SARE Project LNE96-067

New York State
Integrated Pest Management Program

1999 Annual Report

Dedication

This 1999 Annual Report is dedicated to IPM Program Director James P. Tette, who will retire at the end of calendar year 1999, after 26 years of dedicated service to the many stakeholders of the New York State IPM Program. "Jim" will be missed by many. From the small beginning of a one-man operation, he has put together one of the most visible, successful, and dynamic IPM programs in the country. Jim put this program together through his leadership and people skills, his vision and tenacity, and most of all his idealism, optimism, and caring nature. He should be proud of what he has accomplished and the impact he has made at Cornell as well as in the state and the nation.

Jim came to Cornell University in 1969, having completed a Ph.D. in synthetic organic chemistry at SUNY Buffalo the previous year. He conducted research leading to the identification and synthesis of insect pheromones from 1969 to 1970 and then left Cornell to establish a pheromone research and development program for Zoecon Corporation in California.

In 1973 Jim returned to Cornell to coordinate the first New York State IPM Program. These early efforts served as the catalyst for state funding of the IPM Program in 1985. As IPM Program director Jim has been responsible for guiding and directing research and extension efforts in the development of IPM programs in fruit, vegetables, turfgrass, floriculture, field crops, and livestock. He has worked extensively with department chairs and faculty at Cornell, Cooperative Extension field staff, and the IPM Program staff. Jim has been an innovator throughout his career, as evidenced by his developing the first computerized Extension Information System in 1977 and later directing a program for Cornell Cooperative Extension on the use of electronic technology.

Leadership on IPM in nonagricultural settings, such as schools, state parks, and state office buildings, became an additional area of responsibility for Jim in 1994, when the "Urban IPM Program" (now called "Community IPM") was born out of numerous requests from government agencies for education and training in IPM methods.

Jim has worked with state agencies, legislators, and budget personnel to develop legislation, budgets, long-range plans, and annual reports. He served as the chairperson for the National Extension IPM Task Force for several years and has testified at hearings before committees of the U.S. House of Representatives. Yet, despite all his honors and responsibilities, Jim has always remained humble and given credit to those around him.

Jim, it is with great pleasure that we, the undersigned, now give credit where credit is due: to you. Best wishes in your retirement...and thanks for everything.

Robert J. Mungari, Director, Division of Plant Industry, New York State Department of Agriculture and Markets
Anthony M. Shelton, Assoc. Director, Office for Research, College of Agriculture and Life Sciences, Cornell Univ.; Professor of Entomology, NYSAES
Russell Hahn, Chairperson, Livestock and Field Crops IPM Working Group; Assoc. Professor of Soil, Crop and Atmospheric Sciences, Cornell Univ.
Michael Hoffmann, Chairperson, Vegetable IPM Working Group; Assoc. Professor of Entomology, Cornell Univ.
Eric Nelson, Chairperson, Ornamentals IPM Working Group; Assoc. Professor of Plant Pathology, Cornell Univ.
W. Harvey Reissig, Chairperson, Fruit IPM Working Group; Professor of Entomology, NYSAES
Donald Rutz, Professor of Veterinary Entomology and Chair, Cornell Univ.
Michael Villani, Chairperson, Community IPM Working Group, Assoc. Professor of Entomology, NYSAES
The Northeast Extension, Research and Academic Programs Committee for IPM
The IPM Program Staff

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As the 20th century draws to a close, the New York State Integrated Pest Management Program continues to grow in relevancy and importance. An ever increasing concern for human health and the environment is driving the development of rapidly advancing technologies directed at long-term, systemwide approaches to crop production similar to those proposed in the Long-Range Plan for IPM.

The 1999 Annual Report reflects a continued emphasis on research and development, demonstration and implementation, and programs of instruction providing for the integration of cultural, biological, and chemical crop management practices. It also marks the 13th consecutive year of public support for statewide programs in livestock and field crops, fruit, ornamentals, and vegetables. Forty-five research and implementation projects were funded by the IPM Grants Program, bringing the total number of projects funded to over 700 since the Program's inception in 1985.

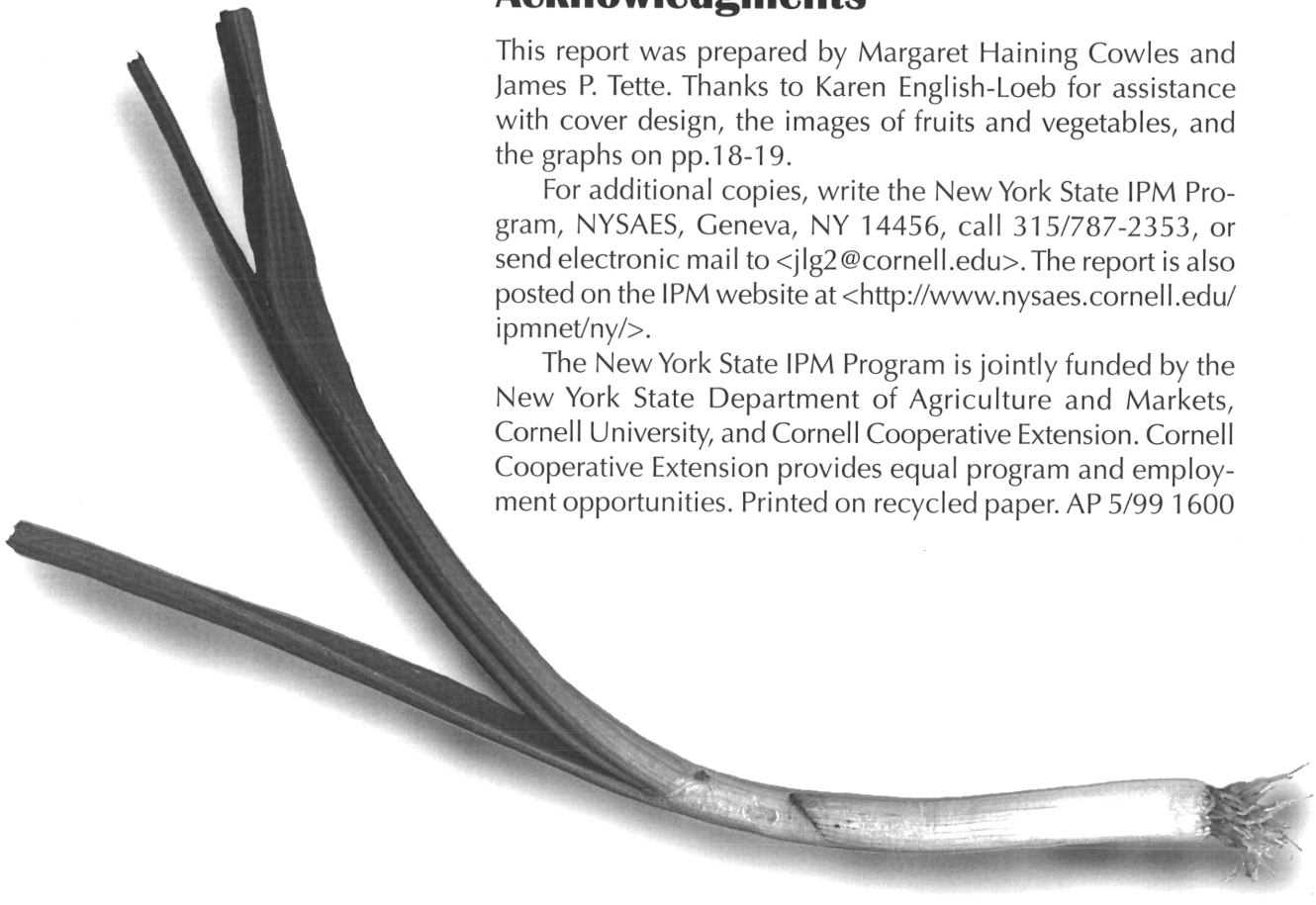
The 1999 report highlights several of the projects and provides a complete listing of projects funded through the state appropriation. Interviews with growers, a special look at the team that make things happen in IPM for grapes, and an update on pesticide application technology are just some of the areas reported on that will serve to demonstrate how the IPM Program is making a difference.

Of note is the retirement of Dr. James Tette, whose numerous accomplishments over the past 13 years have resulted in widespread acknowledgment that the New York State IPM Program is one of the nation's best. On behalf of New York State's most important industry - agriculture - and its most important resource - it s people - I extend to Dr. Tette our sincere appreciation for his dedicated work and service.

I hope you will join me in the continued support of this worthy endeavor.

Sincerely,

Nathan Rudgers
Acting Commissioner



Acknowledgments

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For additional copies, write the New York State IPM Program, NYSAES, Geneva, NY 14456, call 315/787-2353, or send electronic mail to <jlg2@cornell.edu>. The report is also posted on the IPM website at <http://www.nysaes.cornell.edu/ipmnet/ny/>.

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Table of Contents

Director's Message—6

Updates and Recaps—7

Grower Adoption of IPM—7
The Potential Impact of the Food Quality Protection Act (FQPA)—10
Marketplace Requests for IPM-Grown Food: An Update—11
What's New in Pesticide Application Technology?—12
1999 IPM Award Winners—13
The First Annual Grub Week—16
Recent IPM Publications—17
The IPM Grants Program—18
Information Delivery Through Electronic Technology—19

The Grape IPM Team—20

Commodity Highlights—23

New Technologies for a Stubborn Insect Pest of Apples—23
Enlisting Mites to Fight the Number One Grape Disease—24
Less Pesticide, More Weather Data Spell Control of Apple Disease—25
New Tools Improve Strawberry Weed Control—26
Biological Control with Nematodes: Increasing the Odds of Success—27
Monitoring Scheme Critical for Carrot Leaf Blights—28
New Vegetable Varieties Resist Diseases—29
Refining IPM Procedures for Fresh-Market Tomatoes—30

State-Funded Projects—31

Federally Funded Projects—36

Committees and Staff—37

IPM Operating Committee—37
IPM Commodity Working Groups—37
Statewide IPM Grower Advisory Committee—39
IPM Program Staff—40

Director's Message

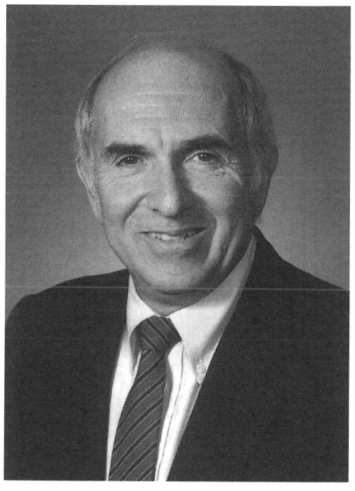
Often, when I have the opportunity to discuss the IPM Program effort with farmers, I am asked if the current mission of the program, one of reducing pesticide use, is a good one, especially since pesticides are an important tool in the IPM toolbox. Over the years we have tried to keep the IPM Program focused on a long-term mission while producing some short-term results, all of which are in the best interests of the New York farmer.

In the early years of IPM most farmers were very successful at reducing pesticide use in the 14 major commodities then being addressed by the Program. Pesticide use has decreased by as little as 20 percent in some commodities and as much as 80 percent in others. This happened because IPM practices were taken right to the farms, where growers could gain familiarity with those that were new and be refreshed on some of the older ones. Thus the greatest levels of success came from the demonstration and implementation of IPM practices on commercial farms, by New York farmers.

Whether that success will continue is not certain, but the trends toward reducing environmental impacts and increasing grower adoption of IPM practices are clearly visible again this year. In several New York cropping systems, science has made most of the immediate advances that are possible and has reached an information and technology plateau. This has resulted in frustration for some growers who still face important pest problems and lack significant integrated management solutions. The pathway to success in these situations is a long-term one. Many potential solutions need to be devised and evaluated—not just in laboratories, but on commercial farms. Such a process will not happen in a one- or two-year time frame. It may take five to seven years before an integrated set of solutions can be developed and demonstrated.

Embedded in this time frame are the economics of potential solutions. The scientists who provide new IPM knowledge and technology usually seek to gather information on the economics of adopting it before it is promoted with the farmers. Too often the knowledge or technology is in its infancy, and the economics appear to be unacceptable. Economic judgments at this early stage are premature and may prevent growers from further implementing the methods that may turn out to be the most economical in the long run.

James P. Tette



Jim Tette. Photo: K. Colton.

Grower Adoption of IPM

Growers talk about why they have adopted IPM, how it has helped them, and what they still need from IPM

Mary Kirkwyland, Winter Sun Nursery, Cortland, NY

"One of the basic parts of IPM is scouting, and that's really crucial in a greenhouse operation. We specialize in herbs. We have a lot of cutting material that we have to maintain year-round, so scouting is critical. It's the cornerstone of IPM.

What do I need from IPM in the future? I could use some guidance on thresholds for thrips and fungus gnats. Of course a single crop may have several thresholds depending on its market destination. Thresholds for field-grown basil sold at a farmer's market are much higher than thresholds for the potted basil plants that I sell to Wegmans. Potted herbs have to look like someone could just snip a leaf off that night and use it as a garnish. But still, greenhouse thresholds would be a tremendous help.... An effective biological control agent for thrips would be nice, too!"

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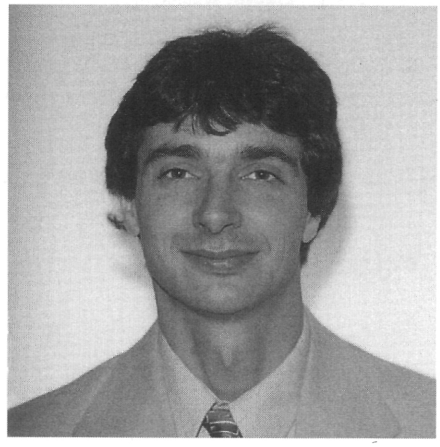
Natalie, Mary, and Jon Kirkwyland pose amid herbs in their greenhouse.

Emil Ronchi, Cradle Valley Farms, Unadilla, NY



"We grow raspberries, strawberries, and blueberries, in that order. Right from the start we employed IPM practices just because they made sense. To us, the writing is on the wall: chemicals are going to fade away in production agriculture, particularly in the minor crops. Also, we live where we work and so have a strong incentive to be excellent stewards of our environment. The third reason to use IPM is that it forces us to be more aware of our production practices and to act in a proactive instead of a reactive manner—enhancing the likelihood of business success.

There aren't enough IPM methods for small fruit, though. I think there is a lot of work that could be done in weed control without chemicals, by using IPM procedures. I sense an attitude among growers that if you've got one weed per field it's too many. We need some sense of what is a tolerable level at what point in time. I would also like to see more work on the raspberry side—such as a tarnished plant bug threshold, some work in mites, and more work in the Japanese beetle arena."

Peter TenEyck, Indian Ladder Farms, Altamont, NY

"We raise about 100 acres of apples, pears, blueberries, and raspberries. I have some of Geneva's disease-resistant apple varieties. I have Liberties plus five others that are only numbered selections.

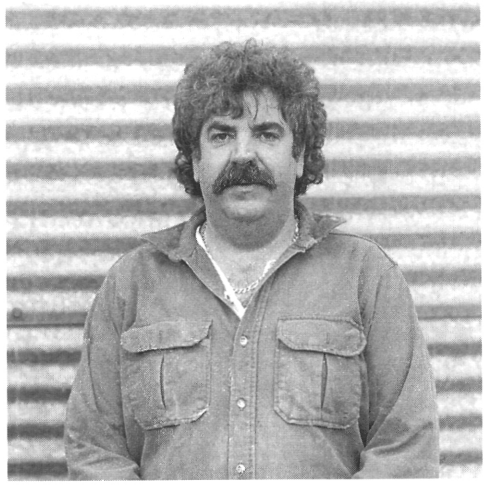
You can't grow apples here in the Northeast without the use of pesticides, but my intention is to grow fruit with no pesticide residues on them when I pick them in the fall. I think that IPM is trying to help me do that. In keeping with that agenda, I'm trying to cultivate a client base that will accept a certain amount of imperfection in the fruit.

As for new areas of research, I'm the most excited about the possibility of doing away with miticides. We're within talking distance of being able to do that. Using 'beneficials' looks like a good possibility. It would be nice if we could close the gap there."

John Gill, Jr., Gill Farms Inc., Hurley, NY

"We grow 1,500 acres of sweet corn, 250 of grain corn, and 75 of mixed vegetables. We've scouted our corn as far back as 1977 or '78. For the past two years we've had Jeff Nerp, who has IPM training, do our scouting. Jeff has brought in pheromone traps; he's taken scouting to another level. With the pheromone traps, I can just drive by, take a quick look, do a moth count, and know whether I should get out and look for insect pests. I also get help from John Mishanec [IPM Extension Educator]. He has such a broad spectrum of information on scouting. Basically, Jeff and John have fine-tuned the IPM process on our farm. I've actually cut down the number of sprays. That can be attributed to Jeff getting out there and he and I looking a little closer. It's worked out quite well. I see a savings.

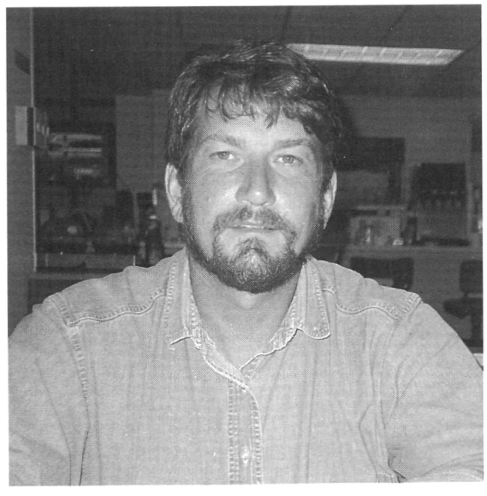
The one thing I think we need to work on in the industry—and maybe the IPM Program could help with this—is the fact that some weeds like velvetleaf, pigweed, and lambsquarters have developed resistance to the herbicides we've been using to treat them. We have no good alternatives for managing these weeds."



Peter Smith, grape grower, Lockport, NY

"Back in about 1991 Tim Weigle [the grape IPM Extension educator] came down, and we went walking through my vineyards. He started showing me how to check for berry moth and use thresholds, which at that point I knew nothing about. The methods I was using then were to follow a spray schedule, whether I needed it or not. Now I apply one prebloom and one postbloom spray for powdery mildew and downy mildew. Unless it's a really wet year, I can get away with just two applications. This year I have one 10-acre block with downy mildew. That's the only block I sprayed; I didn't spray the other 115 acres. I haven't used any insecticides for five years now—that's $10,000 I haven't spent! One of the things I've been trying to work on is getting natural predators to take care of some of the insect pests.

Where could I use more from IPM? I'll tell you, one weed that I'm having a very difficult time with is velvetleaf. You can burn it off in July, and by August it's taller than the grapes. It's very, very prolific."



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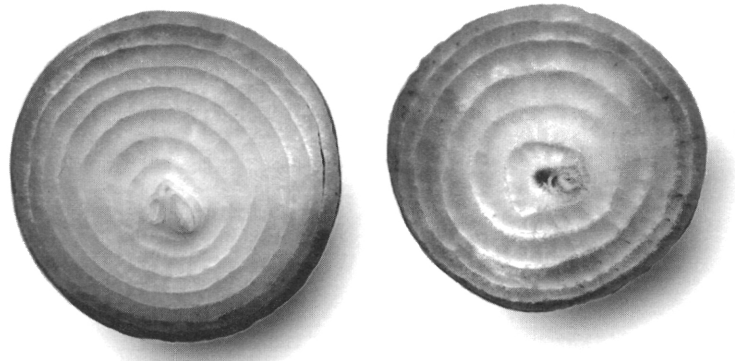
Survey provides insights on IPM adoption

More than 1,000 field corn and alfalfa growers recently completed a survey conducted by the New York State Agricultural Statistics Service at the request of the New York State IPM Program. Analysis of the results shows that growers who have participated in New York State IPM educational efforts through Cornell Cooperative Extension (CCE) are more likely to adopt IPM practices than growers who have not taken advantage of these educational projects. The percentages in the following three statements indicate adoption of many or most of the available IPM practices:

- Survey respondents with no ties to CCE IPM educational programs:
  15 percent adoption rate
- Survey respondents who have formal ties to CCE IPM educational programs:
  35 percent adoption rate
- Survey respondents who have formal ties to CCE IPM educational programs plus completion of a TAg (Tactical Agriculture) Team educational IPM project:
  46 percent adoption rate

TAg Team projects are intensive, one-year courses in IPM conducted on growers' farms.

This sliding scale of adoption confirms the belief that growers need to gain confidence in IPM before they will adhere to its practices. The survey also shows that this confidence-building process usually takes several years.



The Potential Impact of the Food Quality Protection Act

What the IPM Program is doing

Many people connected to agriculture in New York would like to know how the IPM Program is addressing the potential outcome of the Food Quality Protection Act (FQPA). At Cornell, the Pesticide Management Education Program (PMEP) has primary responsibility for dealing with the issue, but the IPM Program works as a partner with PMEP, contributing information on the use of certain pesticides and alternatives to pesticides on the FQPA list of potential cancellations.

In addition, the IPM Grants Program has supported many researchers and Extension educators who are developing alternatives to those pesticides. For example, two projects aimed at managing apple pests without the pesticides on the FQPA list—one aimed only at insect pests of apple and the other aimed at all apple pests—are currently being demonstrated on grower farms throughout western New York thanks, in part, to funding from the IPM Program. The early answer to the question,

Can it be done? is "maybe," but not without some costs to apple growers and to the environment. Some apple growers may be forced to employ more expensive pesticides that will kill many of the biological control agents currently being used for control of red mites.

At this point it appears that the FQPA is mainly concerned with residues on products going to supermarkets and food processors. Previous work at Cornell University has shown that the greater the time interval between pesticide application and harvest, the less the likelihood of residues on the produce.

Marketplace Requests for IPM-Grown Food: An Update

Statistics indicate upward trend

The concept of IPM-labeled produce was first addressed in an IPM annual report in 1997, in an article entitled "The Marketplace Calls for Environmental Stewardship." Initiated in New York by a Rochester-based food retailer, the IPM labeling movement has grown exponentially, not only within New York but nationally.

Trends for New York are shown here in the form of statistics from 1996 and 1997 (with estimates for 1998), gathered for food processing companies by an independent evaluator. Data for fresh-market crops are not yet available. These statistics show increases in the numbers of growers and acres producing crops for IPM labeling and a decrease in the environmental impact of growing these crops. Crops showing higher environmental impacts in 1997 than in 1996 faced increased pest pressures in 1997.

Points are scored for each of the IPM practices these growers use in producing crops for IPM labeling. Each grower must achieve a baseline score in order to qualify. All of the growers currently growing for IPM labeling have scored at or above the 80 percent level each year. Data from several crops in New York show that 80 percent adoption of the IPM practices prescribed for these crops (the "IPM elements") will result in pesticide use reductions of 30 to 50 percent.

New York State producers growing for IPM labeling:
31 in 1996; 118 in 1997; 152 in 1998 (est.)

New York State acres growing IPM-labeled produce:
3,490 in 1996; 8,092 in 1997; 9,029 in 1998 (est.)

Trends in reducing the environmental impact of growing processing crops, as measured by the Environmental Impact Quotient (EIQ):

Crop	EIQ Values '96	EIQ Values '97
beets	72	66
carrots	258	173
kraut cabbage	45	74
peas	23	27
snap beans	114	110
sweet corn	136	119

What's New in Pesticide Application Technology?

Extension associate addresses the challenges faced by growers

Chemical compounds that stunt or kill harmful insects, pathogens, and weeds remain an important part of the pest management package for most New York growers. The IPM Program must therefore take an active interest in the technology surrounding their application.

Extension Associate Andrew Landers, the newest member of Cornell's Department of Agricultural and Biological Engineering, cares a lot about pesticide application technology, too. It's his job. Landers, whose qualifications include a doctorate in agricultural engineering, covers four major topics in his numerous educational presentations to growers: 1) droplet size, 2) spray drift, 3) logistics, and 4) preseason sprayer maintenance and calibration.

Question-and-answer periods following these presentations reveal that many growers are unaware of the basic principles regarding droplet generation and nozzle selection. "They need to know," comments Landers, "that small droplets drift and large droplets bounce. They must define their target and then select the correct droplet size and the corresponding nozzle." Using the right nozzle and the right droplet improves 'deposition,' a term that refers to the amount of material that is deposited on its target.

Spray drift discussions center on ways to reduce drift. Most growers are well aware of the problem of off-target contamination, but the solutions can be difficult to employ. Landers strongly encourages spraying only when "ideal" weather conditions occur. This means, for one thing, avoiding windy conditions—not always an easy thing to do. "In some windy areas of the state," he points out, "ideal conditions for spraying may occur only at such ungodly hours as 2:00 a.m."

The logistics and sprayer maintenance discussions refer to such things as proper planning for an efficient, well-timed system, use of quality equipment that is in good repair, and proper configuration of the spray nozzles. The challenge for growers in these areas is often finding sufficient time to take the necessary steps.

IPM strategies for pesticide application technology include

- discouraging the concept of spraying until the entire crop canopy drips
- eliminating drift by such means as correct nozzles, good timing, and tunnel sprayers
- developing the use of tank washers to reduce the amount of rinsate produced and to reduce cleaning time
- preventing operator contamination through the use of a new device that eliminates the possibility of splashing or spilling during transfers of pesticide from containers to sprayer tanks

1999 IPM Award Winners

The New York State IPM Program has given awards to six or eight individuals and organizations each year since 1996 as a means of recognizing outstanding contributions to the statewide IPM effort. Six awards were conferred in the winter of 1999, two at each of three grower meetings. Meet the 1999 winners.

Fruit IPM award winners

Jim Eve, private consultant, works hard to develop IPM solutions for tree-fruit grower in Wayne County. "Jim is always emphasizing ways to enhance the survival of beneficial insects," comments IPM Program Director Jim Tette. Eve is particularly interested in biological control for pest mites and in finding new ways to manage fire blight. He has been generous in working with Cornell Cooperative Extension to help find grower cooperators for their demonstrations and to keep Extension educators abreast of the pest problems apple growers are facing.

Eve grew up on a small vegetable farm in Naples and is now producing fruit on that same farmland. He earned a bachelor's degree in agricultural economics at Cornell University. Before starting his consulting business in 1990 he worked as a plant pathology technician at Cornell and as a fieldman for Agway.

Jan Nyrop began his career at the Experiment Station in 1982 as an Extension associate in the IPM Program and moved into a faculty position in entomology three years later. His improvements on sampling techniques and thresholds for three major mite and insect pests of apple in the late 1980s continue to make a valuable contribution to the New York apple IPM program. More recently, his work on predatory mite releases in orchards and vineyards is having a major impact on fruit growers throughout the Northeast.

Nyrop earned a bachelor's degree in wildlife ecology from the University of Maine, two master's degrees—one in entomology and one in systems science—from Michigan State University, and a doctorate in entomology, also from Michigan State. He describes his own research focus as the "population ecology of arthropod pests of horticultural crops and their natural enemies."

(continued on p. 14)

Jim Eve. Photo: J. Ogrodnick.

Jan Nyrop. Photo: J. Ogrodnick.

Ornamentals IPM award winners

Jennifer Jens, owner of IPM Consulting, works with nursery and greenhouse growers on Long Island to find IPM solutions. According to Cornell Cooperative Extension nursery specialist Scott Clark, she has "...won the respect of the growers because of her knowledge of IPM and her sensible approach to pest management." Clark has seen several growers on Long Island significantly reduce their pest management costs and their pesticide use with Jens's assistance.

Jens became involved with IPM in 1993. She worked for Extension as a research associate and then as the county scout and was instrumental in helping to fine-tune monitoring programs for a variety of field- and container-grown nursery crops. Her experience with horticulture goes back to her childhood. She grew up in a family with a greenhouse business. Jens went on to earn an associate's degree in landscape design at SUNY-Farmingdale and a bachelor's degree in ornamental horticulture at The Pennsylvania State University.

Charlie Scheer, production manager at Half Hollow Nursery, Inc., of Laurel, has long been interested in finding ways to reduce pesticide use while maintaining plant quality. Scott Clark maintains that "much of what Extension educators and nursery growers in Suffolk County have learned about monitoring and other IPM strategies is due to Scheer's support and encouragement over the past several years." Scheer frequently makes Half Hollow Nursery available to Cooperative Extension as a demonstration site.

Scheer has been active in agriculture all his life. He was born on a Connecticut vegetable and fruit farm, where he worked as a youth. He went on to earn a bachelor's degree in plant science and a master's degree in education and entomology at the University of Connecticut. He taught agriculture and was a nursery specialist for Cornell Cooperative Extension prior to his current position at Half Hollow.

Jennifer Jens and Charlie Scheer. Photo: S. Cheshire.

L to R: Carol R. MacNeil, Curt Petzoldt, and Don Sweet. Photo: R. Way.

Vegetable IPM award winners

Carol R. MacNeil, Cornell Cooperative Extension educator and vegetable specialist for four New York counties, has been helping to develop and to teach IPM practices for 20 years, working both with growers and the Cornell community. A letter from Cornell plant pathology professors William Fry and Rosemary Loria, who have worked with MacNeil on late blight management in potatoes, states that "Carol...has been an effective voice for IPM in central New York. Additionally Carol has been an effective voice for the production industry to Cornell faculty in extension and research. It has been a wonderfully synergistic interaction."

MacNeil works on onions, potatoes, carrots, cabbage, and tomatoes in Ontario, Wayne, Steuben, and Yates Counties. She developed an interest in agriculture at a young age. She earned a bachelor's degree in biology at SUNY Buffalo and in 1976 completed a master's degree in vegetable crops at Cornell University.

Don Sweet is the owner and president of Crop Advantage, a private consulting firm headquartered in Scottsville. His clients include strawberry growers, fresh-market and processing vegetable growers, and dairy farmers. Always the innovator, Sweet starts with Cornell IPM recommendations, but he moves beyond them in the search for new ways to benefit his clients by saving on pesticide inputs. According to the IPM Program's assistant director Curt Petzoldt, "Don has even initiated IPM-related work on crops for which Cornell has not yet developed IPM techniques. For two or three years before Cornell did it, Don was working with greenhouse tomato growers to devise IPM practices for that crop. He is also leading the way with scouting protocols and thresholds for bell peppers and leaf lettuce."

Sweet grew up on a small farm in Rush and was active in 4-H as a youth. He went on to earn two degrees in agronomy: an associate's degree at SUNY Alfred and a bachelor's degree at Iowa State. After college Don managed a 20-acre U-pick strawberry operation and then worked as a scout for an agricultural consulting firm. He started his own consulting business in 1990.

The First Annual Grub Week

Extension educators team up to provide hands-on learning

The first annual Grub Week was celebrated in Monroe and Oswego Counties in August and September 1998. Grub Week is the brainchild of Ornamentals IPM Educator Jana Lamboy. "I wanted to find a way to drum up excitement about grubs and lawn care," says Lamboy. "A lot of educating needs to be done about grub treatment. Research indicates that 80 percent of all home lawns and golf course fairways don't need a pesticide for grubs. Furthermore, if grub treatment is necessary, people may not know that fall is the time to do it and that sampling is a necessary step prior to treatment." Grub Week is a time set aside for presentations on grub biology and on the art of scouting and setting damage thresholds for grubs.

Lamboy started the grub education ball rolling early last summer by working with Cornell entomologist Mike Villani to develop a brochure about grub biology and treatment. Fifty copies of the brochure, called "All About White Grubs," were mailed to each of New York's Cornell Cooperative Extension (CCE) offices in July with a letter suggesting a Grub Week program as a means of spreading the word about proper treatment for grubs.

CCE educators Brian Eshenaur, of Monroe County, and Joan Cybula, of Oswego County, caught the excitement generated by Lamboy. Each organized a half-day Grub Week event that was held at their respective county facilities. Diverse audiences of 20 to 30 lawn care service providers, golf course superintendents, master gardeners, and school groundskeepers attended each event. Indoor presentations by Lamboy and by Villani were followed by roll-up-your-sleeves sessions on the Extension office grounds, where participants used cup cutters to get soil samples and then counted and identified grubs.

Since the fall Lamboy has been to Albany, Brooklyn, Buffalo, and Olean to educate people about grub scouting, and over 8,000 copies of the grub brochure have been distributed at the request of Extension agents. The second annual Grub Week will begin in August 1999.

L to R: Joan Cybula, Frank Pizzuto, and Karen Meyers scout for grubs during Oswego County Cooperative Extension's Grub Week event. Photo: J. Lamboy.

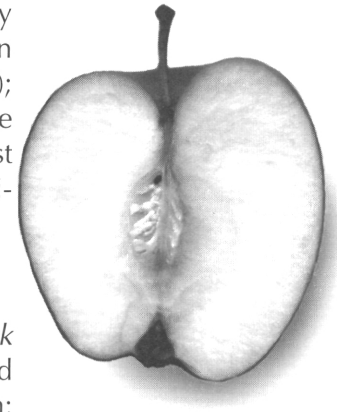
Recent IPM Publications

IPM Field Corn Pocket Guide

The 280-page *IPM Field Corn Pocket Guide* is a resource for Extension staff, farmers, and scouts in the Northeast. It covers the management of insects, diseases, vertebrates, and weeds, plus sustainable ways to manage manure, store harvests, and maintain soil health and fertility. The *Pocket Guide* was produced by Karen Edelstein, Carrie Koplinka-Loehr, and J. Keith Waldron, IPM Program; and James VanKirk, Northeast IPM Facilitator, with assistance from an interstate team and funds from the Sustainable Agriculture Research and Education Program.

Apple Pest Fact Sheet

Achieving Biological Control of European Red Mite in Northeast Apples: An Implementation Guide for Growers is an eight-page color fact sheet co-authored by Deborah Breth, Cornell Cooperative Extension, Lake Ontario Fruit Program; Jan Nyrop, Department of Entomology, NYS Agricultural Experiment Station (NYSAES); and Joseph Kovach, IPM Program. It explains how to use predatory mites to manage the European red mite and why a particular species of predatory mite is the most effective one. The publication was funded by the National Biological Control Institute of the USDA and was based on research funded by the IPM Program.



Apple IPM Manual

Apple IPM: A Guide for Sampling and Managing Major Apple Pests in New York State is a manual for apple growers co-authored by Art Agnello, Jan Nyrop, and Harvey Reissig, Department of Entomology, NYSAES; Joseph Kovach, IPM Program; and Wayne Wilcox, Department of Plant Pathology, NYSAES. the first edition was published in 1993. A second printing with slight revisions was issued early in 1999.

All About White Grubs

All About White Grubs, an eight-panel color brochure, uses photographs, illustrations, and nontechnical language to educate the public about the life cycle of these common turf pests as well as the what, how, and when of recommended IPM treatments for them. It is co-authored by Jana Lamboy, IPM Program, and Michael Villani, Department of Entomology, NYSAES.

A Model IPM Recommendation Document for Vegetables

Integrated Crop and Pest Management Recommendations for Commercial Vegetable Production , a 305-page book published in 1999, is the result of a two-year grant funded by the Northeast IPM Grants Program. Editors Stephen Reiners, Department of Horticultural Sciences, NYSAES; Curt Petzoldt, IPM Program; Mike Hoffmann, Department of Entomology, Cornell University; and Christine Cefalu Schoenfeld, IPM Program, worked with 19 discipline editors from Cornell University to create this comprehensive volume. The new *Recommendations* is a major revision of what was the *Cornell University Pest Management Recommendations for Vegetable and Potato Production.* The purpose of the revision was to create a document that includes alternatives to pesticides as well as pesticide information, cultural practices, fertility practices, and crop variety information. This inclusiveness allows users of the document to more easily understand and make use of all IPM options rather than just pesticides. Pest complexes covered are weeds, diseases, insects, and wildlife. The book is currently being formatted for loading onto the World Wide Web.

The IPM Grants Program

1998 funds available

The New York State governor and legislature provided $837,000 for the IPM Program in 1998. State funding has remained at this level since 1993. The pie chart below shows the allocation of these funds in 1998, with by far the largest portion of the budget going to the IPM grants program.

Additional funds totalling $1,058,029 were garnered from federal IPM programs by members of the Cornell research and extension community, whose proposals were chosen over many others submitted nationwide. Their names and the titles of their projects are listed on page 36.

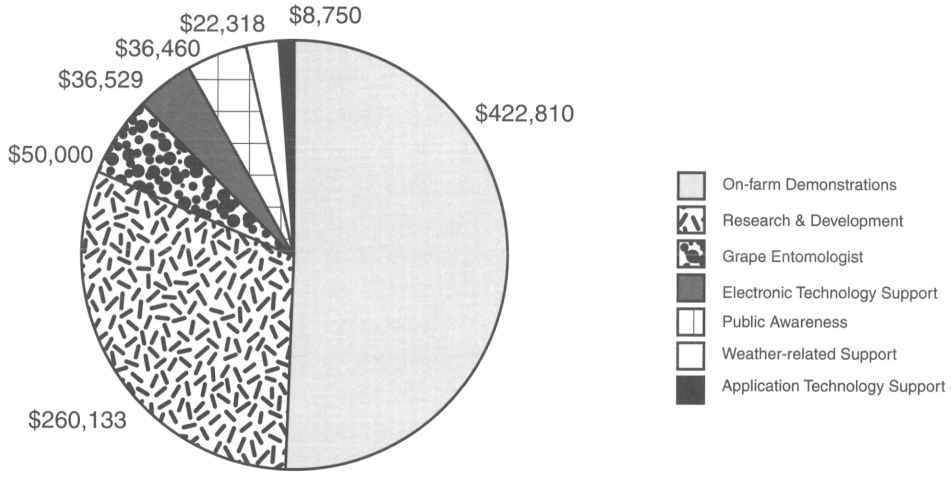
1998 funding cycle

The New York State IPM Program provides funds every year for projects that will demonstrate IPM concepts to agricultural producers on their farms. The Program also funds projects that need one or two years of field testing to validate new IPM knowledge and technology. Each fall the Program issues a request for proposals (RFP) for both on-farm demonstration projects and applied research projects. The RFP contains a list of crop and pest priorities developed by the IPM Commodity Working Groups and outlined in the *New York State Integrated Pest Management Program Strategic Long-Range Plan.* Proposals for the 1998 growing season were due in late January 1998.

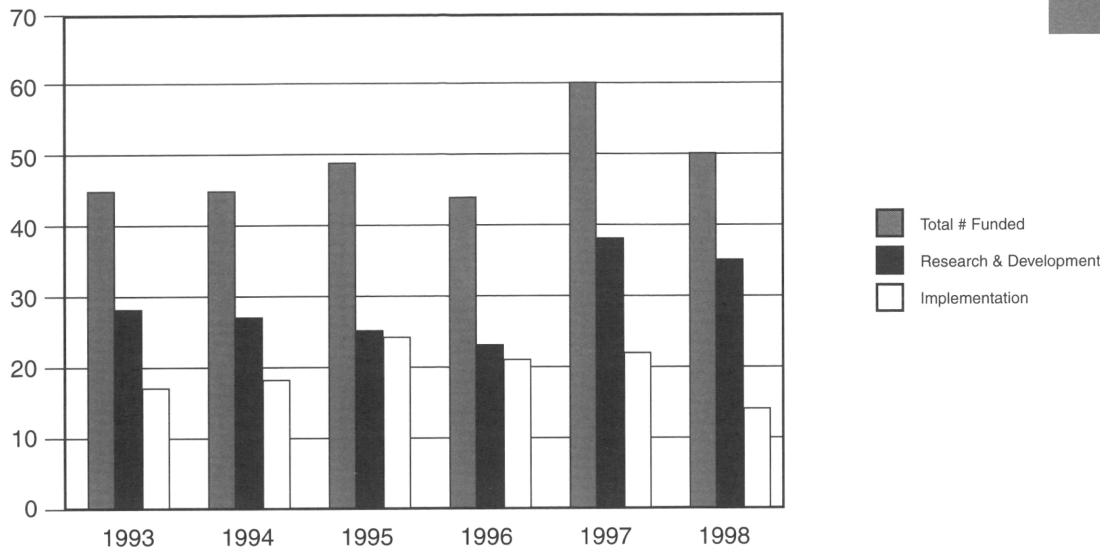
After the Commodity Working Groups evaluate and rank the grant proposals each year, the IPM Executive Committee makes final funding decisions. Project leaders were notified of the funding decisions in March of 1998, and began working on their projects immediately thereafter. The funding cycle was completed when the project leaders filed reports on project outcomes with the IPM Program office in December.

The bar graph on page 19 shows the numbers and types of state-funded projects for the years 1993-1998. Titles of the 1998 state-funded projects and names of the project leaders are listed on pages 31-35.

Distribution of State Funds for IPM, 1998



Projects Funded Through IPM Grants: 1993 - 1998



Information Delivery through Electronic Technology

IPM information reaches growers via the "web"

The delivery of crop protection and pest management information to growers continues to expand through the use of statewide, regional, or commodity websites. Delivery of information through automatic "faxing" to growers is also on the rise.

In the past year IPM Program staff have noted an increase in the number of growers who use computers to gather data for pest management decision making. Increases have also occurred in the types of information available to grower audiences on several IPM and Cornell websites. Some of this information is free, while the data and information on the impact of weather on pest problems involves a subscription by a grower. These data are derived from locally based weather stations that are queried each day by a computer.

The universal resource locator (URL) for the IPM Program website is <http://www.nysaes.cornell.edu/ipmnet/ny/>. A wealth of information, usable by agriculturists, researchers, and consumers, can be found at this site and the many sites linked to it.

The Grape IPM Team

Teamwork Improves Grape Pest Management Options

Teaming up on the grape berry moth

Grape IPM specialist Tim Weigle is convinced that the most vital aspect of this year's work on managing an insect pest called the grape berry moth (GBM) was the communication that resulted from it. "This has been the best example of researchers exchanging useful information with growers on a timely basis that I have been involved with," reports Weigle. What were they communicating about? Late-season damage from the GBM. Growers are concerned about it, and researchers are looking for ways to alleviate it.

Fifteen pheromone traps were set out in an effort to determine how many GBM generations there are and when to expect them. Project leaders concluded that more precise information may be gained by trapping female berry moths instead of the males that are attracted by pheromone traps. Future plans are to design traps for the females and to use those trap catch results to improve the timing of insecticide applications.The GBM project was funded in part by the IPM Program and in part by the New York Wine and Grape Foundation.

New methods evaluated for mites, leafhoppers

Tim Martinson, the regional extension specialist for the Finger Lakes Grape Program, tried some new materials for the management of two ubiquitous grape pests: European red mite (a spider mite) and grape leafhopper (an insect). Conventional miticides have been the only option for grape growers who must contend with spider mite infestations.

Martinson found that dormant spray oil, long used by apple growers as the first line of defense against spider mites, has little effect when applied to grapes during the dormant season. "Winter mite eggs on apples are located on exposed twigs," explains Martinson. "On grapes, the same eggs are laid in crevices underneath the bark of two- and three-year-old wood. Dormant sprays on grapes are not effective because it's difficult for spray residues to come in contact with the protected eggs." However, Stylet oil applied during the growing season did provide temporary relief from spider mites. Three applications before the bloom stage kept the mites away through the end of August. Stylet oil is a plant extract that disrupts insect feeding by clogging the pores of the stylet, an insect's feeding tube. Stylet oil also controls powdery mildew, giving growers in New York who contend with both pests more for their money.

Grape leafhoppers have developed resistance to the insecticide typically used to manage them, but three new materials have been tried with success. Two of the materials are insecticides. One of these is a new reduced-risk insecticide. It provides adequate protection from leafhoppers with one application and is compatible with biological control organisms. It is more than twice as expensive as the other insecticide, but its environmental and other benefits make it a better value overall.

The third material is effective against both leafhoppers and spider mites. Although registered for use on apples, it is not yet registered for commercial grapes. It may become the best option of the three.

Reducing sprays for powdery mildew, black rot

Plant pathologist Wayne Wilcox has two years' data showing that two applications of fungicide should, under normal circumstances, provide adequate protection from the grape diseases powdery mildew and black rot. This is a significant reduction from previous recommendations of four or five applications. "Treatment can be limited to the time period just before and just after bloom," explains Wilcox, "because this is the only period during which the fruit is susceptible to these diseases." In addition to looking at periods of susceptibility, Wilcox achieved success rotating standard fungicides with an alternative treatment, monopotassium phosphate. This foliar fertilizer is another feasible means of reducing the pesticide load on grapes.

A second project on grape powdery mildew is being spearheaded by entomologist Greg English-Loeb. He and his collaborators are looking at fungus-eating mites as possible biological control agents (see p. 24.)

Managing vineyard weeds: less is more

Reductions in active ingredient of 400 to 670 percent, dollar savings, and excellent weed control are the results of the second year of two postemergence weed management demonstrations. Tim Weigle led a demonstration in the Lake Erie Region, and Tim Martinson led one in the Finger Lakes Region.

Conventional in-the-row weed management for vineyards has involved herbicide applications both before and after weed emergence. The postemergence strategy has the potential to cut the number of applications in half by limiting them to the time after weed emergence. The ten growers who allowed portions of their vineyards to be used for these demonstrations saw firsthand that postemergence weed control was equivalent to the control achieved in the plots that were given conventional treatment.

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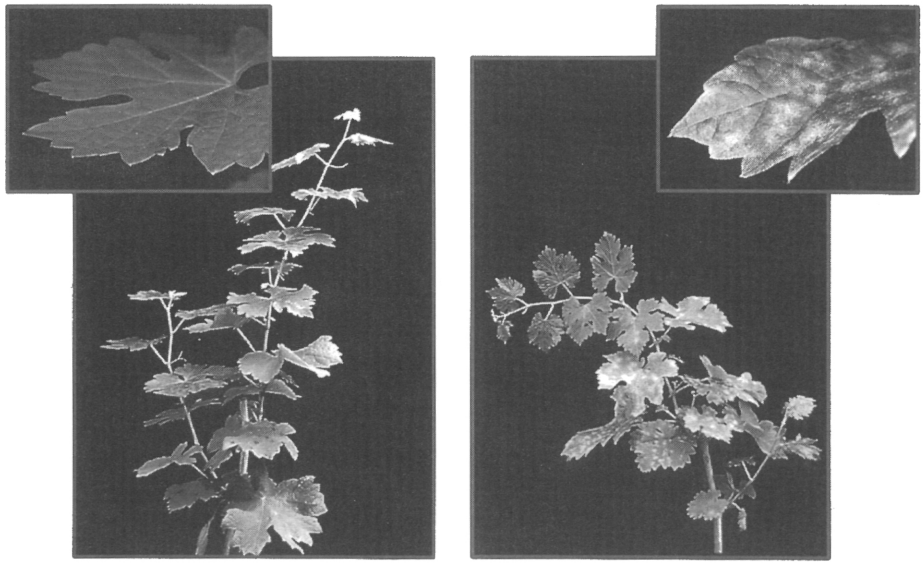

L: Healthy grape plant; R: grape plant with powdery mildew.
Photos: J. Ogrodnick.

Electronic crop updates improve communication

A new method of information transfer was introduced last year by the grape IPM team, thanks to the leadership of Extension Educator Tim Martinson and IPM Extension Educator Tim Weigle. They modernized and expanded on weather and pest information that has been disseminated by a telephone message ("Code-A-Phone") and sent the information out via e-mail. Seventy-five growers, Extension field staff, administrators, researchers, and food processor representatives signed up to receive these electronic "crop updates," and the list of recipients continues to grow. Weigle finds the e-mail delivery system "...an excellent way not only to get information out to the industry but also to collect input from the industry as to crop- and pest-related events during the growing season." The new crop update system has also prompted growers and others to use e-mail to ask questions of the grape team. Martinson says he has received more positive feedback from the grape industry on this than on any other project.

Introducing the grape team

Rick Dunst, research support specialist and manager of the Taschenburg Lab in Fredonia, did the research for the postemergence weed management projects.

Greg English-Loeb is an entomology professor at the Experiment Station in Geneva (NYSAES). He collaborated on the projects concerning grape berry moth, European red mite, and grape leafhopper management. He also led a project on managing powdery mildew with beneficial mites (see p.24).

Growers who devoted part of their acreage to the postemergence weed management projects are Ed Barger, Jr., Joel Rammelt, and Bill Dunn.

Sudah Katti and **Mike Saunders,** entomologists at Penn State, studied the biology of the grape berry moth and shared their findings with those working on this pest at Cornell.

Tim Martinson is an Extension educator with the Finger Lakes Grape Program. He led a three-faceted project on the European red mite, the grape leafhopper, and postemergence weed management (Finger Lakes Region).

Andy Muza, Extension agent from Erie County, Pennsylvania, worked on the grape berry moth project and the electronic crop updates.

Robert Pool, horticultural sciences professor, NYSAES, assisted in the development of the postemergence weed management protocol.

Barry Shaffer, Cooperative Extension educator at the Lake Erie Region Grape Program, specializes in farm business management. He worked on the economics of grape berry moth management and helped with the electronic crop updates.

Phil Throop, team leader at the Lake Erie Region Grape Program, helped prepare the electronic crop updates.

Tim Weigle is an IPM Extension educator based at the Lake Erie Region Grape Program headquarters. He covers grapes statewide, focusing mostly on the Lake Erie and Finger Lakes Regions. Tim headed up the projects on grape berry moth and on postemergence weed management (Lake Erie Region).

Wayne Wilcox, plant pathology professor, NYSAES, conducted the study on powdery mildew and black rot. He also collaborated on Tim Martinson's project.

New Technologies for a Stubborn Insect Pest of Apples

Three pheromone release systems take on the obliquebanded leafroller

Microsprayers, microencapsulated sprayables, paraffin-based emulsions—no, this is not a chemistry professor's shopping list. It's a list of the latest in techniques for managing insect pests. These new delivery systems or formulations can be used to spread pheromones (hormone-like chemicals that enable male insects to locate the females of their species at mating time) in crop foliage. Ideally, pheromone releases have the effect of disorienting male insects. They stop searching for females, and the mating process is disrupted. A microsprayer and an applicator used for applying the paraffin-based emulsion are pictured below. Microencapsulated sprayables look a lot like vitamin capsules and are applied using standard sprayers.

Cornell entomologists Art Agnello and Harvey Reissig tried these three types of pheromone releases—along with a new, IPM-compatible insecticide—in two commercial apple orchards last summer. They were attempting to manage the obliquebanded leafroller (OBLR), an insect that has caused costly damage to western New York apples for the past 25 years. According to Agnello, "The OBLR is the insect to beat in western New York apple orchards. We've got to keep looking for alternatives." The leafroller has developed resistance to many of the standard insecticides.

The orchards used for this project have typically withstood 15-30 percent damage by the OBLR if left untreated. What happened in the 1998 season?

At orchard #1, where leafrollers were not very numerous, the addition of a pheromone treatment to a standard pesticide spray did not make much difference. There was three percent damage with either the microsprayer or the emulsion plus the new biorational pesticide, and four percent damage with the grower's standard treatment.

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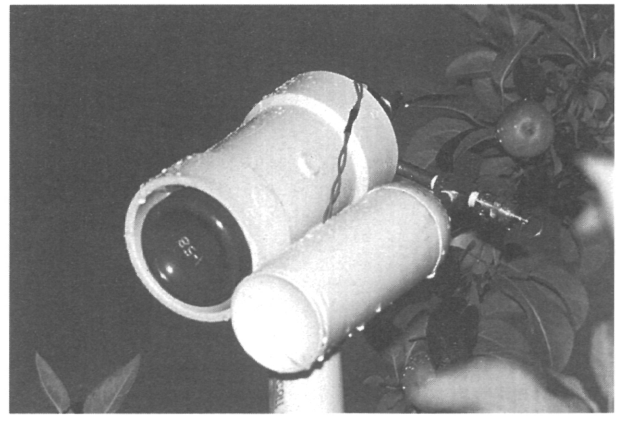
Paraffin-based emulsions can be placed on trees by "tree-marking gun applicators" like this one. Photo: J. Ogrodnick.



This microsprayer releases pheromones in puffs of atomized liquid from pressurized canisters. Photo: J. Ogrodnick.

At orchard #2, where leafroller populations were high, the damage spread was significant: 5 percent with microsprayers plus the alternative pesticide versus 30 percent with the grower's standard treatment.

The three pheromone release systems performed well. The paraffin-based emulsions and the microsprayers showed somewhat better results than the encapsulated sprayables, perhaps because the latter cannot provide a stable release of pheromone for prolonged periods and so is more dependent on a careful reapplication schedule. Further testing of these devices will be necessary to compare their effectiveness in orchards with various levels of OBLR infestation.

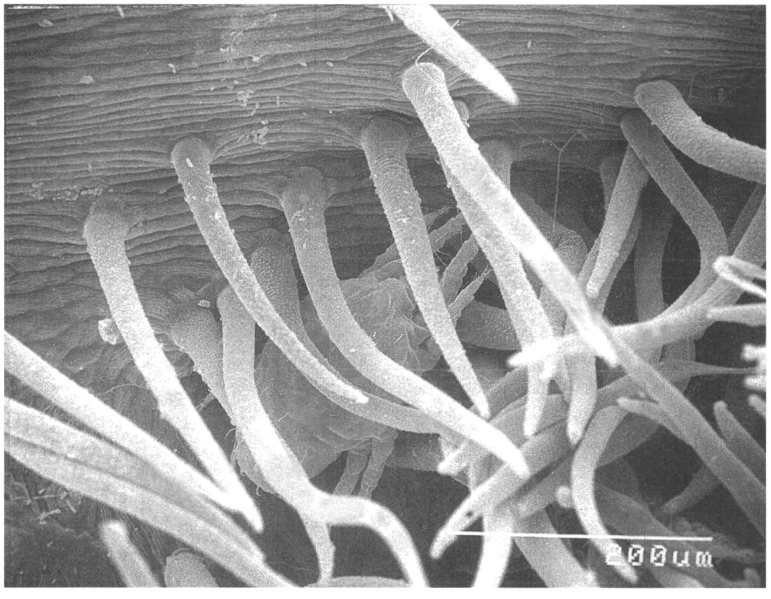
Enlisting Mites to Fight the Number One Grape Disease

Entomologists and plant pathologists pit fungus-eating mites against grape powdery mildew

Grape powdery mildew packs a punch. Not only is it the most destructive of all known grape diseases in the Northeast, adversely affecting vine health, grape quality, and yield, but it has an amazing capacity for resistance. Several new materials have been developed to combat this disease, but their effectiveness is often short-lived. This resistance problem, coupled with increasing concerns about environmental hazards that may accompany the use of fungicides, has led to the idea of biological control via fungus-eating mites.

Entomologists and plant pathologists from Geneva—Greg English-Loeb, David Gadoury, Andrew Norton, Bob Seem, and Wayne Wilcox—are focusing on fungus-eating "tydeid" mites. A certain species of these mites has been discovered busily protecting wild grapes from powdery mildew. The question is: can this species do the same for cultivated grapes under vineyard conditions?

The full answer to this question will take two to four more years to answer, but so far, so good. In the first season English-Loeb and the others successfully established



Scanning electron micrograph showing a tydeid mite taking cover in the hairs of a grape leaf. Actual size of this mite is that of a small pinhead.

Scan by A. Norton/ H. Hoch.

over 700 rooted cuttings of both commercial and wild grapes in a new vineyard planting at the Experiment Station in Geneva. Vines were assigned to one of three treatments: 1) mites but no fungicides, 2) mites and a fungicide active against powdery mildew, or 3) neither mites nor fungicides.

According to English-Loeb, "The mites became established on all of the grapes we are working with, both cultivated and wild. We weren't necessarily expecting this." Tydeid mites have shown a preference for grapes with pubescent (hairy) leaf veins, probably because the hairs protect them from predators and harsh weather. Several of the 15 grape types being tested have smooth, non-hairy leaves. While mite density per leaf ranged from 3 to 26, no major differences were detected as a function of grape species. This bodes well for their future usefulness in vineyards.

Mildew levels were assessed on a subset of vines at the end of the season. Vines that received mites and no fungicide had slightly lower levels of mildew than vines without mites or fungicide, but the difference was not statistically significant. (Vines receiving both mites and fungicide were not evaluated.) A more comprehensive evaluation of which cultivars are most suitable for these mites and of the extent to which the mites provide protection against powdery mildew will be carried out over the next several field seasons.

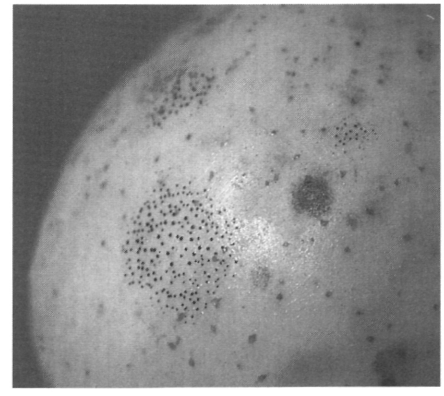
Less Pesticide, More Weather Data Spell Control of Apple Disease

Weather-based model enables growers to reduce treatments for flyspeck

Two seasons of work by Cornell plant pathologist David Rosenberger have given apple growers assurance that the disease called flyspeck may be controlled with one fewer fungicide spray per orchard per season than has previously been applied. Flyspeck is a common summer disease of apples in the Northeast. Its name is a good descriptor of the damage it causes. Though the damage doesn't go beyond the skin of the fruit, the disfigurement can be enough to make affected apples unmarketable as fresh fruit. Other IPM methods for managing flyspeck include pruning tree branches, thinning fruit, and removing brambles and other host plants, when practical.

Rosenberger worked with fruit extension educators Warren Smith and Mike Fargione (Ulster County) and Kevin Iungerman (Saratoga County). They tested a New York Flyspeck Timing Model in nine orchards scattered across the Hudson Valley, Champlain Valley, and Saratoga production regions.

The model uses weather data such as hours of leaf wetness to determine when infection conditions are present and when fungicide treatments are needed. Even though 1998 was an exceptionally wet year and thus conducive to the development of fungal diseases like flyspeck, the model provided adequate information for disease control in seven of eight test plots. A more conservative spray program may still be needed in areas where disease levels are exceptionally high.



Apple disfigured by flyspeck. Photo: D. Rosenberger.

New Tools Improve Strawberry Weed Control

Brush hoe and finger weeder achieve better results than herbicide in newly planted berries

When New York strawberry growers name their toughest challenges, weed control comes out on top. Controlling weeds is especially tough in newly planted strawberries. Marvin Pritts, of Cornell's Department of Fruit and Vegetable Science, explains why: "Only one herbicide is labeled for use in the year of planting strawberries, and it is active for only six weeks. Growers are turning to cultivation as an adjunct, but the standard Rototiller sometimes does more harm than good." Rototillers tend to go too deep, breaking down soil structure and bringing weed seed to the surface, where it can germinate.

Pritts and colleague Robin Bellinder tackled the weed problem with three "nonstandard" cultivation implements this past summer: the flex-tine harrow, the brush hoe, and the finger weeder. These tools are nonstandard because they 1) disturb only the top few centimeters of soil and 2) cultivate both within and between plant rows.

Records were kept of labor and equipment costs associated with each tool and of the numbers of weeds in each plot at the end of the season. Strawberry yields will be recorded next year so as to complete the economic analysis. Bellinder and Pritts found that the flex-tine harrow disturbed the soil too deeply to be a good choice for strawberries (though it has proven useful in several vegetable crops). The other two tools were very effective.

Although operating the brush hoe and the finger weeder is more expensive than a single herbicide application, these tools achieved much better weed control. At the end of the season there were 40 times more weeds in the herbicide-only plots than in the brush hoe and finger weeder plots. Pritts is confident that the cost difference will be taken care of by increased yields: "All that is needed to make up the costs is a three percent yield increase over the herbicide-only plots. I think that kind of outcome is very likely due to the significant difference in weed numbers."

L: Finger weeder cultivating strawberries. R: Brush hoe. Photos: M. Pritts.

Biological Control with Nematodes: Increasing the Odds of Success

27

Soil types and watering regimes affect nematode survival in nursery and greenhouse settings

Nematodes are microscopic roundworms that live in the soil. Some are pests; some are beneficial because they prey upon other pests. Recent attempts to achieve biological control of insect pests using these predatory nematodes have often failed. Why? Explanations include poor strain selection and inattention to the nematodes' habitat and moisture requirements. Elson Shields and Tony Testa, of Cornell's entomology department, decided to make another attempt, this time with a focus on discovering just what soil and moisture conditions will optimize nematode survival.

The pest of interest: black vine weevil, an insect that can kill ornamental trees and shrubs by feeding on their roots. The biological control agent: a cold-tolerant nematode that was first found in the Oswego, New York, area in 1990 (scientific name *Heterorhabditis bacteriophora* 'Oswego'). Shields chose the Oswego strain because it is known to be effective against a close relative of the black vine weevil. What he didn't know was whether the nematodes can survive in the types of soils commonly used in woody ornamental production.

Shields and Testa put the nematodes in several types of greenhouse potting soils and in a sample of the sandy loam in which the nematodes were originally located, and kept track of the numbers that survived over a several-month period.

They soon learned that watering from the top down, a typical greenhouse and nursery production method, is likely to flush the nematodes out of the soil altogether. When the nematode populations disappeared from all soil types within 30 days of this kind of watering, nematode populations were replenished, and the watering regime was changed to sub-irrigation (pots are placed in water-holding trays). Nematodes persisted in all of the soil mixes for at least 120 days thereafter.

Population levels of nematodes varied among the soil types, but no conclusive results have yet been released. The soil samples will continue to be monitored for several months beyond this writing, but according to Shields, "It is clear even now that choosing the right soil mix—as well as the right watering regime—will have a major impact on the long-term presence of predatory nematodes in the nursery production system."

Monitoring Scheme Critical for Carrot Leaf Blights

Fungicides cut in half with scouting, proper timing

When a 1997 plot comparison revealed no differences in carrot yield between a field receiving three fungicide treatments and one receiving eight, Cornell plant pathologist George Abawi recognized an urgent need for more work on carrot leaf blights. "I saw a tremendous opportunity to better control these diseases and also to save on fungicides," says Abawi. "There is a great need to educate growers about scouting and about withholding treatment until a certain level of disease severity has been reached."

This year's work, led by Abawi, made good on the opportunity and the need. Five commercial carrot fields were split into "IPM plots" and "grower-managed" plots. The first treatment for leaf blight in the IPM plots was made only when sampling showed infection on 25 percent of the leaves. Subsequent treatments were applied at intervals of 10-14 days if the scouting reports and weather conditions showed a high probability of leaf blight development. The grower-managed plots were treated according to the growers' standard practices.

The results were dramatic: 4 of the IPM plots received 0, 2, 3, and 3 fungicide applications, a total of 8, while corresponding grower-managed plots received 6, 4, 7, and 8 applications, totaling 25. Both the IPM plot and the grower's plot received 6 sprays at the fifth site, which was planted to the highly susceptible variety 'Eagle.'

Despite the much lower number of fungicide sprays applied in the IPM plots, incidence and severity of leaf blight was no worse in those plots than in the other sections of the fields. Furthermore, according to Abawi, "There was no detectable difference in the yield and marketability of carrots grown under the IPM scouting program and carrots grown under the regular spray schedule at the sites we harvested."

An added bonus came with the discovery that carrot varieties differed greatly in their tolerance of leaf blight. Some—particularly 'Fullback' and 'Carson'—were highly tolerant; 'Carson' required no treatment at one site. Others (such as 'Eagle') were very susceptible to blight. Armed with this new information, growers can cut down on fungicides and increase profitability by choosing the right cultivars.

CCE Educator Lee Stivers (left) scouts a carrot field with her assistant Frances Tucker. They were a part of Abawi's team on this project, as were CCE Educator Carol MacNeil; IPM Extension Educator Abby Seaman; Gilbert Scott, of Agrilink; Don Sweet, of Crop Advantage; Tim Widmer, of the Geneva plant pathology department; and four growers. Photo: G. Abawi.

New Vegetable Varieties Resist Diseases

29

Multiple disease resistance benefits growers and consumers

Whitaker squash. Photo: J. Ogrodnick

Resistant Squash. A summer squash called Whitaker got a lot of media attention a year ago, along with the man responsible for its successful breeding: Cornell horticulturist Richard Robinson. This work of ten years' duration, accomplished with the assistance of plant pathologists R. Provvidenti and H. M. Munger and research support specialist Joe Shail, has been supported in part by an IPM grant.

Why is Whitaker such big news? Multiple resistance is the answer. Whitaker is resistant to four significant diseases, three viral and one fungal. No other squash can resist this many diseases. Multiple resistance means reduced pesticide use, control of diseases that have never before been adequately controlled, improved quality, higher yield, and longer storage life. Resistance to a single disease isn't nearly as significant. A squash that resists one disease can be lost to another.

Robinson continued refining Whitaker this year, attempting to add resistance to one more disease and to the cucumber beetle. He was assisted in this effort by Mike Hoffmann, of Cornell University's Department of Entomology. Robinson also worked on transferring Whitaker's resistance to other squashes.

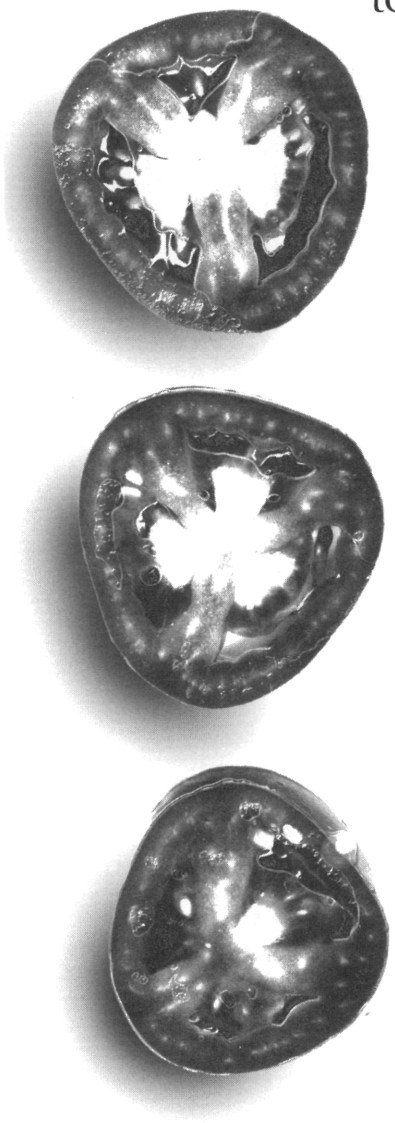
Resistant Broccoli and Cabbage. A similar effort to Robinson's is underway in the laboratory of Cornell's Elizabeth Earle. She used a cell culture procedure called protoplast fusion to transfer disease resistance into crucifer vegetables from other species. Following the initial fusion experiments she began working with Cornell horticulturist Mike Dickson to produce resistant broccoli and cabbage of marketable quality. They now have broccoli lines that are resistant to either blackrot or Alternaria leaf spot and some broccoli/cabbage crosses that are resistant to both. Six of the 18 broccoli lines tested in 1998 showed good resistance to blackrot. According to Earle, "This was an increase in percentage of resistance over earlier generations. It could mean that resistance is becoming uniform in these strains."

Blackrot is a bacterial disease that causes leaves to become discolored and brittle. When weather conditions favor its development, blackrot causes stunting, wilting, and even plant death. Alternaria leaf spot is a fungal disease that appears as dark spots sometimes covered with a black mold. It can render whole heads of cabbage worthless.

Seed for Sale. Seed for Whitaker summer squash and for the resistant broccoli plants is readily available to growers for the first time this spring.

Refining IPM Procedures for Fresh-Market Tomatoes

Weather- and disease-forecasting models take on tomato diseases



IPM procedures for tomatoes used in frozen and canned products have been in place since the 1980s, but they need to be tailored to suit tomatoes that are sold fresh. One particular area of need is disease forecasting. A weather-based program called TOMCAST has been used to forecast early blight and powdery mildew, but it does not forecast late blight. For this, another program called BLITECAST is needed.

In the 1998 growing season Professors Bob Seem and Helene Dillard, plant pathologists at the Experiment Station in Geneva, evaluated late blight management using a form of BLITECAST that had been adapted to work with a weather- forecasting product called E-Weather. Demonstration sites were located on three farms in western New York and at the Experiment Station in Geneva.

Unfortunately, E-Weather did not prove to be reliable under the test conditions set up by Seem and Dillard. No late blight was observed at any of the locations being assessed, yet the forecast system made consistent warnings of infection for all four locations. Comparisons to monitored weather data showed that the E-Weather forecasts consistently overestimated periods of high humidity and leaf wetness. Additional work on the weather and the disease-forecasting models must be completed before this system can be considered for commercial implementation.

The same three farm fields used by Seem and Dillard for their late blight forecasting were used by IPM Extension Educator Abby Seaman to demonstrate TOMCAST as a tool for managing three other diseases: early blight, Septoria leaf spot, and anthracnose. IPM-managed plots were compared to grower-managed plots at all three farms.

Fruit quality at harvest was equally good in the IPM and the grower-managed plots at the Ontario County and Niagara County sites. It was unacceptable in both plots at the Chemung County site. The moist conditions at that site may have contributed to the steady development of an early blight infection that occurred in late July and August.

Seaman believes that TOMCAST has the potential to significantly decrease fungicide use in tomatoes, especially compared to a conventional weekly spray schedule. But there have been obstacles to proving this. Late blight and bacterial canker, diseases that are not managed by TOMCAST, have frequently prevented Seaman from demonstrating the full season savings in fungicide applications that is possible with TOMCAST. What to do? Knock down one of these obstacles. According to Seaman, "Late blight, once it appears, is beyond the growers' control, but bacterial canker management is a frontier worth exploring. It will be the focus of next year's demonstrations."

Cooperators on the Seem and Dillard project and on Seaman's project were Extension Educators Brian Caldwell, Carol MacNeil, and Mike Orfanedes; Barbara Christ, of Penn State; Joseph Russo, of ZedX, Inc.; and Cornell faculty members Mike Hoffmann, Meg McGrath, and Tom Zitter.

Titles and Project Leaders, by Commodity

Fruit

Apple

Apple IPM Demonstration in Orange and Ulster Counties—*M. Ullrich, T. Rusinek*
Refining and Validating a Fungicide Timing Model for Controlling Flyspeck on Apples in the Hudson Valley—*D. Rosenberger*
Comparison of Different Pheromone Release Systems for Mating Disruption of the Obliquebanded Leafroller Integrated with a Biorational Insecticide—*A. Agnello, H. Reissig*

Grape

Demonstration of a Postemergence Weed Management Strategy and Reexamination of Grape Berry Moth Management Practices in the Lake Erie Region—*T. Weigle, R. Dunst, G. English-Loeb, B. Shaffer, J. Bixby*
Evaluating Management Options for European Red Mite and Sevin-Resistant Grape Leafhopper, and Postemergent Weed Management Demonstration in Finger Lakes Vineyards—*T. Martinson, T. Weigle*
Biological Control of Grape Powdery Mildew Using Tydeid Mites—*G. English-Loeb, A. Norton, D. Gadoury, R. Seem, W. Wilcox*
Minimizing Spray Programs for Control of Grape Disease Based on Phenological Stages of Susceptibility—*W. Wilcox*

Small Fruit

Assessing and Augmenting Biological Control of Tarnished Plant Bug in New York Strawberries—*M. Hoffman, K. Tilmon*
Evaluation of New Cultivation Tools for Weed Control in Newly Planted Strawberries—*R. Bellinder, M. Pritts*

Livestock and Field Crops

Field Crops

Determining the Value of the World Wide Web in Providing Local Pest and Crop Conditions to Area Farms—*K. Ganoe, P. Sutton*
Demonstration of the Impact Potato Leafhopper-Resistant Alfalfa Varieties Will Have on Alfalfa Hay Crop Yield and Harvest Quality—*B. Tillapaugh*
Combining Reduced Herbicide Rates and Cultivation for Effective Weed Control in Corn—*J. Mt. Pleasant*
Reducing Damage from Potato Leafhoppers on Alfalfa in New York through Variety Selection: A Comparison of Resistant vs. Susceptible Varieties—*J. Hansen, J. Miller-Garvin, K. Waldron, D. Viands*
Classical Biological Control of Soil Insects in Field Corn and Alfalfa—*E. Shields , T. Testa*

(continued on p. 32)

Establishing Alfalfa as a Cover Crop in Corn—*R. Hahn*
Herbicide-Resistant Corn for Reducing Use of Residual Herbicides and for Wirestem Muhly Control—*R. Hahn*
Evaluating Soil Characteristics as a Potential Means to Minimize Soil Insecticide Usage to Control Corn Rootworm—*J. Losey, K. Waldron, L. Allee*

Livestock/Poultry

Evaluation of Competition, Host Type and Host Location on Searching Ability and Parasitism Rates of *Muscidifurax raptorellus* and *Nasonia vitripennis* in New York Poultry Facilities—*D. Rutz, P. Kaufman, S. Long, K. Waldron*

Ornamentals

Greenhouse

Bedding Plants and Poinsettias in Orange and Ulster Counties—*S. MacAvery, T. Rusinek, A. Corbin*
Biological Control of Powdery Mildews of Greenhouse Ornamentals—*G. English-Loeb, D. Gadoury, A. Norton*

Nursery

Branching Out, An Integrated Pest Management Newsletter for Trees and Shrubs—*G. Hudler*
Evaluating the Potential of the Entomopathogenic Nematode *Heterorhabditis bacteriophora* 'Oswego' to Persist in Soils and Soil Mixes Used in the Nursery Production of Woody Ornamentals—*E. Shields, T. Testa*

Turfgrass

Quantifying Disease Suppression Activity of Organic Fertilizers/Biostimulants on Golf Course Turfgrass in the Capital District of New York State—*D. Chinery*
Novel Use of Japanese Beetle Pheromone and Floral Lures to Reduce Grub Populations in Turfgrass—*M. Villani, W. Roelofs*
Impact of Environmental Variables on Grub Populations in New York State Turfgrass—*M. Villani, J. Nyrop*
Moisture Effects on Entomopathogenic Nematodes—*J. Grant, M. Villani*
Optimization of Application Timing and Frequency of Microbial Inoculants for Turfgrass Disease Control—*E. Nelson, C. Craft*
Compatibilities of Conventional Turfgrass Pesticides with Biological Disease Control Strategies—*E. Nelson, C. Craft*
Evaluation of Turfgrass Establishment Systems for Pesticide Reduction—*F. Rossi, E. Nelson*

Vegetables

Carrots

Demonstration of an Effective IPM Program for Fungal Leaf Blight Diseases of Carrots—*G. Abawi*

Crucifers

Crucifer Vegetables with Resistance to Blackrot and Alternaria Leaf Spot—*E. Earle*

Cucurbits

Breeding and Evaluation of Squash and Pumpkin with Multiple Disease and Insect Resistance—*R. Robinson*
Determine the Detection and Biology of Bacterial Leaf Spot (*Xanthomonas campestris* pv. *cucurbitae*) of Cucurbits for the Development of Effective Disease Management Practices—*T. Zitter*

Mixed Vegetables

Integrated Management of Potato and Tomato Late Blight in New York State—*A. Seaman, J. Mishanec*

Stale Seedbed Practice for Vegetable Production—*B. Caldwell*

Onion

Pest Reduction Analysis of Onion Fields Following a Sudangrass Rotation on Muck Soils in New York—*J. Mishanec*

Use of Bt Bait Solutions and Beauveria for Control of Adult Onion Maggot—*J. van der Heide*

Sweet Corn

WNY Sweet Corn Pheromone Trap Network—*A. Seaman*

Assessing Biological Control and Host Plant Resistance for Management of Corn Leaf Aphid—*M. Hoffmann, S. Lynch*

Early-Season Establishment of *Trichogramma ostriniae* for Season-Long Suppression of European Corn Borer in Sweet Corn—*M. Hoffmann*

Biorationals for Management of Lepidopteran Pests of Fresh-Market Sweet Corn—*R. Straub*

Combining Interseeded Cover Crops with Banded or Low-Rate Applications of Herbicides for Weed Control in Sweet Corn—*R. Bellinder*

Tomatoes

Development and Demonstration of an IPM Protocol for Fresh-Market Tomatoes—*A. Seaman*

Investigation of TOM-CAST, Staking, and Mulch for Managing Tomato Diseases—*M. Tuttle McGrath, D. Moyer*

Tomato Late Blight Forecasts: True Forecasting with Adaptation to Disease Management Practices—*R. Seem, H. Dillard*

Titles and Project Leaders, by Project Type

Education/Demonstration

Apple IPM Demonstration in Orange and Ulster Counties—*M. Ullrich, T. Rusinek*

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(continued on p. 34)

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WNY Sweet Corn Pheromone Trap Network—*A. Seaman*

Biological Control

Assessing and Augmenting Biological Control of Tarnished Plant Bug in New York Strawberries—*M. Hoffman, K. Tilmon*

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Impact of Environmental Variables on Grub Populations in New York State Turfgrass—*M. Villani, J. Nyrop*

Semiochemicals

Comparison of Different Pheromone Release Systems for Mating Disruption of the Obliquebanded Leafroller Integrated with a Biorational Insecticide—*A. Agnello, H. Reissig*
Novel Use of Japanese Beetle Pheromone and Floral Lures to Reduce Grub Populations in Turfgrass—*M. Villani, W. Roelofs*

Federally Funded Projects

Northeast IPM Grants Program

Development of a Model Integrated Pest Management Recommendation Document—*Curtis Petzoldt, Michael Hoffmann, and Stephen Reiners*; $19,250 for 1 year

Evaluation of Non-corn Plants As Refugia in a Resistance Management Program for ECB on Bt Corn—*John Losey*; $92,102 for 2 years

Integrated Management of Immigrant Phytophthora infestans: Area-wide Systems—*William Fry*; $48,012 for 2 years

Integrated Management of Shoot and Rootstock Phases of Fire Blight on Apple—*Herbert Aldwinckle, M. Timur Momol, and John Norelli*; $99,970 for 3 years

Mite Biological Control in Apples Through Distribution and Augmentation of Typhlodromus pyri—*Jan Nyrop*; $99,842 for 2 years

Row Cultivation for Zone-Till: Implications for Reduced Inputs and Soil Conservation—*Robert Gallagher*; $56,201 for 2 years

Pest Management Alternatives Program Grants

Biological Control of European Corn Borer with Inoculative Releases of Trichogramma ostriniae—*Michael Hoffmann*; $155,642 for 2 years

Cabbage Maggots on Cole Crops: Documenting Strategies and Developing New Technologies—*Anthony Shelton*; $158,345 for 2 years

Developing Fifteen Commodity and Pest Management Profiles for Vegetable Crops in New York State—*Robin Bellinder and Bill Smith*; $42,259 for 6 months

Non-Woven Biodegradable Fiber Barriers for Control of Root Maggot Pests—*Michael Hoffmann*; $52,713 for 2 years

USDA Special Grant

Controlling Fire Blight Disease of Apple Trees—*Herbert Aldwinckle*; $233,693 for 1 year

Committees and Staff

IPM Operating Committee

The IPM Operating Committee provides the primary policies and directives that guide the New York State IPM Program. Membership is made up of the chairpersons of the four IPM Commodity Working Groups, the IPM Program director, directors of research at Geneva and Ithaca, a director of Cornell Cooperative Extension, the director of the Plant Industry Program of the New York State Department of Agriculture and Markets, and the director of the Cornell Pesticide Management Education Program.

James Tette—Chairperson, Director, New York State IPM Program
Ronnie Coffman, Associate Dean for Research, College of Agriculture and Life Sciences; and Director, Agricultural Experiment Station at Ithaca
Russell Hahn, Associate Professor, Soil, Crop and Atmospheric Sciences
Michael Hoffmann, Associate Professor, Department of Entomology, Ithaca campus
James Hunter, Director, New York State Agricultural Experiment Station
Robert Mungari, Director, Division of Plant Industry, New York State Department of Agriculture and Markets
Eric B. Nelson, Associate Professor, Department of Plant Pathology, Ithaca campus
W. Harvey Reissig, Professor, Department of Entomology, New York State Agricultural Experiment Station
Donald Rutz, Director, Pesticide Management Education Program
R. David Smith, Associate Director, Cornell Cooperative Extension
Michael Villani, Associate Professor, Department of Entomology, New York State Agricultural Experiment Station

IPM Commodity Working Groups

The four IPM commodity working groups help the IPM Program organize its long-range plans, identify priorities for and evaluate proposals made to its grants program, and encourage teamwork among the scientific disciplines at Cornell University. The vegetable implementation group is a subcommittee that coordinates and makes funding decisions on vegetable IPM implementation projects.

Fruit

W. Harvey Reissig, Entomology, Geneva—Chairperson
Arthur Agnello, Entomology, Geneva
Deborah Breth, CCE, IPM Extension Educator
Thomas Burr, Plant Pathology, Geneva
Greg English-Loeb, Entomology, Geneva
Joseph Kovach, IPM Program Unit
George Lamont, Fruit Grower, Orleans County
Robert Pool, Horticultural Sciences
Marvin Pritts, Fruit and Vegetable Science
Terence Robinson, Horticultural Sciences
David Rosenberger, Plant Pathology, Geneva
Bill Truncali, Jr., Fruit Grower, Ulster County
Timothy Weigle, CCE, IPM Extension Educator
Wayne Wilcox, Plant Pathology, Geneva

(continued on p. 38)

Livestock/Field Crops

Russell Hahn, Soil, Crop and Atmos. Sciences—Chairperson
William Cox, Soil, Crop and Atmos. Sciences
Janice Degni, CCE, CCTTS Regional Field Crops Specialist
Lawrence Eckhardt, Capital Area Ag. Consulting, Rensselaer County
Kevin Ganoe, CCE, Herkimer County
Mark Green, Cash Crop Farmer, Monroe County
Donald Rutz, Entomology, Ithaca
Elson Shields, Entomology, Ithaca
Margaret Smith, Plant Breeding and Biometry
J. Keith Waldron, IPM Program Unit

Ornamentals

Eric B. Nelson, Plant Pathology, Ithaca—Chairperson
Nina Bassuk, Floriculture and Orn. Horticulture
Gerard ("Rod") Ferrentino, IPM Program Unit
Daniel Gilrein, Long Island Hort. Research Lab.
George Good, Floriculture and Orn. Horticulture
George Hudler, Plant Pathology, Ithaca
Frank Rossi, Floriculture and Orn. Horticulture
Michael Villani, Entomology, Geneva
George Zerrillo, Greenhouse Grower, Onondaga County

Vegetables

Michael Hoffmann, Entomology, Ithaca—Chairperson
George Abawi, Plant Pathology, Geneva
Robin Bellinder, Weed Science
Leroy Ellerbrock, Fruit and Vegetable Science
Molly Jahn, Plant Breeding and Biometry
Dale Moyer, CCE, Suffolk County
Michael Orfanedes, CCE, Erie County
Laura Pedersen, CCE, Ontario County
Curtis Petzoldt, IPM Program Unit
Stephen Reiners, Horticultural Sciences
Steven Slack, Plant Pathology, Ithaca
Richard Straub,Entomology, Hudson Valley Laboratory
Ward Tingey, Entomology, Ithaca
Maire Ullrich, CCE, Orange County
David Votypka, Potato Grower, Steuben County
Richard Wildman, Ag. Consulting Services, Inc., Monroe County

Vegetable Implementation

Curtis Petzoldt, IPM Program Unit—Chairperson
Brian Caldwell, CCE, Tioga County
Stephen Childs, CCE, Wyoming County
Aaron Gabriel, CCE, Washington County
Daniel Gilrein, Long Island Hort. Research Lab.
Donald Halseth, Fruit and Vegetable Science
Michael Hoffmann, Entomology, Ithaca
John Mishanec, CCE, IPM Extension Educator
Margaret Tuttle McGrath, Plant Pathology, Ithaca
Stephen Reiners, Horticultural Sciences
Abby Seaman, CCE, IPM Extension Educator
Lydia ("Lee") Stivers, CCE, Lake Plains Vegetable Team, Monroe County
Jan van der Heide, CCE, Oswego County

Statewide IPM Grower Advisory Committee

Origin and function

The Statewide IPM Grower Advisory Committee is a group of New York agricultural producers who meet annually to advise the IPM Program on its plans and activities. The Committee was established in 1992 by the governor of New York to ensure that grower input is an important factor at both the policy-making and the operating levels of the IPM Program. Members are invited not only to react to ideas but to help set the agendas for upcoming meetings. Members are also asked to inform their respective industry groups about IPM Program developments and to share with their local state legislators perspectives on the value of the Program.

In 1997 two growers were elected to serve as co-chairpersons of the committee. One of their roles is to communicate a grower's point of view on the direction and benefits of the IPM Program to state legislators, the state department of Agriculture and Markets, and Cornell's College of Agriculture and Life Sciences.

Members

Warren Abbott, field crops, fruit, and vegetable grower
Dawn Betts, grape grower
Walter Blackler, apple grower
Scott Collins, dairy farmer
Randy DeBacco, golf course superintendent
Richard DeGraff, vegetable grower
David Deuel, dairy farmer
Rod Dressel, Sr., apple grower
Bill Erickson, grape grower
Robert Feindt, golf course superintendent
Tom Giles, vegetable grower
Amy Hepworth, apple grower
Carol R. MacNeil, Cornell Cooperative Extension
*Gerry Miller, greenhouse grower
Richard Moses, vegetable grower
Robert Noble, dairy farmer
Darrel Oakes, apple grower
Randall Paddock, IPM consultant to apple growers
Rick Pedersen, vegetable grower
*Brian Reeves, fruit and vegetable grower
John Russel, greenhouse grower
Charles Scheer, nursery grower
Norm Sharman, golf course superintendent
Cal Snow, dairy farmer
David and Janet Vollmer, greenhouse and vegetable growers

*Co-chairperson

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Cornell University, and Cornell Cooperative Extension.