# Journal Of ENVIRONMENTAL TURFGRASS

**Scientifically based and objective information to help educate the public to the environmental benefits of turfgrass**

Vol. V, No. 1 Spring, 1993





Additional information, technical background details, resources and expert interviews will be provided media representatives upon request.

The American Sod Producers Association is located at 1855-A Hicks Road, Rolling Meadows, Illinois 60008. Phone 708/705-9898, Fax 708/705-8347.

## General Uses of the Contents

**The "Journal of Environmental Turfgrass" is designed and distributed as an original material resource. The articles, illustrations and other matter in this publication may be used (in whole or part) by other individuals, organizations and businesses as they see fit. This information may be used in whatever form best suits the needs of the audience—the basis of an article, a poster, or a flier, or even a mailer.**

**These items may be used as background material or they may be easily and inexpensively reproduced. Illustrations provided near the back of the publication can be incorporated into any of the articles, used independently or used with other related items.**

## Newsletter Use

**The material can be easily adapted to a company newsletter:**

- ☐ **If you use a computer to produce your company newsletter, simply type the material in whole or in part. Leave space for art work, which you can position once you have the computer print-out. Then take the newsletter to a "Quick-Print" shop and get the needed copies.**
- ☐ **The material also lends itself to the "snip-and-paste" method of making a newsletter. Cut out the copy and illustrations you want and paste them into position.; Better yet, mark the parts you want and let a "Quick-Print" shop put it all together for you. They will provide you a "proof" to let you make changes or additions before the final printing.**
- ☐ **Finally, if you produce your company newsletter using a typewriter, take various portions of the "Journal" copy and adapt it to your personal needs. Remember, many marketing services believe that typewriter composition is preferable to professional typesetting. Typewriter copy helps to build the impression that the contents of the newsletter are both timely and require a minimum of reading time.**

## How to Order Extra Copies of this Journal

**To order extra copies of the "Journal of Environmental Turfgrass" write, call or fax the American Sod Producers Association, 1855-A Hicks Road, Rolling Meadows, IL 60008. Phone 708/705-9898; Fax 708/705-8347.**

**If ordering by phone or fax, include your credit card number and the card's expiration date.**

**Each copy costs $1.30. When placing your order, include shipping/handling costs as printed below.**

**SHIPPING/HANDLING CHARGES**

| # of Copies Ordered | U.S. | Canada | Internat'l | # of Copies Ordered | U.S. | Canada | Internat'l |
|---|---|---|---|---|---|---|---|
| 1-2 copies | $ 1.00 | $ 1.50 | $ 1.50 | 26-50 copies | $ 5.00 | $10.00 | * |
| 3-5 copies | $ 2.00 | $ 3.00 | $ 4.00 | 51-75 copies | $ 6.00 | $13.00 | * |
| 6-10 copies | $ 3.00 | $ 5.00 | $ 7.00 | 76-100 copies | $ 8.00 | $16.00 | * |
| 11-25 copies | $ 4.00 | $ 7.00 | * | 101+ copies | $12.00 | $20.00 | * |

*will be billed shipping charges upon shipment; please select option:

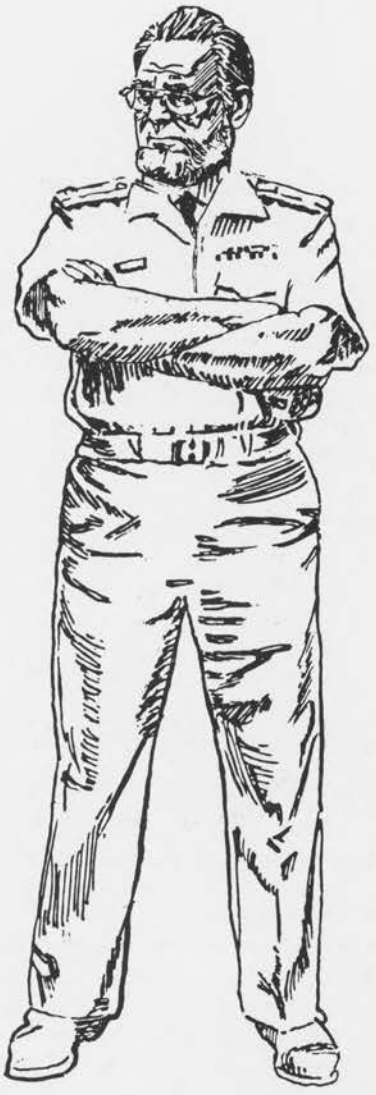
☐ **Ship fastest method regardless of cost** ☐ **Ship most economical method (approximately 6-8 weeks for delivery)**

**For ASPA Files,** it would be very beneficial to receive samples of how this material was used. Suggestions of topics, authors, etc., for future issues of the "Journal of Environmental Turfgrass" would be very helpful.

**Samples and comments** should be sent to "Journal of Environmental Turfgrass," ASPA Headquarters, 1855-A Hicks Road, Rolling Meadows, IL 60008.

# Scare Tactics on Pesticides Mislead the Public

By C. Everett Koop



*Dr. C. Everett Koop was surgeon general of the United States from 1981 to 1989.*

Back in my former incarnation as a surgeon, I was distressed when cyclamates were taken out of soft drinks. I had found Fresca very much to my liking.

The reason these substances were banned was because of experiments on rodents. The scientists found that high doses of cyclamates cause cancer in rats.

Translating those scientific studies to someone my size, I would have had to drink four bathtubs full of Fresca daily for about eight years to have an equivalent dosage.

Those who read murder mysteries know that with poison, it is the dose that counts. With coffee, it takes 96 cups to deliver a toxic dose of caffeine, and with turkey, 3.8 tons to deliver a toxic dose of malonaldehyde.

In the days of my early surgical career, the state of the art in detecting the concentration of toxins was beginning to approach a sensitivity of one part per million. Anything below that was considered to be zero residue.

In 1965, we were able to test for parts per billion; by 1975, parts per trillion. And now, we are approaching the time when we will be able to test for parts per quadrillion.

Even parts per million is a minuscule measurement. Converted to time, it is one second per two years. Parts per billion converts to one second every 32 years. And parts per trillion comes out in time to a sensitivity of one second every 32,000 years.

Americans are concerned because they are confused. They are confused because no one sorts out for them various components of what has become the food safety issue.

The public does not have a very good grasp of the relationship between the dose of a toxic substance and its risk in human beings. Their information comes from those who revel in using scare tactics instead of science to warn the public about dangers in the food supply.

These scare tactics lead us down the wrong path. We end up creating concern where it isn't necessary and ignoring concerns that are real.

For instance, some people think that all manmade substances, such as pesticides, should be removed from our food supply, and that everything occurring in nature is beneficial.

To sell nothing except foods untreated by pesticides would not only leave storekeepers with rotting food but would also fail to protect the consumer against molds that in high enough concentration can be lethal.

People who are so worried about pesticides fail to realize that the cancer rates have dropped over the past 40 years. Stomach cancer has dropped more than 75 percent, while rectal cancer has dropped more than 65 percent.

In the food supply—as in all other public health questions—we need better understanding of the difference between risk and hypothetical risk.

There is risk in almost everything we do, so we need to concentrate on the differences. The chances of your being killed in a motor vehicle (1 in 6,000) are much more real than are threats from pesticides. Yet that doesn't keep us off the road, either as passengers or as pedestrians.

There is another concern I have. By focusing on a hypothetical risk, like that from pesticides, not only do people find their anxiety levels elevated, but by focusing on a straw man, they also feel that they are doing something to improve their health.

In so doing, they often neglect all the other things that they could be doing more readily, more legitimately and with greater effect, such as paying attention to smoking, alcohol, exercise, balanced diet and so on.

Our food is not only the safest but also the most abundant in the world. Science and good sense will eventually prevail, but not until the pesticide terrorists have had another lick or two. □

*Reprinted with permission of "Progressive Farmer." © January 1992.*

## How I Learned to Have a Healthy Yard:

# Turfgrass—The Roots of the Landscape

By Dr. H. Marc Cathey, National Chair for Florist and Nursery Crops Review, National Program Staff, Agricultural Research Service, U.S. Department of Agriculture, Beltsville Agricultural Research Center, West Beltsville, MD.

Our "fitted" lawns, in our 110,000,000 private gardens and 50,000,000 public areas, by their success and tradition, have been viewed as vast open green spaces. We used them for play, sun trap, design, and the most evident sign of community responsibility. In fact, almost anything can happen with the other plants in the landscape if the lawn is fertilized, watered, weeded and mowed frequently.

In the 1980s our view of the lawn shifted with the rise of "environmentalism." The lawn is now shown to be an area of intensive carbon dioxide-oxygen exchange and, on an area basis, the most effective type of $C_4$ plants to take up carbon dioxide and release oxygen. It has also become a trap for nutrients, organic matter, water, microorganisms, and critters (moles, insects, etc.).

This "Journal" covers these approaches and the adjustments needed to maintain sustainable turf with reduced inputs of material and labor.

Our "fitted" lawns co-exist with many other kinds of plants. The direct benefits of having a lawn area when you grow your landscape annuals, perennials, herbs, shrubs, grasses, and trees should be featured in any discussion about the total environmental impact of turf. Consider the following:

1 **Borrowed root space:** The roots of most lawn grasses can be easily contained when grown under traditional maintenance schemes. This is not true for our woody landscape trees and shrubs. Many of our most frequently grown species are refugees from swamp areas or flood plains. Although they can survive the upland dry conditions throughout their life, they really become monsters when their roots invade the traditionally watered, fertilized, and mowed lawns. The girdle support roots and the side feeder roots readily mix between the grass roots and compoete for all of the "essentials" being supplied to the lawn. The root systems can often extend double or thrice the diameter of the shade of the tree.

**BONUS:** Grass roots fit neatly into any landscape plan and will permit the borrowed roots of landscape trees and shrubs to invade the area and co-exist with the grasses.

2 **Competing root space:** Shade trees are always viewed as the dominant plants in the landscape. We do all sorts of procedures to insure their health. First we spray the foliage of the transplanted tree with anti-transpirants to reduce transplant shock. We install stakes that rigidly hold the trees in place until they root. We create enclosing tents of burlap to reduce the heat/wind stresses of summer and the cold/drying/wind stresses of winter. In reality—what we should be doing is getting the trees to develop a new anchoring, supporting, adsorbing root system as soon as possible. Since most trees lose 80 to 95 percent of their previous root system from digging, only trees which can generate a new system rapidly will survive. Where is a better site for these roots to regenerate than in a well cared for, fertilized, and watered lawn?

**BONUS:** All gardeners are already programmed to care for the lawn—the trees thus will require no different or unusual procedures of maintenance. Lawns make the introduction of new trees and shrubs as simple and natural as possible.

3 **3-D root space:** All of us like to think that our garden soil reaches all the way to China. In actual fact—the top 3-5-8 inches of the soil is where almost everything goes on. The girdle roots of trees—like spokes on an umbrella—are only two or three inches below the soil surface. The actual feeder roots of the tree cross and recross and create a fiberous network in the top three inches of the soil. Although we talk about deep watering and fertilizations of tree roots—the availability of oxygen, and the escape of carbon dioxide ($CO_2$), carbon monoxide (CO), and ethylene ($CH_2 = CH_2$) are in direct proportion to the depth of the soil. Only the top two to three inches of soil are well aerated (oxygen) with decreased or negligible amounts of $CO_2$, CO, and $CH_2 = CH_2$. This thin layer—not the depth of soil—is where the water and nutrients are taken up efficiently and rapidly.

**BONUS:** A healthy lawn means that all of the forces—natural and gardener provided—are in the right balance for the trees and shrubs to thrive.

Proper preparation (limestone, gypsum, organic matter) and site correction (French drains, curbing) of the lawn will insure that added trees and shrubs will also thrive.

4 **Contoured root space:** Lawns are composed of thousands of individual plants with their thousands of individual root systems. This means that they literally float (almost) on the surface of any contours of soil that you propose. Contours of the soil allow the homeowner to control traffic, water flow, erosion, and stability of the entire landscape. At a distance these subtle changes in terrain are not obvious to the casual viewer but these grade changes are essential for a successful landscape design. Regardless of how the soil is contoured, the roots of your landscape trees and shrubs can expand and intermix with roots of the grasses.

**BONUS:** The roots of your trees and shrubs when combined with those of the grasses should create traffic flow

**This must be our objective—to create a garden that is environmentally responsible which does not impact on the surrounding streams, wetlands, lakes, and reservoirs.**

and water control that should stabilize any area. Using sod to accelerate the process of stabilizing foot and water traffic paths through your garden is preferred over the much slower establishment process of seeding.

5 **Fiberous root space:** Going right along with the contoured space is the intense network of feeder roots. Just by sheer numbers, the billions of tiny roots holding every soil particle together is truly the miracle of any lawn. Regardless of rainfall, changes in temperature, frequency of mowing, and the layering of the duff, it is the roots, not the shoots, that are the binding system of the landscape. You will know when your landscape finally becomes environmental—the water that drains out of your garden is optically clear and chemically pure.

**BONUS:** This must be our objective—to create a garden that is environmentally responsible which does not impact on the surrounding streams, wetlands, lakes, and reservoirs. With all the operations that we must perform—only the unseen roots must accomplish the most demanding task of all—to stabilize, filter, and purify the drainage from the garden.

6 **Organic root space:** The roots of plants—grasses or landscape shrubs and trees—do not live forever. Thus—the soil is constantly being invaded again with fiberous roots—expanding into areas with the most desirable combinations of nutrients, water, gases; and organic matter. These roots may follow the tracks created by earthworms. Over and over again—the same soil is reinvaded by roots. Thus your maintenance of the lawn area becomes critical—you must supply the correct balance of many often underappreciated factors. Organic matter added to the surface of the soil will never work its way into the mantle like the roots do.

**BONUS:** Mulches, organic matter, fertilizer, lime, gypsum, wetting agents and pesticides will only be effective when the roots of the host plants are already in a healthy state. Sustaining good growth of lawn grasses rather than frequent renovations must be the prime objective of any gardener.

The borrowed root space of your trees and shrubs in your lawn requires that we become more aware of what we are doing to the lawn.

☐ *Less water:* We need to train our plantings to be more efficient users of water. When, how, and where you water should be programmed for the best use of this limited natural resource.

☐ *Less nutrients:* We need to balance the applications of inorganic (easy to leach) and organic (slow to become available—difficult to leach) so that every one of the 16 essential elements are taken up by the plants and none escape into the environment.

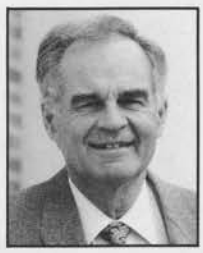
☐ *Sensible weed control:* We need to understand that our trees and shrubs are potential targets for some of our weed control measures. A well cared for lawn should have few—to no—weed control problems.

☐ *Sensible applications of gypsum:* Calcium sulfate ($Ca\ SO_4$) is often ignored in the preparation of the soil. In addition, many gardeners ignore a needed application of gypsum every three years. Gypsum does not change the pH of the soil but modifies the structure of the soil and the availability of other elements.

☐ *Programmed applications of limestone:* Calcium carbonate ($Ca\ CO_3$) must be used to shift the acidity of most eastern and far western soils to a near neutral state. Remember that the co-existing trees and shrubs also have preferred soil conditions. One must study and balance the acidity to meet the requirements of both the lawn and the landscape plants.

☐ *Engineered/disease and stress resistance:* Great strides have been made in identifying superior cultivars of lawn grasses. Every time we reduce the chemical dependencies of our lawns means that the health potentials for our landscape plants are also increased. By 1997—all of our pesticides must be reregistered—we should proceed to "hedge our bets" as much as possible.

I am completing a year's analysis of the research, marketing, and export potentials for the green industries. All 15 convocations we have conducted across the United States have urged that we speak inn one voice. Recognizing that turfgrasses are the roots of the landscape begins the process. ☐



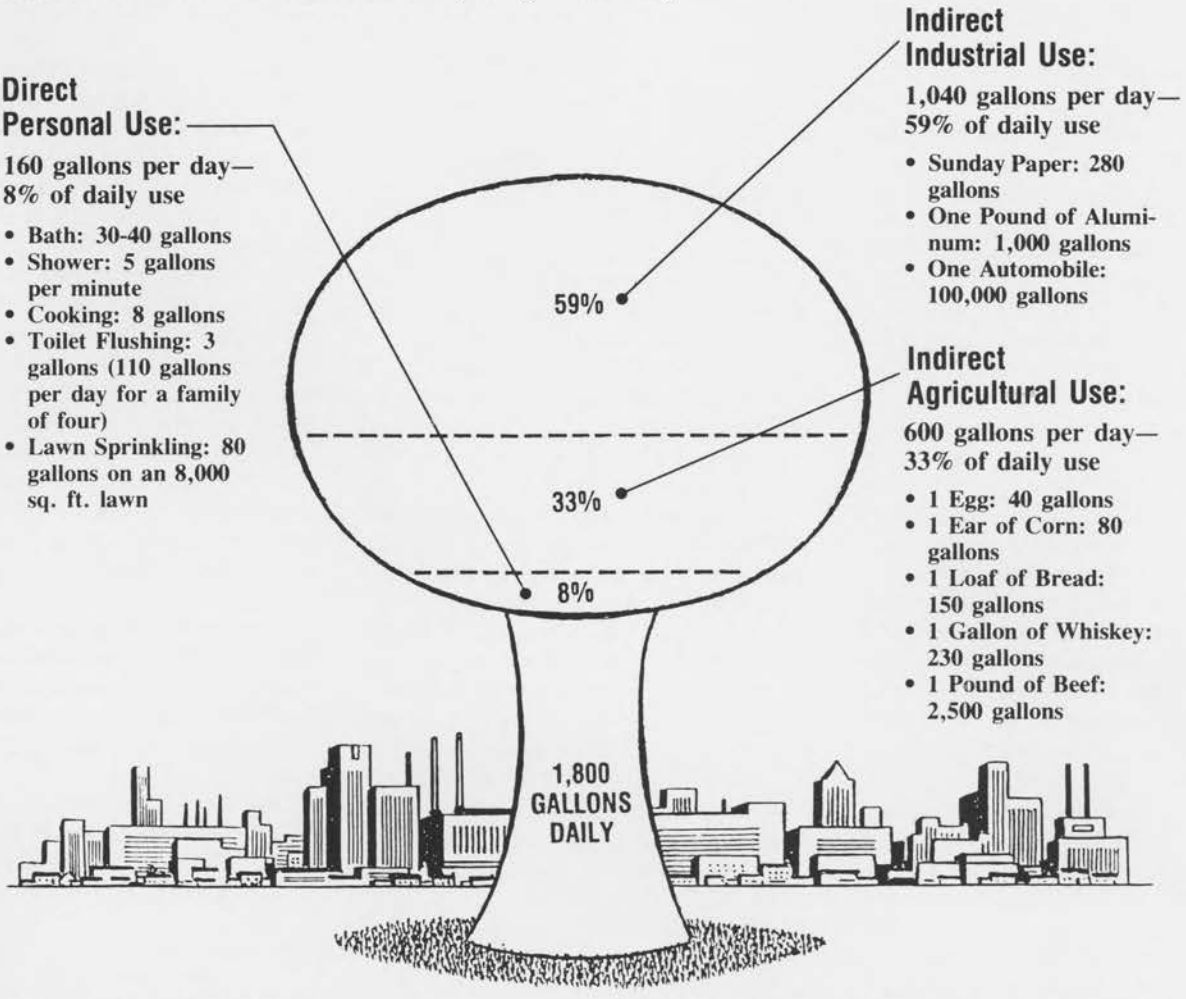
*Dr. H. Marc Cathey is National Chair for Florist and Nursery Crops Review. He is stationed in the National Program Staff, Agricultural Research Service, U.S. Department of Agriculture, Beltsville Agricultural Research Center, West, Beltsville, MD 20705. He was the Chief of the Florist and Nursery Crops Laboratory from 1960 to 1980; Professor of the D. C. Kiplinger Chair at Ohio State University for the academic year 1981; and, Director of the U.S. National Arboretum, Washington, D.C., from 1981 to 1991. In his current position he is cooperating with the Federal and State experiment stations, and 40 professional and trade associations to put together a national research, marketing, and export plan for florist and nursery agriculture.*

# Outdoor Watering Bans: Symbolism or Good Sense?

**While green lawns and flower gardens may be conspicuous consumers of water, one of our most precious natural resources, how effective are outdoor watering bans in helping to solve a very serious problem? As Kathleen K. Wiegner noted in "Forbes" magazine, "Bricks in toilet tanks or shutting off sprinklers hissing on summer lawns makes better symbolism than sense in dealing with water shortages."**

**According to G. Tyler Miller, Jr., in his publication, "Living in the Environment," the average American uses 1,800 gallons of water daily, some through direct personal use, the rest by indirect agricultural or industrial use.**

**Here's how we use much of those 1,800 gallons daily:**



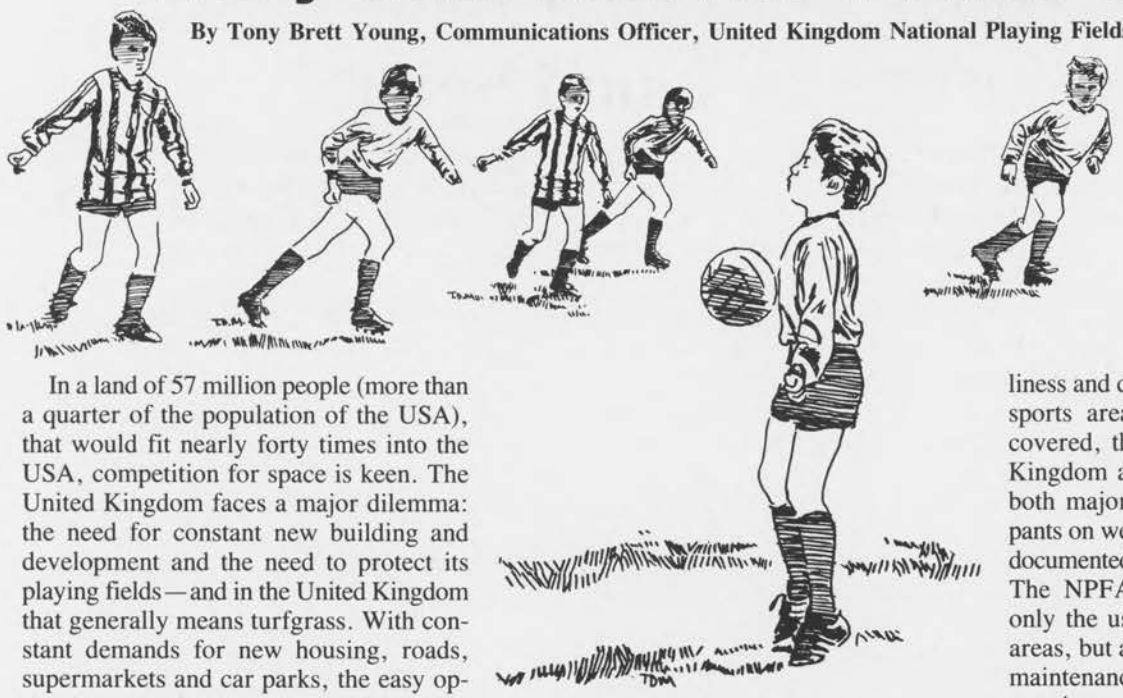

**Symbolic acts seldom solve serious problems and more often than not, they serve only to redirect attention from another problem. For most areas, the problem is not green vs. brown lawns, it's more a matter of determining the value of water and planning sufficiently far in advance to ensure adequate supplies are present when they're needed.**

**Conservation is important, because water truly is one of our most precious natural resources. The concern is that we create effective conservation programs and not merely symbolic gestures that have little real meaning.**

## United Kingdom's NPFA Puts Meaning To The Phrase:

# 'Every Child Deserves a Place to Play'

**By Tony Brett Young, Communications Officer, United Kingdom National Playing Fields Association**



In a land of 57 million people (more than a quarter of the population of the USA), that would fit nearly forty times into the USA, competition for space is keen. The United Kingdom faces a major dilemma: the need for constant new building and development and the need to protect its playing fields—and in the United Kingdom that generally means turfgrass. With constant demands for new housing, roads, supermarkets and car parks, the easy option has too often been a sacrifice of the nation's recreational land. But, as the humorist Mark Twain once observed: "The trouble with land is, they've stopped making it!"

However, as is so often the way of the British, the people are fighting back. Leading the crusade against the continuing loss of playing fields is an independent charity, the National Playing Fields Association (NPFA), which was established in 1922 to protect and improve recreational land. Involved in the organization are such world-renown notables as Prince Philip, the Duke of Edinburgh who serves as President and NPFA Vice-President Michael Caine. Roger Moore of James Bond fame, also lends his active support to the organization.

To the NPFA, the value of physical activity among children is paramount. It believes it is essential that the habit of keeping active and fit should be formed at school age. Once children leave school, many of their games, sports, recreations and other pastimes are forgotten, and there is little likelihood that the fitness habit will be developed in adulthood.

However, surveys have lead to a growing concern about the fitness of British children. One study revealed that 90 percent of children in a major provincial city were not as fit as they should be. Part of the problem comes from the fact that many of them are being denied the facilities they need to play freely and safely at school and outside of school hours.

The NPFA believes that generally, children are still keen to play games and sports, and particularly on a natural surface provided by turfgrass. However, if society makes it increasingly difficult for them to do so, they will inevitably drift more and more to passive pastimes, thus becoming less physically fit.

To counter the loss of playing fields, the NPFA carries out its protection role in a number of ways, including constant lobbying of central and local government bodies. It has had some success in persuading them of the value of one of its major planks of policy—the NPFA Six Acre Standard. Broadly, this recommends that a minimum of six acres (2.43 hectares) of recreational land should be provided for every 1,000 in the population. The NPFA also acquires land for sport, recreation and play and at present owns 111 playing fields or open space sites. These holdings make it the largest owner of formal recreational land in the country.

The charity also promotes improvement of play fields by providing an independent advisory service on all technical aspects of outdoor recreational facilities. This includes design, layout, installation, construction, management and maintenance and can range from advice on soil, drainage and irrigation to floodlighting, fencing and line marking.

The NPFA also recognizes the value of turfgrass playing and sports fields because of their increased margins of safety, cleanliness and diversity. While not all play and sports areas can appropriately be turf-covered, the vast majority in the United Kingdom are. The reduction of injuries, both major and minor, to active participants on well maintained turf has been well documented by numerous scientific studies. The NPFA accordingly encourages not only the use of high quality turf playing areas, but also its proper management and maintenance to ensure that the quality is ongoing.

The NPFA has proven what common sense tells us and that is, if children are given a reasonable opportunity to play out of doors on a well maintained area, they will gladly do so. Also, a community which provides a mix of activities including safe and adventurous play, sport and recreation will benefit from healthier, more intellectually developed, imaginative children. They will grow into adults who will contribute much more to that community.

The need, not only in the United Kingdom, but around the world is urgent and underlines the relevance of the National Playing Fields Association's slogan, "Every child deserves a place to play."

For further information about the NPFA, write to: Elsa Davies, Director, NPFA, 25 Ovington Square, London SW3 1LQ, United Kingdom. □

*Tony Brett Young is the Communications Officer of the United Kingdom National Playing Fields Association, and has a detailed knowledge of recreational issues. He produces all the charity's published material, and acts as its main spokesperson in the media. As a journalist and writer, he has thirty years' experience in press and public relations in the United Kingdom and Australia. He has published four books, including one on Charles Dickens, and is currently writing another for an American publisher.*

# Even Tan or Brown Lawns Benefit the Environment

By Dr. James B. Beard, International Turfgrass Science Institute

The green color of outdoor vegetation is one of the healthy, desirable components in a favorable quality-of-life, and green grass is one of the key symbols of this quality.

However, ideal climatic conditions for maintaining a green lawn are not always present. Extended droughts occur with various frequencies depending on the climatic characteristics of a given region. Certain species/cultivars of both warm- and cool-season turfgrasses have enhanced survival capabilities under extended drought stress and should be selected for use in those climatic regions where extended drought stress is a reoccurring concern. Research at Texas A&M University has shown that certain cultivars of bermudagrass, St. Augustinegrass, and seashore paspalum can remain green for more than five months under extended drought stress.

### When Turfgrass Becomes Dormant

If the drought stress is long enough, the turfgrass leaves will eventually turn tan to golden to brown in color and the plant enters a state of dormancy. This is an important survival mechanism which the perennial turfgrasses possess. While the leaves are brown and essentially dead, the vital meristematic areas of basal crowns and, more importantly, the meristematic nodes on lateral stems of underground rhizomes remain alive and healthy. When subsequent rainfall reoccurs, these living meristematic areas of the crown and stem nodes are capable of initiating new shoot and root systems, resulting in full recovery of the turf including a green attractive appearance. Thus, a drought resistant, perennial creeping turfgrass in a tan to brown condition during drought stress is not dead. Rather, it is in a dormant nongrowing state and has the capability to recover relatively quickly once the drought period ceases.

### Accepting the Natural Condition of Turfgrass

Homeowners have the option of either irrigating perennial turfgrasses during the drought stress period or allowing them to enter the tan to brown dormant state. The latter option is of particular significance where water supplies are limited during the summer water/heat stress period. Unfortunately, certain homeowners have viewed turfs as an ornamental surface which should remain green at all times. It has been quite acceptable for deciduous tree leaves to turn brown in the fall and eventually drop to the ground, leaving only the brown wood and bark during the winter dormancy period. Leaves of certain tree species turn attractive colors of yellows, reds, and purples during the autumn. There also are species and cultivars of turfgrasses that behave in a similar manner in terms of reddish and purplish leaf colorations during the autumn low temperature discoloration phase.

*Dr. James B. Beard is Director and Chief Scientist, International Sports Turf Institute, College Station, TX. His research and teaching in Turfgrass Sciences include a broad array of topics published in six books on turfgrass and their cultures; over 230 scientific papers; and, 340 popular technical articles. Recognized as a leader by his peers, he has served as President of the Crop Science Society of America and the International Turfgrass Society, as well as being a recipient of numerous honorary positions and awards. Dr. Beard is an honorary member of the American Sod Producers Association and serves as Environment Science Advisor to the association.*

### Beneficial Contributions of Dormant Turfgrass

It is important to emphasize that a dormant tan or brown colored turf is not necesarily undesirable and, in fact, can continue to make important beneficial contributions to the environment, in addition to functioning as a water conservation entity during periods of drought stress. The benefits to our turfgrass environment and quality-of-life that are retained by tan to brown dormant turfgrasses include the following:

- **Erosion Control.** Even during the midsummer brown dormancy period turfs retain their superior capability to control soil erosion and, in turn, also protect the quality of surface waters in streams and lakes.
- **Mud and Dust Stabilization.** The movement of dust and mud into residential houses and places of employment can be a significant problem that is substantially reduced through the use of turfgrasses to stabilize the extensive soil areas. Nongreen dormant turfs continue to play an important role in this valuable function of enhancing our quality-of-life.
- **Water Entrapment-Ground Water Recharge-Flood Control.** Turfs in a nongreen dormant state continue to function as one of the better vegetations for water entrapment, which in turn increases ground water recharge. This unique capability as it reduces the extent of costly man-made structures required for flood control, especially where the watershed is dominated by relatively impermeable surfaces.
- **Organic Chemical Degradation.** The turfgrass-soil ecosystem contains a very large, diverse population of microorganisms with extraordinary capabilities in the degradation of organic compounds, including pesticides. The intensity of microorganism activity would be lessened during dormant periods caused by water stress, but the capability is still retained to a certain extent and can be accelerated quickly to pre-drought levels once rainfall occurs.
- **Carbon Storage.** The fibrous, dense root system of turfgrasses contributes substantially to soil organic matter levels and resultant carbons storage. This function continues in a positive manner during nongreen dormancy periods, such as a drought stress.
- **Noise Abatement.** The canopy morphology that functions in noise abatement is retained during the tan to brown

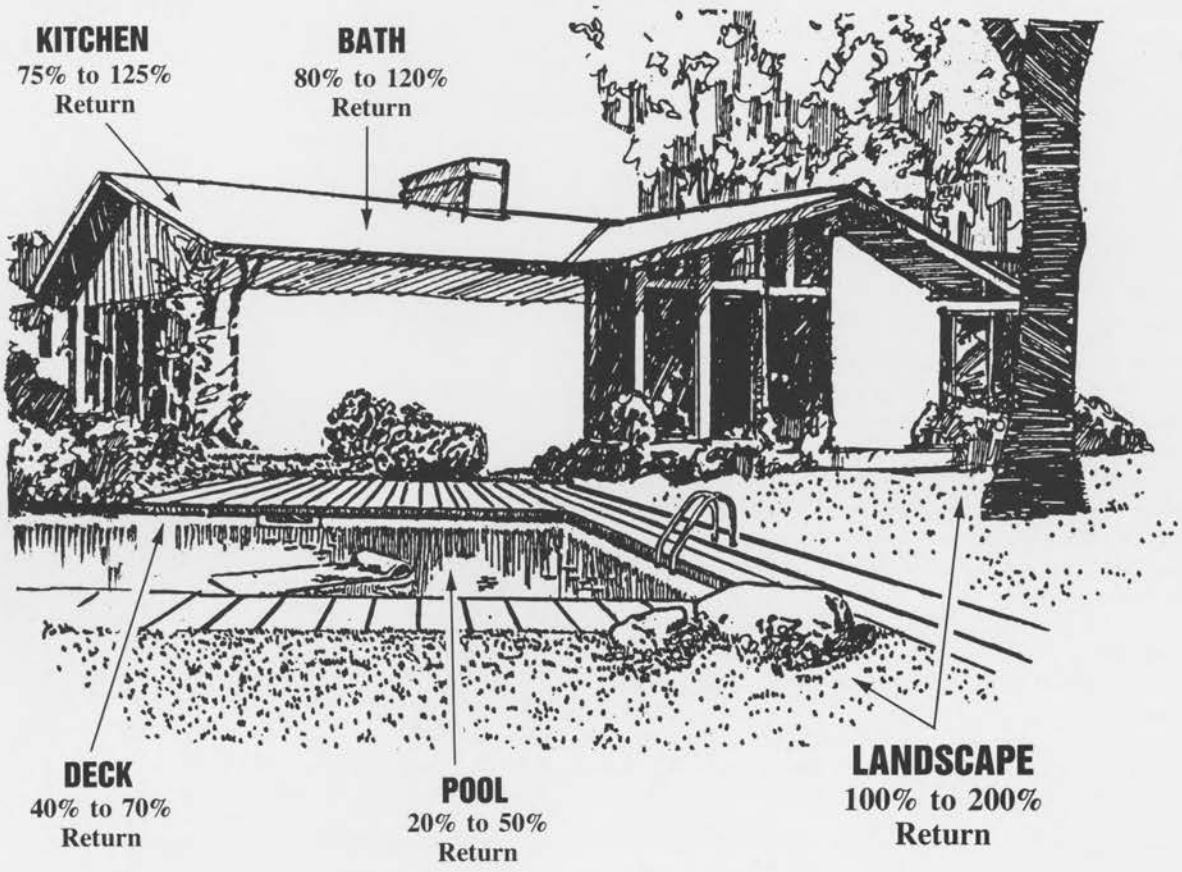
dormancy period induced by drought stress. Therefore, brown turfs continue to provide an important beneficial dimension in the abatement of unwanted noises.

■ **Decreased Nuisance Pests, Allergy Related Problems and Human Disease Exposure.** The problems associated with nuisance pests such as snakes, rodents, ticks, mosquitos, and chiggers are substantially reduced even by mowed, brown turf areas compared to tall growing flower, shrub, and tree plantings. Also, the nongrowing, weed-free perennial turfs would have a minimum release of allergy related pollens. Finally, human disease exposure, such as Lyme disease which is spread by a tick, would be significantly reduced. Thus, health related concerns are greatly alleviated even by mowed turfs which enter a brown dormant state.

■ **Safety Cushion.** Brown dormant turfs retain the safe cushioning affects that reduce the potential for injury to participants falling on such resilient surfaces. However, under very intensive usage the continued use would eventually result in wearing away of the dormant turfgrass shoots, thereby resulting in the exposure of bare ground. Thus, irrigation during drought stress periods is quite important for intensively used sports fields along with the use of drought avoiding species which retain their green color and growth capability longer into the drought stress. □

## Home Improvements: Landscape Your Best Return on Investment

**Get the most out of the money you put into your house. The highest return—100% to 200%—is an investment in the landscape. For the fastest return, invest in turfgrass sod. Sodding offers a wide range of immediate benefits. These include soil erosion control, temperature moderation, heat dissipation, glare reduction, noise abatement, atmospheric pollutant entrapment and degradation, water harvesting, soil water recharge, and aesthetic enhancement.**



# Evaluation of Materials Used to Control Erosion and Capture Sediment

By Mark J. Carroll, University of Maryland, Department of Agronomy.

**The following is a summary of a presentation made by Dr. Carroll at the 1992 American Sod Producers Association's Midwinter Conference held in Las Vegas.**

**The preliminary findings of this study indicate that runoff from a site will be significantly lower when sod is selected to control erosion over any of the man-made erosion control materials we investigated.**

Of all the material entering the nation's waterways, by far the single greatest pollutant is soil sediment. The effects of sediment loading on water quality are enormous. Continual sediment loading of surface waters is known to be responsible for the loss of water storage capacity in municipal reservoirs, increased dredging of navigation channels, and the loss of numerous aquatic organisms such as oysters, fish, and submerged vegetation. On a per acre basis, the loss of sediment from construction sites far exceeds that from traditional agricultural land. A 1978, United States Geological Survey study of the Anacostia River near Washington D.C. found that urban construction sites can contribute anywhere from 7 to 100 tons of sediment per acre annually. In contrast, the sediment load typically found at the edge of agricultural fields seldom exceeded 4 tons per acre on a yearly basis. Widespread construction within the rapidly growing urban and suburban areas of the Chesapeake Bay watershed has been implicated as a major source of sediment loading of the Chesapeake Bay.

Contractors attempt to control soil erosion, and off site sediment transport, at construction sites by hydroseeding or sodding bare ground slopes and waterways, or by using man-made erosion control materials such as curlex or jute. Often, construction projects are started and completed within 3 to 4 months time. Thus, use of erosion or sediment control measures that involve the establishment of grass by seeding are likely to be only partially effective at controlling erosion and capturing this shortcoming many contractors have begun using man-made erosion control materials in tandem with seeding to limit sediment losses. The effect of using man-made materials in preventing sediment loss and promoting sod development of seeded areas has not been adequately investigated.

In 1991, a study was initiated at the University of Maryland to examine the effect of four man-made erosion control materials on preventing soil erosion from a disturbed soil located on an 8 to 10% hillside slope. Sediment loss from the four man-made materials were compared with sediment loss from sodded, straw covered and bare soil areas on the same hillside. The effect of the man-made materials and straw placed down at a rate of 2 to 3 tons per acre on the establishment of sod from seed was also investigated on the hillside in 1991. The man-made materials examined included:

- C-125, a polyester netted coconut erosion control blanket from North American Green,
- Dekowe 700, a coconut-fiber woven-strand mat from Belton Industries, Inc.,
- Curlex, a polypropylene netted non-woven mat of elongated wood-shaved fibers from American Excelsior and
- Geojute, an open mesh net made of twine-like strands from Belton Industries, Inc.

Sediment losses were examined for five weeks under natural rainfall conditions and under artificial rainfall conditions using a rainfall simulator. Establishment of sod from seed was evaluated by seeding areas with an approved Maryland highway mix, then covering the seeded areas with straw or one of the man-made materials. The highway mix consisted of 92% Tall fescue, 2% Kenblue Kentucky bluegrass, 2% Canada bluegrass, and 1% redtop. The mix was seeded at a rate of 60 pounds per acre.

Under natural rainfall all materials examined provided excellent sediment control. Sediment losses were reduced from 94 to 99% of the amount loss from the bare soil areas. (See Chart I.)

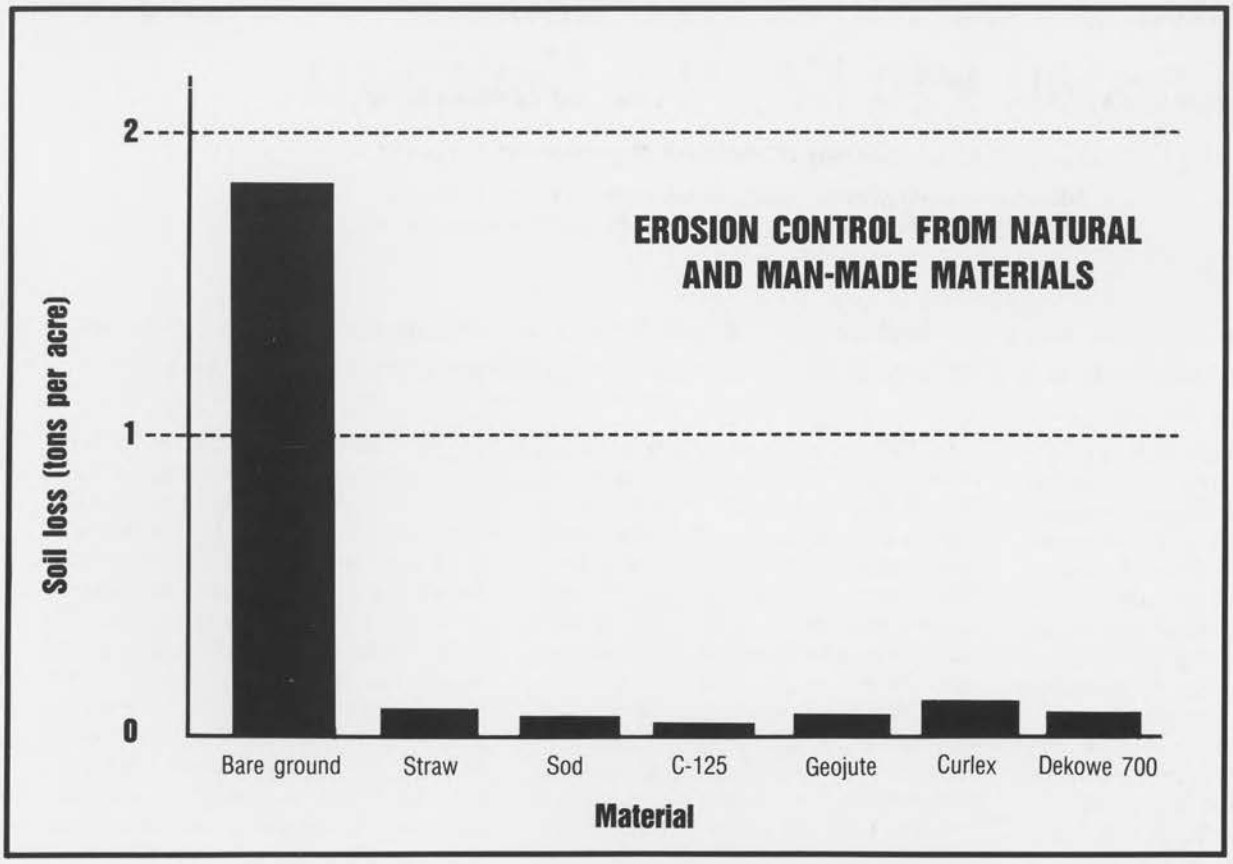
Under highly reproducible simulated rainfall conditions, each area was subjected to a 3.8 inch per hour rainstorm for a time period necessary to cause runoff plus an additional 35 minutes. Sediment loss under these conditions from sodded areas was 8 to 15 times less than for any of the man-made materials, and 10 times less than for the straw covered areas. (See Chart II.)

In addition, the amount of time needed before runoff was observed from the sodded areas was 28 to 46 times longer than for any of the other erosion control materials. Preliminary observations from the seeded areas indicate that initial seedling establishment and ground cover of the highway mix is reduced from 50 to 90% when the seed is covered with one of the man-made materials instead of straw.

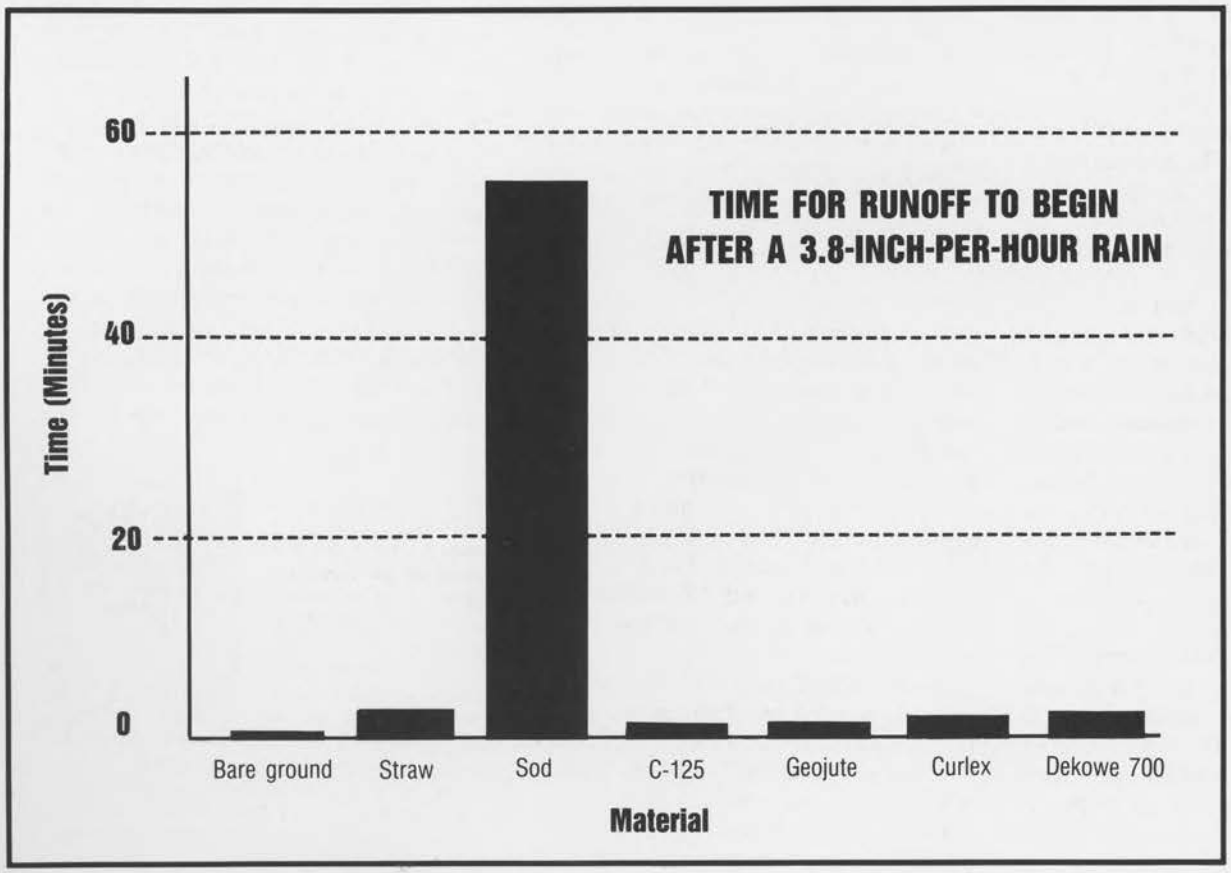
The preliminary findings of this study indicate that runoff from a site will be significantly lower when sod is selected to control erosion over any of the man-made erosion control materials we investigated. Our findings also showed that when runoff does occur, that the amount of sediment suspended in the runoff will be higher for straw and man-made materials than for sod. While additional work is needed with contrasting soil types and at different site locations to verify our initial findings, our preliminary data indicate that the higher cost associated with using sod as an erosion control material is warranted. □

*Mark J. Carroll is an Assistant Professor of Turfgrass Science at the University of Maryland. Dr. Carroll holds a joint research and teaching appointment within the Department of Agronomy at the UM College Park campus. His research interests are in the areas of turfgrass water use and water quality. He is the Turf and Urban Agronomy curiculum undergraduate advisor at the University of Maryland and serves as the instructor for both the introductory and commercial turfgrass management courses.*

## CHART I




## CHART II

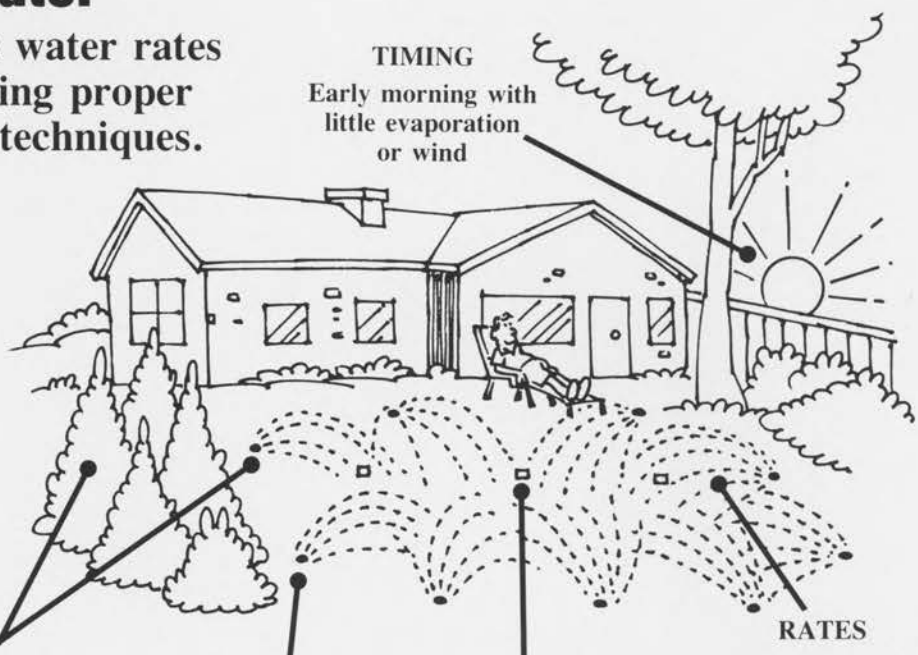


# Conserving Water

**Reduce your yard's water rates 50% to 200% by using proper water conservation techniques.**

**METHOD**

Sprinkler system, engineered to water-use zones, well maintained



**TIMING**
Early morning with little evaporation or wind

**AREA**
Selective area watering to match plant and soil needs

**NOZZLE**
Uniform coverage, with large droplet size

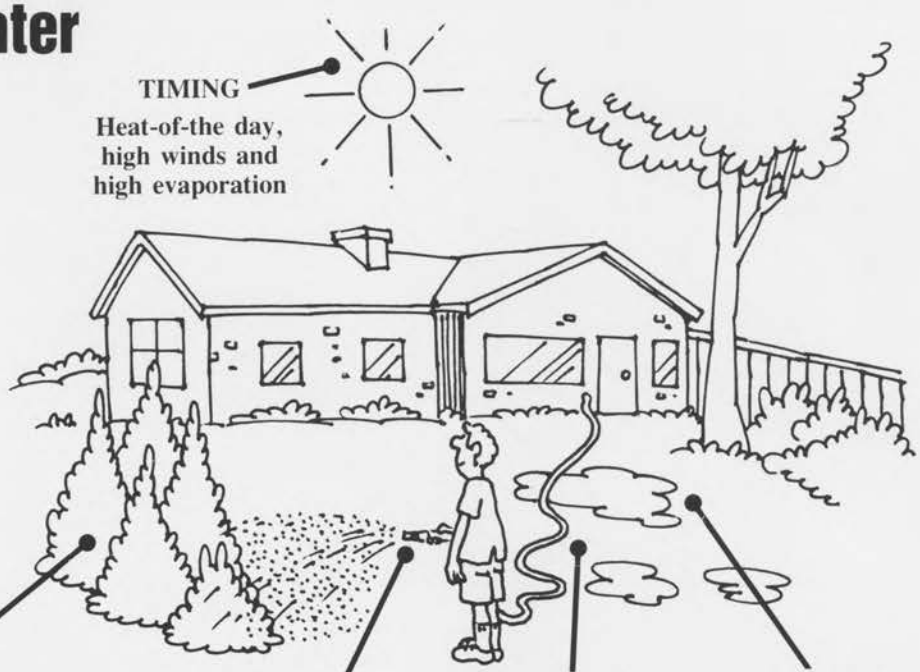
**FREQUENCY**
Local ET rates—soil sensors or probes

**RATES**
Matched to soil infiltration—multiple cycles to avoid runoff

# Wasting Water

**METHOD**

Hand-held hose



**TIMING**
Heat-of-the day, high winds and high evaporation

**AREA**
Border to border coverage—everything gets the same amount of water

**NOZZLE**
Hose-end—small droplets that drift and evaporate

**FREQUENCY**
"Guess and Hope" method: guess it's time; hope it's enough

**RATES**
As fast as possible, creating puddles and runoff

# TURFGRASS SOD AND SEED INSTALLATION
## Factors To Consider When Recommending Turf Installation Alternatives

Properly established and maintained lawns are a life-time investment, adding to the value of the property, its safe, clean and enjoyable use and even a benefit to the environment as the tightly inter-woven plants of a mature lawn clean the air by releasing oxygen as it uses carbon dioxide, traps particulate pollution and cleanses runoff water that helps restore our groundwater supplies.

• • •

Making the wrong decisions when a lawn is established will cost time, energy, money and natural resources.

• • •

Making the right decisions when a lawn is established will create a beautiful, useable and enjoyable investment.

• • •

| FACTORS TO CONSIDER | SEED | HYDROSEED | TURFGRASS SOD |
|---|---|---|---|
| Time of Year to Install | Not recommended for Winter or Summer, possible in Spring, best in Fall for most areas. | | Year-round installation, even on frozen ground if sod is available. |
| Soil Preparation | Same for all types of lawn installation: Deeply till soil, add necessary amendments and fertilizers, grade and level for smooth surface, remove all debris, lightly pack and moisten. | | |
| Water Requirements | Highest water needs — Bare soil will dry quickly. Water lightly for 3 to 4 weeks, keeping surface moist, begin to apply 1-inch of water per week after first mowing. | Moderate to high water needs. Mulch will preserve some moisture. | Lowest water needs — Water at installation to a depth of 6-inches, then light waterings for next 2-3 weeks. Grass will shade soil and prevent drying. |
| Seed Quality | Extremely variable because of germination rates, weed and foreign matter content; unknown or unspecified varieties. Generally lower quality seed than used in cultivated sod production. | | Typically highest available sod quality, certified, elite seed. May be certified to prove specific variety. Mixtures & blends used to suit area needs. |
| Weed Control | Multiple applications of chemicals usually required to combat competitive weed invasions until turf is well established. | | Minimal, if any chemical control required. |
| Uniformity of Coverage | Seeding varieties, rates, germination times, wash-outs (erosion), traffic, feeding birds and rodents can create spottiness. | Mulch layer may reduce some problems. | 99 to 100% uniformity with use of mature turfgrass sod. |
| Runoff/Erosion | Heavy rains or sloping areas will cause seed, chemicals and silt to wash onto sidewalks and into sewer systems. Little, if any protection for several months. | Mulch should reduce erosion/ runoff. | Capable of accepting heavy rains without erosion or damage. |
| Visual Impact | Rough texture and open soil | Colored mulches act to camouflage soil appearance. | Immediate beauty of a 'complete' and mature landscape. |
| Useability | Low traffic use 2 to 4 months after seeding with faster germinating seed. Normal to high use only after first year. | | Low traffic immediately. Normal, high traffic levels within 2 to 3 weeks. |
| Installation Cost | Lowest cost | Low to mid-level cost | Highest cost |
| Cost vs. Value | Higher management and maintenance costs, compounded by increased water and chemical applications, as well as delay of use, poor uniformity and visually unappealing are trade-offs for lower installation cost. | | Installation costs offset by added values of timing, useability uniformity and visual appeal. Reduced maintenance, chemical and water costs. |

# Turfgrass: The Environmental Sponge

By J. Scott Angle, Associate Professor of Agronomy, University of Maryland, College Park, MD.

## Introduction

Over the past decade, the turfgrass industry has been increasingly criticized as a significant source of pollutants entering the environment. Various articles over the last few years have suggested that the turfgrass industry is one of the greatest polluters of surface and ground water. Since very little research data was available regarding this potential, the industry has been unable to respond to these charges.

Without a complete understanding of the complex nature of turfgrass, and with a lack of research data, it is understandable that various groups may consider turfgrass a significant source of contaminants in the environment. Within the mid-Atlantic region, turfgrass, on an acreage basis, is one of the most important crops in the region. In Maryland, for example, more acres are devoted to turfgrass than any other agricultural crop.

Much of the maintained turfgrass in the region is intensively managed. Application rates of nitrogen, phosphorus and potassium often exceed that which is applied to corn or small grains. Herbicides, insecticides, and fungicides are also used on a routine basis on turfgrass. The use of varied and high rates of pesticides and fertilizers coupled with the large acreage of turfgrass leads many to suggest that turfgrass is an important and significant source of contaminants in the environment.

An understanding of the complex nature of turfgrass and the techniques used for its management suggest that it may not be the source of contaminants in the environment that many believe.

Turfgrass is a rapidly growing crop and has the ability to utilize most of the nutrients applied during establishment and maintenance. With crops such as corn and wheat, more fertilizer and pesticides are applied than can be used at any one time. Significant amounts of these materials can therefore be lost in leaching to ground water or runoff into surface water.

However, fertilizers and pesticides are not applied to turfgrass in a single application as they are with most traditional agricultural crops. Instead, these materials are applied in small, frequent treatments. This metered application, or spoon feeding, greatly increases the efficient use of these chemicals. Little excess is available at any one time to be lost to the environment. Therefore, from a theoretical basis, loss of chemicals, especially fertilizers should be minimal.

***An understanding of the complex nature of turfgrass and the techniques used for its management suggest that it may not be the source of contaminants in the environment that many believe.***

Until very recently, essentially no information was available to support either side of the argument. Much of the information in the popular press over the last few years is simply based upon an author's opinions regarding the environment.

Over the past five years, a number of scientific studies have examined this important question in detail and we are now just beginning to fully understand the impact of turfgrass cultivation on the environment. With this new information, sound and reasonable judgments can be made on the overall impact of turfgrass on the environment. It is also possible to make recommendations that minimize the impact of turfgrass cultivation on the environment.

As we will see, the impact of turfgrass cultivation and maintenance on the environment is significantly less than the cultivation of many traditional agricultural crops (corn, soybeans, wheat). Despite the relatively low impact of turfgrass on the environment, we are not relieved of the responsibility to act in a manner which will protect the environment.

The concept of stewardship requires that we all do what is possible to protect the environment for future generations. Hence, this article will also suggest alternative approaches for the maintenance of turfgrass that will enhance our ability to protect the environment.

***Much of the information in the popular press over the last few years is simply based upon an author's opinions regarding the environment.***

## Current Research

Most of the information published over the last few years on the interaction between turfgrass and the environment has examined fertilizers. The chemistry of fertilizers in the environment is relatively well understood. Much less information is available on the interaction of pesticides applied to turfgrass due to the expensive equipment and analyses required to fund such studies. For this reason, the remainder of this article will focus only on fertilizers applied to turfgrass.

Several studies within our laboratory have demonstrated that the loss in runoff of fertilizer nutrients applied to turfgrass is minimal. For example, a side-by-side comparison of fertilizer losses in runoff from tobacco and turfgrass was examined. Losses from each are presented below:

| Fertilizer Nutrient | Tobacco | Turfgrass |
|---|---|---|
| | —loss in lbs. per year— | |
| Nitrogen | 11.7 | 0.14 |
| Phosphorus | 2.4 | 0.02 |

Reference: *Journal of Environmental Quality*, Vol. 19, p. 663; *Journal of Environmental Quality*, Vol. 20, p. 604.

Similar results have been found when turfgrass is compared with corn, soybeans, and wheat. These findings are not unexpected in that the growth habit of turfgrass prevents runoff from all but the most heavy of rainfall events. The dense, thick and thatchy nature of the turfgrass intercepts rainfall and causes most of the water to infiltrate into the soil. The establishment of grass buffer strips on the lower side of fields is a well-known method for reducing losses of nutrients from agricultural fields. Only under conditions of very heavy rainstorms, and where the slope of the land is moderate to severe, can runoff occur when the area is maintained in properly managed turfgrass.

The lack of runoff from areas cultivated to turfgrass raises a question concerning the fate of the applied fertilizer nutrients. As previously noted, significant quantities of fertilizer nutrients are often applied to

turfgrass. Whenever it rains, water either runs over the soil surface as runoff or it infiltrates into the soil where it ultimately contacts the ground water. Reduced rates of surface runoff are inversely related to increased rates of water infiltration into the soil. It is therefore possible that the increased amount of water infiltrating into and leaching through turfgrass could carry with it significant quantities of the fertilizers applied to the turfgrass.

The potential for leaching of fertilizer nutrients through soil cultivated to turfgrass was investigated in a separate experiment. We established plots on a sandy-type soil and monitored the leaching of nitrates through the soil profile. Nitrogen fertilizer applied to turfgrass is rapidly converted to nitrates and nitrates are water soluble and thus prone to leaching down through the soil. The turfgrass was maintained and fertilized as per management regimes typically used by commercial lawn care companies.

The leaching of nitrates through the soil profile under turfgrass was found to be extremely low. Nitrate concentrations in soil water under turfgrass fertilized with granular and liquid nitrogen sources were compared to unfertilized plots.

Nitrate concentrations in the percolate from the fertilized plots ranged from zero to 3.2 mg nitrate-nitrogen per liter. These concentrations are not substantially different from concentrations found under a nearby hardwood forest, which had never received fertilizer. When compared to other nearby studies in which corn or soybeans were grown, the nitrate concentration under these crops typically ranged from 8 to 12 mg nitrate-nitrogen per liter. Leaching losses of phosphorus from turfgrass was generally undetectable. These results demonstrate that the loss of fertilizer nutrients from turfgrass via leaching is very small compared to other traditional agricultural crops.

The results we have obtained in our field studies at the University of Maryland are in general agreement with studies published from other areas of the country. It is typically observed that when turfgrass is maintained using recommended maintenance programs, losses of fertilizer nutrients are minimal. Leaching and runoff losses of fertilizers do not appear to be a significant concern.

***Most turfgrass sod producers, golf course managers and lawn care companies do not over apply fertilizers since there is an economic disincentive for doing so. Moreover, most commercial companies are aware of the environmental consequences of overapplication.***

### Unanswered Questions

The data, information and conclusions presented above do not apply to pesticides. As previously noted, it is much more difficult to study pesticides compared to fertilizers. Research is currently underway to examine the pesticide—turfgrass interaction, however, wide-ranging conclusions may not be available for several years. Pesticides should, as always, be used on turfgrass with caution and only when absolutely needed. Routine application of pesticides to turfgrass promotes excessive usage. An integrated pest management approach should ideally be followed.

The most important question related to fertilizer nutrients is "Where are the nutrients that are applied to the turfgrass going?" Turfgrass is typically fertilized with relatively high rates of nitrogen. The nitrogen is neither being lost in the runoff nor the leachate. Where is the nitrogen? It is postulated that some of the nitrogen is lost as a gas to the atmosphere. There are several types of biological and chemical reactions that can convert solid nitrogen into nitrogen gasses which are subsequently lost to the atmosphere.

It has been previously established that if nitrogen is applied to turfgrass on a warm, windy day, a significant portion of the nitrogen may volatilize into the atmosphere. Losses to the atmosphere, however, do not account for the total amount of nitrogen applied to the turfgrass. Some of the nitrogen is carried away from the area if the clippings are removed. This practice, however, simply transports the problem from one area to another and therefore is not a true solution to the question.

***The impact of turfgrass cultivation and maintenance on the environment is significantly less than the cultivation of many traditional agricultural crops (corn, soybeans, wheat).***

We suspect that much of the nitrogen which is unaccounted for is tied up in the thatch layer of the turfgrass. Thatch contains a significant amount of nitrogen and may function as a sink for excess fertilizer nutrients added to the turfgrass. This theory has yet to be adequately explored, although there are few other processes or fractions of the turfgrass ecosystem that could account for the storage of excess nitrogen.

The data discussed above assumes that the turfgrass was maintained using recommended programs. Turfgrass maintenance programs are available from most state Agricultural Experiment Stations. We do not know what happens to fertilizer nutrients when they are applied above that which can be assimilated by the turfgrass. Most turfgrass sod producers, golf course managers and lawn care companies do not over apply fertilizers since there is an economic disincentive for doing so. Moreover, most commercial companies are aware of the environmental consequences of overapplication.

Fertilizer application by the homeowner is a different situation. There is essentially no information on practices used by the homeowner. We all know of situations where someone assumed that if one rate is recommended, then twice or triple the recommended application rate must be twice or three times as good. It is certainly possible that homeowners are heavily overapplying fertilizers and thus are a significant source of fertilizer nutrients lost to ground and surface waters. There is an immediate need to assess the practices of the typical homeowner.

### Recommendations

Despite the scientific observations that the cultivation and maintenance of turfgrass— when using recommended

practices— is not a significant source of fertilizer nutrients in ground and surface water, the philosophy of stewardship requires that we do all that is possible to minimize nutrient losses from turfgrass. This may occasionally require compromising or reducing the aesthetic quality of turfgrass. Should we expect that perfect stands of turfgrass be maintained throughout the entire year? Are we obligated to provide perfect turfgrass even when we suspect that a particular practice may have a detrimental effect on the environment?

The obvious answer is that the environment should be protected, but we must convince the homeowner that there is an environmental consequence, however minimal, of maintaining a perfect stand of turf.

The following are a list of recommendations proposed by the author and do not necessarily reflect the recommendations or opinions of the Cooperative Extension Service, University of Maryland.

1 **Many maintenance programs recommend that turfgrass be fertilized in early December.** If the temperature at this time of the year is warm and the turf is actively growing, this is an acceptable practice. In the mid-Atlantic region, however, temperatures are often low enough to cause the turf to become dormant. Hence, when fertilizer is applied to the turfgrass, none of it is used by the crop. Nearly all of the fertilizer applied during this time may be lost in runoff and via leaching through the soil profile. The primary consequence of eliminating a December fertilization is that the turf will be slower to green up in the early spring.

2 **Grass clippings should not be removed.** Removal of clippings only transports the nitrogen to a new location (ie. landfill) where it is likely to create a further environmental problem. Leaving the clippings on the surface will allow fertilizer rates to be adjusted downward since some of the clipping nitrogen can be recycled. Further, it is likely that the presence of thatch in the turf stand has some environmental benefits. While maintenance of a moderate quantity of thatch in turf is not a typical recommended practice, it may have significant environmental implications.

***It is typically observed that when turfgrass is maintained using recommended maintenance programs, loss of fertilizer nutrients are minimal. Leaching and runoff losses of fertilizers do not appear to be a significant concern.***

3 **An early spring application of nitrogen is often recommended as a means to ensure early greenup as soon as temperatures allow for growth.** If the temperature fails to warm on schedule and growth promotion does not occur, most of the fertilizer nitrogen may be lost to ground and surface water. Nitrogen in March or early April should only be added to turfgrass when it is evident that the turf has broken dormancy and started its spring growth.

***Several studies within our laboratory have demonstrated that the loss in runoff of fertilizer nutrients applied to turfgrass are minimal.***

4 **Follow prudent and common sense approaches to fertilizing turfgrass.** Do not apply fertilizer to the sidewalk or street. If fertilizer is accidently applied onto impervious surfaces, sweep the fertilizer back onto the turf. Do not fertilize if heavy rainfall events are anticipated soon after application. This reduces the potential for runoff losses of fertilizers. Use slow release fertilizers where possible. Slow release fertilizers enhance the nutrient use efficiency of the applied fertilizers.

5 **In summary, practice an integrated fertilization approach for the application of nitrogen.** Only apply nitrogen when you are sure that the turf will be capable of efficiently utilizing the nutrients. For example, September droughts in the mid-Atlantic region often keep turfgrass in a summer dormancy stage. Do not automatically fertilize on schedule in September if the turfgrass is still dormant. Although nutrient losses from turfgrass are generally low, it is still in the best interest of the industry to take the lead in protecting the qualilty of the environment. □

*Dr. J. Scott Angle is Professor of Agronomy in the Department of Agronomy, University of Maryland, College Park, MD. His area of specialization is Soil Microbiology and Environmental Quality. He has spent many years as advisor for solving problems related to golf course needs. Dr. Angle spent 1991 on sabbatical leave in England.*

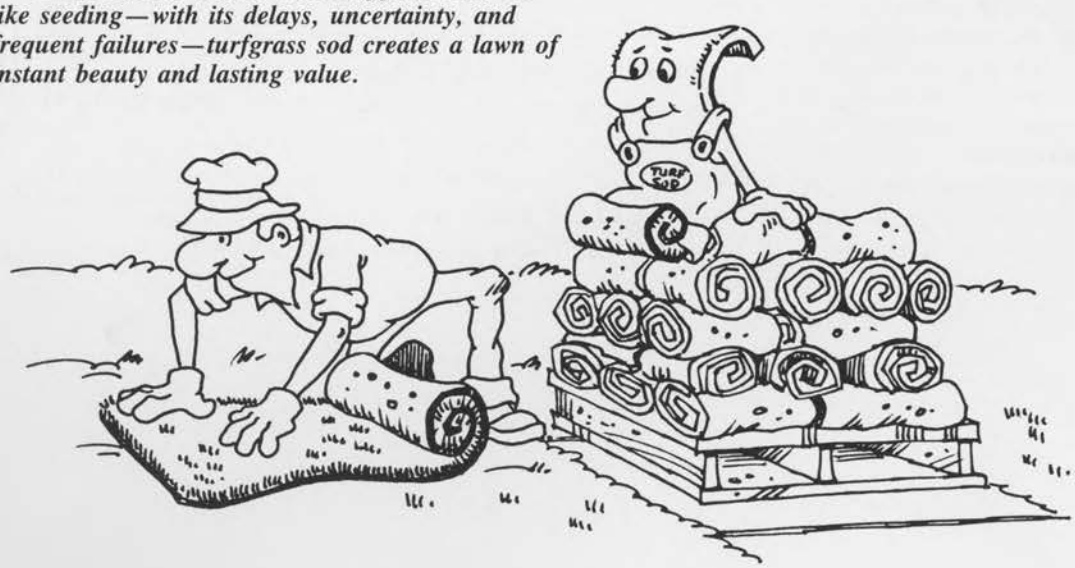
*Trees can take much of the water intended for turfgrass.*

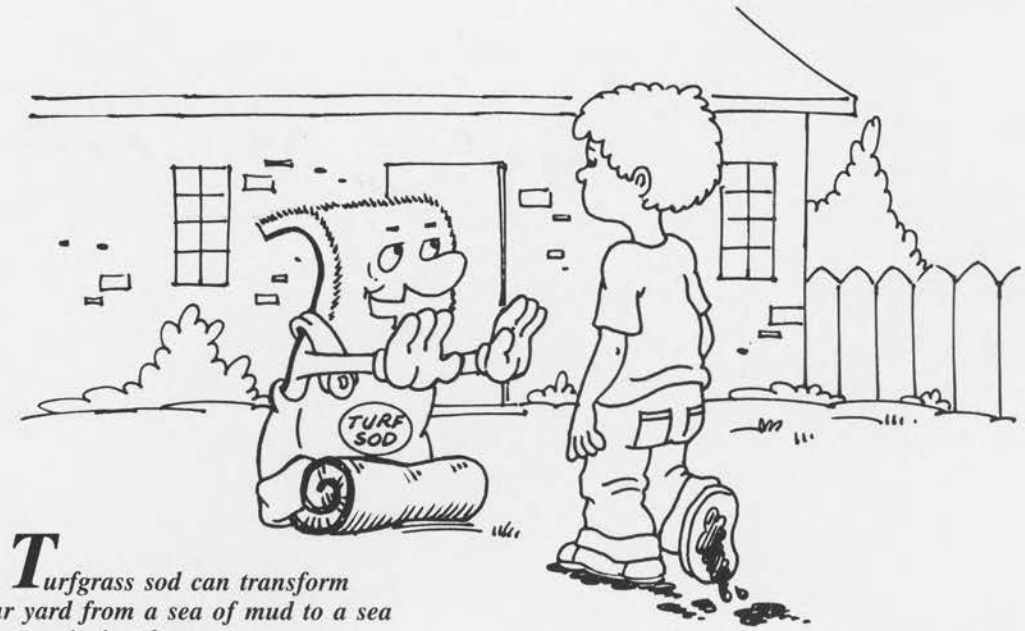
*Too much water can kill the tree.*

*Too little water can kill the turf.*

*Infrequent and deep irrigation will balance the water needs of trees and turf.*

*You can be certain with turfgrass sod. Unlike seeding—with its delays, uncertainty, and frequent failures—turfgrass sod creates a lawn of instant beauty and lasting value.*





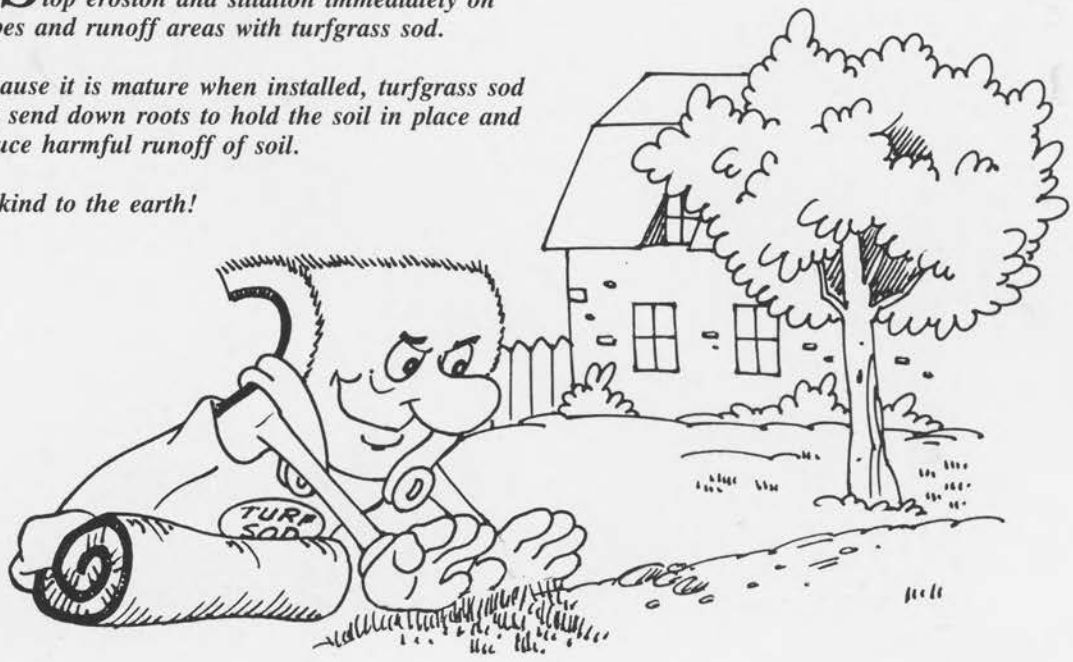

*Turfgrass sod can transform your yard from a sea of mud to a sea of green in just hours.*

*Why wait a year for seeds when sod can solve your yard problem immediately.*

*Stop erosion and siltation immediately on slopes and runoff areas with turfgrass sod.*

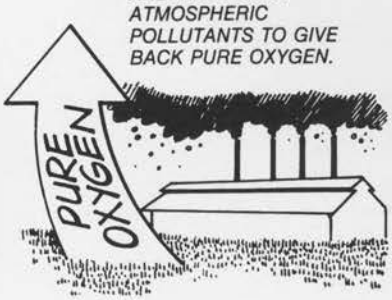
*Because it is mature when installed, turfgrass sod will send down roots to hold the soil in place and reduce harmful runoff of soil.*

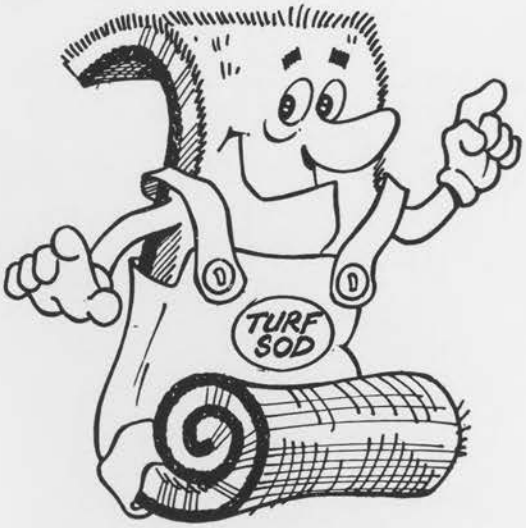
*Be kind to the earth!*



# Illustrations and Clip Art

*GRASS BLADES TAKE IN CARBON DIOXIDE AND THE WORST ATMOSPHERIC POLLUTANTS TO GIVE BACK PURE OXYGEN.*

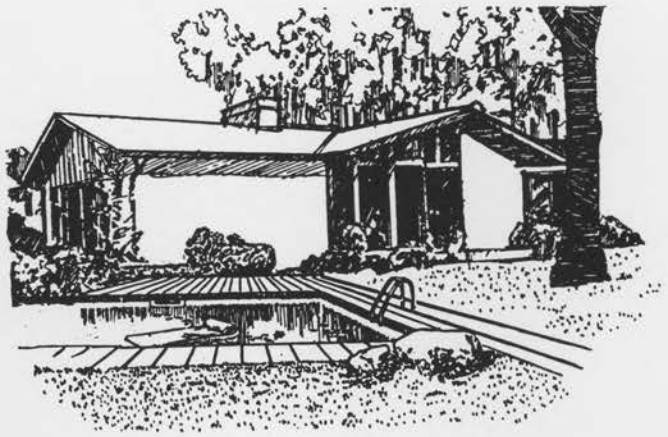


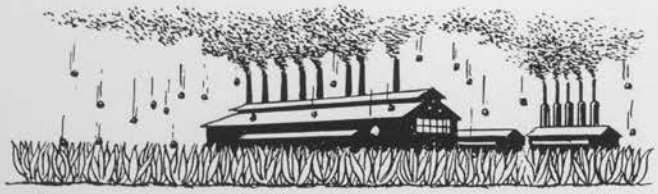





*TURFGRASS TRAPS CHEMICAL AND PARTICULATE AIR POLLUTANTS, AND CONVERTS NOXIOUS GASES TO CLEAN OXYGEN.*


**With up to 90% of the weight of a grass plant in its roots, it makes a very efficient erosion prevention device, also removing soil particles from silty water.**





**Turgrasses trap much of an estimated 12 million tons of dust and dirt released annually into the U.S. atmosphere.**

**The following organizations endorse the environmental educational efforts of the American Sod Producers Association.**

**American Society of Landscape Architects**
**Associated Landscape Contractors of America**
**Georgia Golf Course Superintendents Association**
**International Society of Arboriculture**
**Irrigation Association**
**National Arborist Association**
**National Turfgrass Council (of England)**
**Professional Grounds Management Society**
**Professional Lawn Care Association of America**
**The Lawn Institute**

American Sod Producers Association
1855-A Hicks Road
Rolling Meadows, IL 60008