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**JULY 1991**

**LAWN  
INSTITUTE**



# harvests

**Volume 38 Number 2**

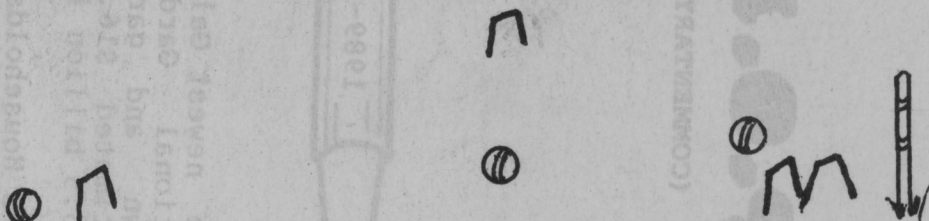
## THE HARVEST MIX

"Agronomy and the Environment" leads off this issue. Selected comments of five speakers at the 1990 ASA Convention in San Antonio, Texas, are important to the turfgrass industry.

Another talk by Dr Joe Howland, "Marketing - Why Let the Hollywood Crowd Put You Out of Business", is a supplement to the first which was in the April issue. Both present some really good ideas that hopefully you will take seriously.

Comments from some of the talks presented at the 1991 Virginia Professional Horticultural Conference in Virginia Beach are formatted to answer your questions on several important topics.

Threshing the Journals includes reviews of research on growth regulators, soils and soil conditions, turfgrasses, and physiology.



# AGRONOMY AND THE ENVIRONMENT

The theme of the 1990 American Society of Agronomy meetings held in San Antonio, Texas was "Agronomy and the Environment". Five speakers are introduced here along with selected comments that are important in the context of Turfgrass as an agronomic area of specialization.

Comments by: Elizabeth Dowdeswell, Assistant Deputy Minister of the Atmospheric Environment Service, Canada

- Similar life styles create similar environmental problems. This seems to be just as much a fact of life as the linkages that exist between Agriculture and the Environment.

- What have been the results of humankind's existence:

- ozone has become eroded;
- average temperatures are on the increase;
- rain has become acidic and toxic;
- some 80,000 chemicals are found all around us;
- tropical forests are being lost at an alarming rate;
- land is being converted to deserts;
- one species is becoming extinct each day;
- we are becoming overwhelmed by unlovely wastes;
- waste is being dumped in the oceans without treatment;
- pollution is life-threatening to some species;
- major emphasis is placed on debate of waste disposal and toxic substance limits on development with little action;
- need more study of the issues so use this as an excuse to do nothing.

- Air, water and land are in need of protection. A much better understanding of the issues is needed in order to break this gridlock. Public distrust of government complicates the issue.

- Climatic change is the key. This cannot be ignored. There is a policy problem of scope and complexity never dealt with before.

- Industrialization is rooted in the belief that improved quality of life will be the outcome. All of us concerned with industrialization are responsible for what is happening. There is an interaction taking place between two systems: socio-economic and atmospheric.

- There are many short term impacts of current policy, but the uncertainty of the future demands that decision making be based not only on the short term but also on the long term. At present the policy cart is in front of the scientific horse.

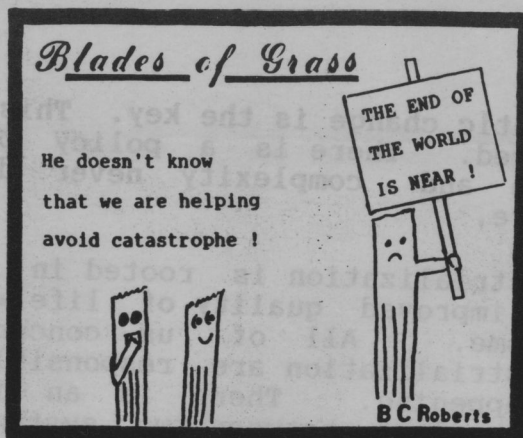
- These are complex non-linear systems that create very low comfort levels for policy makers.

- Costs of inaction may be extremely high. Courts require reasonable certainty or reasonable doubt in decision making. How does this apply to environmental matters? Do we give the environment the benefit of the doubt?





- We now recognize a global interdependence. A car driven here or a tree cut there has an impact somewhere else. Progress brings choices. What will a developing country like China do in the future? The pace of globalization is mind-boggling. There is a well defined speeding up of movement around the world. Industrial output is multiplying rapidly. For example, Asia has desires to increase in production of goods and services. Now, 60 percent of world trade is in the Pacific Ocean Rim.
- Climate change has more to do with oil than strictly meteorology. Environmental affairs are a global security issue. As such, international cooperation is not easy to come by. Thus, the "gloom and doom" scenario takes hold.



- Sustainable development is the key for the future. Growth can be environmentally sustainable only when environmental affairs are moved to the center of the decision making process. A change in perceptions is needed. So often we seem to be asking the wrong questions. A new strategy based on a new thinking of the issues is needed. More horses and more men are not likely to solve these problems. Improved information must be brought to the front.
- We must look harder for opportunities to reverse climate change. What's good for the environment is likely also to be good for industry. Industry should have an opportunity to get a good head start and demonstrate the leadership for which it is capable. Higher standards at times may yield an important competitive edge. All of this will require a change in mind set that places emphasis on sustainability.
- The environment is now a political issue. As with all political issues, how can we cause behavioral change to take place. Since Agriculture does impact on climatic change, we have opportunities to swing the balance in either positive or negative directions.

Comments by: Jim Moseley, Assistant USDA Secretary for Natural Resources and the Environment

- What quality of life contributions are expected from Agronomists? The American people, including farmers, are stewards of the land. In the production of food and fiber, farmers are competitive in a world market. It's a fact that American agriculture is the envy of the world.
- Today we live longer, have better health, and enjoy an excellent quality of life. There is nothing to be ashamed of, even though we are led to believe that ecological disaster will occur if we continue agricultural practices as they are. We are often viewed as villains in ecosystem management. "Big Green" initiatives predict environmental doom.
- Movie stars say - stop listening to the experts. Questions are posed on environmental quality from America's smoke stacks on to the "back 40". Non-point sources of pollution complete a gloom and doom perspective. Although we are being questioned unfairly, if science is sound [and it is], we will know how to handle these situations.
- There are lessons to be learned from history. Civilizations have been lost from deforestation practices. Barren deserts have been created.
- World population will reach 6 billion by the year 2000 and 12 billion by the year 2050. What we do or fail to do in the next few years is critical. Population trends look like they are fixed unless disease or wars intervene in unexpected ways.
- We must look to science to find answers to technical problems.
- We have 32 million acres out of production at the present time. In the long run, more land than this will be needed.





# AGRONOMY AND THE ENVIRONMENT CONTINUED



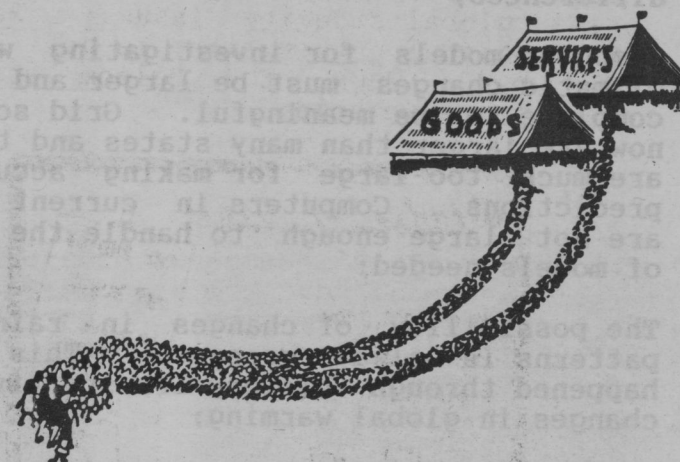
Comments by: Stephen Rawlins, USDA-ARS  
Research Scientist

- Increases in regulations of farming and ranching are reflected in local zoning laws and in state initiatives. These have caught farmers by surprise.
- Issues have become highly political. Agronomists must be active in helping to solve environmental problems or let others work out the solutions so that then they can sit back and complain about what has been lost. The agricultural community and the environmental community must find a common ground on which to make progress. Will we be leaders or followers? Short term decisions may have long term implications.
- These issues are hard to deal with. The key element is aggressive environmental research to provide a basis for decision making. Sound information is a must. It is a continuation of the age old discovery process. There are numerous questions for we do not have adequate answers.
- Then there is the matter of getting technology into practice. This is not easy either. We only use about 50 percent of our current knowledge.
- The bottom line is "when nobody sells, nothing happens". This applies to ideas as well as products and services. There is a teachable moment when someone is ready to listen. We must use our most modern means of communication.
- Through all this, there are three major requirements for success:
  - hard work;
  - stick-to-itiveness;
  - common sense.



- Society wants to know what effect agriculture is having on global environmental change. This topic has focused on a lot of mis-information. More light and less heat are needed at this time.

- Worldwide population increases may reach 12 billion people. All want more goods and services and a better life style.



- Efforts of great magnitude will be required to increase agricultural production sufficient for feeding twice the present world population. This task will be, at the very least, difficult.
- Oil as a source of energy is on the way out. New energy sources will be required. These will bring about changes in agriculture.
- What do we know at present about environmental change?
  - Increases in greenhouse gases in the atmosphere are taking place;
  - Concentrations of these gases are not the only changes taking place;
  - Cloud formations increase with increases in greenhouse gases; this change has not been included in most investigative models;
  - Ocean changes are taking place and these are not represented in most investigative models;
  - Population growth increases at the same rate as increases in green house gases - 0.5% increase each year; how can these gases be reduced without reducing population growth?



## AGRONOMY AND THE ENVIRONMENT CONTINUED

- Photosynthesis draws down carbon dioxide from the atmosphere in the summer; however, in winter it increases in the atmosphere;
- Nitrous oxides increase 0.25% in the atmosphere each year;
- CFC's are contributing to the potential for global warming;
- Year to year climatic variability is too great to show meaningful differences; only long term trends are worth study and these indicate only very small differences;
- Computer models for investigating world climatic changes must be larger and more complete to be meaningful. Grid scales now are larger than many states and these are much too large for making accurate predictions. Computers in current use are not large enough to handle the type of models needed;
- The possibility of changes in rainfall patterns is always present. This has happened through history irrespective of changes in global warming;
- Agricultural soils, not unlike all soils, are lost through erosion. Over time, even mountains are worn down and salts and particulate matter moved to the world's oceans. This has happened through history irrespective of changes in global warming;
- Benefits of carbon dioxide in the atmosphere increasing photosynthesis should not be discounted. Plant productivity should increase as carbon dioxide levels increase;
- Clearing of forests and combustion of all carbon containing energy sources add carbon dioxide to the atmosphere. Not all carbon released can be accounted for in the atmosphere. Much is stored in the world's oceans and in land forms that are more stable than organic matter in the soil.
- Carbon dioxide has a direct influence on photosynthesis but only an indirect influence on global warming. As much as a 200 percent increase in plant growth may be realized from atmospheric increases in carbon dioxide.
- Agriculture is likely to be able to adapt to change whatever the change may be.

Comments by: Dr Jay H Lehr, Executive Director of the National Water Well Association

- The question: "Is it past time for gloom and doom obituaries for the planet earth?" should be answered in the affirmative.
- Much of the current public concern results from chasing small risks.
- We can now measure in quantities as small as one part per quadrillion. There is a one in one million risk of being struck by lightning. In a real sense, there is a molecule of everything in anything. Natural carcinogens are present in natural food 99 percent of the time.
- Faced with a new field of science, toxicology has become the key to understanding risk in all environmental situations. It is the dose that makes the poison [not what it is, but how much of it is present in the exposure].
- Environmental Protection Agency [EPA] has a problem with public opinion, not with agricultural chemicals, which have made us the healthiest nation of all time.
- There is a problem with the mishandling of all chemicals, but when this happens infrequently, it is not non-point pollution and needs to be dealt with at the spot.
- In evaluating non-point pollution, we tend to ignore epidemiology data. We conduct rodent bio-assay tests. Of 350 chemicals, more than half of the tests show carcinogenic effects on rodents. Rates of chemical application are high and mathematical models are used to interpret results. By-in-large, these rodent bio-assays are meaningless.
- A mutagenic condition may well be produced in rodents exposed to high levels of test chemicals. This causes cells to split in response to this insult to the body and this increases the chance of mutations.
- It is time to tell the public that things are not as bad as they think.

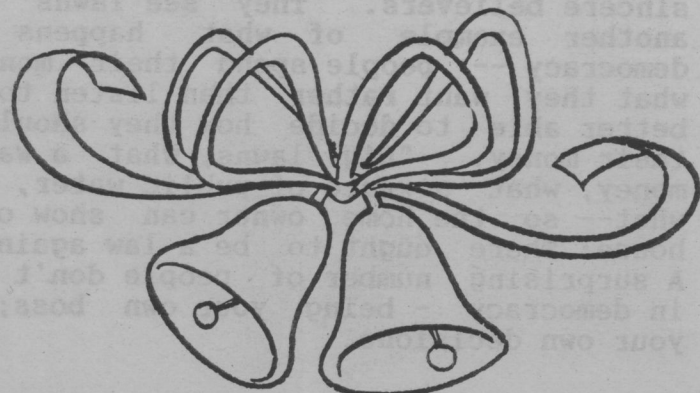




# AGRONOMY AND THE ENVIRONMENT CONTINUED

Comments by: Donald Worster, Environmental History Professor at the University of Kansas

- An important question: "Can agriculture and ecology be married?" Consider Agriecology! Ecology is interested in agriculture, but it is not always clear that agriculture is interested in ecology.
- Farmers and industry that make up agribusiness do not want interference. Agribusiness needs public support but also wants free enterprise.
- Agriculture needs a mate and ecology would be an ideal partner, but agriculture has been sleeping around with business.
- Agriculture is in need of reform. It's not all been success; there have been failures. Efforts have been made in trying to ignore failures. For example:
  - soil erosion and depletion;
  - deforestation in southern New England;
  - lack of self sufficiency in food.
  - Two thirds of Massachusetts is in forest but 84 percent of the food is imported.
  - Is New England a success or a failure in agriculture? So goes the history of agriculture.
  - The southern cotton belt is not different.
  - Great Plains farming is in trouble. Will we soon be back to a dry land farming system in a free market economy?
  - Even with a reform in agriculture's character, is it possible for agriculture to last 1000 years or more in one place?
  - Social and environmental restraints do not allow much freedom. Land cannot be bought or sold without community approval. All sorts of interests are involved in what goes on.



- Agriculture is shaped by the market economy and this does not change. It reflects tradition and community patterns. Limits are placed on wealth and expansion. Private property and private gain are a basis for freedom.
- Is it possible to establish a radical free farm system?
- The bride to be would be the science of ecology. She would need to teach virtue. The question is: "Is the bride prepared?" Expert understand of how nature works must be brought into the system. This knowledge is deceptive and we are not sure what it would take to change agriculture. All models of nature come from cultural experiences and thus it's not clear what should be done with agriculture.
- The farmer may seem trapped by business and not able to follow the principles that ecology sets forth. Farmers are, in fact, a product of their history.
- No freedom is ever complete.
- Dedication from both parties in this marriage is essential. Nature is a pattern or order to be respected. As such, nature is a whole that is greater than we can understand. Important input must come from the community as a whole in areas of ethics and philosophy.



A talk before the Annual Meeting of the  
American Sod Producer's Association at San  
Antonio, Texas on January 24, 1991.

# MARKETING

by **Dr Joseph Howland**

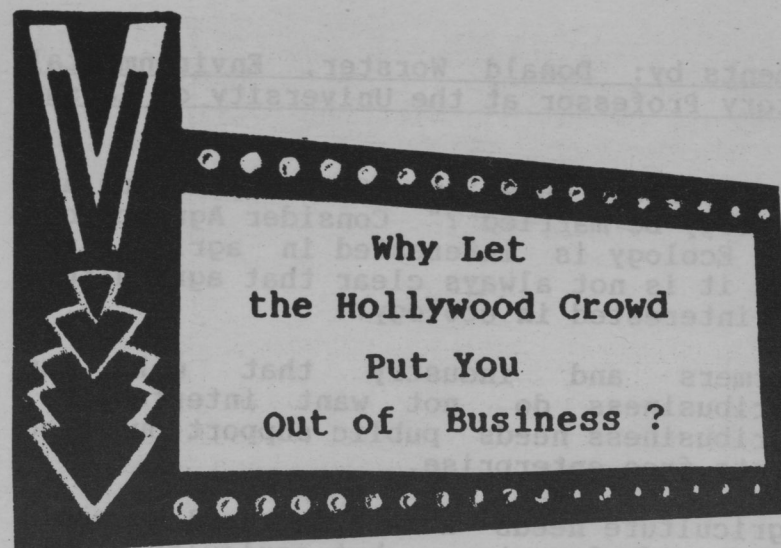
University of Nevada

Lyndon Johnson learned the power of "Hanoi Jane". Her tearful apology on Barbara Walters couldn't correct the lies she told. No apology can put you back in business after sending you into bankruptcy.

Fading Hollywood stars know there's no faster way to revive their career than going on national TV to protest. Anything. Just be highly visible; make astonishing claims. Don't worry about lying; lies sell better anyhow. Let others talk truth. **PROTEST**, that's the key. Go for it. Lambaste an industry. If they rise up, just move your protest to another "cause".

The facts be damned. We can make people believe anything. We're **ACTORS**. We live in fantasy land. We'll give you gripping fast-paced TV "stories" that do convince people we know the real truth.

-The Hollywood Creed



## What Better to Attack Than Lawns !

Lawns are everywhere. And, highly visible. "Big users" of precious water at a time when people are being asked to conserve water. And the big houses of the rich have big, big showplace lawns kept bright green all summer when I'm supposed to be saving water -- for them ?" Lawns, a sitting duck for the highly emotional.

What would you give to have your side of the story told ?

## Yes, SOME Believers in Hollywood.

True, not all of the Hollywood crowd is out just for the personal publicity. There are sincere believers. They see lawns as just another example of what happens in a democracy -- people spend their money for what they want rather than listen to people better able to decide how they should spend their money. "Big lawns, what a waste of money, what a waste of public water, all for what-- so the home owner can show off his house: There ought to be a law against it". A surprising number of people don't believe in democracy - being your own boss; making your own decisions.



## MARKETING CONTINUED



Your local TV station loves Hollywood stars -- they boost TV ratings with their "exclusives".

TV Entertainment bragged recently about the power of the TV stars when they take up a crusade. The Alar hysteria a year ago showed the national TV networks they could build a giant audience with Hollywood stars attacking anyone without fear of reprisal.



Did you hear CBS boast that it would have a super year of advertising revenue because it would have such a large audience watching its year-long crusading series about "the ecology issues facing America."

Ted Turner has put a lifelong political activist in charge of the Turner Broadcasting environmental programming. And, Hollywood bigwig, Norman Lear, is spearheading a new organization, Environmental Media Association [EMA], specifically to get environmental issues tucked into movies and television. The media are saying EMA is so active that it is hard to find time in movies and on TV network news for activists demands.

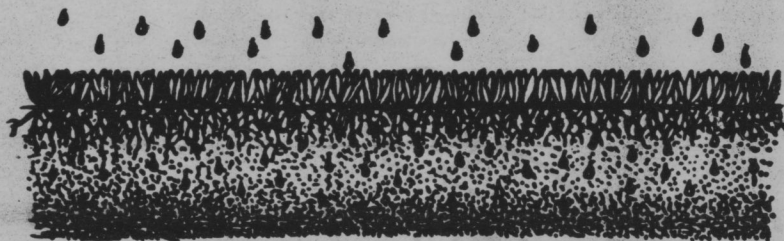
Stellar TV performances can give the impression that there's danger for children who play on our sodded lawns. The Cancer Institute sees this as sordid twisted lies to deceive.

### Sod Industry Inherited the Problem

Visitors to the United States often comment on "your big front yard lawns". What a waste, they call them. No use to the family. No use to anyone. Just a show of luxury. Symbol of American extravagance.

We do have great front yard lawns. Whole streets of them. All thanks to the American real estate brokers; they got communities to require 30-foot and 40-foot setbacks for houses. Easier to sell a house in a parklike setting. Easy for communities to take pride in their pretty residential streets.

**WATER CONSERVATION:** Tomorrow has arrived. We must do our part to show home owners how to use lawn water conservatively.



**Turfgrasses help purify water entering underground aquifers by its root mass and soil microbes acting as a filter to capture and breakdown many types of pollutants.**



## MARKETING CONTINUED

### Big Front Lawns Created Our Industry

Remember how we got started? I was there. A product of Rhode Island State College and its turf plots. As Garden Editor of House Beautiful magazine, and later as Editor of Lawn Care, I saw the sod industry blossom in a big way. In Southern California. In Denver.

Do you remember Toby Grether and his Cal-Turf? Toby was the greatest marketer we've ever had. Many Eastern sod growers thought Toby was crazy. Who would buy sod when they could have its equal in Southern California from seed in three weeks?

But Toby saw something that we Easterners had missed; offer to seed -- or sod -- at the same contract price! Lay sod, water through the first mowing -- then collect your money! No long 60-day tie-up of your money [and the hassles that so often stretched 60 to 90 or 120 days when your customer had questions about weather, vandalism, etc during that 60-day clause for seeded lawns].

So goes California, so goes the rest of America. Once the home & garden magazines started reporting "sodded lawns" -- and the grass seed industry started advertising "Own a Merion or Windsor lawn -- and have it tonight!", all America got the sod fever. We had only to sit back and worry about producing enough sod. I remember it well.



### Then the Hollywood Crowd and BIG GREEN

Jane Fonda and the Hollywood crowd got over-confident. They went all-out for "BIG GREEN". So confident that they swept into it all the demands of dozens of ecology activists. They decided to enact it into California law, then demand the same as a federal law. They lost big in the November election. That should be no consolation to anyone in the sod industry. They lost a skirmish, not their war.

Why did BIG GREEN go down to defeat? Important we know this. It lost 2 to 1. BUT... the agricultural industry's counter proposal lost far worse, despite spending a huge war chest [it may turn out to be five times as much as BIG GREEN collected from people scared to offend Hollywood stars.

BIG GREEN, along with all but a bare handful of the dozens of proposals on the California ballot, got a resounding "NO!" vote. Analysts now say the Hollywood crowd, with their superbly orchestrated and produced TV commercials, plus their constant personal appearances on TV talk shows, tried to sell too much in one package, with two millions in new taxes for Californians for this, and two million more in taxes for that, etc.

Why did the agricultural industry get beat even worse? Voters just didn't believe them. The agricultural fund apparently just didn't convert anybody. Or it converted some people to support BIG GREEN.

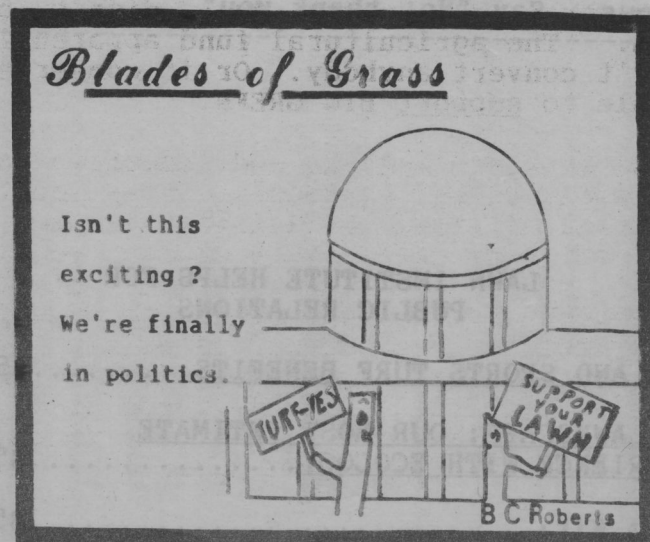
A lesson there for the sod industry: Take the Hollywood crowd seriously. They know how to generate millions of dollars in free TV air time for any cause they choose to take up. They provide superb TV, provocative [remember: truth has nothing to do with what they decide to claim about us]. They are actors, masters at swaying public emotion, getting people committed "to do good". They can wipe out the sod market, our industry, if they choose -- if we let them.



# MARKETING CONTINUED

## WHAT TO DO:

1. Fight Lies Aggressively. Go on the offense. Demand retraction by going on TV and radio yourself. Every station is required by law to provide the sod industry equal time to tell our side of the controversy. Stations that refuse you can lose their federal license to operate. Be ready to put your most persuasive speaker on the air immediately. Better yet, offer yourself to your local radio and TV stations before the damaging lies get on them.
2. Demand Free Time on Radio and TV. Assume your local radio and TV stations will give a quick "YES !" to every offer by the Hollywood crowd to have a bigname star create "a special program just for your station -- and it's FREE !" Don't sit around hoping it won't happen in your market area. Get there first.
3. Develop Great Credibility. With both the stations and with their audiences. Deserve to be known as the authority in your town. Study, do everything needed to make you the fountain of truth about ecology and lawns. If you personally aren't a great persuader on the air, make the best persuader you know your spokesperson.
4. Lobby the State Legislature. Continuously. Know what is being proposed. And by whom. Make it your business to know why Senator X or Representative Y is thinking of introducing a bill to kill your business. Let no week go by that you are not represented by someone from the sod industry.



## BENEFITS

5. Practice Sound Ecology - and let the public know you do ! Supply the newspapers, radio and TV stations with interesting picture stories showing how you make sure the lawns you create are ecologically good for the community.

Let everyone in town know that lawns are great creators of free oxygen for the air -- and big consumers of the excess carbon dioxide in the air we breathe.

Encourage the high school science teachers to demonstrate in class how lawn grasses do this. Show people, repeatedly, that modern lawn sprinkler systems CONSERVE water, that water running off into the street identifies the sprinkler systems needing an overhaul, not a lawn watering ban.

Demonstrate on TV that minimum watering, done correctly, maintains the lawn beauty your community has always been noted for by visitors.

6. Learn How to Interview People. Get their exact words -- and quote them whenever you get time on radio or TV. What did they say about the importance of their lawn for their family ? You can make very human TV stories even if the people quoted would rather not go on TV themselves.

Interviewing is an art. Anyone can learn to do it well. Give me an hour this afternoon or tonight and I'll make you a great interviewer, teach you how to get people "to open up", talk freely, tell you what they think about you and your business, the sod business.



## WHAT TO AVOID DOING

1. Avoid Close Ties to the chemical and foods industries. Just don't get mixed up with their debates about food safety. The Hollywood Crowd will make mincemeat out of you. Food quality is not your expertise. You have enough trouble with the lies about the dangers to children playing on the lawn after you apply lawn care products. BIG GREEN is coming back, this time piecemeal, at the state legislatures and in the Congress instead of as ballot propositions. Avoid any hint that the sod industry supports any part of the opposition to safe food.
2. Avoid Ties to "Organic Gardening". It's advocates are noisy, yes. But not as effective as you might think. Notice how most of the major national supermarket chains across America backed away from their big national campaign of just six months ago. Chain after chain spent millions adding an "organic" food department, spent more millions in local newspaper advertising -- and today, just don't talk about it. SAFE FOOD is in, "organic" food is not. The chains learned that the people who talk so loudly about "organic" just don't buy them when they are in the store. Talk is cheap.

3. Avoid Getting Mixed Up With Quacks. Speak for yourself. Remember what happened to the apple industry when it let the self-styled Natural Resources Defense Council [NRDC] do the talking about apples.

Now there's a new book out, Poisoned Planet. The author, like NRDC, presumes to talk for science, even claims he is a scientist [he's a news reporter] and that he has co-authored an Academy of Science Research Report [he was only a consumer representative on a seafood safety committee, one of 1,000 NAS committees]. He was not appointed for any scientific expertise, NAS points out. It is NAS procedure to list every member of a committee. "Steinman has not conducted any of the research, nor does he have the training necessary".

Like the Hollywood "experts", Steinman cheerfully makes all kinds of wild claims. That they are false doesn't interest him. Example: he claims "Pesticides could be responsible for thousands of cancer deaths -- and attributes [falsely] his information to the NAS study.

The NAS report makes NO such claim. Former Surgeon-General C Everett Koop says "Absolutely NOT. Steinman's concepts are not scientific -- they are trash".

The sod industry can't afford to let any of these "experts" talk for us on TV talk shows. Say "No, thank you".



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## CHEMOPHOBIA STRIKES THE HOME LANDSCAPE

Dr Rick Brandenburg  
N C State University

Chemophobia is a buzzword meaning the irrational fear of pesticides which is not based on facts. An example was the Alar scare. The public is concerned about what pesticides are doing to their health and to the environment. Daily the media headlines carcinogens, mutations, etc, that are attention getting and create interest. Often facts are used inappropriately or are distorted.

Every professional is responsible for helping to educate the public about this subject. They must not be beaten down with false information. A special approach is needed - stick with the facts. The other side uses distortion, so much of the hysteria is not soundly based. Because the controversy is so political, it might be easier to let it slide. Adversaries say anyone who is pro-pesticide must be paid by the agrichemical companies. This is a very emotional issue which is difficult to discuss. It is hard to get sound information to a person who is emotionally upset.

An American Farm Bureau survey showed 56 % of the public believe that few farmers receive any training in pesticide use. They don't realize that those applying chemicals on lawns are certified.

There are facts that can be used when talking about pesticides. For instance:

- incidence of stomach cancer was only one half in 1980's compared to the 1930's and yet many chemicals in use now have been put into use since that date;
- all cancers, except skin and lung, have decreased or remained steady in the last 30 years when pesticides have been in use;
- testing on rodents is not always a reliable basis for extrapolating risks for humans;
- conflicting information in medical journals - statistics can be developed for either side;

--crop production in southern states, because of the climate, would be hardest hit if pesticide use were curtailed.

There is no excuse for improper application of a pesticide:

- have equipment handy so that you are prepared if there is a spill;
- wear protective clothing when working with undiluted chemicals.

Perception vs reality:

- anything applied to a lawn is a pesticide - FALSE;
- whatever is natural is safe and all synthetic materials are dangerous - FALSE;
- if any amount of a substance, no matter how small, can be found in a chemical analysis, it is of concern - FALSE  
[1 part per million is like 1 drop in a pool 30' x 20' x 8' and 1 part per billion would be 1 drop in 1000 of these pools].

The public has come to demand green, dense lawns and turf and the most expedient way to accomplish this is with the use of pesticides. Is the public therefore to blame for pesticide use? Turf managers using Integrated Pest Management [rather than calendar use] have decreased the use of pesticides and fertilizers in the last few years.

Look and dress like a professional. Become familiar with "organic" lawn care so it can be used as an option. When in doubt about a pesticide application, don't use it. Applicators have concerns about health and the environment and are not in business to mess up. The pesticides labeled for turf used properly are safe.

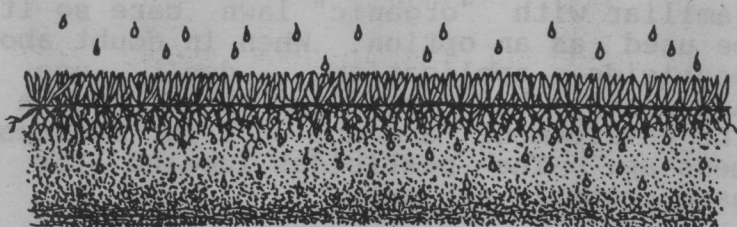


## MOVEMENT OF NUTRIENTS & PESTICIDES IN TURF

Dr Charles Peacock  
N C State University

The primary cultural practices for turf are the same for lawns or golf courses. All of the practices interact with the environment.

- There is a difference between movement in surface water and ground water.
- By selection of materials, nitrogen movement can be reduced but proper cultural practices are more important than the materials used.
- Nitrates and phosphates are of concern in ground water.
- Phosphates used on turf are better than 88% soluble but once they contact the soil, they are fixed and at most move only 1-3 cm/year.
- Nitrates can be a problem in drinking water [10 ppm is the maximum allowed].
- Nitrates below the root zone can move in drain tiles, as free drainage, into ground water.
- Nitrate loss depends on the amount of leachable nitrate present, the amount of water moving through the soil, and the physical properties of the soil.
- In a greenhouse study at North Carolina State University, 3 lbs of actual nitrogen/1000 square feet had to be added to bermudagrass in order to force it through the turf system. The most soluble material [urea] came through the most, but even in the control plot to which no nitrogen was added, some nitrogen still showed up in the leachate. This was from microbial activity.
- Movement depends on the type of soil - more volume is moved when there is less organic matter. Need to fine tune the amount of nitrogen used depending upon soil type.



- To minimize nitrate loss:
  - 1] control efficiency in rate and timing of nitrogen inputs; and
  - 2] control efficiency in rate and timing of irrigation.
- Nitrogen selection criteria are influenced by: time of year, cost, compatibility.
- Pesticides applied to turfgrass move by: drift, capillary movement, leaching, volatility, photodecomposition, absorption among other means.
- There are many factors working against pesticide effectiveness. They are transformed by photo, biological and chemical decomposition.
- Factors affecting groundwater contamination from pesticides: greatest vulnerability from pesticides that are highly soluble with low adsorption characteristics and persistence in environment on soils that are sandy and low in organic matter, on a shallow site in a wet climate [or under heavy irrigation] or where pesticide is injected into the soil.
- Chemistry has developed so that 1 part per billion can now be detected - a very small amount. [Like 1 shot glass of vermouth in a 5 acre lake of gin]. As analyses can detect smaller and smaller amounts, drinking water standards get tougher.
- Surface movement of liquids on turf is rare. Turfgrass is a great buffer system.
- The current problem is one of perception vs reality. Perception is that anyone associated with application of pesticides must be bad. Turfgrass managers are guilty by association. Any improper applications reflect on the whole industry. People also relate concerns which have risen from other agricultural applications.

The turf system is a great attenuator; a wonderful ecosystem that is very dynamic.



# Ethical Advertising & Safety Claims in the Lawn Care Industry

Thomas Delaney  
PLCAA

- The current problem about pesticides has built over many years from controversy over chlordane and DDT to Alar.
- Scientific facts are not always accepted in these controversies.
- Certain words and phrases in advertising lawn care can now trigger requests from state attorneys for: copies of all advertising, pamphlets used over 2 years, records of complaints, chemicals used over 2 years, scientific data to back your claims. It can be claimed that such words or statements are misleading - for instance: "EPA approved", "a material is safe", etc. PLCAA has guidelines for use of terms - example: "EPA registered", "a material can be used safely", etc.
- The Environmental Protection Agency [EPA] and Federal Trade Commission [FTC] are both involved. EPA doesn't know much about advertising; FTC doesn't know much about pesticides.
- If research shows that a chemical is not toxic to the applicator or customer, the questions get more and more specific, for example, how about neurological effects, or long term effects, resulting in demands for more and more tests.
- It has become difficult to make any positive claims about a chemicals use. Beware of what you put in print and what statements are made by you and your workers or you may be accused of false advertising.
- The Government Accounting Office [GAO] indicates that even "organic" natural products can't be indicated as being "safe".
- Advertising guidelines are being revised to be reviewed by governmental agencies.

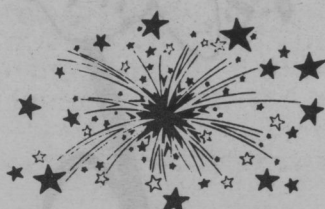
## RISK AND OUTRAGE

Dr Peter M Sandman, Director of the Environmental Communication Research Project, Rutgers University, says that it is necessary to understand why the public takes all chemical risks more seriously than some proven risks from more hazardous substances. Experts define "risk" as expected annual mortality [hazard]. But, the public's concern is broader and includes factors termed "outrage". Risk therefore becomes the sum of hazard and outrage.

**risk = hazard + outrage**

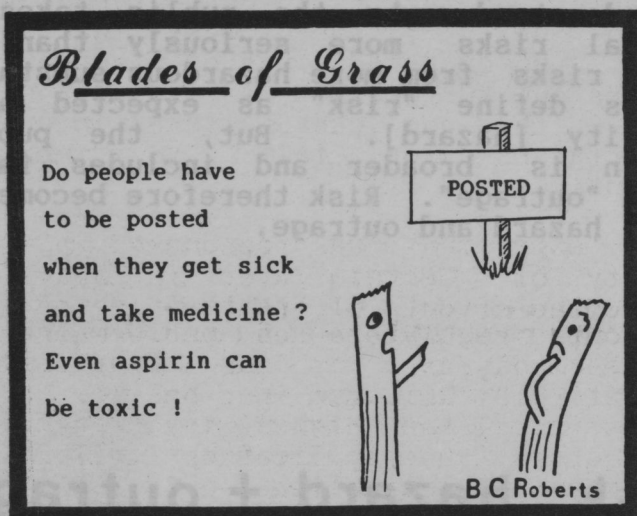
Some outrage factors:

- voluntary risk is more acceptable than forced risk;
- control over a situation by the individual means lower outrage;
- when neighbors endure risk without benefits, outrage ensues;
- talk about cost-risk trade offs seems immoral when considering something perceived as evil [ex: pollution];
- high tech hazards produce more outrage than familiar hazards;
- cancer and carcinogens cause more dread than some other serious diseases;
- if an organization/agency doesn't involve the community in decision making, it can be perceived as dishonest and arrogant.





The risk manager needs to consider these points. By decreasing outrage about modest or low hazards, public concern will decrease. People need to be treated with fairness, honesty and given a right to make their own decisions. Give the public all the facts and let them make the choice. If the safety of a lawn chemical is compared to broccoli, it doesn't help them to be less concerned. They miss the point. When there is low hazard, ex: Alar, the experts don't always take into account "outrage".



A few years ago the lawn care industry wanted to be noticed. It now has the public's attention in a different way. The "green truck syndrome" is common. A chemical spray truck is seen in the neighborhood and claims of illness arise, even if the truck contains only water. This is a sign of outrage against pesticides. Chemicals are not understood and thus scare people.

- If people are given a choice of the type of treatment - chemical or organic - they will probably choose the cheaper [chemical] and outrage is tempered.
- As soon as people find under the posting and notification regulations that they can ask about the chemicals being used, concern is modified.
- At this time only one state requires homeowners who are using lawn care chemicals to post the property. If this spreads, it may become a regulatory nightmare but there may be a backlash of tougher regulations for professionals. More products will eventually be restricted for homeowners.

## FUTURE

- People will have a right to know what chemicals are used and everything about them.
- Brochures to customers may have to have a bottom line that says "use fewer chemicals".
- Give best information possible to customers and let them make choices.
- Actually posting often has positive advertising effects.
- GAO and the Senate are concerned with advertising. There may be more hearings in 1991.
- EPA is concerned with: 1] reregistration of products; 2] employee exposure and dislodgeable studies; 3] other laws and regulations governing lawn care industry; 4] misuse cases; 5] posting and notification requirements; 6] EPA and FTC - advertising; 7] IPM and less toxic forms of pest control; 8] certification training; 9] endangered species; 10] ground water protection.
- Turf is considered a minor-use category so chemical companies are not anxious to pay to generate the extra data that EPA is demanding. Two hundred active ingredients may be lost from registration. EPA hasn't developed the protocol, so registration of new products has been held up.

We need to embrace the future and not hold to past ways of doing things.





# THRESHING THE JOURNALS



## Growth Regulators

### ANTI-SENESCENCE ACTIVITY OF CHEMICALS APPLIED TO KENTUCKY BLUEGRASS

J M Goatley and R E Schmidt  
Journal American Society Horticultural Science  
Volume 115 Number 4  
Pages 654-656  
1990

Foliar treatments with BA, a synthetic cytokinin, have delayed or prevented leaf senescence in many plants. Triadimefon and propiconazole, systemic triazole fungicides frequently used for plant disease control, have delayed senescence of small grain crops in the field. Triadimefon has increased chlorophyll retention of Kentucky bluegrass leaves. Foliar applications of chelated iron have also been reported to delay senescence of french bean. The greening effect of foliar applications of iron on Kentucky bluegrass has been attributed to the requirement of iron as a precursor in chlorophyll biosynthesis.

Research at Virginia Polytechnic Institute and State University has been conducted to determine the potential anti-senescence activity of triadimefon, propiconazole or benzyladenine applied alone and with chelated iron on excised Kentucky bluegrass leaves. One day following foliar applications of benzyladenine triadimefon and promiconazole with and without chelated iron [8 percent iron phosphate citrate], Kentucky bluegrass leaves were excised, floated on distilled water in petri dishes and placed in a darkened growth chamber. Foliar applications of iron benzyladenine, triadimefon or propiconazole applied alone induced an anti-senescence response. Combinations of iron with the chemicals delayed excision-induced leaf senescence, but no significant increase in anti-senescence activity was obtained from the iron and chemical combinations as compared to the materials applied alone.

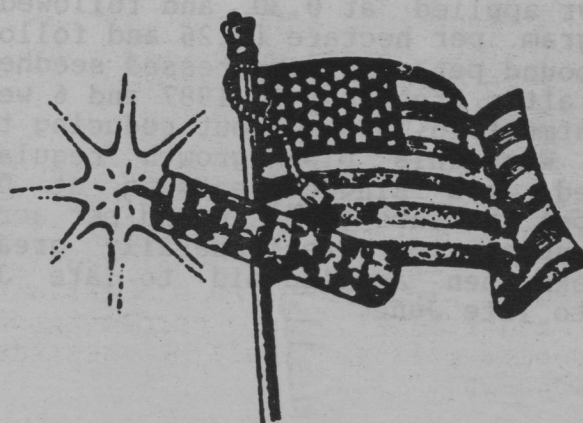
Foliar applications of triadimefon, propiconazole and iron are a part of many turfgrass maintenance programs. In addition to their respective uses as fungicides or fertilizers, the anti-senescence activity could theoretically promote an increase in photosynthetically active leaf area for the turf plant and further enhance plant growth and development.

### TIFWAY BERMUDAGRASS RESPONSES TO PLANT GROWTH REGULATOR APPLICATION DATES

B J Johnson  
HortScience  
Volume 25 Number 4  
Pages 436-438  
1990

Plant growth regulators are of interest for their potential to reduce the cost of turf maintenance. As much as 50 percent reduction in mowing during 5 to 8 weeks has been reported. However, the use of plant growth regulators on turfgrasses has two potential problems - they can cause severe injury to the turfgrass or fail to perform consistently.

A field experiment was conducted at The University of Georgia over 2 years to determine the effects of treatment dates with plant growth regulators on performance of Tifway bermudagrass. For flurprimidol applied at 0.84 kilogram per hectare [0.74 pound per acre] the highest injury occurred from 16 or 28 June application in 1987 and from 17 May or June application in 1988. The injury was similar from treatment dates with flurprimidol plus mefluidide or paclobutrazol plus mefluidide. The plant growth regulators were applied over a longer period in 1987 than 1988 without affecting vegetative suppression of Tifway bermudagrass. However, in 1988, the suppression from the 17 May treatment was equal to or better than that obtained when treatment dates were delayed until 1 June or later.





## THRESHING THE JOURNALS continued

### INFLUENCE OF FREQUENCY AND DATES OF PLANT GROWTH REGULATOR APPLICATIONS TO CENTIPEDEGRASS ON SEEDHEAD FORMATION AND TURF QUALITY

B J Johnson  
Journal American Society Horticultural Science  
Volume 115 Number 3  
Pages 412-416  
1990

Plant growth regulators are applied to turfgrass to retard vegetative growth and/or to suppress seedheads. Centipedegrass is a low-maintenance grass and requires only infrequent mowing throughout the growing season; therefore, plant growth regulators are generally not needed for the suppression of vegetative growth of this species. However, centipedegrass seedheads are numerous during mid-summer, and frequent mowing is required to maintain a turf free of seedheads. If plant growth regulators could be applied to centipedegrass to inhibit seedhead formation, mowing frequency could be reduced during this period.

Two separate experiments have been conducted at The University of Georgia, involving one and two applications and dates of treatment with plant growth regulators to determine injury and seedhead suppression of centipedegrass. Mefluidide caused less injury than either imazethapyr or flurprimidol plus mefluidide. Mefluidide applied at 0.56 kilogram per hectare [0.5 pound per acre] in each of two applications at 2 week intervals suppressed seedheads for 10 weeks. A single 0.56 kilogram per hectare [0.5 pound per acre] application of mefluidide failed to suppress seedheads when applied any time from mid-June until late July. A single treatment with flurprimidol plus mefluidide severely injured centipedegrass, and seedhead suppression was poor, regardless of date of treatment. Centipedegrass was severely injured when flurprimidol plus mefluidide was applied at 1.68 plus 0.28 kilograms per hectare [1.5 plus 0.25 pounds per acre] in each of two applications, but seedheads were suppressed for 10 weeks.

Imazethapyr applied at 0.30 and followed by 0.15 kilogram per hectare [0.26 and followed by 0.13 pound per acre] suppressed seedheads 10 weeks after treatment in 1987 and 6 weeks after treatment in 1988 without reducing turf density. When this plant growth regulator was applied as a single treatment at 0.30 kilogram per hectare [0.26 pound per acre], seedhead suppression was generally greater for 8 weeks when applied mid to late July than mid to late June.

### TALL FESCUE ROOT GROWTH RATE FOLLOWING MEFLUIDIDE AND FLURPRIMIDOL APPLICATION

L B McCarty, L C Miller and D L Colvin  
HortScience  
Volume 25 Number 5  
Page 581  
1990

Due to the extensive use of tall fescue and the high mowing expense associated with unsightly seedheads, growth retardants have been studied as methods of lowering mowing costs. One suggested undesirable effect of growth retardants to turf is root growth suppression.

Research at Clemson University has been conducted to evaluate root growth response of greenhouse grown Kentucky-31 tall fescue following treatment with plant growth regulators flurprimidol and mefluidide. Tall fescue root growth rate was not inhibited for 8 weeks following application of plant growth regulators during either 1984 or 1985. General growth trends indicated enhancement in root elongation rate for mefluidide-treated plants.

Effective growth regulators that do not reduce or actually increase tall fescue rooting would benefit growers located in seasonally drought-stressed areas.

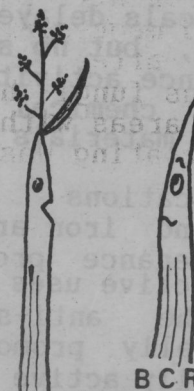
### Blades of Grass

No. -

I don't think

my hair style

is over done !



B C Roberts



# THRESHING THE JOURNALS continued

## Soils & Soil Conditions

### LOCALIZED DRY SPOTS AS CAUSED BY HYDROPHOBIC SANDS ON BENTGRASS GREENS

K A Tucker, K J Karnok, D E Radcliffe,  
G Landry, R W Roncadori and K H Tan  
Agronomy Journal  
Volume 82 Number 3  
Pages 549-555  
1990

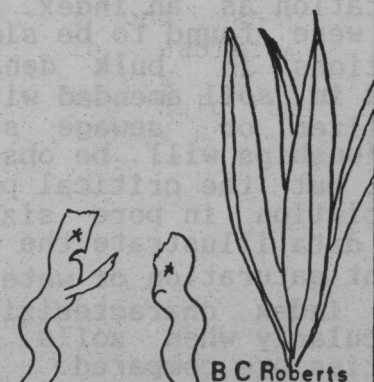
Certain surface soils exhibit a hydrophobicity that retards or prevents infiltration of rain or irrigation water. Hydrophobic conditions occur in uncultivated sandy soils and have been reported in grasslands in Australia, citrus groves in Florida and in burned forest lands in southern California.

In the early 1960's, the United States Golf Association began advocating the construction of golf greens with topsoil mixtures that contained greater than 90 percent sand. Shortly thereafter, irregular patches of water-stressed turfgrass, known as localized dry spots, began to appear in newly constructed creeping bentgrass golf greens. There are several possible causes of localized dry spots, including excessive thatch, compacted soil, poor irrigation coverage, steep sloping grade or hydrophobic soil. Sand grains have been found in localized dry spots that had an organic coating that was absent on sand grains taken from adjacent healthy areas. These organic coatings had an infrared spectrum similar to that of soil fulvic acid. Localized dry spots have been attributed to the formation of calcium and magnesium fulvate which become hydrophobic after prolonged drying. Basidiomycetous fungi have been associated with dry spot areas with the possibility that the organic coating was a metabolic product of the fungi.

Research at The University of Georgia has been conducted to determine the relationship between management practices and the severity of dry spots and to determine difference in soil chemical and physical properties from localized dry spots and adjacent areas. Dry spots were found at all locations surveyed and no correlation was observed between management practices and the severity of localized dry spots. No differences in soil chemical properties were found between localized dry spots and adjacent areas, but water droplet penetration time and contact angle were greater in localized dry spots compared to adjacent areas. This hydrophobic condition was confined to the top 50 millimeters [2 inches] of soil in the dry spot samples and coincided with the presence of an organic coating on sand grains that was observed by scanning electron microscopy.

### Blades of Grass

Where DO the  
weeds get  
their water ?



"Next in importance to the divine profusion of water, light and air—may be reckoned the universal beneficence of grass. Grass is the forgiveness of nature, her constant benediction."

Senator John J. Ingalls (1833-1900)



# THRESHING THE JOURNALS continued



## SOIL RESPIRATION AS AN INDEX OF SOIL AERATION

J W Neilson and I L Pepper  
Soil Science Society of America Journal  
Volume 54 Number 2  
Pages 428-432  
1990

The level of soil aeration essential to a productive agricultural soil can be restricted by compaction or high soil water levels. Total soil respiration is a function of root and microbial activity. In soil free of roots, most carbon dioxide evolution is due to heterotrophic aerobic microbes. Reduced levels of root and microbial respiration due to poor aeration have been found in compacted and nontilled soils that become saturated and anaerobic more frequently than tilled soils. Increased denitrification has been found in wet soils compacted by tractor traffic. In addition, soil amendment with readily biodegradable organic wastes was found to increase respiratory oxygen consumption by heterotrophs, thus creating anaerobic microsites. There are also variations in microbial respiration rates in response to amendment with different substrates. Thus, oxygen availability in soils is a function of porosity, water content and respiratory oxygen consumption.

Research at The University of Arizona has been conducted to evaluate combined effects of soil bulk density, water content, and organic and inorganic amendments on available soil oxygen using carbon dioxide from soil respiration as an index. Soil respiration rates were found to be similarly affected by variations in bulk density and moisture levels in soil amended with either inorganic fertilizer or sewage sludge. Similar relationships will be observed for all soil types, but the critical points will vary due to variation in pore size and distribution. These data illustrate the limitation of using percent saturation or water-filled pore space as an index characterizing soil aeration, particularly when soils of differing bulk densities are compared.

## KENTUCKY BLUEGRASS THATCH CHARACTERISTICS FOLLOWING APPLICATION OF BIO-ORGANIC MATERIALS

W L Berndt, P E Rieke and J M Vargas  
HortScience  
Volume 25 Number 4  
Pages 412-414  
1990

Core cultivation combined with frequent topdressing has proven to be an effective thatch management procedure for creeping bentgrass turfs. Time and economic constraints may prohibit this approach for other turf situations, such as ornamental lawns. Enzymes and carbon compounds have been used to stimulate thatch microbial activity in the growth chamber. Use of pectinase and ferulic acid on red fescue thatch increased microbial activity and total cell wall content of thatch decreased.

Several new thatch control products have recently been produced for use in turf. These are organic materials that can serve as complete fertilizers and are enriched with micro-organisms thought to stimulate thatch decay. These materials have been termed bio-organics. Research at Michigan State University has been conducted to evaluate the status of existing Kentucky bluegrass [Victoria, Bristol and Cheri] thatch after treatment with three bio-organic materials applied at four rates based on nitrogen contents. Treated thatch was reduced in thickness and had increased earthworm populations when compared to untreated thatch. Thatch thickness was reduced with increasing levels of nitrogen, thatch lignin and earthworm populations. Thatch thickness was increased as thatch cellulose content increased.



"I believe a leaf of grass is no less than the journey-work of the stars."

Walt Whitman (1819-1892)



## Turfgrasses

### TURF GROWTH AND PERFORMANCE EVALUATION BASED ON TURF BIOMASS AND TILLER DENSITY

W M Lush  
Agronomy Journal  
Volume 82 Number 3  
Pages 505-511  
1990

Turf species, cultivars and cultural techniques are often evaluated using visual ratings. Visual rating systems, however, are subjective and consequently the results they produce can be inconsistent. We need objective, quantitative evaluation systems for turfs in order to put decision making in turf science and management on a more sound footing. Biological criteria that are related to turf growth, performance and appearance must be defined.

Evaluation methods used in crop science have limited application in turf science, because we are more concerned with the state of the standing vegetation than with the part that is harvested. In this emphasis on the standing vegetation, turf science has much in common with plant ecology. Turfs are densely populated stands, so it is likely that studies on other, crowded populations of plants, such as forests, may have something to offer.

One of the differences between forests and turfs is that forests are made up of large individuals [trees] and have a high total biomass per unit area. Turfs, by contrast with forests, are made up of many small individuals and have low total biomasses per unit area. In fact, it is this very observation: in crowded populations, the higher the biomass, the less dense is the population and the larger are the individuals in it; that is the basis of the power or thinning rule of population biology. The power rule defines, mathematically, the upper limits to population biomass at any given population density or vice versa.

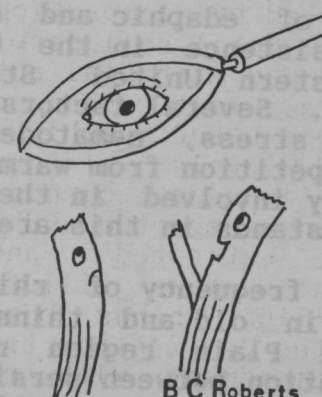


### Blades of Grass

SMILE !

He's checking  
our visual

quality !



Research conducted at the University of Melbourne in Australia has had as its objectives the comparison of turfs with other types of vegetation by reference to the power rule; the examination of whether the power rule governs the response of turfs to management inputs; the consideration of the use and interpretation of measurements of biomass and tiller density with respect to turf growth and function, and the examination of other parameters derived from measurements of biomass and tiller density which may be useful in evaluating turfs.

As applied to turfs, conformity to the power rule means that biomass is highest at the lowest tiller densities, with the consequence that very hard-wearing turfs may inevitably be coarse textured.

Estimates of the upper limits to biomass at tiller densities commonly found in turfs of different texture, suggest that there is more potential for the improvement of coarse turfs than fine ones. For turf assessment, biomass [alone or divided by tiller density to estimate mean tiller mass] is a useful guide to wear resistance. A measure of the fineness of turf texture is proposed. The use of biomass density [biomass divided by turf height] as a predictor of golf ball roll and lie would seem worthy of consideration.



## GREENHOUSE EVALUATION OF TALL FESCUE GENOTYPES FOR RHIZOME PRODUCTION

J P DeBattista and J H Bouton  
Crop Science  
Volume 30 Number 3  
Pages 536-541  
1990

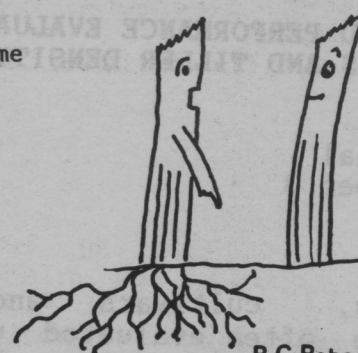
Although tall fescue is adapted to a wide variety of edaphic and climatic conditions, its persistence in the Coastal Plain of the Southeastern United States is severely reduced. Several factors, including heat and drought stress, nematodes, foliar diseases, and competition from warm-season grasses, are probably involved in the thinning of tall fescue stands in this area.

A high frequency of rhizomatous tall fescue plants in old and thinned pastures in the Coastal Plain region reflects a positive association between persistence and rhizomes. Rhizomes benefit a plant in various ways. They serve as organs of carbohydrate storage, which affects heat resistance and allows the plant to spread and compete better in a sward. Rhizomes also provide growing points under the surface of the soil, where they are better protected from temperature extremes and overgrazing.

Earlier taxonomic descriptions describe tall fescue without rhizomes. However, more recent descriptions include the presence of short underground stems or rhizomes with short internodes. Volunteer tall fescue plants in a Kentucky bluegrass sward, have exhibited a spreading habit and no clumpiness. Up to 30 percent of elongated lateral buds in a tall fescue sward have originated on rhizome nodes, indicating the importance of rhizomes in tall-fescue pasture dynamics.

## Blades of Grass

Don't judge me  
on my skin,  
look below  
the surface.



B C Roberts

Since endophyte infection in tall fescue causes plant growth modifications and its influence on rhizome expression is unknown, the objective of research at the University of Georgia has been to assess the possibility of using a greenhouse screening procedure for selecting endophyte-free tall fescue genotypes for rhizome production. Numbers of rhizomes and tillers were affected by pot size times plant age interactions. At least 7 months of growth were required before rhizome expression occurred in tall fescue seedlings under greenhouse conditions. These results support previous reports showing that evaluation in a single field location gives good estimation of the rhizome production capacity of tall fescue genotypes. However, greenhouse evaluation proves to be unsuccessful in screening tall fescue genotypes for rhizome production.



"Grass is what saves and holds the water that keeps life good and going ... It keeps the falling rain from flushing away. Blades of grass take water from the air and transpire it into the ground. That works the other way around too. Because grass blades help put water back into the air so that rain can fall again."

Theodore Roosevelt (1858-1919)



## PHYSIOLOGY

### LIMITATIONS OF PHOTOSYNTHESIS IN PERENNIAL RYEGRASS AFTER CHILLING

J W Moon, D M Kopec, E Fallahi, C F Mancino,  
D C Slack and K Jordan  
Journal American Society Horticultural  
Science  
Volume 115 Number 3  
Pages 478-481  
1990

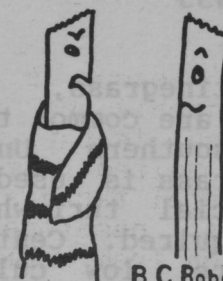
Many plant species originating in tropical and subtropical climates are classified as thermophilic and show dramatic reductions of growth when exposed to low but above-freezing temperatures. These chilling-sensitive plant species commonly incur damage between 0 and 15 degrees Centigrade [32 and 59 degrees Fahrenheit]. Chilling sensitivity is not restricted to thermophilic species, as some temperate plant species are also affected by chilling temperature. The photosynthetic apparatus of many thermophilic plant species is especially sensitive to chilling temperatures, and inhibition of photosynthesis after a chilling exposure may last for several days. Observations suggest that the lower the temperature, the longer the exposure to chilling, and the higher the light intensity during chilling, the greater the damage to photosynthetic capacity.

Perennial ryegrass is a temperate, cool-season grass used as forage and as a turfgrass. Turf type perennial ryegrasses are used as year-round turfs in maritime climates and in the mid-Atlantic region of the eastern United States. It achieves maximum turf performance under environmental conditions ideal for shoot - 20 to 25 degrees Centigrade [68 to 77 degrees Fahrenheit], and root - 12 to 15 degrees Centigrade [54 to 59 degrees Fahrenheit] growth. Thus, it is productive in only a narrow range of environmental conditions and is sensitive to many environmental stresses, including those from heat, salt, drought and cold.



### *Blades of Grass*

I know the sun  
can't get to me...  
but I'm chilled.



B C Roberts

Perennial ryegrass is seeded over bermudagrass turf in the desert southwestern United States to provide green playing surfaces on golf courses during the winter. When used as an overseeded turf during November through March, perennial ryegrass is often subjected to chilling temperatures. Dramatic decreases in calculated canopy conductance to water vapor following chilling exposures have been measured during attempts to use energy-balance approaches to schedule irrigation of ryegrass turf. Successful energy-balance approaches to scheduling irrigation depend on a correlation between canopy temperature and the water status of the plants.

Research at The University of Arizona has been conducted to determine the extent and duration of reduction in net photosynthesis of perennial ryegrass following a chilling exposure and to partition any photosynthetic inhibition into proportions due to stomatal and non-stomatal factors.

Photosynthesis was reduced by 85 percent to 90 percent in perennial ryegrass following a one-day chilling exposure at 8 degrees centigrade [46 degrees Fahrenheit] day and 5 degrees Centigrade [41 degrees Fahrenheit] night. Seven days of recovery at 22/17 degrees Centigrade day/night [72/63 degrees Fahrenheit] were required for full recovery of photosynthesis. More than 75 percent of the limitation in photosynthesis following chilling was due to non-stomatal factors. Photosynthetic capacity was reduced for 5 days following chilling.

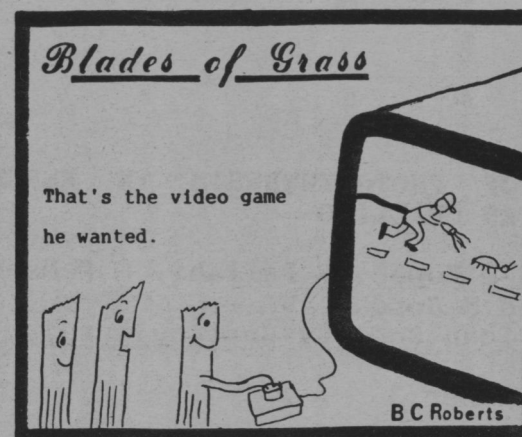


## PHOTOSYNTHESIS AS AN INDEX OF TURFGRASS GROWTH FOLLOWING APPLICATION OF HERBICIDES

T R Willard, C M Peacock and D G Shilling  
HortScience  
Volume 25 Number 4  
Pages 451-453  
1990

St Augustinegrass, centipedegrass and bahiagrass are common turfgrass species grown in the southern United States. St Augustinegrass is used primarily for lawns and commercial turf where fine leaf texture is not required. Centipedegrass is used for lawns where low cultural intensity is desired. Bahiagrass is common along roadsides and other low-maintenance areas because of its excellent drought, disease and insect tolerance.

In the southern United States, more than 100 weeds occur in turf. In Florida, about 70 weeds are found in turf with 25 of these causing frequent problems. These weeds cause significant economic losses due to the cost of chemical control, decreased turf quality, decreased land values and increased sod harvesting costs. Of these 25 weeds, 8 are annual grasses with annual bluegrass, crabgrass, goosegrass and crow-footgrass dominating. Research at The University of Florida has been conducted to evaluate the effects of sethoxydim, cloproxydim and fluazifop on photosynthesis and growth of Florialawn St Augustinegrass, Pensacola bahiagrass and centipedegrass to determine if photosynthesis could be used as a rapid nondestructive measure of relative susceptibility.



Under field conditions, St Augustinegrass was susceptible to sethoxydim and fluazifop applications, as indicated by a 40 percent and 38 percent reduction in apparent photosynthesis, respectively. Bahiagrass incurred a respective 62 percent and 51 percent reduction in apparent photosynthesis from sethoxydim and fluazifop application. Growth of these species, as measured by foliage dry weight, was also inhibited by both herbicides.

Centipedegrass growth was unaffected by sethoxydim, but was reduced 48 percent by fluazifop. Under greenhouse conditions, centipedegrass apparent photosynthesis was reduced by sethoxydim and cloproxydim [41 percent and 51 percent respectively], while fluazifop caused a 71 percent reduction. Growth of centipedegrass was significantly reduced only by fluazifop [83 percent].

These studies indicated that in vivo, photosynthetic measurements may provide a sensitive, rapid and non-destructive method for determining the susceptibility of turfgrasses to post-emergence grass herbicides.



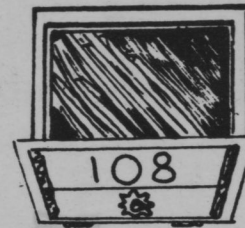
“Whoever could make ... two blades of grass grow where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together.”

Johnathan Swift (1667-1745)



# P.O. BOX 108

(COMMENTARY FROM THE MAIL)



Warvests  
23

## 1989-1990 NATIONAL GARDENING SURVEY

The newest Gallup survey sponsored by the National Gardening Association shows that lawn and garden retail sales totaled an estimated \$16.3 billion in 1989 compared to \$15.5 billion in 1988.

U S Households spent an average of \$245 each on their lawns and gardens in 1989, up from \$227 in 1988.

Seventy five percent of the 92.8 million households in America [70 million households] participated in one or more types of indoor and outdoor lawn and garden activities in 1989 compared to 76 % or 69 million households in 1988. From 1988 to 1989, the total U S household population increased by 1.7 million households.

Fifty three million households [57 %] participated in lawn care in 1989, the same number as in 1987 and 1988. Retail sales for lawn care products and equipment increased 6 % from 1988 to 1989 and \$5.3 billion to \$5.7 billion. Lawn care sales in 1989 reached a record high for the decade of the 1980's.

For information on the complete 300 page report, contact:

Bruce Butterfield  
National Gardening Association  
180 Flynn Avenue, Burlington VT 05401  
[802/863-1308]

## LOT PRICES SOAR

The Urban Land Institute reports their 1990 Residential Land Price Inflation Survey shows that the price of a 10,000 square foot lot with standard characteristics range from a high of \$230,000 in San Jose CA to a low of \$10,150 in Chattanooga TN. The price of an average lot has increased 62.5 % since 1985.

Selected metro area lot prices:

Region	1975	1985	1990
Boston	18,176	45,000	90,000
Minneapolis	9,500	22,000	25,000
Atlanta	8,000	16,000	18,000
Dallas	9,500	30,000	32,500
Miami	11,750	30,000	37,500
Boulder	11,500	35,000	43,000
San Jose	14,500	70,000	230,000

Landscaping, including nice lawns will add to the value of any property. There should be good opportunity for the Green Industry in light of the rising cost of building lots.

For more information on the survey:  
Tom Black [202/624-7112]  
Andrea Keeney [202/624-7087]  
The Urban Land Institute  
625 Indiana Ave NW  
Washington DC 20004

## TURFGRASS INFORMATION FILE

Just a reminder that the USGA Turfgrass Information File is at the Library at Michigan State University and a good place to get information. Peter Cookingham is in charge. Phone: 517/353-7209.





## THE LAWN INSTITUTE

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Lawn Institute Harvests is published four times a year by The Better Lawn and Turf Institute. The headquarters office address is P O Box 108, Pleasant Hill, Tennessee 38578-0108. Phone: 615/277-3722. Inquiries concerning all aspects of this publication may be addressed to the headquarters office.

The Better Lawn and Turf Institute is incorporated as a nonprofit business league formed exclusively for educational and research purposes concerned with agronomic, horticultural and landscape concepts.

Lawn Institute Harvests is dedicated to improved communications among turfgrass seed and allied turf industries and other firms, businesses, organizations and individuals with lawngrass research and educational interest and concerns.

Editor: Eliot C Roberts, PhD

Associate Editor: Beverly C Roberts, MA

Printer: Crossville Chronicle (Tennessee)