

# Turf Grass TRENDS



[Vol. 3]  
Volume 4, Issue 11

November 1994

A re-evaluation

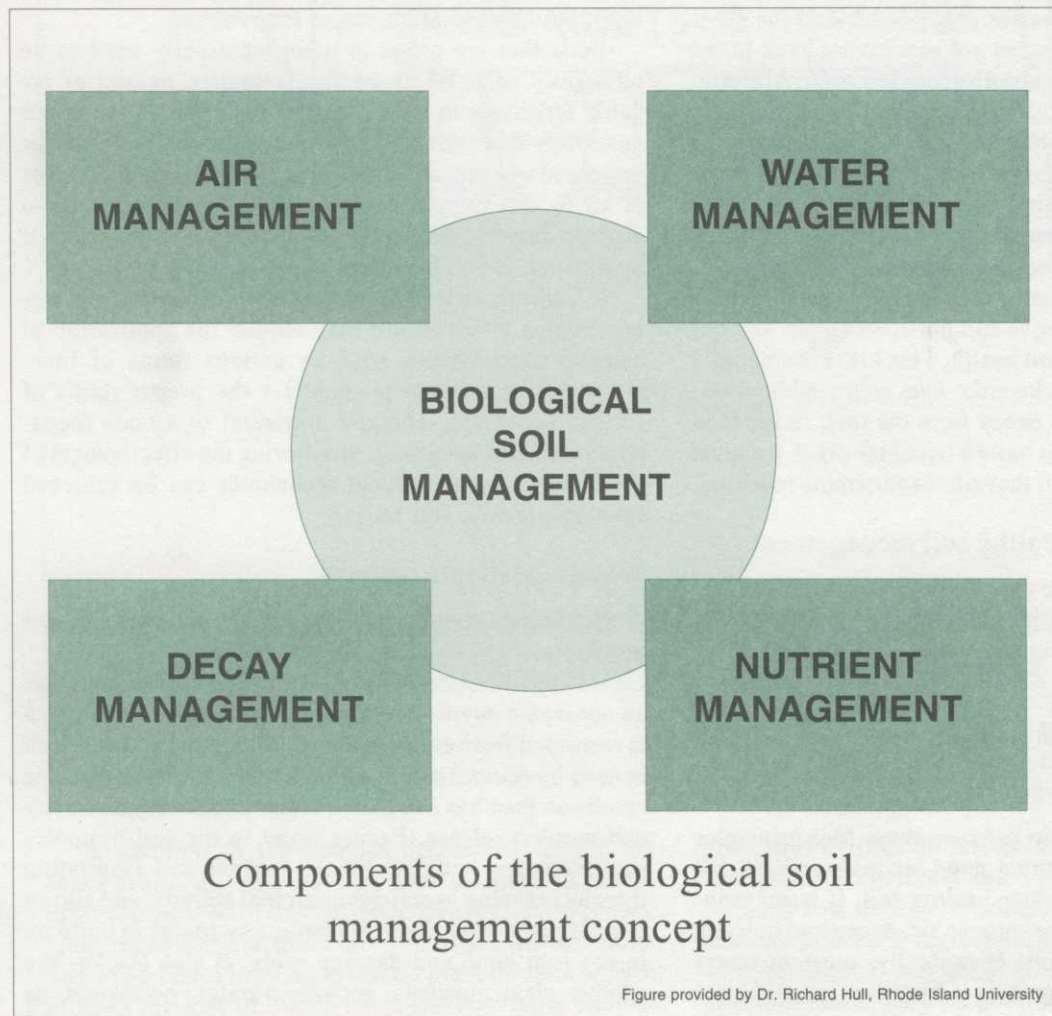
## Biological soil management

by Joel Simmons

Many turfgrass managers today are re-evaluating their understanding of basic soil science. Many of us were exposed to the subject of soil science when we studied agronomy in college. But we often

found it to be dry and boring. From this experience we often came away from our formal exposure to the subject with a limited knowledge of the dynamics of soils.

Unlike the instruction we received in col-



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lege, soils are very dynamic. Once we glimpse the complexities of soils, a whole new world opens up and an excitement develops about the exploration of this vital area of turfgrass management.

Today, the more skillful turfgrass managers are those who practice sound soil management first and plant management second. These turfgrass managers gain tremendous benefits from practicing biological soil management.

### Rediscovering the basics

Biological soil management is based on solid agronomic principles that date back decades. As an example, Dr. William Albrecht, the former head of agronomy at the University of Missouri, wrote in the late 50s and early 60s of the importance of maintaining a healthy soil. Unfortunately, through the shortsightedness of the times, Dr. Albrecht's reward for this advanced thinking was to be 'let go', as his ideas differed from the conventional wisdom of the chemical revolution that began to take hold in agriculture.

Today, agriculture is making major changes in its attitude toward managing soil health. Today's agriculture is going back to basics. Agriculture and the other plant management sciences are hearkening back to the principles that were espoused by people like Dr. Albrecht.

As many in agriculture are realizing, the benefits of these management principles and the advantages of biological soil management are becoming equally apparent to the turfgrass industry. An effective soil management program depends on an understanding of the agronomic principles behind biological soil science.

For years now, those of us in turfgrass management have focused on the above soil portion of plant growth, and have ignored the soil health. This historic emphasis on foliar health is backwards. Our concern for foliar health is based on our needs from the turf, rather than the turfgrass' needs. To build a healthier plant, we must first build a healthy soil that allows for ample nutrition.

### The principles of healthy soil management

There are four basic agronomic principles that have to be considered when building a healthy soil.

Those are, in descending order of importance:

- air management
- water management
- decay management
- and nutrient management.

The interrelationship between these four principles is very important. Without good air management, the other three cannot produce healthy soil. If water management is not up to par, proper air, decay and nutrient management is difficult. Historically, most turfgrass managers have over-emphasized nutrient management

(i.e. fertilization) without considering the interdependence that exists between air, water, decay and nutrient management.

A management program that keeps all four of these principles in mind assures good results, lessens plant stress and reduces the need for pesticides. This may sound simplistic, but it works. Unfortunately, our industry is focused on products designed to manage nutrients, often at the expense of air, water and decay management.

### The breathing soil

Proper air management insures that ample plant-available oxygen exists in the soil. Soil microbes, the heart of a healthy soil, need ample supplies of oxygen in order to survive and proliferate. Soil compaction and poor soil structure dramatically impede air movement within soil, allowing available oxygen to become depleted and to have a deleterious effect on microbe populations.

A well-balanced turfgrass management program must first address the negative effects of soil compaction and poor soil structure in order to manage properly the soil oxygen levels. Too often, compaction is managed by the short-term treatments of aeration or top-dressing, ignoring the fundamental causes of the problem.

Soils that are prone to compact usually need to be physically changed by adding composts, natural or organic fertilizers or other organic materials in sufficient quantities that will help open the soil and provide for improved oxygen mobility. Over time, this improvement in air to soil oxygen exchange takes place when these organic amendments are worked into the soil and their application is combined with core aeration practices.

In addition to improving soil organic content, managing oxygen levels in soil may require the application of calcium amendments, such as various forms of lime, limestone or gypsum to maintain the proper ratios of cations (positively-charged nutrients) to anions (negatively-charged nutrients). Monitoring the effectiveness of these oxygen management techniques can be achieved through periodic soil testing.

### Water: a delicate balance

Water management of healthy soil addresses the dual problems of too much or too little water.

Too much water leads to saturated soil which creates an anaerobic environment. Under this condition, oxygen is restricted from entering the soil to replenish that which is used by normal plant and microbe respiration and this condition then has a negative effect on microbial activity and nutrient release. Excess water in the soil promotes root pathogen activity, blocks normal soil respiration thereby reducing beneficial microbial activity, and allows normal plant and microbial respiratory toxins to build up in the root zone and damage roots. It also leaches the soluble plant nutrients, such as nitrates, potassium, as



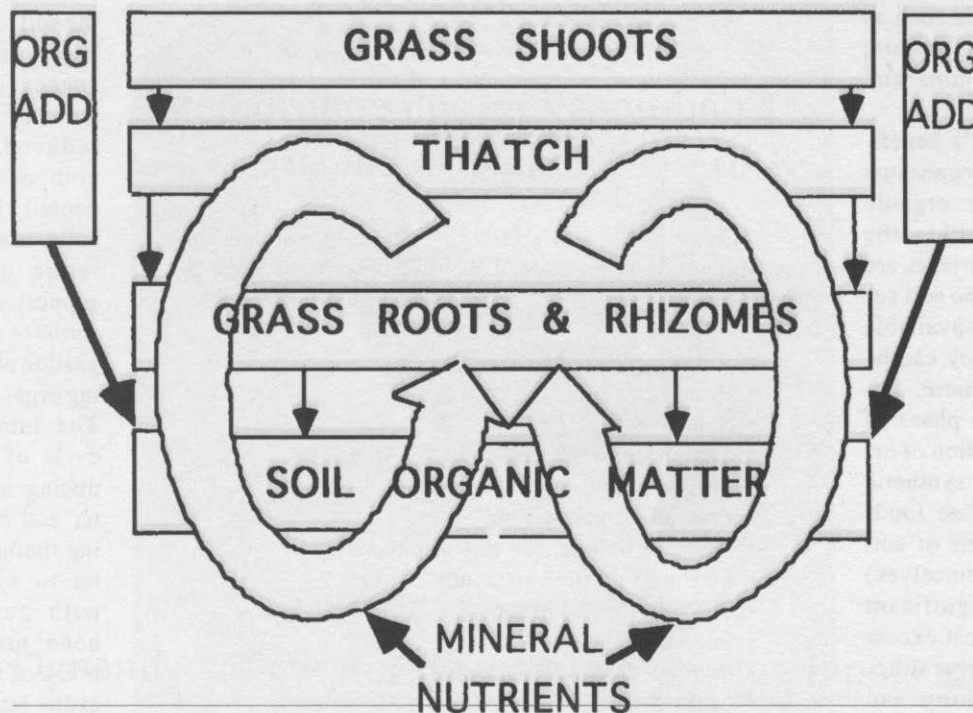
well as small amounts of ammonium and calcium from the plant root zone. Many of these soluble nutrients are alkaline and their leaching often leaves the root zone soil acidic, further restricting the availability of other essential plant nutrients.

Too little water can produce similar results.

loss of the ability of plants to absorb soluble plant nutrients.

As with good oxygen mobility, the good structure of healthy soil will have a significant effect on water mobility. A richly organic soil will provide both the pore spaces to allow water to drain through and the sponging

## Flow of organic matter and nutrients in the turf-soil system



This model integrates the decay and nutrient management aspects of biological soil management

Figure provided by Dr. Richard Hull, Rhode Island University

In addition to the obvious detrimental effects on shoot health that is caused by loss of shoot turgidity, extended periods of low soil moisture levels can reduce long-term beneficial microbial viability. Low soil moisture has a direct limiting effect on plant nutrient uptake through the loss of viable roots and root hairs and the

properties of organic matter, that will hold water for later plant or microbial use.

Soils low in organic components are low in humic acid, an important ingredient in the healthy process of soil granulation, and often do not have the stable soil structure that allows for good moisture mobility.

## From decay comes life

Decay management of soils is a concept that has yet to be fully appreciated. As there is more research on the dynamics of decay it is becoming evident that here biological soil management will have its greatest impact.

Soil micro-organisms need the same kind of environmental conditions that many other organisms need to survive: air, water, and nourishment. Good air and water mobility within the soil must be maintained to sustain beneficial microbial activity. Nourishment for soil microbes is supplied from organic matter in the form of plant residues which contain compounds such as carbohydrates, sugars, proteins, vitamins and minerals.

As the soil's beneficial micro-organisms feed on these organic compounds within the soil, many nutrients are released into the soil solution in plant-available form where they can be used. Furthermore, humus (the final phase of the decomposition of organic matter, synthetic and natural plant foods and the remains of soil organisms themselves) provides a significant buffering against excess moisture, temperature, acidity, alkalinity and salts. This buffering reduces stress and increases the ability of plants to tolerate insect feeding, disease infestations and weed invasions.

## Plant foods vary

Without proper microbial activity, the nutrients of some synthetic fertilizers cannot be made plant available and thus are not assimilated by plants. As an example of microbial involvement in plant food availability, the urea molecule of turf fertilizers is transformed into ammonia, one of the forms of nitrogen that plants can use, due to the activity of urease enzymes that are produced by these organisms. To make these enzymes, energy in the form of the soil available carbohydrates found in organic matter including humus must be present for microbes to use.

The over-use of synthetic fertilizers eventually destroys soil aggregates found in a healthy soil structure due to excessive salt accumulation. The high salt content of many synthetic fertilizers is a result of the manufacturing processes used to capture plant nutrients and allow for shelf life of the product. The application of these high salt fertilizers with large amounts of rapidly available nitrogen may overwhelm the natural balance of organic decomposition taking place in the soils.

The complex carbohydrates and nitrogen compounds found in humus are oxidized or broken down, and are used as an energy source to accommodate overloads of non-protein nitrogen. This depletion of microbe food

sources slowly causes the soil to die. As this happens, the pore spaces or granular structure of the soil is reduced, creating compaction. Compacted, low-oxygen soils can no longer retain moisture or support adequate life forms to stimulate digestion of the remaining organic materials. The interdependent cycle of plants producing organic matter and microbes using that organic matter to supply plants with nutrients has been broken. This break of the nutrition cycle leads to plant stress which encourages insect and disease pressure and the subsequent "rescue chemistry," in the form of pesticides, is needed. The soil and

the plants become "dependent", like plants in a hydroponic medium, on the use of these synthetic chemicals and a new artificial cycle develops.

## Formula for success

Biologically friendly turf care programs improve the soil structure by adding organic matter from compost, natural organic fertilizers or even grass clippings and can help managers maintain the natural nutrient cycles.

If turfgrass managers use synthetic products, then proper integrated pest management practices should be

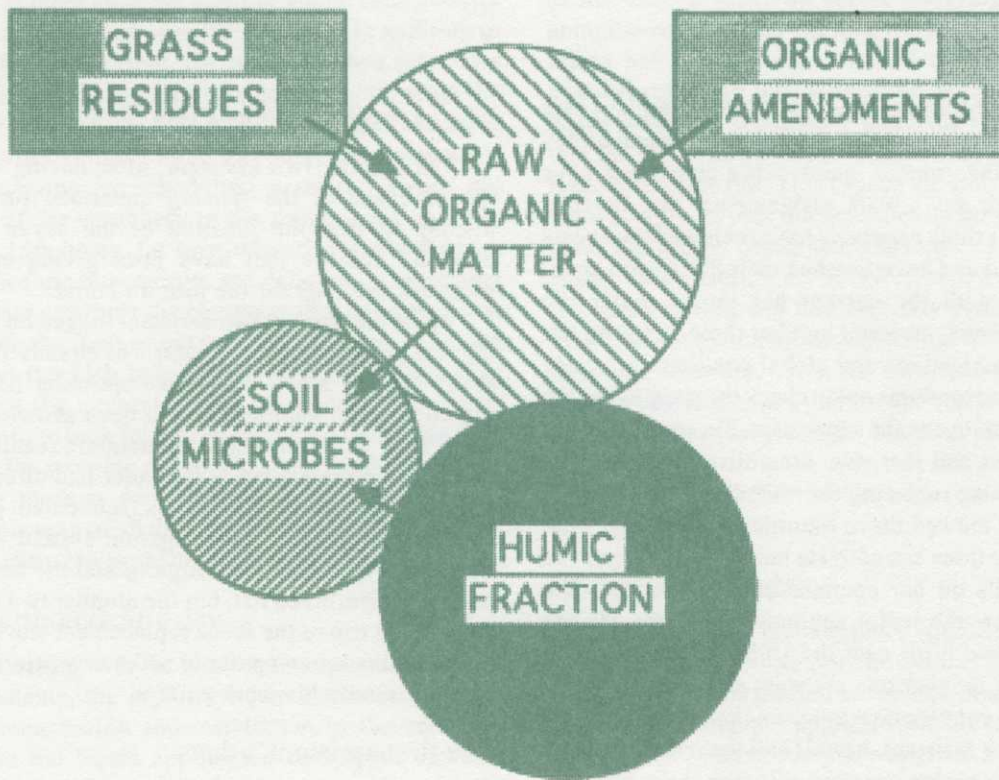
## Conditions that can contribute to short-term drought stress

The following is a partial list of conditions that—in combination with reduced rainfall, excessive heat or both—can contribute to short-term drought stress.

- Root damaging diseases
- Root damaging insects
- Soil layering
- Thatch depth greater than 1/2 inch
- Soil compaction
- Poor soil construction
- Nutrient imbalances in soil chemistry
- Poor soil particle structure
- Shallow topsoil mass
- Poor water percolation
- Poor species or variety choices
- Light frequent irrigation

All these conditions have a detrimental effect on a turf stand's root biomass.





## Dynamics of carbon flow among organic inputs and organic matter pools of a turf-soil ecosystem

Figure provided by Dr. Richard Hull, Rhode Island University

instituted and followed to help negate the detrimental effects of the synthetics. Choosing the synthetic fertilizers that have the least harmful effect on the soil will also help.

Fertilizers should be chosen that have lower salt indexes and that are low in chlorine, as this element in high concentrations is detrimental to microbial life. One should consider the use of natural organic fertilizers as the increase in the amount of organic matter allows for a reduction in total nitrogen that must be applied for the year. One should also use fertilizers with less reactive sources of phosphorus such as colloidal or rock phosphates.

With the four basic agronomic principles of a healthy soil in mind:

- air management
- water management
- decay management
- and nutrient management

turfgrasses will get the most out of the soil. There will be more available nutrients, less plant stress and less dependence on the use of pesticides and synthetic fertilizers. ■

# Turfgrass management after the millennium

by Christopher Sann

The day is Monday, June 14, 2019. The place is a well-known private country club on Long Island at day break. All of the grounds maintenance employees have started on their day's work assignments. The superintendent and his three assistants have reviewed the events of the weekend and have finished their discussion about how to deal with the current hot issues. After the meeting has ended, assistant number three straps on her mobile communications and global positioning locator gear and head set and sets out to check the progress of the 10 grounds employees she supervises. Six employees are mowing greens and tees, two are collecting trash, and the two others are replacing the 40 feet of fencing that a member's car mowed down Saturday night. Before assistant number three can activate her locator system, she gets three calls on her communications headset. The first call is from the senior equipment operator. He has found three dead birds near the 15th tee. She transfers this call to the number one assistant and there ensues a brief four way conversation between the superintendent, the number one assistant, herself and the operator. They decide that the senior operator will stay there to guard the site until the number one assistant arrives.

The second call is from a recently hired equipment operator who has been sent to hand-mow the turf around the club house. The operator has flooded the mower engine and can't get it restarted. After "walking" the employee through the restart procedures, the number three assistant transfers the call to the head mechanic and listens long enough to make sure that the head mechanic has the situation well in hand. The third call is from the senior maintenance employee, who has a materials estimate to fix the damaged fence, but has been unable to contact the number two assistant to get a purchase order number to give to the materials supplier. The number three assistant tries to call the number two assistant, but the central communications computer reports that the number two assistant is not yet on line. Giving the verbal code to activate the locator system, she finds that he has not yet activated his locator transponder, so she is unable to locate him on her portable display. First she and the number two assistant review and modify the purchase order as seen on their displays. Then she activates the number three assistant's beeper and receives and transfers the materials authorization code to the senior maintenance employee. After the three calls are taken care of, she activates the locator display and heads out to supervise her employees.

## The second assistant's day

The number two assistant, after having authorized the purchase of the fencing materials, turns on his display to find the location of the seven irrigation moisture sensors that have been giving erratic soil moisture readings for the past 36 hours.

When the number two assistant logged on that morning, the maintenance computer had already flagged the seven sensors along with three sprinkler heads and a digital weather station that had been showing reduced water flow data and erratic temperature readings. Additionally, the maintenance computer had already downloaded and prioritized the six scheduled preventive maintenance jobs on the irrigation system that it was tracking. The display had highlighted the best route to the "old" prioritized list, but the number two assistant's impromptu trip to the fence replacement site had forced the maintenance computer to make new priorities of the list and reroute his work pattern.

## The first assistant's day

The number one assistant is talking to the state's area pesticide compliance officer, at the site where the three dead birds are, and the superintendent is monitoring the call. As required by pesticide regulations, the number one assistant informed the officer about the possibility of a pesticide poisoning at the golf course. Before calling the compliance officer, the assistant logged onto the integrated pest management computer and searched the global information database and a display history of the site. He confirmed that the bio-rational insecticide had been spot-applied to that and the other two areas of the club to control Frit fly activity last week. He also confirmed that it was not toxic to birds.

During the conversation the compliance officer instructs the number one assistant to bag the dead birds in bio-sampling bags and to notify the certified testing facility to have the samples picked up by a driver that afternoon. Under the regulations, the compliance officer has the authority to issue a quit work order over the phone without seeing the site, but he opts to review the global positioning records at the club's offices that afternoon and to wait for testing results before taking any further action. Having notified the integrated pest management computer of the situation regarding the dead birds, the number one assistant then issues a set of verbal commands to the integrated pest management computer to reroute his regular Monday morning inte-



grated pest management scouting activities. The computer reroutes him past the business office to drop off the bio-samples and then on to the 11th fairway to check it and the next three holes for signs of Dollar Spot activity that had been reported over the weekend. In addition to checking for Dollar Spot, the computer then schedules the number one assistant to take core samples from the tees and greens on 10th, 13th, and 17th holes to check for early signs of Pythium blight. The computer finishes the scouting session by scheduling a second sweep net sampling of the shrubbery in the rough areas on 12th, 14th, and 15th holes, for over-wintering sod webworm adults. Once the bio-samples are delivered, the number one assistant activates the computer display screen that mounted on the dash of his cart and proceeds down the fairway on the 11th hole. He follows the tight zigzag pattern that the integrated pest management computer recommends to look for Dollar Spot infestation. He does not finish the scouting run on the back nine holes before noon, but there is enough time to do a preliminary microscopic scan of all the samples that he has taken that day to confirm the probable field diagnoses.

### The superintendent's day

After dealing with the two conference calls from his three assistants, the superintendent turns his attention to the demonstration and installation of the computer upgrade to the liquid application equipment that had been scheduled for earlier that morning. He calls the club's outside computer consultant to check that the specialist has reviewed the new hardware requirements for the upgrade and to make sure that the specialist would be at the meeting. The specialist responds that he is en route and that he was faxing the club's central office computer the certification that the club's computer system could meet the requirements of the new equipment. While the superintendent waits for the computer specialist and the equipment salesperson to arrive, he reviews the club's maintenance labor requirements for the week, month, and year to date and has the computer do a "what if" run to see what effect the recent and predicted weather of the next few days would have on his labor allocations for the next two weeks. After the computer predicts the new labor requirements for the next two weeks, the superintendent has the computer compare the stored scouting data and information concerning previously recommended and already taken corrective actions with the recent past and predicted weather for the next month. He feeds this into the new disease forecasting model to see if it will predict any disease infections that may require the use of chemical controls. If the new model forecasts any above threshold disease outbreaks, then he will want to notify the pesticide compliance office that he may request written permission for the use of prescription status pesticides to

control the infection. The superintendent learned an expensive lesson the previous year when the old disease forecasting model required he wait for site confirmation of the disease infection before notifying the pesticide compliance office. By the time the pesticide compliance office had processed and issued the required written authorization for the application of the prescription status pesticide, the disease had done so much damage that the superintendent had been forced to do extensive reseeding in the fall. This caused the club's material and labor costs to go over budget. Luckily for the superintendent, the greens committee chairman could access the stored data covering all of the recorded actions of that two week period and had correctly concluded that the fault was not the superintendent's but that of old disease modeling software. Later, the superintendent canvasses his three assistants in a conference call to check if every thing is going as planned. Then he checks with the business office to make sure that the previous week's employee payroll data that had been retrieved over night was being processed.

### Computer upgrades

He then greets the computer specialist and they go over the work order authorizations that are required for the upgrade's installation as the equipment salesperson unloads the computer upgrade from the trunk of her car. The \$2,000 sprayer computer upgrade is about the size of a large sandwich but the installation requires more than just plugging in like the last upgrade. As the sales person and the specialist go over the new requirements, the superintendent brings the sprayer from its storage location. The hardware installation takes about an hour and the computer specialist takes about thirty minutes to make sure that the systems are completely compatible. Next the senior application specialist returns from trash pick-up duty and all four spend the next hour getting the wrinkles out of the system. Getting the global positioning database systems working correctly requires they test-spray several locations with rinsette solution on several designated pesticide mitigation sites that the club operates with the pesticide compliance officer's approval. Once the new upgrade is fully operational and the system is zeroed into the club's global positioning system, the newly upgraded sprayer will provide application accuracy down to less than one inch at running speeds of five to six miles per hour while operating wireless communications directly with the club's integrated pest management computer. No longer will the spraying system operators have to download the data before starting. Now all of that happens in real time. Unlike the old system, the data about spraying activity can be available as it is generated. This increases the superintendent's direct control of applications as they are made. Also the upgrade automatically notifies the

pesticide compliance office that an authorized application is being made. Additionally, the new upgrade has an on-site environmental condition monitoring system that eliminates the need for an operator to guess whether the current site conditions meet the requirements of the pesticide to be applied. The new system is so advanced that it can change the spray droplet size and application pressure on the run by using variable diameter spray nozzles that change to meet changing site conditions.

### Clocking in

As the mowing operators come back to the storage garage, they plug their machines into the maintenance computer to down-load the performance data for that day. If the computer gives them a storage clearance, they park the equipment and check the preventive maintenance worksheet for their machines. Once they have performed the required maintenance and logged that information into the maintenance computer, they can clock out for the day using their employee identification cards in a card reader. If the computer does not give them the required storage clearance, they drive the mowers over to one of the maintenance bays and consult with the lone mechanic on duty. If the computer has detected a major problem, then the mower is left for the mechanic to repair and a backup unit is issued and parked back at the equipment storage building. If the problem is minor and the mechanic or the operator, with mechanic's supervision, can fix it, then that problem is taken care of at that time. Any overtime authorizations for operators must be cleared with the superintendent's computer. If no overtime authorizations are given, then the equipment is left in the maintenance bays over-night and the problem is corrected in the morning.

### The assistants finish their days

Once the equipment operators have left for the day, number three assistant checks the maintenance computer to see if there are any problems with the equipment. If one or more of the mowers will be delayed in starting the next day or if the weather will not allow mowing, she asks the computer to put together a new jobs list for those employees and posts it. She then checks with the number two assistant to see if his maintenance work will require more than the two employees normally assigned to help with systems maintenance. Once that has been determined her employee work allocations are forwarded to the superintendent. They discuss the allocations and modify a few. Once that task is completed, she leaves for the day. The number two assistant enters his work progress on the maintenance computer and has the computer develop a prioritized list for tomorrow's work. Since the fence repair went well, tomorrow he will have his normal two-person crew back and they will be able to

get back on schedule repairing and maintaining the club's infrastructure and operating systems. The number one assistant has been back at his diagnostic lab since just after lunch. He and the two members of his integrated pest management crew have finished the microscopic examination of the collected samples. Their analysis of the 11th fairway samples has found that the suspected Dollar spot is actually the beginnings of a *Nigrospora* disease outbreak. A check of the data base has found that they can either increase irrigation in the infected area and apply an organic product or make an application to the pesticide compliance office for written authorization to use a high-rate application of a known ground water contaminating fungicide. After clearing his actions with the superintendent, he programs the irrigation sprinkler heads in the infection area to run for 30 minutes more per watering cycle. He then schedules three, monthly applications of compost for the infected area and he changes the fertility schedule for the site to account for the added nutrient input. The number one assistant's microscopic examination of the core samples taken from the greens and tees has proven negative for *Pythium* blight. And his sweep net sampling for sod webworm adults has captured some moths but not enough to reach the control action threshold required by integrated pest management. The integrated pest management software will have the number one assistant run the same two checks for sod webworms and *Pythium* when he again scouts the back nine holes in two weeks. The number one assistant reports his findings of his scouting activities to the superintendent's computer and he then runs the integrated pest management program to see what planned action, fertilization, pesticide application or cultural activity is scheduled for the next day.

### Tomorrow

Tomorrow, the number one assistant will be scouting the front nine holes, while the senior application specialist makes a series of scheduled liquid applications with the upgraded sprayer and the junior application specialist samples the fairways on the back nine to test for soil nitrate concentrations. These will be used to determine the timing of the next fertilizer application. This schedule for the next day is also downloaded to the superintendent's computer. Because of outside obligations late in the day, the superintendent is not able to get the number one and number two assistants' progress reports. So later that night he accesses the various club computers using a computer terminal at home. From there, the superintendent can review all the day's activities and either approve or modify each assistant's plans for the next day. The work day having ended, the superintendent turns in knowing that it all starts again at 4:30 am, Tuesday, June 15, 2019. ■



# Ask the Expert

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## Joseph F. Losito of the University of Vermont Asks the Expert:

*"I know that the weed speedwell is very tough to control with available herbicides on the market. The herbicide quinclorac seems to not only control the weed but kill it. Will this herbicide ever be available for the use on turf, especially for golf courses?"*

As a genus, the speedwells (*Veronica* spp.) may be the most difficult of all of the weeds that turfgrass managers must deal with. As a member of the group of "winter annuals" such as the chickweeds, the annual forms of *Veronica* are very difficult to control with standard turf herbicides. One of the varieties of *Veronica* is so resistant to normal turf herbicides that it even resists repeated applications of Roundup. We contacted Dr. Joseph Neal of Cornell University. He recommended a tank mix combination of Turflon II and Gallery be applied in the fall to the areas infested with the Slender Speedwell (*Veronica filiformis*) and that following this good to excellent control should be obtained by next spring.

### Speedwell pamphlet available

We note that Dr. Neal has recently written an excellent pamphlet entitled "A Guide to the Identification and Control of the Weedy Speedwells". It can be obtained by requesting document number 141IB229 from the Resource Center, 7 B.T.T., Ithaca, NY 14850. The \$6.25 price includes shipping and handling. This reference contains excellent identification examples and a series of recommended cultural procedures that can be followed to reduce infestations by this weed species. The latest chemical control recommendations to manage *Veronica* spp. can be found in the Cornell Cooperative Extension publication "1994 Pest Management Recommendations for Commercial Turfgrass", document number 141RTG, also available from the Resource Center for \$2.50. Either of these two valuable reference materials can be ordered by calling (607) 255-2080.

## Paul F. Miller, director of golf course operations, Nashawtuc Country Club, Concord, MA, Asks the Expert:

*"My question concerns earth worm casts (especially on fairway turf). They seem more severe on *Poa Annua* turf than on Bentgrass. Why? They seem more evident after rainfall. Does heavy irrigation promote them. Lastly, are high rates of Benymil or Sevin the only recommended treatments."*

We contacted Dr. Michael Villani, an entomologist at Cornell University. He said that, although the presence of earthworms is highly desirable from a turfgrass ecology point of view, their activity can present turfgrass managers with several problems. The castings, or excreted soil, that mounds up around the earthworm's hole can damage reel mower blades and, if numerous, can cause an irregular cut of the turf in the infested area, as well as reduce site playability and hamper play. Earthworms and other annelid worm live by processing the soil and digesting the moist soil's organic matter as a food source. Earthworm populations tend to be more concentrated in high organic soils, such as bottom land or muck soils. Dr. Villani said that heavy rains or frequent irrigation tend to drive earthworms to the soil surface because their holes become filled with water. Earthworms are air breathers. Dr. Villani did not know of any research that had been done on earthworm turfgrass species preference, but he felt that Miller's observation of a higher incidence of castings on annual bluegrass versus bentgrasses was more likely due to the organic content of the site soil than to any particular preference for one turfgrass species over another. Earthworms tend to stay away from the high sand and low organic content soils of greens and tees versus the annual bluegrass and ryegrass on the native soil of many golf course fairways.

### Controlling the problem

Dr. Villani said there are no chemical pesticides that are registered for control of earthworms. Because of this, he said he could make no recommendation for the use of a pesticide for the control of earthworms that would not

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violate federal pesticide labeling laws. He did say that cultural practices could help reduce the level of the problem. Where feasible, periodic topdressing of the problem areas using a high sand content mixture would help make the area less attractive to earthworms. Also, efforts should be made to correct any existing drainage problems at the site by redirecting water flow or by improving site water percolation. In areas with shade, an effort should be made to increase air flow or light penetration and thereby reduce periods of soil wetness. He also felt that the use of high organic content topdressings or organic fertilizers, particularly those based on composted manure sources, may significantly increase surface earthworm activity. Curtailing such applications or finding a less attractive organic source as a substitute should reduce the problem. We feel that the use of multiple applications of wetting agents, particularly in the spring, to reduce excessive soil moisture may be an additional tool to help with this problem. If an earthworm infested area is receiving frequent irrigation because of a reduced root structure due to heavy root damaging disease pressure, then any steps that are taken to identify and reduce site factors, such as poor soil structure and layering, should make the areas less attractive to earthworms as well as improve stand survivability. Finally, make sure that the castings that you are finding are in fact from earthworms. The feeding activity of several northern mole cricket species, which looks very much like earthworm activity, has been identified as far north as Long Island and coastal Connecticut.

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**Ernie Carlomagno,  
park foreman,  
Montgomery Township,  
Somerset County, NJ,  
Asks the Expert:**

*"We have closed our soccer field for the fall. We have a thatcher with an aeroblade seeder on the back. We are under the impression that we could use just the aeroblader, but we must thatch in front running both machines at the same time. In the process of doing this, a lot of thatch was torn up. The seeds are in the ground, but too much thatch is on top. How can thatch be removed without damaging seeds while they are germinating? Is it okay to leave thatch cover until seeds germinate?"*

Ernie Carlomagno's concern about the difficulty of combining dethatching and slit seeding activity into one operation has been an ongoing problem for many turfgrass managers for many years. I have yet to find a single machine to accomplish this combined task successfully in the 20 years that I have been involved in the industry. The only solution that I have found that works well is to do the job in two separate operations. First, cut the grass in the area to be seeded as short as possible without scalping and collect the leaf clippings. Then dethatch the site if the thatch depth is over 1/4 inch and the turf stand's root structure is in good to excellent condition. Remove as much thatch as possible. If necessary, make multiple dethatching passes in the same direction. Clean up the debris between passes. After the last dethatching pass, clean up the debris using backpack or walk-behind blowers with their nozzles pointed toward the ground. Blow the debris up parallel to the direction of the slits that were produced by the action of the dethatching machine. This use of blowers will stop any of the smaller debris particles from falling back onto the soil's surface and will do a far better job of removing loosened debris from in between the crowns of the plants than raking. Once the debris has been removed, check the site to see if there are enough open slits in the remaining thatch or enough thatch has been removed, so that the bulk of the applied seed can come in contact with the soil. If there are enough open slits, then overseed the site using a drop spreader. If the remaining thatch will prevent seed to soil contact, then slit seed the area with a disc seeder that cuts grooves and places the seed in the groove without kicking up any additional debris. If the turf at the site does not have a deep enough root structure to withstand the rigors of dethatching or the site has 1/4 inch of thatch or more, consider putting off overseeding until the stand's root mass and depth can be improved through improved management techniques. If seeding the site at a later date is not an option, then verticut the site with a verticutter or vertical mowing machine in one or two directions, blow off the debris and seed as above. After seeding wait 30 days, then make a starter fertilizer application and an application of a root stimulating compound. Follow those applications 30 days later with a high nitrogen or high nitrogen and potassium turf grade (sulfur coated or synthetic organic) fertilizer application at one pound of nitrogen per 1,000 square feet. Mow the seeded area with a light weight mower with newly sharpened blades as soon as the majority of seed has germinated and the seedlings are 1 1/2 to 2 inches high.

*This month's Turf Grass Trends expert is Christopher Sann.* ■



E.P.A. proposal

## Exempt some pesticides

Based on its belief that certain substances do not pose "unreasonable adverse effects" to the environment, the Environmental Protection Agency (E.P.A.) has proposed to exempt these substances from federal pesticide laws when they are used, sold or distributed as pesticide active ingredients. The substances listed in E.P.A.'s proposal include: castor oil, cedar oil, cinnamon, citric acid, citronella, cloves and clove oil, corn gluten meal, corn oil, cottenseed oil, dried blood, eugenol, garlic, geraniol, geranium oil, lauryl sulfate, lemongrass oil, linseed oil, malic acid, mint and mint oil, peppermint and peppermint oil, 2-phenethyl proprionate, potassium sorbate, putrescent whole egg solids, rosemary and rosemary oil, sesame, sodium chloride (table salt), sodium lauryl sulfate, soybean oil, thyme and thyme oil, white pepper, and zinc metal strips.

## USDA faces major reorganization

In the final days of its legislative session, Congress gave final approval to a major reorganization of the U.S. Department of Agriculture (USDA). The legislation, which includes job cuts, consolidation of major farm programs, and a refocusing of the agencies priorities, gives the Secretary of Agriculture broad authority to restructure the department and eliminate waste. Turf Grass Trends will continue to monitor this USDA reorganization for developments that might affect our industry.

## On-line pesticide database created

Members of the U.S. crop protection industry have combined to provide a new medical information source on pesticide active ingredients and the appropriate medical treatment for exposures to these ingredients. Called MedTIP, this new service will supply information to third party on-line computer database providers at emergency medical facilities so that personnel can provide prompt and effective treatment to individuals suffering from pesticide exposures.

Penn State development

## Waste paper mulch

G. Hamilton, an instructor at Penn State, has developed a new waste paper mulch to be used in the establishment of turf from seed. The new, palletized mulch is thinly applied to newly seeded areas to enhance seed germination. Applied with conventional spreaders, the biodegradable mulch expands with exposure to water and holds water and a starter fertilizer for use by the seedling turf. This new mulch will provide many of the benefits of conventional mulching techniques but without the expensive equipment necessary for hydromulching.

## Golf course planning guide available

The American Society of Golf Course Architects (ASGCA) has published the Golf Course Development Planning Guide which provides basic information for anyone who might consider developing a new course. Including sections on acreage, financing, and site location, the guide is a place to start your research. For a copy, contact ASGCA, 221 N. LaSalle St., Chicago, IL 60601, Tel: (312) 372-7090, Fax: (312) 372-6160.

## House panel approves pesticide analysis

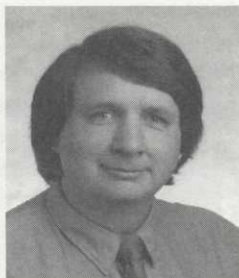
In approving a bill strongly backed by the agriculture and chemical industries, the House Agriculture Subcommittee on Department Operations and Nutrition has moved to reinstate true cost-benefit analysis in the regulation of pesticide products. This bill, H.R. 1627, would allow minute residues of potentially cancer-causing substances in both raw and processed food products so long as the risk to public health is negligible. Although this bill would finally give weight to both the risks and benefits of pesticides, it is opposed by the Clinton Administration and many environmental activist groups.

The ultimatum:

## Looking ahead

by Christopher Sann

**T**he goal of the Clinton administration's Reduced Pesticide Initiative (R.P.I.) — to reduce total pesticide usage 50% by the year 2000 through the adoption of integrated pest management in 75% of production agriculture — is more than this administration's response to the Supreme Court's upholding the "no tolerance" wording of the Delaney clause. This initiative represents the culmination of public, environmental, and scientific concerns as well as government regulatory responses to the issue of pesticide safety.



These issues have been debated since the very establishment of the federal Environmental Protection Agency (E.P.A.) in 1970 and clearly this initiative does not represent new topics for discussion, but rather is presented as an ultimatum to the agriculture community.

### Change in E.P.A. tactics

Until now, most of the efforts of the E.P.A. have been focused around the edges of pesticide usage and have been primarily pointed at reducing accidental pesticide exposures and spills, removing dangerous materials from the marketplace, establishing pesticide exposure and tolerance thresholds, and raising the level of professionalism of the pesticide application industry. This new R.P.I. represents an historic departure from these policies and exemplifies the E.P.A.'s first attempt to dramatically reduce total pesticide usage. Under R.P.I., the E.P.A. will have the power to phase down the use of a pesticide and the power to remove a dangerous pesticide from the marketplace. This means that the E.P.A. will henceforth be able to mandate a reduction in use of a particular pesticide based on the total quantity of use of that pesticide rather than the current cost/benefit standard. Although the E.P.A. has publicly stated that this new policy will apply only to production agriculture, previous experience with such assurances as well as private conversations with state regulatory officials indicate that these new standards will eventually apply to all segments of the pesticide application industry. This enhanced regulatory power will revolutionize all aspects of the pesticide application business, whether in agriculture, horticulture, or turfgrass management.

### Tough start for integrated pest management

Establishing widespread acceptance of integrated pest management techniques in the turfgrass management industry, with integrated pest management's emphasis on reduced pesticide usage through adherence to strict action thresholds and precise timing of pesticide applications based on pest life-cycles, will be considerably more complicated than just swapping one management strategy for another. By comparison, unlike the slow incremental imposition of pesticide regulations that has marked the last 20 years of regulation of turf management activities by the E.P.A., this new initiative will be a quantum leap. Beyond the natural resistance that always develops in trying something new, implementing integrated pest management will necessitate major changes in approach and attitude by agriculture, horticulture, and turfgrass managers. Integrated pest management techniques are pest and site specific.

### More regimented approach needed

The use of integrated pest management requires a much more regimented approach to the process of gathering facts than is currently practiced. Integrated pest management techniques establish threshold standards for implementation of pesticide-based control actions. They recognize a broader set of possible solutions to pest problems based on pest life cycles, and require much higher levels of pest specific knowledge to successfully implement than the ill-defined and inconstant set of standards that represent the current state-of-the-art of data gathering in turfgrass management. For example, the blanket, preventive pesticide applications based on the calendar day of the year, which is often today's standard operating procedure, will be no longer be possible. In the future a pesticide application will have to be qualified through the accurate identification of pests, quantified to see if the pest population meets action thresholds, and justified by an analysis of the current life cycle stage of the pest before the chemical control application will be made. In the case of the newly proposed "prescription status pesticide" procedures for known ground water contaminating chemicals, the standards will require that after the application has been justified by the use of integrated pest management techniques, prior written approval must be obtained before that prescription pesticide can be applied.



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## Managers will have fewer tools

In addition to fostering integrated pest management implementation, the new initiative will increase the level of safety testing required of manufacturers to obtain new use-registrations or to maintain an existing pesticides' use-registration. In the next three years, implementation of these higher safety standards will lead to a substantially reduced number of chemical tools on which managers will be able to count. Fully two-thirds of the more than 600 pesticides currently registered for use have not been fully tested for human and environmental safety. Many narrow-use products may be lost because manufacturers will choose to stop making them rather than meet the new safety standards. And some broad-use pesticides may make label modifications that will restrict their use in turf management.

For what ever reason, three years from now, there will be fewer chemical pesticides available for use by turfgrass managers. But lower turfgrass quality won't fly. The public's heightened chemical paranoia has led to a substantial increase in questioning of turf and agricultural managers about the use of their chemical tools. Yet, at the same time, demonstrating its typical schizophrenia, the public has indicated that with the expected

reduction in pesticide usage it will not tolerate any reduction in quality.

Food shoppers want fewer pesticides to be used to produce their food, but they are unwilling to accept some of the inevitable reduction in quality that will come with this reduction in pesticide usage. Golf course superintendents are under increasing pressure from golfers and greens committees to reduce pesticide usage, yet the same golfers have let superintendents know that they expect current course playability to be maintained.

## How to keep up quality with fewer tools?

Turfgrass managers are stuck. They know that any substantial reduction in total pesticide use under the current management strategies will lead to a substantial reduction in turfgrass quality. Tinkering around with current strategies might be able to deliver pesticide use reductions of from 10% to 15%, but even that modest level of reduction would require a substantial effort.

Tinkering with decreased herbicide and insecticide usage might produce some significant pesticide use reductions without a substantial impact on turf quality, but restricting chemical fungus control applications, for example, would prove problematic as turfgrass quality would vary dramatically, depending on the disease to be controlled and current weather conditions. Clearly, modifying current turfgrass management techniques will not be able to reach the initiative's stated goals of 50% reduction in total pesticide usage by the year 2000. What is needed is a different approach.

## Problem solver: integrated pest management

The pressure on the pesticide applications industry to maintain both food quality and turfgrass aesthetic standards while reducing chemical inputs will continue to increase. New biologically based pesticides will be able to replace some of the chemical pesticides. But more than anything, this pressure will put an increasing premium on the accurate and timely use of those chemical tools that remain.

When turfgrass managers use a chemical pesticide, they must be sure of the pest with which they are dealing, have a good idea about the size of the pest population, and the present life cycle stage of the pest. The full implementation of turfgrass integrated pest management techniques offer the only realistic format to accomplish this increasingly difficult juggling act. Whether or not we like it, turfgrass managers in the year 2000 and beyond will be using integrated pest management. ■

### Coming attractions

## December Issue

The science of compost

by *Dr. Peter Landschoot*

and

*Mr. Andrew McNitt*

*both of Penn State University*

Editor's update

## Where we stand

by Todd Natkin

During my first few months at *Turf Grass Trends* I have had the opportunity to examine many of the issues facing the turf grass management community and to consider how best they should be reported to you, our readers. Here are a few of the changes that we hope to make and that you should be seeing in the next few months.



Todd Natkin

First, *Turf Grass Trends* will adjust its editorial schedule to give you the latest news about turf grass management on a seasonally adjusted basis. Stories relating to summer turf grass issues will be published earlier in the spring to allow you to make the best use of this information when it is most needed. Issues of importance during the winter months will appear in the early fall.

*Turf Grass Trends* will put the information you need into your hands before you actually need it. A feature which we hope to publish each month starts with this issue. Our Ask the Expert feature addresses three issues presented to us by our subscribers.

*Turf Grass Trends* is published to help you with complex turf grass management issues and each month we would like to publish questions of general interest along with the responses provided by our panel of experts. In order to do this, however, we need those questions. Please send them to us using one of the methods listed in our Ask the Expert information box in this issue. While we cannot answer each question individually, we will publish in-depth responses monthly for the benefit of all our readers.

### Coming soon: cumulative index

In our October 1994 issue *Turf Grass Trends* published an index of articles every issue since its inception.

We are preparing a cumulative subject index to make *Turf Grass Trends* your one-stop research library for turf grass management issues. And, most importantly, those back issues are still available from the publisher. Until that subject matter index is published, however, we can check our back issue records for any subject issue which might be of interest — please call, write, or e-mail if we can help you with any turf grass management problem.

### Major regulatory changes coming

*Turf Grass Trends* will provide you with extensive coverage of the upcoming renewal and revision of the Federal Insecticide, Fungicide and Rodenticide Act [FIFRA] as well as an expected overhaul of the major EPA regulations affecting turf grass pesticides. The proposed EPA regulations, which are expected in early 1995, may result in entirely new strategies for turf grass pest management and you can be sure that we will keep you informed as soon as the proposed regulations are published for public comment.

### The future of turf management

In this issue we welcome a new contributor: Joel Simmons, president of Earthworks Natural Organic Products of Martins Creek, PA. We also present Christopher Sann's view of turf management developments well into the 21st century. As a turf grass professional, Sann is already thinking about how his business will evolve to handle the problems of the future and how all turf grass managers will make best use of new technology. Of course, you can count on *Turf Grass Trends* to be one of your primary turf grass management tools so long as there is turf grass to manage.

### *Turf Grass Trends* is here to help you

Our goal is to make *Turf Grass Trends* an indispensable knowledge base for turf grass managers.

As you can see from our index in the October 1994 issue, we have already achieved coverage of many important turf grass issues. And each subject will be revisited whenever advances in technology or techniques become available to our community. ■

## ASK THE EXPERT

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# Resources

How to profit from the past

## Turf Grass Trends Back Issues

Did you join the Turf Grass Trends team recently?

Could you benefit from issues you don't have?

In the October issue is an index of the articles and their authors of all the back issues of *Turf Grass Trends* that have been published. The back issues are available. Just write the number of copies you want on the form below (photocopy this page so your issue remains intact), return the entire page with your check and we'll rush your issues to you. Don't forget to order one or more handy *Turf Grass Trends* binders for an extra \$5.00 each. Now is also a convenient opportunity to extend your subscription for an extra year for \$120.00.

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11/94

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Tel: (202) 483-TURF  
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