



New York State Integrated Pest Management Program

*20 years of solid science and sound solutions
for farm and community*

1985–2005



Cornell University
Cooperative Extension



Director's Message

Twenty years ago, when the New York State Integrated Pest Management (IPM) Program was established, the emphasis was on finding ways to help New York farmers reduce pesticide use. In those early years, IPM was practiced by some, but not all farmers.

Today—and thanks to our partnerships with growers, Cornell faculty, Cooperative Extension educators, New York State Department of Agriculture and Markets and Department of Environmental Conservation personnel, private consultants, the United States Department of Agriculture's Cooperative State Research, Education, and Extension Service, and many others—IPM is the widely recognized and accepted standard. Although much of our energy is still focused on agriculture, the Community IPM effort in nonagricultural settings holds enormous potential, and includes IPM for schools, turfgrass, buildings, nursing homes and more.

Working with many others, IPM's mission-driven staff seeks and delivers new solutions to an ever-expanding list of pest problems. Strong and trusting partnerships, innovation, responsiveness to the needs of all of the states' citizens, and an ability to build bridges across philosophical divides are some of the essential attributes of the program. Thanks to the support of our many stakeholders and state and federal partners, the NYS IPM Program is widely recognized as a leader in New York State and beyond.

The challenges that lie ahead are many and ever changing. New, invasive pests, pesticide-resistant pests, and up-and-coming IPM tools and methods that need to be tested, then applied: these are just a few. Meeting these challenges will require basic and applied research, an excellent delivery system, a relentless pursuit of resources, the adoption of more efficient delivery tools (the internet, for instance), and new partnerships.

I have been director of NYS IPM for six years—six rewarding, enriching years. Now I have accepted the position of Associate Dean for the College of Agriculture and Life Sciences and Director of the Cornell University Agricultural Experiment Station. But I am pleased to let you know that Don Rutz—former chair of Cornell University's Department of Entomology, with long experience in IPM and solving problems at the ag-urban interface—is the Program's new director.

With Don Rutz at the helm, I see an incredible range of opportunities for the NYS IPM Program, working with hundreds of dedicated area and regional partners, to bring the very best pest management solutions to every citizen in New York State—solutions that really do matter for our health, our economy, and our environment.

This 20-year anniversary report takes you both into the future and back to the past to show you what we've done and where we're going. We invite you to help us achieve our vision—to make IPM *the* pest management solution for all New Yorkers.

—Michael Hoffmann, Director (1999–2005)

Why does it matter? New, emerging pests are being reported across the state at an alarming rate. Recently discovered pests such as European crane flies, sirex woodwasp, Asian longhorn beetle, and swede midge threaten New York's economic well-being and its natural resources. And pests new and old may become resistant to pesticides. IPM specialists can help New Yorkers develop and use new pest survey and management strategies.

We keep promises

Twenty years ago, the New York State Integrated Pest Management Program—NYS IPM—made a commitment to all New Yorkers: to protect our health and the environment by developing and delivering cost-effective, least-risk pest management methods. We work with partners all over the state to solve pest problems on farms where our food is grown; in our homes, schools, and offices; and in urban landscapes.

New York is among the top 10 agricultural producers nationwide in dairy, ornamental plants, fruits, vegetables, and more—18 crops in all. It's also one of the nation's most heavily populated states.

This is why we are renewing our commitment to New York's citizens. Our goal for the next 20 years is to keep doing what we do best: improve and promote the IPM paradigm. It's a paradigm based on a common-sense approach, one that incorporates ecological principles, with the assurance that pest management practices are economically and environmentally sound. It's a way of life that meets the widely varying needs of all New Yorkers.

Our 20-year plan

Promote continued research and demonstrations in

- protection from pests on widely varying crops and commodities
- applied ecology on farms and in communities
- biological and cultural control techniques for town and country
- holistic, system-wide approaches to understanding crop and ecosystem health

Promote continued education and outreach that

- teach effective, research-based pest management techniques to dairy, fruit, vegetable, and ornamental producers
- bring an innovative, hands-on IPM curriculum to the 3.2 million children in New York's schoolrooms
- provide statewide monitoring networks that bring real-time pest forecasts to growers' computers
- foster community-wide approaches to sound pest management in schools, at parks and golf courses, and in municipal buildings

Research. Demonstrations. Education. Outreach. All part of a comprehensive, strategic plan to make IPM the safe, effective pest management solution for all New Yorkers.



Why does it matter? Each year nationwide, lawns and gardens receive thousands of tons of “active ingredient” contained in conventional pesticides. Yet the homeowners who apply many of these materials often lack training in the careful use of pesticides. Meanwhile, municipalities, neighborhoods, and schools are facing new regulations about pesticide use. IPM can help all New Yorkers learn safer, sounder ways to manage pests.

NYS IPM carries an important message, but we're a small group. The best way for us to do research and get the word out is through partnerships and collaborations with others: Cornell University faculty and programs; growers; schools; state, local, and tribal governments; businesses; nonprofits; advocates—with people from every walk of life.

Our power comes from our collaborations. We're at the core of a statewide IPM network of researchers, grower-collaborators, and extension educators—plus our own staff—who multiply the value of the work many times over with every workshop given, each grant awarded, every person reached. These people are smart. Creative. Excited about what we've accomplished together and eager to do more.

Twenty years of solid science, sound solutions

When we began the NYS IPM Program 20 years ago, we wanted to promote the best possible solutions to both pest and pesticide problems. These solutions had to protect our environment. They had to protect our economic well-being. They had to protect our health.

These three overarching values guided everything we did. They still do. And they shared a common foundation: our commitment to working with partners and stakeholders wherever they are. They always will.

Many NYS IPM research, development, and implementation projects span years in supporting growers and practitioners. During the past two decades, we've funded 992 projects that range from the micro to the macro—from investigating, say, how molecules secreted from the roots of turfgrass can stop weeds, to setting up “trap networks” that track, then post the movement of insect pests all across New York's farm belt. And we've brought tested IPM methods to over 80,000 people in nearly 2,500 workshops and demonstrations statewide.

Let's look at just a few of our program highlights from the past 20 years.



Jim Tette

The Right Chemistry (I)

Jim Tette, our first director, built Cornell University's first IPM team back in the mid-1970s with funds from a USDA initiative to bring IPM to each state in the U.S. Originally a chemist, Tette was amazed by how insects communicate using chemicals and began seeking ways that growers could use those chemicals to help manage pests. Just as he bridged disciplines—chemistry and biology—Tette had the

knack for bridging the gaps between research and extension. And he had a deep instinct for accountability. When the NYS legislature mandated the NYS IPM Program in 1985, Tette was the logical leader. He built a team-based program that brought science to the farm; a program built on credibility, commitment, and caring—values that remain at the program's core.



Protecting our health

Clean water for New York City

New York City's water supply brings 1.4 billion gallons of fresh water each day from its 1.2-million-acre watershed in eight upstate counties—also home to 400 dairy farms and their 18,000 cows. Pesticides, fertilizers, and manure-borne pathogens are potential water pollutants. In 1989, new federal laws made protecting the City's drinking water a "must-solve" problem—but how to do it without heavy-handed regulations that could undermine these farmers' economy and way of life?

From 1990 through 1995, NYS IPM collaborated with a dozen-plus agencies and organizations to develop and beta-test voluntary "Whole Farm Plans" that kept farm-field runoff out of streams while cutting pesticide use on both crops and cows. The result: better farming practices and better water protection. The model has won national acclaim and provided inspiration to agricultural advocates worldwide.

"Some years we never have to spray for bugs. This year ... our threshold wasn't high enough to spray for red spider mite. I don't know if cutting down on sprays changes or improves the taste, but it's certainly healthier."

—John Kaiser is vineyard manager at 48-acre Fox Run Vineyards, Penn Yan, N.Y.



Our Mission:

We develop sustainable ways to manage pests, helping people use methods that minimize environmental, health, and economic risks.



“My business is across the street from a school, so my neighbors are 300 kids and their parents. If I don’t have to suit up to spray pesticides, then they don’t have to worry.”

—Laurie Smith grows a full range of garden and indoor plants at Swanson Florist in Croton-On-Hudson, N.Y.

Safeguarding our children from pests and pesticides

Children are more vulnerable to pesticides than adults are. Their metabolism is faster, they play close to the ground, and they put things in their mouths. That’s why IPM researchers worked with the New York State Department of Health and the New York State Education Department to survey 703 New York school districts in 2000. The survey told us what pests bug school maintenance staff the most (ants in some schools, wasps in others, curbside weeds in others) and that they spend, collectively, more than \$3 million each year to manage those pests.

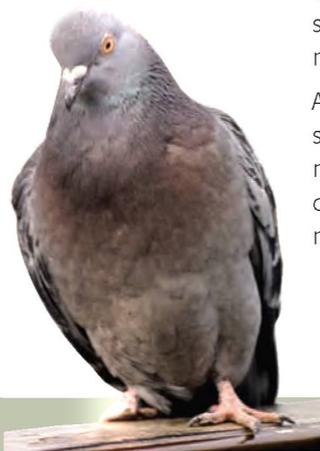
Since then, NYS IPM has used this information to develop programs for school districts around the state. With our collaborators, we’ve tested or demonstrated a range of IPM options—from high-power “HEPA” vacuums and high-pressure water guns that knock back wasps, to hot-water machines that “cook” weeds, to traps, exclusion devices, and baits that control cockroaches and ants. At the foundation of it all, there’s a message in a single word: prevention. School staff can prevent pest problems with a two-pronged approach: denying pests entry and keeping classrooms squeaky-clean.

Preventing damage—to your health, to buildings—from pigeons and other urban pests

Even with conventional methods, managing pests in public places is a formidable task. Field surveys in Albany in 2000 showed that pigeons pose a major problem for buildings and their inhabitants. Pigeon droppings can corrode roofs and window ledges. If droppings build up near air vents, disease-causing spores can waft in to contaminate apartments and workplaces.

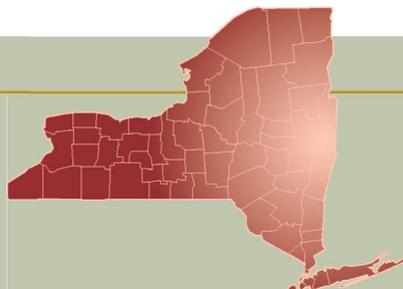
The NYS IPM solution: build them out. Our campus-county teams have provided “pest excluder” displays, scouting expertise, and manuals to help property managers around the state deal with pigeons.

And when ants or flies or mice move in... IPM specialists go to office buildings, fire stations, airports, nursing homes, slaughterhouses, and jails to demonstrate the best and safest combination of monitoring, sanitation, exclusion, traps, and baits.



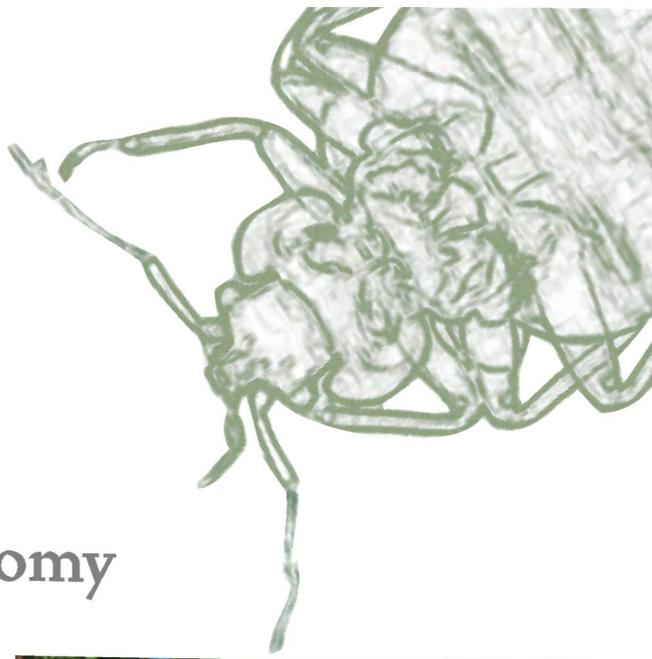
1985

New York State law charges Cornell University and New York State Department of Agriculture and Markets to promote IPM statewide. **Today:** IPM finds widespread acceptance among New York’s 37,000 farms, and growing acceptance in schools, workplaces, parks, and golf courses in communities across the state.



Bedbugs—they're back

Bedbugs are an ancient pest, but they're new to most of us. After almost vanishing from most of North America by the 1950s, bedbugs are on the rebound. Many people are allergic to their bites. Hotels could be the hardest-hit by the outbreak, which is aggravated by the enormous increase in global travel. Since 2002, NYS IPM surveys and workshops have helped pest managers find new and safer ways to deal with bedbugs.



Protecting our economy

Maintaining global markets for apple growers

Pest management issues have gone global. Retail grocers feel they need to reassure their customers that the food they buy is of highest quality—which is why, in 2003, a consortium of European supermarkets adopted the "EUREPGAP" standards. Suppliers must comply with a detailed list of 210 agricultural "best management practices," most of them mandatory. Yearly audits enforce these demanding standards.

New York's apple growers are the most heavily affected. They export more apples—worth \$12 million annually—to Europe than any other state. And they've had to get in compliance quickly. That's why the IPM fruit team worked with growers, specialists, New York State Department of Agriculture and Markets staff, and Cornell University faculty from around the state to prepare an audit workbook for growers, then helped lead training sessions for growers in 2004 and 2005. "Without the workbook, I'd have spent five times as long preparing for the audit," says grower Pete Russell of Russell Farms in Appelton, New York. More than 110 growers and several packinghouse fieldmen have completed the day-long training programs.



New York is the nation's second leading state in apples, a \$103 million crop.

1986

We test and tweak new, computer-based disease-forecasting systems for grapes and several other crops. **Today:** Sophisticated yet easy to use, real-time IPM forecasts, diagnostics, and advice on many of New York's major crops come to growers via the Network for Environment and Weather Awareness (NEWA), our internet forecasting service.



1987

We train 438 producers, 11 consultants, and 52 scouts across all our commodities. **Today:** We've provided more than 2,400 workshops and presentations that have provided IPM training for more than 80,000 people all across New York.

Aiding organic growers and landscapers

Organic growers often rely on IPM research to decide, for example, which combination of tools and techniques will suppress weeds, maximize yields, and improve soil health. Yet organic growers—whose industry is growing about 20 percent per year—are disadvantaged by the comparative lack of plant protection products that perform well and meet exacting organic standards.

Organically grown crops are worth \$12.9 million in New York—and growing.

NYS IPM has been working with growers and practitioners in this growing market since 1989. Since 2000, we've helped teach over 150 organic vegetable growers organic-friendly techniques in winter production schools and have worked with farmer-collaborators, studying their production systems and seeing how crop rotations, cover cropping, and cultivation methods correlate to levels of pest and beneficial organisms. Meanwhile, IPM research on pest-resistant crops help bring scores of organic vegetable growers to twilight meetings, hosted on grower-cooperators' farms.

For apple growers, IPM helped fund Cornell University researchers who tested and improved organic methods for apple maggots, fruit thinning, and weed suppression. For organic dairy and beef farmers, who place greater emphasis on pasturing their livestock, researchers are studying beetles that thwart those pesky biting pasture flies that can reduce milk yields.

We've carried the IPM message far beyond the farm and into communities, contributing to organic certification programs that have already trained 600 lawn and garden care professionals on Long Island.

Fewer flies, more profits

By now, most flies are resistant to nearly every insecticide. How to prevent them from pestering cows—and reducing milk yields by as much as 15 percent, a potential \$270 million loss? Since 1985, IPM researchers have worked with farmer-cooperators to develop and demonstrate the best combination of sanitation, traps, parasites, and predators, bringing this knowledge to farmers through workshops, videos, and farm demonstrations.

New York's dairy products contribute \$1.8 billion to the economy per year—third in the nation.



1988



First IPM educators join program coordinators to bring Cornell University research to growers across New York. **Today:** Twelve IPM educators bring agriculture and community IPM programs to thousands of audiences statewide.



1989

We beta-test "Elements of IPM" so growers can rate their pest management goals. **Today:** Elements are available for 25 fruit, vegetable, ornamental, and field crops.

Taking the byte out of paperwork

Both growers and food processors want to be able to trace what crop protection products were used on which crop, and when. But maintaining easy access to these records can be labor-intensive.

Now apple and grape growers who once reentered the same information over and again on forms for different processors can do the job in a fraction of the time, thanks to IPM's TracApple® and TracGrape® computer programs, released in 2004 to over 400 growers. These easy-to-use software programs automatically create the forms growers need. They also help growers record their yearly spray history, keep EPA worker protection records up to date, and analyze their pest management strategies—all vital to good IPM. TracBerry® and TracStoneFruit® are available now. TracVegetable® is next in line.



Scouting saves time, money—and sprays, year in and out

Finding out what pests are present and whether they even pose a problem, instead of simply applying “calendar sprays,” is called scouting. This core practice of IPM can cut down on pesticides and save money.

Back when we began, most growers didn't have good scouting information. For instance, our surveys in 1987 showed that only one percent of greenhouse growers scouted for pests; in 1989, only 25 percent of poinsettias were whitefly-free. Yet by 1992, already 50 percent of poinsettia growers were scouting and the crop was 75 percent whitefly-free.

Floriculture is a \$196 million commodity in New York, fifth in the nation.

We funded and promoted similar methods for many commodities. In 1988, Cornell University scientists developed simple thresholds for grape berry moth, and grape growers who scouted reduced sprays by 60 to 100 percent. By 1995, they had tested the protocol long enough to see that growers could save, in equivalent spray costs, up to \$90 for every hour spent scouting their vineyards. They tweaked 1985 apple mite scouting



1990



First Tactical Agriculture—TAg—teams provide hands-on training in field crops. **Today:** Nearly 900 TAg alumni collectively farm 178,850 acres of field crops.



protocols so that scouting took only half as long. They reworked greenhouse whitefly scouting protocols to reduce sampling costs by 40 percent. And they developed scouting protocols for grubs in turf that cut insecticide use by up to 80 percent.

We strive always to make our best better. Until 1991, scouting protocols for corn rootworm, a serious new pest of grain and silage corn, took upward of 90 minutes per field. We funded new “sequential sampling” methods that year that shaved the time by 78 percent. Still, our 1998 survey showed that while 77 percent of growers scout for rootworm at least a couple of times per season, 60 percent were concerned about how long it took—and to be most effective, scouting usually needs to be done every week or so during a pest’s season.

So in 2003 we helped fund the development of a method that further reduced scouting time by 46 percent, and computer simulations suggest that this new technique performs well even under extreme pest pressure.

Field corn earns \$392 million in New York—silage production is second in the nation.

Insect dating disaster means profits for growers

Female grape berry moths emit streams of scent—pheromones—to attract potential mates. Pheromones are so rarified that we can barely detect them, but male moths have no problem. If you flood a vineyard with enough pheromone to disorient the males, they often can’t find the females, or mate with them. This is called “mating disruption.”

From 1990 through 1992, we helped fund studies on mating disruption of grape berry moths. The very first year, grower-cooperators cut losses by 100 percent in four out of five vineyard blocks. Averaged over three years, mating disruption reduced pesticide use by 85 percent and control costs by 12 percent.

New York’s vineyards produce 142,000 tons of grapes, third in the nation.

The same concept works for different crops. Peach tree borers and oriental fruit moths are a growing problem in peaches, a \$5.4 million a year crop. In 2000 and 2001, researchers found that for borers, pheromones alone work as well as—or better than—sprays. It took longer to refine recommendations for

1991



Scouting practices for grubs, dollar spot, and other turf pests are fine-tuned on 11 Monroe County golf courses. **Today:** These techniques form the basis of monitoring protocols across the state and around the nation.



oriental fruit moths, on the upswing not only in peaches but apples, cherries, and pears. If processors find just one worm in a load of apples, they'll reject the whole load. This pest took a big bite out of the apple in 2002, with a four-fold loss over 2001. But in 2003, with mating disruption as part of the management plan, losses plummeted. Indeed, of the 30 growers who attended IPM workshops, only one had apples rejected—and then only a single load.

State's longest "trap line" helps keep growers in greenbacks

Pheromones have other uses, too. Since 1994, they've been the mainstay of our sweet corn trap network, with stations in 13 counties. Pheromone-scented traps that attract males provide growers with a heads-up on how many pests are in the neighborhood, and let them know when to start scouting for European corn borer, corn earworm, or fall armyworm, which can cost growers over \$1.6 million per year to manage.

Sweet corn is a \$68 million crop in New York, third in the nation.



Protecting our environment

Battling invasive insects and diseases

Asian longhorn beetle is one. West Nile virus, another. Wheat soilborne mosaic virus, yet another. Nearly every year, a couple more new pests show up in New York State. Soybean aphid is New York's first serious pest of soybeans, a \$34.5 million crop. Viburnum leaf beetle has already decimated thousands of ornamental viburnums in parks, backyards, natural areas, and tree nurseries. Swede midge could severely damage New York's valuable cabbage, broccoli, and cauliflower harvest. And European crane flies are poised to deal New York's turfgrass industry—contributing more than \$5 billion to the state's economy—a serious blow.

New York's cabbage is worth \$94 million, second in the nation.

When new pests show up, NYS IPM is there to help. We funded research in 2000 to help find out which



viburnum leaf beetle

1992

"Environmental Impact Quotient"—EIQ—is the first system designed to help researchers and crop managers calculate environmental costs of pesticides. **Today:** The EIQ database has been expanded to cover more than 200 pesticides.



1993

Our statewide grower advisory committee forms, helps us refine our first long-range plan. **Today:** the committee provides invaluable expertise in planning our future and shaping our goals.



a black and yellow lady beetle larva among soybean aphids

ornamental viburnums best resist the viburnum leaf beetle and which beneficial organisms attack it. That same year, we distributed more than 31,000 brochures that helped New Yorkers deal with mosquito-borne diseases such as West Nile virus. By 2001, Cornell University scientists had tested which wheat varieties resisted the new wheat virus. In 2002, scientists concluded three years of research on both transgenic rootworm-resistant corn and new, super-low-rate insecticide seed coatings, which, if widely used, could steeply reduce insecticide use. By 2003, researchers had found 25 natural enemies of soybean aphid, including six fungal pathogens and two parasitic wasps never seen on this aphid before. And NYS IPM helped fund an informative fact sheet that helps growers identify and manage swede midge, even before it arrived from Canada in 2004.

Meanwhile, Cornell University researchers and the agricultural community are keeping an eye out for soybean rust. This new disease, which has devastated the Brazilian soybean crop since 2001, arrived in 2004 in the southeastern United States and could blow north on spring and summer storms. This disease attacks 32 types of legumes, including green beans and garden peas. Once this disease becomes established, losses could be enormous. Protecting plants with fungicide is the short-term solution, but the most economical long-term IPM solution is to develop resistant strains of beans.

"I save thousands of dollars a year on my pesticide bill using IPM. Over the past 10 years, I've probably saved \$75,000."

—Dave Votykka grows peas, beans, and sweet corn on 645-acre Votykka Farms in Wayland, N.Y.

New York's soybean crop is worth \$34.5 million per year.

Beneficial insects reduce pesticide use in egg and greenhouse industries

By the mid-1990s, New York's two top egg producers, who produce nearly 400 million eggs per year, had cut insecticide use by 75 percent by purchasing beneficial insects to rid their poultry houses of flies. In 1999, Cornell University researchers, supported in part by NYS IPM, helped them cut costs even more by learning how to trap, transfer, and use naturally occurring "hister beetles" in areas on a farm where better control is needed.

New York's poultry farms produce \$50.9 million in eggs each year.

Meanwhile, thrips are a destructive greenhouse pest, reproducing so prolifically that growers often spray



hister beetle

1994

Cornell University scientists fine-tune scouting techniques and predictive models for red mites and fire blight, two serious apple pests. **Today:** These tools are now standard practice in many apple orchards across New York.



1995

Community IPM Program begins: IPM for where you live, work and play. **Today:** We've brought IPM solutions to hundreds of schools, municipalities, golf courses, and homes.

weekly. Pesticide runoff can leach into groundwater, and thrips could become resistant to sprays. Since 1996, IPM demonstrations have shown commercial growers how to use tiny predatory mites that thrive on thrips. Growers reported cutting back, in some cases nearly eliminating sprays—a big savings in time and money.

Of course, beneficial organisms can be vulnerable to the same sprays that are used against pests. In 1999, we tested 65 commercial pesticides against common beneficials to develop an index that will help growers and scientists evaluate which chemicals are least likely to harm the good guys.

IPM labels spell quality at the supermarket and in cafeterias

Eco-labels bring information about sustainability into the marketplace, helping consumers or food managers select for environmental value. In 1995 a

team of growers, food processors, Cornell University faculty, and NYS IPM worked together to devise the “Elements of IPM,” a scorecard that helps growers measure their level of participation in IPM practices. In 1997, responding to a retailer’s request, a similar team developed the first IPM label for supermarket foods; participating growers had to score 80 percent on the Elements each year to qualify.

Using the New York model, SYSCO, the nation’s largest food-service distributor, has now made IPM practices the standard for its new SYSCO Sustainable program. This comprehensive, audit-based plan promotes the highest standards for environmental and worker well being among the growers and cooperatives who are opting in. The 100 New York growers who already conform to the “Elements of IPM” may use those records to help them meet SYSCO Sustainable standards. Upward of 300 growers in New York State could ultimately benefit from the SYSCO Sustainable program.



1996



We give first IPM awards to growers, advocates, and researchers who show exemplary work in IPM. **Today:** We’ve recognized 57 people for their commitment to IPM.





"Pesticides aren't getting any cheaper. You can spend a fortune for just a few cases in the back of your pickup. Using IPM thresholds, we've cut way back and still get almost perfect control."

—Charlie Scheer grows scores of tree varieties as production manager of 625-acre Half Hollow Nursery in Laurel, N.Y.

Reducing pests—and pesticides—in tree and shrub nurseries

New York nursery growers produce hundreds of different types of trees and shrubs. It's not easy to keep up with pests when you've got such a huge range of crops. In fact, up to 175 insect pests and 110 disease pests may plague nursery growers. Not only that, but most state agriculture departments have—understandably—zero tolerance for pests on nursery stock that crosses their borders.

This challenge is one that IPM works hard to meet. Since 1985, we've taught the basic drill to dozens of nursery growers in New York State: scout for pests, then decide whether you need to treat. Researchers and educators have beta-tested IPM methods with some of New York's leading growers, refining and testing pest thresholds, pheromone traps, and disease forecasts—then worked with state and federal regulatory officials to help put these techniques in place as standards for interstate commerce. These teams have taken the message to garden centers, too, teaching their employees how to correctly identify a customer's pest problem, then offer choices from among a range of IPM options.

1997



First IPM labels appear on supermarket shelves, conveying a positive message about good stewardship by farmers.

Today: SYSCO, the nation's largest food service wholesaler, has rolled out new SYSCO Sustainable program, embracing IPM practices.



Holistic health for soils and crops

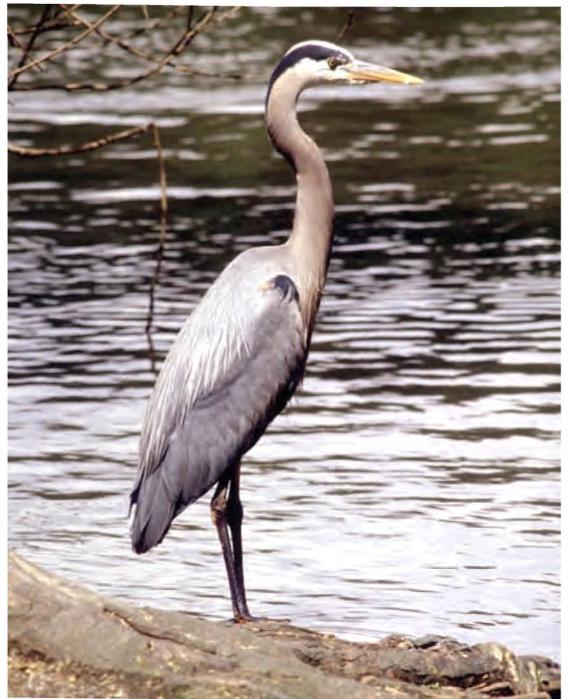
The sum of a soil's physical, biological, and chemical properties—its "soil health"—can change over time, since it is based on cumulative soil and pest management decisions, themselves varying according to each farmer's philosophy. Plus, what happens to the soil at the farm level is much more complex than what happens in a lab or even a research plot, where you test just one variable for a season or two. That's why, in 1996, IPM researchers designed a vegetable "systems trial" to take a long-term, holistic look at four different approaches to farming practices. We wanted to watch how each system affected the soil and, in turn, the crops.

We tested current conventional, organic, and IPM systems—including "IPM future," which was based on new research that's not standard practice yet. These "IPM future" plots, while using the same cover crops as the organic plots, had the lowest incidence of root disease (conventional plots had the most disease). But they also had the overall lowest biological activity. And a rich diversity of biological activity usually is considered the hallmark of a healthy soil.

Tests for biological activity lump together all types of microorganisms, both beneficial and harmful. Could these "good" and "bad" microorganisms be the plant world's equivalent of "good" and "bad" cholesterol? After all, the ratio of good and bad cholesterol is an important health indicator. It may be that IPM future methods are good at reducing levels of harmful microorganisms, which would account for such low activity levels.

Innovative "EIQ" released

Pesticides vary widely in their toxicity to a range of plants and animals—not to mention their persistence on plants or in the soil, and the possibility that they could get into streams or groundwater. In 1992 we debuted a national first: the Environmental Impact Quotient, or EIQ. This formula helps researchers and growers factor in widely ranging variables to calculate the impact of over 200 pesticides on beneficial organisms, soil, birds, fish, bees—and people: especially the ones who apply pesticides.



1998

IPM Institute of North America forms to foster marketplace recognition and rewards for IPM practitioners. **Today:** The Institute serves as a link and resource for New York State and IPM programs nationwide.



1999

We update our website, providing readers with fact sheets, guidelines, reports and other resources. **Today:** Database technology provides even more efficient access to over 1,800 online pages.

Seasons of serendipity lower carrot and apple loss

In 1999, after three years of research, Cornell University researchers developed scouting thresholds for carrots that helped reduce fungicides for leaf blight by 50 to 100 percent. During their fourth year of research, they meant also to confirm which carrot varieties are disease resistant and document how much money growers could save. What they didn't count on was the weather, which favored an entirely different blight from the one that had plagued growers during the previous three years. Even so, the thresholds worked perfectly, providing growers with thresholds and info on resistance to two diseases instead of one.

New York's carrot crop is worth \$4.2 million, sixth in the nation.

For New York's valuable apple crop, the year 2000 was the season for serendipity. A Cornell University researcher seeking to improve apple bin-cleaning techniques discovered that post-harvest drenching systems actually helped spread fungicide-resistant fruit decay. Based on this research, apple packinghouses were able to protect fruit from decay by simply eliminating the drench for some varieties, saving thousands of dollars per year on chemical and application costs.

"Most years, when I don't have pest problems, I save several thousand dollars on insecticides that I would have sprayed, back before I started using IPM."

—Peter Smith is a winemaker and grape grower at Niagara Landing Winery and 125-acre Peter Smith Farms in Lockport, N.Y.



The Right Chemistry (II)

Mike Hoffmann, our director from 1999 to 2005, helped build on his predecessor's legacy and make the program "world class," according to an outside review. Hoffmann's background: farm boy-turned entomology professor, whose research is dedicated to finding beneficial

organisms that will combat difficult pests with the greatest efficacy and least expense. His strengths as a leader: credibility, commitment, and caring—and a tremendous instinct for developing strong, effective partnerships that promote and teach IPM at every level of society.

Tracking weather to reduce pesticides

Got powdery mildew on your grapes, mums, or pumpkins? Potato leafhoppers on your potatoes—or your soybeans, apples, or alfalfa? You can always blame it on the weather.

Rain, humidity, or dew can provide ideal conditions for plant diseases. Warm and cold temperatures can promote or reduce insect pressure. NYS IPM got into the electronic forecasting business in the late 1980s, when—for example—we helped debut an onion blight alert in three counties, decreasing pesticide use the first year by up to 45 percent.

New York onions are a \$39 million crop, sixth in the nation.

By 1995, 49 onion growers had joined up, and disease alerts for tomatoes, grapes, potatoes, and apples were in the works. In 1997 we folded it all together in NEWA—the Network for Environment and Weather Awareness. Now 45 dataloggers in 22 counties stream weather data to our computer servers in Canandaigua and Geneva, N.Y., and web hits currently average 50,000 per year.

“Biorationals”—the new buzzword

Some pesticides are “softer,” more environmentally friendly, than others. Many of these new pesticides are derived from compounds found in plants or microorganisms. Others are based on naturally occurring minerals and oils. The range is huge, and can include anything from hormone analogs—such as growth regulators that keep insects from reproducing—to pathogenic fungi that infect and kill insects (but have no effect on people), to specially formulated clays that suppress foliar diseases on fruit trees.

These alternative pesticides hold great potential for the future, and could substitute for many of the pesticides now being phased out by the Food Quality Protection Act of 1998. But soil type, the weather, and a host of other factors may affect how well they perform. And then, of course, the price must be right. NYS IPM has sponsored research on dozens of “biorationals” and “soft pesticides.” A few work great, while others may take years of development before we get consistent results.



“Our goal—to run a farm that’s both profitable and environmentally sound, and to be good neighbors. IPM helps us do that.”

—Laura Pedersen grows pumpkins, cabbage, and hops on 1,200-acre Pedersen Farms in Seneca Castle, N.Y.



2000

Cornell University and Penn State partner to form the Northeastern IPM Center, which fosters regional cooperation in IPM. **Today:** Over the years, Cornell University faculty and staff have garnered 36 IPM grants through the Center, worth \$2.8 million.

A common foundation: working and learning with others

Hands-on pest solutions for field-crop farmers

Adult learners—farmers, say—want to learn new ideas and techniques, things they can use right away. But studies show that many learners retain only five percent of lecture content. Yet give them a combination of hands-on learning and teaching each other, and they retain up to 90 percent.

That's why we developed our TAg—Tactical Agriculture—program back in 1990. The field is the classroom. Flexible formatting means that TAg team members can address issues as they crop up. Team members practice using the latest proactive scouting and diagnostic protocols along with the most up-to-date planting and nutrient management information. They teach and learn from each other's experience and expertise, and from each operation's strengths and constraints. Crop consultants—and sometimes even farm bankers—join in, the better to serve their clients.

Now we've trained 900 people who collectively farm 179,000 acres of field crops. We've added programs for wheat, soybeans, and organic field crops. And with farmers asking for more in-depth training, we've begun our first Triple-P—Pests, Production, and Profit—Program.

When wildlife viewing gets too close to home

As suburbs and neighborhoods come of age, with their gardens, trees, and parks, a host of critters—skunks, raccoons, deer, coyotes, squirrels, bats, and many more—feel increasingly at home. Not everyone is comfortable sharing their yard, attic, or garage (or the contents of their pantry!) with wildlife. In fact, wildlife are now so common in people's backyards that the number of nuisance wildlife control operators has quadrupled in New York State during the past 15 years.

Yet until 2002, New York—like many other states—lacked a comprehensive training and testing program. Not every operator knew humane, legal ways to deal with animals in the wrong place. To meet the need, a



"The TAg team is a great program. It's very hands-on. All of the guys who were on my team are using the information."

—George Ayres grows alfalfa, soybeans, and sweet corn on 500-acre Fresh Ayr Farm in Shortsville, N.Y.



2001

A USDA panel reviews NYS IPM and calls program "world class." **Today:** The program helps set the national agenda for IPM.



2002

We receive EPA "Environmental Quality Award" for developing and promoting progressive pest management strategies that protect the environment in New York. **Today:** We continue to promote the newest and best in scientifically sound, responsible pest management.

team of Cornell University researchers, NYS IPM staff, state agencies and wildlife control operators created a comprehensive training manual that's earned national praise (and three awards) and serves as a regional model for the Northeast.

New York's 1,500 wildlife control operators handle about 50,000 calls per year.

Helping municipalities, schools cope with changing pesticide laws

In 1995, we took a new and vital step—starting our Community IPM program to work with community leaders as they seek low-risk solutions to both pest and pesticide problems. So we were ready when, that same year, Buffalo became the nation's second city to vote in a pesticide phase-out. Since then, Suffolk, Albany, and Westchester counties—and most recently the five boroughs of New York City—have adopted IPM as the method of choice for making pest management decisions on municipally-owned properties.

Meanwhile, the neighbor notification bill became New York State law in 2000. Among other things, this law requires schools and day care centers to inform parents and staff, ahead of time, of when sprays are scheduled, and to provide thrice-yearly reports on all the pesticides they use.

Now our new "learning communities" approach to school IPM is bringing school staff together across districts to learn better, safer ways of dealing with pests. Working with peer mentors, these teams scout each other's properties and assess each other's management plans—learning from each other in a program that has accountability built into it from beginning to end.

IPM for bookworms and more

New York's 750 public libraries, 310 town halls, and 200 museums—despite "no food, no drinks" policies—have insects, molds, and rodents to deal with. Some of these pests thrive on paper and binding glue, others on leather; some eat the print right off the page. But pesticidal fogs and aerosols can irreparably damage collections often valued in the hundreds of millions of dollars. Since 2000, IPM

"I'm a peer mentor in a 'Learning Communities' IPM project for several school districts in the Hudson Valley. We're analyzing the nuts and bolts of school facilities management and taking the good programs they already have and making them great."

—Kevin Trotta is head groundskeeper for the North Rockland Central School District in Garnerville, NY.



2003



Soybean aphid, first major pest on this 6.7-million bushel NY crop, makes landfall on farms statewide. **Today:** IPM advisories on aphid presence and biocontrol (25 documented natural enemies in New York) help farmers stay competitive with this valuable crop.





workshops have helped archivists to put prevention first, scout for damage, and use the best combination of baits, desiccants, atmospheric control, and barriers to exclude and manage pests.

Teaching children about IPM

A brand new kid-tested, teacher-tested program, "IPM Teaching Tools for K–12," is starting to bring IPM to schoolrooms all over New York State. Our "IPM Trunk" brims with creative, ready-to-go tools and materials—display mounts, magnifiers, games, wall charts, student workbooks, and more—that help teachers integrate science, health, and environmental responsibility into the curriculum.

These grade-appropriate, inquiry-based lesson plans bring together science, math, writing, and history while improving each student's ability to observe, analyze, question, and strategize. They reinforce practical, take-home lessons on making responsible, environmentally sound choices about dealing with pests. They also help children and their families understand the kinds of choices that farmers face every day. And they foster an appreciation of the ever-shifting interface between science, nature, and culture.

Why teach IPM? Because it's real-world science. Because it's about learning and making choices. Because—it's important. The teaching tools program meets New York State and national standards.

Park "makeover" is IPM success story

Ground ivy moves in where the soil drains poorly, one sign reads. Outwit pest problems before they start. Plant pest-resistant shrubs and trees in fertile, well-drained soil, another advises.

Conley Park, in Ithaca, NY, the nation's first IPM interpretive park, is an IPM makeover success story that brought together a city public works department, a landscape architect—and us. Once a heavy-equipment parking lot, now Conley Park is a see-it, touch-it, believe-it demonstration that fundamental IPM practices—mowing right, fertilizing right, planting right, and promoting beneficial insects—really do make for healthier yards, healthier streams, and a healthier environment. A science center with 75,000 visitors a year, many of them kids, is right next door. And an eight-page teacher's guide helps Conley Park do double-duty as an outdoor classroom for nearby schools.

2004



We develop new software for fruit growers that keep them competitive in multimillion-dollar national and international markets. **Today:** Already, over 400 tree fruit, berry, and grape growers use Trac[®] software.



Greener greens (and lawns) with fewer pesticides

Turfgrass on golf courses, parks, and lawns covers more than 3.4 million acres of New York State. New Yorkers collectively spend about \$83.6 million a year on pesticides for turf. But is all of it needed?

Golf courses have the most exacting requirements for pest control. Back in 1989, Cornell University and IPM researchers found that less than 20 percent of treatments for grubs in turf were actually needed, and by 1992 had enrolled 22 commercial golf courses in IPM scouting demos. In 1998, researchers showed that lower seeding rates can increase traffic tolerance while reducing disease and maintenance costs. By 2005, Cornell University researchers had identified five cultivars of fescue grass that suppress more than 90 percent of turf weed seedlings in research plots. These and their bioactive root compounds could form the basis of a new generation of biorational herbicides for golf courses, parks, and lawns.

Two-time U.S. Open golf course is open to IPM, too

In 2000, IPM staff and Cornell University scientists began our most ambitious turf project: a “systems trial” in cooperation with the United States Golf Association and staff at the world-renowned Bethpage State Park Golf Courses. Bethpage hosted the U.S. Open in 2002 (and will again in 2009). Instead of examining isolated problems and treatments, the IPM team tested three complete management packages on putting greens. This provided a holistic analysis and comparison of conventional, nonchemical, and IPM greens over five years of play. The results: IPM methods provide the best compromise for quality of play while cutting pesticide use by 33 percent or more, and reducing environmental impact by 50 to 72 percent.

New Yorkers play 20 million rounds of golf a year on New York State’s 860 golf courses.

“We offer a customized IPM service that’s environmentally sensitive. We love what we do, and it shows.”

—Laurie Broccolo serves over 3,000 clients at Broccolo Tree and Lawn Care in Rochester, N.Y.



2005

Our 20th anniversary year finds us stronger than ever, with IPM on the farm, at home, and in the community.



Our Vision:

IPM is recognized as the pest management solution for all New Yorkers.



"Farms in New York produce crops valued at over \$3.6 billion per year. Many of our commodities rank in the top 10 nationwide, year after year. How do we keep New York's agriculture strong while protecting our environment and our health? The NYS IPM Program has helped develop management solutions for pests for 20 years now—solutions that combine innovative science, practical outreach, and effective partnerships. In fact, 90 percent of New York's growers practice some form of IPM—a testimony to the value of the IPM approach."

—New York State Department of Agriculture and Markets Commissioner (1999 to 2005) Nathan L. Rudgers



"Protecting our environment. Safeguarding our health. These have been the aims of the NYS IPM Program since it began two decades ago. Dedicated to seeking and promoting the best mix of sound science, environmentally sensitive technologies, and commonsense solutions to pest problems, the NYS IPM Program makes a difference in our schools, homes, parks, and workplaces all over New York."

—New York State Department of Environmental Conservation Commissioner Denise M. Sheehan



IPM. The reasons are all around you.



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What can you do?

Seek IPM solutions to pest problems at home and at work.

Adopt IPM strategies for your farm, school, or business.

Support IPM in your community and across New York State.

Want to know more? Visit us online at www.nysipm.cornell.edu

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