Economic Contributions of MONTEREY *County* AGRICULTURE

COUNTY OF MONTEREY • AGRICULTURAL COMMISSIONER •

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Commissioner's Letter

I am pleased to share the **Economic Contributions of Monterey County Agriculture**. This report takes an important step beyond the County of Monterey Crop & Livestock Report that we have published every year since 1929. Instead of stopping at crop production values and acreage, it quantifies agriculture's total economic contributions through production, local processing, employment and economic multiplier effects.

In short, this report uses twenty-first century economic tools to document agriculture's broader role in sustaining a thriving local economy.

This new study shows that in 2023, the latest year for which we have complete data, agriculture contributed a total of $11.706 billion to the county economy. This far exceeds the $4.353 billion value from our 2023 County of Monterey Crop & Livestock Report. Agricultural production and processing also directly supported 56,365 employees, plus another 24,951 from multiplier effects. Agriculture ranked #1 among county industries for direct economic output, as well as for direct employment.

In addition, this report documents strong economic diversification within agriculture, which supports resilience in agriculture and in the greater county economy.

Agriculture has a long tradition in Monterey County. For more than a century, it has been a pillar of our economy and culture. With this report, we deepen our understanding of that tradition and renew our commitment to sustaining it well into the future.

Respectfully submitted,

Juan Hidalgo
Agricultural Commissioner

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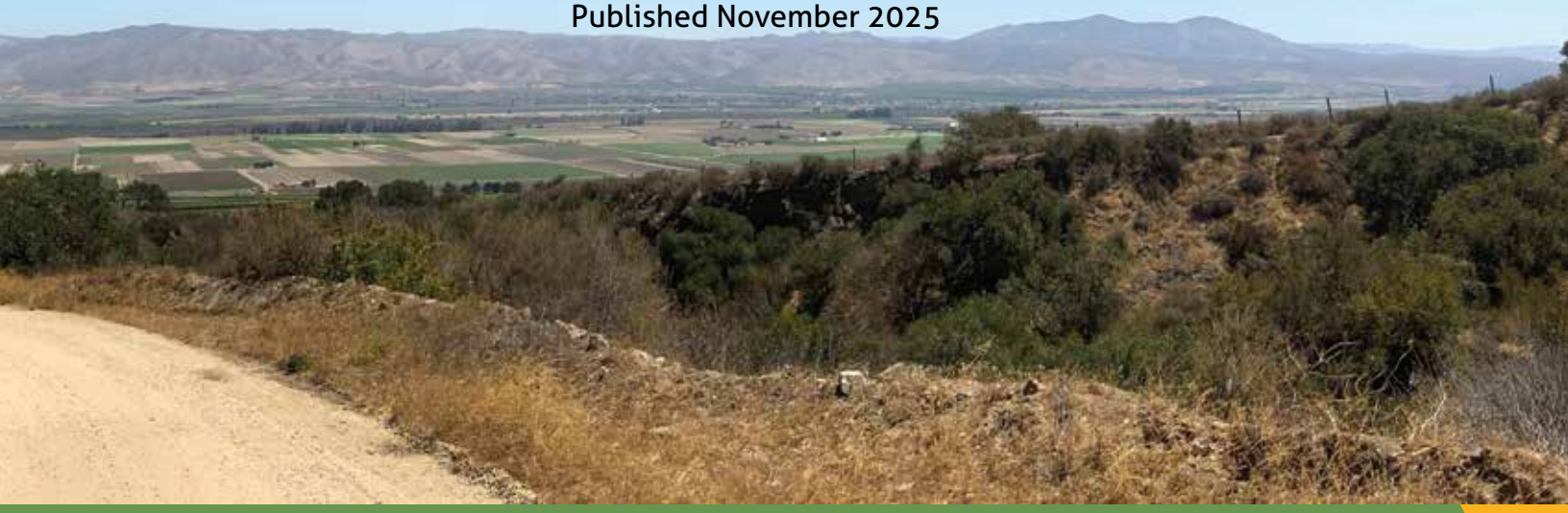


Monterey County Agriculture at a Glance

Economic Contributions
of the Agricultural Industry for 2023

$11.706 BILLION | Monterey County Agriculture's total contributions to the local economy

$7.897
BILLION in direct economic output

$3.809
BILLION in multiplier effects

$32,072,782
per day

Employment Effects
of the Agricultural Industry

81,315
total jobs (rounded)

56,365
direct employees across production & processing

24,951
additional jobs attributable to multiplier effects: expenditures by agricultural companies and their employees

1 in 5
jobs in Monterey County attributable to the agricultural industry

Introduction

In 2012, 2015 and 2020, we produced research reports that examined not just agricultural production values, but also agriculture's wider economic contributions through local food processing, employment and multiplier effects. Those documents generated tremendous positive responses, providing detailed assessments of agriculture's role in sustaining a healthy local economy. This document updates and expands upon those original reports.

Consistent with the previous studies, we used multiple data sources and advanced economic modeling techniques to analyze agriculture's total contribution to the Monterey County economy. We also measured economic diversification within agriculture, which has implications for economic resilience. Overall, the findings offer important information for policy makers, the public and anyone who values a vibrant and resilient local economy.

Our Approach

A *basic industry* sells most of its products beyond the local area and thus brings outside money into local communities. Agriculture easily qualifies as a basic industry in Monterey County. Calculating a reasonable range of economic contributions by a basic industry entails quantifying three economic areas: 1) *direct* economic effects; 2) *indirect* economic effects; and 3) *induced* economic effects. This report covers all three, the latter two of which are known as *multiplier effects*.

Direct economic effects include farm production, local processing, and their related employment. *Indirect* effects consist of inter-industry, business-to-business supplier purchases. *Induced* effects reflect consumption spending by employees. The **Multiplier Effects** section on page 8 explains this further.

To understand the furthest economic impacts of agriculture, one would also need to assess agricultural-related costs to society such as subsidies and net impacts on water and other natural resources. A full economic impact study would also quantify dollar value of scenic beauty, wildlife habitat, wildfire mitigation and more than a dozen other non-market services that agricultural lands provide to society—which our 2020 study estimated to be worth $4.7 billion to $10.9 billion per year. While important, a full assessment of these impacts lies beyond the scope of this study.

Our calculations draw from local and national data sources. The local sources include industry experts and the annual County of Monterey Crop & Livestock Report produced by the County of Monterey Agricultural Commissioner's Office. The main national data source is IMPLAN, a widely used economic modeling program (see www.implan.com).

Originally created for the U.S. Department of Agriculture (USDA), IMPLAN uses econometric modeling to convert data from more than a dozen government sources into local values for every U.S. county and zip code across 546 industry sectors. Because IMPLAN draws from multiple sources, including the most recent USDA Census of Agriculture, its employment and economic output numbers often differ from those reported by individual state and federal agencies. For details, please see "Data Sources for Select Industries: Farm, Construction, Railroad, and Government" on the company website (http://bit.ly/4e0if2Z).

Except where otherwise noted, all figures are from 2023, the most recent IMPLAN dataset available. Where appropriate, we adjusted sector names for clarity and applied coefficients to IMPLAN values to reflect unique Monterey County conditions. Please contact the authors for additional details on the methods used.

Direct Effects of Monterey 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 agricultural jobs.

PRODUCTION

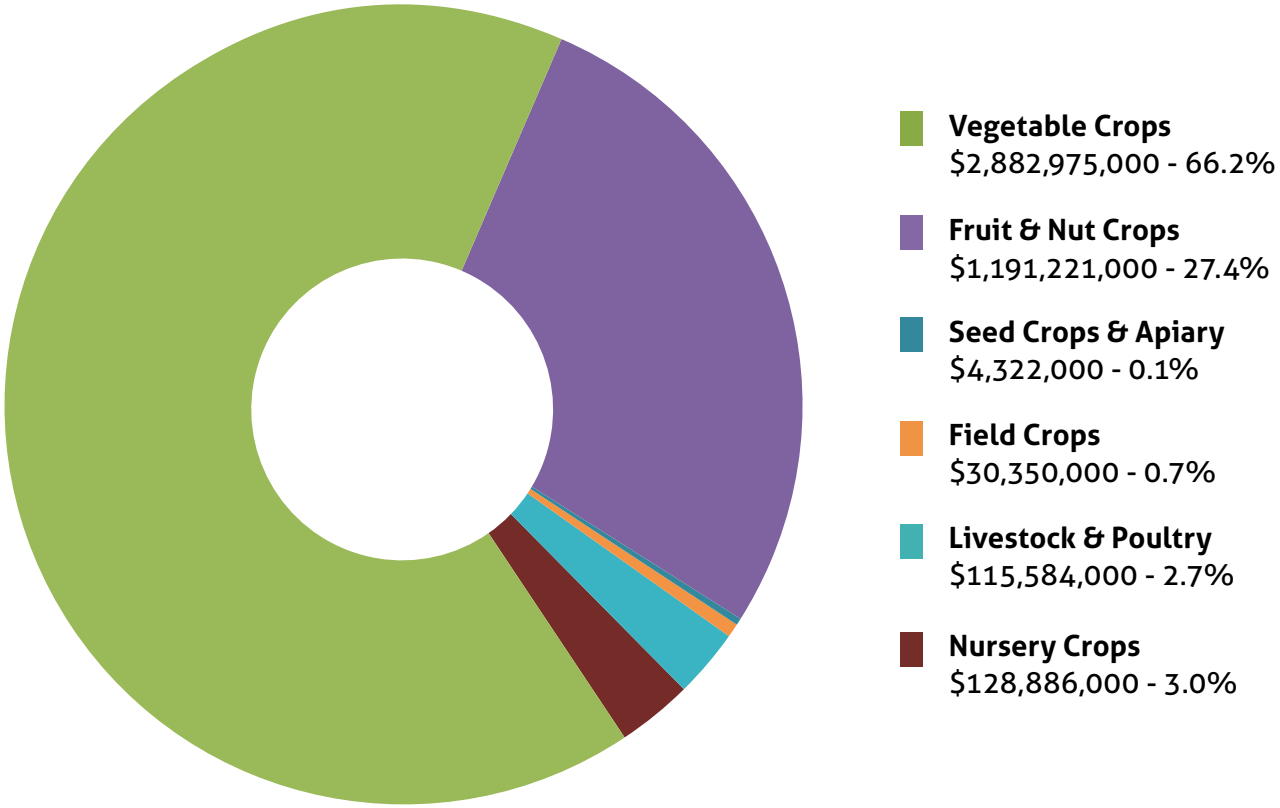
Figure 1 shows the various categories that made up Monterey County's farm production value. At $2.883 billion, Vegetable Crops was the single largest production category by dollar value, comprising 66.2% of the county total. Leaf lettuce dominated this category at $782.1 million. Head lettuce followed ($493.5 million), then broccoli ($468.9 million) and cauliflower ($188.2 million).

At 27.4%, Fruit & Nut Crops represented the second largest category ($1.191 billion). Strawberries led this group with $903.8 million in production, followed by wine grapes at $194.6 million. These two categories, Vegetable Crops and Fruit & Nut Crops, accounted for 93.6% of all production value.

The combined total dollar value for all products dropped $140.1 million over the previous decade (-3.1%), from $4.493 billion in 2014 to $4.353 billion in 2023. Floods and cool weather made 2023 an especially challenging year. 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 county's 2023 County of Monterey Crop & Livestock Report for additional details on specific products and their value.

Figure 1. Distribution of Monterey County Farm Production

Source: 2023 County of Monterey Crop & Livestock Report, Office of the Monterey County Agricultural Commissioner/ Sealer of Weights & Measures



EMPLOYMENT

How many people work in agricultural production? In 2023, IMPLAN data indicate that agricultural production directly employed 29,294 people in Monterey County. This figure encompassed a wide range of production-related jobs, including not just growing, but also sales, marketing and many other roles. It did not include food processing jobs, which are discussed on page 12. Nor did it include Monterey County's public sector jobs in agriculture across a range of local, state, and federal agencies.

Readers who want to know more about employment estimates are encouraged to consult IMPLAN's "Data Sources and Procedures Data Sources for Select Industries: Farm, Construction, Railroad, and Government" article referenced earlier. In general, IMPLAN data attempt to correct for omissions and inconsistencies among other sources. For example, IMPLAN counts farm owners (proprietors) even though other sources do not. IMPLAN also corrects for certain crops with low production levels not being reported by other sources due to privacy concerns. Last, IMPLAN counts part-time workers differently than the USDA Census of Agriculture. Imagine a farm with six people who each work two months. The Census of Agriculture would report that as six jobs of up to five months each. IMPLAN, in contrast, would count those twelve months of work as just one job that happens to be filled by six different temporary workers.

Multiplier Effects of Monterey County Farm Production

This section quantifies the economic ripples that farm production creates in the local economy. These ripples take two forms: *indirect effects* and *induced effects*. The first consists of business-to-business supplier purchases. For example, when a grower buys fertilizer, pesticides, seed, insurance, banking services, farm equipment, and other inputs, the grower creates *indirect effects*.

The second ripple type, *induced effects*, consists of consumption spending by the combined owners and employees of agricultural businesses and their suppliers. They pay for groceries, housing, healthcare, leisure activities, and other things for their households. All this spending creates ripples in the economy.

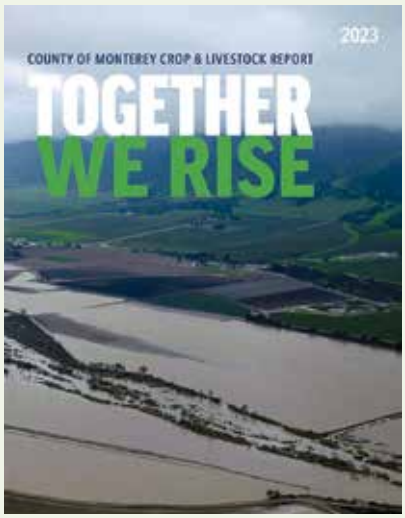
Although agricultural companies, suppliers and their combined employees certainly spend money in other counties, this study only reflects those expenditures within Monterey County. Quantifying expenditures outside the county would be an expensive, complex effort that lies well beyond our scope here.

Figure 2 shows agriculture's *direct*, *indirect*, and *induced* economic effects within the county across major production categories. The numbers use IMPLAN multipliers for each sector, which are rooted in the most recent U.S. Bureau of Economic Analysis input-output models.

Note that sector names and production values in **Figure 2** differ from the county's annual report. They closely follow a standard classification system used nationwide called the North American Industrial Classification System (NAICS), as adapted by IMPLAN. Each NAICS/IMPLAN category has an explicit definition. Agricultural producers in Monterey County and nationwide use the NAICS categories on Schedule F of their federal tax returns ("Profit or Loss from Farming"), which requires producers to designate the NAICS category that best fits their operation. Producers also use NAICS categories when completing the Census of Agriculture, most recently for 2022.

NAICS and IMPLAN also combine familiar products in unfamiliar ways. For example, they put the county's hay crop (alfalfa & oats) under "All Other Crop Farming" and the county's pollination services under a sector called "Support Activities for Agriculture," both of which fit into **Figure 2** under "Miscellaneous Other Crop Farming." They also spread the county's seed production across multiple sectors such as "Grain Farming" (bean seeds) and "Vegetable and Melon Farming" (e.g., broccoli, cauliflower, cucumber, and other seeds). Category names in **Figure 2** combine and consolidate certain sectors to fit Monterey County conditions.

The following list helps bridge NAICS and IMPLAN sectors in **Figure 2** with familiar Monterey County commodities listed in the 2023 County of Monterey Crop & Livestock Report:



- **Vegetable & Melon Farming:** Anise, Artichokes, Bok Choy, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Cilantro, Garlic, Kale, Leeks, Lettuce, Mushrooms, Napa Cabbage, Onions, Parsley, Peas, Peppers, Radish, Spinach, Spring Mix, Misc. Vegetables.
- **Fruit Farming:** Avocados, Blackberries, Grapes, Lemons, Raspberries, Seeds (Vegetable), Strawberries, Misc. Fruit.
- **Miscellaneous Other Crop Farming:** Alfalfa Hay, Barley, Beans, Oats, Pollination, Rangeland, Seeds (Other), Misc. Field Crops, Plus support activities such as Land Preparation, Planting, Cultivating and Harvesting.
- **Cattle & Other Animal Production:** Cattle & Calves, Stockers, Sheep, Lamb, Hogs, Misc. Livestock & Poultry Products.
- **Greenhouse, Nursery & Floriculture:** Vegetable Transplants, Misc. Nursery Products, Misc. Cut Flowers & Foliage.

Figure 2. Economic Effects of Monterey County Farm Production

Dollar values are in $ millions. Figures are for 2023 and come from IMPLAN and U.S. Bureau of Economic Analysis, with adjustments for local conditions. Columns and rows may not compute exactly due to rounding.

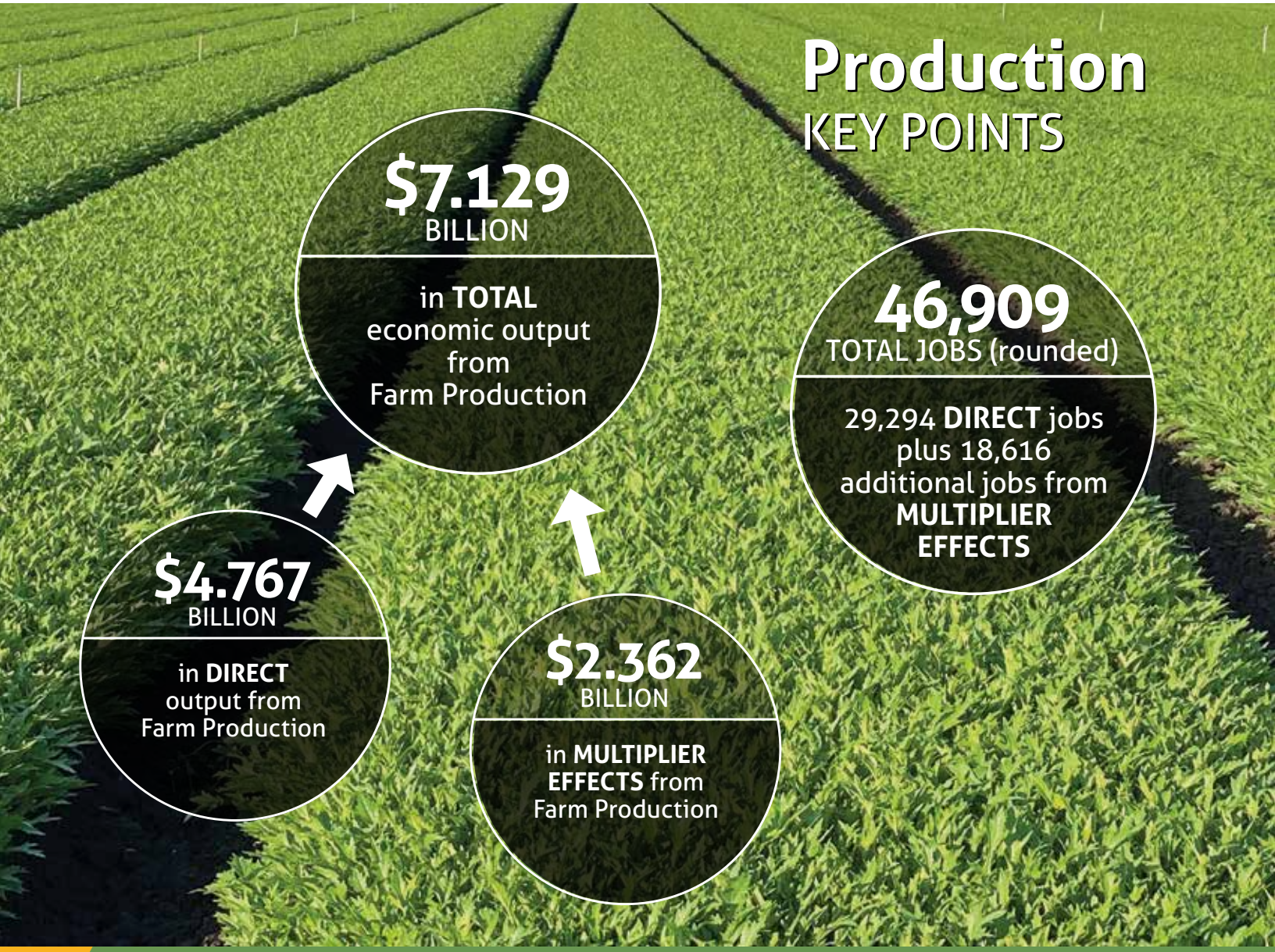
FARM PRODUCTION SECTOR	Output Effects ($ Millions)			TOTAL
	Direct	Indirect	Induced	
Vegetable & Melon Farming	$2,883.0	$844.7	$491.7	$4,219.4
Fruit Farming	$1,191.2	$351.5	$350.3	$1,892.9
Miscellaneous Other Crop Farming	$438.3	$16.9	$176.6	$631.8
Cattle & Other Animal Production	$125.4	$61.2	$28.2	$214.8
Greenhouse, Nursery & Floriculture Production	$128.9	$26.6	$14.3	$169.8
TOTAL ECONOMIC OUTPUT:	$4,766.8	$1,300.8	$1,061.1	$7,128.7
	Employment Effects (# of Jobs)			TOTAL
	Direct	Indirect	Induced	
TOTAL EMPLOYMENT	29,294	11,494	7,122	47,909

Each sector has distinct multipliers. Monterey County "Vegetable & Melon Farming," for example, had a 2023 *indirect effects* multiplier of 0.2930 and an *induced effects* multiplier of 0.1705. This means that each dollar's worth of direct output generated an extra 29 cents in supplier purchases, plus 17 cents more in consumption spending by the owners and employees of agricultural businesses and their suppliers.

Multipliers change every year for each sector and county nationwide. The multipliers update to reflect how much money companies and their employees spent, and where they spent it. The *indirect effects* multiplier for Monterey County "Grain Farming," for example (included in **Figure 2** under "Miscellaneous Other Crop Farming"), was 0.2027 in 2013, then more than doubled to 0.4249 for 2023.

Sectors have unique multipliers not just for economic output but also for employment. Monterey County "Fruit Farming" for example, supported 6,471 *direct* jobs plus an additional 3,626 *indirect effects* jobs and 1,942 more from *induced effects*. The bottom row of **Figure 2** shows combined employment figures across sectors.

Because IMPLAN's methodology differs from that of the county's annual agriculture survey, the total direct production value in **Figure 2** ($4.767 billion) slightly exceeds the $4.353 billion reported in the 2023 County of Monterey Crop & Livestock Report. IMPLAN data, for example, capture the dollar amounts that businesses generated for soil preparation, planting, cultivating and harvesting, as well as for commercial logging and fishing. Consistent with the county's 2023 County of Monterey Crop & Livestock Report, we did not include the county's $362.6 million in cannabis production in the overall tally.



Locally Sourced, Value-Added Food Processing

Farm production tells only part of the story. This section captures the economic value of local food processing, which plays a key role in the Monterey County economy. It is neither an exact science nor a full assessment but rather gives the reader a basic overview of the topic.

To avoid overstating the numbers, we only include food manufacturers and sectors that fit two strict criteria: 1) they use mostly local agricultural inputs; and 2) they are unlikely to exist here without the presence of the associated agricultural sector, i.e., Monterey County's abundant supply of fruits, vegetables and other raw agricultural products.

We also took precautions to avoid double-counting. For example, we did not factor wine grape production into this section because **Figure 2** already captured the $194.6 million direct dollar value of wine grapes in its "Fruit Farming" row. We only calculated the value created by converting wine grapes into wine. The same applies to other crops that undergo processing into value-added products.

Based on these strict criteria, we excluded several IMPLAN food and beverage sectors that other studies often include. Adding these sectors could overstate the value of local agriculture, including its employment and multiplier effects. For example, we did not include Monterey County's $114.2 million in bread and bakery products because most raw ingredients such as flour and yeast came from outside the county. Nor did we include the county's manufacturing of bottled and canned soft drinks & water ($102.8 million), chocolate confectionery ($21.8 million) and coffee & tea ($19.4 million).

We also did not count the county's $11.6 million distilleries sector. A craft distillery in Gonzalez sometimes infuses rum and other spirits with local fruits, but only on rare occasions and the base for these and other products depends mostly on sugar cane and cereal crops grown outside the county.

Figure 3 shows the economic effects of locally sourced, value-added food processing. As with **Figure 2**, the sector names draw from IMPLAN and NAICS, which lump and split products according to a national classification system for tracking economic output.

The largest sector by far, **"Light Processing of Fruit, Vegetable & Nursery Products"** in **Figure 3**, reflects post-harvest value added to the county's abundant fresh produce, especially leafy greens. Consistent with our previous report, this sector captures portions of IMPLAN's "Support Activities for Agriculture" sector that involve the sorting, grading, cleaning, and packing of fresh produce, including when those activities occur in the field during harvest. It also encompasses portions of the NAICS/IMPLAN sector "All Other Food Manufacturing" which contains fruits and vegetables that are cut, peeled, and turned into perishable foods such as salad mixes and other ready-to eat and ready-to-use refrigerated products.

Figure 3: Economic Effects of Locally Sourced, Value-Added Food Processing

Sources: IMPLAN and U.S. Bureau of Economic Analysis data and various local sources. Columns and rows may not compute exactly due to rounding.

FOOD PROCESSING	Output Effects ($ Millions)			TOTAL
	Direct	Indirect	Induced	
Light Processing of Fruit, Vegetable & Nursery Products	$2,644.1	$209.2	$980.4	$3,833.7
Wineries	$414.2	$151.8	$68.1	$634.0
Meat & Other Animal Products	$33.9	$16.0	$3.6	$53.5
Canned, Jarred and Bottled Fruits & Vegetables Manufacturing	$28.5	$9.2	$2.9	$40.6
Frozen Fruits, Juices & Vegetables Manufacturing	$7.8	$3.9	$1.1	$12.7
Miscellaneous Other Food Manufacturing	$2.3	$0.7	$0.4	$3.3
TOTAL ECONOMIC OUTPUT:	$3,130.7	$390.8	$1,056.5	$4,577.9
	Employment Effects (# of Jobs)			TOTAL
	Direct	Indirect	Induced	
TOTAL EMPLOYMENT	27,071	1,745	4,590	33,406

Lettuce offers a prominent example. Home to the "Salad Bowl of the World," Monterey County produced $1.276 billion in lettuce in 2023, as well as $139.0 million in spinach and various other leafy greens. Producers add value through careful handling during and after harvest. Workers harvest the crops by hand or machine, then move them quickly into cooling systems to lock in freshness. Crews trim, sort, and wash the leaves—often several times—with chilled, sanitized water to reduce microbes. Processing facilities maintain strict food-safety standards as they package greens for market. Companies deliver the crops in many forms: whole heads in cartons, trimmed hearts, bagged or boxed fresh-cut leaves, and ready-to-eat salad mixes. They also use vacuum-sealed or modified-atmosphere packaging to extend shelf life, ensuring customers receive fresh, convenient, and high-quality leafy greens.

Broccoli, cauliflower, celery and other major vegetable crops also undergo light, post-harvest value-added processes. Growers even add value to the county's $65.0 million in nursery products. They add value to indoor potted plants, landscape plants, farm stock, and other plants by putting product into suitable containers ranging from inexpensive flats and trays to decorative clay and wooden pots. Growers also prune, trim and shape product, then add labels as appropriate for wholesale and retail markets.

Cut flower operations add similar value. After harvest, producers trim, cool, arrange, and package flowers, then add labels. Many vertically integrated flower farms sell wholesale and retail in addition to offering specialized services and events. A farm in Carmel Valley, for example, offers flowers wholesale to florists, restaurants, caterers, hotels, and spas. Staff also package seasonal bunches and mixed bouquets, wrapped or sleeved, for local retail stores. For individuals, the farm supports weddings, anniversary parties, baby showers, and other events.

"Wineries" in **Figure 3** reflects the value added to the county's $194.6 million wine grape crop. A unique combination of climate, soils, and other factors supports over 340 vineyards that produced 136,000 tons in 2023 across 40,200 bearing acres.

The Wineries value in **Figure 3** especially reflects wine from local, estate-grown grapes. Viticulturalists (experts who grow grapes) collaborate with winemakers to produce quality wines, paying attention to terroir—the combination of soils, topography, and other physical factors that can affect the wine's character. Many wineries add extra value by hosting tastings, weddings, private tours, and other events.

For a much broader analysis of wineries' economic impact that goes beyond the scope of this study, please see the "2022 Economic Impact of California Wine and Grapes on Monterey County" (http://bit.ly/4qiiuwa). Among other things, that larger study includes grapes imported from other counties and economic impacts that occur outside Monterey County.

"Meat & Other Animal Products" includes the small amount of meat processed locally. The overwhelming majority of the county's cattle go to auction, then leave the county for finishing and processing at Harris Ranch and other locations outside the county. California's only USDA-inspected Mobile Harvest Unit (MHU) is based ten miles outside the county, in Paso Robles, and can serve local ranchers.

Several boutique-scale operations produce animal products of various types. A dairy north of Salinas converts milk from its cows into a variety of cheeses, raw milk and yogurt sold online and through local shops. A 40-acre ranch in Royal Oaks produces sheep milk, cheese and yogurt from roughly 100 milking ewes. The farm also produces pasture-raised heritage breed pigs and heritage laying hens. Visitors can experience the operation through open houses, farm dinners, and a summer farmstand. A few apiary operations, including ones in Carmel and Pebble Beach, produce local honey with distinctive flavors influenced by the diverse landscapes and flora of Monterey County.

A handful of companies add value to seafood caught in Monterey Bay. An operation in Moss Landing, for example, sources raw product from over 25 fishing boats then adds value through filleting, pin-boning, packaging, spiral and blast freezing, and mechanized portion control. Another local company specializes in frozen squid, offering whole round and cleaned calamari in various packaging options. California's only in-ocean abalone farm operates in Monterey, offering direct-to-consumer shipping of live and processed abalone products.

"Canned, Jarred and Bottled Fruits & Vegetables Manufacturing" in **Figure 3** reflects canned, jarred, and bottled products made from fruits and vegetables that are not destined for the fresh market. Monterey County has largely transitioned away from being a major canning center. Processing facilities, including ones owned by a major international brand, now concentrate on fresh-cut vegetables, salads, frozen products, and specialty items rather than traditional canned goods. Boutique-scale fruit and vegetable processing, however, continues to thrive.

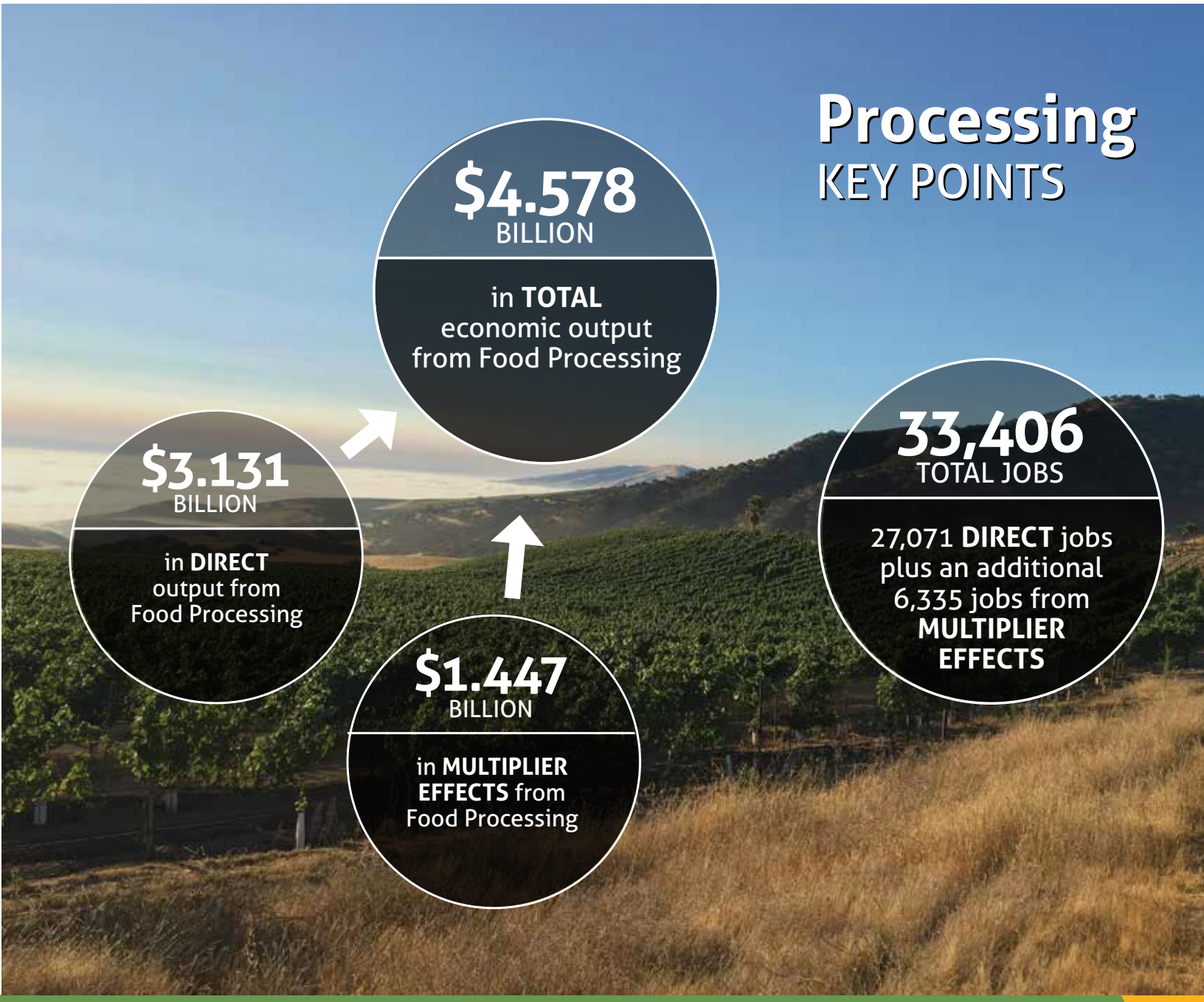
A ranch in San Ardo, for example, has over 4,800 olive trees and produces award-winning extra virgin olive oil. Growers from across the Central Coast truck their olives to the farm's state-of-the-art milling facility. A company in Gonzales makes artisanal jams using all-natural ingredients. A small Royal Oaks farm processes fruit into a variety of hand-crafted preserves. Vendors at farmers' markets sell juices, kombucha, ciders and other bottled drinks made with local fruit.

As the name suggests, **"Frozen Fruits, Juices & Vegetables Manufacturing"** in **Figure 3** reflects frozen products. Some of the same processors that add value to fresh produce and create the canned, jarred, and bottled products described earlier also manufacture frozen products. For example, a multi-generation family farm in the Salinas Valley not only sells a wide range of fresh vegetables but also produces individually quick frozen (IQF) vegetables. Customers can buy 40 to 1,500-pound frozen packs of chopped spinach, kale, and Arugula, as well as frozen Brussels sprouts and bell peppers (diced or strips, in red, green, or yellow).

The largest supplier of frozen strawberry products in the U.S. by market share has its headquarters in Monterey County but operates its large processing facilities across the border in Watsonville (Santa Cruz County) and Santa Maria (Santa Barbara County). Only a tiny amount of Monterey County strawberries goes to processing—$3.5 million out of a total 2023 strawberry harvest of $903.8 million.

"Miscellaneous Other Food Manufacturing" combines multiple, niche activities. Examples range from dried & packaged fruits and vegetables to the cleaning, sorting, and packaging of seeds grown for sale. This catch-all category also incorporates a small portion of the county's $11.9 million in "Breweries" sector. Two farms grow hops on a total of four acres, making it possible for Monterey County craft breweries to produce beers that are truly fresh and local, rather than relying on hops imported from the Pacific Northwest and Germany.

Finally, the largest land-based seaweed farm in the continental United States also factors into this category. Operating out of Moss Landing since 2015, the facility cultivates eight different species of edible seaweeds, all native to California. The company ships fresh seaweed nationwide, as well as dried seaweed products and seaweed chips.



Total Economic Contributions of Monterey 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 effects of Monterey County agriculture.

As **Figure 4** shows, the total 2023 economic contribution of Monterey County agriculture was $11.706 billion. This consisted of $7.897 billion in combined direct output from production and processing, plus $3.809 billion in multiplier effects.

The combined $11.706 billion in total 2023 output slightly exceeds the $11.659 billion figure in our 2020 report, which was based on 2018 data. The increase would have been larger but severe flooding and a wet, cold spring in 2023 delayed planting and harvest schedules and caused losses. Those weather-related losses, in turn, reduced agriculture's economic multiplier effects within the county. Agriculture's total direct value rebounded 14.7% in 2024.

For perspective, agriculture pumped over *thirty-two million dollars per day* into the county economy during 2023 ($32,072,782 to be exact), compared to $31,943,580 per day in 2018. The daily figure for 2023 translates to $1,336,366 per hour and $22,273 per minute.

Total agricultural employment covered in the scope of this study was 81,315. Of these, 56,365 jobs were directly in agricultural production and processing, with the remaining 24,951 from multiplier effects.

The 56,365 direct agricultural jobs represented 21.1% of Monterey County's total employment of 267,418, or nearly one out of every five jobs (4.7 to be exact).

The 81,315 total jobs attributable to agriculture represented a 27.2% rise over the 2018 level of 63,921. Evidence indicates this increase was not due to industry growth, but rather to updated data and methodologies for calculating employment attributable to multiplier effects. Direct employment in production and processing decreased by 2.0%, from 57,503 in 2018 to 56,365 in 2023.

Figure 4. Overall Economic Effects of Monterey County Agriculture

Columns and rows may not compute exactly due to rounding.

Type of Effect	Direct	Indirect	Induced	TOTAL
FARM PRODUCTION				
Output Effects ($ Millions)	$4,766.8	$1,300.8	$1,061.1	$7,128.7
Employment Effects (# Jobs)	29,294	11,494	7,122	47,909
LOCALLY SOURCED, VALUE-ADDED FOOD PROCESSING				
Output Effects ($ Millions)	$3,130.7	$390.8	$1,056.5	$4,577.9
Employment Effects (# Jobs)	7,071	1,745	4,590	33,406
TOTAL VALUE OF AGRICULTURAL INDUSTRY				
Output Effects ($ Millions)	$7,897.4	$1,691.6	$2,117.5	$11,706.6
Employment Effects (# Jobs)	56,365	13,239	11,712	81,315

Agriculture In The Larger Economy

Agriculture's $7.897 billion in combined direct output from production and processing represented 16.3% of the county's total economic output of $48.385 billion, about one out of every 6.1 dollars. This made agriculture the largest economic sector in Monterey County by far, as shown in **Figure 5**.

Government ranked second ($6.728 billion) and includes public entities across city, county, state, and federal levels. Federal spending features prominently in this sector and comes from the U.S. Departments of Homeland Security, Agriculture, Justice, Veterans Affairs and others. Government also encompasses the county's many public schools, from the elementary and secondary levels up to colleges and universities such as Hartnell College and California State University Monterey Bay.

Figure 5. Monterey County Industries Ranked by Direct Economic Output

CATEGORY NAME	OUTPUT	RANK
Agriculture (production & processing)	**$7,897,422,767**	**1**
Government (all levels & types)	$6,728,199,358	2
Real Estate & Rentals	$5,711,790,547	3
Manufacturing	$3,355,928,103	4
Accommodation & Food Services	$3,100,673,329	5
Health & Social Services	$2,884,854,641	6
Wholesale Trade	$2,778,026,239	7
Retail Trade	$2,608,001,782	8
Professional, Scientific & Technical Services	$2,427,622,041	9
Construction	$2,256,818,425	10
Finance & Insurance	$1,638,185,222	11
Administrative & Waste Services	$1,366,718,657	12
Other Services	$1,338,142,423	13
Arts, Entertainment & Recreation	$1,311,849,024	14
Transportation & Warehousing	$828,174,664	15
Information	$701,560,225	16
Utilities	$509,696,548	17
Management of Companies	$403,704,539	18
Educational Services	$270,618,746	19
Mining	$266,944,817	20

Agriculture also ranked first in the county for direct employment **(Figure 6)**. Government ranked second with 39,198 jobs, the majority of them in public school systems.

Accommodation & Food Services ranked third and included, for example, hotels, motels, bed-and-breakfasts, RV parks, campgrounds, restaurants and drinking establishments. Health & Social Services ranked fourth, encompassing doctors, dentists, hospitals, medical laboratories, residential care facilities, and day care services.

Figure 6. Monterey County Industries Ranked by Direct Employment

CATEGORY NAME	EMPLOYMENT	RANK
Agriculture (production & processing)	56,365	1
Government (all levels & types)	39,198	2
Accommodation & Food Services	25,343	3
Health & Social Services	21,958	4
Retail Trade	18,584	5
Other Services	15,271	6
Professional, Scientific & Technical Services	12,680	7
Administrative & Waste Services	12,384	8
Construction	11,767	9
Real Estate & Rentals	10,862	10
Manufacturing	8,474	11
Finance & Insurance	7,355	12
Transportation & Warehousing	7,191	13
Wholesale Trade	6,772	14
Arts, Entertainment & Recreation	5,594	15
Educational Services	3,366	16
Management of Companies	1,842	17
Information	1,582	18
Utilities	464	19
Mining	366	20

How Resilient is Agriculture to Economic Shocks?

We have all heard the old saying "don't keep all your eggs in one basket." If the basket drops, then you might lose everything. This section takes a deep dive into that concept and focuses on three questions: 1) Why is economic diversification important? 2) How economically diversified is Monterey County agriculture? and 3) How has agriculture's level of economic diversification trended over time?

Answers to these questions can shed important light on the agricultural industry's economic resilience, with implications for the wider county economy and beyond.

WHY IS ECONOMIC DIVERSIFICATION IMPORTANT?

Like growers and ranchers everywhere, Monterey County's agricultural producers face a long list of risks. Examples include: wildfires, droughts, floods, pandemics, crop pests and diseases, food safety-related outbreaks, new regulations, new competitors, new trade policies, labor availability and cost, price drops, and rising costs for fuel, equipment, water and other inputs. Any one of these risks can deal a damaging blow. When combined, they can undermine not just an individual operation but an entire industry.

Take Napa County, for example, where wine grapes account for 99% of the annual agricultural value. When wildfires and a pandemic caused a 51% decline in wine grapes for 2020, the county's overall agricultural value declined by that same percent. Contrast that with Monterey County—wine grapes dropped 43% in value for 2020, but, because of the county's agricultural diversification, the industry's overall decline was limited to just 11.3%, then increased by 4.8% during the pandemic's peak in 2021.

HOW DIVERSIFIED IS MONTEREY COUNTY AGRICULTURE?

If economic diversification is like an "insurance policy" against risks, then that raises the question: how economically diversified is Monterey County agriculture?

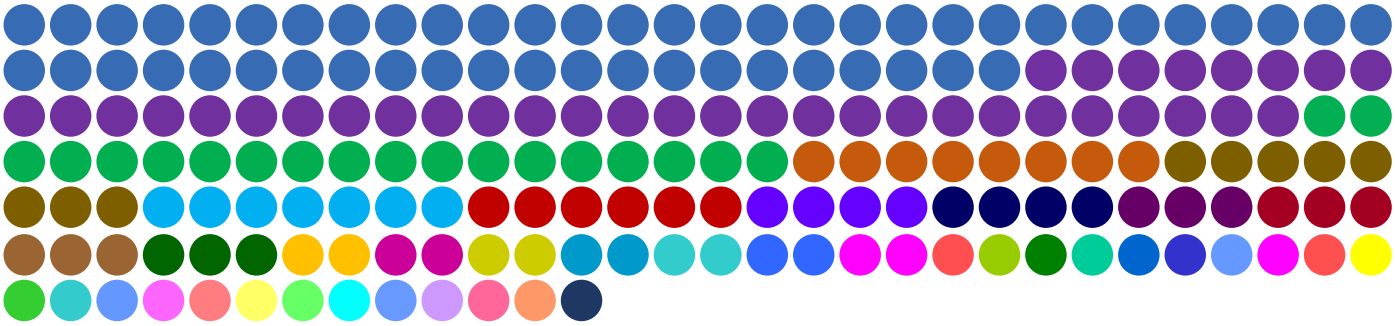
To answer this question, we calculated the Shannon-Weaver Index for Monterey County agriculture. Created in 1949 for military code breaking, the Shannon-Weaver index is widely used by economists and others interested in quantifying diversification. Different versions of the basic Shannon-Weaver formula exist. What they all have in common, though, is that they quantify not just the number of different items – such as characters in a coded message or crops grown in a county – but also their relative *evenness* or *abundance*.

How exactly does one calculate the Shannon-Weaver Index for agriculture? The main steps are: 1) create a list of agricultural products and their production values over the past decade; 2) remove the 21 minor, outlier products with average production values less than 0.25% of the county total; 3) enter the data into the Shannon-Weaver formula; and 4) convert to a scale from 0.0 to 1.0. For additional details, please contact the authors.

Over the past decade, Monterey County has consistently produced and reported thirty major commodities. The relative contribution of individual commodities varied during this period from 0.25% of the county's total farm gate value (the minimum threshold for this analysis) to 31.7% of the county total (lettuce in 2014). **Figure 7** depicts their most recent relative contributions.

Figure 7. Relative Distribution of Monterey County Agricultural Commodities

Each circle below represents approximately $25 million in gross sales, and each of the 51 colors represents a unique agricultural commodity. Combined, the circles and colors visually portray major agricultural commodities' relative contributions to Monterey County's total 2023 farm gate value. Commodities less than $25 million in value are depicted with a single dot. The number of commodities produced, and their relative evenness, influences the industry's economic diversification score and its resilience to economic shocks. (Source: 2023 County of Monterey Crop & Livestock Report)



For 2023, the Shannon-Weaver Index for Monterey County's agricultural industry was **0.57**.

What exactly does this number mean? For starters, getting the highest index, a perfect 1.00 on a scale from 0.00 to 1.00, would require the impossible: produce all seventy-two of California's major commodities and have farm gate values equally distributed across them. No single county could accomplish this.

At first glance, Monterey County's index of **0.57** seems near the middle of the 0.00 to 1.00 range. But the Shannon-Weaver formula includes a logarithmic function, which complicates interpretation. The logarithm makes the scale exponential, like the Richter Scale that measures 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 here.

The **0.57** index is high compared to most of the United States and slightly above average compared to twenty-two California counties analyzed thus far. Monterey County's number suggests solid protection from economic shocks.

HOW HAS AGRICULTURE'S LEVEL OF ECONOMIC DIVERSIFICATION TRENDED OVER TIME?

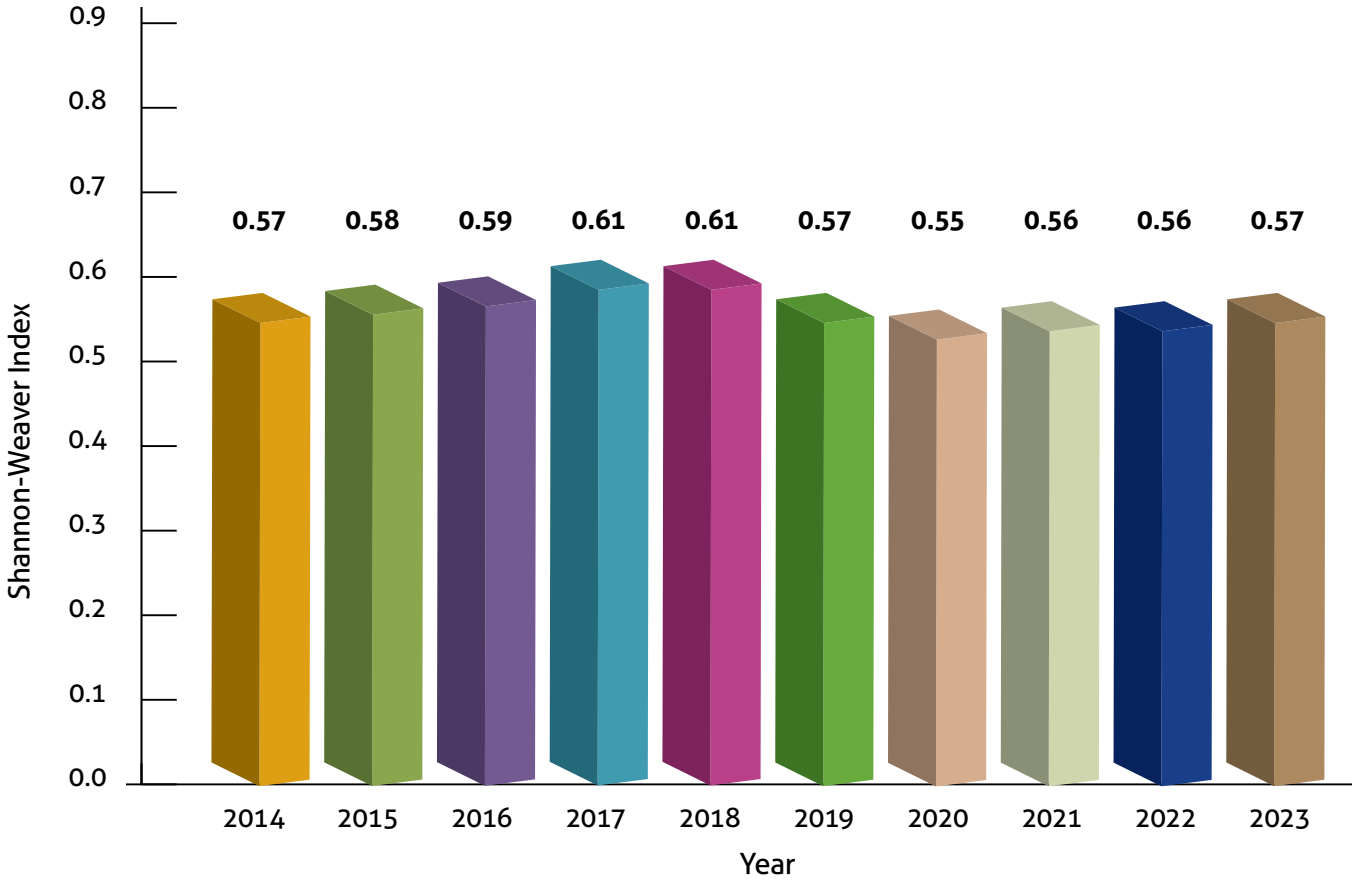
Has agriculture become more diversified in Monterey County, or less so? **Figure 8** shows the Shannon-Weaver Index for the past decade. The figure updates numbers from our previous report, based on the new set of ten-year crop data spanning 2014 to 2023.

The main thing to note is consistent, strong economic diversification across the years. The index has held steady over time, always between 0.55 and 0.61. This suggests solid ongoing economic resilience within agriculture. It also contrasts with the downward trend occurring in many California counties that have become dependent on one or two major products such as almonds, berries or wine grapes.

Monterey County's livestock sector plays an important role in the agricultural industry's economic resilience. Our previous study already documented the invisible benefits that Monterey County's rangelands produce—ecosystem services worth $4.6 billion to $9.9 billion in 2018. Recent evidence suggests that rangelands and the cattle they support also give Monterey County "shock absorbers" when markets or weather swing. California's cattle and specialty-crop sectors have low to negative correlations. Their revenue highs and lows rarely coincide due to different biological clocks, price drivers and weather sensitivities. Thus, the presence of livestock provides portfolio-level risk reduction for the county.

Figure 8. Ten-Year Trend in Monterey County Agriculture's Economic Diversification

An indicator of economic resilience, the **Shannon-Weaver Index** *quantifies economic diversification and resilience by combining the number of different commodities produced and their relative economic value.*



The Covid-19 pandemic underscored the importance of a strong, diversified production base. The pandemic disrupted supply chains, farm labor, production costs, exports, prices, and other factors. Many crops went unharvested, and grocery store shelves sat empty across much of the Northern Hemisphere.

A majority of Monterey County products declined in value. Prominent examples included grapes (-43.0%), celery (-38.3%), broccoli (-25.3%), lettuce (-15.8%) and cauliflower (-9.2%). But increases in strawberries (+25.9%), Brussels sprouts (+21.8%), vegetable transplants (+37.7%), spinach (+11.1%) and nine other products (including cattle) helped offset the losses. The county's overall production declined 11.3% for the year, then gained 4.8% for 2021.

BOTTOM LINE

The discussion here supports three key points: 1) economic diversification helps buffer against economic shocks such as wildfires, droughts, and even pandemics; 2) Monterey County agriculture has significant economic diversification across crops, which likely benefited the industry during the recent Covid-19 pandemic; and 3) agriculture's level of economic diversification has held steady over time.

All of this bodes well for the future. In an era of rapid change and rising risks, the agricultural community can take pride and comfort in not having "all of its eggs in one basket."

Toward the Future

This report has documented the role that Monterey County agriculture plays in the county economy. The key points are:

- Including local food production, processing, and multiplier effects, agriculture contributed $11.706 billion to the county economy. This represents over thirty-two million dollars per day ($32,072,782 to be exact) or $1,336,366 per hour and $22,273 per minute.
- With $7.897 billion in direct economic output from food production and processing, agriculture easily ranked #1 among Monterey County industries.
- As the county's largest employer, agriculture directly supported 56,365 employees—one out of every 4.7 jobs in Monterey County—plus another 24,951 jobs from multiplier effects.
- With a Shannon-Weaver Index of 0.57, agricultural production has a high level of economic diversification, which has provided critical stability and resilience to the agricultural industry and to the larger county economy.

Agriculture is a major pillar of the Monterey County economy and represents a vital link to the county's cultural past and competitive future. Agriculture will no doubt face many challenges and opportunities in the coming years. For now, the findings herein provide the most complete view to date of Monterey County agriculture's significant economic role.

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