If you wish a complete copy of the report from which the following is condensed, please contact Dr. A.W. Hodges, Gainesville, FL 32611-0240; (352) 392-1881 x 312.

CONTRIBUTION OF THE TURFGRASS INDUSTRY TO FLORIDA'S ECONOMY, 1991–92: A VALUE-ADDED APPROACH

(Condensed by J.J. Haydu and L.N. Satterthwaite)

by

A.W. Hodges, J.J. Haydu, P.J. van Blokland and A.P.Bell

University of Florida
Institute of Food and Agricultural Sciences
Food & Resource Economics Department

December 1994

Table of Contents

Abstract 1

Introduction 1
The Economic Organization of the Florida Turfgrass Industry 1
Objectives and Organization of the Florida Turfgrass Survey 2
Turfgrass Acreage 3
Turfgrass Varieties Used 5
Employment in Florida's Turfgrass Industry 5
Water Used for Turfgrass Irrigation 6
Irrigation Water Sources 7
Cash Expenses for Turfgrass Products and Services 7
Itemized Cash Expenses for Turfgrass Products and Services 9
Sales of Turfgrass Products and Services 9
Itemized Sales of Turfgrass Products and Services 11
Turfgrass-Related Non-Land Assets 11
Value-Added by the Florida Turfgrass Industry 12

Literature Cited 13

List of Figures and Tables

Figure 1. Organization of Florida's turfgrass industry 2

Table 1. Organization of the Florida turfgrass industry survey sectors and their economic roles 4
Table 2. Turfgrass area used and maintained in Florida, 1991–92 4
Table 3. Employment in Florida's turfgrass industry, 1991–92 6
Table 4. Water consumption for irrigation in Florida's turfgrass industry, 1991–92 7
Table 5. Cash expenses in Florida's turfgrass industry, 1991–92, by industry sector and by expense category 8
Table 6. Itemized cash expenses for Florida's turfgrass industry, 1991–92 10
Table 7. Sales of products and services in Florida's turfgrass industry, 1991–92 11
Table 8. Non-land assets in Florida's turfgrass industry, year end 1991–92 12
Table 9. Value-added by Florida's turfgrass industry, 1991–92 13

Abstract

The contribution of the turfgrass industry to Florida's economy in the 1991–92 fiscal year was evaluated by means of a comprehensive statewide survey undertaken during 1993 and 1994. The survey was designed to separately estimate the impacts of eight different sectors of the industry: sod producers, turf-product manufacturers, wholesale/retail distributors, service vendors, commercial institutional turf product users, non-profit institutional users, golf courses and homeowners. Completed mailed questionnaires were received from 916 respondents in the first seven sectors, and 629 households were interviewed by telephone.

The total turfgrass area used and maintained in Florida in 1991–92 was about 4.4 million acres, with 75 percent of this area in the residential (household) sector. Turfgrass industry employment was 185 thousand full-time and part-time workers, or 130 thousand full-time equivalents. Water used for turfgrass irrigation in the commercial sectors was about 1.8 billion gallons per day, with 58 percent from groundwater sources. Consumers spent $5 billion on turfgrass maintenance, or about $1,200 per acre. Sales of turfgrass products and services by producers and commercial distributors totaled $6.5 billion, with $2.1 billion in cash expenses for purchased items. Turf-related assets in equipment, irrigation installations and buildings, but not land, had a book value of $8.6 billion, including $3.0 billion non-land assets purchased during 1991–92. Value-added to Florida's economy in 1991–92 by all sectors of the turfgrass industry totaled $7.3 billion, with golf courses contributing 35 percent and service vendors and households contributing 21 percent each.

Introduction

The Economic Organization of the Florida Turfgrass Industry

Cultivated turfgrass is a pervasive feature of the urban landscape in Florida and many other developed regions of the world. It is preferred as a vegetative groundcover to reduce erosion, absorb pollutants, dampen noise, and to provide a comfortable, durable, and aesthetically pleasing surface for outdoor activities. In Florida, a very large industry has rapidly evolved to produce and deliver turfgrass products and services. This industry contributes to Florida's economy in terms of employment, cash spent on inputs, sales and the value-added created by its economic activities.

Economic activity in the turfgrass industry may be broadly grouped into three categories: 1) supply of turfgrass products; 2) service activities related to the supply of turfgrass products; and 3) consumption of turf products and services. The supply of turfgrass products includes not only sod but also the many goods necessary for production and maintenance of turfgrass, such as chemicals, fertilizer and mowing equipment. Turfgrass service activities include installation and ongoing maintenance of turfgrass areas. Consumption of turfgrass products and services may be subdivided as (a) commercial turf-based activities, such as golf courses or athletic fields, and (b) non-commercial uses, such as home lawns.

Figure 1 illustrates the structure of the turfgrass industry and the flow of goods and services among the various sectors of the industry.

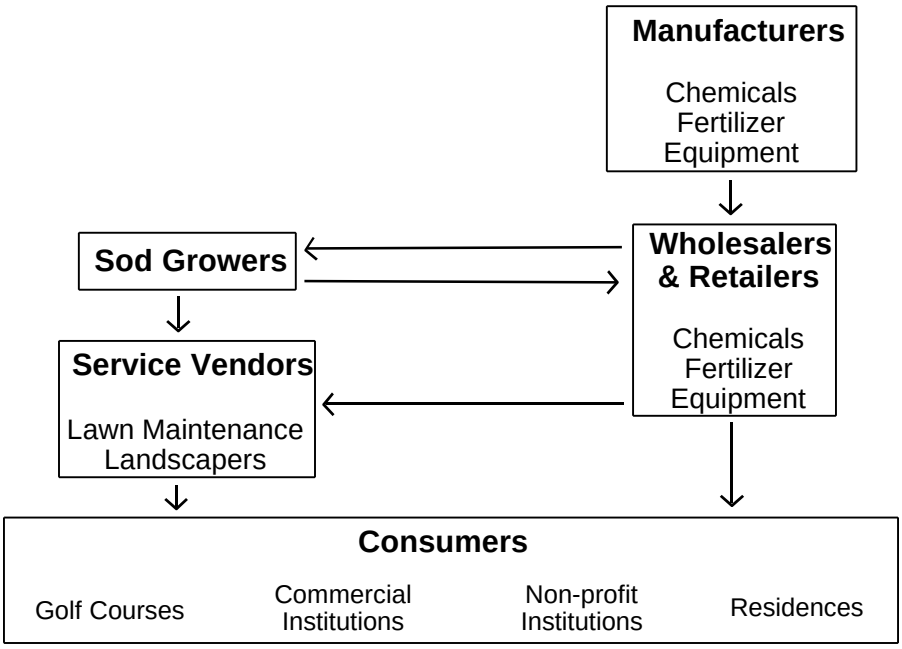

Figure 1. Organization of Florida's turfgrass industry.

Central to the industry are sod growers who produce the product that is directly or indirectly used by the rest of the industry. Manufacturers of turf equipment, fertilizers and chemicals hold a similar economic role as primary producers. Wholesalers, retailers, and service vendors purchase and resell sod and other turfgrass products together with their services to consumers. These market intermediaries provide services — including transportation, packaging, installation, and product use information — to customers. In addition, lawn maintenance vendors provide complete lawn care services, such as mowing, irrigation and fertilizing. Each of these activities adds value to turfgrass products for final consumers.

The turfgrass industry is primarily a locally based industry: most goods and services are produced and consumed within the state, and very little is exported to other regions. Consequently, the vast majority of value-added services occurs within the state and benefits the local workers. This stands in contrast with many other industries that ship raw materials or relatively unrefined products to other regions for further value-added processing. In this case, the exporting region loses a large share of value-added activities and the jobs that these activities support.

Objectives and Organization of the Florida Turfgrass Survey

The basic objective of this project was to evaluate the annual economic contribution of the turfgrass industry to Florida's economy. To accomplish this objective, survey information was obtained on the turfgrass area maintained, maintenance expenses, product and service sales, turfgrass-related non-land assets, and resources used for

irrigation and fertilization. A second objective of this study was to more generally characterize the nature of Florida's turfgrass industry — in terms of varieties of turfgrass used, itemized product expenses and sales, market distribution channels, maintenance practices, and problems experienced by turf users — for use by industry professionals.

The survey was organized around the concept of value-added, i.e. the increase in value of products due to addition of labor and other services as they move from producers to consumers through market intermediaries. Based upon the value-added concept and previous studies in Florida and other states, eight major sectors of the turfgrass industry were identified for surveying. Table 1 lists these major sectors and their constituent sub-sectors along with their economic roles in the industry. Sod farms (sector 1) and manufacturers of turf-related goods (sector 2) were considered primary producers. Manufacturers consisted of sporting goods makers; lawn, garden and farm equipment producers; and fertilizer and chemical manufacturers. Turf product wholesalers and retailers (sector 3) are market intermediaries consisting of sporting goods stores, retail nurseries, farm supply businesses, and garden stores. Turf service vendors (sector 4), including landscape and lawn maintenance firms, are both service producers and market intermediaries of turf-related products. Commercial businesses (sector 5), non-profit institutions (sector 6), golf courses (sector 7), and households (sector 8) are all consumers of turf products and services. Commercial institutions include apartments/condominiums; cemeteries; airports; hotels and motels; trailer parks and campgrounds; museums, gardens and zoos; hospitals and nursing homes; and sports clubs, race tracks and amusement parks. Non-profit institutions include schools, prisons, parks, and government buildings and grounds. Highway roadsides maintained by government were sometimes reported as a separate category to emphasize their importance. Public and private golf courses were classified as a separate category of consumer because of their prominent role in the industry as a provider of high-valued turf-based services.

Turfgrass Acreage

The total area of turfgrass maintained in Florida during 1991–92 was estimated at 4.4 million acres (Table 2). Single family homes comprised the largest share of maintained turf with 3.3 million acres, 75 percent of the total. Non-profit institutions were the largest user group with 336 thousand acres (8%), including 167 thousand acres for local governments and 113 thousand acres for elementary and secondary schools. Highways represented the second largest user group with 329 thousand acres of maintained turf in the state. Commercial institutions had a total of 203 thousand acres, representing 5 percent of the total area. This group embodied a wide array of institutions but, within this group, only airports had more than 1 percent of the total acreage. Golf courses accounted for 131 thousand acres of turfgrass, 3 percent, and sod farms produced and maintained 46 thousand acres. Service vendors cared for 1.1 million acres of turfgrass, 24 percent of the total industry acreage. Lawn and garden service vendors cared for about 1 million acres of turfgrass, which was reported under consumer sectors.

Table 1. Organization of the Florida turfgrass industry survey sectors and their economic roles.

	Industry Sector	Functional Economic Role
1	**Sod farms**	primary producer
2	**Turf product manufacturers:** fertilizers/chemicals, lawn & garden equipment	primary producer
3	**Turf product wholesalers and retailers:** farm supply vendors, garden centers, retail nurseries, sporting goods shops	market intermediary
4	**Turf service vendors:** landscapers, lawn service firms, building maintenance firms, specialty construction contractors	service producer and market intermediary
5	**Commercial institutions:** hotels/motels, cemeteries, apartments/condominiums, hospitals, airports, race tracks/ stadiums, medical facilities, botanical/ zoological gardens, museums/galleries	consumer
6	**Non-profit institutions:** religious organizations, schools & colleges, correctional facilities, government building complexes, highway roadsides	consumer
7	**Golf courses:** private, public	consumer and producer of commercial turf-based activity
8	**Households:** single family dwellings	consumer

Table 2. Turfgrass area used and maintained in Florida, 1991–92.

Sector	Thousands of Acres	Percent of Total
Sod Farms	46.1	1.0
Service Vendors	1,065.4	24.3
Golf Courses	131.3	3.0
Commercial Institutions	202.5	4.6
Non-Profit Institutions	336.2	7.7
Highways	329.1	7.5
Residential	3,306.6	75.3
Total	4,391.0*	100%

* Total does not include area managed by landscapers and lawn and garden services for final consumers.

Turfgrass Varieties Used

Five turfgrass varieties were used by survey respondents. St. Augustinegrass and bahiagrass were the dominant varieties reported. Some 1.5 million acres of St. Augustine were maintained in 1991–92, representing 36 percent of total acreage. As a warm season grass, St. Augustine is well-adapted to all parts of Florida and is favored for high-quality turf. Bahiagrass accounted for 19 percent of total turfgrass area, 751 thousand acres, and is favored for its pest and drought resistance. Mixed grasses accounted for 543 thousand acres or 14 percent of total area. Bermudagrass was maintained on 382 thousand acres (10%), Centipedegrass occurred on 280 thousand acres (7%), and Zoysiagrass was on 59 thousand acres (1%). Two final categories, "other" and "unknown" accounted for the remaining 13 percent of turfgrass acreage in Florida.

Employment in Florida's Turfgrass Industry

Employment is a vital indicator of an industry's contribution to a local, regional or national economy. Wages stimulate an economy when they are spent locally in the purchase of other goods and services. In 1991–92, Florida's turfgrass industry employed a total of 186 thousand workers, including 135 thousand full-time and 51 thousand part-time workers (Table 3).

Full-time equivalent employees (FTEs) is a standardized measure of employment, with one FTE representing 2080 hours, or 52 weeks at 40 hours per week worked annually. Using this definition and the reported total employee weeks worked, Florida's commercial turfgrass industry employed 130 thousand FTEs in 1991–92. Put in perspective, turfgrass-industry employment was about two-thirds of the employment in construction and nearly three times the number of workers employed in agriculture in the state (1993 Fla. Stat. Abstract).

Turfgrass-industry employment was dominated by service vendors, commercial institutions and non-profit institutions. Commercial institutions employed 43 thousand FTE workers for turfgrass maintenance, representing 33 percent of the industry total. Within this group, apartments/condominiums, hotels/motels and nonresidential buildings accounted for a substantial share of total employment. Service vendors had 39 thousand FTE employees, representing nearly one-third (30%) of all workers employed in the industry, with lawn care firms alone accounting for 20 percent. Non-profit institutions employed over 18 thousand FTE workers, a 14-percent share of total employment, with schools and colleges/universities representing over half of the turf care personnel in this group.

Golf courses employed 17 thousand full-time and part-time workers, 13.3 thousand FTEs, representing 10 percent of employment in Florida's turfgrass industry. Because golf courses require high maintenance, this group had a very high number of employees per acre.

Employment in the remaining intermediate-demand sectors of sod farms, manufacturers and wholesale/retail establishments accounted for 16.9 thousand FTEs, or about 13 percent of the total. Wholesale and retail establishments employed 13 thousand FTE workers for their turfgrass market business. Sod farms employed 2.9 thousand FTEs, 2 percent of the industry total. Manufacturers accounted for less than one percent of industry employment with a total of 1200 FTEs.

Table 3. Employment in Florida's turfgrass industry, 1991–92.

	Number of Employees			FTEs Annually	
Sector	Full-time	Part-time	All	Number	Percent of Total
Sod Farms	2,795	334	3,130	2,894	2.2
Manufacturers	1,236	41	1,277	1,208	0.9
Wholesale/Retail	15,119	1,860	16,979	12,769	9.8
Service Vendors	39,803	9,581	49,383	38,928	29.9
Golf Courses	14,663	1,820	16,484	13,409	10.3
Commercial Institutions	43,352	25,973	69,324	42,707	32.8
Non-Profit Institutions	17,853	10,916	28,769	18,362	14.1
Total	134,822	50,524	185,345	130,275	100%

Water Used for Turfgrass Irrigation

Florida has one of the nation's fastest growing populations with a net inflow of nearly 1,000 people a day (1993 Fla. Stat. Abstract). As urban populations swell, pressures on limited supplies of clean water increase. Water use is currently, and will remain, a defining issue for the state. Water will partly determine growth rates of urban centers as well as the types and sizes of both agricultural and non-agricultural enterprises. Allocation of water resources (i.e., who gains and who loses) will, in part, be determined by the economic contribution of each competing industry. Turfgrass is a significant consumer of water in Florida, but the turfgrass industry is also a major economic contributor.

Water consumed for turfgrass irrigation by Florida's sod farms, golf courses, and commercial and non-profit institutions was estimated from the irrigated acreage, depth of irrigation, and irrigation frequency. The total water used by these sectors was estimated at 1.75 billion gallons per day (Table 4). Non-profit institutions dominated water consumption for turfgrass irrigation with 58 percent of the total. Golf courses and commercial institutions each consumed about 20 percent and sod farms consumed about 2 percent of total water used. Golf courses and non-profit institutions were the most intensive users of water, with 2.6 and 3.0 million gallons per day per 1000 acres of turfgrass (Table 4).

Service vendors and wholesale/retail establishments were not included in this assessment because they were not final consumers of water for turfgrass irrigation. Survey information on water use was not available for households.

Table 4. Water consumption for irrigation in Florida's turfgrass industry, 1991–92.

Sector	Water Used (Million Gallons Per Day)	Percent of Total	MGD Per 1000 Acres
Sod Farms	37	2	0.8
Golf Courses	345	20	2.6
Commercial Institutions	356	20	1.8
Non-Profit Institutions	1,016	58	3.0
Total	1,754	100%	

Irrigation Water Sources

Four sources of water were used for turfgrass irrigation in Florida: groundwater wells, surface water bodies (lakes, rivers), municipal potable water supplies, and recycled municipal wastewater. Over half (58%) of all the water used came from groundwater wells. Recycled and surface water were the second most important sources at 15 and 17 percent, respectively. Municipal water represented 10 percent of total consumption. An unknown share of municipally-supplied water was also withdrawn from groundwater wells.

Cash Expenses for Turfgrass Products and Services

Cash expenses for turfgrass products and services by sector and by major expense category are presented in Table 5. In 1991–92, an estimated $7.25 billion was spent for production, distribution and use of turfgrass products and services in Florida. Some $5.1 billion (65%) of the total cash expenses was accounted for by final users (sectors 5-8) and $2.2 billion (35%) by the commercial intermediary sectors (sectors 1-4).

These cash expenses were made up of materials, equipment, labor, services and other direct costs. Expenses for materials including sod, seed, chemicals, and fertilizers were $1.5 billion or 21 percent of total expenses. Equipment accounted for $1.6 billion or 22 percent of total expenses. Employee labor was $1.4 billion (19%) and professional services, principally for lawn care, totaled $2.0 billion (28%). Other direct costs that could not be itemized accounted for $974 million (10%). These cash expenses do not include taxes, debt service, or depreciation.

Put in perspective, the total cash expenses by sectors five through eight ($5.1 billion) is equivalent to every working person in Florida (5.3 million) spending $955 annually, or each person in the state (13 million) spending $390.

Residential households (single family homes) were the dominant group, spending $3.9 billion on turfgrass maintenance, representing 78 percent of the total $5.1 billion cash expenses by final users in Florida. Commercial institutions spent $448 million, 9 percent of the total. A large share of expenses for this group came from hotels and motels ($155 million) and nonresidential buildings ($110 million). Golf courses accounted for $470 million or 9 percent of the total. Non-profit institutions had expenses of $309 million, mainly from schools and local governments.

For intermediate demand (sectors 1-4), wholesale/retail establishments had cash expenses amounting to $1.12 billion. Within this group, the "lawn/garden equipment" classification represented $908 million. Service vendors had total cash expenses of $855 million, with the largest share from "lawn and garden services" ($595 million). Sod producers spent $94 million, or $2,000 per acre of sod produced. Finally, manufacturers spent $7 million for production of goods sold to the turfgrass market, with nearly all of it in chemicals and fertilizers.

Cash expenses per acre are an indicator of turfgrass maintenance intensity (Table 5). Across all user groups, lawn care expenses averaged about $1,600 per acre in 1991–92. Homeowners spent an average of $1,189 per acre on their lawns while golf courses spent $3,600 per acre. Costs per acre were also very high for landscape services ($5,300), nonresidential buildings ($5,300) and hotels ($4,100). Maintenance expenses per acre were lowest for highway roadside maintenance ($27), airports ($401) and trailer parks/campsites ($386).

Expenses for lawn maintenance are probably higher in Florida than in other states because of the sub-tropical climate, especially in southern Florida where about two-thirds of the state's population resides. In most parts of Florida, turfgrass must be maintained throughout the year, rather than only part of the year as in northern states.

Table 5. Cash expenses in Florida's turfgrass industry, 1991–92, by industry sector and by expense category.

	Sector	Total Cash Expenses (mill. $)	Total Expenses Per Acre (thous.$)	Expenses by Major Category (million $)				
				Materials[1]	Equipment	Labor	Services	Other
1	Sod Farms	93.6	2,031	14.3	13.9	38.1	6.2	21.1
2	Manufacturers	7.3	NA	3.7	0.0	0.1	1.0	2.5
3	Wholesale/Retail	1,124.2	NA	75.7	881.8	92.8	6.8	67.2
4	Service Vendors	854.5	802	91.6	101.3	503.4	33.1	125.1
5	Commercial Institutions	447.7	2,211	46.6	31.7	264.3	97.3	7.9
6	Non-Profit Institutions	308.9	919	26.2	25.7	234.7	20.7	1.6
6a	Highways	8.8	27	1.1	3.2	4.5	0.0	0.0
7	Golf Courses	469.7	3,577	94.0	57.9	271.3	17.6	28.9
8	Residential (single family household)	3,932.6	1,189	1,134.6	479.8	0.0	1,820.5	497.6
	Total (avg)	7,247	1,647	1,488	1,595	1,409	2,003	752

[1] Materials includes sod/seed, fertilizer, soil amendments, and chemicals.

Itemized Cash Expenses for Turfgrass Products and Services

Cash expense items for turfgrass products and services by final consumers (sectors 5-8) and by market intermediaries (sectors 1-4) are detailed in Table 6. In economic terms, the final consumer sectors represent final demand for turfgrass products, while the intermediary sectors represent intermediate demand for the same products. Turfgrass plugs, sprigs, or seeds was the largest material item at $1.0 billion, with $938 million of it spent by final consumers. Fertilizers also represented a substantial share of expenses on materials at $230 million. Chemical products including pesticides, herbicides, fungicides, and growth retardants comprised expenses of $240 million, approximately evenly split between final and intermediate demand. Compost and soil amendments were rather small items at about $4 million.

Equipment expenses by final consumers were fuel, repairs, and rentals (Table 6). The other equipment items were considered capital investments by final consumers, thus they were reported under "Assets" (see following section). For the intermediate demand sectors, purchases of mowers ($407 million) and irrigation equipment ($333 million) were the largest equipment expense items. Fuel and repairs were also significant equipment operating expense items ($285 and $379 million, respectively) for turf growers and service vendors.

The $1.41 billion spent on labor was broken-down into employees' wages ($1.06 billion), and salaries for supervisors ($275 million) and clerical/sales employees ($71 million).

Expenses for professional services, defined as work performed by agents other than employees of the company or household itself, totaled $2.0 billion, which was the largest single category. Lawn care services consisted of chemical and fertilizer applications, irrigation installation, contract labor, and transportation. Contract labor accounted for $1.54 billion or three-quarters of total service costs — with all but $9 million paid by final consumers. Installing irrigation systems was the second most expensive service ($303 million) followed by chemical fertilizer application ($154 million).

Sales of Turfgrass Products and Services

Sales of turf products and services were estimated for the five turfgrass industry sectors that actually sell turf products and services: sod farms, manufacturers, wholesalers/retailers, service vendors, and golf courses. Total sales for these sectors in the 1991–92 fiscal year amounted to $6.8 billion (Table 7). In comparison, during this same time period, Florida farm cash receipts were around $6.3 billion, including citrus, which generated $1.7 billion. Another comparison giving some idea of the size of the whole turfgrass industry is that net sales taxes paid in Florida in 1991 were $8.2 billion, and Florida's department stores sold $7.5 billion of merchandise in 1991 (1993 Fla. Stat. Abstract).

The biggest contributor to turfgrass industry sales was the golf sector, with $3.0 billion. Service vendors were the next largest group, with sales of $1.86 billion, largely for "lawn and garden services". The wholesale/retail sector had sales totaling $1.65 billion, mainly for lawn/garden and sporting equipment wholesalers. Sod farms and manufacturers had relatively small sales by comparison, amounting to $161 million and $83 million, respectively.

Table 6. Itemized cash expenses for Florida's turfgrass industry, 1991–92.

Expense Category/Item	Final User Expense	Intermediary Sector Expense	Total All Sectors
	Millions Dollars		
Materials	1,151.0	336.6	1,487.6
Plugs/Sprigs/Seed	937.8	74.8	1,012.6
Herbicides	38.8	51.2	90.0
Fungicides	21.1	21.8	42.9
Other Pesticides	52.6	50.4	103.0
Growth Retardants	2.8	1.4	4.2
Fertilizer	95.9	134.7	230.6
Compost/Soil Amendments	1.9	2.3	4.2
Equipment	602.8	992.5	1,595.4
Fuel	239.7	45.4	285.1
Repairs	331.8	47.2	379.0
Rentals	31.3	9.2	40.5
Tractors*	NA	48.4	48.4
Mowers*	NA	406.5	406.5
Irrigation Equipment*	NA	333.0	333.0
Sports Equipment*	NA	12.8	12.8
Other Equipment*	NA	90.2	90.2
Labor	798.5	610.8	1,409.2
Wages	611.0	452.5	1,063.5
Supervisor salaries	164.9	109.8	274.6
Clerical/Sales salaries	22.6	48.5	71.1
Services	1,960.5	42.7	2,003.3
Chemical/Fertilizer Application	131.6	22.4	154.0
Irrigation Installation	294.1	9.1	303.2
Contract Labor	1,534.8	9.7	1,544.5
Transportation*	NA	1.6	1.6
Other	548.2	203.7	751.9
Total All Items	5,061.0	2,186.4	7,247.4

* item applicable only to expenses for commercial intermediate demand sectors

Table 7. Sales of products and services in Florida's turfgrass industry, 1991–92.

	Sales (Millions Dollars)	Percent of Total
Sod Farms	161	2
Manufacturers	83	1
Fertilizer & Chemical Manufacturing	46	1
Turf & Grounds Equipment Manufacturing	37	1
Wholesale/Retail	1,647	24
Lawn/Garden Machinery/Equipment Wholesale Trade	1,175	17
Fertilizers & Agricultural Chemicals Wholesale Trade	145	2
Lawn & Garden Equipment Retail	187	3
Retail Sporting Goods Shops	141	2
Service Vendors	1,856	28
Landscape Services	148	2
Lawn and Garden Services	1,574	23
Athletic & Recreational Facilities Construction	73	1
Building Maintenance Services	60	1
Golf Courses	3,006	45
Public golf courses	1,745	26
Private golf courses	1,261	19
Total	6,753	100%

Itemized Sales of Turfgrass Products and Services

An “other” products and services category comprised the largest single sales value at $2.9 billion. Golf play was the second largest with $2.03 billion, 30 percent of total sales. Irrigation equipment was a major item with $1.2 billion in sales, emphasizing the importance of water to this industry. Mowers had total sales of $1.0 billion. Other notable sales items were sod ($338 million), fertilizer ($243 million), and "other equipment" ($486 million), which together made up 16 percent of total sales. Herbicides, fungicides, and other pesticides together comprised $84 million, representing only 1 percent of total sales.

Turfgrass-Related Non-Land Assets

The assets used for turfgrass maintenance or turf market business activities were reported by survey respondents as depreciated ("book") values for the year ending in 1991–92, and the market value (cost) of assets purchased during this year. Total assets for all industry sectors amounted to $8.56 billion, including $3.2 billion (38%) in equipment, $2.5 billion (29%) in irrigation installations, and $2.9 billion (34%) in buildings used for turf maintenance (Table 8). The residential household sector had assets valued at $3.0 billion, representing 35 percent of the industry total. Wholesale/retail establishments had assets valued at $2.0 billion or 24 percent. Golf courses, service vendors, and commercial institutions each had assets of $800 million to $1 billion, representing about 10 percent of total turfgrass-related assets. Assets were not divided into categories for the household, manufacturer, or wholesale/retail sectors.

Golf courses had the highest level of assets invested per unit area — over $8,000 per

acre for all courses and over $11,000 per acre for private courses (Table 8). Sod farms and many commercial institutional sectors also had turfgrass-related investments amounting to several thousand dollars per acre.

Table 8. Non-land assets in Florida's turfgrass industry, year end 1991–92.

	Total Assets (mill.$)	Assets Per Acre ($)	Assets by Category (millions $)			Assets Purchased 1991–92 (mill.$)
			Equipment	Irrigation	Buildings	
Sod Farms	87	1,889	53	21	13	5
Manufacturers	110	NA	NA	NA	NA	6
Wholesale/Retail	2,045	NA	NA	NA	NA	1,243
Service Vendors	885	831	477.6	90.7	316.6	92
Commercial Institutions	922	4,556	257.7	345.3	319.4	199
Non-Profit Institutions	426	1,267	155.2	176.8	94.1	40
Golf Courses	1,068	8,130	356.7	305.1	405.8	110
Residential (single family household)	3,013	911	NA	NA	NA	1,266
Total (avg)	8,555	$1,944	3,223	2,450	2,883	2,962

Value-Added by the Florida Turfgrass Industry

A value-added methodology was used as a summary measure of the economic impact of Florida's diverse turfgrass industry. The value-added in each successive stage of marketing turfgrass products and services is broadly calculated as the difference between the value of sales and the cost of inputs from suppliers. The total value-added for the industry is simply the sum of value-added for all sectors.

Value-added was calculated differently for the commercial business and final consumer sectors of the turfgrass industry. For commercial businesses (sod farms, manufacturers, wholesale/retail establishments, turfgrass service vendors and golf courses), value-added was calculated as total sales plus depreciation minus cash expenses for material goods and outside services. Expenses for employees were not deducted because labor is an essential part of value-added. For the consumer sectors (institutions and households), value-added was calculated as labor expense plus depreciation. In the case of the residential sector, unpaid household labor was valued at two-thirds of the average expense for professional services. Annual depreciation was calculated as a percentage of current asset values.

The total value-added by the turfgrass industry was estimated at $7.4 billion (Table 9). Golf courses accounted for $2.6 billion (36% of total value-added). Service vendors and single family residences each accounted for $1.5 billion (20%) in value-added. The wholesale/retail sector also contributed significantly, with $819 million in value-added (11%). Commercial and non-profit institutions contributed 5 percent and 4 percent, respectively. Sod farms and manufacturer sectors together contributed about 3 percent of the total value-added by the industry.

On a per acre basis, golf courses contributed an average of over $20,000 in value-added. Sod farms, service vendors, and commercial institutions also had a high value-added per acre (over $1000) while residential households, non-profit institutions and highways had relatively low values (Table 9). Landscape service vendors, a sub-sector

of service vendors, averaged nearly $5000 per acre in value-added.

Table 9. Value-added by Florida's turfgrass industry, 1991–92.

	Sector	Value-Added (Millions Dollars)	Percent of Total (%)	Value-Added Per Acre ($)
1	Sod Farms	118.0	1.6	2,561
2	Manufacturers	86.6	1.2	NA
3	Wholesale/Retail	819.1	11.1	NA
4	Service Vendors	1,521.9	20.6	1,429
5	Commercial Institutions	382.6	5.2	1,890
6	Non-Profit Institutions	297.0	4.0	883
6a	Highways	4.5	0.1	14
7	Golf Courses	2,915.2	35.8	20,126
8	Residential (single family households)	1,502.8	20.4	454
	Total (avg)	7,375.1	100%	1,676

Literature Cited

1993 Florida Statistical Abstract. 1993. 27th edition. Anne Shermyen, ed. University of Florida, College of Business Admin., Bureau of Economic and Business Research.

Barkley, David W. and L. Simmons. 1989. *Contribution of the Golf Industry to the Arizona Economy*. Technical Bulletin 263, Dept. of Agr. Econ., University of Arizona, Tucson.

Cisar, J.L. and J.J. Haydu. 1991. Adjustments in Market Channels and Labor in the Florida Sod Industry. *Journal of Agribusiness*, Fall 1991, 33-40.

Evans, W.C., Gregory P. Truckor, and David P. Knopf. 1990. *Pennsylvania Turfgrass Survey, 1989*. Pennsylvania Agricultural Statistics Service, Penn. Dept. of Agric., Harrisburg.

Florida Department of Agriculture and Consumer Services. 1976. *Florida Turfgrass Survey, 1974*. Division of Marketing, Crop and Livestock Reporting Service, Orlando, Fl.

Haydu, John J. and J.L. Cisar. 1992. *An Economic and Agronomic Profile of Florida's Turfgrass Sod Industry*. Economics Report ER92-1, Food & Resource Economics Department, Florida Ag. Expt. Sta., University of Florida.

Haydu, John J. and J.L. Cisar. 1990. Structural Changes in Florida's Cut Sod Industry. *Journal of Farm Managers and Rural Appraisers*, 54(2): 56-61.

Haydu, John J. and J.L. Cisar. 1993. Sod Production in Florida in 1990. *Journal of International Turfgrass Research*, 7(1):857-863.

Indyk, H., D. Rossi and P. Dhillon. 1983. *Economic Value of the New Jersey Turfgrass Industry--Summary Report*. New Jersey Cooperative Extension System, Rutgers University, New Jersey.

Oklahoma State University. 1979. *1978 Oklahoma Turfgrass Survey*. Agric. Exp. Station Bulletin MP-105.

Morley, Michael F. 1978. *The Value-Added Statement: A Review of its use in Corporate Reports.* Gee & Co., London.

Smith, C.N. and R.H.Brewster. 1968. *An Economic Study of the Florida Cut Sod Industry*. Economics Report EC 69-3, Department of Agricultural Economics, Agr. Expt. Sta., University of Florida, Gainesville.

Sporleder, T.L., D.L. Snyder, W.E. Distad. 1990. *The 1989 Ohio Turfgrass Survey*. Department of Agricultural Economics, Ohio State University.

Stanton, B.F., J. Jinkins, M. Ahearn, and G. Hanson. 1992. Perspectives on Farm Size and Structure Provided by Value-Added Measures. Unpublished manuscript. USDA, Washington.