Arkansas Horticulture Industry

Economic Impact and Characteristics











UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE

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Report Highlights

Production Value (Cash Receipts):

- $88.2 million is the 2002 value of the state's horticulture production (all segments) which represents an increase of 17% since 1997.
- $30 million is the 2002 market value of vegetable production up 3% since 1997.
- $9.9 million is the 2002 market value of fruit, nut and berry production down 35% since 1997.
- $51.8 million is the 2002 market value of nursery and greenhouse crops.

Employment:

Economic Impact

- Horticultural firms were directly related to the employment of 19,640 employees in Arkansas in 2000.
- An additional 3,412 employees are employed by horticulture allied businesses.

Survey Responses

- Average employment levels for the responding firms were 5.2 (full time) and 7 (part-time) employees, respectively.
- 60% of the responding firms utilize seasonal or part-time labor.
- 30% of respondents listed only one full time employee.
- 79% of survey respondents indicate that they have fewer than 5 employees.
- 5% of the respondents have over 20 full-time employees.
- 19% of the horticulture production firms reported hiring migrant workers.
- 5% of horticulture production firms responding utilize the government worker program.

Sales and Service:

Economic Impact

- Horticulture industry's total economic impact is estimated at $1.93 billion.
- Horticulture industry creates $1.03 billion in value-added economic activity.

Survey Responses

- 45% of the respondents had sales between $5,000 and $50,000
- 15% of respondents had sales between $50,000 and $100,000
- 60% of the responding firms were sole proprietorships.
- All firms reported market growth of 18% over the 1995-2000 period.
- 33% of the golf courses are affiliated with a residential development/community.

Introduction

The horticulture industry is an important part of Arkansas agriculture and the state's economy. Horticulture is made up of diverse sectors of production, sales and service firms. The industry includes the agricultural businesses producing fruit, vegetable, nut, greenhouse, nursery, and turf products. In addition, the industry includes golf course management, garden centers, landscape installation/maintenance, arborists, florists, and landscape architects. The sector enhances the quality of life by providing abundant fresh and processed produce for consumption and income for the producers of goods and services. Also, there are aesthetic benefits that result from the utilization and display of ornamental goods and services.

Horticulture contributes to the economy not only through direct agricultural production and value-added processing but also through services provided to businesses and homeowners. In addition, the horticulture sector enhances the state's economy through its interactions with other sectors. By examining the industry's production, processing, and service components as well as the interactions with other sectors, this study examines the size and scope of industry, characteristics of the businesses within the industry, and the total economic impact of the industry on Arkansas' economy.

According to USDA's Economic Research Service (ERS) 2002 value of cash receipts, Arkansas' horticulture ***production*** industries had a value of ***$88.2 million***. This figure only represents the value of direct production and excludes the supply firm and value-added economic activity that exists as a direct result of the production. Horticulture businesses purchase goods and services from local businesses to create and deliver their final products to consumers. In addition, a number of businesses add value by processing horticultural products or utilize horticultural products to deliver services. These purchases and economic activity inject new money into regional economies and stimulate additional spending by local businesses and households. Including the inter-industry linkages, the industry's total economic contribution to the state is estimated at ***$1.9 billion***.

This report examines Arkansas' horticulture industry and estimates the economic contribution of the sector to the state's economy. The report is organized into three distinct components: 1) survey response: industry profile and summary, 2) analysis of horticulture secondary data, and 3) estimate of economic contribution through input-output modeling.

Section I. Horticulture Industry Survey

The survey examines all areas of horticulture including the production, sales, and service sectors of turf, ornamentals, fruits, vegetables, nut, and herbs. Seven different questionnaires were administered to producers and businesses that make up the industry. The types of questionnaires included 1) Vegetable/fruit production, 2) Vegetable/fruit processing and sales, 3) Turf production, 4) Golf course management, 5) Nursery/greenhouse production, 6) Ornamental sales & service, and 7) Landscape Architects.

Methodology

In the summer of 2002, a questionnaire was developed by the University of Arkansas Cooperative Extension Service (CES). The questionnaire focused on assessing the size and scope of the horticulture industry. The initial questionnaire was developed with the assistance of CES agriculture economists and horticulture faculty. Industry feedback was solicited from individual business owners and industry representatives to improve the questionnaire design. Once the questionnaire design was developed CES cooperated with Arkansas Agricultural Statistics Service to further refine the survey.

Attempts were made to include all commercial firms operating within the industry in the mailing database. General merchandise firms (e.g. Wal-Mart), government agencies and municipalities, educational institutions, and privately managed landscapes *were not* included in the database. These firms represent significant economic activity in terms of sales and employment devoted to landscape maintenance, but it was to difficult to accurately survey these businesses.

The survey was administered through Arkansas Agricultural Statistics Service and included an initial mailing, a second mail-out, and a telephone follow-up. In November of 2002, questionnaires were sent to 4,026 horticultural businesses operating in Arkansas. A second survey was mailed to 3,116 businesses in early December of 2002 to those firms who did not initially respond. Finally, in January 2003 telephone interviews were attempted for approximately 1,000 additional firms who still had not responded to the earlier mailings. Administering the survey resulted in 1,320 returned surveys (Table 1). This results in a total response rate of 33% for the survey.

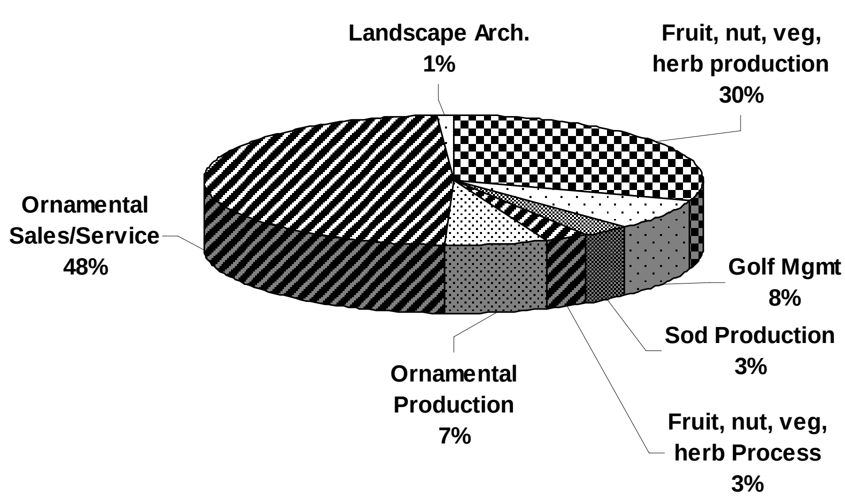
Table 1. Response Rates of CES Horticulture Survey.

Horticulture sector	Number of Firms Surveyed	Number of Returned Surveys	Number of Usable Surveys	Usable Response Rate (%)
Fruit, nut and vegetable producers	1,774	589	215	12
Fruit, nut and vegetable processors	79	43	19	24
Turf Producers	76	36	22	29
Golf Course Managers	251	65	54	22
Ornamental Producers	168	95	48	29
Ornamental Sales and Service	1,639	481	342	21
Landscape Architects	39	11	8	21
Totals	**4,026**	**1,320**	**708**	**18**

Analysis of the returned surveys resulted in 708 surveys with usable data (Table 1) which represents 18% of the surveyed firms. The turf and ornamental producers were the most responsive survey groups with 29% of the surveyed firms responding. The group with the lowest response rate was the fruit, nut and vegetable producers with only 12% of the queried group replying.

Figure 1 provides a break-down of the total usable responses by the different business types. The sales and service firms accounted for nearly half of the usable responses with the next largest segment being fruit, vegetable, nut, and herb production. This was expected because in terms of number of firms in the database, those two groups dwarf the remaining sectors (Table 1). The smallest number of usable responses came from the landscape architects sector.

Figure 1. Businesses Responding (%) to the CES Survey by the Different Horticulture Sectors.



Business and Ownership Characteristics

The horticulture business owners that responded were a very experienced group (see Appendix A). The average age of the respondents was 52 with a range from 21 to 87 years of age. These businesses have been operating for an average of 18 years. This figure points to significant business experience in terms of operating tenure, and over 25% of the firms have been operating over 25 years. It should be noted that approximately 40% of the firms have been in operation for 10 years or less.

Examining the different business structures utilized by firms revealed that sole proprietorship was the dominant form used by over 60% of the respondents (Table 2). One-fourth of the respondents used the corporate business structure making it the second most utilized business form. The finding that a majority of the producers utilize the sole proprietorship is not surprising since a majority of these operations are small scale operations relying on direct marketing strategies to distribute their products and services. The average response for firm gross sales was in the second income category ($51,000 - $99,999), so a majority of the responding firms' sales levels were relatively small.

Table 2[a]. Business Structure Utilized by Horticulture Businesses Responding to the CES Horticulture Survey.

Horticulture sector	Sole Prop. (%)	Partner. (%)	LLC (%)	Corp. (%)
Fruit, nut and vegetable producers	79	12	1	7
Fruit, nut and vegetable processors	32	11	11	47
Turf Producers	50	13	4	33
Golf Course Managers	25	6	6	63
Ornamental Producers	54	8	8	29
Ornamental Sales and Service	57	9	1	32
Landscape Architects	0	25	0	76
All Sectors	**60**	**10**	**2**	**28**

[a] Rows may not sum to 100 due to rounding.

In terms of employment, the firms reported average employment of 5.2 employees (1.6 part-time employees). A majority of the firms (79%) hired fewer than five employees (full-time) with ninety-one percent of all firms employing less than ten (full-time) employees. Because of the seasonal nature of this industry, one would expect the firms to rely heavily on seasonal employment to assist with peak production/service periods. Fifty-nine percent of the firms indicated utilizing seasonal employees, but most of these firms only hire a few employees with nearly three-fourths (72%) reporting hiring five or less part-time employees.

The owner/managers responding were primarily male (73%) and educated beyond high school with seventy percent reporting post-secondary training/education. Vocational technical training was the dominant form of education received by the respondents. In terms of reporting percentages, forty-one percent attended vo-tech schools while twenty-nine percent of the respondents completed college. The secondary training is not surprising given the technical expertise needed to manage these firms.

Marketing

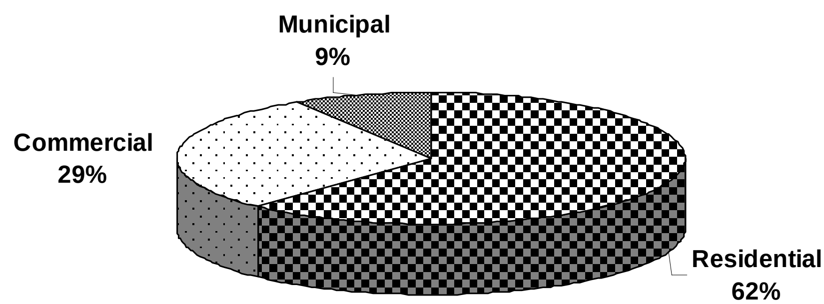
Because of the diverse products and services offered by the businesses in the industry, there were a number of marketing strategies utilized by the surveyed firms. In terms of the production[1] firms, the strategies included farmers' markets, internet, mail order, and wholesale sales. Twenty-eight percent of the responding firms indicated no wholesale sales activity. For those firms involved in wholesale sales, a majority of the firms (62%) reported directly negotiating their sales contracts, while some of the firms (10%) utilized brokers and sales agents in their marketing plans.

For the service and supply firms, the break-down of sales by customer type reveals some interesting results. Figure 2 details the proportions of sales to residential,

[1] Production firms include operations involved in the production of fruits, vegetables, nuts, herb, greenhouse and nursery products.

commercial and municipal customers. As the graph reveals, residential customers dominated the firm's sales volume with sixty-two percent of the sales[2] being derived from residential customers.

Figure 2. Sales[2] Volume Derived by Various Customer Types as Reported by CES Surveys.



For sales across all sectors, in-state customers dominated sales volume generating an average of eighty-seven percent of the responding firms' sales. In terms of out-of-state customers, the responses revealed significant economic activity. Thirty-eight percent of the responding firms reported sales of ten percent or less with an additionally, twenty-six percent of firms reporting out-of-state sales volume between 11-30 percent. These figures indicate a substantial amount of sales to out-of-state customers signaling strong export activity within the state's horticulture industry.

The surveys queried producers on their recent and projected market growth. The question examined their past growth over the last five years (1995-2000) and on their growth for their 2002 marketing year. The marketing growth responses are reported in

[2] This figure only represents sales from turf, ornamental producers, ornamental sales/service, and landscape architects.

Table 3 across the seven different surveyed sectors. The table reveals significant past and recent growth estimates by the responding firms. Across all surveyed sectors the firms estimated that their respective markets had grown an average of 18.5 percent between 1995 and the 2000 marketing year. These survey results suggest strong growth in all horticulture sectors. In terms of production firms, this result differs from USDA estimates. Based on ERS estimates of cash receipts, only the greenhouse nursery sector has experienced significant growth.

Table 3. Horticulture Firm's Average Market Growth Based on CES Horticulture Survey.

Horticulture sector	Marketing period	
	2002 (%)	1995-2000 (%)
Fruit, nut and vegetable producers	17	19
Fruit, nut and vegetable processors	12	16
Turf Producers	10	19
Golf Course Managers	9	11
Ornamental Producers	20	29
Ornamental Sales and Service	9	20
Landscape Architects	19	27

The ornamental industry is currently experiencing significant growth around the country. According to the most recent ERS report on the value of cash receipts, Arkansas' 2002 ornamental production valued at $51.8 million grew 51% since 1997. For the CES survey five-year period (1995-2000), the ornamental production sector reported the highest average market growth. Therefore the finding of growth rates being the highest within the ornamental sectors is similar to the growth estimates of USDA (production firms only).

Industry Perceptions of Challenges/Resources

The survey instrument queried producers on their perceptions of issues challenging the various sectors of the horticulture industry. Table 4[3] presents the responses to the industry challenges revealing the respondents perceptions across a number of issues. The table includes the number of firms responding along with the corresponding percentages.

Table 4. Perceptions of Issues Affecting Arkansas Horticulture Industry According to CES Surveyed Firms.

Issues		Percentage of Responses			
	# of Responses	Not Applic. (%)	Not Important (%)	Somewhat Important (%)	Important (%)
Marketing Information and Training	597	13	16	33	38
Government Regulations	598	15	18	36	31
Technical Training for Your Employees	598	29	22	29	20
Bus. Competition; Changing Market Structure	601	10	17	33	40
Labor Issues	611	19	18	25	39
Profit Margin	607	3	4	14	79
Water Issues	591	23	28	25	25
Equipment Issues	543	15	23	34	27
Bus. Management Training	594	13	28	33	26
Transportation Expenses*	258	16	21	28	35
Cost of inputs and Supplies*	317	3	5	24	68

* Issue was not asked on all of the seven different sector surveys.

[3] Category response percentages may not sum to 100 percent due to rounding. The table excludes responses from the landscape architects. For a detailed display of responses for each survey see the Appendix "B" reports.

Firm perceptions of business resources were also examined with the questionnaire. The respondents were asked to indicate the frequency which they utilized a variety of business resources (Table 5). As the table illustrates, the areas examined included both public and private resources.

Table 5. Perceptions of Business Resources Utilized by Arkansas Horticulture Industry According to CES Surveyed Firms.

		Percentage of Responses		
	# of Responses	**Never (%)**	**Some (%)**	**Regularly (%)**
Trade Publications	607	28	39	34
Industry Seminars	595	48	39	13
Internet Resources	594	37	42	21
Professional Associations	591	45	34	21
Professional Consultants	576	75	19	6
Peer Business Contacts	597	23	46	31
University of Arkansas	612	34	40	26

The table reveals that trade publications and peer business contacts were the resource utilized most by the responding firms. Three out of four surveyed firms indicated using these resources either regularly or some. Trade publications received the highest overall ranking for being used regularly with thirty-four percent responding.

It is interesting to note the high percentages reported by the responding firms under the "never utilized" column. It is not surprising that three-fourths of the reporting firms have never used a professional consultant, but it is interesting to see that almost half do not use either industry seminars or professional associations. Additionally, over one-third of the respondents reported never using university resources. This was especially interesting considering the magnitude of expertise and services that the university provides often at little or no cost.

Section II. Analysis of Secondary Data

This section analyzes secondary data from U. S. government agencies and a private data collecting firm. The purpose of this section is to provide information to further describe the size and scope of the businesses operating within the horticulture industry. Data sources utilized include reports from the Department of Agriculture, Bureau of the Census, Dept. of Commerce, Bureau of Economic Analysis, and data purchased from a private data collecting firm, InfoUSA, Inc. The report primarily examines employment and sales data for the industry. The industry is examined by its major categories including fruit, vegetable nut, herb, greenhouse, and nursery production; horticulture processing; and ornamental sales and services, golf course management and landscape architects.

Table 6. Number of Horticulture firms by sector and gross sales based on 2001 InfoUSA data.

Horticulture Sector	No. of Firms	Gross Sales (million $)
Turf production	55	24
Landscape architects	36	34
Fruit and vegetable production/ processing	145	1,142
Arborist	168	71
Florist	612	193
Garden center/retail	162	258#
Golf courses	243	175
Greenhouse production	46	55
Irrigation installation & maintenance	67	73
Landscape installation & maintenance	338	175
Nursery production	9	7
TOTAL	**1,881**	**2,207**

Sales estimate calculated to include garden purchases from mass merchants. Estimate based on data from National Gardening Association.

An analysis of secondary data reveals some interesting insights into Horticulture businesses in Arkansas. Based on 2001 data from InfoUSA (Table 6) gross sales for all

Horticulture industries are estimated at $2.2 billion. This includes production, sales, and service businesses. Growing and processing fruits, vegetables and nuts represents one-half of the total at $1.14 billion. The second largest sector based on sales is garden center sales estimated to be $258 million. This would include sales from independent garden centers, mass merchants (e.g. Wal-Mart) and home centers (e.g. Home Depot).

The number of firms in each sector varies depending on the secondary source used. The U.S. Census data (Tables 7, 8, 9) includes only data on service and sales businesses, whereas InfoUSA (Table 6) includes service, sales, and ***production*** business data. Both sources agree fairly well on the number of firms when considering landscape architecture and landscape service firms. The 2001 U.S. Census (Table 7) reports 286 garden centers and 34 landscape architecture firms while InfoUSA reports 338 and 36 (Table 6), respectively. In contrast, the two surveys do not agree well on the number of firms when dealing with garden centers, florists, and golf courses. For example, the 2001 U.S. Census indicates 286 garden centers while InfoUSA lists 162 firms.

In developing a mailing list for the CES Horticulture survey, a mailing list database was developed from various sources including telephone directories, trade association mailing lists, and government lists. The CES survey mailing list included 324 garden center/retail firms. The wide disparity in numbers between information sources may be explained by what is included in the lists. For example, InfoUSA may be low if it does not include garden centers affiliated with mass merchants (e.g. Wal-Mart) and home centers (e.g. Home Depot). A significant disparity in firm numbers was also found with golf courses. The number of golf courses reported by the 2001 U.S. Census, InfoUSA, and the CES Horticulture survey mailing list was 143, 243, and 262, respectively.

Table 7. Number of Arkansas Horticulture Business by Sectors (1999-2001).

Industry Sectors	1999	2001	Percent change (%)
Nursery and Garden Centers	279	286	3
Landscaping Services	327	378	16
Florists	323	311	-4
Fresh Fruit & Vegetable Wholesale	21	25	19
Fruit/Vegetable Preserving and Specialty Food Mfg.	22	21	-5
Frozen Fruit, Juice, and Vegetable Mfg.	3	2	-33
Fruit/Vegetable Canning, Pickling & drying	14	15	7
Fruit & vegetable Canning	9	9	0
Wineries	2	2	0
Fruit & Vegetable Markets	11	13	18
Landscape Architectural Services	43	34	-20
Flower Nursery Stock & Florists Supplies Wholesale	26	27	3
Golf Courses & Country Clubs	151	143	-5
Totals	**1,231**	**1,266**	**3**

Source: County Business Patterns (NAICS), U.S. Census.

Employment data from the U.S. Census (Table 8) shows the level of employment by the various sectors making up the horticulture industry. The table lists the fruit and vegetable manufacturing sector as the largest horticulture industry employer. According to the table, the landscape service sector is experiencing the most growth within the service and sales sectors of horticulture. Employment in landscaping services grew 38% from 1999 to 2001. This significant increase likely reflects the growing commercial and residential economies in Central and NW Arkansas. Overall, employment in the service and sales sectors of horticulture increased 3% from 1999 to 2001.

Table 8. Employment by Arkansas Horticulture Industry Sector (1999-2001).

Industry Sectors	1999	2001	Percent change (%)
Nursery and Garden Centers	2,182	2,356	8
Landscaping Services	1,992	2,751	38
Florists	1,346	1,477	10
Fresh Fruit & Vegetable Wholesale	203	257	27
Fruit/Vegetable Preserving and Specialty Food Mfg.	4,418	4,072	-8
Frozen Fruit, Juice, and Vegetable Mfg.	375	60	-84
Fruit/Vegetable Canning, Pickling & drying	750	750	0
Wineries	60	60	0
Flower Nursery Stock & Florists Supplies Whsle.	375	258	-31
Fruit & Vegetable Markets	60	60	0
Landscape Architectural Services	175	175	0
Golf Courses & Country Clubs	2,254	2,385	6
Totals	**14,190**	**14,661**	**3**

Source: County Business Patterns (NAICS), U.S. Census.

Payroll data from the U.S. Census (Table 9) supports the employment data (Table 8) that revealed the most substantial growth in the landscaping services sector. The payroll figures show a 102% growth in that sector of horticulture. Both the employment and payroll figures support the fact that landscape services have experienced tremendous growth in recent years. For all service and sales horticulture sectors, payrolls increased 17% from 1999 to 2001.

The relatively high growth rate for landscape services is a stark contrast to the fruit and vegetable canning and pickling industries. Those industries saw an 8.5% decrease in payrolls from 1999 to 2001. This is reflective of some industries relocating outside of the state’s borders and/or downsizing.

Table 9. Payroll by Arkansas Horticulture Business Sectors. 1999-2001.

Industry Sectors	1999	2001	Percent change (%)
	(Payroll $1,000)		
Nursery and Garden Centers	45,603	51,678	13
Landscaping Services	39,397	79,610	102
Florists	15,418	15,137	-2
Fresh Fruit & Vegetable Wholesale	7,312	9,342	28
Fruit/Vegetable Preserving and Specialty Food Mfg.	111,729	108,489	-3
Frozen Fruit, Juice, and Vegetable Mfg.	N/A	N/A	N/A
Fruit/Vegetable Canning, Pickling & drying	45,709	41,811	-9
Fruit & vegetable Canning	N/A	N/A	N/A
Wineries	N/A	N/A	N/A
Fruit & Vegetable Markets	N/A	N/A	N/A
Landscape Architectural Services	N/A	N/A	N/A
Flower Nursery Stock & Florists Supplies Wholesale	N/A	4,602	N/A
Golf Courses & Country Clubs	36,650	40,684	11
Totals	**301,818**	**351,353**	**17**

Source: County Business Patterns (NAICS), U.S. Census.

Section III. Economic Impact Analysis of Arkansas Horticulture Industry

Throughout Arkansas' history, agriculture has been a major contributor to the state's economic growth. Numerous past studies document the economic impact of the agricultural industry on the state's employment, wages, and production value (Goodwin et. el (2002) and Miller et. al. (1997)). These studies often highlight the economic contributions of the traditional commodities like poultry, forestry, cotton, food grains, etc. While the traditional commodities are an integral part to the state's economy, Arkansas' horticulture industry contributes significantly to the economy as well.

Methodology

The study uses input-output technique to examine the economic contributions of the horticulture industry. This technique identifies the structural linkages between the different industries within an economy. The analysis is accomplished using IMPLAN

(IMpact analysis for PLANning). IMPLAN is an input-output model that uses a computerized database to create regional economic multipliers. The model developed by the Forest Service of the U.S. Department of Agriculture can examine inter-industry linkages on up to 528 sectors within an economy (unaggregated levels). Numerous studies have utilized IMPLAN to estimate economic impacts of horticulture including Tavernier and Brumfield (2003), Hall (1999), and (Uva (1999). For a good discussion of the economic framework and theory see Tavernier and Brumfield (2003).

Our study calculates economic impacts using 2000 data for Arkansas from the Minnesota IMPLAN Group, Inc. Industry measures such as total employment, wages, value added, and output value are estimated and presented. The various components of the horticulture industry are analyzed by sector and with an emphasis on the inter-sectoral linkages. All value figures are reported in 2000 dollars.

Results and Discussions

The horticulture sector's direct impact on the state economy is measured by the sum of the impacts of agricultural production, processing of agricultural products, and service activity. Table 10 highlights estimates of the direct economic impacts of Arkansas' Horticulture Industry in terms of the value of industry sales, employment and value-added activity. The value-added estimate represents the difference between the sales value and the cost of purchasing the input. Value-added is an important measure of an industry's economic contribution to the state's economy. Summing the value-added activity of all Arkansas' industries equals the state's Gross State Product.

This study estimates that 19,640 workers are employed by the horticulture production, processing, and service sectors including allied businesses in 2000. These workers jobs are directly associated with the industry. In that same year, horticulture and its supplying firms paid $323 million in wages and salary to the sectors employees. This figure represents wage and salary payments and benefits to both full and part-time employees of the sector and provides a measure of the income paid to workers.

Table 10. Direct Economic Impact of Arkansas' Horticulture Industry, 2001 ($Million).

	Industry Sales	Employees
Fruits	$11.2	226
Tree Nuts	1.0	20
Vegetables	28.8	305
Greenhouse and Nursery	49.5	832
Sod, Landscape and Horticulture Services	272.6	8,859
Canned Fruit and Vegetables	$222.7	994
Pickles, Sauces, and Salad Dressing	110.4	386
Frozen Fruits, Juices and Vegetables	6.3	32
Lawn and Garden Equipment	478.8	1,979
Retail Floral and Garden Supply	451.0	9,697
Total Direct Impact	**$1,632.2**	**19,640**

In addition to being a significant employer for the state, the Horticulture industry's 2000 output was estimated at $1.6 billion. *This estimate excludes the direct value of golf course maintenance due to difficulty in accurately modeling this economic activity*. Additionally, the industry added over $596 million[4] of value to the state's economy. The sub-components making up value added are employee compensation, proprietary income, other property income, and indirect business taxes (Minnesota Implan Group, Inc., 2000). Proprietary income consists of payments received by self-employed individuals. Other property income represents payments form interest, rents, dividends and profits. This value also includes profits earned by corporations. The sector generated over $206 million in other income (profits) in 2000. Additionally the industry paid $71 million in business taxes. These taxes primarily excise and sales taxes occur during the normal operation of the business but do not include income taxes. Proprietary income represents payments as income to self-employed individuals.

IMPLAN measures economic activity through three effects: direct, indirect, and induced. These three effects combine to estimate an industries total economic impact in terms of employment, output and value added activity. The direct effect represents the sector-specific contributions of the horticulture industry. This effect measures the economic impact resulting from purchases of horticulture industry products and services by businesses, households, and others. The indirect effect represents the increases in

[4] The value added estimate is the sum ($ million) of the following components: $323 employee compensation, $82 proprietary income, $206 other property income, and $71 business taxes.

Horticulture industry firm purchases of input products and services as they respond to the demands for their products and services. These inputs include labor, seed, material, etc. The last effect included in the total economic measure is the induced effect. The induced effect is the derived consumption effect from increased household spending. Household spending increases because more labor is hired to satisfy consumer final demands for horticulture Industry goods and services.

Table 11 shows the total economic impact of Arkansas' horticulture Industry detailing the value of sector sales, supplying firm(s) sales, and the household expenditure impacts. Once inter-industry linkages are considered, the total value of output resulting from the horticulture industry is estimated at $1.9 billion for 2000. This estimate is based on direct industry sales of $1.3 million from the production, processing and service firms.

Table 11. Output, employment, and Value-Added Contributions of Arkansas' Horticulture Industry, 2000 ($Million).

Activity	Direct	Indirect	Induced	Total
Output ($M)	$1,296	$311	$323	$1,930
Employment (#)	19,640	3,412	4,650	27,701
Value-Added ($M)	$683	$154	$191	$1,028

The inter-industry linkages are calculated through the indirect and induced effects. In 2000, the horticulture industry created $311 million of economic activity (indirect) for firms that supply goods and services to the sector. Induced impacts result when employees of the horticulture firms and supplying firms--horticulture businesses supplying raw material and service to the horticulture businesses--make local purchases. The estimated induced effects are valued at $323 million in increased household consumption. Totaling the jobs created from direct, indirect and induced economic activity reveals that the Horticulture Industry was responsible for 27,701 jobs. This estimate includes 3,412 jobs created in businesses providing goods and services to the employees in horticulture and its supplying industries. These employees and the proprietors of these businesses combined with the horticulture industry to add value of $1 billion to the Arkansas economy.

This research suggests that Arkansas' horticulture industry is an important contributor to the economy of Arkansas. The employment and output value estimates represent significant economic activity and illustrate the level of inter-industry linkages that the industry has developed.

References

Goodwin, H.L., Jennie Popp, and Wayne P. Miller. Economic Impact of Agriculture on the Arkansas Economy. University of Arkansas Experiment Station Report. 2002.

Hodges, Alan W. and John J. Haydu. Economic Impacts of the Florida Environmental Horticulture Industry, 2000. Proceedings of SNA Research Conference, Forty-Seventh Annual Report, 2002. Southern Nursery Association, Inc.

MIG, Minnesota IMPLAN Group. Implan Professional 2.0 Users Guide. 2000.

Miller, Wayne P., Carl R. Dillon, Ronald Rainey, Timothy A. Roberts, and Yoko Sato. "Economic Impact of the Agricultural Sector on the Arkansas Economy". Little Rock: University of Arkansas Cooperative Extension Service. January 1997.

Tavernier, Edmond M. and Robin G. Brumfield. An Economic Analysis of the Greenhouse, Nursery and Sod Sector in the United States. HortScience 38(1): 128-130. 2003.

Uva, Wen-fei. An Analysis of the Economic Dimensions of the New York State Greenhouse Industry. Department of Agriculture, Resource, and Managerial.

United States Department of Agriculture (USDA). Census of Agriculture, National Agriculture Statistics Service, USDA. 2002.

Appendix A.[5] Summary of Horticulture Industry Survey, All Sectors.

1. Average number of years in operation: 18 years

2. Percentage of operations classified as:

Business Type	**(%)**
Sole proprietorship	60
Partnership	10
Limited Liability Company LLC	2
Corporation	28

3. The reported averages for operation's sales volume derived from the following sources:

Reported Total Sales Volume (%)	**Percent of Firms with In-State Sales (%)**	**Percent of Firms with Out-of-State Sales (%)**
0-10	3.6	37.8
11-30	3.6	25.8
31-50	4.8	13.9
51-70	5.3	4.5
71-90	16.4	10.1
91-100	66.3	7.9

4. Primary operator information:

Average age	52 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	73	White	96
Female	27	Black	3
		Asian	0.1
		American Indian	1
		Hispanic (incl. in other races)	2

5. The highest level of education the primary operator has completed:

Education Level	**(%)**
Some High School	4
High School	23
Vocational Technical	3
Some College	29
College	41

[5] NR denotes that the data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

6. Sales growth (in percent) as compared to 2001 sales level:

2002 marketing year:	11%
1995-00 marketing period:	18%

7. How often producers utilize the following businesses/organizations for business information:

Business/Organization	Never	Sometimes	Regularly
Trade Publications	28	39	34
Industry Seminars	48	39	13
Internet	37	42	21
Professional Associations	45	34	21
Private Consultants	75	19	6
Peer Business Contacts	23	46	31
U of A CES Programs/Workshops	34	40	26

8. Average number of employees:

Employee	Avg.
Full-time	5.2
Seasonal/part-time	7.0

9. Percent of operations hiring seasonal or part-time employees? 59%

10. Percentage of operations that hire migrant labor: 18%

11. Operations participating in the Government Worker Program: 4%

12. 2001 average gross annual sales from fruit, vegetable, nut and herbs sales per operation: NR

13. 2001 average annual wages and salaries excluding benefits paid for operation's employees: NR

Appendix B1.[6] Fruit, Vegetable, Nut and Herb Production

1. Average number of years in operation: 18 years
2. Percentage of operations classified as:

Business Type	(%)
Sole proprietorship	80
Partnership	12
Limited Liability Company LLC	1
Corporation	7

3. What is the percent of your sales volume distributed through the following outlets:

Marketing Channel	(%)
Farmers market	22
Internet	26
Mail Order	8
Retail Sales	23
Other	21

4. Percent of your operation's sales volume derived from the following sources:

In-state: 72%	Out-of-state: 28%

5. Primary operator information:

Average age	58 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	89	White	94
Female	11	Black	4
		Asian	1
		American Indian	2
	Hispanic (incl. in other races)		3

6. The highest level of education the primary operator has completed:

Education Level	(%)
Some High School	7.9
High School	21.2
Vocational Technical	3.5
Some College	24.2
College	43.2

[6] NR denotes that the data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

7. Sales growth (in percent) as compared to 2001 sales level:
   - 2002 marketing year: 16.7%
   - 1995-00 marketing period: 19.1%

8. The five most important business challenges facing your business (in order of importance):
   1. Net return or profit margin.
   2. Production/cultivation practices.
   3. Cost of supplies, inputs.
   4. Marketing opportunities.
   5. Water problems (availability/quality).

9. How often producers utilize the following businesses/organizations for business information:

Business/Organization	Never	Sometimes	Regularly
Trade Publications	34.8	36.4	28.9
Industry Seminars	55.3	37.0	7.7
Internet	48.6	34.6	16.8
Professional Associations	56.4	28.5	15.1
Private Consultants	72.6	21.1	6.3
Peer Business Contacts	33.9	36.8	29.3
U of A CES Programs/Workshops	13.1	35.4	51.5

10. Firm employment average reported levels:

Employee	Avg.
Full-time	2.5
Seasonal/part-time	13.7

11. Percent of firms hiring seasonal or part-time employees: 59%

12. Percentage of operations that hire migrant labor: 18%

13. Operations that participate in the Government Worker Program: 4%

14. 2001 average gross annual sales from fruit, vegetable, nut and herbs sales per operation: NR

15. 2001 average annual wages and salaries excluding benefits paid for operation’s employees: NR

Appendix B2[7]. Fruit, Vegetable, Nut, and Herb Processing and Sales.

1. Average number of years in operation: 27 years

2. Percentage of operations classified as:

Business Type	(%)
Sole proprietorship	32
Partnership	11
Limited Liability Company LLC	10
Corporation	47

3. What is the percent of 2001 sales volume distributed through the following outlets:

Marketing Channel	(%)
Farmers market	23
Internet	0
Mail Order	0
Retail Sales	71
Other	6

4. Percent of your 2001 sales volume derived from the following sources:

In-state: 60%	Out-of-state: 40%

5. Primary operator information:

Average age	54 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	89	White	89
Female	11	Black	11
		Asian	0
		American Indian	0
	Hispanic (incl. in other races)		0

6. The highest level of education the primary operator has completed:

Education Level	(%)
Some High School	6
High School	11
Vocational Technical	0
Some College	28
College	56

[7] NR denotes data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

7. Sales growth as compared to 2001 sales level (as a percent of 2001 sales).

2002 marketing year:	12.2%
1995-00 marketing period:	15.5%

8. How often producers utilize the following businesses/organizations for business information using the following scale:

Business/Organization	Never	Sometimes	Regularly
Trade Publications	29.4	41.8	29.4
Industry Seminars	47.1	41.2	11.8
Internet	41.2	5.9	52.9
Professional Associations	41.2	52.9	5.9
Private Consultants	76.5	11.8	11.8
Peer Business Contacts	17.7	41.2	41.2
U of A CES Programs/Workshops	38.9	38.9	22.2

9. Greatest business challenges (in order of importance):
    1. Supply of horticultural products (adequate or quality)
    2. Net return or profit margin
    3. Business competition, changing market structure
    4. Production expenses
    5. Government regulations

10. Firm employment average reported levels:

Employee	Avg.
Full-time	22
Seasonal/part-time	14.8

11. Percent of firms hiring <u>seasonal/part-time</u> employees? 65%

12. Percent of firms hiring migrant labor? 19%

13. Percent of firms participating in the Government Worker Program? 11%

14. Percent horticultural products purchased from Arkansas producers: 41.4%

15. 2001 average gross annual sales from fruit, vegetable, nut and herb sales: NR

16. 2001 annual average wages and salaries excluding benefits paid employees: NR

Appendix B3[8]. Turf and Sod Producers.

1. Average number of years in operation: 20 years

2. Percentage of operations classified as:

Business Type	(%)
Sole proprietorship	50
Partnership	13
Limited Liability Company LLC	4
Corporation	33

3. What is the percent of 2001 sales volume distributed through the following outlets:

Marketing Channel	(%)
Residential	49
Commercial	41
Municipality	10

4. Percent of your 2001 sales volume derived from the following sources:

In-state: 76%	Out-of-state: 24%

5. Primary operator information:

Average age	56 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	92	White	96
Female	8	Black	0
		Asian	0
		American Indian	4
		Hispanic (incl. in other races)	8

6. The highest level of education the primary operator has completed:

Education Level	(%)
Some High School	8
High School	28
Vocational Technical	0
Some College	28
College	36

[8] NR denotes data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

7. Level of sod production (average acreage): NR

8. Frequency for utilizing the following businesses/organizations for business information:

Business/Organization	Never	Sometimes	Regularly
Trade Publications	57.1	28.6	14.3
Industry Seminars	76.2	23.8	
Internet	59.1	31.8	9.1
Professional Associations	66.7	23.8	9.5
Private Consultants	86.4	9.1	4.6
Peer Business Contacts	26.1	34.8	39.1
U of A CES Programs/Workshops	45.5	36.4	18.2

9. Five greatest business challenges (in order of importance):
    1. Chemical/fertilizer expenses
    2. Net return or profit margin
    3. Business competition, changing market structure
    4. Business operating expenses
    5. Equipment selection/utilization

10. Average number of employees:

Employee	Avg.
Full-time	6.4
Seasonal/part-time	6.3

17. Percent of firms hiring seasonal/part-time employees? 67%

11. 2001 average annual wages and salaries excluding benefits paid employees: NR.

12. 2001 average gross annual sales: NR.

Appendix B4[9]. Golf Course Management.

1. Average number of years in operation: 33 years

2. Percentage of operations classified as:

Business Type	(%)
Sole proprietorship	25
Partnership	6
Limited Liability Company LLC	6
Corporation	63

3. Primary operator information:

Average age	52 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	88	White	100
Female	12		
		Hispanic (incl. in other races)	2

4. The highest level of education the primary operator has completed:

Education Level	(%)
Some High School	2
High School	14
Vocational Technical	2
Some College	26
College	56

5. Average annual sales growth to 2001 sales level (reported as a percent of 2001 sales):

   2002 marketing year: 9.27%
   1995-00 marketing period: 10.76%

6. Percentage utilization of businesses/organizations for business information:

Business/Organization	Never	Sometimes	Regularly
Trade Publications	18.2	47.7	34.1
Industry Seminars	40.9	38.6	20.5
Internet	44.2	46.5	9.3
Professional Associations	34.9	30.2	34.9
Private Consultants	44.2	44.2	11.6
Peer Business Contacts	9.3	51.2	39.5
U of A CES Programs/Workshops	31.8	50.0	18.2

[9] NR denotes data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

7. Challenges facing your business in order of importance:
    1. Net return or profit margin
    2. Equipment selection/utilization
    3. Chemical/fertilizer expenses
    4. Business competition, changing market structure
    5. Labor issues (acquiring/retaining)

8. Average number of employees reported by responding firms:

Employee	**Avg.**
Full-time	8.0
Seasonal/part-time	5.5

9. Average annual wages and salaries paid to employees: NR

10. Percentage of total 2001 golf maintenance budget devoted to each area:

Budget categories	**(%)**
Salaries and Labor	50
Fertilizer and Chemical	12
Soil Amendments (including top-dressing sand	4
Equipment	7
Equipment Maintenance (fuel, fluids, repair, replacement)	8
Irrigation Costs and Maintenance	4
Capital Improvements	4
Utility Costs	4
Landscape Materials and Maintenance	2
Seed or Sod	3
Office Supplies	1
Other	9

11. Average number of holes on golf course(s) reported by all firms. 17.2

12. Average number of rounds of golf played per year by all firms. 20,272

13. Average weekday greens fee for 18 holes:
    With cart: NR
    Without a cart: NR

14. Average total construction cost of golf course: NR

15. Percent of courses affiliated with a residential development/community: 33%

Appendix B5.[10] **Ornamental Producers.**

1. Average number of years in operation: 21 years

2. Percentage of operations classified as:

Business Type	**(%)**
Sole proprietorship	54
Partnership	7
Limited Liability Company LLC	9
Corporation	30

3. What is the percent of 2001 sales volume distributed through the following outlets:

Customer Type	**(%)**
Residential	55
Commercial	40
Municipality	5

4. Percent of your 2001 sales volume derived from the following sources:

In-state: 64%	Out-of-state: 36%

5. Primary operator information:

Average age	53 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	80	White	96
Female	20	Black	4
	Hispanic (incl. in other races)		2

6. The highest level of education the primary operator has completed:

Education Level	**(%)**
Some High School	2
High School	21
Vocational Technical	6
Some College	21
College	50

7. Respondent nursery production calculations (averages production area). NR

8. Greenhouse production calculations (average production area). NR

[10] NR denotes data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

9. Percent of sales volume marketed through various outlets:

Marketing Channel	(%)
Retail sales	29
Farmers markets	21
Internet	16
Mail Order	19
Other	15

10. Percentage sales growth reported as a percent of 2001 sales:
    2002 marketing year: 19.7%
    1995-00 marketing period: 28.8%

11. Business challenges in order of importance:
    1. Net return or profit margin
    2. Cost of supplies, inputs
    3. Production/cultivation practices
    4. Marketing opportunities
    5. Utility expenses

12. Utilization of the following businesses/organizations for business information:

Business/Organization	Never	Sometimes	Regularly
Trade Publications	13.6	29.6	56.8
Industry Seminars	29.6	54.6	15.9
Internet	17.8	48.9	33.3
Professional Associations	37.8	33.3	28.9
Private Consultants	84.1	13.6	2.3
Peer Business Contacts	10.9	54.4	34.8
U of A CES Programs/Workshops	20.5	59.1	20.5

13. Average number of employees:

Employee	Avg.
Full-time	7.1
Seasonal/part-time	11

14. Reported percent of firms hiring migrant labor: 23%

15. Reported percent of firms hiring seasonal/part-time labor: 75%

16. Percent of firms participating in the Government Worker Program: 4%

17. 2001 average gross annual sales: NR

18. 2001 Average annual wages and salaries for employees: NR

Appendix B6[11]. Ornamental Sales and Service.

1. Average number of years in operation: 17 years

2. Percentage of operations classified as:

Business Type	(%)
Sole proprietorship	57
Partnership	9
Limited Liability Company LLC	1
Corporation	33

3. What is the percent of 2001 sales volume distributed through the following outlets:

Customer Type	(%)
Residential	64
Commercial	28
Municipality	8

4. Percent of your 2001 sales volume derived from the following sources:

In-state: 80%	Out-of-state: 20%

5. Percent of responding firms that provided the following products/services (percent does not sum to 100 only reflects the type of firms responding)

Product/service	# of firms (%)	Product/service	# of firms (%)
Nursery production	17	Landscape install/main.	37
Greenhouse production	18	Florist	40
Arborist	10	Irrigation installation	19
Garden Center	21		

6. Primary operator information:

Average age	48 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	56	White	96
Female	44	Black	3
		American Indian	1
	Hispanic (incl. in other races)		1

[11] NR denotes data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

7. The highest level of education the primary operator has completed:

Education Level	**(%)**
Some High School	3
High School	26
Vocational Technical	2
Some College	34
College	34

8. Utilization of the following businesses/organizations for business information:

Business/Organization	**Never**	**Sometimes**	**Regularly**
Trade Publications	24	39	37
Industry Seminars	46	38	17
Internet	29	48	24
Professional Associations	39	36.5	24.5
Private Consultants	80	17	3
Peer Business Contacts	21	48.5	30
U of A CES Programs/Workshops	49	38	13

9. Business challenges in order of importance:
    1. Net return or profit margin
    2. Supply or quality of locally produced horticultural products
    3. Business competition, changing market structure
    4. Other
    5. Labor issues (acquiring/retaining)

10. Responding firm percentage product(s) purchased from Arkansas producers:

Products	**(%)**
Annuals	71
Perennials	57
Woody Ornamentals	48
Fruit plants	53

11. Percentage of sales by outlet:

Marketing Channel	**(%)**
Farmers market	20
Internet	10
Retail Sales	39
Other	32

12. Sales growth reported as a percent of 2001 sales.

2002 marketing year: 8.8%
1995-00 marketing period: 19.4%

13. Average number of employees:

Employee	Avg.
Full-time	4.1
Seasonal/part-time	3.8

14. Percentage of total annual salaries devoted to the following areas of operation:

Business area	%
Production (fieldwork, greenhouse, nursery, etc.)	25
Services (consulting, landscaping, etc.)	36
Retail/wholesale sales	39

15. 2001 average annual wages and salaries excluding benefits: NR

16. 2001 average gross annual sales: NR

Appendix B7[12]. Landscape Architects Survey Responses.

17. Average number of years in operation: 27 years

18. Percentage of operations classified as:

Business Type	(%)
Sole proprietorship	25
Partnership	0
Limited Liability Company LLC	0
Corporation	75

19. What is the percent of 2001 sales volume distributed through the following outlets:

Customer Type	(%)
Residential	51
Commercial	21
Municipality	28

20. Percent of your 2001 sales volume derived from the following sources:

In-state: 81%	Out-of-state: 19%

21. Primary operator information:

Average age	54 yrs		
Sex:	**(%)**	**Race:**	**(%)**
Male	89	White	89
Female	11	Black	11
		Asian	0
		American Indian	0
	Hispanic (incl. in other races)		0

22. The highest level of education the primary operator has completed:

Education Level	(%)
College	100

23. Percentage of sales growth (reported as a percent of 2001 sales):
    2002 marketing year: 19.4%
    1995-00 marketing period: 26.9%

[12] NR denotes data not reported because of one or more of the following: protecting the confidentiality of individual responses, respondent data reporting errors, or low level of confidence in reported estimate(s).

24. Utilization of the following businesses/organizations for business information:

Business/Organization	Never	Sometimes	Regularly
Trade Publications	11	78	11
Industry Seminars	33	56	11
Internet	22	33	44
Professional Associations	22	78	0
Private Consultants	0	44	56
Peer Business Contacts	0	63	37
U of A CES Programs/Workshops	56	44	0

25. Greatest business challenges in order of importance:
   1. Net return or profit margin
   2. Business competition, changing market structure
   3. Increases in operating costs
   4. Marketing information or training
   5. Training on business management or record keeping

26. Employee information, average reported levels:

Employee	Avg.
Full-time	2.4
Seasonal/part-time	2.7

27. Percent of firms hiring seasonal/part-time labor: 74%

28. Percent of firms hiring migrant labor: 14%

29. Percentage of employee time/salary devoted to each of the following areas:

Business Area	Time Working (%)	Annual Salary (excl. benefits) (%)
Landscaping (install and maintenance)	44	27
Consulting Services (design)	52	69
Other	4	4

30. 2001 average annual wages and salaries excluding benefits: NR

31. 2001 average gross annual sales: NR