

Maryland

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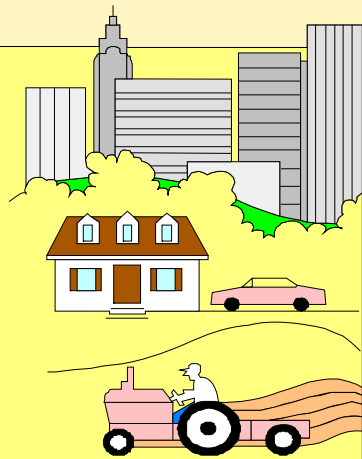
Nursery

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IPM

2006



*Maryland IPM Program
Annual Activities Reports*
<http://mdipm.umd.edu/activityReports/>

PROGRAM WEBSITES
for IPM Information Transfer

*Maryland Department of
Agriculture*

www.mda.state.md.us/

*The Maryland IPM
Program*

www.mdipm.umd.edu

*The Maryland Component of
the Northeastern Regional IPM Center:
Maryland Information Network
for Pesticides &
Alternative Strategies*

www.pesticide.umd.edu/MINPAS.html

The Home and Garden Information Center (HGIC)

www.hgic.umd.edu

1-800-342-2507 in-state or
410-531-1757 toll call for out-of-state

Maryland Master Gardeners

<http://mastergardener.umd.edu/>

Green Industries

IPM Pest Alert system

www.agnr.umd.edu/IPMNET

Bug of the Week

<http://www.raupplab.umd.edu/bugweek/>

Contents

The Maryland Integrated Pest Management (IPM) Program draws from the expertise of faculty and staff in the University of Maryland College of Agriculture and Natural Resource Sciences, the College of Chemical and Life Sciences and the Plant Protection and Weed Management Section in the Maryland Department of Agriculture. A teamwork-based systems approach is accomplished by the networking of State and Regional Specialists, Area Extension Educators, County Extension Educators with local, regional, national and international IPM Stakeholders.

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The University of Maryland IPM Program

Sandra Sardanelli
Maryland IPM Program Coordinator
Entomology Department, UMCP

University of Maryland IPM Programs and projects are created and directed by Maryland Cooperative Extension and Maryland Agricultural Experiment Station faculty and staff. Representing the College of Agriculture and Natural Resources and the College of Life Sciences, our extension and research faculty and staff daily network with the public and private sector to reinforce and extend the adoption of IPM approaches.

The diverse nature of Maryland IPM program activities requires input from faculty and staff in crop science, entomology, horticulture, plant pathology, and weed science, all of whom contribute to projects and serve as information resources for agronomic and horticultural crops, and urban and structural pest management. Additionally, encouraging increased stakeholder participation is a continuous process in the Maryland program for promoting the adoption of IPM principles.

Agribusiness, growers, pest control professionals, and consumers are directly involved in needs assessments that identify timely stakeholder priorities to ensure “best management” approaches to pest management. Needs assessments and priority determinations are currently accomplished by frequent stakeholder interaction in commodity and working groups and program/

The University of Maryland IPM Program

project evaluation - Maryland Pest Management Recommendations/Guidelines are constructed to address identified priorities.

NEW DIRECTIONS:

A major focus of IPM planning for the next Plan of Work cycle (2006-2008) efforts will be to coordinate a Plant Protection Center Initiative which will enable a re-structuring and enhancement around core IPM/plant protection functions. Alignment with the Plant Protection Center Initiative will allow the Maryland IPM Program to maintain and enhance its essential program components through expanded public/private partnership. The venture is jointly sponsored by the College of Agriculture & Natural Resources and the College of Chemical & Life Sciences.

Maryland 1890-1862 IPM . Sponsored by the Southern Region IPM Center and held in Indianapolis on September 11-12, the 1890-1862 IPM Collaboration Forum was the first step toward introducing IPM coordinators from 1862 land grant universities to their counterparts at the 1890 land grant universities. Maryland 1890-1862 IPM Coordinators, Stephan Tubene and Sandra Sardanelli, attended the meeting and subsequently set up collaborative projects.

The Maryland IPM - NRCS Liaison, Betty Marose, initiated cooperative efforts between the two state programs involving local, multi-state and regional project initiatives.

The Maryland IPM Website, www.mdipm.umd.edu is currently under revision to increase access and provide quick referral to a variety of Maryland Web-based IPM informational resources and program directories and reports.

MARYLAND COOPERATIVE EXTENSION PLANT DIAGNOSTIC LABORATORY



Ethel Dutky
Retires
Director, Plant Diagnostic Lab
May 1979 - Dec. 2006

Ethel was hired to establish the Plant Diagnostic Laboratory soon after completing her MS in Botany/Plant Pathology. From 1979 through 1995 the lab was located in the Department of Botany. In 1995 a College re-organization resulted in Botany no longer existing as a Department, so the lab moved to the Department of Entomology where it continues today as a good fit with the plant protection team in Entomology.

Throughout her 28 years as laboratory Director, Ethel established close working relationships with colleagues at the Beltsville Agriculture Research Center and the Maryland Department of Agriculture which have resulted in cooperative projects, surveys and other activities over the years. On several occasions when the Maryland Department of Agriculture had not yet established a diagnostic lab, and

MARYLAND COOPERATIVE EXTENSION PLANT DIAGNOSTIC LABORATORY

when their diagnostician was absent, Ethel processed all samples for the Nursery Inspection Program.

The lab is closely tied to pilot programs in Integrated Pest Management (IPM) conducted by faculty in the Department of Entomology and by Extension Regional Specialist Stanton Gill. Ethel designed the monitoring protocols for plant diseases for IPM pilot programs for landscapes, greenhouse and nursery settings. Because these programs monitor for weeds, nutrient levels, diseases and pests, and are team executed, they are referred to as “Total Plant Management (TPM)” programs. The team has produced two bulletins for recommendations: “Total Plant Management for Herbaceous Perennials” and “Total Plant Management for Greenhouse Crops”.

In 2002, the National Plant Diagnostic Network (NPDN) was started to link all of the diagnostic labs at each Land Grant University. The overall mission of NPDN is to enhance national agricultural security by quickly detecting introduced pests and pathogens. The network, divided into 5 regions across the country, is a collective of plant disease and pest diagnostic facilities from Land Grant Universities and State Departments of Agriculture.

NPDN Regional Centers have been designated and are coordinated by the following universities: Cornell University (Northeast region), Michigan State University (North Central region), Kansas State University (Great Plains region), University of Florida at Gainesville (Southern region), and University of California at Davis (Western region). The University of Maryland is a member of the Northeast Plant Diagnostic region (NEPDN).

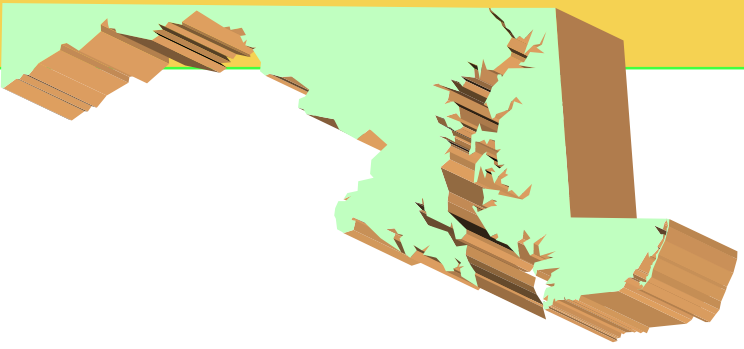
INFORMATION TRANSFER

Keeping Maryland Stakeholders Informed

Amy E. Brown, Professor
State Network Project Leader
Department of Entomology, UMCP

The Maryland Information Network for Pesticides and Alternative Strategies (MINPAS) serves as the State Network Project (SNP) designed to gather and transmit information on issues relevant to both current and transitional pest management strategies, including pesticides. MINPAS aims to improve the level of knowledge, awareness, and understanding of local, state, regional, and national pest management practices. MINPAS is the primary information source for federal and state regulatory agencies and other agencies regarding use and usage of all Integrated Pest Management (IPM) tactics, including pesticides, in all IPM settings in the state.

MINPAS delivers pesticide regulatory and policy information to Extension educators, growers, crop consultants, and pesticide users in the state; gathers pest management data from researchers, Extension educators, growers, crop consultants, and pesticide users; analyzes these data to estimate the impacts of changes in pesticide regulations on agricultural productivity in Maryland; solicits input from other states in the mid-Atlantic region on shared commodities; and shares this information with other states in the mid-Atlantic region, the Northeastern Integrated Pest Management Center (NEIPMC), the US Department of Agriculture (USDA), and the US Environmental Protection Agency (EPA).



Information sources available directly through the MINPAS home page at <http://www.pesticide.umd.edu> include the MINPAS annual reports, Pesticide Notes newsletters (current plus archives), crop profiles, Extension publications in the Pesticide Information Leaflet series, and information on how to register to receive Just-in-Time Pesticide Information. In 2006, the monthly newsletter, Pesticide Notes, reported on federal pesticide policy developments, nanotechnology issues, green landscaping practices, use of herbicides in agriculture, pesticide container recycling, proposed changes for pesticide education and certification, and many other timely topics.

Just-in-Time Pesticide Information is an electronic outreach system that facilitates subscribers' input on pesticide decisions at the federal level. Subscribers to the free service are notified of upcoming pesticide policy-related meetings, requests for comment on proposed actions, and other time-sensitive pesticide issues. This service helps Maryland stakeholders maximize the time to learn about possible federal actions and prepare comment on issues of concern. In 2006, subscribers were notified of opportunity to comment on 36 pending pesticide decisions throughout the year, with an average of 30 days to respond.

Community IPM Resources

University of Maryland's Home and Garden Information Center

Mary Kay Malinoski and David L. Clement
Regional Specialists
Central Maryland Research and Education Center

The Home and Garden Information Center provides unbiased Community IPM information to the residents of Maryland via our toll-free number (1-800-342-2507) and regionally/nationally via our main web site at hgic.umd.edu and Plant Diagnostic site at plantdiagnostics.umd.edu. One of our primary goals is to help educate clients about using IPM principles to help reduce pesticide use. Available online resources include publications, useful links, timely tips and important invasive species information.

Impacts for 2006:

- Results of online survey of “Send a Question” service: 87% of 126 respondents stated that we correctly identified their problem. 63% were able to successfully manage the problem based on IPM advice and 64% learned how to prevent the problem next year.
- Both the HGIC main web site and Plant Diagnostic site underwent a complete redesign and reconstruction. The Plant Diagnostic site was converted into a database driven site with a new look and customized search engine.
- 13,494 clients were assisted by phone consultants via HGIC’s toll-free phone number. 57% of these inquires related to ornamental landscape problems and 10.5% to pest control.
- 3,096 clients were assisted via the “Send a Question” service. 56% of the questions related to landscape ornamental problems and 9% concerned pest control.

New Roles for Urban Extension

Michael J. Raupp
Professor, Landscape IPM
Entomology Department, UMCP

Homeowners are supplanting clientele such as farmers and growers as an audience for extension activities in Maryland. ***I use mass media including television, radio, newspapers, and web-based delivery systems to deliver extension programs and educate our urban stakeholders.*** My goals are to allay fears about arthropods, teach children and adults ecological and evolutionary principles, help plant managers reduce losses caused by arthropods and train graduate students. The Media Relations Associate helps plan and coordinate contacts with mass media. More than 12 million viewers, listeners, and readers received information from my work with mass media in 2006.

Active web sites and web castes:

Bug of the Week <http://www.raupplab.umd.edu/bugweek/>

ABC News at <http://abcnews.go.com/GMA/Health/popup?id=889403&content=&page=1> and <http://abcnews.go.com/Video/playerIndex?id=2201161>

CBS News at http://wjz.com/local/local_story_309190033.html .

Scientific American, Scientific American.com, Ask the experts. http://www.sciam.com/askexpert_question.cfm?articleID=00044AA0-BDC1-1492-BDC183414B7F011B&ref=sciam

Maryland Master Gardeners

Jon Traunfeld
State Master Gardener Coordinator

Master Gardeners are the most active volunteer group in Maryland fulfilling the College of Agriculture and Natural Resources' mission to teach citizens how to reduce unnecessary pesticide use through the IPM approach. Basic training for all volunteers includes entomology, plant pathology, and IPM. Advanced training opportunities in plant diagnostics are provided at the county and state level.

Master Gardeners are trained to walk clients through the IPM process- from correct diagnosis to monitoring, prevention, and, when necessary, making targeted applications of least toxic pesticides. Volunteers also teach home gardeners how to identify and attract beneficial insects.

Impacts for 2006:

- 278 new trainees completed the program.
- 970 volunteers contributed 56,500 hours of service.
- Plant Clinic sub-committee worked to improve plant clinic operations.
- MG programs in 11 counties and Baltimore City operated plant clinics at 30 sites.
- Results of evaluation postcards completed by clients (290 responses from 24 plant clinic sites):
 - o 94% said MGs identified their problem or answered their question “very much” or “a good deal.
 - o 93% said they learned something new from their interaction with MGs.
 - o 30% learned “a good deal” or “very much” about how to reduce fertilizer use.

Reaching a Different Audience: Weed Science for Master Gardeners

Betty H. Marose, IPM Specialist, Weed Science
Robin M. Hessey, Master Gardeners Program

Reaching the urban/suburban audience of pesticide users is a challenge. Maryland Cooperative Extension initiated a Master Gardener Program in 1978 as a means of extending the horticultural and pest management expertise of its specialists. Today, this popular program can be found in 13 Maryland counties and Baltimore City. The program is designed to train volunteer horticultural educators for Maryland Cooperative Extension, the principal outreach education unit of the University of Maryland.

Between 225 and 300 beginning Master Gardeners are trained each year in weed science by the senior author. After numerous requests for more in-depth weed training, an advanced weed class was developed in 2002. The current course curriculum was developed for a 5-day session offering 20-25 hours of contact time. Each day is a blend of lecture, discussion and hands-on activities which include collecting, keying and identifying weeds from field walks, reading herbicide labels, and deciding on best management practices for various scenarios.

Enrollment is limited to 25 students per year to keep class size small and allow for good interaction. Efforts are made to have the range of plant materials and stages of growth as diverse as possible. Therefore, classes are held about six weeks apart from mid-March through early September and generally run from 9:30 – 3:00. After course completion, 68% of students could recognize (flash photo) and name more than 40 weed species without the aid of any books or notes.



URBAN IPM: OUT AND ABOUT IN THE COUNTIES

St. Mary's Master Gardener Program

Ben Beale

Agent, Co- County Director

Agriculture and Natural Resources

The Master Gardener program provides educational opportunities to the citizens of St. Mary's County. This educator planned, facilitated and implemented two basic training programs for certification of 126 new volunteer interns, including 30 new interns in 2006.. This educator taught numerous sessions at the training including "Vegetable Gardening", "Soil and Fertilizer Use", "Introduction to Master Gardener Program" and "MCE Volunteer Policy". In addition, this educator serves as the coordinator of the program, providing leadership and direction to volunteer activities. Additionally, this educator has taught eight local advanced training sessions to volunteers and led quarterly meetings to plan and evaluate Master Gardener activities. This educator has also given presentations to three other county programs on four occasions. Examples of St. Mary's Co. programs include the planning and construction of a Freedom Garden in the Governmental Center complex that memorialized the events of 9/11, facilitating design and construction of beautification and education projects at 8 community parks, 2 elementary schools, 3 historic sites, and 2 county buildings and the coordination of an interactive exhibit at the county fair. In addition, Master Gardener volunteers held numerous public educational seminars throughout the year at local libraries and garden clubs. End of class evaluation data has been collected indicating a positive response to every program. Thus, the St. Mary's Master Gardener Program is actively growing, with 85 volunteers performing over 3800 hours of service annually.



URBAN IPM: OUT AND ABOUT IN THE COUNTIES

Extension Urban Agriculture Program Baltimore City/County

Josue Lopez

Agent, Agriculture and Natural Resources

Urban Horticulture, Master Gardener Coordinator

The Extension Urban Agriculture Program provides continuing support and training to about 28 community gardens and beautification projects in Baltimore City. The main purpose of the Community Garden Program is to promote urban greening initiatives through environmentally friendly horticultural practices that include but are not limited to composting, soil sampling and amendments, soil building guidelines, preparing and planning the vegetable garden, cover crops, and diagnosis of insect and plant diseases and the use IPM methods. The Extension educator developed and established networks and relationships with agencies such as Parks and People Foundation, Department of Recreation and Parks, Civic Works, Neighborhood Design and the Latino Providers Network for the maintenance, enhancement and expansion of community gardens.

Bay-Wise Landscape Management

Wanda MacLachlan, Area Educator

The Extension Urban Nutrient Management Program focuses on residential water quality issues with urban, suburban and rural homeowners statewide and the Area Educator concentrates efforts in Baltimore, Howard, Montgomery Counties and Baltimore City. The ultimate goal is to have citizens reduce the amount of nitrogen, phosphorus and pesticides they contribute to their local streams, rivers and eventually, the Chesapeake Bay. Bay-Wise landscape management is the name of the program created to address this water quality issue. Topics covered

IPM Educational Outreach to the Green Industry

Stanton Gill
Regional Extension Specialist
Nursery and Greenhouse Management

In Maryland, the Green Industry comprises the second largest agricultural sector in the state in terms of cash receipts. The University of Maryland Cooperative Extension has a well known and recognized program for the green industry in the IPM arena. Professional IPM scouts and companies practicing IPM actively seek out pest and disease activity information during the growing season.

The Regional Extension IPM Specialist, Stanton Gill, works as team lead for the University of Maryland Cooperative Extension production of a near real-time electronic IPM Alert which is sent weekly to arborists, and landscape, greenhouse and nursery managers. Co-authors are IPM Specialists: Paula Shrewsbury, Ethel Dutky, and Chuck Schuster.

This system provides an electronic means for sharing immediate alerts on insect and disease outbreaks, near real-time, precise lifecycle information, forecast, and other timely information between growers, landscape managers, arborists, IPM scouts, Extension professionals and researchers.

One of the key components is quality image delivery of currently active insects, mites, diseases, weeds and beneficial organisms. The electronic IPM report in 2004 involved direct participation of 400 green industry professionals, increased to 625 in 2005 and increased to 890 in 2006 in Maryland, the District of Columbia and Northern Virginia.

Lower Eastern Shore Area IPM and Best Management Practices

Virginia L. Rosenkranz
Area Extension Specialist
Commercial Horticulture

For Commercial Horticulture, the Area Extension Specialist with primary responsibility for the lower three counties on Maryland's Eastern Shore is located in Wicomico County. The primary program focus is the Integrated Pest Management and Best Management Practice for the green industry.

Working with the greenhouse and nursery growers, landscape contractors, garden center operators and golf course supervisors and cut flower growers, the program aims to assist in the development and implementation of Integrated Pest Management and Best Management Practices to reduce the amounts of nutrients and pesticides for better soil and water quality. This includes diagnosing insect, disease and biotic plant problems and developing solutions to their problems.

At this time the Lower Eastern Shore Master Gardener Program has three Plant Clinics where the Master Gardeners can help the community by identify plant materials brought to the Plant Clinics, solve pest problems addressed at the Plant Clinics and give University of Maryland recommendations for the control of the pests. One is conducted each Tuesday afternoon during the growing season at the Ocean Pines Library, one is held each Friday afternoon at the Berlins Farmers Market and one is held each Saturday at the Salisbury Farmers Market.

Each of the three counties hosts a County Fair where the Master Gardeners set up a mobile Plant Clinic.

Interstate Pest Management Conference – Structural Pests

Nancy L. Breisch
Senior Research Associate, Urban/Structural IPM
Entomology Department, UMCP

The continuing rise in population in Maryland and associated urbanization has caused a parallel increase in demand for structural pest management. The Maryland Department of Agriculture requires that licensed pesticide applicators receive a minimum of 8 credits of training yearly to keep up-to-date on the latest technology and practices to maintain their licensed status. A significant subset of licensed Maryland pesticide applicators in the more than 700 structural pest control businesses in Maryland also holds a reciprocal license in a least one of the surrounding jurisdictions- especially Virginia, West Virginia, Pennsylvania, Delaware, and the District of Columbia – and must also fulfill those state and local requirements for recertification to maintain their license.

Experts from industry, government, and the scientific community are assembled annually at the Interstate Pest Management Conference to provide state-of-the-art training with an emphasis on Integrated Pest Management to members of the structural pest management industry. This training covers all pests associated with structures from bats in the attic to snakes in the basement as well as the organisms that actually degrade structures like termites and wood-rotting fungi.

Technical presentations allow participants to earn recertification credits in industrial, institutional, structural, health, and public health categories including but not limited to general pest management, termite, bird, mosquito, and rodent control, as well as the specialty category of structural and stored commodity fumigation.

The 2006 Interstate Pest Management Conference trained over 625 structural pest management professionals who earned recertification credits in 15 states and the District of Columbia, supporting a Maryland industry with gross annual sales over 200 million dollars.

Integrated Management of Fruit Diseases

Anne DeMarsay

Regional Extension Specialist in Fruit Pathology

Fruit crops account for a small portion of agricultural land use and revenue but may increase in importance in the state's agricultural economy for a number of reasons: growing demand from consumers for high-quality, nutritious produce; the revenue potential from high-value processed fruit products such as wine; the increasing popularity of agri-tourism activities that enhance and stabilize farm revenue; and the suitability of small fruit crops for intensive cultivation on relatively small farms.

For some fruit crops, limited information is available on current disease and pest management practices among growers to guide educational programming and applied research. For others, there is a substantial base of research information in the mid-Atlantic region, and education and information dissemination are the major needs.

In the last three months of 2006, the Specialist conducted a preliminary assessment of needs and existing information resources to define the program area and developed plans for 2007 Extension and research activities; reviewed publications and attended professional meetings to gain currency in fruit diseases and disease management, especially grape diseases; participated in the grape harvest in the research vineyard at Upper Marlboro and made observations of late-ripening varieties to gain familiarity with the crop and yield-limiting diseases such as powdery mildew and secondary rots; obtained required certification as a commercial pesticide applicator in Maryland; and attended training and in-service courses on the use of research tools (GPS and GIS), grant preparation, and pesticide safety.

Management Decisions for Fusarium Wilt

Kathryne L. Everts

Associate Professor & Extension Specialist

Plant Pathology, Vegetable Crops

Department of Plant Sciences & L. A., LESREC

Watermelons provide more than 15% of the total value of vegetable production in Maryland and Delaware. My program conducts basic and applied research on several diseases of watermelon, including Fusarium wilt (*Fusarium oxysporum* f. sp. *niveum*). Fusarium wilt is increasing in importance and was identified as the most important watermelon disease in the region at a January 2007 five-state pest management strategic plan. Fusarium wilt has become more prevalent as the production of triploid (seedless) watermelons increase and the use of methyl bromide is phased-out.

Our research program on Fusarium wilt has led nationally in the development of new knowledge as well as extension information on this disease. Our program is a major contributor to the national working group on Fusarium wilt on watermelon and we have published 7 research and 13 extension articles. We have documented that almost all triploid watermelon cultivars are highly or moderately susceptible to Fusarium wilt.

A new management tactic is the production of watermelon following a fall planted hairy vetch cover crop that is killed in the spring and amended into the soil as a green manure. Hairy vetch-induced suppression to Fusarium wilt in watermelon is dependent on the resistance level of cultivars and is overcome by high inoculum levels of *F. oxysporum* f. sp. *niveum* in soil. The use of suppressive cover crop may provide a feasible, alternative

Insecticide Baseline Susceptibility and Resistance Monitoring in Colorado Potato Beetle Populations

Galen Dively, Professor, IPM Specialist

Colorado potato beetle is notorious for developing resistance to classes of insecticides and will likely become resistant to any new mode of action. In the past decade, neonicotinoids and spinosad have been used to control this pest. These products offer novel modes of toxic action for resistance management purposes and pose lower risks to human health and the environment. More recently, new active ingredients such as metaflumizone and rynaxypyr have been developed but not yet registered.

Knowledge of baseline susceptibility responses to new insecticides is an essential first step in resistance management to preserve their long term effectiveness. Assessments of potential cross-resistance between insecticides provided insight into how resistance may occur and how new insecticides should be used to minimize the risks of resistance.

Results indicated that potato beetle populations are still susceptible to spinosad. About one-half of the populations assayed showed concentration-mortality responses to imidacloprid outside the baseline range, indicating that many populations are showing signs of resistance development. To prevent further resistance development, a neonicotinoid-free management plan was implemented in one potato production area in Maine in 2004. Populations from several field sites in this area assayed in 2006 showed signs of resistance reversion and thus may become more susceptible over time. Baseline responses were established for metaflumizone and rynaxypyr, which will provide a reference for detecting early stages of resistance to these new products.

Vegetable IPM program

Jerry Brust

Regional Vegetable Specialist

The pressure on vegetable growers to produce vegetables that are considered to be cosmetically high in quality has exerted pressure on the vegetable industry to spray on a regular calendar-based schedule. This situation leads to serious problems for growers, which include: environmental contamination concerns, illegal pesticide residues, premature reentry of agricultural workers into contaminated fields, and the possibility of pesticide movement into nearby urban areas.

Growers need to maintain produce that is cosmetically acceptable to the consumer, but reduce their use of potentially harmful pesticides. The primary goal of the IPM vegetable program is to design an agenda that uses cultural and biological controls, resistant and new vegetable crop varieties and practices that are integrated into sustainable programs that reduce chemical inputs while maintaining the economical viability of the farm.

I am investigating using real-time in-the-field nitrate testers to determine when nitrogen needs to be added based on the plant's NO₃-N concentration. Over 40% of MD vegetable growers feed through their drip irrigation (and >65% are capable of this), but do not know how much N is needed. I hope to discern what rate is best and how often it should be supplied and if cover crops can supply half of the needed N in a plastic-culture vegetable system, only adding additional nitrogen when needed during the season. The beginnings of this research appear on a web site I developed concerning Maryland Vegetables (Horticultural, Nitrate Management) <http://mdvegetables.umd.edu/>. Fact sheets will be produced next year on this topic as well as IPM topics.

New Crop Ventures

Bryan Butler

Senior Agent and Carroll County Extension Director

Carroll County Farming Agriculture in Central Maryland is changing. High development pressure and land prices have led some farmers to consider new types of farming that require less land and have a greater profit potential than traditional crops. I am striving to focus on the local needs of producers regardless of size or commodity. I have developed a 3 hour program to provide both Nutrient Management voucher training and pesticide recertification at one time. I am working with our IT person and Nutrient Management advisors to develop practical and useful computer spreadsheets for pesticide and nutrient record keeping. I am providing IPM and PSNT services to selected producers where I feel there will be a multiplier effect through the producer passing on his or her experiences to other producer thus providing a wider acceptance of best management practices.

IPM in the Marketplace

Ben Beale

Agent, Agriculture and Natural Resources
St. Mary's County

Vegetable Production has increased, especially in regard to new growers in the last 5 years. As part of this educational effort, this educator worked with vegetable growers in enhancing knowledge of production practices such as utilizing IPM programs, using drip and plastic mulch systems and planning fertility programs. As a part of this effort, this educator has posted current IPM and cultural production updates at the Loveville Produce Auction. In addition, this educator coordinated an IPM twilight tour held at a local vegetable farm. At the twilight, 40 producers received updated information regarding pest control options and production updates.

Regulatory Support for IPM

Carol Holko

Chief, Plant Protection and Weed Management
Maryland Department of Agriculture

Participation in the IPM Maryland Program, a cooperative effort between MDA and the University of Maryland, continued and expanded. IPM Maryland consolidates research, education, outreach, regulatory, and support aspects of IPM to mutually benefit agriculture, the environment and the citizens of Maryland. Cooperative efforts continued with MDA, the University of Maryland, growers, and the Northeast Integrated Pest Management Center (NEIPMC). MDA represents Maryland state regulators at the NEIPMC through a seat on the Advisory Council. In 2006, the Section was active on planning and implementation teams for the Maryland Plant Protection Center, a cooperative effort between USDA and the University of Maryland, which aims to establish a leading academic research and extension program in the mid-Atlantic region.

During 2006, MDA continued to take a leadership role in the Maryland Invasive Species Council (MISC), a forum for information exchange and consensus building among diverse interests in public and private agencies or organizations concerned with invasive species. Several Plant Protection and Weed Management staff members were directly involved with MISC and were able to assist other members or individuals with technical information on control of invasive plant species or with actual spraying as well as partner with other agencies on grants to control invasive species. Through MISC, MDA has been able to disseminate information on many of the serious pests cited in this report. The MISC Web site is www.mdinvasivesp.org.

The Cooperative Agricultural Pest Survey (CAPS)

Dick Bean, Entomologist
Plant Pest Survey and Detection

The Cooperative Agricultural Pest Survey (CAPS) is a joint project between MDA and USDA-APHIS-PPQ. USDA recommends pests of quarantine export significance as survey priorities and provides funding for these surveys. MDA adapts the appropriate survey methods and conducts the actual survey. This cooperative program has provided necessary data used to certify Maryland products for export to many countries.

These surveys document the presence or absence of exotic pests in Maryland, support APHIS-PPQ exotic pest survey activities, and provide state-specific data for exotic pests in the United States. If any of these species were to become established, it would pose a significant threat to our agricultural production and have a significant impact on Maryland's ability to export agricultural commodities. Early detection of exotic pests before they become established will aid in any eradication or control efforts undertaken.

Three thousand nine hundred and thirty four insect traps were deployed and monitored in 2006. Through the various types of surveys conducted, 14,731 samples were collected and over 94,000 insects identified. Trapping techniques involved a wide range of devices including blacklight and pheromone traps as well as many others. Visual surveys accounted for the detection of 2 new sites infested with giant hogweed. The blacklight and pheromone traps were instrumental in alerting growers on the Eastern Shore of a potential outbreak of black cutworm that can cause severe losses to corn and vegetables.

The surveys conducted target pests that are both exotic and endemic to Maryland. Eighteen extensive surveys for exotic wood borers, stored product pests, field crop and vegetable pests including diseases such as soybean rust, and fruit crops were conducted.

Emerald Ash Borer

Carol Holko

Chief, Plant Protection and Weed Management

*In August of 2006, the emerald ash borer (*Agrilus planipennis*) was detected in ash trees* located in the Clinton/Brandywine area of southern Prince George's County. The infested trees were discovered during survey and eradication efforts begun after the detection of the insect in Maryland in 2003, when a Michigan nurseryman shipped infested trees, in violation of a quarantine in that state, to a Prince George's County nursery.

The emerald ash borer, an exotic, devastating pest of ash trees was first detected in the Detroit, Michigan/Windsor, Ontario area in 2002. This federally-regulated beetle is thought to have arrived in the United States in solid wood packing material from its native Asia. It has been found since in Ohio, Indiana, and Illinois. Because of the emerald ash borer, more than 20 million ash trees have died in Michigan, Ohio, and Indiana. On August 22, 2006, the Maryland Secretary of Agriculture issued a Quarantine Order (#06-01) that prohibits anyone from moving ash trees, wood, or any hardwood firewood out of Prince Georges's County until further notice.

Ash accounts for more than 10% of the trees planted in Baltimore City, and an estimated 3% of trees in wooded areas of Baltimore and surrounding counties. The USDA has estimated that losses could exceed \$227,568,000 in the Baltimore area alone, should this pest become established. Ash is also the second most predominant tree, and one of the most frequently successful, in streamside buffer areas that protect the Chesapeake Bay watershed. The MDA, with federal funding support and in cooperation with our federal, state, and local government partners, has undertaken a massive eradication effort continuing into 2007.

Phytosanitary Certificates

Matt Travis
Nursery Inspection

The nursery and greenhouse industry continues to be a strong part of Maryland's agricultural economy. Based on a crop cash value, in 2004, of more than \$360 million, it is the number two agricultural commodity in the state. Total sales of Maryland horticultural products and services were \$1.04 billion. It is a goal of the section to facilitate the production and sale of Maryland nursery stock by inspecting all plant material intended for sale or distribution, to ensure that it is disease and pest free.

Maryland law and reciprocal agreements with other states require plant material at each producing nursery is to be inspected annually for freedom from dangerously injurious plant pests prior to its movement out of Maryland. These inspections also facilitate phytosanitary certification of Maryland plants for export from the United States. MDA inspectors issued 510 phytosanitary certificates for the movement of plants and plant products to 18 states and territories, and to 14 foreign countries, during 2006. Most of the certificates were issued to meet other states' quarantine requirements for Japanese beetle. The number of phytosanitary certificates issued was reduced during 2006, primarily due to a revised protocol which reduced the need to send certificates with shipments, and a decrease in mail-order trade.

Inspections of plants at 733 plant dealers (garden centers, chain stores and landscape contractors) and 384 Nursery Inspection Certificates (nurseries and greenhouses producing nursery stock) were conducted to intercept pests not known to occur in Maryland. The general health of Maryland-produced nursery stock was found to be excellent.

The mission of the Plant Pathology Laboratory (PPL) at the Maryland Department of Agriculture (MDA) is to collect, accept, and evaluate plant samples for plant pathogens and diseases. General activities include: evaluating plant samples in support of the Nursery Inspection Program to ensure that all plant material in Maryland intended for distribution or sale is disease free; diagnosing plant diseases submitted by other sections of MDA, i.e., Pesticide Regulation and Forest Pest Management, other Maryland agencies, home gardeners and home owners, consultants, and industry representatives; providing technical and diagnostic support for virus-free certification programs; supporting the Cooperative Agricultural Pest Survey Program through laboratory assays for specific diseases; and supporting USDA, APHIS and MDA regulatory functions through diagnostic assays for pathogens of regulatory importance.

In 2004, Ramorum Blight /Sudden Oak Death, caused by *Phytophthora ramorum*, a fungus-like microorganism, exploded on the American nursery industry. Economically-important nursery plants (e.g., *Rhododendron*, *Viburnum*, *Pieris*) were found to be susceptible to what was previously a forest disease in California and Oregon on several oak species.

The laboratory was authorized to perform diagnostic tests for *P. ramorum* by USDA, APHIS, PPQ through the Provisional Laboratory Approval Program on June 9, 2006. Authorization was granted after the laboratory passed an inspection of the physical facilities, submitted a written Standard Operating Procedure, and passed a proficiency panel consisting of 20 unknown DNA samples. The laboratory was authorized to perform both the nested and real-time PCR protocols as specified by USDA, APHIS, PPQ.

Dick Bean, Entomologist
Plant Pest Survey and Detection

*Soybean rust, caused by *Phakopsora pachyrhizi**, was introduced into the southeastern United States in the fall of 2004 on the coattails of Hurricane Ivan. This disease has the potential to severely limit soybean production. MDA, in cooperation with the University of Maryland and other interested parties, developed an action plan to prepare for the arrival of soybean rust into Maryland.

MDA established two sentinel soybean plots in St. Mary's county in southern Maryland in 2006 (in addition to four established by the University of Maryland). These plots were sampled biweekly for both healthy and diseased tissue. Samples from the University of Maryland Plant Diagnostic Clinic also were received. Diseased tissue contained brown spot (*Septoria glycines*), downy mildew (*Peronospora manshurica*), frog eye leaf spot (*Cercospora sojina*), and thrips damage, just to name a few. DNA was extracted from all samples and assayed for *P. pachyrhizi* using real-time PCR (qPCR). All results were negative for *P. pachyrhizi*.

Spread of soybean rust into Maryland in 2007 will depend on the amount of inoculum surviving the winter in the southeast on kudzu, and weather patterns during the growing season. If past seasons are any indication, in Maryland only double cropped soybeans late in the season may be at risk, however, that may change if a major weather event (hurricane) tracks up the east coast from the Gulf of Mexico.

John Bowers and Richard Anacker
Plant Pathology and Pest Management

The MDA Plant Disease Diagnostic Clinic was established primarily to assist MDA nursery inspection staff with routine diagnostics of plant diseases. The plant diagnostic clinic has received over 400 samples (a record number) over the 2006 growing season. Samples were submitted by MDA nursery inspectors and pesticide investigators, nurserymen, landscapers, IPM scouts, private consultants, and homeowners. The majority of the samples were of fungal leaf spots diseases, with a number of fungal root rots and canker diseases. Host plants consisted of the usual range of popular nursery and landscape plants.

Outreach through grower workshops, in conjunction with the University of Maryland Cooperative Extension and the HGIC, has increased the awareness of the MDA Plant Pathology Laboratory. Site visits to growing facilities (particularly nurseries) have resulted in increased sampling by the MDA field pathologist and nursery inspectors. Routine field visits have been beneficial to both plant pathology lab personnel and nursery inspectors. Such field visits also benefit growers. Problems often are discussed directly with the grower or production manager, and addressed in the field. This effort will continue in the future whenever possible.

Phytophthora spp. identification. In concert with the identification of *Phytophthora* spp. recovered from streams, a major emphasis in the clinic is to identify species of *Phytophthora* that are present on nursery stock, landscape plants, and forest species. Numerous isolates of *Phytophthora* have been obtained through survey efforts and clinic samples, and identified to species by morphological and restriction fragment length polymorphism (RFLP) analyses. Predominant species include *P. cactorum*, *P. cinnamomi*, *P. citricola*, and *P. nicotianae*.

Decline of European Beech. The laboratory also has been working with the Maryland Arborist Association (MAA) to determine the cause of a Phytophthora disease affecting European beech trees (*Fagus sylvatica*). Several sites with large, declining European beech trees have been located in Baltimore and Harford counties, and are being monitored. Experimental fungicide treatments were conducted in the fall of 2005 on a large European beech located on the campus of Towson University and at an additional site. These trees continued to be monitored. Carroll Tree Service donated and applied the fungicide treatment.

Rose certification. The Laboratory continues to participate in the virus-free rose certification program with Angelica Nursery. MDA maintains and certifies stock plants of 17 varieties of roses as virus-free. Plants are maintained in the MDA greenhouse with insect controls. Laboratory personnel participated in a visual inspection of all rose plants in the nursery both in the spring and fall, and submitted leaf samples of the stock plants to Agdia for testing in their rose screen for viruses. Visual surveys are conducted twice a year, and testing occurs once each year.

Hosta Virus X (HVX) was a big concern for nurseries and retail stores alike in 2006. An increase in the media coverage of this disease has alerted nurseries, retail centers, and homeowners to the seriousness of this virus. Nursery inspectors and concerned homeowners brought several cultivars of hostas to the Plant Pathology Laboratory to be tested for HVX. The hostas were tested by Jayme Dinsmore (an intern from Catholic University), using an ELISA assay (Agdia kit) to determine the range of cultivars infected. A total of 71 samples were tested, and 34 tested positive for HVX (48%). A sample of both positive and negative plants were planted in a small area next to the MDA greenhouse to determine the fate of the virus in plants over

Gaye Williams

Entomologist, Pest Identification

The MDA Entomology Laboratory processed a number of interesting samples in 2006. Some highlights follow:

A mealybug, *Chorizococcus brevicruris*, was collected on a greenhouse Hoodia from California, an onion aphid, *Neotoxoptera formosans*, was found in fancy onions and garlies at a gourmet market.

A very interesting tropical ant, *Odontomachus* sp., which snaps its large jaws to launch into the air and escape predators, was collected on palm trees from Florida. A horntail ‘wasp’, *Urocerus gigas flavicornis*, not known in the east below New Hampshire, was found in an exotic beetle trap in Baltimore.

Fancy (and expensive), lacquered Asian furniture from Florida was found to be riddled with large larvae and adults of a cerambycid beetle, *Stromatium longicornis*. In some places, only the thick lacquer pant was intact, concealing powdered wood.

Three bedbug (*Cimex lectularius*) collections from hotels reflected the national increase in these pests as less toxic pesticides are utilized for control.

In addition, there were plenty of snakes, camel crickets, cicada killer wasps, as well as the unfortunate reappearances of emerald ash borer (*Agrilus planipennis*, see elsewhere), red imported fire ant (*Solenopsis invicta*, see elsewhere), and brown garden snail, *Cryptomphalus aspersus*.

Robert Trumble

Plant Protection and Weed Management

Weed Integrated Pest Management (IPM)

Under the direction of Plant Protection and Weed Management Section entomologists, staff assisted in an integrated pest management (IPM) program to provide biological control of certain thistle species. The program has helped greatly to control musk thistle along highway areas that are inaccessible to mowing and/or spraying equipment. MDA provided technical assistance to the federal government, county governments and other state agencies with noxious weed problems on public land, including the University of Maryland, Department of Natural Resources, correctional institutions, county road departments, State Highway Administration and the U.S. Department of the Interior.

Thistles

Weed IPM research activities continue to be conducted at field plots at the MDA facility in Cheltenham. Field plots established along State Highway Administration rights-of-way sites during each of the past six years continued to be used for evaluation and to conduct weed suppression trials. Investigations continued on integrated pest management of *Cirsium* and *Carduus* thistles.

Research is concentrating on the evaluation of organisms for potential biocontrol, testing herbicide formulation efficacy, and evaluating the use of competitive vegetation (including native grasses and forbes) in an effort to provide environmentally-sound and cost-effective methods for suppression of noxious thistle species in Maryland. The department continues to be involved with the State Highway Administration in a cooperative thistle management program on state highway rights-of-way.

Mark Smith
Weed Control

Noxious Weed Management

This program supports the control and eradication of designated noxious weeds in order to reduce their economic and aesthetic impact on farmers and landowners. Noxious weeds (Johnsongrass, shattercane, thistles, and multiflora rose) cause losses in excess of \$15 million annually to Maryland agriculture due to reduced quality and yields of crops and forages, increased control costs, and increased roadside and development property management cost.

The Maryland General Assembly enacted the first Nuisance Weed Law on Johnsongrass in 1969. In 1987, the Nuisance Weed Law was rewritten and renamed the Noxious Weed Law (Title 9, Subtitle 4, Agriculture Article, Annotated Code of Maryland). The Noxious Weed Law requires that a landowner, or a person who possesses and manages land, eradicate or control the noxious weeds on that land by using practices prescribed by the department, including mowing, cultivating, or treating with an approved herbicide.

The law prohibits the importation and transportation of these weeds in the state and prohibits the presence of viable noxious weed seed and rhizomes in seed, topsoil, mulch, nursery stock, on-farm machinery, or any other article. The Noxious Weed Law also provides that the Maryland Department of Agriculture may enter into an agreement with a county or political subdivision to provide technical and financial assistance for initiating weed management and eradication programs. A weed control advisory committee

has been established in each of the 20 participating counties, with representatives from farming organizations, governmental agencies, and local farmers. Each committee provides advice or input into planning the noxious weed control program in that county. A county weed control coordinator, usually employed on a part-time basis, determines the degree of noxious weed infestations within the county, locates uncontrolled infestations, provides information on currently recommended control practices, and initiates agreements with landowners to implement a control program.

In many counties, the local weed control coordinator also performs spot-spraying on roadsides, in cooperation with the Maryland State Highway Administration, to help eliminate Johnsongrass or thistles and to control noxious weeds on private or public lands for a fee. In counties with no weed control coordinator, section employees handle these duties. This program was active in reducing the impact of noxious weeds in most areas of the state during 2006.

The weed control program provided grant assistance to 20 counties, averaging \$4,400 per county which were leveraged with similar amounts of money from the counties. In addition, the counties generated in excess of \$600,000 from spraying services.

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Northeastern Regional Priorities: Sources of stakeholder priorities for IPM research, extension and education projects

www.neipmc.org/regu_regional.cfm

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