LAWN INSTITUTE

Harvests

Volume 30 Number 3 OCTOBER 1983

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GENERAL TOPICS SECTION

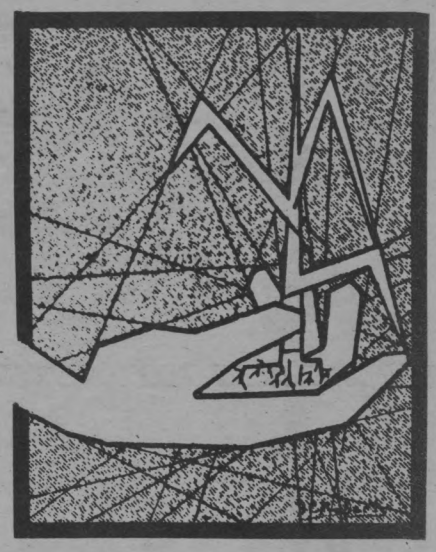
TECHNICAL TOPICS SECTION

THE HARVEST MIX

(AN INTRODUCTION TO THIS ISSUE OF HARVESTS)

Harvests 1

Harvests Volume 30,Number 3 (October 1983) presents turfgrass related topics under the following headings:



"I Believe a Leaf of Grass is No Less than the Journey-work of the Stars"

— Walt Whitman

Director's Dialogue

(EDITORIAL ON LAWN INSTITUTE
AND RELATED TOPICS)

Warvests
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LAWN SEED REGULATIONS AND CONTROLS

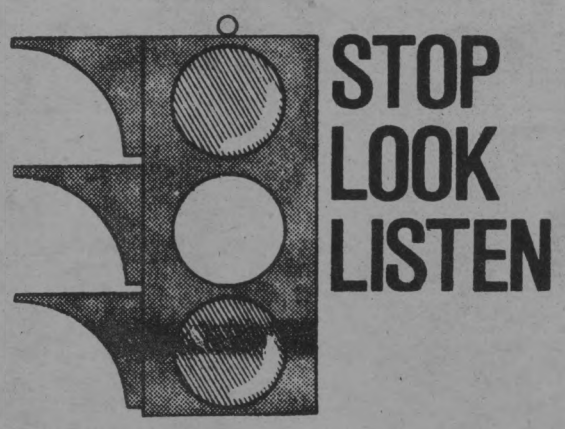
by

Eliot C Roberts

Regulations and controls have increasingly become a fact of life during the latter half of this century. Of course, we realize that they are intended as protection from all sorts of outside forces and influences and also, often from no one but ourselves.

Perhaps our use of motor vehicles is the prime example for needed regulations and controls. Traffic signs and signals determine where, when and how fast we may proceed. In addition, we are reminded to use safety equipment within the vehicle upon prompting by lights and buzzers.

Some of us feel relieved that we are being watched out for and protected, even though the cost for this service is increasing. More regulations and controls mean more jobs to protect the consumer and this effort is becoming a significant part of our economy.



LANDSCAPE HORTICULTURAL CONTROLS

In the field of landscape horticulture there seems to be no end to regulations and controls on everything- lawnmowers, chemical pesticides, fertilizers, seed. To be sure, these have helped the consumer to learn about the various products and how to evaluate quality and obtain satisfactory results and safe use. Laboratory testing has provided a means for making certain that labels are accurate and describe the product fairly.

Labels are particularly important on lawnseed. There are perhaps four important aspects of the seed package that influence the consumer in making a purchase.

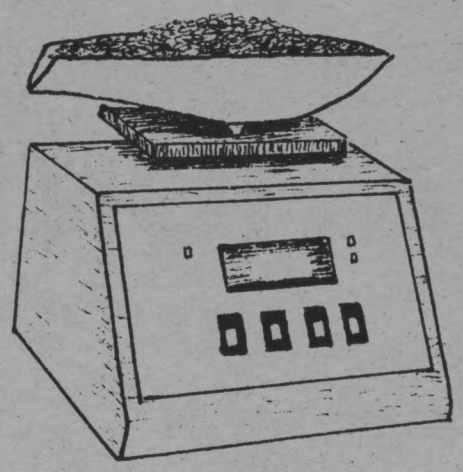
First: The name of the seed company and the reputation of the company based on public relations and advertising.

Second: The price and size of the package.

Third: The picture and other graphic material including name of the mixture on the package.

Fourth: The label containing technical information about the ingredients of the package.

Lawn Seed Regulations & Controls cont



The Lawnseed Label

Of these four, the label is by far the least conspicuous and the most difficult for the consumer to read and understand. Federal and state seed laws require reasonable information on lawnseed labels, but most consumers reporting to The Lawn Institute are not sufficiently informed about lawnseed, nor interested in additional technical information to pay much attention to the label. The information is there, but it is something else to read it and understand the significance between labels on different blends or mixtures.

It is easy to rely on the seed firms identity and reputation; this is desirable. At the same time, reliance on an attractive package of large size and low cost can be highly misleading in terms of selecting well adapted perennial grasses for local use.

Most retail outlets will provide something for everybody, over a rather wide price range. Ultimately the consumer is responsible for making a decision. The importance of the seed label in this respect cannot be discounted. Increased effort is desirable in making it more functional.

New Lawnseed Regulations

New seed regulations are being considered by some states. The issue is over the proper designation for some seed types that have generally been known as "other crop seeds" when present in small amounts. New wording "restricted noxious weed seeds" would apply to any bermudagrass seed, redtop and/or bentgrass seed, annual bluegrass and/or rough bluegrass seed, meadow and/or tall fescue seed, orchardgrass and/or timothy and velvetgrass seed.

Should any of these ten crop seeds be found to occur in amounts less than five percent of the total in bentgrasses, Kentucky bluegrasses, Chewings, creeping red or hard fescues, perennial ryegrasses, turf type tall fescues and/or blends and mixtures of these, the noxious designation would apply. When present in amounts greater than five percent, bentgrasses and redtop, meadow and tall fescue, rough bluegrass and bermudagrasses would be included as a recognized component of the blend or mixture.

Also under consideration is a requirement to have the number of these seeds per ounce listed in addition to the percentage of the total represented by other crop seed. At present, both federal and state seed laws require the designation of "other crop seed" by percent of the total.

An alternate proposal to add "contains undesirable crop seed" following the designation "percentage of other crop seed" when appropriate has also been discussed. No requirement to name specific seed types or list numbers of seed per ounce is included, and no additional test would be required to determine the necessity of providing additional information.

Noxious is generally defined as harmful or injurious to health or physical well-being or morally harmful, pernicious-ruinous, highly hurtful, deadly, fatal, evil or wicked. Undesirable carries the meaning of objectionable, not worthy of being desired, not pleasing, not excellent. On this basis it would seem that use of the word 'noxious' in the proposed new seed label would result in significant 'over-kill', leading ultimately to increased confusion and misunderstanding on the part of those consumers who try to understand the meaning and significance of the seed label.

Lawn Seed Regulations & Controls cont

Seed Label Uniformity

Seed label uniformity is recognized as critically important in the seed trade. This permits seed marketed within various climatic regions of the country to be packaged and labeled uniformly. Should one or more states require different information on the label than other states, the result would be distinct interference with interstate seed shipment. The provision of separate labels for these states would be costly. In fact, such labels would violate other state seed laws. It has even been suggested that the proposed regulations violate the commerce clause of the United States Constitution because they unnecessarily burden interstate commerce.

Lawnseed Resolution

The following resolution was recommended by the ASTA Lawnseed Division and adopted by the American Seed Trade Association Board of Directors at their January 1983 meeting:

"Whereas, effort is underway to revise the Federal Seed Act, and

Whereas, revision of the Federal Seed Act is a joint effort of USDA/Agricultural Marketing Service, American Association of Seed Control Officials, Association of Official Seed Analysts, Association of Official Seed Certifying Agencies, Seed Policy Committee of the Experiment Station Committee on Policy and the American Seed Trade Association, and

Whereas, the objective of the Federal Seed Act is to provide for truthful labeling of seeds to ensure orderly marketing of seeds entered into interstate commerce while satisfying the needs of the consuming public, the individual state and industry, and

Whereas, uniformity in labeling offers positive benefits to all concerned;

Now, Therefore Be It Resolved, that the American Seed Trade Association requests that all states hold in abeyance any proposal of planned revisions to their individual state seed laws as they pertain to lawnseed labeling until such times that the revised Federal Seed Act is available, as any new state lawnseed labeling laws will be counter-productive to the national effort now underway."

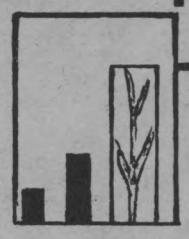
The American Seed Trade Association supports proposed changes in the Federal Seed Act regulations to eliminate fine-textured and coarse-kind labeling of lawnseed, and has appointed a committee to develop a position paper in opposition to "noxious weed" labeling of agricultural crop seeds in lawn-turf seeds.

P.O.BOX 108

(COMMENTARY FROM THE MAIL)

The following four items called to our attention are of special interest at this time.

GARDENING rates HIGH



Among Retired People

The August 1983 issue of The Participant published by The Teachers Insurance and Annuity Association described what life is like for those retired from careers in higher education.

The respondents' ages ranged from 60 to above 90. Eighty four percent returned a completed questionnaire. The top three activities reported, including percentage of respondents, were: reading- 92 %; socializing with friends - 75 %; gardening and home improvement - 71 %. The world of literature, the neighborhood of friends and the landscape environment are an important part of everyday life, even on through retirement.

Annual Research Report TEXAS Turfgrass Progress

The 164 page Annual Texas Turfgrass Research Progress Report for 1983 is now available according to Dr James B Beard. It is published as Consolidated PR 4147-4170 of the Texas Agricultural Experiment Station. Individuals wishing to request copies should contact Tom Sneed, Department of Agricultural Communications, Texas A & M University, College Station, Texas 77843.

President Reagan Honors Dr Burton

Dr Glenn Burton of Georgia's Coastal Plain Experiment Station in Tifton has received the National Medal of Science. President Ronald Reagan presented the award during ceremonies at the White House. This, the nations highest scientific award, is made in recognition of outstanding contributions in the physical, biological, mathematical, engineering, social and behavioral sciences. Dr Burton was cited for his research and achievements as a plant geneticist and breeder. His improved grass varieties have made southern lawn and sports turf more beautiful and enjoyable, and his research on grain crops are leading to higher food yields.

Congratulations, Glenn, from all of us in the turfgrass industry.

Turfgrass Slide Sets

The Crop Science Society of America announces the availability of the following Turfgrass Slide Sets:

- The Botanical Characteristics of Turfgrasses by Dr Glen M Wood;
- Roadside Turfgrass by Dr Robert W Duell;
- Microbiology of Turf Soils by Dr J P Martin;
- Diseases of Turfgrasses by Dr Lloyd M Callahan.

For detailed information about these sets, including cost, write to: The Crop Science Society of America, 677 South Segoe Road, Madison, Wisconsin 53711.

Readers' Forum

(NEWS AND VIEWS)

The following three items speak to past, present and future aspects of the turfgrass industry. Much progress is evident; future prospects for research and development are promising.

LAWNGRASS SEED AVAILABILITY

A recent survey (August 1983) of stocked (on the shelf) lawngrass seed in a leading retail outlet in the Washington DC area produced some interesting data.

- Eleven different formulations were presented for use in this area.

- These eleven different formulations were packaged by two leading seed firms.

- Weight of seed packaged varied from one pound to ten pounds.

- Cultivars and varieties included in different formulations varied from one to four.

- Price per container of seed varied from $2.99 to $19.95.

- The following fourteen grasses were included in one or more of the formulations:

  Kentucky bluegrasses:
  common — Merit
  Park — Victa
  Newport — Bristol

  fine fescues:
  common creeping red
  common Chewings
  Banner Chewings
  Jamestown Chewings

  perennial ryegrasses:
  common perennial
  Manhattan

  annual ryegrass

  Kentucky 31 fescue

- calculations based on price of seed per pound indicated the least expensive formulation to cost $0.90 and the most expensive $5.32. Between these two extremes, price per pound of seed was $1.20, $2.22, $3.65, and $4.60 - a good spread.

- In 10 lb lots, Kentucky 31 fescue was available for $1.20/pound.

- In 10 lb lots, annual/perennial ryegrass mixture was available for $0.90/pound (no proprietary).

- In 9 lb lots, bluegrass/fine fescue/ryegrass mixture was available for $2.22/pound (no proprietary).

- In 3 lb lots, blend of three proprietary bluegrasses was available for #5.32/pound.

- In 3 lb lots, mixture of two bluegrasses and two fine fescues (all proprietary) was available for $4.60/pound.

- In 3 lb lots, mixture of two bluegrasses and one fine fescue (one proprietary) was available for $3.65/pound.

- It was concluded that in this particular outlet, there was something available for everyone in both price range and in range of expected lawn quality. Faced with this selection, what would you buy ? How much would you be influenced by price; how much by knowledge of the cultivars and varieties included; how much by the appearance of the package; how much by the name of the seed company ? If you have been influenced by knowledge of the cultivars and varieties, from whence was this information obtained ? May we hear from readers of Harvests who have made other surveys similar to this.

FIFTY YEARS OF TURFGRASS SCIENCE

Dr Fred V Grau, President of The Musser Foundation, provided the following reflection on the development of turfgrass science:

The importance of the ground breaking ceremony on September 29,1983 for the new Turfgrass Research and Education Facility at the University of Maryland calls for a brief review of earlier historical events.

The year 1917 marks a turfgrass milestone with the advent of the book "Turf for Golf Courses" by Piper and Oakley, USDA scientists.

Fifty Years of Turfgrass Science CONTINUED

Readers' Forum

In 1920, the putting greens at Columbia CC died just before the U S Open Championship. Putts were made on "sanded browns". This man-made disaster led to the formation of the Green Section of the US Golf Association.

Dr John Monteith, USGA Green Section in 1927, made a small money grant to the University of Nebraska which in 1931 resulted in a Nebraska farm boy (Grau) coming east to work toward his M.Sc. degree at The University of Maryland. The degree was granted in 1933, fifty years ago, for work on "Weed Control in Turf". Plots were laid out on the crabgrass infested lawn just below what is now the campus chapel.

Except for prominent golf courses, for all practical purposes, all turfgrass work came to a screeching halt during the Depression years. There were no jobs and no money. My M.Sc. degree meant little then. Dr Metzger and Dr Thomas counseled wisely that I pursue an advanced (Ph.D.) degree. They even found the money to finance my studies on "Pastures in Maryland". Eight gallons of gas for my Model A cost $1.10.

In 1934 there was a beginning of the sod industry. Horse drawn sleds cut the common bluegrass (weedy) pasture sod which, when laid on new lawns, quickly became solid crabgrass. Farmers received $100 to $125 an acre for the sod. In 4 to 5 years, sod could be cut again.

Crabgrass lawns were tolerated for the most part. When frost blackened the crabgrass, it was common practice to seed annual ryegrass for green winter color. The cycle was repeated the next year.

Sulfate of ammonia was the most available and popular fertilizer 50 years ago. When used with hydrated lime, much turf was burned to a crisp. Blood meal, cottonseed meal, guano, and tankage also were used.

Fifty years ago zoysiagrasses were considered a botanical curiosity. Now, zoysia lawns are a first defense against crabgrass. Soon zoysia turf will be established with seed.

Turfgrass conferences were held at The University of Maryland classrooms in the early 40's. Dr E N Cory, Enotmologist, provided guidance with the help of leading greenkeepers. In later years, when Dr Cory retired, Dr George Longford took the reins of leadership.

One of the leading figures in the formation of the Maryland Turfgrass Council was Mr Parker Shirling, then with Princeton Turf Nurseries. He was a dynamic figure in the sod industry, as well as in other facets of turfgrass.

Publication of the Maryland Turfgrass Report, an economic impact study, in 1981 established beyond doubt the economic significance of the turfgrass industry in Maryland.

Work at Beltsville from 1945 to 1953 saw many "firsts" in turfgrass research. Even without a research program at the University, several graduates have assumed high places in the turfgrass industry. The following are but a few examples of advancements that began in Maryland.

- A plan to finance graduate students in turf.
- Initiation of the Turfgrass Committee in the American Society of Agronomy. Eventually this became Division C-5 and recognized turfgrass as an integral part of agriculture.
- Naming and release of Merion bluegrass, the first improved turfgrass grown from seed.
- Naming and release of Meyer (Z-52) zoysia, a lawn grass of high quality.
- First National Coordinated Turfgrass Trials.
- Sponsoring and partial funding of research on warm-season grasses at Tifton, Georgia with Dr Glenn W Burton, recent Medal of Science winner.
- First ureaform nitrogen fertilizer made at Beltsville by Dr K G Clark and first application to turf at the Plant Industry Section.
- First lawn in the east to be planted to a tall (Alta) fescue.
- First broad leaf weed control using 2,4-D by Davis, Mitchell and Marth.

Thus it is evident that Maryland has been a leader in many aspects of the turfgrass industry. This ground breaking ceremony establishes another mile stone to mark Maryland's continuing progress in the search for Better Turf that ultimately will benefit every tax payer. Many have contributed to the steady progress. Two names in the Maryland Turfgrass Council merit special mention: John Strickland, past president, and Robert Larsen, incumbent president. To "Gus" Day, University of Maryland, much is owed for counsel and guidance.

Editors Note: Congratulations to all in Maryland who have worked so diligently over the years in behalf of Turfgrass Science. And may we add one more name to the many who have contributed much - that of Dr Fred V Grau. We all can learn from this Maryland success story.

MARYLAND TURF STEPS FORWARD

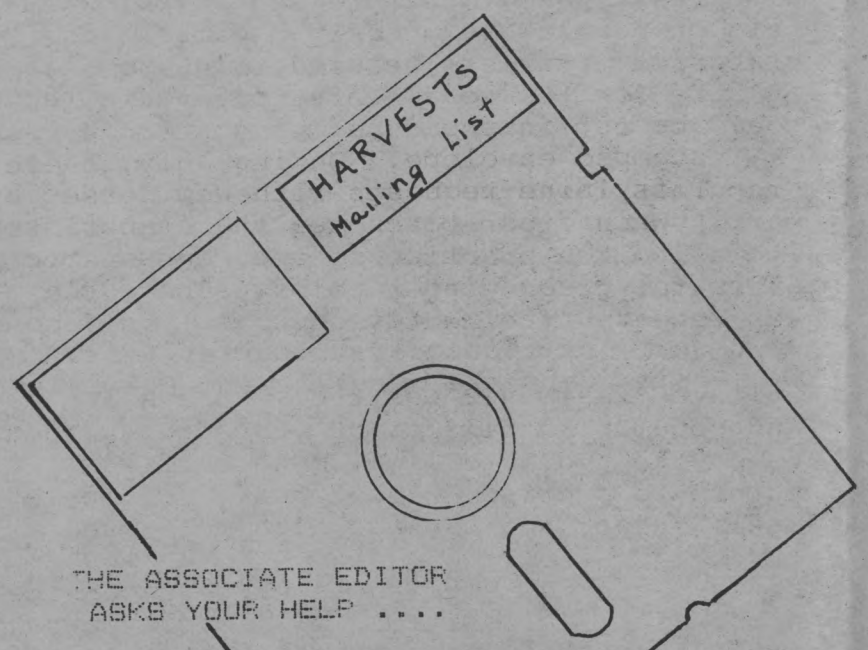
Dr Mark S Welterlen, Turfgrass Specialist in the Department of Agronomy at the Univeristy of Maryland, compiled the following review of key steps in their turfgrass program development. This successful effort may well encourage others involved in similar projects.

Turfgrass research, teaching, and extension at the University of Maryland has provided much needed information on both applied and basic aspects of turfgrass science. Until recently, however, the importance of the Turfgrass Program has not received adequate recognition. Through the efforts and financial support of the Maryland Turfgrass Council, an economic impact study was conducted in 1979 to assess the importance of the turfgrass industry on the economy of Maryland. The results of the study verified the importance of the turfgrass industry on the economy of the state. As a result of this survey, efforts were made to revitalize the Turfgrass Program at the University of Maryland to meet the needs of the industry and people of the state. Consequently, the Maryland Agricultural Experiment Station, under the direction of Dr Lemar Harris, allocated funds for upgrading the turfgrass research facilities. Efforts were also made by Dr James R Miller (Chairman, Dept of Agronomy) to increase the Turfgrass Science staff in the Department of Agronomy. Presently, there are three full-time faculty members at the University of Maryland, and they are: Drs Thomas R Turner (Extension Specialist), Peter H Dernoeden (Research/Extension) and Mark S Welterlen (Research/Teaching).

The first and foremost step in upgrading the turfgrass research facilities was the acquisition of a suitable field research center. The new 38.4 acre site consists of 15.4 acres of prime research land, with the remaining acreage in woods. The new site will be equipped with underground irrigation lines so that the research area will be fully irrigated. Two buildings will also be constructed on the site. One building (40 by 80 ft) will include an equipment storage room, a repair shop, office, and a field room. The other building (14 by 52 ft) will be used to store pesticides, lime and fertilizers. For security, the entire site will be surrounded by a six-foot-high chainlink fence.

In addition to field research facilities, an analytical laboratory for turfgrass research has been constructed on the College Park Campus. This new lab was made possible by contributions from the Maryland Turfgrass Council. The lab will be used for turfgrass disease identification, and tissue and soil analyses. The Maryland Turfgrass Council has also provided funds for analytical equipment that will be used in the lab to determine levels of tissue nitrogen, phosphorus and carbohydrate reserves. This equipment will greatly aid our research in the areas of turfgrass fertility, physiology, and environmental stress tolerance.

Current and future areas of turfgrass research at the University of Maryland include: environmental stress of turfgrass, the influence of turf areas on environmental quality, etiology of turfgrass diseases, weed and disease control, fertility and efficient turfgrass culture with limited imputs of water and energy. The support of these new facilities from the Maryland Agricultural Experiment Station and the Maryland Turfgrass Council has provided the impetus for the University of Maryland to become an international leader in turfgrass research.



THE ASSOCIATE EDITOR
ASKS YOUR HELP ....

This is the first issue of Harvests to be mailed using labels printed by computer. Approximately 900 names and addresses were entered and even with careful checking, errors can slip by.

PLEASE LOOK AT YOUR LABEL.
If corrections are needed, send the label and correct address to:
THE LAWN INSTITUTE
PO BOX 108
PLEASANT HILL, TN 38578

THANK YOU FOR THIS ASSIST

QUARTERLY PROGRAM REPORT

(INSTITUTE PROGRESS AND ACHIEVEMENT)

The Lawn Institute's major thrust during July, August and September has involved release of the Late Summer-Early Fall Press Kit and Harvests newsletter. Three articles were published during this period. In addition, travel reported under Itinerary has increased contacts for The Lawn Institute and provided an enriching experience.

LATE SUMMER-EARLY FALL 1983 PRESS KITS

One thousand seven hundred and forty four Press Kits were mailed the end of July. Distribution throughout the northern states, according to the first digit of the zip code was as follows:

237	ME,NH,VT,CT,RI,MA,NJ
340	NY,PA,DE
109	MD,DC,VA,WV
293	MI,IN,OH,KY
151	MT,ND,SD,MN,IA,WI
243	NE,KS,MO,IL
53	ID,WY,CO,NM,AZ,UT,NV
250	CA,OR,WA,AK,HI
24	Canada
17	Overseas
1744	

Some articles included in our Press Kits offer LISTS (Lawn Institute Special Topic Sheets) in exchange for a self addressed, stamped envelope. During July, there were fifty nine requests with New Jersey by far the leading state. During August, there were two hundred and one requests. Again, there were more from New Jersey than any other state. Good response from the mid-west, particularly Missouri, Kansas, Illinois, Nebraska, Indiana and Ohio (in decreasing order of response)was also noted. Contact has been made with residents of thirty one states. During September, requests for LISTS totaled 230. Thirty four states were represented with New York and New Jersey leading in the northeast; Ohio, Illinois, Kansas and Missouri in the midwest, and California in the west.

PUBLICATIONS

- "Lawngrass Seed - What to Use Where", Lawn Care Professional Volume 2 Number 5 (July 1983 issue) pages 12,13,20.

- "Why Autumn Lawn Care Is So Important", J.D.Shopper Volume 2 Number 3 (Autumn 1983 issue) pages 8 and 9.

- "High Quality Lawnseed Comes As No Accident - Quality Lawnseed Costs Dollars", Lawn Care Professional Volume 2 Number 6 (August/September 1983 issue) pages 17, 18,19,33.

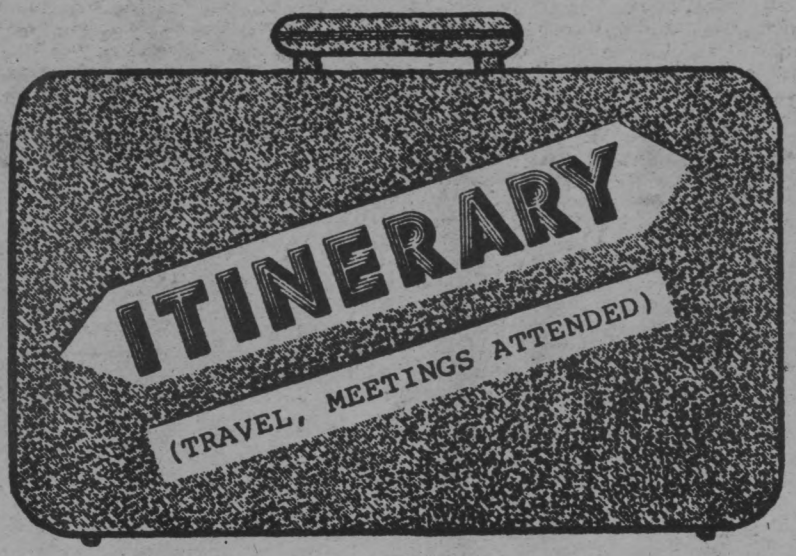
HARVESTS NEWSLETTER

Eight hundred and sixty two copies of the July issue of Harvests were mailed. Distribution according to the first digit of the zip code was as follows:

65	ME,NH,VT,CT,RI,MA,NJ
65	NY,PA,DE
72	MD,DC,VA,WV,NC,SC
141	TN,MS,AL,GA,FL
70	MI,IN,OH,KY
53	MT,ID,SD,MN,IA,WI
73	NE,KS,MO,IL
46	TX,OK,AR,LA
68	ID,WY,CO,NM,AZ,UT,NV
172	CA,OR,WA,AK,HI
24	Canada
13	Overseas
862	

erratum :

Harvests Volume 30 Number 2 (July 1983) presented information by Dr C Reed Funk on perennial ryegrasses on page 6. Dr Funk reviewed early development of the new, improved perennial ryegrasses starting with NK-100 and then Manhattan, which was widely publicized and stimulated public interest. Now, a total of about thirty million pounds of turf type perennial ryegrass are used each year. We were in error by stating that thirty million pounds of Manhattan perennial ryegrass seed was used annually. Perhaps this much Manhattan has been used in total since 1967 when the first years production amounted to four to five thousand pounds.



The third quarter (July, August, September) itinerary consisted of travel up into the northeastern states with stops for two professional meetings and visits to three New England Turfgrass Research Stations.

JULY 31 - AUGUST 3

Soil Conservation Society of America Annual Meeting in Hartford, Connecticut

The theme of the convention was "Resource Information for Conservation Decisions". We have moved in this country from the Agricultural Age to the Industrial Age and are now into the Information Age. The Lawn Institute, as an effective communicator, must function well within the developing structure of new information/ communications systems.

This annual meeting provided an opportunity to consider in depth the challenge before us in processing information and in communicating this information to the benefit of humankind.

AUGUST 4,5,8

Turfgrass Research at Agricultural Experiment Stations in Southern New England.

- University of Connecticut Turfgrass Research is conducted off campus on golf courses, parks and lawns maintained by owner-cooperators. Dr William Dest is project leader for investigations of soil-turfgrass relationships. His office and laboratories are located on campus in Storrs, Connecticut.

- University of Massachusetts Turfgrass Field Research is directed by Dr Joseph Troll and Professor John Zak. Turf plots are located off campus and include: variety trials, weed control studies, disease/ turf relationships, growth regulator studies,and turf management investigations involving various combinations of cultural practices. This turf research effort has expanded in recent years with increased interest and support from the Massachusetts turf industry. Tissue culture and genetic engineering research is being conducted by Dr William Torello. Now in addition to a strong teaching program, involving four year, two year and Winter School students, a well balanced research program is helping to serve needs of southern New Englanders.

- University of Rhode Island Turfgrass Research is conducted by a team of scientists, including Dr's Richard Skogley, Richard Hull, Noel Jackson, Thomas Duff, Robert Wakefield and Professor John Jagschitz. Virtually all aspects of soil-turfgrass relationships are under investigation, with emphasis on weed ecology and control, turfgrass physiology and biochemistry, turfgrass pathology, turfgrass genetics and breeding, allelopathic turfgrass relationships, growth regulators and turfgrass ecology. Now into their second half century of Turf Research Field Days, the Rhode Island effort continues as one of the major sources of turf management information.

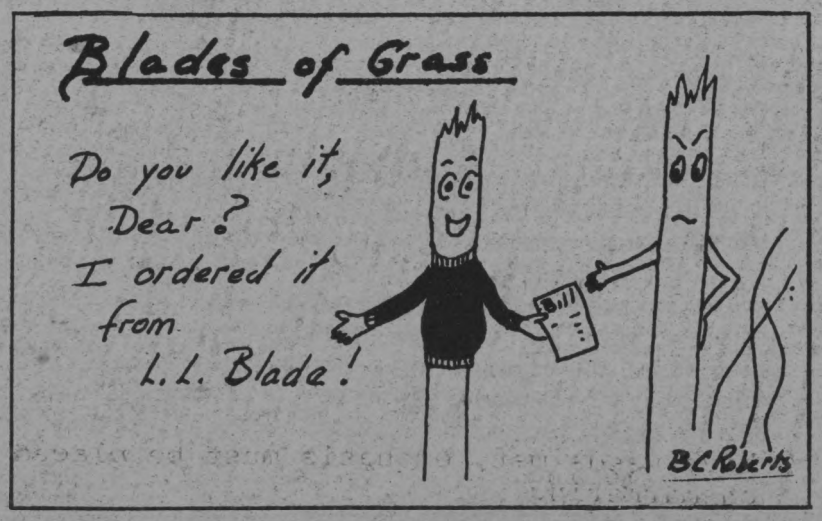
AUGUST 14-19

American Society of Agronomy Annual Meeting in Washington, DC

A record number of turfgrass research papers (fifty nine) were presented. In addition, a full day turfgrass tour in the Washington DC area featured:

-White House grounds;
-Kennedy Stadium;
-USDA Turfgrass Research at Beltsville;
-University of Maryland Turfgrass Research.

This issue of Harvests presents information from the tour in the Score Card section, and a review of research papers in the Research Synthesis section.



Looking Ahead

(PLANS FOR THE FUTURE)

Warvests II

During the fourth quarter (October, November and December), The Lawn Institute will be represented at one major turf conference each month. In addition, the annual fall meeting of The Lawn Institute Executive Committee is scheduled for early November.

- October 9-12 Kissimmee, Florida - The Florida Turf-Grass Association 31st Annual Conference and Show featuring the theme "Turfgrass in the Space Age". Keynote speaker: Eliot C Roberts, "The Politics of Space Age Turfgrass"

- November 2-4 Orlando, Florida - Joint Meeting: Atlantic Seedsmens Association, November 2-4; ASTA Lawnseed Division, November 4; Lawn Institute Executive Committee, November 2.

- November 7-10 Birmingham, Alabama - National Institute on Park and Grounds Manangement featuring the theme "New Expectations for a Changing Profession". Speaker - Eliot C Roberts "New Low Maintenance Turfgrasses - Potentials for...Probability of...Practices for".

- December 14-15 Athens, Georgia - Fourteenth Annual Turfgrass Conference The University of Georgia. Speaker - Eliot C Roberts "A Turfgrass Cultivar Clinic" "The Living Soil"

Lawn and Turf Industry Trends

Three speakers at the 1983 Golf Course Superintendents Association educational conference in Atlanta had something in common. They were looking ahead, searching out trends that would relate turfgrasses to golf course conditions, professional lawn care and the entire green industry. James Prusa represented GCSAA and Martin Erbaugh, the Professional Lawn Care Association of America. Richard Morey, Brantwood Publications, spoke from the perspective of editor and publisher. In addition, Bruce Shank, Executive Editor with Harcourt, Brace & Jovanovich added more insight in this area during a discussion entitled "The Business of Turf - An Overview" at the 1983 Midwest Regional Turf Conference at Purdue University.

GOLF TURF

Golf turf is recognized as highly specialized. Besides the turf, specific club and golf requirements must be satisfied. This indeed involves a unique profession that contributes in unique ways to the overall turfgrass industry. Jim Prusa cited management as the key concept in a time of industry change. Needs of the professional turf manager are diverse and in order to have needs met, emphasis must be placed on marketing.

Good management concerned with turf or grounds involves marketing of approaches, concepts, areas of emphasis, priorities. There is always more than one way to get from here to there. Market segmentation recognizes the differences in what appeals to people. It is necessary to understand these differences so that the proper marketing approach may be advanced.

All of this applies to members of a professional organization, such as GCSAA, and Jim outlined what he termed "the four P's" in the marketing formula.

First - the Product . This may well be viewed as membership services. What are the elements required by the turf manager to be outstanding in his field ? What sort of a package should there be ?

Second - the Price. What will be the cost ? What delivery methods will be involved (different methods result in different costs) ?

Third - the Placement. The delivery system may vary depending on objective. It all involves communications of one form or another - large audience, small audience; face to face confrontation or use of videotape or teleconferences. All are possibilities and directly related to cost.

Lawn and Turf Industry Trends continued

Fourth - the Promotion. What are existing membership services doing for the turf manager or Golf Course Superintendent ? What kind of recognition is there that advances the profession ? Not only what's in it for me, but what's in it for all of us ?

Jim concluded that the person with the lowest quality professional output determines how the group as a whole is viewed. It's the old addage that a chain is no stronger than its weakest link. Thus, to be the best we can be is still the urgent challenge of the day. It's really mostly a matter of communications, the only way to overcome ignorance and mediocrity.

These points, made by Jim Prusa, are worthy of reemphasis here because as we all look ahead to the future, it does matter what our public thinks of the green world and those of us who strive to improve environmental quality through use of turf and lawngrasses and other landscape plants. Golfers are a critically important part of the green world concept, for golf turf represents quality standards that are goals for all of us.

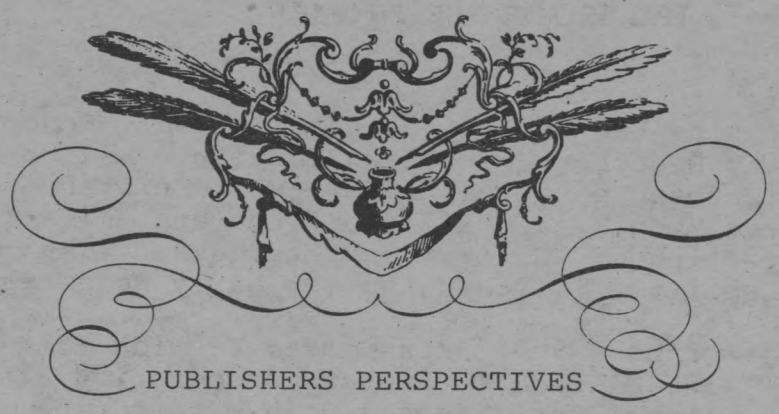
LAWN TURF

Lawn care has come of age during the past few years as specialists have developed reputations for good results at costs comparable to "do-it-yourself". The Professional Lawn Care Association of America is taking a leadership role in working with both small and large firms to establish and maintain standards of high quality workmanship.

Large firms have sufficient capital for large investments in equipment and train well qualified personnel to perform with a high degree of uniformity. Small firms often enter the lawn care business with little capital investment and may not have personnel adequately trained for the job at hand. According to Martin Erbaugh, PLCAA should not be considered a club of large member firms, but rather a means for providing services to a broadened membership during the months ahead.

The millions of homeowners that have been introduced to technical lawn service in recent months are concerned with standards of high quality. The new Executive Director of PLCAA, James R Brooks, is developing plans to assure that these consumer needs are met.

Warvests 12



PUBLISHERS PERSPECTIVES

Richard Morey has a broad vantage point for looking at the green industry. He is publisher of Nursery Business, Landscape and Turf and Southern Landscape and Turf. His GCSAA talk "The Future of the Turfgrass Industry" was subtitled "Plant Petunias".

Turfgrass as a commodity has come a long way from its early roots in forage and pasture grass research to meet prescribed growth requirements for highly diverse uses: roadside environments, commercial developments, residential developments, recreational developments of all sorts. Now lawn service and landscape maintenance have added a new dimension, and we hear about high maintenance and low maintenance.

New cultivars of lawngrass have entered the scene with new names and bold claims. Some segments of the industry appear confused by so many reports released from so many research centers around the country. Dick noted that even though there seemed to be little common ground for the industry to get together, this is, in fact, a fifteen billion dollar a year enterprise - three billion dollars for golf alone.

The challenge of delineating this massive fine turf effort nationally is difficult at best. Even accurate determinations of size are hard to come by and descriptions of how all the related segments are put together are even more subject to speculation. Predictions of where we are going; how we will get there; and how fast are called for. Dick, looking into his crystal ball, sees it this way:

- Lawn maintenance is the fastest growing segment of the industry and this will continue.

- Lawn maintenance is not likely to take over the specialization of lawn establishment. It is not likely to become involved with grass seed used in new lawns or in renovation to a great degree.

- There are likely to be fewer new golf courses per unit time during the years ahead.

- More emphasis may well be placed on the preservation of natural areas.

Lawn and Turf Industry Trends continued

- Less emphasis is likely on fine grooming. More low maintenance lawns will be in demand.

- The largest market for grass seed may well be in the south for overseeding. These techniques are highly feasible for residential lawns.

- More commercial buildings will feature naturalistic grounds with smaller lawn areas.

- Central city malls will involve use of other ground covers and have less grass.

- Greater redevelopment of central city space will provide residential habitats.

- More crown vetch and zoysia are likely to be used on roadsides in an effort to reduce maintenance costs.

- Government buildings and school grounds will have smaller lawn areas maintained.

- Home lawns will be smaller and home landscaping will likely involve less grass.

- More lawns will be developed and maintained as features of the condominium.

- There will be fewer urban lawns.

From all this it's difficult to tell how great the turf industry is, but make no mistake, it is great. It's just that there seem to be changes on the horizon for the future. More emphasis is seen likely on planting petunias and on planting woody ornamentals. At this point in time, this seems natural and the way we should go according to Dick Morey.

Changing life styles of people are the key determining factor. These life style changes can be influenced by those of us actively involved in green world enterprises. If there are not adjustments in current trends, the following additional predictions should be considered:

- Lawn mowing has such a negative image that fewer mowers may well be required.

- Sod - instant lawn - looks better than seeding for the homeowner with smaller lawns (seeding is too slow);

- Reseeding and renovation of old lawns is not likely to become popular;

- Some reduction of irrigation water will cause cut backs in the placement of new systems, but slow growth should be evident in time;

- Opportunities through horticulturally related activities should develop - interiorscaping may become more important than landscaping.

The position of turf and lawngrasses has always been in relation to the landscape as a whole. As landscape concepts are becoming better understood, great strides are being made in the creation or modification of out-of-doors space. Lawns will continue to be a part of this, but they will be featured in new and different ways. It's up to us to make this change exciting.

Bruce Shank, speaking on "The Business of Turf - An Overview" at Purdue University, emphasized both agronomic and business aspects. Weeds,Trees and Turf with a circulation of 45,000 and Lawn Care Industry with a circulation of 13,000 attest to the importance of a thorough treatment of both aspects. From Bruce's perspective, it looks like twenty to twenty five percent growth through 1985. Only slow growth is expected during the mid 1980's. More competition is likely and greater emphasis on cost control in the older market areas is predicted. Increasing use of computers in both agronomic and business aspects will be seen.

Bruce emphasized that we will be dealing with megatrends and recommended the book, Megatrends-Ten New Directions Transforming Our Lives, by John Naisbitt, Chairman of the Naisbitt Group, a Washington DC based research and consulting firm and published by Warner Books. We are dealing with information concerned with changes in society from an industrial emphasis to a computer emphasis. We can now expect to have the resources from review of 600 technical papers each day with all information processed for use. No matter what the business, even lawn care, operations will be different than they have been.

Lawn and Turf Industry Trends continued

The following items were identified and discussed:

- Now contractors and architects seem to have a better appreciation of business operations. The lawn care industry must concentrate in this area. It is becoming a more sophisticated, respectable business.

- Construction is expected to pick up by mid 1984. Since the architects' image of maintenance has improved, there is an increased need for a coordinated effort by architects, contractors and maintenance supervisors to be involved in and concerned for the total outcome- the finished landscape.

- The image of lawn care has improved with well marked vehicles, well trained people and excellent results.

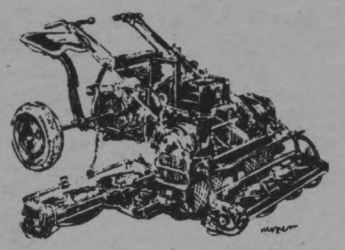
- Some areas need to be watched carefully-

  - The old "five years and drop syndrome cycle". These business cycles do occur; every effort should be made to prevent the "drop". Lawn care success is based on continuing service without a "drop".

  - Disease conditions are real; lawn service must be responsive.

  - Customer education is a key to continuing service.

  - Subcontracting of activities, like renovation of lawns and tree and shrub care, looks like the way to go. Perhaps there should be two or three levels of service.



  - Soil and tissue tests offer potential for follow up activities.

  - Phone call checks lead to good consumer relations.

  - Ethics related to competition and advertisements must be reinforced.

Several areas of research are yielding results that make the future for the turfgrass industry appear bright. Bruce listed the following:

- development of better growth regulators;
- new, more effective insecticides;
- lower volatilization of urea;
- improvements in bulk blending and cuts in handling costs;
- improved renovation techniques;
- new, more effective fungicides;
- new turf type tall fescues;
- new hard fescues;
- new perennial ryegrasses;
- new, more effective herbicides;
- better understanding of value of wetting agents.

This is how it looked to four top representatives of the turf and lawngrass industry in early 1983. Even since then, changes have taken place that might influence projected trends. The most predictable aspect of what has been presented is that even this will change.

Research Synthesis

(ANALYSIS OF RESEARCH REPORTS
AND INTERPRETATION OF RESULTS)

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15

AGRONOMY

Seeds, Soil and Society

NATIONAL TURFGRASS RESEARCH EFFORT BREAKS ALL RECORDS

Fifty nine turfgrass research reports were presented at the 1983 annual meetings of the American Society of Agronomy in Washington DC. These represented the results of research at twenty four state universities, the United States Department of Agriculture and three industrial stations. Three or more papers were listed from the University of Nebraska, Penn State University, Texas A & M University, University of Maryland, Auburn University, University of Georgia, University of Florida, University of Massachusetts, University of Illinois, USDA and Monsanto.

These reports are referenced in one or more of the following seven categories:

- cool season grasses;
- warm season grasses;
- seeds, seedlings, sod and soil;
- fertilizers and mineral nutrition;
- stress;
- growth regulators;
- pest management.

COOL SEASON GRASSES

References:

1 - Morris K., J.Murray The National Turfgrass Evaluation Program Data Submission Form and Use. MT Council and USDA, ARS, Beltsville MD.

2 - Wu L., J. Harding, A. Harivandi, W. Davis Isoenzyme Markers For Kentucky Bluegrass Cultivar Identification. University of California, Davis.

3 - Kopec D., T. Riordan, R. Shearman Mowing Response on Root and Shoot Growth of Tall Fescue. University of Nebraska.

4 - Taylor D. Particle Size of Sand for Topdressing Golf Greens. University of Minnesota.

5 - Nelson E., J. Duich Development of Rhizomatous Colonial Bentgrasses. Pennsylvania State University.

6 - Mancino C., J. Troll Studies of the Fate of NO_3^- and NH_4^+ Nitrogen from Various Fertilizers on a Penncross Creeping Bentgrass 80 % - 20 % Sand; Peat Golf Putting Green. University of Massachusetts.

7 - Cuddeback S., A. Petrovic Traffic Effects on Growth and Quality of Creeping Bentgrass. Cornell University.

8 - Brede A., J. Duich Plant Interaction Among Poa annua, Poa pratensis and Lolium perenne Turfgrasses. Pennsylvania State University.

9 - Brede A., J. Duich Initial Mowing of Kentucky Bluegrass - Perennial Ryegrass Seedling Turf Mixtures. Pennsylvania State University.

These nine reports featured the following points :

National Turfgrass Evaluation

Uniformity of turfgrass evaluation is the key to reliability of data interpretation. Cooperators are using forms and formats especially developed for computerization of data and precise evaluation of results.(1)

Kentucky Bluegrass

Isoenzyme markers can be used for the identification of Kentucky bluegrass cultivars. Five enzyme systems have been studied using starch-gel-electrophoresis. Seed and seedling materials have been compared. Seed of different cultivars harvested from different fields in different states in different years were examined for isoenzyme consistancy. (2)

COOL SEASON GRASSES continued

Tall Fescue

Seedlings of seven tall fescue cultivars were mowed at a one and one third inch height (3.3 cm). This mowing treatment reduced root number 20%, root depth 23%, fresh root weight 61%, fresh top weight 60% and leaf area 64%. Turf not mowed had different leaf and root numbers among cultivars. Mowed plants had different leaf number and root depth among cultivars. Numbers of tillers, roots, deep roots, fresh root weight, fresh top weight, root volume, root/shoot ratios and leaf area were measured. (3)

Bentgrasses

In golf putting green trials, sands containing gravel and very coarse sand particles (> 1.0 mm in diameter) were picked up by mowers in higher amounts following topdressing. Averaged over all treatments 19.2% of the gravel, 8.8% of the very coarse sand, 1.6% of the coarse sand, 0.4% of the medium sand and 0.2% of the fine sand were picked up in the first mowing. (4)

Evaluations of first generation selections from open pollinated and selfed seed of colonial bentgrass have more rhizomes. Potential for further improvement is great. Use of these new grasses in sports turf seems feasible. However, parential selections exhibit a low self fertility that hinders inbreeding. Low pollen quality has not been found to be a major cause of this. Some selections had up to 25% inviable pollen. Self seed set under pollination bags may be improved by partial shading to reduce temperatures inside the selfing bags. (5)

Leaching losses of nitrate and ammonia nitrogen on a Penncross creeping bentgrass putting green were not different between treated and untreated plots. Rate of nitrogen applied had no influence. Under normal growth conditions, the grass utilized applied nitrogen even when frequency is every 7 to 14 days. (6)

A traffic simulator used to impose artificial use on creeping bentgrass had the following effects: as frequency of traffic increased, bulk density and vertical penetration resistance increased; aeration porosity, root growth and thatch thickness and weight decreased. Cultivars varied in traffic tolerance. (7)

Turfgrass Interactions

Grasses differ in their ability to dominate a turf stand. With annual bluegrass, Kentucky bluegrass and perennial ryegrass, interspecific interaction was significant both above and below ground. Reductions in root and shoot parameters were noted. Ryegrass had an advantage below ground, while the bluegrasses were more dominant above ground. (8)

In mixtures and monocultures of Kentucky bluegrass and perennial ryegrass, the bluegrass tended to be more prevalent when close, early mowing treatments were made. Mowing two weeks after planting favored the bluegrass. At this time there was a 50% foliar ground cover in the unmowed mixed stand. Initial mowing at one and one half inches (3.8 cm) where 95% bluegrass 5% ryegrass was seeded produced a 50-50 mixture of the two species by the end of two months. Mowing at one half inch (1.3 cm) where 50% bluegrass 50% ryegrass was seeded produced the same 50-50 mixture by the end of two months. (9)

WARM SEASON GRASSES

References:

1 - Murray J.,M.Engelke, Y.Maki Distribution, Collection and Use of Zoysiagrass in the Far East -Part I. USDA,ARS Beltsville MD; Texas Agricultural Experiment Station Dallas Tx; Akita Pref.College Japan.

2 - Engelke M.,J.Murray, D.Yeam Distribution, Collection and Use of Zoysiagrass in the Far East-Part II. Texas Agricultural Experiment Station Dallas Tx; USDA,ARS Beltsville MD.

3 - Portz H.,J.Choi, J.Murray Characteristics of Zoysiagrass Grown from Harvested Seed of Several Cultivars. Southern Illinois University; USDA,ARS Beltsville MD.

4 - Choi J.,H.Portz,J.Preece Changes in a Scarified Zoysiagrass Seed Covering Morphology as Determined by Scanning Electron Microscopy. Southern Illinois University.

5 - Hubbell G., J.Dunn Zoysia Establishment in Kentucky Bluegrass with the Use of Growth Retardants. University of Missouri.

6 - O'Neill N., J.Murray Biology of Puccinia Zoysiae and Requirements for Infection of Zoysiagrass. USDA,ARS Beltsville MD.

Research Synthesis CONTINUED

WARM SEASON GRASSES continued

7 - Krans J.,F.Blanche Morphological Characterization and Identification of Turf Type Bermudagrass Cultivars. Mississippi State University.
8 - Gaussoin R., A. Baltensperger Evaluation of Bermudagrass Genotypes for Shade Tolerance. New Mexico State University.
9 - Horst G.,L.Tenn, R.Taylor, N.Beadle Bermudagrass Growth as Related to the Nitrogen/Calcium Ratio. Texas A & M University Research and Extension Center El Paso TX.
10 - Miller K., R.Dickens Centipedegrass Seed Production as Affected by Management. Alabama Agricultural Experiment Station, Auburn.
11 - Turner D.,R.Dickens Centepedegrass Sod Strength as Affected by Atrazine. Alabama Agricultural Experiment Station Auburn.
12 - Busey P.,B.Center Composite Cross Population in St Augustinegrass. University of Florida.
13 - Dudeck A.,C.Peacock Plant Response of Seashore Paspalum to Salinity. University of Florida.
14 - Peacock C., A.Dudeck Physiological Responses of Seashore Paspalum to Salinity. University of Florida.
15 - Beard J., S. Griggs, K.Kim Genetic Diversity in Low Temperature Hardiness of Warm Season C-4 Turfgrasses. Texas A & M University.
16 - Kim K., J.Beard Comparative Evapotranspiration Rates of Eleven Major Warm Season Turfgrasses Grown Under Both Uniform and Optimum Cultural Regimes. Texas A & M University.

These sixteen reports emphasized the following:

Zoysia

A USDA/USGA/Texas Agricultural Experiment Station Zoysiagrass exploration trip from May 14 to July 12,1982 included four countries: Japan, South Korea, Taiwan and the Philippines. Samples of Zoysia japonica, tenuifolia, matrella were collected between 9°N to 43°N latitude. Establishment by seed is common in Japan and Korea. (1)

Two additional species of zoysia, tentatively identified as sinica and macrostaycha were obtained from high salt areas in South Korea. Considerable variability exists for numerous agronomic characteristics, including: flowering habit, leaf texture and color, wear tolerance, turf uniformity, quality under minimal maintenance and disease resistance. Specimens collected included:

421 from Japan
261 from Korea
53 from Taiwan
62 from The Philippines
797 Total (2)

'Meyer' zoysiagrass seedlings and mature plants have shown the greatest variation in plant types and inflorescences. 'Midwest' zoysiagrass produces more uniform individual plants. Harvesting techniques are improved by slowing vegetative growth with growth retardants while still allowing full seed head exertion. (3)

The seed covering of zoysiagrass is primarily an outer glume with stomates. Nontreated seeds germinate 20% in 20 days and have smooth surfaces with plugged stomates. Base scarified (sodium hydroxide) seeds germinate 85% in 20 days and have rough and porous surfaces with open stomates. (4)

Mefluidide, growth retardant, enhances the spread of zoysia in bluegrass turf by 20%. This reduces the competition of the bluegrass without serious injury. Nitrogen fertilization increases rate of zoysia cover by 10 to 20%. Vegetative propagation of zoysiagrass from plugs and sprigs is still a slow process. (5)

Rust is a serious disease of zoysiagrass in most regions of the country. Urediospores survive storage in liquid nitrogen and germinate at rates as high as 74% after one year. Forty-two clones of zoysiagrass were evaluated in the field and greenhouse for rust and found to vary in reaction from resistant to very susceptible. (6)

Bermudagrass

Eighteen turf type bermudagrass cultivars originating from breeder stock material include: Tifdwarf, Tifgreen, Tifway, Tifway II, Tiflawn, Texturf 10, Texturf 1F, Midway, Midiron, Midmo, PeeDee, Sunturf, U3, Everglade, Ormond, Tufcote, Santa Anna, Common. Morphological features of each have been characterized. (7)

WARM SEASON GRASSES continued

Thirty two bermudagrass genotypes have been evaluated under two light treatments to determine shade tolerance and turf quality factors most affected by reduced light. 'No Mow','Boise', and'Berlin 7-2' were most shade tolerant. 'Tifway', 'Santa Anna' and 'Common' were extremely intolerant of shade. Experimental types were found throughout this range. (8)

An increase of well over 100% in nitrogen extraction efficiency of bermudagrass was found where calcium had been added to the nutrient media. The amounts of dry matter partitioned into topgrowth and root-rhizome growth in addition to differences in total biomass were influenced by calcium. A saturated calcium treatment increased root-rhizome production by 38% while topgrowth remained static in a calcareous sand media. Nitrogen/calcium ratio of applied nutrients may well be critical in the development of new management practices in the turf industry. (9)

Centipedegrass

Establishment of centipedegrass by seed is limited in the southeastern United States because of high cost seed. Seed yields are low. Effect of management practices on seed yield have been studied. Mowing at lower heights increases seed production. Nitrogen fertilization and late final mowing also increase yields. Freshly harvested seed germinates poorly indicating a possible post-harvest dormancy. (10)

Centipedegrass sod has low tensile strength and this limits production. Use of atrazine in multiple applications for weed control is common production practice. Tests indicated that sod strength is reduced by use of atrazine during the growing season. (11)

St Augustinegrass

Four cycles of composite crossing were performed in St Augustinegrass. In the initial cycle, specific combinations of geographic sources yielded superior turfgrass hybrids. The final composite population constitutes a broad germplasm that can now be narrowed through selection for local adaptation, while still preserving genes from diverse sources. (12)

Seashore Paspalum

Four selections of Paspalum vaginatum were tested under six salinity levels. 'Futurf', 'Adalayd', 'FSP-1' and'FSP-2' responded differently. 'FSP-1'was superior to the others. (13)

'Adalayd'exhibited linear responses with decreased total leaf water potential, leaf osmotic potential and leaf turgor potential to increased salt concentrations. 'FSP-1' responded quadratically by decreased total leaf water potential and leaf turgor potential and responded linearly by decreased leaf osmotic potential as salt levels increased. (14)

Warm Season Grass Evaluation

Cold hardiness of forty nine commonly used turfgrasses has been assessed. Nineteen bermudagrasses, seventeen zoysiagrasses, four buffalograsses, three centepedegrasses and six St Augustinegrasses were included. Significant differences were observed at both interspecies and intraspecies levels. (15)

Eleven warm season turfgrasses were evaluated for evapotranspiration rates under both non-limiting soil moisture and progressive water stress conditions. St Augustinegrass,'Adalayd", sand knotgrass and bahiagrass had high ET rates. 'Emerald' zoysiagrass, buffalograss, 'Tifgreen' bermudagrass and centipedegrass had low ET rates. 'Common' bermudagrass, 'Tifway' bermudagrass, 'Meyer' zoysiagrass and bluegrama had medium ET rates. Within species different ET rates resulted from variations in cutting height, nitrogen fertilization rate and soil moisture level. Air temperature, soil temperature, net radiation, pan evaporation and relative humidity influenced ET rates. (16)

SEEDS, SEEDLINGS, SOD AND SOIL

References:

1 - Hathcock A., P.Dernoeden, J. Murray, D. Wehner The Influence of Several Adhesives on Seed Germination of Tall Fescue and Kentucky Bluegrass. University of Maryland, USDA,ARS Beltsville MD, University of Illinois.

2 - Samples T.,L.Cargill, A.Brede Evaluation of Seeding Method, Mulch and Species for the Establishment of an Erosion-Resistant Ground Cover. Oklahoma State University.

3 - Hall J.,L.Taylor, J.Shoulders Sod Strength of Kentucky Bluegrass Cultivars, Blends and Mixtures. Virginia Tech.

4 - Burns R. Effect of Age of Sod on Rooting. University of Georgia.

SEEDS, SEEDLINGS, SOD & SOIL continued

5 - Lee K., R.Shearman, R.Klucas Nitrogen Fixation and Root Exudates of 'Park' Kentucky Bluegrass as Influenced by Mowing and Lines. University of Nebraska.
6 - Duell R., G.Peacock, C.Meyra, L.Sadasivan The Occurrence of Rhizosheaths on Grass and Their Role in Nitrogen Fixation. Rutgers University.
7 - Agnew M., R.Carrow Influence of Soil Compaction and Irrigation on the Growth and Temperature Regimes of Kentucky Bluegrass. Kansas State University.

These seven papers placed emphasis in the following areas:

Seeds and Seedlings

Adhesives-gum arabic, Methocel A-15, Pelgel, Solka Floc and two experimental materials did not adversely affect germination and early seedling growth of Kentucky 31 tall fescue or 'Adelphi' Kentucky bluegrass. The effectiveness of the adhesives in retaining a limestone seed coating was in the order: Methocel A-15 greater than Pelgel greater than Solka Floc greater than AP-1 which was equal to AP-2. (1)

Under Oklahoma roadside conditions, a seed mixture composed of range grasses yielded consistently greater vegetative cover and seedling numbers than either bermudagrass or weeping lovegrass. A mulch times species interaction was observed only on one occasion. A brillion seeding technique promoted greater vegetative cover than a broadcast method.(2)

Sod

Sod strength was affected by blend and mixture components as well as by sod maturity. Weak cultivars tended to lower sod strength of blends even when only included as 10% of the total. Spring harvested sod averaged twice the strength of mid summer harvested sod. Victa, Cheri, Vantage, Holiday, America, Merit, Welcome, Mystic, Sydsport, Enmundi, Vanessa, Mosa and Harmony produced sod of greatest strength. (3)

Younger sod of bermudagrass, centepedegrass, and tall fescue, in addition to being less expensive to produce, should perform better when transplanted. Younger sod had a larger total new root length in all cases. In terms of ratio of new sod to old sod, centepede was 1.4, bermuda was 1.7 and tall fescue was 3.3. (4)

Roots and the Soil

Mowing enhanced nitrogen fixation by the roots of 'Park' Kentucky bluegrass. Differences in nitrogen fixation were noted among fifteen lines comprising 'Park'. Although a line with the highest nitrogen fixation had the highest sugar exudation, differences were not observed among the lines. (5)

Non-fibrous roots predominate over fibrous roots under some conditions. In a vigorous seedling stage, when uncrowded, non-branched roots have discretely cemented cylinders of soil covering them. These are called rhizosheaths and are commonly 4 mm in diameter by 50 to 150 mm long. Seminal roots are fibrous. Roots from distal nodes of stolons typically have discrete rhizosheaths. Progressing proximally, rhizosheaths disintegrate and branching becomes more pronounced on these older roots. The nitrogen content of rhizosheath soil is often 25 to 100 percent higher than adjacent soil. Azospirillum spp. has been isolated from the rhizosheath soil and root tissue of several grass species. Fungi also occur in this association. Rhizosheaths are found on grass roots in fertile fields and infertile roadsides with soil ranging from sand to clay loam. Structural integrity is maintained through cycles of freezing from fall to spring. Rhizosheaths are not found on dicots. (6)

'Touchdown' Kentucky bluegrass grown on a silt loam soil was evaluated under varying irrigation and compaction treatments. Compaction reduced clipping yields, visual quality, shoot density and rhizome weights but did not affect root growth. Cumulative stress degree days increased with compaction and low soil moisture. (7)

FERTILIZERS AND MINERAL NUTRITION

References:

1 - Landschoot P., D.Waddinton Evaluation of Various N-Sources for Use on Turfgrass. Pennsylvania State University.
2 - Karnok K. The Segregation of Homogeneous and Physically Mixed Fertilizers from a Centrifugal Spreader. University of Georgia.
3 - Fermanian T., D.Wehner, B.Spangenberg Low Volume Application of Liquid Fertilizers on Kentucky Bluegrass. University of Illinois.
4 - Freeborg R., W.Daniel, D.Mosdell Poa ratensis Response to Liquid and Granular Sources of Nitrogen Fertilizers. Purdue University.

Research Synthesis CONTINUED

FERTILIZERS & MINERAL NUTRITION continued

These four papers are summarized as follows:

'Merion' Kentucky bluegrass grown on a Hagerstown silt loam was rated for nitrogen response. The highest initial response was obtained from flowable ureaform reaction products (Fluf and Fluf Plus), methylene urea Formolene, urea and ammonium nitrate. More uniform color trends were observed with oxamide, IBDU, sulfurcoated urea and ureaform. Higher yields and better color were noted with a finer divided oxamide. Ureaform was slow in its initial response. A composted sludge was inferior to Milorganite as a source of nitrogen. (1)

Using test procedures in accordance with American Society of Agricultural Engineers specifications, particle size distribution was determined for homogeneous and physically mixed fertilizer distributed from a centrifugal spreader. The physically mixed formulations had a greater particle size distribution, and exhibited a greater variability across the spreader swath. (2)

A blend of 'Columbia-Touchdown' Kentucky bluegrass was used to study phytotoxic potential of liquid applied fertilizers. Both Fluf and Formolene treated plots were not significantly injured at any volume on any date. Folian, UAN, and urea exhibited significant leaf injury from low volume sprays. (3)

In a 1981 test, oxamide supported best residual growth followed by liquid nitrogen sources with dicyandiamide, flowable and liquid urea-formaldehyde. Total yield expressed as an average of eight harvests ranked liquid nitrogen plus dicyandiamide, urea plus etridizaol and sprayable oxamide best. In a 1982 test, thiourea and a flowable urea-formaldehyde were slightly better than liquid nitrogen plus dicyandiamide and liquid urea-formaldehyde. (4)

STRESS

References:

1 - Howard H., T.Watschke Mechanisms of Relative High Temperature Tolerance Among Kentucky Bluegrass Varieties. The Pennsylvania State University.
2 - Wehner D., T. Watschke The Effect of Heat Stress on Protein Synthesis and Exosmosis of Cell Solutes in Three Turfgrass Species. University of Illinois and Pennsylvania State University.
3 - Minner D., D.Wehner, P.Dernoeden The Effects of Pre and Post Stress Environment on the Recovery of Kentucky Bluegrass from Heat Stress. University of Maryland, University of Illinois.
4 - Meyer W., C.Rose, S.Yoder The Response of Turfgrass Cultivars to Wear Stress. Turf-Seed Inc, Hubbard Oregon.

These four reports emphasize the following points:

Relative high temperature tolerance is probably a result of differential photosynthetic capability. Tolerant varieties exhibit greater growth rates and higher carbohydrate levels than intolerant varieties. Little difference in the partitioning of weight and carbohydrate among plant parts is observed. (1)

Kentucky bluegrass, annual bluegrass and perennial ryegrass were exposed to temperatures in the range of 109 to 122°F (43 to 50° C). These grasses differ in their heat tolerance. Either disruption of some physiological process or differential repair or tolerance of the heat stress injury must account for this. Indirect rather than direct heat injury may be responsible for the behavior of these grasses. (2)

The heat tolerance of 'Adelphi' Kentucky bluegrass was significantly affected by the preconditioning environment at the time of sampling. Heat tolerance was highest on June 6 and lowest on October 24. The equation Y(average recovery weight)=0.197 (low temperature in F) +10.179 (day length in hours) - 9.906 (rainfall in inches) - 79.851 was generated to explain the effect of environment prior to sampling for heat tolerance. (3)

Forty Kentucky bluegrasses, thirty two perennial ryegrasses, twenty one tall fescues and thirty two fine fescues were evaluated for wear stress. The improved perennial ryegrasses suffered the least amount of wear injury and the fine fescues had the most injury. The tall fescues and Kentucky bluegrasses were intermediate in terms of injury and recovery. The new improved turf types performed better than the common types. (4)

GROWTH REGULATORS

References:

1 - Doyle J., R.Shearman Plant Growth Regulator Responses on a 'Touchdown' Kentucky Bluegrass Turf. University of Nebraska.
2 - Dernoeden P. The Effects of Long Term Usage of Plant Growth Retardants on a Kentucky Bluegrass Turf. University of Maryland.
3 - Symington A., L.Cracker, K.Hurto Growth and Injury Response of Kentucky Bluegrass to Chemical Retardants. University of Massachusetts.
4 - Armstrong T. United States Evaluations of Monsanto Turfgrass Plant Growth Regulator. Monsanto Company.
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6 - Sandbrink J., J. Kaufmann, S.Stehling, P.Thibodeau Application of Timing of MON-4620 on Cool-Season Grasses. Monsanto Company.
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8 - Dipaola J., W. Gilbert, W. Lewis Tall Fescue Response to Growth Retardant Treatment as Influenced by Infloresence Development. North Carolina State Un.
9 - McElroy M., P.Rieke, S.McBurney, J. Kaufmann Efficacy of Six Plant Growth Regulators on Michigan Roadside Grasses. Michigan State University.
10 - Deal D., J. Dipaola Lateral and Vertical Growth of Common Bermudagrass Following Several Applications of Gibberellic Acid and Growth Retardants. North Carolina State University.

These ten papers presented the following progress statements:

'Touchdown' Kentucky bluegrass was used as test plant for plant growth regulator responses. MON 4621, 4622 and mefluidide allowed no seedhead expression. Plant height and clipping yield were suppressed up to four weeks with mefluidide and six weeks with the Monsanto chemicals. Water use for plant growth regulator treated turf was reduced 23 to 44 percent through 28 days of the test. (1)

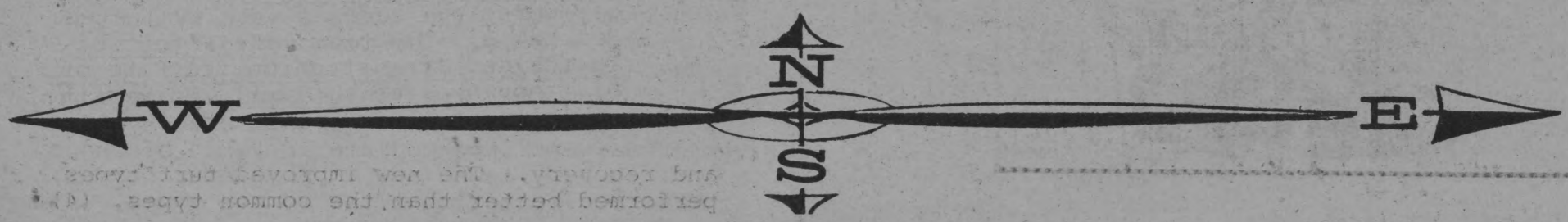
On Kentucky bluegrass turf, mefluidide and MBR 18337 provided most rapid growth suppression. Flurprimidol provided a longer period of suppression. Mefluidide and MBR 18337 reduced turf density which resulted in severe infestations of crabgrass. Tiller and root weight data revealed that the plant growth regulators had no deleterious effects upon shoot and root recuperative potential of Kentucky bluegrass. Ethephon treated turf maintained best summer quality; however, apical meristems were elevated resulting in excessive reduction of verdure upon mowing. (2)

Four growth retardants were evaluated on 'Merion" Kentucky bluegrass. All four, mefluidide, MBR-18337, EL-500 and PP-333, significantly suppressed turf height as compared with the unmowed controls. Clipping dry weights were reduced and older leaf tissue became chlorotic as a result of plant growth regulator treatments. Stress studies indicated that high temperatures brought about leaf injury where plant growth regulators were used. (3)

For six to eight weeks both flowable and granular formulations of MON-4620 reduced the number of mowings and vegetative height by 50 percent. Seedhead emergence was reduced 85 to 100 percent. Two to five pounds active ingredient per acre were found safe and resulted in acceptable turfgrass quality. The 2.5 pound rate was considered optimum. (4)

The primary effect of MON-4620 plant growth regulator is a vertical growth rate reduction of the crown meristems. Foliar applications of a liquid that did not reach the crown and soil applications of a granular form that were not watered in were not effective. Growth enhancement of roots of MON-4620 treated plants is a result of compensation because of crown inhibition. (5)

Flowering of cool season grasses is generally synchronous and occurs in late spring. Applications of MON-4620 made too early delayed spring "green-up" up to four weeks. Applications for seedhead control must occur prior to seedhead elongation, but may occur after seedhead initiation. Applications made after seedheads had been mowed off resulted in vegetative growth reductions. A "window of application" is considered to be about four weeks. (6)



GROWTH REGULATORS continued

Tall fescue, Kentucky bluegrass and perennial ryegrass were evaluated for response to MON-4620 applied at the following rates:

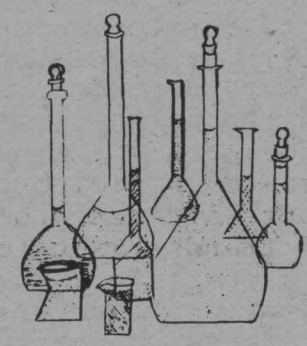
Pounds Active Ingredient per Acre	Kg Active Ingredient per Hectare
0.50	0.56
1.00	1.12
1.50	1.68
2.00	2.24
2.25	2.52
2.50	2.80
2.75	3.08
3.00	3.36
5.00	5.60
7.50	8.41
10.00	11.21
12.50	14.01
15.00	16.81

The optimum application rate was 2.5 pounds per acre. Rates from 2.00 to 5.00 pounds per acre result in uniform growth reduction and are considered safe with no phytotoxicity and acceptable levels of turfgrass quality. Rates of 10.00 to 15.00 pounds per acre result in unacceptable levels of thinning and quality reduction but did not kill the turfgrass. (7)

Seedhead suppression of Kentucky-31 fescue, (relative to the control), in excess of 95 percent was obtained with maleic hydrazide applied when the average infloresence length did not exceed 42 mm. Applications made when the average infloresence length was 93 and 222 mm resulted in 57 and 12 % seedhead suppression respectively. Turf height was reduced (relative to the control) by 70, 50,41,and 12 % following applications when the average infloresence was 42,93,222 and 311 mm respectively. (8)

Plant growth regulators, Embark, Eptam, Glean, EL-500, PP-333 and MON-4621 were evaluated. Embark and MON-4621 applied the last week of April and the first week of May gave the greatest seedhead suppression. Vegetative suppression was observed with reduced rates of combined compounds: EL-500 & Embark, EL-500 & MON-4621, PP-333 & Embark, and PP-333 & MON-4621 suggesting synergistic effects. Vegetative color enhancement was observed with Embark, Eptam, EL-500, MON-4621, PP-333 & Embark, and EL-500 & MON-4621 on both roadside and high maintenance Kentucky bluegrass plots. (9)

Individual and combined treatments of flurprimidol, maleic hydrazide and gibberellic acid were made on common bermudagrass. Gibberellic acid used during the spring increases vertical shoot growth under some conditions. Maleic hydrazide and flurprimidol effectively controlled turf height for 4 to 8 week periods with spring or summer applications. Spring applications of gibberellic acid reversed the growth inhibiting effects of flurprimidol for a two week period. (10)



PEST MANAGEMENT

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3 - Bell D., K.Hurto, J.Troll Use of Ethofumesate and Perennial Ryegrass to Control Annual Bluegrass in Tees and Fairways. University of Massachusetts.

4 - Christians N., D.Larocque The Effects of Chlorsulfuron on Kentucky Bluegrass and Tall Fescue. Iowa State University.

5 - Turgeon A., B.Branham, D. Wehner The Effects of Thatch, Irrigation and Soil Type on the Fate of DCPA Applied to Turf. Texas A & M University and University of Illinois.

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7 - Dickens R., D. Turner Eradication of Common Bermudagrass in Commercial Sod. Alabama Agricultural Experiment Station.

8 - Riordan T., R. Shearman, D. Bishop, A. Bruneau Procedure for Screening Cultivar Reaction for Poa pratensis to Bluegrass Billbug Infestation. University of Nebraska.

9 - Branham B., D.Wehner The Effect of Thatch and Irrigation on the Fate of Diazinon Applied to Turf. University of Illinois.

PEST MANAGEMENT continued

These nine papers illustrate current research emphasis in the following areas:

Integrated Pest Management

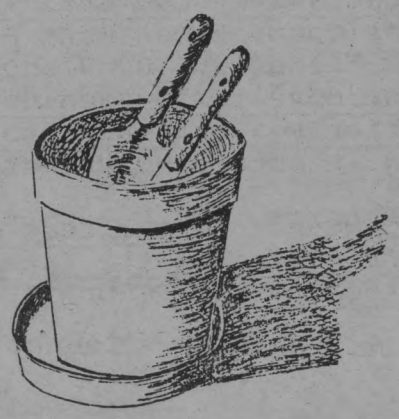
Correct identification of factors causing turfgrass injury is essential in the implementation of a turfgrass integrated pest management program. In Nebraska, a statewide surveilance system was established with 97 volunteers trained to monitor and report turfgrass pest activity. Daily weather data and soil temperatures were recorded. These were used to determine the potential for pest development and the proper timing for application of appropriate pesticides. Results of scouting reports and meteorological data were compiled and trends evaluated. When conditions warranted, a pest alert was sent to county agents, professional turfgrass managers, and lawn and garden centers, using a statewide agricultural computer network, newsletters, and a toll free phone line. (1)

Weed Control

Weed control in Ohio was better under cool, moist conditions of late summer than when hot and dry during midsummer. Increasing spray volume did not reduce control of dandelion, common plantain or white clover when cool and moist. When hot and dry, weed control was reduced at larger spray volumes. Comparison among salt formulations of 2,4-D, mecoprop and dicamba mixtures indicate that weed control is greater with the three-way mix than for 2,4-D & dicamba. (2)

Ethofumesate applied in April, May, August, and September with overseeding of perennial ryegrass immediately prior to herbicide treatments on golf tees and fairways is effective in the control of annual bluegrass, while maintaining a playable turf. (3)

Chlorsulfuron may have potential for use as a selective control of tall fescue in Kentucky bluegrass turf. Greenhouse trials using 'Baron' Kentucky bluegrass and Kentucky 31 fescue indicated a differential response to applications of this chemical. (4)



In Texas trials, DCPA did not move from the point of application; however, considerable leaching of two metabolites was noted. Increasing soil moisture within a given soil type caused an increased rate of degradation of DCPA. The rate of degradation in thatch that had been derived from turf growing on an organic soil was significantly higher than that found in thatch that had been derived from turf growing on a mineral soil. (5)

Effects of tank mixed herbicides for postemergence control of emerged winter weeds and for preemergence control of summer weeds in bermudagrass under Georgia conditions indicates combinations of DCPA with simazine reduced control of annual bluegrass, and spur weed. Combinations of DCPA and glyphosate reduced crabgrass control. Crabgrass control was also less from tank mixed bensulide with 2,4-D + mecoprop + dicamba or paraquat when compared with DCPA or bensulide alone. (6)

No selective herbicide exists for the control of bermudagrass in warm season turfs; nor is there currently available a nonpersistent herbicide for its eradication. Investigations in Alabama are underway in search for such an herbicide. (7)

Insect Control

Observations of natural bluegrass billbug infestations in hybrid Kentucky bluegrass breeders' nurseries indicate that bluegrass genotype and cultivar resistance can be determined during the first growing season. Bluegrass billbug larval counts ranged from an average of 13.5 to 0.3 per plant and were correlated with visual injury ratings. Four reaction types have been identified: 1) low billbug larval population-low plant injury; 2) high population-low plant injury; 3) high population-high plant injury and 4) low population-high plant injury. National bluegrass trials are being evaluated in this way. Identification of reaction types (1) and (2) may be valuable in breeding for bluegrass billbug resistance. (8)

Loss of diazinon occurs by volatilization, leaching and metabolism that is accompanied by carbon dioxide evolution or binding of metabolites to the soil. The rate of diazinon degradation was higher in turf with thatch. An increased rate of degradation in thatch is correlated with an increased irrigation frequency. More frequent irrigation did not affect rate of degradation in the absence of thatch. Without thatch, 2.3% of the diazinon leached through; with thatch, 0.8% leached through. (9)

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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 serves as a quarterly newsletter for members. It also provides a means of communication between Turfgrass Seed and Allied Industries and other organizations and individuals with research and educational interests.

Editor: Eliot C Roberts, PhD

Associate Editor: Beverly C Roberts, MA

Printer: Crossville Chronicle (Tennessee)