

Economic Contributions of San Diego County Agriculture



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Economic Contributions of San Diego County Agriculture



County of San Diego

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The Honorable Board of Supervisors of the County of San Diego
Supervisor Dianne Jacob, Chair, District 2
Supervisor Kristin Gaspar, Vice Chair, District 3
Supervisor Greg Cox, District 1
Supervisor Ron Roberts, District 4
Supervisor Bill Horn, District 5

I respectfully submit the **Economic Contributions of San Diego County Agriculture Report** that documents agriculture's broader role in sustaining a thriving local economy. It quantifies local agriculture's total economic contribution through food production, local food processing, employment, and economic multiplier effects.

For 2015, agriculture contributed a total of \$2.88 billion to the county economy. This far exceeds the \$1.70 billion figure from our 2015 *Crop Statistics and Annual Report*. Agriculture also supported 16,648 jobs with 5,021 of those from multiplier effects.

Agriculture contributes to the region in many ways. Sustaining a thriving local agricultural economy is important on many fronts and forms a key component of County initiatives including:

- The Live Well San Diego Initiative that ensures the San Diego region where all residents are healthy, safe, and thriving.
- The Food System Initiative that addresses the issues of the sustainability of local agriculture, food insecurity, and the importance of healthy nutrition for San Diego residents.
- The Purchase of Agriculture Easements (PACE) Program which promotes the long-term preservation of agriculture.
- The Agriculture Promotion Program which promotes agri-tourism and wineries, and simplifies and streamlines regulations.

We appreciate your continued support of local agriculture and our work in promoting a diverse agricultural community, healthy residents, and a sustainable environment. Thank you.

Respectfully,

A handwritten signature in blue ink that reads "Ha Dang".

Ha Dang
Agricultural Commissioner

San Diego County Agriculture:

- ...contributes a total of \$2.88 billion to the local economy, including:
 - \$1.7 billion in direct economic output from agricultural production, and \$70 million from locally sourced, value added food processing;
 - \$1.06 billion in additional economic output in the form of expenditures by agriculture companies and their employees and \$50 million by local wineries and their employees.
- ...provides 16,648 jobs in San Diego County economy, including:
 - 11,390 direct employees in agricultural production and 237 in locally sourced, value added food processing;
 - 4,647 additional jobs attributable to expenditures by agricultural companies and their employees, and 374 additional jobs attributable to expenditures by local wineries and their employees.
- ...has exceptional diversity that provides critical economic stability within agriculture and to the broader county economy (Diversity Index of 2.43).

Introduction

Residents and visitors alike know and value the contributions farmers make to San Diego County. Farmers' markets overflow with locally grown produce and community spirit. Cut flowers and ornamental plants brighten homes, yards, and stores. Avocados, tomatoes, strawberries, and dozens of other crops grow in an ideal Mediterranean climate. Clearly, agriculture plays a vital role in sustaining a healthy local economy. What's not so clear, however, is the true size of that role. How much money does agriculture pump into the local economy? How many jobs does agriculture support? In other words, just how important is agriculture as a driver of the county's economic health?

This report sheds light on these and related questions. Using multiple data sources and advanced economic modeling techniques, it analyzes agriculture's total contribution to the San Diego County economy. The report also examines agricultural diversity and its role in supporting economic resiliency, including a first-ever quantitative measure. On the whole, the findings offer important information for policy makers, the public, and anyone who values a thriving local economy.

Economic Contributions of San Diego County Agriculture

Our Approach

When it comes to economic analysis, it's important to examine the fullest possible range of economic contributions. This report does that by focusing not just on *direct* economic effect such as farm production and employment, but also on *multiplier effects*. *Multiplier effects* are ripples through the economy. These ripples include inter-industry “business to business” supplier purchases as well as “consumption spending” by employees. The **Multiplier Effects** section on page 4 explains this further.

It's appropriate to calculate *multiplier effects* when analyzing what economists call a *basic industry*. A *basic industry* is one that sells most of its products beyond the local area and thus brings outside money into local communities. Agriculture is a basic industry in San Diego County, so this report includes *multiplier effects* when describing agriculture's total economic contribution.

Our analysis only examines agriculture's economic contributions. To understand agriculture's full economic impact, one would also need to assess agricultural-related costs to society, for example net impacts on water and other natural resources. While important, these impacts lie beyond the scope of this study.

Our calculations draw from local and national data sources. Local sources include industry experts and the annual *Crop Statistics and Annual Report* produced by the Department of Agriculture, Weights, and Measures. The main national data source is IMPLAN®, a widely used economic modeling program (see www.implan.com). IMPLAN® uses econometric modeling to convert data from more than a dozen federal government sources into local values for every U.S. county and zip code, across 536 industry sectors. Except where otherwise noted, all figures are from the year 2015, the most recent IMPLAN® dataset available. Please contact the authors for additional details on the methods used.

"Direct Effects" of San Diego County Farm Production

This section focuses on the simplest measures of economic activity: production and employment. It describes total farm production and the number of agriculture jobs.

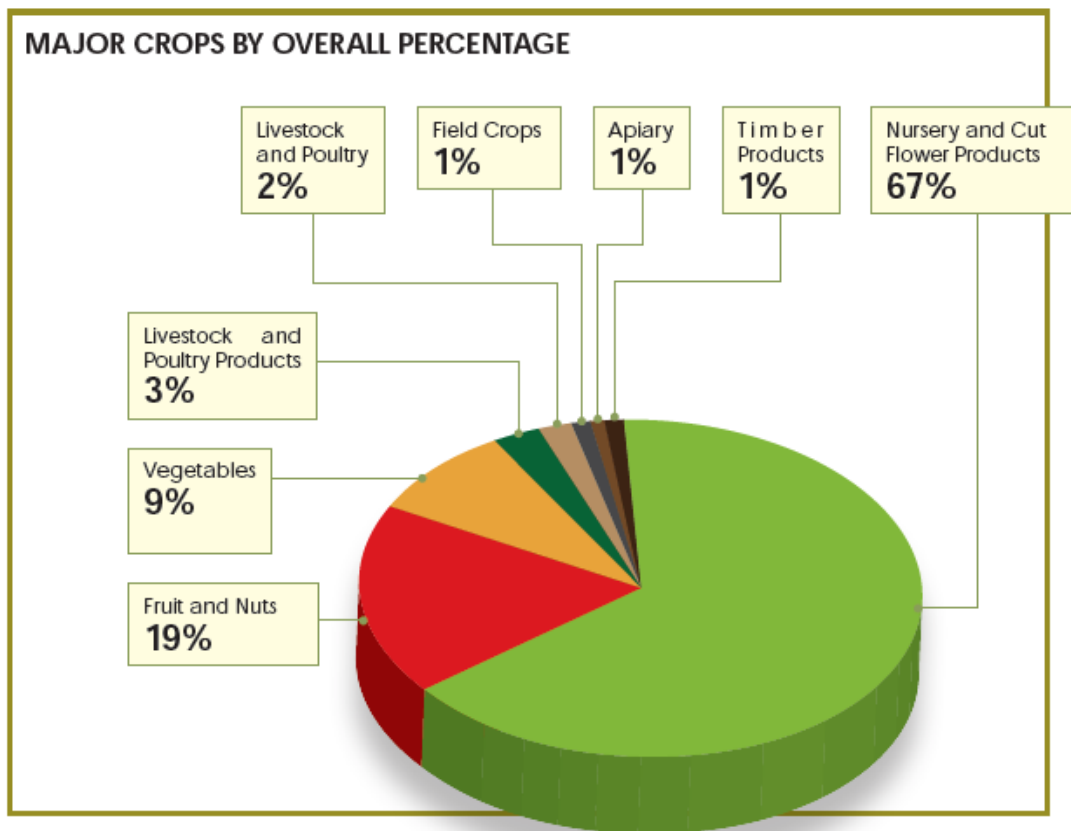
Figure 1 shows the various categories that make up San Diego County farm production value. Nursery and Cut Flower Products are the single largest production category by dollar value (\$1.15 billion), comprising 67% of the county total. Three products dominate this category: Ornamental Trees & Shrubs (\$409.5 million), Indoor Flowering & Foliage Plants (\$344.2 million), and Bedding Plants / Color & Herbaceous Perennials (\$215.4 million). At 19%, Fruits and Nuts represent the second largest category (\$320.7 million), consisting mostly of avocados, lemons, and strawberries. Together, these two super categories account for 86% of the county's direct farm production values.

The combined, total dollar value for all products rose 16.4% over the past decade, from \$1.46 billion in 2006 to \$1.70 billion in 2015. Inflation totaled 19.5% during this period, averaging just under 2% per year, making the net, inflation-adjusted change negative 3.1%. Total values do not reflect net profit or loss experienced by individual growers or by the industry as a whole. Interested readers are encouraged to consult the annual *Crop Statistics and Annual Report* for additional details on specific crops and their value.

Economic Contributions of San Diego County Agriculture

Figure 1: Distribution of San Diego County Farm Production

Source: 2015 San Diego County Crop Statistics and Annual Report



Employment. How many people work in agricultural production? For 2015, agricultural production directly employed 11,390 people in San Diego County. The figure encompasses a wide range of production-related jobs, including not just growing and harvesting, but also sales, marketing and many other roles. It does not include food processing jobs, which we discuss below. Nor does it include employment attributable to other natural resource-based activities, for example 263 jobs in the county's \$11.7 million commercial fishing industry.

“Multiplier Effects” of San Diego County Agricultural Production

This section quantifies the economic “ripples” that agricultural production creates in the local economy. These ripples take two forms: *indirect effects* and *induced effects*. The first consist of “business to business” supplier purchases. For example, when a grower buys farm equipment, fertilizer, seed, insurance, banking services, and other inputs, the grower creates *indirect effects*. The second ripple type, *induced effects*, consists of “consumption spending” by owners and employees of agriculture businesses and their suppliers. They buy housing, healthcare, leisure activities, and other things for their households. All of this spending creates ripples in the economy.

Economic Contributions of San Diego County Agriculture

Figure 2 shows agriculture’s direct, indirect, and induced economic effects within the county, for major production categories. The numbers use IMPLAN multipliers for each sector, which are rooted in U.S. Bureau of Economic Analysis production data and other sources.

For example, “Nursery and Cut Flower Products” in San Diego County has an *indirect effects* multiplier of .2407 and an *induced effects* multiplier of .3955. This means that each dollar’s worth of direct output generates an extra 24 cents in supplier purchases, plus approximately 40 cents extra in consumption spending by agriculture owners and employees. Individual sectors all have different multipliers for *induced* and *indirect* output as well as for employment.

Agricultural production created \$2.76 billion in total economic output within San Diego County, of which \$1.06 billion were multiplier effects. Indirect and induced spending supported an additional 4,647 jobs within the county, bringing agriculture-related production’s total employment to 16,037. These figures do not include the economic output or jobs created by local food processing.

Figure 2: Economic Effects of Agricultural Production

AGRICULTURAL PRODUCTION SECTOR	DIRECT	INDIRECT	INDUCED	TOTAL
Output Effect (\$ Millions)				
Nursery and Cut Flower Products	\$1,146.8	\$276.1	\$453.6	\$1,876.4
Fruits and Nuts	\$320.7	\$74.2	\$134.5	\$529.4
Vegetables	\$146.6	\$29.2	\$51.0	\$226.8
Livestock and Poultry Products	\$47.9	\$14.2	\$8.3	\$70.4
Livestock & Poultry	\$30.9	\$9.2	\$5.4	\$45.4
Apiary	\$4.1	\$1.0	\$1.2	\$6.3
Field Crops	\$4.0	\$1.4	\$1.8	\$7.2
Timber Products	\$0.9	\$0.8	\$0.3	\$2.0
TOTAL ECONOMIC OUTPUT:	\$1,701.8	\$406.0	\$656.0	\$2,763.8
Employment Effect (# Jobs)				
TOTAL EMPLOYMENT:	11,390	1,805	2,842	16,037

Dollar values are in \$ millions. Figures are for 2015 and come from IMPLAN®, Crop Statistics and Annual Reports, and U.S. Bureau of Economic Analysis.

Economic Contributions of San Diego County Agriculture

Locally Sourced, Value Added Food Processing

Farm production tells only part of the story. San Diego County agriculture also includes value-added activities that contribute to the local economy. This section captures the economic value of local value-added food processing. It makes three key points: 1) the county has a thriving food manufacturing industry but nearly all of its raw materials come from elsewhere; 2) local agriculture emphasizes fresh products with little to no processing required; and 3) wineries offer an important exception.

The discussion is neither an exact science nor a full assessment, but rather gives the reader a basic overview of the topic. A full assessment would require significant additional research that includes collecting detailed financial information from individual companies. To avoid overstating the numbers, we only include sectors that fit two strict criteria: 1) they rely heavily on local agricultural inputs; and 2) they are unlikely to exist here without the presence of the associated agricultural sector. These strict criteria rule out nearly all food processing within the county.

Local Food Manufacturing. With \$5.2 billion in 2015 production, local food and beverage manufacturing is one of the county's largest industries. For 2015, the county produced significant quantities of beer (\$2.25 billion), bread and bakery products (\$543.9 million), tortillas (\$292.5 million), and many other products.

Nearly all of this food manufacturing relied on raw products imported from elsewhere. Manufacturers source most of their wheat flour, corn meal, yeast, and other materials from outside the county. The \$27.8 million chocolate industry, for example, imports all its cacao beans from overseas. The \$63.4 million coffee manufacturing sector depends on coffee beans grown in the tropics.

Given its massive size, beer brewing warrants a closer look. Large producers such as Anheuser-Busch do most of the beer brewing and rely on externally sourced raw materials. That said, the "craft" beer niche is growing fast and accounted for an estimated \$850 million in 2015. Local brewers need various raw products, including hops. They import most hops from the Pacific Northwest and Germany. Fifteen local growers have begun producing hops. At an estimated 2,200 pounds for 2015, total production remains small and accounts for less than two-tenths of one percent of the total craft beer market.

Raw product moves not only into the county, but also out of it. For example, ranchers produced \$26.8 million in cattle & calves in 2015 but no commercial meat processing occurs within the county. Nearly all of the county's \$6.9 million in fluid milk production leaves the county for pasteurizing and packaging.

A Focus on Fresh. If local food and beverage manufacturers source most of their raw materials from outside the county, then where do growers sell most of their agricultural products? The answer is that most locally grown products target the "fresh" market.

Growers emphasize fresh products that do not require processing. For example, nearly all of the \$110.5 million avocado crop is sold fresh rather than processed. It makes good financial sense to sell a California-grown avocado whole rather than compete against a giant guacamole producer in Mexico. In fact, a well-known local food company that specializes in oil, mayo, and other avocado-based products uses avocados imported from Kenya and Mexico.

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Citrus offers a similar example. Nearly all lemons (\$70.4 million), oranges (\$27.5 million), and grapefruit (\$11.0 million) go to the fresh market. Only minor exceptions exist, for example some growers that sell a small portion of their total produce to a local organic juice company.

Consultations with local experts revealed other examples of small-scale, valued-added food processing. For example, a few growers process apples, strawberries, and other fruit into jams and jellies for sale at farmers' markets. This provides a value-added option for lower quality fruit unfit for the fresh market. Overall, though, growers emphasize the fresh market, which supports the County's "Live Well San Diego" initiative. San Diego County residents are never far from abundant, fresh fruits and vegetables that support healthy lifestyles.

As **Figure 1** on page 3 shows, non-edible products play a major role in San Diego County agriculture, accounting for just over 67% of production value. Few of these products entail value-added processing, though. Many growers add value to flowers by reworking them into bouquets in plastic sleeves. Others place orchids, succulents, hothouse azaleas, and other plants into decorative containers for sale in stores, often as gifts. Such activities can add significant value for individual products and growers, but occur on a small scale.

Landscaping is big business in San Diego County and makes extensive use of local products. As the 2015 *Crop Statistics and Annual Report* notes, local growers produced \$409.5 million in ornamental trees and shrubs, \$215.4 million in bedding plants and perennial flowers, and \$72.6 million in cacti and succulents. Much of this product supports the county's "Landscaping and Horticultural Services" sector, which produced \$983.4 million in 2015 and supported 18,139 jobs.

The thriving "Landscaping and Horticultural Services" sector meets the first criterion specified earlier: heavy reliance on local agricultural inputs. But it does not meet the second criterion of being unlikely to exist here without the associated agricultural sector. Put simply, if growers did not produce flowers, shrubs, and other landscaping products locally, then landscapers would likely import them from elsewhere. Thus, good practice precludes including the sector's multiplier effects in this analysis.

Grapes into Wine. Wineries offer the lone, significant example of locally sourced, value-added food processing. **Figure 3** on page 6 shows the economic effects of wineries. Note that the numbers avoid double-counting by including only the dollar values and employment that wineries add to wine grapes by producing wine. Numbers in the **Farm Production** section above already include the value of wine grape production.

The county's 143 wine producers (based on data from the Alcohol and Tobacco Tax and Trade Bureau) create significant multiplier effects. Many wineries proudly advertise "100% estate grown grapes" rather than importing grapes from other locations. They also add economic value through wine tastings, weddings, and other events.

Boutique wineries, in particular, have flourished since a 2010 county ordinance made them easier to establish. A 2016 update to the boutique winery ordinance clarified what "local" really entails. A "local" wine means: 1) at least 25 percent of the wine must come from grapes grown on site; 2) another 50 percent of the wine can come from grapes, juices or pre-made bulk wine made elsewhere within the county; and 3) the remaining 25 percent can originate from anywhere. This policy has uncorked a fast-growing boutique winery sector that creates significant economic multiplier effects because producers source a majority of their raw product within the county.

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Local food processing by wineries produced an estimated \$70.4 million in direct output. Multiplier effects bring the total value to \$120.1 million. The sector directly employed 237 workers. These workers and their employers spent enough money in the local economy to support an additional 374 jobs, bringing San Diego County's total food processing employment effect to 611.

FOOD PROCESSING SECTOR	DIRECT	INDIRECT	INDUCED	TOTAL
Economic Output by Wineries (\$ Millions)	\$70.4	\$32.1	\$17.5	\$120.1
Employment by Wineries (# Jobs)	237	248	126	611

Sources: IMPLAN® and U.S. Bureau of Economic Analysis data, with input by local industry experts.

Total Economic Contribution of San Diego County Agriculture

The previous sections have provided key pieces to an economic puzzle. This section combines those puzzle pieces into a final picture showing the overall economic effect of San Diego County agriculture.

As **Figure 4** shows, the total economic contribution of San Diego County agriculture was \$2.88 billion. This consisted of \$1.77 billion in combined, direct output from production and processing, plus \$1.11 billion in multiplier effects. Total employment was 16,648. This included 11,627 jobs directly in agriculture and wineries, and another 5,021 attributable to multiplier effects.

Figure 4. Overall Economic Effect of San Diego County Agriculture

TYPE OF EFFECT	DIRECT	INDIRECT	INDUCED	TOTAL
Farm Production Sector				
Output Effect (\$ Millions)	\$1,701.8	\$406.0	\$656.0	\$2,763.8
Employment Effect (# Jobs)	11,390	1,805	2,842	16,037
Locally Sourced, Value-Added Food Processing Sector				
Output Effect (\$ Millions)	\$70.4	\$32.1	\$17.5	\$120.1
Employment Effect (# Jobs)	237	248	126	611
Total Value of Agricultural Sector				
Output Effect (\$ Millions)	\$1,772.2	\$438.2	\$673.5	\$2,883.9
Employment Effect (# Jobs)	11,627	2,053	2,968	16,648

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The Value of Agricultural Diversity

Economists may disagree on some things but there's one thing they all can agree on: a diverse economy is a resilient economy. Any region that depends on a large number of economic sectors reduces risk of catastrophic shocks.

This important economic principle applies to agricultural diversity, too. For example, a county with just one or two main crops faces higher vulnerability to shocks in the form of price drops, disease outbreaks, new regulations, new competitors, spikes in the cost of key inputs, and other unpleasant surprises. Meanwhile, a county with a diverse agricultural industry can withstand shocks to certain crops without unraveling the entire agricultural economy.

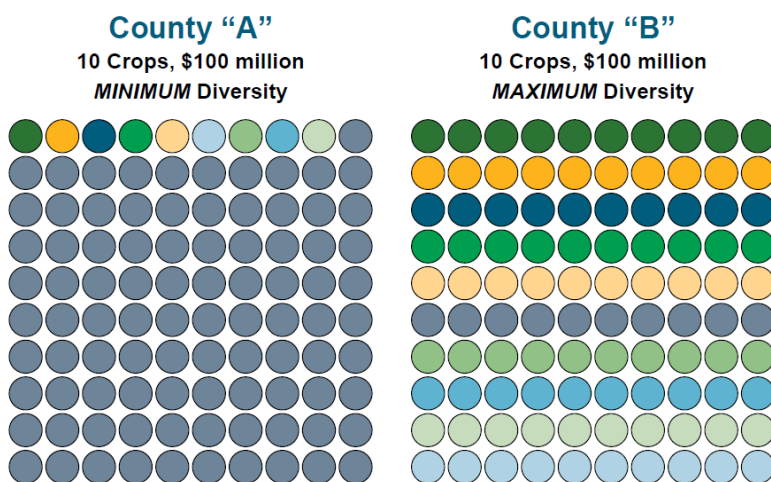
Bottom line: having "all your eggs in a single basket" is never a good idea, especially when it comes to something as economically important as agriculture.

Unfortunately, robust measures of San Diego County agricultural diversity do not exist, let alone the total economic value of such diversity. People see assorted crops growing in well-tended fields. They see farmers' markets overflowing with different kinds of food and flowers. But no one has attempted to quantify that diversity or its economic value.

Part of the reason is that measuring diversity is a complex job. It requires more than just counting the different things for sale at the farmers' market or listed in the *Crop Statistics and Annual Report*. Measuring diversity includes the number of different crops grown as well as the assessing their economic *abundance* or *evenness*.

For example, imagine two California counties where the annual farm production value is \$100 million each. Both counties grow ten different kinds of crops. In County "A," a single crop contributes 91% of the revenue and the nine other crops make up 1% each (see **Figure 5** below). In County "B" the ten crop types all contribute equally, at 10% each. *Both counties have the same number of crops and total revenues, but County "B" has much higher economic diversity.* Thus, we could expect County "B" to be much more resilient to economic shocks than County "A".

Figure 5. Agricultural Economic Diversity is More Than Just the Number of Crops



Economic Contributions of San Diego County Agriculture

Because economic diversity is so important, economists have developed sophisticated tools for measuring it. The most popular one is a summary statistic called the Shannon-Weaver Index. The index stems from the Shannon-Weaver entropy function, which was created in 1949 and is widely used in both ecology and economics. Economists and ecologists alike use the formula to calculate the Shannon-Weaver Index, which we share here and can explain further to interested readers:

$$SW_t^k = - \sum_{n=1}^k p_n * \ln (p_n)$$

The lowest possible index score is 0.00. Zero represents an extreme case where all economic output occurs in only one sector. In ecology, this would be a rain forest with only one species. In agriculture, it would be a county with just one commercial crop. The other extreme – an open system where potential diversity is unlimited – would have a much higher score. The higher the score, the greater the diversity.

To measure agricultural diversity in San Diego County, we started by creating a list of specific crops mentioned in the *Crop Statistics and Annual Report* over the past decade. We only used crops for which production values were provided for all ten years, even though the total number of commercial crops grown is certainly much larger. For example, we tracked Hass avocados from their 2015 total (\$102.1 million) all the way back to 2006 (\$132.1 million).

Careful lumping and splitting resulted in 46 different crop categories consistently reported over the past decade. Next, we applied the list of crops and production values to the formula above. This resulted in a 2015 Shannon-Weaver Diversity Index score of **2.43**.

By itself, the index score says little. Where it comes in handy is making comparisons. The agricultural community can track the score over time to ensure that overall agricultural economic diversity remains high. Maintaining high economic diversity in agriculture will minimize the risk of significant economic shocks. It's an insurance policy against economic earthquakes.

Speaking of earthquakes, note that equation above includes a logarithmic function (“ln”), similar to the Richter Scale for measuring earthquakes. Many Californians understand that a 7.4 earthquake releases twice the energy of a 7.2 earthquake even though the numbers are not far apart. The same principle applies to Shannon-Weaver Diversity Index scores: a tiny numeric difference represents a big change.

Figure 6 shows how the Shannon-Weaver Diversity Index score has fluctuated over time. The overall ten-year change has been positive, suggesting increased economic diversity within agriculture. Note that the diversity index dipped in 2007 and 2011 but has shown steady increases overall. This does not mean that fewer crop types were grown in the county during those two years. It means that a small number of crops represented larger pieces of the economic pie that year, for example ornamental trees & shrubs in 2007 and avocados in 2011.

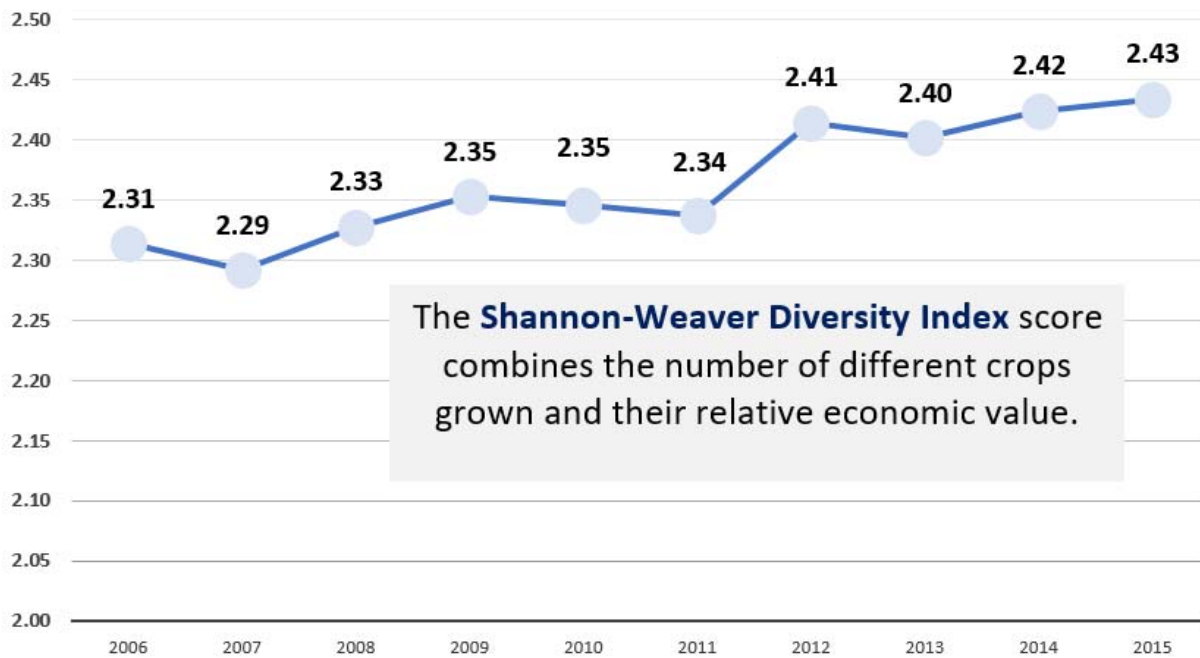
A discussion of the Shannon-Weaver Diversity Index should include mention of caveats and this measure's potential limitations. Although this index provides a useful measure of how the county's agricultural industry has become more diverse over time, it might not be informative to compare the score of San Diego County with other counties in order to determine which has a more diverse agricultural economy. The reason for this is that counties use different methods to classify and group their agricultural products when producing their Crop Reports. For example, San Diego County's Crop

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Report provides information on the dollar value of crops like “Indoor Flowering & Foliage Plants,” but this single entry includes dozens of crops, such as poinsettias, orchids, carnations, and others. To compare San Diego County’s Diversity Index to that of another county might not provide an “apples to apples” comparison if that other county’s crop report provides greater detail and gives a dollar value for each individual type of plant or flower. San Diego County has more than 200 different agricultural commodities grouped together into 46 crop categories used to calculate the Diversity Index.

Despite that caveat, the big picture is that the economic diversity of San Diego County’s agriculture industry is continuing to grow over time. With over 5,700 farms as of the most recent agricultural census, San Diego has more farms than any other county. Most (68%) of these farms are 1-9 acres. This diversity of many small farms growing a wide variety of crops means that San Diego County may be particularly resilient to potential economic shocks compared to counties with fewer growers specializing in a smaller number of crop types.

Figure 6. How Economically Diverse is San Diego County Agriculture?



Toward the Future

This report has documented the role that San Diego County agriculture plays as a local economic driver. Agriculture contributes \$2.88 billion to the county economy. Agriculture also plays an important role in county employment, directly or indirectly supporting 16,648 jobs. Finally, agriculture’s impressive diversity provides critical economic stability to the county. The economic value of this stability is certainly high, albeit hard to quantify.

Economic Contributions of San Diego County Agriculture

Agriculture is an important pillar of the San Diego County economy and represents a vital link to both the county's cultural past and competitive future. Although this report has presented many facts and figures, it has barely begun to fill key information gaps about agriculture's role. The process of developing this report has raised several additional questions that lie beyond the scope of this report but may warrant future research (**Box 1**). In the meantime, the findings herein provide the clearest picture yet of San Diego County agriculture's important economic role.

Box 1: Additional Questions to Answer

- Since 2010, the County's "Live Well San Diego" strategic initiative has sought to strengthen and monitor a high quality of life for area residents. In what quantifiable ways does local agriculture support this initiative through economic vitality, healthy food, physical activity, and other means?
- San Diego County is a recognized leader in the burgeoning "urban agriculture" movement. What is the direct and indirect economic value of its 53 Certified Farmers' Markets, organic farms, and hobbyist beekeeping? What is the impact of the growing "farm to table" movement, in which local restaurants serve high-quality food grown on local farms?
- San Diego County occupies the national forefront of organic farming. A total of 385 registered organic producers grew more than 125 different crops in 2015. What implications might the expanding organics niche have for diversifying and strengthening the economy?
- San Diego County could create significant economic value through locally sourced, value-added food processing. The recent explosion of boutique wineries demonstrates the positive economic impact that favorable policies can generate. What other new policies, programs, and other initiatives could create additional breakthroughs in local processing?
- This report does not consider the impact of agritourism, a growing industry in San Diego County. Farmers can supplement and diversify their incomes by holding events that educate and entertain the public on their properties. In 2013, the San Diego County Board of Supervisors initiated an Agricultural Promotion Program that supports and promotes agricultural tourism. More than 100 companies in the county now participate in some form of agritourism, with certain attractions drawing visitors from outside the county who spend money at restaurants and hotels during their visit. As one example, a 1999 study estimated that over 200,000 people annually visit the Carlsbad Flower Fields, and those numbers may have risen significantly since then. As tourism is one of San Diego's largest industries, with 184,000 San Diegans employed by the industry and 34.9 million visitors coming to San Diego each year, great opportunity may exist to expand agricultural tourism.

Acknowledgments

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