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MISSION STATEMENT

Committed to enhancing the professionalism of athletic field managers in New Jersey by improving the safety, playability and appearance of athletic fields at all levels through seminars, field days, publications and "networking" with those in the sports turf industry.

"Welcome New SFMANJ Members"

Our membership is growing fast. Currently we have 208 members. If you haven't renewed your membership please call for a new form in order to continue receiving this newsletter at (908) 236-9118.

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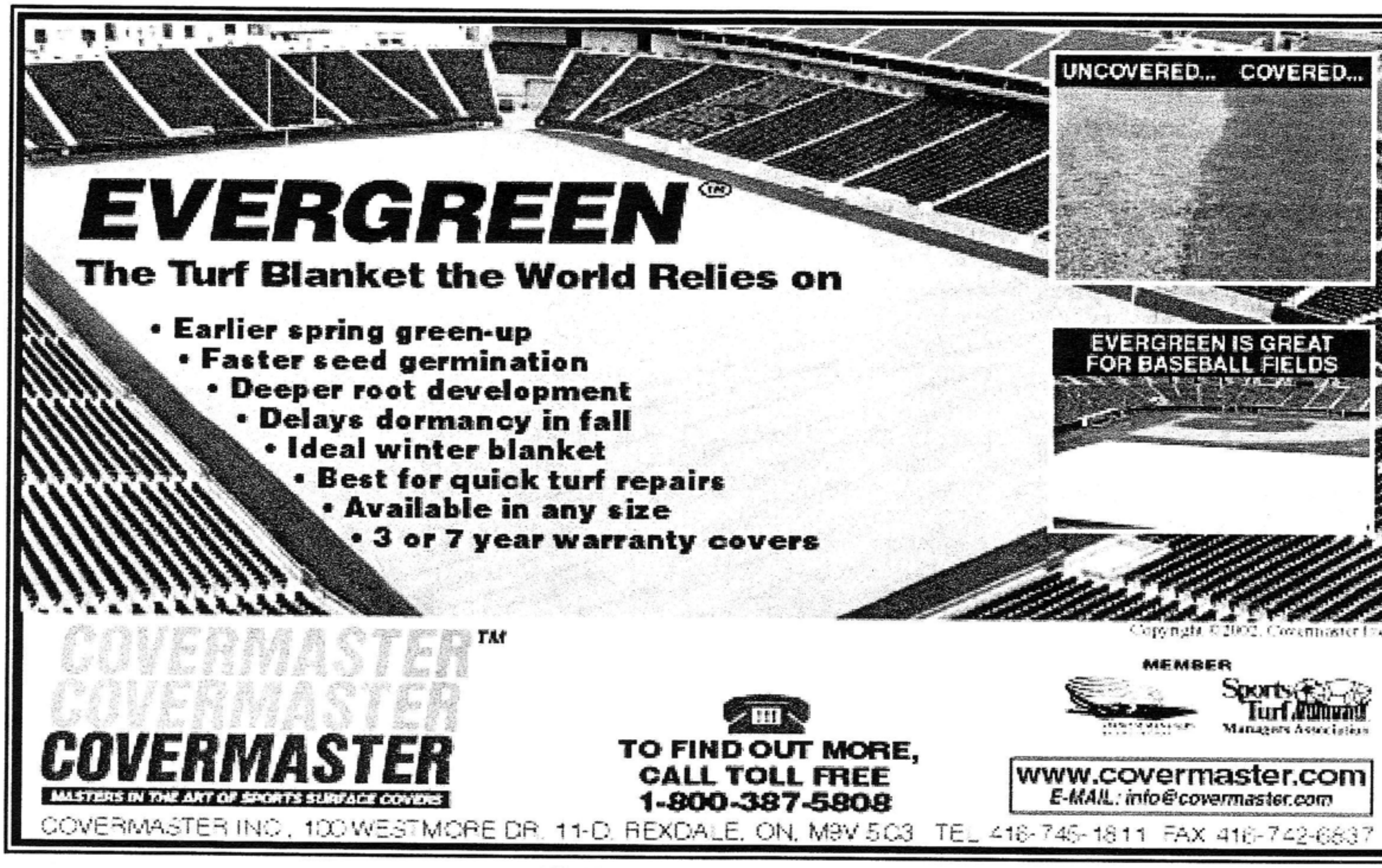

"RUTGERS CORNER"

'Sports Turf Drainage' by Dr. James A. Murphy, Specialist in Turfgrass Management

Adequate drainage is essential to maximize field use, minimize maintenance problems and provide a desirable environment for turfgrass growth. The main idea in planning drainage is to protect the playing surface from excess water. Many fields attempt to accomplish this by surface flow (drainage). Catch basins and surface inlets (vertical drains) are used around the perimeter of the field to move the excess water away.

Techniques used to protect the root zone from becoming waterlogged include subsurface pipe to intercept a rising water table and vertical or slit drainage (shallow and very close spacing). High sand content root zones work quite well since the depth of the root zone aids in displacing the soil interface deeper so that saturated conditions would mostly occur well below the depth of turf rooting. Root zones constructed from native soil (often problematic) work by encouraging surface runoff (centerline to sideline paths for water flow off field).

Both internal and surface drainage must be considered. Good internal drainage allows excess water to move out of and away from the surface layer where it could be a problem. Surface drainage is sufficient when excess rainfall can runoff the surface layer. Turf areas with minimal surface drainage require high infiltration and internal drainage.

Good surface drainage requires a slope of 2% (1 foot fall over 50 feet). A 1% slope can be effective; however, any imperfections (depressions) along the run of the slope will likely pond water under high rainfall. When surface drainage is inadequate and internal drainage can not removed the excess water, vertical drains are necessary to remove the surface water.

Cross drains and perimeter drains are two types of vertical drains. Cross drains are a corrective action used when adequate surface drainage does not exist. Cross drains are placed directly on the playing surface to prevent water from accumulating and running to low portions of the playing surface. Cross drains can be as simple as silt trenches filled with a uniformly sized coarse sand or fine gravel, or prefabricated drains within the trenches. To be effective the trenches need to be open to the surface, thus the trenches should be back-filled to the surface with a readily draining material (i.e., sand, fine gravel, etc.). Covering with a finer-textured soil will seal off the trenches. Slit trenches of various widths and depths have been used successfully to improve surface water conditions. Typically, the trenches are no more than a couples inches in width.

Perimeter drains are placed outside the playing field areas to collect surface runoff (surface inlets) and move the excess water away. Cross drains may be connected with perimeter drains to the direct excess water away from the field.

Subsurface drain tiles are used in fine- and medium-textured soils to lower a water table that is too near the playing surface. Very wet (saturated) soil conditions must exist before water will move from the soil into the drain tile. Therefore, placing drain tiles at hallow soil depths will do little to create drier soil conditions.▲

"Give It What It Needs"

'Nitrogen Sources for Turf' by Dr. James A. Murphy and Pedro Perdomo[1]

A sound nitrogen fertility program is needed to maintain the desired quality and function of a turf. Of all the cultural inputs, nitrogen is preceded only by water in the amount required by the turf. Not only is the amount of nitrogen applied important, but the timing of the application is also critical. A well-timed nitrogen fertilization may help alleviate damage from diseases such as dollar spot or red thread. Pythium blight and brown patch, however, may be stimulated by the application of nitrogen during hot, humid weather. Research continues to show that nitrogen source and form can play a significant role in the management of stresses afflicting turf. Understanding how nitrogen sources influence the amount and timing of nitrogen release is crucial to the development of a sound fertility program.

Quickly and Slowly Available Nitrogen Sources

Two broad classes of nitrogen fertilizer are the quickly available and the slowly available nitrogen sources. Quickly available nitrogen sources fit into three categories: inorganic salts, urea, and ureaformaldehyde products. These water soluble forms of nitrogen are taken up rapidly by a healthy and vigorously growing turf. Inorganic salts are materials such as ammonium sulfate, ammonium nitrate, ammonium phosphates, calcium nitrate, and potassium nitrate. Urea is a compound containing organic nitrogen. Methylol-ureas are short-chain precursors to methylene ureas and are formed by the combination of urea and formaldehyde. Although methylol-ureas are included among the quickly available nitrogen sources, they are not as readily available as urea.

Compared to the quickly available nitrogen sources, slowly available sources have lower water solubility, a lower salt index, and when applied, result in a slower initial turf green-up with a longer duration. Slow green-up and longer color retention of turf occur when using slowly available nitrogen sources because the plant available nitrogen is released over a longer period of time. When using slowly available nitrogen sources, consider the physical and/or biological processes involved in releasing plant available nitrogen to the turf. It is important to understand these processes so that the growth responses expected from a nitrogen fertilizer are realistic.

Slowly available nitrogen fertilizers are formulated as either water insoluble nitrogen compounds or as encapsulated, water soluble nitrogen sources. Water insoluble organic nitrogen fertilizers can be derived from either natural organic or synthetic organic materials.

Natural Organic Nitrogen Sources

Prior to 1950, natural organic materials were the only form of slow release nitrogen fertilizers available for use on turf and other agricultural crops. Materials such as animal manures, bone meal, dried blood, waste from the food industry, activated sewage sludge, soybean meal, and cotton seed meal are used as components of natural organic fertilizers. Each component has a distinct rate of nitrogen release due to differences in the complexity of organic nitrogen containing compounds within each material.

Non-leguminous plants, such as turfgrasses, can only utilize the mineral forms of nitrogen, which are nitrate- and ammonium-nitrogen. Natural organic nitrogen sources must be mineralized, or converted from an organic nitrogen compound to a mineral form of nitrogen, before plants can utilize the nitrogen contained in these sources. To mineralize natural organic fertilizers, soil microbial activity is required. Factors such as pH, temperature, and moisture influence the activity of soil microorganisms. A soil pH between 6 and 7 is generally considered optimal for the mineralization of organic fertilizers by microorganisms. Microbial activity is reduced when cold soil temperatures predominate. The application of organic nitrogen fertilizer during the cool weather of early spring and late fall, therefore, will not result in a rapid green-up response. Deficient and excessive soil moisture will also inhibit microbial activity. Soil moisture levels at field capacity and slightly below are considered ideal for microbial activity.

Synthetic Organic Fertilizers

Ureaformaldehyde reaction products and IBDU are two widely-used synthetic organic nitrogen sources. Methylene ureas (also known as UF or ureaform) are formed by the reaction of formaldehyde with urea. Methylene urea polymers formed by this process can be short- or long-chain compounds. The length or size of these polymers influences the speed with which the nitrogen is supplied to the turf. Larger size polymers release plant available nitrogen more slowly than small size polymers. Methylene ureas require microbial activity to release mineral nitrogen (mineralization); therefore, the growth response will be limited when microbial activity is low. Nitrogen release from methylene urea is slowed during the cool weather of spring and fall. Low soil pH and moisture content may also reduce the effectiveness of methylene urea fertilizers.▲

Isobutylidene diurea (IBDU) is another synthetic organic fertilizer, and it is formed by the reaction of urea with isobulybuteraldahyde under pressure and heat. In contrast to methylene urea, nitrogen release from IBDU is independent of

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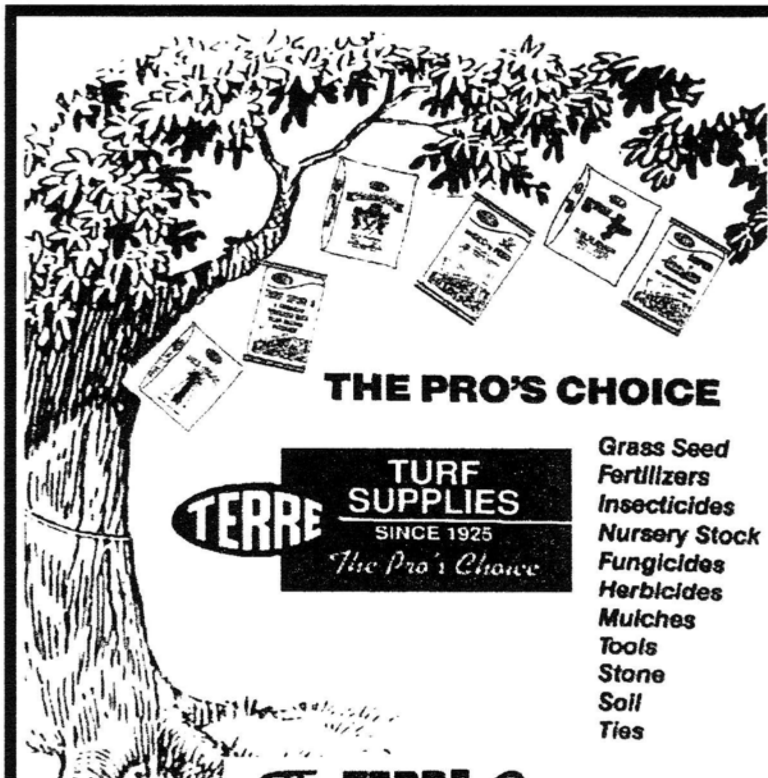
microbial activity; however, its release is influenced by temperature, moisture, particle size, and soil pH. Moisture and particle size are typically the dominating factors influencing nitrogen release from IBDU because nitrogen release is the result of hydrolysis of IBDU to urea. Wetter soil conditions and a finer fertilizer particle size increase the release rate of plant available nitrogen from IBDU. Thatchy turfs often respond more slowly to IBDU than turfs with little thatch. Thatch inhibits IBDU granules from reaching the soil surface where the granules are more easily hydrated and dissolved. Good low temperature response from IBDU can be expected because the release of nitrogen is independent of microbial activity. Release of nitrogen from IBDU can be inhibited as soil pH approaches and exceeds 7.

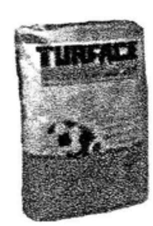
Coated Nitrogen Sources

Coated nitrogen sources consist of a water soluble nitrogen source, such as urea, encapsulated within a coating that is impermeable or semi-permeable to water. The coating inhibits wetting of the water soluble urea, delaying the release of nitrogen. The two principal types of coated fertilizer are sulfur-coated and resin-coated fertilizers. Resin-coated materials are also referred to as plastic- or polymer-coated products.

Sulfur-coated urea (SCU) relies on a sulfur coating around a prill of urea to create a barrier to water. Water must penetrate the sulfur coat through pinholes or cracks in the coating before the urea prill can be dissolved. Once dissolved, urea will either diffuse out through pinholes, or will more rapidly leak out through the larger cracks in the sulfur coating. Conditioners and sealants are commonly used on sulfur-coated material to minimize the effects of cracks on nitrogen release.

The process of nitrogen release from resin-coated urea is different than that of sulfur-coated urea. The resin-coated fertilizer pellet swells upon diffusion of water across the resin coat and into the pellet. Dissolved urea then diffuses back out through the resin coating, or the swelling pressure causes the pellet to crack open and release urea. Resin-coated materials have fewer flaws compared to the numerous cracks found in sulfur-coated products. The greater integrity of resin-coated materials provides a more predictable nitrogen release. Urea release from resin-coated urea is affected by the coating thickness, prill size, soil temperature, and moisture. A thicker resin coating and larger prill size will decrease the rate of nitrogen release, thus slowing nitrogen availability. Temperature increases the release of nitrogen from resin-coated products because the rate of diffusion increases with temperature. Moisture is needed for diffusion to proceed; dry conditions following fertilization, therefore, will delay the release of nitrogen from a resin-coated urea. Resin-coated ureas are typically blended with uncoated urea to improve initial green-up and growth responses. Cont. next page.





Recently, materials combining sulfur-coating and resin-coating technology have been marketed. The resin coating of this sulfur/resin-coated material is much thinner than a typical resin-coated urea and acts primarily as a sealant over the sulfur coat. The resin sealant reduces the rapid release of urea that can occur when cracks or flaws are present in the sulfur coat.

Nitrification and Urease Inhibitors

Nitrification and urease inhibitors modify nitrogen transformation processes in the soil and are intended to maintain nitrogen in a form that minimizes leaching and volatilization losses, thus improving the efficiency of nitrogen fertilizers. Nitrification inhibitors inhibit the conversion of ammonium-nitrogen in the soil to nitrate-nitrogen. This is useful because nitrate-nitrogen is susceptible to leaching, whereas ammonium-nitrogen is retained by the soil. Two products that inhibit nitrification, N-Serve (nitrapyrin) and DCD (dicyandiamide), have been studied on turf. N-Serve has not been effective on turf systems most likely because the compound is highly volatile. Although DCD is a low volatility nitrification inhibitor, most research indicates that its effectiveness on turf is also limited.

Following application, urea should be carried into the soil by thorough irrigation or by rainfall. Otherwise, surface-applied urea will hydrolyze and release ammonia to the atmosphere. Research has shown that up to half of surface-applied urea can be lost in this manner. Initial research has shown that urease inhibitors can be effective in reducing this type of nitrogen loss. Phenylphosphorodiamidate (PPD) and N-butyl phosphorothiaic triamid (NBPT) are two urease inhibitors shown to be effective in reducing ammonia volatilization losses from urea fertilizer. ▲

DID YOU KNOW? Rutgers is *"plotting"* to develop higher quality turf. Check out the turf research plots. Come see the finest programs in the nation. Visit Rutgers Landscape Research Turf Field Day on July 31st. It's not only for Landscapers. Sports Field Managers can enhance their knowledge too. SEE CALENDAR on page 8.

Always Consider the Environment

by Jim Hermann

As students of the turf industry we try to read as many articles as we can find on the subject of turf management. We use the information we receive from these articles to help formulate the management programs we implement on the fields we maintain. These articles often times include topics such as aeration technique, selection of topdressing materials, yearly maintenance programs, athletic field renovation etc.

When you evaluate an article, always make sure you are considering the similarities and differences in the ***environment*** of the field you are reading about and the ***environment*** of your own field.

I trust that many of you have found yourselves in the following situation. You are trying to decide how to deal with a problem on your field. Not having had personal experience with this particular problem, you base your decision on an article that was written about a similar situation, or so it would seem.

Let's assume your soccer field is constructed on heavy textured native soil. The chemical soil analysis has determined that you have an acceptable Ph of 6.5 along with adequate amounts of available Phosphorous and Potassium.

It's September and the soccer league is tearing your field up and you're in a quandary over what to do first. You go to your mailbox and what do you find but the new issue of Sports Turf. By sheer coincidence the main article is written about how some facilities management company maintains a world-class soccer field. After you finish reading the article, you commit to a fertilizer program consisting of 8 lbs. of Nitrogen a year along with an obscene amount of Potassium and Phosphorous and micronutrients you never heard of before. In addition to this you purchase a trailer load of sand from the local supply house to use as a topdressing material. What's wrong with this picture?

The field you are reading about is more than likely constructed on a sand based root zone. Water is most certainly supplied by an automatic irrigation system. It is more than likely mowed every other day with a reel mower. It has a slit drainage system and employs a maintenance crew the size of a small town. *Cont. next page*

continued from page 6 **"Always Consider."**

Sand based root zones have relatively low water and nutrient holding capacity as compared to heavy clay root zones. A more complete and intensive fertilizer program typically including micronutrients is necessary to supply the turf with what it needs. Nutrients are typically supplied at lower rates and at more frequent intervals than are most heavy textured native soil New Jersey fields.

The sand topdressing is supplied with a sieve analysis "***compatible***" (the key word when discussing topdressing) with the root zone. Although sand may be indicated as a topdressing material for many fields, its use should never be contemplated without first consulting an agronomist well versed in soil science. The risk of causing more harm than good is extremely high.

If the ***environment*** of the field you are reading about differs greatly from your own, the maintenance program is going to differ from your own.

As you enter into decisions concerning maintenance and renovation procedures of your sports turf always ask yourself this question, "What am I trying to accomplish?" Here is an example. Modification of heavy textured soil with sand is often times recommended as a means of increasing the drainage qualities. What many fail to realize is that in order for drainage to occur, there needs to be a place for the water to go. If your field is not equipped with drainage, this procedure may not work.

Whenever making maintenance decisions, "always consider the **environment**".▲

***If you are looking for suggestions to improve your fields and have questions for the professionals attend the Sports Field Managers Association of New Jersey's field day on August 8. *SEE CALENDAR ON PAGE 8.*

CALENDAR OF EVENTS

RUTGERS

July 31 - Rutgers Landscape Turf Field Day, Adelphia Plant Science Research Station, Adelphia, NJ. (732) 932-9711 ext. 135. *(Learn about the research on turf grasses to improve your turf).* MARK YOUR CALENDAR!!!

SFMANJ

August 8 – Field Day at Bernards Twp's Bunham Park. A Day loaded with equipment demos, 5 ways to attack your goal mouths, writing specs, maintenance programs and more. 8:30am to 3pm. Watch for fliers mailed in June or call 908-236-9118 for info.

NEW JERSEY TURFGRASS ASSOCIATION

December 10-12 - New Jersey Turf and Landscape Expo 2002 , Taj Mahal, Atlantic City, NJ. *(Athletic Field Educational Sessions begin Wed., Dec.11 from 4pm to 6pm. & Thurs. Dec. 12 from 10am to 3:30pm with annual SFMANJ meeting at 1pm Thurs).*

SFMANJ Membership Registration form

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State__________ **Zip**__________

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STMA Members deduct $10 for first applicant

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Annandale, NJ 08801

WELCOME NEW MEMBERS

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Sam	Pepe	Neptune Board of Ed
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ENDOPHYTE-INFECTED TURFGRASSES

FOR SUSTAINABLE INSECT MANAGEMENT

Dr. Albrecht M. Koppenhöfer[1] & Dr. William A. Meyer[2]

Certain turfgrass species, notably perennial ryegrass, tall fescue, and fine-leaf fescues, can form mutualistic relationships with fungi in the genus *Neotyphodium*. Because these fungi occur exclusively within the plants they are called endophytes. The fungus can be found only in the above ground parts of the plants and is transmitted by seed and vegetative propagation. Endophytic fungi depend on their grass host for nutrition, whereas endophyte-infected plants have been observed to have enhanced growth and vigor, germination and seed set, drought resistance, and resistance to certain pathogens and insects. Insect resistance is associated with the production of toxins, called alkaloids, by the endophytes. While the alkaloids do not harm the grass, they are deterrent or toxic to some insect pests that feed on stems, leaves, and leaf sheaths.

In perennial ryegrass, endophyte-infection generally confers resistance to billbugs, sod webworms, hairy chinch bug, and greenbugs, and partial resistance to fall armyworms. In tall fescue, a grass species that is generally less susceptible to insect damage even without endophytes, endophytes have been observed to increase resistance to fall armyworm, billbugs, sod webworm, leafhoppers, and greenbugs. In fine-leafed fescues, increased resistance to the hairy chinch bug and fall armyworms has been observed. Root-feeding insects such as white grubs generally don't seem to be significantly affected by the presence of endophytes, probably because little of the protective alkaloids is translocated into the turfgrass roots.

Figures on the degree of protection against insects that endophytes confer to turfgrasses are variable because resistance levels may not only vary with turfgrass and insect species but also with turfgrass cultivar, environmental conditions (e.g. highest alkaloid concentrations in spring and in fall), soil fertility, and other parameters. In a field study in New Jersey in the late 1970, perennial ryegrass cultivars with > 90% endophyte infection generally sustained only 1-5% damage by billbugs whereas cultivars with < 10% endophyte infection sustained generally > 25% damage (up to 83%). However, in the same study some cultivars with 100% endophyte infection sustained 25% damage and some cultivars with 0% endophyte infection sustained only 7% damage. In another study in New Jersey in the late 1980s, tall fescue infected with endophytes sustained only 1% damage by billbugs whereas endophyte-free tall fescue sustained 25% damage.

From a historical perspective in the past 2 National Turfgrass Variety Trials all top performing perennial ryegrasses contained a high level of endophyte. The following new improved turf-type perennial ryegrasses performed well in New Jersey turf trials: AllStar2, Amazing, Applaud, Brightstar II, Brightstar SLT, Cabo, Charismatic, Churchill, Citation Fore, Exacta, Fiesta III, Gator III, Integra, Jet, Kokomo, Pace Setter, Palmer III, Paragon, Pizzazz, Pinnacle II, Premier II, Promise, Repell II, Seville II, Somerville, SR 4820, Stellar. Similarly, all top performing tall fescues in the National Turfgrass Evaluation Trials contained a high level of endophyte. The following improved turf-type tall fescues have performed well in New Jersey turf trials: Arid 3, Bingo, Biltmore, Bonsai 2000, Coyote, Crossfire II, Finesse, Focus, Forte, Gazelle, Justice, Masterpiece, Millennium, Mustang 3, Plantation, Olympic Gold, Oncue, Picasso, Rebel Exeda, Rebel Sentry, Rembrandt, Shenandoah II, Scorpion, Sr8250, Tarheel, Watchdog, Wolfpack.

Recent studies in Ohio indicated that insect pests can also be suppressed in mixed stands of Kentucky bluegrass and endophytic perennial ryegrass. Thus, population densities of bluegrass billbug and bluegrass sod webworm decreased significantly as the percentage of endophytic perennial ryegrass (Repell II) increased in mixed stands with Kentucky bluegrass until the proportion of endophytic perennial ryegrass reached 40%. Higher percentage of endophytic perennial ryegrass did not result in further reduction of pest populations. In the same study, another endophyte enhanced perennial ryegrass cultivar (Triple Play) did not decrease billbug populations.

Viability of the endophyte in seed declines rapidly under warm, humid conditions. Therefore the seed should be stored under cold (32-40°F) and dry conditions, and should be planted as soon as possible to guarantee the higher endophyte infection levels after establishment. Overall, the use of endophyte-enhanced turfgrasses is a useful tool in the management of surface-feeding insects and can significantly reduce the need for insecticide applications.▲

[1]Assistant Extension Specialist in Turfgrass Entomology, and [2]Professor of Plant Science, New Jersey Agricultural Experiment Station, Cook College, Rutgers, The State University of New Jersey, New Brunswick, NJ 08901.