CORNELL UNIVERSITY TURFGRASS TIMES

CUTT

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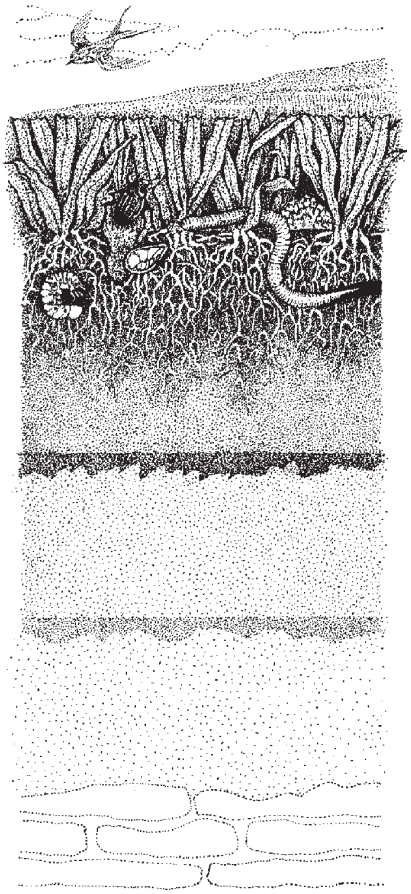
Special 12 Page Issue



Conducting A Bioassay For Herbicide Residues

What is a Bioassay? A bioassay is a technique for determining if herbicide (or other chemical) residues are present in soil or water at high enough concentrations to adversely affect plant growth. This is a simple and direct method to determine if it is safe to plant turf or other landscape plants into areas previously treated with herbicides or into soil with an unknown history of herbicide use. ■

In its simplest form, a bioassay uses susceptible plants to identify if the herbicide is present in concentrations high enough to inhibit germination and/or growth. However, scientists sometimes use sensitive bioassays to estimate herbicide concentrations in soil and water, and to identify unknown herbicide residues from the symptoms of injury.

When is a Bioassay Warranted?

When turf is damaged by wear or other pests, residual herbicides, such as those applied for crabgrass control, can prevent turf emergence and establishment. Top soil brought onto the site often comes from abandoned farm land. These soils often contain herbicide residues, particularly atrazine, which can injure turf seedlings. Additionally, if you suspect that a herbicide contaminated product is responsible for some unusual turf injury, both the affected turf and the product can be tested.

How to Conduct a Bioassay

1. *Collect representative soil samples.*
   a. Sample areas suspected of having herbicide residues as well as areas which are known to be free of herbicides. You will use the herbicide-free soil for comparison.
   b. Take separate samples from high spots, low spots, and different soils. Also sample areas where sprayer overlap could have over-dosed the turf.
   c. Take soil cores. Remove the thatch and keep only the upper two inches of soil. Most residual herbicides will be bound in the upper two inches of soil. On sandy soils sample to four inches.
   d. Take several samples from an area and combine them. You need enough soil to fill a pot in which you will grow the bioassay plants (I suggest a 3 to 4 inch pot).
2. *Select the bioassay species.*

In general, the best bioassay species is the one you intend to grow. However, turfgrasses sometimes do not grow well indoors in pots, nor do they respond rapidly or decisively enough to be reliable bioassay species. Therefore, it is often advisable to select other species. For general bioassays, oats, cucumber, and tomato are

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Short Cutts

Cornell Turfgrass Field Day

June 27, 1991 Ithaca , NY

Please turn to page 10 for CUTT subscription information.

Successful Grant Year for Turfgrass Program

While state budget woes are seriously impacting statutory colleges at Cornell, the Turf program is holding its own. The turfgrass faculty has worked very hard this past winter writing proposals to secure outside funding. We are happy to report a very successful year. Listed below are the major grants and gifts obtained:

• $12,500 from NYSTA to the turf program. This brings NYSTA's contribution for the current matching funds year to $50,000!

• $10,600 from the NTEP Grants Program to Norm Hummel and Eric Nelson. Project Title: Screening of NTEP Bentgrasses and Fine Fescue/ Bentgrass Mixtures for Disease Resistance.

• $130,000 over two years from the USDA Northeast Regional IPM Program to a research team of Eric Nelson, Marty Petrovic, Mike Villani, and Norm Hummel. Project Title: Organic- based Construction Mixes in Golf Course Putting Greens for the Suppression of Soil-borne Turfgrass Pests and Alleviation of Pesticide Leaching Potential.

• $80,000 over three years from the USGA to Eric Nelson. Microbial Basis of Disease Suppression in Composts Applied to Golf Course Turf.

• $250,000 over three years from the USGA to Marty Petrovic. Project Title: Mass Balance Assessment of Pesticides and Nutrients Applied to Golf Turf.

• $43,100 from NYS Ag and Markets (IPM Program) to Norm Hummel, Eric Nelson, and Mike Villani, for an IPM Demonstration, Biocontrol of Diseases, and Scarab Grub Monitoring projects, respectively.

Several other corporate gifts and grants help fund our research program. We would especially like to acknowledge the following associations who have contributed to this years matching funds program (1990-91):

Metropolitan Golf Course Superintendents Association

Central New York Golf Course Superintendents Association

Northeast Golf Course Superintendents Association

Finger Lakes Association of Golf Course Superintendents

Western New York Golf Course Superintendents Association

Hudson Valley Golf Course Superintendents Association

Adirondack Golf Course Superintendents Association

Pocono Golf Course Superintendents Association

Thank you very much for your support!

Cornell Turfgrass Field Day

Time is running out for you to register for the Cornell Turfgrass Field Day.

The Field Day will be held on Thursday, June 27 at the Turfgrass Field Research Laboratory in Ithaca. Following registration at 9:00, tours and discussions of current research projects will be the order of the day.

A chicken barbeque lunch, and the Cornell Research Report is included in the $18 cost. On site registration is $20 and does not include lunch. The plots are located just off of Warren Road, about 3 miles south of Route 13.

A Golf Tournament to benefit the newly formed New York State Greengrass Association Research Foundation will be held Wednesday, June 26 at 1:00.

For more information or registration materials for the Field Day or Golf Tournament, contact Cheryl Koroluck at 607-255-1789, or your county Cooperative Extension office.

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Biostimulators Enhance Sod Strength

Researchers at the Polytechnic Institute and State University of Virginia, Blacksburg, studied the effects of various foliar applied biostimulators (non-fertilizing materials which enhance plant growth at low application rates) on the tensile strength and rooting activity of Kentucky bluegrass sod.

Materials tested in field trials, all of which are known to have some type of biostimulator activity, included the systemic triazole fungicides propiconazole and triadimefon (stimulates root and shoot initiation), the synthetic cytokinin benzyladenine (BA) (delays leaf senescence), seaweed extract (SWE) (stimulates root growth) and chelated iron phosphate (promotes greening).

Mature Kentucky bluegrass ("Plush") was treated in place, then transplanted to wire mesh screens pressed into a prepared soil surface. Sod tensile strength was measured on a mechanical sod stretcher, and rooting activity was measured as the force necessary to lift the screens and sod free of the soil. Measurements were taken 4 and 8 weeks after transplanting.

The iron treatments produced no effects, either alone or in combination. BA treatments produced either no effects or were inconsistent. SWE appeared to slightly enhance rooting activity, but not sod strength. Triadimefon occasionally enhanced sod strength, but gave inconsistent results. Triadimefon did, however, consistently enhance rooting activity. Propiconazole was the best performer, significantly enhancing both sod strength and rooting activity in nearly all experiments.

The researchers surmised that the beneficial results obtained with the triazole materials was not due to their fungicidal activity, but to their ability to stimulate root growth directly, much like the cytokinin growth regulators produced by the plant itself. Previous research has shown that these same triazoles, in high concentrations, actually inhibit sod formation and plant growth generally. Treatment rates in the current experiments were low, as recommended for fungicide application.

(From: J.M. Goatley, Jr. and R.E. Schmidt. 1991. Biostimulator Enhancement of Kentucky Bluegrass Sod. HortScience 26(3): 254-5.)

Clinoptilolitic Zeolite as a Sand Amendment

Clinoptilolitic zeolite (CZ) is one of 40 known naturally occurring zeolites (crystalline, hydrated alumino-silicates). CZ has the particle density of sand, but a much higher cation exchange capacity, absorbs and retains water, and generally combines some of the desirable physical qualities of sand and chemical properties of clay. Additionally CZ is reported to selectively retain ammonium and potassium cations, the two nutrients in highest demand by turfgrass. In field trials at the University of Washington, Puyallup, researchers compared the effects of CZ, sphagnum peat, and fresh Douglas fir sawdust as amendments to quartz sand on the establishment of Penncross creeping bentgrass.

All amendments were tested at volume/volume ratios of 5, 10 and 20% in 1x2 meter plots 30cm deep overlying a native sandy loam soil. All plots were fertilized after seeding with diamonium phosphate (18-48-0) and potassium chloride (0-0-60). In addition to bentgrass establishment, the cation exchange capacities of the amendments and their effects on moisture retention of the mixes were measured.

At the 5% levels, all amendments were equally effective in improving bentgrass establishment over the sand controls, but the 10 and 20% rates of sawdust were actually less beneficial than the 5% level. This effect was attributed to competition between the bentgrass and decomposers for available N from the decaying sawdust. The investigators suggest that weathered sawdust may have produced a more satisfactory result. For both CZ and peat, however, establishment ratings continued to improve with higher amendment rates.

Moisture content and water retention of the mixes was highest for peat, followed by sawdust and then CZ, the sand control being by far the worst.

In other studies, high volume amendment with CZ has produced undesirable results, especially when using material of fine particle size (<1mm). This effect has been attributed to the high sodium content of CZ. The authors caution that long-term studies are needed to determine the leaching requirements of the finer grades of this material as well as its resistance to weathering and breakdown in the field.

(From: J.L. Nus and S.E. Brauen. 1991. Clintoptilolitic Zeolite as an Amendment for Establishment of Creeping Bentgrass on Sandy Media. HortScience 26(2): 117-9.)

Scanning the Journals

A review of current journal articles

Researchers surmised that the beneficial results obtained with low application rates of triazole materials was not due to their fungicidal activity, but to their ability to stimulate root growth directly.

At the 5% levels, all amendments were equally effective in improving bentgrass establishment over the sand controls, but the 10 and 20% rates of sawdust were actually less beneficial than the 5% level.

Bioassay

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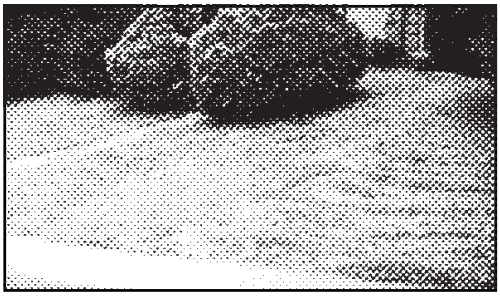
A bioassay determines if it is safe to plant turf or other landscape plants into areas previously treated with herbicides or into soil with an unknown history of herbicide use.

A bioassay is a simple, inexpensive, and accurate way to determine if herbicide residues are present at high enough concentrations to affect turfgrass seedling emergence and growth.

good species and are readily available. Table 1 provides a list of recommended bioassay species for detecting different herbicide residues.



Vandalized turf may require bioassay before reseeding.

3. Seed and grow for about three weeks.

Seed the bioassay species in "clean" and "contaminated" soil. Place the pots in a greenhouse or on a sunny windowsill and keep them watered (do not waterlog). Watch the plants for about three weeks.

4. Evaluate plant growth.

a. Oats in "clean" soil should be about four inches tall when you evaluate the plants. Cucumbers and other broadleaf indicator plants should have three true leaves (not counting the seed leaves).

b. Examine the overall growth, leaves, and roots. Look for stunting, yellowing (or other discoloration), abnormal leaf or stem growth, and root swelling or stunting.

If Herbicide Residues Are Present

There are basically three options.

1. Leave the soil fallow (or stockpile top soil) for one growing season before planting (in turfgrass areas this is generally not feasible);
2. Plant another species which is tolerant of the herbicide, such as a different turfgrass species, or install a woody ground cover bed; or,
3. Incorporate (rototill) activated carbon into the soil to a depth of six inches. The recommended amount to detoxify herbicide residues is 100 lb activated carbon per acre for

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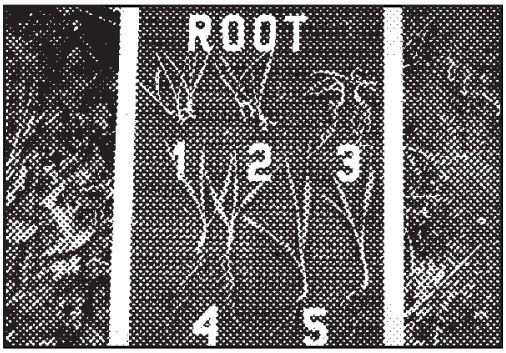


Oats as affected by preemergence herbicides.

Recommended Bioassay Species for Herbicides and Expected Injury Symptoms

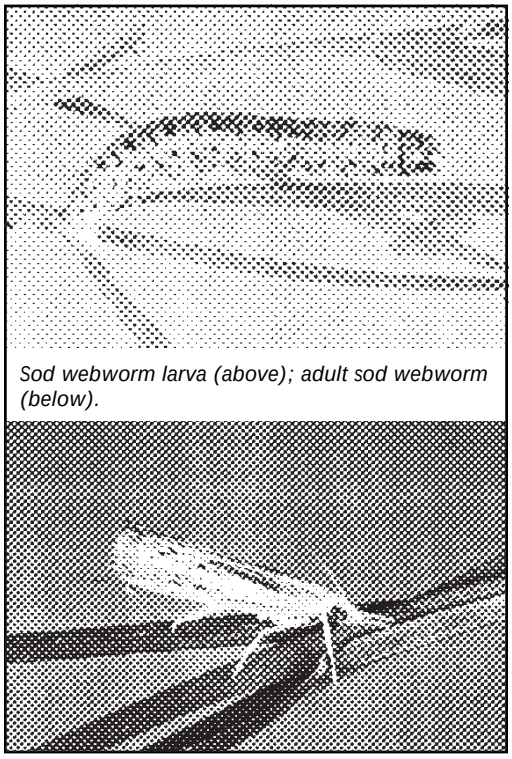
Herbicides	Recommended Test Species	Expected Symptoms
Acetanalides (Dual, Lasso, Pennant)	Oat	Stunting, malformed leaves.
Amitrol	Oat, cucumber, tomato	White (not yellow) leaves.
Dinitroanilines (Balan, Treflan, pendimethalin, others)	Oat, cucumber	Stunting, swollen and shortened roots.
Isoxaben (Gallery)	Cucumber Mustard, chinese cabbage	Swollen roots, stunted plants. Reduced emergence; if plants emerge, roots are swollen/stunted.
Oxadiazon (Ronstar)	Oat, tomato	Stunted shoot growth, roots less affected; foliage necrotic where contacted by herbicide treated soil.
Sulfonylureas and imidazolinones (Glean, Oust, Lesco TFC, Pursuit, Arsenal, others)	Tomato, cucumber, spinach	Stunting and general yellowing of new growth.
Triazines (Atrazine, simazine, others)	Oats Cucumber, tomato	Stunting, yellow leaves. Stunting, interveinal yellowing of new leaves starting with about the 3rd true leaf.
Synthetic auxins (Banvel, MCPP, 2,4-D, Turflon, Picloram, others)	Cucumber, tomato	Malformed, twisted shoot growth.

Summer Insects in Turfgrass

In the last issue of CUTT we discussed several insect pests of turfgrass found in the spring and our recommendations for control. In this issue we will discuss these same insects as they affect summer turf and which control tactics may be appropriate for summer management. Managers interested in more detailed information are directed to *Turfgrass Insect and Mite Manual* by Shetlar, Heller and Irish or *Turfgrass Insects of the United States and Canada* by Haruo Tashiro.

Sod Webworm

Overwinter as caterpillars in soil. Will usually pupate without feeding; there is little likelihood that you will see any spring feeding damage from common species. According to the species present, adult moths may be seen flying weakly over turf in mid- to late June.



Sod webworm larva (above); adult sod webworm (below).

Summer Management: Sod webworm caterpillars vary in color from green to beige, brown, or gray. Most are spotted. All larvae hide in thatch during the day and feed on grass blades after sundown. Persistent bird presence on turf may indicate webworm activity. Use of endophytic grasses will reduce webworm infestation and injury. Pesticides applied late in the afternoon and not irrigated in will most effectively target feeding webworms. Alternatively, insecticides applied in early morning and irrigated lightly will target webworms hiding in thatch.

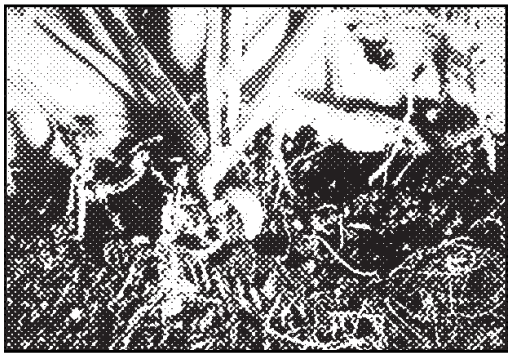
Chinch Bug

Chinch bug adults and nymphs (immatures) can be seen actively feeding on turfgrass stems and foliage during the entire summer. Chinch bugs feed by sucking plant juices from turf, thereby mimicking drought stress. During extremely hot and dry periods, chinch bugs may hide down in thatch during midday making detection more difficult.

Summer Management: Determine the presence of chinch bugs through careful examination of turf and thatch or by flotation. In general, chinch bugs are a mid-summer problem and are not considered a spring pest of turf. Use of endophytic grasses and avoidance of water stress will reduce chinch bug infestation and injury.

Annual Bluegrass Weevil (formerly Hyperodes)

Large larvae and pupae and some adults may be found around the roots of annual bluegrass in mid-June through early July. All stages of the annual bluegrass weevil may be present at the same site throughout the summer.



Annual bluegrass weevil.

Summer Management: In general, midsummer damage by second-generation larvae is much less severe than is spring damage by the first generation. Adult weevils are targeted if chemical control is needed. Removal of leaf litter prior to adult migration to overwintering sites in the fall will reduce adult numbers.

Bluegrass Billbug

Adult billbugs may be seen wandering on driveways and sidewalks in May and June on sunny afternoons as they move from sheltered overwintering sites into turf for ultimate egg laying in June and July.

Summer Management: Because larvae feed inside grass stems, much like Annual bluegrass

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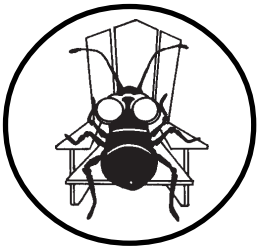

Pest Watch

Persistent bird presence on turf may indicate webworm activity.

Use of endophytic grasses and avoidance of water stress will reduce chinch bug infestation and injury.

Summer Insects

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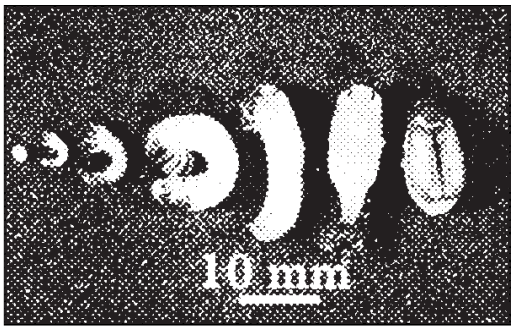
weevils, it is the adult stage that is the preferred target to manage. If five to ten adult weevils can be collected in a five minute period by one person, then treatment may be required. Fungal endophytes found in some ryegrasses and fine fescues will reduce billbug feeding damage.

Fungal endophytes found in some ryegrasses and fine fescues will reduce billbug feeding damage.

Annual White Grub

Includes Japanese beetles, European chafers, Oriental beetles, Asiatic garden beetles, and masked chafers. Large white grubs will be moving up in the soil to the root zone to feed in early to mid spring (depending upon grub species). Grubs will feed for a period before moving down in the soil to pupate. Although the adults may emerge in June, most grubs will be in the resting or pupal stage until late June or early July. Except for Japanese beetles, adult feeding damage is minimal. Small grubs will be seen in turfgrass soil beginning in mid-July with feeding damage and predator activity increasing in late summer and early fall.



Annual white grubs.

Summer Management: Late spring (June) treatment for grubs is not recommended because grubs will feed for only a short period of time before pupating. Reduction of adult populations through trapping or insecticides have not been shown to reduce grub damage to turf. Grub populations greater than 8-12 grubs per square foot (1 grub per standard cup cutter) in late July or early August may warrant insecticidal control to reduce turf loss.

Late spring treatment for grubs is not recommended because grubs will feed for only a short period of time before pupating.

Black Turfgrass Ataenius

Eggs are laid in soil in May and June with hatch usually within ten days. It is not unusual to find all developmental stages in the soil in late spring. Heavy grub populations (> 50 grubs/square foot) may cause general wilting of turf. Summer adults lay eggs in sod in late July and August with a second generation of larvae, pupa and adults occurring by late summer.

Summer Management: Naturally occurring milky disease often reduce ataenius populations within a year or two of a heavy infestation. High summer populations (>30-50 grubs/square foot) may require insecticide applications. Removal of leaf litter prior to adult migration to overwintering sites may reduce adult numbers.

May and June Beetles *(Phyllophaga sp.)*

Several species of large grubs have multi-year life cycles. Adults or grubs may be seen in spring with feeding damage to turfgrass roots occurring in spring, summer and fall; a situation different from the more common, annual white grubs (opposite).

Summer Management: Five to seven May or June beetle grubs/square foot is generally considered high enough to treat with insecticides. Grubs not controlled in spring will feed throughout the summer.

Black Cutworm

Will not overwinter in northeast, but must migrate from more southern regions in late

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Turfgrass Pest Spring Life Cycles

Pest	June	July	August	September
Sod Webworm	P / A	L / P / A	A / L / P	A / L
Chinch Bug	N / A	N / A	N / A	N / A
An. Bluegrass Weevil	L / P	L / P / A	L / A	L / A
Bluegrass Billbug	A /L	A / L	L / P	P / A
An. White Grub	L / P / A	P / A / L	A / L	L
Bl. Turfgrass Ataenius	L / P	L / P / A	L / P / A	L / P / A
May & June Beetle	A / L	A / L / P	L / P / A	L / P / A
Black Cutworm	A	A / L	A / L / P	A / L

A = adults; L = larvae; N = nymph; P = pupa

Starting an Integrated Pest Management Program

The first step to starting an Integrated Pest Management (IPM) program is to clear your head of all the miscommunicated information about IPM. It is time to stop listening to misinformed individuals and start realizing the importance of implementing IPM techniques and methods. IPM is a common sense approach to pest control based on monitoring, recording, and making intelligent pest management decisions. If you are interested in improving your pest management program and environmental stewardship, then IPM is the way to go.

Typical IPM Misinformation

"IPM will not work on my type of turfgrass setting."

Wrong, IPM principles, techniques and strategies will work on every turfgrass situation. This includes high and low budget golf courses, residential lawns, school grounds, campuses, institutional grounds, parks, and athletic fields. Open your mind to develop methods to make IPM work on your turfgrass.

"With IPM I can not use pesticides."

Wrong, pesticides are an important tool of an IPM program. IPM programs incorporate the use of pesticides and will continue to use them. IPM practitioners optimize the use of pesticides by increasing their knowledge base of turfgrass, turfgrass pests, monitoring, and timing of pesticide applications to maximize their efficacy and minimize their off-target hazards. Learn how to apply least toxic materials that are safe for the applicator and the environment.

"The Cornell IPM program will come into my operation and prescribe a program and the government will force me to follow it."

Wrong, IPM programs are flexible. The members of the IPM program at Cornell are not regulatory. We are committed to improving your pest management program, not regulating it.

The intent of an IPM program is to enhance pest prevention and control on your turfgrass. The turf ecosystem is dynamic. Turfgrass, pests, and people are different from site to site. The Cornell IPM team will help lay the foundation for an IPM program. The success of the program is directly related to your input. It is up to you to make it happen.

The key to a successful IPM program is an open mind and a positive attitude. It is the responsibility of the turfgrass manager to take leadership and develop a site-specific IPM program for their turfgrass setting. Utilize the guidelines as a foundation. Improve and enhance the guidelines according to your situation.

General Guidelines

Business Plan

A clear, concise business plan will help organize your IPM program. Design the business plan according to the type of turfgrass you manage. The golf course superintendent's plan will obviously be different from that of a grounds manager. Important components of the business plan might include:

1. Statement of purpose: briefly list objectives and goals;

2. IPM program description: list and describe in detail the components of the new IPM program or service. Include alternative options and methods;

3. Budget: labor, equipment, least-toxic pesticides, and diagnostic services.

Establish an IPM Team

An integral part of an IPM program is communication. Who are the people involved in your program? Describe their roles and determine who will make pest management decisions. Arrange what, how and when information will flow to all members of your IPM team.

Background Information

What is your turfgrass management program? List and describe your current pest management and cultural practices. Identify previous pest problems. What time of the season were they present? Where were they a problem? Record the types of control methods. Include the type, amounts and frequency of pesticide applications. This historical perspective is invaluable when developing and evaluating your new IPM program.

Identify Resources

IPM programs are based on monitoring (scouting) the turf on a regular frequency. You can either train an employee to scout, hire a new person, or contract with a pest management consulting firm. Compile necessary pest information such as biology, life cycle, identifying features, and damage symptoms. Identify equipment and products. You may have to retro-fit or purchase new or special equipment. Locate and record the name of suppliers and distributors.

continued next page

IPM Integrated Pest Management

IPM Corner

IPM is a common sense approach to pest control based on monitoring, recording, and making intelligent pest management decisions.

IPM principles, techniques and strategies will work on every turfgrass situation.

Pesticides are an important tool of an IPM program.

IPM

continued from previous page

The key to a scouting program is making observations on a regular frequency throughout the entire season.

One of the biggest advantages of implementing an IPM program is documenting the real needs of the turf.

Monitoring program

Pest Management Units

In order to design a realistic scouting schedule, divide the turfgrass site into pest management units (PMUs). The PMUs represent specific areas to a scout. Rank individual PMUs as either high, medium or low priority. Rankings are based on information such as (but not limited to) aesthetic value, visibility, intensity of required maintenance and plant material. The ratings will determine how frequently a PMU should be scouted. Discuss with your IPM team the best method to divide, name and rank the PMUs.

Scouting Procedures

Scouting procedures for turfgrass are based on visual observations of the turf. The key to a scouting program is making observations on a regular frequency throughout the entire season. Scout the turf at least once a week. However, if you are on a golf course, at certain times of the season it is better to scout two, three or even four times per week. Certain landscape settings may only require scouting once a month. Work with your IPM team and decide when and how frequent to scout each PMU. If you encounter unknown problems, remove a sample and send it to a diagnostic laboratory.

Outline a step by step scouting procedure for the scout. Incorporate where, when and how to scout. Include what and how to record plant and pest information. The scout must follow the same pattern each week.

Scouts

In order to effectively implement an IPM program, a person(s) must be assigned and trained to carry out the responsibilities of monitoring (scouting) the turfgrass. The responsibilities of the turfgrass scout include, but are not limited to, the following: 1) Monitor turfgrass or other landscape plants for insects, plant diseases, and weed infestations on a regular basis. 2) Record findings on field data sheets. 3) Diagnose problem and rate severity based on diagnosis, priority of site, and turf value. 4) Routinely report findings to decision makers. 5) Follow-up after pest management action as been taken and evaluate results. Report results to decision maker.

Record Keeping and Evaluation

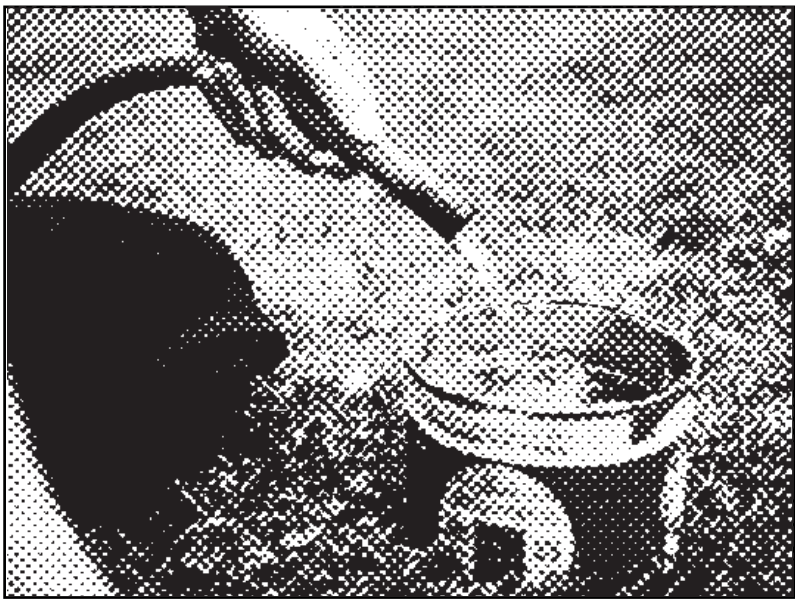
One of the biggest advantages of implementing an IPM program is documenting the real needs of the turf. Recording where, what and how many (severity) pests are present or absent is valuable information. Over time this data is necessary to develop action thresholds and is priceless when trying to justify control actions. The success or failure of a pest control program can easily be evaluated by combining pest and pesticide use data. In future articles I will discuss methods on how to evaluate pest and pesticide information.

Plan of Work

Outline a step-by-step plan to implement your new IPM program and include a time frame and target date for completion.

The intent of these guidelines is to lay a foundation. It is your responsibility to build a program. Take this information and tailor an IPM program for your site.

Gerard W. Ferrentino
Ornamentals IPM Coordinator



Flooding will expose chinch bugs and other insects.

1990 NTEP Bentgrass Results

There has been a real flurry of bentgrass releases over the past couple of years. Golf course superintendents are frequently asking us for information on the new releases; information that did not exist. In 1990, the USDA National Turfgrass Evaluation Program (NTEP) sponsored, to my knowledge, the first three bentgrass tests: greens native soil, greens modified soil, and fairway.

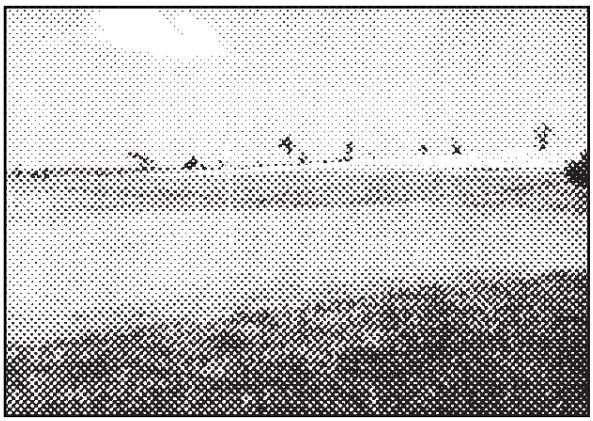
In July of last year, we planted the greens native soil test at the research facility in Ithaca. The test included 19 bentgrasses, and with the help of some good weather, we had a very successful establishment. We began collecting data in August. The results of the seedling vigor and quality data collected in 1990 are found in the table below.

The cultivars that were the most rapid to establish included Emerald, Putter, and WVPB 89-D-15, followed by Pro/Cup, Penncross, and Pennlinks. Carmen creeping bentgrass was very slow to establish, as were Allure and Bardot colonial bentgrasses.

While much of this data is very preliminary, there were very notable differences in the quality of the cultivars we tested. Top prize for 1990 goes to Pro/Cup (Forbes 89-12) which had the highest ratings for both dates. High marks were also given to 88.CBL, Providence, Penncross, WVPB 89-D-15, and Putter.

We didn't take color ratings, but it's worth mentioning that Providence and Pro/Cup had exceptionally dark color. Providence also appeared to have a more upright, non-graining growth habit. It's appearance is distinctively different than most other seeded creeping bentgrasses. While Providence is an extremely attractive grass, I question if it would be a good choice for overseeding into existing greens or fairways. It certainly would be a viable option, however, for new seedings.

The poorest performing cultivars included Allure and Tracenta colonial bentgrasses, BR 1518 dryland bentgrass, and Carmen creeping bentgrass. None of these grasses provided turf of acceptable quality (rating 6 or greater) for either date. These results are preliminary, however, since we plan on looking at them over the next 3 or 4 years.



There are many new bentgrasses for golf greens.

What's Next

The NTEP cultivars will also be evaluated for disease resistance and putting speed. In late 1990, we inoculated all the cultivars with Pythium root rot. We obtained some valuable data on this last year. We will inoculate the plots this year with dollar spot, brown patch, and pink snow mold. Hopefully, within this diverse genetic pool of bentgrass cultivars, we will identify some with improved disease resistance.

Norman W. Hummel Jr.
Dept. of Floriculture and Ornamental Horticulture

Summary of 1990 NTEP Bentgrass Trial Results

Name	Seedling Vigor[a]	Quality		
		Sept.	Nov.	Mean
Pro/Cup (Forbes)	7.3 ab[b]	7.7 a	8.0 a	7.8 a
88.CBL	5.7 a-e	7.3 a	7.3 a-c	7.3 ab
Providence	6.3 a-c	7.0 a	7.6 ab	7.3 ab
Penncross	7.0 ab	6.7 ab	7.3 a-c	7.0 a-c
WVPB 89-D-15	8.0 a	6.7 ab	7.3 a-c	7.0 a-c
Putter	8.0 a	7.0 a	7.0 a-d	7.0 a-c
88.CBE	5.7 a-e	6.7 ab	6.7 a-e	6.7a-d
Regent	5.3 b-e	6.7 ab	6.7 a-e	6.7 a-d
SR1020	6.3 a-c	6.0 a-c	6.7 a-e	6.3 b-e
Cobra	6.0 a-d	5.7 a-d	7.0 a-d	6.3 b-e
Bardot	3.7 de	6.7 ab	5.7 d-g	6.2 b-f
Pennlinks	7.0 ab	5.7 a-d	6.3 b-f	6.0 c-g
Emerald	8.0 a	5.7 a-d	6.0 c-g	5.8 c-g
National	6.0 a-d	5.7 a-d	5.3 e-h	5.5 d-h
Egmont	4.0 c-e	4.7 b-d	6.0 c-g	5.3 e-h
Carmen	3.3 e	4.7 b-d	5.3 e-h	5.0 f-i
Tracenta	4.0 c-e	4.7 b-d	5.0 f-h	4.8 g-i
BR1518	4.3 c-e	4.3 cd	4.7 gh	4.5 hi
Allure	3.7 de	3.7 d	4.0 h	3.8 i

[a]Rated on a scale of 0 - 9, 9 = most vigorous.
[b] Means followed by same letter within each column are not significantly different.

Bioassay

continued from cover

every pound of herbicide active ingredient (AI) per acre suspected to be present. After incorporating activated carbon, run the bioassay again to confirm detoxification.

If option three is chosen, be aware that activated carbon does not detoxify all herbicide residues. Therefore, you may wish to run a small test in pots to determine whether the activated carbon will effectively detoxify the herbicide residues. Mix 1/2 ounce (dry measure) of activated carbon in 1 quart of water. Add 1 fluid ounce of this to each 4 inch pot of soil. [This will approximate an application of 600 lb activated carbon per acre.] Dump the soil in a bag and mix well; then return the soil to the pot and run the bioassay. If the plants grow well, proceed with the application of activated carbon to the field. If the plants are still stunted, contact your local Cooperative Extension office for assistance.

A bioassay is a simple, inexpensive, and accurate way to determine if herbicide residues are present at high enough concentrations to affect turfgrass seedling emergence and growth. By conducting a bioassay on new top soil or in new seedings previously treated with a herbicide, you may avoid wasted time and turf seed, thus saving you time and money in the long run.

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DEPT. OF FLORICULTURE AND ORNAMENTAL HORTICULTURE

When turf is damaged by wear or other pests, residual herbicides, such as those applied for crabgrass control, can prevent turf emergence and establishment.

Summer Insects

continued from page 6

spring. Cutworm adults are often seen around lights in June in New York State. Caterpillars are called cutworms because they often clip grass blades at the crown and drag them into their burrows to feed. Cutworms may severely damage bentgrass greens if heavy populations are not controlled.

Cutworm damage.

Summer Management: Best method for determining heavy infestation of cutworms is to drench soil with disclosing solution. Adult moths in light traps and bird feeding in turf may suggest possible problems with cutworms. Insecticides must be watered in to reach cutworms in their burrows.

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CUTT is a quarterly newsletter from the Cornell University Turfgrass Faculty. The purpose of *CUTT* is to bring to you the latest research results from Cornell, as well as other universities, in a timely manner. Each issue, published to coincide with the change in seasons, will help you understand turfgrass better, enable you to manage your turf better, and maintain healthier turf with greater environmental protection ■

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Annual Field Diagnostic Course For Turfgrass Managers

Mark your calendar today! On August 6, 7 and 8 Cornell Turfgrass Pest Management Specialists will use field sites, golf courses and athletic fields on and off campus to review identification techniques and control strategies for turfgrass insects, diseases and weeds. Sampling procedures, laboratory diagnosis and utilization of key diagnostic resources are essential components of the course. The enrollment is limited to 25 turfgrass managers to allow for the ideal learning situation. This is an advanced course and will be particularly beneficial to past Cornell Turfgrass Short Course graduates, graduates of other turfgrass management programs or individuals with 5 years of experience. The tuition of $180 includes: instruction, study materials (textbooks and guides), breaks, lunches, BBQ and a certificate after completion of the course. Registration will only be taken by mail and not by phone. Use the registration form provided. General information and details on local accommodations will be sent with the registration confirmation. If you have any questions, please call Joann Gruttadaurio at 607-255-1792. Please complete and mail the form to:

Becky Parker, 20 Plant Science Building
Cornell University, Ithaca, New York 14853.

Make your check for $180 payable to Cornell University. Class enrollment is limited to 25 students. A cancellation fee of $20 will be charged to registrants who cancel after July 22. Please submit one form for each individual and print clearly.

August 6, 7 and 8, 1991
Cornell University, Ithaca, NY

Send in your Registration form today!

Registration Form

Annual Field Diagnostic Course

Name: _____ SS #: _____

Home Address: _____ Phone: _____

Business Address: _____ Phone: _____

Have you attended the Cornell Turfgrass Short Course? _____ Year: _____

Describe your turfgrass experience and list number of years: _____

_____

Education: High School _____ 2 year degree in _____

4 year degree in _____ Masters in _____ Other _____

Work Experience: Lawn & Landscape Maintenance _____

Athletic Field/School Grounds _____ Golf Course Maintenance _____

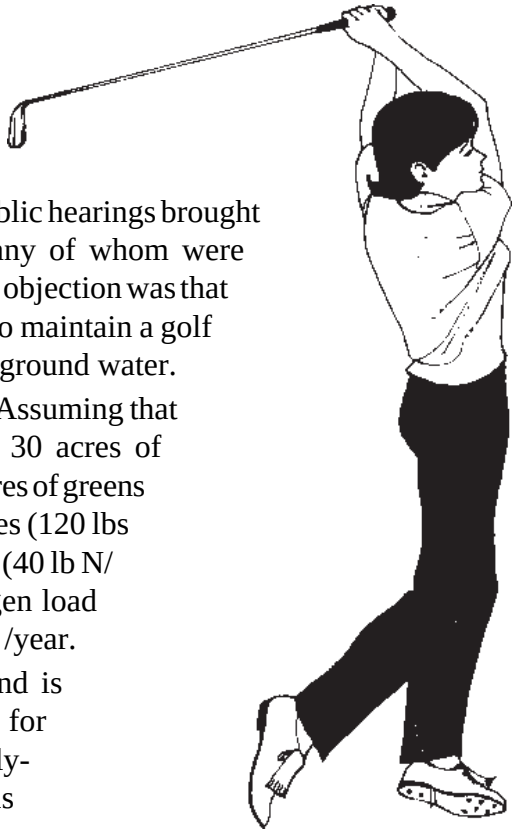
Other _____

Your confirmation packet should be sent to your: (please check one) ____ home address or ____business address.

Something to Think About

Are golf courses such a horrifying use of land as many people think?

A town zoning board recently considered the request of a developer to build an 18 hole public golf course. Much of the land was already in corn production. The public hearings brought people out of the woodwork, many of whom were opposed to the project. Their major objection was that the high rates of fertilizer needed to maintain a golf course would pollute streams and ground water.



Think about this for a minute. Assuming that this was a 120 acre parcel, with 30 acres of fairways (80 lb N/acre/year), 2.5 acres of greens (120 lbs N/acre/year), 2 acres of tees (120 lbs N/acre/year) and 85 acres of rough (40 lb N/acre/2 years), then the total nitrogen load on this course is about 25 lbs/acre /year.

If the farmer working this land is following Cornell Recommends for Corn Production, he should be applying around 130 lbs N/acre. With this in mind, are golf courses such a horrifying use of land as many people think?

Cornell Cooperative Extension

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