# NEW YORK STATE INTEGRATED PEST MANAGEMENT PROGRAM

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IPM ANNUAL REPORT 1997

# Commissioner's Message

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This eleventh annual report on the work of the New York State IPM Program ushers in a new era of increased visibility and impact of the Program on New York's citizens. In 1996, the start of the second decade of state support of this vital program, writers and editors from major publications learned the ABC's of IPM in New York City at a two-day workshop titled "IPM: In Partnership with Nature." The workshop consisted of presentations about integrated pest management interspersed with visits to fruit, vegetable, and dairy farms and greenhouses where IPM is practiced.

A new tradition of recognizing and rewarding outstanding IPM practitioners in New York was begun in 1996. Eight "Excellence in IPM" awards were given to growers, consultants, a scientist, a food processing company, and an extension office. Eight Excellence in IPM awards are being offered in 1997 as well.

IPM-labeled canned and frozen vegetables were made available to consumers for the first time in this country. A dynamic partnership of growers, a food retailer, a food processor, and IPM experts at Cornell made it all possible.

Lists of protocols to be followed in growing IPM crops, called "elements of IPM," were formulated by the same partnership of growers, scientists, and food industry representatives. The "elements" serve to define IPM more precisely. They are likely to aid in the adoption of IPM by New York's growers, bringing us closer to the federal government's goal of 75 percent adoption of IPM by the year 2000.

The Northeast Weather Association (NEWA) was born in 1996 as a nonprofit corporation offering subscribers both agricultural weather data and a computerized forum for discussing weather-related concerns. This effort was begun with funds provided by the New York State IPM Program. NEWA is filling a gap left when the federal government determined that it could no longer offer agricultural weather services. Its membership and its range of services will both be expanded in 1997.

The 1996 state appropriation of $837,000 for IPM was used to fund 44 implementation and research projects in four commodity areas - fruit, livestock and field crops, ornamental crops, and vegetables. Sixteen of these were educational outreach efforts in a wide variety of commodities; another 10 explored innovative biological control methods; and the remainder looked at aspects of IPM such as host plant resistance, cultural controls, and pest biology.

Common to all of these endeavors is a dedication to improving the quality of life in New York State by improving the way in which our food crops and other agricultural commodities are produced while lessening the impact such production has on our environment.

Sincerely,

Donald V. Davidsen, D.V.M.

Commissioner

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# Director's Message

## from James P. Tette, Director, NYS IPM Program

New York's agricultural production will likely be affected in several ways by legislative action taken in 1996. The impact of the new federal laws related to the passage of the Food Quality Protection Act will require the EPA to go back and look more carefully at the risks synthetic pesticides might pose to the health of all people, and particularly to the health of infants and young children. New state legislation passed in 1996 requires agricultural businesses to record and report more details about their pesticide use than was previously required.

One issue that stimulated the latter regulatory action was the concern over the possible connection of pesticides to breast cancer in women through disruption of endocrine receptors in the human system.

There is no doubt that science does not fully understand the risks that synthetic pesticides pose to our environment and our health, and it may take years of research to uncover the answers. This is one of the many reasons why it is imperative for the state to continue to encourage the practice of Integrated Pest Management, with its comprehensive set of options for producers to rely upon as they manage their pest problems. The options that IPM can offer make sole reliance upon synthetic pesticides a thing of the past.

Because IPM is a concept that continues to attract attention and interest from agricultural producers, agribusiness and the general public, it is worthwhile to define and restate the mission and some of the goals of the New York State IPM Program.

## Definition

Integrated pest management (IPM) for agriculture is the application of an interconnected set of principles and methods to problems caused by insects, diseases, weeds and other agricultural pests. IPM includes pest prevention techniques, pest monitoring methods, biological controls, pest-resistant plant varieties, pest attractants and repellents, biopesticides, and synthetic organic pesticides. It also involves the use of weather data to predict the onset of pest attack, and cultural practices such as rotation, mulching, raised planting beds, narrow plant rows, and interseeding.

## Mission statement

The mission of the New York State IPM Program is to educate and encourage agricultural producers to grow crops and raise animals using pest management methods that

- reduce or replace the use of synthetic organic pesticides
- are environmentally sound
- pose minimal risk to human health
- enable growers to obtain a reasonable return on investment
- ensure consumers a supply of high-quality, safe, and economical foods and other agriculturally related products.

## Goals

Given this mission, the New York State IPM Program works to

- develop strategies that help the agricultural industry strike a better balance between biologically intensive and chemically intensive methods of managing pests
- conduct educational demonstrations, workshops, schools, courses, and pilot projects for growers and agribusiness personnel to learn the concepts of IPM so that these principles become routine in farm management operations
- encourage the development of a private IPM service sector that will supply IPM services to growers and farmers
- document economic and environmental data that measure the benefits of IPM as a shift to biologically intensive methods occurs
- cooperate with the private sector and with state and federal agencies in the extension of IPM knowledge to producers through demonstrations
- provide educational opportunities for consumers and environmentalists in the concepts of IPM so they will understand and support it

## Where we've been...where we're going

Over the years the program has searched for and demonstrated many alternatives to pesticides through a grants program. A brief look at some of the categories of approaches that have been addressed through the grants program shows that since 1991 the program has funded 53 projects concerning biological control, 11 projects leading to the development of pest-resistant plant varieties, 40 projects using cultural methods to combat pests, 35 projects on forecasting pest attack,131 on-farm demonstration projects, 11 multidimensional (systems approach) projects, and 3 projects related to pest biology. This comprehensive and detailed array is one reason that the New York State IPM Program is one of the best in the nation.

The Program continues to document the impact of funds it receives from state and federal sources, and these data continue to show that agricultural producers are committed to increasing their environmental stewardship as they adopt many of the IPM practices available to them. The data also show that pesticide use and associated risk continues to decline in New York, primarily as the result of this Program's efforts.

New York is on the verge of seeing several of its crops being raised with no synthetic pesticide inputs. However, it may also be on the verge of seeing the risk reduction accomplishments languish unless its citizens take the time to understand that significant changes in agricultural crop protection only take place over several years. In many ways the easy part of developing and demonstrating IPM methods is behind us. Pesticide use and risk have been significantly reduced in many crops across the state, but further reductions will come more slowly as growers and scientists learn how biologically intensive IPM methods can be employed. These methods may work very well for several years, but their very nature requires study and confidence building over many years. The citizens of New York will need to exhibit a good degree of patience and be willing to continue support for the IPM Program if we are to realize new reductions in risk from pesticides.

# NYS IPM 1997 Excellence-in-IPM Award Winners

Each year the Program awards individuals or organizations whose work supports integrated pest management in New York State in one or more of the following ways:

- developing new tools that will speed the adoption of IPM
- allowing IPM methods to be evaluated in their growing operations
- encouraging demonstrations of IPM methods on their farms
- promoting IPM in their businesses
- bolstering the adoption of IPM practices through the work of their organizations or through educational programs

The IPM Program fosters the reduction of chemical pesticides by using a combination of methods that protect human health and the environment.

### THIS YEAR WE ARE PLEASED TO PRESENT AWARDS TO:

Carl Bannon

David Deuel

Jennifer Grant

Gerry Miller

Anthony Shelton

Bob and Dawn Betts

LynOaken Farms, Inc.

### Team Award:

Wegmans Food Markets,Inc

Lynn Fish

Kris and Jim Gray

Doug Mason

Alan & Jeff Werner

# The Marketplace Calls for Environmental Stewardship

## Impetus from a supermarket chain has brought IPM-labeled produce - both fresh and processed - to New York customers for the first time.

For the first time ever, New York supermarket customers can stock their shopping carts with a variety of IPM-labeled vegetables this year. Wegmans Food Markets, Inc. sells IPM-grown, fresh-market sweet corn in its Rochester-area stores and several types of frozen and canned vegetables bearing IPM labels in all of its stores. The labels explain that "Through IPM, growers use less pesticide over time by taking other steps to reduce pest damage. Your purchase supports the efforts of growers who truly care about the environment." The story behind these new labels is one of a food industry initiative and an enthusiastic response by the IPM Program. It is a story of new partnerships and environmental gains.

## Steps in the Process

Wegmans first approached Cornell in 1994, seeking the means to offer its customers IPM-grown sweet corn. The retailer was examining new marketing strategies and wanted to test the marketplace with an IPM product. As a first step, the retailer's fresh-market sweet-corn growers were trained in IPM methods by IPM extension educators from Cornell. The training was funded and co-facilitated by PRO-TECH, a Cornell Cooperative Extension program whose mission was to enhance the sustainability and competitiveness of New York's fruit, vegetable, and ornamental horticulture industries through educational programs.

IPM-grown sweet corn - with signs promoting it as such - was sold at one store in 1995. It went over so well with customers that Wegmans decided to expand the IPM connection in two ways: 1) sell fresh-market IPM corn at all of its Rochester-area stores and 2) sell canned and frozen vegetables under IPM labels at all of its stores.

When Wegmans presented this second idea to Comstock Michigan Fruit, its supplier of processed fruits and vegetables, the grower-owned company was able to accommodate Wegmans immediately. Comstock selected 10 growers who already practiced IPM to grow processing vegetables for the Wegmans IPM label.

Comstock Michigan Fruit, no stranger to IPM, adopted IPM practices on all of its sweet corn acreage in 1991, with a resultant 50 percent drop in insecticide use. Its long-standing efforts to adopt IPM were recognized in 1996 with an "Excellence in IPM Award."

Once an agreement to market the IPM vegetables was reached, representatives from Wegmans, Comstock, and Cornell began working with growers on the details of carrying the plan to fruition. One crucial endeavor was the formulation of "IPM Elements" for processed beets, cabbage for sauerkraut, carrots, peas, snap beans, and sweet corn. These Elements are lists of agreed-upon IPM practices to be followed in producing crops that are to be sold under an IPM label.

Since many of the growers enlisted for this project had already adopted many IPM methods, they did not need to make major adjustments to comply with the Elements. The biggest challenge was to document their pest management practices more extensively than in the past. Growers were assigned points for adopting various practices on the lists of Elements, and a specific point total was determined as the required number to qualify a crop as IPM grown. Nearly 3,500 acres of fresh and processing vegetables were grown for IPM labeling in 1996. All of the growers involved in this project exceeded the required point level by about 15 percent.

As for the economics involved, IPM-labeled products were sold in the stores for the same price as other Wegmans-brand vegetables. Whatever the product, Wegmans did not have its own competing brand, but other brands of similar canned products were offered on the shelves.

This project is aimed at encouraging environmental stewardship. Wegmans is asking its agricultural producers to show progress in stewardship over a period of three years. The results of the point total above show that such progress is taking place and will likely continue. The project also seeks to measure the environmental impact of the pesticides used on each crop. Data collected in this regard were also very favorable in 1996. At least one grower did not use any herbicides, fungicides, or insecticides on one of his crops.

## What Does It All Mean?

The success of this effort has been due to the willingness of growers, the food processing and marketing industries, and Cornell to learn from one another and to venture into unknown territory. Wegmans views the IPM vegetables as "value-added" products. It has devoted significant advertising resources to the new products. In-store videotapes, brochures, television and radio spots, and an advertisement in its weekly newspaper insert have all been aimed at educating the public about IPM and about the environmental stewardship of New York farmers.

Bill Pool, manager of Food Safety and Regulation for Wegmans, describes the effects of the effort in this way: "Strong support for IPM was evident in a follow-up survey of 302 of our customers after we sold the first IPM-grown sweet corn. While the process of educating consumers about IPM will take some time, it's a wonderful opportunity to tell a very positive story about production agriculture."

Stories like the following one, shared with IPM staff by Dr. Christine Gruhn, biology professor at Nazareth College in Rochester, are proof positive that knowledge about IPM is spreading as a result of the Wegmans initiative. Gruhn typically asks the members of her freshman biology class whether any of them knows what IPM means. The answer is usually a unanimous "no." In the fall of 1996, though, 8 out of 20 students said "yes." When she asked them to name the source of their knowledge, all 8 named Wegmans.

# Ag Weather Goes Private: the Northeast Weather Association

Two years ago the agriculture industry realized that governmental support for agricultural weather services was waning. People started looking for private avenues, and in 1996 the Northeast Weather Association was born.

A nonprofit membership organization called the Northeast Weather Association (NEWA) came into being in 1996 thanks to the efforts of an interested group of agricultural producers, IPM extension educators, and agribusiness organizations.

The purposes of NEWA are twofold: to disseminate weather data, pest forecasts, and weather forecasts to its members; and to act as a forum for the resolution of agricultural weather concerns of its members, who include growers, food processors, private consultants, fieldmen, and extension personnel.

Between 50 and 60 growers or organizations had purchased automated, in-field weather instruments in the state of New York as of 1996. These instruments measure temperature, relative humidity, leaf wetness, and precipitation. Why couldn't the owners get their own data from these instruments? Why form an association? Because it is difficult for individuals to acquire the expertise to summarize the data and the software needed to run pest forecast models. Furthermore, weather forecasts cannot be obtained from weather instruments, and they are a critical element in sound crop and pest management.

Some of the services NEWA offers were formerly made available by the federal government, with no charge to growers. Funding cuts put an end to them in 1995.

A USDA Agricultural Telecommunications grant awarded to the IPM Program makes possible a network of individual weather instruments, linked by three computers that act as "bulletin boards." The bulletin boards, located in Central, Western, and Eastern New York, have sophisticated software that can summarize daily weather data gathered from the network of instruments and can run pest forecast models for NEWA members.

Agricultural weather forecasts for six New York growing regions, purchased by NEWA from Weather Track, Inc., a private forecasting service in Rochester, New York, are also posted on these bulletin boards at 7 a.m. each day. These forecasts, as well as the pest forecasts and weather instrument data, were provided from early April until the end of October 1996.

One advantage of this new weather association besides the obvious one that it provides weather information needed by New York's farmers is that it creates a link between the agriculture industry and the research and extension base at Cornell University. Research linking weather information to pest and crop developments is under way in several of the Cornell crop protection departments.

What do NEWA members get for their subscriptions? Some receive daily facsimiles containing data on predicted hours of precipitation, temperatures, and relative humidity for the day. Members with home computers can make local phone calls daily to one of the bulletin boards and download information that translates the weather information into suggested management strategies. Membership fees cover the expenses of the Weather Track forecasts, the telephone lines necessary to create the network, and services to maintain the weather instruments, keep the software updated, and train growers to use the weather data on their own computers.

In 1996 subscribers received NEWA data for apples, onions, grapes, and potatoes. In 1997 NEWA organizers hope to add information pertinent to field crops, ornamentals, and some additional vegetable crops. They also hope to double the current NEWA membership of forty-three subscribers.

# Comparing Cropping Systems

## Four crops received holistic scrutiny this year when systems such as "conventional," "organic IPM," and "future IPM" were compared in side-by-side plots.

Specialization has been the favored path for medical professionals, lawyers, and business people for decades. In the realm of scientific research it is often considered a necessary path. The theory is, how do we find answers to the mysteries of our world unless we break them down into manageable components?

Three long-term IPM projects are taking the opposite approach as scientists study and demonstrate IPM practices for strawberries, sweet corn, field corn, and soybeans in a holistic fashion. These projects use the systems approach - an approach that involves the blending together of many components. Why? There is a great need to understand how all of the components of IPM technology interact and relate to one another. Farmers employ a systems approach to managing their pests; why not have IPM demonstrations that do the same? There are distinct advantages to such integration:

- Findings from finite projects can be validated by looking at them in combination with each other and over an extended period;
- Growers and Cooperative Extension IPM educators benefit from seeing all of the IPM strategies for one crop in one setting;
- The systems approach fosters teamwork at Cornell because it benefits both researchers and extension educators. Researchers are able to add knowledge from systems studies to their component studies. Extension educators can use this approach to gauge the likelihood of commercial success of various methods;
- Larger plots are used than the usual research plots, which means the results can be more readily transferred to commercial growers' fields.

How does a systems study work? Side-by-side plots are managed according to prescribed plans that cover all aspects of pest management. Both the strawberry and the sweet-corn projects use three treatments called "present IPM," "future lPM," and "organic IPM." The sweet-corn study also includes a "conventional" treatment. The field-corn/soybean project, the only one of the three that has been completed, examined the IPM benefits of crop rotation versus continuous corn under three weed and soil insect control regimes and two tillage systems (moldboard plow and chisel).

### THE STRAWBERRY SYSTEMS

The strawberry cropping systems project was begun by a small-fruit team led by fruit IPM coordinator Joe Kovach in the spring of 1995. Cover crops were planted on approximately two acres at the New York State Agricultural Experiment Station in Geneva that year. In 1996, strawberries were planted. The first full fruiting year will be 1997, and it is anticipated that data will be collected through the year 2000.

No pesticides, either natural or synthetic, are being applied in the "organic IPM" system; only cultural and biological controls are being used. The "future IPM" system combines cultural and biological controls with minimal use of synthetic pesticides. IPM technology as published in Cornell's 1995 Pest Management Recommendations for Small Fruit Crops is applied to the "present IPM" system.

These treatments are being applied to four varieties of strawberries, two June-bearing and two ever-bearing (called "day-neutrals"). Varieties were selected for inclusion in the project either because of their tolerance to insects or because they are less susceptible to fruit rot than other varieties.

A wide spectrum of pest prevention methods has been or will be employed in this cropping comparison. A sampling of these follows.

### Insect or nematode management

- marigolds, used as a cultural method for suppression of nematodes that feed on strawberry roots
- a one-meter strip of alfalfa planted around each plot as a trap crop for insects
- releases of parasitoids (biological control agents) in the alfalfa to manage tarnished plant bug
- vacuuming of strawberry plants to manage tarnished plant bug

## Weed management

- rye planted as a cover crop one spring and mowed the following spring before the strawberries are planted
- straw mulch applied between rows
- comparing banded applications of herbicides (in strips along the rows rather than broadcast over the fields) with no herbicides

## Disease management

- avoidance of spring nitrogen applications
- bee-delivered Trichoderma, a biological control agent that manages fruit rot
- comparing narrow rows of plants with wide rows

While the complexity of measuring so many factors in multiple treatments may seem daunting, many interesting results are expected that will raise the level of IPM knowledge.

## THE SWEET-CORN SYSTEMS

The sweet-corn study, initiated by a team of vegetable scientists and led by vegetable IPM coordinator Curt Petzoldt, involves fine-tuning the use of a new type of cultivator for weed control so as to avoid damage to plants, and a seed treatment with a biological control agent, Trichoderma, to increase yield in the organic IPM plot. Researchers are also elucidating differences in soil structures and levels of biological activity in soils, the effects of rotating with cover crops, and the efficacy of banding of herbicides (application to narrow strips adjacent to plant rows) versus broadcasting of those materials (application to entire fields).

Results to date indicate that while there are certain tradeoffs between environmental impact and economic costs, all four systems (conventional, present IPM, future IPM, and organic IPM) have valuable components to contribute to a sustainable production system for fresh-market sweet corn. This project is scheduled to run for at least five years. Investigators have already tested the four management approaches during two very distinct growing seasons. The sweet-corn project is one of a series of vegetable systems comparisons. A cabbage comparison begun in 1992 with the same four systems ran for three years (1992-1994).

## THE FIELD-CORN/SOYBEAN SYSTEMS

Various pest management systems for field corn have been demonstrated on Cornell research farms for several years. This work was begun by a team of scientists led by Bill Cox, of the Soil, Crop and Atmospheric Sciences Department at Cornell. Evaluations of economics and effectiveness have been made regarding tilling equipment, rotation, and three levels of pest management inputs.

Demonstrations of project results were conducted in four central and western New York locations in 1996. The demonstrations reinforced IPM principles and increased grower awareness by sharing these findings:

- growers can reduce weed problems in field corn by using a moldboard plow instead of a chisel plow
- the benefits of rotation over continuous corn are decreases in corn rootworm damage, yield increases of 10-30 bushels per acre, and greater net returns
- savings of $5-20 per acre can be realized and pesticide use can be reduced when growers replace broadcasting of herbicides with either of the following: 1) moldboard plow tillage followed by rotary hoeing and timely cultivation, or 2) banding of herbicides and timely cultivation

## SUMMARY

A systems approach provides a broader and more practical view than a traditional, single-component demonstration. One goal of this approach is to achieve a more biologically balanced system for raising a particular crop. “This can’t be done in a year or two,” asserts IPM Director Jim Tette. “As we rely more and more on biological plant protection mechanisms, we need more time to understand whether they will lead to systems that are as productive and economical as those we have now.”

# New York Agriculture Industry $upports IPM

## Some of the funds for IPM research and educational outreach programs in New York state are coming from the pockets of growers and their organizations.

The ever-increasing confidence of New York's growers in IPM evidences itself in many ways. One of the most tangible of these is the steady flow of dollars from growers to support IPM-related research and implementation work. While the state of New York funds many of these IPM projects, agricultural producers also provide funds to support certain projects.

Agricultural producers also spend their own funds to obtain IPM advice and guidance. They hire the services of private crop consultants or pay for IPM services through their crop management associations. In some parts of the state where neither of these options is available, producers have prevailed upon local Cornell Cooperative Extension offices to use producer funds to coordinate IPM services. Table 1 shows that in 1996 New York agricultural producers spent an estimated one million dollars of their own resources to obtain IPM services and advice. The numbers in table 1 are tangible evidence of the significant interest shown by the agricultural community in supporting IPM.

### Table 1. IPM Services Purchased by Growers in 1996

| **Source of IPM Services** | **IPM Service Providers** | **Acres Served (estimates)** | **Growers Receiving IPM Services** | **Grower Payments for IPM Services** (estimates) |
|---|---|---|---|---|
| private crop consultants | 30 | 88,670 | 986 | $628,625 |
| grower associations/ cooperatives | 6 | 67,005 | 728 | $317,535 |
| extension-coordinated services | 24 | 29,852 | 2,896 | $30,533 |

Crop checkoff programs are another avenue of producer support for IPM. Many producers have organized crop checkoff programs that set aside money they would normally put in their own pockets as profit from their crops. This set-aside money goes into a fund for research and extension projects that seek answers to the problems producers face. The fund also supports educational outreach projects that demonstrate and explain new information to producers. Growers of cabbage, apples, sweet corn, snap beans, grapes, and several other commodities have used their checkoff funds to support IPM projects.

# Defining IPM: A Collaborative Effort

## Teams of agricultural producers, Cornell IPM experts, and food industry representatives met in 1996 to pin down what it means to practice IPM in upstate New York and to commit it to paper as the "Elements of IPM."

Ever since the term "IPM" was coined in the 1950s, its definition has been ambiguous. With the advent of the federal government's National IPM Initiative, integrated pest management is increasingly in the spotlight. More people want and need to know just what IPM is:

- State and federal agencies often search for a list of practices that constitute IPM. They need to determine which growers qualify for cost-sharing under programs that fund environmentally sound agricultural practices.
- Marketing surveys have shown that consumers are more interested than ever in pest management and the affects it may have on food safety and the environment.
- Growers who practice IPM welcome the means to document their practices.

Fortunately for all of these constituents, IPM practices, called "Elements of IPM," are now being committed to paper in New York. What are these Elements? Crop-specific lists of recommendations for preparation of a field before planting, use of pest-resistant plant varieties, monitoring for pests, and use of weather data to forecast pest attacks. The Elements also touch on issues not so directly linked with pests, such as the addition of nutrients to a crop or the handling of a crop after harvest.

Many New York growers have been adopting the Elements by modifiying the way they grow their crops. Often this is accomplished over a two- to three-year period. Some of the changes require a new investment, mostly in a grower's management time. But growers often realize a net profit by adopting IPM.

The Elements are not static; they are reviewed annually and often revised. As research reveals more about a crop and its pests, as new pests surface, and new management options are developed, the Elements are changed to accommodate the new information.

It is often impractical for growers to use each individual Element in every year. Growers need to take into account unpredictable weather conditions, significant changes in the U.S. economy, or new government regulations affecting agriculture.

Fresh-market sweet corn was the crop chosen for the first set of IPM Elements. The sweet-corn model was then used to develop Elements for six processing vegetables in upstate New York: beets, carrots, kraut cabbage, snap beans, sweet corn, and peas. The same model is now being applied to certain fruit and field crops in New York and to processing tomatoes in New York, Pennsylvania, and New Jersey.

Defining IPM for specific crops is a new concept - as is the process of developing these definitions - because it involves new partnerships. The fresh-market sweet corn Elements were written through a collaborative effort among several stakeholders: food industry representatives, agricultural producers, and Cornell IPM experts. A food processor, Comstock Michigan Fruit, joined the partnership when it was time to define Elements of IPM for the six canned and frozen vegetables.

After identifying the Elements, these partners prioritized them and developed forms and procedures by which to verify adoption of them. "This was a learning experience for everyone," commented Curt Petzoldt, vegetable IPM coordinator and leader of the Cornell portion of the partnership. "The growers added some Elements that the rest of the partners would not have thought of. In some ways they made things more demanding for themselves."

# Journalists Report to the Fields to Learn About IPM

## Writers and editors from major publications learned the ABC's of IPM in New York City and on farm and greenhouse visits in Orange County last June.

What is integrated pest management and how should writers explain it? About two dozen writers and editors - some freelancers and some representing major U.S. magazines and newspapers - got an extended answer to these questions in a two-day workshop held in New York City and Orange County in June 1996. The workshop, titled "IPM: In Partnership with Nature," consisted of presentations about integrated pest management interspersed with visits to IPM greenhouses and IPM fruit, vegetable, and dairy farms.

"This was our best workshop to date," said Sylvia Rowe, President of the International Food Information Council Foundation (IFIC), comparing the New York media workshop to two previous workshops for the media held in other states. Her organization and the National Foundation for IPM Education cosponsored the workshop, with support from the U.S. Environmental Protection Agency, Cornell University, the New York State IPM Program, and Cornell Cooperative Extension of Orange County.

Workshop participant Edith Hogan, spokesperson for the American Dietetic Association, kept a list of sound bytes such as "spray and pray," a grower's description of conventional pest management, and "environmental stewardship" and "harness nature," key components of the IPM philosophy. Hogan plans to inform her urban audience about IPM by relating its principles to gardening, the number one U.S. hobby.

During the Orange County tour, ably led by Cornell Cooperative Extension educators Lucy Joyce and Maire Ullrich, participants heard growers praise IPM for both its economic and environmental savings. Onion grower John Cavallaro told them about rotation with sudangrass, a cover crop that, when plowed under, naturally releases a gas that kills microscopic pests in the soil. Planting sudangrass costs Cavallaro $25 per acre, whereas the alternative, soil fumigation with a chemical pesticide, costs him $600-700 per acre.

Apple grower Jeff Crist, of Walden, told the participants, "We'd dearly love not to have to spray at all. For one thing, I wouldn't have to get up at 4:45 a.m." Additional time with his wife and three children is one advantage to Crist's adoption of IPM methods. His farm has employed a full-time IPM scout for many years.

While in New York City, participants heard about the national IPM initiative from EPA's Dr. Janet Andersen, director of the Biopesticides and Pollution Prevention Division, and Larry Elworth, Special Assistant to the Under Secretary for Natural Resources and Environment at USDA. Dr. Donald Davidsen, the commissioner of the Department of Agriculture and Markets, Dr. Jim Tette, director of the New York IPM Program, and two Orange County growers (Russell Kowal, of Goshen, and Deborah Sweeton, of Warwick) spoke about New York State's dedication to IPM. Colleen Wegman, of Wegmans Food Markets, Tom Facer, of Comstock Michigan Fruit, and Dr. Molly Anderson, of the Tufts University School of Nutrition, gave updates on IPM in the marketplace.

Participants represented publications such as McCall's, Country Living, Glamour, Good Housekeeping, and Eating Well. Throughout the year many of these writers have published stories on IPM that help the general public understand the challenges agricultural producers face as they strive to improve their environmental stewardship.

# Commodity Highlights

## FRUIT

### Managing the strawberry "clipper"

Cooperative Extension educator Regina Rieckenberg had a familiar pest in mind when she met with 70 strawberry growers at a twilight meeting in Oswego County last summer: the strawberry bud weevil, nicknamed the "clipper."

Most New York strawberry growers apply at least one clipper spray each year to stop the insects from clipping off the strawberry buds. Is this necessary? To find out, Rieckenberg identified nine fields likely to have clipper problems. Sections of these fields were left untouched by insecticides, and plants in those sections were monitored every other day for clippers.

End-of-season measurements showed that neither yield nor fruit size was affected by the presence of clippers until the number of clipped buds exceeded 20 per meter of row. Thus, growers may be able to forego sprays for clippers until injuries exceed this number. (The "economic threshold" used to be 2 clipped buds per meter of row.) Studies by fruit IPM coordinator Joe Kovach have also shown that when circumstances do warrant chemical treatment, it can be limited to the outside 30 feet of a field, where clipper activity is highest.

### Using biological control methods in strawberries

Three strawberry IPM projects involved biological controls in 1996. One used *Trichoderma harzianum,* a naturally occurring fungus, to combat a fungal disease called Botrytis. The project went a second step and used a biological agent to deliver the Trichoderma to the plants: honey bees deposited spores of the beneficial fungus on strawberry blossoms during pollination.

Results from five growers' farms plus a research site in Geneva show that bee-delivered *Trichoderma harzianum* provides the same level of control of the disease as one commercial fungicide application. Furthermore, the berries in bee-visited plots were 30 percent larger on average than berries in plots not visited by the bees. Bioworks Inc., a company begun by scientists at the Geneva Experiment Station, hopes to have its strain of Trichoderma approved for commercial use this year.

Another IPM project focused on the root weevil. This pest has been particularly troublesome because growers have lacked an effective means of managing it. However, three formulations of nematodes (microscopic roundworms) that show promise for root weevil management are now available commercially.

In the IPM project, nematodes were applied to the soil in hopes they would find and feed on root weevils. Positive results were achieved in 1995, but tests were inconclusive in 1996, as the nematodes did not survive long in the soil. Some of the specimens may have died in transit from the manufacturer. Samples of future shipments of nematodes will be examined under a microscope upon arrival to make sure they are alive.

A third attempt to expand the array of biological control options for strawberries used *Beauveria bassiana,* a fungus that acts as a contact insecticide, to manage the tarnished plant bug, a major pest of strawberries in New York. Results from 1995 showed that the fungus reduced tarnished plant bug injury to a commercially acceptable level. In 1996, however, Beauveria appeared to have no effect on tarnished plant bug populations. This year's smaller plots with no buffer zones apparently allowed for migration of the bugs from one plot to another. This would account for the lack of difference between treated and untreated plots.

### "Imported" mites feed on mite pests in apples, grapes

Spider mites, especially European red mites (ERM) are pests of both apples and grapes in New York. Previous IPM projects carried out in upstate New York orchards and vineyards have shown that ERM can be managed by enhancing existing populations of beneficial mites that feed on spider mites. One beneficial species, *Typhlodromus pyri (T. pyri),* can totally supplant the use of miticides in these locations.

Not all locations in our state are equally fortunate when it comes to mites. While both *T. pyri* and another beneficial species, *Amblyseius fallacis (A. fallacis),* occur naturally in western New York, only *A. fallacis* is commonly found in the other important apple or grape-growing areas of the state, the Hudson and Champlain Valleys, and Long Island. Both species feed on ERM, but *T. pyri* is a much more effective natural enemy for the following reasons: 1) *T. pyri* remains in the tree or vine all year, so it is always available to feed on spider mites; 2) *T. pyri* feeds on a wider variety of foods than *A. fallacis* does and can therefore remain at high densities even when populations of ERM are temporarily low; 3) *T. pyri* can detect the presence of ERM via chemical cues and prefers to feed on it; and 4) *T. pyri* survives northeast winters better than does *A. fallacis*.

In 1996 Cornell scientists transported *T. pyri* from western New York into the Hudson and Champlain Valleys and elsewhere in the northeast. How does one move microscopic creatures from one orchard to another? Researchers have observed that when apple trees are in bloom, beneficial mites congregate in and near the flowers to feed on pollen. In May of 1996, apple blossom clusters were collected from an orchard at the Experiment Station in Geneva and were sent to 9 orchards in New York and 32 orchards in 6 other northeastern states. The clusters were then attached to apple trees in the recipient orchards, and the *T. pyri* made those trees their new homes.

Mites were again released in July, when apple leaves from Geneva were stapled to leaves in the 41 recipient orchards. Leaf samples from each site were later collected and sent back to Geneva. They were put through a mite brushing machine, and the beneficial mites that fell off the leaves were counted under a microscope. *T. pyri* were found in samples from all but 3 of the 41 sites. Now that they have become acclimated to these new regions, researchers expect that *T. pyri* will provide biological control of European red mite during the 1997 growing season.

In the vineyard study, *T. pyri* collected from an apple orchard in Geneva were successfully established in two Long Island vineyards. The effect of fungicides on *T. pyri* was measured in these vineyards. Mite densities following treatments showed that one commonly used fungicide is very toxic to *T. pyri*. The next step in biological control of spider mites is to find an alternative to this fungicide for management of grape diseases.

The outcome of this project underscores one of the factors that must be taken into account when working with biological controls. The fragility of living organisms such as the nematodes must be dealt with both by newly emerging biological control industries, as they develop their product lines, and by growers wishing to use such pest management methods. Biological controls can be more vulnerable than synthetic materials to changes in temperature, humidity, and precipitation. Despite these difficulties, biological controls are a necessary piece of an environmentally and economically sound agricultural system.

## Releasing beneficial wasps in New York orchards

An insect called the oblique-banded leafroller (OBLR) is a very costly pest of apples in New York. Its immature life stages feed on apple blossoms and on developing fruit. Many OBLR-damaged apples drop from the trees prematurely; a small percentage remain on the trees, but these develop deep, corky scars and indentations.

Growers with orchards heavily infested with OBLR can experience 5 to 10 percent fruit injury, even when they have applied multiple sprays of the most effective insecticides available. In 1996 New York apple growers as a group lost $2.7 million in revenues because of fruit sales thwarted by OBLR damage. Finding an effective means of managing OBLR, which has developed resistance to many chemical treatments, will be a tremendous coup for the New York apple industry.

Last summer Harvey Reissig and Jan Nyrop, Cornell entomologists, investigated the potential for biological control of OBLR by a wasp called *Trichogramma platneri,* which feeds on leafroller egg masses but is harmless to people and livestock. The wasps were released in large numbers in both a commercial orchard and an unsprayed, research orchard. Rates of parasitism of OBLR egg masses by the wasps were recorded for several weeks.

The wasps' effect on OBLR damage varied. Leafroller damage to McIntosh and Cortland apples at the research orchard was 50 to 70 percent lower than in plots where no wasps were released. But damage in the Delicious apples in the same orchard was not at all reduced by *T. platneri.* In the commercial orchard, damage was reduced by 10 percent in Jerseymacs, but the wasps seem to have had no effect in the Cortland plots.

The wasps alone are not likely to provide adequate management in orchards heavily infested by OBLR. But using beneficial wasps in combination with other control methods could well enable New York apple growers to reduce insecticide applications for leafrollers by 30 to 50 percent. Replacing standard insecticides with the wasps may also enhance the development of biological control of mites.

## Irrigation may help grape growers manage weeds

Weeds in vineyards are significant pests because they compete with grape vines for water and nutrients. Because vineyards are hill crops, vineyard weeds cannot be managed by plowing. Erosion of valuable soil and contamination of wetlands and lakes by soil and fertilizer would result. Herbicides are therefore important tools for grape growers in New York. Yet herbicides, too, can become contaminants. Cover crops have been studied at Cornell in recent years as an alternative to herbicides, but these, like the weeds themselves, can compete with vines for water.

In a 1996 project, horticulturists Bob Pool and Alan Lakso, of the Geneva Experiment Station, and two research support specialists from the Fredonia Vineyard Laboratory looked at irrigation as a way to enhance weed control. They found that irrigated vineyards were able to tolerate more weed or cover crop competition than nonirrigated vineyards. The irrigated vines didn't have to compete with surrounding ground cover or weeds for water. These first-year results suggest that irrigation may be a viable means of managing weeds while reducing herbicide use.

## A sampling of outreach activities

A grape IPM workshop was conducted for 25 vineyard workers and vineyard management teams from two large New York wineries. The workshop included a basic overview of pest biology for insects, diseases, and weeds, and assistance in using this information to develop management strategies.

Extension Educator Deb Breth provided support to tree fruit growers across the Lake Ontario region through both educational outreach and applied research. This included a fax subscription service for frequent delivery of pest management information; biweekly newsletters containing features such as "Harvest Evaluation to Plan Pest Management Strategies for `97: A Picture is Worth a Thousand Words" (a description of pest damage and an advertisement of an IPM fact sheet series); recorded telephone messages updated weekly in July and August, with primary emphasis on grower concerns over obliquebanded leafroller, apple maggot, and summer diseases; and a summer educational meeting that included a session on leafroller management.

Breth also worked with several Orleans, Monroe, and Niagara County farms that had hired a private consultant to scout pests block by block. She helped these growers incorporate an electronic weather sensor into their pest management decision-making programs.

## Biological control shows promise in poultry houses

Wherever there are chickens, there is chicken manure, a great habitat for house fly breeding. No one wants to live next door to a "fly hatchery," but expanding urbanization has juxtaposed former "city folk" and poultry producers. Some of these urban neighbors have confronted producers or even pursued litigation over increasing fly populations.

Though flies do not harm chickens, our nation's poultry producers spend millions of dollars each year (e.g., $32.4 million in 1993) in an attempt to rid their poultry houses of them. Many insecticides are either no longer effective or no longer available, reinforcing the need for an integrated approach to managing house flies.

One promising alternative to chemicals entails releasing tiny wasps that kill house flies by parasitizing their immature stages. These parasitic wasps ("parasitoids") are harmless to humans and to poultry and other livestock. Stefan Long, Wes Watson, and Don Rutz, of Cornell, carried out an IPM-funded project in 1996 to release a species of parasitoids called *Muscidifurax raptorellus* in three poultry houses. They monitored *M. raptorellus* population growth and took note of impacts on the fly population.

*M. raptorellus* killed more than 70 percent of immature flies during a nine-week period in poultry houses in which there had been previous releases of biological control parasitoids. Rates were much lower in the poultry house with no history of parasitoid releases: only 26 percent control of the flies was provided by *M. raptorellus*.

By minimizing practices detrimental to parasitoids, such as applications of larvicides and residual insecticides, growers can enable the wasps to become established in sufficient numbers to control fly populations in poultry houses. Augmentative releases can help beneficial parasitoids become established more quickly.

Several species of fly parasitoids occur naturally throughout the United States. Preferences for climates and for fly breeding materials vary from species to species. One species common to dairy farms and poultry operations is M. raptor, which has been positively evaluated in previous IPM projects.

*M. raptorellus* has an advantage over M. raptor: its females typically lay more eggs. The average for *M. raptorellus* is 3-5 eggs per fly pupa. M. raptor females lay only 1 egg per pupa. This potential for more rapid population growth makes *M. raptorellus* a promising candidate for biological control of flies.

Several privately owned insectaries have recently begun mass rearing of *M. raptorellus* for commercial use. This tiny biological control agent may soon be helping poultry producers save face, save money, and stay out of court.

## Tactical Agriculture Teams (TAg) expand

TAg Teams, an educational concept begun in New York by the IPM field crops team in 1990, reached out to new audiences in 1996. Sixty farmers from 11 counties were enrolled in TAg Teams this year, bringing the total number of people who have received TAg instruction over the years to approximately 650. This year's group included both Amish and Native American growers for the first time.

Identical tests administered to participants before and after the TAg program proved the high educational value of this year's sessions. Test results showed that grower understanding of alfalfa insect pest management issues improved by 80 percent and knowledge of corn rootworm improved by 55 percent.

Knowledge about corn rootworm is especially important. Growers with only a partial understanding of this pest often try to manage it with routine, preventive applications of soil insecticides. TAg Team participants learn that such routine treatments are not necessary in first-year corn and can be avoided thereafter with no risk of corn rootworm injury if crop rotation is possible.

Pest data collected by TAg scouts provided additional proof of the wisdom of using IPM instead of blanket treatment programs. Only 33 percent of the alfalfa fields in the TAg project had alfalfa weevil populations over the "action threshold" (the population of a pest that, if left untreated, would cause significant economic damage). These fields were managed by timely cutting of the alfalfa; no use of pesticide sprays for alfalfa weevil was reported.

Scouting for the potato leafhopper, another alfalfa pest, showed that only seven percent of the fields were over the action threshold this year. Several growers were able to avoid treating for potato leafhopper by re-checking their fields after a heavy rainstorm. Rain can cause high mortality rates for this and other small insects.

Evaluations of the educational program by this year's participants reflected both gains in knowledge and favorable impressions of TAg:

- **100 percent stated** that TAg helped them better understand their IPM role
- **100 percent** plan to continue scouting their fields
- **86 percent** said that TAg increased their awareness of pest and crop events
- **75 percent** would recommend TAg to others "very strongly"

**"I have seen a real savings on fertilizer cost and a yield increase by using the pre-sidedress nitrogen test.... I got so much out of TAg that I would like to do it again."**

—Gary Davis, Schoharie County

**"I taught soil science for years at SUNY-Morrisville, so I was used to working with the principles we dealt with in TAg, but now I have a real appreciation of what it's like to actually apply these principles."**

—Edward Lynch, Madison County

**"What I learned from TAg has helped to prove what I thought was true, that you can grow corn without commercial fertilizer.... I also appreciated the opportunity to talk with other farmers, to solve problems together. Sometimes you think you're the only one with a problem. It's a relief to learn that you're not."**

—Harold Vroman, Schoharie County

## New field-corn hybrids aid in pest management

"Killing two birds with one stone" has long been a metaphor for efficiency. A 1996 IPM demonstration project on field-corn production has shown that a biopesticide known as Bt *(Bacillus thuringiensis)* can vastly improve the management of two pests: the insect European corn borer (ECB) and anthracnose, a fungal disease that is commonly associated with ECB presence.

Field corn is the most valuable crop in New York, with more than one million acres in production annually. It is grown as feed for livestock, both as grain and silage. Field corn is threatened each year by ECB, which weakens plants by chewing holes in their leaves and stalks. Once ECB larvae tunnel into corn plants, they are protected from insecticide treatments, making control a challenge. Management of ECB is further complicated by the presence of ECB strains that produce two generations per season. The more generations there are, the longer the potential period of injury to the corn. Not only can ECB feeding weaken plants and decrease yield and standability, but the wounds it causes provide openings for invasion by the stalk rot phase of the disease organism anthracnose. When both of these pests are present, the losses are much greater than those from either pest alone. Grain yield reductions of 12 to 46 percent have been associated with this pest duo in New York.

The good news is, first, that ECB is not a significant problem for every corn field. Second, Bt corn hybrids are now available as a new management tool for those fields that do incur serious yield losses due to ECB. These hybrids have a gene from the bacterium Bt built into their own genetic material. They produce a protein that is toxic to ECB larvae. The obvious result is less foliar feeding on Bt corn than on non-Bt plants and therefore less opportunity for invasion by anthracnose stalk rot. The toxic effect of Bt corn is very pest specific. It is toxic neither to mammals nor to the environment as a whole.

Data from the IPM-funded project show that ECB feeding injury was near zero for all of the Bt hybrids, and that symptoms of anthracnose stalk rot occurred much less frequently in the Bt hybrids than in the non-Bt's - almost a five-fold difference. The link between these two pests was verified once more by the fact that 82 percent of the plants with stalk rot symptoms also had stems wounded by ECB. Finally, silage yields were higher for three of the four Bt hybrids than for their non-Bt counterparts. Highest overall yields were obtained from a standard non-Bt hybrid, illustrating the fact that hybrids need to be selected based on factors such as production potential and standability, not just resistance to ECB.

Researchers do have a concern about Bt as well as enthusiasm for its possibilities. Given sufficient exposure to Bt, corn borers are likely to adapt to it and become immune, as a number of other insects have done. Keith Waldron, livestock and field crops IPM coordinator, points out that "The development of Bt-resistant ECB populations would be significant not only for field corn but for wheat, soybeans, snap beans, potatoes, onions, apples, and nearly 200 other plant species that are also attacked by ECB."

Cornell entomologist Elson Shields believes that the best way for growers to use Bt corn is to plant it on 70 to 75 percent of their acres. "The remaining percentage should be planted to corn that is susceptible to ECB," says Shields. "This creates a 'refuge' in which some borers are not exposed to Bt and do not develop resistance. Their populations mix with those who have survived feeding on Bt corn, and the resistance gene is diluted." Current recommendations for those using Bt hybrids are to plant non-Bt hybrids either in 20 to 30 percent of all corn fields or in the border rows of all Bt-hybrid fields.

Of the four Bt hybrids used in this study, two were commercially available as of 1996, and a third will be available sometime this year.

## A sampling of outreach activities

Extension IPM outreach activities in addition to TAg Teams included participation by IPM staff in the development of agricultural practice/water quality risk assessment tools that incorporate management guidelines for pests, pesticides, and other potential pollutants. These tools are being utilized in the New York City and Skaneateles Lake watershed protection efforts. Seventy-six farms in these watersheds have voluntarily participated in whole-farm water quality risk assessments for pesticides and other potential pollutants.

IPM extension educators participated in a series of Department of Environmental Conservation and Cornell Cooperative Extension-sponsored meetings in support of the New York State Herbicide Management Plan. One hundred twenty agricultural professionals received weed IPM, herbicide management, and water quality protection training.

IPM extension educators also provided training for 90 certified crop advisors (CCAs) in 1996 and 66 more in January 1997. The New York Certified Crop Advisor Program has been adopted as the model for CCA programs for the entire New England region.

Four hundred fifty agricultural professionals have received IPM training through the New York CCA Program since 1994. The IPM knowledge imparted during these meetings is being multiplied many times as these CCAs consult with growers across the state.

## Nursery IPM: It isn't just on Long Island anymore

In previous years efforts devoted to nursery IPM in New York were for the most part confined to Long Island. But now the opposite end of the state, Erie County, has joined the picture. Six hundred acres of field and container stock were scouted weekly in Erie County during the 1996 growing season. Appropriate IPM recommendations and training were provided to seven participating growers, with an eye toward making the program self-sustaining in future years. Growers were helped with scouting, pest thresholds, pest biology, use of traps to monitor and identify pests and beneficial insects, pest biology, consideration of weather conditions, and record keeping. They also had access to a new nursery IPM resource manual for help in diagnosing and managing pest problems.

Impacts of the Erie County nursery IPM program include these comparisons of the 1995 and 1996 growing seasons:

- Changing from cover sprays to spot applications meant decreases in pesticide use from 9,100 gallons to 3,100 gallons at one nursery and from 17.5 acres sprayed to 11.5 acres sprayed at another.
- Improved application techniques and better equipment resulted in a 37 percent drop in average plant injury at one nursery and a 30 percent drop at the other.
- Increased understanding of pest biology enabled one grower to decrease the number of treatments for bacterial blight by 60 percent.

**"Participating in nursery IPM programs broadens my circle of contacts. Karen Dean [Cooperative Extension educator] acts as a bridge to helpful resources such as other growers with the same pest problems.... It has also meant decreases in the amount of pesticide I use and in the time I spend on the telephone searching for answers to pest problems."**

—Ken Lawton, General Manager, Congdon and Weller, North Collins

In addition, 1996 saw one grower use biological control for the first time at his 20-acre Erie County nursery. Several releases of lady bird beetles helped to manage green peach aphid on flowering shrubs sufficiently to reduce that grower's pesticide use.

In an effort to reach a wider audience, IPM area extension educators offered two evening programs for wholesalers, retailers, garden center employees, and landscape professionals. Many of the attendees found the hands-on pest identification sessions helpful and expressed their hope that similar sessions will be offered in the future.

## Testing biological controls for a turfgrass disease

Turfgrass is a commodity found on sod farms and in golf courses, parks, and athletic fields. IPM for turfgrass has been a part of the New York IPM Program effort since 1986. Several strains of beneficial bacteria and fungi were tested in 1996 for their ability to manage Pythium root rot, a turfgrass disease, and for their compatibility with fungicides that are currently used to treat this disease.

While several of the biological control agents were found to have great potential for managing Pythium root rot, they were also found to be, in large part, negatively affected by the fungicides. The opposite effect was also seen: populations of some of the biological controls were stimulated by some of the fungicides rather than reduced by them.

Whether the fungicides that reduce populations of the biological control agents will cause reductions in their effectiveness against diseases and whether the opposite is true for those fungicides that stimulate the biologicals are questions to be determined by further testing this year.

Such data are of great interest to New York's turfgrass managers. Cornell plant pathologist Eric B. Nelson says that "Because of the negative side effects accompanying increased fungicide use, turfgrass managers are realizing that biological and combined biological/chemical methods of disease control are becoming essential to turfgrass management."

## New angles covered in greenhouse IPM program

Management of two insect pests and of three aspects of diseases were tackled in the comprehensive greenhouse IPM effort that took place in 1996.

**Insect Management.** One of the major components of the 1996 greenhouse IPM effort was a study of three IPM methods for control of western flower thrips, an insect that was the primary concern mentioned by New York greenhouse owners in a 1995 survey.

Thrips is difficult to manage because it has developed resistance to insecticides, has a short life cycle (which leads to rapid population growth), and has mysterious feeding habits. Furthermore, thrips can carry a viral disease complex (impatiens necrotic spot virus/tomato spotted wilt virus) that has caused crop losses in New York greenhouses as high as $20,000 in one year.

The first of the three methods studied in 1996 involved new packaging - a slow-release sachet - of a predatory mite *(Amblyseius cucumeris).* These mites succeeded in suppressing the thrips population for three weeks at a retail store participating in the IPM demonstration. After three weeks, thrips-infested plants were brought into the store from the owner's growing area, and the mites were no longer able to keep up. The grower was nevertheless satisfied with the level of control achieved by the mites and plans to expand the area of mite releases to include her growing area.

Sticky traps were a not-so-new method that was examined from a new angle. Blue sticky traps have been used for some time to catch thrips because blue has been considered the best color for attracting them. But a 1992 study (reported in an Illinois publication) has indicated that hot pink sticky traps will catch twice as many thrips as blue ones. This finding was tested in the fall and winter of 1996 in four New York greenhouses. Preliminary results confirm that hot pink is more attractive to thrips than blue. The traps will be compared again this spring, when greenhouse light levels will differ from those of the fall and early winter.

The third method of thrips management tried in 1996 was the biological control *Beauveria bassiana*. This fungus, along with a neem-based biopesticide, was applied twice to impatiens in a commercial greenhouse. (Neem is a natural substance originating from trees in India. It has many medicinal and pest management uses.) Thrips levels dropped by approximately 63 percent and stayed at or near that lowered level for at least a month following the applications.

Fungus gnats are another persistent insect pest of greenhouses. Various life stages cause significant root system injury, carry plant diseases, or are a nuisance to greenhouse workers and customers. Three biological control agents, a predatory mite, a biopesticide, and nematodes (microscopic roundworms) are commercially available and have been shown to be effective for fungus gnat management. Various combinations of these methods were tested on a greenhouse poinsettia crop in 1996. Better season-long control was achieved with the biological methods than with the standard chemical sprays. The mites reduced the fungus gnat population from a high level to a moderate one in two weeks, while the population rose sharply two weeks after a chemical application and stayed high for three weeks.

An early-season release of the mites *(Hypoaspis miles)* coupled with a late-season application of the biopesticide (a Bt-based material called Gnatrol) seemed to be the most effective combination for season-long control of fungus gnats. A fact sheet on fungus gnat biological control was written to accompany this project and should prove useful to all New York greenhouse growers.

**"I've been practicing IPM for four years now. One difference it makes is that I use fewer chemicals. I probably use 50 percent less than I used before. I wait for the weekly monitoring reports, and I don't treat for insects if the pest count is too low to warrant it. This year we've been extremely clean. There were only two thrips on all of our sticky cards yesterday."**

—John Russell, Owner, Brookside Florist and Greenhouse, Newburgh

**Disease Management.** Techniques for early detection of diseases in greenhouses are badly needed. Detection of root system problems is a top priority. Stopping problems before they affect the visible portions of plants is obviously preferable to stopping them after that. Root system health is a complex aspect of successful greenhouse production. Not only are workable techniques needed for disease detection, but the interrelationships of several factors that contribute to root diseases need to be better understood. These factors include soil pH, soluble salts, nitrogen, and the link between Pythium root rot and fungus gnat larval feeding. Which factors contribute the most? Are some of them innocuous? For example, is Pythium root rot anything to worry about when there is no accompanying damage from fungus gnats or soluble salts?

Work done in the 1996 season did not answer all the questions, but much was learned:

- monitoring of soil pH and salt levels will enable growers to correct cultural practices before disease problems develop, with the side benefit of reducing fungicide use
- excessive nitrogen in fertilizers is a key factor in the development of Pythium root rot
- "rapid detection kits," donated to the project by Agdia, Inc., of Elkhart, Indiana, confirm the presence of plants infected with the impatiens necrotic spot virus (INSV) much faster than outside laboratory tests, enabling growers to remove the plants immediately and stop the spread of the virus
- fava beans are effective indicator plants, warning growers of the presence of INSV-infected thrips before the thrips reach the crops to be sold

## A sampling of outreach activities

An IPM-sponsored Greenhouse Diagnostic Skills Short Course has enrolled more than 200 greenhouse growers in two full-day sessions, one in 1996 and one in 1997. Pest biology and management were covered in the first year and diagnosis of crop management problems in the second.

The 75 greenhouse growers and 8 agricultural inspectors who enrolled in the second course had hands-on workshops about pest, nutrient, cultural, environmental, and water-related problems. Participants came away from the experience with information on the latest technology and tools for spotting potential problems in their greenhouses. Course evaluations indicated that this year's session met or exceeded all participants' expectations. Evaluations pointed to increases in grower understanding of pest and cultural management practices. Participants ranked cultural and greenhouse environmental problems as more important than pest problems, reversing the order from last year.

Ornamental IPM efforts in 1996 emphasized total crop management, with results not necessarily attuned to pesticide reduction but rather to a healthier crop. "It is difficult to measure change with this emphasis," comments IPM Program Director Jim Tette, "but we are finding ways to quantify our impacts."

## Tiny wasps take on the European Corn Borer

European corn borer (ECB), the most significant insect pest of sweet corn in upstate New York, is managed in a typical year with statewide applications of some 82,000 pounds of synthetic insecticides, at an economic cost of $1,600,000. What if this persistent pest could be managed instead by a natural enemy, a tiny wasp called *Trichogramma ostriniae*, for approximately the same price tag?

In 1996 an IPM demonstration project brought together an IPM area extension educator, a Cornell entomologist, and two insectaries for the first commercial-scale releases in New York sweet corn of these beneficial wasps. *Trichogramma ostriniae* (abbreviated T. ostriniae), with a track record of successful control of the Asian corn borer in China, was the species chosen for the project.

*T. ostriniae*, which attacks ECB eggs, consistently parasitized more than 80 percent of the naturally occurring ECB egg masses in the fields in which the wasps had been released. Because of the excellent dispersal ability of the wasps, there were also high levels of parasitism in the plots in which no releases had been made. While the levels of control of ECB are higher with conventional insecticide sprays (usually 95-100 percent), it is entirely possible that the level of protection provided by *T. ostriniae*will prove to be sufficient to produce equivalent yields of marketable corn.

**"If we find that one or two releases are sufficient, it means that the wasps will be a cost-effective method for growers."**

—Abby Seaman, Area IPM Extension Educator

A side benefit of substituting wasps for conventional insecticides is that other beneficial insects that cannot survive conventional insecticide treatments do survive in the release fields. Lady bird beetles, lacewings, and other predators that feed on aphids (another insect pest of sweet corn) were so numerous in the release fields that they provided aphid control comparable to that achieved with insecticides.

Successful mating of the wasps in the field - indicated by the high number of female wasps emerging from the parasitized ECB egg masses - was another positive finding. "This means," explained Area IPM Extension Educator Abby Seaman, principal investigator on this project, "that it may be possible to make one or two releases early in the season and have the *Trichogramma ostriniae* population sustain itself through the rest of the season. If we find that one or two releases are sufficient, it means that the wasps will be a cost-effective method for growers." The dollar outlay for the wasps is comparable to that required for an insecticide on a per-acre, per-application basis. Environmental costs of the two methods are, of course, worlds apart. There are no known ill effects associated with use of the beneficial wasps.

Not all test sites had equal success with the biological control releases in 1996. Extremely high infestation levels of the ECB at some of the sites meant that the amount of damage to the corn was unacceptably high despite successful establishment of the wasps. One explanation for this is that the wasps may have been released later than the optimal time; high densities of ECB eggs were seen in one field prior to the first release. When populations of ECB are lower than these extreme levels, however, *T. ostriniae*should keep the amount of ECB damage within the range of acceptability.

Until further research is conducted, a reasonable approach to using this biological control agent may be to combine it with scouting and - when needed - applications of Bt, a naturally occurring insecticide that is not harmful to beneficial organisms.

## Onion growers see beneficial effects of sudangrass

Sudangrass is a warm-season cover crop with extremely useful qualities: it builds and repairs soil damaged by compaction and depleted by overcropping, and it apparently suppresses harmful nematodes and root rot fungi. But New York's vegetable growers have until now lacked adequate information about how to get the most out of a rotation with sudangrass. For instance, when should it be planted? When and how often should it be mowed?

Three years of demonstrations by Cornell Cooperative Extension educators were concluded in 1996, with sudangrass used as a season-long rotational crop for onions in muck soil. When yield and weight of the onions in the year prior to sudangrass rotation were compared to yield and weight in the year after it, growers saw increases of 29 percent and 15 percent, respectively. Results are likely to be even more positive in years with better weather conditions than those of 1996.

Previous studies have shown that sudangrass reduces pest pressure by breaking pest cycles and reducing populations of soil-dwelling pests. No significant reductions in pest populations were seen in 1996.

While it is unclear at this point whether the improvements in onion yield and quality that follow a rotation to sudangrass are attributable to improved physical characteristics of the soil, suppression of pests, or both, growers appreciate the improvements. They also appreciate the potential for reduced chemical pesticide use represented by such rotation. An average season-long pesticide load on an acre of onions in Orange County is 25 pounds. An acre of sudangrass, on the other hand, requires no pesticides. By planting 280 acres in sudangrass in 1996, Orange County onion growers reduced the countywide pesticide usage by 7,000 pounds (280 x 25).

One of the largest onion farms in Orange County has begun planting sudangrass on 25 percent of its acreage each year. The grower will see to it that each field has been rotated to sudangrass within four years. Eight other growers have also incorporated sudangrass into their production practices during the course of this sudangrass project.

Vegetable growers and agribusinesses have received a fact sheet summarizing cultural practices for sudangrass and data on yield and quality improvements attributable to it. The fact sheet includes the recommendations shown in abbreviated form in figure 1. These tips will become a part of the official Cornell recommendations for onions this year.

## Breeding vegetables for pest resistance

Cornell plant breeders are hard at work developing vegetables with natural resistance to common diseases and other pests. This year broccoli plants that have been bred selectively for five generations were inoculated four times with the fungus that causes blackrot, but they showed virtually no symptoms of the disease. Most of them developed into excellent plants. A new molecular marker associated with resistance to blackrot disease was discovered this year. This discovery may make selection of resistant plants more convenient in the future. Plans are under way to apply what has been learned from broccoli to cauliflower and cabbage.

New York potato growers have been plagued by new forms of the disease late blight. Only costly chemical management options are available to prevent crop loss. When the Cornell Plant Breeding Program potato clone "Q237-25" was evaluated for resistance to late blight in 1996, it ranked sixth among 26 potato clones. Its creators are confident that this clone will develop into seed with a reduced dependency on fungicides.

Not only is Q237-25 resistant to late blight, but it has good tuber shape and color and is resistant to a viral disease and to three races of microscopic roundworms called nematodes. (Some nematodes are biological control agents that feed on crop pests; others are pests that feed on crops.)

The 3,000 clones produced from Q237-25 in 1996 will be planted this summer in an effort to find a clone equal to or better than its parent.

## Managing cabbage pests and protecting the "good guys"

Two years of effort funded by IPM grants have added greatly to our knowledge of beneficial insects and spiders in cabbage fields. Spiders, hover flies, and lady bird beetles have been found to be the most numerous, but the question "Which is the most efficient predator of the imported cabbageworm?" is still to be answered.

Once we know which beneficials are present and which best manage this major cabbage pest, it makes sense to look at how standard chemicals affect these beneficials. Selection of pesticides that are effective against the pests without harming natural enemies is one way growers can enhance naturally occurring biological control.

Three pesticides were tested in 1996. All three were effective against the imported cabbageworm, but two were also highly toxic to natural enemies. The third left lady bird beetles and "harvestmen," another beneficial species, unharmed.

Results of this project were summarized in a "selectivity index" calculated for each pesticide. This index will be incorporated into future IPM recommendations for cabbage, enabling growers to choose pesticides with foreknowledge of their effects on natural enemies.

## A sampling of outreach activities

Small-scale, direct marketers in Franklin and St. Lawrence Counties learned about IPM techniques in three in-season meetings that reviewed pest biology, pest monitoring methods, and management strategies. Similar meetings were conducted in Clinton and Dutchess Counties.

In the Capital District, a scout working with federal reimbursement from the Integrated Crop Management Program was trained in IPM.

In Orange County, weekly scout meetings were held in the field to increase awareness of which pest problems to anticipate. Methods to forecast late blight of potatoes and onion blight were demonstrated throughout eastern New York.

# State-Funded Projects

These project reports reside in the NYS IPM Project Reports collection in eCommons. Please go to https://ecommons.cornell.edu/handle/1813/41245 and search by Year 1996.

# Federally Funded Projects

## 1996 Pest Management Alternative Grants Program

Mite Biocontrol in Northeast Apples by Distributing the Predator Typhlodromus pyri
Project Leader: J. Nyrop
Funding: $103,773

Integrated Biointensive Management of Apple Arthropod Pests
Project Leader: A. Agnello
Funding: $60,282

Modifying Cultural Practices for Management of Onion Bulb Mites in New York
Project Leader: C. Eckenrode
Funding: $69,996

Management of Nematodes on Carrots by Using a Sudangrass Cover Crop
Project Leader: G. Abawi
Funding: $111,994

## 1996 Northeast IPM Grants Program

Adapting Cultural Practices for Management of Arthropod and Nematode Onion Pests
Project Leader: C. Eckenrode
Funding: $68,500

Developing Traps and Fruit Volatile Lures for Monitoring the Blueberry Maggot
Cooperator: W. Roelofs
Funding: $33,792

Integrated Management of Immigrant Phytophthora infestans
Project Leader: W. Fry
Funding: $50,430

Integrated Pest Management of Beetle Pests of Cucurbits
Project Leader: M. Hoffmann
Funding: $93,731

Integrated Crop Rotation and Plant Resistance in Onion Pest Management
Project Leader: T. Walters
Funding: $30,000

Integration of Insect Growth Regulators and Biological Control Agents for Control of Whiteflies on Poinsettia
Cooperator: J. Sanderson
Funding: $20,202

# The IPM Grants Program

## The Funding Cycle

Each year the New York State IPM Program provides funds either for projects that will demonstrate IPM concepts to agricultural producers on their farms or for projects that need one or two years of funding to validate new IPM knowledge and technology. In the fall the Program issues a request for proposals (RFP) for applied research projects and on-farm demonstration projects. The RFP contains a list of crop and pest priorities developed by the IPM Commodity Working Groups. Proposals are usually due in late January.

IPM grant proposals are first evaluated by the IPM Commodity Working Groups, who rank them and advise the IPM Executive Committee on funding. The IPM Executive Committee makes final decisions on which proposals to fund based on the priorities outlined in the New York State Integrated Pest Management Program Strategic Long-Range Plan .

Project leaders are notified of funding decisions in April, and projects usually begin activity then. The funding cycle for the grants program is completed when the project leaders file reports on the projects with the IPM Program office in December. Table 2 lists the numbers of funded demonstration and research projects for the years 1990-1996.

## Table 2. Projects Funded through IPM Grants

| Year | Demonstration | Research | Total |
|---|---|---|---|
| 1990 | 31 | 49 | 80 |
| 1991 | 24 | 33 | 57 |
| 1992 | 25 | 28 | 53 |
| 1993 | 17 | 28 | 45 |
| 1994 | 18 | 27 | 45 |
| 1995 | 21 | 25 | 46 |
| 1996 | 21 | 23 | 44 |

## Funds in 1996

The New York State legislature appropriated $837,000 again for the IPM Program in 1996. State funding has remained at this level since 1994. Table 3 shows the allocation of these funds in 1996.

In addition, because state IPM funds have been used to initiate practical approaches to IPM, the Cornell research and extension community was able to successfully compete for funds in the amount of $642,700 from federal IPM programs in 1996.

## Table 3. 1996 Allocation of State Funds for IPM

| | |
|---|---|
| **On-farm Demonstrations** | $433,354 |
| **Research and Development** | $250,769 |
| **Grape Entomologist** | $50,000 |
| **Public Awareness** | $42,957 |
| **Computers** | $35,125 |
| **Weather-related Programs** | $24,975 |
| **Total:** | $837,000 |

# NYS IPM Committee Lists

## OPERATING COMMITTEE

The IPM Operating Committee provides the primary policies and directives that guide the New York State IPM Program. Members are 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, Director, New York State IPM Program, Cornell University Chairperson

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, Cornell University

Michael Hoffmann, Assistant Professor, Department of Entomology, Cornell University

James Hunter, Director, New York State Agricultural Experiment Station, Cornell University

Robert Mungari, Director, Division of Plant Industry, New York State Department of Agriculture and Markets

Eric B. Nelson, Assistant Professor, Department of Plant Pathology, Cornell University

W. Harvey Reissig, Professor, Department of Entomology, New York State Agricultural Experiment Station, Cornell University

Donald Rutz, Director, Pesticide Management Education Program, Cornell University

R. David Smith, Associate Director, Cornell Cooperative Extension, College of Agriculture and Life Sciences, Cornell University

## COMMODITY WORKING GROUPS

IPM Commodity Working Groups are composed of research and extension faculty and staff, off-campus extension educators, growers, and private crop consultants. They help to organize long-range plans for IPM research and extension efforts in specific commodities, identify priorities for IPM Program-funded projects, encourage teamwork among the disciplines, and evaluate grant proposals.

### Fruit

W. Harvey Reissig, Entomology, Geneva Chairperson

Art Agnello, Entomology, Geneva

Deborah Breth, Cornell Cooperative Extension, Area IPM Extension Educator

Thomas Burr, Plant Pathology, Geneva

Greg Loeb, Entomology, Geneva

Joseph Kovach, IPM Program Unit

George Lamont, Fruit Grower, Orleans County

Clancy Maynard, Pest Management Consultant to Crist Bros. Orchards, Orange County

Marvin Pritts, Fruit and Vegetable Science

Terence Robinson, Horticultural Sciences

David Rosenberger, Plant Pathology, Geneva

Timothy Weigle, Cornell Cooperative Extension, IPM Area Extension Educator

Wayne Wilcox, Plant Pathology, Geneva

## Livestock and Field Crops

Russell Hahn, Soil, Crop and Atmospheric Sciences Chairperson

Gary Bergstrom, Plant Pathology, Ithaca Vice-chairperson

William Cox, Soil, Crop and Atmospheric Sciences

Paula Davis, Entomology

Janice Degni, Cornell Cooperative Extension, Lewis County

Lawrence Eckhardt, Capital Area Agriculture Consulting, Rensselaer County

Kevin Ganoe, Cornell Cooperative Extension, Herkimer County

Mark Green, Cash Crop Farmer, Monroe County

Donald Rutz, Entomology, Ithaca

Margaret Smith, Plant Breeding and Biometry

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J. Keith Waldron, IPM Program Unit

## Ornamentals

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Andrew Corbin, Cornell Cooperative Extension, Area IPM Extension Educator

Gerard Ferrentino, IPM Program Unit

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Frank Rossie, Floriculture and Ornamental Horticulture

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Mike Villani, Entomology, Geneva

George Zerrillo, Greenhouse Grower, Onondaga County

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Laura Pedersen, Cornell Cooperative Extension, Ontario County

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Anthony Shelton, Entomology, Geneva

Ward Tingey, Entomology, Ithaca

David Votypka, Potato Grower, Steuben County

Russell Wallace, Fruit and Vegetable Science

Richard Wildman, Ag. Consulting Services, Inc., Monroe County

## STATEWIDE IPM GROWER ADVISORY COMMITTEE

Warren Abbott, field crops, fruit, and vegetable grower

Dawn Betts, grape grower

Walter Blackler, apple grower

Joseph Broyles, turf consultant

John Cecchini, dairy farmer

Maria Cinque, CCE Nassau County

Scott Collins, dairy farmer

Randy DeBacco, golf course superintendent

Richard DeGraff, vegetable grower

David Deuel, dairy farmer

Rod Dressel, apple grower

Bill Erickson, grape grower

Robert Feindt, golf course superintendent

Tom Giles, vegetable grower

Amy Hepworth, apple grower

Carol MacNeil, CCEOntario County

Gerry Miller, greenhouse grower

Richard Moses, vegetable grower

Robert Noble, dairy farmer

Darrel Oakes, apple grower

Randall Paddock, apple consultant

Rick Pedersen, vegetable grower

Brian Reeves, fruit and vegetable grower

Charles Scheer, nursery grower

Marion ("Mickey") Shuback, onion and turf grower

Cal Snow, dairy famer

# NYS IPM Staff List

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