Turfgrass Maintenance on the Island of Oahu

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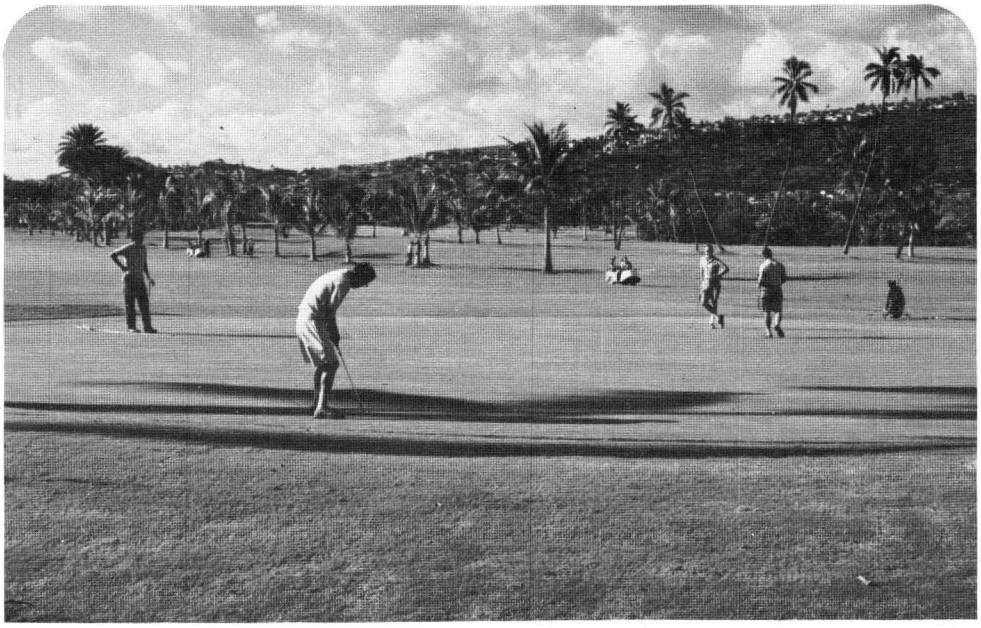

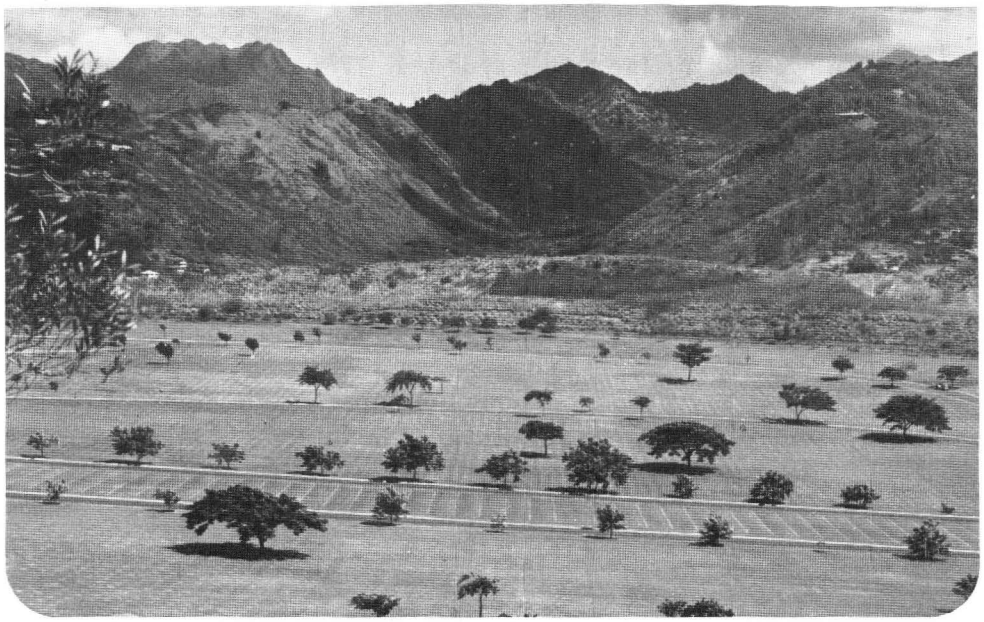

Hawaii Agricultural Experiment Station · College of Tropical Agriculture
University of Hawaii · Departmental Paper 41

On the Cover:
Top Waialae Country Club golf course. Camera Hawaii photo, courtesy Hawaii Visitors Bureau.
Bottom Punchbowl National Memorial Cemetery of the Pacific. Photo courtesy Hawaii Visitors Bureau.

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ACKNOWLEDGMENTS

The assistance of Paul Wallrabenstein, Agricultural Statistician, Statistical Reporting Service, U.S. Department of Agriculture, in preparing the questionnaires is gratefully acknowledged.

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The development, production, and maintenance of specialized grasses for utility, beautification, and recreation is an important industry on Oahu, the most populous island in the State of Hawaii. Involved are the principles of turfgrass science, the development of manual skills, and the creation, distribution, and sales of turfgrass products and services.

The total value of the turfgrass industry is difficult to assess because part of that value is related to the aesthetic value of turf and its contribution to human welfare. In spite of this difficulty, several states have recently made excellent surveys of their turfgrass industries (1, 2, 3, 4, 5, 6, 7, 8, 9, 10), which have provided insight into the importance of the turfgrass industry to the general economy and aided industry personnel in defining their role.

OBJECTIVE

The objective of this study was to compile data on the turfgrass industry on the Island of Oahu. Because of limited funds, statistically valid sampling procedures were not possible. Special consideration was given to obtaining information on the cost of maintaining turfgrasses in selected sectors of the industry where complete returns could be obtained. In sectors where the total population was not known, or where returns represented only a samll portion of the sector's economy, conservative estimates were made based on the returns received.

PROCEDURE

Questionnaires were mailed to entries on procured mailing lists representative of selected segments of the turfgrass industry. Different questionnaires were prepared for each segment of the industry and were pretested by interview with selected individuals in the different segments before mailing.

The total number of golf courses and memorial parks is known, and each facility within these two sectors was personally contacted, and individual interviews were held. Public schools and government facilities are sectors under one director; therefore, data for these sectors are also considered complete. It was not possible to determine the population of other sectors, such as churches, schools other than public, and private dwellings, and returns from these sectors were inadequate.

The maintenance budget figures represent out-of-pocket costs and do not include land values, purchase cost of land upon which the turfgrasses were established, cost of buildings, taxes, interest, insurance, office expenditures, travel, and so on. The data are discussed by sector of the industry surveyed.

Golf Courses

In 1975, there were 24 golf courses on the Island of Oahu and one under construction. Of the 24, two were 36-hole, 18 were 18-hole, and four were 9-hole courses. Breakdown by category of ownership showed eight military courses, four municipal, eight privately owned but open for public play, and four private or semiprivate clubs.

The 9-hole courses averaged 49 acres in size, and the 18-hole courses averaged 128 acres. Fourteen of the courses had Tifgreen bermudagrass greens, nine had Tifdwarf greens, and one had creeping bentgrass greens. All had common bermudagrass fairways, and most had common bermudagrass tees. The total maintenance labor force for the 24 golf courses consisted of 292 full-time and 33 part-time employees. The combined maintenance budget for all golf courses was reported to be $3,076,000 with $1,973,568 (64 percent) allocated to labor. Material costs were reported to be $667,990 and included $288,000 for fertilizer, $40,000 for pesticides, $72,000 for irrigation system repairs, and $267,990 for water to irrigate the courses. The inventory value of maintenance equipment totaled $1,593,651. Annually, $105,550 was spent for new equipment not previously contained in the inventory, and $313,000 was allocated for repair and replacement of existing equipment.

The task of mowing (greens, tees, aprons, fairways, and roughs) required the largest portion of available manhours of labor--a total of 116,604 manhours was required. Weed control accounted for 25,600 manhours, edging and sweeping 44,872 manhours, applying fertilizer 15,398 manhours, aeration and topdressing 27,615 manhours, and other tasks, such as vertical mowing, sod repair, and disease and pest control, 17,288 manhours.

The data for golf courses are shown in Table 1.

Table 1. Turfgrass maintenance summary for Oahu golf courses, 1975

Item	Number	$ value
Number facilities	24	
Military	8	
Public	4	
Private	4	
Semiprivate	4	
Combined 18-hole and 36-hole courses	20	
Combined 9-hole courses	4	
Total rounds per year (in thousands)	1678	
Total area (18's = 3061 acres; 9's = 196 acres)	3257	
Total area in turfgrasses, acres	2895	
Number facilities having Tifgreen greens	14	
Number facilities having Tifdwarf greens	9	
Average acres for 18-hole courses	128	
Average acres for 9-hole courses	49	
Number maintenance employees, full-time	292	
Number maintenance employees, part-time	33	
Maintenance combined budget		3,076,000
Combined maintenance labor annually		1,973,568
Inventory value of maintenance equipment		1,593,651
Equipment replacement		313,000
Additional equipment to inventory		105,550
Annual material costs		668,354

Memorial Parks

There were nine memorial parks on the Island with a total area of 734 acres. Of this area, 693 acres were in established turfgrasses, mostly hybrid bermudagrasses. Ninety-four full-time and five part-time employees were required to maintain the turfgrasses. The total annual maintenance budget for memorial parks required $649,000 with labor accounting for $331,000 (51 percent).

The maintenance tasks of edging and sweeping required a higher percentage of time on memorial parks than for other sectors of the turfgrass industry. Together they totaled over 31 percent of the total available manhours for turfgrass maintenance.

The data for memorial parks are summarized in Table 2.

Table 2. Turfgrass maintenance summary for Oahu memorial parks, 1975

Item	Number	$ value	Manhours
Number	9		
Total acres	734		
Acres in turfgrasses	693		
Maintenance employees, full-time	94		
Maintenance employees, part-time	5		
Annual maintenance budget		649,000	
Annual maintenance labor		331,000	
Inventory value of maintenance equipment		228,500	
Annual replacement and equipment repair		60,000	
Annual material costs		117,000	
Annual operational tasks			
Mowing			7,000
Weeding			10,000
Disease and pest control			5,000
Topdressing			3,000
Aerifying			1,000
Edging			44,632
Sweeping			15,680

Government Facilities

The government facilities and areas with maintained turfgrasses comprised an area of 3160 acres. These areas were made up primarily of State and City-County parks. Military bases were not included in this survey.

Annual maintenance budget for these areas was almost $2 million, the major portion of which was maintenance labor. The equipment inventory value was $182,600, with equipment replacement and repair requiring almost $44,000 annually. Most of the labor requirement was in the areas of mowing, irrigating, and weed control (189,870 manhours) and sweeping, edging, and trimming (167,000 manhours).

The data for this segment of the industry are summarized in Table 3.

Table 3. Turfgrass maintenance summary for Oahu's government facilities, 1975

Item	Number	$ value
Number	NA	
Total acres	6,550	
Acres in turfgrasses	3,160	
Maintenance employees, full- and part-time	305	
Annual maintenance budget		1,937,300
Annual maintenance labor		1,461,000
Inventory value of maintenance equipment		182,600
Annual replacement and equipment repair		43,150
Annual material costs		270,540
Annual operational tasks		Manhours
Mowing		83,200
Weed control		38,850
Disease and pest control		3,520
Edging and trimming		23,200
Sweeping		144,100
Aerating		330
Topdressing		2,200
Irrigating		67,820
Fertilizing		4,270

Table 4. Turfgrass maintenance summary for Oahu's universities and colleges, 1975

Item	Number	$ value
Number	7	
Total acres	1028	
Acres in turfgrasses	512	
Maintenance employees, full-time	31	
Maintenance employees, part-time (students)	30	
Annual maintenance budget		306,000
Annual maintenance labor		176,000
Inventory value of maintenance equipment		163,000
Annual replacement and equipment repair		16,000
Annual material costs		30,000
Annual operational tasks		Manhours
Mowing		11,459
Weeding		4,690
Aerifying		525
Edging and trimming		7,938
Fertilizing		924
Sweeping		6,909

Universities and Colleges

The seven educational institutions that made up this sector had a combined campus area of 1028 acres, of which 512 acres were established to turfgrasses. Two of the campuses had lawns of centipedegrass, one had hybrid bermudagrass, and all others had common bermudagrass.

For all institutions combined, there were 31 full-time and 30 part-time maintenance employees.

The total annual budget for maintenance of the seven campuses was $306,000. Of that total, $176,000 (57.6 percent) was for labor. Most institutions reported a restriction in budgets, which kept the expenditures for weed, insect, and disease control, as well as any maintenance item not absolutely essential, at a minimal level.

The data for universities and colleges are summarized in Table 4.

Schools Other Than Universities and Colleges

The State Department of Education reported that the combined area of their 156 schools on Oahu, from kindergarten through grade 12, was 1800 acres. The area in maintained turfgrass totaled 1100 acres. The annual maintenance budget for all schools was $184,000 with the overwhelming majority allocated to labor.

Table 5. Turfgrass maintenance summary for Oahu's schools other than colleges and universities, 1975

Item	Number	$ value	Manhours
Public schools (elementary and high schools)[a]			
Number	156		
Total acres	1800		
Acres in turfgrasses	1100		
Maintenance employees, full- and part-time	22		
Annual maintenance budget		184,000	
Annual maintenance labor		150,000	
Inventory value of maintenance equipment		60,800	
Annual replacement and equipment repair		4,000	
Annual material costs		34,000	
Value of additional equipment purchased		10,000	
Annual operational tasks			
Mowing			42,592
Fertilizing			480
Irrigating			156
Aerating			120
Other schools[b]			
Number	131		
Acres in turfgrasses	80		
Annual maintenance budget		50,000	
Annual maintenance labor		39,300	23,510
Annual material costs		7,000	
Inventory value of maintenance equipment		27,500	

[a]The data were provided by the State of Hawaii, Department of Education.
[b]Estimate calculated from a limited number of responding schools of the 25 special schools and 106 nonpublic educational facilities.

In addition to the 156 public schools, there are on Oahu some 25 special schools which serve the handicapped and 106 private schools of all kinds (nursery, kindergarten, elementary, and high school). Although accredited by the Department of Education, they provide their own maintenance. Only a few schools of this category responded to the survey questionnaire; therefore, data from this group represent a conservative estimate based on a limited number of responses.

Data for schools other than colleges and universities are given in Table 5.

Churches

The Atlas of Hawaii lists 834 established churches of 80 denominations in the State of Hawaii. Attempts to determine the actual number on Oahu were unsuccessful; however, it was estimated that there are approximately 678 churches of all denominations on the Island.

A questionnaire was mailed to 192 churches on Oahu, and 34 replied. These indicated that the maintained turfgrass area ranged from 5000 square feet to 3 acres in size. The overall average of the 34 replies was 1 acre.

The data for Oahu's churches are given in Table 6.

Table 6. Turfgrass maintenance summary for Oahu's churches, 1975

Item	Number	$ value
Number	678[a]	
Average turfgrass area (acres)	1	
Combined turfgrass area (acres)	678	
Annual maintenance budget		859,100
Paid and unpaid labor		813,600
Annual material costs		33,900
Annual equipment repair and replacement		11,600
Inventory value of maintenance equipment		116,110

[a]Based on 81.4 percent of 834 churches in the State of Hawaii from the Atlas of Hawaii, 1972.

Single-Family Dwellings

The diversity of single-family dwellings on Oahu made it impossible to obtain meaningful data about this segment of the industry. An attempt to estimate the size of this sector was made using figures from the State Department of Economic Planning, commercial gardeners, and landscape contractors.

Table 7. Turfgrass area estimate for Oahu's single-family dwellings, 1975

Item	Number
Estimated single-family structures	103,045
Units with turfgrass	82,436
Average turfgrass area per unit (sq. ft.)	2,500
Combined turfgrass area (acres)	4,800

Table 8. 1975 summary of Oahu turfgrass study by maintained areas

Item	Golf courses	Memorial parks	Government facilities	Universities and colleges	Schools		Churches	Single-family dwellings	Total
					Public	Other			
Number	24	9	NA	7	156	131	678	82,436	
Total acres	3,257	734	6,550	1,028	1,800	-	-	6,000	19,369[a]
Acres in turfgrasses	2,895	693	3,160	512	1,100	80	678	4,800	13,918
Employees	325	99	305	61	22	-	-	-	812[a]
Maintenance budget	$3,076,000	$649,000	$1,937,300	$306,000	$184,000	$50,000	$859,100		
Annual labor	1,973,568	331,000	1,461,000	176,000	150,000	39,300	813,600		
Equipment inventory value	1,593,651	228,500	182,600	163,000	60,800	27,500	116,110		
Annual equipment repair and replacement	313,000	60,000	43,150	16,000	4,000	2,750	11,600		
Annual material cost	668,354	117,000	270,540	30,000	34,000	7,000	33,900		
Value "add-on" equipment	105,550	9,000	9,130	3,850	10,000	-	11,600		

[a]Minimum total due to unknown data for some categories.

It was estimated that 59 percent of the 174,653 housing units on Oahu were single-family dwellings, for a total of 103,045 single-family homes. It was estimated that only 80 percent of the single-family dwellings actually have lawns. The average size of the home lawn was further estimated to be 2500 square feet, making a total of 4800 acres in home lawns.

While no attempt was made to obtain data from homeowners on maintenance costs of their lawns, surveys from other states (1, 2, 3, 4, 5, 6, 7, 8, 9, 10) show that the single-family dwelling accounts for 60 to 75 percent of the total expenditures for turfgrass maintenance. There is no reason to believe that Hawaii would vary greatly from these figures.

Estimates concerning the size of the single-family segment of Oahu's turf industry are given in Table 7.

SUMMARY

Based on the limited data derived from this study, the turfgrass industry has made a sizable contribution to the economy of the Island of Oahu. Besides enhancing the environment through the establishment of parks, golf courses, athletic fields, and greenbelts for the enjoyment of its population, the industry has provided opportunities for employment and a market for services, equipment, and materials.

It was not possible to include all segments of the industry in this survey. The area in turfgrasses in the landscape of such facilities as hotels, hospitals, banks, condominiums, apartments, consulates, airports, industrial sites, and office buildings remains an unknown factor. Collectively, these areas may well represent a large acreage of turfgrasses with additional economic weight in terms of labor and maintenance budgets. The data that were tabulated, however, show that, compared to the 32.7 thousand acres of sugarcane and 15.5 thousand acres of pineapple, the 13.9 thousand acres of maintained turfgrasses on Oahu should be considered a sizable and economically important part of the agricultural industry of this State.

The data for all segments of the turfgrass industry are summarized in Table 8. Problem areas of greatest concern of the different segments of the turfgrass industry are given in Table 9.

Table 9. Areas of greatest concern ranked by selected segments of the turfgrass industry[a]

Areas of concern	Golf courses	Memorial parks	Government facilities	Universities and colleges	Schools
Weeds	1	1	3	4	1
Insects and pests		2			
Disease		5			
Fertility		3			2
Irrigation	3	4	1	3	3
Drainage	2		4		
Thatch	4	3	5		
Compaction	5				
Labor	2	3	2	1	4
Vandalism					
Traffic				5	
Trash and debris					
Employee training					
Absenteeism					5
Turf damage					
Other (specify)				Landscape design 2	

[a]Ranked from 1 (greatest) to 5 (least). Areas of equal concern were ranked with same numerical designation.

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Departmental Paper 41—October 1976 (2M)