REPORT OF PROGRESS

Pennsylvania Integrated Pest Management Program

March 1, 2014

Contributors:

This report was prepared by Kristie Auman-Bauer, with contributions from Edwin Rajotte, Cathy Thomas, Lyn Garling, Sarah Pickel, Cathy Nardozo, Amber Brunskill, Michelle Niedermeier, Dion Lerman, Brian Schildt, Maria Gorgo-Gourovitch, John Tooker, David Biddinger and Beth Gugino.

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What is IPM?

Integrated Pest Management (IPM) is an approach to pest control that focuses on pest prevention by eliminating the root causes of pest problems. When infestations are present and require immediate intervention, the safest, most effective methods available for the situation are chosen.

IPM follows a stepwise approach:

• Identification: The first step in solving any pest problem effectively and safely is the correct identification of the pest. It is critical to find out what kind of pests you have and where they are coming from. Since each pest has different habits, biology and life cycles, its positive identification will lead to more effective control.

• Prevention and Exclusion: Prevention of the conditions that pests need is critical to successful control. In the case of rodents, ants and cockroaches, it can be accomplished by eliminating pests' food, water and shelter. This means cleaning up food and beverages and their packaging or wrappers, fixing leaky plumbing, and eliminating clutter. Entry to a building or home by pests is prevented by caulking cracks and crevices, repairing screens, repairing drains and installing door sweeps.

• Monitoring: New infestations can be controlled best if spotted early. With IPM, pest populations are regularly monitored using traps. Pest sightings are recorded to document where and when the problems occur.

• Multiple tactics: IPM typically uses several non-chemical tactics to deal with the pest. Pesticides are used only as a last resort and only by a licensed and experienced professional.

Because IPM focuses on prevention, it provides more effective, long-term control than a reactive, spray-based approach to pest control. It also reduces the need to use pesticides.

About Our Program

The Pennsylvania Integrated Pest Management Program (PA IPM) is a collaboration between the PA Department of Agriculture and the Pennsylvania State University College of Agricultural Sciences. The mission of this program is to promote effective pest management that results in the efficient protection of our food, fiber, health, home and industrial resources in a manner that is profitable, safe and environmentally compatible.

In order to maintain inter-institutional collaboration, management and staffing is distributed between Penn State University and the PA Department of Agriculture. There are two coordinators and eleven staff members that presently manage the PA IPM program. Two staff members and one coordinator work at the Department of Agriculture Plant Industry Division, with the rest of the staff working out of the Penn State University Department of Entomology.

Stakeholder Interaction

PA IPM is informed by several stakeholder groups. We have an IPM Statewide Advisory Committee made up of members representing Pennsylvania government agencies, industries, and non-governmental organizations. The committee meets three times per year to address IPM issues, policies and programs.

In addition to interactions with formal committees, PA IPM often communicates directly with client groups throughout the state. Likewise, through the office of the IPM Coordinator, PA IPM is linked with regional, federal, and international IPM bodies.

Our Mission

The mission of The Pennsylvania Integrated Pest Management Program is to promote effective pest management that results in the efficient protection of our food, fiber, health, home, and industrial resources in a manner that is profitable, safe, environmentally compatible, and sustainable. This mission will be accomplished by supporting research to develop and/or improve IPM programs through public education of IPM practitioners, and implementation of IPM programs. In support of this mission, specific goals of the program are:

Community Interaction

• Develop and maintain an on-going, cooperative, interactive relationship with IPM stakeholders
• Coordinate pest management programs across government agencies, the university and the private sector
• Promote and support privatization of IPM services
• Utilize IPM principles to protect surface and ground water quality in Pennsylvania
• Promote the integration of IPM principles into a holistic approach to farm management, such as the One-Plan program
• Act as liaison to legislative and regulatory bodies

Education and Implementation

• Support the field testing, evaluation, and promotion of new IPM technologies
• Establish education and certification standards

for IPM practitioners
• Develop and maintain continuing education programs in IPM for practitioners
• Promote an increase of implementation funding

Government Issues

• Reconcile conflicting government program goals
• Modify regulations to promote IPM tactics
• Utilize cross-compliance systems for regulatory or government programs
• Promote the modification of crop insurance to encourage IPM practices
• Facilitate the development of resident IPM education programs for Pennsylvania colleges, universities, and secondary and primary schools
• Produce IPM informative and educational materials in a variety of media
• Develop the IPM components of certification programs such as Certified Crop Advisor and Pesticide Applicator Training
• Develop outreach programs for the general public

Program Scope

Since pests (insects, diseases, weeds, animals, etc) occur in all environments in Pennsylvania, from natural ecosystems through urban landscapes, PA IPM has the challenge of addressing this wide diversity. Our program has expanded in the areas of school IPM, community IPM (urban communities), greenhouse IPM, and agricultural IPM. We also provide information for green industry professionals, public health sectors, homeowners and home gardeners, and parks & forest managers.

Budget and Staff

Budget

Funds to operate PA IPM come from several sources, including the U.S. Department of Agriculture's National Institutes for Food and Agriculture (USDA/NIFA), state government, and competitive grants. Since PA IPM is a collaboration between Penn State and Pennsylvania Department of Agriculture, we can combine resources to offer a much more effective effort.

Staff

Along with two program coordinators, there are eleven staff members that help run the PA IPM Program:

Kristie Auman-Bauer
Location: Penn State
Public Relations and Outreach Coordinator
kma147@psu.edu

Ms. Auman-Bauer develops and implements the program's communications strategy. Her responsibilities include writing and editing the quarterly PA IPM News, writing press releases and public service announcements, and writing and designing program brochures and publications.

David Biddinger
Location: Fruit Research & Extension Center, Biglerville
Tree Fruit Entomologist & Biocontrol Specialist
djb134@psu.edu

Dr. Biddinger's research focuses on developing IPM programs in tree fruits that utilize selective insecticides to control lepidopteran pest species while promoting biological control of secondary pests. Other areas of research are field evaluation of experimental and registered insecticides and acaricides for control of tree fruit pests and examining current levels of resistance and the potential for cross resistance in new compounds and types of chemistry; laboratory evaluation of IGR's on stage specificity and sublethal effects on reproduction in leafrollers; and identification and biology of leafhopper parasitoids in tree fruits.

Amber Brunskill
Location: Penn State
Education Specialist
aeg16@email.psu.edu

Ms. Brunskill's responsibilities include developing IPM curricula for schools and assisting with other PA IPM educational outreach efforts.

Lyn Garling
Location: Penn State
Manager of Programs
ljg5@psu.edu

Ms. Garling coordinates PA IPM's outreach efforts to teachers, health professionals, master gardener trainers and the general public on the issues of less toxic pest management and common-sense IPM solutions. She has organized public outreach strategies for IPM at national and regional IPM meetings.

Maria Gorgo-Gourovitch
Location: Philadelphia Cooperative Extension
Latino Community Outreach Coordinator

Ms. Gorgo-Gourovitch is the Latino Community Outreach Coordinator for the PA IPM Program and the Philadelphia School and Community IPM Partnership (PSCIP). Her duties included translating program brochures and educational

materials into Spanish and outreaching to the Latino communities in Pennsylvania. She is also an agricultural engineer and a certified food safety instructor.

Dion Lerman
Location: Philadelphia Cooperative Extension
Environmental Health Educator
dll33@psu.edu

Mr. Lerman is an environmental health educator working with the Philadelphia School and Community IPM Partnership (PSCIP). A certified food safety professional and instructor, Mr. Lerman works with low-income urban residents in a newly expanded Pennsylvania IPM project aimed at reducing pesticide use through educational outreach.

Cathy Nardozo
Location: Penn State
IPM Web Master
cfn2@psu.edu

Ms. Nardozo is the program's web master, maintaining content on the PA IPM and PSCIP Web sites and assists with administrative needs of the program.

Michelle Niedermeier
Location: Philadelphia Cooperative Extension
Community IPM Coordinator
mxn14@psu.edu

Ms. Niedermeier is the Coordinator for the Philadelphia School and Community IPM Partnership (PSCIP). Projects involve working with schools and community groups to build partnerships for safer pest control resulting in healthier homes and families. Additionally, PSCIP provide outreach education materials and programs to school-aged children and families on less-toxic pest control practices.

Sara Pickel
Location: PDA
Education Specialist
c-spickel@state.pa.us

Ms. Pickel fulfills a variety of duties, including surveying IPM implementation in school facilities and providing informational materials for facilities managers and IPM coordinators. She also assists Cathy Thomas with greenhouse projects and other IPM programs.

Brian Schildt
Location: PDA
IPM Scouting Consultant
c-brschild@state.pa.us

Mr. Schildt is involved with the Christmas tree program, scouting Christmas tree farms for pests and making control recommendations to the growers. He is also responsible for updating insect and disease control sheets for various plants, as well as assisting with other IPM programs.

IPM Advisory Committee

The PA IPM Advisory Committee was commissioned by the Secretary of Agriculture to advise us on policy and program priorities. Members are appointed by the secretary and represent all areas of the community (agriculture, forestry, urban, government, environment, education, etc.) interested in the promotion and implementation of IPM. Members of this voluntary group serve a three year term. They advise the Pennsylvania Department of Agriculture (PDA) on IPM policies, programs and issues that should be pursued and bring program needs to the attention of the Department.

Meetings are held three times a year at a "field" site that represents an interest area of one of the members. This allows a board member to demonstrate what that industry is doing and any special concerns or challenges facing the industry, so that all members can appreciate the IPM concerns that each brings to the table. The current members are:

Leo Donovall
Invasive Species Council Coordinator
PDA, Bureau of Plant Industry

David Scott
PDA, Bureau of Plant Industry

Kerry Richards
Pesticide Education Program, Penn State

John Butler
EPA Region III Waste and Chemical Management

Kelly Ireland
Natural Resources Conservation Service

Rosemary Moyer
Nursing Services Consultant
Pennsylvania Department of Health

Sandy Gardosik
Entomologist
PDA Bureau of Plant Industry

Tim Abbey
Penn State Cooperative Extension

Ken Martin
Field Manager
Furmano Foods

Flora Eyster
The Improved Milton Experience

Scott Heidel
Sanitarian Program Specialist
Pennsylvania Department of Health

Judy Smith
IPM Scouting Consultant

Kelly Ireland
USDA - NRCS

Audience and College Collaborations

Audience

The PA IPM Program strives to coordinate and promote modern approaches to managing pests in the various agricultural and urban programs served by Penn State, the Pennsylvania Department of Agriculture (PDA) and other state agencies.

Audiences served by the program include a mix of colleagues from Penn State, PDA, state and national IPM programs, teachers, practitioners, farmers, master gardeners, pesticide control operators, homeowners and special interest groups such as greenhouse and mushroom growers.

Practitioners as well as the general public can obtain information on IPM through our web site, news blog, newsletters, and Facebook and Twitter pages. The 1-800 PENN IPM hotline also addresses these audiences.

For various industries we have collaborated with special interest groups to produce various manuals. We have also developed informative videos that address various grower concerns and administrators interested in implementing IPM in their schools.

To further reach our various audiences,we have developed webinars, trainings and traveling displays, attending various conferences and events across the country.

Our outreach efforts expose IPM to a wide range of audiences, and our web sites and hotline are always available so that anyone can obtain more information on IPM.

College Collaborations

The PA IPM Program coordinates with the various departments of Penn State's College of Agricultural Sciences in many projects.

We've contribute to Plant Sciences' pest surveillance program, developed weed IPM modules for School IPM and researched emerging pest issues.

In Entomology, we contribute to the sweet corn insect trapping and scouting program managed by Dr. Shelby Fleischer, Greg Krawczek's fruit insect monitoring system, and field crop IPM projects managed by Dr. John Tooker. We also participate in such departmental outreach events such as "The Great Insect Fair".

In Forest Resources, we've developed the Northeast Region National Park IPM program Web site. We've also incorporated vertebrate IPM modules into school IPM curriculum.

In Agricultural Extension and Education, we've collaborated with Dr. Nicole Webster to initiate a service-learning project in a school in West Philadelphia.

In conjunction with the College's Office of International Programs, we collaborate on the Sustainable Crop Protection in Agriculture Program (SUSPROT). The program allows graduate and undergraduate students to spend time in one of four institutes in Western Europe to gain a global perspective on sustainable agriculture, including IPM.

PA IPM also provides trainings to the College's Cooperative Extension Educators, indcluding Master Gardners, about IPM.

Communications

The main focus of the PA IPM program is facilitation of communication among college faculty, county staff, state and national government, the private sector and the general public. Communications promotes collaboration and cooperation and allows the program to take advantage of the broad range of expertise in the system. In turn, collaboration allows sharing of resources and avoids duplication of effort.

We communicate with our audiences in a variety of ways, including our web site, news blog, and Twitter and Facebook pages.

The **PA IPM web site** at http://www.paipm.org has averaged over 100,000 visits per year (see chart page 14). Our news blog, Twitter and Facebook pages firmly establish PA IPM's social media status, and our followers continue to grow.

Other means of communicating the program's message include an **IPM e-mail listserv** in which IPM information is sent out to over 400 recipients throughout the U.S. and in many other countries.

We also develop **brochures** and **fact sheets** that promote using the least toxic means to treat a pest problem. **Videos** posted to our web site and on YouTube inform growers of IPM practices and school administrators on the importance of IPM in schools.

We make **presentations** at the request of such groups as the Pennsylvania Association of School Business Officials, Pennsylvania Department of Education, Pennsylvania Association of Intermediate Units and schools across the region to further promote the message of IPM. Specialist teach the basics of IPM, insect identification, IPM tactics and conduct field walks.

We also generate **news releases** and send them out to various media and produce a quarterly newsletter that updates our audiences on happenings of the program.

We participate in **conferences** and meetings across the country, such as "Pest Prevention by Design Authoritative Guidelines for Designing Pests Out of Structures," a project of the San Francisco Department of the Environment and the Center for Environmental Health, funded by the US EPA. For more about these and other program activities, go to page 15.

Another way we inform the public about IPM is through the **1-800 PENN IPM** Hotline. Being able to anticipate a potential pest situation is key to a good IPM program. Because of this, we help to fund a toll-free hotline so Christmas tree growers, agricultural crop producers, ornamental managers and others across the state can get the latest pest and pest management information.

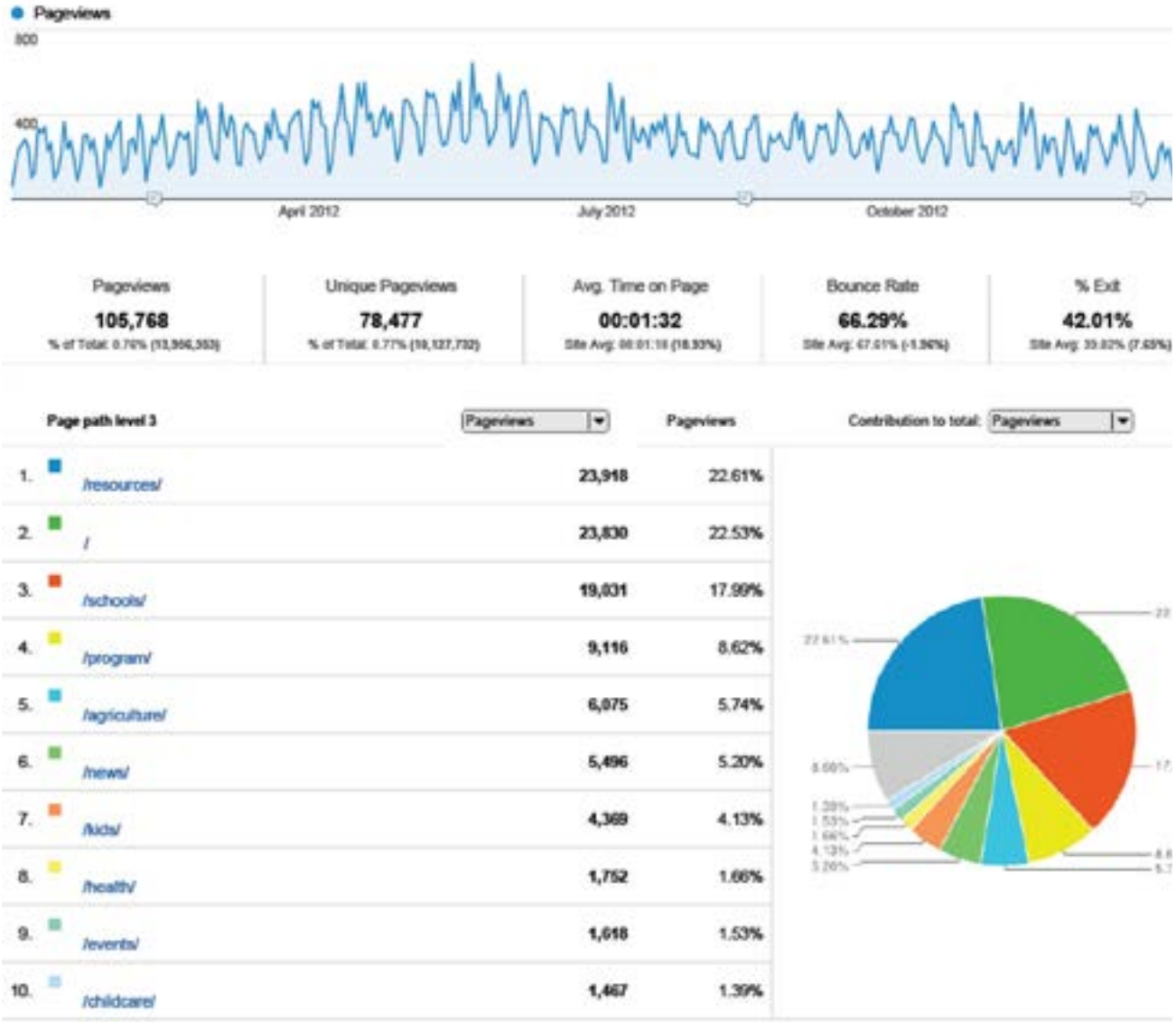
In order to better understand current trends in agriculture and in what way PA IPM may better serve Pennsylvania growers, we have contributed funding for several different **surveys**. We also contribute funding and/or support to such **projects** as the Pennsylvania apple and peach IPM program, greenhouse IPM, community and urban IPM, Christmas trees, vegetables other commodities.

In another effort, PA IPM, through PDA Plant Inspectors, provides **IPM Diagnostic Kits** to greenhouse and nursery/ornamental growers to promote the use of IPM in those industries. PA IPM also contributes equipment used by cooperative extension agents for pest and disease identification.

We also coordinate the publication of various **manuals** that help growers and schools implement IPM. To read more about these manuals and other publications see page 23.

We will continue to facilitate communication and promote collaboration and cooperation to take advantage of resources and expertise in the field of IPM.

Number of Hits on PA IPM Web Site



On the PA IPM Web site at http://www.paipm.org, users will find a vast amount of information on IPM. Following a redesign three years ago, the site is now easier to navigate with information about IPM divided into new categories tailored toward different audiences. From the home page, viewers have the option of choosing from categories such as agriculture, public health, and school IPM. In additoin, popular features such as our news blog, information in Spanish and "Problem Solver" are now more easily accessible.

Activities of PA IPM

Latino Community Outreach

Pests and pesticides pose serious risks to human health and the environment. Minority populations bear a disproportionate burden of negative health effects due to environmental hazards, including exposures to pests and pesticides.

PA IPM has Hispanic programming in both urban and agricultural settings. Hispanics have a great unmet need for accessible IPM information, education and resources at the individual, organizational and community level. The social, linguistic and economic disadvantages faced by many Hispanics leave them less able than other groups to understand and manage environmental hazards. Low levels of education and English-language proficiency, especially among recent immigrants, limit their ability to access information while increasing vulnerability to health risks of pests and the misuse of pesticides.

PA IPM is addressing the increasing need among Hispanics for culturally appropriate IPM educational materials and trainings in agricultural and urban settings by forming the Latino Community IPM Partnership. The partnership includes Latino organizations, government agencies, consulates, media, private companies and Spanish speaking individuals.

Currently, the partnership is expanding a Philadelphia pilot project into New Jersey and Delaware by partnering with Rutgers University and the University of Delaware. The partnership will adapt and develop bilingual IPM educational materials and programs and expand outreach efforts through Penn State Cooperative Extension. The pilot project designed, developed and delivered over 100 hours worth of trainings, workshops, seminars and health fairs, TV shows and radio interviews participation. As a result, over 76,000 individuals were reached with the IPM message.

In addition, almost 70 program evaluations were taken from various trainings and workshops conducted in Spanish in the Latino community. The goal of these evaluations was to assess the quality of the trainings and the knowledge of the participants on IPM before and after the trainings. These evaluations clearly show the effectiveness of trainings.

The partnership also translated into Spanish many of PA IPM's educational materials, fact sheets, brochures, articles, program's website and presentations. There was a total of 11 educational materials and 15 presentations, including the Asthma Tool Kit for the American Lung Association.

Maria Gorgo-Gourovitch, PA IPM's Latino Coordinator, is also conducting trainings in Spanish, giving presentations at conferences and participating in Latino community events. She participated in the 13th Annual Binational Health Week at the Consulate of Mexico in Philadelphia. PSCIP also conducts bi-monthly community-based programs about IPM and healthy homes and maintains a display with educational materials in the Consulate.

Gorgo-Gourovitch also attended the 73rd Annual Membership Meeting Luncheon of the Pan American Association of Philadelphia. The meeting brings together Latino leaders in the region as well as consuls and ambassadors of several Latin American countries. Additionally, she attended the II° Latinos in Agriculture Leaders Conference in San Antonio, TX. The conference focused on ways to educating and informing Latinos of the opportunities afforded to them in Agriculture in order to stay competitive in the marketplace.

Gorgo-Gourovitch, along with PSCIP's Dion Lerman, is currently providing IPM trainings to Latino childcare providers in the Philadelphia area to more effectively control pests and reduce the risks of pest and pesticide exposures to young children.

The need for IPM information for Hispanics in agricultural settings is also increasing. As reported in the U.S. Department of Agriculture 2007 Census, Hispanics claim the highest rate of

new farmers in the nation. The number of Hispanic operators grew 14 percent from 2002, significantly out pacing the 7 percent increase of U. S. farm operators overall. Of the 2 percent U.S. population working in agriculture, 1.5 percent is Hispanic. Spanish is predominantly the native language of farm workers (81 percent).
To help meet this need, PA IPM along with Penn State Cooperative Extension received a grant from the Northeastern Regional IPM Center to support the project, "Bringing IPM to the Hispanic Workforce" in the Mid-Atlantic mushroom industry.

The project will increase the risk management skills of English and especially Spanish-speaking members of the mushroom farm community. The project also includes developing programming to help Hispanic growers and employees understand the content of the private pesticide applicator certification exam. This is an opportunity for a unique agricultural commodity to develop specific IPM training for an industry to then be shared and developed across multiple agricultural commodities as more of the agricultural workforce and general population transitions to more Spanish speaking workers, managers, and owners.

During the first phase of the grant, PA IPM developed a Hispanic Advisory Group for IPM education and training. During the second phase, the program is conducting three surveys in English and Spanish for owners/managers, farm workers and suppliers to assess the educational needs in multiple IPM trainings and techniques. Through these surveys, we will identify the needs and priorities for bilingual IPM materials and programming. These surveys are critical to provide data in order to re-apply for future funding to provide low cost training and educational materials to the mushroom farm community in IPM and other subject areas in the mushroom industry. Surveys were distributed to 80 farms in Delaware, Maryland and Pennsylvania by email, snail mail and by conducting personal interviews on site.

In addition, PA IPM organized, coordinated and delivered the first two Mushroom Pesticide Meetings in Spanish for mushroom growers in Pennsylvania covering topics on personal protective equipment, best management practices and the fundamentals of IPM, fly life cycles, etc. Each training offered licensed pesticide applicators core and category credits for attending.

Gorgo-Gourovitch also served as chair and moderator of the Mushroom Short Course organized by Penn State's Plant Pathology Department.

PA IPM has also developed and implemented a sustained agriculture IPM outreach in Spanish for other vegetable and fruit crops.

Gorgo-Gourovitch also conducts food safety trainings in conjunction with the Penn State Food Safety Department ServSafe training and certification program for the food industry. She obtained the ServSafe Food Safety instructor and proctor certifications and has successfully developed and presented the Spanish ServSafe outreach program for the Food Safety Department.

She also conducted ServSafe trainings in Spanish for Food Handlers & Managers in several counties such as Lancaster, Chester, Philadelphia and Berks counties. This certification demonstrates that the food handler has up-to-date information about food safety and a commitment to provide safe food. The ServSafe Food Safety Certification Training fulfills the Pennsylvania Department of Agriculture requirements that each establishment employ a certified food handler. Gorgo-Gourovitch has also translated several educational materials into Spanish which are currently used at the trainings/classes.

PA IPM's Spanish website can be accessed at http://extension.psu.edu/pests/ipm/resources/espanol.

Community IPM Partnerships

The Philadelphia School and Community IPM Partnership (PSCIP) was established twelve years ago as a means to promote IPM to reduce the risks associated with pests and pesticides. PSCIP engages in an integrated mission of creating a relationship between school IPM and community IPM. These two sectors are connected through PSCIP committee membership and the active engagement of PSCIP partners, who include parents, students, administrators, teachers, agencies, churches, and community group/organization representatives.

The theme of the annual partnership's meeting this year was "Reaching out to the Latino Community: Healthy Indoor Environments Homes, Schools and Workplaces". Several Latino Organizations in the southeast region of PA were in attendance, in addition to representatives from the US EPA, USDA, HUD and OSHA.

Previous and on-going projects of the partner ship include the implementation of IPM in a Philadelphia row house community and IPM workshops and trainings in Philadelphia and New Jersey communities to raise the awareness and understanding of local residents, businesses and service providers about common-sense IPM solutions to pest problems. PSCIP also received an Environmental Protection Agency's (EPA) Pesticide Re-registration Improvement Act (PRIA2) to work on increasing skill levels of pest management employees at the urban neighborhood level. The IPM training team provided a three-week training cycle that culminated in the students taking the Pesticide Applicator Core and Category 11 exams.

PSCIP is also working with schools and child care centers to reducing allergies and asthma triggers by promoting less-risky methods of controlling pests and green cleaning. PA IPM team members serve on the Pennsylvania Asthma Partnership's Outreach and Education committee and on the Children's Hospital of Philadelphia's annual "Asthma Disparities" conference planning committee.

IPM in Child Care

With over 12 million children under the age of five enrolled in child cares in the United States, PA IPM and The Better Kid Care Program at Penn State are collaborating to give child care professionals the tools they need to provide safe early learning environments for children across the nation and world.

Recent legislation for child care facilities in many states requires them to practice safer pest management. Better Kid Care (BKC) and PA IPM are developing a series of online professional development lessons that promote safer and healthier indoor environments.

BKC provides evidence-informed professional development for early care and education professionals to improve the quality of their care and educational practices. Currently there are 150 on-demand lessons available and approved for the Department of Public Welfare professional development credits, accepted for CDA and approved by more than 25 state child care licensing organizations. BKC also provides free professional development and support to caregivers of children from military families through a USDA/Department of Defense partnership project in collaboration with the University of Nebraska-Lincoln.

The online modules are growing in popularity; centers from across the nation and many countries are accessing an increasing number of lessons each month. One- and two-hour lessons include topics such as child growth and development, environment and curriculum, family support, observation, professionalism and health, and safety and nutrition. Viewing the lessons is free and for a small cost, an assessment can be taken at the end of the lessons to receive professional development credit. Continuing Education Credits (CEUs) are also available for completing the lessons.

BKC partnered with the PA IPM program to develop a three-module on-demand training series on "Healthy Child Care Environments: Pest Prevention Using IPM, Pest Treatment Using IPM, and Using Green Cleaners".

The lessons are geared towards child care professionals, but the information is also extremely useful for program administrators and facility managers. The lessons explore the connection between children's health and indoor environments of early learning facilities. It's important for everyone involved in child care to be able to evaluate key aspects of their indoor environments to make them healthier and safer for young children. Pests and pesticides, the use of chemical cleaners and air fresheners, and poor ventilation can all contribute to poor air quality.

Solutions include preventing pest problems through sanitation and exclusion measures, treating the pest problem at hand using the least toxic methods, using green cleaning alternatives, and maintaining ventilation systems. Each training module contains an activity and appropriate handouts for the topic. As of December 2013, over 2,000 users have completed the modules.

PA IPM and BKC will continue to evaluate their current offerings and will add new topics in the coming year, including one to help child cares develop their own IPM action plan.

The on demand lessons are available on the Better Kid Care website at extension.psu.edu/youth/betterkidcare/on-demand and the PA IPM's IPM for Child Care and Early Learning Environments website at extension.psu.edu/pests/ipm/schools-childcare/childcare.

Additionally, PA IPM Environmental Educator Dion Lerman was one of two dozen authorized trainers state-wide for the roll-out of the Eco-Healthy Child Care (EHCC), the first-ever state-adoption of environmental health standards for child care providers. He is also on a national working-group to explicitly incorporate Healthy Homes principles into EHCC. Currently, PA IPM is completing a project training for all staff in eight child-care centers in children's environmental health issues and standards.

PA IPM also participates in the Interagency Child Care Consortium that is hosted by the Philadelphia Department of Public Health and once a year gives presentations on IPM and Healthy Homes.

School IPM

Pennsylvania legislation mandates IPM be taught as part of the Academic Standards for Environment and Ecology. Academic standards specify what students have to learn in core subjects. In addition, all school districts in Pennsylvania are now required to adopt IPM plans to manage pests on school grounds.

Since 2000, PA IPM's strategy has been to approach school IPM as a community-based effort in a service-learning format. The school grounds are considered the community site for the students, staff, and faculty. To this end, PA IPM developed *IPM Jump Start: An Exploration Into IPM*, a book of IPM lesson plans, and *IPM for Pennsylvania School: A How-To Manual* to manage pests in schools and on school grounds.

In addition, PA IPM hosts webinars and conducts trainings that focus on the most effective and safest control of pests in schools and childcare facilities. Topics include dealing with bed bugs and head lice in schools and promoting the use of certified green cleaning products and reducing pesticide use to help to reduce pollutant exposures indoors.

Pennsylvania also legislates that schools have an IPM plan in place to manage pests in schools and on school grounds. PA IPM offers workshops to help schools establish and implement IPM plans. The program also offers workshops that focus on keeping school grounds both safe and attractive using an IPM approach with few or no pesticides. The workshops include outdoor demonstrations of practices, walking discussions and presentations by experienced educators.

Throughout the year, PA IPM's Community IPM Coordinator Michelle Niedermeier meets with the Delaware Valley Green Building Council Green Schools Advisory Team to promote IPM and to educate their staff and constituents about IPM in Schools

In addition, the program's School IPM web site at http://extension.psu.edu/ipm/schools is updated frequently and contains additional resources for parents, students, teachers, administrators and facility managers.

Public Health IPM

Bed bugs are a public health pest and are making a comeback in apartment buildings, dorm rooms, hotels, hospitals and homes across the country due to people traveling more frequently, resistance to pesticides and lack of public awareness.

To address the issue in central Pennsylvania, PA IPM helped establish the Centre Region Bed Bug Coalition to educate the community about preventing the spread of bed bugs. The coalition is a joint effort by PA IPM, Centre Region property owners and managers, the Borough of State College, Penn State Entomology Extension, Penn State Housing, and commercial pest management operators to provide education about treatment and prevention of bed bug infestations.

PA IPM has also offered two trainings in Spanish on bed bug prevention and control in four public housing buildings in Jersey City, NJ. Eighty Spanish-speaking residents were surveyed to determine the impact of the trainings on residents' approach to prevent and control bed bugs. These trainings were offered in collaboration with Rutgers University Entomology Department.

In addition, PA IPM partnered with Rutgers University New Jersey Agricultural Experiment Station (NJAES) to produced a series of bed bug videos in English and Spanish about bed bug biology and management. The videos can be found at http://extension.psu.edu/bedbugs/about or http://njaes.rutgers.edu/bedbug/?videos.

PA IPM also participates in bed bug workshops in Philadelphia, collaborating with Congreso de Latinos Unidos and Resources for Human Development. Participants learn how to recognize bed bugs and their signs, detect early infestations, what to do if an infestation is found and receive educational materials in Spanish and English.

PA IPM Education Specialist Dion Lerman conducted a whole-day workshop on bed bugs for US EPA's Region 8 in Helena, MT with a live video-cast to six locations state-wide. The video is archived at the PA IPM site, as are the slides, handouts and resources and research papers referenced.

These and other resource on public health pests can be viewed at http://extension.psu.edu/ipm/resources/factsheets.

Sweet Corn & Field Crop IPM

Grown on more than 28,000 farms nationwide, sweet corn is the most commonly grown vegetable crop in the United States. In EPA Region III, sweet corn sales bring in more money than any other vegetable crop, with Pennsylvania as the leader in the region.

In an EPA-funded project, Cathy Thomas, PA IPM Coordinator at the Pennsylvania Department of Agriculture and biocontrol specialist, is focusing on corn earworm, a major pest of sweet corn. The larvae damage the fruit of the plant by first feeding on the silks, hindering pollination, and later by feeding on the kernels inside the ear.

Farmers feel pressure to use multiple applications of broad-spectrum pesticides because there is little consumer tolerance of worm-damaged corn. But heavy pesticide use can have serious affects on the farm environment and surrounding areas and can cause insects to be resistant to insecticides. According to Thomas, the goal of the project is to reduce or eliminated broad-spectrum pesticides to control corn earworm by training growers to use IPM and biocontrols.

Thomas has been working with three Amish farmers in York county who were interested in IPM and reduced spray programs. They all have farm markets and take produce to the local produce auction, so it's important the corn be marketable.

Thomas is helping growers incorporate biocontrols such as the parasitic wasp, Trichogramma pretiosum and other biological treatments. She is also educating growers on the identification and life cycle of corn earworm and other sweet corn pests. Additionally, the project team is producing educational posters and brochures to help consumers and retailers understand that produce grown with fewer pesticides may result in some worm damage, but will be better for farm worker protection, consumers and the environment.

In addition, pesticide reduction or elimination will make farm environments safer for the children, other family members and farm employees. Also, there is less risk of pesticide runoff in local water ways, local pollinators won't be harmed by excessive pesticide use, resistance to pesticides will be reduced, and the surrounding communities will be pleased to know that there are fewer high-risk pesticides being used in their region. Farmers will save money they would spend on chemicals and should be able to draw a higher price for produce grown

with reduced pesticides.

For more information on biocontrol and to read a collection of articles written by Thomas, go to http://extension.psu.edu/ipm/pestproblemsolver/greenhouse/bugvsbug

Another EPA-funded project is targeting slugs, one of the most challenging pests faced by no-till field crop growers in the Northeast.

According to John Tooker, assistant professor of entomology at Penn State and project coordinator, recent research suggests that neonicontinoid insecticides can have negative impacts on natural predators of damaging pests such as slugs.

Neonicontinoids and their use in preventative seed coatings has expanded enormously and now hundreds of millions of acres of corn, soybean, cotton, sunflower, canola and other field crops are planted annually with neonicontinoid seed treatments (NSTs). The great majority of NSTs are used outside an IPM program with little regard for the threat level of pest populations or economic benefits of the practice.

The project will build on previous research to test an alternative approach to slug management that avoids NSTs and uses rye cover crops to provide an alternative food source for slugs while maintaining strong populations of potential predators. Tooker's research shows cover crops can help keep slug populations down. Conversely, NSTs in our research seem to make slugs harder to manage.

The two-year project will compare slug damage in corn and soybeans grown in commercial fields where there was a fall planting of rye cover crop to fields grown without a cover crop and use NSTs. Research findings will be shared with Mid-Atlantic field and forage crop growers and other agricultural professionals at regional meetings.

Tooker said the widespread use of NSTs outside an IPM framework is particularly concerning because agricultural pests have such a strong ability to evolve resistance against insecticides. The project is also relevant for pollinators because recent research has implicated NSTs used in corn production having a negative effect on honey bees populations.

In another project supported by a Northeast SARE grant, Tooker is planting mixed wheat cultivars to boost genetic diversity in the field. Using mixed cultivars is resulting in fewer pesticide applications and improved yield and profitability for both conventional and organic growers participating in the project.

Tree Fruit IPM

Fruits and nuts are high value crops in the Mid-Atlantic states worth over $300 million and are being heavily impacted by honey bee shortages for pollination. A $1.4 million grant from the USDA NIFA Specialty Crops Research Initiative (SCRI) program is enabling Penn State and PA IPM to look at future impacts on fruit pollination and the development of alternative pollinators to supplement honey bees.

David Biddinger, tree fruit entomologist and biocontrol specialist at Penn State's Fruit Research and Extension Center and project co-director, estimates the supply of honey bees in the U.S. will not be able to meet the demand for pollination services in the near future. Alternative pollinators such as native wild bees are greatly needed.

The project is establishing surveys and a monitoring program to identify the importance of wild pollinators to agricultural pollination, assess bee species collected during survey work to determine if any pathogen or other invasive species has infected the population, develop new pollinators and enhance pollinator awareness through education efforts.

A video describing the importance of these native pollinators in Pennsylvania was produced by Biddinger and PA IPM's Ed Rajotte and posted on YouTube. "Native Pollinators: A Promising Solution to an Emerging Crisis", describes the decline of honey bees and the role other native pollinators play in pollination of crops. It depicts the efforts of Penn State's Center for Pollinator Research, NRCS and the Xerces Society in researching the most effective native pollinators and assisting growers by planting pollinator habitats in farms and orchards in Pennsylvania. The video can be found on PA IPM's web site at http://extension.psu.edu/ipm/resources/native-pollinators.

Other collaborators on the native pollinator project include researchers from Penn State, the Pennsylvania Department of Agriculture, the Xerces Society, Long Island University, the US Department of Agriculture NRCS and

the US Department of the Interior (USGS).

In other research published in PLoS ONE, Biddinger and other researchers showed that pesticide effects can vary between different species of pollinators, and that mixtures of insecticides with fungicides (which are normally thought to be safe to bees) can significantly increase the toxicity of the insecticide to bees. The researchers concluded that because of these varying effects, the pesticide registration process required by the EPA should be modified to include tests on additional species of bees since the honey bee is not representative and should look at common pesticide mixtures.

Many pesticides are registered as 'reduced risk' or 'organophosophate replacements' and have toxicity tests with the honey bee, but are in fact toxic to non-targeted organisms, such as other species of pollinators and beneficial predatory and parasitic insects in an IPM program.

Biddinger also helps growers identify new fruit pests in Pennsylvania, including African Fig Fly (AFF) and Spotted Wing Drosophila (SWD). Biddinger is advising growers to use IPM to monitor the pests so control tactics can be implemented before the flies lay eggs.

In another project, Penn State researchers are educating growers report their stink bugs problems to help them make better pest management decisions through an expanded web monitoring tool. BMSB feeds on many different crops and has few effective natural enemies in the United States, allowing its populations to grow unchecked.

John Tooker, assistant professor of entomology in the College of Agricultural Sciences, helped develop the free web-based tool along with Douglas Miller, associate professor of geography and director of the Center for Environmental Informatics in the College of Earth and Mineral Sciences in a collaboration with the PDA. The tool, found at http://stinkbug-info.org/, gives growers more information about the population dynamics of the brown marmorated stink bug.

Web-based Predictions for Vegetable IPM

In the last five years, late blight on tomato and potato plants has become an increasing problem among Northeast growers. Late blight is a fungus that primarily affects tomatoes, potatoes and certain solanaceous weeds such as bittersweet nightshade. Cool and wet springs and summers can facilitate late blight growth for both home gardeners and commercial farmers.

To combat the problem, Beth Gugino, assistant professor of plant pathology at Penn State, developed an extension education and adaptive research program to develop IPM strategies for growers. Growers are educated about disease symptoms and advised to remove diseased plant tissue and potato tubers from the current and previous seasons, since the disease is communicable.

Gugino contributes to the delivery of computer-based tomato/potato early and late blight disease forecasting information via Pennsylvania PIPE (http://pa-pipe.zedxinc.com/). Gugino also conducts fungicide efficacy trials for commonly occurring diseases on tomatoes, onions and cucurbits in PA. With increasing concern about fungicide resistance and cost of inputs, selection of the most effective fungicides/biopesticides is the most important component of a vegetable IPM program.

Gugino also participates in pest monitoring and prediction efforts for cucurbit and basil downy mildews (http://cdm.ipmpipe.org/index.php) and tomato/potato late blight (http://usablight.org) that help disseminate timely information about confirmed outbreaks that growers can use to make in-season disease management decisions.

Gugino also conducts day-long workshops focusing on the management of soilborne pathogens in vegetable production in the Northeast as part of the NE SARE Professional Development project. Other grower workshops are conducted by PA IPM staff, including mushroom IPM workshops taught by Maria Gorgo-Gourovitch in partnership with the American Mushroom Institute.

Christmas Tree IPM

Pennsylvania is ranked fourth in the nation for sales of Christmas and evergreen trees in a 2007 USDA/NASS survey. According to Cathy Thomas, PA IPM coordinator at PDA, scale pests from Asia such as Elongate hemlock scale and Cryptomeria scale cause a lot of damage to hemlock and fir trees. Each of these scales has two generations per year, with adults having a waxy, armored-like covering. This makes these scales difficult to control with pesticides, which often causes growers to make excessive pesticide sprays.

A group of growers expressed interest in finding an alternate method of control, since broad-spectrum pesticides often kill off natural predators of the scales. For this project, Thomas and project team members Sarah Pickel and Brian Schildt focused on finding alternative methods of controlling Cryptomeria scale using IPM.

According to Pickel, the goals of the project were to establish a conifer scale warning system through scouting and weather data, and educate growers through a one-on-one training with an IPM specialist regarding scale life cycles, scouting, growing degree-day accumulation and record keeping. IPM seminars were also held for participating growers to learn about current pest information and research while recommending the use of biocontrols, reduced-risk products and sustainable techniques used in an IPM system.

After working on this project for two growing seasons, growers expressed increased knowledge about IPM and a reduction of broad-spectrum, traditional pesticides. The project has shown that a combination of native beneficial arthropods, compatible soft pesticides and released parasitoid wasps for biological control can provide a safe and effective pest control program.

For more information on Christmas tree pest management, go to the Penn State Christmas Tree Web site at http://ento.psu.edu/extension/christmas-trees. For weekly Pennsylvania Christmas tree scouting reports go to http://extension.psu.edu/ipm/program/christmas-tree/scouting-report.

The project was funded by a grant from PDA agricultural research funds.

Greenhouse IPM

PA IPM's greenhouse IPM program is currently active in central Pennsylvania, Lancaster, Philadelphia and Pittsburgh areas. Cathy Thomas, PA IPM coordinator and biocontrol specialist based at the PA Department of Agriculture, has headed the program for over ten years working in many regions throughout the state. Thomas has been a part of numerous IPM/biocontrol related projects working with Penn State and Pennsylvania Department of Agriculture personnel.

In Philadelphia, Thomas works with a number of greenhouses, including the Horticulture Center at Fairmont Park. Pesticides were used routinely in the Center's greenhouse for years, with mixed results. Whiteflies, aphids, spider mites, mealy bugs, fungus gnats and roaches were becoming immune to the pesticides, and the greenhouse was becoming infested. Horticulture Center Supervisor Michael O'Brien was also concerned about exposing children and hypersensitive people to pesticides, and turned to Thomas for alternatives. Thomas helped the greenhouse establish an IPM program by getting rid of some the pest host plants and bringing in pest resistant plants and beneficial insects such as wasps and boric acid to control cockroaches.

Thomas also gives hands-on training to greenhouse growers, who are in some cases new to the greenhouse industry and have no prior knowledge of pesticides or IPM methods. Thomas is showing growers how a successful IPM/biocontrol system can replace traditional pesticides. Through use of biologically compatible pesticides combined with biological controls, growers can slow resistance in target pests, create a safer working environment, and maintain quality crops while increasing profitability when marketed as "pesticide free."

The greenhouse IPM program is funded by grants from the Environmental Protection Agency and from the USDA's Sustainable Agriculture Research and Education program.

IPM Publications and Videos

The PA IPM Program complements other publications produced by the PDA, Penn State and other institutions as well as responds to special requests by coordinating the publication of manuals that help integrate IPM programs.

Wild Pollinators of Eastern Apple Orchards and how to Conserve Them

Wild Pollinators of Eastern Apple Orchards and how to Conserve Them explains that due to colony collapse disorder and its effects on honey bee hives, it is wise for growers to diversify their pollination dependence. Besides honey bees, there are about 450 other bee species in the eastern U.S., and over 100 of these wild bees visit apple orchards. The more species that are in one area, the more likely there will be a species that can tolerate variable climate conditions, diseases, pesticides, parasites and habitat loss.

The publication includes a color photo guide to bees most important for apple production in the East, steps to conserving wild bee pollination in the orchard, recommended plantings to enhance food for pollinators, summary of commonly used orchard pesticides and how they might affect wild bees, and resources for more information.

The booklet was produced as part of a collaboration between Penn State University and Cornell University. It was funded by a USDA NIFA Specialty Crops Research Initiative project at Penn State that is looking into impacts on honey bee decline on fruit pollination and the development of alternative pollinators, and with additional support of the Northeaster IPM Center. It is authored by Mia Park, Bryan Danforth, John Losey, Arthur Agnello (Cornell University) David Biddinger, Edwin Rajotte (Penn State University)
Mace Vaughan, Jolie Dollar (The Xerces Society).

To obtain a free pdf version of the booklet, or instructions to order hardcopies, go to http://www.northeastipm.org/park2012.

Common Urban Pests, Identification, Prevention and Control

Homeowners dealing with pests such as bed bugs, cockroaches and mice can now find helpful information in a new publication developed by PA IPM researchers in 2011.

The publication,contain full color photos of 20 pests commonly found in the home along with a brief description, a guide to its actual size, whether it's a nuisance pest or a health concern, and some basic control measures using IPM.

The publication is available as a downloadable PDF at http://extension.psu.edu/ipm/resources/factsheets/common-urban-pests/view. It is also available for the Kindle at http://ento.psu.edu/publications/CommonUrbanPests.mobil/view.

Invasive Species Video Now Online

Asian longhorned beetle, purple loosestrife and other invasive species are included in the Pennsylvania IPM Program's video, "BugMobile vs. Invasive Species", which can now be viewed on the program's website at http://extension.psu.edu/ipm/resources/bugmobile-vs.-invasive-species.

Geared toward lower and upper secondary students, the video offers suggestions for

managing invasive species IPM.

The video is hosted and narrated by PA IPM's talking car, The BugMobile, and identifies the effects of humans and human events on watersheds, explains species diversity, introduces species that are classified as pests in their new environment, and analyzes the benefits to the environment and society associated with alternative practices used in IPM.

In addition, a lesson plan with content objectives, assessment strategies and procedures is also available as a downloadable PDF from the program's website. The lesson plan also includes pre and post-tests for the students to complete, discussion questions and suggests other related extension activities.

Mushroom IPM Handbook Now Available in English and Spanish

Pennsylvania is the number one producer of mushrooms in the United States with more than 250 farms producing the common button mushroom. Pennsylvania is also a national leader for mushroom IPM, influencing growers with over 70 years of IPM research and extension activities. The *Mushroom IPM Handbook* addresses the pests with the most potential to reduce mushroom yield and quality.

The handbook is intended to be used by growers as well as researchers, both as an educational tool and as a reference manual. Recommendations are to be used as a guide for developing an effective IPM program.

The handbook is divided into two parts: the first covering the theory of IPM, and the second dealing with IPM in mushroom growing. The section on theory explains the concepts of pest management, types of control and the importance of understanding pest life cycles and biology. The second part of the handbook describes how the unique features of the crop can be used effectively in IPM.

Mushroom growing lends itself naturally to IPM, as they are one of the few food crops grown in climate controlled buildings. This allows for control of the internal environment of the growing room to combat many pests, and since the crop is grown inside a structure, pests can be excluded.

Other features of mushroom production also make IPM a necessity. Mushroom production is measured in pounds per square foot rather than in bushels or tons per acre, so mushroom growing is high density farming. If a pest enters a room, it can spread rapidly because of the large amount of food available within a relatively small space. In addition, many pests cannot be controlled using chemical pesticides, either because there are no products labeled for mushroom use, or materials do not exist for specific type of pest organisms that will not destroy the crop as well. These features make the IPM approach the most effective and economical means of long term, sustainable pest control.

The handbook illustrates specific control techniques, such as exclusion and cultural and biological control. It also describes the most destructive pests and their control, including anthropoid pests, fungal pathogens, weed and indicator molds, bacterial diseases, nematodes and viruses.

Contributing to the handbook are Shelby J. Fleischer, Ph.D., Department of Entomology, Penn State; Phil Coles, Giorgi Mushroom Co., Temple, Pa.; William Barber; Danny Lee Rinker, Ph.D., Horticultural Research Institute of Ontario; Susan Whitney; Clifford Keil, Ph.D., University of Delaware; David Beyer, Ph.D., Plant Pathology, Penn State; Paul Wuest, Ph.D., Plant Pathology, Penn State; Peter Romaine, Ph.D., Plant Pathology, Penn State.

The English and Spanish versions of the publication are available as downloadable PDFs from the Pennsylvania IPM Program website at http://extension.psu.edu/ipm/agriculture/mushrooms, or the American Mushroom Institute at http://www.americanmushroom.org/integrated-pest-management-p-5.html.

School IPM Manual

PA IPM responded to the request of Pennsylvania government and helped to developed the *IPM for Pennsylvania Schools: A How-to Manual*.

The goal of PA IPM and the various collaborators on the manual was to produce a user-friendly manual that would encourage schools to adopt an IPM program and to provide suggestions so that each school can decrease or manage pest problems.

The manual includes chapters on suggestions for setting up an IPM program in schools and developing an IPM policy. It also includes a sample policy from the Pennsylvania School Boards Association.

Additionally, the manual contains a partial listing of commonly encountered pests in and around schools as well as information on the biology, identification and management of various types of pests such as ants, cockroaches, flies, fleas, head lice, silverfish, termites, and yellowjackets.

The manual also contains a list of additional pest management resources. Other IPM information like monitoring and maintenance tips are also included.

Collaborators on the manual include Penn State College of Agriculture, Departments of Entomology and Crop and Soil Sciences; Pennsylvania Departments of Agriculture, Education, and Health; Pennsylvania Association of School Business Officials; and the Pennsylvania Pest Management Association.

The publication is available as a downloadable PDF at http://extension.psu.edu/ipm/schools/facilitiesmanagers/paschoolsipmmanual/ipmmanual.pdf/view.

Identifying Common Household Insects in Pennsylvania

PA IPM helped to produce the publication *Identifying Common Household Insects in Pennsylvania*.

Since pest identification is the first step in an IPM program, the publication helps homeowners identify common insects found in the home. Each insect identified in the guide has a color picture and a short description. Insects described in the publication include lady beetles, ticks, carpenter ants, bed bugs, cockroaches, and larder beetles. Homeowners are referred to several resources to find out more information on the pests.

Collaborators on the publication are Steve Jacobs, Penn State Extension Entomologist; Kristie Auman-Bauer, Public Relations and Outreach Coordinator, PA IPM Program; Scott Camazine, Ph.D., Department of Entomology, Penn State; Howard Nuernberger, College of Agricultural Sciences, Penn State; and the Department of Entomology, University of Nebraska.

The publication is available as a downloadable PDF at http://extension.psu.edu/ipm/resources/factsheets/commoninsects.pdf/view.

Join Our Pest Patrol

The PA IPM Program helped to produce the publication, *Join Our Pest Patrol*.

*Join Our Pest Patro*l is a fun, educational resource for Pennsylvania teachers of students in grades 3-4. The workbook addresses the Academic Standards in Environment and Ecology, section 4.5.4, "Integrated Pest Management".

Students learn whether a pictured insect is a "pest or guest", find out about weeds such as dandelions and purple loosestrife and learn pesticide safety through fun and educational activities such as crossword puzzles, fill in the blanks, mazes and picture drawing.

Also available is the accompanying "Teacher's Guide" that includes facts, investigations, activities and resources to support children's curiosity and extended learning. The guide will help teachers better explain IPM to kids.

Copies of the publication in English and Spanish can be downloaded as printable PDF files from the PA IPM Program's web site at

http://extension.psu.edu/ipm/schools/educators/brochures/pestpatrol.

Environment and Ecology for Pennsylvania, Meeting the Standards

The PA IPM Program contributed to the *Environment and Ecology for Pennsylvania, Meeting the Standards*.

Aimed at secondary educators to help their students understand the environment, natural resources, and the human impact upon them, the 272-page textbook contains activities, Pennsylvania-specific case studies, and lesson reviews. The textbook also includes chapters on topics ranging from watershed and wetlands and environmental health to threatened and endangered species and integrated pest management. In addition, it can be adapted to meet the needs of other states.

The accompanying Teacher's Manual refers teachers to the Environment and Ecology academic standard that can be met with each activity, assesses students' proficiency through chapter tests and includes a sample of the upcoming Pennsylvania STEEP test. Web resources and integrated lessons and activities are also included.

Published by The Globe Fearon Pearson Learning Group, *Environment and Ecology for Pennsylvania, Meeting the Standards* hardcover textbooks and Teacher's Manuals are available by contacting Tony Piperno at 800-435-3499, ext. 5763, or Mary Ann Reck, 866-811-9400.

Greenhouse IPM Manual

The PA IPM Program helped to produce the manual *Greenhouse IPM with an Emphasis on Biocontrol*.

The manual was developed in response to the need for practical information on greenhouse IPM and biocontrol. It is intended to help educate commercial greenhouse operators, crop consultants, and IPM scouts to develop biocontrol systems for greenhouses that will maximize yields while reducing pesticide usage.

The 108-page manual contains more than 90 full-color images as well as descriptions of the most common pests in the greenhouse industry and the biocontrols used to manage them. It is based on more than ten years of experience in implementing biocontrol and IPM in working, commercial greenhouses in Pennsylvania.

The manual is available as a free downloadable PDF file from Web site http://extension.psu.edu/ipm/program/greenhouse/greenhouse-manual. Hard copies of the publication are available by contacting Penn State's Publications Distribution Center at 1-877-345-0691.

Establishing and Operating Greenhouse Crop Management Associations in Pennsylvania

PA IPM helped to sponsor the publication *Establishing and Operating Greenhouse Crop Management Associations in Pennsylvania*.

Greenhouse crop management associations help growers obtain profitability of Pennsylvania greenhouse operations by providing professional IPM services and consulting. The ultimate goal of every crop management association is to promote more economical, efficient, and environmentally sound crop production practices in member greenhouses.

The purpose of the publication is to guide greenhouse owners in organizing producer-owned crop management associations (CMA). It lists the general services offered by crop management personnel, benefits cited by producers, steps in establishing a crop association and responsibilities of CMA directors. Also described are the characteristics of one operating association, including its structure, size and employee profile.

Contributing to the manual are Robert D. Berghage, assistant professor of horticulture,

Penn State; Alan H. Michael, Penn State extension agent, horticulture; Gary W. Moorman, professor of plant pathology, Penn State; Michael D. Orzolek, professor of vegetable crops, Penn State; Janis T. Pruss, Penn State CMA Program Manager; and Judy Smith, greenhouse scout for the Lancaster/Lebanon County CMA.

The publication is available as a downloadable PDF at http://extension.psu.edu/ipm/resources/pestproblemsolver/greenhouse/establish/view.

IPM Jumpstart

IPM Jump Start: An Exploration Into IPM is the first in a series of lesson plan books being developed by PA IPM. The book contains four lesson plans and a glossary that are specifically designed for elementary school teachers.

Both PA IPM and the Pennsylvania Department of Agriculture are dedicated to assisting educators in gaining the knowledge and skills necessary to effectively teach IPM in the classroom and to help students become good decision makers. The IPM Jump Start lessons are designed to help teachers and elementary students take the first leap into learning about IPM.

The lessons cover a wide variety of IPM topics such as pest identification, insects, rodents, and pesticide safety. All lessons are correlated to the Pennsylvania Academic Standards and include possible assessment opportunities.

The publication is available as a downloadable PDF at http://extension.psu.edu/ipm/schools/educators/brochures/jumpstart/view.

Integrated Pest Management for Christmas Tree Production

Produced by the Pennsylvania IPM Program, *Integrated Pest Management for Christmas Tree Production* is the first manual customized for Pennsylvania conditions that describes pests and their management. The pests included are common on Christmas trees in the Mid-Atlantic and Northeast regions of the United States, however, many of these pests can be found in other regions of the United States also. The manual draws upon expertise from Penn State University and the Pennsylvania Department of Agriculture to help growers to incorporate IPM techniques into their farm operation.

The 208-page full-color manual includes IPM basics, pest fact sheets, pesticide information and appendixes such as a pest and disease photo chart, over 400 color photos and a photo index, seasonal monitoring guide, scouting record templates and lists of pests and a glossary. Spiral-bound with a waterproof cover, the manual is intended for field use for any level of grower, whether professional or hobbyist.

The manual was produced as part of a larger research project under the direction of Cathy Thomas, Pennsylvania Department of Agriculture IPM coordinator. During the project, Thomas, Sarah Pickel, and Brian Schildt, PA IPM program associates, worked with growers to develop better scouting and monitoring techniques, which are included in the new manual.

The project was funded by a grant from PDA agricultural research funds. Hard copies of the manual can be obtained through the Publications Distribution Center by calling 814-865-6713, e-mail AgPubsDist@psu.edu, or by filling out the order form at web site http://pubs.cas.psu.edu/orders_CAS.asp (specify publication AGRS-117 on the order form). A PDF copy of the publication can be downloaded from Web site http://pubs.cas.psu.edu/FreePubs/pdfs/agrs117.pdf.

Appendix

Select 2013 Press Releases

To view news releases in their entirety, go to the PA IPM's news blog at http://extension.psu.edu/ipm/news

• Soybean project scouts for disease and insects

• May is Asthma Awareness Month – Do You Know Your Triggers?

• Penn State Partnership Stimulates New Pest Technology Business in South Asia

• Penn State's Great Insect Fair celebrates 20th year

• Penn State to host international conference on pollinator health

• Updated Pest Fact Sheets Now Available

• Training Modules Provide IPM Tips for Child Care and Early Learning Environments

• New Heat Treatment Program Battles Invasive Species

• Using Less Pesticides on Sweet Corn with Biocontrols

• Training Modules for Child Cares Now Online

• Online Child Care Training in Demand

• Penn State Entomologist Talks Global Pesticide Use on NPR

• Trainings in Spanish for Mushroom Growers

• New Partnership to Educate Latino Community in Philadelphia

• International degree program spawns graduate student seminars

• IPM for Multi-family Housing Online Training

• Researchers Make Movies to Get a Jump on Bed Bugs

• Pesticide Mixtures have Damaging Affects on Bees

• Creating Healthy Environments in the Latino Community

• IPM Education in Latino Communities