



Economic Contribution of the Missouri Specialty Crop Industry

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How Much Does the Missouri Specialty Crop Industry Contribute to Missouri's Economy?



Number of Jobs Supported



Dollars Added to Missouri's Economy (GDP)



Dollars Provided to Missouri Labor Workforce and Business Owners



Local, State and Federal Taxes Stimulated

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1. Introduction

Much work has been completed in the past few years to better understand Missouri's specialty crop industry and evaluate its economic impact.

First, an earlier report titled "Historical Perspective of the Missouri Specialty Crop Industry" provided a historical view of the state's specialty crop industry. It detailed acreage, operations, cash receipts, production and yields for Missouri-grown specialty crops. Data were reported for all facets of Missouri specialty crop production: fruits, tree nuts, vegetables, culinary herbs and spices, medicinal herbs, horticultural goods, annual bedding plants, potted flowering plants, potted herbaceous perennials, cut flowers, cut cultivated greens, foliage plants, Christmas trees, deciduous flowering trees, broadleaf evergreens, deciduous shade trees, landscape conifers and deciduous shrubs. University of Missouri (MU) specialists completed this report in October 2017.

Second, a survey of Missouri specialty crop producers was conducted to learn more about the industry. To develop and conduct the survey, MU Extension led the efforts and collaborated with the MU Assessment Resource Center. The survey asked Missouri specialty crop producers to provide information about their farms, their specialty crop sales, their distribution outlets and the types of specialty crops they grew. The survey was first distributed in July 2017 and closed on Sept. 1, 2017. To collect more responses, the survey then reopened from November 2017 to March 31, 2018. In total, producers submitted 554 survey responses. A summary report of this survey work was published in May 2018. The survey research results provide insights about Missouri's specialty crop farming operations. The survey results and the historical report are both available at crops.missouri.edu/horticulture.

This study seeks to expand on the earlier research and examine the Missouri specialty crop industry's total economic contribution to the state and its counties. An economic contribution study focuses on describing the extent to which a particular existing business, sector, program or industry supports the economy. Quantifying this impact and creating awareness of it are important as doing both would enable the Missouri specialty crop industry to communicate its value to farmers, consumers, policymakers and other stakeholders. The following sections share more about the Missouri specialty crop contribution analysis' economic research, methodology and findings.

2. Methodology and Terminology

IMPLAN (implan.com) is a leading provider of economic data and analytical software. Its database of regional impact data is compiled from a variety of government sources such as the U.S. Department of Agriculture (USDA), U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics and U.S. Census Bureau. Estimations in this report used the 2016 IMPLAN data set for Missouri and its counties.

For this study, the authors conducted a multi-industry contribution analysis to describe the portion of the economy supported by Missouri's specialty crop businesses. IMPLAN has a recommended methodology for modeling this analysis, and the authors used it to inform the models developed for this report.

Three economic effects contribute to an industry's total economic contribution: direct, indirect and induced effects. **Direct effects** refer to the industry sales made by specialty crop businesses. **Indirect effects** accumulate when those specialty crop businesses purchase materials and services from other businesses (i.e. supply chain interactions). **Induced effects** accrue when specialty crop businesses' employees and proprietors spend their household income within the local economy.

This study reports several measures used to communicate economic contribution:

- **Jobs** data are the annual average of monthly jobs. A job can be either full-time or part-time. These do not represent full-time equivalents.
- **Output** communicates the value of an industry's sales.
- **Value added** represents the difference between industry sales (output) and the cost of the intermediate inputs used to generate those sales. This measure includes employee compensation; proprietor income; taxes on production and imports less subsidies; and other property income such as corporate profits, net interest, dividends and rent. Additionally, value added is considered to be an industry's contribution to gross domestic product (GDP).
- **Labor income** refers to employment income. It includes proprietor income and employee compensation, such as wages and benefits. Labor income is a component of the value added measure.
- **Taxes** are also included in the value added classification. They're reported separately as 1) state and local taxes and 2) federal taxes. Tax totals include sales taxes, property taxes, motor vehicle licenses, severance taxes, social insurance taxes, corporate profits taxes, income taxes and other miscellaneous taxes.

3. Specialty Crop Definition and IMPLAN Sectors Used

Specialty crops refer to fruits, tree nuts, vegetables, nursery and floriculture crops and other horticultural goods. Exhibit 3.1 lists the specialty crops named in the USDA definition. The definition doesn't include grains, oilseeds, bioenergy crops and plants federally controlled as illegal drug plants. As a result, crops such as corn, wheat, soybean, canola, switchgrass and alfalfa aren't considered specialty crops. Also, the crop list shared in the exhibit isn't exhaustive. States may amend the specialty crop definition to include other fruits, tree nuts, vegetables, nursery and floriculture crops and horticultural goods that are locally significant in their respective areas (USDA Agricultural Marketing Service).

Exhibit 3.1 - Crops Named in USDA Specialty Crop Definition

Category	Crops or Goods
Fruits	apple, apricot, aronia berry, avocado, banana, blackberry, blueberry, cacao, citrus, cherimoya, cherry, coconut, coffee, cranberry, currant, date, feijoa, fig, gooseberry, grape, guava, kiwi, litchi, mango, nectarine, olive, papaya, passion fruit, peach, pear, persimmon, pineapple, plum and prune, pomegranate, quince, raspberry, strawberry, suriname cherry
Tree nuts	almond, cashew, chestnut, hazelnut, macadamia, pecan, pistachio, walnut
Vegetables	artichoke, asparagus, snap bean, lima bean, dry edible bean, beet, broccoli, Brussels sprouts, cabbage, carrot, cauliflower, celeriac, celery, chickpeas, chive, collards and kale, cucumber, edamame, eggplant, endive, garlic, horseradish, kohlrabi, leek, lentils, lettuce, melon, mushroom, mustard and other greens, okra, peas, dry edible peas, onion, opuntia, parsley, parsnip, pepper, potato, pumpkin, radish, rhubarb, rutabaga, salsify, spinach, squash, sweet corn, sweet potato, Swiss chard, taro, tomato, turnip, watermelon
Culinary herbs and spices	ajwain, allspice, angelica, anise, annatto, artemisia, asafetida, basil, bay, bladder wrack, Bolivian coriander, borage, calendula, chamomile, candle nut, caper, caraway, cardamom, cassia, catnip, chervil, chicory, cicely, cilantro, cinnamon, clary, cloves, comfrey, common rue, coriander, cress, cumin, curry, dill, fennel, fenugreek, file, fingerroot, French sorrel, galangal, ginger, hops, horehound, hyssop, lavender, lemon balm, lemon thyme, lovage, mace, mahlab, malabathrum, marjoram, mint, nutmeg, oregano, orris root, paprika, parsley, rocket, rosemary, rue, saffron, sage, savory, tarragon, thyme, turmeric, vanilla wasabi, watercress

Medicinal herbs	artemissia, arum, astragalus, boldo, canaga, comfrey, coneflower, fenugreek, feverfew, foxglove, ginkgo biloba, ginseng, goat's rue, goldenseal, gypsywort, horehound, horsetail, lavender, liquorice, marshmallow, mullein, passion flower, patchouli, pennyroyal, pokeweed, St. John's wort, senna, skullcap, sonchus, sorrel, stevia, tansy, urtica, witch hazel, wood betony, wormwood, yarrow, yerba buena
Horticultural goods	honey, hops, maple syrup, tea leaves, turfgrass
Annual bedding plants	begonia, coleus, dahlia, geranium, impatiens, marigold, pansy, petunia, snapdragon, vegetable transplants
Potted flowering plants	African violet, azalea, florist chrysanthemum, flowering bulbs, hydrangea, lily, orchid, poinsettia, rose
Potted herbaceous perennials	astilbe, columbine, coreopsis, daylily, delphinium, dianthus, garden chrysanthemum, heuchera, hosta, ivy, ornamental grasses, peony, phlox, rudbeckia, salvia, vinca
Cut flowers	carnation, chrysanthemum, delphinium, gladiolus, iris, lily, orchid, snapdragon, tulip, rose
Cut cultivated greens	asparagus fern, coniferous evergreens, eucalyptus, holly, leatherleaf fern, pittosporum
Foliage plants	anthurium, bromeliad, cacti, dieffenbachia, dracaena, fern, ficus, ivy, palm, philodendron, spathiphyllum
Christmas trees	balsam fir, blue spruce, Douglas fir, Fraser fir, living Christmas tree, noble fir, Scots (Scotch) pine, white pine
Deciduous flowering trees	crabapple, crepe myrtle, dogwood, flowering cherry, flowering pea, flowering plum, hawthorn, magnolia, redbud, service berry
Broadleaf evergreens	azalea, boxwood, cotoneaster, euonymus, holly, pieris, rhododendron, viburnum
Deciduous shade trees	ash, elm, honey locust, linden, maple, oak, poplar, sweetgum, sycamore
Landscape conifers	aborvitae, chamaecyparis, fir, hemlock, juniper, pine, spruce, yew
Deciduous shrubs	barberry, bubbleia, hibiscus, hydrangea, rose, spirea, viburnum, weigela
Fruit and nut plants	berry plants, citrus trees, deciduous fruit and nut trees, grapevines
Propagative materials	bare-root divisions, cuttings, liners, plug seedlings, prefinished plants, tissue-cultured plantlets

To qualify as a specialty crop, a crop must be cultivated for sale or subsistence. To satisfy the cultivation criteria, some sort of management must be involved in producing the crop. As a result, native plants may be considered specialty crops if they're managed, monitored or documented. Here again, states may have flexibility to amend

the specialty crop definition. They may name a specialty crop as one that’s collected from wild areas located within their borders (USDA Agricultural Marketing Service).

IMPLAN reports data for 536 sectors, which represent different industries. It derives and aggregates these sectors according to the North American Industry Classification System. Exhibit 3.2 shares that a majority of the crops listed in the USDA specialty crop definition link to one of four IMPLAN sectors: vegetable and melon farming; fruit farming; tree nut farming; and greenhouse, nursery and floriculture production. These sectors are included in this report’s state- and county-level contribution analyses. Crops grown in fields and under cover (e.g., in greenhouses or high tunnels) are included in these sectors.

Exhibit 3.2 – Major Sectors Used in Contribution Analysis and Missouri Study Area Data

IMPLAN Sector	Jobs	Output (Sales)
Vegetable and melon farming	446	\$50,087,589
Fruit farming	859	\$37,059,441
Tree nut farming	281	\$16,493,904
Greenhouse, nursery and floriculture production	974	\$86,311,386

Although a majority of Missouri specialty crop data fit within the four previously mentioned IMPLAN sectors, a few specialty crops tie to other IMPLAN sectors. Exhibit 3.3 lists IMPLAN sectors which include these other specialty crops.

Honey provides a significant contribution to Missouri’s economy. In 2016, statewide honey cash receipts totaled \$1,081,000 (USDA Economic Research Service). County-level honey sales data are not available. Thus, honey sales were modeled into the state-level contribution analysis, but were not included in the county-level estimates.

Herbs and spices grown in open fields, hops and maple syrup are categorized in the “all other crop farming” sector, and dry pea production is represented in the “grain farming” sector. USDA Census of Agriculture data indicate that these crops are produced in Missouri; however, no crop-specific sales data were available for 2016. Thus, these specialty crops were not included in the contribution analysis.

Exhibit 3.3 – Other Sectors with Missouri Specialty Crops Included

IMPLAN Sector	Specialty Crop
Animal production, except cattle and poultry and eggs	Honey
All other crop farming	Herbs and spices (grown in the open), hops, maple syrup
Grain farming	Dry peas

Note, this report focuses on specialty crop production’s economic impact at the “farm” or “business” gate. IMPLAN will capture the backward linkages in models from these sales points in the value chain, but it will not include forward linkages when specialty crops are sold and used as inputs by other businesses further downstream in the value chain. Grape production provides an example. The contribution analysis includes the value of grape sales, but it doesn’t capture further economic impacts created by the winery or other retail sectors. Specialty crops grown in Missouri do contribute economically to industries that further process foods and beverages through freezing, canning, dehydrating or other methods, but this analysis does not include such processing impacts.

4. Economic Contribution of Specialty Crops, State-Level Results

During 2016, the Missouri specialty crop industry supported 3,642 jobs in total and generated nearly \$329 million in total output or industry sales. Exhibit 4.1 further details the Missouri specialty crop industry's statewide 2016 economic contribution, and it reports the contribution by direct, indirect and induced economic effects.

With respect to employment, the state's specialty crop industries directly supported 2,584 jobs. Materials and services purchased from input suppliers indirectly supported an additional 544 jobs, and household spending induced another 514 jobs.

Total annual value added—or the contribution to Missouri's GDP—was approximately \$157.5 million. Labor income, which is included in the value added classification, totaled \$99.4 million. Tax revenues, which are also included in the value added classification, include those collected by local, state and federal entities. Taxes paid by the Missouri specialty crop industry totaled nearly \$12.4 million at the state and local levels and nearly \$21.7 million at the federal level.

Exhibit 4.1 – Economic Contribution from Missouri Specialty Crop Industry, 2016

Description	Direct Effect	Indirect Effect	Induced Effect	Total
Employment	2,584	544	514	3,642
Output (sales)	\$193,546,579	\$65,741,355	\$69,707,274	\$328,995,208
Wages, salaries, benefits	\$53,875,348	\$23,489,408	\$22,077,627	\$99,442,383
Value added (GDP)	\$80,765,091	\$36,726,399	\$40,006,001	\$157,497,491
Local and state taxes	\$6,594,455	\$2,347,777	\$3,450,540	\$12,392,772
Federal taxes	\$11,478,618	\$4,947,511	\$5,244,165	\$21,670,294

Note: Presented in current (2018) dollars

Source: University of Missouri, using software and data from IMPLAN

The economic contribution of Missouri's specialty crop industry can also be communicated by industry sector. Exhibit 4.2 shows the top 10 industry sectors impacted; they're ranked according to the total number of jobs supported by Missouri specialty crop businesses. The data reported are totals; they reflect all three economic effects: direct, indirect and induced. The greenhouse, nursery and floriculture production sector generated the greatest employment impact. It supported 974 jobs in total and provided \$34.8 million in value added impact in 2016. Fruit farming and vegetable and melon farming ranked second and third, respectively, for employment.

*Exhibit 4.2 – Top 10 Sectors Impacted by Missouri Specialty Crop Industry, 2016
(Ranked Based on Total Employment)*

Industry Sector	Jobs (number)	Value Added (millions)	Output (millions)
Greenhouse, nursery and floriculture production	974	\$34.8	\$87.5
Fruit farming	859	\$16.6	\$37.6
Vegetable and melon farming	446	\$19.5	\$50.8
Support activities for agriculture and forestry	281	\$8.4	\$11.9
Tree nut farming	281	\$9.4	\$16.7
Wholesale trade	54	\$8.1	\$12.5
Real estate	43	\$4.8	\$7.3
Limited-service restaurants	31	\$1.3	\$2.5
Full-service restaurants	29	\$0.7	\$1.4
Hospitals	29	\$2.5	\$4.4

Note: Presented in current (2018) dollars

Source: University of Missouri, using software and data from IMPLAN

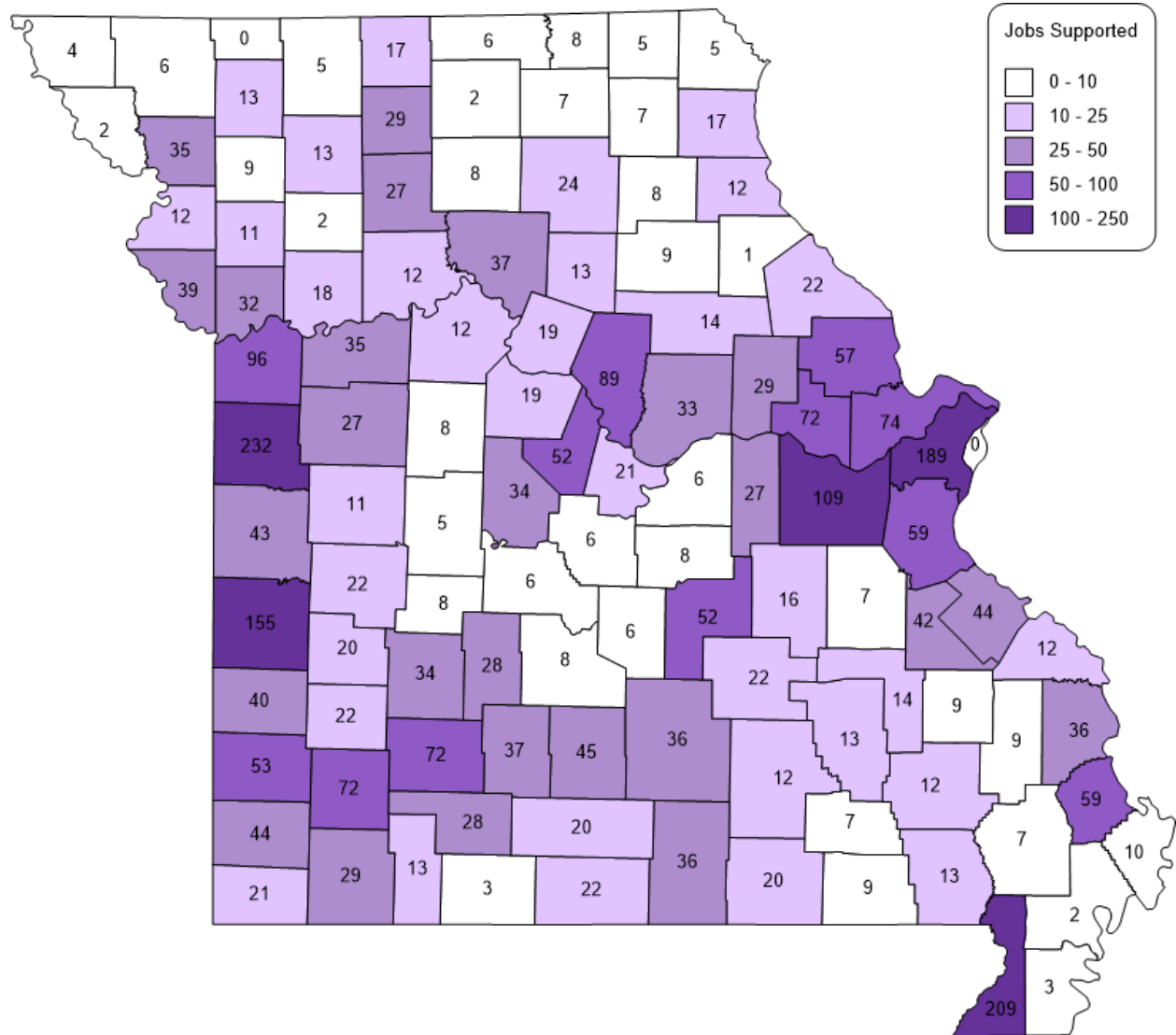
5. Economic Contribution of Specialty Crops, County-Level Results

As noted in the previous section, specialty crop production contributes significantly to Missouri's economy. Many of the contributions can also be communicated by region, and this study included a multi-industry economic contribution analysis for all Missouri counties in 2016. Each county was modeled as its own geographic region in order to only capture the economic effects within one particular county at a time. The county-by-county analysis followed the same methodology used in the state-level contribution analysis. Honey was the one exception. Honey sales were not included in the county-level estimates because county-level sales data were not available. Statewide honey sales data, however, were reflected in the state contribution analysis.

By county, the following maps summarize the specialty crop industry's total economic contribution. Darker shading for a particular county indicates the specialty crop industry made a larger economic contribution in that county. Note, the maps report total economic contribution, which includes all direct, indirect and induced effects.

Exhibit 5.1 details the economic contribution of Missouri’s specialty crop industry according to the total jobs supported by county. During 2016, the industry supported the greatest number of jobs in Cass (232), Dunklin (209) and St. Louis (189) counties.

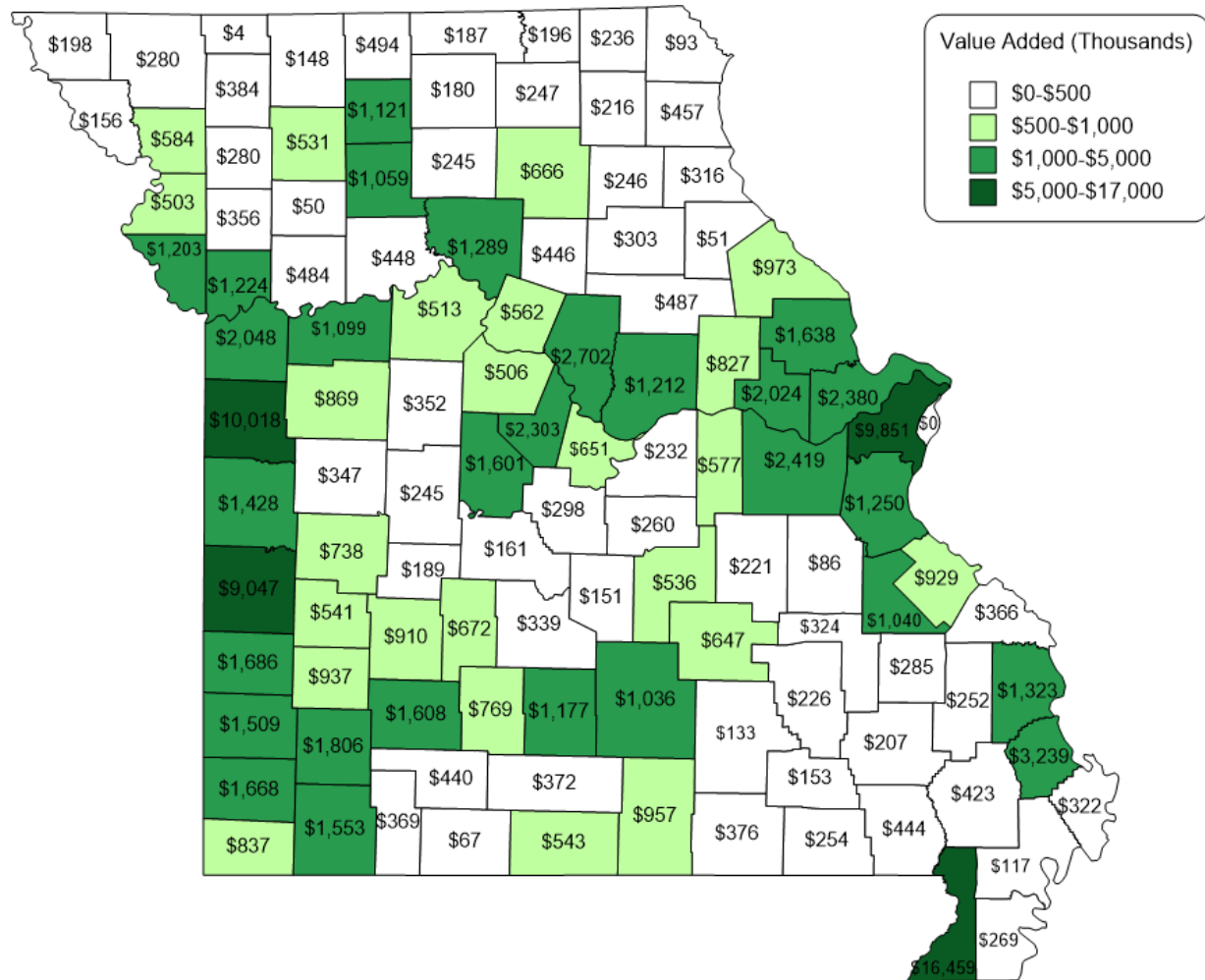
Exhibit 5.1 – Total Jobs Supported by Missouri Specialty Crop Industry, By County, 2016



Source: University of Missouri

Value added represents the difference between industry sales and its intermediate expenditures. This is also recognized as the contribution to GDP. Exhibit 5.2 shades Missouri counties according to the value added impact generated by the specialty crop industry. The industry contributed the most value added impact in Dunklin (\$16.5 million), Cass (\$10 million) and St. Louis (\$9.9 million) counties during 2016.

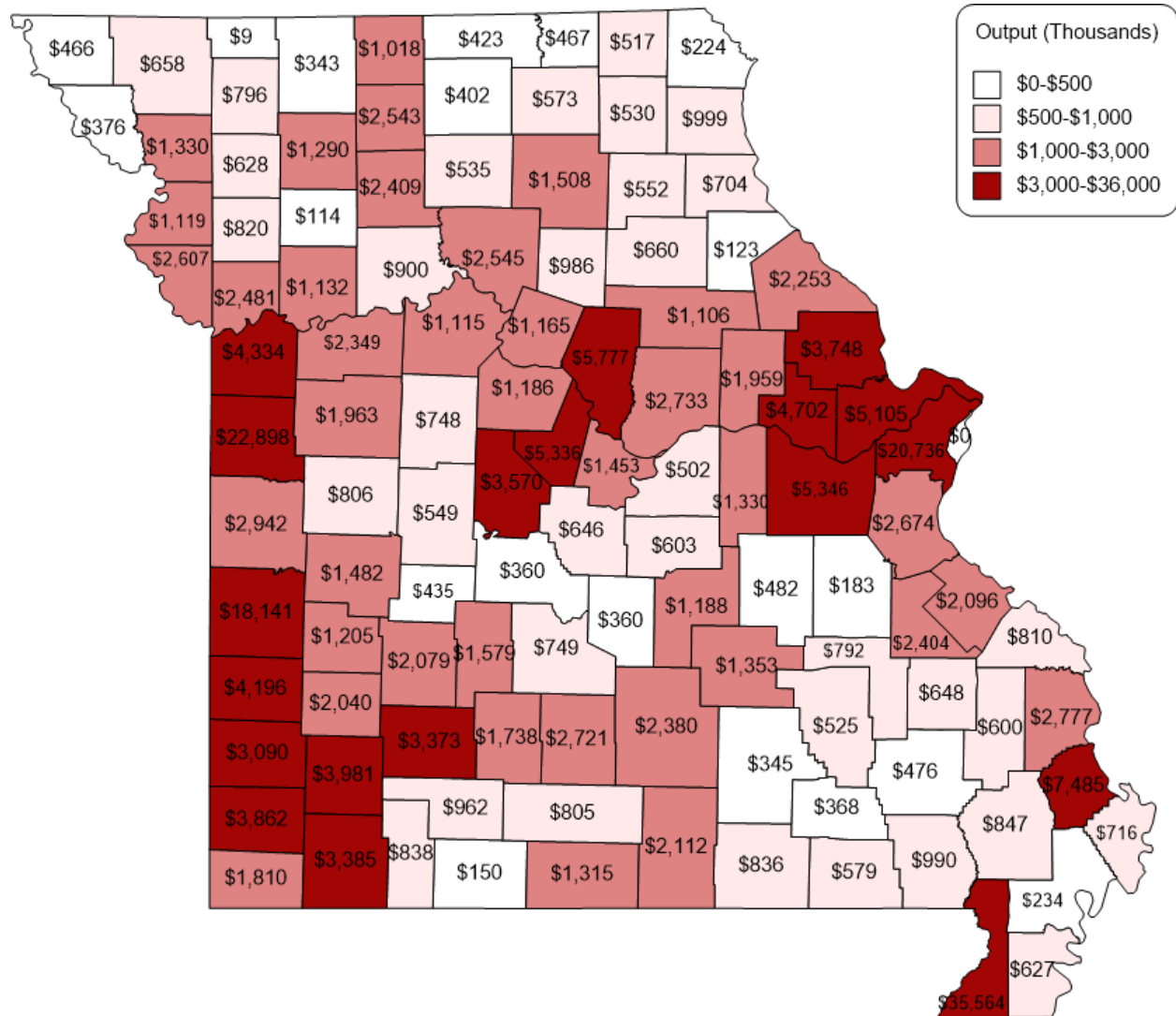
Exhibit 5.2 – Total Value Added from Missouri Specialty Crop Industry, Thousand Dollars, By County, 2016



Note: Presented in current (2018) dollars
 Source: University of Missouri

Output represents the value of industry production. Exhibit 5.4 reports total output (sales) contributed by the specialty crop industry by county for 2016. The industry helped generate more than \$10 million in industry sales in four Missouri counties.

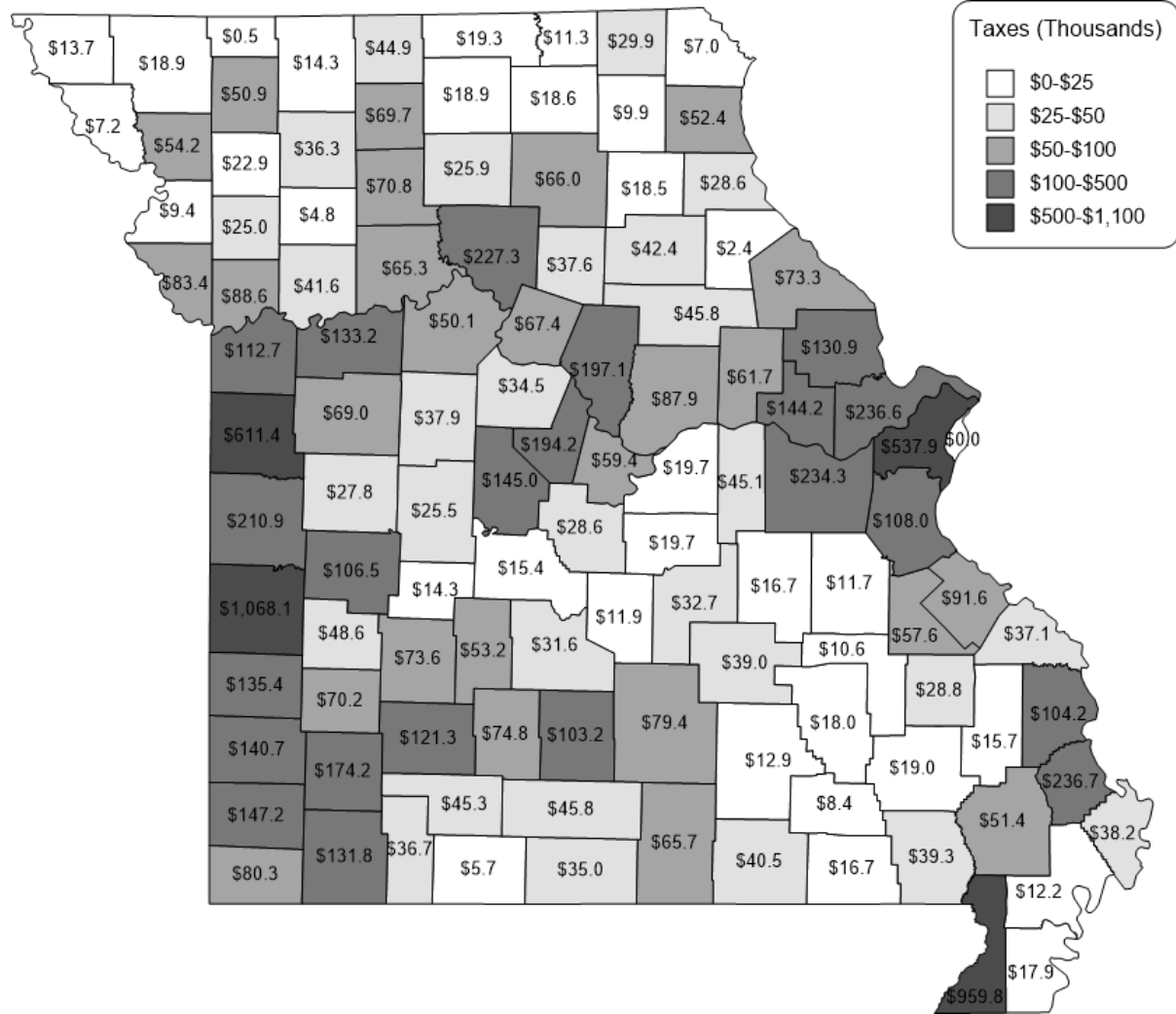
Exhibit 5.4 – Total Output (Sales) from Missouri Specialty Crop Industry, Thousand Dollars, By County, 2016



Note: Presented in current (2018) dollars
 Source: University of Missouri

Taxes collected benefit local and state authorities. Exhibit 5.5 details state and local tax revenue stimulated from specialty crop production in each Missouri county. Such revenue is primarily generated by personal income tax, sales tax and property tax. In 2016, four counties collected state and local taxes greater than \$500,000 from specialty crop businesses, and state and local taxes ranged from \$100,000 to \$500,000 in 22 counties.

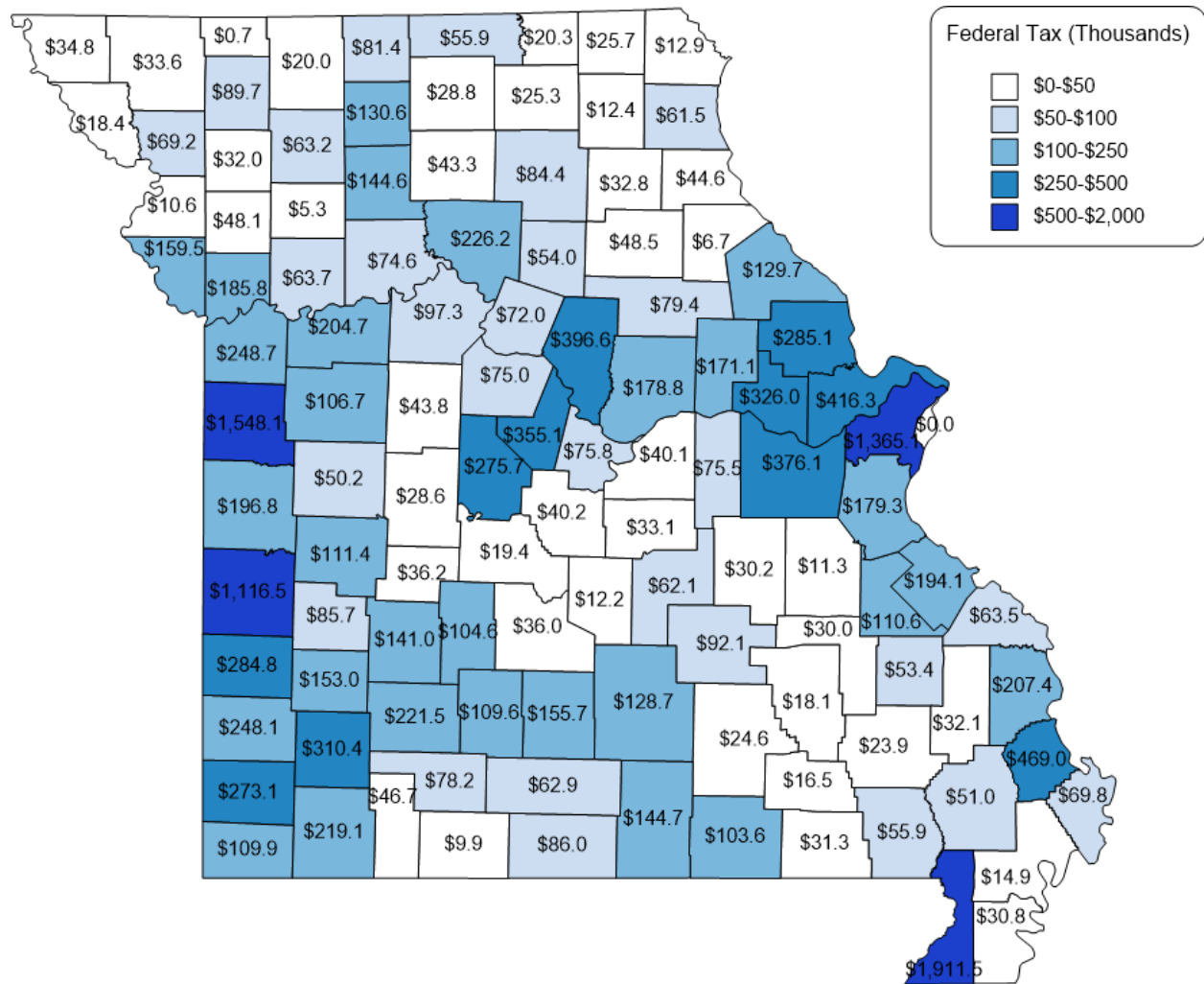
Exhibit 5.5 – Total State and Local Taxes from Missouri Specialty Crop Industry, Thousand Dollars, By County, 2016



Note: Presented in current (2018) dollars
 Source: University of Missouri

Exhibit 5.6 shows the amount of federal taxes paid by specialty crop and related businesses by county. These tax payments are primarily generated by social insurance tax, income tax and corporate profits tax. The specialty crop industry in Dunklin County stimulated approximately \$1.9 million in federal taxes in 2016. Cass County and St. Louis County followed with \$1.5 million and \$1.4 million, respectively, paid in federal taxes.

Exhibit 5.6 – Total Federal Taxes from Missouri Specialty Crop Industry, Thousand Dollars, By County, 2016



Note: Presented in current (2018) dollars
 Source: University of Missouri