

NORTHWEST



TURFGRASS TOPICS

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1989 Northwest Turfgrass Conference Rated Excellent

This year's Northwest Turfgrass Conference and Exhibition in Tacoma (September 18-21) was an outstanding success according to over 400 attendees.

—Education Program—

Over 30 excellent presentations covering a wide range of turf care topics were available for the conference attendees. Presentors from throughout the nation served to maintain the usual high quality of information available at the annual Northwest Turfgrass Conference Education Session.

—Exhibition—

Exhibitors supported this year's exhibition in an outstanding manner. Over forty exhibitors from throughout the region and nation filled over 17,000 square feet of the Tacoma Bicentennial Pavillion with displays. Everyone agreed the exhibitors put on a great show.

—Golf Tournaments—

Nearly 80 golfers played in the men's and women's tournaments held at the Northshore Golf and Country Club. Many thanks were in order to owners, Larry Proctor and Jim Bourne; pro Scot Solomonson; and superintendent, Mike Tight. The great facilities and cooperation was instrumental in making the tournaments the success they were.

Once again, our suppliers were a big help with donations for tournament prizes. Remember, these donations make it possible for us to put more into the research and scholarship fund. A big thank you goes to the following suppliers:

C.H. Kuhn & Associates, Champion Irrigation Products, D.A. Hogan & Associates, Golf Week Magazine, J.A. Jack & Sons, J.R. Simplot BEST Products, Montco/Surfside, Northwest Outdoor Equipment, O.M. Scott & Sons, R.W. Faukenburg & Associates, Standard Golf Co., The Chas. H. Lilly Co., and Western Equipment.

1989 Northwest Turfgrass Exhibition Exhibitors

The NTA recognizes and appreciates the valuable contribution and great support the turf care industry suppliers continue to demonstrate at each conference and this year was no exception to the rule.

NTA members should know that any extra revenues generated by the exhibition do not go into underwriting non-exhibit related conference expenses. Instead, any extra money, after exhibition costs are paid, goes into the NTA Research and Scholarship Fund.

Many thanks to the following exhibitors who contributed to the success of this year's show:

Advanced Drainage Systems, Inc.
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John Deere Company
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President's Corner

As your new president I would like to take a moment to thank all of you who have worked so hard in the past serving the NTA. Your efforts and dedication will make my task much easier during the coming year. We need to give a round of applause to past president Mike Kingsley, the 1988-89 Board of Directors, and Blair Patrick and his staff at Organization Management for a job well done. When you see a member of your NTA



William J. Johnston
NTA President

board at a meeting this winter give them a well deserved pat on the back. Remember they work hard for you and the pay is poor, although the personal satisfaction is great.

The past year was a very good one for the NTA. Over the past two years our Board of Directors has been working hard to define our membership, your needs, and how the NTA can best serve you. We, and especially Bo Hepler and his finance committee, have also worked at putting the organization on a strong financial footing. We have made great progress in these areas and I am pleased to report we are a very sound and healthy organization.

Last year several "new traditions" were begun. The first of these was the **NTA Summer Turfgrass-Fest** with a turfgrass research golf tournament, cookout, and industry equipment demonstration. This event was held in conjunction with the annual Turfgrass Field Day at the WSU Puyallup Research and Extension Center. The Turfgrass-Fest will allow NTA members to get together and learn about current research activities, see a "state of the art" field equipment display, and socialize at a golf outing. The golf tournament at future Turfgrass-Fests will be named the **NTA R. L. Goss Turfgrass Research Golf Tournament**. Proceeds from this tournament will go toward funding turfgrass research in the Pacific Northwest. Plan to attend this event in 1990.

The second "new tradition" was the awarding of the **NTA Distinguished Service Award**. Wally Staatz was the first recipient of the award for his years of support of the NTA. This is a most prestigious award and one that will not be automatically given each year. It must be earned. Congratulations, Wally.

One of the major events of the turfgrass year was the addition of Dr. Gwen Stahnke to the WSU extension/research faculty at Puyallup. Gwen will fill Dr. R. L. Goss's position in turfgrass extension and research. On behalf of all the members of the NTA, I would like to welcome Gwen to the Pacific Northwest and wish her the best for a long and productive career.

On a final note, the 1989 year went out with a bang. The education sessions at the 1989 NTA Conference in Tacoma were felt by most members to have been excellent. Several people thought it was the "best NTA Conference yet." Others who had made suggestions for improvements are assured the board will take them into account when planning next year's conference. Vice President William Griffith is program chair for the next conference. If you have suggestions for conference speakers, contact Bill **at once** at (509) 527-4336. We are not putting

the program together and expect to have another outstanding program in 1990 at Rippling River in Oregon.

For those of you who stayed to the end of the Tacoma NTA Conference, remember what Troy Bussey said, "COURAGE and talk to your gossamer angel often in 1990."

NTA Officers and Directors Elected for 1989/1990

Dr. William J. Johnston was elected president of the Northwest Turfgrass Association during the recently concluded 43rd Northwest Turfgrass Conference and Exhibition. Bill is Turfgrass Science Agronomist with Washington State University in Pullman, Washington. He served the association this last year as vice president and chairperson of the annual conference program committee.

Other officers elected during the conference to serve on the board for 1989/1990 include William B. Griffith, Golf Course Superintendent at Veterans Memorial Golf Course in Walla Walla (WA), who will serve as vice president; and Bo C. Hepler, Turfgrass Agronomist with Senske Lawn and Tree Care in Yakima (WA) who will serve as treasurer. Filling out the officer corp will be Mike L. Kingsley, Golf Course Superintendent at MeadowWood Golf Course at Liberty Lake (WA).

Freshman directors on the board include David P. Jacobson, President of Farwest Turf Equipment in Portland (OR); Alan L. Nielsen, Golf Superintendent at Royal Oaks Country Club in Vancouver (WA); and, Thomas M. Wolff, Golf Course Superintendent at Sahalee Country Club in Redmond (WA).

Carryover directors serving out unexpired terms for the year include Donald L. Hellstrom, Golf Superintendent at Jackson Park Golf Course in Seattle (WA); Rebecca R. Michels, President of Messmer's Landscaping Service in Kent (WA); and, Patrick J. Nibler, Operations Manager for PRO GRASS located in Wilsonville (OR).

In addition to the elected "voting" members of the board there are non-voting members Dr. Roy L. Goss, Director Emeritus and Blair Patrick, NTA Executive Director.

1990 Annual Membership And Dues

The NTA is a non-profit corporation founded in 1948 to help all people interested in turfgrass culture. The association now has grown to over 400 people involved in turf facilities development and maintenance at schools, parks, golf courses, cemeteries, parks, sports fields, commercial sites, and home lawns. In addition, lawn spray services, landscape architects, landscape contractors, and equipment and chemical suppliers all participate as members in this organization. Through its many activities, the NTA has benefited all of these people by helping them learn more about their profession. Its annual conference and publications program provide timely and pertinent information specifically aimed at turf culture needs in the Pacific Northwest. In recent years, its focus has broadened to include landscape maintenance in addition to turf culture.

The NTA is directed by its membership through a board of directors. The board encompasses all fields and

(continued on page 3)

Membership *(continued from page 2)*

geographic areas throughout the Pacific Northwest. Board members are elected at the general membership meeting of the annual conference, and serve three year terms. Active participation by members is encouraged so that the organization will reflect their needs and wants.

The NTA offers an opportunity to participate shoulder to shoulder with other leading turf professionals in the Pacific Northwest. Members get:

1. An opportunity to attend the annual conference to listen to outstanding researchers and practitioners and then discuss their findings face to face.

2. A copy of the annual conference **Proceedings**. This publication typically runs 100 to 150 pages and contains approximately 25 different topics as presented by top researchers throughout the Pacific Northwest and the United States. Many of the talks are practically oriented and provide information to take home and apply.

3. An opportunity to exchange ideas and experiences with other turf colleagues in the Pacific Northwest.

4. A first hand look at new equipment and products as displayed at the conference by suppliers from throughout the region and the United States.

5. A quarterly publication, **Turfgrass Topics**, filled with timely information on turf care and other items of interest in our industry. **Turfgrass Topics** also includes advertising by the suppliers with whom you want to do business on a regular basis.

6. An annual **Directory** including a listing of association members along with valuable industry data.

7. A handsome annual **Certificate of Membership**.

8. An active group of elected and appointed colleagues looking out for your interests and those of the industry.

9. An opportunity to support and promote industry-related research.

Annual dues statements for 1990 will be mailed within the next few weeks. The dues are as follows: \$75.00 for **Active Members** (any individual, firm, corporation, jurisdiction or institution engaged in the turfgrass industry or in the development or application of turfgrass industry technology); \$15.00 for **Student Members** (any person enrolled in a university, college, community college or vocational school, turfgrass or related industry program of studies); \$100.00 for **Associate Members** (any individual, firm, corporation, jurisdiction or institution not eligible for other membership categories, but interested in advancement of the purposes of the association); and, \$25.00 for **Subscriber Members** (any person employed and sponsored by an active member).

There has been confusion on occasion in the past with the fact that the Active Member dues rate (\$75.00) is the same as the annual conference registration rate (\$75.00). Even though the rates are the same, that is the only similarity. They are both independent charges and one \$75.00 payment does **not** cover both items.

1990 Research and Scholarship Fund Raising Campaign

Bill Griffith, chairperson of the NTA Research and Scholarship Fund Committee, has announced the kick off

of the 1989/1990 Research and Scholarship fund raising campaign.

Intimately involved with turfgrass management, we realize more than most, that today's turfgrass quality is the result of knowledge and technological gains resulting from research and education accompanied by hard work and effort. We owe our thanks to those who gave their time and money to make the research and education possible, for without them we would have to rely on our own slow trial and error methods.

Few of us are independently capable of, nor prepared to conduct the research or develop the education programs necessary to keep the industry on the leading edge. Recognizing this, the Northwest Turfgrass Association created a research and scholarship fund to help make it possible for each of us to participate significantly in the advancement of present and future knowledge. Through this fund, each of can financially contribute to industry research and education advancements.

Donation forms will be mailed to members and industry supporters within the next month or so. Contributions are tax deductible and those contributing to the research and scholarship fund each year are recognized in the NTA Annual Directory

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1990 Northwest Turfgrass Conference and Exhibition

The Board of Directors of the Northwest Turfgrass Association extend a cordial invitation to the members of the association, along with their colleagues, employees, spouses, friends and others interested in the turfgrass industry in the Pacific Northwest to attend and participate in the 1990 **44th NORTHWEST TURFGRASS CONFERENCE AND EXHIBITION** scheduled for September 17-20, 1990 in Welches, Oregon at the Rippling River Resort and Conference Center.

Research information, education, equipment displays and demonstrations, the annual turfgrass men's and women's golf tournaments and a turfgrass facilities tour will highlight the Conference and Exhibition. Also on the schedule of events are the annual business meeting of the NTA members; an excellent program for spouses and friends; and a number of social activities designed for everyone.

Rippling River will host the hundreds of golf course superintendents; parks, cemetery, school and other grounds maintenance personnel; professional consultants; landscape and lawn care personnel; equipment and product suppliers; research and extension staff; and others involved in the turfgrass industry from throughout the Pacific Northwest who will assemble for the outstanding professional development conference.

Rippling River, one of the largest meeting facilities of any resort in Oregon and Washington, will house the industry equipment and supplier exhibition, a regular high point of the annual conference.

Superintendents Gun for International Golf Championship

More than 600 members of the Golf Course Superintendents Association of America (GCSAA) will compete for the association's Golf Championship early next year in Orlando, FL. The GCSAA Championship, one of the largest member tournaments in the nation, is a major annual event for the men and women who manage golf courses throughout the world.

The two-day tournament will be played Feb. 19-20 on five courses in the Orlando area: the Palm, Magnolia and Lake Buena Vista courses at Disney World, the New Course at Grand Cypress Resort and Hunter's Creek Golf Course.

The tournament will be held prior to GCSAA's 61st International Golf Course Conference and Show. Organizers project a record number of members competing for the 1990 championship.

More than just a golf outing, GCSAA's tournament is the annual championship for one of the game's foremost organizations. Many of today's superintendents are avid golfers, and their knowledge of the game plays an important role in the management of their courses.

The GCSAA Championship, reflecting the growth of the industry, has also increased in size recently. Just three years ago, the tournament had only 288 competitors on two golf courses.

Individual and chapter team honors are up for grabs in this event. The Midwest GCSA won last year's team competition. Dave Powell, superintendent at Myers Point Country Club in Charlotte, N.C., is set to defend the title he has won for the past two years.



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1989-90 NTA Schedule of Events

DATE	EVENT	SITE
Sept. 21, 1989 (Thursday)	First Regular Meeting of the Board	Sheraton Tacoma Hotel Tacoma, Washington (206) 572-3200
Nov. 20, 1989 (Monday)	Second Regular Meeting of the Board	Westwater Inn Olympia, Washington (206) 943-4000
Feb. 12, 1990 (Monday)	Third Regular Meeting of the Board	Westwater Inn Olympia, Washington (206) 943-4000
May 14, 1990 (Monday)	Fourth Regular Meeting of the Board	Towne Plaza Yakima, Washington (509) 248-5900
June 25-26, 1990 (Monday-Tuesday)	2nd Annual Summer Turfgrass-fest	(TBD)
Aug. 13, 1990 (Monday)	Fifth Regular Meeting of the Board	Westwater Inn Olympia, Washington (206) 943-4000
Sept. 16, 1990 (Sunday)	Sixth Regular Meeting of the Board	Rippling River Resort Welches, Oregon (503) 622-3101
Sept. 17-20, 1990 (Monday-Thursday)	44th NTA Northwest Turfgrass Conference and Exhibition	Rippling River Resort Welches, Oregon (503) 622-3101
Sept. 19, 1990 (Wednesday)	Annual Membership Business Meeting	Rippling River Resort Welches, Oregon (503) 622-3101

INDUSTRY FIELD DAYS

(TBD)	OSU Turf Field Day	Contact: Tom Cook (503) 737-3695
June 21, 1990	Turf-Seed, Inc., Field Day	Contact: Turf-Seed, Inc. (503) 981-9571
June 26, 1990	WSU Turf Field Day	Contact: Stan Brauen (206) 840-4511

Gardening Tips

It is said the garden in winter is a true test of a gardener. The form and structure are revealed when uncluttered by leaves and brightly colored blossoms. In the Midwest, it is that six months of the year when most gardeners have lost interest in their gardens because their garden bears no interest.

The addition of some plants with winter interest can tie autumn to spring with a completely different view in the very same garden! One of my favorite perennials that quietly expands through spring and summer is nothing more than a coarse, textured green buffer between more noticeable, brightly colored plants is *Sedum Autumn Joy*! It is a pleasant surprise every fall when it turns from pink to rose to burgundy to rust where it remains standing throughout the winter. These flat topped blossoms catch the snow and create an altogether different effect. Other perennials with winter interest are the ornamental grasses, *Miscanthus*, *Pennisetum*, and *Cortaderia* all provide vertical interest with different types of inflorescences that catch the low angled light of late fall and winter, revealing their more subtle beauty.

Winter interest in a perennial garden is probably one of the main reasons dwarf conifers are so often placed in conspicuous places. Not only can they devine space, but their form and texture are greatly accentuated in the absence of herbaceous plants.

Other evergreens have a variety of effects not seen or noticed in summer. *Mathonia Aquifolium*'s shiny green leaves change to a ruby red with the onset of cold weather, and blue princess holly sports bright red berries against the deep green leaves.

Deciduous plants can reveal a completely different look without leaves. Interesting buds of birches, magnolia and dogwood all add to the pleasure of a garden in winter. Bark is another attraction. The cinnamon peelings of river birch or the black cork of persimmon bark and smooth grey muscular yellowwood and beech all generate cold weather attention.

The so called 'off season' can bring delight in plants of a more subtle and quiet nature. Noticing things like frost on evergreens, the low angle of winter sun shining on the needles of white pine, or snow exaggerating the winged branches of euonymous alatus, can make you appreciate that usually "boring" time of year.

Source: Gateway Green/October 1989

Demise of Field Burning?

MARTINSVILLE, N.J. — This year may in fact be the last time open burning of seed fields is allowed in Oregon, says Gary L. Parker, general manager of Lofts Great Western Seed Co. Next year, growers will be spending substantially more money to eradicate remnants of the 1990 crop, he says.

"We'll be okay this year," Parkers says. "They (the Oregon state legislature) are not going to shut us off completely, unless something truly unexpected happens."

Parker, addressing visitors at the Lofts Annual Field Day, says that propane burning is the most likely alternative, though it will add anywhere from \$20 to \$70 an acre to the cost of field burning. "I think the actual increase will

be closer to \$40 an acre," predicts Parker. "Yes, it's an added expense, but if the legislature says that's the way it's going to be, that's the way it's going to be."

Parker notes that propane equipment will cost growers close to \$30,000, but that isn't his biggest worry. "We're at the point now where they want to regulate propane burning too. We're a little nervous about that. Hopefully calm heads will prevail."

Source: Landscape Management/November 1989

Inland Northwest Turf and Landscape Conference

The 1990 Inland Northwest Turf and Landscape Conference is scheduled Jan. 23-24 at the Spokane Sheraton Hotel.

A one-day trade show will be held in conjunction with the conference on Jan. 24 at the nearby Spokane Convention Center. The events attract 300 people involved in turf management, grounds maintenance and landscaping from eastern Washington, eastern Oregon, Montana, Idaho and British Columbia.

Tree pruning, site selection for landscape plants, use of native Inland Northwest plants in landscapes, integrated pest management in landscapes, use of fatty acids and oil to control landscape pests, low maintenance turfgrass varieties, diseases in lawns, problem diagnosis in landscape plants and urban trees are topics that will be covered during the conference.

Seven recertification credits will be offered for licensed pesticide applicators in Washington and Oregon.

The conference is sponsored by Washington State University Cooperative Extension; the trade show by the Inland Empire Gold Course Superintendents Association.

Registration fee for the conference is \$50 per person. Discounts are available for individuals, groups and students registering before Jan. 1. Entrance to the trade show is free. Contact Jones and Associates at (509) 327-5904 for further information.

Cornell Publishes Athletic Field Guide

Three turf specialists at Cornell University have teamed up to publish a comprehensive guide to athletic field care titled "Athletic Field Maintenance: A Guide for Sports Turf Managers." Norman Hummell, Jr., Joseph Neal, and Martin Petrovic each contributed to the publication which is intended primarily for grounds managers at schools and parks.

The guide covers a wide range of topics from establishing and maintaining durable natural turf fields to care of skinned areas. Among the subjects included are field drainage, thatch control, fertilization, turfgrass selection, mowing, irrigation, seeding and control of weeds, insects and diseases. The focus of the booklet is cultural management of newly seeded, overseeded and established turfgrass areas.

Copies of the guide can be purchased for \$3 each by writing: Cornell University Distribution, 7 Research Park, Ithaca, NY 14850.

Pesticide Licensing Classes Offered

Pre-licensing and recertification courses are being offered by Washington State University's Cooperative Extension to help people prepare for the Washington State Pesticide Licensing Exam. A pesticide license is required for all those working with pesticides in the ornamental and turf industries. Recent changes in the state pesticide law repealed the "residential landscape gardener exemption from licensing."

Registration fee: \$25 a day if registered 10 days in advance; \$35 a day if registered within 10 days of the start of the class. For more information, contact your county WSU Cooperative Extension office.

Pre-Licensing Classes

Pullman	Jan. 8, 9, 10
Kelso	Jan. 9, 10, 11
Pasco & Mt. Vernon	Jan. 16, 17, 18
Tacoma	Jan. 23, 24, 25
Spokane	Jan. 31, Feb. 1, 2
Lynnwood	Feb. 6, 7, 8
Moses Lake	Feb. 7, 8, 9
Olympia	Feb. 21, 22, 23

Recertification Classes

Spokane & Lynnwood	Nov. 29, 30
Kelso	Jan. 10, 11
Pullman	Jan. 11, 12
Mt. Vernon & Pasco	Jan. 17, 18
Yakima & Tacoma	Jan. 24, 25
Spokane	Jan. 31, Feb. 1
Moses Lake	Feb. 5, 6
Lynnwood	Feb. 7, 8

Pacific Coast Turf and Landscape Conference and Show

Beginning December 5, 1989, experience 2½ days of seminars and exhibits. Exhibitors include major distributors and suppliers! Seminars feature national and regional experts on plant diseases, toxic waste disposal, ground water contamination and use of pesticides and fertilizers. The keynote address will be given by the world's foremost authority on turfgrass management, Houston Couch. Couch is currently on the faculty at Virginia Polytechnic and State University. Eleven Pesticide recertification credits are approved.

Throughout Tuesday and Wednesday you will have opportunities to wander through the Exhibit Hall, preview new products and equipment, and discuss the latest techniques and practices. This is your chance to compare features and costs before making purchases for next spring.

Contact Jones and Associates at 509/327-5904 to reserve your space.

Pesticide Applicator Re-certification

Licensed Pesticide Applicators will receive eleven recertification credits for attending all presentations on Tuesday, Wednesday and Thursday. Credits are available for Washington, Oregon and Idaho.

Exhibits

The Exhibit Hall will be open to the public Tuesday, December 5 from 9 a.m. until 4 p.m. and Wednesday from 10 a.m. until 2:30 p.m. There is no charge for admission to the Exhibit Hall. An exhibitor-hosted reception is scheduled on Wednesday from 2:30 p.m. until 5 p.m. All Conference participants are invited.

Another Banner Year in the Making

A mid-year review of golf course development activity in the U.S. indicates that 1989 could be another banner year in new course openings as well as construction.

For example, NGF tracking records show that a total of 159 new courses have been opened across the country during the first six months of this year.

If this pace continues, the nation could easily eclipse the last year's 12-month total of 211 new course openings. Until last year, the nation had been averaging only about 125 new courses per year.

At the end of 1988 a total of 662 courses were listed as being either in planning or under construction. At the halfway mark this year, the total here is already up to 791.

The industry's goal is 400 new courses a year. It is based on NGF research that has shown that the popularity of the game is growing at such a rate that the number of golfers in the U.S. could easily skyrocket from 23.4 million to well over 30 million by the year 2000.

To accommodate this growth, researchers estimate that upwards of 4,000 new golf courses (or approximately one a day) will be needed over the next 10 years.

Activity Summary

	1988 12 months	1989 6 months
In planning	343	416
Under construction	319	375
Open	211	159
Total	873	950

Fall Applications Of Herbicides For Controlling Broadleaved Weeds In Turfgrass

by Dr. Joseph C. Neal, Cornell University

Perennial broadleaved weeds such as: dandelion, plantain, and clover, invade and proliferate in turf regardless of the management intensity, species of turfgrass, or usage (i.e.: home lawn, athletic field, institutional grounds, or utility). Effective herbicides are available to control the majority of common broadleaf weeds but "clean" turfgrass areas are rapidly reinfested via wind blown seed (dandelion), dormant seed in the soil (clover), encroachment from adjacent areas (creeping speedwell). As a result, many turfgrass managers find it necessary to make annual herbicide applications to control these pests.

The standard treatment for broadleaf weeds in cool season turfgrasses is a May application of a 2-way or 3-way combination of 2,4-D with mecoprop (MCP), diclorprop (2,4-DP), dicamba (Banvel), and/or triclopyr (Turflon products) will provide excellent broad spectrum weed con-

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Herbicides *(continued from page 6)*

trol when applied to actively growing broadleaf weeds. Cool temperatures and abundant moisture in the spring promote the lush weed growth necessary to provide optimum control. When applied under these conditions, 100% control of common weeds such as dandelion, plantain and clover may be expected. Unfortunately, when these weeds die, thin spots are left in the turf at a time of year when cool season turfgrass vigor is poor and when weed seed germination is at a high.

An alternative, which has been recommended by Cornell Cooperative Extension for many years, is to make herbicide applications in the fall. In late September and October, cooler temperatures and adequate moisture encourage lush growth of weeds and turfgrasses. If weeds are controlled at this time of year the turf has at least three months of good growing conditions to fill-in before late spring and summer germination of weeds can occur. At least in theory, this would limit the potential for weed reinfestation from seed.

Research conducted at Cornell University has shown that fall applications of the labeled herbicides were equally effective as standard spring treatments for the control of dandelion, plantain, and clover. These tests were conducted in the absence of turf, so unfortunately it was impossible to evaluate the rate of reinfestation. However, germination of dandelions were observed from late June through July regardless of whether the plots were treated in May or October. This germination timing coincides nicely (from the weed's perspective) with "summer dormancy" often observed with cool season turfgrasses. If these tests had been conducted on areas of good quality turfgrasses; the areas treated in October would have had at least three months of excellent growing weather before dandelion germination occurred.

In addition, fall applications of postemergent herbicides will control many seedling winter annual weeds which start germinating in late August. Common winter annual broadleaved weeds which may be present at this time are chickweed, corn speedwell, pineappleweed, and henbit. If these weeds are present when the October postemergent treatment is applied, a preemergent herbicide application may be necessary to prevent reinfestation. Effective materials for this purpose include DCPA (Dacthal), pendimethalin (Halts, Pre-M), oxadiazon (Ronstar), and others. Follow label recommendations for application methods, rates, and weed spectra controlled (Note: oxadiazon does not control chickweed).

Another advantage of fall applications, over spring treatments, may be improved control of certain species such as ground ivy. Research dealing with the control of woody vines and shrubs has shown that fall applications of herbicides are often much more effective than spring treatments. In the spring most perennial plants are translocating stored carbohydrates and nutrients toward the growing point (i.e.: from the roots to the shoots). However, in the fall, many plants prepare for the winter by translocating sugars and other compounds from the leaves to large stems and roots. More complete control may often be obtained if translocated (systemic) herbicides are applied at this time of year. This apparently is the case with ground ivy, explaining why control of this weed is usually more consistent with fall than with spring applications.

(continued on page 12)

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Winterizing Irrigation Systems

As managers of high-use recreational facilities realize the futility of maintaining turfgrass without irrigation, all types of systems are being installed, from the hottest regions of the country to the coldest.

Irrigation provides a reliable, consistent level of playability for turf during periods of drought or irregular rainfall. Today there are no boundaries for irrigation — and sports turf maintenance is changing as a result.

The vital role of irrigation for recreational turf has also prompted parks, schools, golf courses, universities, resorts and stadiums that already have irrigation systems to convert from manual to automatic control, add sophisticated pump stations, and upgrade sprinkler heads.

An investment in irrigation goes beyond design and installation. Regular maintenance is critical, in order to preserve the operational design of the system from year to year. Advances in controllers have eliminated much of the labor involved in operating irrigation systems. However, controllers have not replaced the human eye when it comes to troubleshooting.

Even though most of an irrigation system is out of sight, it should not be out of mind . . . especially during the winter. Not only can freezing temperatures turn water into an enemy, procedures used to remove water from the system can damage components if the turf manager is not careful. Equally delicate is the process of recharging the system in the spring.

The simplest explanation of an irrigation system is a series of interlinked containers full of water. Pressure exerted on the water at the source pushes it through pipes to valves that hold the water in chambers. Upon opening, the valve allows the pressure from the source to force water through more pipes to the sprinkler heads for distribution.

All components are designed to hold and move water within a certain pressure range and rate of flow. When conditions exceed these ranges, the pipe, fittings, valves and heads are all in danger. That is why irrigation system designers go to great lengths to select components and provide extensive specifications and details for installation.

When water freezes, it expands. If it is confined as it freezes, the water will exceed the burst strength of irrigation components, including those made of metal.

For this reason, any portion of an irrigation system below the frost line must be drained in the fall. This process is termed winterization. If properly done, it takes just a few hours and removes water from all components susceptible to freezing during the winter.

Irrigation systems, especially those in the colder regions of the country, should be installed with drainage in mind. Large systems need to be drained or blown out one section at a time. Emergency shut-off valves enable you to isolate one section from another. Pipe in each section should slope to low point(s), where drain valves are installed in gravel sumps.

A system without drains or graded pipelines is far harder to drain than one installed with drainage in mind. Yet even a system with adequate emergency gate valves, drain valves, and pitched piping will not survive poor drainage procedures.

To help avoid such costly failures, we consulted with specialists in winterizing at two irrigation manufacturers, Bucknew of Fresno, CA and Weather-matic/Telsco of Dallas, TX. Their "inside information" figuratively puts you within the pipe itself.

When draining an irrigation system, consider yourself as an air mass crawling inside the pipe and pushing a ball the size of the inside diameter of the pipe to force all the water ahead of you. The water will remain in front of you until you provide an opening — a sprinkler, quick-coupling valve, or drain valve — to let the water escape from the pipe.

You must always look back to see that you have not forced any water *behind* you, as might happen in a loop pipe system, or when not starting the drainage process at the water source.

The following drainage procedure, offered by Buckner, will deal with a properly designed and installed system, and should show the need for adequate drainage provisions.

- Install two or more one-inch larger air connections in the water-supply discharge pipe, with a gate valve between the air connection and the pipe. Air may be added through quick-coupling valves, but Weather-matic's Don Cooper cautions that air coming out of an air compressor is hot enough to damage plastic piping adjacent to the valve.
- Locate a 250-cfm or larger air compressor (two 125s will do) with a hose and fasten it to your air connections.
- Close all valves that could permit water to flow from the irrigated area back into the water source.
- Start the compressor and slowly open the air connection valve. Do not permit the air pressure to drop below 40-50 psi or the air mass will not move the water properly. On the other hand, excessively high pressure can damage pipe and fittings. Most large irrigation systems are designed to operate at approximately 120 psi at the source and 80 psi at the heads. Some pipe and fitting manufacturers will not honor warranties if their products are damaged by improper winterization.
- Select one branch of irrigation piping and open a group of valves in series nearest the water supply. The concentrated high velocity of the air will blow most of the water out of the pipe within a few minutes. When air instead of water comes out of the heads, shut off the valve to those heads. Do not permit air to blow through the heads for more than a few seconds or damage may result.

Automatic valves, whether electric or hydraulic, open quickly but close slowly. This shut-down time may range between five and 30 seconds. You want the next set of valves to open before the first set closes to prevent pressure from backing up in the system. You can instruct the controller to shut down the first set of valves and then open the next set of valves as long as you stay within the shut-down period.

Proceed from the source downstream until all of the valves have been opened, the sprinklers have discharged air, and you have reached the end of the pipe, or an emergency gate valve in the event of a loop pipe system. Operate the valves several times so air can replace the water in the operating parts of the valves.

By controlling the number of valves open, you control the pressure in the line. If the pressure drops below 40 psi, shut off several valves. Restart them when the air

pressure has recovered.

It is desirable to have a drain or quick-coupling valve on both sides of an emergency shut-off valve if all of the water is to be removed from that line.

- Select the second branch of piping and repeat the previous step, from the source to the end. Continue the same process until all branches have been blown.
- At the low points in the piping, the air blew past the water, and the water has now returned to the low points by gravity. This is where the drain valves should be.

With the pipe under air pressure, *crack* the drain valve, until all air and no water comes out of the valve. Close the drain valve and proceed to all drains on the property, following the same closing procedure with each.

The closed drains will prevent gravel from the drain wells, and surface water from rain or a thaw, from entering the system over the winter months. Spring turn-on is also expedited by not having to make the rounds to close each drain valve.

- Repeat the procedure from the fifth step ("Select one branch," etc.) on each branch to verify that all air and no water is discharged from the sprinklers.
- Drain all gate valves, pressure-reducing valves, check valves, backflow preventers, pump volutes, pressure gauges, and piping in the pumphouse.

In closing their list of procedural pointers, the Buckner people point out that gravity drainage of an irrigation system can also be very successful. Patience is necessary — as well as a good understanding of the pipe size, water volume, and infiltration rate. However, drainage with air is usually faster and more effective for the typical installation, they advise.

Cooper, product manager and technical services manager for Weather-matic, conducts many irrigation service seminars across the United States and in Canada. "Basically, when you talk about winterization, you have to talk in terms of specific areas of the country, as procedures vary according to climate," he points out.

Discussing winterization procedures in the first of four north-to-south climatic zones, Cooper says, "In the northern part of the country, basically on a line that goes from Colorado north and Montana east through Michigan and all the way to New York, systems are winterized to a point that they're completely evacuated of water."

He continues, "Blowing out, to use the trade term is done with an air compressor that injects air into the system till the water is completely evacuated. It's a very simple process — if done properly.

"If *not* done properly, a lot of damage can be incurred to the system," he warns, "particularly where rotary heads are used — and gear drives in particular. So let's talk for a moment about gear drives.

"The impetus for rotation comes from an impeller. Water flowing across the impeller causes it to turn. Through a gear reduction, the rotation speed of the impeller is reduced to about a two- to three-minute revolution at the nozzle. Depending on the manufacturer of the gear drive, the impeller speeds will generally be somewhere in the 1,000-rpm range."

However, he observes, if the impellers are turned on air rather than water, the rotation speed increases dramatically. The bearings that the impeller rides on are not designed for that type of operation. If the air movement is kept going through the heads for a prolonged period of

time, damage can occur to the impeller bearings. A common terminology for this is "burning the bearings."

How long is too long? "The maximum cycle duration after the first head starts to blow air should be no more than 30 seconds to one minute," Cooper emphasizes. Therefore he recommends using short multiple cycles for blowing the system out. "One person should operate the controller while others observe what's going on at each head or drain valve. By using radios, the people in the field can let the person at the controller know when heads start to blow air." Another option would be to install remote-control devices to run the controllers from the field. Someone should also keep a constant watch on the air pressure.

By using multiple cycles, he explains, the impellers and impeller bearings are not stressed, as they would be with one continuous cycle of evacuation. In most small institutional systems, he advises, the system can be completely evacuated in about three cycles.

If manual drains are available, once the system has been evacuated they should be opened and left open. This procedure is recommended by Cooper for all types of irrigation equipment. Of course, these valves should be located in such a way that water does not collect at the valve opening and reenter the system.

Automatic drain valves can simplify matters. One example is the King Drain which closes when the pressure exceeds 10 psi. As long as the system is pressurized with water or air, the valve remains closed. It opens when the pressure drops below 10 psi to drain water that collects in low spots so freezing won't damage the pipes. A filter and back-flow valve built into the drain prevent debris from entering the system. These valves allow for winter drainage and eliminate the process of opening and closing drain valves in the fall and spring.

Gard Crow, spokesman for Hunter Industries, a manufacturer of gear-drive heads, says that pressure should be watched at all times during blow-out. "Some people think that if they raise the pressure the job gets done faster," says Crow. "All you need is about 40 psi and you shouldn't go above that."

"As we travel further south across the country," Cooper continues, "winterization becomes simply a case of draining the mains and laterals through the use of drain valves.

"The one thing demanding particular attention in these instances would be any backflow-prevention device set above grade — above ground level," Cooper advises. "Depending on the winter's severity in your area, special attention will need to be paid to these units to make sure they are drained.

"As we progress further south, winterization may simply consist of assuring that the system does not operate during an extreme cold snap. Where system operation is allowed during the winter, one of the prime methods to prevent watering during such a cold snap would be the use of a freeze-stat. This item is simply a temperature gauge with a switch, or else a temperature-sensitive switch. It would preclude system operation once the temperature drops to 40 degrees or less."

These items can be purchased preset at a specific temperature, or they can be bought with the temperature as an adjustable feature.

"As we proceed south, basically to the Caribbean, the last temperature extreme would require virtually no winterization," Cooper continues. "In Florida they very

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Winterization *(continued from page 9)*

seldom winterize. Even here, in certain parts of Texas, we seldom winterize. This is particularly true of south Texas.

"So basically there are four strata of winterization within the United States. Most of the winterization provisions are made at installation by the contractor. By this we mean that if you're going to use air evacuation, an entry-way into the system has to be 'plumped' into that system during installation.

"One thing is mandatory when installing automatic drains: They must be installed at the low point of the line being drained, to assure that complete drainage will occur. Automatic drains need good gravel sumps.

"Manual drains also need good gravel sumps — and access to manual drains needs to be built into the system at the time of installation, with attention being paid to grade changes," says Cooper.

"One more place where caution needs to be used is this: When evacuating with air do not over-pressure the irrigation system. Too often, during evacuation of the system, people pay more attention to speed than to the care of the system itself."

When this happens, Cooper emphasizes, the problems that occur during turn-on or restart the following spring can be tremendous, due to damaged equipment — not only the irrigation equipment, such as sprinkler heads and valves, but damage to the piping itself.

"The reason I make this statement is that, unlike water, air is tremendously compressive," he explains. "And, as a result, pressure surges two or three times that of the originating pressure can be built up in the system. In most cases, an irrigation system is not designed to handle these pressures."

Cooper adds, "One of the main concerns most service people have, as far as winterizing an irrigation system is concerned, is 'What do we do with the controller?'"

"As a rule of thumb, it is best if the controller is kept operating. Irrigation controllers are designed to be operated 24 hours a day, 365 days a year. By operating the controllers, the operating components — gears, bushings, bearings, etc. — in electro-mechanical controllers are kept from obtaining a 'set.'

"In electronic controllers, the circuit components are kept active and fresh, and the surge protection is kept functional," says Cooper. "Additionally, the heat generated by the transformer helps to keep the condensation that would otherwise occur to a minimum.

"The main point to remember is that the valves must be precluded from operating. Most controllers have a switch that breaks the output voltage to the valves. It is not advisable to operate the solenoids on the valves dry — that is, with no water in the valve."

Some irrigation systems have moisture-sensing equipment installed above ground that is used to preclude automatic operation if enough rainfall occurs. "When winterizing," Cooper warns, "remember to protect these devices in addition to the remainder of the system. If these sensors have collected moisture and a freeze occurs, they are more than likely going to be damaged."

All the precautions that are vital to winterizing are just as important when a drained system is recharged. Water flows considerably faster in an empty pipe than in one full of water. You don't just turn on the pump and start opening valves. The system should be refilled slowly, in order to get all the air out of the lines first.

"When a pipe is full of water the design velocity should be four to five feet per second," explains Cooper. "In an empty pipe, water can reach a velocity of up to 13 feet per second. When the pipe becomes full and the water velocity is suddenly reduced to design velocity, a pressure surge of up to three to four times static pressure can be generated at the sprinkler head. Water hammer, caused when the velocity of the water is suddenly slowed, can burst heads, pipe, and fittings, causing severe damage to an irrigation system."

Cooper suggests turf managers with pump stations use just the jockey pump to charge the system — and keep as many valves open as possible. "It may take eight hours or more to charge a golf course irrigation system, but the worst possible thing you can do is rush it," he warns.

He strongly advises that large irrigation systems include sufficient filters to remove sand and debris. Such material can seriously harm components when the system is winterized. Whenever a pipe is repaired, the system should be flushed by removing downstream heads to remove any dirt, glue or debris that may have entered the system.

Cooper prefers to keep drain valves open during the winter, in order to allow moisture entering the system from melting snow and rain to drain out.

"It's not unusual for irrigation heads to be under water or hidden beneath snow during the winter," he remarks. "Some of that water is going to drain into the heads and down to the valves and pipe. While a portion of the water will evaporate, the rest needs someplace to go. Keeping the drain valves open, but protected, will get rid of the water."

Winterizing is something that turf managers should keep in mind throughout the year. There is more to irrigation maintenance than meets the eye, and it's what you don't see that can hurt you more than what you can see.

"This may require a little extra effort in the fall," Cooper admits, "but it's better than replacing damaged components in the spring."

Source: Sportsturf, November 1988

Golf Course Impact On Water Quality

FINDING: Golf courses do not pose a significant pollution threat to nation's water supplies. This conclusion is based on a review of the scientific evidence that is currently available. Neither groundwater nor surface water is threatened by golf course runoff. Further, studies show that stormwater runoff is near zero from golf courses.

GROUNDWATER: About half of all people in the United States depend on groundwater for their drinking water, and the figure is 90 percent in rural areas. Results from ongoing scientific studies show that the use of pesticides on golf courses does not threaten public drinking water. Because of the low mobility and quick biodegradation of most golf course pesticides, they simply do not reach groundwater in significant quantities.

One Environmental Protection Agency-funded study being undertaken on Cape Cod in Massachusetts provides for a "worst-case" estimate of groundwater contamination. To date, test results have been encouraging, demonstrating that golf courses and clean groundwater do coexist.

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Water Quality *(continued from page 10)*

Some experts argue that golf turf offers uniquely favorable control mechanisms to prevent groundwater contamination. Dr. Stuart Z. Cohen, a former Ground Water Team Leader for the EPA in Washington, notes that "the use of pesticides on golf courses poses less of a threat to the nation's groundwater than does the agricultural use of pesticides.

Additionally, turfgrass provides a "thatch layer" not found in row crop situations. Thatch binds up pesticide residues and increases degradation of some chemicals. Dr. Harry D. Niemczyk of Ohio State University has found that as much as 99% of recovered pesticides are found in turfgrass thatch.

In some areas, golf courses are also helping to mitigate the groundwater pollution effects of hazardous waste sites. Many of the nation's golf courses fertilize soil using sludge compost mixes prepared by urban waste recycling programs. These sludges might otherwise be disposed of in municipal landfills. Thus, potential groundwater leaching from dump sites is averted by careful community planning and recycling.

STORMWATER RUNOFF: Stormwater runoff from golf courses is not a significant environmental hazard. Research conducted by Dr. Thomas Watschke, a turfgrass specialist at the Pennsylvania State University, indicates that thick, healthy turf reduces runoff "to next to nothing."

An average golf course of 150 acres effortlessly absorbs 12 million gallons of water during a three-inch rainfall. Dr. Watschke finds that thick, carefully managed turfgrass has 15 times less runoff than does a lower quality lawn. As a result, almost all of the pesticides applied to the grass remain in place after peak rainfall.

Dr. Richard J. Cooper of the University of Massachusetts argues that turfgrass cover "reduces soil erosion

and prevents soil and chemical runoff into water sources."

By comparison, parking lots, streets and even residential areas load nearby waters with hazardous pollutants carried in runoff from road surfaces, gutters and catch basins.

SURFACE WATER: Golf courses help decrease sedimentation pollution of rivers, streams and lakes by preventing topsoil erosion. The major polluter of U.S. surface water is sedimentation from soil erosion. However, turfgrass reduces erosion, as compared to alternative land uses.

For instance, studies show that grassland experiences 84 to 668 times less erosion than areas planted with wheat or corn. Construction has an even more devastating impact on topsoil, so golf courses can greatly reduce erosion effects as compared to other land users, like shopping malls or housing developments.

Sedimentation pollution from soil erosion costs society billions of dollars in increased transportation, shipping, and cleaning costs. Thus, by preventing soil erosion, golf courses serve a very beneficial societal purpose.

CONCLUSIONS: Golf courses do not threaten the nation's water supplies. Scientific studies show that pesticides used on golf courses do not seep into neighboring groundwater sources. Other studies demonstrate that stormwater runoff is greatly reduced by turfgrass. Finally, still more studies show that grassy areas reduce soil erosion, which is a major cause of sedimentation pollution in the nation's rivers, lakes and streams.

On the whole, a golf course makes an environmentally sound contribution to any community.

Source: GCSAA Reports

Herbicides *(continued from page 7)*

Recently, several new herbicides have been labeled for turfgrass use; these include chlorfluonol (Break-Thru) and triclopyr (Turflon products). It was unclear whether these new products would perform as well with fall applications as they do with spring applications. Tests at Cornell University concluded that weed control from spring and fall applications with these new herbicides was equal. However, neither product provided adequate control of dandelion or plantain. It is apparent that these products must be mixed with other herbicides to broaden the spectrum of control. Table 1 provides information on these products and some mixes. Recent controversy surrounding the future availability of 2,4-D provided an incentive for many turfgrass managers to switch from phenoxy (2,4-D, MCP, 2,4-DP) to non-phenoxy herbicides. The only non-phenoxy herbicides labeled for broadleaf control in turf were chlorfluonol, dicamba, and triclopyr. A mixture of these three herbicides was widely used in 1988 providing good to excellent control of many turf weeds including dandelion, clover, black medic, chickweed, and others. Unfortunately, this mixture does not provide acceptable control of broadleaf plantain. Therefore, where weed populations include plantain, 2,4-D is still necessary for consistent and complete control.

Another recent development has been **improved amine formulations** of standard herbicides. Previous amine formulations were not as effective as ester formulations under cool conditions and thus were reserved for use under high temperatures when esters would volatilize.

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Herbicides *(continued from page 12)*

However, our research showed that the new amine formulations of Weedone DPC (2,4D + dicloprop) and Turflon II Amine (2,4-D + triclopyr) were equally effective as the esters (Weedone DPC and Turflon D, respectively). Table 1 includes information on these new formulations.

To summarize, a well maintained turfgrass is always the best defense against weed invasion; but, if broadleaved weeds are a problem, fall applications of 2-way and 3-way herbicide mixtures are as effective as Spring applications for controlling common broadleaved weeds. Additionally, fall applications offer the advantages of control of seedling winter annuals before they become established, greater potential for turfgrass recovery before germination of many weed seeds and improved control of certain hard-to-kill species. The best timing for fall herbicide applications will vary. To obtain the information on the best timing for your region, consult your local Cooperative Extension Service office. Remember that when using any pesticide, follow the label directions and use appropriate caution.

Coring, Wetting Agents Battle Dry Spots

Just because researchers haven't figured out what causes localized dry spots doesn't mean there aren't steps you can take to control them, says Karl Dannenberger, professor at The Ohio State University.

Circumstantial evidence suggests that a fungal hyphae that coats sand particles is the culprit, but the

fungus has yet to be isolated. Researchers do know that localized dry spots can be associated with hydrophobic thatch and hydrophilic soil, hydrophilic thatch and hydrophobic soil, and thatch and soil that are both hydrophobic.

One of the most effective management practices recommended by Dannenberger is coring. "We've found that, in the soil profiles of localized dry spots, the thatch is hydrophobic and the soil hydrophilic or vice versa," he notes, "Therefore you need to break one of them down. The frequency of coring might be why some people have problems and some don't."

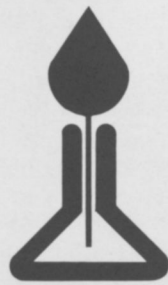
Dannenberger suggests that everyone should be coring at least once a year. Turf managers with localized dry spot problems should be coring at least twice a year, he says.

Dannenberger also recommends syringing the spots to reduce its canopy temperature. Syringing won't eliminate your dry spot problem but may prevent it from becoming worse. Also, using wetting agents will effectively reduce the spots' severity.

"Preventative applications give the best results but curative applications can also be effective," says Dannenberger. The wetting agents should be thoroughly watered into the turf to prevent the possibility of leaf burn caused by these compounds.

"More than anything else, you can't get away from getting out there and watering these areas by hand," adds Dannenberger.

Source: Landscape Management/December 1988



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Why is Annual Bluegrass So Successful?

by Steve Poitras and Bill Johnston
Washington State University

When dealing with a species that is a weed one must keep in mind why an environment is favorable to the species as well as the biological adaptations of the species that allow it to invade. Often the cultural practices used to promote healthy turf also favor invasion of less desirable species, such as annual bluegrass. Some of the cultural practices that favor annual bluegrass invasion are high fertility, excessive irrigation, and close mowing.

What are the special adaptations that enable a plant to become an invading species? H. G. Baker, in his studies on the genetics of colonizing species, has outlined what he believes make an ideal weed, ideal meaning successful in terms of maintaining itself as a viable population. Baker lists fourteen attributes that a weed may possess in order to be a successful invader. A species does not need to have all of these characteristics to be an invading species; however, annual bluegrass has many of these characteristics.

Annual bluegrass propagation, according to T. K. Koshy, is mainly from seed, especially in the annual types. The perennial biotypes produce seed, but are also able to vegetatively reproduce indefinitely from the formation of new tillers and rhizomes. Koshy states that annual bluegrass' success as a weed is due in part to its high versatility in seed formation. *Poa annua* is self compatible, that is, it is able to self-pollinate. However, it also is able to undergo cross-pollination. The ability to undergo self-pollination is a very important characteristic for an invading species. If one seed falls in an open niche and conditions are favorable for germination and growth, the plant will be able to flower and produce seed even if there are no other plants of the same species present for pollination. The process of cross-pollination will lead to different biotypes in the population and is probably the reason that perennial types have developed.

Viable seed can be obtained from annual bluegrass on the same day anthesis (flowering) occurs. From a turfgrass management point of view this can present a problem. If the turf is cut daily, in order to remove seed heads as they are produced, there will still be viable seeds in the clippings or clinging to the machine to be deposited elsewhere and continue the spread.

Another advantage of annual bluegrass seed production is that seed can be produced under many different environmental conditions. J. B. Beard cites studies that show the optimum temperature for seedhead production is approximately 27°C. However, even under less than ideal temperatures (as low as 10°C) seed can be produced. The ideal photoperiod for seed production is a 12-hour day, but once started the plant can produce seed over a wide range of photoperiods all season long, according to Beard. A. J. Renny reports that annual bluegrass is able to produce seed the entire growing season if conditions are favorable, and feels this is the reason annual bluegrass can produce so much seed. Renny found that one plant may produce up to 360 seeds over a 4 month period. It has been shown that the soil surface lay may contain up to 30 million seeds per acre where an annual bluegrass population exists.

The seeds of annual bluegrass do not exhibit much dormancy. The perennial biotype produces seeds that are ready to germinate immediately on exposure to favorable conditions, whereas, the annual biotype seeds need an afterripening period of approximately 3 months, according to T. G. Tutin. The seeds of both types will remain viable in the soil for approximately 2 years, according to H. B. Sprange. Even though this is not a long period of dormancy, a large reservoir of seed can be built up in the soil.

Germination and seedling growth are very important for the success of any weedy species. Baker says that successful invaders will have no special requirements for germination. Annual bluegrass can germinate over a wide range of temperatures, (4°C to 21°C). Subsequent seedling growth, however, requires higher temperatures. Low germination temperature allows annual bluegrass to become the first grass in a turf mixture to initiate growth in the spring and to outcompete other species for space and nutrients, Beard reports.

There is a strong light requirement for the germination of annual bluegrass seeds, according to Beard. This can be a benefit for a species, such as annual bluegrass, that has a very small seed size. The light requirement will inhibit the seed from germinating in deep soil. If germination takes place too deep in the soil, food reserves will be used up before the plant can emerge. Also, seed would fail to germinate in highly shaded areas that are not conducive to growth. Annual bluegrass is a problem in areas that are continually mowed, have bare spots, and where shading is at high light intensities, Sprague reports, it can effectively adapt to shaded conditions. Since neither Kentucky bluegrass or creeping bentgrass are well adapted to shade, annual bluegrass can often outcompete these desirable turfgrasses in shaded environments.

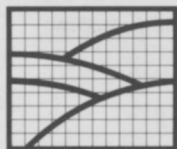
The time from germination to flowering is an important factor in the weediness of a species. Also, if the time between flowering and seed set is short the plant will put a larger share of its resources into reproductive production than into vegetative growth, and thus produce more seeds. A plant that has a short time to flowering and seed set is more able to produce its seed and escape potentially adverse environmental conditions. The annual biotype of annual bluegrass has a relatively short vegetative phase. Flowering will begin within approximately 50 days after emergency, while the perennial type takes longer, approximately 80 days, according to Beard. This relatively short time to flowering will allow the plants to have several flowering dates in a single season, and could help in the continual repopulation of the species.

According to Beard, the root system of annual bluegrass is commonly reported as being shallow. However, in most of these observations the plants were growing on compacted sites such as golf greens. Sprague and Burton have done studies that show the root system of annual bluegrass is comparable to Kentucky bluegrass and creeping bentgrass under non-compacted soil conditions. Annual bluegrass can adjust to compacted sites and lower oxygen concentrations better than Kentucky bluegrass or creeping bentgrass. Sprague reports the performance of these two desirable turfgrasses declines under compacted soil conditions the competitive abilities of annual bluegrass become apparent as it becomes the dominant species.

(continued on page 15)

Bluegrass *(continued from page 14)*

In conclusion, annual bluegrass is an opportunistic species that can invade habitats that are intensively managed to favor other turf species. It has been noted from personal experience of the authors that the degree of annual bluegrass infestation is dependent on the health of the desirable species, and that containment of an infestation must be based on sound cultural practices. But as Beard states, annual bluegrass is a highly variable species which can adapt to widely differing environmental conditions by the natural selection of existing biotypes or the development of new biotypes through cross-pollination. In addition, the strong capability of continual reseeding of occupied sites ensures a prominent role for annual bluegrass in intensively managed turfgrass.



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- November 20** NTA Board of Directors Meeting
Contact NTA Office (206) 754-0825
- December 5-7** Pacific Coast Turf and Landscape Conference and Trade Show
Contact Jones and Associates (509) 327-5904
- December 12-13** OGCSA Pesticide Seminar
Contact OGCSA Office (206) 573-6969
- December 13-14** Oregon Turf and Grounds Exhibit
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- January 4-6** Washington State Nursery and Landscape Association Annual Conference
Contact WSNLA (206) 863-4482
- January 24-24** Inland Northwest Turf and Landscape Conference
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- February 12** NTA Board of Directors Meeting
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- February 19-26** 61st International Golf Course Conference and Show
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NTA President

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