COMMUNITY IPM

for where you live, work, and play

2000-2001

the year in review

CORNELL Cooperative Extension

New York State Integrated Pest Management Program

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

For more information about the Community IPM Program:

NYS IPM Program
NYS Agricultural Experiment Station
Geneva, NY 14456
800.635.8356 (fax 315.787.2360)
www.nysipm.cornell.edu
email: nysipm@cornell.edu

Written and edited by Jennifer Grant and Mary Woodsen with help from Jody Gangloff-Kaufmann, Lynn Braband, Gary Couch, Jana Lamboy, Carrie Koplinka-Loehr, Jill Shultz, and Michael Hoffmann. Cover design by Karen English-Loeb.

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Executive summary

The past year has been exciting for the New York State Community IPM Program. With an increase in state funding, we have been able to further our extension and research efforts and reach into new environments—with results benefiting citizens throughout the state of New York.

A range of settings

The community IPM program was created to address pest management needs in a wide range of settings, such as schools, homes, parks, museums, and golf courses—all the places we live, work, and play. IPM is integrated pest management—a sustainable approach to preventing and suppressing pest problems while minimizing risks to human health and the environment. IPM practitioners use a judicious blend of biological, cultural, mechanical, and chemical controls.

Weighing the threat of damage, annoyance, or even danger from a pest against the safety of people is a tricky business. But that's just what our program strives to do—keep us and our children safe both from pests and the methods we use to control them. Whether we're at work or at home, we all face pests on a daily basis—lawn weeds, raccoons in the trash, the mosquitoes and wasps that bug us, even the mildew on the wall. The complexity of problems and places requires creative strategies to either prevent pest problems or to manage the ones we can't avoid.

Creative strategies

The funding we've received from New York State through the Department of Environmental Conservation since 1999 has enabled us to

- establish IPM educational programs for New York schools;
- help county and municipal governments adopt and implement IPM policies and practices as they grapple with legislation that phases out pesticide use;
- demonstrate IPM methods for landscape professionals, golf course superintendents, homeowners, and others;
- develop and implement biologically-based and improved conventional pest management tactics that reduce the use of chemical pesticides;

Executive summary

- build public awareness about IPM principles and practices;
- support applied research, demonstration, implementation, and diagnostic projects; and
- create and distribute IPM manuals, brochures, fact sheets, and other educational materials.

A more advanced level

With increased funding during 2000 and 2001 we reached more areas of the state while taking IPM education, implementation, and research to a more advanced level. The funding enabled us to focus on turfgrass IPM for athletic fields, golf courses, school grounds, and home lawns—all areas important to water quality. Furthermore, we were able to investigate unknowns such as

- effects of lawn pest management practices—both chemical and biological—on nontarget organisms;
- quality, environmental, and economic differences among golf course greens managed conventionally, those under IPM protocols, and those without chemicals;
- effects of applying composted organic matter to athletic field turf;
- ways to reduce risks from stinging insects without chemicals; and
- the distribution of harmful plant-parasitic nematodes in golf course greens—which affects sampling and management strategies.

Promoting collaboration

We launched our expansion into the world of turfgrass by hiring turfgrass IPM specialist Jennifer Grant, whose expertise in turf science strengthens and broadens our IPM programming for school grounds, golf courses, and athletic fields. Her presence gives us broader opportunities to promote collaboration for IPM education, demonstration, and research among faculty, extension staff, pest managers, and private industry. Recently, Jennifer has become our Community IPM coordinator.

We now have five education and research specialists—three full-time and two part-time—working on community IPM. This past year, they held more than 45

workshops, demonstrations, and training sessions that reached over 3,000 people.

Setting priorities

Sometimes we taught the "teachers and reachers"—people who, in one way or another, instruct others or make decisions about pest management in places ranging from schools, public parks, and libraries to offices, nursing homes, and golf courses. Other times we went directly to the public and the professionals who care for homes and landscapes, sharing information on everything from lawn care to evicting cockroaches and mice. And we helped them, as well as legislators, agency and industry representatives, and environmental advocates, to work out pest management protocols that affect some of our most densely populated areas. In turn, these professionals and advocates helped us set priorities and collaborated with us in our research and education projects.

Our teaching, research, and other collaborations are critical—but to multiply our efforts, we look to our communications team. These specialists work with us to design, edit, and write our brochures, pest management manuals, magazine articles, reports, radio spots, and news releases—publicity that reached tens of thousands of people this year.

The sensible solution

IPM—it's the sensible solution to pest problems, no matter what the setting. We invite you to read on to find out what we've done this past year, and we thank you for helping us provide the residents of New York State with practical information on integrated pest management that they can use where they live, work, and play.

IPM at work in New York State

We are not alone. Wherever we are, whatever we do, a host of other creatures—seen or unseen—are with us. Most of these creatures are harmless, even beneficial. But some are pests. How can we manage them while saving money and minimizing risks to our health and the environment?

Working together, finding solutions

Even with conventional methods, managing pests in public places is a formidable task. Yet several heavily populated areas—including Albany, Westchester, and Suffolk Counties—have recently passed "sunset laws" that phase out pesticides on municipal properties. In each, representatives from the public, industry, local government, and regulatory agencies are coming together to forge policies that rely increasingly on integrated pest management. And they're asking us to help them.

Field surveys in Albany County showed that pigeons often pose a major pest problem to buildings—and their inhabitants. Pigeon droppings can build up by the bushelful in inaccessible places, corroding roofs and window ledges. When they accumulate near air vents, disease spores often waft in to contaminate workspaces.

Solving pest problems

"Build them out" is the IPM motto: install exclusion devices such as bird netting, electrified tracks, and porcupine wires that discourage roosting and nesting. We're also providing pest management manuals, displays, scouting expertise, and much more to help Albany County meet the challenge of the new regulations.

At one Suffolk County office building, troops of unappreciated ants were thronging the windowsills and traipsing across office desks. A group of six teens from the Suffolk County Youth Community Corps spent three afternoons cleaning and caulking—cleaning to wash away the ants' scent trails to known food sources and caulking to exclude them where possible. Next, they set up bait stations inside and out—rounding out a set of complementary responses that exemplify IPM.

Understanding pest biology

Meanwhile at an agency across town, the mice on the second floor were raiding everyone's cookie drawer to get the high-energy snacks they need to survive. Sanitation and traps were

the first line of defense, while future structural repairs will make entry a more daunting prospect for mice. And whatever management system we employ, educating ourselves and others is key. At both Suffolk locations, IPM's educational materials helped workers understand mouse biology—and how changing our habits can alter their habitat enough to keep them at bay.

Seen any bedbugs lately? These days they're often found in high-class hotspots—hotels, high rises, and the like—for they can hitch a ride in your luggage. These tiny insects offer a different lesson in pest biology. After all, how do you manage a pest that can live as much as a year between meals and easily becomes resistant to insecticides? IPM surveys and workshops are helping pest control companies find new, effective ways to deal with outbreaks of this ancient pest.

Demonstrations at work

It's no picnic maintaining Westchester County's five public golf courses. They operate with about three times the traffic and a third of the materials and equipment of many private courses. Although products for use on some pernicious diseases of turf are exempt under Westchester's recent phase-out legislation, chemical pesticides are prohibited for everything else from grubs to dandelions.

IPM demonstrations on Westchester's golf courses showed what's involved in using natural controls and testing new products. One—a natural substance secreted by soil microorganisms—offered good control for annual bluegrass weevil grubs, a very destructive pest in the metropolitan New York area. Initial trials with nematodes (microscopic worms) that parasitize the weevils didn't result in thorough control but were promising; future research will build on what was discovered.

New mandates

Sunset laws aren't the only legislative mandates coming down the pike. This past year, Governor Pataki signed the neighbor notification bill into law. This law requires public and private schools and daycare centers statewide to notify parents and staff in advance of any pesticide application in school buildings or on the grounds, and to provide full reports of pesticides used, three times a year. The law also allows for counties to opt into additional provisions that require lawn care companies to

notify their clients' neighbors 48 hours before they apply pesticides. And for the first time, homeowners in these counties must post a notice after applying a pesticide to their own lawns. Meanwhile, garden centers and other retailers must post signs that warn of pesticide hazards and describe safe methods for application. Dozens of other laws to restrict pesticide use in parks, institutions, and golf courses are also being considered by local and regional governments across New York State.

Teaching the pros

More than ever, turf and landscape professionals need to stay on top of the latest research findings for nonchemical and biological strategies for insect, weed, and disease management. The Cornell Turfgrass Hotline—a conference call and electronic newsletter featuring Cornell specialists and national experts—does just that by discussing timely turf topics and answering questions for 125 subscribers every week. Extension offices statewide (and many beyond our borders) include the information in their newsletters, too. Surveys show that golf course superintendents, lawn care providers, groundskeepers, athletic field managers, Cooperative Extension educators, and industry reps are highly satisfied with the Turfgrass Hotline. The project recently won an award for outstanding new extension publication by the New York State Association of County Agricultural Agents.

New programs, new possibilities

Turf got a real boost this past year. This makes sense, given the link between turf management and watershed health—and given the proliferation of legal mandates to find alternatives to pesticide use in parks, athletic fields, and golf courses. For starters, we hired a turfgrass specialist for our IPM team. And we funded several important new projects to examine how we can produce healthy, productive, top-notch turf using few or no pesticides.

Fundamental research

Turfgrass managers have long been clamoring for advice on amending athletic fields with organic materials. Although we face several years of careful research before we can offer solid data and science-backed recommendations, we've gained valuable knowledge about application procedures for organic composts, and we're studying the long-term effects on turfgrass

quality and soil properties.

Our program is also addressing fundamental scientific questions that are important to what we do. Does the way we manage grubs in turf impact other soil dwellers—earthworms, crickets, and the like? The chemistry of pesticides has changed enormously over the years, and we can't presume to know how "nontarget" organisms will be affected by their use—even biological controls may threaten them. Now we're looking at a number of chemical and biological grub control products, and so far, they don't seem to have any negative effects on nontargets.

Applied research

In a similar vein, researchers are investigating some little-understood agents of turf decline. Several species of plant-parasitic nematodes, tiny root-feeding worms, may cause unthrifty turf—turf that can die rapidly if it's stressed, whether from lack of rain, or being cut too short, or too many people tramping over it day after day.

New York's 800 golf courses, comprising over 80,000 acres, often have these stresses—as well as disease and insect pressure. Yet little research has been conducted on nematode ecology, the severity and extent of the damage they cause, or the diagnostic techniques that distinguish this damage from other turf problems. Misdiagnoses can mean unnecessary pesticide applications, money wasted, no improvement in quality, and worst of all, continued turf decline or death.

Now IPM researchers have identified the types of nematodes commonly found on cool-season turfgrasses and learned more about their distribution across a putting green—information that should lead to better sampling procedures.

Demonstrating effectiveness

Parks, playing fields, and golf courses are not the only focus of our work. Surveys show that stinging insects are among the top concerns of many workers in schools and public buildings. Yellowjackets, baldface hornets, and paper wasps: these insects do a great job of controlling many lawn and landscape pests, but they're *persona non grata* around school yards and public buildings. After all, for susceptible people a single sting can cause a severe reaction. But can you keep them away without using pesticides?

IPM at work in New York State

Generally, yes—according to applied research and demonstrations this past year at several schools, a county farm, and a jail. Prevention is the first line of defense—caulking and sealing cracks keeps bees and wasps from nesting in wall and attic cavities. Scouting comes next—identifying their nests and foraging areas early in the season makes stinging insects much easier to manage.

Safe removal techniques for hornet and wasp nests abound. Pest managers can hose nests down with high-pressure water guns, spray them with mint oil, or even vacuum wasps out of wall spaces. And we've learned that pineapple juice cocktails can lure thousands of yellowjackets to traps. But is trapping effective in reducing the risk of being stung? This year, researchers hope to answer that question.

Putting knowledge to work

With their "no food, no drinks" policies, you'd think that a library or museum—or even your town hall—wouldn't have much trouble dealing with pests. But facilities like these actually provide a banquet of foodstuffs (cellulose, starches, and proteins) for insects, rodents, and molds. Some pests thrive on paper and binding glue, and will even eat the print right off the page! Insecticidal fogs or aerosols can't be used because they are oil-based and will irreversibly damage a collection.

Special circumstances like these require special techniques. This past year we taught library and museum staff how to put prevention first, scout for damage, then use the best combination of baits, desiccants, atmospheric control, and barriers to exclude and manage their unwelcome guests.

Teaching the people

Reach new audiences—that's a big item on the docket for every thriving organization. Of course, when you're teaching children it also helps to have fun.

The Underground Theater made the audience the cast for "The Community Beneath Our Feet," which tells the story of the beneficial but largely unseen organisms that build healthy lawns. From schools to county fairs to summer recreation and library programs—over 350 kids took part in this IPM-funded program during the past year. A "pre-test" and "post-test," cleverly built into the action, showed that kids got

IPM at work in New York State

the take-home message: choose low-risk methods for yard care! The complementary "Bug-tivity News" was jam-packed with science activities, puzzles, and games.

Now the play's authors have a new challenge: how to meet the demand for the play, statewide and beyond, from teachers, club leaders, museum educators, master gardeners, and even farmers with entertainment activities on the farm.

Reaching the people

"Very timely." "Please continue to send." "A real work… alternatives admirably and effectively depicted…nothing but good can come of it." These comments on return postcards from radio announcers indicated that our first series of IPM tips for radio are reaching listeners at up to 160 stations throughout the state. Some stations report playing them ten times a week.

Our 30-second messages describe techniques listeners can use in their homes and yards to discourage common pests. The spots also tell about our website and give our 800 number. These new public service announcements are a great way to make "IPM" a household word.

Summing it up

Outreach and research—they go hand in hand. From Long Island to Plattsburg to Buffalo—and scores of places in between—we've seen how often (and how well) commonsense solutions work in tandem with groundbreaking research on biological controls and environmentally sensitive products. In the year to come we'll reach more people—and more pests!—to make New York a better place to live, work, and play.

Multiplying the message

Partnerships and collaborations

IPM staff offer an important message, but we're a small group. Often the best way to do research and get the word out is through consultations, partnerships, and collaborations with others: schools, governments, businesses, organizations, Cornell faculty and programs, or individuals.

Here are some of this year's partnerships:

Governmental organizations

National Agricultural Statistics Service
New York City Department of Parks and Recreation
New York State Department of Agriculture and Markets
New York State Department of Education
New York State Department of Environmental Conservation
New York State Department of Health
New York State Department of Parks and Recreation
United States Department of Agriculture

Cornell-based programs and working groups

Cornell Cooperative Extension county associations (CCE)
Cornell Working Groups:
- Horticulture Home and Grounds
- Landscape Horticulture
- Turfgrass

Insect Diagnostic Laboratory
New York State Agricultural Experiment Station
Pesticide Management and Education Program
Plant Disease Diagnostic Clinic
Program on Breast Cancer and Environmental Risk Factors in New York State (BCERF)
Water Resources Institute

County and community committees, organizations, and facilities

Albany County Correctional Facility
Albany County Nursing Home
Ann Lee Nursing Home
City of Buffalo Pest Management Board
Erie County Department of Environment and Planning
Great Lawns/Great Lakes
Huntington Recreational Association
Nassau County Department of Health
Nassau County Department of Social Services
Nassau County Pesticide Advisory Committee
Nassau County West Nile Virus Public Awareness Committee
Suffolk County Community Advisory Committee
Suffolk County Department of Health
Suffolk County Department of Real Properties
Suffolk County Educational Farm

Multiplying the message

Partnerships and collaborations

Suffolk County IPM Working Group
Suffolk County Minimum Security Facility
Suffolk Superintendents of Buildings and Grounds Association
Town of Hempstead Department of Parks and Recreation, Nassau County
Town of Potter, Yates County
Vanderbilt Museum, Suffolk County
Village of Northport, Suffok County
Westchester County Department of Parks, Recreation, and Conservation, Dunwoodie Golf Course, Maple Moor Golf Course
Westchester County Pest Management Committee

School and BOCES districts

Baldwinsville Central Schools
Bethlehem School District
Boards of Cooperative Educational Services (BOCES):

- Broome-Tioga–Delaware
- Eastern Suffolk
- Erie2-Chautauqua–Cattaraugus
- Genessee Valley
- Questar III

Center Moriches School District
Coddington Center Preschool
Connetquot School District
Glenmont Elementary School
Hauppauge School District
Hilton School District
Huntington School District
Lansingburgh School District
Livonia School District
Manhassett School District
New Hyde Park-Garden City Park School District
New York Association of Superintendents of School Buildings and Grounds
Plainedge School District
Smithtown Central School District
Suffolk and Nassau County Chapters, New York Association of Superintendents of School Buildings and Grounds
Turnpike Elementary School
West Islip School District
Westbury School District

Educational institutions (non-Cornell)

Finger Lakes Community College
Ithaca College
Niagara County Community College
Ohio State University
Rutgers University
SUNY Cobleskill
University of Massachusetts
University of Vermont

Multiplying the message

Partnerships and collaborations

Environmental organizations

Audubon International
Environmental Advocates
National Coalition Against the Misuse of Pesticides
New York Coalition for Alternatives to Pesticides
New York Public Interest Research Group
One in Nine

Professional associations

Finger Lakes Landscape and Nursery Association
IPM Institute
Long Island Arboricultural Association
Long Island Nursery and Landscape Association
Long Island Pest Control Association
Nassau-Suffolk Landscape Gardeners Association
New York State Pest Management Association
New York State Turf and Landscape Association
New York State Turfgrass Association
New York State Wildlife Management Association
Rochester Landscape Technicians Program
Sod Growers Association
Tri-county Nursery and Landscape Association
United States Golf Association
Western New York Organic Horticulture Society

Multiplying the message

Workshops and trainings

This past year our staff delivered the IPM message to more than 3,000 people—buildings and grounds staff concerned about new legislative mandates, homeowners concerned about water quality, public health officials concerned about disease control, and more.

Here's a list of our workshops and presentations:

"Basics of IPM": workshop for master gardeners in Ulster County Cornell Cooperative Extension (CCE)—17 attendees.

"Bed bugs in the 21st century": presentation for the New York State Pest Control Association annual meeting—80 attendees.

"Insects of trees and shrubs": session, Westchester CCE—15 attendees.

"Introduction to IPM" and "Ornamental insect IPM": sessions for Hudson Valley Garden Center employee training program with Dutchess, Orange, Ulster, Westchester, Putnam, and Rockland CCEs—16 attendees.

"IPM and the neighbor notification law" presentation for lawn care professionals, school grounds personnel, County legislators, and the Environmental Management Committee in Tompkins County (in cooperation with CCE)—35 attendees.

"IPM for home lawns": workshop for home gardeners in Binghamton—15 attendees.

"IPM in the home landscape": presentation for the Victor Garden Club—20 attendees.

"Landscape IPM": presentation at NYS Turf and Landscape Association annual conference—120 attendees.

"Moles and voles": presentation at the CCE consumer horticulture in-service training, Cornell University—50 attendees.

"Monitoring turf and plants for problems": presentation for the Nassau Suffolk Landscape Gardeners Association annual conference—300 attendees.

"Mosquito control and West Nile virus": workshop for school personnel with Broome County BOCES—50 attendees.

"Ornamental insects" and "Ornamental diseases": sessions for pesticide training course with Rockland CCE—10 attendees.

IPM for home and community

Multiplying the message

Workshops and trainings

"Pests and pesticides in the home—using IPM to minimize both risks": workshop for Hudson Valley retail garden center employees in Dutchess, Orange, Ulster, Westchester, Putnam, and Rockland CCEs—16 attendees.

"Principles of site assessment and pest identification": training for Chemung County Landscape Field Day (CCE)—20 attendees.

"Proactive, non-toxic stinging insect management": two presentations at the Monroe County CCE nontoxic pest management workshop—20 attendees.

"Structural pests and their control": workshop for master gardener training at Nassau CCE—52 attendees.

"Tree and shrub IPM": workshop for master gardeners in Orange and Dutchess County CCEs—35 attendees.

IPM for school and municipal facilities

"48-hour neighbor notification summary": two workshops, one each for the Suffolk and Nassau Associations of Buildings and Grounds Superintendents—95 attendees.

"Concepts of structural IPM for non-toxic pest management": training for municipal employees in Monroe County (CCE)—60 attendees.

"Grounds IPM for schools": CCE training session for school staff in Orange County—24 attendees.

"Implementing school IPM": workshop for school maintenance staff with Genesse Valley BOCES in Livingston County—35 attendees.

"Insects and spiders": demonstration at Eastplain Elementary School—60 attendees.

"Introduction to IPM" and "School IPM policy development": series of four CCE workshops around the state for school personnel—131 attendees.

"IPM and school notification": presentation for Smithtown School District facilities staff—30 attendees.

"IPM for school grounds": interactive training program for grounds staff at Baldwinsville Central Schools, Onondaga County—6 attendees.

"Nematodes for control of white grubs in athletic field turf": demonstration for school grounds workers in the Hauppauge School District—15 attendees.

Multiplying the message

Workshops and trainings

"Nontoxic pest management for insect pests" and "Nontoxic pest management for vertebrate pests": workshops for Suffolk and Westchester county school and municipal staff—175 attendees.

"Pest management policy development" and "Proactive stinging insect management": training sessions for school and municipal administrators and staff in Rensselaer County with Questar 3 BOCES—20 attendees.

"Proactive stinging insect management" and "School IPM": workshops at the New York State Pest Control Association annual meeting—100 attendees.

"School IPM policy development": workshop for school and municipal IPM with Clinton County CCE—40 attendees.

"School IPM": workshop for BOCES statewide conference—61 attendees.

"Tenets of IPM": series of three workshops for municipal staff on Albany County's pesticide phase-out legislation—90 attendees.

"Use of exempt products": workshop on school pest management in Monroe County with Genesee Valley BOCES—44 attendees.

IPM for parks, golf courses, and athletic fields

"Bethpage golf course pest management research project update": presentation for Long Island State Park Golf Course Managers—25 attendees.

"Can IPM work on athletic fields?": presentations for athletic field managers and golf course and grounds maintenance personnel at NYS Turfgrass Association annual conference—250 attendees.

"Compost use on athletic fields: research update": CCE Agriculture Production Week, landscape horticulture session—30 attendees.

"Entomopathogenic nematodes and other microbial control products for use on golf course turf": presentations for athletic field managers and golf course and grounds maintenance personnel at NYS Turfgrass Association annual conference—200 attendees.

"Entomopathogenic nematodes for management of white grubs": presentations for athletic field managers and golf course and grounds maintenance personnel at NYS Turfgrass Association annual conference—200 attendees.

"IPM for athletic fields and school grounds": training sessions for school grounds managers in Binghamton, Watertown, and Plattsburg; in cooperation with local BOCES and CCE—100 attendees.

Multiplying the message

Workshops and trainings

"IPM for golf courses: new directions": presentation for Long Island Superintendents Association Winter Conference—100 attendees.

"IPM for turfgrass: principles and practices": Cornell University turfgrass management class for horticulture undergraduates—15 attendees.

"Organic field care—what does this mean?": presentations for athletic field managers and golf course and grounds maintenance personnel at NYS Turfgrass Association annual conference—250 attendees.

"Pesticide reduction: legislative trends, research, and pesticide alternatives": presentation at the NYS Turfgrass Association regional conference in Western NY—125 attendees.

"Setting thresholds" and "Monitoring": at "Protocols for an IPM system on golf courses," a training seminar in Massachusetts for golf course personnel—50 attendees.

"Soil moisture effects on entomopathogenic nematodes": Geneva entomology department—25 attendees.

"Turf IPM" and "Insect lab": workshops for Cornell CCE turfgrass short course, Hudson Valley—58 attendees.

"Turfgrass insect control with beneficial nematodes and microbes": workshop for Monroe County Advanced Horticultural School, in cooperation with CCE—25 attendees.

"Turfgrass IPM": Cornell University turfgrass short course, Ithaca—50 attendees.

"Use of exempt products": workshop on school pest management in Monroe County with Genesee Valley BOCES—44 attendees.

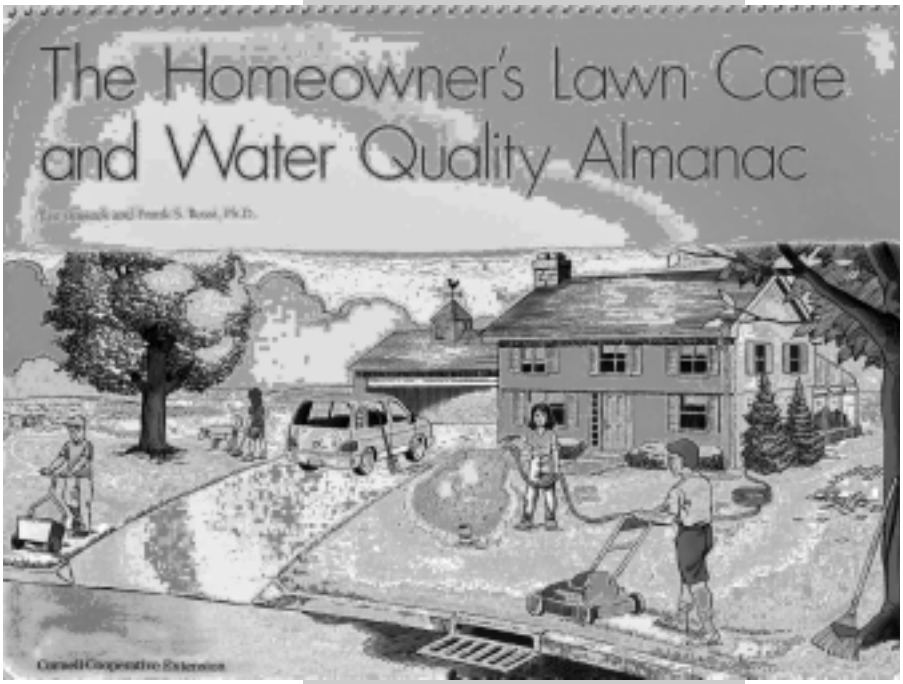
"Using nematodes for white grub control": workshop for municipal golf course employees, Westchester CCE—8 attendees.

Multiplying the message

Publications

Ever since Gutenburg, print media has been a crucial element of reaching and teaching almost every audience, be it the neighbors down the street or the scientists at neighboring institutions.

Here's a sampling of newsletter articles, reports, manuals, brochures, and more. Some we contributed to, others were funded in whole or in part through the Community IPM Program.



The homeowner's lawn care and water quality almanac. Cornell Cooperative Extension, Ithaca, NY.

Nontoxic pest management for collections and their facilities: a training manual. New York State IPM Program, Geneva, NY.

The integrated approach to tree selection, culture and pest management: a resource manual. New York State IPM Program, Geneva, NY.

Guide to pest management around the home: part two, pesticide guidelines. Cornell Cooperative Extension, Ithaca, NY.

Hemlock borer. *Branching Out* 7(11).

Milky spore disease. *Cornell University Turfgrass Times (CUTT)*, 10 (2).

Monitoring: The heart of IPM. *Hudson Valley Horticulture* 11(10).

Weeds and your garden. New York State IPM Program, Geneva, NY.

Grubs in your lawn? A guide for lawn care professionals and homeowners. New York State IPM Program, Geneva, NY.

New York State IPM Program: Strong economy, healthy environment (display for Roberts Hall, Cornell University).

Natural enemies of garden pests. Poster for Whale Watch Community Festival, Geneva, NY.

New York State Integrated Pest Management Program website. http://www.nysipm.cornell.edu/

Soil moisture effects on entomopathogenic nematodes. Poster presented at Entomology Society of America Annual Meeting, Montreal.

Remembering Mike Villani

The NYS IPM Program lost a great friend and champion this past year. Dr. Michael Villani, professor of soil ecology in the Department of Entomology at the New York State Agricultural Experiment Station, passed away on May 15, 2001.

Mike had a great impact on the shape and direction of the NYS IPM Program as well as the practice of IPM in New York, serving as the chair of the IPM working group for ornamentals and turfgrass for five years (1991-1995) and more recently as chair of the community IPM working group (1999-2001). Indeed, Mike saw the potential for IPM to be the primary pest management solution for all New Yorkers.

Mike's specialty was soil and turf insect ecology—the interrelationships between turfgrass insects and the soil they live in. Highly regarded as a world-class researcher and practicing entomologist, he developed groundbreaking techniques to study the behavior of soil insects and the damage they cause. Among the IPM strategies he researched were the impact of soil physical properties on chemical and microbial insecticides, pheromones for grub monitoring and management, and the use of fungal pathogens and nematodes to help control turf insects.

Mike co-authored the recently revised "bible" of the turfgrass industry, *Turfgrass Insects of the United States and Canada*. He also received numerous awards, including the New York State Turfgrass Association's highest honor, the Citation of Merit, and the National Recognition Award in Urban Entomology from the Entomological Society of America.

But Mike was not only a world-renowned soil ecologist and entomologist—his guidance of the NYS IPM Program has been inestimable. During the mid 1990's, when Jim Tette and Rod Ferrentino (former director of the NYS IPM Program and former Community IPM coordinator, respectively) were building support for the fledgling Community IPM Program, Mike was there. He offered thoughtful perspectives and innovative approaches to building coalitions among the many interest groups in the state, as well as within the Cornell community. His visionary, broad-minded leadership helped secure state funding for Community IPM and will doubtless shape our plans for many years to come. He is deeply missed.

Hellos and goodbyes

This past year, the Community IPM program said goodbye to old friends and welcomed new ones.

We wish the best to Rod Ferrentino, former Community IPM coordinator, now director of new products for a company that produces organic soil amendments. Rod, along with Jim Tette, our program's former director, started Cornell's urban IPM effort—now Community IPM. Rod's IPM career began in ornamentals. But early on, he envisioned the potential for IPM in all sectors of New York society, and he had a knack for sharing his vision with others—just ask the legislators in Albany, landscapers on Long island, or pest management professionals in Buffalo. Good luck, Rod—and thanks for all you did!

In the "new faces" department, Jennifer Grant rejoined the program last year to lead our new programs in turfgrass IPM research, training, and implementation. After Rod Ferrentino left, she stepped up to the plate to become the Community IPM coordinator. Jennifer is working to increase both philosophical and financial support for community IPM as well as promote science-based IPM solutions to all New Yorkers. She continues her projects on school grounds, athletic fields, and golf courses while working with an exceptional team of community IPM specialists and support staff.

We welcome our new commodity chairperson Don Rutz, professor of veterinary entomology and chair of Cornell's Department of Entomology in Ithaca. Don brings a wealth of experience, including prior service on the IPM Operating Committee, several years as director of Cornell's Pesticide Management and Education Program, and a history of diplomacy in dealing with a broad range of pest management issues at the urban-agricultural interface. We look forward to Don's sage guidance in building coalitions and spreading the IPM word!

Community IPM staff

Michael P. Hoffmann
Director, NYS IPM Program

Jennifer Grant
Coordinator, Community IPM
315.787.2209
jag7@cornell.edu

Lynn Braband
Extension Educator
315.787.2408
lab45@cornell.edu

*Gary Couch
M.S., Extension Educator
845.344.1234
gjc15@cornell.edu

Jody Gangloff-Kaufmann
Extension Educator
516.454.0900 x270
jlg23@cornell.edu

*Jana Lamboy
Coordinator, Ornamental IPM
315.787.2207
jsl7@cornell.edu

These staff have partial responsibilities (25 to 80 percent) to the Community IPM program. All other staff work 100% for Community IPM.

Jennifer Grant is our eyes and ears on the ground, bringing her expertise in turf management to projects on athletic fields, golf courses, and home lawns. Her experience with IPM systems and biological control of insects contribute to the program's goal of maintaining turf quality while minimizing risks to human health and the environment.

As an avid naturalist and wildlife expert, **Lynn Braband** has expertise that translates well to using pest biology to exclude and exile mice, wasps, pigeons, and more from homes, schools, and workplaces. His current work focuses on implementing IPM in schools, controlling wasps without chemical pesticides, and educating people about ants in their homes and workplaces.

Colleagues describe **Gary Couch** as a phenomenal entomologist who can identify even obscure insects on sight. He's also an avid horticulturist with a good eye for diagnosing sick plants. Gary helps homeowners, landscapers, and grounds workers discover creative solutions to pest problems.

A biologist first and foremost, **Jody Gangloff-Kaufmann** chose to study the lives and habits of insects for her advanced education. She applies her entomological knowledge and IPM skills to a range of pests at the urban-rural interface, including bedbugs, mosquitoes, and wasps.

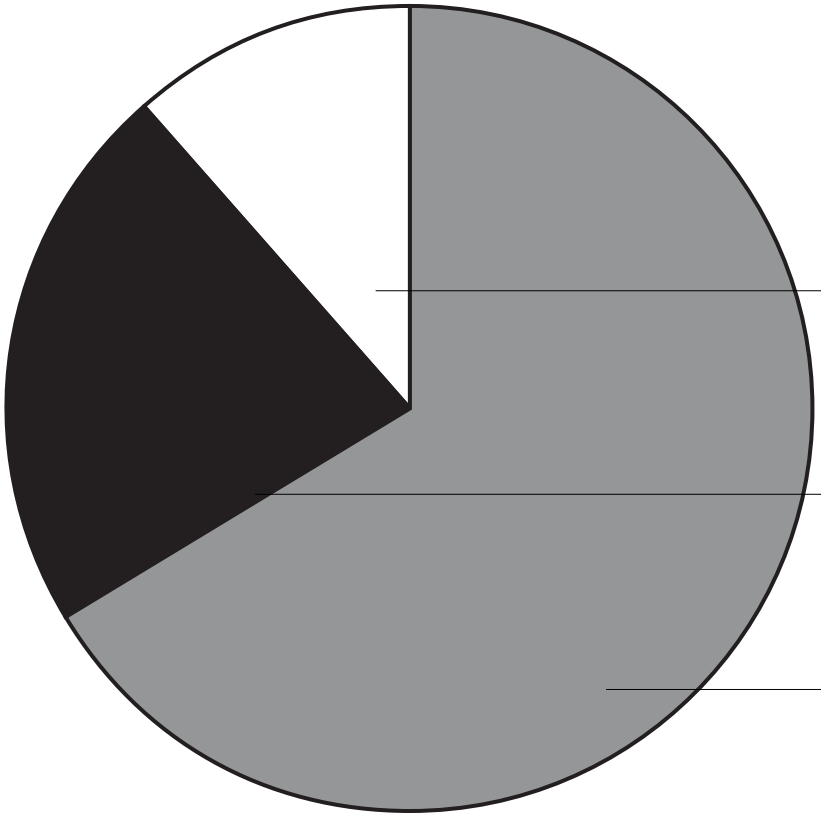
Jana Lamboy spends much of her time with nursery and greenhouse crop producers and enjoys working with these same plants in home and community settings, helping to solve problems in consumer horticulture. Jana's training in plant pathology and interest in beneficial microbes are a natural complement to Community IPM programs for landscapers, lawn care professionals, and homeowners.

Our communications team*, **Karen English-Loeb, Carrie Koplinka-Loehr, Liz Myers, Jill Shultz,** and **Mary Woodsen,** has over six decades of collective writing, graphic design, and marketing expertise. They produce everything from technical reports, webpages, and brochures to feature articles, radio spots, and fact sheets—publications that bring IPM information to practitioners and help raise the environmental awareness of all New Yorkers.

Photos, top to bottom (and left to right): Michael Hoffmann and Jennifer Grant; Lynn Braband and Jana Lamboy; Jennifer Grant and Carrie Koplinka-Loehr.

Distribution of funds

Community IPM Program 2000–2001



Dollars spent April 1, 2000–March 31, 2001

Public awareness

40,194

Research and development

77,641

Implementation

232,165

Project reports

Results of projects funded by the NYS IPM Program's grants program

IPM for home and community

— education

Advanced Pest Diagnosis Workshop

Project Leader: Gail Culver, Consumer Horticulture Educator

Audience: Attendees included 23 Master Gardeners and 5 Nursery Professionals

Date Of Workshop: February 8, 2001

Location: Cornell Cooperative Extension of Genesee County

Methods Used:

Four individual workshops were offered from 8:30 am until 5 p.m. on the date of the workshop:
A registration brochure was mailed to all nursery professionals within a 30 mile radius of Batavia, New York and all master gardeners from Orleans and Genesee Counties, as well as the Master Gardeners who just completed the 2000-2001 master gardener training. This included master gardeners from Genesee, Orleans, Wyoming, Niagara, and Erie Counties.

The schedule of the workshop was as follows:

8:00 am-8:30 am Registration/refreshments

8:30 am - 12 noon IPM Basics for the Master Gardener and Nursery Professionals
Presenter: Rochelle Smith, Extension Educator
Cornell Cooperative Extension of Orleans County, Albion, NY

12 noon - 1 p.m. Lunch break (lunch provided)

1 p.m. - 3:00 p.m. Hands on diagnostics and control recommendations
(Participants will have the chance to practice the basics learned in the morning session.)
Presenter: Vicki Jancef, Department of Ornamental Horticulture
Niagara County Community College, Sanborn, NY

3:00 p.m. - 4:00 p.m. Pesticide Misuse - Case studies by the Environmental Protection Agency Region 2

4:00 p.m. - 4:30 p.m. Using the Internet as a Diagnostic Tool, Websites to benchmark
Charles "Chip" Malone, Extension Educator
Cornell Cooperative Extension of Genesee County, Batavia, NY

4:30 p.m. - 5 p.m. Wrap up and evaluation of workshops.
(Post-test administered to determine effectiveness of the workshops. Evaluation also requested of all participants.)

Evaluation Process:

A pretest was administered to the participants prior to the workshop. A post-test was administered after the workshops to determine increase of the level of competency in pest diagnosis of the workshop participants. A final posttest will be mailed to the participants at the end of the 2001 growing season to determine if the participants did utilize the knowledge gained in the workshop.

Handouts and photos from the workshop are available on request.

Hudson Valley Garden Retailer Training

Project leader: Stephanie D. Mallozzi, Extension Educator, Cornell Cooperative Extension of Dutchess County

Sponsor: Cornell Cooperative Extension, Hudson Valley Commercial Horticulture Education Program.

Description:

Four educational sessions were held to introduce garden retailers to the integrated approach to plant health care. Thirty-two employees of Hudson Valley retail garden establishments received a total of 24 hours of IPM training.

A resource binder and hand lens were distributed to each participant. The resource notebook contained fact sheets and study guides that not only assisted participants with homework and class assignments, but also presented a valuable source of information sheets that were camera ready and printable for their clients.

Structure:

Classes consisted of lectures and practical lab work. Each topic included a framework for integrated pest management. Topics covered included the following:

- Satisfying Customer's Horticulture Information Needs
- Integrated Pest Management Basics
- Soils and Fertilizers
- Ornamental Trees and Shrubs
- Turfgrass Management
- Insects of Ornamentals
- Diseases of Ornamentals
- Structural Pest Management
- Annuals and Perennials Culture and Pest Management
- Vegetables Culture and Pest Management
- Marketing and Sales

Evaluations:

Program evaluations indicated that participants will utilize the principles of IPM before making pesticide recommendations. Pest identification, non-chemical management, and least toxic alternatives will be part of the process when employees assist their clientele. A follow-up survey is scheduled for mid-summer after the spring rush to assess how well participants put into practice IPM principles in their day to day job responsibilities.

Improving Diagnostic Skills through Regional Training Sessions

Project Leader: Karen L. Snover, Director, Plant Disease Diagnostic Clinic
Department of Plant Pathology, Cornell University, Ithaca, NY 14853

Objectives of the Project:
Improve disease diagnostic skills of Cooperative Extension Educators, Master Gardeners, and community members by conducting regional educational workshops.
Continue improving our web site and expand the fact sheet database.

Introduction:

Any Integrated Pest Management (IPM) effort needs to stress the importance of proper, accurate pathogen identification. Control method recommendations are often very specific depending on the organism causing the plant disease. An IPM approach to managing pathogens will only be successful if proper disease diagnosis is performed prior to taking any action to correct the situation. The Plant Disease Diagnostic Clinic at Cornell University has dedicated itself to providing the New York State community with plant disease diagnostic pathogen identification and education. To continue this mission and expand our audience, we have created a plan of development to improve our interaction with consumers and to increase the awareness of plant diseases among residents of our community through regional training sessions and expansion of our web based fact sheet database.

Procedures:

Improvement of disease diagnostic skills of Cooperative Extension Educators, Master Gardeners, and community members was provided by conducting regional educational workshops. To fulfill the need for regional training sessions, three sites for continued training were selected by determining, with the help of county extension educators, where the greatest need for such training exists and where the greatest impact may be obtained. The program effort focused on how to approach a plant problem and development of diagnostic skills. Through a discussion of a systematic 5 step technique, the most likely cause of a plant problem will be determined by considering the normal characteristics of a plant species or cultivar, by asking critical questions, and by observing the pattern of damage in the landscape, on an individual plant, as well as on an individual plant part.

Results:

With the help of a Community IPM grant in 1999, we were able to conduct four regional training sessions that brought diagnostic skill development to approximately 350 participants. In 2000, three training session were/will be conducted at SUNY Cobleskill, in Dutchess county, and at a yet to be determined site. These sessions are performed during the off season due to the down time available to the audience we hope to attract. At SUNY Cobleskill, students about to enter the world of industry were the audience for a discussion of determining when a problem may have a plant pathogen involvement. These students showed enthusiasm and participated in the

discussion. Faculty advisors present commented on the value of this presentation for these students. The presentation in Dutchess County will be directed at employees of garden centers that interact and are questioned by many homeowners on problems they find in their surroundings. Outcomes of these yet to be performed presentations will be forwarded to you at their completion.

The expected outcome of this project was to improve disease diagnostic skills for Cooperative Extension Educators, Master Gardeners, community and industry members. Improved diagnostic skills enables these individuals to make better decisions about the proper course of action to combat a pest problem. Our goal was to provide useful information that will allow individuals to make well-educated decisions when first determining what has caused a problem and then the best method of management of the problem. I believe this outreach program meets these goals.

Community IPM Discovery Center

Project Leader: Steve VanderMark, Cornell Cooperative Extension of St. Lawrence County

Abstract:

With Community IPM Grant support, the Center's design process began in the Fall of 2000 as part of the Extension Learning Farm facility assessment processes. Important factors affecting access were determined prior to construction plans. As such plans progressed, needs for further funding support was clearly identified.

Realizing the potential usefulness of the IPM Discovery Center, Kraft Foods has approved an additional grant of over $8,000 to complement the Community IPM Grants program support for this project. Also, the technology industry involving interactive computer kiosk facilities is continuing to expand, simultaneously offering improved technical options for the project's designs.

Progress is also underway with identifying, recruiting local expertise for the project's most technical aspects. Plans are to explore local college off-campus Service Learning Programs for ways student teams could help develop and test this project's computer application before the general public and agricultural use by the next season.

Report:

A Community IPM Discovery Center is being established at the Extension Learning Farm in Canton, New York. The center will contain print, electronic, and media materials, as well as a computer kiosk to explain the principles of community IPM. The Discovery Center will also include demonstration displays that demonstrate IPM principles. The center will be open to the public daily, except some weekends, and will be an integral part of the Extension facility's Agricultural Discovery Center, Ag Field Days, Harvest Festival, and Farm and Rural Life Week, each of which reaches over 1,000 individuals, both adults and students.

With Community IPM Grant support, the Center's design process began in Fall 2000 as part of the Extension Learning Farm facility assessment processes. Extension staff familiar with public access educational site design began integrating plans with other staff familiar with technology needs. Public access patterns were observed closely during a major Open House and demonstration event (Harvest Festival) in September to rate location points at the Extension Learning Farm for IPM Discovery Center. Important factors affecting access were determined prior to construction plans. Such plans would involve modifying a part of one of the Learning Farm buildings. As such plans progressed, need for further funding support was clearly identified and proposals submitted to the local agri-business industry.

Realizing the potential usefulness of the IPM Discovery Center, Kraft Foods has approved an additional grant of over $8,000 to complement the Community IPM Grants Program support for this project. Kraft recognizes the project's initiative for

experiential learning, innovation and best practices relative to the regional dairy industry, since part of the project's application will be aimed at dairy/agriculture producers. Such support will be vital to the project's construction during Winter 2000-2001.

Also, the technology industry involving interactive computer kiosk facilities is continuing to expand, simultaneously offering improved technical options for the project's design. Recent, new ideas from computer companies alone will provide improvements over original kiosk plans, while other supportive materials such as printed guides are also being updated. Design plans are incorporating such new developments as much as possible.

Progress is underway with identifying, recruiting local expertise for the project's most technical aspects. Primary department links are established with Clarkson University, Potsdam, and St. Lawrence University, Canton, to garner skilled assistance with computer kiosk development tailored for the project. Plans are to explore local college off-campus Service Learning Programs for ways student teams could help develop and test this project's computer applications before the general public and agricultural use by next season.

This project anticipates meeting the following objectives upon final construction for use in the 2001 growing season and beyond:

- Youth and adult North Country residents will access centralized IPM educational websites via a computer kiosk located in an IPM Discovery Center at the Extension Learning Farm.
- Youth and adult North Country residents will learn basic IPM principles and values through media and display items at an IPM Discovery Center located at the Extension Learning Farm.
- Educators and IPM specialists will have information concerning the number of contacts with their web sites via the kiosk.
- Agriculture producers will have access to up-to-date IPM best management practices through the kiosk.
- North Country resident knowledge of IPM principles will be significantly increased.

Community IPM Educational Resources

Project Leaders: Rosemarie S. Baglia, Diana K. Weiner

Collaborators: Gary J. Couch, Lynn Braband

Location: Cornell Cooperative Extension- Orange County

Objectives and procedures:

- To develop a set of IPM educational exhibits to be displayed at educational programs, events, and prominent locations throughout the community.

Designed and built display boards depicting general IPM principles, and different species of wasps, ants, ticks, and mice. These displays include information on lifecycles of these pests and how to control their populations using the least toxic and most environmentally sound methods.

- To compile a set of educational resources to assist CCE staff and volunteers in conducting IPM educational programs for the general public, schools, and municipalities.

Purchased a set of IPM educational resources including reference manuals and books, pest identification CD and video, educational brochures and preserved insect collections which were used at the workshop and programs listed above.

- To educate citizens of Orange County about principles of IPM.

Displays and resources were utilized as part of educational programs in Orange County such as School IPM Workshop (November 15, 2000, 30 attendees), Orange/Dutchess/Putnam counties Master Gardener training program (November 2, 2000, 39 attendees), Orange County Master Gardener meeting (November 15, 2000, 35 attendees).

Outcome:

Over 100 residents of Orange County became aware of IPM principles and have the capability to incorporate this information into their pest control practices in homes, schools, and municipalities. A follow-up survey to assess these changes in practices is planned for 2001.

The resources developed and obtained have assisted Cooperative Extension educators in delivering the IPM message to public school personnel, pesticide applicators, and Master Gardeners. These displays and materials will be utilized at future educational programs.

The Underground Theater Presents: "The Community Beneath Our Feet"

Project leader: Pat LaPoint, Extension Educator, CCE of Genesee County

Type of Project: Interactive hands-on play and narrative with accompanying activities

Description:

Our goal is to better inform students about soil and the organisms in and on the soil and also help them understand that the way we treat soil and plants makes an impact on our environment. The kit contains:

An original play for school age children where the audience becomes characters in the play.

A "how-to video" to help with background material; IPM information and ideas for developing the play, encouraging the facilitators to make it their own production.

Reproducible drawings of organism that the audience participants will wear.

An activity book ("The Bug-tivity Newspaper") that is passed out to the audience. It contains IPM and good-bug, bad-bug information, experiments and other fun activities for the family that helps them understand more about our environment and how the choices we make affect it.

While scripting the play we included a pre-test situation; when the plot of the play becomes apparent the audience is asked their opinion, by a show of hands, as to whether the main character (Ms. Talltower) should spray the weeds in her lawn. At the conclusion of the play, after all information has been shared and the audience participants are on the stage with the main characters, the audience is again asked whether Ms. Talltower should spray the weeds (post-test situation). The results are discussed in the evaluation section.

Objective and Implementation:

The play was performed at seven sites over the summer in various settings such as the Genesee County Fair, Head Start summer programs, summer recreation programs, a summer school assembly (over 200 students at this one!) and a summer library program. We feel the play has passed its pilot testing and evaluations follow in the report. Other facets of the project are complete and in the process of being duplicated for distribution.

As part of the implementation process, publicity notices were created and are making their rounds to various newsletters, displays and public presentations that pertain to the topic. We are creating a mailing list so we may send the completed package out shortly after the first of the year. We have requests in New York State and Ohio at this point. Some people are educators and Master Gardeners in Extension around the state, some are with IPM programs, also elementary school teachers with an active school gardening program, a science museum and farmers with edutainment activities on the farm.

Evaluations:

At this point evaluations will have to be from our pilot projects and performances over the summer. As stated before; we wrote a pre-test and post-test situation into the scrip. The pre-test showed that the audience was unsure what they felt; several would raise their hands when asked if Ms. Talltower should spray the weeds in her lawn, the neighboring kids would sometimes follow suit, if somebody seemed to raise their hand. At the end of the play during the post-test - when the audience was asked should Ms. Talltower dig out the weeds with her trowel and ask for advice from Master Gardeners at Cooperative Extension the hands were a resolving "yes" from the audience, no hesitation what-so-ever. While designing this project we realized we were reaching a student audience, however, they are accompanied by adults, who are also participating and getting the message. The 'Bug-tivity Newspaper' is also slanted for family participation. It has a message about integrated pest management, understanding insect life cycles, good bugs and bad bugs and experiments and activities in a fun filled format.

In situations such as the County Fair where the play was repeated several evenings in a row, we watched kids come back each night to be a part of the fun.

The "Bug-tivity Newspaper" is being printed now, we will also test this on students to see their reactions. The 'how-to video' has been reviewed and is in the process of being duplicated at the moment. Distribution to people on the mailing list will begin shortly. In public educator presentations and casual conversations alike; the response has been overwhelmingly positive.

"We have been looking all over for something like this! How soon can we get a copy?" "I have often thought about doing something along these lines but was afraid I would do something wrong, now you have solved the problem". "Please come back next summer and be a part of our programming". "Hurry, I need this for after school programming."

At this point, this is informal and anecdotal evaluation. I will include a survey with the materials when distributed in hopes people will give us hard copy information. We will be glad to share more formal evaluations when the kits have been distributed, used and surveys are returned. I work with the New York State Agriculture in the Classroom and am an educator with Cooperative Extension. I know from the materials available that this is something new and will be widely used by educators, 4-H Clubs and Master Gardener programs.

Analysis:

Grant monies have been used frugally, fifty kits are being prepared for distribution along with an evaluation survey to be returned after use. We are unable to anticipate demand and are concerned how to fill requests when the initial kits are gone.

Lawn Ranger Volunteer Training

Project Leaders: Todd Schongalla, James Lee and Joe Heller, CCE of Westchester County and Marjorie Keith and Jason Dampier, CCE of Putnam County.

Collaborators: Dr. Frank Rossi and Evie Gussack, Cornell University Turfgrass Extension Team. Rod Ferrentino, Community IPM Coordinator. Gary Couch, Southeast Area IPM Educator. Dr. Tamson Yeh, CCE of Nassau. Westchester County Pest Management Committee.

Location: Westchester and Putnam Counties

Objectives:

CCE of Westchester and Putnam counties seeks to protect drinking water and human health by training homeowners in best management practices for the use of pesticides and fertilizers through the implementation of the Lawn Ranger Volunteer Training Program. With the help of Dr. Frank Rossi, Evie Gussack and Cornell Media Services, we have developed a new consumer-oriented lawn care training program that will be delivered by a corps of CCE trained volunteer educators. After receiving training, our Lawn Ranger Volunteers will provide free educational programs focusing on establishment and maintenance of healthy lawns with an emphasis on environmental stewardship. Two goals will be paramount: reducing pesticide and fertilizer use, and helping homeowners understand how their lawn care practices affect water quality.

Methods:

Since receiving an initial grant from the Westchester Community Foundation, project leaders and collaborators have spent a year and a half developing the "Home Lawn Care Almanac." This 24-page guide encapsulates the most important information for home lawn care each month. The Almanac provides much of the drawings, diagrams, and content for the slide show talk, which Dr. Rossi has completed. The almanac was conceived by CCE staff and written by Dr. Rossi and Evie Gussack. Final editing, desktop publishing, and art work for the Almanac has been completed by Cornell Media Services. The “Home Lawn Care Almanac” is now available as item number 141S2 from Cornell Media Services, and a copy has been sent to each of the extension associations in the state as an example of a recently completed publication from Cornell Media Services. The almanac has received very positive comments from the people who have so far seen it. In order to move this project to completion, CCE staff and Dr. Rossi provided more than $10,000 of in-kind work. The Westchester Community Foundation funds originally allocated to develop this program are being used to pay for Media Services' work.

The training sessions for the Lawn Ranger Volunteer Program began on March 27, 2001 with Dr. Frank Rossi training the first class of Lawn Ranger Volunteers. This half day train-the-trainer program also served as an in-service opportunity for extension educators from other counties in the Hudson Valley. Volunteers who work with extension in other counties in the Hudson Valley were also invited to attend

this educational event. Our Lawn Ranger Volunteers were thoroughly trained in subject matter and delivery of the 45-minute slide show presentation.

These volunteers will give the program for free to any community group that requests it in Westchester or Putnam County. Each of the volunteers agrees to deliver a minimum of two Lawn Ranger Training programs for the public. Our experience with Master Gardener Training suggests that most of those we train will do more than two talks. In the beginning, CCE staff will provide talks to key audiences to create public awareness and demand for the program. The Lawn Ranger Program has already received much attention from extension associations in surrounding counties.

Recently, the New York City Department of Environmental Protection provided a contract to help cover volunteer training and management and posting the "Home Lawn Care Almanac" on the web. (http://www.hort.cornell.edu/gardening/lawn/almanac/index.html) We do believe though that attending a 45-minute talk will not be sufficient to change people's lawn care practices, and that the Almanac is a crucial piece of this educational program. The Almanac was created to reinforce what homeowners learned in the talk at the appropriate time of the year. The $1500 in funding received from NY State IPM was used to purchase a total of 214 “Home Lawn Care Almanacs” at a cost of $6.99 each from Cornell Media Services. During the next two years, we will give these copies away to our Lawn Ranger Volunteers and homeowners who attend the initial Lawn Ranger Volunteer Training classes in Westchester and Putnam Counties. Copies will also be given to members of the Cornell University Extension Turfgrass Team, NY State IPM Program staff, and CCE staff in surrounding counties for them to use as a resource, and to publicize the Almanac and the Lawn Ranger Program.

Sessions on May 21 and August 14, though not technically part of reporting year, presented an overview of the Lawn Ranger Volunteer Program to the public.

Outcomes:

Evaluations from all three events were highly positive. We plan to change home lawn care practices in Westchester and Putnam Counties by providing 45 minute talks and the “Home Lawn Care Almanac” to homeowners who want to learn how to grow and maintain a healthy lawn without endangering water quality and human health.

Integrated Pest Management for Greener Lawns and Landscapes

Project Leader: Kristen Stewart, CCE Schuyler County

Objective:

1. Provide education to homeowners, Master Gardeners and those interested in maintaining lawns and landscapes in an environmentally sound and safe manner.

2. Set up a workstation to allow individuals to research insect identification information and integrated pest management resources.

Impact:

A workshop was held on October 2, 2000 to educate individuals on practices to reduce pest and disease problems, winterizing your garden and composting. Workshop presenters were Kristen Stewart, Agriculture Educator and Michelle Benjamin, Recycling and Solid Waste Coordinator, CCE Schuyler County. Hands on instruction at the CCE-Schuyler County compost and garden demonstration site complemented classroom instruction.

A workstation has also been established to allow access to individuals, Master Gardeners, and CCE staff on IPM and home horticulture resources. The workstation includes a desk, chair, and resource materials. Future plans include a computer to allow on-line access to Cornell and IPM resources. The workstation compliments a dedicated soil test and microscope lab area that is used on a regular basis by CCE staff.

Workshop topics included:
2000 gardening season
Identifying insects and diseases
IPM practices to reduce insect and disease damage
Cleaning and winterizing garden for 2001 growing season
Building and maintaining compost bins
Basics of composting

Of the fifteen program participants, 13 were new to Extension programming. The participants' backgrounds varied with a majority being home gardeners and/or composters.

Evaluations were completed. Of the fifteen attendees, twelve turned in evaluations. On a 1-5 scale with 1 being poor and 5 being excellent, the class received an evaluation of 4.7.

Conclusion:
It was determined from class participants that additional programming and resources on pest control, eco-gardening, organic gardening and composting would be well received. Hands on activities were recommended as a more popular teaching tool on such topics.

Project reports

Results of projects funded by the NYS IPM Program's grants program

IPM for school and municipal facilities

— education

— research and development

Putting IPM to Work in Schools and Institutions

Project Leader: Amy Ivy, Cornell Cooperative Extension, Essex County

Collaborator: Lynn Braband, Extension Educator, NYS IPM Program

The Need

There is increasing awareness of and interest in reducing pesticide use in schools, institutions and public places. Most of the schools in the Clinton, Essex and Franklin County region are small and grounds staff is unable to attend regional turf programs offered in Albany. They need a day-long program within an hour's drive to learn about IPM programs and how they could put them to work in their facilities. Some schools have adopted a "no pesticide" policy. One school had a chemically sensitive student who had to be tutored at home. The interest and need for this kind of program is definitely there.

The Response

In response to this need, Amy Ivy, project leader and Extension Educator in Essex and Clinton Counties and Lynn Braband, project collaborator and Extension Educator with the NYS IPM program in Geneva, designed a day-long education and awareness program, *Putting IPM to Work in Schools and Institutions*. The objectives of this program were to explain why and how to initiate an IPM program, to teach specific IPM management strategies for structures and grounds and to convince managers to adopt an IPM program at their facility. In addition, Master Gardener volunteers who answer homeowner questions on household pests and yard care also benefited from this learning opportunity.

The day-long program ran on February 13, 2001 in Plattsburgh, NY, from 9:00-3:30 and covered the following topics:

- District Policy Development – Lynn Braband, NYS IPM Program
- Regional DEC Pesticide Rules & Regulations – John Bennett, Region 5 DEC
- Common Problems with Woody Landscape Plants – Amy Ivy
- IPM for Indoor Pest Problems – Rich Muscarella, Pest Control Consultant, Buffalo, NY
- IPM for Turf and Athletic Fields – Jennifer Grant, NYS IPM Program

Ninety-eight percent of the evaluation respondents rated these segments as very helpful to them.

The Audience:

A total of 32 people from the industry attended, plus 9 Master Gardeners. The breakdown is as follows:
19 from public schools grounds & maintenance staff
4 from hospital grounds & maintenance staff

2 from DEC
6 from summer camps, campgrounds and public parks
1 from the horticulture department of a correctional facility
10 Master Gardener volunteers

This was the first program held by Cornell Cooperative Extension in Essex or Clinton County that attracted such a large public school audience. Within a few months since this program 4 attendees have called our office with follow-up questions. This program was successful in connecting with this new audience and establishing Extension as a credible local resource.

Evaluation responses included the following audience information:

The topics that were of particular interest to them before coming to the program were pest management policy development and DEC updates, closely followed by turf and athletic field management and indoor pest management. Problems with landscape plants was listed by one third of the respondents.

Just over half the respondents indicated they used pesticides only as a last resort, a third said they applied them as needed, one never uses pesticides. Just over half use a pest control company to apply pesticides and the other half applies them themselves.

In the Before and After section of the evaluation, 19 out of 22 respondents indicated an improvement in their understanding of How to adopt a pest management policy and How to manage pest problems indoors, followed by 18 respondents whose understanding increased about DEC rules and regulations pertaining to schools and public buildings and How to avoid problems in the landscape. Sixteen respondents increased their understanding of how to decide if a pesticide is necessary to control a problem and how to manage athletic fields.

Here are topics they would like to see covered in future IPM programs:

- turfgrass and its care
- athletic fields
- more on turf IPM
- More on IPM
- walk throughs, what to look for, how much is too much? Pest thresholds, management techniques
- Continued topics on ice storm damage
- More on natural controls, less on pesticides
- More on 3a ornamentals and turf, recert credits in Plattsburgh and Glens Falls area
- Set up a program in one school district and initiate some training
- Raccoons, bats, skunks

Program Outcomes:

As a result of this program:

The communication and collaboration between public school maintenance departments and Cornell Cooperative Extension was enhanced. Twelve new schools learned of the resources available to them from their local county Extension offices.

Many attendees did not realize until this program that they could not use even wasp spray without being certified. It became obvious from watching the audience's faces and reactions that many of them have not been in compliance with NYS pesticide laws. This program definitely increased their awareness.

Many attendees did not know much about the pests they are trying to control. Many commented during the section on indoor pests about using foggers over the weekends to control lice in the classroom. Lice control strategies were an excellent real-life illustration to them about how important it is to know the life cycle of the pest you are trying to control before choosing a management plan. Some of the new contacts for our office didn't know until then they could have called us for this life cycle information.

A request for follow-up training was made by the BOCES Health and Safety Officer, Dan Riley. We arranged a day-long training in June with Lynn Braband and Jennifer Grant specifically for schools, to explain which products fall under the 48 hour notification law and what it would take for each school to certify at least one person in their maintenance department.

As a result of the June program, we are coordinating a 30 hour training program for the fall of 2001 to get school staff certified. Our purpose is to allow staff to quickly deal with a pest problem quickly, with least toxic products, to avoid having to call in a PCO and wait until they can get there.

Here are some specific practices that they used to do that they would no longer do as a result of attending this program (from the program evaluations):

- Spray insects with over the counter sprays (in school)
- Be careless with spray cans
- Use lice killer on fabric and carpets
- Dig hole for trees deep instead of wide
- Fog for lice
- Waste time fertilizing trees
- Spray bees
- Apply pesticides on all greens as a preventative if pest is found on 1 or 2 greens

Here are some practices that they learned at the program and plan to use in the future (from the program evaluations):

- Care of trees
- IPM on indoor pests
- Ant control with bait
- Endopytic grasses
- Question pesticide salesmen on amount and quantity of pesticides to use
- Not worry about fall webworms
- Use least toxic pesticides like boric acid instead of more toxic pesticides
- Use specific types of bee and mouse traps
- Manage pests indoors with the least amount of pesticides
- Be aware of potential allergic reaction to pyrethrin spray

In Summary:

This program was a success because it made new connections between public schools and their local Cornell Cooperative Extension offices, made some people aware that some of their pest management practices (i.e. using wasp spray) must stop until they become certified, convinced many people that becoming certified would actually improve and simplify their pest control problems by enabling them to deal problems in their earliest stages, and illustrated how valuable it is to know about the pest or problem you are trying to control.

Facilitation of School District IPM Implementation

Project Leader: Lynn Braband, Extension Educator, NYS IPM Program

Collaborators: Livonia School District, Genesee Valley BOCES, and CCE of Livingston County

Introduction:

In late 1999, the Livonia Central School District in Livingston County was identified as a partner for the development of a comprehensive school IPM program. Genesee Valley BOCES personnel recommended Livonia because of the probable good cooperation of the school administration and the district's desire to reduce pesticide use. Initial meetings identified the needs and objectives of the partnership.

Objectives:

A. Facilitate adoption of a district pest management policy.
B. IPM training of district and pest control personnel.
C. Assist general implementation of IPM.
D. Conduct a focus project on mice.
E. Conduct a focus project on lice.
F. Conduct a focus project on ants.
G. Hold an educational meeting on district property.

Results:

Pest Management Policy Adoption: I provided school administration with two written model policies. In November, I was informed that the school board will be considering a policy. I provided feedback to the proposed policy. To my knowledge, board discussion of the policy is still pending.

IPM Training: The plan was to conduct an inservice for Livonia buildings and grounds personnel, cafeteria staff, and pest control contractors. One complication is that the district has been without a structural pest control contractor for much of the year. I did propose to the school administration that we hold an inservice for their staff in November or December, but that did not materialize.

General IPM Implementation: The focus was on the primary school. In January, together with personnel from the school district, CCE of Livingston County, and Orkin Pest Control, I conducted an inspection of the general exterior of the primary school plus the kitchen, cafeteria, and teachers lounge. The building exterior was in generally good structural condition and the kitchen was very clean. I provided the school superintendent of buildings and grounds with a written report containing specific recommendations. Many of the recommendations (especially exterior exclusion) have been implemented.

Monthly, I have been inspecting the exterior of the primary school looking for signs of pest problems. When found, these have been reported in writing to the school administration.

The lack of a structural pest control contractor has impeded implementation of IPM. The school district has recently signed a contract with a company that sounds promising. I will be meeting with their manager this coming January.

At the request of the school district, I provided some input into stinging insect management at the middle school and the high school.

Mice: In late August, I set 9 pairs of mouse snap traps around the foundation of the primary school to monitor mouse activity. These traps were checked weekly through early November and less frequently since then. A total of four mice (3 *Peromyscus* and 1 *Mus*) were caught. Exclusion recommendations were made at one location where two of the mice were caught.

In December, I started replacing the snap traps with up to 18 tamper-resistant bait stations containing a non-toxic monitoring bait. This method has been around for a few years but has not been extensively adopted by the pest control industry. I wish to evaluate the method's efficacy as a monitoring tool.

Lice: I have met with the primary school nurse and received a copy of her current policy and recommendations concerning lice. I have provided some initial input and will be pursuing this further.

Ants: The objective was to work closely with the school's pest control contractor on ant IPM. Again, the lack of a contractor for several months prevented this.

Educational Meeting: On October 26, a half-day workshop was held in the school district. More than 30 school and BOCES personnel attended. The demonstration was described along with the stinging insect project (Livonia was a cooperator with that also). The workshop included a two-hour tour. Written evaluations were positive with appreciation especially being expressed for the information on stinging insects.

Impact:

To date, the greatest impact has probably been the educational meeting which served as a forum for school pest managers to interact on implementing IPM.

Future Plans:

A) Work with the school administration and school board on the adoption of a district pest management policy.

B) Work with the district's new pest control contractor on implementing IPM with a focus on ants.

C) Work with the school nurse on updating the school's lice policy and educational literature.

D) Continue the mouse focus project especially the evaluation of the non-toxic bait monitoring stations.

E) Hold another educational meeting next fall to highlight the demonstration project to others outside the Livonia School District.

Orange County School IPM

Project Leaders: Rosemarie S. Baglia and Diana K. Weiner, Extension Educators, CCE of Orange County

Collaborators: Lynn Braband and Gary J. Couch, Extension Educators, NYS IPM Program

Location: Cornell Cooperative Extension of Orange County

Objectives and Procedures:.

- To determine the awareness level, knowledge, and current status of IPM practices in Orange County schools.

Conducted a survey of school superintendents, administrators, and building and grounds personnel to assess their level of awareness and knowledge of IPM principles, and current school IPM practices. A follow-up survey is planned for 2001.

- To develop IPM educational programs for schools to increase the level of awareness and knowledge of IPM principles, and enable school personnel to make informed decisions regarding pest control methods.

Utilized survey results to develop a school IPM educational program tailored to meet the educational needs of Orange County school personnel. A school IPM workshop was conducted to address the educational needs of school personnel (November 15, 2000, 30 attendees). This workshop focused on pesticide regulations, developing school IPM policies, and structural IPM issues. Workshop evaluations were conducted and analyzed. Another workshop is planned for February 2001 to address athletic field issues and ornamental IPM.

Outcome:

CCE educators acquired baseline data on awareness and knowledge of IPM by school personnel from the survey. The survey indicated that most schools in Orange County contract with Pest Control Operators for structural pest control, but most athletic fields and grounds are maintained and treated for pests by school personnel. Sixty percent of the survey respondents indicated that their district did not have a pest management policy. Thirty three percent were unaware of the new mandatory 48 hour pesticide application notification law as it applies to schools. Data can be compared with a follow-up survey to evaluate increased knowledge for individuals attending IPM educational programs.

Orange County school personnel became more knowledgeable about IPM principles and practices by attending the fall school IPM conference and given the knowledge they need to develop and implement IPM programs for their facilities. Twelve out of seventeen attendees listed at least two IPM practices they intend to use within the next year as a result of the workshop. Valuable contacts were made with school personnel for potential on site demonstration projects and future programming efforts.

IPM Workshops for Schools and/or Municipal Properties

Report on a Community IPM Project

Project Leader: Lynn Braband, Extension Educator, NYS IPM Program

Collaborators: Selected BOCES and county CCE's, Community IPM Working Group members

Introduction:

Reducing risks from both pests and pesticides in schools is an increasingly important issue in NYS and nationally. Similar attention is developing concerning pest management on municipally owned properties. Activities include action by local, state, and national legislators and agencies. A variety of private activist groups are also focusing on how pests are managed on school and municipal properties. When pesticide reduction efforts are encouraged or mandated, assistance is needed in the administration and implementation of IPM. The Community IPM Program has held IPM training workshops for the past two years in several locations throughout the state. Feedback from these workshops plus other surveys have revealed the desire and need for continued IPM training of school and municipal personnel.

Objectives:

Develop and conduct four workshops that provide instruction on implementing IPM in school and/or municipal settings. The workshop locations will be distributed throughout NYS. Two workshops will be in the summer/fall of 2000 while two will be in winter of 2001. Presentations will be made on the concepts and tenets of structural, turf, and landscaping IPM. The audience will interact with successful IPM practitioners. Pest management tools that fit into an IPM program will be demonstrated. As a result of the workshops, participants will have improved their abilities to implement IPM.

Results:

Availability of the DEC municipal non-toxic pest management training grants affected the "market" for municipal outreach. Thus all four workshops were focused on school IPM. There was an excellent distribution of the workshops with one each in eastern, western, southern, and northern NYS. Following is a synopsis of each workshop.

Location: Castleton, Rensselaer Co.
Date: October 23, 2000
Collaborator: Questar III BOCES
Number of participants: 20

Location: Fredonia, Chautaqua Co.
Date: January 25, 2001
Collaborator: ECC BOCES
Number of participants: 40

Location: Binghamton, Broome Co.
Date: February 6, 2001
Collaborator: BDT BOCES
Number of participants: 25

Location: Philadelphia, Jefferson Co.
Date: February 12, 2001
Collaborator: CCE of Jefferson Co.
Number of participants: 20

Impact:

In the workshop evaluations, all respondents reported an increase in their pest management knowledge. Most rated the individual sessions highly. Individual respondents indicated several IPM practices that they plan to implement including new turf practices and IPM policy development.

Current Pest Management Practices of School Districts in NYS

Project Leader: Lynn Braband, Extension Educator, NYS IPM, Geneva, NY

Collaborators: NYS Dept. Education, NYS Dept. Health, Cornell University faculty, USDA National Agricultural Statistics Service

Introduction:

Some NYS school districts have successfully adopted IPM. However, other districts have had problems in adopting pesticide-reduction programs or still depend upon "conventional" pesticide treatments. A comprehensive picture of the status of pest management needs and as a baseline for measuring changes.

Objectives:

A draft survey had already been developed before this grant. The draft had also been pilot tested in a few BOCES and school districts. Cornell faculty and computer support personnel will be consulted concerning the survey's final draft, administration, and analysis. The target audience will probably be school district superintendents of buildings and grounds. Once developed, the survey will be distributed, collected, and analyzed.

Status:

I interacted with several Cornell agencies and faculty about the survey. Mike Duttweiler, in particular, provided helpful feedback on question design. I also approached the National Agricultural Statistics Service (NASS) about the possible role they might play.

In November, I learned that the State Education Dept. and State Health Dept. were planning to administer a survey very similar to ours. In December, I met with representatives of these two departments to plan a combined survey. We redesigned the survey to fit all our needs.

In February, the State Education Dept. mailed the survey to all public school districts in NYS. In March, a second mailing was sent to school districts that had not responded. During the spring, a telephone survey of the remaining school districts was undertaken by NASS. Response rate of the total survey was over 70%. The State Health Dept. has coded the results and is currently conducting an initial analysis.

Stinging Insect Pest Management: Pilot IPM Project in New York State

Project Leaders: Lynn Braband, Extension Educator, NYS IPM Program; Carolyn Klass, Extension Associate, Cornell University; Joyce Rodler, Extension Educator, CCE of Suffolk County; Jody Gangloff-Kaufmann, Extension Educator, NYS IPM Program

Cooperators: Staff at: Livonia Primary School, Livingston Co., Glenmont Elementary School, Albany Co., Turnpike Elementary School, Rennselaer Co., Pat Cozzarin Pest Management, pest management company for South Hill and Belle Sherman Elementary Schools, Ithaca, Coddington Center Pre-School, Ithaca, NY, Connetquot School District (Junior High and two elementary schools), Bohemia, NY, Huntington Recreational Association, Suffolk County Educational Farm, and the Suffolk County Minimum Security Facility.

Introduction:

In many parts of the U.S., stinging insects are reported to be one of the most common complaints in public places and especially in schools. A variety of problematic species of stinging insects can invade parks and school grounds, including paper wasps, cicada killers, ground-nesting bees, and yellowjackets. The fierce and numerous varieties of yellowjackets generally pose the most threat to children in such locations. Severe allergic reactions can result from a few stings, potentially leading to anaphylactic shock and death in a few individuals. Approximately 40 deaths occur every year in the U.S. due to severe reactions to yellowjacket stings[1]. This is a risk most parents do not want to take. Equally important is the risk of exposure to pesticides used to control dangerous and nuisance insect pests. Increased public awareness of the potentially harmful effects of pesticides has led many schools, towns, counties and states to enact laws to reduce or eliminate pesticide use within schools.

This project was designed to acquaint us with social stinging insects and test a program of non-toxic monitoring, and management in such a way as to promote integrated safe techniques to schools and other institutions.

Objectives:

- Monitor and identify stinging insect pests at sites
- Remove nests with water or by hand
- Use plant oil-based spray, and cultural or mechanical techniques for control after hand removal
- Use traps for capturing yellowjackets
- Evaluate results of managed versus unmanaged sites
- Report results

[1] Reisman, R. 1995. Hymenoptera. *Immunology and Allergy Clinics in North America*. 15(3): 567-574

Results:

Monitoring: Inspection and monitoring were the first steps of the program of each individual in this project. Each site was evaluated at some point in the spring after wasps became active (earlier in the two northern regions, later in the two LI portions, due to a very cool spring). It was consistently found that paper wasps are the earliest visible pests around buildings and early in the summer, yellowjackets are difficult to find. During mid-summer, bald-faced hornets become more obvious, as paper wasp nests continue to grow. At the end of summer and through the warm days of fall, the most serious problem lies with yellowjacket nests, which have secretly become enormous.

Various structures were used by paper wasps for nest building; the most common requirement seemed to be warmth. Paper wasps will nest in metal tubes, even if nest size is limited. An old metal tractor sitting in full sun had numerous nests and wasps swarmed the defunct vehicle if it was bumped. Another old tractor only feet away from the first, but located in almost total shade, had no signs of wasp nests. Sunnier sides of buildings, facing south and east or sometimes west were prime locations for paper wasps and yellowjacket nests.

The timing of inspections was evaluated and it was determined that weekly visits were no better than semi-weekly or even monthly visits. However, there was some build-up in wasp numbers during absences. Since yellowjackets are difficult to find in low densities, it might be wise to devote more time to yellowjacket monitoring during late spring, using traps or other attractive bait and visual inspection. Early detection of yellowjacket nests will be the biggest challenge in monitoring and prevention of stinging insect pest problems in early and mid fall when school is in session.

Removal: In all locations, nest removal was the second step in stinging insect management. Paper wasp nests were the most obvious and easy to find. Each investigator got a feel for predicting the locations favored for nest building, and was able to uncover hidden paper wasp nests. Water sprays and hand removal were used to knock down nests and this was reported to be effective. One investigator used a 12-foot pole with a hand made hook on the end to pull down wasp nests after treating them with water or mint-oil spray (see low-toxic controls).

Wall and ground-nesting yellowjacket nests were nearly impossible to remove. In one case, an investigator treated and dug up an underground yellowjacket nest. He reported that this was a difficult task. Although digging up the nest was highly effective for elimination of the problem, the process was probably unrealistic.

In two cases at the Suffolk County Educational Farm, bald-faced hornets were encountered and nests needed to be removed. One was apparently treated with a can of pesticide before we got to it. A bee suit was recommended for nest removal and in both cases, a clear plastic bag was slipped over the nest and the nest was cut out of the foliage. An effective way of dealing with a plastic bag full of hornets in summer is to carefully tie off the bag, place it into another plastic bag, and place the whole thing in a sunny location, away from human activity. The wasps will eventually be killed from excessive heat.

Low-Toxic Pest Control: All chemical and cultural or mechanical control tactics are included in this section and there were a variety employed in this project by each of the investigators. Each individual was given a supply of mint-oil wasp spray. This was a reliable line of defense for all situations involving stinging insects. Wasps could be knocked down from nests in a variety of situations without the risks associated with pyrethroids or organophosphate insecticides. Yellowjackets could be temporarily suppressed at the nest entrance, though this did not work for very long. Another formulation of plant-based oil was available in a dust formulation and was used by one investigator for wall void yellowjacket problems. This appeared to be very successful and will be used again.

In the case of the old tractor infested with paper wasps, time and patience were needed to repeatedly spray mint oil, then remove nests and seal up openings used by wasps. A combination of steel wool and expanding foam spray were used to block the many entrances into this favored nesting site. Care was then taken to improve the appearance of the tractor after sealing. Spray foam can be unsightly and usually needs to be cleaned up and disguised. The end result was successful. Sealing up nesting locations will be extremely useful on the playground and in fences in any areas where wasps build nests.

In the case of one school with a significant yellowjacket nest in a window casing near the playground (highly sensitive site) staff of the school attempted to block the opening with silicone caulk. Yellowjacket workers quickly chewed their way through the caulk leaving behind a pile of silicone rubble. It was recommended that this school employ a professional and do what is necessary to kill the insects before closing up the nest entrance. They were told of the potential that wasps could make their way inside the school if the outer entrance were totally blocked.

Another technique commonly referred to is the use of a glass jar or bowl over a yellowjacket ground nest entrance to fool the wasps into starving the nest. It is said that wasps that can see daylight will not attempt to create a new entrance and will therefore starve. We attempted this at the SCEF with a ground nest in a large empty lawn. We found that while the yellowjackets became confused (and not especially agitated) they did dig a new entrance in two days. Repeating this experiment by covering the new entrance with sand worked very slowly, took several weeks to suppress, and therefore would not be recommended as a means of controlling ground-nesting yellowjackets. Other techniques will need to be evaluated in the coming season for ground nests, including the use of a vacuum or large volumes of sand only.

Other issues, including landscape management, play a significant role in stinging insect management. At one location, milkweed plants growing outside the classroom were attracting wasps foraging on honeydew from pest aphids. Removing aphids and honeydew did not work completely due to the foraging memories of wasps still patrolling the area. Eventually the milkweed plants were removed. Many schools and educational facilities have gardens and flowering landscapes that will attract foraging insects of all kinds. However, to date, no issues have come up regarding stinging insect problems associated with gardens.

Of great concern and probably the most important factor in stinging insect pest problems is waste management and sanitation. Garbage residues attract wasps for many reasons. Sanitation is the most difficult challenge; especially regarding commercially provided dumpsters. Each investigator made several recommendations for cleaning, requesting clean dumpsters, waste residue management, and use of lids on containers. This will be an ongoing challenge and several tactics will be evaluated in the coming project year.

Trapping: Although each investigator used trapping for wasp control, and found great numbers of wasps trapped at most locations, this technique was the most difficult to evaluate. We quickly learned that 1. Traps do not work in shady locations, 2. Traps mainly catch yellowjackets and smaller numbers of other species, and 3. Traps need to be serviced at least once a week for best effectiveness. We do not know whether traps simply attract more foragers to the area or if they are attractive enough to draw attention away from other food sources, such as garbage.

All investigators used the same type of trap that included a pre-made single-use tube of bait. The formulation was meant to attract yellowjackets but it only lasted about a week. To save on resources, we each filled traps with different combinations of fruit juices. Citrus juices, apple, and pineapple juice were very effective, although trap location and weather were usually more important factors. One trend became obvious, the more traps placed in a heavily infested location, the more wasps were caught. Numbers caught were in the thousands per location during the project period. However, we were not able to assess whether the foraging population had actually dropped. In one location, the Suffolk County Minimum Security Facility, inmates and Officers did report that they were very pleased with the noticeable reduction in wasp numbers on their loading dock, which is closely flanked by five dumpsters. Over 20 traps were placed on the perimeter fence surrounding the jail yard.

Overall, trapping appeared to be an accessory tactic in stinging insect control and fine-tuning of bait choice and trap placement will be necessary to maximize the usefulness and strength of this tool.

Impact:

The impact of this pilot project was significant. As a new endeavor, each investigator was able to learn the nuances of working with stinging social insects, as well as the practicality of using several methods to manage them. In many cases, building staff followed us around to point out nests or to observe the efforts of our team. Each participant took the opportunity to explain the purpose of the project and made recommendations for non-toxic approaches to stinging insect management. This project has helped the team identify priorities, parameters, recommendations, and warning signs of wasp problems. Reports and recommendations were sent to each of the facilities that participated in the study and follow up visits will be made in the coming months to prepare for the next season.

The reduction of pest problems as a result of the work done in this project was visible as compared to no management; however, we do not know how these efforts compare to conventional stinging insect control.

Conclusions:

- Monitoring should be done on a semi-weekly or monthly schedule from a date in early to mid spring through the fall, with added emphasis on location of yellowjacket nests in late spring or early summer.
- Nest removal is extremely helpful, but established wasps are persistent and follow-up visits are a must to prevent nest re-building.
- There are a variety of low-toxic control methods available and more to come. Mint oil spray, although effective on contact, has no residual effect and therefore was not as effective as we had hoped. Use of tree-oil dust will be very handy for wall void nests.
- Landscape alteration and waste management handling are important issues that can be investigated further for practical solutions.
- Trapping may be limited in usefulness, especially when preferred food sources are available.

Future Efforts:

1. Look at methods that help improve trap usefulness, such as timing and location of placement, especially in regards to nest location.
2. Learn more about the biology of these stinging insect pests.
3. Identify realistic, low-toxic solutions for wasp control in the vicinity of dumpsters that will work in addition to cleaning such areas.
4. Increase the number of comparison sites (managed vs. unmanaged buildings).
5. Expand efforts in exclusion and sanitation, and use of vacuuming as a tool.
6. Look into an experimental use permit (from NYS DEC) for tree oil dusts on ground nesting yellowjackets.

Project reports

Results of projects funded by the NYS IPM Program's grants program

IPM for public parks, golf courses, and athletic fields

— education

— research and development

Integrated Pest Management Field Day: Focus on Diagnosis

Project Leaders: Brian Eshenaur and Sharon Rosenblum, Extension Educators, CCE Monroe County

Collaborators: Monroe CCE horticulture staff; Jerry Bond, Nancy Schewenzer, Elizabeth Berekeley, and Pam Hyman, Genesee Finger Lakes Landscape and Nursery Association; staff from the New York State IPM Program; Cornell-based faculty and staff.

Location: Monroe County

Abstract:

Since accurate diagnosis is the first step in IPM, improving diagnostic and scouting skills in landscape situations were the key objectives of this project. This was a regional day-long workshop. It was held in the meeting facilities and on the exentensively planted grounds of Sonnenberg Gardens in Canadaigua NY. The program began with formal presentations. This was followed by hands-on field activites, such as scouting, which were conducted in the landscapes of Sonnenberg. Insects, diseases and cultural problems were viewed in the situations where they naturally occur. Pest management options were discussed both in formal presentations and in the field.

A total of 67 people attended this workshop. This project was successful in reaching the targeted audience with 83% describing themselves as professionals from commercial landscape or lawn companies

The evaluations indicated that the participants walked away with practical knowledge to apply in their workplace. The speakers emphasized the concept of thresholds. Apparently this concept was successfully communicated as one participant's response to the open-ended question in the evaluation**:** "*One useful item I learned about that I would use on my job is…*" "Sometimes treatment of an insect pest or disease is not necessary." This summed up the feelings of many in attendance.

Objectives:

The objective of this project was to promote integrated pest control strategies to individuals responsible for Landscape and turfgrass maintenance. This program was promoted both to individuals working in the public and private sectors. Since accurate diagnosis is the first step in IPM, improving the diagnostic skills and scouting in landscape situations were the key objectives of this project. In addition, familiarity with the diagnostic process and the availability of assistance through diagnostic labs was emphasized.

Methods:

Extensive mailing lists of practitioners in the green industry were used in order to notify participants of this workshop. This was a regional day-long workshop. It was held in the meeting facilities, and on the exentensively planted grounds of Sonnenberg Gardens in Canadaigua, NY. The program began with formal presentations in the carriage house.

These were followed by hands-on field activites, such as scouting were conducted in the landscapes of Sonnenberg. Insects, diseases and cultural problems were viewed in the situations where they naturally occur.

Outcomes:

67 Individuals responsible for landscape and grounds maintenance attended this workshop on August 22, 2000.

Education day program results: (based on program evaluations completed by participants.)

We met our goal of reaching the landscape profession based on the answer to the prompt:
I would describe my primary work as:

Landscape Maintenance – 41%
Landscape Installation – 24%
Lawn Maintenance – 17%
Other Green Industry Profession – 17%

Some comments regarding the educational sessions follow:

Landscape Plant Insects: Paul Weston, Cornell University
- "Excellent, practical and relevant."
- "It was good to see the life cycles spelled out."

Scouting Cultural Problems, Jerry Bond, Cornell Cooperative Extension, Monroe County
- "It was good to learn about the thought process in diagnosis."
- "Very informative"

Scouting Disease Problems, Brian Eshenaur, CCE Monroe County.
- "Good variety of symptoms and plant material."
- "I learned some new things about common diseases."

The following comments were in response to the prompt**:** "*One useful item I learned about that I would use on my job is*:"

- "Actual insects on growing plants."
- "Scouting information, nutrient analysis deficiency symptoms."
- "Sometimes treatment of an insect pest or disease is not necessary."
- "Identification of diseases and diagnosis of cultural problems."
- "Scouting cultural & disease problems to answer customer questions."
- "Whether or not to control for insects is necessary. Or just leave it alone- i.e. be conservative."
- "How to look for insects and what to do about them- and how to get certified."

The following evaluation remarks were to the prompt of: "*Additional Comments*":

- "Very well organized and in a nice setting."
- "Local seminars seem to be more relevant than Cornell sited seminars. Please more."
- "Hope you have another one next year."
- "Nice job everyone."

The Cornell Turfgrass Hotline; A Pest Management Decision-Making Tool for Extension Staff and Turfgrass Managers

Project Leaders: Frank S. Rossi, Ph.D. and Eva Gussack; Extension Associate, Cornell University Turfgrass Team

Project Overview:

The New York State Integrated Pest Management (IPM) program has established an international reputation for delivering quality programming that results in enhanced management practices focused on reducing pesticide use. Thousands of turfgrass managers are implementing techniques developed and delivered through Cornell-based research and extension efforts. Still, there is a majority of turf managers who are unaware, unable, or not interested in utilizing the research-based information for the purpose of reducing pesticide use.

Clearly, for a portion of this disenfranchised audience, no amount of effort will produce the desired result. Yet, *easy and equal access* to information could improve pest management decisions. Knowledge-based decision-making is the cornerstone of what is needed to reduce pesticide use in New York State.

The Cornell Turfgrass Team in partnership with the IPM Program is chronically understaffed to meet the information delivery needs of New York, and more recently the north east region. Simply, our success in putting the wealth of new technologies to work has been limited by our ability to transfer the information in a timely and consistent format.

The advent of sophisticated interactive learning technologies, including communication and computer systems, enhances the feasibility and efficiency of handling large volumes of inquiries. Currently, a person interested in current cultural or pest management recommendations based on the latest environmental conditions would speak directly to an extension educator, agricultural and technical college faculty, or a campus specialist. If the information was available via eMail, world wide web or broadcast FAX, it could be accessed anytime and possibly made regional to enhance clientele satisfaction.

The goal of this project is to identify the key aspects of a timely, responsive, pest management information service as a means of improving pest management and reducing pesticide use through the promotion of non-chemical and biological strategies.

The Cornell Turfgrass Hotline involves a weekly conference call during the growing season, among meteorologists, turfgrass specialists on campus, extension (field staff) educators, and national experts (including USGA Agronomists). During the call, the weather is reviewed with forecast provided, then a "roll call" of updates from field staff is delivered, with questions being addressed across regions. Specialists discuss timely topics based on prevailing environmental conditions and finally a national expert discusses a particular topic more in-depth (such as root diseases or Annual Bluegrass Weevil). Following the call, the notes are transcribed, edited and written in bullet-format,

amenable for use as a decision-making tool that is delivered via eMail or broadcast FAX to every county office in New York State and selected industry leaders.

Financial Results:

Since the inception of the Hotline in 1998, we maintained a break-even financial philosophy in an effort to recover the "real" cost of delivering this information. Following a few years of start up funding from the NYS IPM Program and New York State Turfgrass Association, cost recovery would come from subscriptions.

Annual expenses for labor, conference time, and materials averaged $19,500. Start up funding for the first two years averaged $7,000, leaving a deficit of $12,000 per year. Subscriber fees began at $30 per year and in 1998 and 1999 we had 70 paid. In 2000, subscriber fee and subscriptions increased 200%. There were increased costs associated with promotion such as direct mailings and travel to meetings. However, we are getting closer to reaching our goal of providing an user-funded information delivery system.

Impact of The Cornell Turfgrass Hotline:

Logistics

In 2000, the Turfgrass Hotline ran for 34 weeks. Extension educator attendance at the weekly conference call was at least 75% (9 of 12 invited staff) throughout the season. A survey of call participants indicate that they are generally satisfied with the day and time of the call (Table 1). The three Hotline groups (Call participants, Field Staff who receive the newsletter, and subscribers, preferred the Monday delivery of the electronic newsletter. Interestingly, the subscribers strongly agreed with the idea to continue a monthly newsletter during the winter. In general, extension staff was not as interested in the winter newsletter, most likely due to their responsibilities outside of turf.

The subscribers were very interested in submitting questions that could be answered during the call, with extension field staff significantly less interested. There was only slight interest in increasing the amount of county-based information. This could be related to the broad applicability of the existing format. In fact, the information in the weekly e-newsletter appears to be written in a non-technical style that is well received by call participants and subscribers. However, the field staff who just receive the newsletter, feel that the information is too technical.

The perceived technicality of the newsletter reflects the fact that in many counties, the field staff are not horticultural agents and may lack basic expertise. In the future we will be making a concerted effort to improve on the issue by offering additional in-service opportunities, or simplifying the information. Nevertheless, penetration into counties that lack this expertise is critical for the Cornell Cooperative Extension (CCE) to serve increasing horticultural interests or professionals and consumers.

Usefulness

The 2000 subscriber profile indicated that 45% were from golf, 25% lawn care, 15% grounds/sports turf and 15% industry representatives (equipment and product sales). This represents a major shift in subscriptions from 1999 where lawn care subscriptions represented 53% of the total. This is likely a result of increased costs in 2000.

In general, survey results indicate a high level of satisfaction with the usefulness of the Hotline (Table 2). As an educational and information transfer resource the Hotline is used regularly by the groups for writing articles and answering client questions.

From a decision-making perspective, subscribers overwhelmingly agree that the Hotline has been integrated into their decision-making process. Increased awareness of environmental issues, such as water quality was an important aspect of the Hotline. In addition, the subscribers indicated that not only is the Hotline information resulted in a change in their management strategies, they agree that it helped reduce pesticide use.

Summary

We have great expectations for the fourth year of the Turfgrass Hotline in 2001. Survey information collected to date has validated many of our current delivery and informational strategies. In addition, word of mouth is spreading and we expect to surpass our subscription amounts from 2000 by 100%. This would result in reduced expectation from outside funding sources.

We are pleased with the overall usefulness of the Hotline to educators and managers. In fact, this information delivery approach supports educational research conducted on asynchronous distance learning. In those studies, researchers found that end-users utilize distance learning approaches, such as the Hotline, for just-in-time learning, i.e., the user access the information just when they need it. This is reflected by the active integration of the information that resulted in pesticide use reduction. An aspect of management that could only have been reduced with this form of delivery.

Table 1. Summary of various participant responses to evaluate perceptions about the delivery and format of the Turfgrass ShortCUTT.

	Score†		
Question	Call Participants	Field Staff	Subscribers
Monday is the best day to receive ShortCUTT.	4.0a‡	4.0a	4.0a
I would like ShortCUTT to continue on a monthly basis through the winter.	3.75b	4.0b	4.3a
I would like to submit questions for a Q & A section.	N/A	3.0b	4.4a
ShortCUTT should contain more in-depth county information.	3.75a	3.5a	N/A
ShortCUTT is too technical.	1.5b	4.0a	1.1b
ShortCUTT conference call is at convenient time.	3.25	N/A	N/A
ShortCUTT conference call is on convenient day.	3.25	N/A	N/A

† Rating Scale: 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree.
‡ Means within a row followed by different letters are significantly different at $p<0.05$ based on Fisher's protected LSD.

Table 2. Summary of various participant responses to evaluate perceptions about the usefulness of the Turfgrass ShortCUTT.

	Score†		
Question	Call Participants	Field Staff	Subscribers
ShortCUTT is an important educational tool.	4.0a‡	4.5a	4.5a
I use ShortCUTT to answer client questions.	4.0a	4.0a	4.0a
I use ShortCUTT information when writing articles.	4.0ab	4.5a	4.5a
As a result of ShortCUTT, I am more aware of water quality and environmental issues as they relate to turf.	3.0b	4.25a	4.0a
Information in ShortCUTT has been integrated into my decision-making.	N/A	N/A	4.5
ShortCUTT has resulted in a change in my management strategies.	N/A	N/A	4.0
ShortCUTT has helped me reduce pesticide use.	N/A	N/A	4.0
I will subscribe/like to receive ShortCUTT next year.	5.0a	5.0a	5.0a

† Rating Scale: 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree.
‡ Means within a row followed by different letters are significantly different at $p<0.05$ based on Fisher's protected LSD.

Evaluation of Golf Turf Management Systems with Reduced Chemical Pesticide Inputs

Project Leaders: Jennifer A. Grant, Turfgrass Coordinator, NYS IPM Program; Frank S. Rossi, Dept. of Horticulture, Cornell University

Background:

Golf courses throughout the United States are being challenged to reduce or eliminate the use of chemical pesticides. In New York State, many public golf courses have been affected by legislation that phases-out and/or eliminates chemical pesticide use. Such laws have been passed for municipal properties in Suffolk County (Long Island), the City of Buffalo, and Albany and Westchester Counties. In addition, at least 20 laws that would restrict pesticide use on golf courses in other areas of the state are currently under consideration. Specifically, a majority of this legislation phases-out pesticide usage by toxicity class over a 3-6 year period. Pesticide use is eliminated by EPA toxicity classification with class I (Danger) compounds being removed first, followed by class II (Warning), and III (Caution) in subsequent years. Advocates of this type of legislation are often unaware of the "costs" of implementing the policies and the resulting impacts on turfgrass quality and golf turf performance.

Golf turf managers faced with operating their facilities under constraints on the use of chemical technology need better information on how to maintain acceptable, playable golf course turf. However, there is a dearth of information available on individual practices and technologies to reduce pesticide use, and especially on how these alternative cultural and pest management technologies would integrate and work together in a system. For example, Plumley *et al.* (1992) found that increasing the height of annual bluegrass putting greens from 3.2 mm to 4 mm reduced incidence of summer patch (*Magnaporthe poae*) by 40%, yet very few managers have implemented this practice because of the effect on ball roll distance. However, if increased mowing height was combined with increased mowing frequency, aggressive topdressing and rolling, it might be possible to maintain acceptable ball roll distance. Recently, Huang et al. (2000) have shown the favorable influence of increased mowing heights on plant energy dynamics that will result in healthier plants. Furthermore, with the introduction of azoxystrobin (Heritage), a chemical that effectively manages summer patch and anthracnose (*Colletotrichum graminciola*), golf turf managers have grown confident in maintaining annual bluegrass through stressful months under intense maintenance pressures. This reliance on a specific class of fungicides, and flagrant disregard of healthy cultural practices is counter to the principles of IPM. Such reliance can lead to increased stress on putting surfaces and ultimately the development of resistant fungal strains.

Our project is a systems-based approach to golf course greens management. It explores total management systems, as practiced by turf managers, rather than focusing on individual technologies and isolated practices. In addition to this project being conducted at a research facility, we have received funding from the USGA to conduct a sister project on the greens of an operational golf course on Long Island. The two projects conducted simultaneously will provide important complimentary information from two settings. One site has sand-based greens in a research setting in a central New

York climate; the other has soil-based greens on a public golf course in Long Island's climate.

Goal:

The goal of this project is to provide information on the costs, feasibility and performance of golf course turf managed with few or no chemical pesticides.

Objectives:

- Evaluate the aesthetic and functional performance of golf putting greens managed under various cultural and pest management systems.
- Determine the costs of implementing the various management systems.
- Determine golfer satisfaction with each management system.

Procedures:

The following cultural and pest management regimes have been imposed on a large sand-based, bentgrass putting green area at the Cornell University Turfgrass Research and Education Center in Ithaca, NY.

Cultural Management:

A) Current Standard: Cultural practices typically followed at public golf courses in central New York.
B) Alternative: Modified to reduce turfgrass stress, minimize pest problems, while attempting to maintain minimum performance standards.

Pest Management:

1) Unrestricted: All legal and currently available chemical pesticides in New York State may be used to manage pests, both preventatively and curatively.
2) IPM: Management decisions based on monitoring information. Emphasize least-toxic approaches as defined by factors such as water quality impact, effects on non-target organisms and toxicity to humans. Allow for higher-risk treatments when necessary to maintain expected performance.
3) Non-chemical: Emphasize biologically-based and cultural management of pests, but do not allow the use of pesticides registered in class I, II, or III by the EPA. This mimics conditions currently legislated for implementation by 2002 on many public courses and other turf facilities (parks, schools, etc.) in New York State.

Cultural and pest management systems have been implemented in all possible combinations, for a total of six management regimes as follows.

	Cultural Practices	
Pest Management	Current Standard	Alternative
Unrestricted	I	II
IPM	III	IV
Non-chemical	V	VI

I. Current Standard Culture, Unrestricted Pest Management

Golf turf management typically practiced at public golf courses in central New York is being implemented. This system must produce acceptable turfgrass performance (e.g., quality ratings above 6 on the NTEP rating scale and ball roll distance > 2.5 meters). Any legal cultural or pest management practices may be used, including prophylactic treatments (e.g. snow mold preventative fungicides).

II. Alternative Culture, Unrestricted Pest Management

This system allows for a full compliment of legal chemical pesticide use (preventative and curative). However, cultural practices are modified to minimize turf stress (Table 1). Modifications include slight increases in mowing heights, light frequent topdressing with dry sand (to reduce abrasion and maintain surface integrity), water injection cultivation every three weeks (to increase oxygen penetration into the root zone), light frequent fertilization (based on turfgrass tissue analysis and annual soil testing), hand watering to minimize dry spots, and aggressive traffic management that may require cup changes twice a day.

III. Current Standard Culture, IPM

Cultural practices for golf turf management, typical of public golf courses in central New York, are being implemented. Pest management products and practices are selected by a risk assessment (RA) process (described below), but this system must produce acceptable turfgrass performance (e.g., quality ratings above 6 on the NTEP rating scale and ball roll distance > 2.5 meters). Prophylactic chemical treatments are used only when justified by significant site history of problems and lack of curative strategies that are acceptable in the RA process. In this system, acceptable turfgrass performance is not intentionally sacrificed. Therefore, it may be necessary to select a more toxic method in order to avert significant turfgrass damage or loss of turf.

IV. Alternative Culture, IPM

This system allows for a variety of cultural management options designed to provide acceptable turf performance while attempting to minimize stress, as outlined in system II. In addition, pesticide selection is restricted based on the RA approach utilized in system III.

V. Current Standard Culture, Non-chemical Pest management

Cultural practices for golf turf management, typical of public golf courses in central New York, are being implemented. This system strives to produce acceptable turfgrass performance (e.g., quality ratings above 6 on the NTEP rating scale and ball roll distance > 2.5 meters). However, no pesticides carrying an EPA toxicity classification of I (Danger), II (Warning), or III (Caution) are allowed. Pest management options include the use of biostimulants, increased fertility, microbial inoculants, incorporation of disease-suppressive composts, and entomopathogenic nematodes and fungi. Severe damage or loss of turf may occur under some conditions and the cost of reestablishing the areas through overseeding and sodding will be included in the economic analysis of the management programs.

VI. Alternative Culture, Non-chemical Pest Management

The cultural practices in this system are modified to minimize turf stress, as described in system II. Pest management options exclude all pesticides carrying an EPA toxicity classification of I (Danger), II (Warning), or III (Caution) and rely on the cultural and biological methods described in system V. Severe damage or loss of turf may occur under some conditions and the cost of reestablishing the areas through overseeding and sodding will be included in the economic analysis of the management programs.

Table 1 Cultural Management Practices

	Cultural Management	
Practice	**Standard**	**Alternative**
*Mowing Ht. Range**	0.100 to 0.156"	0.172" to 0.187"
Mowing Frequency	Once per day/ 6 days per week	Twice per day/7days per week
Irrigation	Allow stress	Hand water to prevent stress
Fertilization	Approx. 2 lbs. N/M/yr. All but fall app. will be liquid feed.	Approx. 3 lbs. N/M/yr. All but fall app. will be liquid feed.
Topdressing	Every 3 weeks	Every week
Rolling	1x per week	3x per week
Vertical Mowing	None	Every 2 weeks
Hydro-ject	Every 3 weeks	Every 3 weeks

*Range will be adjusted to achieve desired ball roll distance (≥8.5 ft).

Risk Assessment (RA):

The RA process will be implemented in 2001. Pest management strategies will be evaluated based on criteria such as water quality impact, effects on non-target organisms and toxicity to humans. An "Environmental Impact Quotient" (EIQ) was previously developed to determine the environmental impacts of pesticides used in agriculture (Kovach et al. 1992). We are currently adapting this model to aid in selection of turfgrass pest management products for our IPM treatments. In addition to our "Turf EIQ", we will incorporate water quality models such as Augustin-Beckers, GUS, and WINPST.

Performance Management Evaluation:

Beginning in 2001, systems will be evaluated for aesthetic and functional performance, pest occurrence, turfgrass species population dynamics, tissue and soil nutrient content, organic matter dynamics, rooting, nematode populations and pesticide impact (as measured by the turfgrass EIQ). In addition, the feasibility of each system, will be assessed with a golfer satisfaction survey and an economic analysis. The following evaluations will be performed.

Daily visual inspections (a minimum of five times per week).
All areas of each green will be inspected from ≤ 1 meter distance. Irregular areas will be closely examined for signs and symptoms of disease-causing organisms, agronomic stress or insect pests. The location of all symptoms will be mapped and quantified. The Area under Disease Progress Curve (AUDPC) method will be used when appropriate to increase the statistical validity of the ratings.

If a disease is suspected, turf will be examined microscopically. If a positive identification is not obtained, a sample will be sent for identification to the Disease Diagnostic Laboratory at Cornell University in Ithaca, NY. Results from the labs will be returned to the golf turf manager within 24-48 hours.

If insect pests are suspected, signs of feeding damage and the presence of insects will be sought. Additional insect monitoring will be used as appropriate, such as pheromone trapping for cutworm adults and oriental beetles, mowing box inspections for annual bluegrass weevil adults, and soap flushes for cutworm caterpillars and armyworms.

If no causal organism is found to be associated with the observed malady and agronomic stresses are suspected, specific indications will be sought by examining the grass plants, thatch and soil; previous scouting records; and records of previous cultural and pest management practices at that location.

Weekly quality and pest assessment:

Functional and aesthetic factors

*Overall putting green visual quality--*Assessment will be rated on a scale from 1-9 based on the NTEP ratings with 1= dead turf, 9= ideal turf and 6= acceptable turf.

*Ball roll distance--*Measured with a Stimpmeter at the same time of day in an area representative of the putting green, 3 hours after rolling. Three rolls will be conducted in two directions to determine average distance.

*Turfgrass Tissue nutrient analysis--*Monitored weekly by collecting clippings and submitting to the Cornell Nutrient Analysis Lab. These measurements will be used to develop nutritional history, determine correlations with pest and stress incidence, and establish a precise nutrient management program.

Pest monitoring

*Irritant sampling--*Insects will be sampled from three randomly selected individual square meter areas on each green, using a soap-based irritant as described by Vittum, *et al.* (1999). All pest, beneficial, and incidental insects will be counted by species and life stage, if possible. Unknown insects will be collected for later identification.

*Cutworm traps--*Pheromone traps for monitoring adult cutworm flights will be near the research greens. Cutworm moths in the traps will be counted weekly and the information will be used for the IPM and non-chemical treatments.

Weed mapping--Weeds will be identified and mapped on all plots, and updated weekly, with the exception of *poa annua* which will be quantified bimonthly (see below).

Bimonthly assessments

Rooting--Monitored every two months by extracting 5 cm cores to a depth of 25 cm, removing the soil, oven drying and recording dry weights at 7.5 cm increments.

Organic matter--Dynamics in the top 3 cm will be monitored by establishing a baseline prior to initiation of treatments using the weight loss upon ignition method.

Surface species population dynamics--Vegetative assessments of the putting greens will be conducted across the entire surface. In addition, annual bluegrass populations will be monitored in specific locations on each putting green with the point quadrat method.

Nematode sampling--Soil nematodes will be monitored bimonthly as indicators of soil health status (Niles and Freckman, 1998). Six separate soil cores (1" diam x 6" depth) will be taken from each green. Nematodes from each soil core will be extracted by the sugar-floatation method and identified (to genus, family or order where possible). The following will be recorded: the ratio of free-living (beneficial) nematodes to plant parasitic nematodes, numbers of dominant species or genera, P_f/P_i ratios, and corresponding juvenile-to-adult ratios (Kammenga et al., 1996).

Economic Analysis:

The costs of labor and materials will be quantified for each management regime, and extrapolated to estimate the economics for an 18-hole golf course.

Golfer Satisfaction Survey:

Two golfer satisfaction surveys will be conducted in 2001. Golfers will be invited to our research area and invited to golf on the plots. They will answer a questionnaire as to their perceptions of the quality of each treatment.

Conclusions and Expectations:

Plots were established and cultural practices implemented in 2000. The full compliment of pest management practices and evaluation procedures will be added beginning in the spring of 2001. Management systems must be evaluated over the long term to properly assess differences, costs and benefits. We expect to gain the following information from this project.

• Golf course superintendents, golfers, lawmakers and environmental advocates will have greatly increased their comprehension of quality and economic expectations for golf course turf managed under various cultural and pest management regimes.

• Golf course superintendents who chose to manage with limited pesticide inputs, and those who are legislated to do so, will be better informed of their options. Their

appreciation of specific cultural and biologically-based approaches to reduce chemical usage will be enhanced.

• Turfgrass researchers will identify areas needing further research within the constraints of each management system.

• The results of this systems-based approach will be communicated to the audiences cited via extension publications, and articles in scientific journals and the popular press. Educational programs will provide these audiences with tangible comparative information for decision making.

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Evaluation of Turfgrass Phytonematode Population Distributions on a New York State Putting Green

Principal Investigator: Karen L. Snover, Director, Plant Disease Diagnostic Clinic
Department of Plant Pathology, Cornell University, Ithaca, NY 14853

Collaborator: D. Cord Ozment, CGCS, Superintendent, Country Club of Ithaca, 189 Pleasant Grove Road, Ithaca, NY 14850

Objectives:

1. Determine the identity and distribution of genera of plant parasitic nematodes across a New York State putting green.
2. Track the level and distribution of plant parasitic nematode populations through the growing season.

Introduction:

The goal of this project was to determine the genera of plant parasitic nematodes currently found on a golf course putting green located in New York State. This research project involved a survey of the distribution of nematode genera and population levels on the #2 putting green located at the Country Club of Ithaca. This green was selected because of its chronically reduced vigor and the previous diagnosis of nematode problems. The most recent past survey of nematode occurrence was conducted in 1991 by Peter Mullin of the Department of Plant Pathology, Cornell University (Mullin, 1991). Mullin examined 18 samples from various New York State golf courses and found numerous genera of plant parasitic nematodes. Prior to that survey, a study was conducted in July-September 1976 on greens in southeastern New York (Murdoch et al. 1978). This study used a random sampling approach which unfortunately doesn't indicate the distribution patterns across a green. Due to the lack of information available on cool season phytonematodes, our survey has provided valuable information to turfgrass industry members and university researchers. Our survey focused on the distribution patterns and population levels across a putting green to learn how varied the population can be and in turn determine the accuracy of our current sampling procedures.

Procedures:

The #2 putting green located at the Country Club of Ithaca was the site used to conduct the study. The putting green is approximately 15 x 22.5 m in size. 120 (1.5 x 1.5m) blocks were established across the green. With in each 1.5 x 1.5 m sample block, 10 small cores (2.5 width x 15 cm deep) were collected in a systematic pattern to obtain at least 50 grams of soil per sample site. The 10 cores were mixed together, placed in a plastic bag, and labeled. Samples were transported to the diagnostic clinic and stored in a refrigerator until extractions and identification/nematode counts were made.

Samples were collected at three different sampling times. We predicted that soil temperatures may influence the population changes and that the optimum soil

temperatures for the approximately 12 genera of plant parasitic nematodes that are found on cool season turfgrasses may vary depending on the genus of nematode. A record of soil temperatures and cultural practices conducted during the growing season were recorded but we encountered difficulty with our recording device and analysis of this information may take some time.

Nematode extractions were conducted using the sugar flotation extraction method. The sugar floatation method was chosen for the quick isolation of the nematodes. Fifty grams of soil was placed in a beaker with enough water to mix it thoroughly. The mixture was then poured through a 100 and a 400-mesh sieve to first collect any debris and then to catch the nematodes. The 400-mesh sieve was then rinse into a vile that was centrifuged for approximately 5 minutes. The surfactant was decanted and a sugar solution added to the vile. The nematodes were located in the pellet formed by the centrifugation of the soil mixture. Therefore, the pellet was broken up by tapping the vile on a counter and placed back in the centrifuge for 45 seconds. The nematodes are not as dense as the sugar solution and are contained in it. The solution was poured off through a 400-mesh sieve. The sieve was rinsed to remove the sugar from the nematode environment and then rinsed into a vile for evaluation at a later time. All plant parasitic nematodes were identified to genus and population levels were recorded.

Data Collection:

The collection of the soil samples was conducted on April 19, June 19, and September 10, 2000. Extractions of the nematodes were conducted as quickly as possible after the collection dates. Six genera of plant parasitic nematodes were detected in these samples, *Hoplolaimus* sp., *Tylenchorhynchus* sp., *Meloidogyne* sp., *Criconemella* sp., *Pratylenchus* sp., and *Helicotylenchus* sp. Additionally the free living nematodes were counted for informational purposes of later population comparisons.

A table containing the raw data on identification and population levels for each site for the three collection dates, along with color-coded maps of these populations(for easier visual assessment), are available on request.

Results:

The overall population levels detected were lower than expected. The April collection date produced samples with relatively low population levels for all the plant parasitic and free-living nematodes observed. Low levels were expected at this time due to the cold temperature and continued dormancy of the turfgrass. The spring and summer were extremely wet which should have created ideal conditions for population expansion of the various nematodes.

In June we expected to see a significant rise in the nematode population numbers observed but that was not the case. Soil and air temperature was lower than normal for this time period and we suspect that may have been a factor. *Hoplolaimus* sp. increased slightly at the June collection then reduced slightly in September. Very few of these nematodes were detected to our surprise. This large nematode has been found in cool season turfgrasses and we expected higher numbers than we found. Of the 120 plots for each collection date we found only 96 total *Hoplolaimus* sp. in April, 126 in June, and 96

in September. The distribution pattern was quite interesting (see lilac colored maps). Low levels of this nematode were detected at scattered sites across the green. An occurrence of this nematode was found at the top of the green with another occurrence found 10-15 feet away. This distribution pattern continued across the green and not only occurred in the April collection but continued through the June and September collections.

Tylenchorhynchus sp. appears to be the dominant plant parasitic nematode detected on this green. Although higher levels of one other genera of plant parasitic nematode, *Criconemella*, was found, the population threshold for damage caused by *Tylenchorhynchus* is lower and the nematodes are reported as being more damaging to the plant material. *Tylenchorhynchus* were detected at low levels throughout the green and the distribution of this nematode was very uniform across the green. The total populations were highest in the April collection. Population levels decreased in June with a moderate rebound in September.

Meloidogyne sp. were detected during the initial collection in April at numerous block locations within the green. Interestingly, none were detected in the June sampling. Then again in September the nematodes, at a low level, returned. This may be explained by the lifecycle of this nematode. The J2s are the infectious, juvenile stage of the nematode. They are the lifecycle stage we observed in the April sampling. This makes sense when we consider this early part of the growing season is most likely the time for infection by this nematode. By June the J2s had either died off or infected the plant tissue and were located within the root tissue not swimming around in the soil where we were collecting our nematodes for analysis. Therefore, none were found. By September these nematodes may have been reproducing again and a few juveniles were again present in the soil. Another interesting observation of this nematode was that they were found mainly in the lower section of the green. Whether this was due to the environmental conditions, soil temperatures, soil texture, water levels, etc., or to it being the location of the first inoculation of the green is unknown.

Criconemella sp. were detected at all collection dates. The total numbers began at 5170 nematodes found in 120 samples on this green. The level decreased as seen in other genera during June and then returned to a higher level of 7958 in September. The high numbers of this nematode would not be of concern to most nematologists. Previous studies have reported this nematode at very high levels without causing any symptoms of damage. This is the reason we believe the nematode to study in future analyses is *Tylenchorhynchus* sp. Like *Tylenchorhynchus* sp., the distribution pattern of *Criconemella* sp. was very uniform and spread across the green during all the sampling periods.

The levels and occurrence rate of *Pratylenchus* sp. and *Helicotylenchus* sp. were extremely low and are not considered an important factor in the nematode evaluation but the findings are included in this report.

The recording device used for the collected of the soil temperature and moisture levels was a WatchDog datalogger. The datalogger had the capability of recording the soil moisture at one site and the soil temperature at two different sites located approximately 25 feet apart on the green. The reading were collected and save in a spreadsheet. We encountered difficulty during the summer months when we found the datalogger to no

longer operate correctly after just a few days of proper functioning. We needed to replace the batteries of the unit often and believe the problems arose due to very high humidity in the containers used to protect the unit from water and soil exposure.

It was hoped that a professional survey of the green could enlighten us on any possible association between topography and nematode population levels. Unfortunately, the green could not be surveyed at this time. The facility was hoping to have this done at their expense but could not fit it into their schedule this summer.

Discussion:

This research project has provided us with some very valuable data to analyze. The different genera found help in determining the possible threats of damage and, when comparing this to other research projects, the distribution of these nematodes across our state and the country. The nematodes found are consistent with the nematodes present in past research projects.

Our collections did not produce high levels of nematode populations that would trigger a call for some type of management action being conducted on this green. The green has a number of factors that are contributing to the decline of the turf which is usually most apparent during the hot, dry summer months. The green is shaded during part of the day, which can reduced photosynthesis and allow pathogens to establish if drying time of the turf is prolonged. Additionally, the green was built in the 1950s and the subsoil is made up of a very tough clay composition. The presence of the plant parasitic nematodes is just another factor that contributes to the decline of the turf at this site.

This study has contributed to the assumption that *Tylenchorhynchus* sp. is the nematode of concern in the northeast on cool season turfgrasses. Other nematodes are present and at levels that may prove damaging but *Tylenchorhynchus* sp. are more abundant and the spatial distribution pattern on this green has shown that they are found uniformly. Therefore, we conclude that this nematode is the nematode of interest in our studies and further research should be conducted to learn about the conditions that promote infection and damage by this nematode.

The spatial distribution of the various genera of nematodes was very interesting. This information should be followed up with continued research of other sites to determine if the nematodes consistently tend to congregate in areas that they prefer on the green site. Our research showed that *Criconemella* sp. and *Tylenchorhynchus* sp. were all over the green while *Meloidogyne* sp. and *Hoplolaimus* sp. prefer lower and high locations respectively. Studying another green at a location fairly close to this green may provide us with answers to these questions.

According to the results of this research project the time of sampling and location of a single sample can heavily influence the outcome of a nematode analysis. Our data shows that an early April sample collection may be the most revealing when looking for diversity with the nematode genera and nematode population levels. Also, the location of the sample collection can be very important. If a sample was only taken from the upper center section of this green (around blocks 14-16), we may not have known of the presence of *Meloidogyne* sp. and *Hoplolaimus* sp. nematodes and depending of the

sampling date, the presence of *Tylenchorhynchus* sp. and *Criconemella* sp.. All the information collected during this project will prove quite valuable in determining better sampling procedures and will aid in the development of more research studies to help us understand these organism better than we do at this time.

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Impact of Scarab Grub Management Tactics on Non-Target Soil Fauna

Project Leader: Mike Villani, Deptartment of Entomology, NYS Agricultural Experiment Station

Collaborators: Leslie Allee, Nancy Consolie, and Paul Robbins; Department of Entomology, NYS Agricultural Experiment Station

Location: Turf area at NYSAES in Geneva, NY

Abstract:

This study compared the effect of turfgrass pest management tactics, available to homeowners, on beneficial and nontarget soil fauna. Management products tested included insecticides Merit, Dylox, and Sulfur, an insect growth inhibitor Mach2, and a natural enemy or biological control, nematodes. To measure numbers of nontarget organisms samples were taken from treated and untreated turf plots using pitfall traps, soil cores, and baited ant traps from June through September. We found numbers of beetles, spiders, sow bugs, earthworms, ants, and crickets in treated plots were not significantly lower than numbers in control plots. Using this information, decisions for treatment of turfgrass and educational materials on turfgrass management will be able to include consideration for the impact on nontarget beneficial organisms.

Objectives:

1. Understand the effect of pest management strategy on nontarget beneficial organisms in turfgrass.
2. Compare the effect of the three main types of insecticides used against turfgrass pests on nontarget beneficial organisms in turfgrass.
3. Generate specific information on the effect of pest management options on beneficial organisms in turfgrass that can be used in educational materials such as brochures and fact sheets on turfgrass IPM.

Methods:

Turfgrass plots, 10 x 10 meters, were established on a Crittenden field area at NYSAES, Geneva, NY. Plots received one of six treatments: the insecticides trichlorfon or Dylox 6.2 (Bayer), imidacloprid or Merit .3G (Bayer), MachII 1.5G (American Cyanimid), the growth inhibitor halofenozide, the entompathogenic nematode *Heterorhabditis bacteriophora*, (IPM Labs, Locke, NY), sulfur (Fernz Sulfer Works), and an untreated control. Plots were replicated four times for a total of 24 test plots. Buffer zones, 10 x 10 meters, separated each test plot on all sides. Treatments were made on June 20, 2000 using Merit at 3lb/1000 square feet, Mach2 at 2.3lb/1000square feet and Sulfur at 10lb/1000 square feet. Nematodes were applied on June 21 at 20 million/1000 square feet. On July 28, Dylox was applied at 8lb active ingredient/acre, and a Sulfur application was repeated as above.

The density of beneficial and nontarget organisms such as predatory carabid and staphylinid beetles, spiders, sow bugs, earthworms, crickets and ants were sampled using pitfall traps, soil cores, and ant traps baited with tuna. Plots were sampled weekly, the week before treatment and for 13 weeks after treatment, from June 19, 2000 through September 22, 2000. During sampling weeks, on Day 1 in each plot, a soil core was taken, a pitfall trap was set into the hole from the soil core, and two tuna traps were baited and placed in the soil; twenty-four hours later on Day 2 in each plot, pitfall traps were collected, soil core holes refilled, and tuna traps collected.

Soil cores were dug using a 4-inch diameter stainless steel soil corer and the soil hand sorted. Pitfall traps, 6 inch diameter x 4 inch deep with screen bases, were monitored after 24 hr. Tuna traps were 1 ml plastic centrifuge tubes with a small amount of canned tuna (packed in oil) placed in the bottom third of the tube. The tubes were buried with the top at ground level and monitored after 24 hr. One soil core, one pitfall trap, and two tuna traps were used for each treatment plot, on each sampling date. Invertebrates collected from soil cores, pitfall traps, and tuna traps were processed, identified, and preserved.

Counts of mean invertebrates per trap were compared in treated and untreated plots by analysis of variance using the general linear model (GLM) procedure available in PC-SAS.

Results:

Nontarget and beneficial soil fauna found in traps included beetles (Carabidae, Staphylinidae, Scarabaeidae, Elateridae, Cicindellidae, Curculionidae), spiders (Lycosidae), sow bugs and pill bugs (Oniscus and Armadillium spp.), earthworms (Lumbricidae and Allolobophora spp.), ants (Formicidae), and crickets (Gryllus spp.). Millipedes, centipedes, Hymenoptera, slugs, and flies were also occasionally collected.

Although differences in densities of beneficials might be expected in control versus treated plots, with more beneficials in untreated control plots, this was not the case. Based upon our understanding of these turfgrass pest control tactics we assumed that the impact of specific treatments would be: trichlorfon > imidacloprid > Sulfur > Halofenozide = *Heterorhabditis bacteriophora* = untreated control. However, numbers of beetles (Fig. 1), spiders (Fig. 2), sow bugs (Fig. 3), and earthworms (Fig. 4—all figures are attached) in treated plots were not significantly lower than numbers in control plots. Numbers of ants and crickets were more variable but also were not significantly lower in treated plots compared to control plots.

Using this information, recommendations for treatment of turfgrass and educational materials on turfgrass management will be able to include consideration for the impact on beneficial organisms.

Fig. 1. Beetle numbers in treated plots are not significantly lower than in control plots.

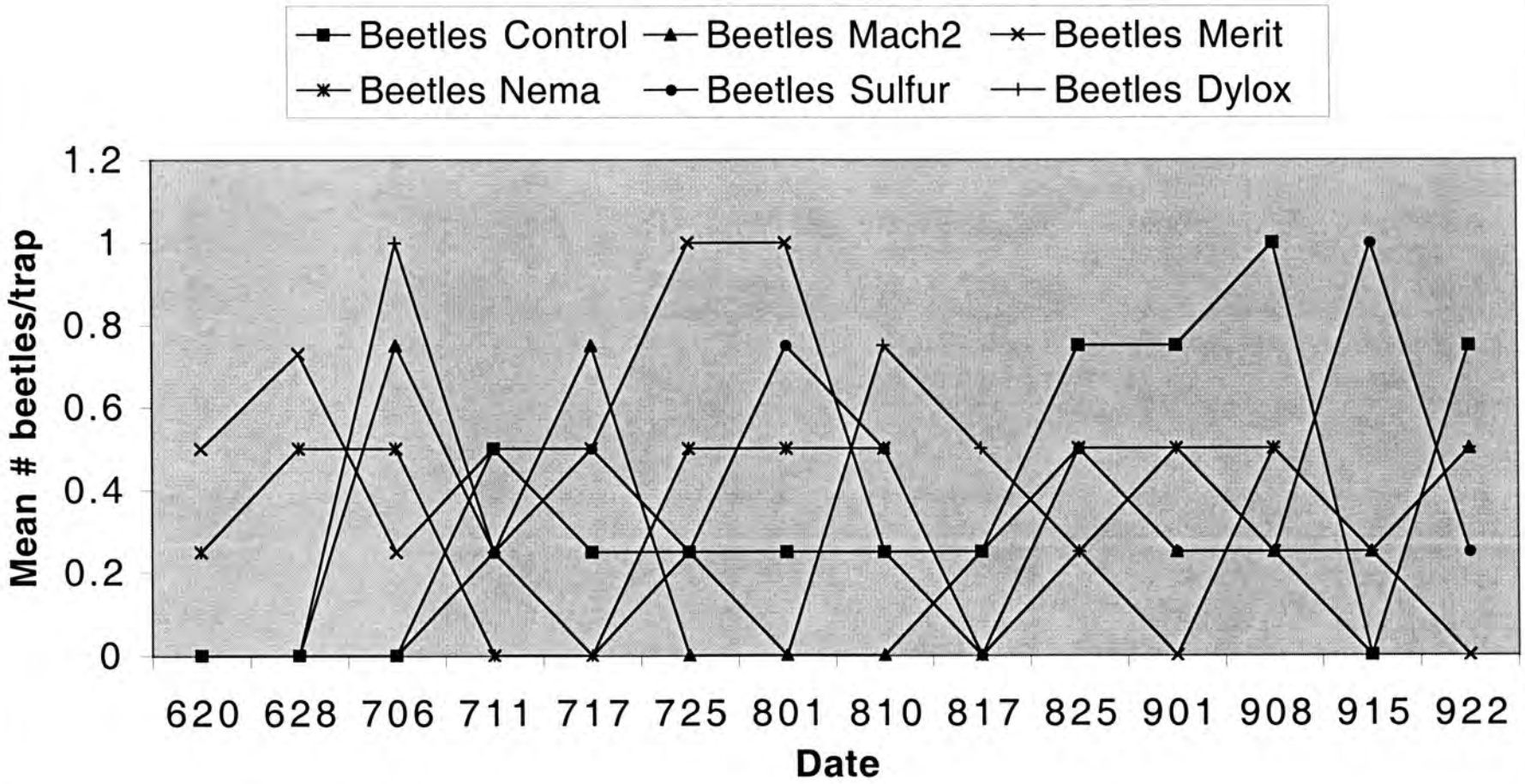


Fig. 2. Spider numbers in treated plots are not significantly lower than in control plots.

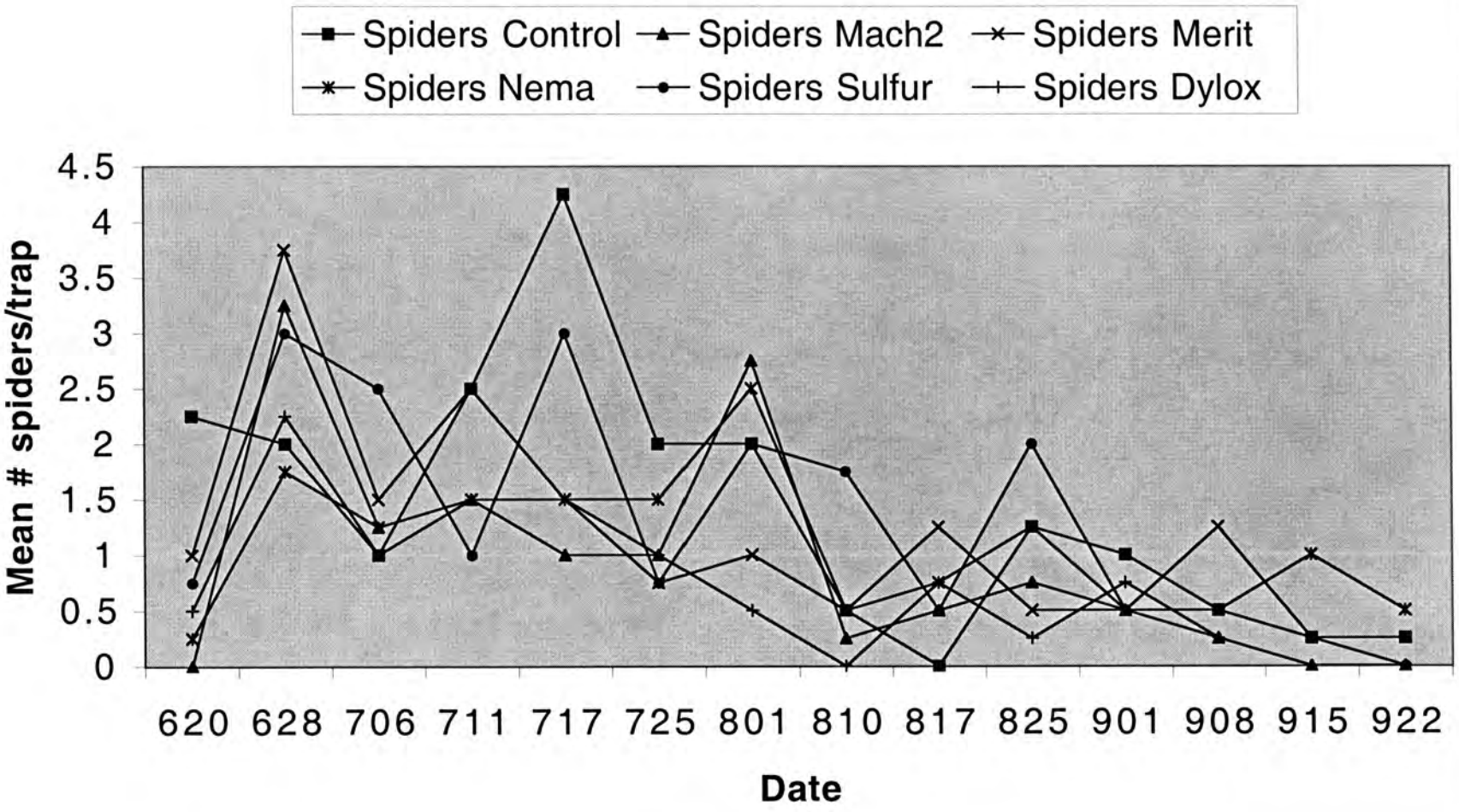


Fig. 3. Sow Bug numbers in treated plots are not significantly lower than in control plots.

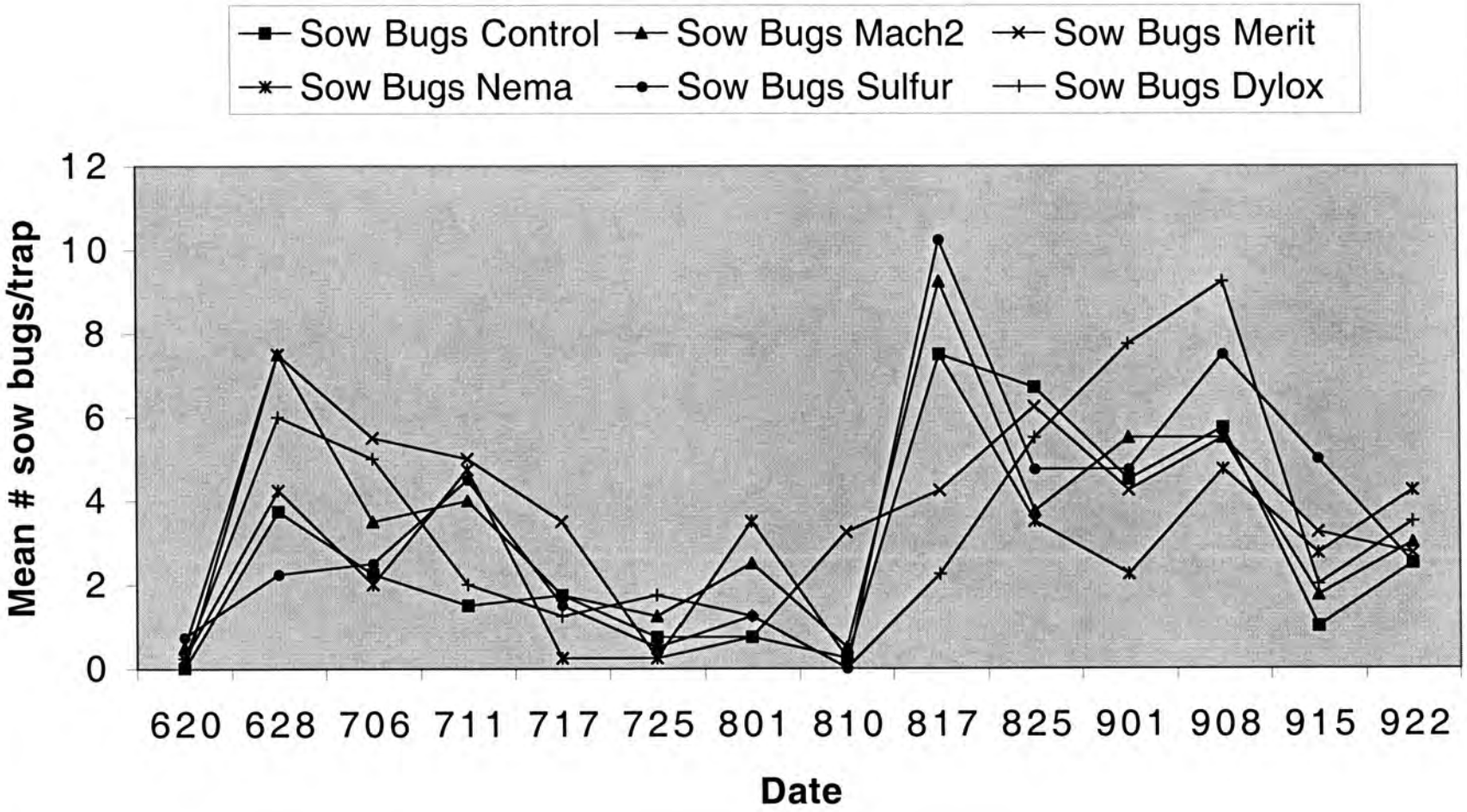
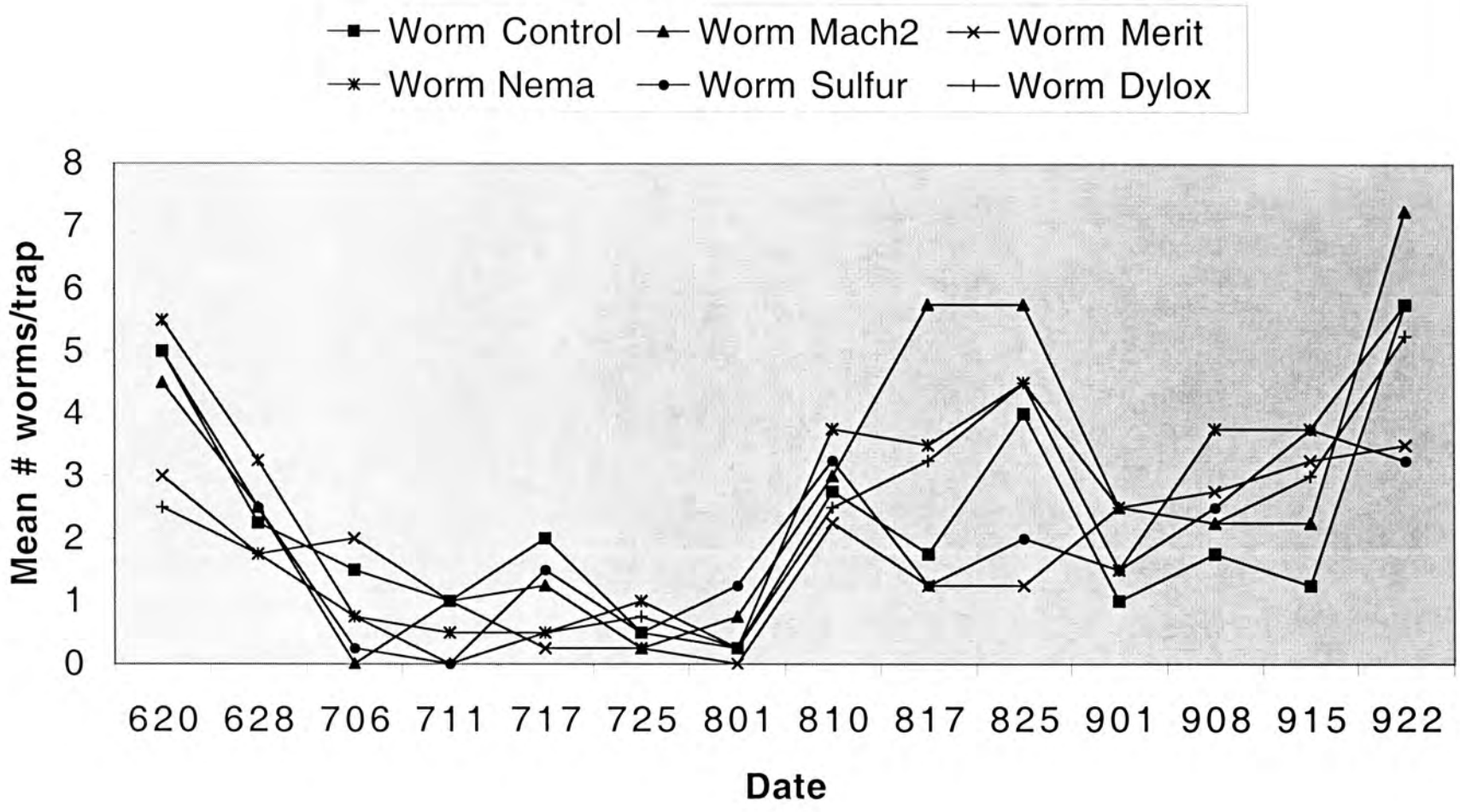


Fig. 4. Worm numbers in treated plots are not significantly lower than in control plots.



Organic Management of Turfgrass: a Comparison of Composts in Monroe, Nassau, Tompkins, and Tioga Counties

Project Leaders: Jana Lamboy and Jennifer Grant (New York State IPM Program), Cornell Cooperative Extension: Brian Eshenaur (Monroe County), Walter Nelson (Chemung County) and Tamson Yeh (Nassau County)

Cooperators: Eric Nelson, Joann Gruttadaurio, Joseph Esnard, Frank Rossi, Marty Petrovic and Leslie Weston (Cornell University); Roger Casterline (Ithaca College); James Nawojski and Gunther Fishgold (Bion Technologies)

Abstract:

The application of composts for improvement of athletic fields is being demonstrated in four areas of the state: Monroe, Nassau, Tioga, and Tompkins County. Several composted materials were applied at varied rates in the spring and fall of 2000. Turfgrass quality, soil nutrients, disease suppressiveness, nematode populations and pest occurrence are being monitored. Significant differences among treatments were not seen in the first season, but are expected within the next two years. Valuable information was gained in 2000 on application techniques.

Introduction:

Across the state, stakeholders ask Cooperative Extension offices to deliver methods for organic turf maintenance. The value of active organic matter, such as composts containing beneficial microbes and plant nutrients has long been accepted in production horticulture and vegetable gardens. However, protocols must be developed for the use of composts for lawns and athletic fields. Studies at Cornell have indicated advantages in turfgrass disease suppression with specific composted materials. The main goal of this project is to demonstrate the long-term effects of topdressing lawns and athletic fields with active composts. In the process, we will compare local and regional compost products, rates, and application techniques.

Objectives:

- To evaluate the effects of topdressing with composts from varied sources in a natural organic lawn care program.
- To incorporate the NOFA guidelines and suggestions from resources such as North Country Organics and Rodale Press into a simplified format for organic IPM of turfgrass in New York conditions.
- To develop an integrated demonstration program that links research faculty from Cornell University, extension educators, and industry innovators.

Progress: Four sites were selected for the demonstration: athletic fields in Monroe, Nassau, and Tioga Counties; and a lawn area in Tompkins County. Collaborations were established between the County Extension Educators, IPM staff, on-site school administrations and groundskeepers, and Ithaca-based Cornell faculty. Baseline information on soil nutrients and turfgrass quality was collected in the spring. Subsequently, all areas were topdressed with compost once in the spring and again in the

fall. (*Tioga did not receive a fall application). A variety of composts and rates were tested at each site. Additional turfgrass quality assessments were made during the season. In the summer, soils from all treatments and sites were evaluated for disease suppressiveness and the presence of beneficial and harmful nematodes. In addition, the compost application was the focus of a fall demonstration and education day for turfgrass managers and groundskeepers in Monroe County.

Materials and Methods:

Site Assessment

In the spring, soil samples from all plots at all locations were analyzed for nutrients, pH and texture. Penetrometer readings were also taken as a measure of compaction. These data will be taken annually to compare long-term changes resulting from compost applications, and to assess needs for additional nutrient applications. In addition, these sites are being used in a project that compares analyses of leaf tissue nutrients with soil nutrients. The project is being conducted by Marty Petrovic and Joann Gruttadaurio, in the Horticulture Dept. at Cornell University, Ithaca. Results from their study will also be used to evaluate change in our plots and advise nutrient needs of the turfgrass.

Compost Applications

At each site, compost applications were assigned to large plots (≥1,000 ft^2), that were replicated and blocked by amount of traffic when possible. Materials and rates are shown in Table 1. After the spring application, a sample of each compost was sent to Woods End Research Laboratory (Mt. Vernon, ME) for analysis. The source materials and analysis results for each material are shown in Table 2.

Table 1. Compost Treatments

	Rate	
Tompkins County	**yd^3/1,000 ft^2**	**Thickness**
Ithaca College compost, green (6 wks. old)	1	3/8"
Ithaca College compost, seasoned (2 yrs. old)	1	3/8"
All Gro	1	3/8"
BionSoil	1	3/8"
Control	none	none
Tioga County		
BionSoil	1	3/8"
BionSoil	2	3/4"
Control	none	none
Nassau County		
BionSoil	0.16	1/16"
BionSoil	0.33	1/8"
BionSoil	0.67	1/4"
Control	none	none
Monroe County		
BionSoil	0.67	1/4"
BionSoil	1.33	1/2"
Planet Green	1.33	1/2"
Control	none	none

Table 2. Compost Source Materials and Analyses.

	Ithaca College				
Compost	**Immature**	**Mature**	**BionSoil**	**Planet Green**	**All Gro**
Source Materials	Food scraps, landscape wastes, wood chips	Food scraps, landscape wastes, wood chips	Dairy manure, bedding	Mushroom waste	Biosolids, yard waste
Water holding capacity (dry basis)	220	143%	114%	173%	208%
pH	6.7	6.5	7.7	6	7.5
Free carbonates (rating)	1 (none)	3 (v. high)	2 (m. high)	3 (v. high)	1 (none)
Organic Matter (dry basis)	71%	43%	33%	54%	66%
Conductivity	38 (v. high)	7 (med high)	2 (low)	24.6 (v. high)	1.9 (low)
Carbon:Nitrogen	8 (v. low)	6.4 (ext. low)	18 (med)	11.6 (m. low)	21 (medium)
Maturity index	1 (raw compost)	6 (curing)	6 (curing)	3 (active)	5 (low-active)
Total Nitrogen (dry basis)	4.8%	3.6%	0.9%	2.5%	1.7%

*Descriptors (in parentheses) determined by Woods End Laboratory

Fields were core aerified 0-7 days prior to compost applications. Composts were applied with a variety of equipment, depending on availability at each site, and the wetness, fineness and uniformity of the materials. A topdresser was used in Monroe and Tioga Counties, and a salt spreader in Nassau County. Plots in Tompkins County were smaller (50 x 20 ft), and materials were dropped by a front loader and then spread manually using shovels and rakes. Compost and cores were crushed and dragged subsequent to application at most sites.

Evaluations

Plots were evaluated for turfgrass quality 2-3 times during the growing season. Assessments included at least 4 components:

1. Cover: % turfgrass, weeds, and bare ground,
2. Color
3. Uniformity
4. Safety

Cover

Cover was determined by a point-quadrat method. A one-meter-square grid was constructed with internal cross strings forming intersections as 25 cm intervals, for a total of 16 intersection points in the grid. The grid was placed on the turf in 3-5 locations per plot, and the same grid locations were followed throughout the season. When the grid was on the turf, a reading was made at each intersection point whether the area immediately below it was a turfgrass plant, weed plant, or bare ground. These readings were converted into % cover of turf, weeds and bare for each plot and treatment.

Color, Uniformity, and Safety

Color, Uniformity, and Safety were assessed by walking through each plot and rating them on a scale of 1-9. Criteria were as follows:

Color	1 = brown, dead 9 = deep, dark green
Uniformity:	1 = severely mixed weed and grass species and bare spots, 9 = completely uniform appearance and texture of desirable grass
Safety (footing):	1 = very lumpy and clumped, holes and other dangerous playing hazards 9 = smooth, even, safe

Other management practices

This season, the groundskeepers at each site followed their normal cultural practices for mowing, fertility management, etc. Next year, we plan to adjust fertility inputs based on results from this project.

Disease Suppressiveness

Soil samples were taken in July from three sites and tested for suppressiveness to *Pythium* fungi. Soil samples were pulverized, mixed, seeded with bentgrass and inoculated with *Pythium* fungi. Treatments were rated for emergence of seedlings and mycelial colonization on a scale of 1 to 5, and compared to a susceptible inoculated control.

These ratings were averaged, with 0 showing no suppressiveness, and 5 being highly suppressive.

Nematode Populations
Plant parasitic and free-living nematodes were extracted and identified from the soil samples taken 8/4/00 at the Tompkins County site, to determine if compost applications have an effect on their populations.

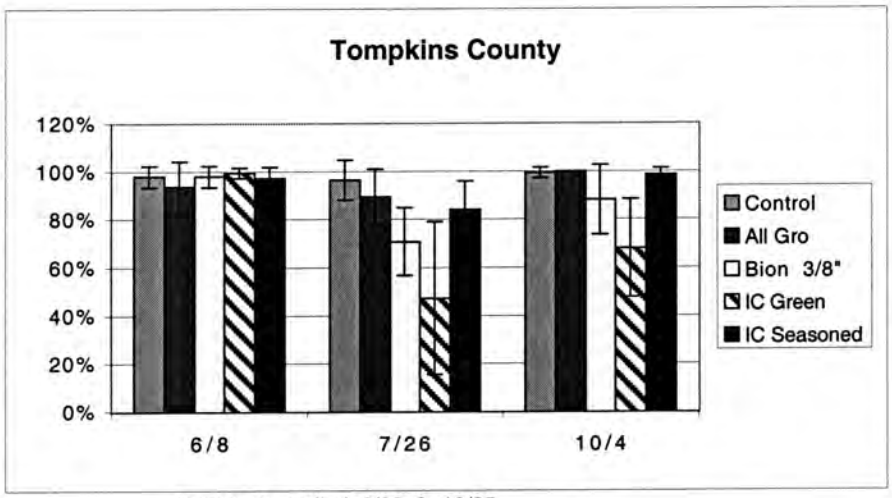
Results and Discussion:

The most significant result this year was knowledge gained about application procedures. The compost materials varied greatly in their texture and moisture content, and therefore ease of application. A topdresser was our preferred method for application, but clumping of wet compost and clogging with large objects sometimes precluded the use of this equipment. We have been working with producers to supply us with material that is drier, finer and more uniform. We hope to make all applications with a topdresser in the 2001 season.

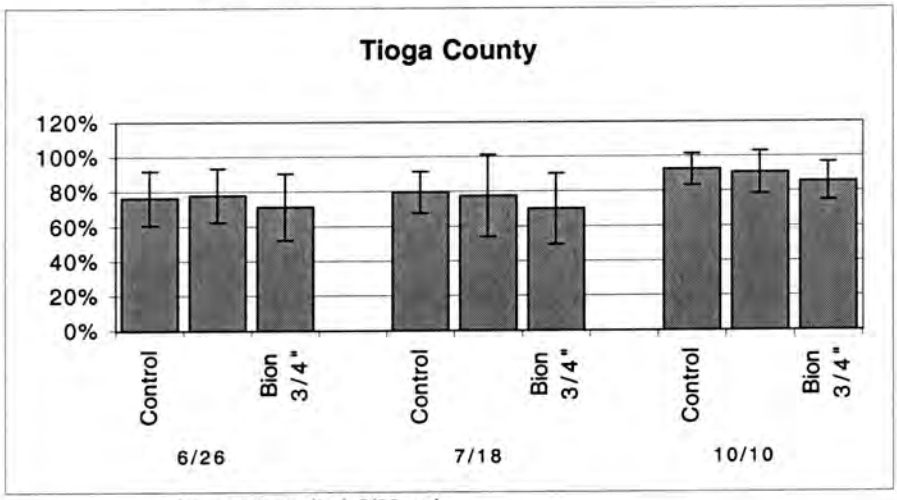
The potential for creation of compost layers in the turf profile is one of our long-term concerns in this project. Aeration prior to compost applications with crushing and dragging of cores afterwards was intended to incorporate the compost and prevent layering. At the Tompkins County site, we felt that incorporation was insufficient in most plots several weeks after the first application. Therefore, these plots were cored and dragged again, approximately one month after the initial applications, and aerification was more intensive prior to the fall application. Layering was more likely to occur at this site because compost was applied manually and therefore less uniformly, and because this field was not in use. Active play on the field could have helped to incorporate material.

Quality
The percent turfgrass coverage for the three upstate sites is shown in Figure 1. At the Tompkins County site, turfgrass coverage in the BionSoil and IC Green treatments was low one month after application the initial application (7/26), However, these differences were not significant due to high variability among plots. The IC Green compost was not mature, and clearly burned the turf in some areas. This treatment was discontinued after the spring application. The reduced turf coverage in the Tompkins County BionSoil plots was not seen at other sites, and may have been caused by thick areas in the uneven manual application smothering the grass. These plots recovered by October. No significant differences among treatments were seen at any site, except that the Ithaca College immature compost was significantly worse than most other treatments in the fall sampling at the Tompkins County site.

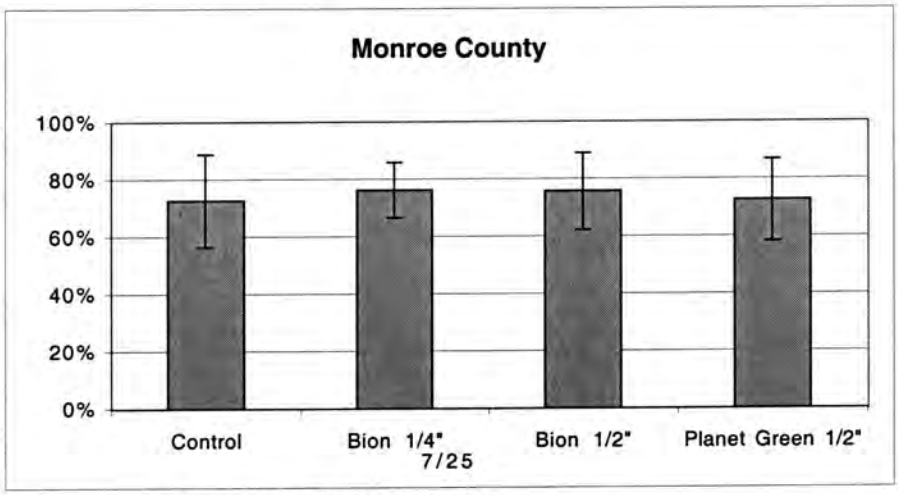
There were also no significant differences or trends seen between plots when comparing color, uniformity and safety ratings among treatments at the three upstate sites. Therefore, these data are not presented. At the Nassau County site, quality was reported as better in the BionSoil 1/4" and 1/2" treatments as opposed to the control. We expect that the experiment will need to run longer term before real differences will be seen.



*compost applied 6/22 & 10/25



*compost applied 6/26 only

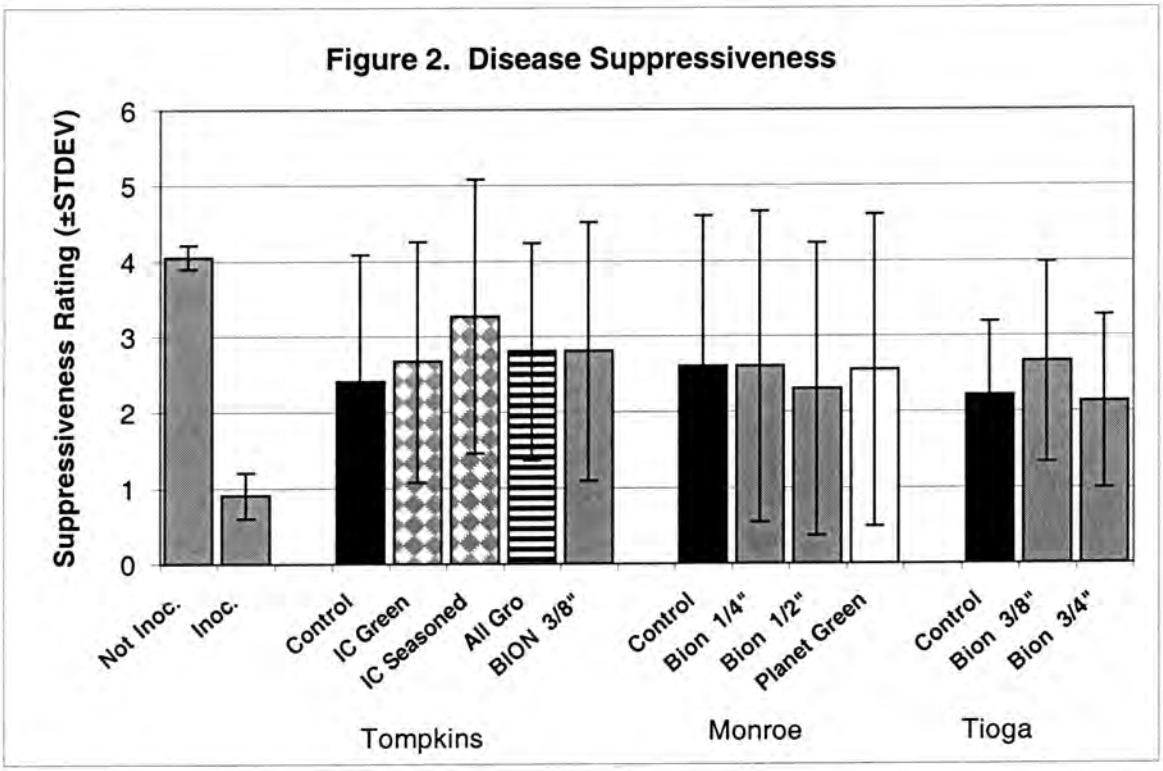


*compost applied 6/5 and 10/17

Figure 1. **%Turfgrass coverage, 2000 field season. Bars = standard deviation of the mean.**

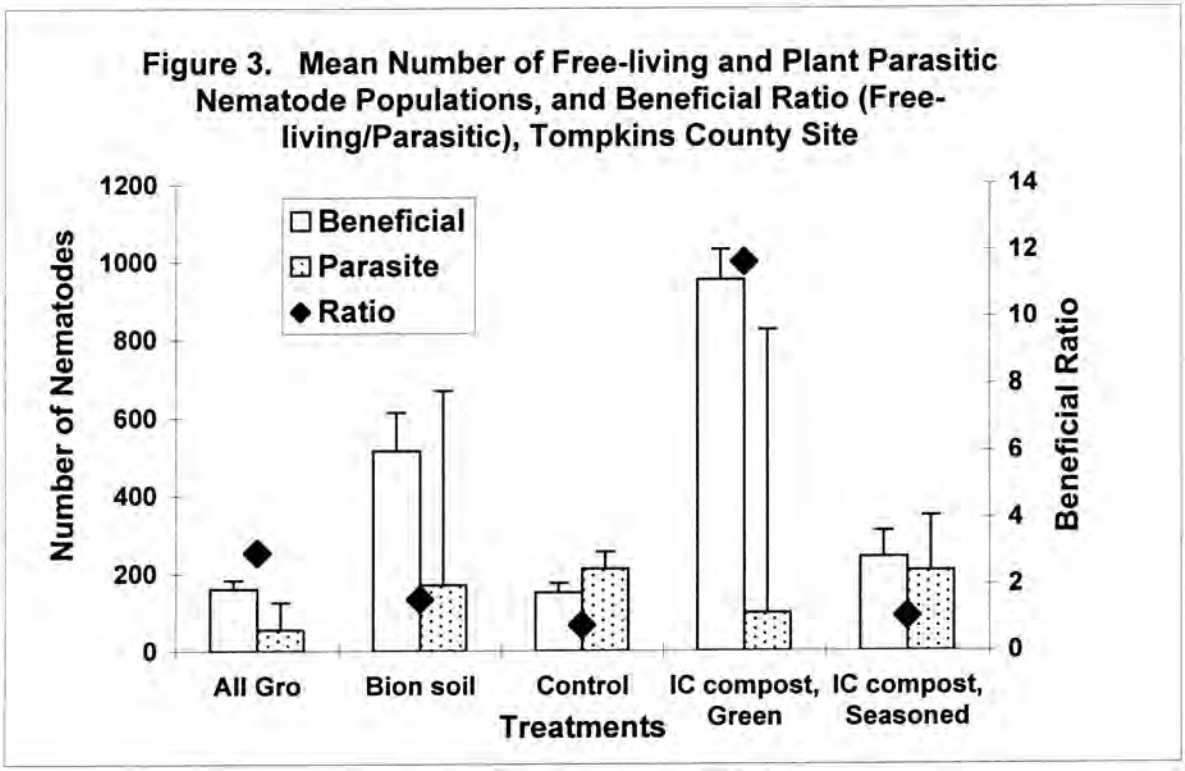
Disease Suppressiveness

Soil samples taken in July from three sites were tested for suppressiveness to *Pythium* fungi, and results are shown in Figure 2. *Pythium* serves as a useful indicator organism because of its high sensitivity to competing microorganisms. Four of the soils tested could be considered suppressive, because their ratings do not overlap with that of the inoculated control (2nd column). Two of these soils were at the Tompkins County site: IC Seasoned and All Gro, and two in Tioga County: BionSoil (3/8") and the control. Suppressiveness may be inherent to these soils, the composts applied, or the application of composts may favor beneficial microbes in either the soil or compost. Interpretation of these first season data should be cautious, because variability was high.

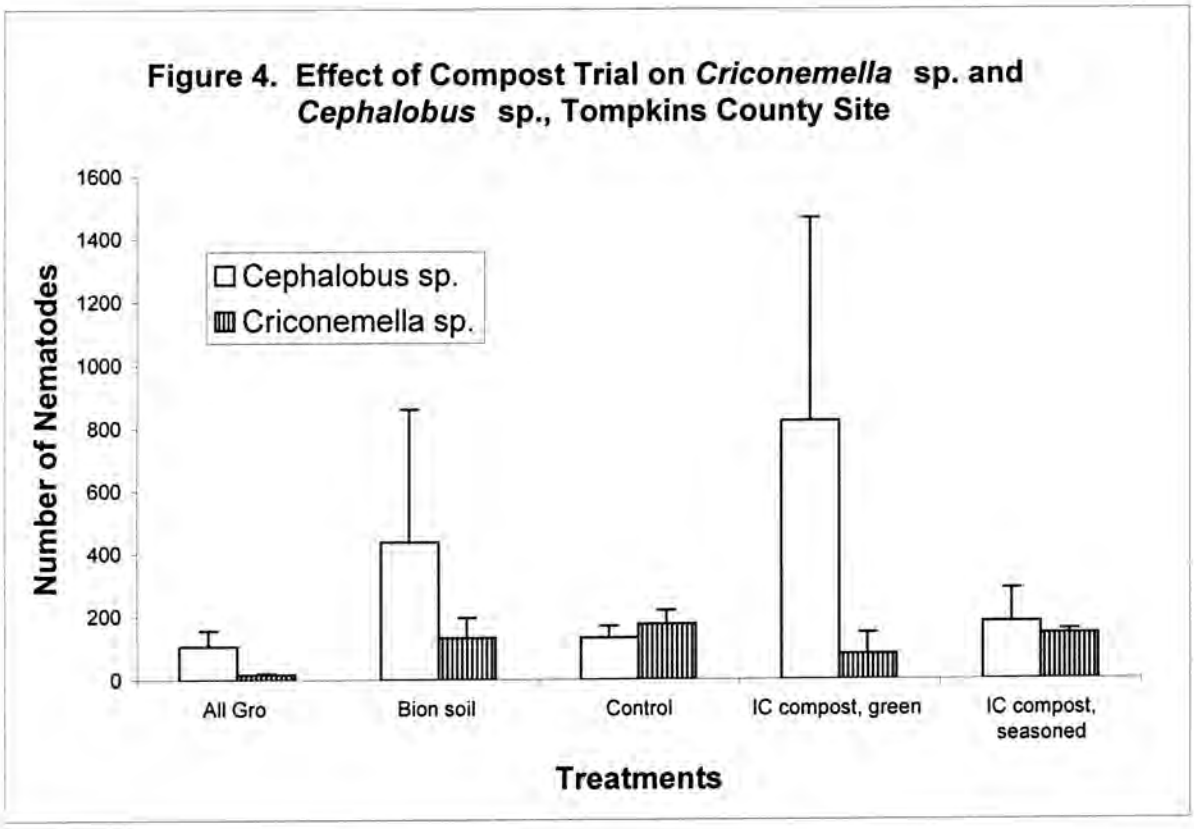


Nematode Populations

Figure 3 shows the effect of the four compost amendments on average numbers of parasitic and beneficial free-living nematodes and the beneficial ratio (beneficials:parasites). The parasitic to beneficial ratio was >1 for the control, <1 for all other treatments. Since this is one sample period, caution should be taken in interpreting the results. However, it appears that All Gro and IC Green may reduce plant parasitic nematode numbers and improve beneficial ratios more than the other treatments. If beneficial nematode numbers are taken alone, then Bion and IC green significantly increased free-living nematodes. "All Gro", however, significantly decreased parasitic nematodes.



The most abundant plant parasite and free-living beneficial nematodes by far were ring nematodes (*Criconemella* sp.) and *Cephalobus* sp. respectively. Figure 4 shows the effect of compost treatments on these two nematodes. The results are generally similar to the effect observed on all nematodes counted (in Figure 3).



Conclusions:

The project was successfully initiated in 2000. As discussed, the most significant result to date has been improved information on application techniques. We expect that clear differences in turfgrass quality, based on compost materials and application rates, will become evident in the second or third year.

Westchester County Golf Course IPM Demonstration Project

Project Leaders: Todd Schongalla, James Lee and Joe Heller, CCE of Westchester County; Gary Couch, NYS IPM Program; Dr. Patricia Vittum, Professor of Entomology, University of Massachusetts.

Collaborators: Gary Metz, Doug Hall, John Sackel, Kevin Duffy, Joe Stout and Ronald Demkovich, Westchester County Department of Parks, Recreation and Conservation (PRC); Rod Ferrentino, Community IPM Coordinator; Dr. Tamsen Yeh, CCE of Nassau County; Westchester County Pest Management Committee.

Location: Dunwoodie Golf Course in Yonkers, NY, and Maple Moor Golf Course in White Plains, NY.

Summary:

Our research to date has not demonstrated the efficacy of *Steinernema carpocapsae* (Sc) nematodes in controlling the annual bluegrass weevil. In comparison to the 45 private courses in Westchester, county courses operate with three times the traffic, half the staff and a third of the materials and equipment. For three years this project has taught Westchester County's golf course managers to reduce their reliance on pesticides through cutting-edge research and practical hands-on training.

Objectives:

1. Insecticide Reduction and Research: Test the effectiveness of four less toxic alternatives for annual bluegrass weevil control. Provide an opportunity for Extension specialists to train participants and gather research data by demonstrating and implementing effective alternative control methods.
2. IPM Scouting: Continue to train existing personnel in effective scouting and documentation procedures to provide accurate data so managers and greenskeepers can make informed IPM choices.
3. Training and Dissemination: Provide opportunities for the exchange of ideas and strategies between and among Westchester golf course professionals and the academic/research community.

Methods:

1. Insecticide Reduction and Research: We collaborated with Dr. Vittum's research on two alternatives for annual bluegrass weevil control at Dunwoodie Golf course: *Steinernema carpocapsae* (SC's) (available commercially as Millenium), *Spinosad* (a product of a soil actinomycete, available as Conserve). We also tested the use of *Heterorhabditis bacteriophora* (Hb) nematodes in controlling grubs at Maple Moor Golf Course.
2. IPM Scouting: We continued training of PRC staff in IPM practices which included monitoring for weeds, insects, and diseases according to NYS IPM scouting procedures.
3. Training and Dissemination: Participants received hands-on training in turfgrass research procedures and sampling methods. We also held two workshops that golf course

staff attended on IPM practices and strategies. As in 1999, we pursued publicity opportunities to advertise this project.

Results and Discussion:

1. Insecticide Reduction and Research: The University of Massachusetts turf entomology team conducted one field trial at Dunwoodie Golf Course in Yonkers, testing the efficacy of *Steinernema carpocapsae* (Millenium) nematodes or spinosad (Conserve) against the annual bluegrass weevil. Plots were five feet by seven feet, placed along the collar of one of the most heavily infested greens, and were replicated three times. We collected 18 cores, each 1.9 inch in diameter, from the plots in early June and hand-inspected each core in the laboratory in Amherst, Mass. For statistical purposes, we pooled the counts from three cores at a time (six "observations" per plot), and ran a Fisher's protected LSD on the data.

Populations in the untreated plots were very high - 270 larvae per square foot. Both applications of nematodes (applied at 1.5 or 3 billion nematodes per acre in May) reduced larval populations significantly (P=0.05) but those populations remained above 145 larvae per square foot, well above the generally accepted "threshold" of 30 to 80 larvae per square foot. The Conserve application reduced populations significantly (P=0.01), dropping levels to around 12 larvae per square foot.

We had hoped to include additional biological control options in 2000 but encountered logistical problems. It continues to be our hope to test another species of Steinernema nematode, as well as a strain of *Bacillus thuringiensis*, in 2001.

The demonstration of using Hb nematodes for grub control at Maple Moor Golf Course was planned for late-August. However, with the untimely departure of the project leader, arrangements for delivery were not made until September. In late September, a workshop was held with course personnel on grub sampling and nematode application technique. An area of rough on the 9th fairway was chosen as sampling indicated high grub numbers (20/sq ft) and damage from foraging skunks was apparent. Species composition was predominantly European Chafer, almost all in the third instar. Though successful control of these large grubs was not expected, application to an area of approximately 400 sq ft was made to demonstrate the process to the staff. Follow-up sampling, conducted by course personnel, indeed indicated that no control was achieved.

2. IPM Scouting: We continued to work with PRC staff on monitoring for pests. If needed, golf course personnel consulted with CCE, NY State IPM, and staff from the University of Massachusetts when making pest management decisions.

3. Training and Dissemination: Golf course personnel received hands-on training in IPM procedures and sampling practices on the days that samples were taken and the product applications of Steinernema nematodes and Spinosad were made at Dunwoodie. A late summer workshop was held at Maple Moor to demonstrate the use of nematodes to control grubs. At this workshop, participants learned how to scout for grubs and apply nematodes for their control. Our IPM educator, Joe Heller, discussed our IPM golf course demonstration project in an interview on a local cable TV station.

Control of White Grubs with Beneficial Nematodes on School Athletic Fields

Project Leaders: Jody L. Gangloff-Kaufmann, NYS IPM Program, Jillanne Burns, Suffolk County CCE, Tamson Yeh, Nassau County CCE.

Cooperators: Al Arnold, Hauppauge School District, Gary Crowell, Center Moriches School District, Jesse Martin, Suffolk CCE.

Introduction:

White grubs are possibly the most important insect pests of athletic field turf in New York schools. While patchy and sporadic in nature, grubs can cause serious damage to turf, and to the untrained eye, this damage might resemble other cultural or disease problems. White grubs are commonly managed with conventional insecticides, such as chlorpyrifos and carbaryl. As public awareness focuses on the risks associated with pesticides, and chemicals like chlorpyrifos are phased out of use, athletic field managers are forced to seek alternatives. This trend has provided the collaborators with an opportunity to demonstrate the use of beneficial nematodes as an alternative control for white grubs. In addition, proper sampling, monitoring, identification, and use of thresholds are fundamental to best management programs for such pests.

Objectives:

1. To teach proper grub sampling and identification.
2. To instruct practitioners in the use of economic thresholds.
3. To demonstrate the use of beneficial nematodes (*Heterorhabditis bacteriophora*) for control of white grubs.

Results and Conclusions:

Methods: The collaborators began this project later in the season than expected, although weather conditions were still favorable at the outset. Preliminary grub sampling was done at the West Islip School district properties, the original collaborating school. When no grubs were found in any turf sampled in the district, fields at Hauppauge SD were suggested due to heavy infestation. In addition, a small school district in Center Moriches had requested help with grubs. Furthermore, the plan included a full plot and demonstration at Timber Point Golf Course, one of three public courses in Suffolk County slated for pesticide phase-out.

Plots were laid out in three locations: Hauppauge School varsity softball outfield, the Center Moriches administration building front lawn, and a fairway at Timber Point Golf Course. All three locations were sampled for grubs to determine the ideal location for nematode plots. Each site had grubs numbering well over standard thresholds for treatment. Grubs were almost entirely in the third instar.

Plots included two different rates (1 and 2 billion per acre) of the same nematode species (Hb) from two different suppliers, and were arranged in RCBD with water-only control treatments. Nematodes were applied with 0.5 inches of water and plots were evaluated approximately 2 weeks later for results.

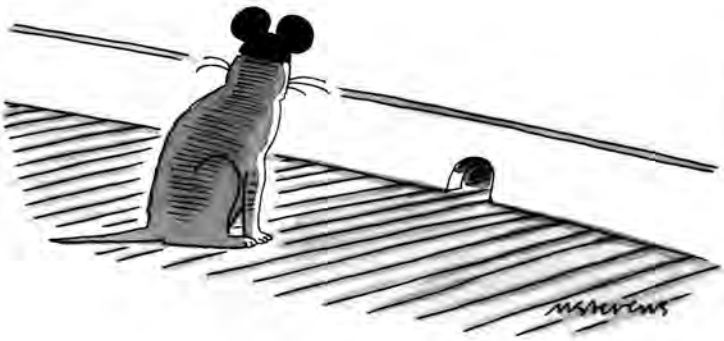
Workshops: One large workshop was conducted at Hauppauge School District for buildings and grounds staff of any school choosing to participate. Announcements were handed out at the Nassau and Suffolk Superintendents of Buildings and Grounds Association meetings. A smaller workshop was conducted at Center Moriches for the staff at that school only. Our golf course workshop was cancelled due to destruction of the plot by grub-seeking crows and busy golf course worker schedules.

The workshops consisted of an explanation and description of the reason for the experiment. We described the biology of the grubs and nematodes, assisted by a visual aid (nematode poster) published by Rutgers University. We then described the plot set up and participants were taught to sample for grubs using a 4" cup-cutter. Thresholds were demonstrated visually, and participants collected grubs for evaluation of the nematode experiment. Results were not as exciting as we had hoped. Only a few nematode-killed grubs were found. However we took the opportunity to teach grub identification and to explain why differences in species matters to a turf manager.

Impact:

Although the experiment was not ideal, the interaction with school buildings and grounds staff was very positive. A total of seventeen workers were present at both workshops and all seemed very interested in the hands-on workshop. Many had never looked closely at a grub or thought about looking under the soil's surface to count them. Results from the survey were positive; all respondents were interested in more information or workshops about alternative, non-chemical pest control for athletic fields. Many were motivated to try nematodes because of the new regulations governing notification of pesticide use in schools, but many also said they would try nematodes at home for their grub-infested lawns.

Community IPM staff worked with Albany County and Cornell Cooperative Extension of Albany County to develop educational materials for county employees. They created this poster for cafeterias, kitchenettes, and other places where employees needed to be mindful of pest management practices.



There's a better way.

10 ways you can help Albany County manage pests without pesticides

1 Wipe up crumbs and clean up spills. Wash coffee cups and other dishes before leaving for the day. Rinse out soda cans and other recyclables.

2 Keep your lunch and all snacks in tightly closed, gnaw-proof containers (such as glass) or in the fridge.

3 If you have a snack after the trash has been emptied for the day, take food scraps home with you.

4 Don't stockpile paper bags or cardboard boxes; cockroaches love to hide in them.

5 Report water leaks (pests need water to survive).

6 Keep outside doors and windows closed, if possible. Pests often enter the easy way!

7 Learn a few common pests and look for their signs: small piles of sawdust; gnaw marks; droppings.

8 When you find a pest, tell your supervisor.

9 Never bring a pesticide to work or use a pesticide at work.

10 Read Albany County's brochure on non-toxic pest management in the workplace for more tips.

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