January 1992

LAWN INSTITUTE

Harvests

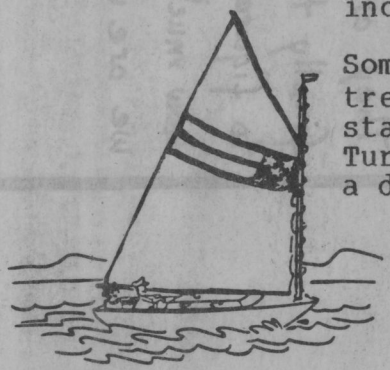
Volume 38 Number 4

THE HARVEST MIX

Bev and Eliot will be retiring May 1,1992 so these are a few final comments: the Final Report of Dr Eliot C Roberts, Executive Director, to The Lawn Institute membership given November 2,1991; and "What in the World is Going On ?" by Beverly C Roberts, Office Manager.

Threshing the Journals is an overview of insect and disease related reports from the 1981,1985 and 1989 Proceedings of the International Turfgrass Research Conferences.

Reviews of selected talks given in 1991 at the Massachusetts Turfgrass Conference and the Kentucky Turfgrass Conference are included.



Some mail announcements are shared. A few trends are listed. "The Last Word" gives some stats that might be used so that you as a Turf Industry rep might have the last word in a discussion.

REPORT TO LAWN INSTITUTE

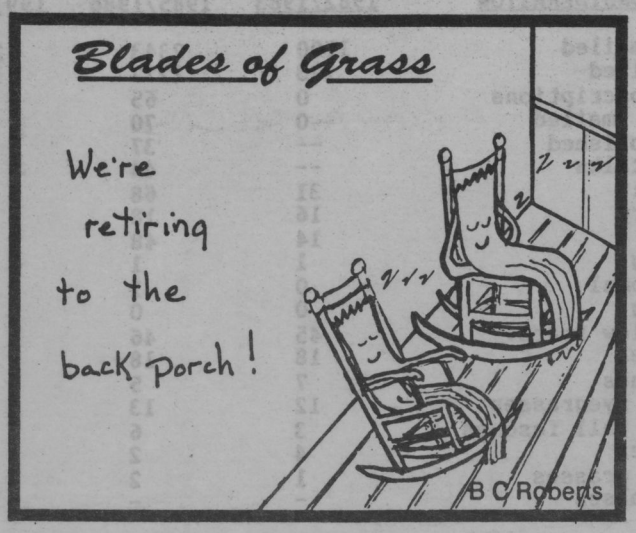
MEMBERSHIP

November 2,1991

by

Eliot C Roberts
Director
The Lawn Institute
Pleasant Hill, Tennessee

With retirement scheduled for May 1,1992, this will be my last annual report to membership of The Lawn Institute. It seems appropriate to review briefly some of the changes taken place in the past nine years. Not all that we hoped to accomplish was realized; however, we feel that the examples cited indicate clearly the importance of who we have been and what we did. Now is the time to make a commitment for the next 10 years through the funding of a full time office program. Bev and I have appreciated the opportunity to work with you and look forward to continuing success for the Institute under new leadership.



Topic Outline

- Mailing Lists - In 1982, there were approximately 1000 cards in a flat file; now we have nearly 5000 in 6 rotary files. Mailing lists are still mostly northern as they were in 1982.

- Harvests was distributed quarterly to members only in 1982; now it is sent to approximately 1500, including all members, four times a year. Format has changed to a 24 page tabloid.

- Press Kits were mailed twice a year in 1982; now they are sent out quarterly. The northern mailing list has increased from 1000 to 2500.

- Lawn-O-Gram - membership LOG of Institute programs and projects is mailed quarterly to some 135 members. This newsletter is new since 1982.

- Lawn Institute Special Topic Sheets [LISTS] are new since 1982. At present there are 102 of these.

- LISTS Notebook [professionally printed] is new [1991]. It contains 385 pages consisting of selected topics from the 102 LISTS.

- Sports Turf Management Kit was developed to provide guidelines for construction and maintenance of safer sports turf. At the present time this is in need of revision.

- Lawn and Sports Turf Benefits booklet and ABC's executive summary were released in 1989. The booklet contains 31 pages.

- The Lawnscape booklet was released in 1990. It contains 40 pages.

- Lawn and Sports Turf History will be released in 1992 and will contain about 50 pages.

- A Lawn Tending Shopping List will be released early in 1992 and will contain about 50 pages.

- In the past 9 years, 90 articles have been published in trade journals for an average of one every 1 1/4 months.

- In the past 9 years, 105 talks have been presented at turf related conferences in the United States and Canada for an average of one every 1 1/8 months.

- Telephone contact provides a major means for The Lawn Institute to become involved with other communicators.

- A service of providing special topics information in exchange for a self-addressed, stamped envelope has proven popular.

- Lawn Institute library holdings have increased by acquisition of selected books and by the donation of the Director's library upon retirement.

- A seven hour seminar, "The Biology of Turfgrass Soils" was prepared for the Golf Course Superintendents Association of America. These have been well attended.

- "Threshing the Journals" has proven to be a popular feature of Harvests.

- The Research Synthesis format has had unique advantages in Lawn Institute communications.

- Effort has been made to develop and maintain liaison with other Green Industry societies and associations.

- Complimentary Membership is offered to Turf Research and Education Specialists who support objectives of The Lawn Institute. This recognition is new since 1982.

Projects and Topics De-emphasized

- Until 1982, turf research plots were maintained in Marysville, Ohio. These were discontinued and not reestablished in Pleasant Hill, Tennessee.

- Until 1982, some seed distribution for testing and evaluation was handled through the Marysville, Ohio office. This was discontinued and not reinitiated from Pleasant Hill, Tennessee.

- Attempts to obtain seed production and distribution data were not successful. Thus, this information could not be used effectively in the Pleasant Hill, Tennessee office.

- Attempts to become more involved in seed education fell well short of expectations because of the lack of data.

- A Seed Technology Seminar was prepared for the Golf Course Superintendents Association of America. This was cancelled upon the request of the Lawn Institute Executive Committee.

- Several seed related articles were published, but this series was cut short because of restrictions in handling seed related information.

- Some progress was made in developing rough drafts of cartoon material relating lawns and environmental education. Funding for production and distribution of this type of material could not be found.

- Some attempts were made to have Lawn Institute exhibits at trade shows and conferences. Costs and staffing of these were found difficult to arrange.

- Need was recognized to develop printed guidelines on the assessment of lawn value in real estate. A more thorough study of this issue is required before writing can begin.

- Need has been recognized to be present at turf field days across the country. Neither adequate time or funds have been available to do this.

- Need has been recognized to upgrade Lawn Institute photo and slide files. This is an expensive project.

- Minimal effort has been expended in obtaining new members. Since 1982, membership has increased nearly four fold.

THE LAWN INSTITUTE

DIRECTION OF CHANGE

ITEMS FOR CONSIDERATION	1982/1983	1985/1986	1991/1992
Press Kits mailed	1100	2343	2454
Harvests mailed	173	1277	1800
Harvests subscriptions	0	65	75
Lawn-O-Gram mailed	0	70	126
Articles published	--	37	90
Conference talks	--	44	107
Memberships:	31	68	121
Proprietary	16	18	20
Affiliate	14	48	92
Supporting	1	1	4
International	0	1	5
Sponsoring	0	0	0
Variety Review Board:	45	46	52
Bluegrasses	18	18	21
Fine fescues	7	5	7
Perennial ryegrasses	12	13	10
Turf type tall fescues	3	6	6
Bentgrasses	4	2	3
Specialty grasses	1	2	3
Bermudagrasses	-	-	2
Expenditures:	$57,460	$65,967	$89,869 *

* 1990/1991

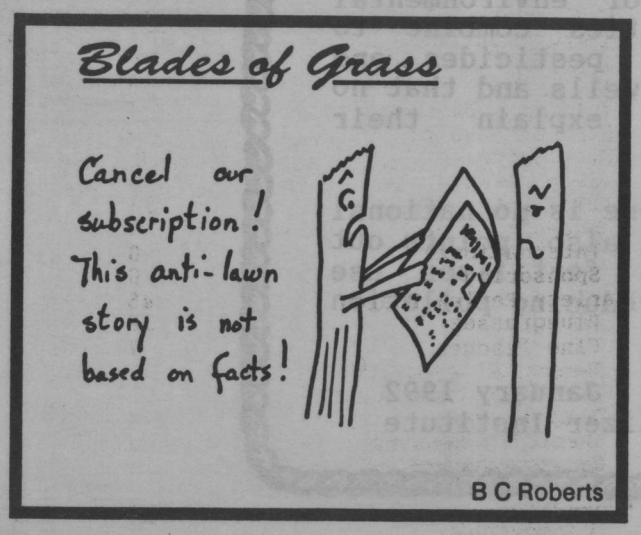
WHAT IN THE WORLD IS GOING ON?

by

Beverly C Roberts
Manager
The Lawn Institute

It was almost ten years ago that I started with The Lawn Institute and at that time, even with a background in biology, I was not really familiar with The Green Industry. It always seemed to me that lawns were about as American as apple pie and Motherhood but then that all seems to have changed and not many voices really seemed to scream out that something is going on that is just not right.

During these ten years, apple pie even became tainted. The Alar scare which was apparently planned and perpetrated by a public relations group did untold damage to the Apple Industry and to horticulture in general. But, it did more than that. It seems to me that this particular scare, even more than the ones about cranberries, fish, red meat, dairy products [and in fact almost every food we eat] pounded a very large spike into the American dream. When a child can't eat an apple; when apple juice can't be served in schools [but sugar laden pop is at the cafeteria] and the apple pie is removed from our list of pleasurable experiences, we are very close to losing the very essence this country was built on.



Lawns are also a part of the American dream. The history of lawns dates back to the early Chinese dynasties, but it has been in this country that the beautiful carpet of green has become a real symbol of freedom of expression, neighborhood, and, yes, even democracy. The home lawn, once an unreachable privilege of the rich, is now a part of even modest residences and of multi-family complexes. Research on the benefits of the grass system has shown that this love affair Americans have with lawns is not just aesthetic. Yes, green lawns are a beautiful frame for whole structural complexes. It isn't just a monetary thing although well designed landscapes that include lawns do add to the value of home and commercial properties. But more than these benefits, without ever putting it into words, people just know that the color, texture, resiliency, and cool feeling of turf is something that is "good" to have.

The grass system is the best in the world to hold and create/enrich soils. The most productive soils in the world were formed under grasslands. Grass is used for soil and water conservation and to prevent erosion. Blades of grass do help cool the surrounding atmosphere. They clean the air and add oxygen. Grass cuts down glare, helps minimize injuries in sports, and provides an unfavorable home for pests that annoy all of us.

OK. I am convinced that a lawn is a great asset. So are the thousands of professionals and homeowners that have contacted The Lawn Institute during these ten years. You should read some of the letters we receive. Many people consider their lawn in the same terms as if it were a beloved pet. Gardeners work hard to have the best lawn possible and are grateful for any help we can provide.

Then, where has the anti-lawn harassment come from and why are people threatened by inaccurate reports that having a well cared for lawn can be hazardous ? One would think that when people care for something so much there would be a swell of public opinion that would counter such accusations and attacks. But, look back to what has happened. People have been conditioned to doubt and fear and the level of terror has left us not knowing what to believe, and how to respond. Certainly if an apple is going to hurt a little child or if a pesticide used on a soccer field to help the grass grow thicker and form a better cushion for young athletes might have some adverse effect, one wouldn't want to be on the "wrong" side. What is "right" and what is "wrong" in this scenario?

We as a public are unnerved. Each week in the grocery store, I hear someone say: "I suppose there is something wrong with this item but then, there is something wrong with everything we eat so I don't know what to do". Now that is sick, but that is where we are. This is a direct effect of one form of terrorism. Sure, we don't want to take any unnecessary risks or put our children in a position of becoming ill, but the print, radio and TV media have been fed over and over reports based in many instances on fiction rather than scientific fact. These media exercises have added unnecessarily to the level of public panic in this country today.

We, as humans, have done a poor job keeping our surroundings in good shape and have been awakened to the fact that as more people populate an area, things change. We can't continue to throw trash on the side of the road, or put our water supply in jeopardy. As the population grows, we have to expect to have more regulations to try to protect our living space. But, as population grows, so does the level of stress. It is difficult enough to cope with the real problems in this world without having the media feeding us a new problem that has just been added to their agenda and for which there is no resolution. It is also not realistic to feel that we can live in a zero risk society. Activists have collected billions of dollars which are used to influence the media and politicians [local, state and national] often using statistics in a twisted fashion which frighten the public who then respond with demands for government controls that are a real threat to our very existence.

As a final thought, as I retire from The Lawn Institute, I just want to tell you that from all the information gathered, from all the research reports studied, I want to finish my stint here happily carrying a banner saying "I love my lawn" and am proud of the fact that I have such a great piece of God's creation right here in my yard. Yes, all lawn lovers stand tall and tell the story of this impressive little grass plant. Any one who tends a lawn is a true conservationist, has a real environmental conscience, and is a protector of nature.

EPA RELEASES WATER SURVEY II

The recently released Phase II Drinking Water Well Survey by the Environmental Protection Agency concludes that nitrate occurrence in United States waters is a limited, site-specific problem and cannot be generally predicted by a simple set of factors. "We conclude that a variety of environmental conditions and human activities combine to affect the occurrence of pesticides and nitrate in drinking water wells and that no one single factor can explain their presence."

This survey shows that there is no national water quality problem. It also points out that a simple reduction in fertilizer use will have little effect on reducing pollution of water.

- Action January 1992
The Fertilizer Institute

THREADING THE JOURNALS

INSECT AND DISEASE RELATED RESEARCH REPORTS FROM PROCEEDINGS OF INTERNATIONAL TURFGRASS RESEARCH CONFERENCES

The International Turfgrass Society sponsors a research conference every 4 years. The first was held in England in 1969 with conferences since then in:

- 1973 - United States
- 1977 - Germany
- 1981 - Canada
- 1985 - France
- 1989 - Japan.

A Proceedings of each conference is published. These contain a wealth of technical information and feature research by scientists from all countries involved in turfgrass investigations. More information on the availability of these proceedings can be obtained from: Dr R E Schmidt, ITS Secretary-Treasurer, 235 Smyth Hall, Virginia Tech and State University, Blacksburg, Virginia 24061.

Here we have reviewed briefly the papers presented at conferences in 1981, 1985 and 1989 [essentially the past 10 years] that were concerned with insect and disease related research. This look at past accomplishments will help prepare us for current technological advances for the 1990's.

KEY TO PROCEEDINGS

1 - Proceedings of the Fourth International Turfgrass Research Conference.
R W Sheard, Editor
The Ontario Agricultural College, University of Guelph, Guelph, Ontario Canada
1981

2 - Proceedings of the Fifth International Turfgrass Research Conference.
F Lemaire, Editor
Institut National de la Recherche Agronomique, Paris, France
1985

3 - Proceedings of the Sixth International Turfgrass Research Conference.
H Takatoh, Editor
Japanese Society of Turfgrass Science
Tokyo, Japan
1989

INSECT PROBLEMS AND TURF RESISTANCE

ENDOPHYTE-ENHANCED RESISTANCE IN PERENNIAL RYEGRASS TO SOD WEBWORM AND HAIRY CHINCH BUG. - 3

J K Mathias, J L Hellman and R H Ratcliffe
Pages 329-331

Various species of endophytic fungi, Acremonium species, have been reported to confer insect resistance to plants in the Poaceae family. Two major insect pests of turfgrass, the hairy chinch bug and the bluegrass sod webworm, have been used in bioassay studies to examine the components of the resistance response.

First instar nymphs and adult chinch bugs reared in endophyte-infested ryegrasses had significantly lower survival rates. A preference study demonstrated the insects ability to detect the presence of the endophyte, consistently selecting endophyte-free plants for feeding.

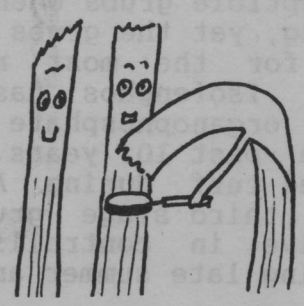
First and Fourth instar sod webworm larvae caged on endophyte-infected ryegrasses had significantly lower survival rates than larvae reared on uninfected ryegrasses 10 days after caging. A preference study with first instar larvae showed that the insect consistently selected and fed on endophyte-free plants.

THE IMPORTANT TURFGRASS PESTS OF JAPAN. - 3

M Hatsukade
Pages 333 - 335

Research on turfgrass pests of Japan has been conducted since 1972. Some 40 species referred to as important turfgrass pests are recognized today. Some of these are introduced species, the most notable being the bluegrasss webworm, the hunting billbug and the rhodesgrass mealybug.

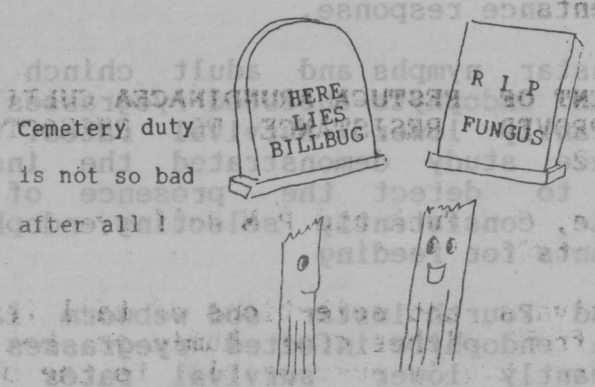
He's on duty watching for the first sign of insect damage.



PROBLEMS AND PERSPECTIVE OF DESTRUCTIVE TURFGRASS INSECTS IN JAPAN. -3

M Yashida
Pages 61-68

Destructive turfgrass insects in Japan are divided broadly into two categories: that of insects common to Japan that have become destructive along with the increase in turfgrass area and that of parasitic invading destructive insects that are thought to have accompanied the importation of turfgrass. As of 1988, over 43 types of destructive insects belonging to the Coleoptera, Lepidoptera, Hemiptera, Diptera, Orthoptera and Nematode types have been discovered and there is a trend of further increase through changes in agricultural species and methods of cultivation.



LIMITATIONS OF ORGANOPHOSPHATE SOIL INSECTICIDES ON TURFGRASS SCARABAEID GRUBS AND RESOLUTION WITH ISOFENPHOS. -1

H Tashiro
Pages 425-432

The currently registered organophosphate insecticides for grub control in turfgrass - Diazinon, Chlorpyrifos, Trichlorfon and Ethoprop - provided only fair control with failures at sufficient frequency to be of major concern. Primary reasons contributing to poor performance include short residual activity, restricted distribution of deposit, effect of higher soil pH, presence of thatch, influence of low soil moisture and larger, less susceptible grubs when soil temperatures are cooling, yet the grubs are in the optimum location for the most rapid insecticidal action. Isofenphos has been the most promising organophosphate soil insecticide during the past 10 years. Applications to established turf during April control the existing third stage grubs and are equally as effective in controlling the following brood during late summer and early fall.

MANAGEMENT OF SCARABEID COMPLEX ON COOL SEASON TURFGRASS IN THE NORTHEAST USA -2

P B Baker
Pages 663-670

The white grub complex remains the number one pest of cool season turfgrass in the Northeast. Historically, this complex has been controlled by insecticides from lead arsenate prior to 1950 through the chlorinated cyclodienes during 1950-60's to our present organophosphates. One of the promising new materials, due to the relatively long residual activity is Oftanol ® isofenphos. In 1982, however, many failures were reported on Long Island, New York. Questions relative to formulation, thatch, irrigation and timing of application needed resolution.

Five formulations of isofenphos in upstate New York soil produced moderate mortality on 3rd instars of the Oriental beetle and the European chafer. Long Island, New York soil reduced the effectiveness of all formulations to the Oriental beetle. This soil contained over 150 ppm of arsenic. It was toxic to the European chafer but not the Oriental beetle grubs.

CONTROL OF WHITE GRUBS IN TEXAS TURFGRASS WITH INSECTICIDES. -2

R L Crocker
Pages 671-678

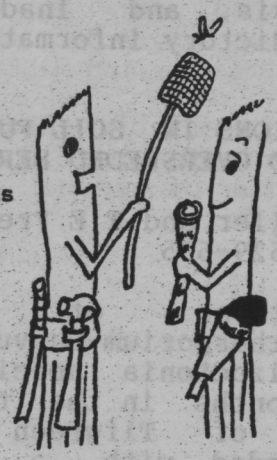
Insecticide experiments on white grubs in Texas demonstrated that only Isofenphos 6E performed equally well on all test dates. The best treatment date was five weeks following 90 percent of the reproductive flight. In 1984, insecticides were applied to Phyllophaga crinita larvae 13 weeks after 90 percent of the adult reproductive flight. Insecticides [in order of increasing efficacy] were: Trichlorfon, Isofenphos, Diazinon, Isazophos, and Chlorpyrifos. These experiments indicate that treatment after minor turf injury develops may be feasible.

SOD WEBWORM

BERMUDAGRASS RESISTANCE TO THE TROPICAL SOD WEBWORM. -3

J A Reinert, P Busey and F Bilz
Pages 325-327

Thirty clonal selections of bermudagrass were exposed in field cages to adults of the tropical sod webworm. This webworm is a severe pest of turfgrasses in the lower Southeastern United States, especially Florida, and many islands of the Caribbean Archipelago. Fewer larvae completed development to adults on PI-298750, PI-290884, PI-290899, PI-289931, Tuffy Ormond, Tufcote, U-3 and Tiffine relative to other commercial cultivars and genotypes. Adult preference or larval antibiosis/tolerance was exhibited. The four PI's exhibited cross resistance to the fall armyworm.



DISEASE RESISTANCE

THE SEASONAL RELATIONSHIP BETWEEN POLYPHENOL LEVEL AND HELMINTHOSPORIUM DISEASE ACTIVITY ON Kentucky BLUEGRASS. -1

J K Mathias, C L Mulchi and J R Hall
Pages 397-404

High concentrations of polyphenols in tissue may influence the resistance of Kentucky bluegrass to Helminthosporium species. Seasonal trends were observed for both polyphenol levels and Helminthosporium disease activity. Phenolic concentrations were highest during the fall and spring. Maximum disease activity occurred over a two-month period extending from May 1 to July 1. As polyphenol concentration decreased, the incidence of Helminthosporium increased for four of six cultivars - Kenblue, Merion, Fylking and Cougar Kentucky bluegrasses. These results suggest that the role of total plant polyphenol levels in host-parasite interactions should be compared with other metabolic parameters.

SHADE ENVIRONMENT - DISEASE RELATIONSHIPS OF Kentucky BLUEGRASS CULTIVARS. -1

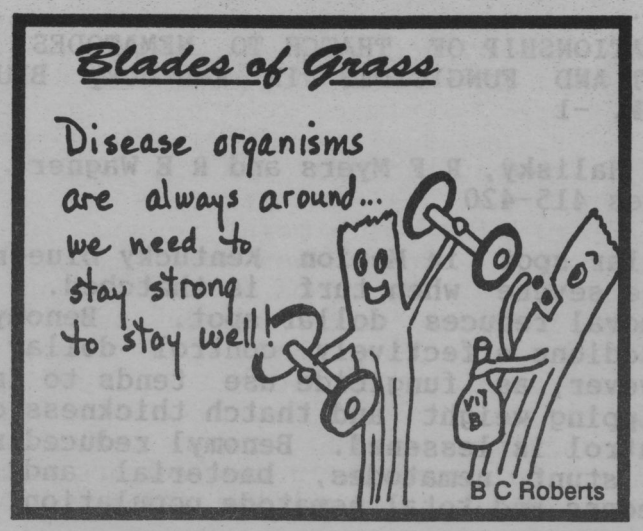
J M Vargas and J B Beard
Pages 391-395

Helminthosporium melting-out was a major disease of 18 Kentucky bluegrass cultivars growing in the shade of maple trees where the incident light was 5 percent of normal sunlight. Powdery mildew became a problem on about half the cultivars in the late summer and fall only. Without fungicide treatment, only Bensun and Nugget Kentucky bluegrass retained their resistance to melting-out under low light intensities. The excellent resistance of Pennstar, Flyking, Merion, Belturf and Galaxy to melting out in full sunlight did not occur under low light conditions. The study showed that disease resistance of certain cultivars in full sun cannot be extrapolated to shaded environments.

DEVELOPMENT OF FESTUCA ARUNDINACEA CULTIVARS WITH IMPROVED RESISTANCE TO RHIZOCTONIA SOLANI. -2

B B Clarke, C R Funk and P M Halisky
Pages 641-646

Most cultivars and selections of tall fescue obtained from either cool humid or hot dry regions are highly susceptible to the brown patch disease incited by Rhizoctonia solani under turf maintenance. Cultivars developed from naturalized ecotypes surviving in warm humid regions of the united States show a substantial improvement in resistance to brown patch; however, no source of high resistance has yet been found. Resistance may be partially associated with improved adaptation and stress tolerance. Germplasm collection and population improvement programs utilizing progeny testing under turf maintenance are being conducted to obtain additional improvements in disease resistance and associated stress tolerance.



THREADING THE JOURNALS continued

DEVELOPMENT OF PERENNIAL RYEGRASS CULTIVARS WITH IMPROVED RESISTANCE TO RHIZOCTONIA BROWN PATCH. -3

B B Clarke, J M Johnson-Cicalese and C R Funk
Pages 337-340

Turf field trials were conducted between 1973 and 1987 to develop and select perennial ryegrasses with improved resistance to Rhizoctonia brown patch under field conditions at Adelphia and North Brunswick, New Jersey. Throughout the study, perennial ryegrass cultivars and selections differed substantially in disease reaction. Most ryegrass cultivars originating from the cool summer climates of Northwestern Europe, New Zealand or Canada were highly susceptible under frequent close mowing. Recent germplasm from areas of Europe with a more continental climate, however, produced cultivars with moderate levels of disease resistance. Cultivars developed from naturalized ecotypes in the Mid-Atlantic region of the United States exhibited the most significant improvements in brown patch resistance. These include Commander, Palmer, Pennant, Pinnacle, Premier, Sherwood, SR-4000, SR-4100, and Tara. In many cases, the plants ability to resist and recover from Rhizoctonia brown patch was correlated with improved heat and drought tolerance.

CULTURAL PRACTICES INFLUENCING DISEASE

RELATIONSHIP OF THATCH TO NEMATODES, DOLLAR SPOT AND FUNGICIDES IN Kentucky BLUEGRASS TURF. -1

P M Halisky, R F Myers and R E Wagner
Pages 415-420

Dollar spot in Merion Kentucky bluegrass is more severe when turf is thatched. Thatch removal reduces dollar spot. Benomyl and Iprodione effectively control dollar spot. However, as fungicide use tends to increase clipping weight and thatch thickness disease control is lessened. Benomyl reduced numbers of stunt nematodes, bacterial and fungal feeders and total nematode population.

A SURVEY OF DISEASES OF TURFGRASSES IN SOUTH AFRICA. -2

M D E Knox
Page 857

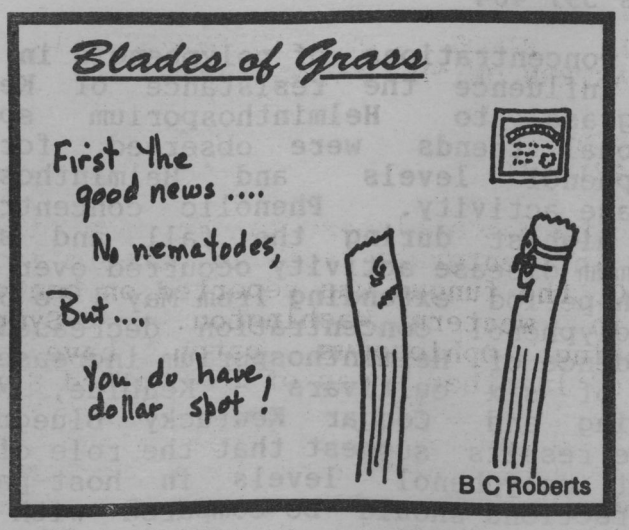
A preliminary survey of turf diseases was carried out on golf courses and bowling greens through South Africa. The most frequently occurring and also the most widespread disease was dollar spot. It was recorded by 28 of the 43 participants. Other problems mentioned frequently were Helminthosporium type diseases [19 cases] and fairy ring [18 cases]. In addition, specific and isolated cases of Phythium blight have been diagnosed and Fusarium blight was suspected in one case.

One of the major problems, which became apparent, was the lack of rapid accurate diagnosis, and inadequate and sometimes contradictory information on treatment.

VARIATIONS IN SOIL FUNGAL POPULATION UNDER NON AND OVERSEEDED BERMUDAGRASS. -2

C P Muller and T E Freeman
Pages 629-635

Populations of Pythium species, Helminthosporium-Curvularia species complex and Rhizoctonia species were monitored for nine months in the thatch and soil beneath swards of Tifgreen hybrid bermudagrass overseeded with a blend of perennial ryegrasses and not overseeded. There was a ten-fold greater population of species of Pythium and Helminthosporium-Curvularia complex in the thatch than in the soil. Population of Rhizoctonia species varied and on occasion was similar in both depths. Overseeding did not affect the population of fungi in either thatch or soil.



DISEASE MANAGEMENT TECHNOLOGY AND STRATEGIES. -2

N R O'Neill
Pages 57-62

Diseases are among the most important of the factors that significantly reduce the quality and performance of turfgrasses. In the United States more than 50 million dollars are spent for fungicides each year to control grass diseases on golf courses alone. Still the loss of individual stands from outbreaks of disease each year is large.

Turf under low maintenance is often under less disease pressure than highly fertilized and irrigated turf. Disease control strategies, if any, are usually limited to modifications in cultural practices [irrigation, mowing height and frequency, fertility levels] and use of grass species, cultivar or blend with tolerance to major diseases.

As the components of turf disease management become more complex, disease management strategies will increasingly require communication and cooperation among the experts who study and understand the chemistry, genetics and biology of the grass host and pathogen, as well as those who can effectively use and apply the strategies.

PATCH DISEASES

TAKE-ALL PATCH OF TURFGRASS IN THE NORTHEASTERN UNITED STATES. -1

N Jackson
Pages 421-424

Ophiobolus patch disease is a common cause of damage in bentgrass turf in western Europe. In 1960, the fungus was reported on bentgrass turf in western Washington. Symptoms resembling Ophiobolus patch have been observed in other areas of the United States, the Midwest and New England. In 1975, the fungus was identified in Rhode Island. Since 1975, further outbreaks have occurred in Massachusetts and in 1980, it was found in Maryland. Kentucky bluegrass is less severely infected than bentgrasses.

THE ISOLATION OF A TOXIN FROM SPRING DEAD SPOT AREAS IN BERMUDAGRASS TURF. -1

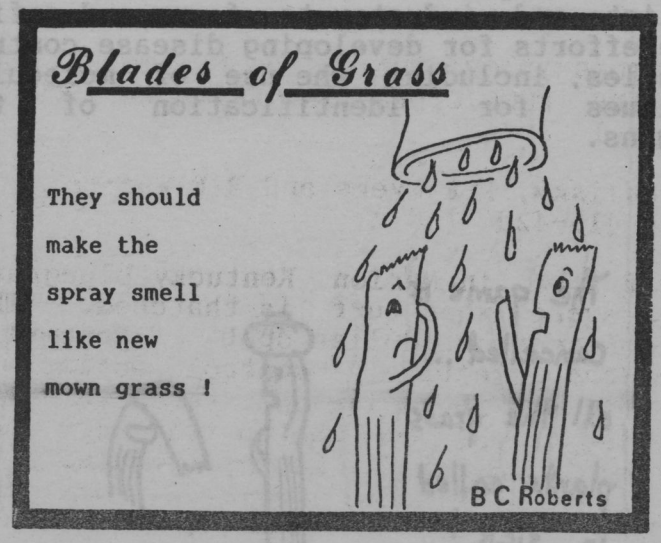
T W Fermanian, R M Ahring and W Huffine
Pages 433-441

Although a pathogen related toxin is suspected as the cause of the turf disease, coined "Spring Dead Spot", isolation and bioassay of the toxin has never been accomplished. Analysis of the bioassay data from studies in Oklahoma where water and ethanol soil extracts were used, showed no evidence of toxin activity. The bioassay of methanol extracts of soil, however, showed a highly significant reduction in seed germination and seedling shoot and root development. Thus, evidence for the existence of one or more toxins is increasing.

IDENTIFICATION OF GAEUMANNOMYCES-LIKE FUNGI ASSOCIATED WITH PATCH DISEASES OF TURFGRASSES IN NORTH AMERICA. -2

R W Smiley, R T Kane and M Craven-Fowler
Pages 609-618

Patch diseases of turfgrasses in North America are caused by a more diverse group of pathogens than was previously recognized. Take-all patch, summer patch, necrotic ring spot and spring dead spot are each different. Ecologically and/or taxonomically related fungi have also been isolated. These fungi are difficult to identify, and guidelines for this process are lacking in the turfgrass literature.



BIOASSAY OF PHYTOTOXINS ASSOCIATED WITH HEALTHY AND PATCH DISEASE-AFFECTED POA PRATENSIS TURFGRASS. -2

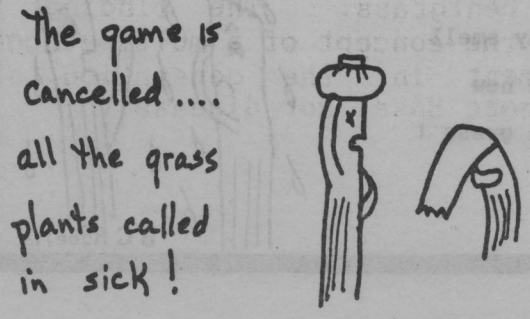
R W Smiley, M Craven-Fowler and L Buchanan
Pages 619-628

Seed germination assays with methanol extracts of Kentucky bluegrass turfs were used to determine if phytotoxins were associated with patch diseases caused by Phialophora graminicola and Leptosphaeria korrae. Highly toxic unidentified compounds were present in extracts of healthy and patch-affected turfgrasses on most sampling dates at four locations. Extracts applied to mature turf killed root cortical and apical meristem cells, and enhanced the progress of disease caused by Phialophora graminicola. Phytotoxins are possibly associated with predisposition to disease and with failures of direct-drill overseedings. Applications of triadimefon to turf in the field enhanced the phytotoxicity of extracts and could therefore also interfere with overseeding programs.

BIOLOGY OF SOILBORNE PATHOGENS CAUSING PATCH DISEASES OF TURFGRASSES. -3

R W Smiley
Pages 55-60

At least five new patch diseases and/or agents were reported in North America during the past decade. Common names include: necrotic ring spot and summer patch, spring dead spot, take-all patch, sclerotium blight, Pythium-induced root dysfunction, yellow patch and yellow ring. Our understanding of the taxonomy and ecology of pathogenic species of Rhizoctonia was expanded greatly during the decade. This progress has contributed significantly to the ability of scientists and industry to focus and refine future efforts for developing disease control strategies, including the use of molecular techniques for identification of the pathogens.



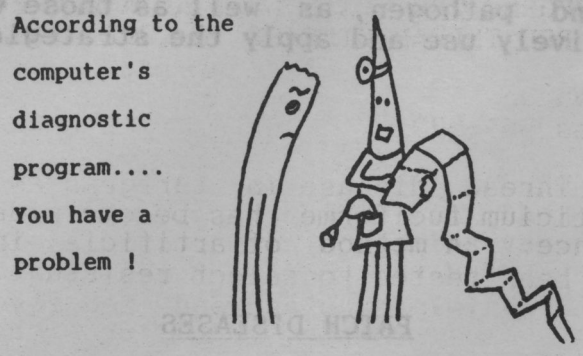
RHIZOCTONIA

ZOYSIAGRASS DISEASES OF LARGE PATCH AND SPRING DEADSPOT CAUSED BY RHIZOCTONIA. -3

K Kobayaski
Pages 345-347

The outbreak of large patch in zoysiagrass started comparatively recently. It is thought to be caused by Rhizoctonia solari. With regard to the conditions necessary for the outbreak of the disease, it occurs when there is plenty of rainfall and particularly in areas with poor drainage, but if lawns suffer physical damage, then outbreak of the disease occurs more easily.

Outbreaks of Spring Deadspot in zoysiagrass have been observed for a long time. When damage occurs, it builds up in grayish white or brown circular patches in early spring. The cause has not been determined. Evidence is available indicating a relationship with Rhizoctonia.



PYTHIUM

PATHOGENIC PYTHIUM SPP FOUND IN FOUR DIFFERENT TURF DAMAGES OF ZOYSIA GREENS. -3

T Ichitani, H Tanpo, A Ueda and T Tani
Pages 341-343

Pythium species pathogenic on zoysiagrasses were frequently isolated on selective medium from areas of damaged turf on zoysia greens. Four different types of turf damage were noted. Different Pythium isolates were found in turf showing different types of turf damage. In addition, Pythium vanterpoolii and Pythium graminicola were detected as pathogens between November and May of the next year, whereas Pythium periplocum was the pathogen from May to August.

THRESHING THE JOURNALS continued

RED THREAD AND PINK PATCH

ETIOLOGY OF RED THREAD AND PINK PATCH DISEASES IN THE UNITED STATES. -2

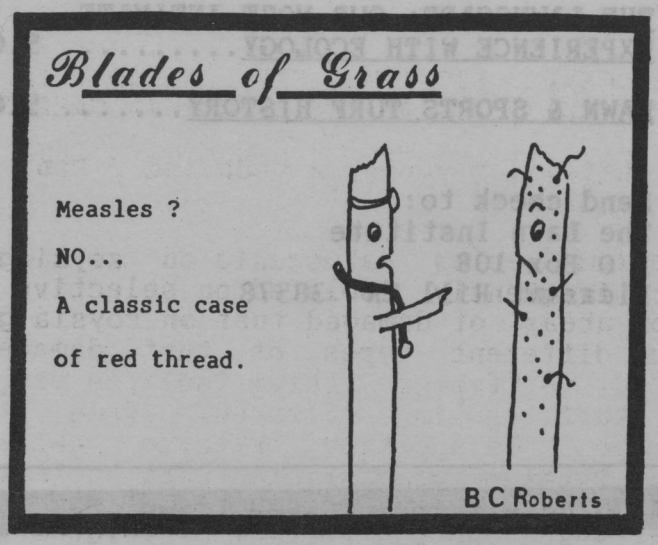
N R O'Neill and J J Murray
Pages 595-607

Fifty-eight fungal isolates were obtained from pink diseased foliage of gramineous hosts from different regions in the United States. Distinguishing characteristics of fungi causing either Red Thread or Pink Patch were red threads [sclerotia] vegetative cell nuclear number, hyphal cell width, presence or absence of clamp connections, growth rate in vitro, and morphology of the teleomorph. The predominant pathogen isolated was Laetisaria fuciformis which causes Red Thread. Laetisaria roseipellis which causes Pink Patch was most often associated with bentgrass, perennial ryegrass and bermudagrass. Differences in susceptibility to Red Thread were found among cultivars and experimental selections of Kentucky bluegrass, perennial ryegrass and tall fescue.

FACTORS IN THE INFECTIOUS DEVELOPMENT AND IMPREGNATION CHARACTERISTICS OF CORTICIUM FUCUFORME THE PATHOLOGICAL AGENT RESPONSIBLE FOR RED THREAD DISEASE IN TURF GRASSES. -2

A Bahuon
Pages 569-577

Red Thread disease in turfgrasses caused by Corticium fuciforme has become widespread in France. A method of artificial inoculation has been tested to select resistant cultivars of perennial ryegrass and red fescue. In order to produce infection, the correct humidity, temperature and a low nitrogen nutrition are required.



ANTHRACNOSE

ANTHRACNOSE OF POA ANNUA: THE PATHOGENICITY OF COLLETOTRICHUM GRAMINICOLA. -2

J M Vargas and R Detweiler
Pages 637-640

Anthracnose, caused by Colletotrichum graminicola, was associated with decline of annual bluegrass on golf courses during periods of warm weather. The confirmation of this fungus-host relationship was confirmed through repeated inoculation of healthy annual bluegrass plants with three fungus isolates and recovery fo these isolates from infected plants. Symptoms on infected leaves were yellow mottling and longitudinally-elongated dark green water-soaked lesions which faded to tan or brown and developed acervali with setoe. Severely infected leaves withered and died.

COLLECTOTRICHUM GRAMINICOLA AS AN INCITANT OF ANTHRACNOSE/BASAL STEM ROTTING OF COOL SEASON TURFGRASSES. -2

N Jackson and V J Herting
Pages 647-656

Isolates of the fungus Colletotrichum graminicola obtained from diseased turfgrasses at several locations were the subject of laboratory investigations to establish their role as pathogens and to determine the environmental conditions conducive to Acthracnose Basal Rot disease. Practical control of Anthracnose in the field was also attempted.

Laboratory studies failed to demonstrate aggressive pathogenicity by five selected isolates of the fungus to plants of Penncross creeping bentgrass and annual bluegrass under differing environmental parameters. Field trials with fungicides and nematicides demonstrated the effectiveness of those pesticides, in combination, to alleviate symptoms of Anthracnose on turf of Kingstown velvet bentgrass. The finding tends to support the concept of a multipathogen/stress involvement in the generation of severe Anthracnose Basal Rot disease.

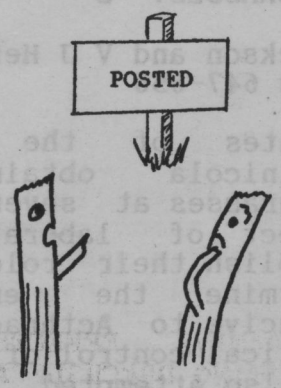
THREADING THE JOURNALS continued

TYPHULA

FACTORS AFFECTING GROWTH OF TYPHULA INCARNATA AND T ISHIKARIENSIS IN CULTURE. -1

L E Sweets and W C Stienstra
Pages 449-458

Sclerotial production of Typhula incarnata and Typhula ishikariensis was greatest at higher temperatures. The rate of mycelial growth and production of sclerotia were not affected by varying light. Mycelial growth of both species occurred from pH 3 to 10 with maximum growth at pH 5 to 8. Aeration of liquid cultures did not affect the growth of either species. When carbon sources were added to a basal salt medium plus sodium nitrate, the best growth of Typhula incarnata was observed. Dextrin, fructose, glucose, lactose, xylose and starch were used. Typhula ishikariensis grew best on malt extract. Sucrose, maltose and starch supported growth better than other carbon sources. When nitrogen sources were added to a basal salt medium plus glucose the mycelial growth of both Typhula species was greater with peptone. Typhula incornata grew better with amino acids while Typhula ishikariensis grew equally well with inorganic and organic sources of nitrogen.



ZOOSPORE CHEMOTAXIS

ZOOSPORE CHEMOTAXIS IN SCLEROPHTHORA MACROSPORA. -1

P H Dernoeden and N Jackson
Pages 443-447

Zoospores of Sclerophthora macrospora were chemotactically attracted to dilute solutions of cystine, glutamic acid and glutamine. Positive chemotaxis of zoospores towards compounds known to be liberated by potential hosts appears to be a mechanism by which this pathogen increase the probability of infecting its host.

FAIRY RING

SUPERFICIAL FAIRY RINGS. -1

J D Smith and N Jackson
Pages 555

Fine turf is often superficially invaded by fungi, usually Basidiomycetes which form circular patches or rings. The substrate for these organisms is plant base material and thatch. Three types of superficial fairyrings are recognizable, ranging from those where little effect on plant growth is seen to those where grass injury and stimulation is obvious. Apart from disfigurement and effect on turf surface trueness because of thatch degradation and sinkage, the fungi may contribute to the production of hydrophobic soil conditions, such as "drypatch". Where the problem occurs and the non-Basidiomycete pathogens are to be controlled, fungicides which will also control Basidiomycetes are required. Management practices to reduce thatch substrate are also appropriate.

FUNGICIDES AND THEIR USE

INFLUENCE OF TURFGRASS FUNGICIDES ON DORMANT CONIDIA OF DRECHSLERA SOROKINIANA ON TURFGRASS DEBRIS. -1

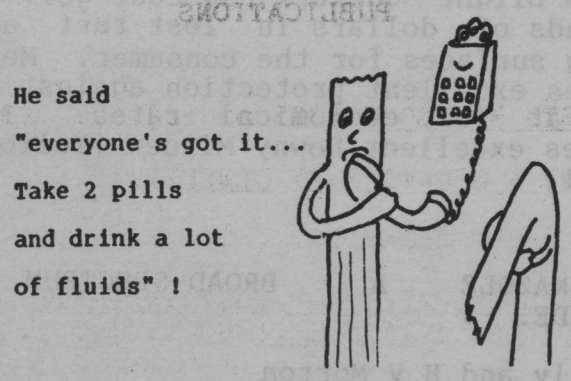
P F Colbaugh, E A Williams and E L Painter
Pages 405-413

Conidia of Drechslera sorokiniana recovered from decomposing turfgrass debris following 14 months exposure in the field were viable and capable of initiating disease symptoms on Kentucky bluegrass leaves. Carbamate fungicides were most effective in reducing viability of Conidia. Chlorothalonil and Analozine were also effective in reducing the viability of Conidia.

THE ROLE OF MERCURIAL FUNGICIDES IN TURFGRASS DISEASE CONTROL AND THE IMPLICATIONS OF SUCH USE IN ENVIRONMENTAL POLLUTION. -1

S G Fushtey
Page 547

During 1977-1979, trials on the efficacy of fungicides for control of Snow Mold in southern Ontario showed that there was no satisfactory substitute for mercurial fungicides. The downward movement of mercury was found to be insufficient to pollute groundwater but that the lateral movement at or near the soil surface could possibly pollute water at distances up to 30 meters [98 feet] from the treated area.



LONG TERM PYTHIUM CONTROL IN TURF. -2

W Stienstra
Pages 859

Treatments for Pythium were applied on fairways at a Minnesota Golf Course. Little difference in products Propamocarb, Etridiazol, Metalaxyl and Chloroneb was recorded. Fosethyl Al performed very well.

NON-TARGET EFFECTS OF FUNGICIDES ON TURFGRASS GROWTH AND ENHANCEMENT OF RED THREAD. -2

P H Dernoeden, J J Murray and N R O'Neill
Pages 579-593

Field studies have revealed that applying fungicides curatively or preventatively improved summer quality of perennial ryegrass. The higher dosages and more frequent preventative fungicide applications, however, caused a reduction in turf quality in October during 3 of 4 test years. Curative fungicide applications did not deleteriously affect turf quality. Two years following the termination of fungicide applications, Red Thread developed again in the test area. Perennial ryegrass plots subjected to the preventative fungicide schedule were more severely damaged by Red Thread than untreated or curatively treated turf. Benomyl and Thiophanate-ethyl were generally more harmful to leaf, crown and root tissue growth than Anilazine or Etridiazol. Further, multiple summer applications of Benomyl to perennial ryegrass encouraged Red Thread the following spring. Benomyl use may predispose perennial ryegrass to Red Thread by reducing turf vigor.

COMPARATIVE EFFECTS OF FUNGICIDES IN COMBATTING DRECHSLERA DEMATIOIDEA INFECTING PENNCROSS BENTGRASS. -2

M D E Knox and D McDavid
Pages 657-662

In routine isolations from diseased turfgrasses Drechslera dematioidea was one of the most frequently isolated fungi. It has shown mild pathogenicity to Penncross creeping bentgrass. Captab, Chlorothalonil, Iprodione and a bactericide, Dichlorophen, inhibited mycelial growth of Drechslera dematioidea. Captab completely inhibited spore germination, Iprodione caused lysis of germ tubes after germination, Chlorothalonil delayed germination for 48 hours and Dichlopophen exhibited no effect. All the materials tested reduced disease severity when used as protectants or therapeutants.

THRESHING THE JOURNALS continued

IPRODIONE FORMULATIONS FOR THE CONTROL OF TURF DISEASES. -2

R T Mercer and G C Paul
Pages 861-862

At 50 percent active ingredient wetable powder formulation of Iprodione has been available for several years in Australia, Canada, France, New Zealand, South Africa, United Kingdom and the United States for the control of diseases of amenity and sports turf. Brown Patch, Dollar Spot, Fusarium Patch/Blight, Grey Snow Mold, Leaf Spot-Melting Out and Red Thread have been effectively controlled.

More recently a 25 percent active ingredient flowable formulation of Iprodione has been developed. This is very rain fast and also reduces the build-up of dew, which on fine turf means that "dew switching" is generally unnecessary for at least a fortnight following application. These properties improve the effectiveness of Iprodione.

EFFICIENT CHEMICAL CONTROL OF RHIZOCTONIA DISEASES AND FAIRY RINGS OF ZOYSIAGRASSES BY GRASTEN. -3

K Minato
Pages 363-365

The excess use of fungicides on golf courses has recently become one of the crucial social problems in Japan. This study was conducted to establish an efficient chemical control of major diseases of zoysiagrasses by the use of Gasten which consists of two antifungal compounds, Flutolanil and Isoprothiolane.

Rhizoctonia Spring Dead Spot which occurs in early spring can be completely controlled by 1 or 2 applications of Grasten wettable powder during late October and early November the previous year.

Rhizoctonia Large Patch requires application of Grasten wettable powder at the early symptom stage of development and at 2 week intervals - 2 applications. A single application of Grasten granular prior to disease development is also effective.

Radical cure of fairy rings could be expected by use of an application of Grasten wettable powder mixed with an osmotic agent - Osmac. The times of application depend on the species of causal pathogens.

RESISTANCE OF COLLETOTRICHUM GRAMINICOLA TO BENOMYL. -3

A R Detweiler, J M Vargas and W L Berndt
Pages 359-362

A benzimidazole-resistant strain of Colletotrichum graminicola was isolated from an annual bluegrass golf course fairway where Anthracnose disease control efforts were only partially effective. The resistant strain maintained its resistance after two years away from the fungicides. In comparison with a sensitive strain, both strains exhibited comparable virulence in greenhouse trials, although the resistant strain failed to be controlled with the fungicide.

CONTROL OF TURFGRASS DISEASES IN THE UNITED STATES WITH FLUTOLANIL 50 WP. -3

J C Adams
Pages 357-358

Flutolanil, a chemical with specific activity against Basidiomycetous fungi, has been evaluated over a 4 years period in the United States. It has a high degree of fungicidal activity against Large Brown Patch, Red Thread, Fairy Ring and Gray Snow Mold.

USE OF METALAXYL FOR CONTROL OF OOMYCETES DISEASES IN TURF. -3

A H Tally, H V Morton and L D Houseworth
Pages 353-355

Pythium blight on turf can cost golf courses thousands of dollars in lost turf and poor playing surfaces for the consumer. Metalaxyl provides excellent protection against Pythium Blight at low, economical rates. It also provides excellent Downy Mildew [Yellow Tuft] control.

PROPICONAZOLE A BROAD-SPECTRUM TURF FUNGICIDE. -3

A H Tally and H V Morton
Pages 349-351

Due to the high expectations of golfers, golf courses are subjected to intensive maintenance regimes, particularly the greens, that can stress the grass and predispose it to disease. Propiconazole is a broad-spectrum fungicide which controls Dollar Spot, Anthracnose, Brown Patch and several other diseases of turf. Since it is systemic and has a different mode of action than the standard contact fungicides, it fits well into the fungicide rotation on many courses.

60TH MASSACHUSETS TURFGRASS CONFERENCE
Springfield, Massachusetts
March 5-7,1991

CURRENT APPROACHES TO SUMMER PATCH CONTROL

Dr Bruce Clarke
Rutgers University

One of the biggest challenges to the turf manager of today are the patch diseases which are caused by root-infecting fungi that attack 6-8 weeks before symptoms are seen.

- There is a long list of patch diseases [ex: brown patch, fusarium blight, pink patch, white patch, etc].
- When root diseases are being discussed, the list is reduced to six: summer patch, fusarium blight, necrotic ring spot, take-all patch, spring dead spot and zoysia patch.
- 1985-1990, the number of reports of these diseases increased in the northeast with summer patch the greatest. Necrotic ring spot and take-all patch are more prevalent in cooler summers.

SUMMER PATCH

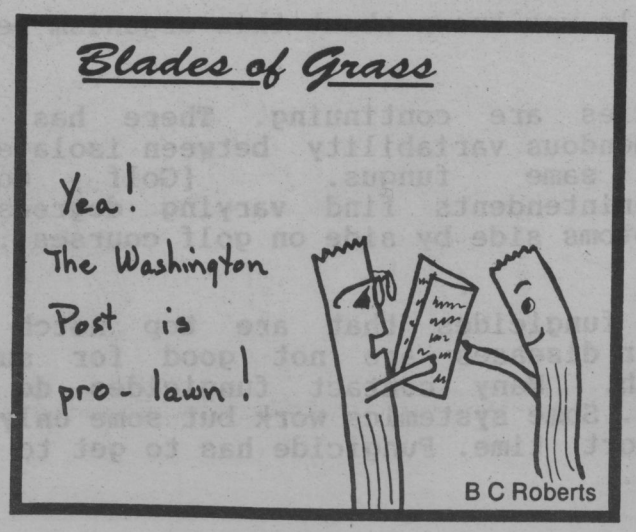
- A typical frog-eye symptom on Kentucky bluegrass in the northeast is probably summer patch. Summer patch is an old disease but is being considered anew.
- Note: anthractnose looks a lot like it and mimics symptoms of summer patch but it does not have black spines like patch diseases.
- For years the frog-eye symptom was thought to be fusarium. Now, it is usually identified as Magnaporthe poae on Kentucky bluegrass and fine fescue.
- Recommendations that were applied to fusarium control are now being reworked.
- This is not found on bentgrass.
- Conditions favoring summer patch: hot, humid, wet weather; excessive soil moisture; compacted, poorly drained soils; low-mowing height. Shows up after heavy rains especially if temperature is high.
- Distribution of patch diseases is from New Jersey to west coast where cool season grasses are grown.
- They are found especially where there is a lot of traffic.
- Areas of damage are 4-6" in diameter and they then come together to make a real mess of the turf.
- Fairways - frog-eye symptoms that have no fusarium connection.
- Perennial ryegrasses are resistant to summer patch.
- Once the symptoms show, fungicides won't work.
- Weeds come in as turf thins.
- Soil compaction emphasizes the symptoms of the disease. Treating compaction can help.
- Frog-eye areas coalesce into large areas.
- There is an identification problem. Pull out one plant. A blackening at the base of the plant down to roots is found on newly diseased plants. [Fusarium is different - has reddening at base and is a crown disease, not a root disease.] A positive diagnosis takes 6 weeks but the superintendent can't wait this long.
- The window for seeing symptoms in the northeast is first or second week of June to September.
- Little was known about this organism before 1987.
- Studies are continuing. There has been tremendous variability between isolates of the same fungus. [Golf Course Superintendents find varying degrees of symptoms side by side on golf courses].
- Some fungicides that are top notch for other diseases are not good for summer patch. Many contact fungicides do not work. Some systemics work but some only for a short time. Fungicide has to get to root area.

SOLVING GOLF'S ENVIRONMENTAL PROBLEMS

Mr James Snow
National Director USGA Green Section
Far Hills NJ

There is still a lack of scientific information about golf's effect on the environment. It is therefore hard to overcome the criticisms focused on golf courses. New and continuing studies are being made.

- Audubon Cooperative Sanctuary Program;
- USGA/GCSAA research on developing grasses that use significantly less water, and bentgrasses that have resistance to diseases;
- Environmental study for next three years [The literature review will be released as a book];
- USGA Turf File at Michigan State University [use of this needs to be increased in order for it to continue - Peter Cookingham at Michigan State University Library W-212, East Lansing MI 48824 (517/353-7209)];
- Eight projects on fate of nutrients and pesticides have been funded.



Perception vs reality is a problem. Non-golfers perceive more risk from use of pesticides on golf courses than those who are playing the game and are familiar with the condition of the course. Their questions need to be addressed with concern and respect to help raise the comfort level in the community. Educating the public is a priority. Golf Course Superintendents need to become more knowledgeable about environmental issues and take an active role in conservation practices on golf courses.

There needs to be some adjustment in the level of expectations concerning playing surfaces by golfers. If pesticide use on golf courses isn't reduced voluntarily, the government may force this. Golfers have to be willing to participate in these discussions.

Exposure to 2,4-D:

Applicators & The Pubic

Dr Keith R Solomon
Canadian Center for Toxicology
University of Guelph

- One of the popular brands of throat spray contains phenol, a compound similar to the pheonoxy of 2,4-D. When these two products are compared at the same concentration levels, the sore throat spray has a lower LD50 [higher toxicity]. This spray will also kill weeds.

- A review of all factors in risk assessment came up with insufficient evidence to conclude that tumors in rats were related to 2,4-D exposure.

- A study [1971-1985] of 70,000 farmers in Saskatchewan who had applied herbicides [including 2,4-D] to wheat showed that the farmers were more healthy than other segments of the population except there were more skin cancers due to exposure to the sun..

- Within groups of farmers, fuel exposure indicates a slight increase in cancer risk.

- A 1990 Nebraska study showed a link between use of 2,4-D and a specific cancer type but when the study was reviewed, there really was no evidence of a link.

"Dosage alone determines poisoning".

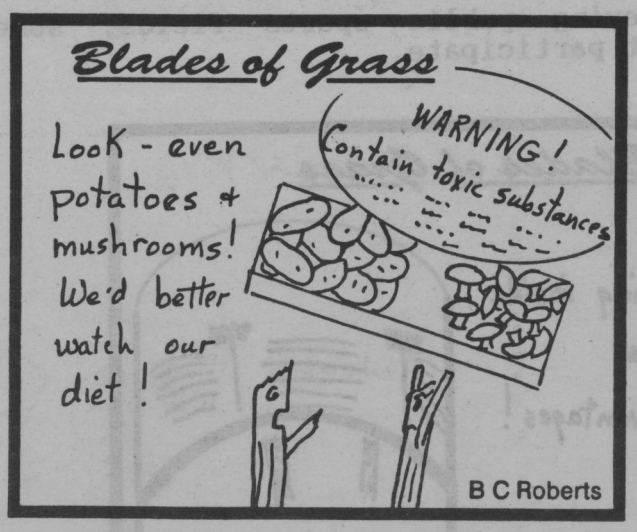
- Paracelsus -

- Any chemical can cause death.

- Studies involving applicators of 2,4-D and bystanders conducted in various settings [with and without protective clothing, etc] concluded that there was no apparent relation between amount of granular or liquid material applied and exposure received. Any exposure to applicator was still below World Health Organization minimum figures acceptable. There was no bystander exposure noted. This should relieve public concern in this area.

- Posting treated sites is based on the assumption that people are being exposed by walking on the grass. This is not likely.

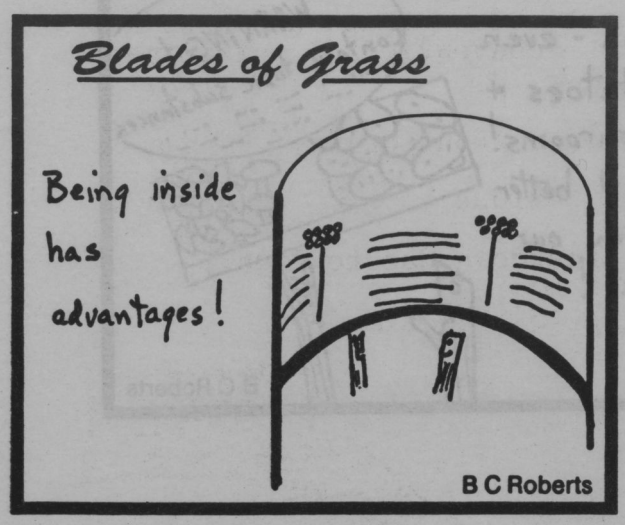
- A study of bystanders with various types of clothing [shorts, slacks, shoes, barefoot, etc] who walked on treated plots showed little exposure and only small amounts of dislodged chemical.



SURFACE CONDITIONS ON ATHLETIC FIELDS

Dr Donald Waddington
Pennsylvania State University

- There are still problems with communications about athletic fields. Caretakers are often biology teachers, janitors or coaches.
- Information is available about good athletic field management but the word needs to get out about control factors such as timing and renovation.
- The most important key is drainage.
- The purpose of the field may be for sports games but many fields are used for other purposes.
  - Band marching practice, especially in mid-field where wear is already heaviest can result in uneven compaction.
  - Graduation exercises can abuse the field.
  - Baseball outfields may be used as parking lots for football games.
- Specialized equipment used for maintenance doesn't cause soil compaction.
- In surveying public sports fields, some will not participate.



- Factors to look at in studying fields include: mowing height, percentage of turf cover/weeds; turf density, stoniness, smoothness, and soil properties.
- Studies also have looked at injuries as reported by trainer: location of activity, severity and category of injury, if related to playing surface, condition of field [wet or dry] when injury happened. There is a range of injury severity from minor [miss practice 1-7 days] to severe [permanent injury].

- Some sports fields are constructed poorly and also maintained poorly. Some of this is based on budget and some on attitude. Typical fields have no surface drainage, no crown and spotty weed control..
- Practice fields are generally in poorer condition than game fields. Physical education classes often play on most worn areas on practice fields.
- Need best surface possible to minimize injuries that could be lessened by a good playing surface.
- Many injuries are not field related but are game related.
- Studies of sports fields and surface related injuries are ongoing across the country.

SUB-SURFACE PLACEMENT OF PESTICIDES & BIO-CONTROL MATERIALS

by Dr Pat Cobb
Auburn University

When you hear about sub-surface placement of pesticides, it is referring to a "precision" application method. If you grow good grass, turf insect pests will be encountered along the way. The most difficult to control insect pests live in the soil. Grubs can be a major problem in the northeast.

In recent years the Turf Industry has increased. There are better grasses. The industry is diverse - not just golf courses. There are concerns about sources of and lack of water and about ground water contamination. Turf managers have greater interest in maintaining environmental quality than any other group. There are new regulations, new labels. We don't want to get swallowed up by these challenges. Turf managers have become more professional and need to use their imagination to help grow better grass.

Soil Insects

Soil insect problems have increased. Residuals of old insecticides have leached out of the soil. There is an increased demand for higher quality turf. The problem is to get the insecticide and/or biological control agents to the pests in the soil. Where there is moisture, insects are usually present to a greater extent than in dry areas.

Subsurface application of chemicals is not new but some equipment is new.

- There is low-pressure technology from New Zealand for grub control. A series of disks and plastic tubes allows the control agents to be dropped to the pest areas. This is used mainly in pastures.

- A low pressure unit used for nematode treatment in Florida [sandy soils] works well.

- In Alabama there is more organic matter in the soil and the material doesn't contact the pests as well.

- A high pressure unit has been developed in the last 5 years. A track opens a slits for the nozzles. Flowables and wettable powders often clog the nozzles.

What does injection do to the turf ? In the south, tensile strength of sod was not reduced by the high pressure unit. Some southern varieties show some burn or yellowing on putting greens.

Mole Crickets

There are four types of mole crickets: northern mole cricket, short winged mole cricket, southern mole cricket and the tawny mole cricket. The latter is a plant feeder and tunneler. The tunnels can uproot plants and the tunnels dry out. In 1988, an enthusiastic reception was given to high pressure liquid injection treatments.

Benefits of High Pressure Liquid Injection

- Can reduce rates of insecticide;

- Can use insecticides that are not as effective in conventional treatment methods;

- Don't have to worry about drift;

- Reduced surface residue;

- Less chemical breakdown due to light;

- Reduction in application time.

SUB-SURFACE PLACEMENT OF PESTICIDES AND BIO-CONTROL MATERIALS

CONTINUED

Degradation & Mobility of Pesticides: Insecticides & Pre-emergent Herbicides

Dr David Shetlar,
Department Entomology
Ohio State University

Limitation to High Pressure Liquid Injection Method

- Not a cure all;
- Excessive or limited moisture, thatch [many materials tie up in thatch], soil type [not as effective where high organic content].

Many Questions About High Pressure Liquid Injection

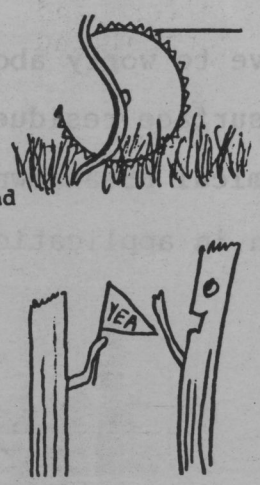
- Ideal spray volume ?
- Soil moisture level ?
- Timing of application ?
- Other insecticides ?

Biological Controls

- Nematode controls don't do well in high pressure systems.
- A new system is being tested using a modified machine that places seed or granular insecticide subsurface.
  - Can place materials where you want them.
  - Perhaps reduced rates can be effective.
  - Granules go in grooves.
  - Experimental

Conclusion

The loss of tools can be discouraging, but with the imagination of turf managers, the response will be new technologies that will carry them through. Stay in touch with researchers and extension agents. Let researchers know where they should be putting emphasis.



- There is pressure in the industry from ecoterrorists [movie stars, etc] who are saying that everyone is getting cancer.
- Need to separate fact from fiction.

Research Results [Dr Harry Niemczyk et al]

- Insecticides applied to turfgrass with thatch do not readily move through the soil profile [94-99 % of pesticides get hung up in the thatch layer.]
- Some chemicals naturally degrade so by the end of 2 weeks, very little is even found in thatch layer.
- Where there is no thatch, applied pesticides are found in first 1 -2 " of soil. Even after 4 weeks in newly established turf or turf without thatch where soil has any kind of organic material, pesticides get hung up in the top layers of soil. They are not challenging water supplies.
- Thatch is a biofilter. More turfgrass needs to be planted to serve as filters.
- The story from research is good and needs to be told. If there is a good turf cover with any thatch, it is almost impossible to get chemicals down to contaminate water.

THE FLORIDA TURFGRASS ASSOCIATION AND RESEARCH FOUNDATION ALLOCATES $140,000 FOR MAJOR TURFGRASS STUDY

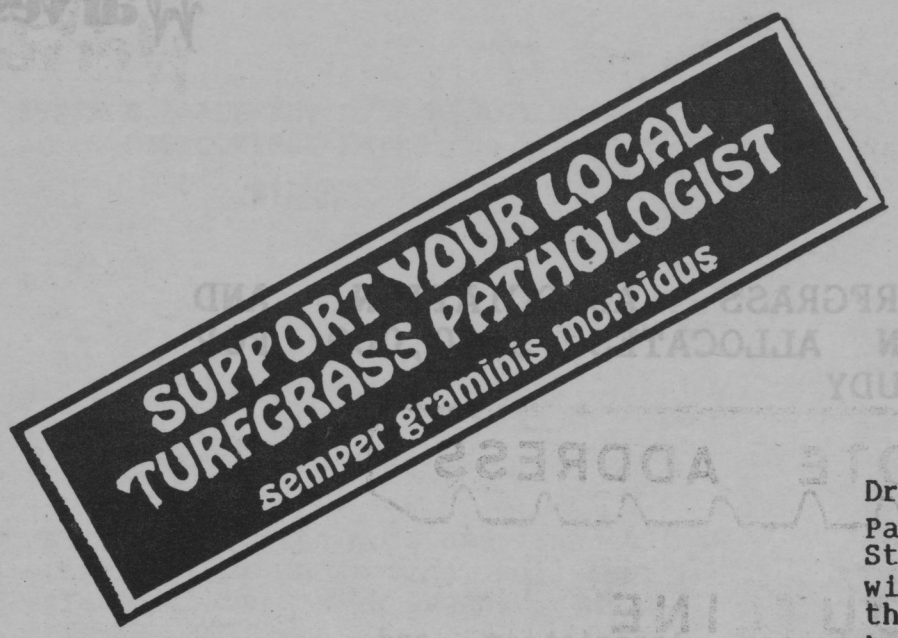
The Florida Turfgrass Association and Research Foundation, in combination with the University of Florida, has pledged $140,000 in funding to a project touted as the most comprehensive turf industry survey in the nation. This study, planned for the last 10 years as a necessary tool for environmentalists and turf industry professionals, will complete the second half of a major pro-active plan by FTGA to develop a new awareness for the turfgrass industry.

One of the most useful elements of the survey will be its measurement of the economic impact turfgrass plays in the state of Florida. Specifically, the study will outline the integral part turfgrass has in all facets of Florida's economy, reaffirming it as one of Florida's most valuable industries.

This comprehensive turf survey is estimated to cost $345,000, with $205,000 of funding donated by the University of Florida. Conducted by the University of Florida Food and Resource Economics Department, the survey results are anticipated to produce concrete data elevating turfgrass as a most valued resource in the state of Florida.

The Florida Turfgrass Association is a non-profit organization dedicated to researching turfgrass and its impact on the preservation of our environment. In support of this effort, FTGA has successfully funded a new laboratory, Envirotron, dedicated to developing tangible data relating to the benefits of turfgrass, including natural filtration of water into the aquifer and biologically safe methods for controlling insect infestation.

For more information call: 800/882-6721.



SAVE THE TURFGRASS PATHOLOGISTS'

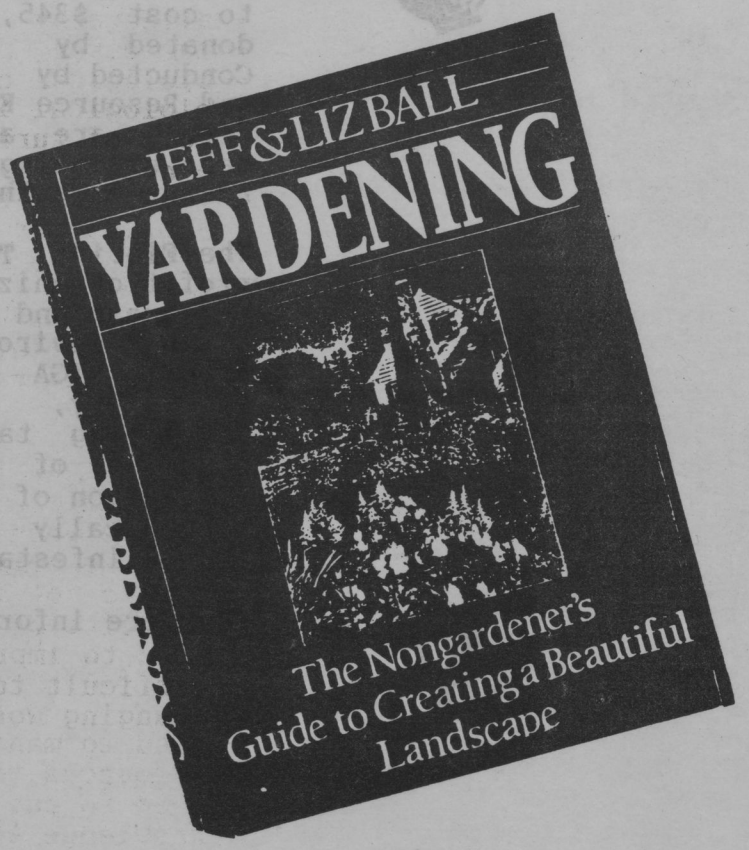
Dr Houston B Couch, Professor of Plant Pathology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia shared with us this bumper sticker from his 'Save the Turfgrass Pathologists' program. "As you know, we are an endangered species, and I thought a public awareness effort of this type might help our cause a tad", said Dr Couch. He continued: "Since the beginning of this program, the number of turfgrass pathologists in the world has increased 40 percent. While I do not credit this increased entirely to this activity, with all modesty I must admit that it probably has been a major contributing factor. Well anyhow... at least there is a positive correlation there."

RIGHT ON, DR COUCH !

YARDENING
THE NONGARDENER'S GUIDE TO CREATING
A BEAUTIFUL LANDSCAPE

by

Jeff and Liz Ball



Jeff and Liz Ball have coined the descriptive word "yardeners" for those who have lawns to care for and want a beautiful landscape but are not really gardeners. This book offers good practical information on the lawn and plant care and also on new products and techniques.

The lawn is the major focus of most yardeners. By selecting appropriate grass varieties and updating maintenance practices, time and energy can be cut and the results will be better.

There is also advice on trees, shrubs, flowers, and vegetables.

Easy to understand and apply.

MacMillan Publishing Co,
866 Third Ave New York NY 10022
268 pages $24.95

KENTUCKY CONCEPTS KEY TO GOOD TURF

Kentucky Turf Council Conference & Field Day
Louisville Kentucky

October 8-10,1991

Warvests
23

KEYNOTE ADDRESS

OUTLINE

by

Dr James Watson
The Toro Company

Presently there is pressure for more research funding in food and fiber to help developing nations. As these areas develop, the need for recreation will intensify and technology/education in turf management will be needed.

Looking into the future we will likely see:

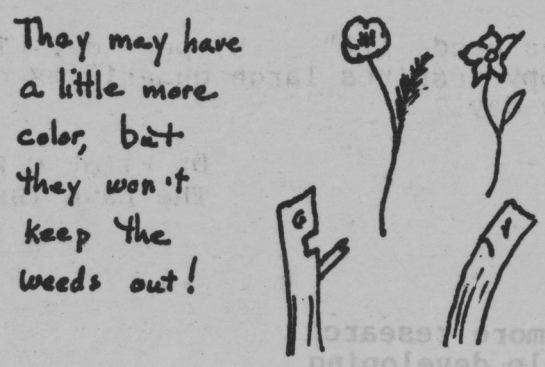
- nitrogen fixing grasses
- alleopathy [war between plants] harnessed
- increasing number of grasses with endophyte
- biological control of insects
- biological immunity to some diseases
- role of turf will increase
  - need for recreation
  - need for filtering of water
  - place for wildlife refuge
- increasing demand for educated turf managers
- greater mechanization and computer systems
- improved Integrated Pest Management [IPM]
- better at recycling water.

Presently:
- we use too little of the information available
- gap between what we know/what we practice/ what we communicate
- public not informed about environmental benefits of turf
- need to improve communication skills
- difficult to keep abreast of quickly changing world
- need to manage natural, landscape and human resources to enhance environment
- need to put into practice all technical knowledge we have access to.

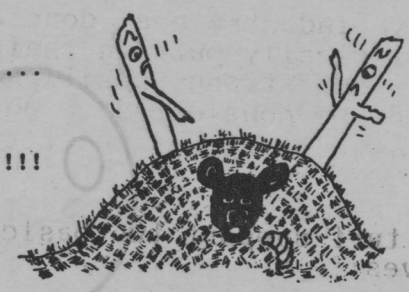
WILD FLOWERS

Wild flowers are as high maintenance as any other type of gardening. Not aggressive enough to keep undesirable plants out. Don't give continuous show. Need encouragement. We should try adding some hardy annuals and native plants to mixes.

Sharon Bale
University of Kentucky



Not an earthquake..... it's a mole after grubs !!!



FOLIAGE COLOR ATTRACTS BEETLES

Color of foliage may be key to attractiveness of some plants to Japanese beeties. Studies have shown that crab apple trees with red or red/green foliage are defoliated more than those with green foliage. Preference for red and red/green foliage over green foliage has also been significant in laboratory studies.

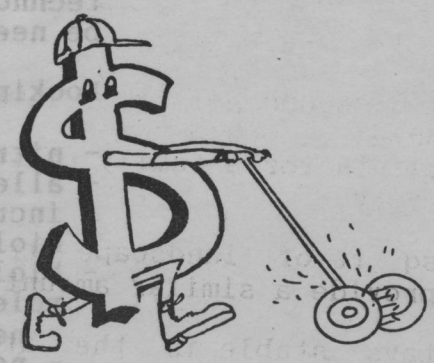
Pat Spicer
University of Kentucky

JAPANESE BEETLE OUTBREAK

This summer there was an impressive outbreak of Japanese beetles in Kentucky.

- Biological control by nematodes was not significant.
- Insect growth regulators look promising for future.
- Disappointing results with milky spore.

Dr Dan Potter
University of Kentucky



HOW GREEN IS KENTUCKY ?

The new Kentucky Turfgrass Survey sponsored by the Kentucky Turfgrass Council is available: Carter Building, Eastern Kentucky University, Richmond KY 40475.

- Turf acres maintained: 889,500
- Expenditures on turf exceed expenditures for any other agricultural crop grown in Kentucky.
- Turfgrass managers and homeowners spend one-fifth as much [excluding rent, capital expenses and property taxes] on turf as is spent on all agricultural commodities grown in Kentucky.
- There are 1,300,000 home lawns in Kentucky.

Dr Forrest Stegelin
University of Kentucky

TURF VS TREES: WATER, CARBON DIOXIDE AND OXYGEN RELATIONSHIPS

The Nursery Industry has done an excellent job in politically putting their products in a visible and strong position nationwide. Turf should be considered equal or more important because of the benefits turfgrasses provide.

Trees and turf support two basic processes in green leaves:

Simplified:
photosynthesis: $6H2O + 6CO2 > C6H12O6 + 6O2$

respiration: $C6H12O6 + 6O2 > 6H2O + 6CO2$.

Leaf area is not the measurement required to predict carbon dioxide uptake or oxygen release. The quality of the canopy is important. Photosynthesis requires light. Leaves on the inside of a canopy are shaded to different degrees. A canopy is the volume in which green leaves exist.

1000 square feet lawn mowed at 2": canopy = 1000 x 1/6' = 166.66 cu ft.

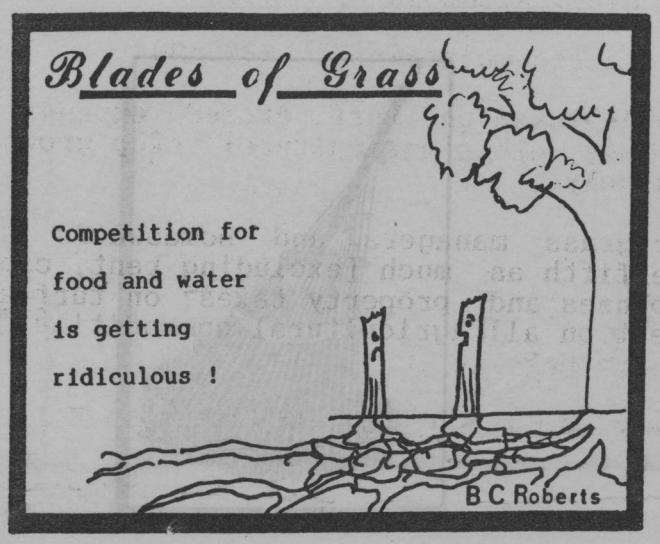
80 year old beach tree canopy = 98,000 cu ft.

Oxygen:

- 24,000 - 36,000 sq ft of lawn turf [1/2 - 3/4 acre] would meet the oxygen requirements for a family of four during an entire year.

- 2,000 sq ft of landscape [trees and turf] would provide a similar amount of oxygen.

Oxygen stays stable in the atmosphere and actually neither turf nor trees contribute the bulk of this gas. Atmospheric oxygen mainly comes from plants that have grown or are growing in water - lakes and oceans of the world



Carbon Dioxide:

Trees are often referred to as carbon storage plants [sink] but in fact they are dying, rotting or being burned continually and thus releasing CO2 back into the atmosphere. Carbon held in wood is of short term duration.

Water:

Water is important for photosynthesis and for transport of nutrients in plants.

- Turfgrass needs 1/7" - 1/3" water per day;
- Trees need 1/2" - 5" per day. The big canopy respires large quantities of water each day.

Dr Eliot C Roberts
The Lawn Institute

FERTILIZER/PESTICIDES/GROUNDWATER ISSUES

We allow ignorance to dictate what we do with the environment. Everything we are exposed to makes up our environment.

The grass system:
- slows runoff
- allows water to infiltrate
- holds Mother Nature together
- cleans water that flows through it
- is not negative just because it is not food or fiber.

Need to weigh risk/benefit before making decisions. Basis for good turf is sound agronomic procedures. Understand grass plants in order to manage them. Understand various type of fertilizers in order to prevent/reduce leaching.

Time fertilization to be synchronous with needs of turf in its growth and development cycle to get greatest benefits and less leaching. Depends on location and type of grass.

Need for pesticides often arises from not using sound agronomic management practices.

Dr Joseph DiPaola
North Carolina State University

DIAGNOSIS OF TURF DISEASES

Many turf problems are not from infectious diseases but are results of stress conditions.

Factors/clues for diagnosis:
- species of grass
- distinctive symptoms
- signs showing evidence of fungus
- time of year
- patterns
- site factors [soil conditions, pets, record of chemical applications etc]
- experience
- diagnosis kits.

Variety selection is single most important factor in controlling disease in a new lawn.

Dr Paul Vincelli
University of Kentucky

SPORTY GRASSES FOR KENTUCKY

There are some super sports fields in Kentucky - some with cool season grasses and some with bermudagrass.

Perennial ryegrass and tall fescue have dominated in heavy traffic areas.

In Kentucky, better chance to maintain sports turf with bermudagrass in areas where it grows. With a good irrigation system, sprigs can even catch hold on unprepared, compacted soil [not recommended procedure]. Can be mowed at 1" with rotary mower. Must be covered to prevent winter kill. Spring dead spot is a destructive disease.

Regardless of grass selection, maintenance practices are important. Grasses cannot be evaluated unless complete maintenance program is considered.

There is no time to seed when fields are used for several sports. Good place to use bermudagrass.

Where perennial ryegrass is used to overseed bermudagrass, it must be taken out after the spring season or it becomes the dominant grass.

Baseball baselines are being grassed in the Southeast.

Seeded tall fescue field takes a year to be ready for play, 6 weeks if sodded. It is a tough grass when mature.

Perennial ryegrass germinates quickly, takes wear and low mowing and is easy to renovate.

Dr A J Powell
University of Kentucky

MANAGEMENT FOR REDUCED CLIPPINGS

Clippings are a big issue now -

- landfills refusing yard waste
- 1989: - 1.25 million lawns in Kentucky;
  - 34 % collected clippings;
  - 13 % put in garbage;
  - estimate 330 million tons of clippings in the state [over 100,000 small truck loads].

For years the recommendation has been to leave clippings on the lawn. Removing is: more work, nutrient wasteful, expensive. Leaving clippings on the lawn does not affect aesthetics if proper mowing is done, and nutrients can equal 1 application of fertilizer a year.

Thatch is <u>not</u> a collection of clippings on the soil surface. Highly maintained lawns can cause a high peak of growth in the Spring. This means a lot of clippings.

Over-irrigation trains plants to use more water than they need. This results in more clippings.

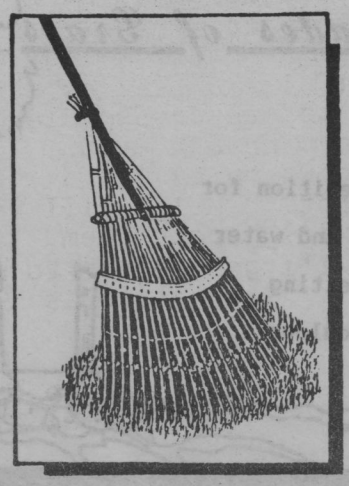
Density of stand in conjunction with height of plant determines amount of clippings.

Clippings fall down through more open canopies.

Can use regular rotary mower, mow more frequently and get smaller clippings rather than using mulching mower.

A property with many trees will have many leaves that can be a problem - too many to compost on small lot; even if cut up fine, potentially can shade grass causing thinning; not sure how tanins etc affect the turf.

Dr A J Powell
University of Kentucky



ORGANICS: FACT OR FICTION

True or false test:

1. Organics are compounds that contain carbon.
   True __ False __
2. Organics are anything natural [not synthetic]. True __ False __
3. Organic has to do with fundamental processes important to our health. True __ False __
4. Organic compounds are highly organized and complex. True __ False __
5. Farm and lawn fertilizers, in general, are synthetic [man made], not organic, harmful to the soil, acid-reacting and kill earthworms. True __ False __
6. Use of organic fertilizers and practices in lawn care will eliminate the need for pesticides. True __ False __

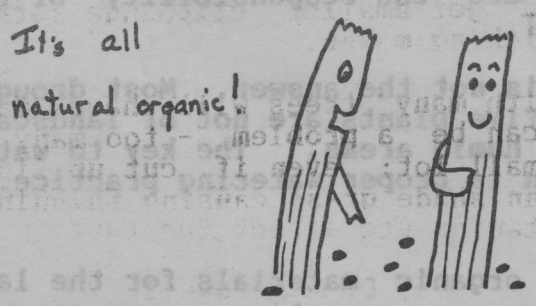
[Answers: 1-4 are true; 5-6 are false]

Organic methods are valid because they enhance the growth of plants.

Newer grass cultivars have improved vigor and resistance to pests.

Need to know about the soil where the grass plants grow. The soil needs to be biologically active to grow healthy turf that will perpetuate a cleaner environment.

Dr Eliot Roberts
The Lawn Institute



MOLE ERADICATION

Moles get together once a year [February] to breed and 3-5 babies are born in April. Moles are solitary in tunnels and can dig a foot a minute. Active day or night. Permanent tunnel is 18" below surface and dirt from this is on surface in mole hills. Surface tunnels branch from a straight runway. Push down on runway and push Victor trap in that spot. Mole will repair that spot and trap will spear them. In times of drought, they will go deeper to moist areas where food is. Alternative is to spray for grubs which are food for moles.

Margie Darling
Animal Ridders Inc

PROPER SEED SELECTION

Need to be aware of:
- species adaptation to lawn type turf
- characteristics of species and varieties.

Newer cultivars are improved in vigor and other characters. Seed represents only a fraction of the cost of a renovation project but it is the seed that produces the turf seen and enjoyed for years. High quality seed will give the person who does the renovation a good reputation. There are improved cultivars of Kentucky bluegrass, perennial ryegrass, fine fescues and tall fescues. Look at seed package labels to compare contents, germination rates, true to variety, and other information. Getting the best seed is important but proper maintenance practices are also needed.

Dr Eric Nelson
NK Lawn and Garden Co

PROPER FERTILIZATION TECHNIQUES AND METHODS/SPORTS TURF

Fertilization alone will not help a sports field that is in poor shape at the end of the season.

Establish definite goals for management programs.

Know: soil physical/chemical properties, drainage, type of grass.

A fertilizer is any substance that will promote plant growth. 16 elements are essential for grass plants. Primary elements are nitrogen, potassium and phosphorus. There are many forms of these elements. Each behaves in a different manner. Soil test shows what is needed.

Starter fertilizer helps: survival of seedlings, root development, competition against weeds, color, rapid recovery from damage.

Fertilizer program should be adjusted on basis of field use: know exact area, calibrate equipment, keep records, analyze problems.

Take pride in your work.

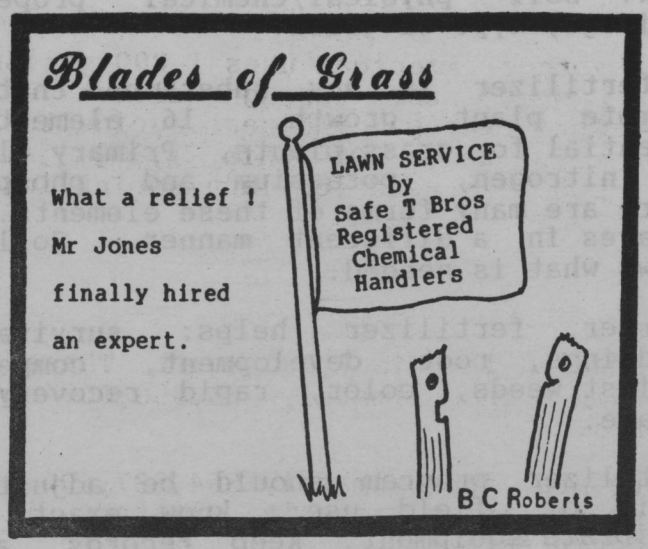
Eugene Mayer
O M Scotts & Sons

Some Trends

* There are two groups interested in gardens and lawns.

  - One enjoys horticultural therapy realized in tending lawns and gardens themselves. This group enjoys benefits of exercise, a feeling of well-being and of satisfaction that comes from working closely with the living plants. Today mowers are easier to use and maintain and are quieter. These people are not interested in contracting for others to tend their lawns.

  - The other group is increasing in number. These people would rather do other leisure activities so hire lawn and yard care done. Many of this group are adults gainfully employed and when there is also child care, time is limited for work outside. Lawn care companies have an excellent market with this group.



Trends

* Landfills in many areas are being closed to yard waste. Grasscycling has become very popular and new equipment such as the mulching mower has been designed to mow grass without having to pick up clippings. Equipment for lawn care is more easily manipulated in small yards, and is generally easier to use and maintain. Mowing practice is the secret to lawn health and vigor.

* Irrigation is a major issue. Even when lawn care is contracted, it is the homeowner who controls this practice, yet it is often the basis for lawn success or failure even when other aspects of maintenance are the responsibility of the professional.

* Xeriscape is not the answer. Most drought tolerant native plants are not of landscape quality in humid areas. The key to water conservation is proper watering practice.

* The use of organic materials for the lawn has become more popular. Fertilizer applications are longer lasting because of being slower release. Thus nutrients will not get into the ground water because they are released through the biology of the soil rather than just by dissolving in water. The rate of nutrient release and the absorption rate by plants should be about the same. Professional lawn care companies are adding this type of service even though use of organic materials are usually more costly.

* When a lawn is healthy and growing well from proper maintenance procedures, less pesticide is needed.

THE LAST WORD

In all discussions, it's kind of nice when you feel you have had the last word. When visiting with folks about lawns and landscaping, use some of the lawn facts and figures included here. These will help you to be better understood and recognized as a conservationist and environmentalist.

- Gardening is the most popular outdoor leisure activity in the US and lawn care is number one among gardening activities.
- Lawns date back to the Chinese dynasties in 157-87 BC.

- Lawns are up to 30 degrees cooler than asphalt and 10-15 degrees cooler than bare soil. Lawns from a block of 8 average houses have a cooling effect of about 70 tons of air conditioning.
- An lawn area of 24,000 to 36,000 sq feet will produce enough oxygen for a family of four for a year.
- Undesirable noise levels can be reduced by 20-30 % by grassed areas.

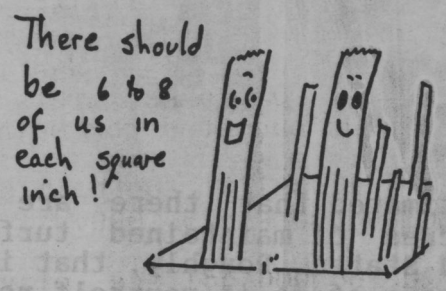
- It is estimated that there are over 31 million acres of maintained turfgrass in the United States. Roughly, that is over 10 million acres of do-it-yourself residential lawns; almost 10 million acres maintained by professional lawn care and landscape operators; 1.5 million acres in golf courses; .3 million acres in turf farms; 1.6 million acres at educational facilities; nearly a million acres in municipal, county and city parks; .3 million acres in cemeteries and over 6 million acres of roadsides.
- There are 92.8 million households in America, an increase of 1.7 million from 1988 to 1989. In 1989, 53,000,000 households participated in lawn care. Retail sales for lawn care products and equipment increased 6 % from 1988 to 1989 from $5.3 billion to $5.7 billion. This was a record high for the decade of the 1980's.

- Lawngrasses need one inch of water a week in the growing season - either from natural rainfall or irrigation or a combination of the two.

- The average American uses 1,800 gallons of water daily, some through direct personal use, the rest by indirect agricultural or industrial use. Of this 1,800 gallons, only .04 % is used for lawn sprinkling.

- The median lawn is 7,000 sq ft. These lawns contain approximately 5,950,000 grass plants.
- There are approximately 564,537,600 blades of grass in an acre [6 plants/sq in; 15 blades/plant].
- A single grass plant grown under ideal conditions can have 387 miles of roots, 13,815,762 individual roots and 2,554 square feet of root surface.

- Good topsoil will contain as many as 200 viable weeds seeds ready to germinate per square foot of surface. This represents only 5 % of the total weed seed present in the top 6 inches of soil so there is more than 1 potential weed for each square inch of lawn. A weed seed can't germinate where a healthy grass plant is growing.



- Soils are made up of varying sized particles ranging from the largest, sand, to silts to clays. A pound of: medium sand will contain over 2 million particles; silt will contain over 2 billion particles; clay over 40 trillion particles. The total particle surface area of: medium sand will be 20 square feet; silt will be 220 square feet; clay will be over 5,500 square feet.

- In the root zone of turf there are over 900 billion microorganisms per pound of soil - 70 pounds of bacteria, fungi, protozoa, actinomyces, etc per 1,000 square feet of lawn. They live in about 50,000 pounds of soil per 1,000 square feet.

- Finding 17 earthworms per square foot of lawn is not unusual. These worms will pass about a pound and a half of soil through their bodies each year leaving it with over 300 % more available nitrogen, over 600 % more available phosphorus and over 1000 % more available potassium, 40 % more available calcium, 200 % more available magnesium than the surrounding soil.

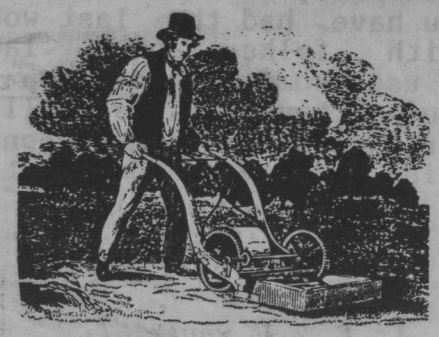
- Fertilizers containing 3 parts nitrogen, 1 part phosphorus and 2 parts potassium are near ideal for lawngrasses under average soil conditions because they replace in the soil what the turf has absorbed.

- At any one time, lawngrasses can use only about one pound of actual available nitrogen per 1000 square feet. For quickly available sources, this would be an application of 10 pounds of fertilizer containing 10 % nitrogen. For slowly available source, 10 pounds of fertilizer containing 30 % nitrogen will supply 3 pounds of nitrogen but only a portion is available immediately and the rest will be released slowly.

- Turfgrasses are most healthy when the soil pH is 6.0 - 7.0.

- Northern grasses grow foliage best when temperatures are between 60 - 70 degrees F and grow roots best when soil temperatures are 50 - 60 degrees F. Southern grasses grow foliage best when it is 80 - 95 degrees F and grow roots best when soil temperatures are 75 - 85 degrees F.

- Northern lawns are best cut at 1 1/2 - 2 inches; southern lawns, containing bermudagrass, are best cut at 3/4 - 1 inch.



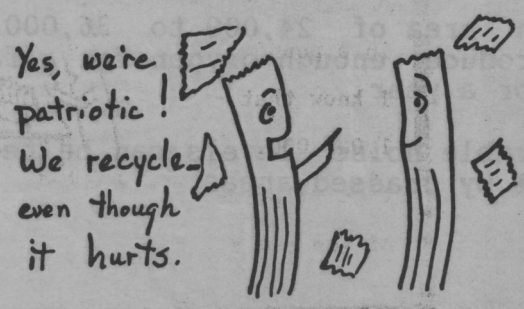
- If the height of cut is raised only 1/8 ", there will be an average increase in leaf surface of 300 sq ft/1000 sq ft of lawn. This will allow more photosynthesis, more transpirational cooling, more roots, and a stronger turf.

- Good mowing practice calls for the removal of leaf tips when growth is about one third more than the cutting height. [Ex: a lawn cut with a mower set at 1 1/2" should be mowed soon after growth has reached 2"].

- It is estimated that the average lawn requires some 40 hours of mowing a year.

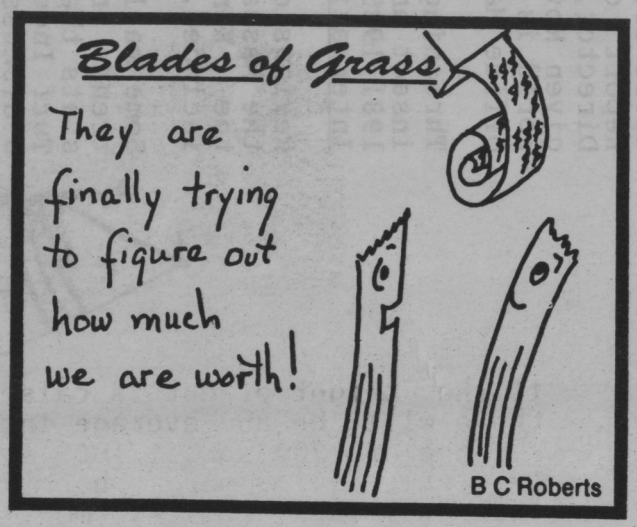
- The lawn mower was patented in 1830 by Edward Budding in England. Prior to that, sheep, rabbits and other animals kept the grass clipped.

- Every individual plant of Kentucky bluegrass produces some three feet of leaf growth in an average season. This amounts to about five tons of clippings per acre each year. When clippings are left to decay in place, they are worth the equivalent of three applications of lawn fertilizer.



- In 1982, the Turfgrass Industry was considered to be a $25 billion plus per year industry in the US. It was estimated that 500,000 people made their living directly from the care and maintenance of turf. Now it provides well over $30 billion in agribusiness impact.

- In 1989, in the US, Lawn Care Industry reported the state of the industry as being $1.8 billion in chemical lawn care and $2.2 billion in mowing/management for a total of $4.0 billion.

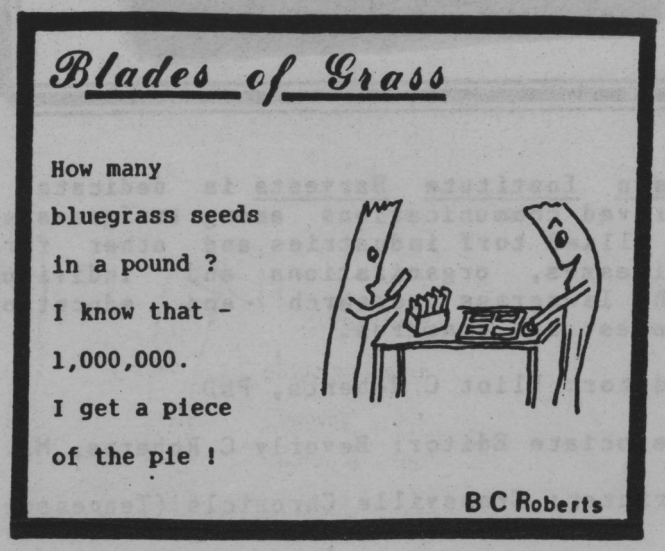


- There are 1,300,000 Kentucky bluegrass seeds per pound; 500,000 fine fescue seeds per pound; 300,000 perennial ryegrass seeds per pound; and 230,000 tall fescue seeds per pound.

- In 1991, there was approximately 71 million pounds of Kentucky bluegrass seed grown in the USA, 60 % common and 40 % proprietary.

- There are 500,000 acres in grass seed production in Oregon. Oregon, Idaho and Washington grow 95 % of the nation's turfgrass seed.

- Twenty percent of turf seeds are for new lawns.



- There are approximately 74,500 sports fields in the US that are under the control of scholastic organizations, plus 374,000 "specific use" fields in parks and recreation departments, plus 6,147 professional team and independently owned sports complexes. This totals over 454,700 fields budgeted for maintenance.

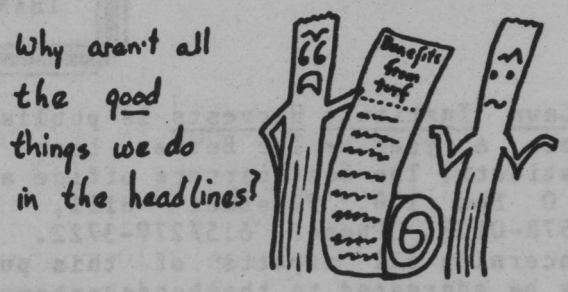
- A well-built football/soccer field costs $100,000 - $250,000.

- 20,200,000 golfers play 445 million rounds of golf a year in the US.

- Healthy lawns absorb rainfall 6 times more effectively than a wheat field and 4 times better than a hay field.

- One acre of grass will absorb hundreds of pounds of sulfur dioxide during a year.

- Grasses trap much of an estimated 12 million tons of dust and dirt released annually into the atmosphere.



- Surveys show that a well maintained and designed landscape with lawn adds 15 % to the selling price of a home and 6 % to a commercial property.

THE LAWN INSTITUTE

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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.

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