1979

Spring 1979 Conference Issue

K. A. Hurto

Alfred W. Boicourt

W. A. Sinclair

E. S. Pira

TURF BULLETIN

MASSACHUSETTS TURF
AND LAWN GRASS COUNCIL
INCORPORATED

FEATURED IN THIS ISSUE:

Weed Control

Bean-Shaped Islands

Conference Preview

SPRING 1979
CONFERENCE ISSUE

BETTER TURF THROUGH RESEARCH AND EDUCATION

EDITOR
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So. Deerfield, Ma. 01373

SECRETARY-TREASURER & ADVISOR
Dr. Joseph Troll
RFD No. 2 Hadley, Mass.

Vol. 15, No. 1 **Spring 1979**

Dear Readers,

It's now February and I think the New England section is breaking all records for ice coverage. The research plots in South Deerfield are covered with a glimmering five inches of ice, and it's not going to melt overnight. Hope there's something living for the 1979 field day.

In this issue I have some interesting reading that will jet you into springtime. (in thoughts anyway). First off is an article by Dr. Kirk Hurto on weed control. Maybe it'll save you some headaches. Then for your spring planting idea's Professor Alfred Boicourt shares some thoughts on bean shaped islands. For the superintendent to use between a tee and green or the landscaper to use off a patio, these islands offer beauty, low cost, and minimal maintenance in a limited area. And can any of you remember 1921 or 1932? Well, I dug up some old U.S.G.A. Greens Section Bulletins and spotted ideas from 1910 and 1979 in the same issues!

Also a publication just out on Dutch Elm Disease is available from the shade tree lab, included is a taste of what it's about. Finally, the University of Massachusetts 48th Annual Turf Conference and 3rd Industrial Show, chaired by Dr. Joseph Troll, is just around the corner. A complete schedule is located in the center of the issue for easy removal. Please bring them to the show for easy reference.

Letters to the editor has been few but thoughtful Superintendent Don Hearn said he was interested in what other professionals have to say. So if you have a sore thumb that won't go away or if a solution to one is discovered, let me know about it. There's a tremendous pool of knowledge in this region, let's tap it. Mr. Richard Lee asked where can he send contributions for turfgrass research. Any inquisitions or contributions concerning turfgrass research can be sent to me or Dr. Joseph Troll, Stockbridge Hall, University of Massachusetts, Amherst, Ma. 01003.

Pleasant reading and see you at the conference.

Pat Kristy

Table of Contents

The Massachusetts Turf and Lawn Grass Council Incorporated is chartered under the laws of the Commonwealth of Massachusetts as a non-profit corporation. The turf council seeks to foster "Better turf through research and education."

More detailed information on the subjects discussed here can be found in bulletins and circulars or may be had through correspondence with the editor.

Principles of Turfgrass Weed Control
I. Annual Grasses

By K. A. Hurto

The presence of weeds in a turfgrass community presents several problems to the turf manager including reduced turfgrass quality due to differences in leaf texture, color, and plant growth habit; disruption of the playing surface; and increased competition between the weed plant and the turfgrass community for light, moisture, and nutrients (Figure 1). Weed encroachment of a turfgrass stand occurs where voids are created as a result of insect damage, diseases, mechanical injury, and other causes, or where competition by the desired grass species is reduced due to improper cultural practices or unfavorable edaphic or environmental conditions.

Development of an effective weed control program must therefore involve utilization of proper management practices which enable the turfgrass community to effectively make use of edaphic and environmental factors to sustain vigorous growth and development. While herbicides play an important role in weed control programs, the success of the program is dependent on correction of management practices which enabled the weed to establish and compete with the desired turfgrass species. If improper management practices are not corrected the weed will reestablish itself or be replaced by more difficult to control weed species.

Turfgrass weeds are classified botanically as either annuals, biennials, or perennials. Furthermore, a weed is described functionally as either an annual grass, a perennial grass, or a broadleaf weed. Identification of a weed's life cycle and function enables the turf manager to properly approach the weed problem culturally and chemically.

Annual grasses are plants which complete their life cycle in one growing season and depend upon seed to survive from year to year. Species which germinate in late spring as soil temperatures warm up are referred to as warm-season grasses while grasses that germinate in the fall and flower in late spring or early summer are called cool-season grasses. Most annual grasses are prolific seed producers which assures their longevity. These seeds exhibit dormancy mechanisms which prevent germination when conditions for growth are unfavorable. Freshly sown seed will not germinate immediately due to internal mechanisms which must be overcome by an after-ripening period. This dormancy mechanism prevents a warm-season grass such as crabgrass from germinating in the fall when climatic conditions would affect the seedling's growth and survival. Other dormancy mechanisms are also present which prevent seed from germinating when environmental conditions are unfavorable. Most annual grasses, particularly crabgrass and annual bluegrass, have a strong light requirement for germination. Turfs that are dense shade the soil surface, preventing germination of annual grass seeds. However, if the turf is thinned by disease, or voids are created by divots, the seed is able to germinate and rapidly invade the turf.

Selection of adapted grasses and proper maintenance of them will prevent annual grass infestation. Golfer demand for closely clipped tees and fairways has resulted in turf managers mowing Kentucky bluegrass turfs at 0.75 inches or less. Associated with a closer mowing of the turf are more frequent irrigation and higher rates of nitrogen application, which usually result in a shift from Kentucky bluegrass towards annual bluegrass, with its different cultural needs. The rate and extent of annual bluegrass encroachment will be affected by Kentucky bluegrass cultivars present and rates of nitrogen being applied. Success of chemical control programs has been limited under these circumstances since cultural practices are favoring annual bluegrass over Kentucky bluegrass. By assessing the existing site conditions and adjusting cultural practices that relate to development of weed populations, a proper weed control program can be developed. Further-

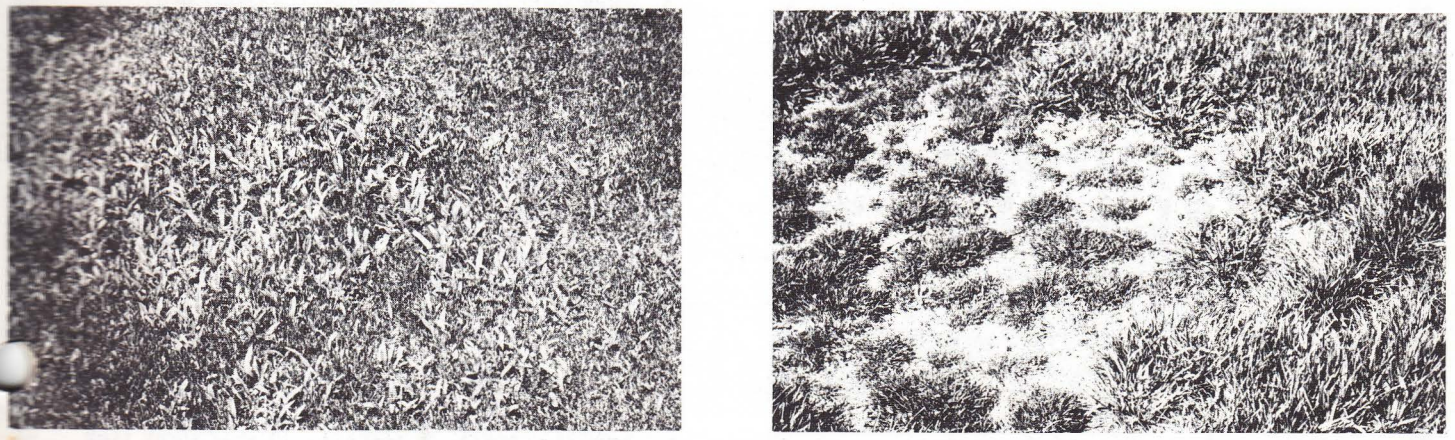

Figure 1. Disruption of turfgrass quality due to crabgrass seedlings (left) and impaired playability due to annual bluegrass (right).

more, one must understand the ecology of the weed species and tailor management programs to avoid practices which favor the weed over the turf plant.

The use of preemergence herbicides for selective control of annual grasses is an important component of turfgrass cultural programs. Preemergence herbicides apparently affect seed germination by inhibiting root cell division and development. However, these herbicides may also affect root and rhizome development of established turf. Presently, there are six preemergence herbicides commercially available to the turfgrass manager for annual grass control (Table 1). With the exception of siduron, which can be safely used during seedling establishment, their ability to control annual grasses in cool-season turfs is due to factors other than biochemical.

Table 1. Preemergence herbicides labeled for annual grass control in turf.

Herbicide	Trade name	Formulations[1]
benefin	Balan	2.5G
bensulide	Betasan	4E, 3.6G, 12.5G
DCPA	Dacthal	75WP, 2.5G
oxadiazon	Ronstar	2G
prosulfalin	Sward	50WP
siduron	Tupersan	50WP

[1] Formulations include: emulsifiable concentrates (E), granules (G), and wettable powders (WP).

These chemicals have very low water solubility and are relatively immobile in the soil. Consequently, a preemergence herbicide selectively controls germinating grasses by creating a chemical barrier at the soil surface (Figure 2). Because they are immobile in soil, they usually do not come into direct contact with roots of actively growing mature, perennial, cool-season turfgrass species.

On turf sites where surface soil disturbance occurs as a result of divots, the chemical layer may be disturbed allowing weeds to germinate. This is common on golf course fairways 100-125 yards from the green where frequent short-iron shots occur. Under these instances a repeat application may be required to assure adequate weed control. Improper timing of auxiliary cultural practices such as aerification can have the same effect.

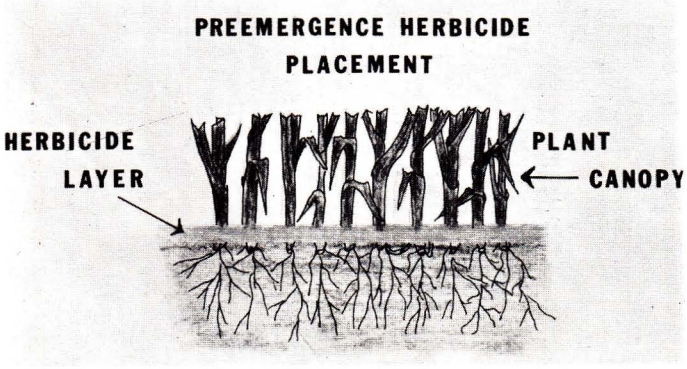

Figure 2. Proper placement of preemergence herbicides at the soil surface creates a chemical barrier to weed seed germination.

Ideally, a herbicide should provide season-long weed control but not persist or accumulate from one year to the next. Since weed seeds will germinate throughout the season if environmental conditions are favorable, an adequate level of biologically-active herbicide must be present to control the weed. Thus, rates recommended for weed control are based on at least two factors: rate of herbicide breakdown and biological activity of the compound. Several factors including time of application, irrigation, soil type, and temperature affect the rate of herbicide breakdown.

Herbicides applied too early may not give season-long weed control; likewise if applied too late early germinating annuals may escape chemical control.

Preemergence herbicides for crabgrass control should be applied as surface soil temperatures near 65° F. This often coincides with end of forsythia flower bloom. Goosegrass usually germinates later than crabgrass and is a more difficult weed to control. In areas where both crabgrass and goosegrass may be a problem, herbicide applications are often split to assure adequate herbicide concentration for late germinating weeds.

Annual bluegrass ranks as our most serious annual weed in turf. Chemical control has had limited success in the past, particularly on sites where populations are high. Under these conditions, the population of desired grasses is usually too low and/or poorly distributed to effectively compete against its reinfestation. Attempts to overseed desired grasses into these sites has had limited success. The introduction of many new improved turf-type perennial ryegrass cultivars may improve the turf manager's success in establishing a more permanent turfgrass com-

munity on fairways and tees. Timing of seeding is critical and cannot be coupled with preemergence herbicide treatment.

Recent advances in turfgrass technology have resulted in numerous changes in turfgrass culture. Modification of the turfgrass root zones to increase resistance to soil compaction and improve water infiltration may also be altering the selectivity of preemergence herbicides applied to these sites. Modified root zones are high in sand, which increases the possibility of herbicide leaching. Additional studies are needed to fully evaluate this potential problem.

Recent studies have shown that the presence of a thatch layer will also affect herbicide activity. Application of preemergence herbicides to thatchy Kentucky bluegrass turfs resulted in increased turf injury as a result of greater mobility of preemergence herbicides in thatch than in soil (Figure 3). The extent of herbicide injury was dependent upon herbicide and rate of application. Laboratory studies also indicated that persistence of these herbicides in thatch was also reduced, but additional field studies are needed to fully understand how this may affect herbicide performance.

Introduction of improved Kentucky bluegrass cultivars with narrower genetic base has resulted in a wider range of Kentucky bluegrass tolerance to preemergence herbicides. Several studies have demonstrated that cultivars differ in their susceptibility to herbicide injury.

Increased demand for quality turf under intensive use will most likely result in increased weed pressure. Development of weed control programs for turf must involve changes in management and cultural practices. Herbicides must be used as a tool and not as a substitute for these cultural practices (Figure 4). By using an integrated approach to turfgrass weed control the demand for improved turfgrass quality under intensive use may be achieved.

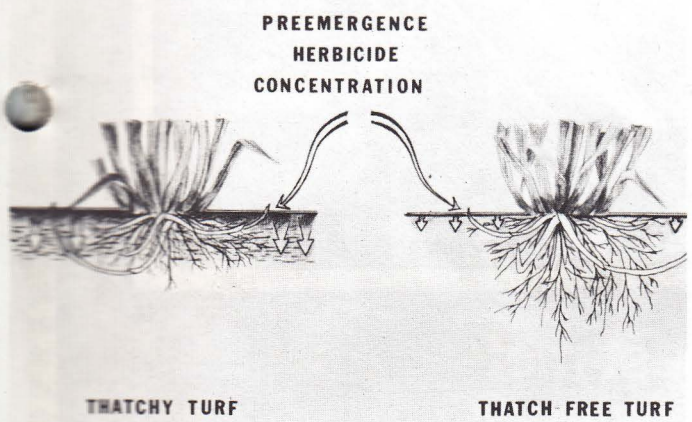

Figure 3. Application of preemergence herbicide to thatchy turf resulted in greater mobility of the herbicide compared to identical applications on thatch-free turf.

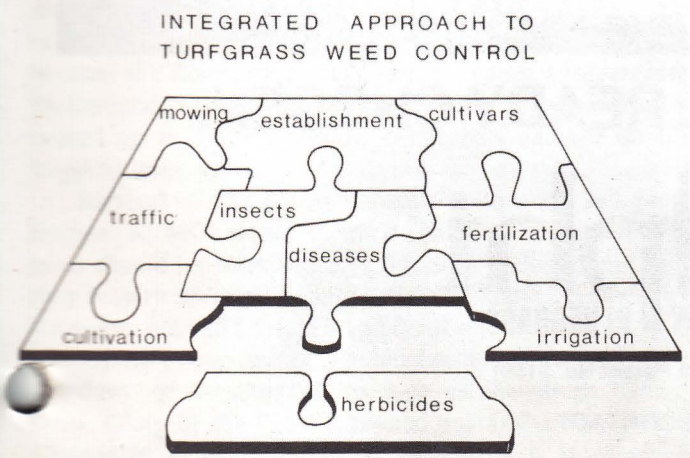

Figure 4. Weed control programs involve proper management and cultural practices in addition to herbicides.

Bean-Shape Islands

By Alfred W. Boicourt
Professor of Floriculture
University of Massachusetts

There is always a place on a golf course for trees, shrubs, evergreens and flowers. Maintenance can be reduced and beauty can be enhanced by planting them in a bean-shaped island.

Many club houses are located on a knoll with several views to the fairways. Each separate view is more beautiful if they are framed by combination of trees, shrubs and evergreens planted in the foreground. Hardy, fool-proof, perennials should be added to give greater seasonal interest.

Group planting is more effective in limiting the total view spread and adds an element of surprise as the viewer moves. Also, by selecting a combination of vertical, round and horizontal plants, the overall silhouette of the group is improved. Single plants spotted in the lawn frequently spoils the skyline effect and increase maintenance costs. Obviously, it takes longer to mow around individual plants than once around the entire group. Also, the environmental conditions are improved for plant growth such as in soil preparation, fertilizing, irrigation and mulching.

The bean shape island blends in with the naturalistic surroundings better than a rectangular shape. Although there is no point of balance in the free standing group, the bed should be viewed from one side. Figure 1 and 2 illustrates the general shape of the bed. As you refer to the planting plan in Fig. 2, you may feel that the spacing between plants is too great, but the plantings are designed to give a pleasing appearance over at least 15 years with little pruning. The hemlocks are 9 feet away from the flowering dogwood and as they grow, they will force the dogwood to spread out over the lawn. The dark area under the dogwood backed by hemlocks is often called a shadow pocket. It is a convenient method to increase the apparent distance from your house to the back boundary line. The real bonus comes when the flowering dogwood blooms because the flowers are more visible against an evergreen background. The bottom branches on the dogwood are removed up to 7 feet to allow convenient passage on the stepping stone walk.

Survival of the plants depends upon good soil preparation. At least three, 6 cub. ft. bales of sphagnum peat moss should be rototilled into the existing soil. Some soils may require an equal quantity of coarse sand. At the same time, why not add 5 lbs. of 5-10-5 fertilizer per 100 sq. ft.

Myrtle (Vinca minor) should border the walk area to cut down on weeding. Bulbs such as snowdrops (Galanthus), Glory of the Snow (Chionodoxa) and crocus can be plugged in below the myrtle. Obviously, it is easier to plant the bulbs first. There are many perennials that will exist in myrtle groundcover. Bleeding Heart (Dicentra),

Figure 1. Bean-Shaped Free Standing Group

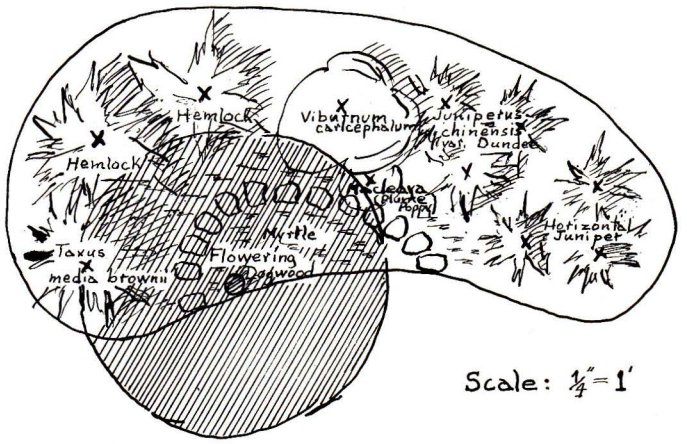

Figure 2. Planting Plan for Figure 1

Peach-leaved bellflower (campanula pensicifolia), Balloon flower (Platycodon), plume poppy (Macleaya) are possible suggestions.

After planting, you may edge the lawn area around the group planting by defining the area with a rubber hose and expose to full sun. One hour later, lift the hose and you will notice that the wilted grass line clearly marks the area.

To reduce maintenance use wood chip mulch for the areas not covered by myrtle. Many substitutions can be made from those suggested in Figure 2. If flowering dogwood isn't hardy in your area, then select another dwarf tree like the purple crab or shade-tree (Amelanchier).

Bean-shape plantings also may be used to separate fairways or boarder walks from one hole to the next tee.

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High Protein Food From Grass

Pakistani scientists have recently developed high protein foods from a grass extract, called leaf protein concentrate (LPC).

SEA research chemist John J. Evans, Athens, Ga., is the cooperating scientist for this Public Law 480 project. "Twenty species of grasses of common interest to the United States and Pakistan were studied for their yield, content and extractability of protein. The Pakistani work supplements current SEA laboratory tests at Athens to develop high protein poultry feeds using southern forages such as Coastal bermuda-grass," says Dr. Evans.

The Pakistanis used the following procedure for extracting protein from the grasses: first, pulping and pressing the leaves to obtain a juice concentrate which was steamed at 80° C. (176° F.). A coagulated LPC and a liquid filtrate were extracted from the juice. The LPC, which consisted of protein, lipids, carbohydrates, minerals, vitamins, and provitamins was used for both feed and food.

The filtrate, or liquid left after coagulation of LPC, was nutritionally rich enough for the propagation of microbial foods such as yeast and mushrooms.

The residue left after extraction of the juice filtrate contained protein, fiber, lipids, lipid soluble vitamins, and carbohydrates and was found suitable for ruminant feed.

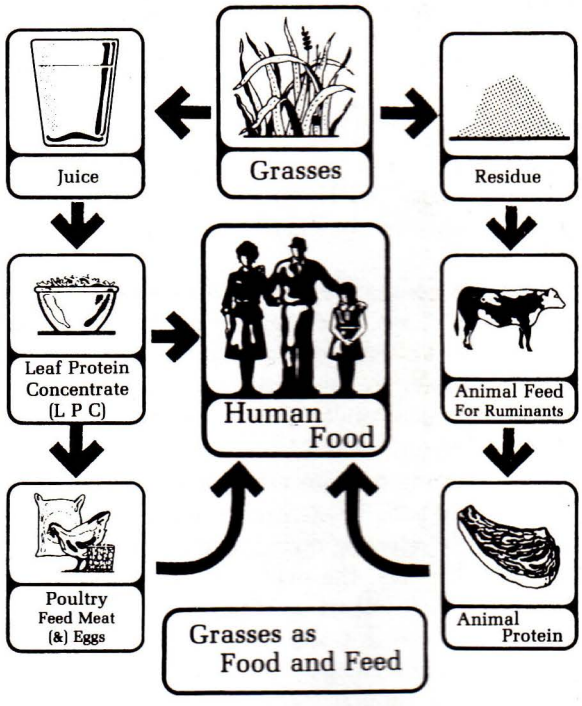
Two examples of traditional Pakistani foods which were fortified are a bread and potato sandwich, and Chutney (a popular far eastern sauce). The sandwich, which contains bread, boiled potatoes, butter, cumin seeds, salt, chilies, and pepper was fortified with seven grams of LPC, creating a protein increase of 51.3 percent.

By adding 15 grams of LPC to 100 grams of Chutney —a sauce made with mint, coriander, onions, pomegranate seeds, and red chilies—the scientists were able to increase its protein content by 70.2 percent. The Pakistanis showed that LPC incorporated in their native dishes does not affect taste, texture, or flavor.

"Unfortunately," Dr. Evans says, "LPC is green in color, and this may result in a slight discoloration of some food products which would not be esthetically acceptable in most Western countries. On the other hand, this is not a problem in the East where many food delicacies are green.

"However," he says, "the Pakistani work has provided SEA researchers with needed information on the preparation, composition, and use of leaf protein concentrates. If SEA scientists can economically develop a white, edible protein concentrate from grass, we will have an important new source of protein for food fortification."

This project was conducted under the direction of Dr. Farrukh Hassan Shah at the Pakistan Council of Scientific and Industrial Research Laboratories, Lahore, Pakistan. Dr. John J. Evans is with the Field Crops Research Laboratory, Russell Research Center, P.O. Box 5677, Athens, GA 30604.—*M.C.G.*



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"Better Turf through Research and Education"

Forty-eighth Annual Turf Conference and Third Industrial Show

February 27, 28 and March 1, 1979
Civic Center Springfield, Massachusetts
(I-91, Exit 6 from South, Columbus Avenue Exit from North)

Sponsored by Massachusetts Cooperative Extension Service
Massachusetts Turf and Lawn Grass Council
Golf Course Superintendents Association of New England

PLEASE BRING THIS PROGRAM WITH YOU.

REGISTRATION
Lobby-Plaza Entrance

8:30 AM - 4:00 PM Tuesday, February 27
8:00 AM - 4:00 PM Wednesday, February 28

TUESDAY, FEBRUARY 27

—Morning—

9:00 AM - 12:45 PM Industrial Show open.
Exhibition Hall
Snack Bar available

—Afternoon—

GENERAL SESSION
Banquet Room

Chairman: Dr. Joseph Troll
University of Massachusetts

1:00 Welcome
Dean John Denison
Stockbridge School of Agriculture
University of Massachusetts

1:15 My Maintenance Program at Aspetuck
Mr. Robert Osterman, Supt.
The Golf Club at Aspetuck
Easton, Conn.

1:45 Extra Projects—A Program in Essential Growth
Mr. Danny H. Quast, Supt.
Milwaukee Country Club
Milwaukee, Wis.

2:15 Fairway Experiences
Mr. Sherwood Moore, Supt.
Woodway Country Club
Darien, Conn.

3:00 Break

3:15 Maintaining *Poa annua* and Bent
Mr. Harry Meusal, Supt.
Yale Golf Course
New Haven, Conn.

3:45 Sewage Effluent for Irrigation Use
Dr. Albert Dudeck
University of Florida
Gainesville, Fla.

4:30 PM - 6:30 PM Industrial Show open.
Cocktails available.

4:45 PM Annual Meeting
Massachusetts Turf and Lawn Grass Council
Banquet Hall

WEDNESDAY, FEBRUARY 28

GOLF COURSE SESSION
Banquet Hall

Chairman: Professor John M. Zak
University of Massachusetts

—Morning—

9:00 Job Standards and Procedures and Job Description
Mr. Richard Blake, Supt.
Woodstock Country Club
Woodstock, VT.

9:45 Professionalism—Why Musical Chairs?
Dr. Marvin Ferguson
Golf Course Architect
Bryan, Texas

10:15 Professional Ethics
Mr. Robert V. Mitchell,
Supt. of Golf & Grounds
The Greenbrier
White Sulphur Springs, West VA.

11:00 Industrial Show open.

—Afternoon—

2:00 The Need for Upgrading Golf Course Personnel
Mr. George W. Cleaver, Supt.
Chestnut Ridge Country Club and
President G.C.S.A.A.
Lutherville, MD.

2:30 Topdressing
Dr. Robert N. Carrow
Kansas State University
Manhattan, Kan.

3:15 Created Turf Problems
Dr. C. Richard Skogley
University of Rhode Island
Kingston, R.I.

3:45 Poa annua—Prince or Pauper?
Dr. D. Thomas Duff
University of Rhode Island
Kingston, R.I.

:30 - 6:30 PM Industrial Show open.

—Evening—

7:00 Banquet and Winter School Graduation
Banquet Hall
Speaker: Mr. Angela Cammarota, Supt.
Hobbit's Glen Golf Course
Columbia, MD.
"Altitude of Attitude"

WEDNESDAY, FEBRUARY 28

ALTERNATE SESSION
College Room

—Morning—

Chairman: Mr. Charles Mruk
Hercules, Inc.

9:00 Maintenance of General Turf Areas in the Northern Zone
Dr. Vaughn Holyoke
University of Maine
Orono, ME.

9:45 Sod Production for the South and the Transition Zone
Dr. Ralph W. White
Southern Turf Nurseries
Tifton, GA.

10:30 Cemeteries Are A Community Resource
Mr. James P. Black, Supt.
Swan Point Cemetery
Providence, R.I.

11:00 Industrial Show open.

—Afternoon—

2:00 New Ideas in Tree Care
Dr. Walter C. Shortle
Northeast Forest Experiment Station
Durham, N.H.

2:45 Maintaining PAT System Turf at Purdue
Mr. Lawrence E. Davis
Assistant Director Operations
Purdue University
West Lafayette, IND.

3:30 Maintenance along the New Jersey Turnpike
Mr. David Grimm
New Jersey Turnpike Commission
Highstown, N.J.

4:30 PM - 6:30 PM Industrial Show open.

THURSDAY, MARCH 1

8:30 AM - 10:00 AM Industrial Show open.

GOLF COURSE SESSION
Banquet Hall

Chairman: Dr. Kirk A. Hurto
University of Massachusetts

10:00 Use of Ryegrasses in a Polystand
Mr. William Buchanan, Mid-Atlantic Director
U.S.G.A. Green Section
Richmond, VA.

10:30 Anthracnose and Other Turf Diseases
Dr. Joseph M. Vargas
Michigan State University
East Lansing, MI.

11:15 Golf Courses and the Environment—Implications of the ASGCA White Paper
Mr. Philip Wogan
Golf Course Architect
Beverly, MA.

12:00 Turf 1978—and the Future
Mr. Stanley M. Zontek, Northeastern Director
U.S.G.A. Green Section
Highland Park, N.J.

(Continued on Page 12)

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CONFERENCE PLANNING COMMITTEE

Golf Course Superintendents Association of New England

Anthony Caranci **Max Mierzwa**
Dean Robertson

Massachusetts Turf and Lawn Grass Council

Allan Cumps **Charles Mruk**
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Joseph Troll, Chairman **Kirk A. Hurto**
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Reprinted from SEARCH Agriculture Vol. 8, No. 5, a Northeast Regional Research Publication.

"Dutch Elm Disease: Perspectives after 60 years"

CONTROL STRATEGIES

by W. A. SINCLAIR

Six principal strategies for control of DED have been employed: exclusion, by which quarantines regulate long-distance spread; eradication; reduction of the infection rate; preservation of valuable individual trees; replacement of susceptible elms with resistant ones; and combinations of these five.

Exclusion. By placing an embargo upon importation of all materials that might harbor *C. ulmi* or its vectors, it is theoretically possible to exclude DED from a given area. Elm-free natural barriers such as oceans, deserts, or mountain ranges help.

Attempts to exclude DED from North America and early efforts to limit its spread on this continent were begun too late. Officials in the United States were apparently unmindful of lessons to be learned from the previous importation of the pathogens causing chestnut blight, white pine blister rust, and citrus canker. Foreign Quarantine No. 70, excluding certain types of elm materials from the United States, was enacted in 1933, 3 years after first discovery of DED in Ohio[417]. Domestic Quarantine No. 71, promulgated in 1935[418] to prevent movement of hazardous elm materials out of the major area of DED incidence in the Northeast, was revoked in 1947 because *C. ulmi* has spread in the saprophytic phase (i.e., with elm bark beetles to breeding sites) beyond the quarantined zone[262]. In Canada a foreign quarantine (No. 17) was enacted against DED in 1928[94]. Its failure was signaled 16 years later when the disease was found in Quebec[311]. A Canadian domestic quarantine (No. 12) was promulgated in 1945 and amended from time to time as more and larger areas came within the range of DED[94].

Eradication. With at least 11 initial centers of DED infection in North America[8 312], eradication programs were a big gamble at best. These were focused upon detection and destruction of elms infected or killed by DED. Failure to prevent spread of *C. ulmi* in the saprophytic phase was the main fallacy in national eradication programs. Colorado enjoyed temporary success; DED was unknown there between 1948 and 1968[243]. Eradication is now being tried in California, where DED was first found in 1975[320].

Reduction of the infection rate. The objective is to provide time for orderly phasing out and replacement of susceptible elms[98 364 369]. Costs of removal and replacement are spread over decades rather than just a few years. Sanitation and spraying with insecticides for suppression of vector populations have been the main tactics in suc-

cessful programs [17] [78] [79] [259] [283] [428] (see *Vector Suppression,* below). Chemical soil treatment for preventing root graft transmission (p. 32) and, more recently, the use of systemic fungicides (p. 34) have also reduced losses in practical situations.

Preservation of valuable individual trees. Local sanitation, insecticidal sprays, soil treatments to prevent root graft transmission, preventive and therapeutic treatments with systemic fungicides, intensive surveillance and eradicative pruning are all applicable to high-value elms [64] [256] . Used as a coordinated package, these techniques can preserve trees, but annual costs can amount to several hundred dollars per tree. Few elm owners are willing to spend such sums.

On the other hand, many are willing to invest modest amounts — several tens of dollars — for preservation of valued trees. This provides a continuing market for new "cures" for DED. To date, all critically tested home remedies and all but a few proprietary compounds (see *Systemic Chemical Treatments of Trees for Protection and Therapy,* p. 34) have given disappointing results [358] [370] [68] [116] [124] [128] [162] [286] [356] [398] [399] [425].

Host resistance. Elms that are subject to sudden death from disease or that require annual expenditures for prevention of disease will not often be selected for new shade and ornamental plantings. Several types of elms highly resistant to *C. ulmi* have been identified or developed by tree breeders, and more are in the offing (see *Exploiting Host Variation,* p. 39).

Combinations. The most successful control strategies involve skillful integration of two or more techniques. No single method is sufficient. The development and planting of resistant trees, for example, is not helpful to those who own or manage susceptible trees. To date, all successful strategies have included sanitation, by which vector populations, and thus the rate of occurrence of new infections, are suppressed.

The preceeding excerpt is but a small portion of the 52 page publication "Dutch Elm Disease: Perspectives after 60 years."

This publication contains everything one could desire to know about dutch elm disease along with a bibliography of 460 references. Single copies are available free of charge from Dr. Francis W. Holmes, Director.

Shade Tree Laboratories
University of Massachusetts
Amherst, MA 01003

Toro Irrigation Design Seminar

May 31-June 1, 1979

The Food Engineering Department at the University of Massachusetts has been designated as one of ten universities throughout the United States and Canada to host a 3-day "Irrigation Design Seminar" sponsored by the Toro Irrigation Company, Riverside, California.

The Seminar is aimed at engineers and/or supervisors in landscape architecture, parks and recreational areas, ornamental horticulture and agricultural crops. Enrollment is limited to a maximum of 25. The participants *will be selected* by a panel in order to benefit a wider range of interest groups. The persons selected will be notified about mid-March, 1979.

The Seminar is *"free"* and all attendees will be given an *"Irrigation System Design Manual"* plus other related literature. However, accommodations and meals must be arranged for individually. If interested in attending contact:

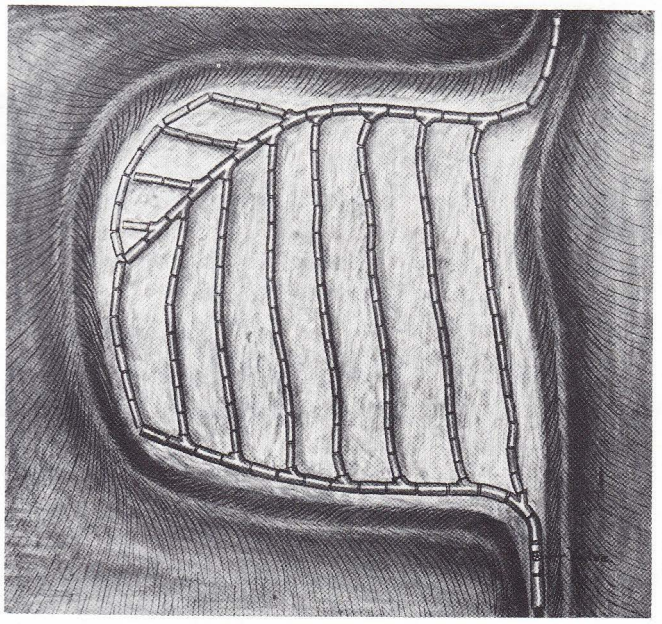
Professor E. S. Pira
Agricultural Engineering Building
University of Massachusetts
Amherst, MA 01003

Ideas's; New and Old

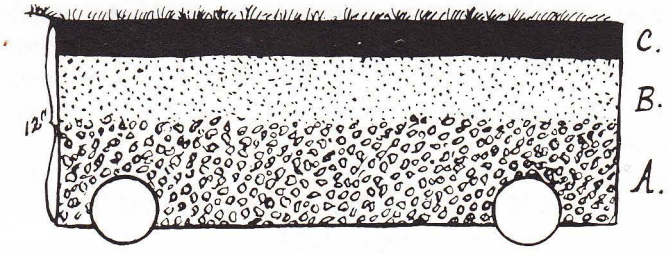
om the USGA Green Section Record 1921 and 1932

Raking a putting green planted with stolons of creeping bent. The tendency of creeping bent to mat under putting green conditions is likely to result in unhealthy turf unless this matting is controlled by occasional raking. Should a thick mat develop through inattention to raking, it should be raked immediately and then cut. The excess leaves and stolons should then be removed, and the putting een topdressed and fertilized.

Dusting a putting green in 1922 with Bordeaux mixture for disease control. This was the first fungicide in general use for controlling turf diseases on golf courses. The fungicidal properties of Bordeaux mixture are due to copper sulphate, which had been used as a fungicide for over a century before being brought into use on golf courses.



Plan of sub-irrigation system of No. 12 putting green, St. Louis Country Club. The main tile are 6 inches in diameter and the laterals 4 inches.



Cross-section of a subirrigated putting green, St. Louis Country Club, showing method of construction. (A), Layer of cinders 6 inches in depth, (B), Layer of clay 4 inches in depth. (C), A layer composed of peat with a small percentage of loam, 2 inches in depth.

More Pesticide Exams

The following dates are the first half of 1979's regularly scheduled exam dates for those pesticide exams and categories that are fully developed.

Be careful, some locations (particularly Amherst) have been moved!

The *dates* are as follows:

1979	Danvers	Waltham	Wareham	Worcester	Amherst	Stockbridge
January	16	10	9	5	3*	30
February	20	13	12	6	7	27
March	20	14	13	6	7	29
April	17	11	10	3	4	26
May	22	16	15	1	2	24
June	19	13	12	5	6*	28

The *locations* and *times* are:

Danvers—(Essex Agricultural & Technical Inst., Rt. 62, Hawthorne.
10:00 A.M.—Core, Licensing (Applicators and Dealers in Restricted Pesticides)
1:00 P.M.—Specialties

Waltham—(Suburban Experiment Station, 240 Beaver Street)
10:00 A.M.—Core, Licensing (Applicators and Dealers in Restricted Pesticides)
1:00 P.M.—Specialties

Wareham—(Cranberry Experiment Station, Glen Charlie Road)
10:00 A.M.—Core, Licensing (Applicators and Dealers in Restricted Pesticides)
1:00 P.M.—Specialties

*In Fernald, Rm. D, both AM and PM.

Worcester—(Worcester County Extension Service, 36 Harvard St.)
10:00 A.M.—Core, Licensing (Applicators and Dealers in Restricted Pesticides)
1:00 P.M.—Specialties

Amherst—(UMASS Campus)
10:00 A.M.—Core, Licensing (Applicators and Dealers in Restricted Pesticides)
1:00 P.M.—Specialties

Morning sessions will be held in Rm. 349 of the low rise part of Graduate Research Building. Afternoon session will be held in Room 408 of the Morrill Science Building. Note that on two dates (January 3 and June 6) these rooms will *not* be used, but instead both the morning and afternoon sessions will be held in Room "D" of Fernald Hall.

Stockbridge—(Berkshire Garden Center, Routes 102 & 183)
10:00 A.M.—Core, Licensing (Applicators and Dealers in Restricted Pesticides)
1:00 P.M.—Specialties

Please Note: These are two sessions at each date:

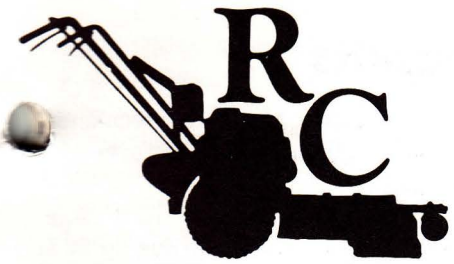
(1) The *Morning* session (10:00 A.M.) is for *Core Exams,* dealer licensing exams, and general-use licensing exams only. *No* specialties.

(2) The *Afternoon* session (1:00 P.M.) is for *Specialties* only. Those specialties available include all private specialties, and the commercial specialties in Cat 2 (Forest), Cat 3 (Orn & turf), Cat 6 (Right-of-Way), Cat 7 (Exterminating—*all* sub categories, i.e., general, termite, fumigation, food processing, vertebrate and site sanitation) and Cat 8 (Public Health). *No* other commercial specialties are currently available.

NOTE: There is no preregistration. After February 1 you must take the *core* exam before you will be allowed to take any specialty exams. *Dealers' Exams* will be available at *all* morning core sessions.

MALATHION LABEL CHANGE

In preparing for next season's insecticide needs, be aware that American Cyanamid's Cythion, the premium grade malathion, is no longer rated at 95% active material. Because of refined analytical techniques, Cythion is currently rated at 91% active material. It is the same material as before and the label uses have not changed. However, in writing specification for bidding or purchasing, be specific so that the appropriate product is purchased.



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Disposal of Pesticides in Massachusetts

Types of Pesticide-Related Wastes

There are 3 types of pesticide wastes that concern the applicator:

1. Empty containers
2. Left over spray
3. Actual pesticide, as purchased

Each of these must be considered separately.

Empty Containers

(a) *Metal, glass* or *plastic* containers should be triple rinsed when they are emptied and the rinsings added to the spray tank. The empty containers should then be returned to your pesticide storage area and kept locked up until they can be taken to a landfill. Containers should be crushed or broken and placed in a metal drum with a lid, while being held in the storage area. If treated in this manner empty pesticide containers may be safely disposed of in ordinary landfills. *Unrinsed containers should not be taken to a landfill.*

(b) *Paper bags* should be emptied as thoroughly as possible and placed in the waste storage drum along with crushed metal, glass and plastic containers and taken to a local landfill.

Left Over Spray

Try to avoid having left over spray. Use up all spray on each job whenever possible. If you cannot do this, then . . .

1. Save the spray in the tank for use the next day if the spray will still be effective, or

2. If this is not possible dispose of the spray by collecting it in a metal drum and then transporting this spray to an area where the spray can be poured out and buried safely. Use an area *under your control* where surface water will *not* be contaminated by runoff or rapid leaching through the soil. Pick an area where the soil is *organic* rather than sandy and where no food crops are likely to be grown. Do not over-use one area. Move around from year to year. You are using the soil's capacity to absorb, hold and breakdown chemicals. This can be overloaded if you continue to dump spray in the same spot. Do not leave any exposed puddles of spray. Cover with several inches of soil. Adding charcoal and lye with also help hold the chemical in place and break it down. *Do not* pour left over spray down sinks, drains or into roadside storm runoff basins. This places chemical *directly* into water and is the *least* desirable place for disposal.

Actual Pesticides

Old or unwanted pesticides must be disposed of by collection and incineration. They should not be buried because they will eventually contaminate the groundwater. Do *not* take such materials to your local landfill. It is not in your best interest or than of your community to do so.

Wrong Ways

1. Take to local landfill (may pollute ground water)

2. Leave sitting in old sheds, barns, or greenhouse (creates a storage problem—children may discover such chemicals and be poisoned.)

3. Take out on your own land and bury in a "safe" place. (These little time bombs may later be dug up by an unsuspecting person during construction and he will be poisoned since he is unprepared for the problem.)

Right Way

Call a licensed hauler of hazardous wastes. He will come and pick up the waste for a fee. He then delivers the waste to an approved incinerator that is specially designed to burn up toxic chemicals safely without creating air pollution. In MASS the following firms are licensed by DEQE to haul waste pesticides:

1. Chem-Trol Pollution Serv. Inc.
   1550 Balmer Road
   Model City, N.Y. 14107
   (716-754-8231)
2. Earthline Co.
   Environmental Service Div.
   253 River Dr.
   Passaic, N.J.
3. Interex Corp.
   3 Strathmore Rd.
   Natick, MA 01760
   (617-237-6650, ask for Hank Ytsilantis)

4. Keefe Environmental Services
   P.O. Box 327
   Epping, N.H. 03824
   (603-679-5255, ask for Paul Keefe).
5. Marlyn Eng. Corp.
   739 Boylston St.
   Boston, MA
   (617-262-0527)
6. Radiac Research Corp.
   261 Kent Ave.
   Brooklyn, N.Y. 11211
   (212-963-2233)
7. Robert B. Our Co., Inc.
   Great Western Rd.
   North Harwich, MA 02654
   (617-432-0530).
8. Recycling Industries, Inc.
   385 Quincy Ave.
   Braintree, MA 02184
   (617-848-0612)
9. Suffolk Service, Inc.
   198 Taylor St.
   Boston, MA 02122
   (617-825-9043)
10. Waste Management of Mass., Inc.
    Leger Div.
    195 Wayside Ave.
    West Springfield, MA 01089

A telephone survey of these 10 firms indicated that Interex Corp. and Keefe Environmental Services are the only two that would handle the small, occasional jobs needed to service applicators and small businesses. Institutions with large, regular waste sources should look into prices and terms offered by the other firms since they are oriented towards volume.

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Moth Controls Nutsedge Weeds

The larvae of an indigenous moth may one day control purple and yellow nutsedge weeds in crops.

Researchers established a laboratory colony from field-collected larvae of the moth, ***Bactra verutana*** Zeller. Laboratory studies revealed that the larvae preferred purple and yellow nutsedge to an artificially prepared laboratory diet. Detailed knowledge of the behavior patterns of the larvae was required before field releases would be effective.

Preliminary studies revealed that field releases should be initiated immediately after crop planting. While the crop is too small to shade the weeds, nutsedges grow rapidly. Massive saturated larval field releases are recommended because the cool temperatures of the mid-May to late June release period tend to slow larval development. Releasing an average of five larvae per shoot shortly after nutsedge shoots appear should result in all shoots being infested during a 3-week period.

The larvae are injurious after a single early-season release and are more mobile and less cannibalistic than previously suspected. According to researchers Dr. Kenneth E. Frick and Ms. Rebecca F. Wilson of the Southern Weed Science Laboratory, Stoneville, MS 38776, serial releases cause the greatest weed injury and offer the best promise of biological nutsedge control. Further successful field trials may be required before this becomes a widely utilized method of weed control.—*E.L.*

FROM

MASSACHUSETTS TURF AND LAWN GRASS COUNCIL INCORPORATED

RFD #2, HADLEY, MASS. 01035

New Pesticide Bill

On September 30, 1978, President Carter signed into law the new amended FIFRA identified as PL-95-396. The new law represents the amendments to the Federal Insecticide, Fungicide, and Rodenticide Act that joint committees of the House and Senate have worked out during the past 15 months.

The bill is complex and subject to interpretation as EPA proceeds to implement the new regulations.

Following are some of the provisions that the new law appears to contain. The overall authority of the States to regulate pesticides is increased. Unless prohibited on the label, a pesticide application can be split into more than one application as long as the total allowable rate is not exceeded. A pesticide may be used to kill pests that are not listed on the label as long as the site use is registered. A pesticide can be applied by any method which is not specifically prohibited on the label. A pesticide may be legally applied at a rate less than that specified on the label. A pesticide can be applied in any volume of water that is not prohibited on the label.

Join Your Massachusetts Turf and Lawn Grass Council

For more information write:
Mass. Turf and Lawn Grass Council
attn.: Dr. Joseph Troll
RFD #2, Hadley, Mass., 01035
413—549-5295

The Massachusetts Turf and Lawn Grass Council is a non-profit corporation. Its officer derive no benefits except the satisfaction of keeping Massachusetts and its neighbors first in turf. It was founded on the principle of "Better Turf Through Research and Education." We must support our University to accomplish this, and we can with a large and strong Turf Cou

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