

California Turfgrass Culture

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CALIFORNIA BOWLING GREEN SURVEY

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Until recently, lawn bowling was a rather obscure sport in California. Many people in this state have never seen a bowling green, let alone played on one. Yet, due to increasing interest, mainly from senior citizens, many municipalities throughout California have built and are maintaining a lawn bowling facility. To evaluate the status of lawn bowling, a survey was made of lawn bowling greens in the state. Generally, four areas of interest were covered in the survey: (1) existing kinds of facilities; (2) costs for building and maintaining lawn bowling greens; (3) trends in popularity and numbers of players; (4) topics related to turf management considered to be major problems for bowling green managers.

Thirty-one lawn bowling facilities were contacted in June 1977. Responses were received from 25 facilities, which represented 52 greens throughout California. Of the responses, about 80 percent were from municipalities, and the remainder were considered privately operated facilities. In most cases the park manager or greenkeeper completed the questionnaire, so the responses are those of the turf manager, not the lawn bowler. The discussion presented is based solely on the results of the survey.

One bias of the survey is the fact that the survey was mailed to all American Lawn Bowling Association affiliated greens and to only a few nonmember greens in California.

It was evident from the various responses that some answers to questions, especially those concerning economics, were very loose guesses while others were quite refined.

California greens

California's bowling green construction pace has fluctuated markedly during the past 75 years. Of those facilities responding to our survey, the oldest green was built in 1901. During the 1920s, seven more greens were built. The depression years surprisingly brought an even bigger boom; nine greens were constructed between 1930 and 1935. Only seven lawn bowling greens were constructed in California the following 19 years.

Since 1954, according to survey results, an average of one green per year has been added, so that approximately 55 greens were in use in 1977.

Probably the greatest improvement in construction of greens over the years (in both bowling and golf) has been the increased use of sands as the major medium for a greens soil mix. Bowling greens were built on existing native soil until 1937, when the first predominantly sand-based green was built. Since 1937, all but 7 of the 29 greens constructed used a sand-based soil mix of one kind or another.

The grass species used on bowling greens were as follows: Only 10 percent reported *Poa annua* as the predominant turf on their greens; 37 percent used creeping bentgrass; 50 percent used hybrid bermudagrass. Interestingly, not all bentgrass greens were in northern California, nor all bermudagrass greens in southern California.

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Economic aspects

Possibly the major complaint against the sport of lawn bowling has been the claim that the maintenance costs are much higher than those for golf or other recreation facilities.

One of the purposes of this survey was to establish some cost figures for the greens as they exist in California. Construction costs for bowling greens were not available for many of the older greens. However, the 13 responses averaged \$15,363 per green, ranging from \$5,000 (1962) to \$40,000 (1967).

The average cost of five greens built since 1970 was \$13,666. Figures obtained from a construction company specializing in bowling green construction quoted a cost today of \$40,000 for a first-class green in California. This wide range of construction costs can be quite dependent on the treatment around the green, including factors such as walkways and seating areas.

Green maintenance is a continuing expense, and figures obtained indicated the average cost (including labor) is approximately \$8,633 per green per year (average of 21 responses). Again, this figure represents more municipal than privately operated facilities. Nine of the responding facilities maintained one green, and 11 maintained two or more in one location. The average maintenance cost per green for one-green facilities was \$8,743; for those with two or more, it dropped slightly to \$7,634.

Of those facilities reporting a separate budget for green maintenance materials (fertilizer, seed, pesticides, etc.), the average amount spent per year per green was \$925.

Another expense reported in the survey was sod replacement. Fifty-six percent of the facilities reported this as an annual practice at an average yearly cost of \$560. At \$0.30 per square foot for sod, this amounts to replacing over 1,800 square feet per year.

Labor costs are a major part of a facility's budget. The average number of man-hours per green per year was calculated from the responses received. On the average, each green received 1,638 man-hours per year of labor, not including any volunteer help. Using 2,080 man-hours as the standard time a full-time employee works per year, this amounts to approximately a 3/4-time employee per green per year (78 percent of full-time), assuming a green that is open for play and maintained 52 weeks per year.

Seventy-two percent of the greens are closed to play for a significant amount of time each year for maintenance. The average time closed for maintenance was 4 weeks per year. The number of days closed per year ranged from 0 to 105.

About 40 percent of the facilities reported that they regularly rely on volunteer labor to help with some aspects of green maintenance. Many pointed out the need for extra labor to accomplish major projects, such as leveling, aerating, and top-dressing the green.

Popularity of the sport

The third area of interest noted in the survey was the greenkeepers' estimates regarding the use of their lawn bowling facilities. Estimates of the number of bowlers using each green per week ranged from 25 to 500. The average, based on the greenkeepers' estimates, was 113 players per green per week. Age breakdown of the players (reported by facilities managers) showed 88 percent senior, 11 percent middle age, and 1 percent young adults.

Maintenance problems

Generally, the maintenance problems on a bowling green are similar to those of other high-use greens. Irrigation, turf diseases, weed control, and soil compaction were all mentioned frequently by those caring for the

greens. A problem unique to lawn bowling greens concerned leveling the bowling green surface.

In over 80 percent of the responses, the turf manager reported a maintenance or management problem directly related to the soil. This points out the continuing need for education in the areas of proper sands for green construction and management of a properly constructed sand green.

Conclusion

Lawn bowling in California has a long history, and it is apparent that the sport will continue to be a part of the recreational

offerings of cities and, increasingly, of private retirement communities.

Construction costs and quality of the greens vary considerably as shown by the fact that 47 percent of the surveyed greens were built on a "sand mix" base, yet over 80 percent of the greenkeepers voiced problems related to the soil mix used for the greens. Apparently, few of the greens have been built with the proper sand, which is vital to achieve the desired product.

Although a lawn bowling green is a high maintenance turf area, it remains one of the few recreational outdoor activities available to the older segment of our society.

THE EVOLUTION OF CALIFORNIA'S SOD INDUSTRY

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Commercial selling of sod for home lawns began around 1920 in the East. Pastures of native grasses, mainly Kentucky bluegrass, were mowed and lifted as sod. By the 1940s the business was such that fields were specifically planted for lawn sod and "cultivated" sod came into being.

Sod has become a significant crop in some eastern states. Michigan State University (1969) reported that over 20,000 acres of cultivated sod were produced annually with a \$30 million return to growers. Maryland had 13,150 acres of sod in production in 1974 and sold 5,699 acres (Hall and Roche, 1974). Surveys indicate that in 1969 there were 160,884 acres of sod in production in the United States, with 74,905 acres marketed; in 1970, 217,298 acres were produced and 102,242 acres marketed (*Weeds, Trees, and Turf*, 1969, 1970). Crop maturity time is often 18 to 24 months, which explains the difference between acres produced and acres sold in a given year (Pennsylvania Department of Agriculture, 1966).

Sod production in California is relatively young compared with that in the rest of the United States. Before 1958, some sod was grown for motion pictures and some small quantities for home use. From the beginning, California growers used hybrids, improved cultivars, and selections of turf species that were as well adapted to the area as the state of the art permitted. No pasture sod was marketed. Sod crops were well maintained with good cultural practices including irrigation, fertilization, and pest control. Most farms were on costly land near population centers, and expensive equipment had to be adapted for use. Then, because Californians were not accustomed to instant lawns, extensive consumer education and product awareness programs were developed by sales and marketing personnel. All of these activities represented much higher costs in comparison with eastern standards.

In the early days of California's sod use, the primary customer groups were golf courses and institutional sites, such as sports fields. As

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increased exposure created additional sales appeal, instant landscapes found wide acceptance in commercial developments. Builders' use of model homes with sodded landscapes as sales tools accelerated rapidly in the 1970s, and, as a result, the general public became aware of the availability and benefits of sod. Today, residential use for new homes, repair, and replacement lawns accounts for most sod sales.

Figure 1 shows the growth of the industry by the number of acres sold annually in California. The first major expansion was in 1969 when the sales in acres more than doubled during that one year. Since then, growth has been rapid and relatively steady with nearly 2,200 acres sold in 1977. Acres in production were estimated to be 3,500 in 1977.

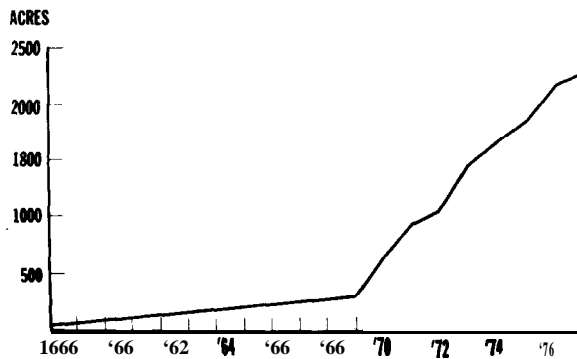


Fig. 1. Estimated sod sales in acres. California, 1958-1977.

Turfgrass sod has begun to have an impact on the state's economy with nearly \$16 million in sales in 1977, as shown in figure 2. This graph indicates a 10-fold increase in only eight years. Another important fact shown in the two figures is that \$16 million were earned in 2,200 acres of sales, while, as discussed, Michigan reported \$30 million on over 20,000 acres.

The average price received for the product actually remained quite stable until the last two or three years. Technology developed

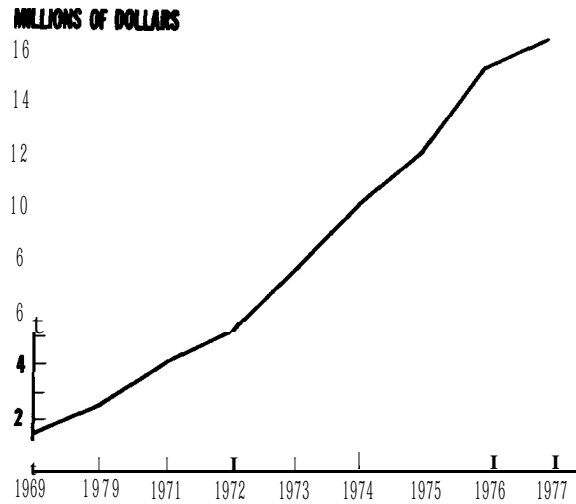


Fig. 2. Estimated sod sales in dollars. California, 1969-1977.

nearly as fast as the industry, keeping costs down. New improved varieties of grasses have helped growers produce higher quality sod faster (for example, hybrid bermudagrasses, new elite bluegrasses, and the new perennial ryegrasses).

The invention of the powered sod cutter in the 1950s was probably the most important development in the advancement of the industry as a whole. Around 1970, mechanical sod rollers became practical, eliminating a backbreaking hand operation in California. Sod harvesters that cut, rolled, and palletized sod took nearly all of the hand labor out of the harvest operation by 1972.

Various material handling methods were adapted to the California sod industry through the years. Palletizing the product and towing a forklift to the job site for unloading were the most significant adaptations. The use of two-way radio dispatching, new lightweight trailers, and transported forklifts have also increased distribution efficiency.

Many technological innovations have improved crop production. Some of the more important developments include colorants for

dormant bermuda, mechanical stolon planters and harvesters, various herbicides, fumigation techniques and equipment, making poultry feed from waste grass clippings, and the use of plastic netting to reduce crop maturity time. The latter development could be one of the really significant milestones along with the invention of the sod cutter.

Sod production has come a long way in California in a short time. As long as the typical Californian continues to demand convenience products, the sod business will thrive, while producing even greater efficiency and more improved methods and techniques than we know today.

FAIRWAY MANAGEMENT IN CALIFORNIA

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Questions were asked of golf superintendents attending meetings of the Northern California, Southern California, and San Diego chapters of the Golf Course Superintendents Association to determine commonly used maintenance practices on golf course fairways in various areas of the state. Fifty-three superintendents responded to the questionnaire, which is about 7 percent of all superintendents in California (around 700 courses). The questions were concerned with golf course age, play in rounds per year, and turfgrass management practices, such as mowing, fertilization, irrigation, vertical mowing, aeration, and pesticide applications.

The responses were grouped into three climatic zones based on course locations. Courses grouped in the cool transitional zone were from the San Francisco Bay Area; courses in the warm transitional zone were from the southern California coast from San Diego north to Santa Barbara; and those courses grouped in the subtropical zone were inland courses where very high summer temperatures are common (San Joaquin Valley

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and inland areas of southern California). Tables 1 to 7 present the results of the survey.

The average age and rounds played per year are given in table 1. Courses in the San Francisco Bay Area (cool transitional) and southern California coast (warm transitional) had been established on the average of 30 years. Inland courses in the subtropical zone were not as old. The play on the surveyed courses, as indicated by rounds per year, ranged, on the average, from 55,500 to 69,300. This level indicates a high, intense use of the golfing facilities.

TABLE 1. THE AVERAGE GOLF COURSE AGE (IN YEARS) AND NUMBER OF ROUNDS PLAYED PER YEAR FOR COURSES IN THREE CLIMATIC ZONES OF CALIFORNIA

	Climate zone		
	Transitional		Subtropical
	Cool	Warm	
Age	30	31	20
(Range)	(to 65)	(to 58)	(to 54)
Play	55,500	65,500	69,300
(Range)	(30M-95M)	(4M-132M)	(25M-200M)

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Table 2 shows the predominant fairway grasses or grass mixes on the surveyed courses. Cool-season turfgrass species were exclusively reported on courses in the cool transitional climate zone, whereas a very high percentage of common bermudagrass was noted on courses in the warm transitional and subtropical zones. Superintendents in the cool transitional zone had the least desire to change their fairway grass; 57 percent of those in the subtropical zone would establish a different species if they had the opportunity. This indicated that problems with fairway management, use, and aesthetics were greater in the San Joaquin Valley and the inland area of southern California.

TABLE 2. PERCENTAGE OF GOLF COURSES WITH FAIRWAYS ESTABLISHED TO THE COMMONLY USED TURFGRASSES, BY CALIFORNIA CLIMATE ZONE

	Climate zone		
	Transitional		
	Cool	Warm	Subtropical
	%	%	%
Kentucky blue	40	0	28
Annual blue	20	3	0
Perennial rye	13	0	11
Colonial bent	7	7	7
Cool-season mix	20	0	0
Common bermuda	0	81	54
Kikuyu	0	9	0
Desire change of fairway grass			
Yes	20	37.5	57
No	80	82.5	43

As will be noted in table 3, most golf courses rely on wells as their major water source, followed in order by municipal and effluent waters. A larger percentage of courses in the warm transitional zones used municipal water, most likely because of poor groundwater availability in southern California and the potential for salt water intrusion on those courses along the coast. Irrigation was mostly by automatic irrigation systems.

The average mowing height and frequency are presented in table 4. Fairways managed in the warm transitional and subtropical zones had a higher cutting height in the fall and

winter and lower in the spring and summer, whereas cutting heights were raised in the spring and summer on fairways in the cool transition zones. This practice is most likely due to the use of cool season turfgrasses, which perform better with higher cutting heights in warm weather. The mowing frequency was very similar for courses in the three climate zones and was closely associated with the time of year.

TABLE 3. WATER SOURCE AND APPLICATION METHOD IN GOLF COURSE FAIRWAY IRRIGATION, BY CALIFORNIA CLIMATE ZONE

	Climate zone		
	Transitional		
	Cool	Warm	Subtropical
	%	%	%
Water source:			
Municipal	31	46	13
Well	63	46	79
Effluent	6	8	8
Method:			
Automatic	73	80	82
Quick coupler	27	20	18

TABLE 4. AVERAGE MOWING HEIGHT AND FREQUENCY BY SEASON FOR GOLF COURSE FAIRWAYS IN THREE CALIFORNIA CLIMATE ZONES

	Climate zone		
	Transitional		
	Cool	Warm	Subtropical
Height (in.):			
Spring	14/16	12/16	11/16
Summer	15/16	12/16	11/16
Fall	14 / 1	13/16	12/16
Winter	13/16	13/16	12/16
Frequency (lb./week):			
Spring	2.1	2.0	1.9
Summer	2.4	2.6	2.6
Fall	1.9	1.8	1.8
Winter	1.2	1.0	1.1

Table 5 gives the amount and type of nitrogen fertilizer used. Courses in the transitional zone apply, on the average, 4 pounds of nitrogen per year. Slightly less nitrogen is applied to courses in the subtropical zone. Nitrogen is applied at a rate of approximately 1 pound per 1,000 square feet. Survey results indicate that most fairways are fertilized with soluble nitrogen versus slow-release sources.

TABLE 5. AVERAGE POUNDS OF NITROGEN PER YEAR, POUNDS PER APPLICATION, AND FERTILIZER TYPE APPLIED TO FAIRWAYS, BY CALIFORNIA CLIMATE ZONE

	Climate zone		
	Transitional		Subtropical
	Cool	Warm	
lb. N/year	3.9	4.0	2.5
lb. N/application	0.8	1.0	0.8
Type (%):			
Soluble	89	74	81
Slow release	11	26	19

TABLE 6. PERCENTAGE OF COURSES THAT VERTICAL-MOW AND AERIFY FAIRWAYS, BY CALIFORNIA CLIMATE ZONE

	Climate zone		
	Transitional		Subtropical
	Cool	Warm	
	%	%	%
Vertical mowing:			
Yes	6	32	21
No	94	68	79
Frequency (number/year)		1.8	1.3
Aerify:			
Yes	88	93	93
No	12	7	7
Frequency (number/year)	2.4	3.7	2.2

Table 6 clearly shows that most golf courses aerify their fairways, whereas vertical mowing is practiced on relatively few courses. More

vertical mowing was reported in climate zones where the strongly stoloniferous bermuda-grass was most commonly used.

Most golf courses use herbicides for fairway weed control, as shown in table 7. Conversely, few superintendents use insecticides and fungicides on fairways.

TABLE 7. PERCENTAGE OF COURSES THAT REGULARLY USE HERBICIDES, INSECTICIDES, AND FUNGICIDES FOR FAIRWAY MANAGEMENT, BY CALIFORNIA CLIMATE ZONE

	Climate zone		
	Transitional		Subtropical
	Cool	Warm	
	%	%	%
Herbicides:			
Yes	93	96	79
No	7	4	21
Insecticides:			
Yes	21	12	0
No	79	88	100
Fungicides:			
Yes	0	8	0
No	100	92	100

In conclusion, this survey attempts to describe average golf course fairway management practices in California. It indicates that fairways are characterized by a high level of management and that the management practices are similar, irrespective of location in the state.

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