effort on schools and IPM in the curriculum because of the critical need to decrease pesticide use to protect our children. Children are more vulnerable to the toxic effects of pesticides because they play low to the ground, eat large amounts of food relative to their body mass, are growing quickly and are less able to effectively detoxify their systems compared to adults (National research Council 1993, Valco 1996, Surgan et al. 2002). We are challenged by the need to both protect our children from toxins and from pests which represent an equally important health hazard (Hollingsworth et al. 2002, Maine School IPM Program 2000,

Maryland Department of Agriculture 1995). Cockroaches have been implicated as a source of powerful allergens that may contribute to asthma and other respiratory diseases (Atkinson 2000, Persky et al. 1999, Cloutier et al. 2002). Similarly, head lice are epidemic in many areas affecting six million children annually. According to the Northeastern IPM Center (http://northeastipm.org/ipm-news-popover.cfm?76id=176) IPM strategies should be utilized to prevent or eliminate infestations. Furthermore they state that, education of children, parents and school staff is key and should start before infestations appear. It is well known that when children understand issues, that directly impact them, they are empowered to effect behavioral changes that positively contribute to the management of the issues of concern and can drive cultural change.

School-aged children are, an enormous captive audience. There are almost 280 million people in the United States. Twenty five percent of those are under 18 years of age and 53.9 million children are enrolled in school (K-12) throughout the USA. In New York State (NYS) there are 703 school districts serving approximately 3.5 million school children daily (US. Census Bureau. 2002). These children serve as a gateway for information dissemination into their communities. There is no doubt, that efforts to make IPM a household word and a common daily practice amongst citizens has to include effective education efforts targeted towards this group of future adults and leaders in our communities. Making IPM a household word starts with engaging children. Our interactive, inquiry-based lesson plans are designed to encourage conversation between children and adults and adoption of IPM attitudes towards pest management to foster improved personal and environmental health. Education, resources, and support allow children to become effective in the solution to pest related issues. Our program develops cross-professional, cooperative education programs designed to improve general science and agricultural literacy. We develop interdisciplinary curriculum that inspire teachers and students to discover IPM-based science. Our curriculum, rooted in biological and social sciences, uses a progressive decision making tree to select the most suitable action for solving everyday pest problems. Lessons learned by applying the tree are applicable to all aspects of life.

School decision-makers often look to other schools for insights on successful programs (Marc Lame, Indiana University, and Dawn Gauge, University of Arizona, at Fourth National IPM Symposium (http://cipm.ncsu.edu/symposium/). This underlines the importance of identifying existing models and establishing IPM programs in schools that can be implemented more broadly both locally and regionally. We have identified four models on which to base our programming and intend to develop some new and innovative programming in the next 2 years that can serve as regional and national models in the future.

OBJECTIVES:

Our broadest goal is to demonstrate how pest management associated risks are linked to crucial environmental issues in urban areas. Our program targets the five major objectives layed out by the National Research Council (1985) by: 1. Determining the needs of teachers and educators as they incorporate new topics into the curriculum 2. Establishing and implementing the "Teaching Tools Program", 3. Developing the IPM Education Trunk 4. Bringing awareness to teachers and school districts about our program, IPM, and its relationship to personal and environmental health issues in urban populations. 5. Forming partnerships for the dissemination of information and materials to teachers and educators. 6. Raising funds

Our focus is to meet the growing need for improved science literacy through four major programmatic areas established in 2004; 1. Development of the IPM Teaching Tools Program, 2. Development of the IPM Education Trunk, 3. Development of IPM-based Science Curriculum K-12, 4. Development of tertiary training opportunities for undergraduate and graduate students in IPM-based outreach and education.

9. PROCEDURES:

Our model of pre-professional learning teams, that include undergraduates and graduate students, pre-service and in-service teachers working together with scientists, will address most of these objectives. Our program will focus its efforts on grades K-6 for the following reasons: 1. An unpublished survey conducted by Blakeslee and MaKinster (2004) of 27 Elementary school teachers responsible for teaching science revealed that the primary factors influencing the quality and quantity of science taught in the elementary school were the lack of time to prepare new lesson plans, resources, funds, confidence in their ability to teach science, attitude towards science and training. Only 7% of the teacher's surveyed carried science as their major in college. Sixty-three percent of the teachers surveyed ha some college-level science, which translated to 1-3 science related courses in the 6 years required to gain a bachelors and then masters' degree in education. Thirty percent of the elementary teachers surveyed who were responsible for teaching science had no college level sciences course or training. Thirty three percent of respondents managed to fit science into their curriculum for less than two hours per week and 8% of respondents admitted they would rather not teach science at all. Obviously there is a need to change the overwhelming cultural attitude towards teaching science in this elementary school teacher community and conduct similar investigations of other elementary school programs to determine if this output is a reflection of regional and national trends. We believe that by targeting pre-service teachers we can foster future in-service teachers who have a positive attitude towards science, have sufficient experience with our graduate scientists to feel confident teaching science and have confidence developing and maintaining working relationships with professional scientists with the goal to disseminating up-date scientific information in creative ways to primary school students. This model and its outputs will directly address objectives 2, 3 and 4 as established by the National Research Council Committee on Agricultural Education in Secondary Schools (1985). We will address objective 5 by developing a web site and clearing house that supports K-6 teachers as they work to increase the quantity and quality of science in the classroom. Furthermore, we have developed a cooperative working relationship with the Geneva City School district that has committed the West Street Elementary School as the model school for our programming. The Blakeslee/ Makinster survey was conducted at this school providing us with a wonderful pre-programming assessment tool and a fertile environment for innovation and change.

In assessing the impact of a Junior Master Gardener program on third, fourth and fifth graders, Klemmer (2002) reported that boys from all grades and girls from the fifth grade who participated in the program as part of their science activities showed significantly higher scores on measures of scientific achievement than their peers who did not participate and were taught science using traditional methods. Results from studies such as this underscore the importance of improving the level of confidence, and training, in science of teachers coming into elementary school programs. Lastly, because Elementary school teachers are the primary teachers for their classes responsible for teaching all subjects, elementary schools provide a rich environment for

the preparation of k-6 instructional materials around the theme of food and fiber systems across the curriculum. This allows for the assessment of the impacts of our programming on academic achievement of elementary school students in general

To meet objectives 1 and 2 and 3 above we did the following:

a. Offered BIO G 200 as an independent study program to three undergraduate students at Cornell University. Together we studied education pedagogy, curriculum development, IPM, Insect Sciences and consulted with an Elementary school teacher. The students developed age appropriate IPM-Based insect science curriculum for kindergarten and middle school. The curricula were reviewed by a kindergarten teacher then field tested in the classroom. b. Consulted with Jim MaKinster (Ph.D.) from the Department of Education at Hobart and William Smith Colleges and analyzed the results of an unpublished survey he conducted with Pat Blakeslee at the West Street Elementary School in Geneva NY to determine the factors that influence the quality and quantity of science taught by elementary school teachers. c. Interviewed 17 elementary school teachers and talked to approximately 80 more at conferences and workshops. d. Hired an in-service 7th grade teacher to work with and coach us on age appropriate curriculum development that meets NYS standards and addresses multiple learning styles, for 8 weeks.

These efforts led to the planning and development of "The Teaching Tools Program" which is designed specifically to offer education, training, support and resource materials to teachers as they bring IPM into the classroom. They also resulted in the base knowledge that was required to initiate the development of the "IPM Education Trunks" which provide students and teachers with curricula that offer sequential development of IPM-based scientific topics and the resources and activities to support them.

To meet objectives 4 and 5 above we:

a. Selectively met with the superintendents of 2 school districts, and Principles from 3 schools in information exchange and programming meetings. b. Presented our program and materials at 7 conferences, workshops, and meetings catering to teachers, educators and program directors. c. Designed, printed and distributed an informational brochure and bookmark for teachers. d. Became actively engaged with programs such as "New York Agriculture in the Classroom Program", The Kids Growing Food Program", "The School IPM Leadership Program" and relevant programs associated with the NYS Farm Bureau

To meet objective 6 above we identified, and applied to, 6 appropriate granting agencies in 2004.

10. RESULTS AND DISCUSSION:

Constraints facing teachers as they bring IPM into the classroom have been identified and tools have been designed to meet their needs. To date, 132 teachers have been exposed to our programming and 5 have field-tested it with positive feedback. The K-1 IPM Education Trunks for teachers and students are ready to go. They consist of interdisciplinary, interactive, inquiry based curriculum rooted in biological and social sciences relevant to the student's daily lives. The lessons are grade specific, age appropriate, target a number of learning styles, and are aligned to NYS and National Standards. . Fifteen teachers from 5 school districts representing 225 students in NYS

are currently signed up to use the materials. The trunks have been requested from 5 educators in Rhode Island, Maryland, California and Minnesota. Three undergraduate students and one high school intern were trained in IPM outreach and education programming. Outcomes for the end-client (the public school student) should reflect improved achievement in science and science-related topics, increased enthusiasm for studying science, and increased probability of studying science or pursuing scientific careers. Outcomes for the pre-service teacher should reflect greater science literacy, increased confidence when teaching science, increased willingness to teach science, increased representation of inquiry-based science learning in the curriculum, and increased confidence in seeking out scientists for guidance and curricula to help transfer cutting edge science to the public. Outcomes for the scientist trainees should reflect an improved understanding of education pedagogy and the complexities of transferring modern scientific information to public school students. They should also reflect a willingness to form learning partnership with public school teachers, greater confidence in their ability to teach, and more time practicing and building outreach into their post-graduate, professional lives. Besides these general outcomes, results of this work will be disseminated through presentations at regional and national professional meetings, publications in appropriate peer-reviewed journals, internal reports and a public access web site.

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