CORNELL UNIVERSITY TURFGRASS TIMES

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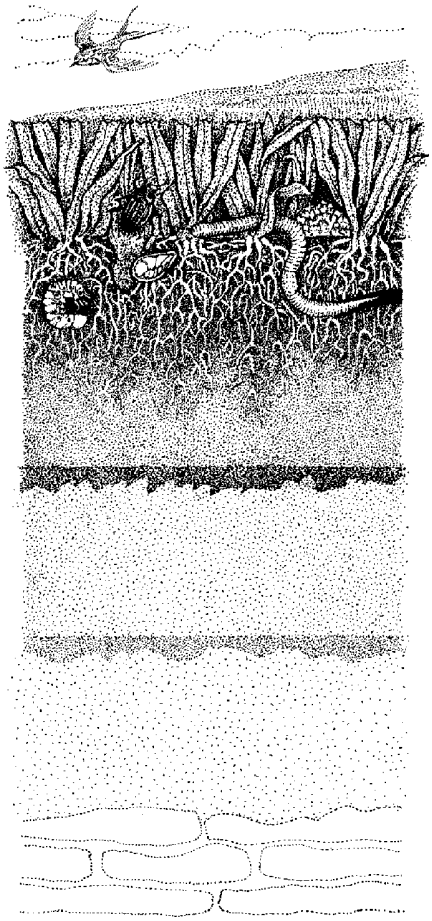


Marketing IPM For Lawn Care

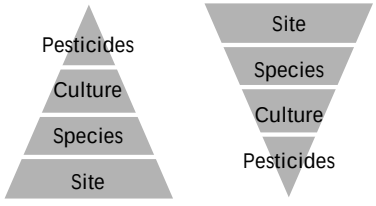
Integrated Pest Management (IPM) is a system of plant management that utilizes a variety of strategies to maintain plants in a healthy and vigorous state. As applied to turf, IPM utilizes the following strategies:

- proper site placement
- proper site preparation and establishment practices
- species and cultivar adaptability and resistance to pest problems
- proper cultural practices (irrigation, mowing, fertilization and cultivation)
- pest management ■

All of these strategies are combined or *integrated* to manage turf in a healthy and vigorous state. No one strategy necessarily takes precedence over another. Like the pieces of a puzzle, all are critical to complete the entire picture of turfgrass management.

An interesting way to view this concept is to visualize the management process as a pyramid. (See Figure 1). The base of the pyramid is the site placement, site preparation, and establishment practices. The stronger the base the stronger the overall health and vigor of the lawn.

Figure 1



As turf managers we often inherit the mistakes of others made during the early stages of planning, preparation and establishment of lawns. Poorly prepared, compacted subsoils are an all too common reality we encounter in lawn care. Inappropriate species or cultivar selection, poor establishment practices and timing or establishment in areas not well suited culturally to turfgrass may also be complicating factors for long term turfgrass management. Note the instability of the pyramid.

A realistic level of expectation for the lawn area and a knowledge of the necessary inputs and time frame required to overcome site and establishment problems should be conveyed to the customer. This in essence takes us off the hook for a slow-to-respond or problem lawn. It also changes our focus and the focus of the owner or property manager away from a single season approach to a long term management plan. Communication thus becomes a critical factor with an IPM approach to lawn care.

Cultural practices are what most lawn care managers have direct influence over. It is here that most planning and program development should take place, even in areas like mowing and irrigation that may not be directly implemented by the lawn care manager. Proper cultural man-

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This Times

Short Cutts

"No one has contributed more to urban entomology worldwide than Dr. Villani."

Professor Cornman organized and directed the Cornell Turfgrass Conference for 26 years and served as editor of the New York State Turfgrass Association (NYSTA) Bulletin for 20 years.

National Recognition for Villani

Cornell Turfgrass Team member Mike Villani was recognized by the Entomological Society of America (ESA) for Excellence in Urban Entomology. This award recognizes Mike's significant contributions to Urban Entomology through his sizable research program and extension activities. This award comes to Mike with the support of his colleagues nationally who submit letters on his behalf. These letters include statements such as; "the best turf entomologist in the country, maybe the world", "a superb scientist and world leader in the area of turf entomology", and "no one has contributed more to urban entomology worldwide than Dr. Villani".

In typical Villani fashion, he deflects the attention to his wonderful lab group including, Nancy Consolie, Paul "the juggler" Robbins, Wendy Heusler, Steve Hitchcock, Jennifer Grant, Dan Dalthorp, and Carlos Potillo-Aguilar. In addition, he indicated that his collaborative work with other scientists at the Experiment Station in Geneva have added to the quality of his research.

Never one to bask in the glory of his achievements, Mike is actively working on the revision of Haruo Tashiro's *Turfgrass Insects of the Untied States and Canada*, with Pat Vittum and "Tash" himself. He recently co-edited the highly successful *ESA Handbook of Turfgrass Insect Pests* with Rick Brandenburg of North Carolina State University. Interestingly, this is not Villani's only interaction with Brandenburg (see Program Update). The two have received over $100,000 from the United States Golf Association over the last 4 years to investigate the behavior of mole crickets, a major insect pest in southern turf systems.

Born in San Antonio, TX and raised on Long Island, Villani received degrees from SUNY Stonybrook and his Ph.D. from North Carolina State University. He is an Associate Professor in the Department of Entomology at the Geneva Experiment Station. Mike is an active family guy in Geneva with his wife Connie and two daughters Sara and Kate.

A Passing Note; John Cornman

The original member of the Cornell Turfgrass Team, Professor John F. Cornman passed away on January 6, 1998 at the age of 84. Professor Cornman retired in 1973 following 37 years of service to Cornell. Born in Shelby, OH, Professor Cornman graduated locally from Watkins Glen High School and received all his degrees from Cornell.

He was employed as a horticulturist for the United States Golf Association in 1939, only to return to Cornell as an instructor in the next year. In 1943 he entered military service with the Navy Bureau of Aeronautics as an agronomist advising them on dust abatement and erosion control. He returned to Cornell in 1947. Professor Cornman was responsible for teaching the turfgrass management course until 1961 when turf became his primary responsibility.

He worked on problems in the 60's that we still struggle with today, such as crabgrass and veronica filiformis control. His extension publication, Home Lawns, was the most requested Cornell publication for many years. In addition, he organized and directed the Cornell Turfgrass Conference for 26 years and served as editor of the New York State Turfgrass Association (NYSTA) Bulletin for 20 years. Professor Cornman received the Citation of Merit from NYSTA in 1979.

Professor Cornman is survived by his wife Francis, three sons, David, Peter, and Stephen, and their families.

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Turfgrass Cultivars and Nitrate Leaching

The concerns for nitrate leaching into groundwater are well known throughout the turfgrass industry. As a result of significant research efforts, we understand the importance of soil types, fertilizer sources, and other management practice influences on nitrate leaching.

A potentially important issue regarding nitrate leaching is the influence of turfgrass cultivar. Researchers at the University of Rhode Island evaluated ten cultivars each of Kentucky bluegrass, perennial ryegrass, and tall fescue on a silt loam soil for seasonal nitrate leaching.

Three- one pound applications of nitrogen were supplied in April, June and November in a blended source of 50% water soluble and 50% synthetic slow release nitrogen. Plots received sufficient irrigation and rainfall to encourage leaching events.

Results indicated that all species demonstrated significant cultivar differences regarding nitrate leaching, with all levels measuring less than half that allowed by the health advisory limit. Specifically, while some cultivars of Kentucky bluegrass had significantly lower nitrate leaching levels, as a species, Kentucky bluegrass was always higher than perennial ryegrass, and both higher than tall fescue as a species. This could be related to the expansive root system known to develop by tall fescue cultivars or general uptake efficeincy. Interestingly, the researchers observed seasonal differences in the species relative to nitrate leaching that could be related to root activity under cooler temperatures. For example, bluegrass will reduce root activity in the summer, leaving it vulnerable to late season leaching events with a reduced root mass.

Conclusions of this study are that genetic variability exists between species and cultivars for nitrate leaching, moderate nitrogen rates generated very low potentials for nitrate leaching, even under excessive moisture, and seasonal differences exist for species and cultivars related to nitrate leaching. These types of experiments will continue to be important as the industry is challenged on the judicious use of energy intensive inputs and more precise management is required. *(from; Liu,H., R.J. Hull, and D.T. Duff. 1997. Comparing cultivars of three cool season turfgrasses for soil water nitrate concentration and leaching potential. Crop Sci. 37:526)*

Educating the Homeowner

The commercial turfgrass industry regularly bears the majority of the public' negative perception of pesticide use and environmental quality. Yet, national statistics indicate that over 75% of all inputs applied in turf management are done so by the homeowner. Therefore, as an industry an important role could be to instruct the homeowner on the proper use of inputs and to more clearly explain the use of inputs in a commercial situation.

Extension personnel at Montana State University, conducted a survey to learn current pest management practices of homeowners, knowledge levels and opinions, areas of interest, and preferred methods of learning. Demographic information concluded that most homeowners in the study were on average 50 yrs of age, with 14 yrs of schooling, roughly split evenly between male and female, and 46% live in urban areas of greater than 10,000 people.

Clearly, the greatest source for information by the homeowners in this study is "stores that sell supplies" (56%), followed by nursery and greenhouses (46%), then friends or relatives (39%), extension service (37%), and seventh on the list was pest control specialists (10%). Most pest identification at the home is done by the homeowner themselves (63%) with extension personnel and professionals used a combined 18%!

Sixty-one percent (61%) of homeowners apply pesticides only when a problem is apparent, with 37% of these homeowners making two or three applications per year. Interestingly, when purchasing pesticides, 64% responded that they seldom or never received instruction for sales personnel on pesticide use. Greater than 50% of the homeowners sought methods of controlling pests without pesticides with 46% interested in learning how to keep pesticides out of the groundwater. In general the authors of the study felt that Montana residents used pesticides responsibly, yet, only a third wear long-sleeves and rubber gloves, suggesting a discrepancy between label instructions and action. Still, 53% of the respondents felt that pesticides were safe when used according to the label.

One of the most fascinating aspects of the study is the differences in where the homeowner is exposed to the information, their awareness, and the effectiveness of the information. The newspaper was perceived as a regular source for information (62%), followed by the library (50%),

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Scanning the Journals

A review of current journal articles

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IPM for Lawn Care

continued from front cover

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agement in all areas must be communicated to the responsible party.

Pest management is the final piece of the puzzle. IPM is not about eliminating pesticide use. IPM is concerned with proper and responsible pesticide use in the context of turfgrass management. Pesticides are a tool necessary for the level of lawn care that is expected by consumers but pesticides should not be the main focus of a lawn care program.

The efficacy and cost of modern pesticides have made them the first choice in many lawn care manager's minds when a problem occurs. A degree of tunnel vision has developed which makes us blind to the complete picture of turfgrass management. Still, pesticides remain an important tool, too valuable to lose through our carelessness or short-sighted approach to lawn care.

Why IPM? Pressure for Change

Many pressures exist for modifying traditional lawn care practices into practices based on an IPM philosophy. These pressures continue to increase and this trend is not likely to reverse in the future. The pressures for change can be categorized into the following general groups:

- Public Perception
- Environmental
- Governmental
- Agronomic
- Financial

Public perception of pesticide use often is negative. A perceived threat to health and safety from pesticides exists in the minds of many consumers. Television, radio, newspapers, and magazines continue to sensationalize and exaggerate health effects from pesticide use with little effort made to report information from a scientific basis or to report on the benefits of lawns. Because traditional lawn care programs focused on the use of pesticides, it became easy for the mass media to simplify lawn care into a pesticide spray operation rather than a total management system.

As a response to the negative public perception of pesticides and the environmental concerns raised, the government on the national, state and local levels has become involved. Lawn care tends to be a very easy and visible target to focus upon. Many local communities have attempted to enact ordinances regulating lawn care operations.

A less visible pressure for an IPM approach to lawn care is one of agronomics. A traditional lawn care program is not sound agronomically. Research continues to demonstrate the importance of a total management approach to lawn care. The impact of pesticides beyond the target pest is also better understood. Often this impact is negative and works to complicate lawn management.

Finally, IPM makes sense financially. A reduction in pesticide use saves money. When a subsequent increase in pest management and increase in lawn health, vigor and quality results, additional financial returns are realized. Savings are both short and long term. An increase in competitiveness, especially for the small to mid size operator, also can result with an IPM approach to lawn care. With improved competitiveness and reduction in costs comes increased profits. Additional services can be offered with an IPM approach and, in fact, additional services fit very well into an IPM system. Additional services can help to improve market share be increasing the customer base and can also increase to revenue generated per customer.

Implementation of an IPM Approach

IPM is a philosophy. In order to implement an IPM approach in your lawn care operation you must believe in the benefits of IPM and understand the concept. Often this concept is easy to understand but it may be difficult to figure out a way to implement it.The difficulty in implementation is what prevents many operators from making what seems to be a risky and dramatic change in operations. The beauty of IPM is that it allows a progression of change from a traditional lawn care approach where every lawn gets the same treatment at a certain time of the year to a degree of IPM that fits the comfort level of the particular business. An all or nothing attitude is not necessary with IPM. Believe in the philosophy, understand the concept and begin to incorporate IPM principles into your business at the pace that suits your operation.

To understand how to implement an IPM approach in lawn care, it is easiest to look at a purer and more complete IPM program rather than the pieces that can be incorporated into your individual operation. There are four basic steps in implementing an IPM approach to lawn care:

- Initial lawn inspection
- Development of a management plan
- Monitoring and treatment based on the management plan
- Evaluation and modification of the management plan

The initial lawn inspection should be as detailed as possible to provide accurate and thorough information for the development of the management plan. Information that is helpful

includes: grass species and cultivars; current mowing height; current irrigation practices; soil profile and texture; soil drainage; soil test information; weed populations; disease activity; insect activity; date of establishment; establishment method; and the expectations of the owner or property manager.

Once this inspection information is compiled, a management plan can be developed. It is this management plan that provides specifications and recommendations for the season. Included should be cultural recommendations, even if direct responsibility for the implementation of certain cultural practices like mowing or irrigation does not lie with the lawn care operator.

Once accepted by the customer, the management plan can be implemented. Typically a series of visits are required at which time problems are monitored and certain treatments are applied. Fertilization based on the site inspection is considered a treatment. Other services such as aerification and overseeding can be scheduled as part of the programmed visits. Pesticides are applied based on the predictions made in the management plan and the activity noted at the time of the visit. In essence each visit becomes an inspection. Pesticides, when applied, should be targeted to high risk areas or areas where pest activity is present. At times, no particular treatment may be applied at the time of a visit but the site would still be monitored and inspected.

Easily neglected but just as critical to the success of an IPM approach is the evaluation and modification of the management plan. Certain sites will require little modification while others will require considerable change, especially as problem sites begin to respond to proper management. In these problem situations, inputs actually tend to decrease with time when an IPM approach is followed.

At each step of the IPM process communication is critical. IPM is information based rather than product based. Communication with the owner or property manager makes or breaks the success of an IPM program. The inspection, the management plan, the monitoring and treatment visits, and the subsequent evaluation of the program should all be approached as a form of customer communication. The client should be able to develop a realistic expectation of the site and a knowledge of the inherent problems associated with the site using the information provided.

Communication also becomes critical with the technician that conducts the site visits and treatments. If possible, the technician should be involved at all stages of the IPM process. Obviously, good verbal and written communication skills are a prerequisite to a quality technician. A level of knowledge above the industry norm is desirable, but this is more easily trained than communication skills and attitude.

Marketing IPM for Lawn Care

The belief in IPM as a philosophy is also critical to the marketing of an IPM approach. A mistake often made is to offer a traditional lawn care option and an IPM option. IPM is at a disadvantage simply due to an experience factor; sales staff, clients and technicians are much more familiar with the traditional approach and IPM will be shuffled aside because it's too confusing, too expensive, or too difficult to implement. Rather, it is better to implement certain principles of IPM in the process of gradual transition away from a traditional approach to a certain level of IPM. Practices such as targeting pesticides, offering additional management services, soil testing to determine fertilizer recommendations, and development of fact sheets on cultural practices and pest problems are all simple ways to ease into IPM. A close look at your current operation may already reveal many IPM principles at work.

Marketing IPM is also about marketing professionalism. Since IPM is information-based rather than product-based, it is important to feel comfortable selling *service*, which is what most professionals sell. Our industry has always talked about service but we did not make any money unless we sold a product in the form of an application. We must change this attitude.

Your doctor, your dentist, your lawyer all charge you for their expertise. Critics argue that the expertise of these professions is greater than someone in lawn care. But your plumber, your electrician, your auto mechanic, the person that fixes or maintains your home appliances also charges for their expertise. Surely we are on a par with this group. An argument is made often that the consumer won't tolerate a charge for our expertise. That's only because as a profession we don't charge them. Try finding a repairman for your washer that you can talk out of his service charge. It is an industry standard that we as consumers have come to expect.

With an IPM approach, not treating is a very viable option in certain cases. What makes it viable in these certain cases is that it is also a very good option agronomically or environmentally. Unless we charge for our ability to make this type of management decision, we can not operate with an IPM approach profitably.

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An all or nothing attitude is not necessary with IPM. Believe in the philosophy, understand the concept and begin to incorporate IPM principles into your business at the pace that suits your operation.

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Tunneling For Answers

Program Update

At Cornell we have developed a variety of techniques that allow us to follow the movement of crickets under the soil. One technique involves using X-rays to produce radiographs to follow crickets over time.

Although much of the research we con duct is focused on turfgrass pests that are important in New York or in the Northeast, there are times when our interests stretch beyond the neighborhood to collaborate with other turf entomologists around the country. One such project involves a collaboration with Dr. Rick Brandenburg, the turfgrass entomologist at North Carolina State University and focuses on the behavior of mole crickets in coastal North Carolina. At Cornell we have developed a variety of techniques that allow us to follow the movement of crickets under the soil. One technique involves using X-rays to produce radiographs to follow crickets over time.

Radiographic studies of mole cricket tunneling have documented stereotypic behavior of southern and tawny mole crickets. We have determined that soil physical properties, the presence of other crickets (of the same or different species), the presence of biological or chemical insecticides, and the presence of fluids from other crickets can alter this behavior and may help explain the variability observed when attempting to manage crickets in the field.

The use of radiography chambers that are essentially two dimensional provides valuable insight into the subterranean activity of mole crickets. However, the actual three dimensional components of the mole cricket's behavior are not well documented. The use of larger chambers to hold soil and preparation of a wax-based material to create casts of the tunneling structure has proven quite successful. Ordinary canning wax was heated and poured down cricket tunnels to create permanent wax castings of these tunnels in larger soil arenas. These castings allow us to view and analyze the burrowing behavior of the crickets during their tenure in the soil in response to a variety of control agents under various soil conditions.

These casts document not only the typical "Y" shaped structure of the tunnel, but the development of an extensive network of tunnels useful for feeding and escape. They not only confirm radiograph findings, but allow further exploration of cricket behavior. Additionally these arenas are of a sufficient size to determine surface activity and turfgrass damage that is indicative of field damage.

The use of this technique in the field during the summer and fall of 1997 has further documented the accuracy and validity of the laboratory radiographs. Field validation of tawny mole cricket tunneling behavior was conducted by creating wax castings of mole cricket tunnels on golf course driving ranges which permitted complete excavation of castings. Wax castings in field tunnels and subsequent excavation of these castings have documented the 'Y' shaped tunnels observed in the radiographs. The consistency of these tunnels lends credibility not only to the laboratory studies, but also to the theory that tunnel construction plays a significant role in mole cricket ecology and avoidance of control strategies.

Seeking the answers to these fundamental questions about pest behavior will undoubtedly aid in the development of more effective integrated management programs. Clearly, understanding pest ecology is the foundation of an IPM program.

Mike Villani
Cornell University Turfgrass Team

Turfgrass Pesticides and Biological Disease Control: Are They Compatible?

In the past few years, biological strategies of pest control have been attracting considerable attention among turfgrass scientists as well as golf course superintendents. These biological approaches are being viewed as an attractive means of reducing the superintendent's dependency on chemical pesticides. Our work over the past 11 years has focused on the development of biological disease control strategies for turfgrasses that employ the use of compost amendments or microbial inoculants. Regardless of the biological strategy followed, the level of control is dependent on the elevated activity of native or introduced soil microorganisms.

Despite the positive results with microbial inoculants and compost amendments, golf course superintendents have been reluctant to place more reliance on these disease control tactics. One of the more commonly-asked questions of biological disease control strategies in general is how other management practices affect the efficacy of biological controls. Of particular concern is the impact chemical pesticides may have on disease control efficacy. It should be realized that no single control strategy is used alone on golf course turf. A wide variety of chemical agents are employed, and no biological agent will replace these immediately. Furthermore, no turf disease control product is always effective, and we would be naive indeed to believe that biological controls were exceptional in this regard. Therefore, information on the compatibility of biological control strategies with existing chemical products, particularly fungicides, insecticides, and herbicides, is critical for the greater adoption of reduced chemical disease management strategies.

In 1997, a trial was established to examine the impacts of high label rates of various chemical pesticides on the efficacy of compost-amended topdressings for the suppression of Brown Patch and Dollar Spot diseases on creeping bentgrass putting greens. Composts that were evaluated included brewery sludge compost, municipal biosolids compost, and Sustane (turkey litter compost). Applications were made at monthly intervals at rates of 10 lb/1000 ft^2. Superimposed over these treatments were applications of various pesticides that included the following products: Merit and Dursban (Insecticides), Trimec [2,4-D, MCPP, and Dicamba] and Pre-M (Herbicides), and Heritage (Fungicide).

Although none of the pesticides tested reduced or enhanced the suppression of Dollar Spot or Brown Patch by compost amendments, the pesticides themselves had dramatic effects on disease development as shown in Table 1.

Interestingly, each of the insecticides and herbicides tested significantly enhanced Brown Patch disease. Heritage effectively controlled the disease. On the other hand, Pre-M and Dursban significantly suppressed Dollar spot disease whereas Heritage significantly enhanced disease severity. The other pesticides had not effect on Dollar spot severity. We know from laboratory studies that none of these pesticides (with the exception of Heritage) is directly toxic to the fungal organisms that cause Brown Patch or Dollar Spot. We have also learned from other laboratory studies that several different microbial inoculants are relatively unaffected by pesticide applications. We can only conclude that the reason we see enhanced or suppressed disease development is because of changes either to the physiology of the turfgrass plant or because of alterations in soil microbial communities that affect the activities of turfgrass pathogens. We plan to investigate this in more detail in coming years. These results do indicate the potential adverse affects different pesticides may have on the severity of turfgrass diseases.

Although our results have not demonstrated any adverse affects on the suppressiveness of compost amendments, our study was small and contained an extremely limited number of treatments. These results can therefore be considered only preliminary. We plan to expand these studies this coming season to investigate the compatibilty of these combinations. The use of biological approaches to turfgrass management is likely to increase as the emphasis in nonchemical and environmentally-friendly production practices increases.

This research not only will identify promising biological products for use in golf course management, but also will identify compatible combinations of biological products with conventional chemical pesticides. It is likely that we will discover synergistic combinations of biological and chemical pesticides as well as identify potentially detrimental interactions between biological and chemical products. This research will be important in the development of IPM strategies for golf course turf and the under-

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Research Update

No single control strategy is used alone on golf course turf. A wide variety of chemical agents are employed, and no biological agent will replace these immediately.

Table 1. Effect of various pesticides on Brown Patch severity on a creeping bentgrass putting green.

	% Plot Area Symptomatic	
Pesticide	Brown Patch	Dollar Spot
Untreated	11.9 c	35.0 b
Trimec (herbicide)	31.3 a	30.9 bc
Merit (insecticide)	20.0 b	39.1 b
Pre-M (herbicide)	29.1 a	25.3 cd
Dursban (insecticide)	34.1 a	17.2 d
Heritage (fungicide)	0.0 d	74.4 a

Different letters within a column indicate significant differences among treatments.

These results do indicate the potential adverse affects different pesticides may have on the severity of turfgrass diseases.

Pesticides & Biocontrols

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This research not only will identify promising biological products for use in golf course management, but also will identify compatible combinations of biological products with conventional chemical pesticides.

standing of these interactions will be essential to the long-term health and sustainability of turf quality on the golf course.

Purpose of the Project

The goal of this project is to determine whether biological control strategies are compatible with standard applications of chemical pesticides commonly used in the management of golf course turf. Specifically, we are interested in any potentially positive as well as any negative combinations of pesticides with microbial inoculants or disease suppressive composts. Our objectives are to:

1) determine the direct toxicity of selected herbicides, insecticides, and fungicides to various turfgrass pathogens so that laboratory and field results may be properly interpreted.

2) examine, in laboratory studies, the impacts of high label rates of various chemical pesticides on the efficacy of various microbial inoculants and compost amendments for the suppression of *Pythium* damping-off and root rot caused by *Pythium graminicola*, Brown Patch caused by *Rhizoctonia solani*, and Dollar Spot caused by *Sclerotinia homoeocarpa.*

3) evaluate, on turfgrass research plots as well as on golf course fairways, the efficacy of selected compost amendments and microbial inoculants when oversprayed with selected chemical pesticides.

Table 2. Pesticides used for toxicity testing with target turfgrass pathogens.

Fungicides	Insecticides	Herbicides
chlorothalonil (Daconil)	bendiocarb (Turcam)	2,4-D
cyproconazole (Sentinel)	chlorpyriphos (Dursban)	DCPA (Dachthal)
etridiazole (Koban)	isophenphos (Oftanol)	dicamba (Banvel)
flutolanil (Prostar)	imidacloprid (Merit)	dithiopyr (Dimension)
fosetyl Al (Aliette)	trichlorfon (Dylox)	fenoxaprop (Acclaim)
iprodione (Chipco 26019)	mecoprop (MCPP)	
propiconazole (Banner)	pendimethalin (Pre-M)	
thiophanate methyl (Fungo)	prodiamine (Barricade)	
propamocarb (Banol)		
mefanoxam (Subdue)		
triadimefon (Bayleton)		
azoxystrobin (Heritage)		

Table 3. Biological treatments tested in combination with selected pesticides.

Microbial Inoculants	Compost Amendments
Actinovate *(Streptomyces spp.)*	Sustane
Companion *(Bacillus subtilis GB03)*	AllGro Biosolids
Green Releaf, Bio-B Plus *(Bacillus spp.)*	Endicott Yard Waste
Pf-5 *(Pseudomonas fluorescens)*	Port Bay Gold
EcCT-501 *(Enterobacter cloacae)*	Nutri-Brew
TX-1 *(Pseudomonas aureofaciens)*	
Turf Tech Bio (various microbes)	
BioStart 2000G (various microbes)	
BioTrek 22G *(Trichoderma harzianum)*	

Objective 1: Direct Toxicity of Pesticides

Results of compatibility testing such as that described here have traditionally been difficult to interpret because of the unknown direct toxicity of various chemical pesticides to turfgrass pathogens. This is particularly true for work with fungicides since many of the fungicides tested for compatibility with biological treatments also have activity against the target pathogen. The use of *Pythium* species as models in fungicide compatibility studies has avoided some of these problems since few registered fungicides have activity against *Pythium* species. However, it is not clear, what toxicity might exist with insecticides and herbicides against *Pythium* and other fungal turfgrass pathogens. Therefore, in order to be able to interpret our field studies properly, we must first establish any known toxicity of the pesticides being tested with target turfgrass pathogens. We will choose pesticides from those listed in Table 2.

These materials will be tested for toxicity to *Sclerotinia homoeocarpa, Rhizoctonia solani*, and *Pythium graminicola,* three of the more common and important pathogens of golf course turf. A range of concentrations will be tested so that relative toxicity (EC50 values) can be determined. Those materials least toxic to the target pathogens will be tested further in laboratory and field trials.

Objective 2: Pesticide Impact on Microbial Inoculant and Compost Amendment Efficacy

In initial screenings, each of the pesticides tested to satisfy the first objective (see Table 2) also will be tested in combination with the biological treatments listed in Table 3.

Microbial inoculants will be amended to sand according to label rates or, with the case of several bacterial strains, will be drenched into sand at cell concentrations of ~108 cells/ml. Immediately after inoculation, cylinders will be drenched with appropriate concentrations of the test pesticide. Concentrations used will depend on specific label rates of each pesticide. Seedling stands will then be evaluated 6, 7, and 8 days after inoculation. The following types of treatments will be included in these experiments: 1) untreated, uninoculated; 2) untreated, inoculated; 3) pesticide treated, uninoculated; and 4) pesticide-treated, inoculated. From these experiments, those pesticide/biocontrol combinations showing either enhancements or reductions in efficacy over the biological control treatment alone

will be tested in field studies outlined below. Those pesticides showing any phytotoxicity to seedlings will be tested further in mature turf in greenhouse experiments.

Objective 3: Field Tests

One set of plots will be established on bentgrass turf at the Cornell University Turfgrass Research Field Facility. Biocontrol treatments will be randomized within a set of four replicate blocks receiving a pesticide application. Control plots will consist of untreated turf (no biocontrol treatment) within each pesticide block. Among the pesticide treatments, one set of biocontrol treatments will receive no pesticide application and serve as an additional control. Individual biocontrol will be applied to 3 ft x 3 ft plots. Unless stated otherwise on the label, microbial inoculants will be applied at weekly intervals according to label rates whereas compost applications will be made at monthly intervals at rates of 10 lb/1000 ft^2. Pesticides will be applied according to label instructions. The efficacy of disease suppression in pesticide/biocontrol combination plots will be compared with plots receiving only the biocontrol treatment alone.

Funding Sources

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NORTH SHORE COUNTRY CLUB, GLENVIEW, IL

Short Cutts

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Citation of Merit for Delhi Leader Morales

The New York State Turfgrass Association (NYSTA) bestowed one of its highest honors on Dominic Morales, Turfgrass Program Leader at SUNY Delhi, awarding him the 1997 Citation of Merit. Dominic has distinguished himself over the years with his willingness to contribute to educational programs throughout the state and region as well as his tenacious promotion and development of the Turfgrass Program at Delhi.

Dominic's expertise as an educator was recognized in the past few years by the SUNY system with the Chancellor's Award for Excellence in Teaching. These two awards demonstrate Dominic's dedication to turfgrass education, his active involvement in industry activities, and the admiration of his colleagues. Recently, he spearheaded the construction of a second nine holes at the Delhi Golf Course and new Turfgrass Education Facility. This activity has brought national attention to the Delhi program.

Dominic received his degrees from SUNY Farmingdale, University of New Hampshire, and the University of Connecticut. He lives in the Delhi area with his wife and lovely children.

The Short Course Returns to Long Island

For the second consecutive year, the Cornell Turfgrass Team in partnership with the Nassau-Suffolk Landscape Gardeners, the New York State Turfgrass Association, and Cornell Cooperative Extension Associations are bringing the Turfgrass Management Short Course to Long Island.

This is the same course that has been offered in Ithaca for 13 years, inspiring over 1000 turfgrass professionals. In 1997, the course conducted on Long Island met with overwhelming support and demonstrated the highly successful nature of this educational opportunity.

This year the course will be held for two weeks at the Holiday Inn Ronkonkoma in West Islip from February 16 to 20, then 23 to 27, 1998. The short course is designed to provide basic information on the art and science of turfgrass management. Many of our short course alumni have improved the profitability in their businesses as a result of this course. In addition, with its emphasis on both fundamental concepts, it serves as a foundation for individuals who do not have formal training in turfgrass science.

Topics covered include turfgrass soil management, selecting and establishing turfgrass stands, understanding soil tests for proper fertilizing, and of course half day sessions with hands-on labs for grass, weed, insect and disease identification.

If you'd like more information please contact our short course assistant Kelly Woodhouse at (607) 255-3090.

This year the "Short Course" will be held for two weeks at the Holiday Inn Ronkonkoma in West Islip from February 16 to 20, then 23 to 27, 1998.

IPM for Lawn Care

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Our traditional approach to lawn care is the dinosaur in the process of extinction. IPM principles put the control back into our hands as an industry.

Fees also are important to cover what may be more time spent during the initial inspection and the development of the management plan. Time is critical at these stages since we are gathering information and making recommendations that will decide the success of the lawn care program for that particular site. Short cuts at these stages jeopardize the end results and ultimately the quality of the lawn.

Money well spent is a powerful inducement to a consumer. IPM eliminates unnecessary treatments and manages the lawn as a unique entity and not just as another stop in a tanker truck's route. Service is personalized and the needs of the consumer are met.

Finally, the environmental issues provide an opportunity for marketing an IPM approach. Unfortunately these same issues are also subject to abuse and confusion on the part of our industry if not handled in an honest and professional manner. IPM does not eliminate pesticides. What IPM does accomplish is lawn care using the best available management practices. Pesticides are not the focus of this approach but are one of many valuable management tools available for use by a professional when deciding a course of action for the particular lawn. IPM meets the environmental concerns of the consumer. Just as critical, IPM meets the needs of government and may help change the overall public perception of lawn care.

To properly market IPM, it is first necessary to believe in the philosophy of IPM. Begin to implement IPM principles as a transition away from a traditional lawn care approach. Secondly, we must believe in ourselves as professionals and be willing to charge for our expertise. There are hundreds of reasons not to charge, none of which is good.

Once we change our minds, it now becomes time to change the minds of consumers. IPM is common sense that a consumer can conceptualize. IPM is proper turf management. IPM is money well spent. And IPM meets the environmental concerns of the consumer.

IPM represents the future of our profession. The writing is on the wall. Our traditional approach to lawn care is the dinosaur in the process of extinction. IPM principles put the control back into our hands as an industry. This control is not only control of lawn care practices but control of the decisions that effect our livelihoods. IPM represents self-regulation which is the best type of regulation for any profession.

Tom Smith
President, Grass Roots, Inc.
East Lansing, MI
e-mail: grassroots4@juno.com

Suggestions for Implementing a Lawn Care IPM Program

- Soil test to determine soil pH, phosphorus and potassium levels and base your fertilizer selection on the test results.
- Target apply pesticides only to those areas where pest activity is occurring or where pest pressure is high. This can reduce your pesticide use by up to 50% which means money in your pocket.
- Do a thorough site inspection that looks at the whole management picture. Make recommendations even if the client is responsible for the particular service in question. This is also a good way to generate more work for yourself.
- Charge!! What other profession doesn't charge for their expertise. Soil testing, site inspections or other advisory services are worth something. Remember that IPM is not product-based but management- and information-based. A viable option with IPM is to do nothing. You should get paid for this decision.
- Look and act professional. Uniforms, truck logos, consistent forms are just some of the ways to increase professionalism.
- Become more information-based. Send out a newsletter, develop fact sheets, and provide regular management updates to clients. Leave good notes that communicate with the client.
- Implement or offer bio-organics in your program. IPM is conscious of the environment and these products can have a place in an IPM approach.
- Consider equipment that reduces drift, injects pesticides as needed, or in other ways reduces the chance of nontarget exposure.
- Time pesticide applications to reduce the exposure to humans, pets and nontarget organisms.
- Become familiar with the products you use and attempt to get information about environmental impact.
- Try to select the product that will have the least amount of environmental impact.
- Investigate bio-controls like BT. Others are sure to become available to lawn care.

Ten Things

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the importance of communication and employee involvement

Managers should show confidence in their decision making ability. Allow employees to make mistakes even if you do not agree with what decisions were made. Discuss how problems might be approached in a different fashion in the future. Provide continuous support and encouragement to employees so that they feel confident as they tackle difficult jobs.

Employees want policies and expectations in writing. Consider developing an employee handbook if you don't already have one. Expectations on job duties and performance levels should be included in the handbook and they should be reviewed with employees on a regular basis. Employees also want to know what the limits are. What behaviors are grounds for discipline and discharge? When discipline and discharge policies have been laid out for the organization employees expect their peers who break the rules to be disciplined accordingly. Employees who break the rules and are not disciplined can affect the morale of the entire staff and employees in general will loose respect for management's attempt to instill order and discipline in the organization.

People want problem employees dealt with decisively and quickly. Employees who play by the rules resent their peers who do not and expect management to not tolerate behavior that takes away the effectiveness of the business.

Employees want to know how they are doing. The manager should become a coach to improve job performance and provide continuous feedback. Use of praise and recognition to encourage a positive work ethic is important. Provide feedback to develop a working environment that encourages employee motivation for peak job performance.

People are the reason for business success. Spend part of each day looking at ways to fulfill employee expectations and they will be far more likely to help you as a manager to fulfill yours.

People want their employers to recognize that they have a life outside of work. Flexible hours and time off are two things employees value highly. The flexibility to attend a child's ball game may be valued more highly than monetary compensation. People want their employers to be fair and consistent with the treatment of all employees.

Managers should create a culture of continuous improvement. Do employees have easy access to information relating to their work? For example if an employee is responsible for cost control then he/she should have access to information on current expenses.

THOMAS R. MALONEY
CORNELL UNIVERSITY TURFGRASS TEAM

People are the reason for business success. Spend part of each day looking at ways to fulfill employee expectations and they will be far more likely to help you as a manager to fulfill yours.

Scanning the Journals

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extension publications (40%), then TV (31%), etc. Keep in mind none of these were identified as primary places where the homeowner actually received the information, and information received from sales people was rated as the least effective source!

Finally, it is clear that people seek pest information only when a problem arises, making timing for newspaper articles critical. In addition, the availability and convenience of retail outlets position them as unique educational opportunities for reaching an elusive and persnickety audience—the homeowner. *(from; Lajeunesse,S.E., G.D. Johnson, and J.S. Jacobsen. 1997. A homeowner survey-outdoor pest management practices, water quality awareness, and preferred learning methods. J.Natural Res. and Life Sci. Educ. 26:43).*

Ten Things Your Employees Expect From You

Human Resource Update

Every so often managers are so consumed by what their expectations are for the people that work for them that they often do not see supervision as a two way street.

Employment by its very nature requires that managers and supervisors place im portant performance expectations on employees to ensure business success. Every so often however, managers are so consumed by what their expectations are for the people that work for them that they often do not see supervision as a two way street. Employees too have important expectations of their employers, as those managers who are mindful of those expectations and work hard to meet appropriate employee expectations do a better job of motivating their workers and gaining their trust and respect. The following are ten things that employees legitimately should expect of their supervisors.

Employees expect an answer to the question, "What is my job?" Answering this question entails having a written job description as well as a verbal understanding of job duties and performance standards. It is very difficult to evaluate and reward an employee for performance when performance expectations have not been regularly identified.

Employees want to know the answer to the question, "Who do I report to?" If it is agreeable with all parties, supervision may change but for each task the employee should only report to one person. Reporting to multiple bosses can lead to great frustration for the employee. In addition, performance may suffer as the employee can not focus on one set of instructions. Also, when an employee has more than one immediate supervisor, there may be a temptation to play one against the other for his or her own personal objectives.

Employees want to know what the rewards for good work are. Employers should provide competitive compensation, the opportunity for increase skill development and recognition for top performers. Incentive or bonus programs may also be implemented. In any case the reward should be given in a positive manner and serve to sincerely compensate an employee on a job well done.

Employees want to go with a winning team and expect to be successful. As a manager of a business it is your responsibility to create an environment of success and high morale. Each employee should work towards common goals and the creativity and intelligence of all employees should be included in planning and decision making. Employees will feel more committed if their ideas are part of the organization's success.

Employees want to know where the business or organization is going. A clearly defined business mission and goals should be written and communicated and understood by all employees. These clearly defined ideas create a vision of how the organization will look in the future. Plans for reaching those goals should be carefully thought out and communicated.

Employees expect their supervisors to let them in on things. Do you have a strong internal communication network? Is feedback on decisions requested and given consideration? Are employees involved in decision making? These are important questions to ask when considering

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