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IMPORTANCE OF TURFGRASS IN CALIFORNIA*

*Victor A. Gibeault***

California and the rest of the United States appear to be in a period of financial stress and resource limitation. The news media remind us daily of cost increases because of inflation and shortages of energy and water. Taxpayers have revolted, formally in California and less formally elsewhere, and have thereby forced the public sector to set priorities for expenditures, if that sector had not been doing so already. Because of these pressures, we in the landscape industry are being asked: "What is the importance of turfgrass, shrubs, trees, ground covers, and nursery and flower products to Californians?"

I believe we each need to participate in this dialogue, whether through the political process, by our relationship with clients, or by simply answering public questions when they arise. We must present factual answers to this honest question to justify already strained public budgets, to make that maintenance contract, or to succeed with a material sale.

But let's back up a bit and evaluate, in a historical and philosophical context, the reasons for the present importance of turf in California as well as the possible future of turfgrass in this state. To do so, I find it most helpful to look at three categories of time in terms of human existence.

The first category can be termed *existence time.* It is the time spent biologically to stay alive-the time spent eating, sleeping, caring for one's health, and the like. Existence time, as a percentage of total human time, has not changed much throughout human history.

In contrast, *subsistence time* has greatly decreased, on the average, especially in the last few decades. This is time spent making a living or preparing to make a living.

As subsistence time has decreased, *leisure time* has increased. Leisure time is defined as a block of spare time when we are free to rest or do what we choose. The turfgrass industry is, in part, closely associated with the availability of true leisure, or discretionary time, to a large part of the population.

A second factor, in addition to time, is income. In recent decades more people have earned increased *discretionary* income-money available after funds for existence have been spent. Whether the discretionary income results from real growth in salaries, the increase in numbers of women working and thus two incomes per household, or social programs based on income redistribution, the result has been more money for many people to spend in a discretionary manner. The spending of such money in recreational pursuits or beautification of property with ornamental plants has had a large impact on the turfgrass industry.

Thus, it becomes apparent that discretionary time and discretionary income have greatly influenced the California turfgrass industry. Also, of course, the industry has been affected by the tremendous population increase since the 1940s.

Turf influences fife-style

Turf has a direct effect on the way most Californians live. Many. recreational facilities depend on a uniform, vigorous, well-maintained turf sward as the medium of play. Common examples include golf courses, bowling greens, picnic areas and parks, soccer, lacrosse, polo,

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baseball, and football fields, and school grounds. Gardening is important to many Californians, and lawn maintenance is a constant source of challenge and pride for the home gardener. Turf also affects people's lives when used in ornamental settings to create a desired aesthetic appearance. Schery very accurately described the importance of turf to city people as follows:

> By observing the seasonal behavior of grass, one touches on the grand rhythm of natural events. With a grassy lawn at our dooryard there is not only respite from the tension and press of the city, but instruction in biological cause and effect. Watching grass respond to soil and season may be, for city people, a last link to the solace and understanding our vanishing wilderness once gave.[1]

Turf influences environment

Turfgrasses directly influence people's environment in many positive ways. Turfs and other plant material reduce discomforting glare, especially in urban areas with buildings, metals, and concrete. Likewise, turf, along with properly placed trees and shrubs, can reduce traffic noise considerably. Soil erosion is reduced or controlled by turf, and chemical and particulate air pollution is decreased at the turfgrass surface. Because of transpirational cooling, turf modifies high temperatures by heat dissipation. I'm sure we have all felt the obviously different temperature when standing on an asphalt pavement in comparison with a turfed site. Because most Californians now live in urban centers, the function of turf in improving such an environment is significant.

Turf influences economy

The costs associated with California turf maintenance are not well documented. In fact, specific, accurate information on acreage by category, labor costs, equipment expenditure, installation or establishment costs, and the like, is not to be found. Nevertheless, to get an idea of the scope of economic involvement, identification of the main economic categories may be illuminating.

Many *facilities* are an obvious source of economic activity, such as golf courses, parks, schools, cemeteries, highways, airports, industrial and municipal lawns, and home lawns. A second category of economic involvement is manufacturing-production of equipment, fertilizer, chemicals, seed, sod, and other supplies used by the facilities. A *service* category includes individuals, groups, or firms such as distributors, architects, contractors, and consultants who provide services for the facility and manufacturing categories. Last, an *institutional* category involves those who conduct research on industry problems, such as University of California or USDA personnel, and educational programs directly serving the industry, such as colleges and universities, including Cooperative Extension.

To get a handle on the size of the facility category in this state, University of California environmental horticulturists Dr. V. Youngner, J. Van Dam, M. Henry and I evaluated turfgrass surveys from other states. Turfed facilities, by category, were put on a population basis and projected into California, given our population size (in 1977). Maintenance costs were likewise projected to California, as governed by the estimated acreage by category. Results presented in the table are estimates and should be viewed as such.

ESTIMATED CALIFORNIA TURFGRASS ACRES AND MAINTENANCE COSTS (1977 DOLLARS)

Category	Percent of area	Area (acres)	Percent of cost	Maintenance cost (in thousands)
Residential	64.0	860,800	67.8	$467,694
Golf	5.3	75,000	10.6	72,800
Parks	3.0	42,000	1.8	12,039
Schools	4.3	68,864	2.9	20,035
Cemeteries	2.3	34,432	1.4	9,877
Sod	0.2	2,500	—	(16,000) sales
Bowling greens	Trace	25	0.1	684
Other*	20.9	296,974	15.4	106,635
Total	100.0	1,380,595	100.0	$689,764

*Includes highways, airports, industrial lawns and speciality situations such as motels, military complexes, etc.

In summary, as population, discretionary time, and discretionary income have increased, so too has the importance of turfgrass to the urban Californian. This increased importance can be measured or described in many ways, including the value to our way of living, environment, and economy.

[1] R. W. Schery. 1961. The Lawn Book. The MacMillan Co., New York. 207 p.

LIVING WITH YOUR TURF*

*Victor A. Gibeault***

It's always comforting to recline in an easy chair, kick off one's shoes, and imagine how simple it would be to manage the turf acreage if only . . . If only the architect had specified a particular species, or variety; if only the installer had done a few things differently; if only the owner, or board of directors, or council had spent that extra $50,000. The fact is, though, that most turf managers must live with their existing facilities; reality usually prohibits redesign or renovation.

As you know, your existing turf sward is a result of the species or mixture that was originally established, the environmental factors that affect growth, the management the turf received, and the use imposed on the site. The turf area improves or declines depending on the interaction of these factors. The best way to ensure an improved turf acreage and an easier time living with those acres is to follow three management steps: (1) comprehensively evaluate the site; (2) determine needs of the site; and (3) evaluate and adjust the primary management practices for turf care.

Evaluation of location

The manager must identify the grass or grasses being grown and know the on-site environmental factors that affect their growth and development. Specifically, which turf species and varieties are being managed, and are they well adapted to the area or is special care needed to ensure their survival? Does the sward include unwanted plants? If so, which species, and how extensive is the weed problem? What are the soil texture, drainage characteristics, and fertility requirements, and is the soil characterized by high sodium, high salinity, or a high level of a specific ion? How much water does the turf use on an average daily, monthly, and yearly basis? Does the water have a high level of salinity, sodium, or specific ions? Are there many trees with significant shade? What type of use does the area receive? What are your budget, manpower, and equipment? I am sure that once you start to evaluate the location in this way, you will recognize other factors that should also be included. It is advisable to write the results of this evaluation in table form.

Determine needs

Once the site has been evaluated, it is possible to determine what must be done to correct undesirable site characteristics that impede turf growth and development. For example, does drainage, either surface or internal, need to be improved; does the irrigation system need upgrading; do trees need pruning to allow more light penetration; does traffic or play have to be controlled or directed; do weeds need to be removed; and finally, to provide the foregoing changes, does the budget have to be increased, or can priorities be rearranged? Based on the evaluation of your site, you may identify other needs. Remember, the goal is to provide the best conditions possible so that the turfgrass species can grow, unimpeded by specific limiting factors.

Review primary management practices

The third step in "living with your turf" is to evaluate thoroughly your observance of the primary management practices. Primary management practices are here defined as those performed regularly to allow the best growth of the species and optimum use of the area. They include mowing, fertilization, irrigation, aerification, and vertical mowing. Sure indications that the primary management practices are not being followed are weed invasion, disease, poor density, inferior color, and poor recuperative potential. The five practices must be designed for the on-site turfgrass species. If they are not, secondary management practices, such as weed control and disease control, will have to be incorporated and budgeted into the annual management program.

In summary, the reality of economics usually forces you to "live with your turf." In that endeavor, it is helpful to know the parameters with which you are working, to determine overall needs and solutions to those needs, and to follow the most correct primary management practices possible.

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* From 23rd Annual Rocky Mountain Regional Turfgrass Conference Proceedings, 1977, pp. 8-9.
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COOL SEASON TURFGRASS CULTIVAR PERFORMANCE, 1975-79

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Two turfgrassvariety trials were established in 1975 to evaluate the performance characteristics of commercially available and experimental cultivars of Kentucky bluegrass and perennial ryegrass. One trial was in Redwood City on a newly developed dredged landfill site on San Francisco Bay. The second trial was at the University of California South Coast Field Station in Santa Ana.

The Redwood City trial was seeded on October 8, 1975, to 25-square-foot plots; each treatment was replicated four times and arranged in a randomized complete block design. The bluegrass cultivars, as shown in table 1, were seeded at the rate of 3 pounds per 1,000 square feet; the ryegrasses listed in table 2 were seeded at 6 pounds per 1,000 square feet. After establishment, the plots were mowed regularly at a 1 1/2-inch cutting height and fertilized four times per year with an 8-3-4 ratio fertilizer applied at a rate to give 1/2 pound of nitrogen at each application time. During the summer of 1977, little irrigation was done because of drought; however, all varieties recovered during the fall of 1977. No evaluations were made during the stress period.

The Santa Ana trial was seeded on September 24, 1975. Plot size was 36 square feet, and each cultivar was replicated three times. The Kentucky bluegrasses listed in table 1 were seeded at 3 pounds per 1,000 square feet. The perennial ryegrasses were seeded at 6 pounds per 1,000 square feet. The Kentucky bluegrass trial was mowed with a riding rotary mower at a 2-inch cutting height. Slow-release fertilizer provided the equivalent of 4 pounds nitrogen per 1,000 square feet per year. Each perennial ryegrass cultivar was managed differently; for the purpose of this article, all subplot ratings were averaged to determine comparative cultivar performance.

A turf score rating system was used to evaluate the variety trials on a periodic schedule. Characteristics considered were color, texture, density, pest activity, and uniformity.

Results are presented in tables 1 and 2. The cultivars are listed in alphabetical order, and their turf scores and comparative rankings are given for each trial.

Acknowledgment

Appreciation is extended to the turfgrass seed industry for supplying the seed and to the Southern California Turfgrass Council for its continued financial assistance which made the southern California study possible.

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TABLE 1.
KENTUCKY BLUEGRASS CULTIVAR PERFORMANCE FOR TRIALS AT SANTA ANA AND REDWOOD CITY, CALIFORNIA

	Santa Ana				Redwood City	
Cultivar	Turf score*	Rank†	Rust‡	Fusarium blight§	Turf score'	Rank†
COMMERCIALLY AVAILABLE						
A34	6.8	6	2.0	3.7	7.2	3
Adelphi	7.4	3	1.2	2.0	6.8	4
Aquilla	6.2	11	2.6	3.7	6.4	8
Arista	4.4	21	3.8	4.3	—	—
Baron	6.4	9	2.5	2.7	7.4	2
Birka	—	—	—	—	6.3	9
Bonnieblue	6.6	8	2.1	1.7	6.7	5
Common	6.0	13	2.3	9.3	—	—
Enmundi	7.1	4	2.4	0.3	—	—
Enoble	6.7	7	2.8	1.0	—	—
Enprima	4.2	22	3.1	16.0	—	—
Fylking	5.3	18	2.5	14.0	6.4	8
Geronimo	6.3	10	2.3	1.3	7.2	3
Glade	5.9	14	2.1	2.0	6.6	6
Majestic	7.4	3	1.3	1.7	6.4	8
Merion	6.2	11	3.8	2.0	5.5	14
Newport	5.9	14	3.3	2.0	6.0	12
Nugget	5.2	19	2.9	13.3	5.6	13
Pacific	6.8	6	2.7	2.3	—	—
Parade	7.5	2	1.3	1.7	7.2	3
Park	5.0	20	2.4	20.3	5.6	13
Pennstar	5.5	17	1.8	4.0	6.1	11
Prato	—		—	—	6.1	11
Ram I	5.6	16	3.2	4.0	6.5	7
Rugby	7.4	3	1.7	0.7	7.2	3
Senic	7.0	5	2.9	5.3	—	—
Sydsport	6.1	12	2.1	3.7	7.6	1
Touchdown	5.8	15	3.6	0.0	—	—
Vantage	6.8	6	3.5	3.3	6.2	10
Victa	6.4	9	2.1	2.3	6.7	5
Windsor	6.3	10	4.4	6.3	6.5	7
EXPERIMENTAL						
BM 15	6.2	11	2.1	2.0	—	—
CA 24	4.2	22	3.7	5.0	—	—
CT 14374	5.9	14	1.7	3.0	—	—
K2-100	—	—	—	—	6.2	10
K3-227	—	—	—	—	6.8	4
K9-47	—	—	—	—	6.5	7
IS-28	7.9	1	1.2	0.3	—	—

‘Turf score is from 0 to 10, with 0 representing completely dead turf or grass removed by weed competition, and 10 an ideal stand for that species. Santa Ana data: average of monthly turf scores from November 1976 to October 1978. Redwood City data: average of turf scores taken in May, July, September, November 1976; January, March, April 1977; January, February, April, June, July, September 1978.

†Rank is turf score performance ranked from highest (1) to lowest (22 for Santa Ana data; 14 for Redwood City data).

‡Rust score from 0 to 10, with 0 representing no rust and 10 the most rust.

§Patch disease caused by Fusarium *roseum.* Data taken on August 18, 1976, represent percent area affected.

TABLE 2.
PERENNIAL RYEGRASS CULTIVAR PERFORMANCE AT
SANTA ANA AND REDWOOD CITY TRIAL LOCATIONS

	Santa Ana		Redwood City	
Cultivar	Turf score*	Rank†	Turf score*	Rank†
Citation	5.3	6	7.2	3
Clipper	6.2	3	—	—
Common	5.2	7	—	—
Cropper	—	—	6.2	9
Derby	6.7	1	7.6	1
Diplomat	6.2	3	—	—
Ensporta	4.5	9	6.7	4
Game	—	—	6.4	7
KO-12	—	—	6.3	8
KO-15	—	—	6.2	9
Lamora	5.1	8	6.5	6
Linn	—	—	5.5	10
Manhattan	6.4	2	7.5	2
NK-100	—	—	6.4	7
NKS-321	5.4	5	6.6	5
Pennfine	6.7	1	7.6	1
Wendy	5.6	4	—	—
Yorktown	5.4	5	6.5	6

*Turf score is from 0 to 10, with 0 representing completely dead turf or grass removed by weed competition and 10 an ideal stand for that species.
†Rank is turf score performance ranked from highest (1) to lowest (9 for Santa Ana data, 10 for Redwood City data).

UC TURF CORNER

*Victor A. Gibeault and Forrest D. Cress**

UC Turf Corner contains summaries of recently reported research results, abstracts of certain conference presentations, and announcements of new turf management publications. The source of each summary is given for the purpose of further reference.

SELECTING OR DEVELOPING CULTIVARS WITH GREATER TOLERANCE TO ALUMINUM TOXICITY IN ACID SOIL

Results from U.S. Department of Agriculture studies at Beltsville, Maryland, show potential for selecting or developing turfgrass cultivars for greater tolerance to acid soil stress factors, particularly aluminum toxicity, which may not be economically correctable. Researchers who conducted the studies say that such cultivars would be deeper rooted and better adapted to low maintenance conditions.

The immediate objective of their research was to determine the range of aluminum tolerance among cultivars of Kentucky bluegrass, fineleaf fescue, and tall fescue species and thereby to provide germplasm for breeding. Thirty-five Kentucky bluegrass, 15 fineleaf fescue, and 6 tall fescue cultivars were studied. They were grown in greenhouse pots containing 1 kg of aluminum-toxic Tatum soil at two pH levels-pH 4.6 and 5.7 for bluegrasses and pH 4.3 and 5.7 for fescues.

Wide growth differences in tops and roots were noted within the bluegrass as well as the fescue cultivars. Eleven of the 15 fineleaf fescue cultivars grew satisfactorily at pH 4.3.

The long-range objective of this work is to develop genotypes adapted to acid soil that is not economically correctable, such as strip mine spoils, expansive highway slopes or other minimum-use turf areas, and to soil high in clay or organic matter that requires high rates of lime application. Such genotypes, the researchers point out, are needed for deeper rooting and more efficient use of both native and applied soil nutrients than at present. Some tolerant genotypes might be suitable for renovation of pastures as well as turfgrass areas.

("Differential Tolerances of Turfgrass Cultivars to an Acid Soil High in Exchangeable Aluminum," by J. J. Murray and C.D. Foy, *Agronomy Journal,* Vol. 70, No. 5, September-October 1978.)

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.

NOTE Progress reports give experimental data that should not be considered as recommendations for " S E . Until fe products and the uses given appear on a registered pesticide label or other legal, supplementary direction for use, it is illegal to use the chemicals as described

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