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JULY 1989

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LAWN  
INSTITUTE



# Harvests

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Volume 36 Number 2

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## THE HARVEST MIX

The lead article, "The Fun Side of a Lawn", is in verse and includes highlights of the "Landscape" series. Educating children about the lawn is an important part of learning.

"New Turfgrass Variety Cost" contains figures that help us appreciate the real value of new cultivars. "Dear Lawn Institute" tells of some of our experiences with homeowners. "In Balance With Nature" is a realistic piece about pesticide use. Three book reviews are included. Six topics from Conferences cover overseeding, work place politics and fertilization. An update on benefits material offers additional ideas.

"For A Healthier Lawn Promote a Biologically Active Soil" emphasizes the interaction between grass plants and the soil. "In the Beginning" is a humorous look at today's regulations.



# The Fun Side of A Lawn



by

Beverly C Roberts

Ben lives in one of our northern states.  
He enjoys hikes and games with his playmates.  
When spring comes to the wetlands  
He listens to frog and insect bands.  
The yard must be asleep, but he didn't hear snoring.  
Grass plants are pretty and soft, but at first they seem boring.

The yard and playing field when covered by grass  
Make safe places to play and look first class.  
The plants don't make noise but their world is exciting  
So much going on, these places really are bustling.



One day Ben fell down in his backyard  
and was face down, not looking skyward.  
At first he saw the grass all green  
and started to count leaves - two thousand fifteen.  
So many plants all in one little place  
Where he and friends like to play and race.

Do tiny little plants have names?  
And, are they all the very same?  
Ben began to have so many questions  
and to the yard he gave his thoughts and attention.

In the region where Ben and his family reside  
There are ryes, fescues and bents side by side  
With another grass - good old Kentucky blue  
Which spreads and heals quickly for top value.

Down south Carrie's yard is also green.  
It is as neat as ever you've seen.  
The plants on which she plays games  
Must also have various and sundry names.  
Bermuda, zoysia, and centipede sound odd,  
St Augustine and bahia also form sod.

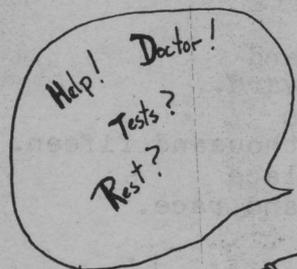
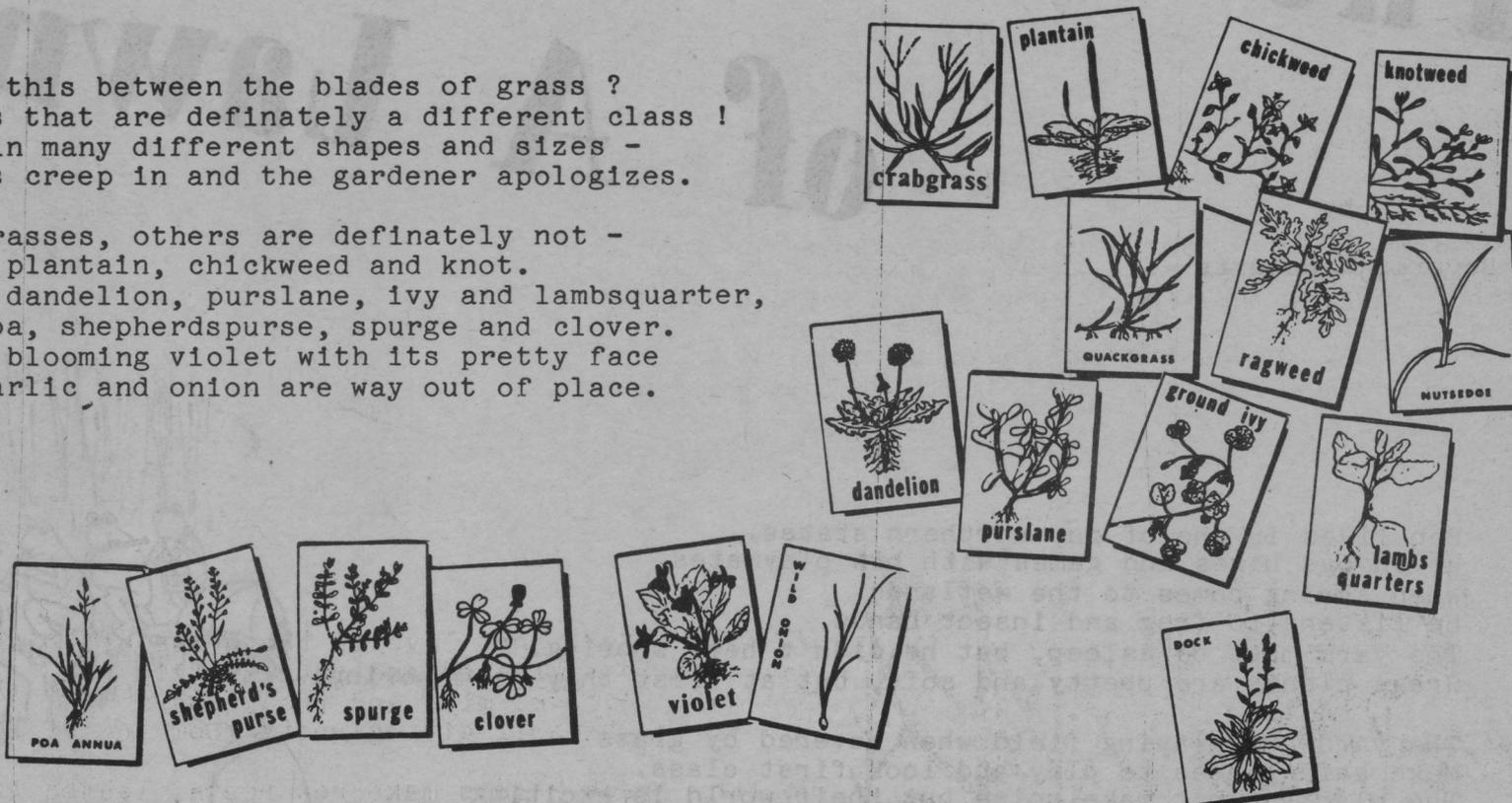
One single grass plant produces 375 miles of roots  
That's as long as the distance from Chicago to Duluth!  
These roots of a lawn get the food for the plant  
From the soil which is their gourmet restaurant.  
Carbon, nitrogen, potassium phosphorus and iron  
Are delicacies like a coconut bon bon.



# The Fun Side cont

But what's this between the blades of grass ?  
Some plants that are definately a different class !  
They come in many different shapes and sizes -  
These weeds creep in and the gardener apologizes.

Some are grasses, others are definately not -  
Crabgrass, plantain, chickweed and knot.  
There are dandelion, purslane, ivy and lambsquarter,  
And also Poa, shepherdspurse, spurge and clover.  
The spring blooming violet with its pretty face  
and wild garlic and onion are way out of place.



Weeds can't get started in turf that is dense;  
Good health is the grass plants first defense.  
The little grass plants must be all run down  
Quick call a grass doctor to examine its crown !  
Why is the little plant so straggly and thin ?  
What is the reason that it is all done in ?

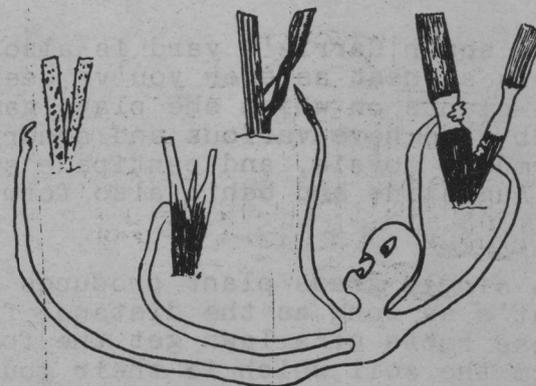
Is it infected with disease or burned by manure ?  
Was it hurt by an insect or too much moisture ?  
Maybe the weather recently got too hot or too cold ?  
For some reason the grass is acting very old !

What ? Before medicine can be given there have to be tests ?  
Soil tests and weed tests and the plenty of rest.  
The doctor will help with a detailed diagnosis,  
Then we'll follow through and solve this weed crisis.

Let's take a walk over there - no weeds are in sight,  
But look at the brown spots ! It must be a blight !  
Call the doctor again - do you think it's a measles ?  
Those plants are in pain and really look awful.  
A fungus among us has attacked in full force.  
To our grassed yard this can mean a great loss !

What are the diseases these fungi produce ?  
Let's take a moment these villains to introduce:  
There are blights, fairy ring, rusts and a blotch;  
Also red thread and mold, the wilts and the spot;  
Then there's melting out, the patches and mildew;  
And slime mold is part of the destruction crew.

By the time the disease is found and the "i"s in their names dotted,  
The damage to the grass plants has made them all spotted.  
The doctor can't doctor; the medicine is too late;  
The grass will need loving care to recuperate.



# The Fun Side cont

Look down in here, something is definately moving.  
 In the leaves and the soil, creatures are dwelling !  
 Some are real cute and others are like dragons -  
 Shapes can be found like buttons and ribbons.  
 Some of these animals help make the soil better,  
 Like earthworms tunneling avenues for air and for water.



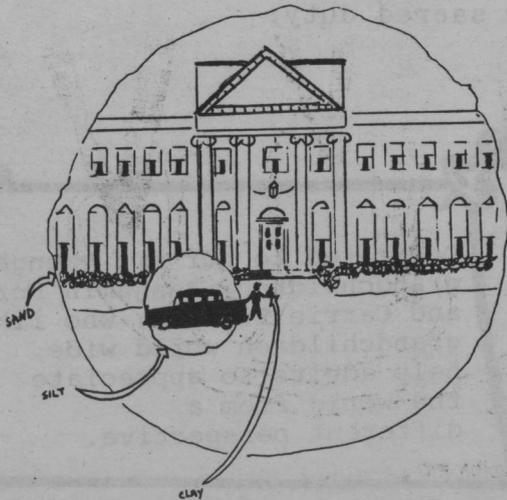
But some of the insects use grass plants for food -  
 It is important to balance the bad and the good.  
 Ants, chafers, beetles, crickets and hoppers,  
 And weevils, scale, billbugs and spiders;  
 Also flies, various worms, mites and hoppers  
 That live in the lawns where the kids play soccer.



Other critters that live in the grass are bigger than bugs  
 And seem to feel safe and snug in this rug.  
 The moles, voles, mice and the gophers  
 Burrow in the soil giving roots room to get greater.

Healthy grass plants make new roots, leaves and stems  
 So some nibbles here and there are not usually problems.  
 But given a chance, the numbers grow big  
 And insect armies chomp, and suck and dig  
 Until the little grass plants give up in defeat,  
 Then starting a yard again is quite a feat.

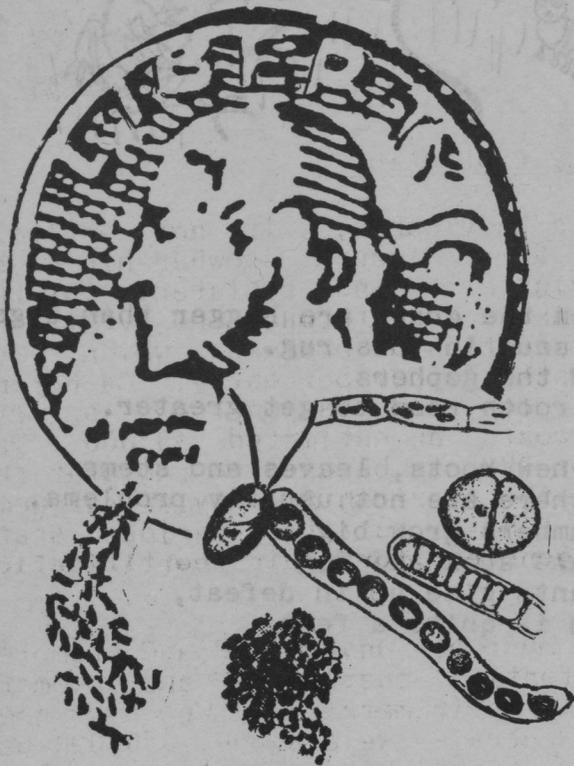
Carrie had time to ponder and took another look.  
 How does a grass plant stand with not even one foot ?  
 She dug in the dirt and saw there were roots,  
 So about shoes and socks they didn't give a hoot.  
 The dirt isn't dirt, it is a busy living soil  
 That holds the roots firm so they won't uncoil.



Imagine, Carrie and Ben, the difference in the size  
 By comparing soil particles with things that we prize.  
 Let the White House represent a grain of SAND;  
 Then the particle of SILT to a limosine expand;  
 The CLAY particle would be as small as a fruit  
 The chauffeur pulls from the pocket of his suit.

# The Fun Side cont

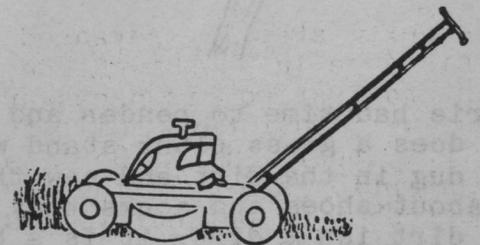
The particles vary in size from little to tiny, tiny.  
Some of them are dull looking and others are shiny.  
Carrie and Ben took a pound of sand and counted -  
Two million five hundred thousand when she ended !  
The clay and the silt would be billions and trillions,  
To count each particle, they voiced their objections !



The soil, like a miniature zoo, is filled with small critters  
That eat up the dead stuff and spit out humus helter skelter.  
This humus builds the soil up so the grass plants grow better  
Along with the sunshine, and air and of course some water.  
Amoeba change shape as they move all around  
Protozoa are microscopic animals that wiggle in the ground.

Acinomyctes and fungi are others we cannot see  
Mostly there are bacteria but there are also algae.  
Millions are in a space the size of a quarter.  
They work free of charge and don't even use a platter.  
Too many chemicals can kill them right off  
So feeding them slowly is the key to be sought.

Grass is the only plant we cut every week.  
This makes it a lawn that is soft and neat.  
But longer leaves can make more food for its livelihood.  
By raising the mower up just 1/8 inch could  
Help the lawn become healthy and strong  
Like adding one leaf 5 feet high and 50 feet long.



Ben and Carrie walked around in bare feet.  
The grass blades tickle and smell so sweet.  
These little plants make places of beauty,  
To care for them properly is our sacred duty.



Dedicated to our two younger grandchildren, Benjamin Ford and Carrie Roberts, who like grandchildren world wide, help adults to appreciate the world from a different perspective.

## NEW TURFGRASS VARIETY COST

by

Arden Jacklin  
Jacklin Seed Company



Most people, including myself at times, have no conception of what it costs to develop, test and introduce a new variety of turfgrass. My figures here are mostly based on Kentucky bluegrass, as this is the kind with which I am most familiar.

Let's start with a new selection or a new hybrid which has passed the first screening and is ready for more extensive testing. That first screening costs about \$500 for each entry. Of all entries, about 10% pass the first screening. So, we start with a \$5,000 cost on each entry which does not include the cost for getting it.

### Two-Thirds Fail

Preliminary testing for turf quality and seed producing ability in our plots runs about \$4,000 per accession. A fair appraisal shows about two-thirds of the accessions fail in this test. So the investment in this test is \$12,000.

The next step is advanced turf and disease resistance in both western and eastern US. Eastern testing is necessary because in the West we don't have all the diseases that affect turf in the largest [eastern] consumption area. These tests will cost about \$5,000 per entry. Assuming an average of two-thirds will fail to show promise, we come up with \$15,000 per successful accession.

### National Testing Important

So far, it's only our word that it's a good or superior variety. Therefore, it's necessary to give it wider and more open public testing in the National Variety Testing trials which involve some 30 testing sites. The charge is \$1,800 for a 3-year test. In our experience about one-third will fail, generating a cost of \$2,700 per accession. At this point, still an experimental number yet to be registered as a named variety, we have a total investment of \$34,700 in it.

It is now time to produce breeder seed from which foundation will be produced. Breeder seed fields or plots are small, requiring much work at high cost. An arbitrary cost well above what the seed can be resold for or charged out is about \$4,000.

### Plant Variety Protection

Next it is advisable, if not entirely necessary, to "insure" ownership by protecting rights to and registering of the variety. This is done through the PVP [Plant Variety Protection] process which for bluegrass costs \$2,000 per entry. Gathering information for submission on a PVP application costs an estimated \$3,000. The same data for PVP can be used to register the variety with the American Society of Agronomy and provide data to the various state certifying agencies for their certification standards.

The variety must be advertised and promoted to get potential customers and promote themselves in their markets. We have good cost figures here. We average \$30,000 per variety for first-year promotion, which includes magazines, in-house publications, convention displays, advertising brochures and favors.

### A Whopping Total

The grand total is \$73,700. That's a lot of money! To back up or justify that kind of investment requires an ongoing, aggressive marketing setup to reclaim it. Not too many companies will take the gamble, and it practically rules out public agency releases. Conversely, when an accession succeeds and is properly marketed, it becomes a valuable asset.

The foregoing does not include the "ability to do the job" in terms of technical know-how, knowledgeable personnel at each level of development and suitable land sites. Also required are small lot seed processing equipment and plot machinery. Obviously a development program for more than one, or even a few varieties, must operate on a continuing basis for reclaiming costs.

The time frame to go through the foregoing process averages about ten years.

- Source: Grass Clippings  
[Jacklin Seed Company]

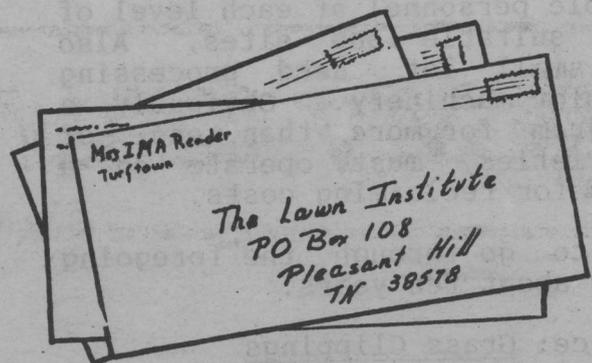
# Dear Lawn Institute...



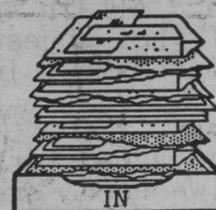
Hundreds of letters from home gardeners come into The Lawn Institute office along with self-addressed stamped envelopes requesting information on care of lawns. These are in response to articles by garden writers that are based on information from our Press Kits. Many writers note: For more information get in touch with The Lawn Institute.

It would be interesting to do an "Andy Rooney" type study on the numerous ways the public asks for information. The requests come in a wide variety of envelopes - the greeting card type [greeting card must have been misplaced], company envelopes with the firm's name crossed out, window envelopes made for invoices and bills with a piece of paper taped to the window, and on and on.

The requests themselves take on all sorts of forms. The efficient ones just put a few words on the envelope denoting what they want. Others have cute memo paper on which the request is written. Business memo forms are common [with all copies still attached]. The other extreme is the lengthy letter, some with a picture of the property. Whatever the form of the request, we place the appropriate sheets in the envelopes and mail them back, usually by return mail.



On opening these letters from all across the country, we have been impressed by the deep feeling that most home gardeners have for their lawns. The concern is so great, it is almost as if the lawn were a beloved pet. When a brown spot appears, or there isn't enough water to keep the grass green all summer, or the soil is rocky, or there are weeds present or any number of other problems appear, the concern expressed is sincere. The question is: "How can I do better?"



Diagnosing lawn conditions from long distance with uncertain details is not easy. A weed sample, long dead, is usually not in good condition for identification. Often we advise contacting a local Cooperative Extension Specialist or Horticultural Consultant. The sheets we send are intended to be just a beginning in the problem solving process.

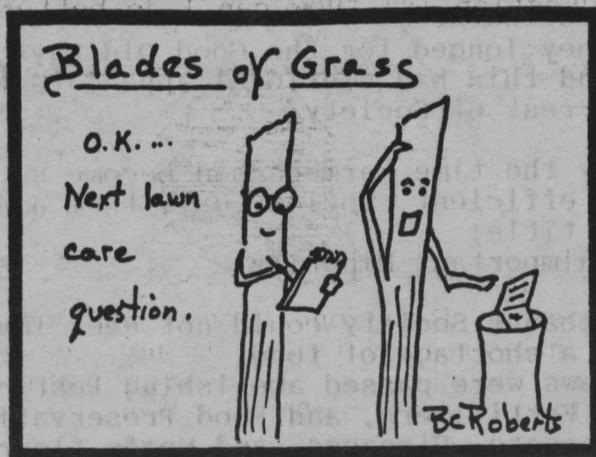
The media has headlined the dangers of pesticides and in response to this there have been many requests for "organic" lawn care information. It is difficult to explain that approved pesticides for turf used properly with proper equipment will not impose undue risks. However, many home gardeners tell us that they have used many different chemicals to treat "brown spots" on the lawn and this is of concern. The implication is clear - faulty diagnosis is leading to the over use of pesticides. The spot may have been caused by a dog passing through but a pesticide is used for a cure. Timing is most important in using chemicals. This is not understood or adhered to in many instances. We try to encourage these concerned home gardeners to have trained specialists handle chemicals for them.

# Dear Lawn Institute... CONTINUED

Requests for cultivars for specific areas are filled with Lawn Institute Special Topic Sheets [LISTS] that describe the new named varieties. The only real challenge comes from states like California which have varying climates within a relatively few miles. Home gardeners are excited about the new improved cultivars and are anxious to be able to purchase these locally. Many cultivars are not marketed in all locations and in years when supplies are short, it is discouraging not to be able to find "the" number one choice. There are many old lawns still serving their purpose that really need to be renovated and the newer cultivars planted.

Gardeners who have moved from the northern, cool, humid zone are used to a type of lawn that is not available in the transition zone or south. Letters come in asking for all kinds of information about lawn care in their new locale. Northerners are used to renovating small areas with seed and so the new seeded bermudagrasses will help meet this need in the south.

Often when writers call The Lawn Institute for background information on articles they are writing, they ask if there is a continuing interest in lawns. My answer is a resounding "YES" based on such letters as the one above. A full time person could easily be kept busy answering all the calls for help.



The retired gardener often tells about time being available to tend the lawn but finances are tight and strength waning. The interest in having a nice lawn is still present. First time home owners are especially enthusiastic about their "first lawn" and want every detail on what to do when. This new experience can be very exciting.

Lawns have come a long way from the areas cropped by sheep dating back to the dynasties of China and the benefits were recognized even then by the wealthy. Today most gardeners are interested in and can have a lawn which serves as a beautiful background for other landscaping and buildings. The lawn adds value to a property. It also has therapeutic to the tender. The lawn keeps precious soil in place, helps clean the air, cools the area, retards fire, increases infiltration of water and cleans the water as it passes through to recharge underground water supplies. Grass plants absorb noise and glare. A thick turf is a safer place for play as it cushions falls and it stays in place for surer footing. No other surface feels as good on bare feet as turfgrass. It is no wonder that people love their lawns as these tiny turfgrasses give so many benefits to us all.

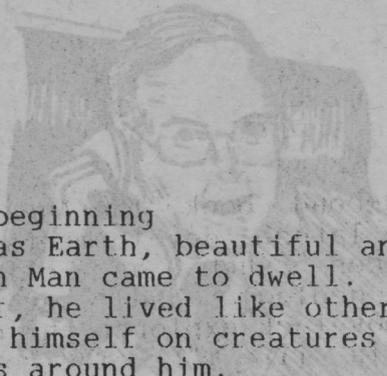
One example of a letter "Dear Lawn Institute: With sincere gratitude upon all the wonderful information you sent, let me thank you. How very kind of you! I'll make use of the seed information; however, my main problem is several brown spots. What do you think they might be? I have worked hard to have a nice lawn but these brown areas detract from the picture. A map showing our area and a picture of our lawn are enclosed. Thank you again, Sincerely, California".



# In Balance

## With Nature

Dr John Carew  
Department of Horticulture  
Michigan State University



In the beginning  
There was Earth, beautiful and wild;  
And then Man came to dwell.  
At first, he lived like other animals  
Feeding himself on creatures and  
plants around him.  
And this was called IN BALANCE WITH  
NATURE.

Soon Man multiplied.  
He grew tired of ceaseless hunting  
for food:  
He built homes and villages  
Wild plants and animals were  
domesticated.  
Some men became Farmers so that others  
might become Industrialists, Artists  
or Doctors  
And this was called Society.

Man and Society progressed.  
With his God-given ingenuity, Man  
learned to feed, clothe, protect  
and transport himself more  
efficiently so that he might  
enjoy life.  
He built cars, houses on top of  
each other, and nylon.  
And life was more enjoyable.

The men called Farmers became efficient.  
A single farmer grew food for 45  
Industrialists, Artists and Doctors  
and Writers, Engineers and Teachers  
as well.  
To protect his crops and animals, the  
Farmer used substances to repel or  
destroy Insects, Diseases and Weeds.

These were called Pesticides.  
Similar substances were used by Doctors  
to protect humans.  
These were called Medicine.  
The Age of Science had arrived, and with  
it came a better diet and longer,  
happier lives for more members of  
Society.

Soon it came to pass  
That certain well-fed members of Society  
Disapproved of the Farmer using Science.

They spoke harshly of his techniques for  
feeding, protecting, and preserving  
plants and animals.  
They deplored his upsetting the Balance  
of Nature;  
They longed for the Good Old Days.  
And this had emotional appeal to the  
rest of Society.

By the time Farmers had become so  
efficient, Society gave them a new  
title:  
Unimportant Minority.

Because Society could not ever imagine  
a shortage of food.  
Laws were passed abolishing Pesticides,  
Fertilizers, and Food Preservatives.  
Insects, Diseases, and Weeds flourished.  
Crops and animals died.  
Food became scarce.

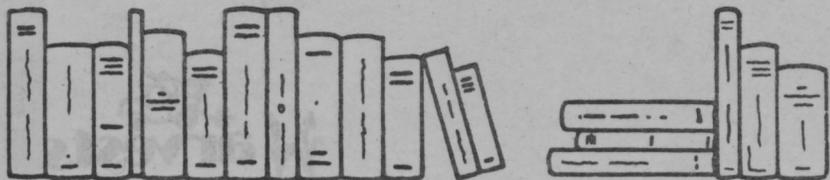
To survive, Industrialists, Artists and  
Doctors were forced to grow their own  
food.  
They were not very efficient.

People and governments fought wars to  
gain more agricultural land.

Millions of people were exterminated.

The remaining few lived like animals,  
Feeding themselves on creatures and  
plants around them.  
And this was called IN BALANCE WITH  
NATURE.

- Reprinted from Fieldman News  
Arizona Agricultural Chemical  
Association, June 1988 issue



## THE AGES OF GAIA

### A Biography of Our Living Earth

James Lovelock, PhD  
The Commonwealth Fund Book Program  
Lewis Thomas, Ed  
W W Norton & Co, NY  
1988  
252 pp

James Lovelock has spent nearly 20 years researching to discover Gaia, the largest living organism. [Gaia is the name the Greeks gave to the Earth Goddess.] In 1979 Dr Lovelock published his first book, Gaia: A new look at life on Earth, [Oxford University Press]. This was the first presentation of his theory that Earth and the organisms inhabiting this planet have evolved as a single system. Lovelock's background with PhD in medicine, teacher at Yale and Baylor University College of Medicine, and as a Rockefeller Fellow at Harvard, Fellow of the Royal Society, London, President of Marine Biology Association and now an independent scientist working from a small farm in Cornwall, England has led to his proposal that a new profession of planetary medicine, with "geophysiology" as its basis, may be needed. The "oath" would be to "prevent the overzealous from applying a cure that would do more harm than good."

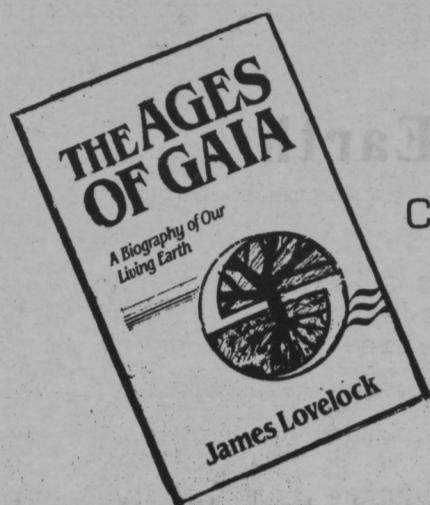
While working with the Jet Propulsion Laboratory to find if there was life on other planets, he started to form thoughts which developed into the Gaia hypothesis. "Gaia theory forces a planetary perspective. It is the health of the planet that matters, not that of some individual species. This is where Gaia and the environmental movements, which are concerned first with the health of people, part company". "In Gaia we are just another species".

Dr Lovelock's second book "The Ages of Gaia" synthesizes the latest developments of many separate sciences such as climatology, geochemistry, geology and evolutionary biology. Dr Lovelock explores the difficult question "What is life?" The composition of the atmosphere is reviewed in some detail. A scheme described as Daisyworld was devised to reduce the complexity of life and its environment to a model which, without distortion, is simple enough to enlighten us and to show that the theory of Gaia is not teleological [one of the strongest criticisms of his first book].

So, what is Gaia? "If the real world we inhabit is self-regulating in the manner of Daisyworld, and if the climate and environment we enjoy and freely exploit is a consequence of an automatic, but not purposeful, goal-seeking system, then Gaia is the largest manifestation of life."

Dr Lovelock traces the evolution of the Earth and its population of organisms starting with the Archean period, which continued from Earth's assembly 4.5 eons ago to when oxygen first dominated the chemistry of the atmosphere 2.5 eons ago. [An eon represents a thousand million years]. During the Archean period, the Earth's population was wholly bacteria. Then between the Archean period and Proterozoic [0.57 to 2.5 eons ago], oxygen appeared as the dominant gas in the atmosphere. This allowed the development of oxygen-using organisms and many changes in the environment.

In the Phanerozoic period from 600 million years ago to the present, large, soft-bodied cell communities developed which changed the environment drastically. The evolution of these organisms and their environment as "a single and inseparable process" shows that when the dominant species change, this is accompanied by a major shift in the environment.



Continued

Today, we foul the air with smog from our cars and from other processes. Very few of us do not contribute to the demolition of the natural environment but step aside from any responsibility and place the blame on modern technology. "The environment has never been so uncomfortable as to threaten the extinction of life on Earth, but during times of abrupt change, the resident species have suffered catastrophe on such scale as to make a total nuclear war seem, by comparison, as trivial as a summer breeze is to a hurricane. We are ourselves a product of one such catastrophe. Could it be that we are unwittingly precipitating another punctuation that will alter the environment to suit our successors?"

In a chapter "The Second Home", Dr Lovelock discusses what would be needed to make Mars a fit home for life. "God and Gaia" is the title of a chapter in which the author explores his belief that "living itself is a religious experience". The very thought of a living entity, Earth, should make it seem, at least on happy days, in the right places, as if the whole planet were celebrating a sacred ceremony. "We have lost the instinctive understanding of what life is and of our place within Gaia".

In the Epilog, the author finds that there "seems that there is no prescription for living with Gaia, only consequences". He describes the destruction of the English countryside that has resulted from making farming more efficient. "Gaia is not purposefully antihuman, but so long as we continue to change the global environment against her preferences, we encourage our replacement with a more environmentally seemly species.."

Dr Lovelock also discusses the following:

- What will the effect be of removing the forests from the Amazon region?
- Is the carbon dioxide regulation system nearing the end of its capacity?
- Pollution by acid rain is a matter of dosage. It is unwelcome when the land on which it falls is already acid. Why are populations of phytoplankton, which emit dimethyl sulfide at a rate comparable to emissions of sulfur from industry, growing?
- Is the carbon dioxide greenhouse effect potentially more serious than ozone depletion?
- Is the media and hype about certain environmental issues diverting us from more serious problems in Gaia?

Some provocative statements [out of context]:

"The health of the Earth is most threatened by major changes in natural ecosystems. Agriculture, forestry and to a lesser extent fishing, are seen as the most serious sources of this kind of damage with the inexorable increase of the greenhouse gases, carbon dioxide, methane, and several others..."

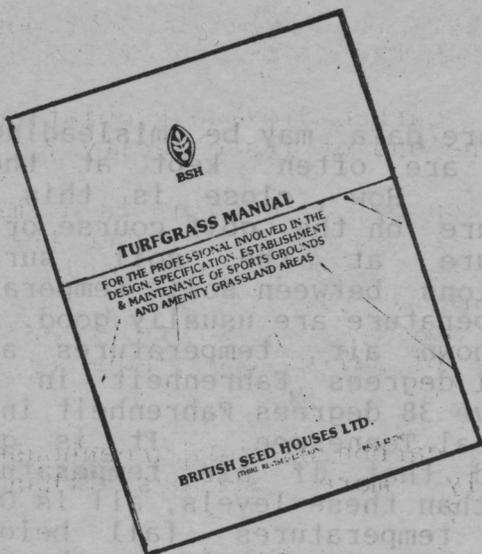
"As for what seems to be the greatest concern, nuclear radiation, fearful though it is to individual humans is to Gaia a minor affair." "We are so used to thinking of radioactivity as artificial that we easily ignore the fact that we ourselves are naturally radioactive."

"Much more probably, 'Earth's fragile shield' is a myth. The ozone layer certainly exists today but it is a flight of fancy to believe that its presence is essential for life."

"Breathing is fifty times more dangerous than the sum total of radiation we normally receive from all sources."

"It is a planet where life does not just adapt to the Earth it finds itself on, but also adapts the Earth to make it and keep it a home".

Editor's Note: The concept of Gaia - a living entity Earth is worth our thoughtful consideration. We are inclined to measure the value of all issues on a scale that places humankind at the top. World population continues to increase and we aspire for a higher standard of living for all. In the process, natural resources are exploited. We are not much of a threat to Gaia, only to ourselves.



**TURFGRASS MANUAL**  
Third Revised Edition  
British Seed Houses Ltd  
Portview Road  
Avonmouth  
Bristol BS11 9JH  
England  
Price: £3.75p

This manual is for the professional involved in the design, specification, establishment and maintenance of sports grounds and amenity grassland areas. It gives a valuable broad view of many situations in which reliable seed is the starting point for good management. Guidelines as well as specifics are given in the following areas: low maintenance; seeded turf production; fungal diseases in turf; lawn management; the bowling green; cricket grounds; tennis court management; hockey pitch turf management; racecourse management; coastal restoration; road verge & housing estates; reclamation of derelict land. Chapters are also devoted to tree seeds; wild flora; method of seed certification; specification & tender for seed; grass species; and other helpful information.

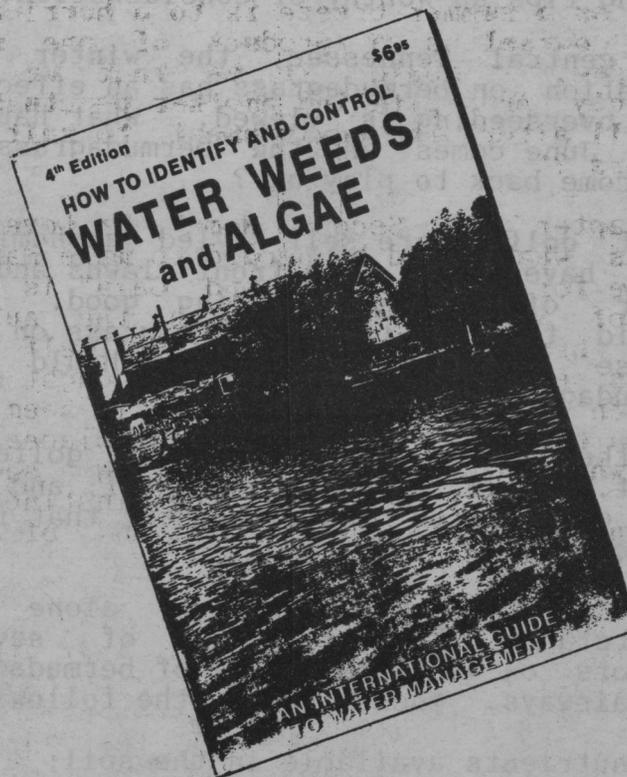
In this booklet the British Seed Houses have put together the experience and knowledge of their staff in a convenient form.

SOUTHERN TURFGRASS ASSOCIATION CONFERENCE AND SHOW

### HOW TO IDENTIFY AND CONTROL WATER WEEDS AND ALGAE

Edited by James C Schmidt  
Applied Biochemists Inc  
5300 West County Line Road  
Mequon WI 53092  
1987  
108 pp \$6.95

The text presents information on the identification and control of water weeds and algae. Colored pictures and written descriptions help identify troublesome plants. Products and dosages for control of specific species are given. Sections on lake and pond management, pond construction considerations, understanding water quality and fish management, managing animal pests, preventative maintenance, check-list, professional lake and pond management services are included.



# Conference Topics

## SOUTHERN TURFGRASS ASSOCIATION CONFERENCE AND SHOW

Nashville Tennessee  
November 17-19, 1985

### OVERSEEDING —

### FAIRWAYS

David Green  
Turf Consultant [former superintendent  
Belle Meade Country Club]  
Nashville, Tennessee

Overseeding golf course fairways is important in middle Tennessee. David Green lists the following tips as worthy of consideration.

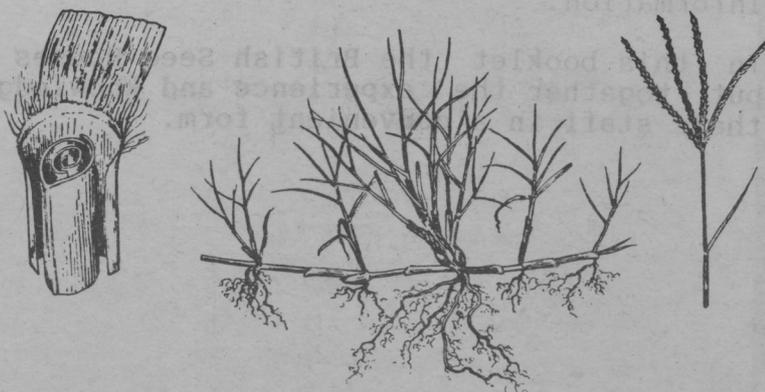
- In central Tennessee, the winter kill situation on bermudagrass has an effect on how overseeding is viewed. What happens when June comes and the bermudagrass has not come back to play on ?
- Most golfers are self-styled agronomists. They have homes with front lawns and see their office lawn looking good. Why should there be trouble with grass on golf course fairways ? Why should the bermudagrass be dead ?
- At these times, the professional golfer is upset. Club managers are upset; and it's the golf course superintendent that feels the crunch.
- It is the superintendent alone that understands the influence of several factors on winter survival of bermudagrass on fairways. These include the following:
  - nutrients available in the soil;
  - moisture in the soil;
  - oxygen in the soil;
  - turf diseases;
  - soil compaction from traffic;
  - climatic variables;
  - mowing practices;
  - turf insects.

- Temperature data may be misleading as the records are often kept at the local airport. How close is this to air temperature on the golf course or to soil temperature at the soil surface ? Correlations between soil temperature and air temperature are usually good. Records have shown air temperatures averaging above 41 degrees Fahrenheit in December and above 38 degrees Fahrenheit in January in central Tennessee. It is generally concluded that if air temperatures are warmer than these levels, all is OK. But, if air temperatures fall below these levels, there is likely to be trouble.

- When the December temperature is 4 degrees Fahrenheit colder than normal and the January temperature is 14 degrees Fahrenheit colder than normal, the result is 80 percent winter kill of bermudagrass. Actually, winter kill can be predicted by looking at average temperature records and comparing these with actual temperature at the time.

- Some how the superintendent needs to look ahead and predict the probability of having temperatures sufficiently low to cause winter kill. If this is a winter kill year, then there is a need to overseed so there is something there to play on in the spring.

- What grasses are best for overseeding fairways ? First, start with the most cold tolerant bermudagrass. Midiron will make a fairway about as cold tolerant as it can be. Have it row planted in late spring so that it is well established by the end of the summer. This will provide good top and shoot growth as well as root growth that can withstand the overseeding practice using cool season grasses.



# Conference Topics CONTINUED

- What are the steps in overseeding ?

- In September, sweep to get the bermudagrass to stand up;

- Seed a blend of Delray perennial ryegrass and Pennfine perennial ryegrass using 50 percent of each;

- Seed at a rate of 225 to 250 pounds per acre [about 5 pounds per 1,000 square feet];

- With a rotary seeder, seed is thrown some 15 feet so that there are 10 to 11 seeds per square inch;

- Seed half the seed in one direction and half in another;

- Some seed may be drilled into the soil;

- Water as necessary to obtain rapid germination and establishment;

- At the time of seeding, the bermudagrass should have about one inch of growth;

- Turf will likely look poorer in October and November than in the spring.

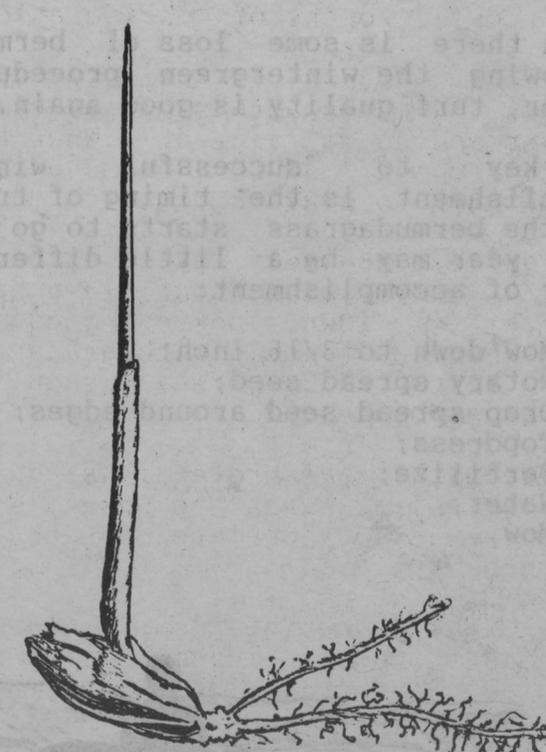
- Poa annua can be a problem as the perennial ryegrass is coming in. Use Prograss herbicide for annual bluegrass in bermudagrass. This has been applied in mid-November with good results.

- When winter kill of bermudagrass occurs, the ryegrass is used to camouflage the dead bermudagrass. In one sense, this is just a tool to help get us through the effects of an exceptionally cold cycle.

- Transition from ryegrass to bermudagrass is always a concern. Seeding at 225 to 250 pounds per acre helps make transition back to bermudagrass less of a problem. Ryegrass has not caused a higher rate of bermudagrass winter kill.



- Aerification of the fairways helps to encourage the bermudagrass to come on strong. Slicers also help in this process. It may be good to blow off the debris.
- Summer maintenance of perennial ryegrass fairways is not intended. If this should be necessary, use fungicides, hold back on nitrogen fertilizer and clip higher than normal. Thirty acres of fairways have been sprayed with fungicides in a 3 hour period.
- In overseeding of fairways, there are always inherent complexities and uncertainties. They have to be handled though on-the-job experience with overseeding. There are no simple or easy answers.



# Conference Topics CONTINUED

## OVERSEEDING — TEMPORARY GREENS

Al Davis, Superintendent  
Ridgeway Country Club  
Memphis, Tennessee

Al Davis has outlined steps he feels are important in overseeding temporary greens in western Tennessee.

- Wintergreen is a process of improving color and playability of golf course tees and greens.
- Mixtures of perennial ryegrasses and Kentucky bluegrasses are seeded at rates of 20 to 25 pounds per 1,000 square feet.
- Seeded areas are topdressed and irrigated.
- When the grass reaches a one inch height, it is cut to 1/2 inch and then down to 1/4 inch.
- Disease control is important.
- One pound of nitrogen per month is considered optimum fertilization.

- Often there is some loss of bermudagrass following the wintergreen procedure. By summer, turf quality is good again.

- The key to successful wintergreen establishment is the timing of treatments as the bermudagrass starts to go dormant. Each year may be a little different. In order of accomplishment:

- Mow down to 3/16 inch;
- Rotary spread seed;
- Drop spread seed around edges;
- Topdress;
- Fertilize;
- Water;
- Mow.



## OVERSEEDING — FOR SPRING PLAY

Dr Richard Duble  
Texas A & M University  
College Station, Texas

In Texas, Dr Duble has the following recommendations for overseeding.

- First use the right grasses for sports turf. Tifway bermudagrass rates high.
- Aerify the soil well in the fall. This prepares the turf for overseeding. Take 2 to 4 weeks to get the ground ready.
- Dethatch the bermudagrass in the fall prior to overseeding. Pick up the material cut loose using a sweeper. This practice will help get the grounds ready for overseeding.
- First overseeding may take place in mid-October.
- Sabre Poa trivialis can be used on a baseball outfield.
- Perennial ryegrasses can be used on a baseball infield.
- These grasses will give infield and outfield a little difference in color.
- Use 3 pounds per 1,000 square feet of Poa trivialis and 20 to 25 pounds per 1,000 square feet of perennial ryegrass.
- Overseed for better play of the game and also for spectator appeal. This is easily accomplished for baseball and soccer with only a very small cost. Overseeding football fields during the fall when fields are in use and play is heavy is difficult.

## OVERSEEDING — SEEDING RATES

Dr Richard Hurley  
Lofts' Inc  
Bound Brook, New Jersey

Seeding rates for grasses used in overseeding are very important to the success of the venture. Dr Rich Hurley of Lofts' Inc presents the following guidelines based on his experience.

The following six grasses are most often used in overseeding warm season turf:

- annual ryegrass;
- perennial ryegrass;
- intermediate ryegrass;
- fine fescues;
- Poa trivialis;
- bentgrasses.

- Use:

- Annual ryegrass for color only;
- Perennial ryegrass at lower seeding rates than annual ryegrass;
- Intermediate ryegrass to provide qualities of perennial ryegrass at an economy price. [This saving may not always be very great.]
- Fine fescues and Poa trivialis are recommended for use on golf greens.



- Seeding rates influence:

- fast germination;
- quick establishment;
- quality turf development.

- Use 150 to 175 pounds of perennial ryegrass seed per acre.

- Use 400 pounds of annual ryegrass seed per acre.

- Tillering of perennial ryegrasses has been improved and this results in lower seeding rates.

- These grasses are generally established under close clipping heights. Thus, lower seeding rates on roughs and aprons and fairways than on golf greens are common.

- Traffic on greens leads to seed of perennial ryegrass drying out.

- In general, perennial ryegrass is seeded:

- 10 to 15 pounds per 1,000 square feet in roughs;
- 15 to 20 pounds per 1,000 square feet in aprons;
- 25 to 40 pounds per 1,000 square feet in greens.

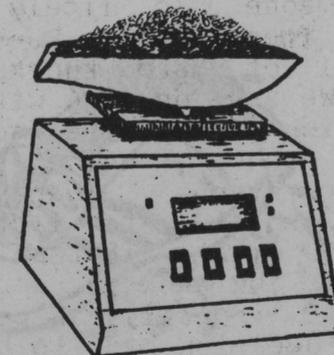
- Heavy play golf courses have higher overseeding rates. Also, the irrigation system in use makes a difference.

- Fairway overseeding with perennial ryegrass may require 225 pounds per acre. The presence of thatch and traffic on fairways makes a difference. From 400 to 500 pounds per acre of perennial ryegrass may be necessary.

- Fine fescues provide good winter color - dark green. They have a higher seed count per pound [500,000 to 600,000] compared to perennial ryegrasses [260,000 to 280,000].

## OVERSEEDING — SEEDING RATES

- *Poa trivialis* germinates under cooler temperatures than other grasses. There are about 2,000,000 seeds per pound and rates of seeding of 12 to 15 pounds per 1,000 square feet are common.
  - When 100 % perennial ryegrasses are used, seeding rates of 25 to 40 pounds per 1,000 square feet are common.
  - When 75 % perennial ryegrasses and 25 % fine fescues are used, seeding rates of 15 to 30 pounds per 1,000 square feet are common.
  - When 85 % perennial ryegrass and 15 % *Poa trivialis* are used, seeding rates of 15 pounds per 1,000 square feet are common.
  - When 60 % perennial ryegrass, 25 % fine fescue and 15 % *Poa trivialis* are used, seeding rates of 18 to 20 pounds per 1,000 square feet are common.
  - Bentgrass is slow to establish and thus in overseeding 5 to 8 pounds per 1,000 square feet is required. Perennial ryegrasses are most rapid in establishment. Higher rates of perennial ryegrass are used only where there is a likelihood of high mortality.
  - Turf quality varies with the grass used.
  - For overseeding fairways:
    - When 100 % perennial ryegrass is used, seeding rates of 125 to 150 pounds per acre are common. For faster establishment, 300 to 400 pounds per acre are sometimes planted.
    - Annual ryegrass does not generally produce acceptable quality turf with seeding rates of 100 to 600 pounds per acre. Quality and color are better at higher rates.
  - Summer preparation of bermudagrass for overseeding is often advised. This includes:
    - aeration in May;
    - verticut in June;
    - aeration in July;
    - verticut in August.
  - A tighter turf requires a higher seeding rate.
  - Overseeding does not permit the luxury of seeding into bare soil. The seed is placed on the soil surface. The germination period needs to be shortened as much as possible. Overseeded areas are irrigated 5 to 6 times a day with small amounts of water. The establishment period is not likely to be less than 2 weeks and should not be more than 10 weeks.
  - Mowing heights of overseeded turf start higher and then are lowered.
  - Spring transition is of critical importance for overseeded grasses. Perennial ryegrasses are now thought to be too strong to permit the best transition back to bermudagrass. The new generation of perennial ryegrasses -
    - Palmer;
    - Prelude;
    - Repell;
    - Manhattan II;
    - All\*Starhave improved vigor.
  - The key to acceptable transition is brought about by stopping the management of perennial ryegrass and starting to manage the recovery of bermudagrass. Do this by:
    - holding back on irrigation;
    - increasing fertilization;
    - starting verticutting;
    - starting aeration;
    - lowering height of cut.
- The result is to let the overseeded grasses go while bringing back the bermudagrasses. It's important to review the entire program each year and continually restructure the operation based on experience gained and new information.



# Conference Topics

ANNUAL CONFERENCE OF THE TENNESSEE TURFGRASS ASSOCIATION

Nashville, Tennessee

January 4-6, 1988

## Dealing With Work Place Politics



Jim Harris, Superintendent  
Chickasaw Country Club  
Memphis, Tennessee

Golf turf management, like many other areas of endeavor, lends itself to work place politics. How we deal with this often determines our longevity at any given position. Jim Harris has given this matter a lot of thought and has the following points and suggestions to make.

- How do some turf managers get to stay at one location 10 to 20 years? Do they ever make a fuss and just go about their own business? Have they figured out how to deal with work place politics? Is survival the name of the game?
- You can have all the right tickets punched - university degree, prestigious apprenticeships, letters of recommendation - so that success will be assured, only to find one day "You're Fired!" What went wrong? That person never found that one someone who could tell him about professional longevity. So, he had to learn first hand. That's what happens to most of us. We may be a turf expert; one of the good old boys, and even a good golfer; but where are we in terms of work place politics?
- Sometime someone is likely to be vindictive. Then what? Does the common sense school of hard knocks carry us through? We are dealing with Executive Status Decision Makers. The fact that they know nothing about running "The Mail Room" is irrelevant. There is little inclination for them to listen to you [although you must listen carefully]. They know all the answers, so there is no need to listen. Finally, in order to save face, a bad decision has to be enforced. Thus, politics grows within a structure that nurtures its growth.

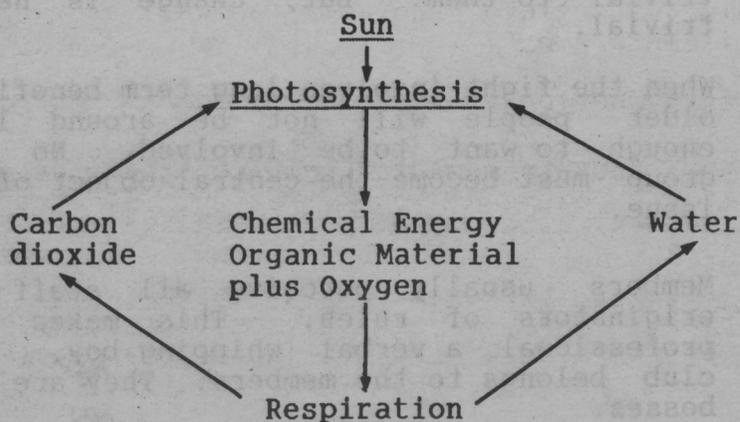
- Banks grow or produce their own leadership. Country Clubs are not like this. Board meetings are often held around an open bar. Highly skilled people are usually present but they are only granted token authority. Every member of the club has to be pleased. A skilled tongue is as important as advanced technology. The wise employee will never assume that he has communicated until final approval is granted.
- Parts of this political monster come from a variety of places. It's difficult to ever really understand how this monster works.
- Act, never react. If it is necessary to react, realize there are both those for and against. Who's right and who's wrong has nothing to do with the political process. It's who wins that counts.
- When you deal with people who have \$500,000 incomes, they live at the plus 1 percent level. Thus, any increase or decrease is trivial to them. But, change is never trivial.
- When the fight involves long term benefits, older people will not be around long enough to want to be involved. No one group must become the central object of an issue.
- Members usually perceive all staff as originators of rules. This makes the professional a verbal whipping boy. The club belongs to the members. They are the bosses.

## Let Growth Cycle Dictate Fertilization Cycle

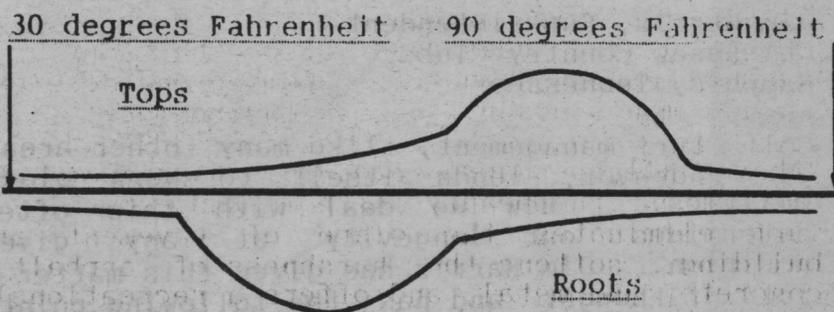
Dr John Dunn  
The University of Missouri

Dr John Dunn has been studying growth cycles of various grasses as they relate to fertilization cycles during the year. Here he presents some relationships worthy of consideration. The example used is Kentucky bluegrass.

- Kentucky bluegrass has a rhizomatous growth habit.
- Fall days get shorter and soils cool at this time of year.
- More rhizomes, more shoots, plants emerge and produce more tillers at this time. White rhizomes form; a thickening process and a healing process within plant development takes place.
- With patience, these rhizomes will heal in summer thinning.
- Fall fertilization involving nitrogen makes leaves green, gets tillering started, as long as the fertilizer is adjusted to apply sufficient phosphorus and potassium.
- In the fall, use of vertical mowers to dethatch will do the job well and any injury to grass plants will heal readily. At this time, the grass can be mown closer so as to form a tighter turf cover.
- The basic reaction involves:



- The net effect of these reactions in the fall will be increased root growth including rhizomes.
- Then, in early spring, tillering will start again following winter dormancy. Spring temperature influences growth:



cool = less tops, more roots  
warm = more tops, less roots

- Spring mowing height is better at a higher level.
- High nitrogen in the spring makes less roots. The response can be drastic.
- Medium nitrogen causes less root development as temperatures increase.
- Low nitrogen causes less root development because foliar growth is affected at a time when higher temperatures increase respiration and decrease energy reserves.
- The result of this spring growth is often disease increases. Fertilizer applications based on turf responses at this time can be hazardous to the plants.
- The question is asked, "Why promote turf growth?" The answer includes:
  - recovery from injury;
  - replace lost nutrients;
  - maintain density;
  - encourage early growth.

Note: green color is not a justifiable reason. The two most important reasons are replacement of nutrients removed in clipping and lost in leaching.

# UPDATE BENEFITS

## Green Grass: Essential for a Better Environment

Kaiser Agricultural Chemicals  
Prepared by  
The Fertilizer Institute

"Green grass, trees and shrubs that surround your home provide nature's number one defense against man's assault on his environment.

"Above all, perhaps, a green, luxurious lawn emphasizes the beauty of home and community. Turf eliminates the glare of pavement or building, softens the harshness of asphalt, concrete and metal, and offers a recreational area to every home owner.

"Turf and ornamentals emphasize the desirable intimacy between man and nature.

"You can contribute to an improved environment by making your area of the world more attractive and more livable through good lawn maintenance, and adequate landscaping."

## Air Purification

"Green leaves are natural air purifiers. They absorb carbon dioxide from air and release oxygen - essential for all animal life. The vital oxygen supply is dwindling in major metropolitan areas, crowded out and used up by a growing population of people, internal combustion engines, and other energy consuming machines.

"Turf grasses are known to be more tolerant of polluted air than most other green plants, and are likely to thrive even in areas of heavy air pollution.

"Considering that man inhales about 20 % oxygen with each breath, one average-sized lawn with healthy, vigorous turf can replenish the air with enough oxygen for eight persons.

"Green plants, such as turf grasses, absorb and detoxify sulfur dioxide, one of the major air pollutants. In fact, some green plants have been developed to act as indicators of air pollution."

## Blades of Grass

Come on now,  
we've got  
serious noise  
to deal with!



## Noise Abatement

"Turf grasses and other green vegetation act as "acoustical sound blocks" to deflect, absorb and muffle the many traffic noises and undesirable street and community sounds."

## Erosion Protection

"Grasses have long been recognized for their excellent soil-holding ability against ravages of wind and water erosion. Soil lacking plant cover is easily washed from even the slightest slope to end up in streams and lakes as silt. Silt-filled streams, lakes and reservoirs destroy recreational uses, add to water pollution and create flooding problems.

"A healthy turf encourages rapid movement of rain water into the soil as well as keeping soil in place."

## Heat Reduction

"Turf and ornamentals help control excessive heat. Because of transpiration, lawn grasses lower the temperature at ground level 20 degrees or more compared to pavement or artificial turf. Even at five feet above the surface, say turf researchers, the temperature above a lawn area may be 10 degrees cooler than areas with no plant cover."

## For A Healthier Lawn

### Promote A Biologically Active Soil

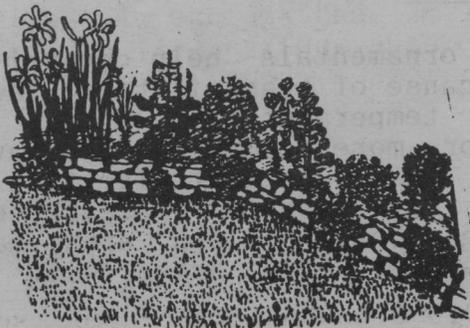
A lawn fits well in the concept of grassland agriculture. Grass is a perennial plant that builds up organic matter in the soil. Under these conditions there ought to be a highly active population of soil microorganisms.

These organisms can biodegrade all sorts of organic matter as well as organic chemicals. Maintaining a lawn "organically" is carrying out any practice that will enhance the activity of these organisms.

There are many old wives tales related to organic gardening, such as "never use chemical fertilizers". Often chemical fertilizers are required to replace quantities of minerals that have become deficient in the soil. Small quantities are used at one time so that the essential elements remain in the soil and are not leached into the ground water.

There is nothing wrong with using a pesticide according to the manufacturers directions when one is needed. If too much [more than is directed] is used, it can have an adverse effect on the living soil. In addition, excess pesticide may move into ground water before it can be decomposed by the microorganisms.

We are seldom immune and not always resistant to many diseases. Because of this we need medicines of various types to help maintain good health. Grass plants are the same. But just as habitual use of medicines is seldom advised for us, we ought not need to make regular applications of pesticides on lawns.



When disease, insects or weeds take over a lawn, pesticides are necessary. Where pesticides are relied upon month after month, something is wrong with the cultural practices so that the beneficial soil organisms are not as active as they should be and the lawn is unusually prone to infections and infestations.

Steps to follow for more active soil organisms and a healthier lawn:

1. New lawn seeds are named. These have been developed to be more vigorous, more insect and disease resistant and should be used in making healthier lawns.

2. Natural organic fertilizers are not man-made. For example:

- Sustane - turkey manure that has been composted;
- Milorganite - sewerage waste from the city of Milwaukee, Wisconsin;
- Ringer Lawn Restore - a mixture of natural organic substances;
- Many others made from natural organic matter.

- These are generally low analysis products that are bulky. They should be used at rates of application specified by the manufacturer.

3. Other slow release types of nitrogen are man made. They are synthetic and represent a duplication of natural organic type fertilizers. For example:

- Nitroform distributed by Nor-Am. This is a slow release organic compound where nitrogen is released by biological breakdown. It helps to promote natural microbiological systems.

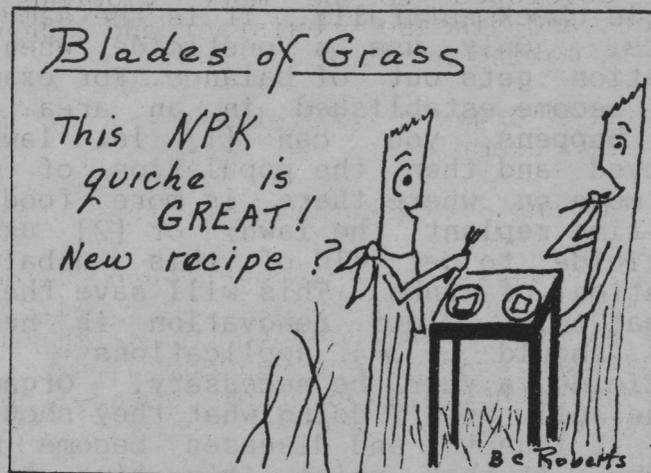
4. Other slow release types of nitrogen are man-made but do not require biological activity for release of nutrients. These are made available by hydrolysis [the action of water]. They include:

- sulfur coated urea;
- IBDU;
- other compounds.

5. Organic quick release types of fertilizer.  
Example:

- urea - fast acting form of nitrogen
  - must be applied in very small quantities so that organisms are not adversely affected and turfgrass foliage is not burned.
- methylene ureas and similar liquid materials that have some slow release properties, but are mostly rapid in reaction.

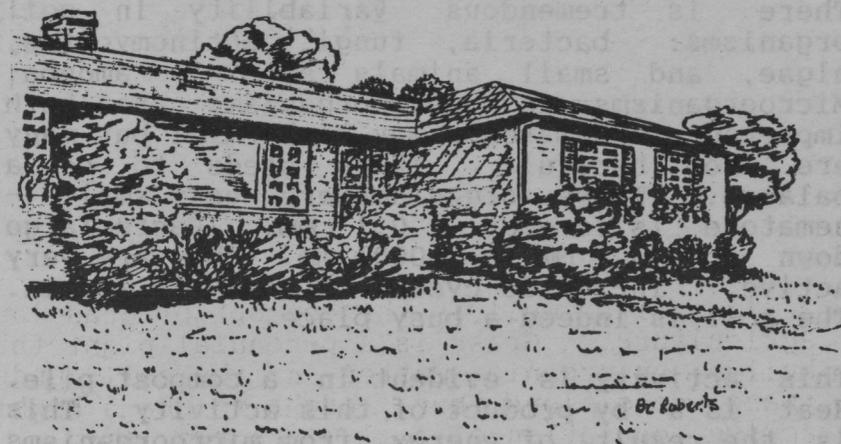
Many lawn fertilizers are combinations of different types of plant nutrient carriers. The slow release types are recommended because they benefit both soil and lawngresses. Rapid release types work well when applied frequently in small amounts. Slow release lawn fertilizers are identified by a number that indicates the amount of water insoluble nitrogen [WIN]. The larger the WIN number, the greater the amount of nutrient held in reserve.



6. Micro- and macroorganisms don't work in dry soil. So wetting agents or surfactants are used to help make soil wet more uniformly. Soap is a type of wetting agent but we recommend formulations of non-ionic compounds that are more effective in a soil system. These help to let the water from rain or irrigation soak through the rootzone evenly so that active biological systems can proceed.

If a substance is not harmful to organisms or to the soil environment, it will help promote a healthy lawn.

7. Some elements get fixed or tied up quickly in the soil. For example, iron that is fixed and made unavailable to plants. Chelated compounds hold the iron or zinc or other micronutrient so they are not tied up and can be released to the roots as needed. These organic substances help create healthier lawns.



8. Ground limestone. Soils tend to become acid. Rainfall has some acidity associated with it and just the grass plants growing in the soil can create acidity. Every 3 years add 50 pounds of ground limestone/1000 square feet. Some soils are alkaline and don't need this treatment. Have a pH test made to determine acidity of your lawn soil.

9. In order for microorganisms or lawngress roots to grow, they need air in the soil. Soil has to be porous enough so air can get in. If your lawn tends to be on a heavy silty or clay soil, it is good practice to aerify or core cultivate to punch holes in the soil to allow air to get in. This allows microorganisms and roots to obtain oxygen. This is recommended in spring or fall. On sandy soils the need is less; with heavy soils this may be needed both spring and fall.

These practices and use of these materials are not difficult to implement. They will help to make organisms active to the degree that they will antagonize pathogenic organisms, increase beneficial organisms that will help control insects, and keep grass vigorous even when hot and dry so weeds are not as likely to come in. Defensive mechanisms of this type help reduce the need for chemical pesticides. But when these populations become unbalanced, there will always be a need for use of pesticides. The chemicals once applied will be biodegraded by soil organisms. Thus, chemicals can be used on a lawn and still have a "chemical free" lawn.

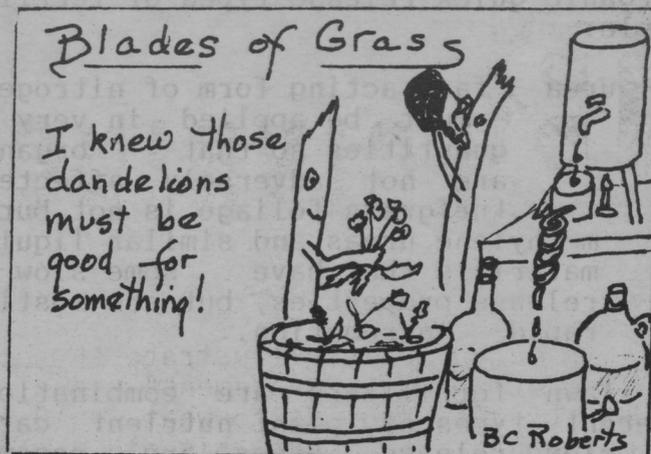
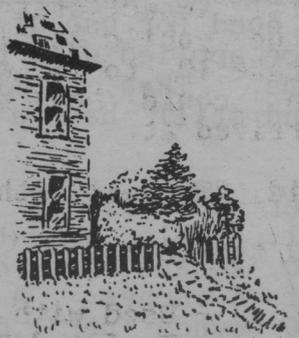
There are over 900 billion organisms per pound of soil. This amounts to 70 lbs of organisms/1000 square feet of soil to a root zone depth of 6 inches. A lawn root zone weighs 50,000 pounds per 1,000 square feet. You will have a better lawn when these organisms are healthy and active.

There is tremendous variability in soil organisms: bacteria, fungi, actinomycetes, algae, and small animals such as amoeba. Microorganisms and macroorganisms are both important. Nematodes may be harmful but many are not harmful. There needs to be a balance. These organisms are very small - nematode is largest - 0.1 mm. Bacteria go down to 0.001 mm to 0.0001 mm. They are very active. The life cycle of some is 15 min. The soil is indeed a busy place.

This activity is evident in a compost pile. Heat is a by-product of this activity. This is the result of energy from microorganisms as they decay organic matter to make humus. They use organic matter, even from a pesticide, take the carbon and biodegrade the compound to make humus which makes soil more productive than any other compound we know of.

Most biologically active soils contain ample populations of diversified micro- and macroorganisms to help maintain a healthy lawn. Decaying grass roots provide the major source of carbon for these organisms. Products are available that serve as a source of organisms and as a favorable substrate for the increase of these organisms in the soil. They are described as biological activators that contain enzymes and growth hormones and stimulants. Many contain micronutrients in chelated form and may contain organic matter from kelp and other sea plants. Where these products are used effectively, the soil must be in a favorable condition for supporting this increased population.

If you have a lawn growing vigorously, no 2 plants can occupy the same place at the same time, so weed seeds aren't likely to become established. In this case weed killers are not needed. In the soil, 1 weed seed per square inch is ready to germinate and become established at any given time. The longer you can keep a grass plant growing in that square inch, the more likely the weed seed is to perish.



Most diseases on home lawns are caused by fungi. A balance of microorganisms is needed in the soil so the pathogenic organisms are kept in check naturally. It is the same with insects. Only use a pesticide when the population gets out of balance. For example: grubs become established in an area. When that happens, you can [1] let lawn be destroyed and then the population of grubs will move on where there is more food. At that time replant the lawn; or [2] use an insecticide to get rid of this unbalanced population of grubs. This will save the lawn so that only minor renovation is needed. Never should 3-4 applications of insecticide a year be necessary. Organisms in the soil aren't doing what they should be doing if insects and diseases become major problems. At that point it's time to get started on 'organic' lawn care.

Pesticides are purchased in concentrated forms. You need to be very careful in using it with no spills. Apply it at the proper dilution, in the proper amount, at the proper time, with equipment that is properly calibrated. If one should put too much chemical down, microorganisms are likely to be killed. If applied at the proper rate, there should be no danger to soil organisms or to people. There is probably more risk or health hazard in eating peanut butter or mushrooms than in normal exposure to a properly treated lawn.

There is good evidence in favor of an 'organic' approach to lawn care. This is really Integrated Pest Management [IPM] at its best. Use any product that will enhance soil microorganisms and use pesticides sparingly.

# IN THE

# BEGINNING



Let us graphically illustrate the present state of "Big Government" involvement today by relating it to what would happen if we wanted to start this old world from scratch again. Our reading is from the Book of Genesis:

"In the beginning God created Heaven and Earth". He was then faced with a class action lawsuit by the Canadian Environmental Law Association for failing to file an environmental impact statement with the Ministry of the Environment.

God was granted approval for the heavenly portion of the project, but was issued a "stop order" on the earthly part, pending further investigation by the Ministry. Then God said, "Let there be light". He should never have brought up this point since the Environmental Assessment Board immediately protested stating, "How was the light to be made? Would it be a coal fired or a nuclear fired generating plant built by Ontario Hydro?" God explained the light would come from a huge ball of fire.

Nobody at the Environmental Assessment Board really understood, but it was provisionally accepted assuming:

- [1] there would be no smog or smoke resulting from the ball of fire;
- [2] a separate burning application would be required;
- [3] since continuous light would be a waste of energy, it must be dark at least half of the time.

And so God agreed to divide light from darkness and He would call the light "Day" and call the darkness "Night". [The Board expressed no interest with in-house semantics.]

When asked how the earth would be covered, God said, "Let there be firmament made amidst the waters: and let it divide the waters from the waters". One ecologically concerned board member accused him of double talk, but the Board tabled any action since God would be required first

to file a "A Firmament Permit from the Bureau of Land management" and also would be required to obtain water-taking permits from the appropriate branch of the Environment Ministry.

The Board asked if there would be only water and firmament, and God said, "Let the earth bring forth the green herb, and such as may seed, and the fruit tree yielding fruit after its kind, which may have seed itself upon the earth". The Board agreed to this as long as native seed would be used.

About future development, God also said, "Let the waters bring forth the creeping creatures having life and the fowl that may fly over the earth under the firmament of heaven". Here again, the Board took no formal action since this would require approval from the Game and Fish Branch of the Ministry of Natural Resources coordinated with the Wildlife Federation and Audubon Society, to say nothing of Greenpeace.

It appeared that everything was in order until God stated he wanted to complete the project in six days. At this time He was advised by the Board that His timing was completely out of the question. The Ministry would require a minimum of 180 days to review the application and environmental impact statement, then there would be the public hearings. It could feasibly take 10 to 12 months before His application could be reviewed and a decision arrived at.

And God said, "To Hell with it".

There ended the lesson.



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Editor: Eliot C Roberts, PhD

Associate Editor: Beverly C Roberts, MA

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