



Economic Contributions of the California Nursery Industry

Hoy F. Carman and Ana Maria Rodriguez



Giannini Foundation Information Series No. 04-1

July 2004



UNIVERSITY OF CALIFORNIA
AGRICULTURE AND NATURAL RESOURCES

THE AUTHORS

Hoy Carman is a member of the Giannini Foundation of Agricultural Economics and a professor of agricultural and resource economics at the University of California, Davis. Ana Maria Rodriguez is a postgraduate-research agricultural economist in the Department of Agricultural and Resource Economics at the University of California, Davis.

Hoy Carman: E-mail – carman@primal.ucdavis.edu, Phone – 530.752.1525.

ACKNOWLEDGMENTS

The authors acknowledge the assistance of Professor Peter Berck, Department of Agricultural and Resource Economics, University of California, Berkeley, in setting up and running the IMPLAN model for California. Elaine Thompson, Executive Director of the California Association of Nurseries and Garden Centers, and Robert Falconer, Director of Government Affairs for the California Association of Nurseries and Garden Centers, assisted with references, data sources, and contacts with industry participants. They also provided helpful comments on an earlier draft of this report. This project was supported by a grant from California Polytechnic University Foundation of San Luis Obispo, California, with funding from the California Association of Nurseries and Garden Centers Endowment. Finally, the authors appreciate the careful comments of two reviewers who helped to clarify and improve our presentation.



This publication has been anonymously peer-reviewed for technical accuracy by University of California scientists and other qualified professionals.

©2004 by the Regents of the University of California
Division of Natural Resources

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the written permission of the publisher and the authors.

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

TABLE OF CONTENTS

Executive Summary	1
Introduction	3
Structural Characteristics of California's Nursery and Floral Industry from 1982 to 1997	5
Number of Farms and Sales	5
California Nursery Farms versus Other Farms: A Comparison of Averages	6
Characteristics of Nursery-Farm Operators	6
Postcensus Changes in Farm Numbers	6
Growth of the California Nursery Industry	8
Location of Production	8
Crops Produced	10
Marketing Channels	11
Number and Type of Firms	11
Retail Sales	12
Market Shares	12
Retail Margins	13
Estimated Economic Impacts	15
Economic Multipliers	15
Estimated Economic Impacts	16
Concluding Comments	19
References	21
Appendix	23

FIGURES

1. Sales for California's Top Ten Commodities, 2001	3
2. California Nursery and Floral Product Sales, Farm Value, and Percent of California's Total Agriculture	8
3. Nursery and Floral Production by County, Value at the Farm Gate, 2001	9

TABLES

1. Farms Growing Nursery and Floriculture Crops, Area Under Glass, Acres in the Open, and Sales, U.S. and California, 1982 and 1997	5
2. California Nursery, Flower, and Foliage Production in 2001, Top 15 Counties with Share of State Total	10
3. Wholesale Value of California Nursery Products by Major Categories, 2000 and 2001	11
4. Statewide Taxable Sales by California Retail Florists and Farm and Garden Supply Stores, 1997–2001	12
5. Estimated Annual U.S. and California Lawn and Garden Retail Sales, 1997–2001	12
6. Estimated Market Shares of Various Retail Store Types for Sales of Flower Products in California, 2001	13
7. Estimated Percentage Gross Margin for Floral and Nursery Products by Retail Store Type, Estimated Total Floral and Nursery Sales, and Total Margin, California, 2001	14
8. Estimated IMPLAN Multipliers for the California Nursery Industry	15
9. Estimated Output, Employment, and Value-Added Total-Effects Economic Multipliers for the Nursery Industry in Selected California Counties	16
10. Estimated Direct and Total Economic Effects of California Flower and Nursery Production and Lawn and Garden Retailing, 2001	17
11. Estimated Total Output, Employment, and Value-Added Effects of Nursery and Floral Production and Lawn and Garden Retailing in California's Top Ten Producing Counties, 2001	17
A1. California's Top 20 Commodities with Values and Ranks for 1999–2001	24
A2. Value (Thousand Dollars) of California Nursery, Flower, and Foliage Production by County, 1992–2001	25
A3. Five Leading Nursery Crops for Each of the Ten California Counties Producing the Largest Amount of Nursery and Floral Products, 2001	26
A4. Population and Value of Nursery and Floral Production by County, California, 2001	28
A5. Nursery and Floriculture Products: Number of Producers, Wholesalers, and Retailers Licensed to Sell Nursery Stock in California, 2002, by County	29
A6. The IMPLAN System	31

EXECUTIVE SUMMARY

The California nursery and floral industries contribute significantly to California's economy. They are the largest in the United States with the California farm value of combined floral and nursery product sales totaling almost \$3.086 billion in 2001. The total output of nursery products places the nursery industry third (\$2.09 billion) and the floral industry seventh (almost \$1 billion) among all California agricultural industries. When floral and nursery product sales are combined, the industry ranks second among all California agricultural products, following the dairy industry, which had \$4.63 billion in sales in 2001.

The number of California farms producing nursery and floral crops grew from 3,263 in 1982 to 4,988 in 1997 according to the *Census of Agriculture* (U.S. Department of Agriculture, National Agricultural Statistics Service 1982-1997). The number of California farms currently growing nursery and floral crops is difficult to determine because of differences in criteria used in classifying farms. The most recent California directory of licensed nurserymen listed 2,999 producers. As is true with many other commodities, there are a large number of small producers that account for a very small share of total output and a moderate number of large producers that produce most of the product sold. There were 411 California farms with nursery sales exceeding \$1 million in 1997; this 8.2 percent of nursery farms by number accounted for 81.3 percent of total nursery sales.

Many California commodities faced price and/or revenue problems during the decade from 1992 to 2002. During that time, the nursery and floral industries enjoyed steady sales increases, which increased the industry's share of total California agricultural production from 8.3 to 10.6 percent of total output. While there is floral and nursery production in 55 of California's 58 counties, ten counties with annual production valued at more than \$100 million accounted for more than 73 percent of 2001's value of production. San Diego County dominated the industry, producing more than \$855 million of nursery, floral, and foliage products in 2001 and accounting for almost 27 percent of the California

total. The other nine, however, have annual production exceeding \$100 million, and the next five counties' production ranged from \$50 to \$100 million. Nursery and flower production is a major agricultural enterprise in several of California's most urbanized counties, including Los Angeles, San Diego, Orange, Santa Clara, and Riverside, which together account for more than 54 percent of California's population.

California is the largest single market for lawn and garden products in the United States, accounting for from 10.3 to 10.4 percent of total annual U.S. sales since 1997. The majority of California's nursery and floral products are sold to California consumers. Based on secondary sources, we estimate that total 2001 California retail lawn, garden, and floral product sales exceeded \$10.1 billion. The gross margin (retail sales minus cost of goods sold) on these sales was estimated at almost \$3.8 billion. Retail channels have been changing over time, with the market shares of "big-box" hardware/home improvement stores such as Home Depot and Lowe's increasing significantly.

Market shares vary by type of retail store and product line. Retail florists have almost half of the cut flower market but have faced increasing competition from supermarkets, which now account for about one-quarter of cut flower sales. Garden centers are still the leading outlet for outdoor garden and bedding plants, but they have faced increasing competition from big-box stores. Retail florists, garden centers, big-box stores, and supermarkets are all important outlets for flowering and greenhouse plants. Direct sales are important for many nurseries; landscape contractors and gardeners purchase products ranging from specimen trees to bedding plants, and agricultural producers purchase trees and strawberry plants.

A regional economic model was used to trace the direct, indirect, and induced effects of California nursery and floral production and lawn and garden retailing through the California economy. The impacts are dramatic and far reaching. Overall, nursery and floral production and lawn and garden retailing contributed more than \$10.3 billion to California's 2001 output and were responsible for almost 169,000

jobs. Total value added attributed to California nursery and floral production and lawn and garden retailing was \$8 billion, and the labor-income impact exceeded \$4.9 billion.

The impacts of nursery and floral production and lawn and garden retailing also were estimated separately. The direct effects of nursery and floral production

were almost \$4.8 billion (46 percent of the combined total) while the direct effects of retailing were almost \$5.5 billion. Nursery and floral production generated 81,011 jobs (48 percent of the combined total) while lawn and garden retailing accounted for 87,867 jobs. Estimated value added for the nursery and retail sectors was \$3.55 and \$4.44 billion, respectively.

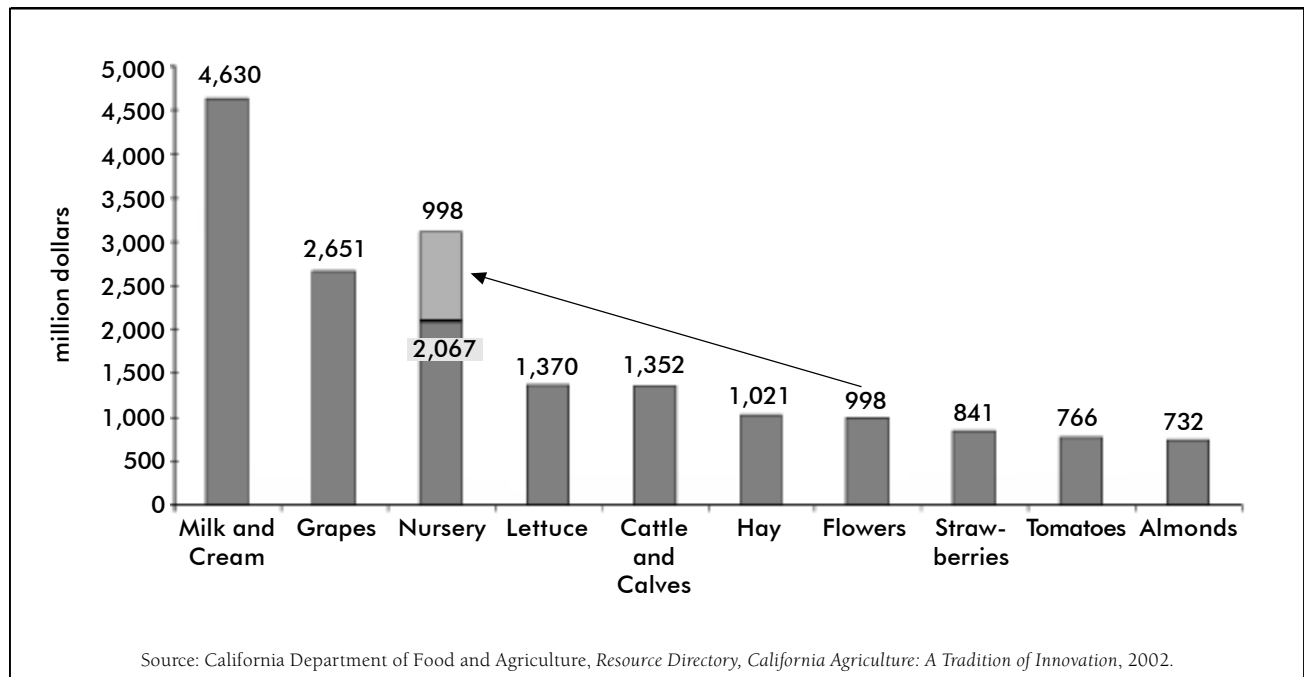
INTRODUCTION

California's nursery industry is the largest in the United States, and floral and nursery product sales are a leading sector in the California agricultural economy. The value of combined floral and nursery product sales in California in 2001 totaled almost \$3.086 billion at the farm level; nursery products contributed \$2.09 billion and floral sales contributed almost \$1 billion. Compared with other California agricultural commodities in 2001, the nursery industry ranked third, following first the dairy industry (\$4.65 billion) and then the grape industry (\$2.65 billion). The floral industry ranked seventh. When 2001 floral and nursery product sales are combined, the industry ranks second among all California agricultural products.¹

Commodities among the top ten in California that rank below floral and nursery products in terms of 2001 sales include lettuce (4), cattle and calves (5), hay (6), strawberries (8), tomatoes (9), and almonds (10). California's gross cash income from all agricultural production totaled \$27.6 billion in 2001. Nursery and floral sales made up 11.2 percent of that total.²

Despite its economic contributions and importance to the state and nation, the California nursery and floral industries are often overlooked by government officials, legislators, the agricultural industry, and the general public in discussions about leading agricultural products and producers. Though the California nursery industry faces the same issues that confront other agricultural producers (water, price and income,

Figure 1. Sales for California's Top Ten Commodities, 2001



¹ The commodity cash income data are reported in the California Department of Food and Agriculture's (CDFA's) 2002 resource directory. While commodity rankings often change from year to year as a result of yield and price variability, nursery crops were ranked third for the last three years (1999–2001). Flowers were eighth in 1999 and seventh in 2000 and 2001. The combined category of nursery and flower crops ranked second in each of the last three years (1999–2001). Rankings for the top 20 commodities for 1999, 2000, and 2001 are listed in Table A1 in the Appendix.

² There are two major data series for California agricultural sales. The California Agricultural Statistics Service (CASS) publishes annual estimates of cash sales that are used by the U.S. Department of Agriculture (USDA) for calculating farm income. CASS also publishes the annual county agricultural commissioners' reports, which provide estimates of the value of production for each commodity. Note that the California gross cash income estimate for 2001 presented here (\$27.6 billion) is less than the county agricultural commissioners' estimate of total agricultural output (\$29.8 billion).

energy and input costs, government regulation, changing market structure, competition, information, etc.), it sometimes is not included in policies and programs designed to benefit agricultural producers. At the extreme, there are individuals and organizations that do not consider the floral and nursery industries to be agricultural production. This may be due to any of a number of factors, including the limited visibility of production facilities and product movement (compared to commodities like tomatoes, rice, and citrus) and the decorative nature of the product (rather than being a food or fiber).

The three major objectives of this report are to:

- Assemble economic data on the California nursery and floral industries that show trends, growth patterns, and present status by location, products, and channels of distribution.
- Use output, employment, and value-added multipliers for the California nursery and floral industries to estimate the regional and statewide economic contributions of the industry.
- Organize economic data and analysis of the industry's economic contributions and impacts for use by the California nursery industry in educational programs for policymakers, agricultural leaders, and the general public.

STRUCTURAL CHARACTERISTICS OF CALIFORNIA'S NURSERY AND FLORAL INDUSTRY FROM 1982 TO 1997

The changing structure of the California nursery industry was examined for the 15-year period from 1982 through 1997 using *Census of Agriculture* data for 1982, 1987, 1992, and 1997. California leads the nation, and Florida typically ranks second, in total sales of nursery and floriculture crops. California sales of nursery and floriculture crops increased from \$957,232,000 in 1982, accounting for 25 percent of total U.S. sales, to \$2,210,574,000 in 1997, accounting for 20 percent of U.S. sales (U.S. Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) 1982–1997). After being adjusted for price changes, California's real sales increase from 1982 to 1997 totaled 38.8 percent. The most recent USDA reports list California's 2001 market share for nursery and floriculture crops at 21.3 percent; Florida trailed with 11.9 percent (USDA Economic Research Service).

Number of Farms and Sales

The number of California farms growing nursery and floriculture crops increased from 3,263 in 1982 to 4,988 in 1997. Increases in other states were more

rapid, however, and California's share of U.S. farms producing nursery and floriculture crops decreased from 9 percent in 1982 to 7 percent in 1997 (Table 1). Note that California's share of area under glass, acres in the open, and sales also decreased from 1982 to 1997. However, the average California nursery operation had more area under glass and approximately 2.75 times the sales of the average U.S. nursery farm (\$443,178 versus \$161,360) in 1997.

In 1982, California farms producing nursery products with annual sales of less than \$40,000 accounted for 50.6 percent (1,652 farms) of the total number of farms but represented only 1.8 percent of total sales. There were 362 farms with sales of nursery products exceeding \$500,000 and they accounted for 76.3 percent of total 1982 sales. The pattern was similar in 1997, with 58 percent (2,892) of the farms with sales less than \$50,000 accounting for only 1.3 percent of industry sales. There were 411 California farms with nursery sales exceeding \$1 million in 1997. These farms, representing 8.2 percent of nursery farms by number, accounted for 81.3 percent of total nursery sales.

Table 1. Farms Growing Nursery and Floriculture Crops, Area under Glass, Acres in the Open, and Sales, U.S. and California, 1982 and 1997

	United States	California	California Share
1982			
No. of Farms	35,507	3,263	9.19%
Square Feet under Glass or Other Protection	637,388,163	143,390,104	22.50%
Acres in the Open	451,607	56,123	12.43%
Sales (\$1,000)	\$3,821,196	\$957,232	25.05%
1997			
No. of Farms	67,816	4,988	7.36%
Square Feet under Glass or Other Protection	1,027,391,958	173,192,317	16.86%
Acres in the Open	1,234,510	90,544	7.33%
Sales (\$1,000)	\$10,942,816	\$2,210,574	20.20%

Source: U.S. Department of Agriculture, National Agricultural Statistics Service, *Census of Agriculture*, 1982–1997.

California Nursery Farms versus Other Farms: A Comparison of Averages

Nursery farms are comparatively compact and of high value compared to other farms in California. There were 74,126 farms in California in 1997 with an average size of 374 acres. Nursery farms represented 5.8 percent of total California farms that year but, with an average of 45 acres of land per farm, they accounted for only 0.7 percent of California land in farms. Overall, the value of the average California farm's land and buildings in 1997 totaled \$941,170 per farm (\$2,605 per acre).³ The value of land and buildings of the average California farm growing nursery crops was \$624,267 (\$12,017 per acre).

The 1997 gross value of California agricultural production was estimated by county agricultural commissioners at \$28.02 billion (\$322,104 per farm) with nursery products, flowers, and foliage accounting for about \$2.5 billion of the total (\$500,855 per nursery farm). This gross value was up from \$21.77 billion in 1992 and subsequently increased to \$29.8 billion in 2001 (Appendix, Table A2). The gross value of nursery, flower, and foliage production increased from a little more than \$1.9 billion in 1992 to more than \$3.17 billion in 2001.

Characteristics of Nursery-Farm Operators

The average age of operators of farms producing nursery crops has been increasing, a trend that holds for other farm operators in California. The number of nursery farms operated by a person over the age of 45 increased from 2,141 (66 percent) in 1982 to 3,822 (77 percent) in 1997. The average age for all California farm operators in 1997 was 56.5 years; for nursery-farm operators, the average age was 54.3 years.

In 1982, slightly more than 64 percent of all California nursery farms were operated by persons whose main occupation was farming. This share decreased to 58 percent in 1997. As might be expected, the pattern of part-time operators varies when income is considered. In 1982, almost 81 percent of the

nursery farms with sales exceeding \$40,000 were operated by persons whose main occupation was farming while 52 percent of the farms with less than \$40,000 in sales were operated by part-time farmers. In 1997, 78.5 percent of the farms with more than \$50,000 in sales were operated by persons whose main occupation was farming while almost 55 percent of farms with less than \$50,000 in sales were operated by part-time farmers.

The legal structure of California nursery operations also has changed over time. The distribution of the number of nursery farms in 1982 was sole proprietors, 61 percent; partnerships, 14 percent; corporations, 24 percent; and other, 1 percent. By 1997, this had changed to sole proprietors, 69 percent; partnerships, 11 percent; corporations, 18 percent; and other, 2 percent.⁴ In the corporate category, the relative importance of family corporations tended to decrease over time. Even though the share of farms organized as corporations has decreased over time, the share of farms owned by corporations is larger for nursery operations than for any other sector in California agriculture. Note that the corporate share of all California farms was about 7.1 percent in 1997.

Postcensus Changes in Farm Numbers

While the structure of California agriculture has been changing since 1997, the extent of the changes is difficult to determine because the 2002 agricultural census has not yet been published. The 1997 census listed 4,988 California farms producing nursery and floral products. As noted previously, 2,892 of these farms had less than \$40,000 in sales and accounted for only 1.3 percent of industry sales. The California Agricultural Statistics Service (CASS), in its annual reports for the California floriculture industry, lists the number of California floriculture producers with sales greater than \$10,000. These reports show the number of floriculture producers decreasing fairly steadily from 1,171 in 1998 to 973 in 2000 and to 802 in 2002. The 2002 California directory of

³ The *Census of Agriculture* (USDA NASS) based the average value of land and buildings on a per-farm and per-acre basis on a sample of California farms.

⁴ The "other" category includes cooperatives, estates and trusts, institutions, etc.

nurserymen, which defines a commercial producer as someone who grows and sells a total of \$1,000 or more of nursery stock in one year, lists 2,999 producers for 2002. If the total number of nursery

and floral producers has remained steady or decreased while total production has increased, average sales per farm may increase significantly.

GROWTH OF THE CALIFORNIA NURSERY INDUSTRY

As noted earlier, production by the California nursery and floriculture industry has grown significantly over time, both in absolute values and relative to the rest of California agriculture. The value of floral products has remained generally stable over the last decade while the value of nursery products has increased. The total value of California nursery and floral products grew from \$1.75 billion in 1989 to \$3.17 billion in 2001 (an overall increase of 81 percent). This growth over time is shown in Figure 2. Total output dipped slightly from 1991 to 1992 and then grew steadily from \$1.938 billion in 1992. Total output increased 63.5 percent from 1992 through 2001 while real output (total revenue adjusted for price changes) increased 43.9 percent. Also shown in Figure 2 is the nursery and floriculture industry's annual share of total California agricultural production. Note that nursery's share of total agricultural output increased from 1989 through

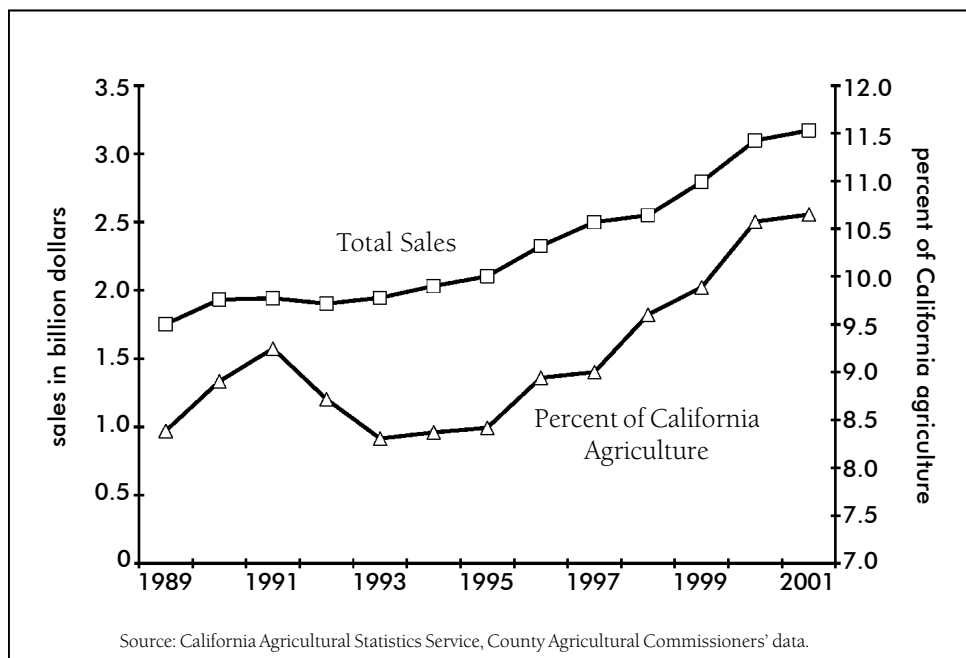
1991, dropped to 8.3 percent in 1993, and then steadily increased to 10.6 percent of total California agricultural output in 2001.

Total California agricultural output grew steadily, from \$21.77 billion in 1992 to \$29.8 billion in 2001, with the only pause in year-to-year growth occurring in 1998. However, the ten-year growth of 36.9 percent for total agricultural output was less than the nursery industry's growth of 63.5 percent, resulting in an increased share of total output for the nursery industry (Appendix, Table A2).

Location of Production

Nursery products and/or flowers and foliage are produced in 55 of California's 58 counties, but production tends to be concentrated in Central Coast and South Coast counties.⁵ There were ten counties with more than \$100 million in nursery, flower, and foliage production in 2001 (Figure 3). Seven of the ten counties border the Pacific Ocean, and Santa Clara County has a coastal type of climate (Figure 3). Note that Kern is the only Central Valley county in the top ten. As shown in Table 2, San Diego County dominates the industry with almost 27 percent of total production. The next four counties—Ventura, Orange, Monterey, and Los Angeles—combine for 25.32 percent of total California production. The remaining five counties account for 21.16 percent

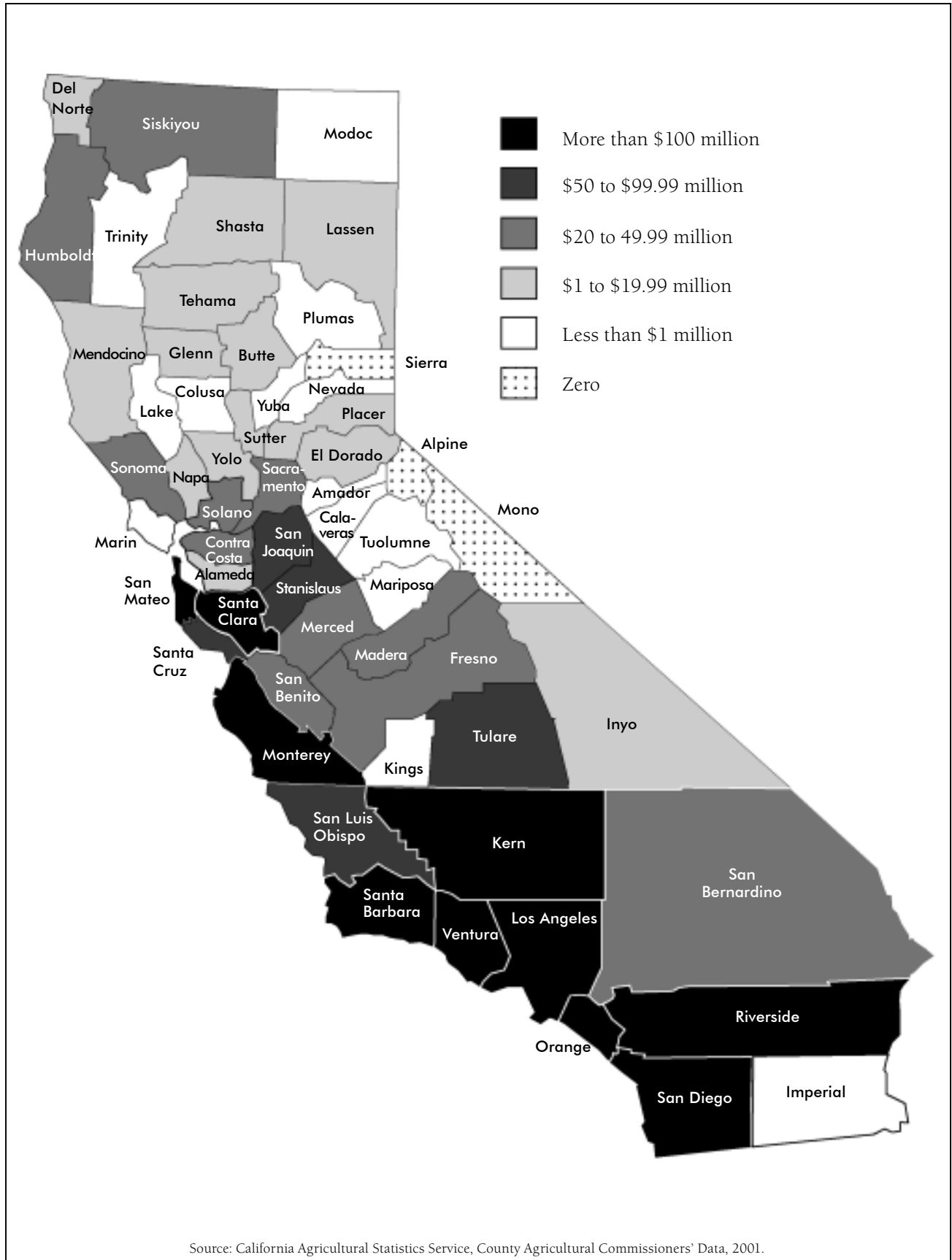
Figure 2. California Nursery and Floral Product Sales, Farm Value, and Percent of California's Total Agriculture



and foliage production in 2001 (Figure 3). Seven of the ten counties border the Pacific Ocean, and Santa Clara County has a coastal type of climate (Figure 3). Note that Kern is the only Central Valley county in the top ten. As shown in Table 2, San Diego County dominates the industry with almost 27 percent of total production. The next four counties—Ventura, Orange, Monterey, and Los Angeles—combine for 25.32 percent of total California production. The remaining five counties account for 21.16 percent

⁵ The gross value of nursery, flower, and foliage production by county is shown in Table A2 of the Appendix. Note that the county agricultural commissioners' reports do not include nursery and flower sales for seven counties that do have producers listed in CDFA's 2002 directory, *Nurserymen and Others Licensed to Sell Nursery Stock in California*. These counties and the number of producers are Colusa (1), Imperial (10), Kings (2), Modoc (3), Plumas (3), Tuolumne (6), and Yuba (5).

Figure 3. Nursery and Floral Production by County, Value at the Farm Gate, 2001



of production. As shown, the ten counties with production exceeding \$100 million accounted for almost \$2.32 billion (73.45 percent) of California's 2001 nursery, flower, and foliage production. There were eight California counties with populations exceeding one million in 2001. Five of them (Los Angeles, Orange, San Diego, Santa Clara, and Riverside) were among the ten largest nursery and flower producers (Appendix, Table A4). The ten largest nursery- and flower-producing counties accounted for almost 63 percent of California's 2001 population.

There were five counties where the value of nursery, flower, and foliage production fell between \$50 and

Table 2. California Nursery, Flower, and Foliage Production in 2001, Top 15 Counties with Share of State Total

	Value of Production (thousand dollars)	Share of State Total (percent)
Top Ten Counties		
San Diego	855,139	26.97
Ventura	223,368	7.36
Orange	218,833	6.90
Monterey	178,564	5.63
Los Angeles	172,046	5.43
Santa Clara	150,265	4.74
Riverside	138,371	4.36
San Mateo	136,613	4.31
Santa Barbara	131,419	4.14
Kern	114,599	3.61
<i>Total for Top Ten Combined</i>	2,319,217	73.45
Next Five Counties		
San Joaquin	99,224	3.13
San Luis Obispo	91,128	2.87
Santa Cruz	75,025	2.37
Stanislaus	68,960	2.17
Tulare	65,175	2.06
Top 15 County Total	2,718,729	85.74
Rest of State	452,346	14.26

Source: California Agricultural Statistics Service, *Summary of County Agricultural Commissioners' Reports*, 2001, 2001.

\$100 million. These counties—San Joaquin, San Luis Obispo, Santa Cruz, Stanislaus, and Tulare—accounted for 12.6 percent of total 2001 production. Overall, 15 counties produced 86.05 percent of California's total 2001 nursery, flower, and foliage crops. Among these top 15 counties, nursery and floral crops were number one in value of production in San Diego, Orange, Los Angeles, Santa Clara, and San Mateo.

Nursery, flower, and foliage crops are very important agricultural products for several California counties that are not among the top 15 value producers previously discussed. For example, nursery crops are listed as the number one commodity in terms of gross value of production for eight counties that are not included in the top 15: Alameda (\$15.1 million), Contra Costa (\$37.5 million), Del Norte (\$16.15 million), Humboldt (\$33.95 million), Inyo (\$4 million), San Benito (\$25.2 million), Siskiyou (\$30.79 million), and Solano (\$37.67 million).

Crops Produced

California nursery, flower, and foliage producers market a tremendous variety of plant materials—from cut flowers, potted flowering plants, flower seeds, bedding and garden plants, bulbs, and ornamentals to fruit and nut trees and strawberry plants. Buyers include consumers, landscape contractors, institutions, and agricultural producers. The most recent data available indicate that the gross value of plant materials produced by the industry in 2001 totaled almost \$3.17 billion (Table 3). Values for the various categories of nursery products are shown in Table 3.

Counties tend to specialize in particular floral and nursery crops. The five leading floral and nursery crops produced in each of the ten California counties with the largest production of floral and nursery crops (listed in Table 2) are shown in Table A3 in the Appendix. The largest single crop in any county is flowering foliage plants in San Diego County, which had a gross value in 2001 of almost \$309 million. Woody, deciduous, and evergreen ornamentals (the largest product category statewide) ranked among the top five crops in seven of the ten counties and number one or two in five counties. Bedding plants rank in the top five crops in five of the ten counties. San Diego County ranks first in value of production of bedding

Table 3. Wholesale Value of California Nursery Products by Major Categories, 2000 and 2001

	2000 Value	2001 Value
Floral Products		
Cut Flowers and Cut Greens	\$383,101,500	\$359,810,600
Flower Seeds	5,830,700	6,074,100
Christmas Trees	10,685,800	10,304,900
<i>Total</i>	<i>\$399,618,000</i>	<i>\$376,189,600</i>
Nursery Products		
Potted Plants and Flowering Foliage	\$615,772,400	\$631,386,400
Bulbs, Corm, Roots and Tubers	10,295,200	35,712,300
Flowering Propagative Materials	75,590,000	75,700,800
Bedding Plants	465,045,400	480,438,100
Rose Plants	45,936,000	54,062,000
Woody, Deciduous, and Evergreen Ornamentals	772,006,300	823,255,600
Herbaceous Perennials	30,069,200	36,175,500
Turf and Sod	42,750,300	56,724,700
Nursery Stock Other than Ornamentals	639,508,900	598,606,600
<i>Total</i>	<i>\$2,696,973,700</i>	<i>\$2,792,062,000</i>
Grand Total	\$3,096,591,700	\$3,168,251,600

Source: California Department of Food and Agriculture Nursery Program, *Value of California Nursery Products, Fiscal Year 2001/2002, 2002.*

plants (\$165 million), but Ventura, Monterey, Los Angeles, and Santa Clara each have significant production. Cut flowers rank in the top five crops in eight of the ten counties, with the greatest production in San Diego, Ventura, and Santa Barbara. Cut roses are important in Monterey and Santa Clara. Kern, the only Central Valley county in the top ten, dominates production of rose plants and is the only one of the ten that counts nursery, fruit, vine, and nut crops among its top five.

Marketing Channels

The distribution of California floral and nursery sales varies by product. A survey of California flower growers conducted in 2000 found that

59 percent of flowers produced in California were sold in California, 40 percent were shipped to other states, and 1 percent was exported to other countries (Prince & Prince, Inc.). Based on industry estimates, approximately 79 percent of California nursery products are sold in California, 20 percent are shipped to other states, and 1 percent is exported to other countries.

Number and Type of Firms

There are a variety of California firms involved in production and distribution of nursery and floral products. According to the 2002 *Directory of Nurserymen and Others Licensed to Sell Nursery Stock in California*, there are 2,999 California producers of nursery and floral products.⁶ This

includes 551 producers in San Diego County, 375 in Los Angeles County, and 207 in Riverside County. At the other end of the range, there are between one and five producers in each of nine counties and no registered producers in three counties (Appendix, Table A5). Moving forward in the channel of distribution, 3,756 retailers primarily sell nursery and floral products. Among them are 263 integrated producer/retailer operations (producers who also retail nursery and floral products). There are also 3,465 incidental retailers registered in California—retail outlets with multiple product lines, including nursery and floral products. Retail stores in the incidental classification include many of the largest nursery retailers (warehouse club stores, chain stores, and mass merchandisers such as Home Depot, Lowe’s,

⁶ The California Food and Agriculture Code states that “It is unlawful to sell any nursery stock without an annual license from the Secretary of Food and Agriculture.” Further, “Exemption from license is allowable to florists and others who only sell plants at retail for the sole purpose of indoor decoration, to persons who sell no nursery stock except seeds, and to persons who only sell cut Christmas trees.” (Sections 6721 through 6744)

Table 4. Statewide Taxable Sales by California Retail Florists and Farm and Garden Supply Stores, 1997-2001

Year	Florists	Farm and Garden	Total
		thousand dollars	
1997	816,185	1,936,173	2,752,358
1998	843,978	1,967,564	2,811,542
1999	921,774	1,961,504	2,883,278
2000	983,396	2,060,713	3,042,436
2001	988,022	2,059,040	3,047,062

Source: California State Board of Equalization, *Taxable Sales in California during 2001, Forty-First Annual Report*, 2002.

Wal-Mart, K-Mart, Target, and the supermarket chains). Many producers sell directly to large-scale retailers, performing the functions usually associated with wholesalers and brokers. There are also 853 wholesalers and 476 jobber/broker/commission merchants dealing in nursery and floral products in California.

Retail Sales

Partial data on retail floral and nursery product sales in California are available from government statistics. Private data collection efforts and consultant reports also include retail sales. These multiple sources were used to develop the best possible estimates for this study.

The California State Board of Equalization publishes sales data by type of retail outlet but not by product line. There are annual retail sales data for florists and for farm and garden supply stores, two types of stores that tend to specialize in floral and nursery products. There are also aggregate sales data for large multi-product retailers such as food stores, hardware stores, and general merchandise stores, but it is not possible to determine their share of floral and nursery product sales. Lacking more detailed retail data, industry members have developed their own rules of thumb for estimating total retail sales.

One such method has simply doubled reported sales for florists (based on the growing importance of flower sales by supermarkets) and farm and garden stores (based on the growth in floral and nursery sales by large retailers such as Home Depot, Lowe's, Wal-Mart, Target, Price-Costco, and others that are not included in that category). Retail sales reported by California florists and farm and garden supply stores for the five-year period from 1997 through 2001 are shown in Table 4. Note that combined sales for the two types of stores shown in Table 4 increased from \$2.75 billion in 1997 to almost \$3.05 billion in 2001. There were 5,338 sales tax permits for retail florists and 3,711 permits for retail farm and garden stores on July 1, 2001.

Nursery Retailer publishes estimates of annual lawn and garden retail sales by state and also ranks America's 100 largest nursery retailers annually. California is the largest single market for lawn and garden products in the United States, accounting for between 10.3 and 10.4 percent of total annual sales since 1997 (Table 5). Estimated 2001 California lawn and garden sales totaled \$9.913 billion of the U.S. total of \$88.4 billion (Greenidge 2002). For the United States, the composition of estimated total sales for the product lines carried by lawn and garden stores were: green goods, 26 percent; equipment and tools, 28.4 percent; chemicals and fertilizers, 24.8 percent; and lawn furniture, accessories, and tree trim, 20.8 percent.

Market Shares

Where consumers purchase floral and nursery products has changed significantly over time in response to

Table 5. Estimated Annual U.S. and California Lawn and Garden Retail Sales, 1997-2001

Year	U.S. million dollars	California million dollars	California's Share of U.S. Total
1997	76,500	7,896	10.32
1998	79,100	8,154	10.31
1999	81,700	8,422	10.31
2000	84,600	8,798	10.40
2001	88,400	9,193	10.40

Source: *Nursery Retailer*, February/March, 1998-2002.

changes in the structure of retailing, competition in local markets, and growing consumer demand. Greenidge, in a 1995 *Nursery Retailer* article, listed three major lawn and garden product distribution channels with estimated 1994 market shares. The channels and shares of the total market were hardware/hardlines, 20.8 percent; garden centers/nurseries, 39.1 percent; and mass marketers/chain stores, 40.1 percent.⁷ In 2001, only seven

years later, the growth of big-box stores such as Home Depot and Lowe's in the hardware category had increased the hardware/hardline's share to 38.9 percent of the total market. The independent sector's share (garden centers, nurseries, and farm stores) decreased to 31.1 percent, and the share held by warehouse clubs, chain stores, and mass merchandisers (Walmart and K-mart are the largest) decreased to 30 percent (Greenidge 2002). These changes in market share, while dramatic, are not surprising given the rapid growth in the number of big-box stores and typical sales of lawn, garden, and nursery items in those stores. National data, for example, show 2001 lawn and garden sales in the average Home Depot store at more than \$5.2 million annually, sales in the average Lowe's store at \$5 million annually, and sales in the average home center store (a category that includes Home Depot and Lowe's) at \$4.67 million annually (Morey, Morey, and Morey).

Retail florists are not included in the store types or total sales figures reported in Table 5. In addition, *Nursery Retailer's* independent sector (garden centers, nurseries, and farm stores) discussed previously undoubtedly includes more retailers than counted by the California State Board of Equalization in the farm and garden supply store category shown in Table 4. Retail florists have faced competition from and loss of market share to other store types, especially supermarkets. Data for market share over time were not available, but estimates of California's 2001 floral

Table 6. Estimated Market Shares of Various Retail Store Types for Sales of Flower Products in California, 2001

Flower Product	Cut Flowers	Flowering and Greenhouse Plants	Outdoor Garden and Bedding
Florist Shop	47.4	12.7	0.7
Garden Center	0.6	19.0	39.5
Discount Chain	0.7	6.7	7.8
Home Improvement/ Hardware	0.2	20.9	37.4
Supermarket	25.9	20.5	2.6
Warehouse/ Price Club	8.3	3.4	0.4
Other Store	16.9	16.8	11.6

Source: Sales estimates provided by The American Floral Endowment, Glen Carbon, Illinois.

market shares by type of retail outlet were provided by The American Floral Endowment (AFE).

AFE collects detailed data on retail flower sales from a national consumer panel and uses this panel data to develop timely detailed sales estimates for use by its subscribing members. Sales data are collected for three major types of flower products—cut flowers, flowering and greenhouse plants, and outdoor garden and bedding plants. These three floral product categories accounted for 43, 23, and 32 percent, respectively, of estimated total 2001 California retail flower sales. The importance of the various retailers varies significantly by flower product category.

The dominant outlet for cut flowers was florist shops, which had a 47.4 percent market share, followed by supermarkets, which had a 25.9 percent share (Table 6). Home improvement/hardware stores, supermarkets, and garden centers each retailed about a one-fifth share of flowering and greenhouse plants. Garden centers and home improvement/hardware stores had the dominant market shares for outdoor garden and bedding plants in California.

Retail Margins

Gross profit margins (sales revenue minus cost of goods sold) vary across retail store types and among stores within a given type because of factors such as firm size, location, services provided, product mix, product perishability, and competitive conditions.

⁷ Greenidge noted that garden centers, nurseries, and farm stores had about 60 percent of the market in 1980.

Table 7. Estimated Percentage Gross Margin for Floral and Nursery Products by Retail Store Type, Estimated Total Floral and Nursery Sales, and Total Margin, California, 2001

Retail Store Type	Gross Margin percent	Retail Sales million dollars	Total Margin million dollars
Hardware/Big Box	30	3,576.077	1,072.8231
Independent Farm/Garden	45	2,859.023	1,286.5604
Chain/Warehouse	33	2,757.900	919.3000
Florists	50	988.022	494.0110
Total	37	10,181.112	3,772.6945

Source: Gross margin estimates provided by members of the California Association of Nurseries and Garden Centers; retail sales estimates are from *Nursery Retailer* and the California State Board of Equalization (Tables 4 and 5).

Estimates of gross margins are an essential component for deriving estimates of the economic contributions of California's floral and nursery industry.

California lawn, garden, and floral product retail sales are estimated at slightly more than \$10.18 billion in 2001.

Estimated gross margins and 2001 retail sales are shown in Table 7. Gross margins range from a low of 30 percent for the largest volume retailers (hardware/big box) to a high of 50 percent for retail florists. Note that these are estimated averages for the categories and that individual stores within a category ranged above and below the estimate. The weighted average retail gross margin is slightly more than 37 percent. Total

ESTIMATED ECONOMIC IMPACTS

California's floral and nursery sector is closely intertwined with other sectors of the state's economy, and changes in flower and nursery production have ripple effects throughout the state. Each dollar earned in the floral and nursery sector stimulates economic activity in the form of jobs, income, and output. The effects of changes in floral and nursery production on total economic activity are estimated through multipliers developed from input-output models. For this study we used the IMPLAN (Impact Analyses and Planning) system, developed by the U.S. Forest Service and USDA, to estimate economic input-output models for individual California counties and the state.⁸ The input-output models provide detailed economic multipliers for greenhouse and nursery production and retailing, as well as for all other sectors of the California economy. A brief description of the IMPLAN system is included in the Appendix in Table A6.

or retailing, indirect effects are changes in interindustry transactions as supplying industries respond to increased demands from nursery production or retailing, and induced effects are changes in local spending that result from income changes in the directly and indirectly affected industry sectors. The sum of direct, indirect, and induced effects is the total-effects multiplier. We estimate Type SAM (social accounting matrix) multipliers for output, employment, value added, and labor income.

Lindall and Olson describe the IMPLAN multipliers. Type SAM multipliers are the direct, indirect, and induced effects where the induced effect is based on information in the social account matrix. This relationship accounts for social security and income tax leakage, institution savings, and commuting. Interpretation of the tabled multipliers follows.

Economic Multipliers

IMPLAN models of the California economy were constructed for the ten individual counties with the largest 2001 flower and nursery production in the state. The estimated multipliers for California nursery production and lawn and garden retailing are shown in Table 8. The total-effects multipliers for the ten California counties are shown in Table 9.

IMPLAN multipliers for California nursery production and retailing estimate three components of total change for a particular county or the state. Direct effects are the initial change in nursery production

Table 8. Estimated IMPLAN Multipliers for the California Nursery Industry

Type/Sector	Direct Effects	Indirect Effects	Induced Effects	Total Effects
Output				
Nursery	1.0000	0.1646	0.3407	1.5053
Retail	1.0000	0.0999	0.3760	1.4759
Employment (jobs/\$ million)				
Nursery	19.9723	2.1496	3.4478	25.5696
Retail	18.4669	1.0159	3.8046	23.2874
Value Added				
Nursery	0.8084	0.1029	0.2120	1.1232
Retail	0.8816	0.0626	0.2339	1.1781
Labor Income				
Nursery	0.4752	0.0657	0.1318	0.6727
Retail	0.5551	0.0393	0.1455	0.7399

Source: Minnesota IMPLAN Group (MIG), Inc., 2003.

⁸ We used IMPLAN PRO software licensed from Minnesota IMPLAN Group, Inc. (MIG) and the associated databases for California. For a detailed description of the software and data, see MIG, *Implan Professional Social Accounting and Impact Analysis Software User's Guide, Analysis Guide and Data Guide*, 1997.

- Output multipliers relate changes in sales to final demand by one industry (nursery or retail) to total changes in output (gross sales) by all industries within the local area. An industry output multiplier of 1.50 would indicate that a change in sales to final demand of \$1.00 by the industry in question would result in a total change in local output of \$1.50.
- Labor-income and employment multipliers relate changes in direct production to changes in labor income and employment within the local economy. For example, a labor-income multiplier for a direct industry change of 1.75 indicates that a \$1.00 change in output in the direct industry will produce an employment income change of \$1.75 in the local economy. Similarly, an employment multiplier of 25 indicates that 25 jobs are created for each \$1 million of output by the industry.
- Value-added multipliers are interpreted the same as labor-income and employment multipliers. They relate changes in sales in the industry experiencing the direct effect to total changes in value added for the local economy. Value added includes employee compensation, proprietary income, other property type income, and indirect business taxes.

Estimated Economic Impacts

The economic multipliers in Table 8 were combined with floral and nursery sales at the producer level and lawn, garden, and floral retail gross margins to estimate total contributions of the industry to the California economy. Procedures and important assumptions used to estimate economic impacts follow. First, the direct effects multipliers of 1.0 for nursery and retail output were applied to the total 2001 wholesale value of California nursery products and gross margins for lawn and garden retailing. The total-effects multiplier, which includes the indirect and induced output multipliers, was applied to the direct output to obtain total output. Second, the direct effects for employment, value added, and labor income were all derived from the direct output values.

Estimated total economic impacts of California's flower and nursery production and lawn and garden retailing are shown in Table 10. Note that the direct output effects, from Table 3 and Table 7, total \$6.9 billion. The indirect and induced economic multiplier effects expand the total California output effect to \$10.3 billion. Based on reported input-output relationships, flower and nursery production generates a total of 81,011 jobs in California while lawn and garden retailing adds another 87,856 jobs, a combined total of 168,867 California jobs. The estimated payroll for the two sectors totals more than \$4.9 billion with \$2.1 billion from floral and nursery production and almost \$2.8 billion from lawn and

Table 9. Estimated Output, Employment, and Value-Added Total-Effects Economic Multipliers for the Nursery Industry in Selected California Counties

County	Output		Employment		Value Added	
	Nursery	Retail	Nursery	Retail	Nursery	Retail
San Diego	1.4766	1.4453	24.1083	22.9199	1.0665	1.1648
Ventura	1.4717	1.4127	25.3528	21.9990	1.0761	1.1375
Orange	1.3354	1.4027	29.8705	20.6946	1.1526	1.1314
Monterey	1.9023	1.5529	27.4385	25.9316	1.9022	1.5529
Los Angeles	1.3426	1.4122	27.9808	22.4117	1.1481	1.1286
Santa Clara	1.2344	1.2509	26.3628	19.4947	1.0384	1.0328
Riverside	1.5717	1.5013	24.1843	25.3873	1.1109	1.2006
San Mateo	1.4194	1.4383	28.4814	20.7759	1.1330	1.1689
Santa Barbara	1.5338	1.4587	28.8306	24.9838	1.1241	1.1806
Kern	1.6645	1.5393	25.6954	28.2864	1.1320	1.2282

Source: Minnesota IMPLAN Group, Inc., 2003.

Table 10. Estimated Direct and Total Economic Effects of California Flower and Nursery Production and Lawn and Garden Retailing, 2001

Type/Sector	Direct Effects	Total Effects
Output (million dollars)		
Nursery	3,168.2516	4,769.1691
Retail	3,772.6945	5,568.1198
Total	6,940.9461	10,337.2889
Employment (jobs)		
Nursery	63,277	81,011
Retail	69,670	87,856
Total	132,947	168,867
Value Added (million dollars)		
Nursery	2,561.2146	3,558.5801
Retail	3,326.0075	4,444.6113
Total	5,887.2221	8,003.1915
Labor Income (million dollars)		
Nursery	1,505.5532	2,131.2828
Retail	2,094.2227	2,791.4167
Total	3,599.7759	4,922.6995

garden retailing. Total value added for the two sectors is just slightly more than \$8 billion with almost \$3.6 billion from floral and nursery production and a little more than \$4.4 billion from lawn and garden retailing. The difference between total effects and direct effects for each row in Table 10 is the sum of indirect and induced effects.

The estimated economic multipliers for the ten California counties with the greatest nursery and floral production (Table 9) were combined with direct output (Table 2) and estimated retail gross margins by county to estimate total output, employment, and value-added effects for California's nursery and floral production and lawn and garden retailing. The resulting estimates are shown in Table 11. Note that the counties that produce the most are not necessarily the largest sources of retail sales since sales and gross-margin estimates are based on each county's population. While the top ten counties account for more than 73 percent of California production, they account for a little less than 63 percent of the state's population. The combined output effects for the nursery and retail industries in the ten counties is \$6.808 billion (Table 11), which is almost 66 percent of California's total output effect of \$10.337 billion (Table 10). The nursery and floral industries have a huge

Table 11. Estimated Total Output, Employment, and Value-Added Effects of Nursery and Floral Production and Lawn and Garden Retailing in California's Top Ten Producing Counties, 2001

County	Output million dollars		Employment number of jobs		Value Added million dollars	
	Nursery	Retail	Nursery	Retail	Nursery	Retail
San Diego	1,262.698	453.515	20,616	7,192	912.006	365.498
Ventura	328.731	118.606	5,663	1,847	240.366	95.501
Orange	292.230	443.271	6,537	6,540	252.227	357.537
Monterey	339.682	69.022	4,900	1,153	339.664	69.022
Los Angeles	230.989	1,495.828	4,814	23,739	197.526	1,195.433
Santa Clara	185.487	233.019	3,961	3,631	156.035	192.391
Riverside	217.478	260.852	3,346	4,411	153.716	208.605
San Mateo	193.908	112.423	3,891	1,624	154.783	91.366
Santa Barbara	201.570	64.531	3,789	1,105	147.728	52.229
Kern	190.750	113.765	2,945	2,091	129.726	90.773
Total	3,443.524	3,364.833	60,461	53,332	2,683.778	2,718.355

Source: Minnesota IMPLAN Group, Inc., 2003.

economic impact in San Diego County, accounting for more than 20,000 jobs, \$1.26 billion in output, and \$912 million in value added. While not as dramatic, the output, employment, and value-added effects in the other nine counties are also substantial and very important. The total output effects of the nursery industry, for example, exceed \$290 million for three of the nine counties, and three more counties have total output impacts ranging from \$200 to \$231 million. In terms of employment in the nine counties, the nursery industry accounts for a low of 2,945 jobs

in Kern County to a high of 6,537 jobs in Orange County (Table 11).⁹

Los Angeles County dominates the retail lawn and garden sales impacts shown in Table 11. This is not surprising given that it had 9,653,900 residents in 2001, slightly more than 28 percent of California's population. There are 778 incidental retailers and 824 specialty retailers for nursery and floral products in Los Angeles County (Appendix, Table A5). San Diego and Orange Counties have very important but smaller retail impacts.

⁹ A reviewer asked about the relative impact of nursery and floral production on employment. Using data from the California Department of Employment Development Web site, we calculated the proportion of total 2001 employment attributed to nursery and floral production. For all of California, the nursery and floral industries generated 1.17 percent of total employment in 2001. For the ten counties shown in Table 11, the largest relative employment impacts were in Monterey (3.98 percent of total county employment), Santa Barbara (3.02 percent), Ventura (2.65 percent), San Diego (2.30 percent), and Kern (2.18 percent). The smallest relative impacts were in Los Angeles (0.70 percent), Santa Clara (0.80 percent), Orange (0.93 percent), San Mateo (1.47 percent), and Riverside (1.59 percent).

CONCLUDING COMMENTS

The California nursery and floral industries have demonstrated significant growth during the last two decades, in real terms and relative to all of California agriculture. Dimensions of this growth include expansion in the number and average size of farms producing nursery and floral products, a threefold increase in crop revenues, and growth to 10.6 percent of the total value of California agricultural output. Recent growth of output has come primarily from nursery production. The flower industry and cut flowers in particular have faced significant competition from imports from Colombia, Costa Rica, Ecuador, Mexico, and the Netherlands.

Data for the nursery and floral industries are typically reported separately. Annual county agricultural commissioners' reports have ranked the nursery industry third among all California commodities in terms of value of production since 1994; the flower industry has ranked seventh. Recently, the nursery and floral industries combined have ranked second among all California agricultural products. At the national level, California's nursery and flower industries lead the nation; Florida ranks a distant second.

Fifty-five of California's 58 counties produce nursery and flower products, but output is small and not reported separately by agricultural commissioners in nine of the counties. As noted, nursery and flower production tends to be concentrated in coastal counties from San Mateo in the north to San Diego in the south. Fifteen counties account for more than 86 percent of total production. Nursery and flower production was the number one agricultural product in terms of value of production in 13 counties with values in 2001 ranging from more than \$855 million in San Diego to \$4 million in Inyo. The location of many nursery and flower producers in the most urbanized areas of California is a distinguishing feature of the industry. These producers are close to many of their customers, helping them to deliver quality products and minimize distribution costs.

The large, growing, economically important nursery and flower production sector is accompanied by

a large and growing retail sector. California is the largest single market for lawn and garden products in the United States with 2001 retail sales estimated at more than \$10.1 billion. The combined effects of nursery and flower production and lawn and garden retailing on the California economy are huge.

The total economic impacts of California flower and nursery production and lawn and garden retailing were estimated at more than \$10.3 billion in 2001. Based on reported input-output relationships, flower and nursery production generates 81,011 jobs in California while lawn and garden retailing adds another 87,856 jobs, resulting in a combined total of 168,867 California jobs—1.17 percent of total California employment in 2001. The estimated payroll for the two sectors together exceeded \$4.9 billion with \$2.1 billion from floral and nursery production and almost \$2.8 billion from lawn and garden retailing. Total value added for the two sectors was slightly more than \$8 billion with almost \$3.6 billion from floral and nursery production and a little more than \$4.4 billion from lawn and garden retailing.

The important message that the nursery and flower industries should deliver to policymakers, agricultural leaders, and the general public at every available opportunity is that the industries are large, growing, and economically important. In terms of total output, the California nursery industry is exceeded only by the dairy and grape industries, and when the nursery and flower industries are combined, their output is exceeded only by the dairy industry. Nursery and floral production exceeds the output of many large, well-known, world-class California agricultural industries, including, for example, lettuce, cattle, strawberries, tomatoes, almonds, cotton, chickens, oranges, broccoli, carrots, walnuts, avocados, celery, melons, and peaches. Recently, more than \$1.06 of every \$10 of California agricultural gross sales were from nursery and floral products. And finally, more than one out of every hundred jobs in California during 2001 could be attributed to the direct and indirect impacts of California nursery production and retailing.

REFERENCES

- California Agricultural Statistics Service. County Agricultural Commissioners' data. Sacramento CA, 1989–2001. Available online as Microsoft Excel files at www.nass.usda.gov/ca/bul/agcom/indexcac.htm.
- California Agricultural Statistics Service. *Summary of County Agricultural Commissioners' Reports, 2001*. Sacramento CA, 2001.
- California Agricultural Statistics Service. *California Agricultural Statistics, Floriculture*. Sacramento, CA, 2001 and 2002. Available online at www.nass.usda.gov/ca/bul/agstat/indexcas.htm.
- California Department of Employment Development. Labor market information. Sacramento CA, 2001. Available online at [www.calmis.ca.gov/file/occup\\$/oes\\$.htm](http://www.calmis.ca.gov/file/occup$/oes$.htm).
- California Department of Employment Development. *California Agricultural Bulletin*. Sacramento CA, 1999–2001. Available online at www.calmis.ca.gov/htmlfile/subject/agric.htm.
- California Department of Finance, Demographic Research Unit. Population estimate data for cities, counties, and state. Sacramento CA, 2001. Available online at www.dof.ca.gov/HTML/DEMOGRAP/Hist_E-4.xls.
- California Department of Food and Agriculture. *Resource Directory, California Agriculture: A Tradition of Innovation*. Sacramento CA, 2002. Available online at www.cdfa.ca.gov/card/card_new02.htm.
- California Department of Food and Agriculture, Nursery Program. *Value of California Nursery Products, Fiscal Year 2001/2002*. Sacramento CA, 2002.
- California Department of Food and Agriculture. *Nurserymen and Others Licensed to Sell Nursery Stock in California, 2002 Directory*. Sacramento CA, 2002. Available online at www.plant.cdfa.ca.gov/nurserylicense/nlmenu.asp.
- California State Board of Equalization, Research and Statistics Section. *Taxable Sales in California during 2001, Forty-First Annual Report*. Sacramento CA, 2002. Available online at www.boe.ca.gov/news/pdf/ts_a01.pdf.
- Greenidge, Chuck. "Gaze into 1995. Will L&G Thrive?" *Nursery Retailer* 40(1) (1995):50–53.
- Greenidge, Chuck. "2002 Looks Bright as Sales Steadily Rise." *Nursery Retailer* 47(1) (2002):62–68. (Articles by Dr. Greenidge in the February/March issues for earlier years include similar data series.)
- IMPLAN Pro 2.0.1016. Minnesota IMPLAN Group, Inc., Stillwater, Minnesota (www.implan.com).
- IMPLAN data for California, 1998, Minnesota IMPLAN Group Version 1.08.01. Minnesota IMPLAN Group, Inc., Stillwater, Minnesota (www.implan.com).
- Lindall, S.A., and D.C. Olson. *The IMPLAN Input-Output System*. Stillwater, MN: Minnesota IMPLAN Group, Inc. (www.implan.com).
- Minnesota IMPLAN Group, Inc. *IMPLAN Professional Social Accounting and Impact Analysis Software, User's Guide, Analysis Guide and Data Guide*. 2d ed. Stillwater, MN: MIG, Inc., 1997. Available online at www.implan.com.
- Morey, R.W., J. Morey, and C. Morey. "2002 Nursery Retailer 100." *Nursery Retailer* 47(2) (2002). (The April/May issues for earlier years report the same data series.)
- Mulkey, W.D., and A.W. Hodges. *Using IMPLAN to Assess Local Economic Impacts*. Gainesville, FL: University of Florida Institute of Food and Agricultural Sciences Fact Sheet, 2000. Available online at <http://edis.ifas.ufl.edu/FE168>.
- Prince & Prince, Inc. *California Cut-Flower Production and Industry Trends 2000: A State-Wide Survey of Cut-Flower Growers*. Columbus, OH: Prince & Prince, Inc. Marketing Research Report, 2000.
- United States Department of Agriculture, Economic Research Service. *Floriculture and Nursery Crops Situation and Outlook Yearbook*. Washington DC, 2002. Available online at <http://usda.mannlib.cornell.edu>.
- United States Department of Agriculture, National Agricultural Statistics Service. *Census of Agriculture*. Washington DC, 1982–1997. Available online at www.nass.usda.gov/census/census97/volume1/vol1pubs.htm.

United States Department of Agriculture, National Agricultural Statistics Service. *Floriculture Crops 2001 Summary*. Washington DC, 2002. Available online at <http://usda.mannlib.cornell.edu>.

United States Government Printing Office. *Economic Report of the President*. Washington DC, 2002. Available from online at http://w3.access.gpo.gov/usbudget/fy2003/pdf/2002_erp.pdf.

APPENDIX

Table A1. California's Top 20 Commodities with Values and Ranks for 1999-2001

Commodity	1999		2000		2001	
	Value in Million Dollars	Rank	Value in Million Dollars	Rank	Value in Million Dollars	Rank
Milk and Cream	4,091	1	3,707	1	4,630	1
Grapes	2,656	2	2,829	2	2,651	2
Nursery	2,009	3	2,247	3	2,087	3
Lettuce	1,130	5	1,494	4	1,370	4
Cattle and Calves	1,223	4	1,218	5	1,352	5
Hay	767	9	769	9	1,021	6
Flowers	776	8	931	7	998	7
Strawberries	904	7	840	8	841	8
Tomatoes	1,118	6	948	6	766	9
Almonds	688	10	666	11	732	10
Cotton	672	11	720	10	658	11
Chickens	515	12	471	13	532	12
Oranges	404	15	346	14	514	13
Broccoli	433	14	574	12	438	14
Carrots	434	13	322	17	434	15
Walnuts	251	19	296	18	342	16
Avocados	327	16	340	15	316	17
Celery	210	25	325	16	260	18
Melons, Cantaloupe	222	22	226	24	252	19
Peaches	238	21	252	21	247	20

Source: California Department of Food and Agriculture, *Resource Directory, California Agriculture: A Tradition of Innovation*, 2002.

Table A2. Value (Thousand Dollars) of California Nursery, Flower, and Foliage Production by County, 1992–2001

County	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Alameda	33,725	31,873	34,641	28,933	25,211	25,215	17,421	19,058	14,049	15,108
Amador	19	22	30	33	48	130	174	209	216	241
Butte	5,085	6,351	6,400	7,437	4,485	5,350	3,610	6,400	5,961	8,555
Calaveras	471	585	856	864	883	896	740	597	452	543
Contra Costa	17,884	24,940	25,409	21,782	26,219	31,288	30,663	28,202	32,105	37,510
Del Norte	10,710	9,721	11,357	10,895	10,683	12,415	13,322	14,831	15,427	16,151
El Dorado	3,868	4,166	3,540	4,149	4,302	4,374	4,114	4,855	5,812	5,988
Fresno	16,747	21,294	23,945	16,211	16,847	36,837	29,576	32,531	28,905	32,014
Glenn	2,191	2,403	2,340	2,178	2,165	2,461	2,615	3,503	3,258	4,238
Humboldt	17,923	20,940	20,940	17,419	17,419	22,577	23,227	25,806	32,859	33,952
Inyo	1,111	1,109	1,324	1,525	3,485	2,341	2,897	2,981	3,515	4,020
Kern	58,191	59,536	62,891	68,710	72,383	79,629	82,636	99,129	106,246	114,599
Kings	0	1,958	2,343	0	0	0	0	0	0	0
Lake	332	332	326	6	12	408	408	408	408	408
Lassen	8,730	10,440	12,329	10,683	8,702	9,512	7,702	11,609	12,336	9,860
Los Angeles	151,536	147,068	153,625	156,909	166,086	172,577	186,660	180,790	170,185	172,046
Madera	4,294	3,855	3,160	3,470	5,324	4,541	15,128	30,200	37,500	24,543
Marin	1,151	1,199	1,000	556	576	547	683	708	814	675
Mariposa	93	93	95	100	108	108	99	136	152	147
Mendocino	2,596	2,123	2,296	2,510	3,092	3,117	2,685	2,620	2,550	2,790
Merced	11,212	14,603	14,923	14,093	14,265	15,833	19,007	23,747	21,758	22,233
Monterey	147,528	116,515	105,514	111,199	114,176	135,893	154,297	180,822	194,252	178,564
Napa	2,176	2,666	2,615	2,881	2,181	2,749	3,804	3,156	3,250	4,720
Nevada	593	509	522	639	564	752	594	633	515	334
Orange	131,397	117,405	127,988	132,780	143,537	165,727	168,387	200,966	214,877	218,833
Placer	8,698	7,825	7,825	8,856	9,513	10,245	10,797	12,090	11,505	12,854
Plumas	1,250	1,400	1,475	0	0	0	0	0	0	0
Riverside	50,257	47,551	79,537	71,169	81,943	82,827	94,549	90,377	107,520	138,371
Sacramento	22,757	16,643	9,910	9,582	15,745	15,969	17,933	17,113	26,408	28,968
San Benito	18,598	23,364	19,384	14,992	15,350	15,668	16,985	19,682	28,428	25,207
San Bernardino	23,141	21,517	22,915	21,906	22,890	23,303	21,718	26,458	29,502	34,617
San Diego	509,768	556,921	585,433	643,193	692,106	704,988	722,186	773,081	790,140	855,139
San Francisco	356	530	475	564	702	482	447	759	727	913
San Joaquin	38,701	53,722	58,538	63,601	97,916	97,059	74,115	81,937	88,257	99,224
San Luis Obispo	37,230	39,301	44,585	49,607	55,546	65,188	70,155	85,149	89,168	91,128
San Mateo	168,909	164,707	165,401	161,611	169,657	171,854	142,460	142,842	154,756	136,613
Santa Barbara	80,573	86,755	78,753	95,244	122,857	139,849	130,038	135,042	150,669	131,419
Santa Clara	48,640	46,228	45,666	40,522	42,824	40,740	45,446	48,467	177,146	150,265
Santa Cruz	54,115	48,174	43,859	51,762	62,972	73,110	56,686	71,562	76,556	75,025
Shasta	9,587	8,229	9,622	9,502	8,865	8,674	8,462	9,534	8,212	8,830
Sierra	450	420	443	0	0	0	0	0	0	0
Siskiyou	6,922	6,566	7,939	9,962	14,526	16,722	17,844	20,695	25,076	30,789
Solano	14,169	14,512	17,345	19,715	22,348	24,078	26,408	28,978	35,045	37,668
Sonoma	25,864	29,297	28,797	30,996	33,078	27,427	27,836	23,133	33,272	30,069
Stanislaus	26,970	28,062	30,906	29,793	32,180	35,553	36,758	64,111	68,642	68,960
Sutter	6,151	8,888	9,116	10,129	7,502	11,839	9,891	11,819	8,025	9,387
Tehama	1,104	867	765	1,228	1,131	1,225	1,651	1,367	1,309	1,991
Trinity	12	32	32	35	35	35	37	32	32	32
Tulare	19,639	22,255	24,176	28,524	43,399	51,823	65,306	69,682	72,730	65,175
Ventura	97,001	105,417	111,230	108,387	124,123	138,808	162,063	180,624	204,828	223,368
Yolo	3,753	3,746	4,514	5,584	5,028	5,603	2,771	4,954	4,533	6,991
Yuba	10	0	0	0	0	0	0	0	0	0
Total Calculated	1,904,188	1,944,635	2,029,050	2,102,426	2,324,989	2,498,346	2,532,991	2,793,385	3,099,888	3,171,075
Total Reported	1,901,303	1,944,632	2,029,646	2,102,425	2,324,650	2,498,345	2,547,817	2,793,384	3,096,592	3,171,074
Total Calif. Agric.	21,766,419	23,697,420	24,373,778	24,947,169	26,260,004	28,048,589	26,950,521	28,647,905	29,349,616	29,801,768

Counties reporting no production: Colusa, Imperial, Tuolumne, Modoc, Mono.

Source: California Agricultural Statistics Service, *Summary of County Agricultural Commissioners' Reports, 2001, 2001*.

Table A3. Five Leading Nursery Crops for Each of the Ten California Counties Producing the Largest Amount of Nursery and Floral Products, 2001

	Gross Value of Nursery Product	Percent Share of County Total
San Diego		
Flowers Foliage Plants	\$308,854,200	36.12
Nursery Woody Ornamentals	198,542,500	23.22
Nursery Plants Bedding	165,465,500	19.35
Flowers Cut Unspecified	71,822,000	8.40
Flowers Poinsettia Potted	42,658,400	4.99
Ventura		
Nursery Plants Bedding	\$65,119,000	29.15
Nursery Woody Ornamentals	56,930,000	25.49
Flowers Cut Unspecified	48,628,000	21.77
Nursery Plants Potted Unspecified	16,963,000	7.59
Nursery Flowering Propagative Materials	10,491,000	4.70
Orange		
Nursery Woody Ornamentals	\$172,662,000	78.90
Nursery Plants Potted Unspecified	25,197,600	11.51
Nursery Flowering Propagative Materials	19,079,900	8.72
Flowers Cut Unspecified	1,425,200	0.65
Christmas Trees and Cut Greens	368,400	0.17
Monterey		
Nursery Plants Vegetation. Bedding	\$57,634,000	32.38
Nursery Plants Bedding	41,983,000	23.59
Nursery Plants Orchid	18,296,000	10.28
Flowers Foliage Plants	13,095,000	7.36
Flowers Roses Cut Standard	8,260,000	4.64
Los Angeles		
Nursery Woody Ornamentals	\$114,254,000	66.41
Nursery Plants Bedding	40,692,000	23.65
Nursery Products Miscellaneous	10,246,000	5.96
Nursery Plants Potted Unspecified	3,534,000	2.05
Flowers Foliage Plants	2,581,000	1.50
Santa Clara		
Nursery Products Miscellaneous	\$89,848,000	55.96
Nursery Plants Bedding	34,057,000	21.21
Nursery Woody Ornamentals	14,698,000	9.15
Flowers Roses Cut Standard	10,301,000	6.42
Nursery Horticultural Specimens Misc.	5,665,000	3.53

continued on page 27

Table A3 (continued)

	Gross Value of Nursery Product	Percent Share of County Total
Riverside		
Nursery Woody Ornamentals	\$94,015,800	67.94
Nursery Turf	29,796,000	21.53
Nursery Flowering Propagative Materials	13,109,000	9.47
Flowers Cut Unspecified	1,035,100	0.75
Christmas Trees and Cut Greens	415,400	0.30
San Mateo		
Nursery Plants Potted Unspecified	\$56,154,000	41.10
Flowers Foliage Plants	22,180,000	16.24
Nursery Flowering Propagative Materials	22,119,000	16.19
Flowers Cut Unspecified	16,761,000	12.27
Nursery Plants Orchid	9,391,000	6.87
Santa Barbara		
Flowers Cut Unspecified	\$48,269,000	38.44
Nursery Plants Potted Unspecified	19,371,800	15.43
Nursery Products Miscellaneous	16,979,200	13.52
Flowers Chrysanthemum Unspecified	9,269,100	7.38
Nursery Plants Orchid	6,855,000	5.46
Kern		
Nursery Plants Rose	\$54,062,000	47.18
Nursery Fruit/Vine/Nut Non-Bearing	38,222,000	33.35
Nursery Turf	15,178,000	13.24
Nursery Herbaceous Perennials	4,853,000	4.23
Nursery Woody Ornamentals	1,161,000	1.01

Source: California Agricultural Statistics Service, *Summary of County Agricultural Commissioners' Reports, 2001, 2001.*

Table A4. Population and Value of Nursery and Floral Production by County, California, 2001

County	Population	Value of Nursery Product thousand dollars	County	Population	Value of Nursery Product thousand dollars
Alameda	1,462,900	15,108	Orange	2,880,200	218,833
Alpine	1,190	N/A	Placer	254,900	12,854
Amador	35,550	241	Plumas	20,850	0
Butte	205,400	8,555	Riverside	1,583,600	138,371
Calaveras	41,050	543	Sacramento	1,247,800	28,968
Colusa	19,150	0	San Benito	54,400	25,207
Contra Costa	965,100	37,510	San Bernardino	1,741,100	34,617
Del Norte	27,650	16,151	San Diego	2,859,900	855,139
El Dorado	161,600	5,988	San Francisco	785,700	913
Fresno	813,200	32,014	San Joaquin	578,600	99,224
Glenn	26,800	4,238	San Luis Obispo	249,700	91,128
Humboldt	127,200	33,952	San Mateo	712,400	136,613
Imperial	148,300	0	Santa Barbara	403,200	131,419
Inyo	18,200	4,020	Santa Clara	1,697,800	150,265
Kern	673,600	114,599	Santa Cruz	257,500	75,025
Kings	131,300	0	Shasta	166,700	8,830
Lake	59,500	408	Sierra	3,570	0
Lassen	34,300	9,860	Siskiyou	44,650	30,789
Los Angeles	9,653,900	172,046	Solano	398,600	37,668
Madera	128,600	24,543	Sonoma	464,300	30,069
Marin	248,100	675	Stanislaus	457,700	68,960
Mariposa	17,000	147	Sutter	80,100	9,387
Mendocino	87,100	2,790	Tehama	56,100	1,991
Merced	213,000	22,233	Trinity	13,000	32
Modoc	9,400	0	Tulare	372,400	65,175
Mono	12,950	0	Tuolumne	55,200	0
Monterey	405,100	178,564	Ventura	765,200	223,368
Napa	126,600	4,720	Yolo	171,800	6,991
Nevada	93,100	334	Yuba	60,900	0
			State	34,384,710	3,171,075

Population data: California Department of Finance data available online at www.dof.ca.gov.

Value of nursery product: California Agricultural Statistics Service, *Summary of County Agricultural Commissioners' Reports, 2001, 2001*.

Table A5. Nursery and Floriculture Products: Number of Producers, Wholesalers, and Retailers Licensed to Sell Nursery Stock in California, 2002, by County

County	Cut Flowers/ Greens Wholesalers	Inci- dental Retailers ^a	Jobber/ Broker/ Commission Merchants	Land- scapers	Producers ^b	Retailers ^c	Total No. of Companies
Alameda	15	84	15	13	43	129	273
Amador	1	9	0	1	7	4	20
Butte	6	31	6	6	38	45	107
Calaveras	1	10	0	3	7	10	27
Colusa	1	2	0	0	1	4	6
Contra Costa	10	86	5	7	24	111	229
Del Norte	0	2	0	1	11	6	21
El Dorado	6	26	2	3	23	25	70
Fresno	6	62	11	16	73	97	239
Glenn	2	3	0	0	7	5	14
Humboldt	9	13	4	2	40	30	87
Imperial	0	8	1	1	10	14	34
Inyo	1	3	1	0	4	7	12
Kern	4	58	6	7	59	81	204
Kings	0	5	0	0	2	12	22
Lake	1	10	1	0	14	12	38
Lassen	1	1	0	0	2	6	11
Los Angeles	83	605	74	73	375	824	1,737
Madera	2	9	3	4	25	15	52
Marin	4	21	3	9	16	38	89
Mariposa	2	4	1	0	4	4	13
Mendocino	5	16	5	8	64	32	103
Merced	1	10	1	0	13	20	50
Modoc	0	2	0	0	3	1	4
Mono	0	1	0	0	0	5	5
Monterey	93	34	14	7	89	46	231
Napa	8	12	9	5	23	24	69
Nevada	3	17	4	3	22	17	51
Orange	16	264	32	40	121	284	666
Placer	14	33	13	17	41	44	125
Plumas	0	5	0	1	3	5	13
Riverside	12	139	28	37	207	208	564
Sacramento	28	101	11	12	50	123	292
San Benito	1	2	2	0	10	7	20
San Bernardino	7	123	12	15	118	180	440
San Diego	176	303	95	49	551	333	1207
San Francisco	40	18	12	4	22	67	150
San Joaquin	9	27	9	6	59	59	162
San Luis Obispo	18	47	5	11	82	56	192
San Mateo	30	39	8	6	54	75	187
Santa Barbara	55	56	14	12	92	59	235
Santa Clara	25	97	11	5	47	161	337

continued on page 30

Table A5 (continued)

County	Cut Flowers/ Greens Wholesalers	Inci- dental Retailers ^a	Jobber/ Broker/ Commission Merchants	Land- scapers	Producers ^b	Retailers ^c	Total No. of Companies
Santa Cruz	46	25	17	4	66	40	167
Shasta	6	23	4	7	36	35	90
Sierra	0	1	0	0	0	0	1
Siskiyou	1	6	0	2	10	6	29
Solano	7	36	3	4	17	36	95
Sonoma	23	52	12	25	128	92	279
Stanislaus	9	28	4	6	37	48	139
Sutter	3	8	1	0	16	14	40
Tehama	1	7	0	1	15	12	29
Trinity	0	1	0	0	1	6	9
Tulare	9	22	3	6	63	46	137
Tuolumne	0	7	3	4	6	9	26
Ventura	45	83	8	9	126	103	304
Yolo	7	11	3	2	17	16	50
Yuba	0	7	0	0	5	8	18
State Total	853	2,715	476	454	2,999	3,756	9,821

Source: California Department of Food and Agriculture, *Nurserymen and Others Licensed to Sell Nursery Stock in California, 2002 Directory*.

^a An incidental retailer is an operator of a retail sales outlet for nursery stock that is handled incidental to other merchandise. Retailers such as Home Depot, Wal-Mart, Lowe's, and supermarkets are in this category.

^b A producer is a commercial producer that grows and sells a total of \$1,000 or more of nursery stock in one year.

^c A retailer is an operator of a sales outlet that has no growing grounds except small areas devoted to production of plants for local distribution and those producing less than \$1,000.

Table A6. The IMPLAN System

The following brief description of IMPLAN is from Mulkey and Hodges.

IMPLAN, an acronym for Impact Analyses and Planning, was originally developed by the U.S. Forest Service in cooperation with the Federal Emergency Management Agency and the U.S. Department of the Interior's Bureau of Land Management to assist in land and resource management planning. It is a computer software package that consists of procedures for estimating local input-output models and associated databases. Since 1993, the IMPLAN system has been developed under exclusive rights by Minnesota IMPLAN Group, Inc., which licenses and distributes the software to users, including universities, government agencies, and private companies.

The economic data for IMPLAN comes from the system of national accounts for the United States based on data collected by the U.S. Department of Commerce, the U.S. Bureau of Labor Statistics, and other federal and state government agencies. Data are collected for 528 distinct producing industry sectors of the national economy corresponding to Standard Industrial Categories (SICs). Industry sectors are classified on the basis of the primary commodity or service produced. Corresponding data sets are also produced for each county in the U.S., allowing analyses at the county level or for individual states. Data on the technological mix of inputs and levels of transactions between producing sectors are taken from detailed input-output tables of the national economy. National and county level data are the basis for IMPLAN calculations of input-output tables and multipliers for local areas.

The IMPLAN software package allows estimation of the multiplier effects of changes in final demand for one industry on all other industries within a local economic area. Multipliers may be estimated for a single county, for groups of contiguous counties, and for an entire state. The multipliers measure total changes in output, income, employment, and value added.

For a particular producing industry, multipliers estimate three components of total change within the local area:

- Direct effects represent the initial change in the industry in question.
- Indirect effects are changes in interindustry transactions as supplying industries respond to increased demands from the directly affected industries.
- Induced effects reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors.

The University of California prohibits discrimination or harassment of any person on the basis of race, color, national origin, religion, sex, gender identity, pregnancy (including childbirth and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or status as a covered veteran (covered veterans are special disabled veterans, recently separated veterans, Vietnam era veterans, or any other veterans who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized) in any of its programs or activities.

University policy is intended to be consistent with the provisions of applicable state and federal laws.

Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action/Staff Personnel Services Director, University of California, Agriculture and Natural Resources, 300 Lakeside Drive, 6th Floor, Oakland, CA 94612-3550, (510) 987-0096.

GIANNINI FOUNDATION INFORMATION SERIES

The Giannini Foundation Information Series (ISSN 0899-3068) is designed to communicate selected research results to a lay audience. The first Information Report was issued in 1963, and reports are numbered serially within years.

The Giannini Foundation of Agricultural Economics was founded in 1930 from a grant made by the Bancitaly Corporation to the University of California in tribute to its organizer and past president, Amadeo Peter Giannini of San Francisco. The broad mission of the foundation is to promote and support research and outreach activities in agricultural economics and rural development relevant to California. In line with those goals, the foundation encourages research in various areas of interest to agricultural and resource economists and supports dissemination of research findings to other researchers and to the public. Foundation membership includes agricultural economists (faculty and Cooperative Extension specialists) at the Department of Agricultural and Resource Economics, Davis, and at the Department of Agricultural and Resource Economics, Berkeley. Associate members include forestry economists in the College of Natural Resources, Berkeley, and economists in the Department of Environmental Sciences at Riverside.

This and other Giannini Foundation publications are available in PDF format online at <http://giannini.ucop.edu/publications.htm>. Hard copies of this report may be ordered from University of California Agriculture and Natural Resources Communication Services.

University of California
Agriculture and Natural Resources (ANR)
Communication Services
6701 San Pablo Avenue, 2nd Floor
Oakland, California 94608-1239
Telephone: 800.994.8849 / 510.642.2431
Fax: 510.643.5470
E-mail: danrcs@ucdavis.edu

Visit the ANR Communication Services Web
site at <http://anrcatalog.ucdavis.edu>

Peter Berck
Giannini Foundation Series Editor
University of California, Berkeley

Julian Alston
Associate Editor
University of California, Davis

Julie McNamara
Managing Editor
University of California, Davis

Angie Erickson
Technical Editor
University of California, Berkeley

Natalie Karst
Production