Historical Perspective of the Missouri Specialty Crop Industry

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The "Historical Perspective of the Missouri Specialty Crop Industry" study provides a historical view of the state's specialty crop industry, and it shares perspectives about the industry. The study creates awareness and understanding of the Missouri specialty crop industry, and it communicates the industry's value to farmers, consumers, policymakers and other stakeholders.

Specialty crops refer to fruits, tree nuts, vegetables, nursery and floriculture crops and other horticultural goods. The table that follows names the specialty crops provided 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 table isn't exhaustive. States have the opportunity to amend the specialty crop definition and customize it to include other fruits, tree nuts, vegetables, nursery and floriculture crops and horticultural goods that are locally significant in their areas (USDA Agricultural Marketing Service B).

For a product to qualify as a specialty crop, note that it 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 B).

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	artemisia, 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
Horticulture	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, spathipyllum
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 confiers	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

Historical Perspective of the Missouri Specialty Crop Industry

Table of Contents

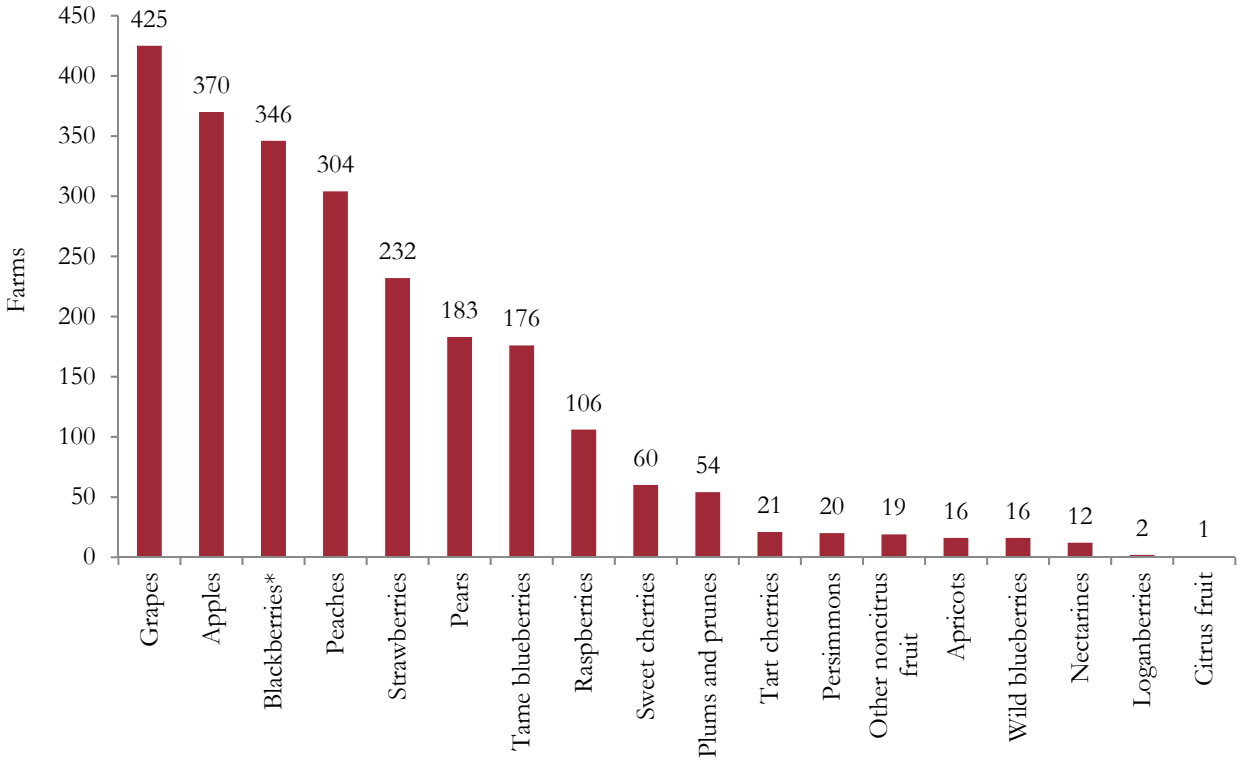
Executive Summary

This report provides historical perspective, including acreage, operation count, cash receipts, production and yields, for Missouri-grown specialty crops. Data are 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. This summary shares highlights of the assessment.

Fruits and Berries

Of the fruits and berries named in the specialty crop definition, Missouri farms have been most likely to raise grapes, apples, blackberries, peaches and strawberries. Exhibit 1 shares the number of farms reporting fruit and berry bearing and non-bearing acreage by crop in 2012. Farms growing grapes totaled 425 operations, and more than 300 farms reported growing apples, blackberries and peaches. Note that blackberry operations include those that raise dewberries and marionberries (USDA National Agricultural Statistics Service 2014b).

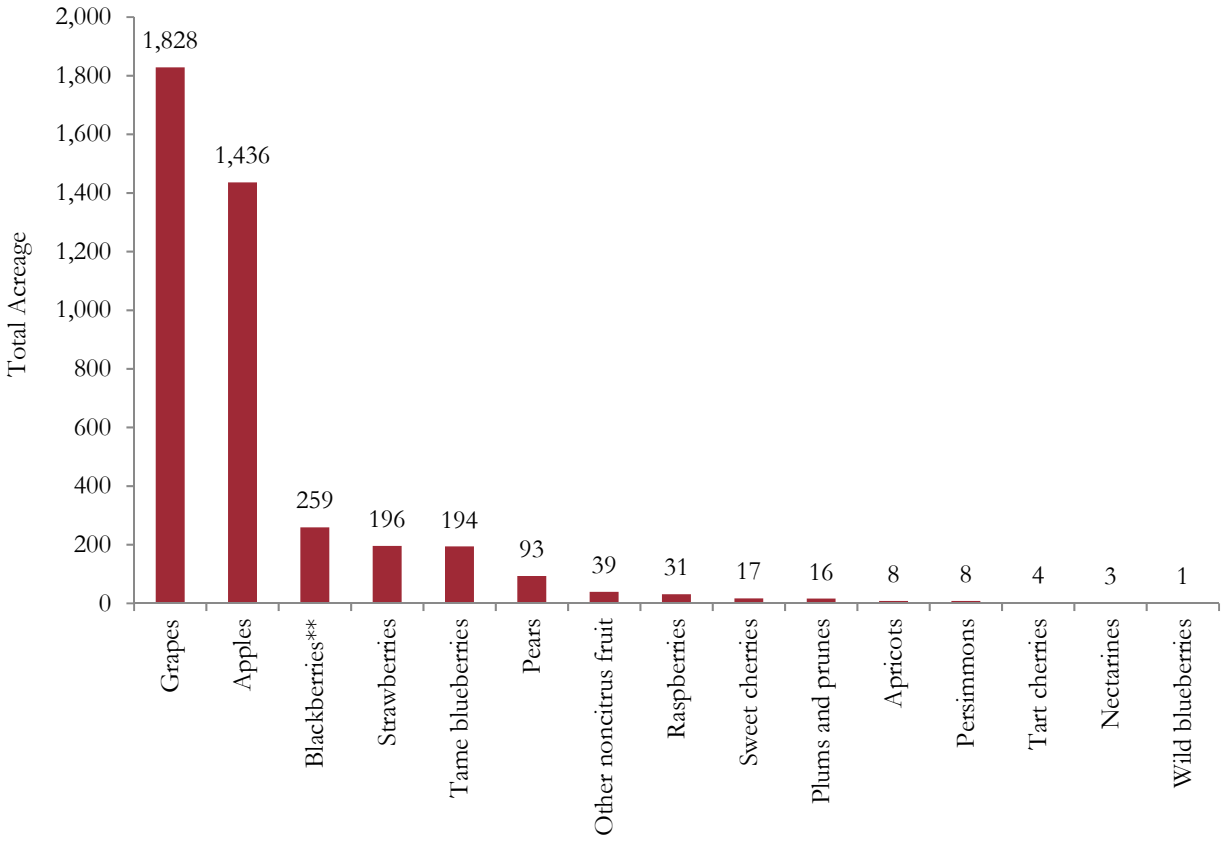
Exhibit 1 – Missouri Farms with Fruit and Berry Bearing and Non-Bearing Acreage, 2012



* Blackberry operations include those growing dewberries and marionberries.
Source: USDA, National Agricultural Statistics Service (2014)

In terms of acreage, Exhibit 2 summarizes total fruit and berry bearing and non-bearing acreage recorded in Missouri by crop during 2012. It shows that grape and apple acreage by far trumped acreage of other fruit and berry crops. Grape area exceeded 1,800 acres, and apple area surpassed 1,400 acres (USDA National Agricultural Statistics Service 2014b). Note that the chart excludes sharing acreage data for loganberries, peaches and citrus fruit. Data for those crops were withheld.

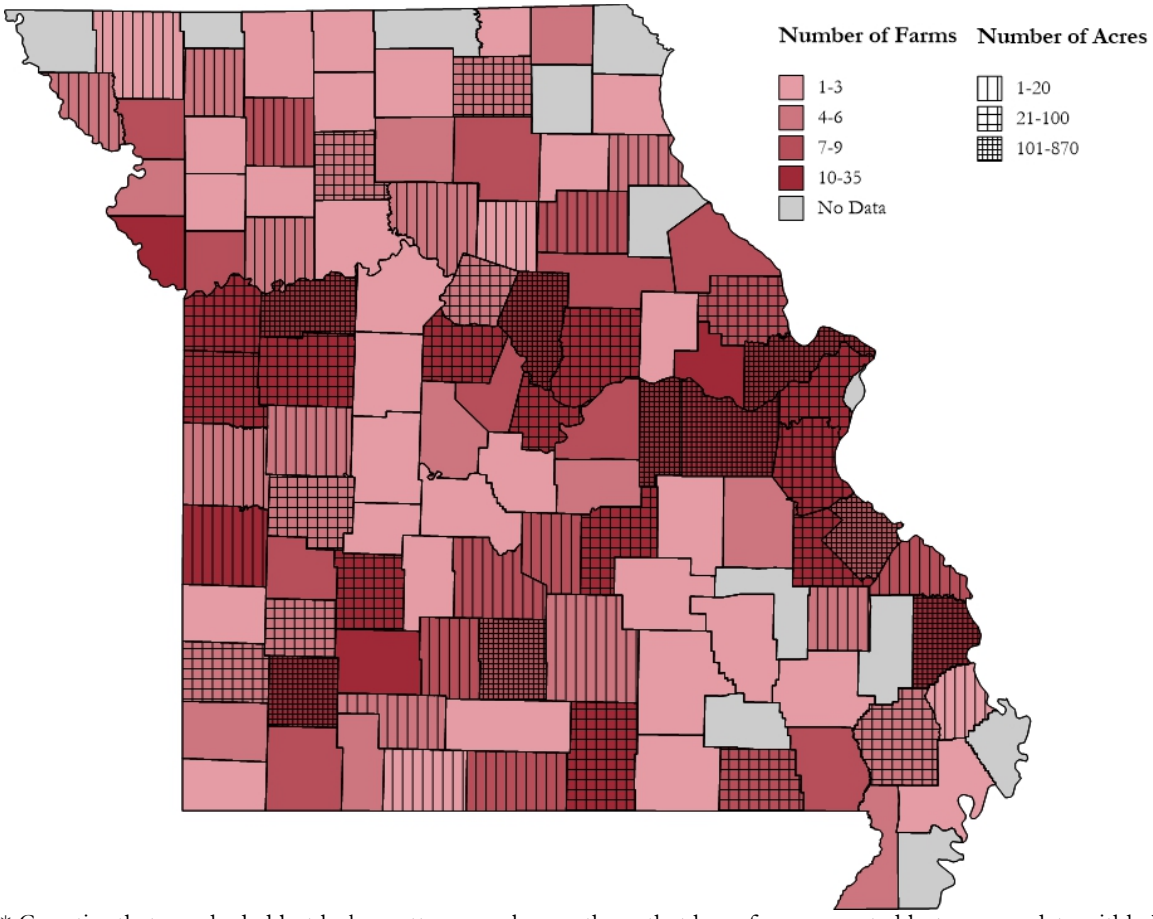
*Exhibit 2 – Missouri Total Fruit and Berry Bearing and Non-Bearing Acreage by Crop, 2012**



* Loganberry, peach and citrus fruit acreage weren't reported to protect data for individual operations.
** Blackberry acreage include that for growing dewberries and marionberries.
Source: USDA, National Agricultural Statistics Service (2014)

By county, those contributing the most bearing and non-bearing acreage to Missouri's non-citrus fruit production in 2012 were Lafayette County, 870 acres; St. Charles County, 195 acres; Ste. Genevieve County, 167 acres; Wright County, 162 acres; and Franklin County, 161 acres. Counties with the most non-citrus operations reporting bearing and non-bearing acreage in 2012 were Franklin County, 35 farms; Gasconade County, 35 farms; Boone County, 26 farms; Jackson County, 24 farms; and Lafayette County, 24 farms Exhibit 3 highlights Missouri counties by their number of fruit and berry operations and acreage (USDA National Agricultural Statistics Service 2014b).

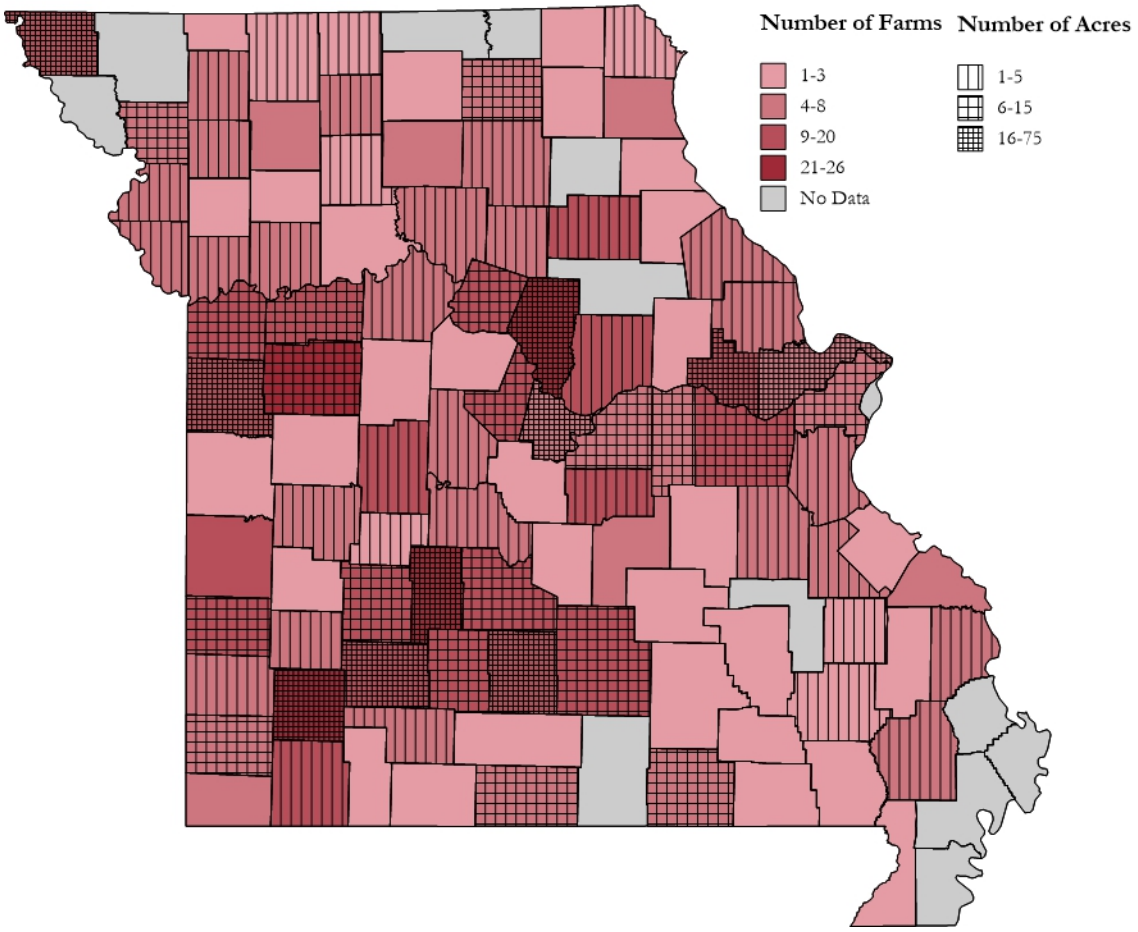
*Exhibit 3 – Missouri Non-Citrus Farms and Acreage by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Exhibit 4 shares berry data by county. In particular, it shades Missouri counties according to berry acreage grown and operations reporting acreage grown. Counties with the most operations growing berries in 2012 were Boone County, 26 farms; Dallas County, 26 farms; Lawrence County, 22 farms; Johnson County, 21 farms; and Wright County, 20 farms. With respect to acreage, counties reporting the most berry acreage grown in 2012 were Boone County, 77 acres; Cass County, 53 acres; and Lawrence County, 26 acres (USDA National Agricultural Statistics Service 2017b).

*Exhibit 4 – Missouri Berry Acreage Grown and Operations with Acreage Grown, 2012**

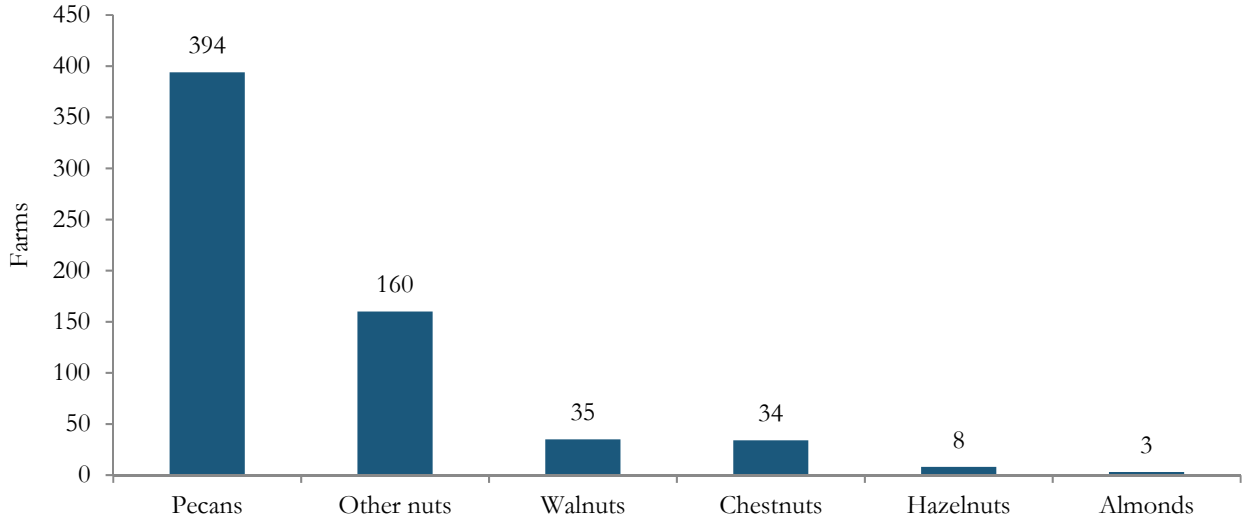


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

Tree Nuts

To summarize Missouri tree nut production, Exhibit 5 shares the number of Missouri farms growing tree nuts by type in 2012. It includes operations that have bearing and non-bearing tree nut crop acreage. As illustrated, Missouri farms were more likely to raise pecans than any other tree nut in 2012. Nearly 400 farms in the state grew pecans in 2012. Eastern black walnuts and chestnuts were grown on 35 farms and 34 farms, respectively. Operations raising "other nuts" totaled 160 farms (USDA National Agricultural Statistics Service 2014b). Other nuts are described as any nut crop that wasn't specifically mentioned in the survey (USDA National Agricultural Statistics Service 2014a).

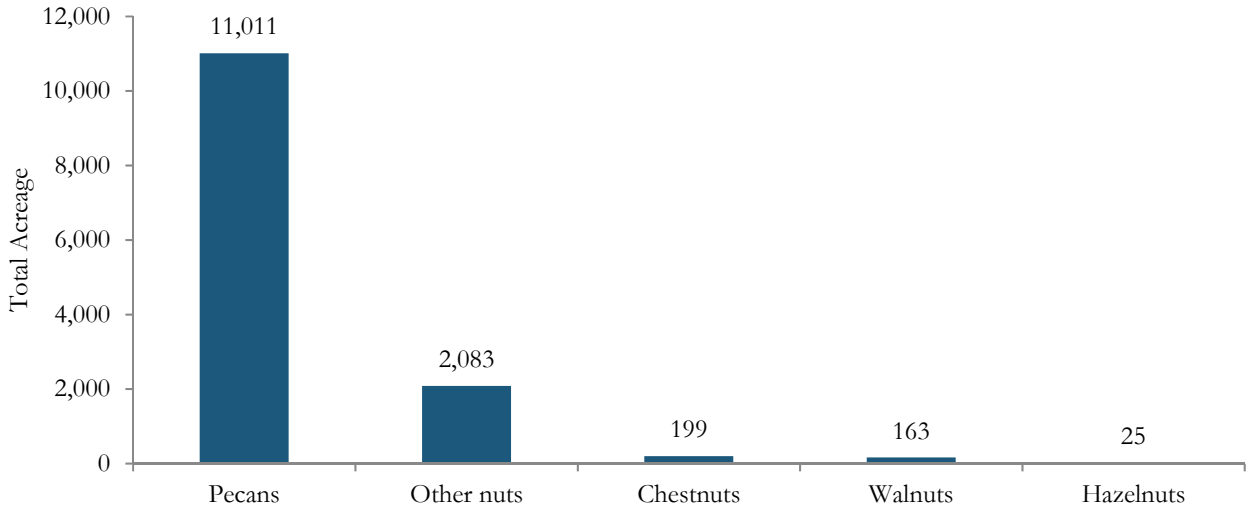
*Exhibit 5 – Missouri Farms with Total Bearing and Non-Bearing Tree Nut Acreage, 2012**



* For walnuts, USDA reports that Missouri data reflect production of English walnuts; however, Dr. Michael Gold with the Center for Agroforestry at the University of Missouri, and Dr. Mark Coggeshall, black walnut breeder, note that Missouri's walnut industry grows eastern black walnuts. As a result, this report overrides USDA's description of walnut production and indicates that the state instead produces eastern black walnuts.
Source: USDA, National Agricultural Statistics Service (2014)

Of all tree nuts grown in Missouri, pecans had the highest acreage in 2012. Total Missouri pecan acreage — aggregate bearing and non-bearing acreage — exceeded 11,000 acres during 2012. Exhibit 6 shares total Missouri acreage for chestnuts, hazelnuts, pecans, eastern black walnuts and other nuts. Note that data for almond acreage were withheld. More than 2,000 operations maintained "other nut" acreage in 2012. Nearly 200 operations shared that they had chestnut acreage, and 163 operations reported eastern black walnut acreage. In comparison, relatively few acres were dedicated to hazelnut production (USDA National Agricultural Statistics Service 2014b).

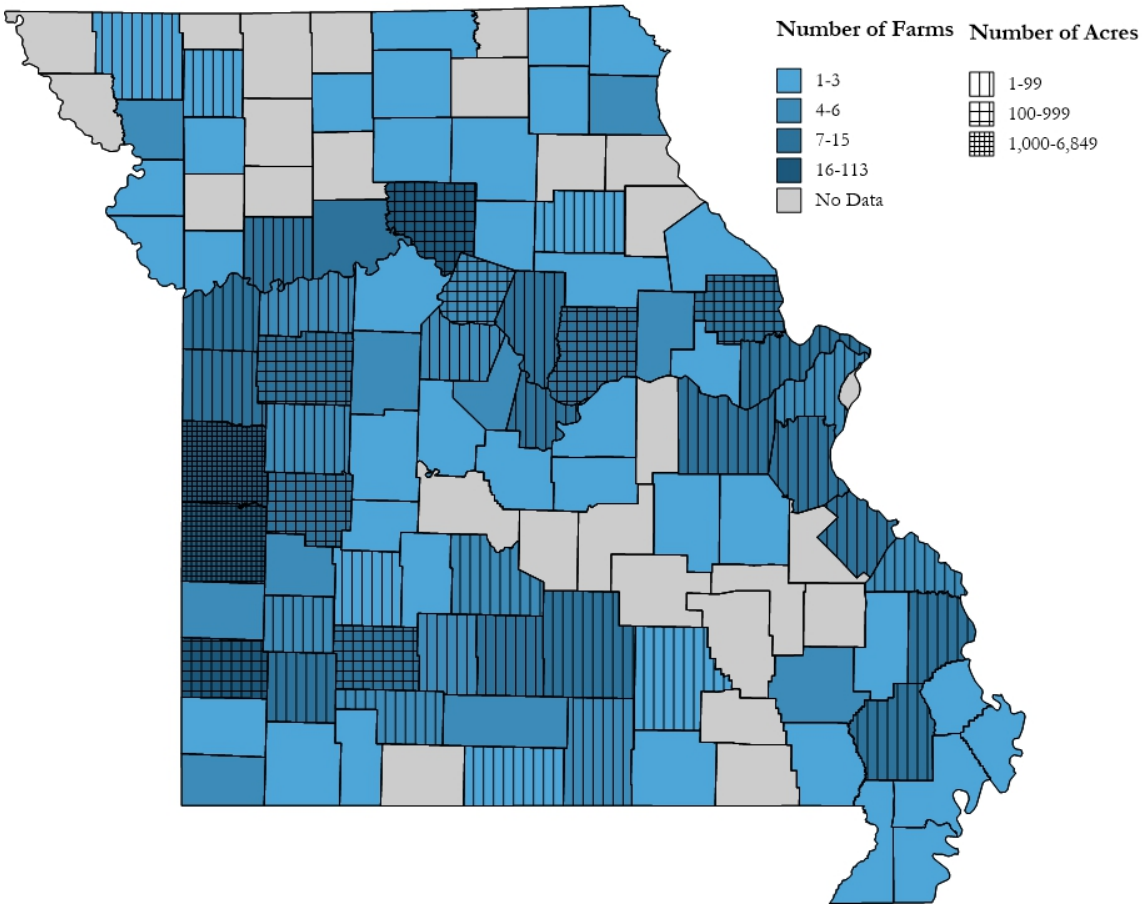
*Exhibit 6 – Missouri Total Tree Nut Bearing and Non-Bearing Acreage by Crop, 2012**



* Almond acreage data were withheld in 2012, and Missouri walnut data are for eastern black walnuts.
Source: USDA, National Agricultural Statistics Service (2014)

Exhibit 7 maps total tree nut farms and acreage in 2012 by Missouri county. Note that totals include bearing and non-bearing acreage. As shown, tree nut farms and acreage concentrated in Vernon County, Bates County and Chariton County. Of these three, Vernon County was the clear leader. During 2012, it had 113 nut farms and 6,849 acres of nuts. In contrast, the nut farm count totaled 28 operations in Chariton County and 27 operations in Bates County. Of these two counties, Bates County had the greater nut acreage in 2012. Its acreage totaled 1,098 acres relative to the 966 acres recorded in Chariton County (USDA National Agricultural Statistics Service 2014b).

*Exhibit 7 – Total Missouri Tree Nut Farms and Acreage by County, 2012**



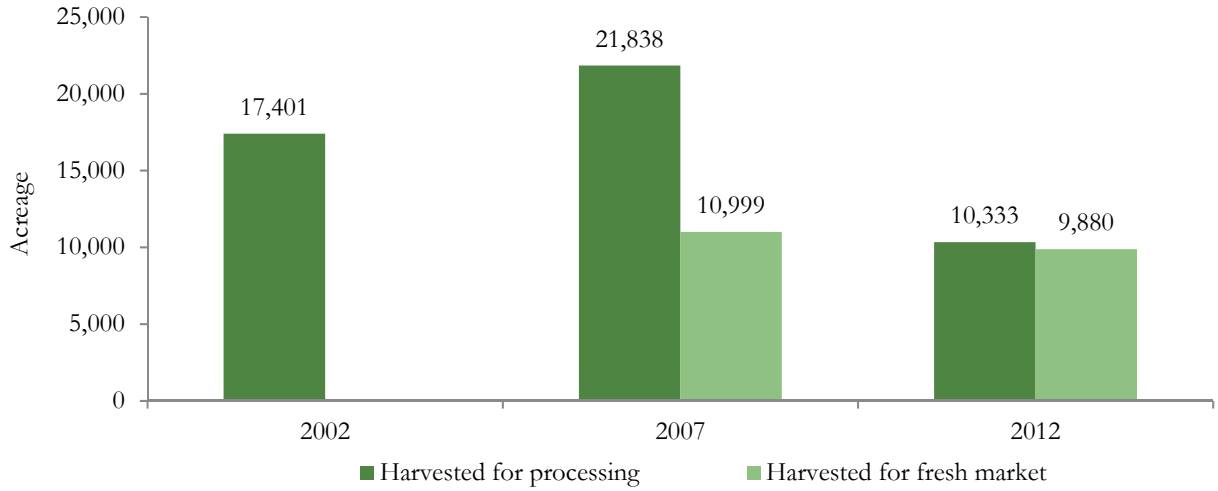
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Vegetables

In 2012, 1,215 farms in Missouri harvested 20,213 acres of vegetables. Missouri vegetable acreage has been harvested to serve fresh and processing markets. For years with data available, Exhibit 8 breaks down the vegetable acreage total into that harvested for processing and that harvested for the fresh market. In 2007 and 2012, Missouri had more vegetable acreage harvested for the processing market than the fresh market. However, note the steep drop in acreage harvested for processing uses between 2007 and 2012. That decline led to acreage harvested for processing just slightly edging out acreage harvested for the fresh market in 2012 — a difference of less than 500 acres (USDA

National Agricultural Statistics Service 2004, USDA National Agricultural Statistics Service 2009 and USDA National Agricultural Statistics Service 2014). Contributing to this drop in processing acreage between 2007 and 2012 was losses in the state's snap bean and cucumber acreage.

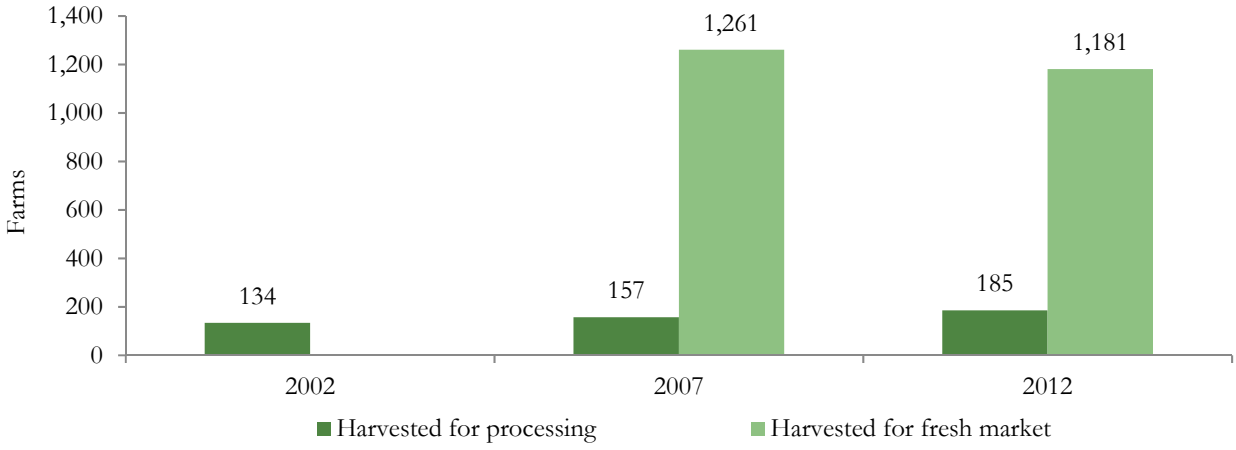
*Exhibit 8 – Missouri Acreage Used to Harvest Vegetables for Sale, 2002 to 2012**



* Fresh data weren't disclosed in 2002.
Source: USDA, National Agricultural Statistics Service (2004); USDA, National Agricultural Statistics Service (2009); USDA, National Agricultural Statistics Service (2014)

Despite vegetable acreage harvested for processing having been higher in recent years than acreage harvested for the fresh market, Exhibit 9 illustrates that Missouri vegetable farms have more commonly harvested product for the fresh market than the processing market. In 2012, 185 farms harvested vegetables for processing, but 1,181 farms harvested vegetables for the fresh market (USDA National Agricultural Statistics Service 2004, USDA National Agricultural Statistics Service 2009 and USDA National Agricultural Statistics Service 2014).

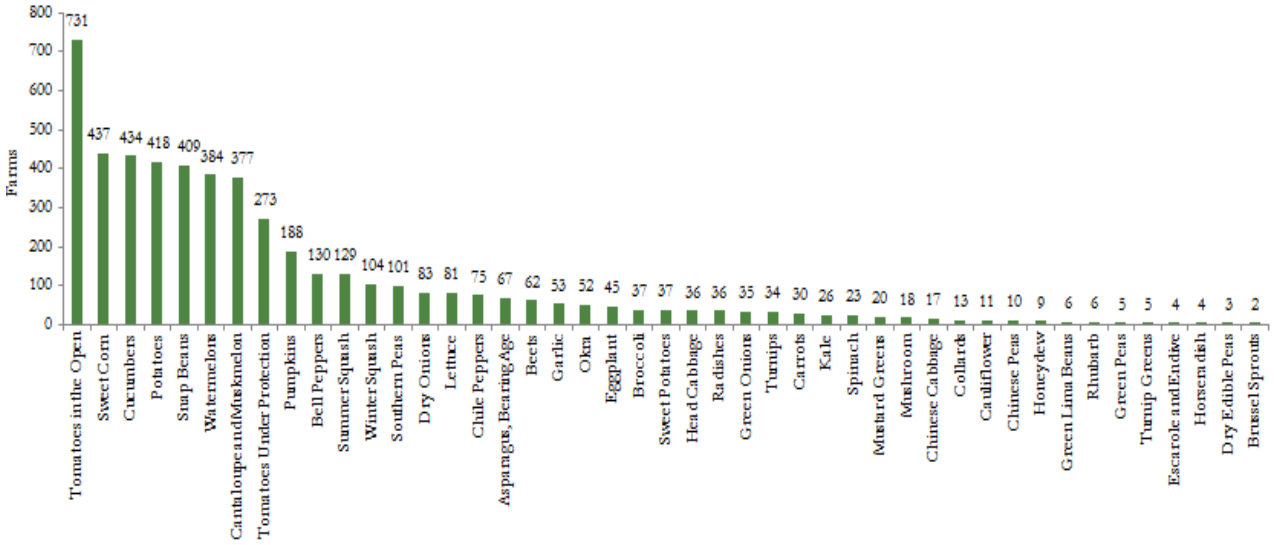
Exhibit 9 – Missouri Farms Harvesting Vegetables for Sale in Processing and Fresh Markets, 2002 to 2012



* Fresh data weren't disclosed in 2002.
Source: USDA, National Agricultural Statistics Service (2004); USDA, National Agricultural Statistics Service (2009); USDA, National Agricultural Statistics Service (2014)

To compare Missouri farm count by vegetable crop, see Exhibit 10. It reports the number of farms with harvested acreage by vegetable type. Tomatoes grown in the open had the greatest number of Missouri farms — more than 730 — harvesting it in 2012. Other vegetable crops with a significant number of operations harvesting them were sweet corn, 437 farms; cucumbers, 434 farms; potatoes, 418 farms; and snap beans, 409 farms (USDA National Agricultural Statistics Service 2014b).

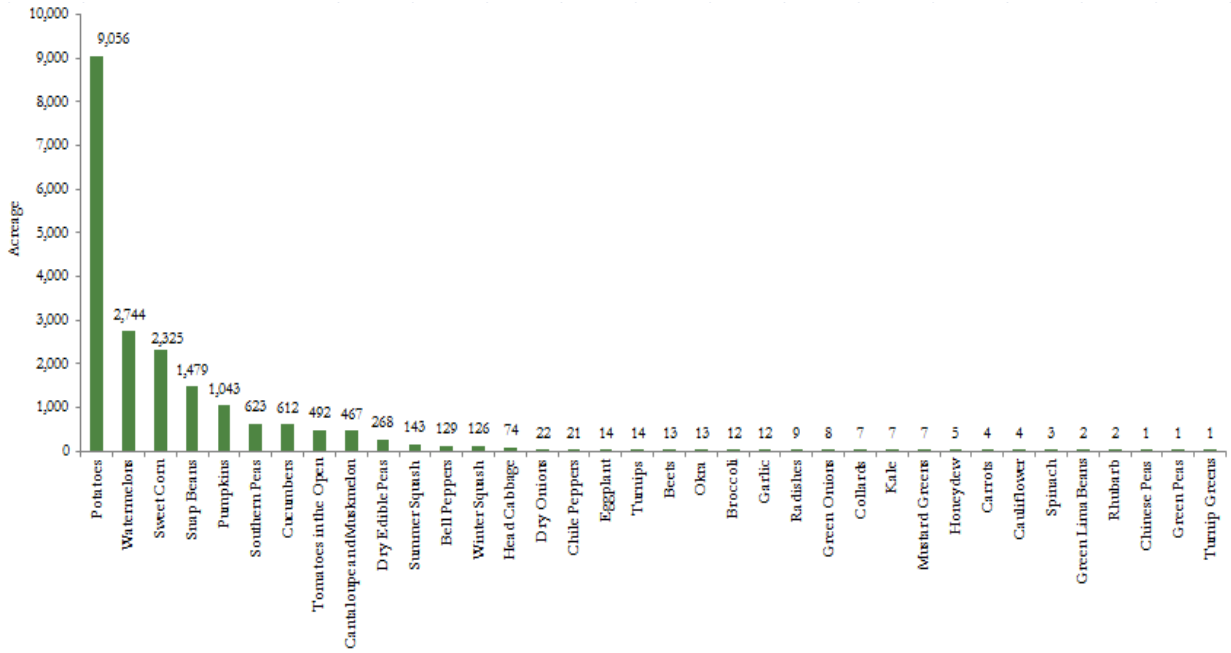
Exhibit 10 – Missouri Farms Harvesting Vegetables by Crop, 2012



Source: USDA, National Agricultural Statistics Service (2014)

For an alternative look at Missouri vegetable production by crop, Exhibit 11 displays harvested acreage totals from 2012. Based on these harvested acreage totals from the USDA National Agricultural Statistics Service, potatoes were the dominant vegetable crop harvested in 2012. In that year, Missouri operations harvested more than 9,000 acres of potatoes. Other top vegetable crops according to harvested acreage were watermelon, 2,744 acres; sweet corn, 2,325 acres; snap beans, 1,479 acres; and pumpkins, 1,043 acres (USDA National Agricultural Statistics Service 2014b).

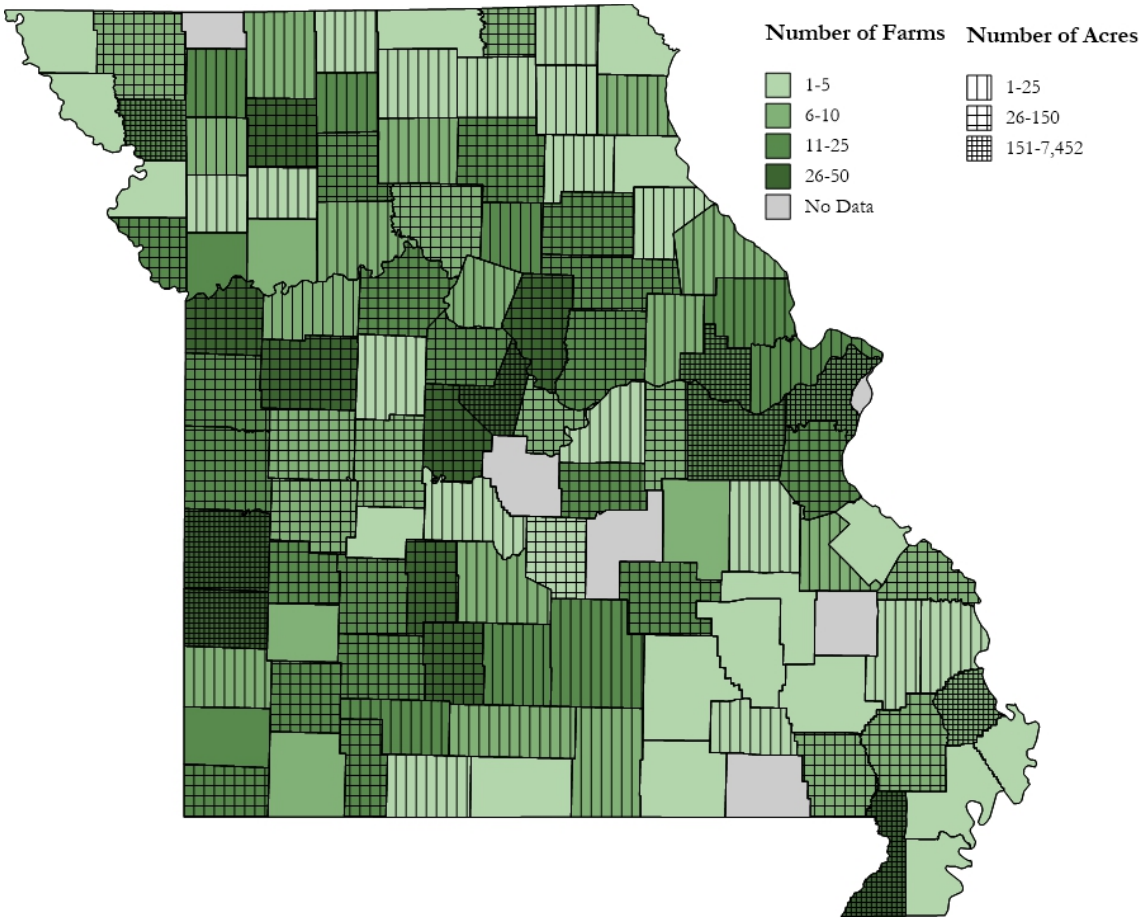
*Exhibit 11 – Missouri Harvested Acreage by Vegetable Crop, 2012**



* Data weren't published for escarole and endive, horseradish, lettuce and sweet potatoes. Data for mushrooms and tomatoes under protection were reported, but their production area is measured in square footage. Square footage under production totaled 1,339,178 square feet for tomatoes under protection and 30,586 square feet for mushrooms.
Source: USDA, National Agricultural Statistics Service (2014)

On a county-by-county basis, Exhibit 12 shares acres of vegetables harvested for selling and the count of farms harvesting vegetables for selling. Note that these data are for 2012. Counties with the greatest number of farms harvesting vegetables for sale were Vernon County, 50 farms; Moniteau County, 45 farms; Boone County, 42 farms; and Dallas County, 40 farms. With respect to acreage, data were withheld for some counties. Of those with data disclosed, the harvested acreage totals were highest in Dunklin County, 7,452 acres; Scott County, 1,775 acres; Vernon County, 879 acres; and Barton County, 659 acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 12 – Missouri Acreage and Farms Harvesting Vegetables for Sale by County, 2012**



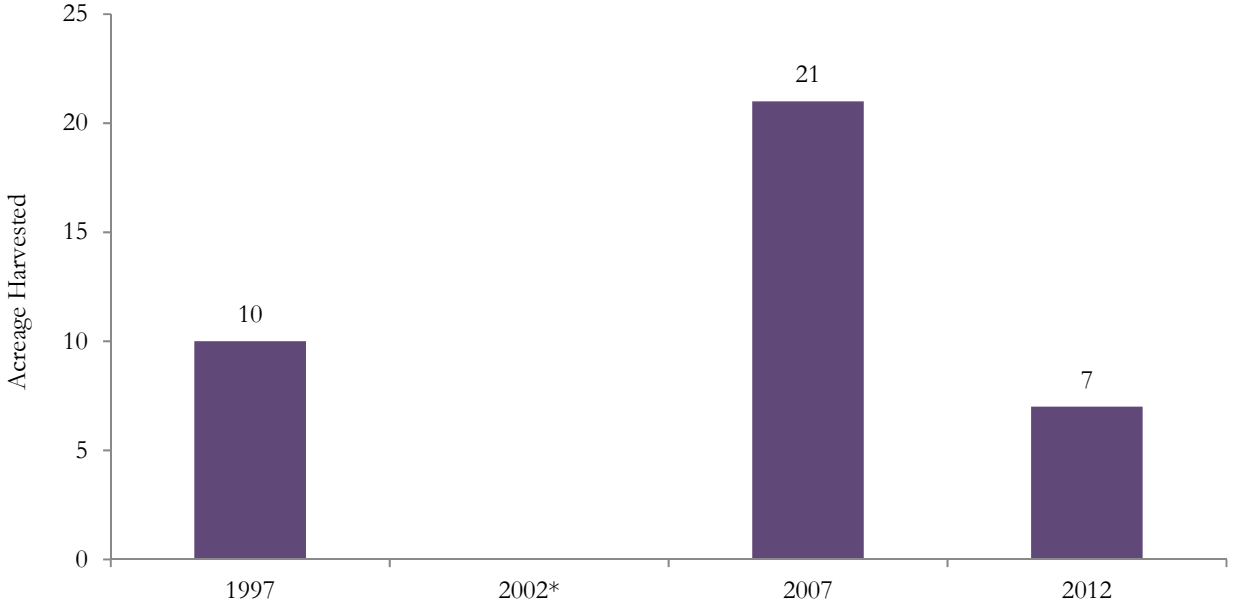
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Herbs

Missouri has raised both fresh-cut herbs and dry herbs. With respect to fresh-cut herbs, Exhibit 13 presents the harvested acreage totals from 1997 to 2012. Note that data weren't published for 2002 to protect data for individual operations. Fresh-cut herb harvested acreage peaked at 21 acres in 2007. It later dropped to seven acres in 2012. All fresh-cut herbs harvested in 2007 and 2012 were used for fresh-market purposes (USDA National Agricultural Statistics Service 2017b).

Organic data were collected in different years and are reported independently in this assessment. In 2015, certified organic fresh-cut herb harvested acreage totaled 440 acres. Three operations contributed to that production, which totaled 600,100 pounds and generated roughly $1.6 million in sales (USDA National Agricultural Statistics Service 2017b). To see a definition of organic products, see this report's Methodology section.

Exhibit 13 – Missouri Fresh-Cut Herbs Acreage Harvested, 1997 to 2012



* Harvested acreage weren't reported in 2002 to avoid disclosing data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

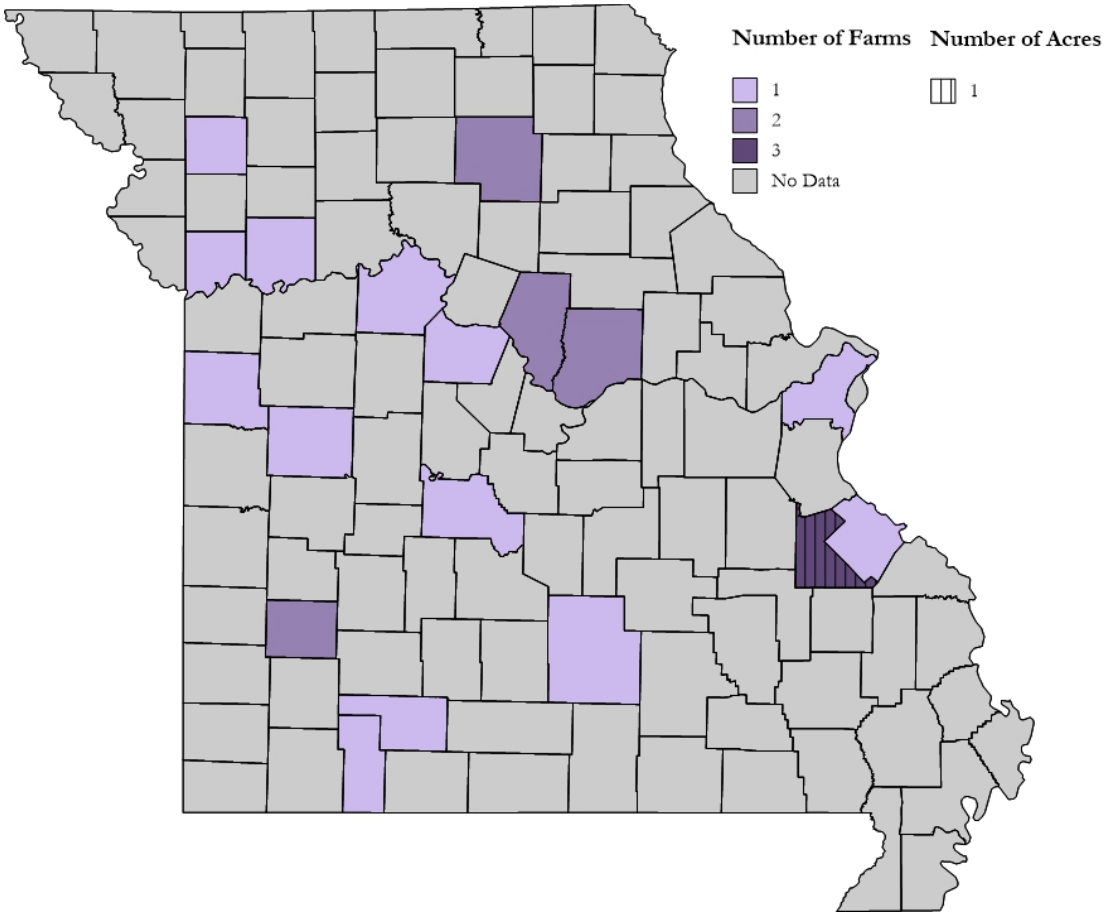
In 2012, 24 operations in Missouri harvested fresh-cut herb acreage, and all of the operations intended to serve the fresh market. Exhibit 14 tracks the number of Missouri operations harvesting fresh-cut herb acreage from 1997 to 2012. Note that the operation count reached its highest level during 2007 — 42 operations with area harvested. All of those operations harvested fresh-cut herbs for the fresh market (USDA National Agricultural Statistics Service 2017b).

Exhibit 14 – Missouri Operations with Fresh-Cut Herb Acreage Harvested, 1997 to 2012

Source: USDA, National Agricultural Statistics Service (2017b)

By operation count, top Missouri counties for harvesting fresh-cut herb area in 2012 were St. Francois County, three farms; Boone County, two farms; Callaway County, two farms; Dade County, two farms; and Macon County, two farms. See Exhibit 15. With respect to acreage data, only St. Francois County had fresh-cut herb harvested acreage data published for 2012; it harvested one acre. Other counties with fresh-cut herb operations had the harvested acreage data withheld (USDA National Agricultural Statistics Service 2017b).

*Exhibit 15 – Missouri Harvested Fresh-Cut Herb Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

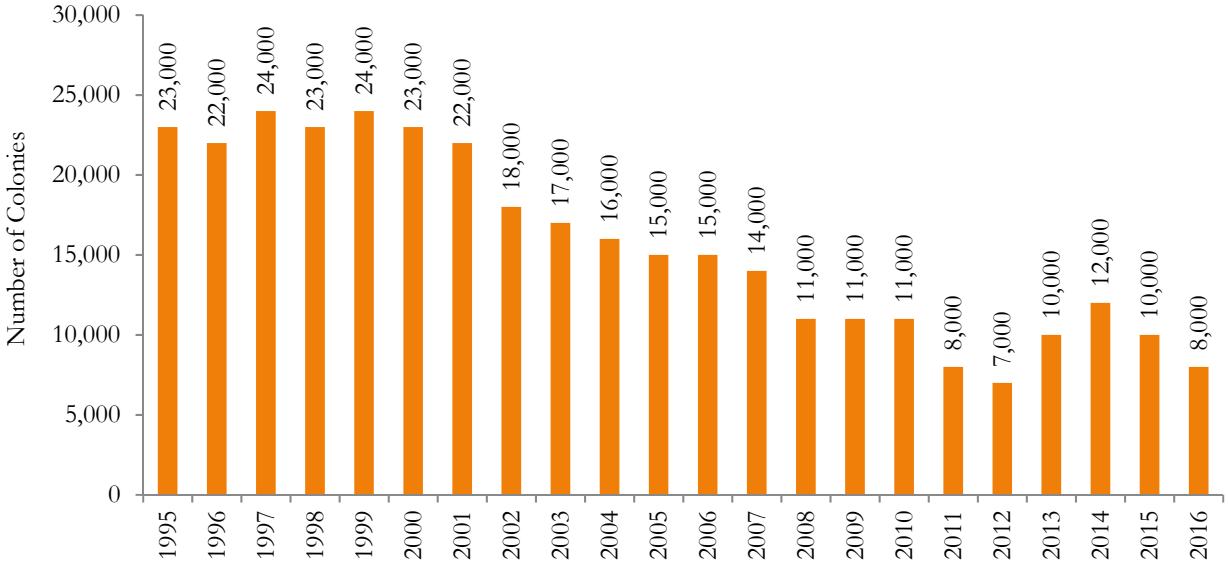
Historically, Missouri has had a small presence in dry herb production. Three Missouri operations reported that they harvested dry herb acreage in 1997, and by 2002, the operation count had dropped to two farms. In more recent years, no farms were reported to harvest dry herb acreage in Missouri (USDA National Agricultural Statistics Service 2017b).

Horticultural Goods

Horticultural goods include honey, hops, maple syrup and turfgrass. For honey, its production varies based on the number of colonies maintained in the state. During the past 20 years, colony inventory in Missouri declined dramatically. Exhibit 16 illustrates the trend in colony inventory from 1995 to

2016. During 2016, the state's honey producers had roughly one-third the colonies that they had in 1995. In total, 8,000 colonies were reported in 2016 relative to the 23,000 colonies existing in 1995 (USDA National Agricultural Statistics Service 2017b).

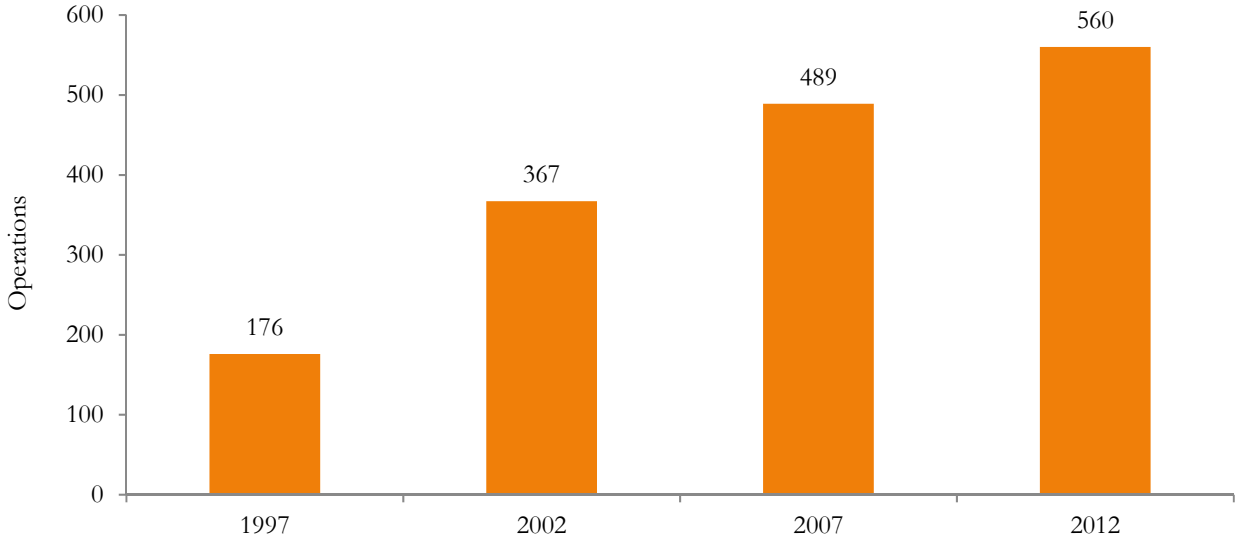
Exhibit 16 – Missouri Honey Bee Colony Inventory, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2017b)

Although colony inventory has shrunk, more Missouri operations have adopted honey production in recent years. The increase in operation count has been quite significant, too. Exhibit 17 illustrates that 176 operations in Missouri reported that they produced honey during 1997. Steady growth ultimately led to 560 operations producing honey in 2012. Of those, 372 operations indicated that they made honey sales in 2012 (USDA National Agricultural Statistics Service 2017b).

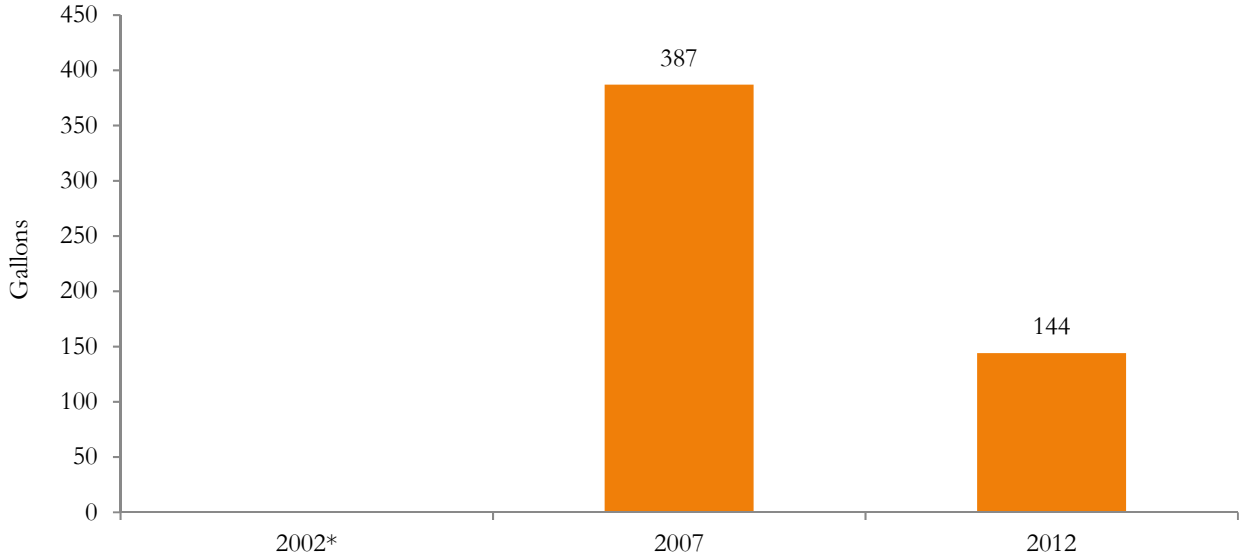
Exhibit 17 – Missouri Operations with Honey Production, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri maple syrup production data are somewhat limited. Exhibit 18 summarizes the Missouri data available. In 2002, USDA withheld releasing a specific value for Missouri maple syrup production. However, 2007 maple syrup production totaled 387 gallons. The production level dropped in 2012 to 144 gallons (USDA National Agricultural Statistics Service 2017b).

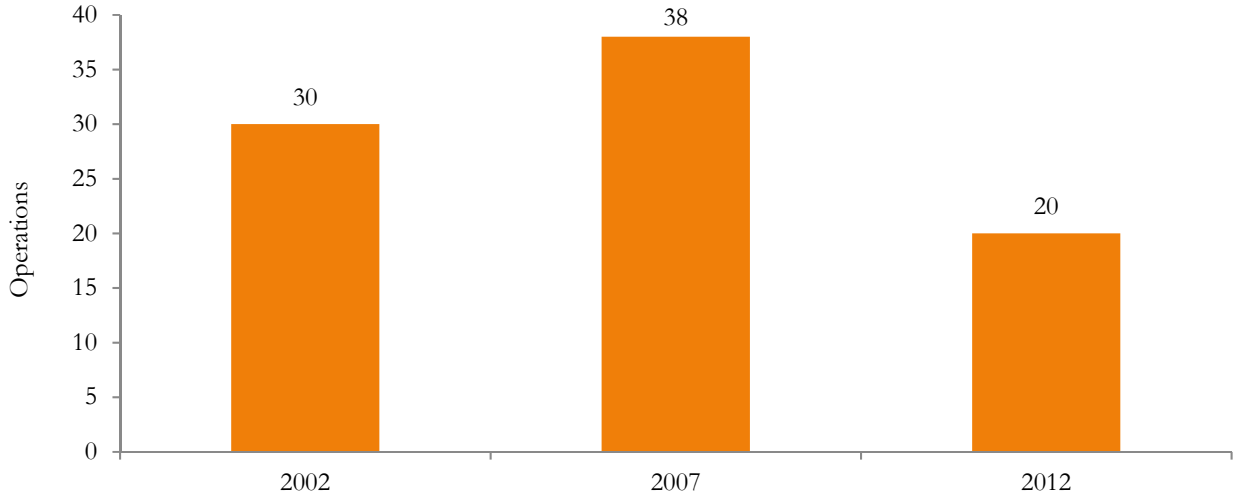
Exhibit 18 – Missouri Maple Syrup Production, 2002 to 2012



* Production data for 2002 were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

With respect to Missouri maple syrup operations, Exhibit 19 shares the count of operations with maple syrup production from 2002 to 2012. In 2012, 20 operations in Missouri indicated that they produced maple syrup. Thirty had produced maple syrup in 2002, and 38 operations in 2007 noted producing syrup (USDA National Agricultural Statistics Service 2017b).

Exhibit 19 – Missouri Operations with Maple Syrup Production, 2002 to 2012

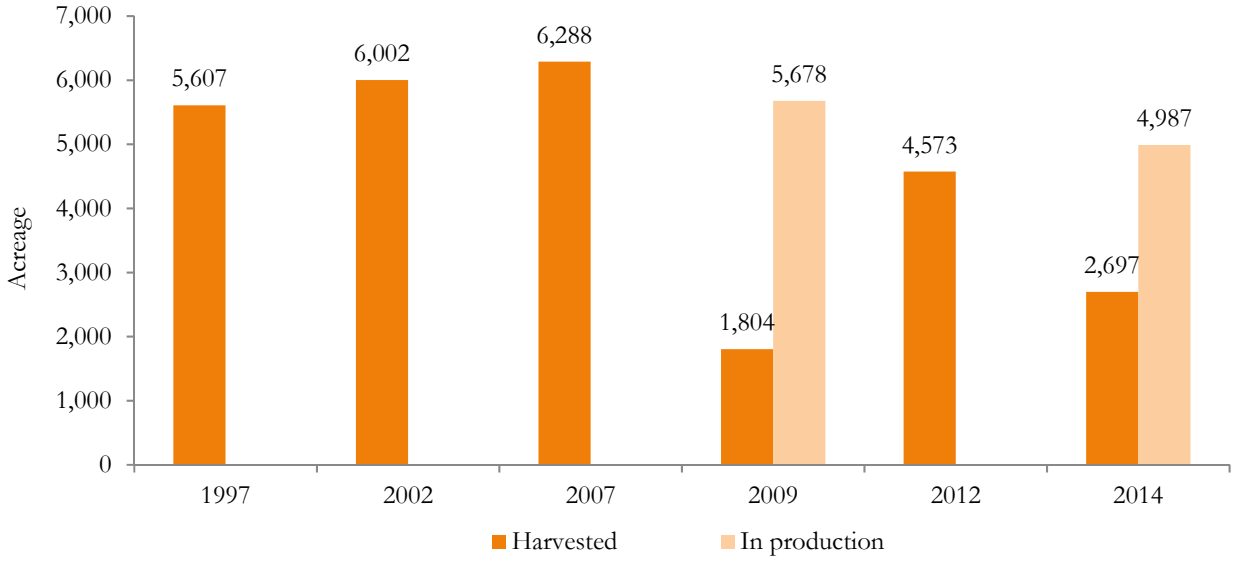


Source: USDA, National Agricultural Statistics Service (2017b)

For turfgrass, the USDA National Agricultural Statistics Service reports data for sod that's raised in Missouri. Acreage data have been measured as acreage harvested and acreage in production. Exhibit 20 illustrates the available data. Note that acreage in production was only released in 2009 and 2014. The graph shows that sod acreage harvested increased early in the observation period and then decreased. Of years with data reported, harvested acreage reached its greatest level — 6,288 acres — in 2007. It dropped to its lowest level of 1,804 acres in 2009. Harvested acreage was fairly low at less than 2,700 acres in 2014 (USDA National Agricultural Statistics Service 2017b).

Note that just a portion of sod in production was harvested during 2009 and 2014. Harvested acreage was just 31.8 percent of acreage in production during 2009. Sod acreage harvested as a share of sod acreage in production was slightly higher in 2014. At the time, harvested sod acreage was 54.1 percent of sod acreage in production (USDA National Agricultural Statistics Service 2017b).

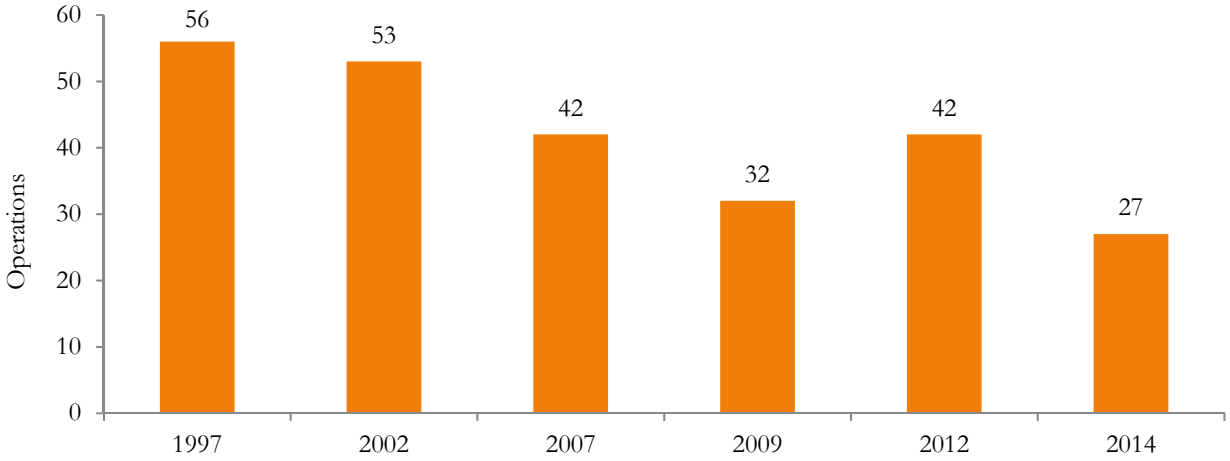
Exhibit 20 – Missouri Sod Acreage Harvested and Acreage in Production, 1997 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations have gradually exited the sod business. In 1997, 56 operations reported that they harvested sod. USDA published that 27 operations harvested sod in 2014. Exhibit 21 illustrates the trend in number of Missouri operations harvesting sod during selected years from 1997 to 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 21 – Missouri Operations with Harvested Sod Area, 1997 to 2014

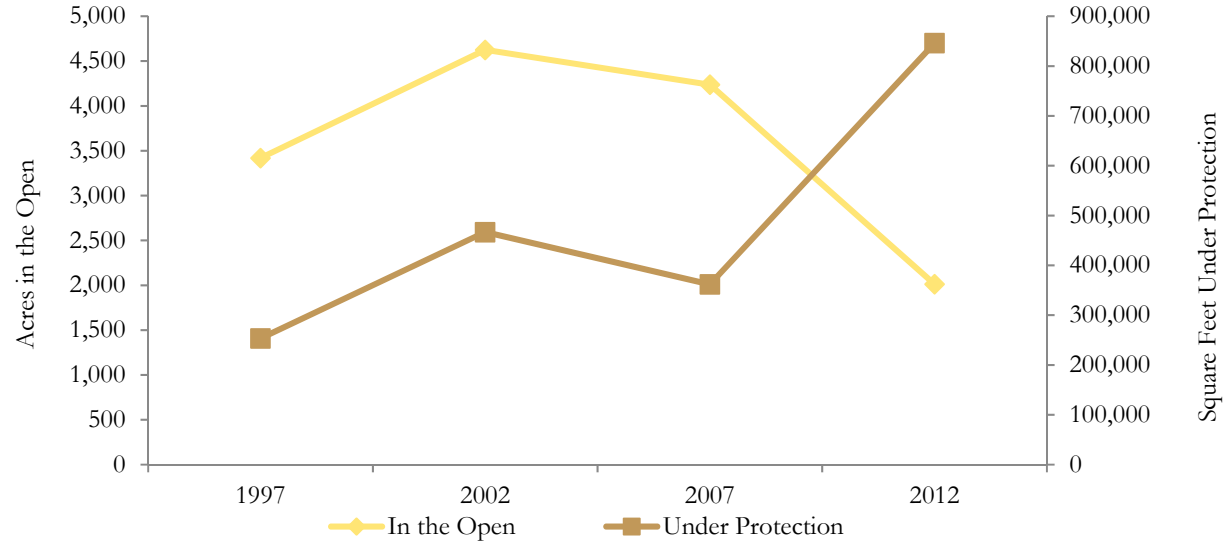


Source: USDA, National Agricultural Statistics Service (2017b)

Nursery Crops and Flowering Plants

With respect to nursery production, Exhibit 22 shares the state's area dedicated to raising nursery crops in the open or under protection. Open areas refer to those that use natural shade or those in open areas other than natural shade. Under protection includes areas covered by greenhouses or those covered by shade structures. Between 1997 and 2002 and 2002 and 2007, the two data sets recorded similar patterns. Operations increased nursery production area and then decreased it. An inverse relationship was shown later, however. Between 2007 and 2012, area under protection used to raise nursery crops grew substantially, and acreage in the open used to grow nursery crops declined markedly. In 2012, Missouri operations dedicated more than 2,000 acres in the open to nursery crops, and the square footage under protection used to grow nursery crops exceeded 846,000 square feet (USDA National Agricultural Statistics Service 2017b).

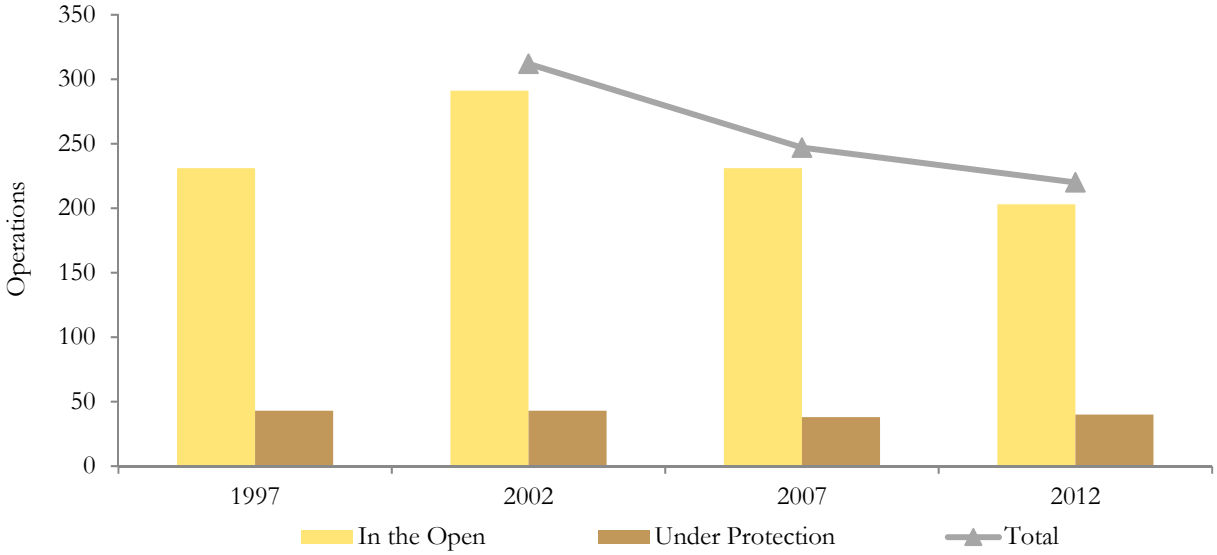
Exhibit 22 – Missouri Nursery Crop Acreage In the Open and Under Protection, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In terms of nursery crop operations, Exhibit 23 summarizes the count that used area in the open and the count that used area under protection to raise nursery crops from 1997 to 2012. It also illustrates the trend in total Missouri nursery operations. During the observed period, fewer Missouri operations used area under protection than area in the open for growing nursery crops, and the total operation count maintained a downward trend. In 2012, 220 operations in Missouri had nursery area in production. Of the total, 203 operations used area in the open, and 40 operations grew at least some nursery crops under protection (USDA National Agricultural Statistics Service 2017b).

Exhibit 23 – Missouri Operations with Nursery Production Area, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

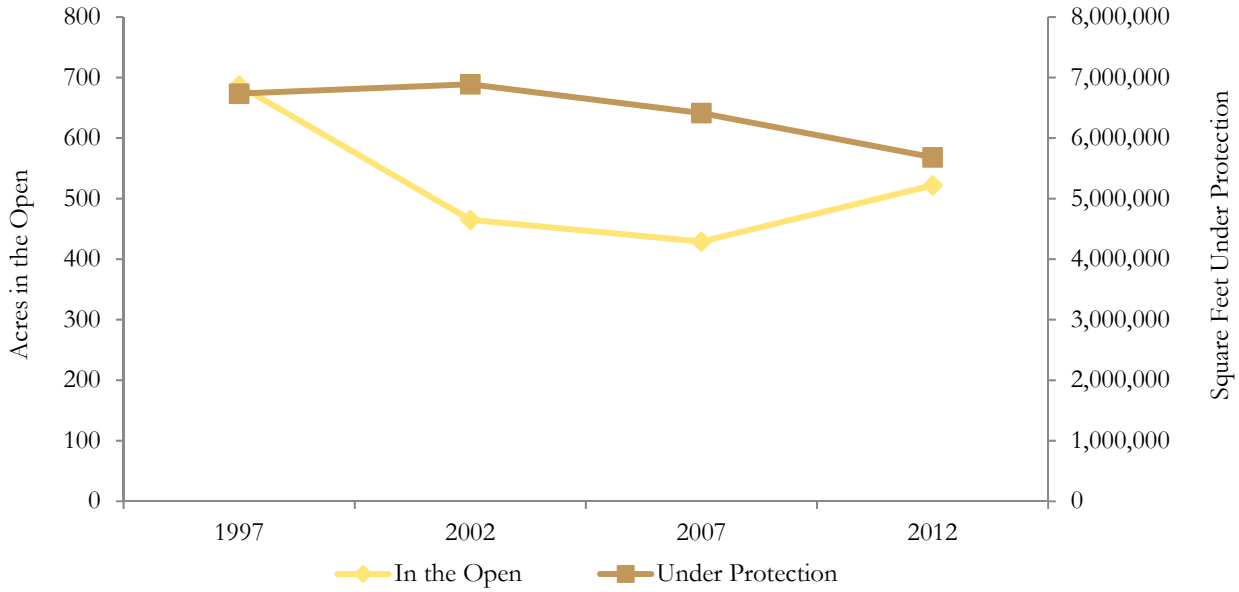
Exhibit 24 shares the number of Missouri operations reporting sales of the types of nursery crops named in the specialty crop definition. Annual bedding plants, 153 operations, and potted herbaceous perennials, 132 operations, had the greatest count of operations reporting sales in 2014. Nursery operations also fairly commonly reported selling foliage plants, 60 operations; potted flowering plants, 57 operations; deciduous shrubs, 52 operations; and deciduous shade trees, 49 operations (USDA National Agricultural Statistics Service 2017b).

Exhibit 24 – Missouri Nursery Operations with Sales by Plant Type, 2014

Source: USDA, National Agricultural Statistics Service (2017b)

Floriculture represents another facet of Missouri specialty crop production. Exhibit 25 summarizes the area dedicated to floriculture production in Missouri. In-the-open acreage declined from 1997 to 2007, but it rebounded slightly in 2012. During 2012, operations in Missouri allocated 522 acres to floriculture production, and area under protection for floriculture production exceeded 5.68 million square feet. Note that square footage under protection increased slightly between 1997 and 2002; however, it later decreased in 2007 and 2012 (USDA National Agricultural Statistics Service 2017b).

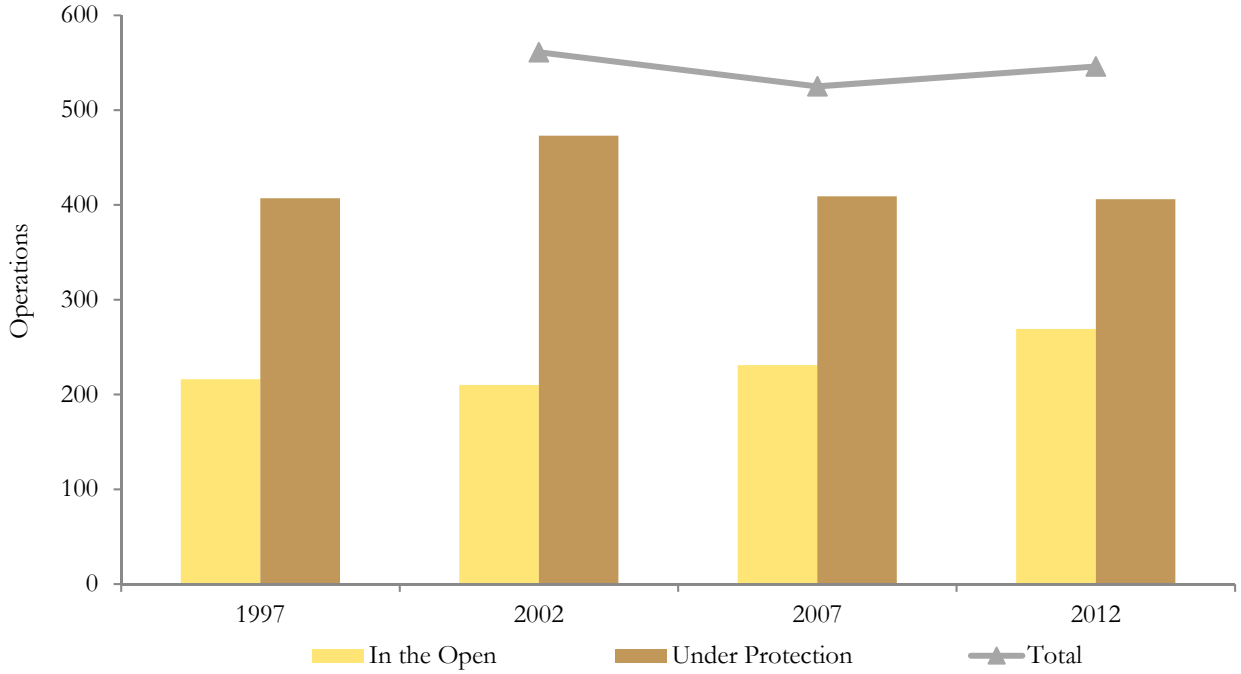
Exhibit 25 – Missouri Floriculture Acreage In the Open and Under Protection, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, Missouri was home to 546 floriculture operations with area in production. See Exhibit 26. As illustrated, the total floriculture operation count had little movement between 2002 and 2012. The chart also shares the number of operations that have used area in the open and area under protection for floriculture production purposes. More Missouri operations have opted for using area under protection relative to area in the open, though the count using area in the open did grow during the observed period. During 2012, 406 operations noted using area under protection for raising floriculture products, and 269 operations used area in the open (USDA National Agricultural Statistics Service 2017b).

Exhibit 26 – Missouri Operations with Floriculture Production Area, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Summary

To summarize, Exhibit 27 shares the 2012 farm count and sales market value of key categories of Missouri specialty crops. As illustrated, nursery, greenhouse, floriculture and sod operations sold more than $88.1 million in goods during 2012. Collectively, these 1,009 farms generated 1 percent of Missouri's total agricultural product sales. Sales of vegetables, melons, potatoes and sweet potatoes exceeded $63.1 million during 2012, and the count of farms selling those goods totaled 1,241 operations. Fruit, tree nut and berry sales were more than $25.7 million, and sales of cut Christmas trees and short rotation woody crops were more than $1.1 million. Note that the cut Christmas tree category may include some woody crops not included in the specialty crop definition. Also, Exhibit 27 doesn't report sales for dry beans or dry peas. Their sales were combined with those for grains and oilseeds, and as a result, the category total would have been skewed by data for the major grains and oilseeds produced and sold in Missouri (USDA Census of Agriculture).

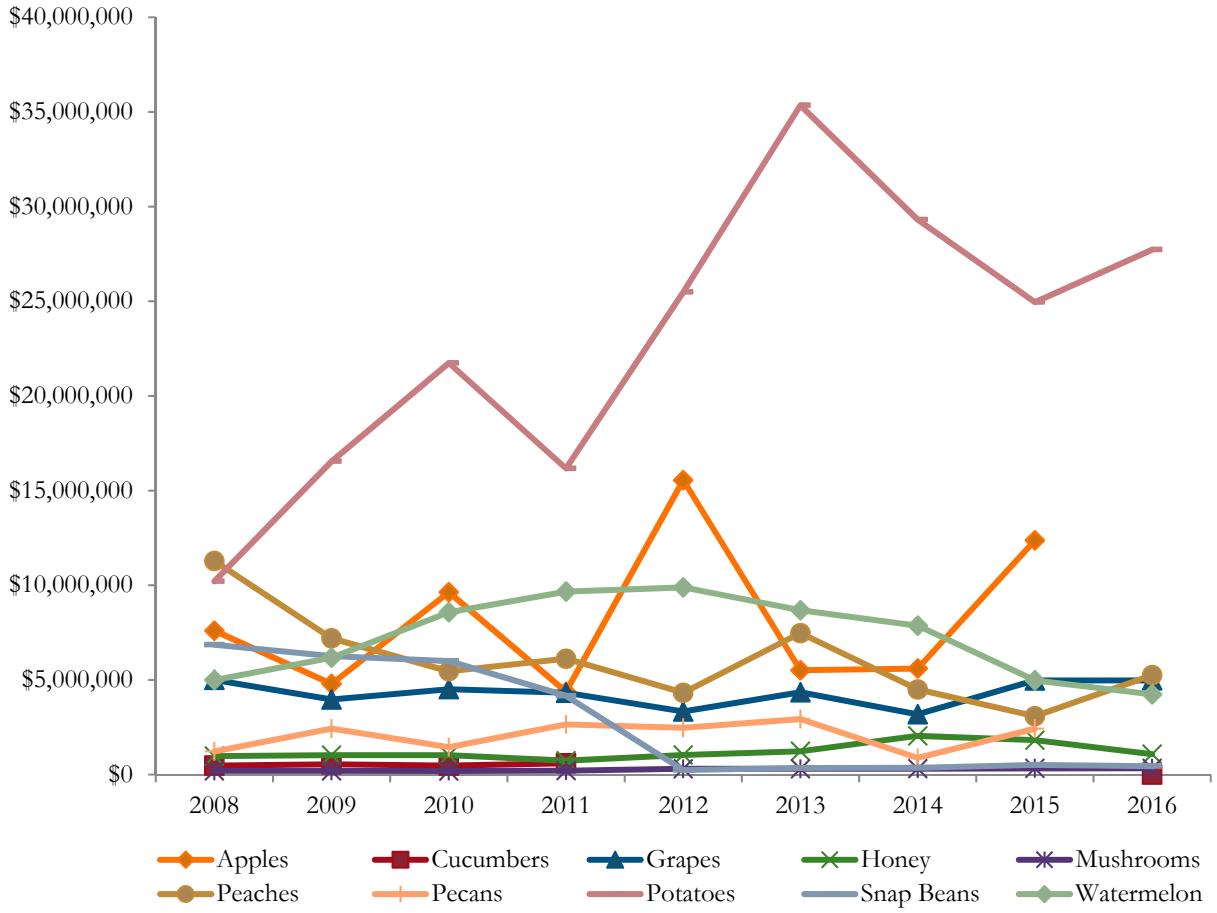
*Exhibit 27 – Market Value and Farm Count Summary for Missouri Specialty Crops, 2012**

Category	Farms	Sales	Rank by Sales	Percent of Total Sales
Nursery, greenhouse, floriculture and sod	1,009	$88,135,000	8	1.0
Vegetables, melons, potatoes and sweet potatoes	1,241	$63,122,000	9	0.7
Fruits, tree nuts and berries	1,251	$25,749,000	10	0.3
Cut Christmas trees and short rotation woody crops	105	$1,146,000	16	(Z)

* (Z) indicates less than half of the unit shown.
Source: USDA, Census of Agriculture

To close, the USDA Economic Research Service has reported cash receipts data for selected Missouri specialty crops. Those with data reported tend to have the most significant production in the state. Of the 10 specialty crops with Missouri cash receipts reported in recent years — see Exhibit 28 — potatoes had the greatest cash receipts total of the observed specialty crops. In 2016, Missouri potato cash receipts exceeded $27.7 million. In 2016, peaches ranked second among the observed specialty crops for cash receipts; cash receipts totaled roughly $5.25 million. Grapes, $4.978 million, and watermelon, $4.237 million, ranked third and fourth, respectively, among the observed specialty crops for their contribution to Missouri cash receipts in 2016. Note that cash receipts for cucumbers, apples and pecans — all of which had data shared in past years — weren't published for 2016 (USDA Economic Research Service 2017).

Exhibit 28 – Missouri Specialty Crop Cash Receipts, 2008 to 2016[1]



* 2016 data weren't published for apples, cucumbers and pecans.
Source: USDA, Economic Research Service (2017)

[1] All cash receipts values shared in this assessment are collected and reported using the following process. Cash receipts exclusively reflect the values that farmers receive for products that they produce in Missouri. Product that's processed in the state but not raised in the state isn't included in Missouri cash receipts totals. In years other than census years, the cash receipts values are estimates based on survey data or other available information from sources such as the USDA Farm Service Agency. Years with estimated data may have some degree of error present in their estimates.

1. Fruits

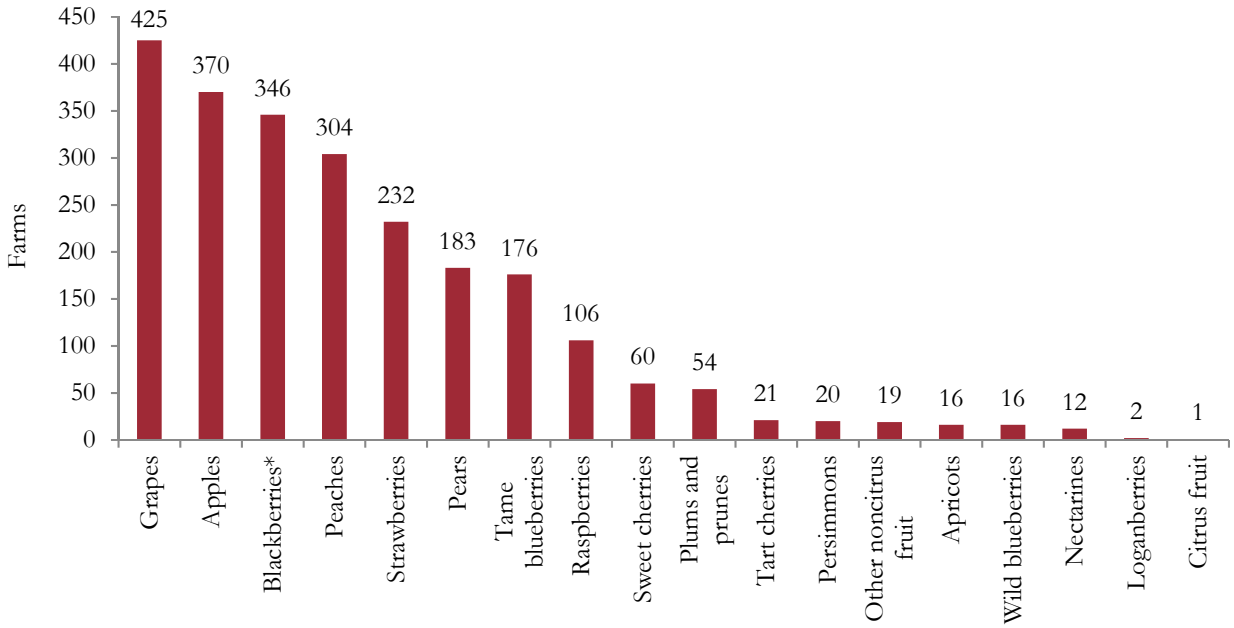
Fruit production is one form of specialty crop activity. Exhibit 1.1 lists fruits included in the USDA Agricultural Marketing Service's specialty crop definition. The following sections describe the fruit industries known to have a presence in Missouri; those fruits are marked in bold. Although not mentioned in the USDA definition, elderberries are a specialty crop grown in Missouri.

Exhibit 1.1 – Fruits and Berries Included in Specialty Crop Definition

Apple	**Apricot**	**Aronia berry**	Avocado
Banana	**Blackberry**	**Blueberry**	Breadfruit
Cacao	**Citrus**	Cherimoya	**Cherry**
Coconut	Coffee	Cranberry	Currant
Date	**Elderberry**	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

Of the fruit and berry specialty crops, Missouri farms have been most likely to raise grapes, apples, blackberries, peaches and strawberries. Exhibit 1.2 shares the number of farms reporting fruit and berry bearing and non-bearing acreage in 2012. Farms growing grapes totaled 425 operations, and more than 300 farms reported growing apples, blackberries and peaches (USDA National Agricultural Statistics Service 2014b).

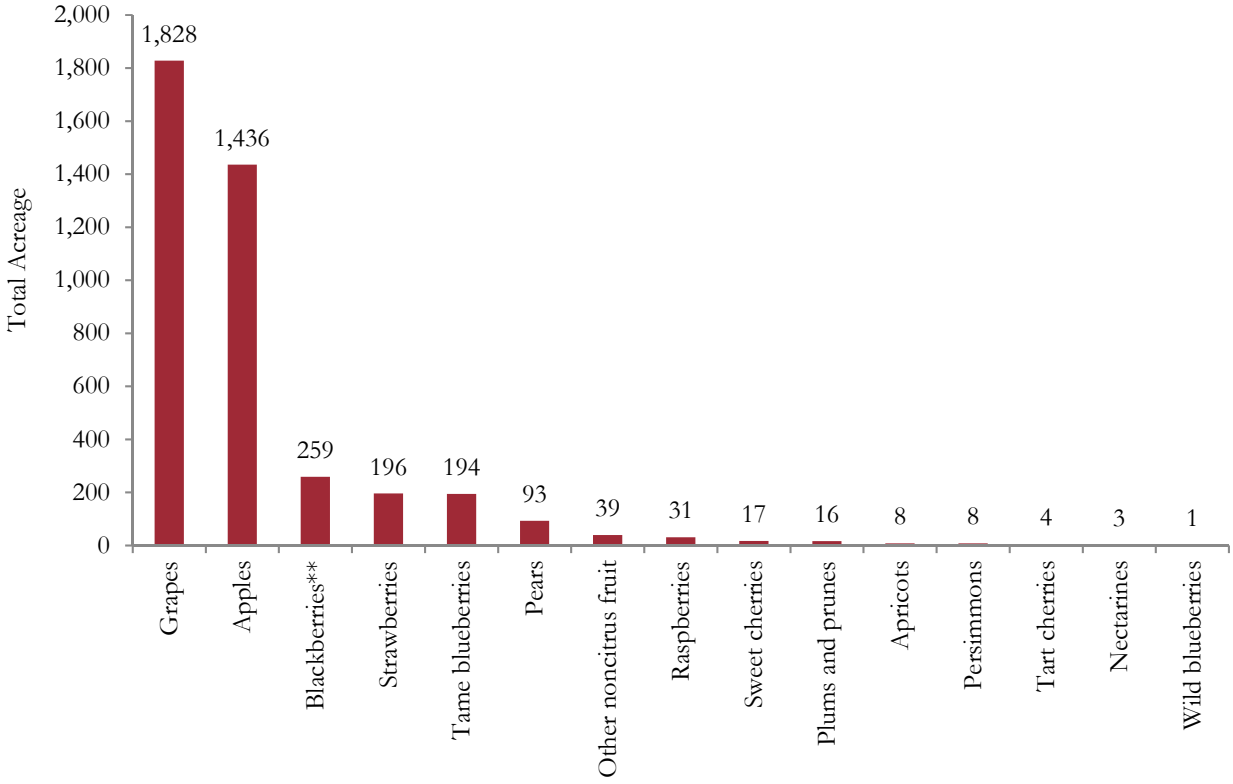
Exhibit 1.2 – Missouri Farms with Fruit and Berry Bearing and Non-Bearing Acreage, 2012



* Blackberry operations include those growing dewberries and marionberries.
Source: USDA, National Agricultural Statistics Service (2014)

In terms of acreage, Exhibit 1.3 summarizes total fruit and berry bearing and non-bearing acreage recorded in Missouri during 2012. It shows that grape and apple acreage by far trumped acreage of other fruit and berry crops. Grape area exceeded 1,800 acres, and apple area surpassed 1,400 acres (USDA National Agricultural Statistics Service 2014b). Note that the chart excludes sharing acreage data for loganberries, peaches and citrus fruit. Data for those crops were withheld.

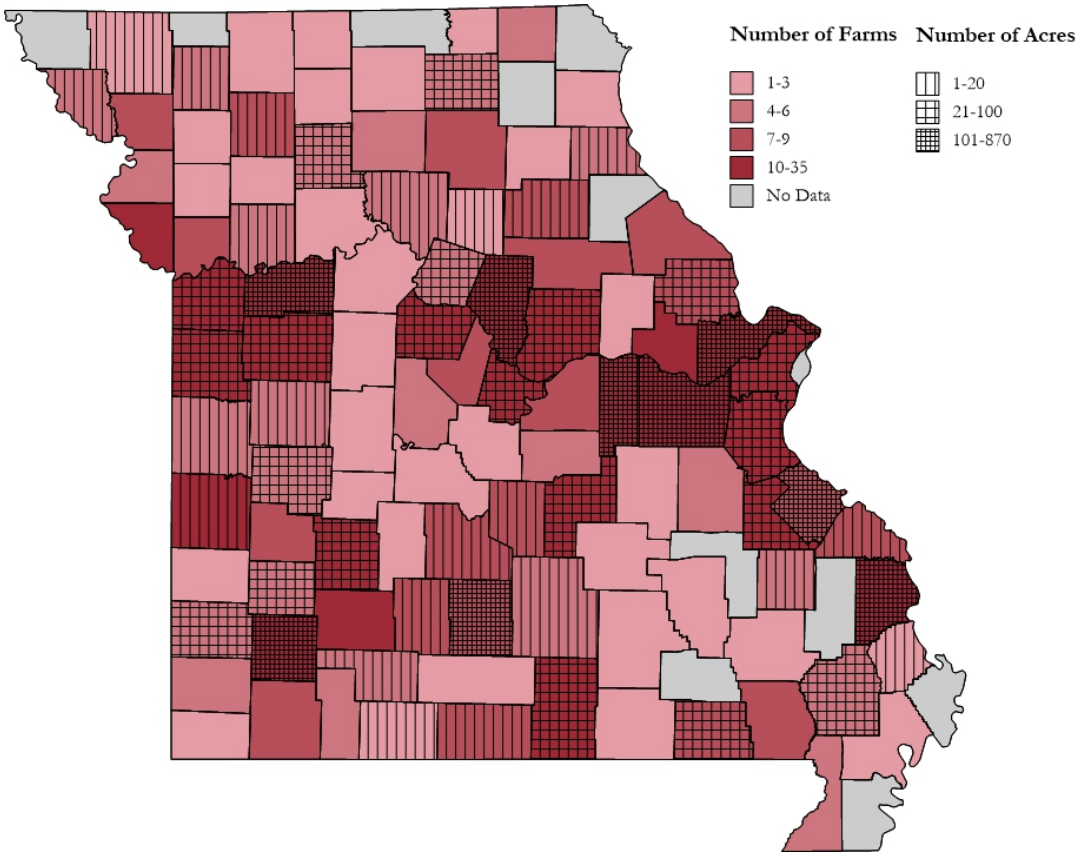
*Exhibit 1.3 – Missouri Total Fruit and Berry Bearing and Non-Bearing Acreage by Crop, 2012**



* Loganberry, peach and citrus fruit acreage weren't reported to protect data for individual operations.
** Blackberry acreage include that for growing dewberries and marionberries.
Source: USDA, National Agricultural Statistics Service (2014)

By county, those contributing the most bearing and non-bearing acreage to Missouri's non-citrus production in 2012 were Lafayette County, 870 acres; St. Charles County, 195 acres; Ste. Genevieve County, 167 acres; Wright County, 162 acres; and Franklin County, 161 acres. Counties with the most non-citrus operations reporting bearing and non-bearing acreage in 2012 were Franklin County, 35 farms; Gasconade County, 35 farms; Boone County, 26 farms; Jackson County, 24 farms; and Lafayette County, 24 farms Exhibit 1.4 highlights Missouri counties by their number of fruit and berry operations and acreage (USDA National Agricultural Statistics Service 2014b).

*Exhibit 1.4 – Missouri Fruit Farms and Acreage by County, 2012**

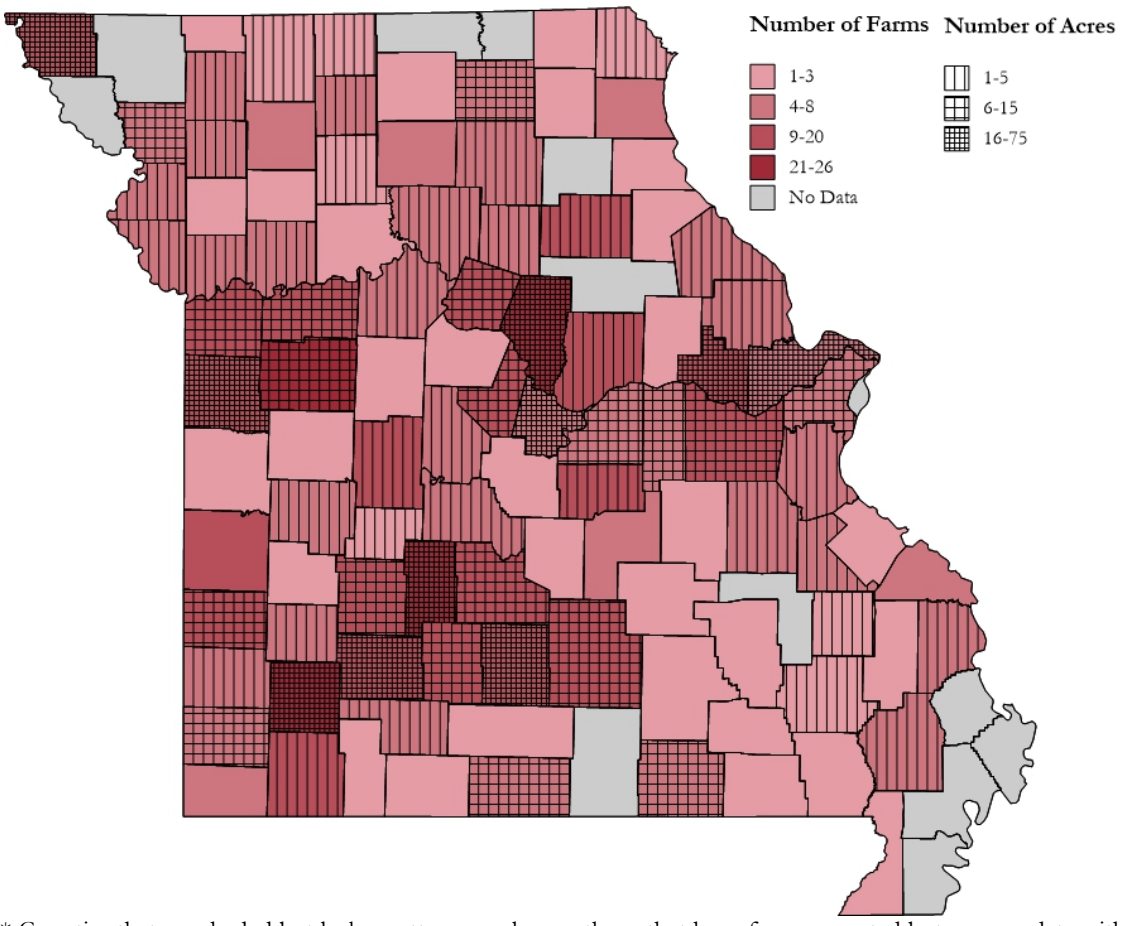


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

In total, 852 farms participated in the Missouri fruit and tree nut industry by selling product during 2012. Note that the USDA National Agricultural Statistics Service combines data for fruits and tree nuts. The market value of agricultural products sold by fruit and tree nut farms totaled more than $23.1 million. Data for berries are reported separately. In 2012, 509 farms in Missouri participated in berry production, and the market value of agricultural products sold by those farms totaled roughly $2.56 million (USDA National Agricultural Statistics Service 2014b).

Exhibit 1.5 shares berry data by county. In particular, it shades Missouri counties according to acreage grown and operations reporting acreage grown. Counties with the most operations growing berries in 2012 were Boone County, 26 farms; Dallas County, 26 farms; Lawrence County, 22 farms; Johnson County, 21 farms; and Wright County, 20 farms. With respect to acreage, counties reporting the most berry acreage grown in 2012 were Boone County, 77 acres; Cass County, 53 acres; and Lawrence County, 26 acres (USDA National Agricultural Statistics Service 2017b).

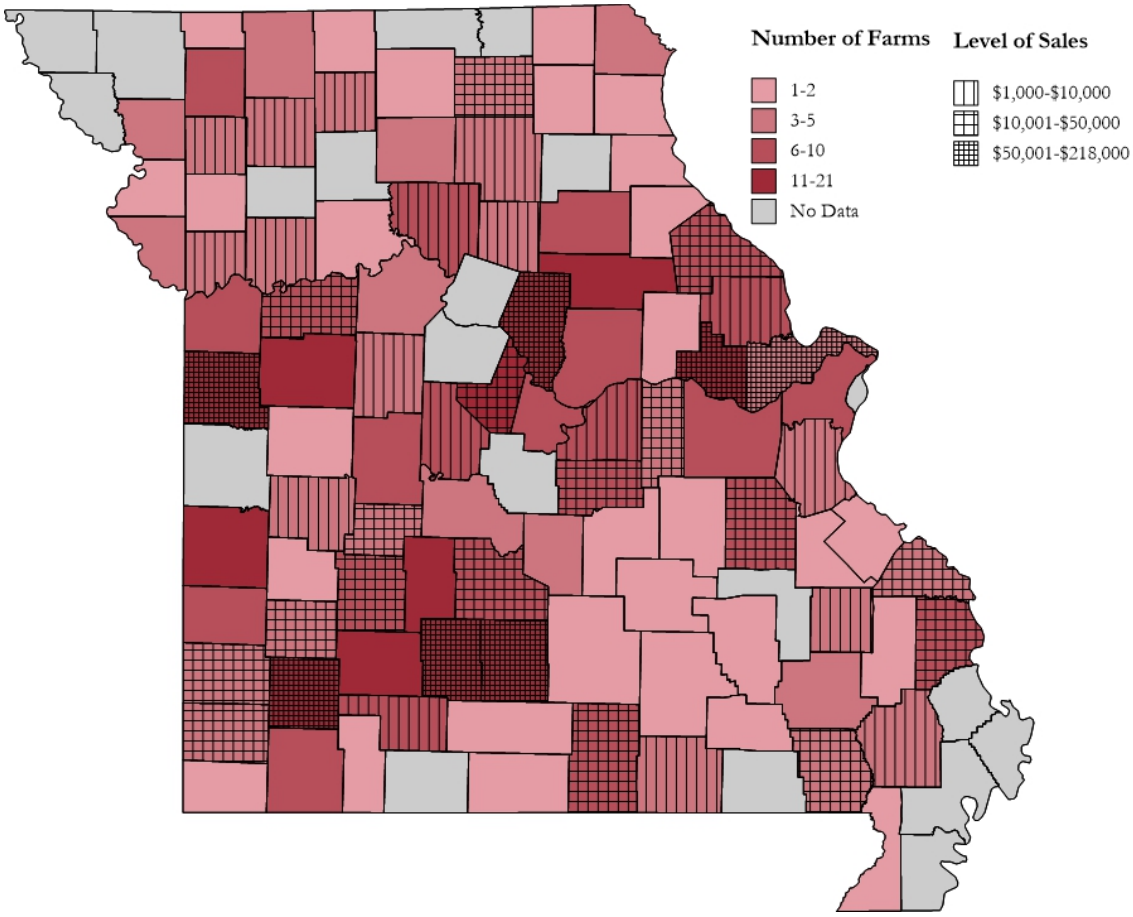
*Exhibit 1.5 – Missouri Berry Acreage Grown and Operations with Acreage Grown, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

For an alternative view of Missouri's berry industry by county, Exhibit 1.6 illustrates the count of Missouri berry operations with sales and the sales totals for 2012. Counties reporting the most operations with sales were Dallas County, 21 operations; Johnson County, 20 operations; Boone County, 17 operations; and Lawrence County, 17 farms. Berry sales accumulated to the highest totals in Cass County, $218,000; Lawrence County, $104,000; Warren County, $94,000; and Webster County, $75,000 (USDA National Agricultural Statistics Service 2017b).

*Exhibit 1.6 – Missouri Berry Sales and Operations with Sales, 2012**

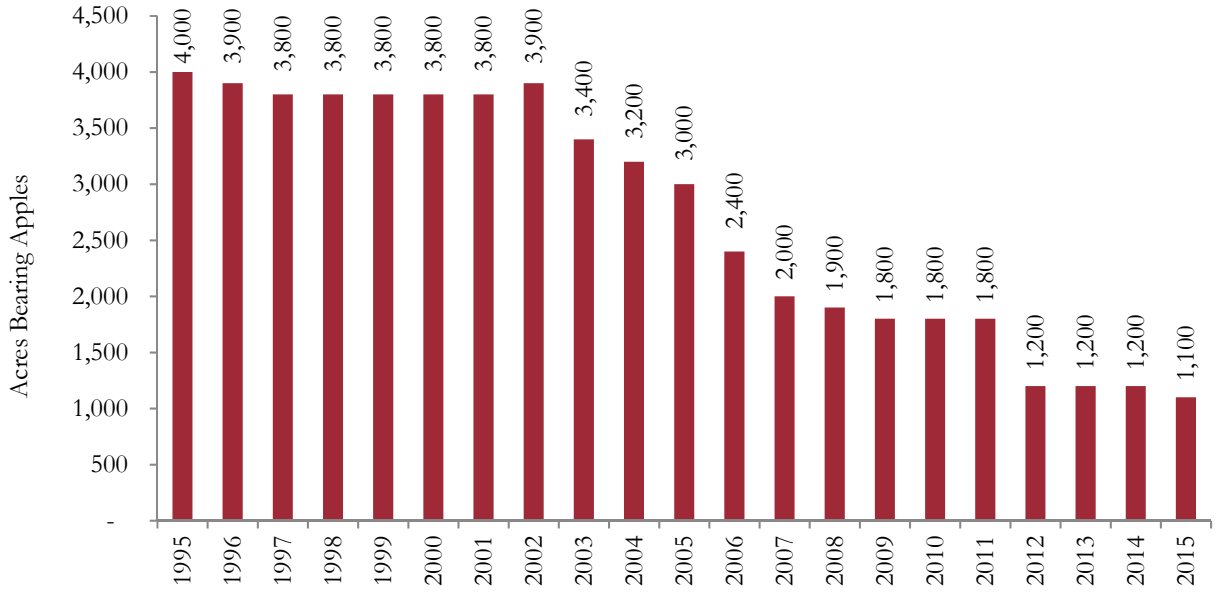


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

1.1 Apples

Apples are a traditional fruit crop produced in Missouri (Quinn 2000). Between 1995 and 2015, however, bearing acres for Missouri apples declined. The steep drops first started in 2003, and the declines continued into later years. Exhibit 1.1.1 illustrates that 4,000 acres were reported to bear apple fruit in 1995. By 2015, the state's apple bearing acreage had constricted to 1,100 acres (USDA National Agricultural Statistics Service 2017b).

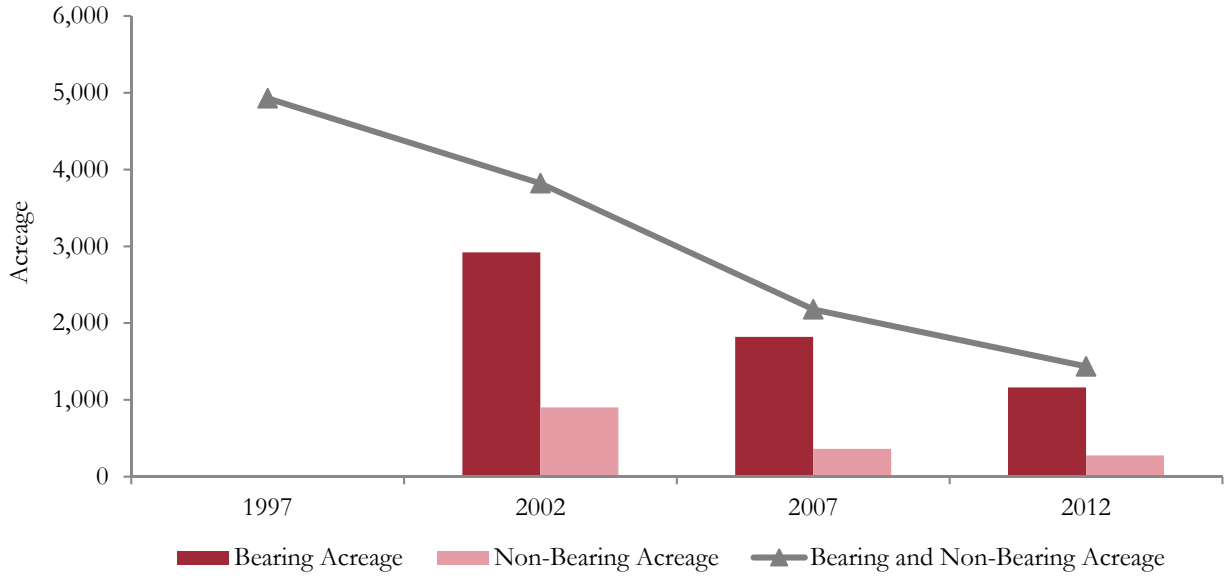
Exhibit 1.1.1 – Missouri Apple Bearing Acreage, 1995 to 2015



Source: USDA, Economics, Statistics and Market Information System (2012) and USDA, National Agricultural Statistics Service (2017)

During Census of Agriculture years, USDA has reported data for both bearing and non-bearing apple acreage. Exhibit 1.1.2 summarizes those data points for recent years. As illustrated, total bearing and non-bearing acreage experienced a rather dramatic slide from 1997 to 2012. In 1997, Missouri recorded nearly 5,000 bearing and non-bearing apple acres. Data for 1997 weren't further classified as bearing and non-bearing acreage. By 2012, bearing and non-bearing acreage totaled slightly less than 1,500 acres (USDA National Agricultural Statistics Service 2017b).

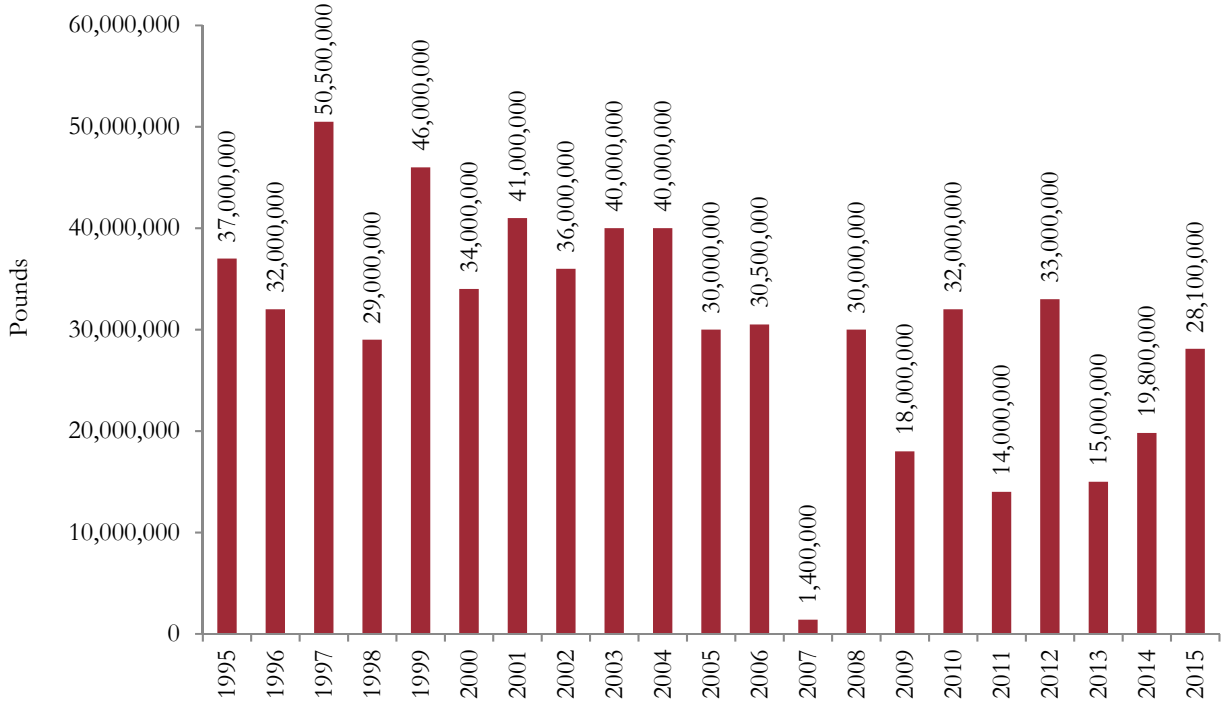
Exhibit 1.1.2 – Missouri Apple Bearing, Non-Bearing and Total Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

As apple bearing acreage has declined, utilized production has also dropped. See Exhibit 1.1.3. Utilized production reached its highest level of the observed period during 1997. In more recent years, 2012 was a year recording high utilized production. In 2015 — the most recent year with data reported — utilized production from Missouri apple orchards totaled 28.1 million pounds. During the observed period, utilized production dipped to its lowest level — just 1.4 million pounds — in 2007. Note, however, that 2007 was an outlier compared with other low-production years (USDA National Agricultural Statistics Service 2017b).

Exhibit 1.1.3 – Missouri Apple Utilized Production in Pounds, 1995 to 2015

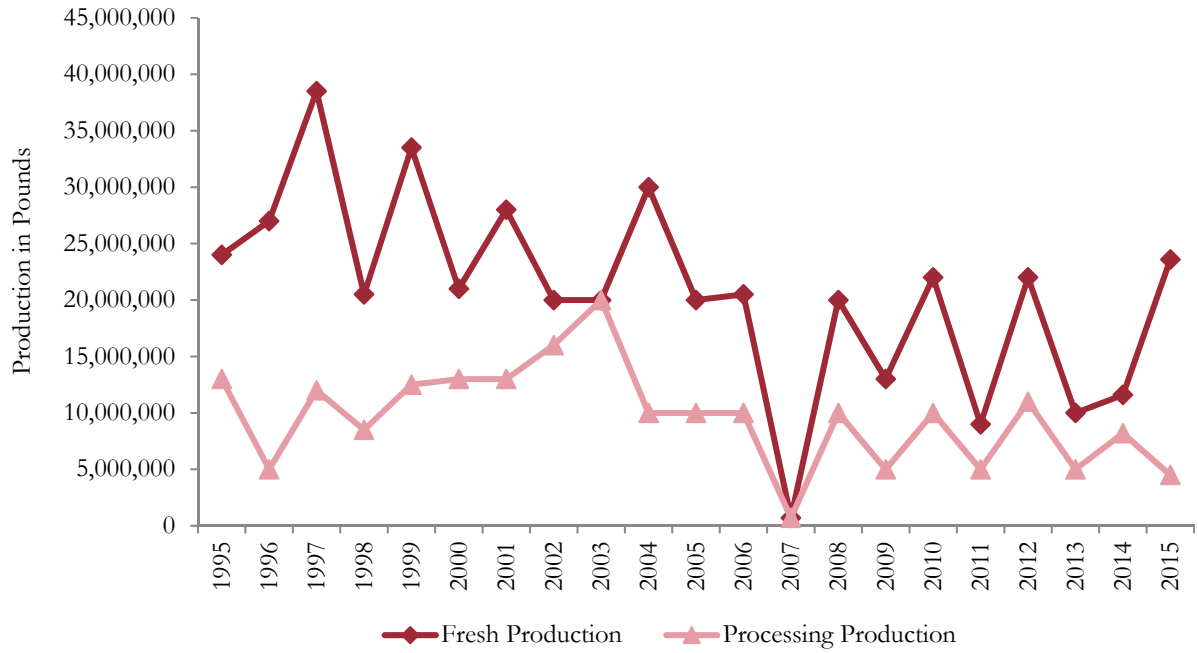


Source: USDA, Economics, Statistics and Market Information System (2012) and USDA, National Agricultural Statistics Service (2017)

Of all apple-producing states in 2015, Missouri ranked 18th in terms of total production by pounds. Note that total production includes utilized production and apples not harvested or sold. When considering production in pounds, Missouri produced 0.3 percent of the total U.S. apple crop during 2015. At the time, top states producing apples were Washington, New York, Michigan and Pennsylvania (USDA National Agricultural Statistics Service 2017b).

Missouri-produced apples have been more likely to have fresh market uses than processing uses. Exhibit 1.1.4 breaks down apple utilized production by category: fresh production and processing production. In 2015, roughly 84 percent of Missouri apples were directed to fresh market uses, and about 16 percent were used for processing purposes. From 1995 to 2015, fresh market utilization averaged 67.2 percent of total utilization, and utilization for processing averaged 32.8 percent of total utilization (USDA National Agricultural Statistics Service).

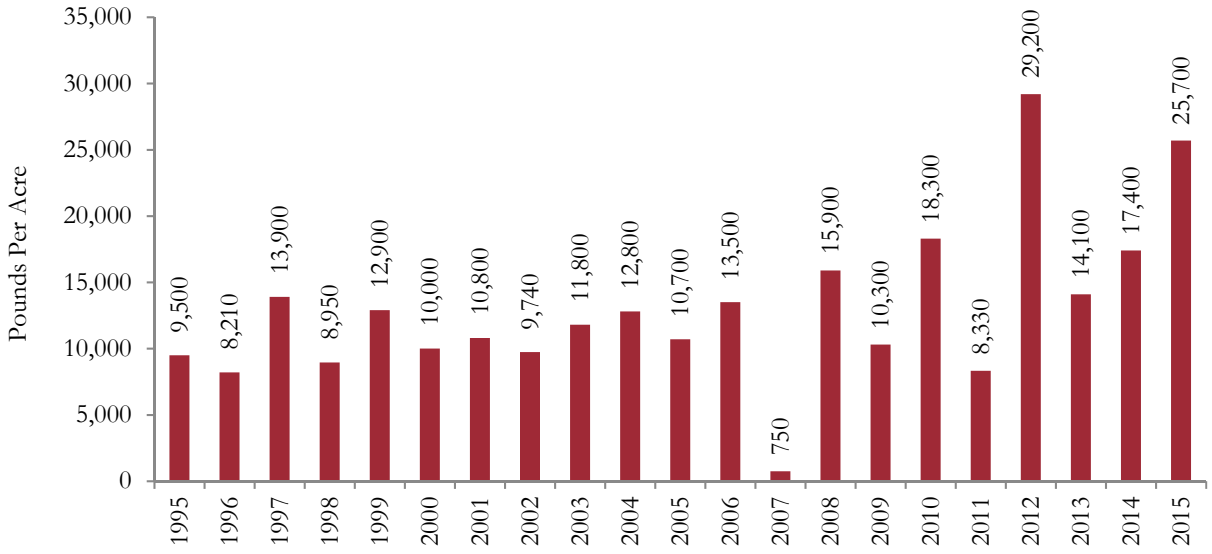
Exhibit 1.1.4 – Missouri Apple Utilized Production in Pounds by Use, 1995 to 2015



Source: USDA, Economics, Statistics and Market Information System (2012) and USDA, National Agricultural Statistics Service (2017)

Yields for Missouri apple producers have also experienced volatility in recent years, but they generally trended upward from 1995 to 2015. Exhibit 1.1.5 shows Missouri apple yields in pounds per acre. On average, Missouri-produced apples yielded 25,700 pounds per acre in 2015. During the observed period, yields were only higher in 2012 (USDA National Agricultural Statistics Service).

Exhibit 1.1.5 – Missouri Apple Yield in Pounds Per Acre, 1995 to 2015

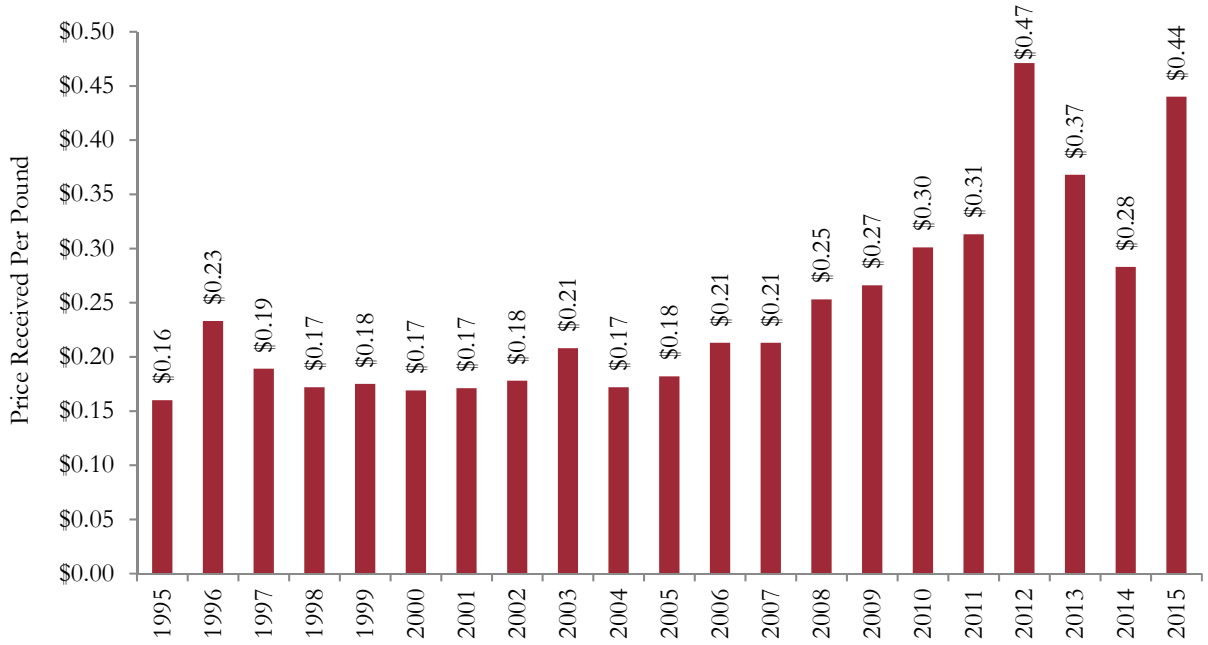


Source: USDA, Economics, Statistics and Market Information System (2012) and USDA, National Agricultural Statistics Service (2017)

Apple price per pound in Missouri more than doubled between 1995 and 2015. See Exhibit 1.1.6. Prices were relatively stable from the mid-1990s to mid-2000s. Since then, prices have ascended relatively quickly on average. They reached their peak in 2012 and then retreated somewhat. In 2015, Missouri apple prices received averaged $0.44 per pound. During the observation period, prices averaged $0.24 per pound (USDA National Agricultural Statistics Service 2017b).

The fresh market tends to pay a premium relative to prices paid for processing apples. In 2015, prices of Missouri apples for fresh use averaged roughly $0.50 per pound. Processing apples received $286 per ton on average. Thus, on a per-pound basis, processing apples received roughly $0.14 (USDA National Agricultural Statistics Service 2017b).

Exhibit 1.1.6 – Average Prices Received for Missouri Apples, 1995 to 2015

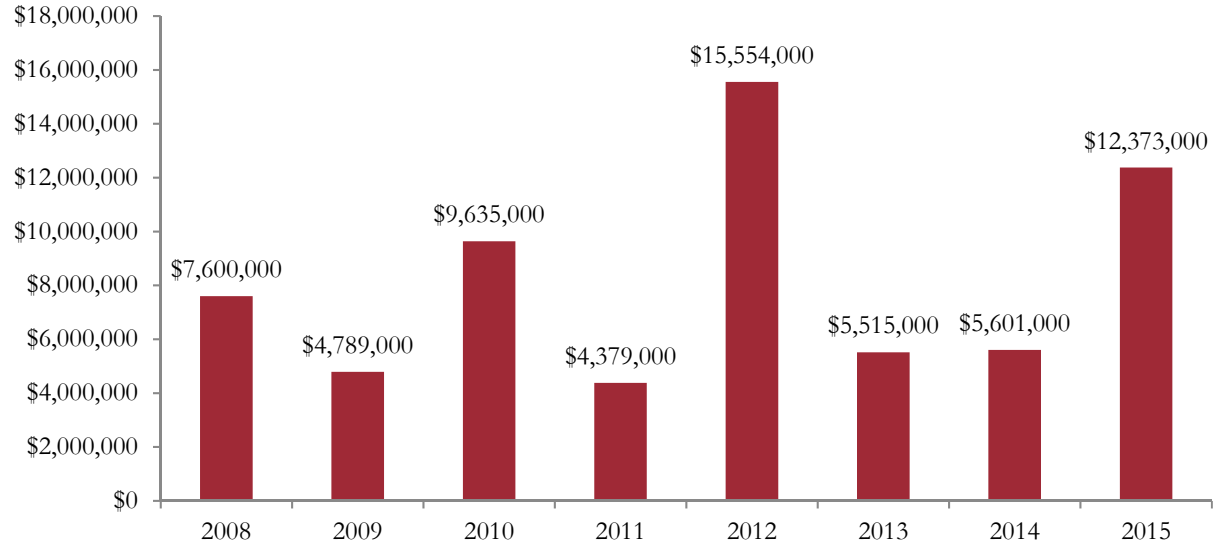


Source: USDA, Economics, Statistics and Market Information System (2012) and USDA, National Agricultural Statistics Service (2017)

Missouri apple cash receipts totaled $12.37 million in 2015. This total was roughly 0.1 percent of total receipts recorded in Missouri, and Missouri's apple cash receipts represented 0.4 percent of all U.S. apple cash receipts recorded (USDA Economic Research Service 2017).

Between 2008 and 2015, statewide cash receipts for apples experienced great volatility. Exhibit 1.1.7 tracks the trend in cash receipts. During this eight-year observation period, apple cash receipts reached their lowest level — nearly $4.38 million — in 2011 but spiked to $15.55 million the following year (USDA Economic Research Service 2017).

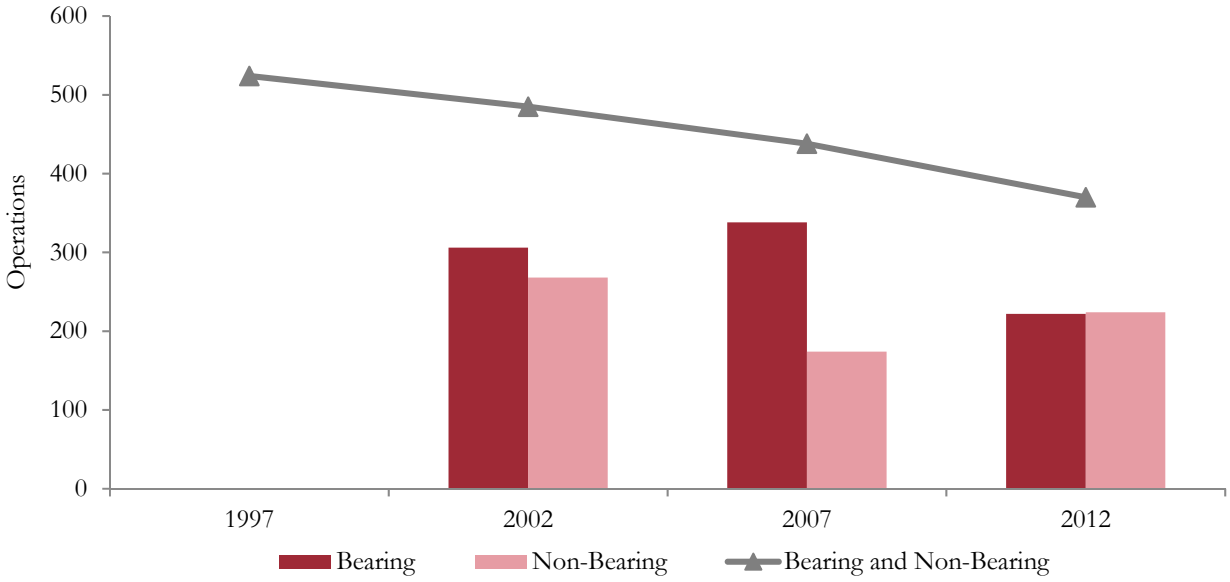
Exhibit 1.1.7 – Missouri Apple Cash Receipts, 2008 to 2015



Source: USDA, Economic Research Service (2017)

The Census of Agriculture reports number of operations engaged in producing various agricultural goods. Administered in 2012, the most recent census found that 222 operations in Missouri had bearing acreage for apples, and 224 reported having non-bearing apple acreage. Total operations with bearing and non-bearing acreage in 2012 was 370 farms. Exhibit 1.1.8 presents the number of Missouri operations with apple acreage during the past four censuses. The number of operations with bearing apple acreage was lowest during 2012. Number of operations with non-bearing acreage was lowest during 2007; this metric recovered slightly between 2007 and 2012 (USDA National Agricultural Statistics Service 2017b).

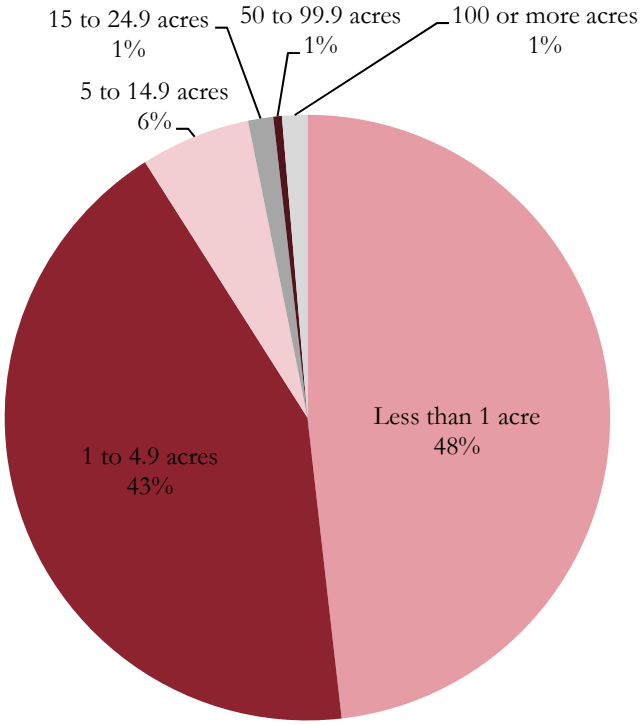
Exhibit 1.1.8 – Missouri Operations with Total, Bearing and Non-Bearing Apple Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, the largest share of Missouri apple operations with bearing acreage reported maintaining less than one acre of bearing and non-bearing apple acreage. Exhibit 1.1.9 shares a breakdown of the percentage of bearing operations according to their total bearing and non-bearing acreage. Note that 48 percent of Missouri bearing apple operations had less than one acre of total bearing and non-bearing acreage. Forty-three percent of Missouri apple operations maintained one acre to 4.9 acres of bearing and non-bearing apples. Just 9 percent maintained at least five acres of bearing and non-bearing apples. These data indicate the importance of small-scale operations to Missouri's apple production industry (USDA National Agricultural Statistics Service 2017b).

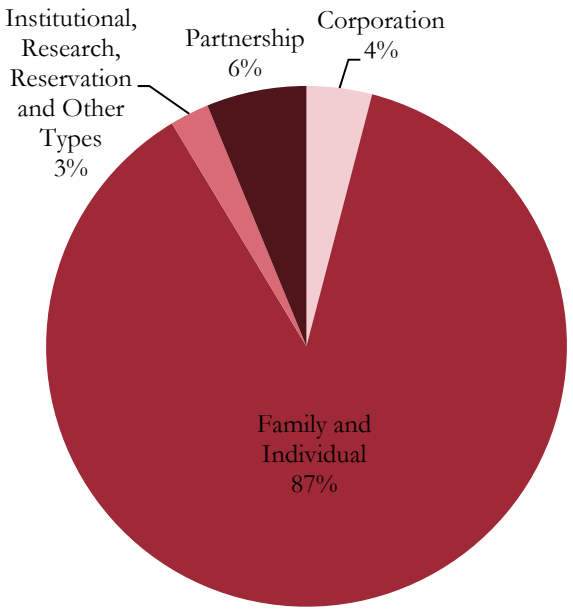
Exhibit 1.1.9 – Share of Missouri Apple Operations with Bearing Acreage Based on Their Total Bearing and Non-Bearing Apple Acreage, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Nearly nine in 10 Missouri apple operations with bearing and non-bearing acreage in 2012 were structured as family or individual operations. Exhibit 1.1.10 illustrates that 87 percent of total Missouri apple operations with bearing and non-bearing acreage were family or individual operations. Six percent of operations in 2012 were organized as partnerships. Corporations, 4 percent of operations, and institutional, research, reservation or other types, 3 percent, were relatively minor operational structures used by Missouri apple operations with bearing and non-bearing acreage in 2012 (USDA National Agricultural Statistics Service 2017b).

Exhibit 1.1.10 – Share of Missouri Apple Operations by Organizational Structure, 2012

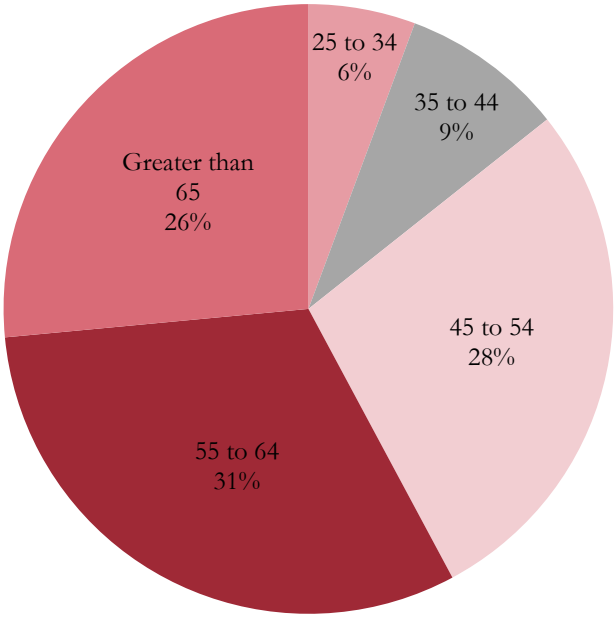


* Operations with bearing and non-bearing apple acreage
Source: USDA, National Agricultural Statistics Service (2017b)

Several data sets also describe characteristics of principal operators of Missouri apple operations with bearing and non-bearing acreage. With respect to primary occupation for these principal operators in 2012, half named farming as their primary occupation, and half named a primary occupation other than farming. Sixty percent of the principal operators shared that they had been on their present operation for at least 11 years. Roughly 20 percent had been on their present operations for six years to 10 years, and another 20 percent had been on their present operations for less than six years (USDA National Agricultural Statistics Service 2017b).

In 2012, 57 percent of Missouri principal operators of apple operations with bearing and non-bearing acreage were at least 55 years old. See Exhibit 1.1.11; it shares a breakdown of principal operator age for operators of Missouri apple farms with bearing and non-bearing acreage. Principal operators who were 45 years old to 54 years old represented 28 percent of the total number of principal operators, and those younger than 45 years old were 15 percent of the total (USDA National Agricultural Statistics Service 2017b).

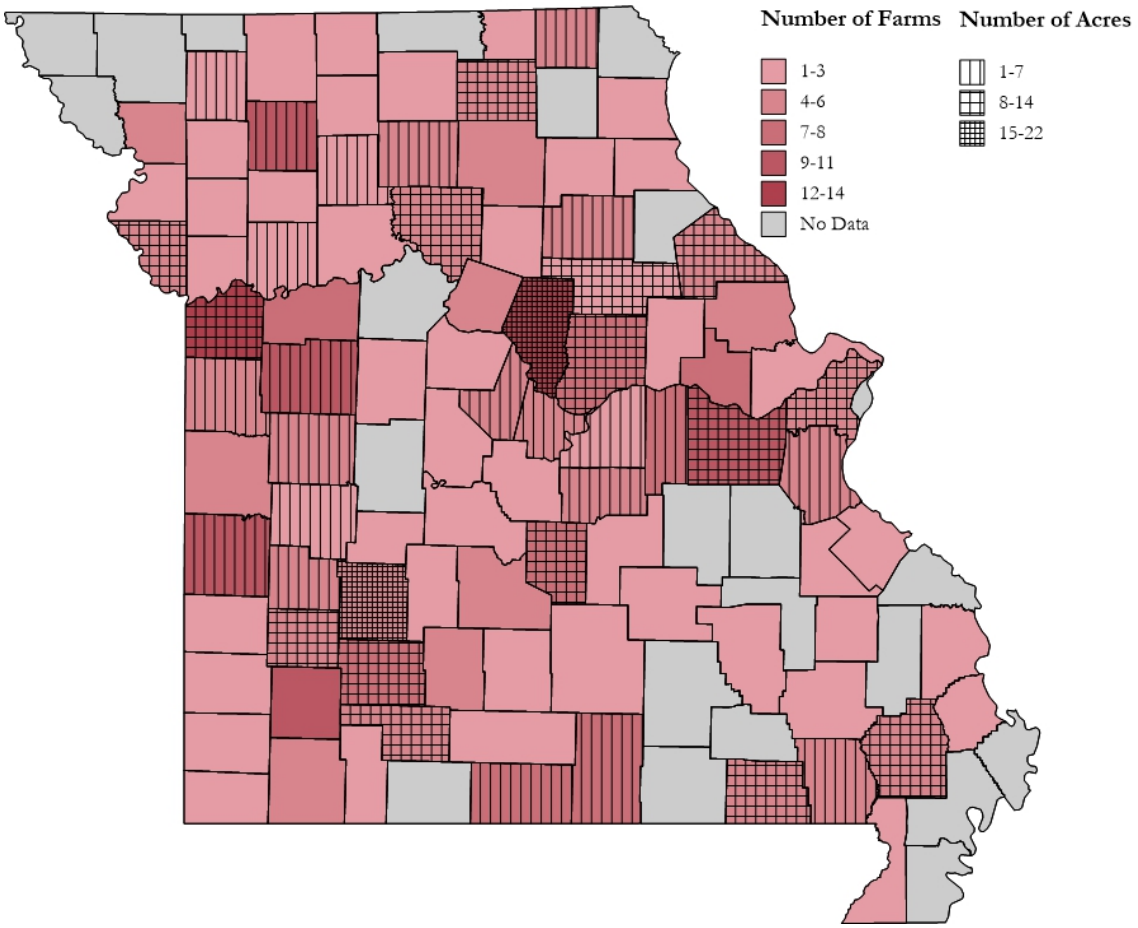
*Exhibit 1.1.11 – Age Distribution of Missouri Apple Operation Principal Operators, 2012**



* Operations with bearing and non-bearing apple acreage
Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 1.1.12 summarizes Missouri's apple industry by county. Note that USDA didn't report some data by county, so those counties aren't described here or in the map. Counties with the greatest reported total apple acreage in 2012 were Boone County, 22 acres; Polk County, 19 acres; Jackson County, 14 acres; and Franklin County, 11 acres. Note again that these counties were those with data reported; data were withheld in some other counties. Counties reporting the greatest number of apple farms with bearing and non-bearing acres in 2012 were Boone County, 14 farms; Jackson County, 14 farms; Franklin County, 11 farms; Lawrence County, 10 farms; and Vernon County, 10 farms (USDA National Agricultural Statistics Service 2014b).

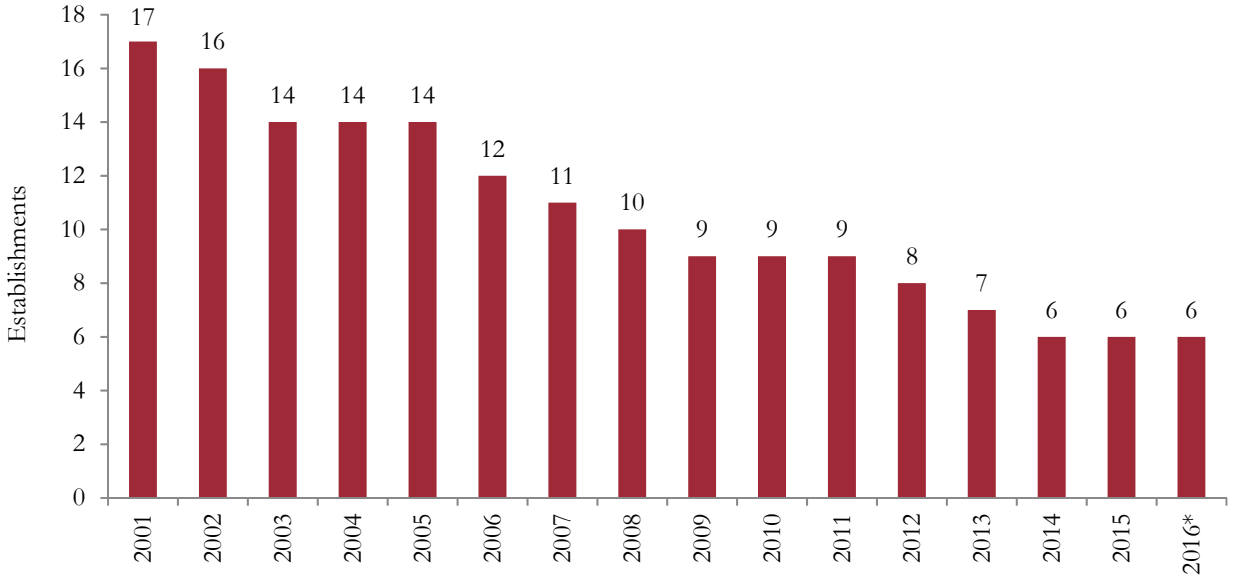
*Exhibit 1.1.12 – Missouri Apple Farms and Total Acreage by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

The Bureau of Labor Statistics reports data for apple orchard establishments, employment and wages in its Quarterly Census of Employment and Wages. These establishments are those classified in the NAICS 111331 category. Between 2001 and 2016, the bureau's data indicate that the number of Missouri apple orchards declined from 17 establishments to an estimated six establishments. Note that data for 2016 were designated as preliminary. Exhibit 1.1.13 shares the trend in establishment count from 2001 to 2016 (Bureau of Labor Statistics 2017).

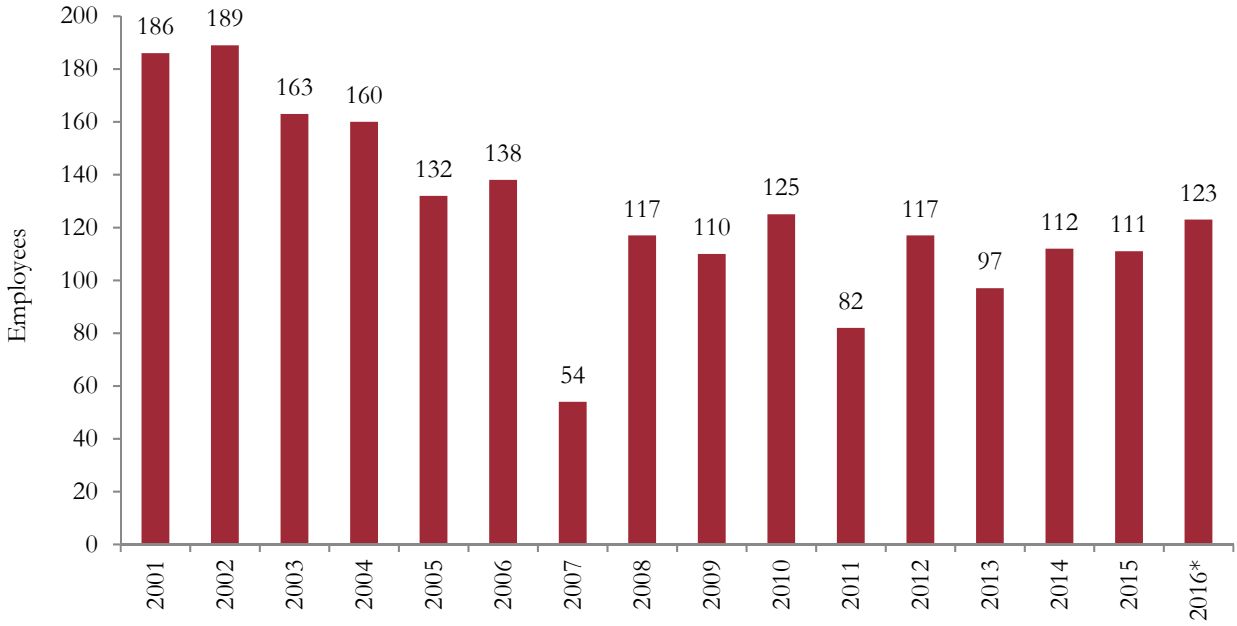
Exhibit 1.1.13 – Number of Missouri Apple Orchard Establishments, NAICS 111331, 2001 to 2016



* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

Missouri apple orchards employed an estimated 123 people in 2016, according to U.S. Bureau of Labor Statistics reporting. From 2001 to 2016, total apple orchard employment experienced some volatility from year to year; however, it declined overall during that period. Exhibit 1.1.14 shares the trend in Missouri apple orchard employment (Bureau of Labor Statistics 2017).

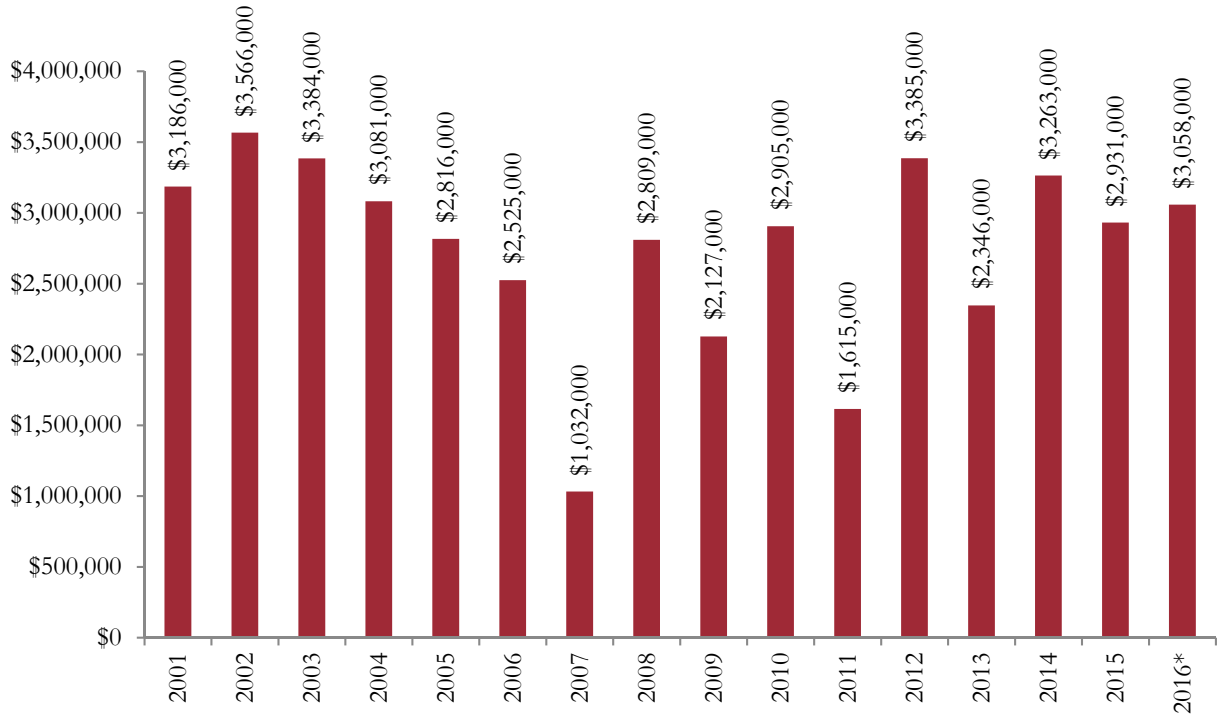
Exhibit 1.1.14 – Missouri Apple Orchard Employment, NAICS 111331, 2001 to 2016



* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

Total wages paid to Missouri apple orchard employees followed a downward trend between 2001 and 2016 but not to the same extent that apple orchard employment was reduced. The Bureau of Labor Statistics released that total wages in 2016 was preliminarily nearly $3.06 million. Exhibit 1.1.15 illustrates the trend. Years with particularly low total wages reported were 2007 and 2011 (Bureau of Labor Statistics 2017).

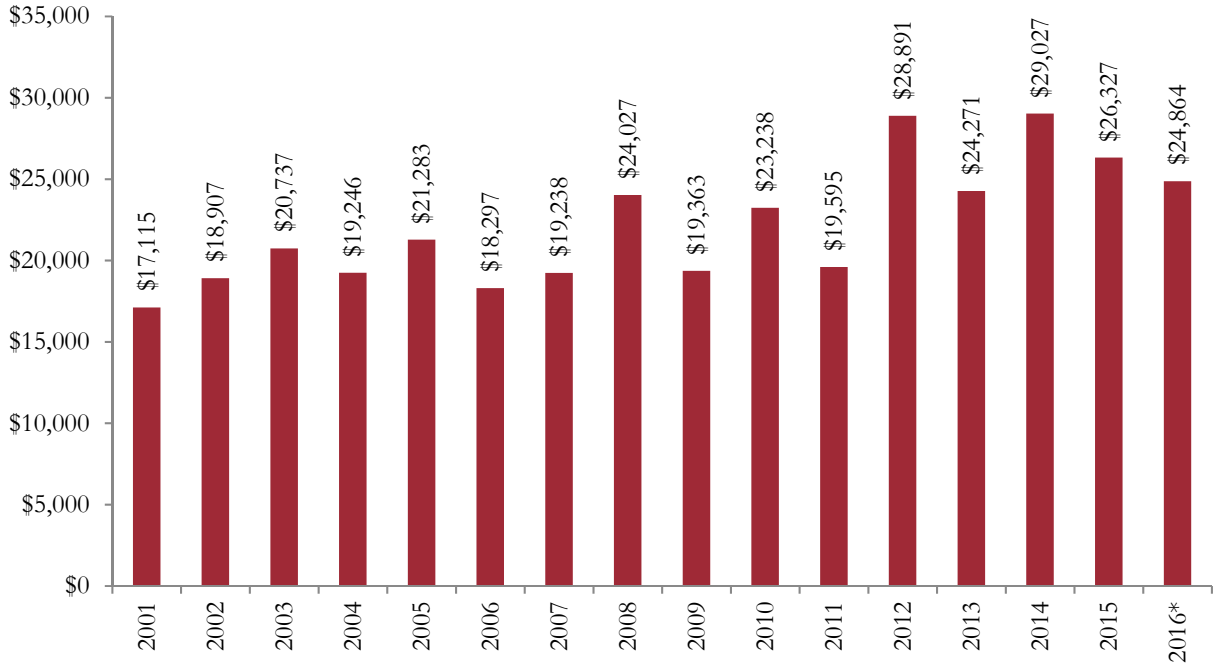
Exhibit 1.1.15 – Total Wages Paid by Missouri Apple Orchards, NAICS 111331, 2001 to 2016



* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

In 2016, Missouri apple orchard employees earned $24,864 on average in annual pay, according to preliminary data. On a weekly basis, the preliminary data from 2016 suggest that weekly pay for Missouri apple orchard employees averaged $478. Between 2001 and 2016, average annual pay in the Missouri apple orchard industry followed an increasing trend. See Exhibit 1.1.16 (Bureau of Labor Statistics 2017).

Exhibit 1.1.16 – Average Annual Pay by Missouri Apple Orchards, NAICS 111331, 2001 to 2016



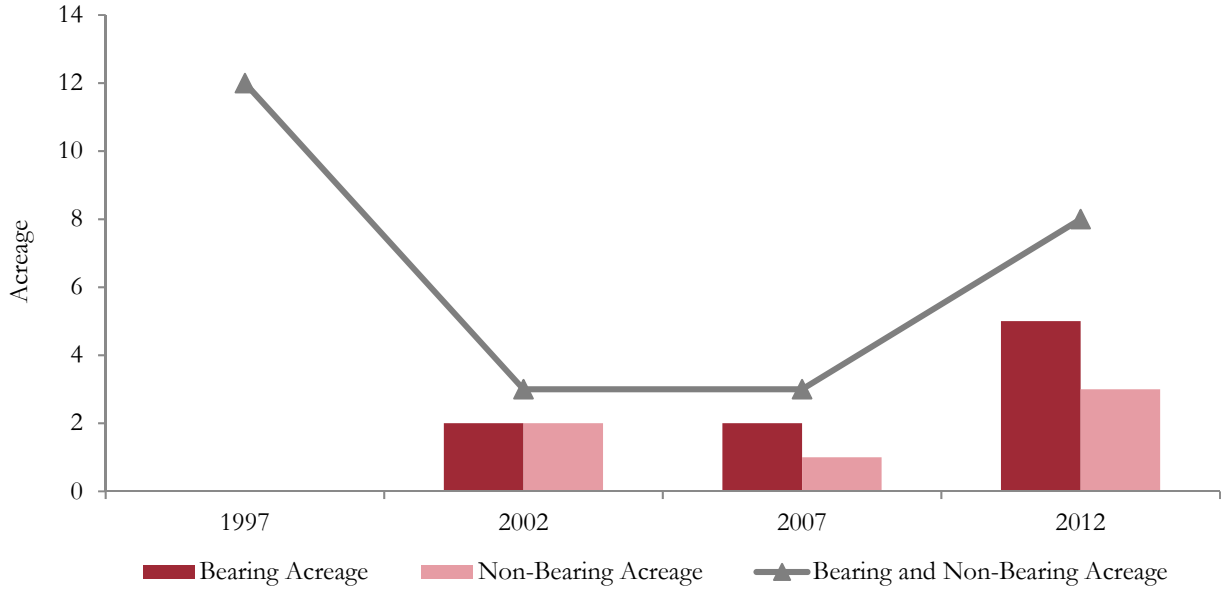
* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

Relatively few apple orchards in Missouri have transitioned to organic. The USDA National Agricultural Statistics Service found that two Missouri farms harvested USDA certified organic apple acreage for the fresh market in 2014. To protect information for these farms, USDA withheld further information, such as acres and pounds harvested, pounds sold and sales value. In 2011, Missouri also reported that two operations harvested USDA certified organic apples for the fresh market. Regarding operations that harvested certified organic apples for processing, one operation reported harvesting acreage in 2011, and two operations shared that they had harvested certified organic apples for processing in 2014 (USDA National Agricultural Statistics Service 2017b).

1.2 Apricots

Missouri has had relatively limited apricot production. Trees tend to bloom early, and that leads to inconsistent production. As such, apricots have been termed an experimental crop for Missouri growers (Quinn 2000). Exhibit 1.2.1 presents the trend in Missouri apricot acreage from 1997 to 2012. Total bearing and non-bearing acreage dropped sharply from 1997 to 2002. Between 2007 and 2012, it increased somewhat. In 2012, the Census of Agriculture found that Missouri farms maintained just eight acres of apricot trees. Of those, five were bearing acres, and three were non-bearing acres (USDA National Agricultural Statistics Service 2017b).

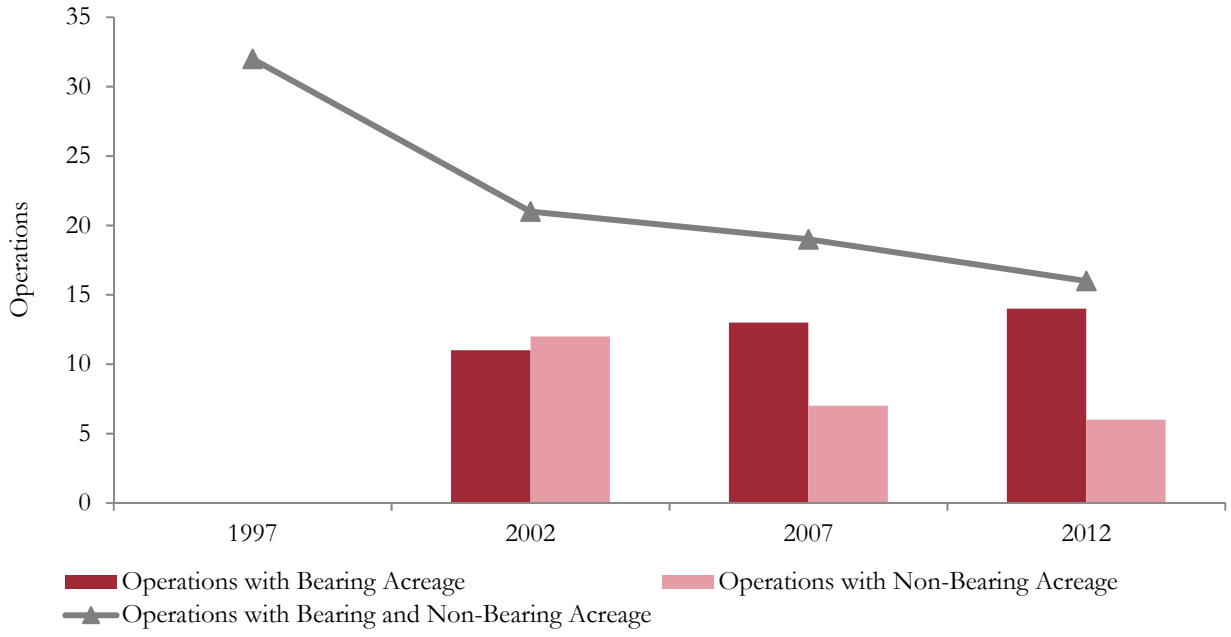
Exhibit 1.2.1 – Missouri Apricot Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 1.2.2 reports Missouri operations with bearing and non-bearing apricot acreage from 1997 to 2012. As illustrated, the number of operations engaged in growing apricot trees declined during that period. The 32 operations counted as having apricot acreage in 1997 was halved to 16 operations by 2012. In 2012, 14 operations were reported to have bearing acreage, and six operations had non-bearing acreage (USDA National Agricultural Statistics Service 2017b).

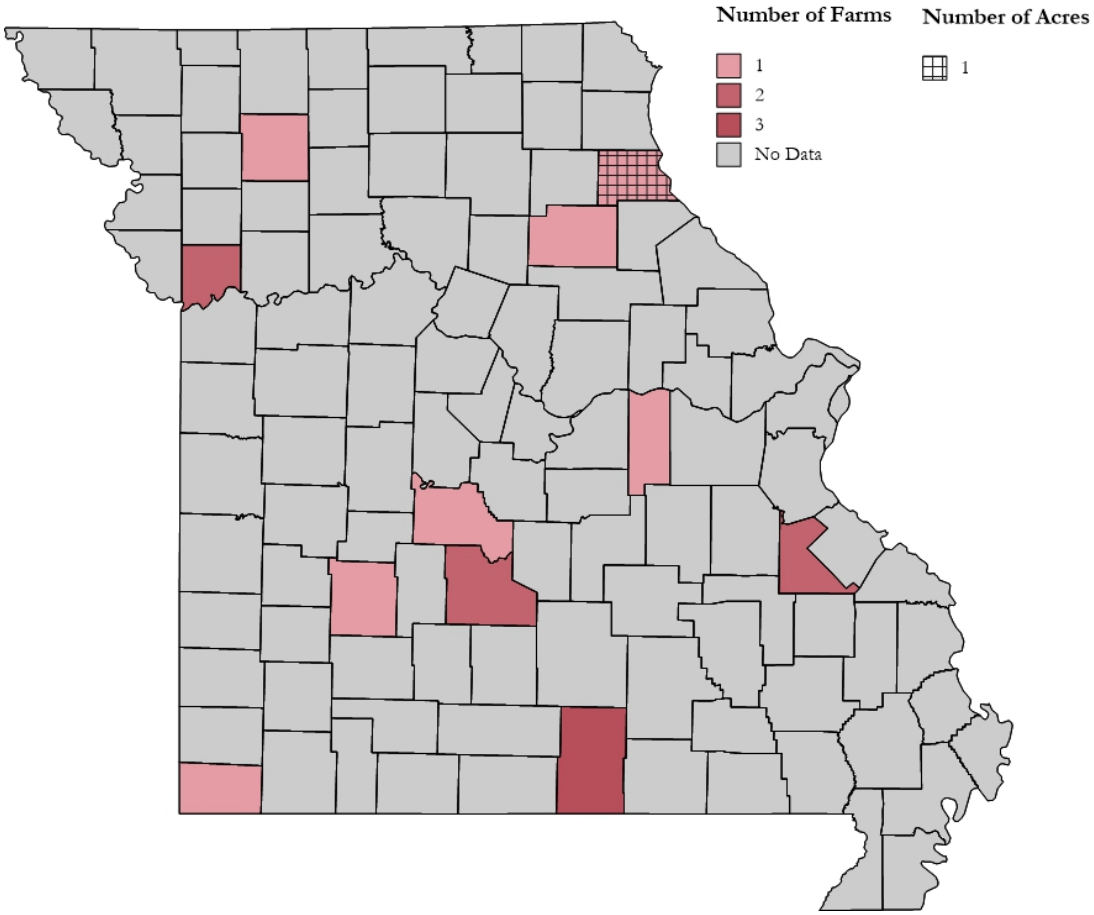
Exhibit 1.2.2 – Missouri Operations with Bearing and Non-Bearing Apricot Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In Missouri, apricot production has occurred rather sporadically from a geographic perspective. Counties with the greatest number of apricot farms during 2012 were Howell County, three farms; Clay County, two farms; Laclede County, two farms; and St. Francois County, two farms. Exhibit 1.2.3 maps locations of Missouri apricot farms and indicates the extent of apricot acreage by county. Note that USDA withheld some data by county, so for counties lacking data, they aren't described here or in the map (USDA National Agricultural Statistics Service 2014b).

*Exhibit 1.2.3 – Missouri Apricot Farms and Total Acreage by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

1.3 Aronia Berries

To an extent, aronia berry production has been adopted in Missouri. Production near Stewartsville, Easton and Denver in Missouri has been reported (Thomas 2013). Some Missouri growers participate in the North America Aronia Cooperative. Other growers in the cooperative have been located in Nebraska, Illinois, South Dakota, Wisconsin and Minnesota (Mayer 2016). The North America Aronia Cooperative has been noted as the first cooperative for aronia berries (Beck 2014).

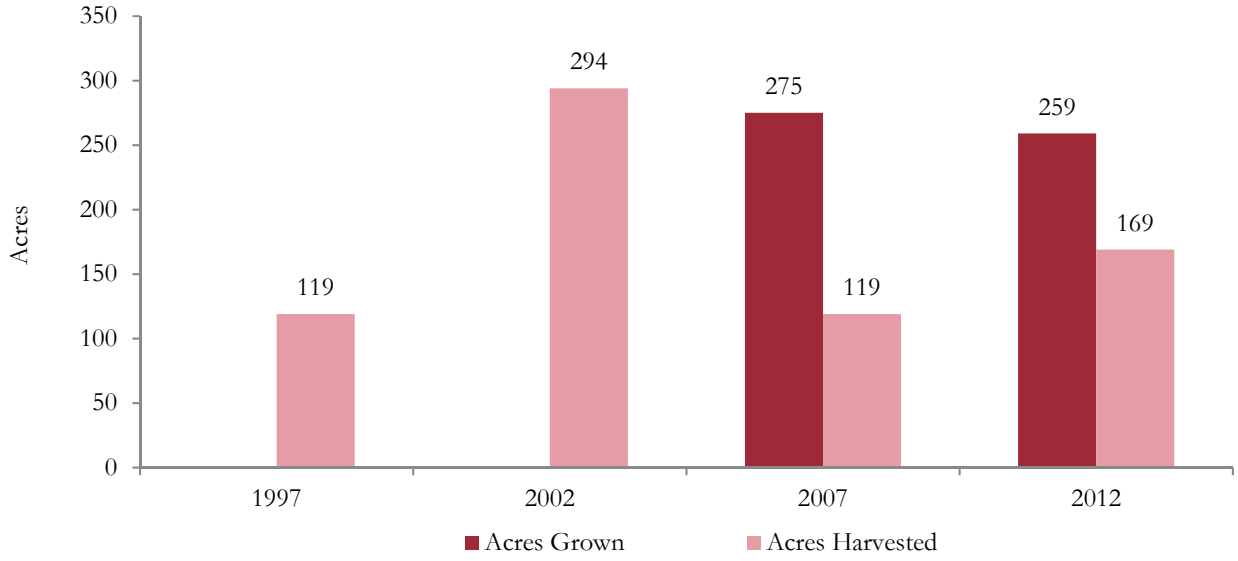
Other growers have sold aronia berries through alternative arrangements. For example, Hargrave Family Farms, an operation located in Denver, Mo., picks aronia berries by hand. It later preserves the berries for making juice and, ultimately, jelly (Missouri Department of Agriculture).

Another Missouri aronia berry grower is Blazerfarmz. The operation harvests berries and further processes them into products such as jam, jelly, fruit chews and juice. The berries may also have application in products such as baked goods, chocolate, wine and beer (Thomas 2013).

1.4 Blackberries

During the past two decades, Missouri blackberry acreage has experienced some volatility. Exhibit 1.4.1 illustrates blackberry acreage grown and acreage harvested from 1997 to 2012. Note that the totals reflect data for blackberries, dewberries and marionberries. Harvested acreage reached its highest level — 294 acres — during 2002. In 2012, Missouri operations harvested 169 acres of blackberries. With respect to acres grown, this value totaled 259 acres in 2012. Thus, 90 acres of blackberries grown in 2012 weren't harvested. Acres grown decreased from 275 acres in 2007 to the 259 acres in 2012 (USDA National Agricultural Statistics Service 2017b).

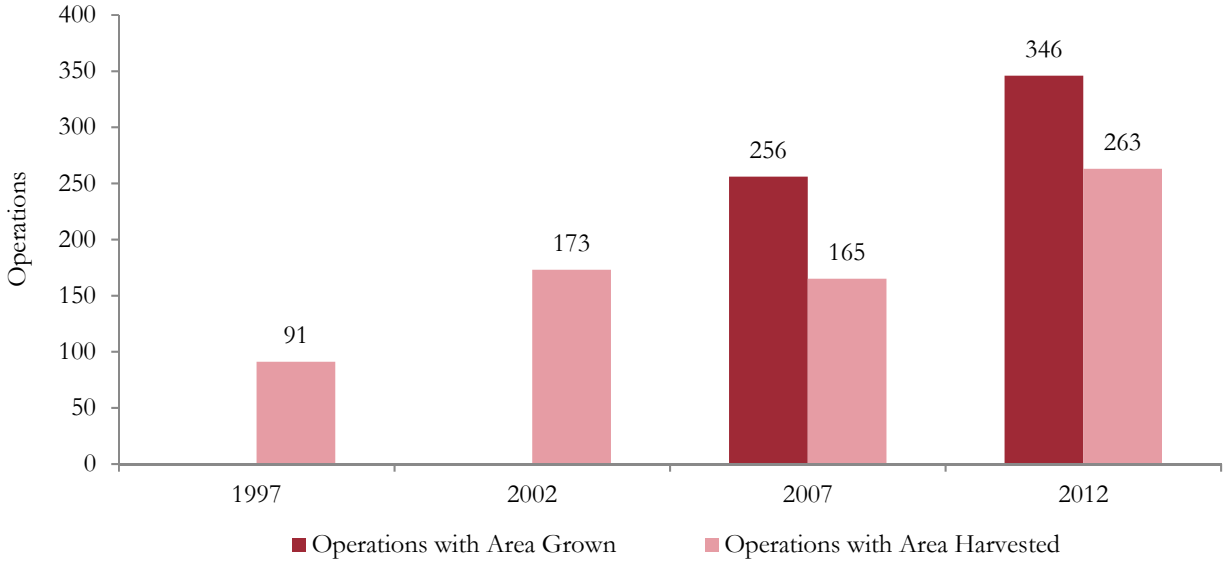
*Exhibit 1.4.1 – Missouri Blackberry Acres Grown and Harvested, 1997 to 2012**



* Blackberries includes dewberries and marionberries.
Source: USDA, National Agricultural Statistics Service (2017b)

The number of Missouri operations harvesting blackberry acreage grew from 1997 to 2012. Exhibit 1.4.2 shows that 91 operations harvested blackberry acreage in 1997. By 2012, 263 Missouri operations harvested blackberry acreage. Again, note that the blackberries category includes dewberries and marionberries. The number of operations with blackberry acreage grown also grew during the observed period. The count of operations with acreage grown increased from 256 operations in 2007 to 346 operations in 2012. Again, note that more operations reported growing blackberries than harvesting blackberries (USDA National Agricultural Statistics Service 2017b).

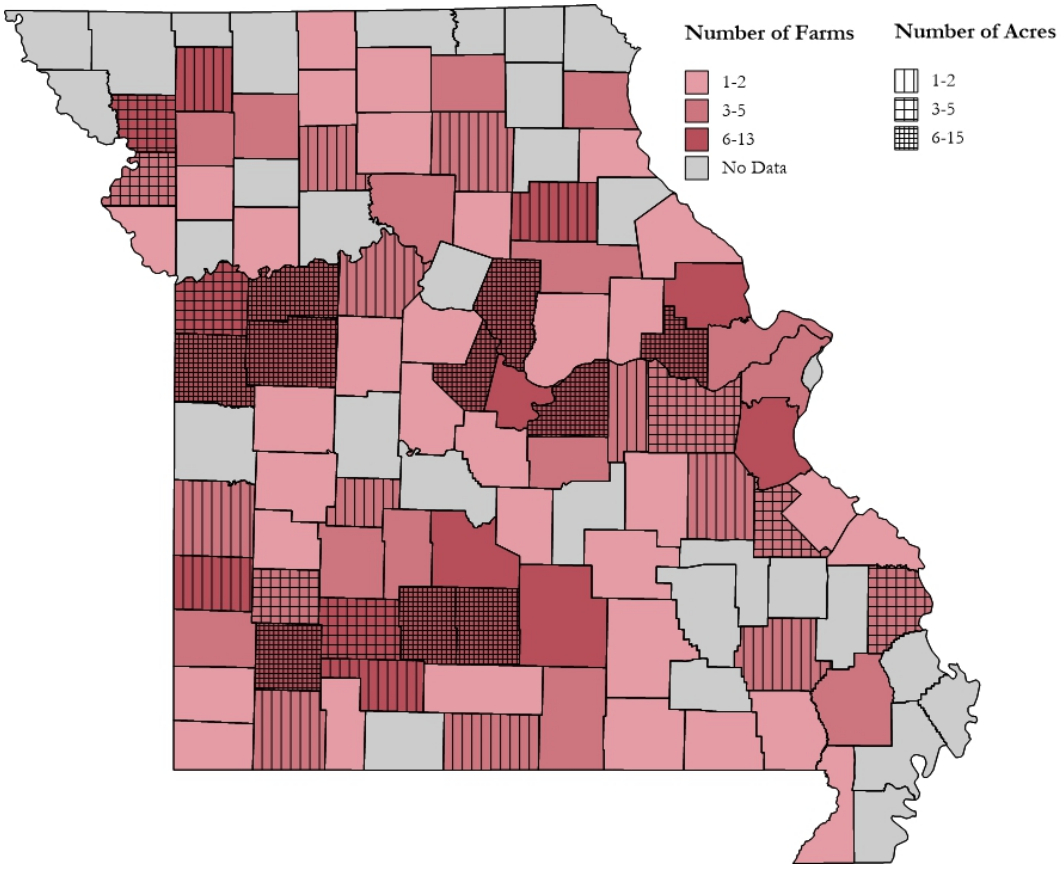
*Exhibit 1.4.2 – Missouri Operations with Blackberry Acreage Harvested, 1997 to 2012**



* Blackberries including dewberries and marionberries
Source: USDA, National Agricultural Statistics Service (2017b)

The map in Exhibit 1.4.3 highlights the concentration of Missouri farms growing blackberries and the acreage used to grow blackberries, including dewberries and marionberries, during 2012. It includes harvested and not harvested acreage. Blackberry production has tended to be popular in the state's central and southwest regions. Counties with the greatest number of blackberry farms in 2012 were Wright County, 13 farms; Warren County, 12 farms; Cass County, 11 farms; Jackson County, 11 farms; Boone County, 10 farms; and Lafayette County, 10 farms. Blackberry acreage was highest in Cass County, 15 acres; Osage County, 11 acres; and Warren County, 10 acres (USDA National Agricultural Statistics Service 2014b). Note that USDA didn't report some data by county, so data for those counties aren't shown.

*Exhibit 1.4.3 – Missouri Blackberry Farms and Total Acreage by County, 2012**



* Blackberries include dewberries and marionberries. * Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

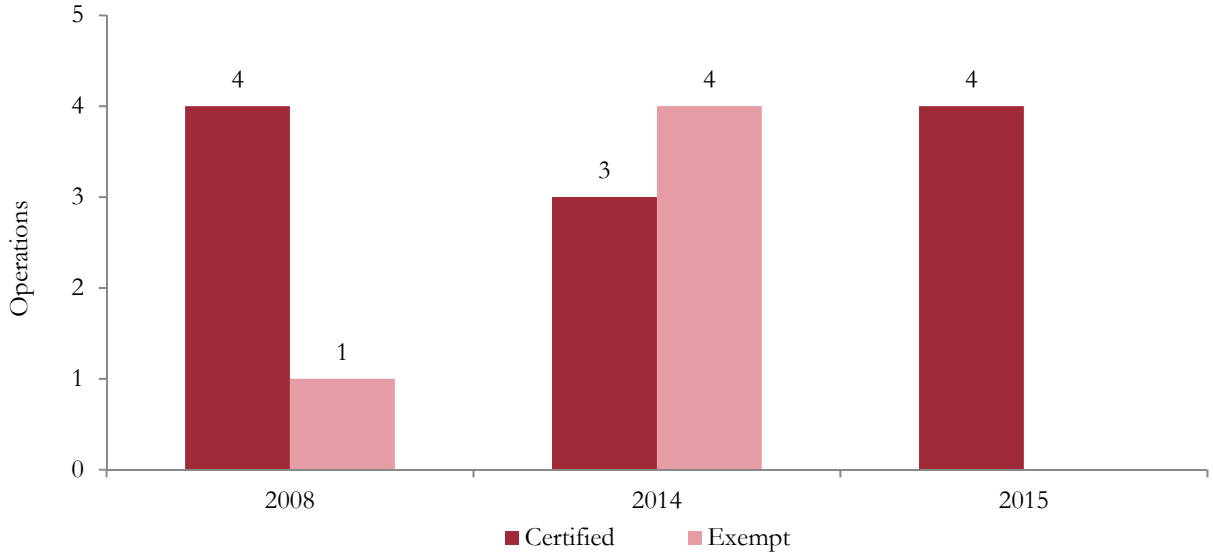
A small portion of Missouri blackberry acreage has transitioned to organic production. In 2014, the USDA National Agricultural Statistics Services reported that Missouri certified and exempt organic harvested area totaled eight acres. Of those, five acres were USDA certified organic, and three were exempt organic (USDA National Agricultural Statistics Service 2017b). For a definition of exempt and certified organic, see the Methodology section.

In terms of organic blackberry production in Missouri, total certified and exempt production was 7,591 pounds in 2014. Of that production, most — more than 90 percent — was USDA certified organic. Certified organic production declined markedly between 2014 and 2015. In 2015, Missouri growers produced 2,282 pounds of certified organic blackberries. Exempt production data were not available to report for 2015 (USDA National Agricultural Statistics Service 2017b).

Dollar sales for Missouri organic blackberries were most recently reported in 2014. At the time, total organic blackberry sales for certified and exempt blackberries registered $13,083. Dollar sales had reached just $2,712 in 2008. Of the 2014 dollar sales, 88.4 percent was for certified organic blackberries. The other 13.1 percent of sales were attributed to exempt organic blackberry sales (USDA National Agricultural Statistics Service 2017b).

Missouri organic blackberry production has concentrated on relatively few operations. See Exhibit 1.4.4. In 2015, four operations harvested USDA certified organic blackberry acreage. Number of operations harvesting certified organic blackberries totaled three operations in 2014 and four operations in 2008. Thus, the number of operations harvesting certified organic blackberries has had stability. In 2014, more operations harvested exempt organic blackberries than certified organic blackberries: four operations and three operations, respectively. Note that number of exempt operations was not reported for 2015 (National Agricultural Statistics Service 2017).

*Exhibit 1.4.4 – Missouri Operations with Organic Blackberry Acreage Harvested, 2008 to 2015**

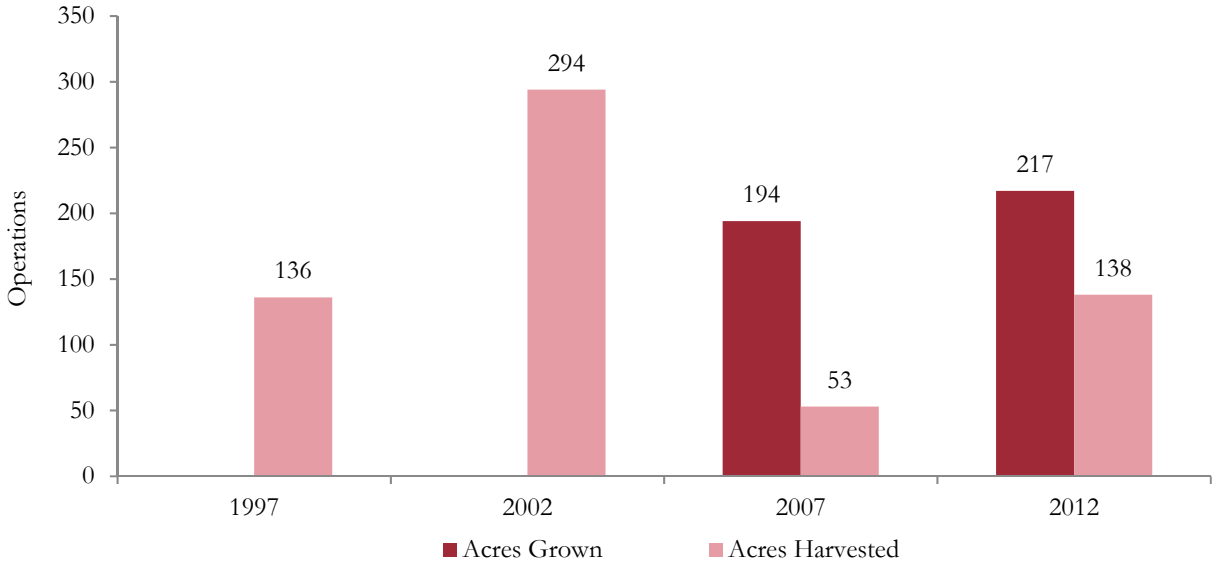


* Blackberries include dewberries and marionberries. The 2015 report was just for certified production.
Source: USDA, National Agricultural Statistics Service (2017b)

1.5 Blueberries

Missouri tame blueberry acreage experienced some volatility during the past two decades. Exhibit 1.5.1 illustrates Missouri acreage grown and harvested for tame blueberries. Harvested acreage reached its highest value in 2002 when Missouri operations harvested 294 acres. Between 2002 and 2007, harvested acreage declined. However, it increased again in 2012 to 138 acres. Tame blueberry acreage grown has exceeded harvested acreage, and it also increased between 2007 and 2012. By 2012, the tame blueberry acreage grown reached 217 acres. Thus, Missouri operations grew 79 acres more than they harvested in 2012 (USDA National Agricultural Statistics Service 2017b).

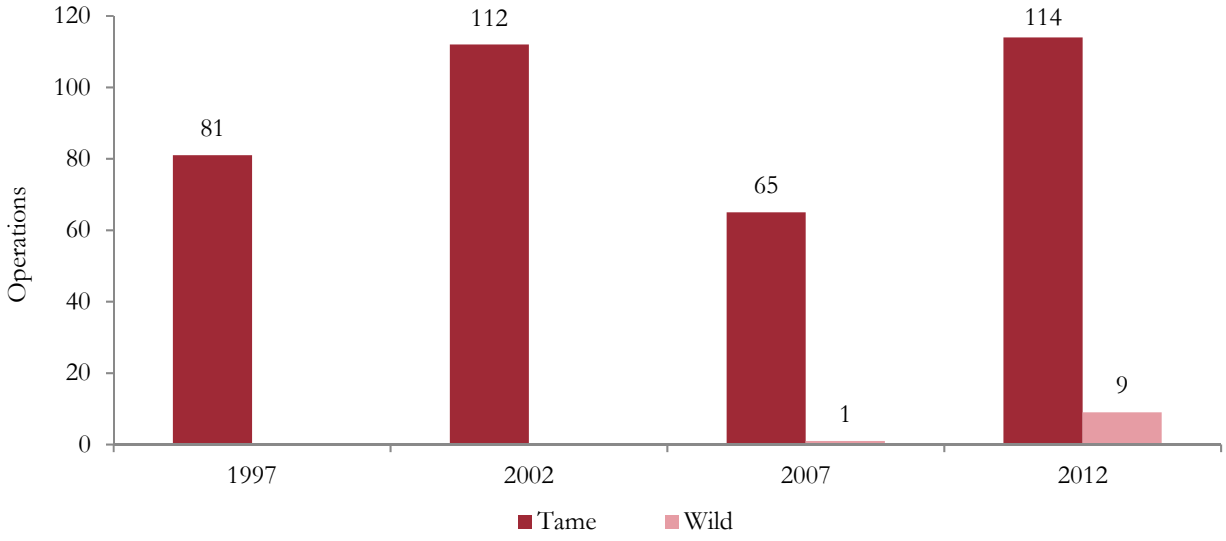
Exhibit 1.5.1 – Missouri Tame Blueberry Acreage Grown and Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations have more frequently reported harvesting tame blueberries than wild blueberries. See Exhibit 1.5.2. Based on data collected from the past four Census of Agriculture iterations, the number of Missouri operations harvesting tame blueberries was highest in 2012. At the time, 114 operations harvested tame blueberries in the state. Also during 2012, nine operations reported that they harvested wild blueberry acreage. The number of operations reporting harvested wild blueberry acreage increased from one operation in 2007 to the nine operations in 2012 (USDA National Agricultural Statistics Service 2017b). Note, despite several operations indicating that they have had wild blueberry activity on their operations, no known commercial-scale production of lowbush berries — also referred to as "wild blueberries" — occurs in Missouri.

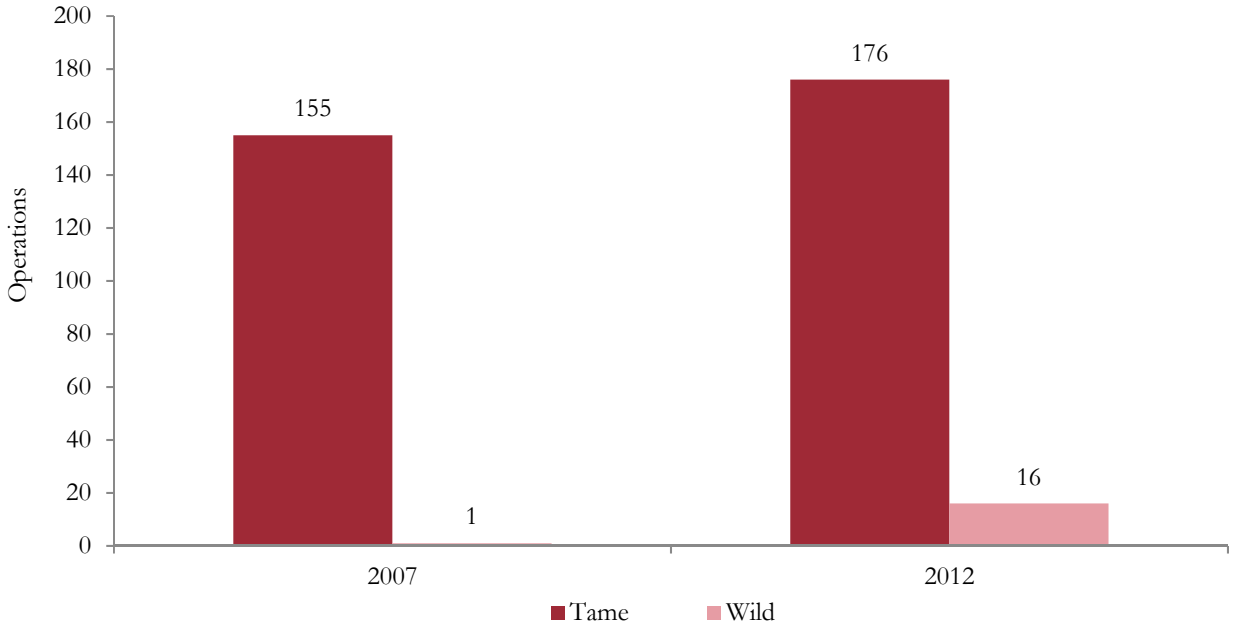
Exhibit 1.5.2 – Missouri Operations Harvesting Tame and Wild Blueberry Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

For an alternative view of Missouri blueberry operation count, Exhibit 1.5.3 shares the count of operations growing wild and tame blueberries in 2007 and 2012. Operation counts for both tame and wild blueberries increased during the observed period. In 2012, 176 operations reported growing tame blueberries, and 16 operations shared that they grew wild blueberries (USDA National Agricultural Statistics Service 2017b). Again, despite several operations indicating that they have had wild blueberry activity on their operations, no known commercial-scale production of lowbush berries — also referred to as "wild blueberries" — occurs in Missouri.

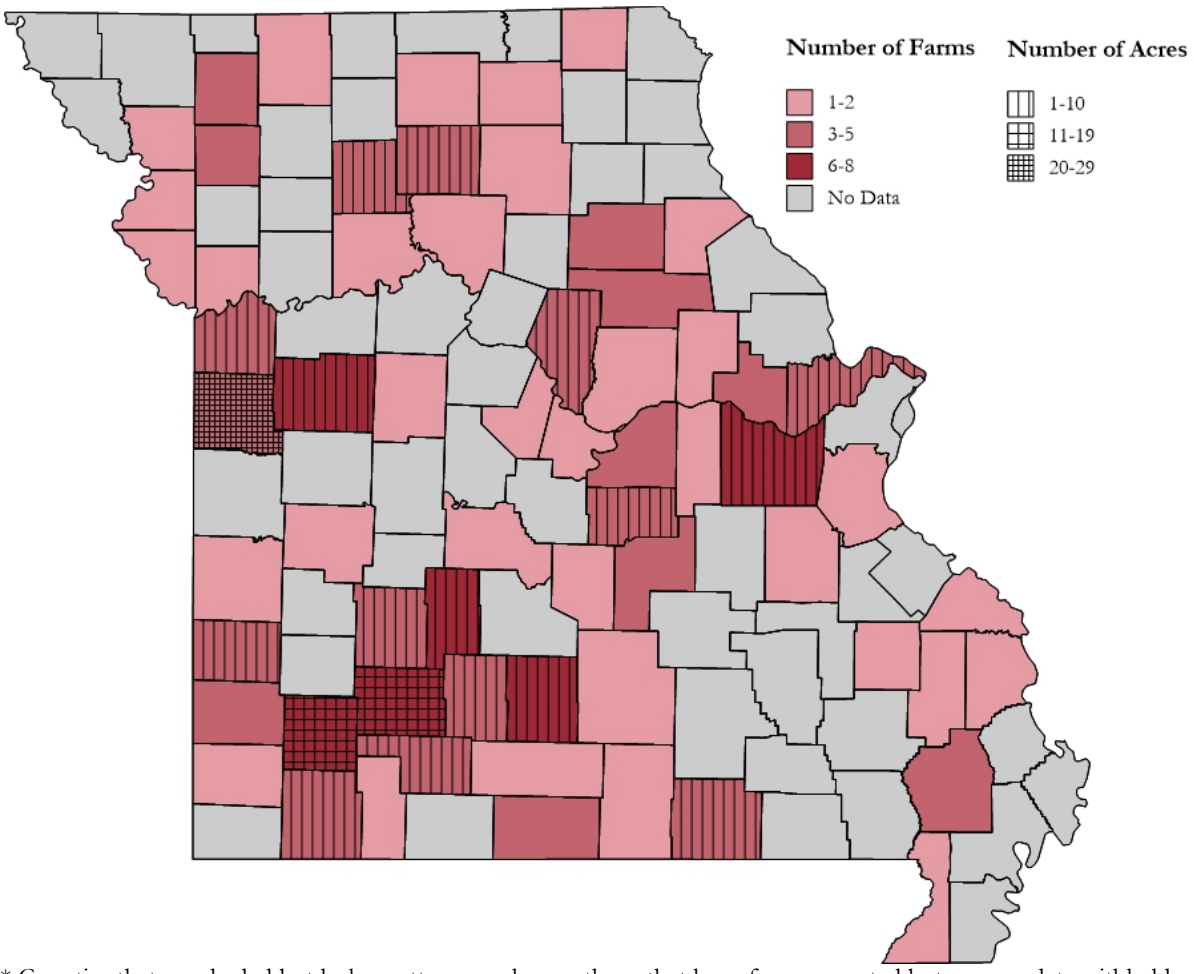
Exhibit 1.5.3 – Missouri Operations Growing Tame and Wild Blueberries, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri counties reporting the most tame blueberry farms in 2012 were Franklin County, eight farms; Greene County, eight farms; Lawrence County, eight farms; Wright County, eight farms; Dallas County, seven farms; and Johnson County, six farms. Tame blueberry acreage was most significant in Cass County, 29 acres; Greene County, 14 acres; and Lawrence County, 14 acres. These data points account for harvested acreage and acreage not harvested. Exhibit 1.5.4 summarizes tame blueberry farms and acreage data by county (USDA National Agricultural Statistics Service 2014b). Note that USDA didn't report data for all counties raising tame blueberries because of limited data and protecting data for individual operations.

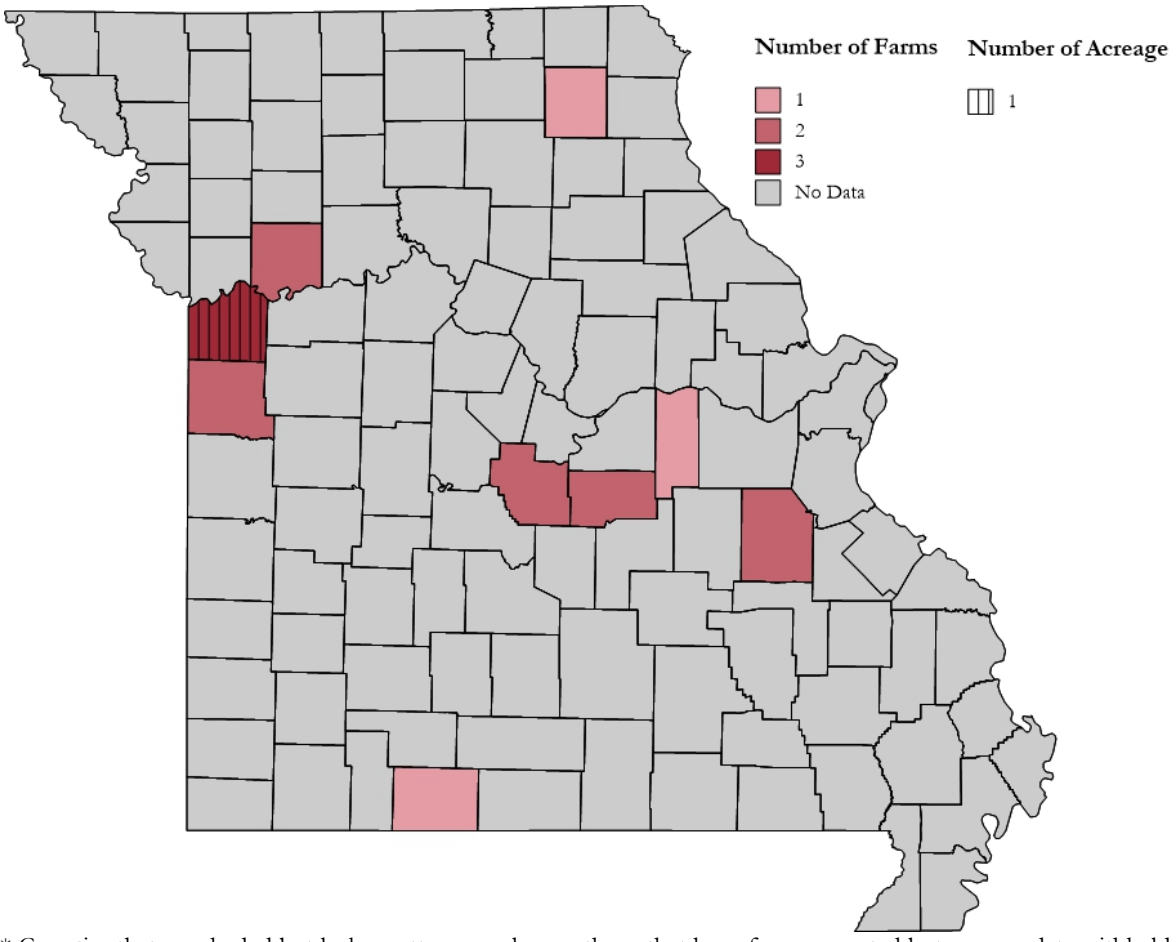
*Exhibit 1.5.4 – Missouri Tame Blueberry Farms and Total Acreage by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

In 2012, wild blueberry production was more limited geographically. Farms with wild blueberries were most prevalent in Jackson County, three farms; Cass County, two farms; Maries County, two farms; Miller County, two farms; Ray County, two farms; and Washington County, two farms. Exhibit 1.5.5 highlights Missouri counties by their number of wild blueberry farms. Note that wild blueberry acreage by county was only reported for Jackson County. Farms in Jackson County grew one acre of wild blueberries in 2012 (USDA National Agricultural Statistics Service 2014b).

*Exhibit 1.5.5 – Missouri Wild Blueberry Farms and Total Acreage by County, 2012**



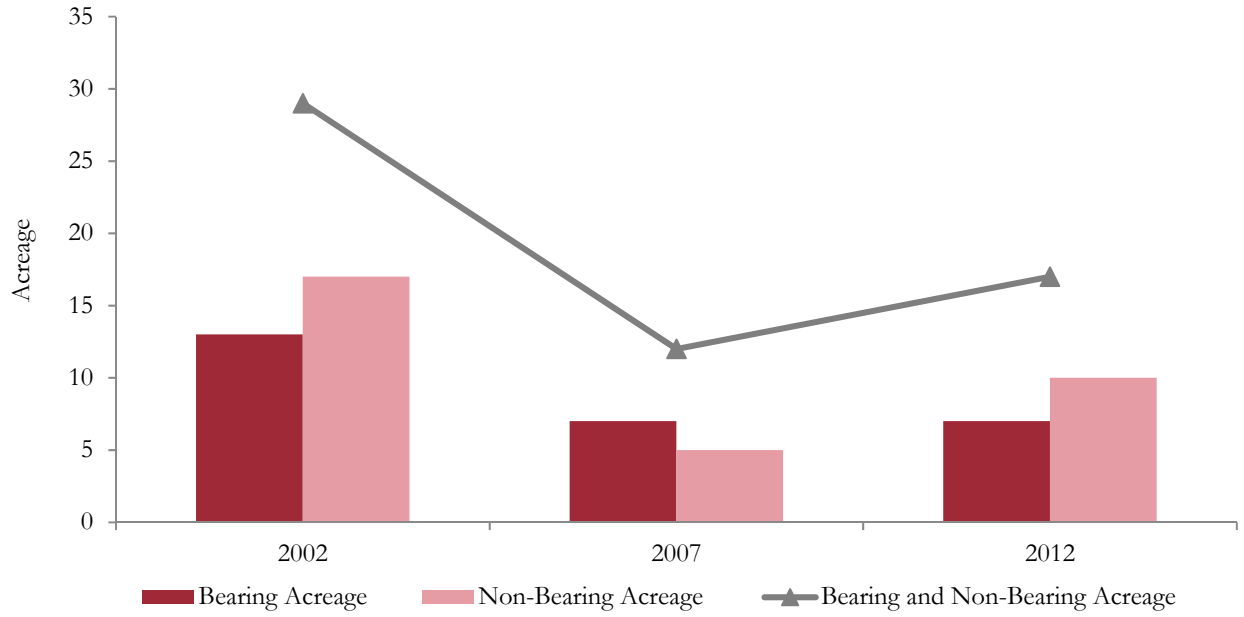
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

In 2015, three Missouri operations with USDA organic certification reported harvesting organic tame blueberries. USDA certified organic tame blueberry production in 2015 totaled 24,900 pounds. In terms of sales, Missouri tame blueberry sales of USDA certified organic product totaled $56,986 in 2015 (USDA National Agricultural Statistics Service 2017b).

1.6 Cherries

Missouri has produced sweet cherries and tart cherries. Exhibit 1.6.1 tracks sweet cherry acreage from 2002 to 2012. The gray line indicates that total sweet cherry acreage dropped sharply from 2002 to 2007. Total sweet cherry acreage had increased by 2012. At the time, Missouri had 17 acres of sweet cherry trees. Of that total acreage, 41.2 percent was bearing acreage, and 58.8 percent was non-bearing acreage (USDA National Agricultural Statistics Service 2017b).

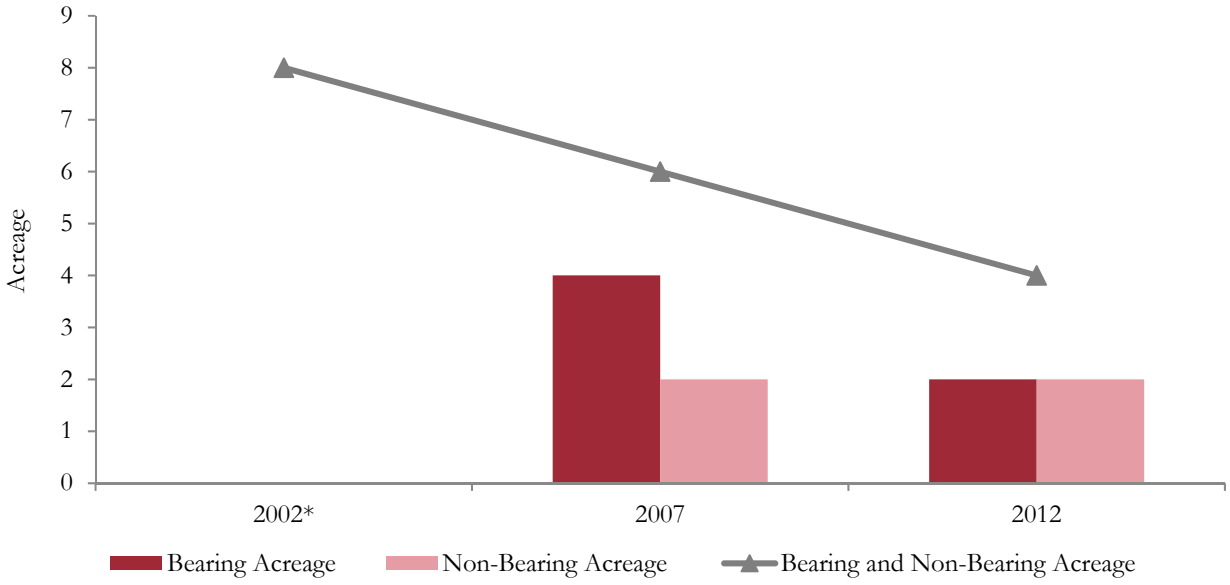
Exhibit 1.6.1 – Missouri Sweet Cherry Acreage, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Relative to the state's sweet cherry industry, its tart cherry industry has been smaller. Exhibit 1.6.2 presents Missouri tart cherry acreage from 2002 to 2012. Like for sweet cherries, tart cherry acreage declined from 2002 to 2007; however, it also dropped rather than rebound between 2007 and 2012. By 2012, only four bearing and non-bearing acres of tart cherries grew in Missouri. Half were bearing, and half were non-bearing (USDA National Agricultural Statistics Service 2017b).

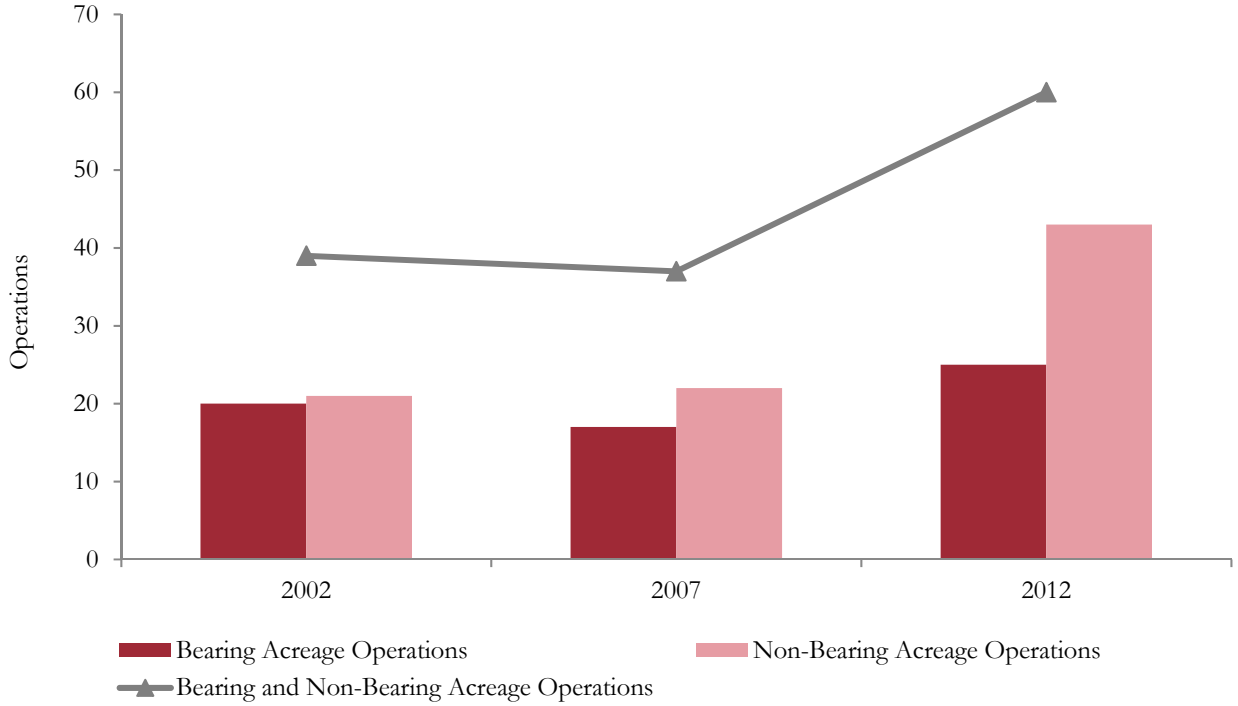
Exhibit 1.6.2 – Missouri Tart Cherry Acreage, 2002 to 2012



* 2002 data were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

Between 2007 and 2012, the number of Missouri operations with sweet cherry acreage increased substantially. Exhibit 1.6.3 illustrates that 37 operations had sweet cherry acreage in 2007, and the count jumped to 60 operations in 2012. The number of operations with non-bearing acreage increased from 22 farms in 2007 to 43 farms in 2012. This growth in operations with non-bearing acreage largely fueled the increase in total sweet cherry operations. However, operations with bearing acreage also increased. In 2007, the state had 17 operations with bearing acreage, and during 2012, 25 operations in Missouri were reported to maintain bearing acreage (USDA National Agricultural Statistics Service 2017b).

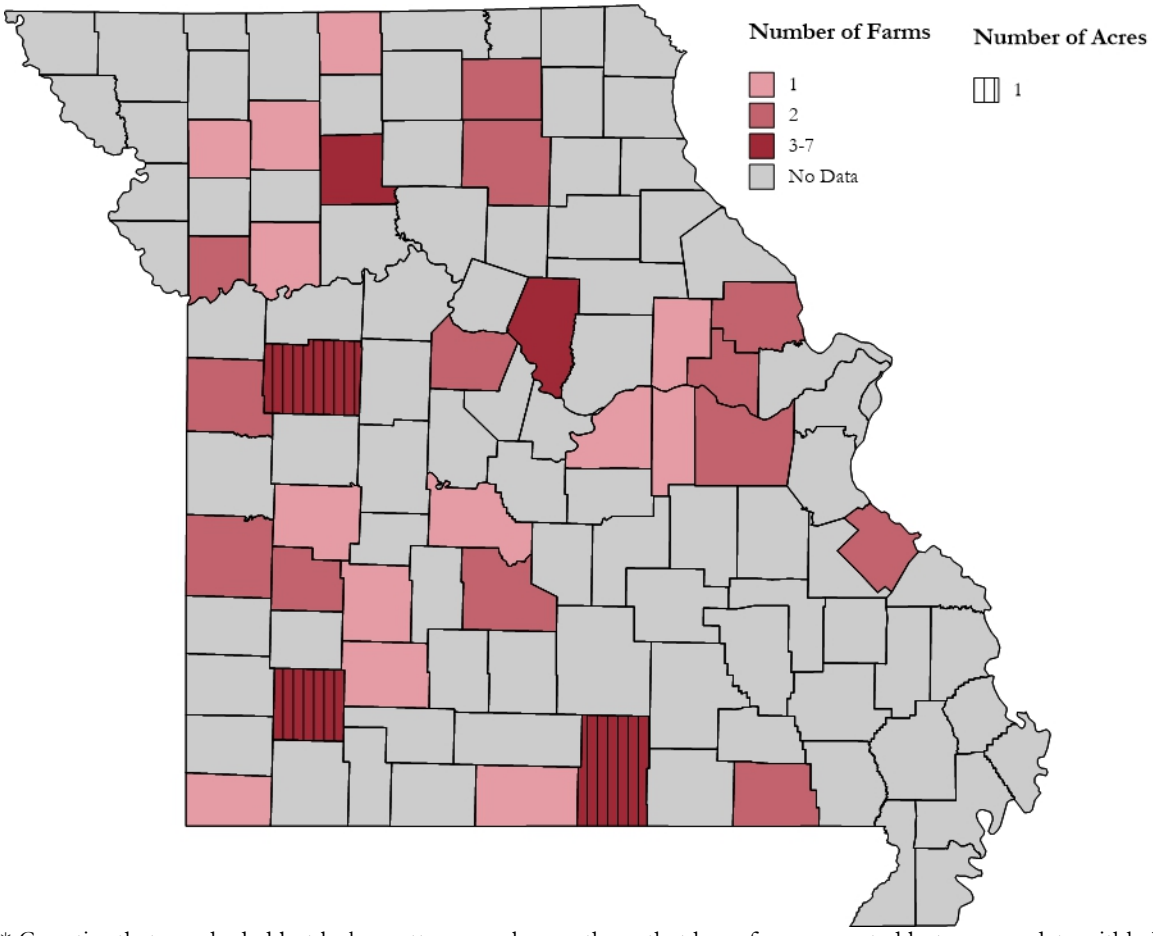
Exhibit 1.6.3 – Missouri Operations with Sweet Cherry Bearing and Non-Bearing Acreage, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, counties in Missouri with the greatest number of sweet cherry farms were Johnson County, seven farms; Howell County, four farms; and Lawrence County, four farms. These totals represent farms with bearing and non-bearing acreage. Exhibit 1.6.4 maps Missouri sweet cherry farms and acreage by county. For most counties, note that acreage data were withheld in order to protect information for individual operations (USDA National Agricultural Statistics Service 2014b).

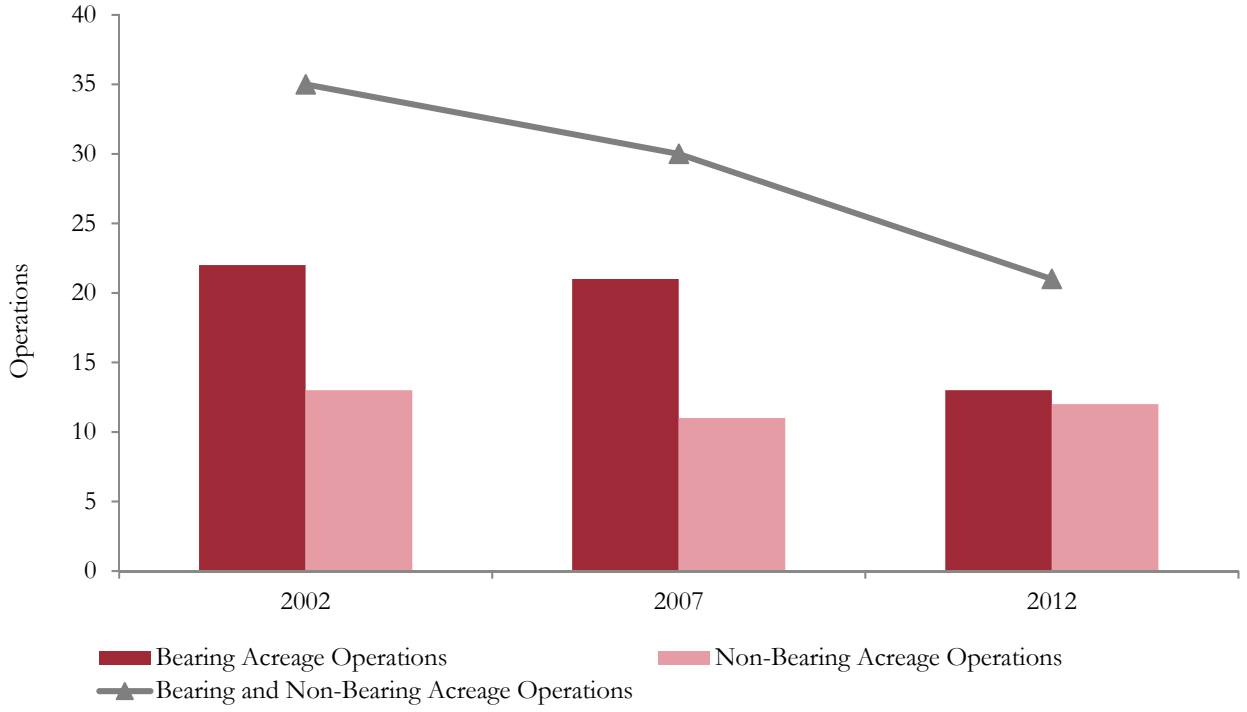
*Exhibit 1.6.4 – Missouri Sweet Cherry Farms and Total Acreage by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2012)

For tart cherries, the total number of operations — those with bearing or non-bearing acreage — declined from 2002 to 2012. To an extent, this trend is counter to the trend reported for sweet cherry operations. Exhibit 1.6.5 illustrates that 35 operations in total maintained bearing or non-bearing tart cherry acreage in 2002. By 2012, the count had dropped to 21 operations. In 2012, 13 operations reported maintaining bearing tart cherry acreage, and 12 farms reported maintaining non-bearing tart cherry acreage (USDA National Agricultural Statistics Service 2017b).

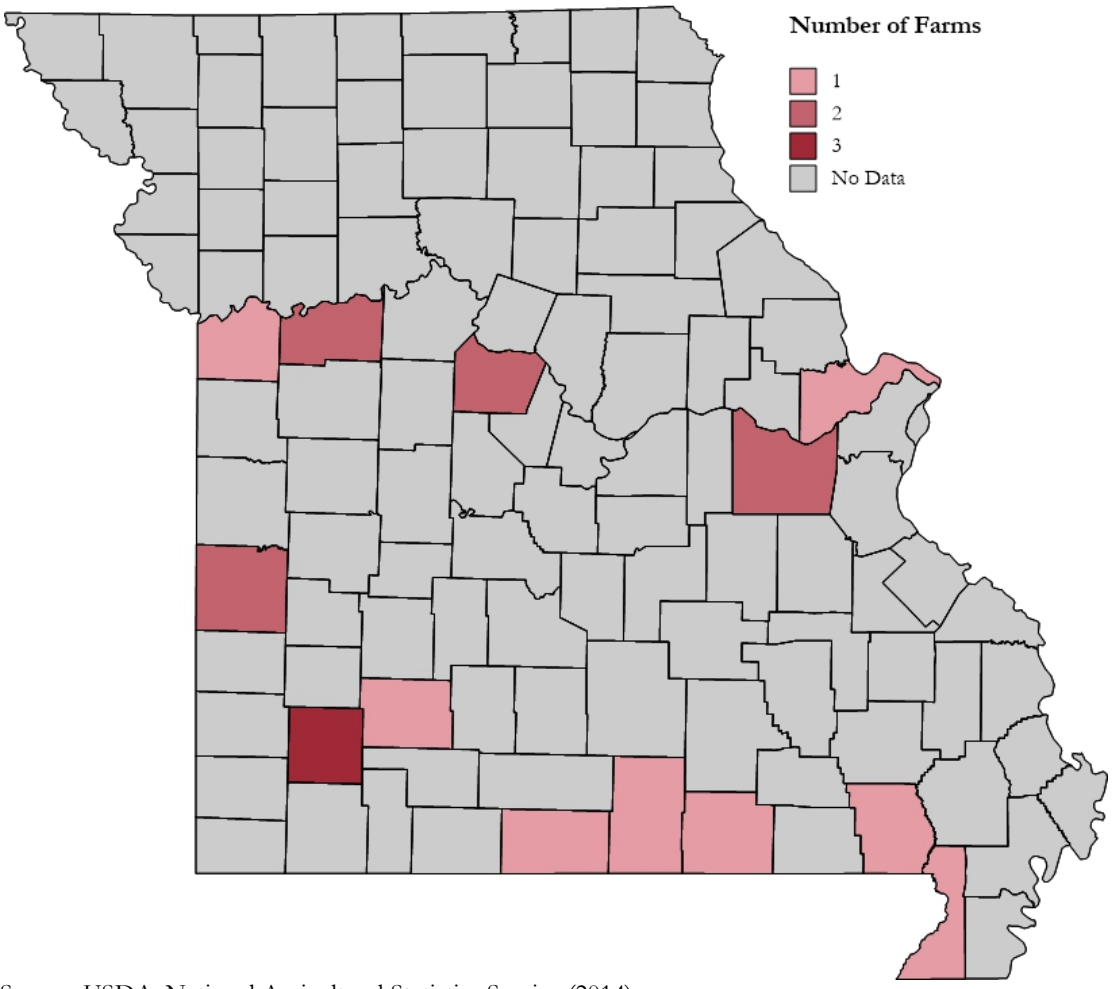
Exhibit 1.6.5 – Missouri Operations with Tart Cherry Bearing and Non-Bearing Acreage, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, counties with the greatest number of tart cherry farms were Lawrence County, three farms; Cooper County, two farms; Franklin County, two farms; Lafayette County, two farms; and Vernon County, two farms. See Exhibit 1.6.6. Again, the data account for operations with bearing and non-bearing acreage. For Missouri counties, note that tart cherry acreage data were withheld in order to protect data for individual operations (USDA National Agricultural Statistics Service 2014b).

Exhibit 1.6.6 – Missouri Tart Cherry Farms by County, 2012



Source: USDA, National Agricultural Statistics Service (2014)

1.7 Citrus

Citrus hasn't been a significant specialty crop in Missouri; however, marginal citrus activity has occurred in the state. In 2012 — the only recent year with data available — one Missouri operation reported citrus bearing acreage. Acreage data weren't disclosed, however. The one Missouri operation that had indicated bearing acreage was located in Greene County (USDA National Agricultural Statistics Service 2017b).

1.8 Elderberries

The elderberry is a native crop (Missouri Life 2013). The USDA specialty crop definition doesn't specifically name elderberries as a specialty crop; however, elderberries have emerged as a specialty crop opportunity. In the U.S., elderberry production occurs on a relatively small scale, but Missouri has served as a leader in cultivating elderberries. Often, the berries are picked by hand. Then, after

they're cleaned, destemmed and frozen, they may be processed into products such as juice, jelly and wines. The flowers themselves also have potential application in products such as drinks and pies. Some operations may also sell elderberry plant materials, such as cuttings (Vanderlip 2011).

The USDA National Agricultural Statistics Service doesn't report elderberry data; however, several news stories cite estimates about the extent of the state's elderberry activity. In 2013, one report estimated that planted elderberry acreage totaled roughly 200 acres (Geist 2013). In 2011, an estimate suggested that 50 elderberry acres in the state would bear fruit of the 60 acres that were planted. The grower count at the time was roughly 30 growers statewide. Boone County had a relatively large contingency of elderberry producers in 2011. Of the estimated 30 producers in total, six producers were located in Boone County (Vanderlip 2011). The MU Southwest Research Center has formally introduced two elderberry cultivars. Both the Wyldewood and Bob Gordon cultivars have been widely planted.

The native elderberry has great potential as a commercial crop for Missouri. River Hills Harvest ElderBerry Juice products was founded in Missouri, and it currently sells products to more than 500 retailers. The elderberry market has shown increasing consumer demand, and prices of elderberry and its value-added products are good (Cernusca et al. 2012). According to Mohebalian et al. (2013), one-third of consumers are familiar with elderberry. Elderberry juice, jelly and wine are the most common elderberry products purchased. Consumers prefer locally produced elderberry jelly relative to imports, and they prefer elderberry jelly with health claims relative to products without health claims (Mohebalian et al. 2013).

Despite the opportunities for elderberry, some barriers to industry growth exist. They include a limited domestic supply of fruit, few regionally adapted varieties suitable for commercial production, lack of mechanized harvesting equipment and high labor costs (Cernusca et al. 2012). Many landowners planning to establish elderberry have received cost-share assistance through the USDA Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) in Missouri. More recently, the USDA NRCS in Missouri created a special EQIP funding pool to promote agroforestry and woody crop establishment (Cartwright et al. 2017).

1.9 Figs

Some resources indicate that fig production generally isn't recommended for Missouri growers (Quinn 2000). However, limited fig production has existed in Missouri. In its 2015 certified organic survey, the USDA National Agricultural Statistics Service reported that two Missouri farms harvested certified organic figs (USDA National Agricultural Statistics Service 2016a).

One Missouri fig operation is Ivan's Fig Farm. In 2015, the operation, located in Dittmer, Mo., was reported to have 500 trees in its indoor inventory, and trees also grew outside. The indoor trees are raised in greenhouses (Live Better Garden 2015). The farm shared in 2014 that more than one dozen fig varieties were grown (ATTRA 2014).

Using a high tunnel, Manitou Farms, a mid-Missouri operation that sells product at the Columbia Farmer's Market, has produced figs. The production period extends from August to October. Figs

are just one somewhat rare fruit produced by Manitou Farms. Others include jujubes, a Chinese fruit, and pawpaws (DeSmit 2016).

1.10 Gooseberries

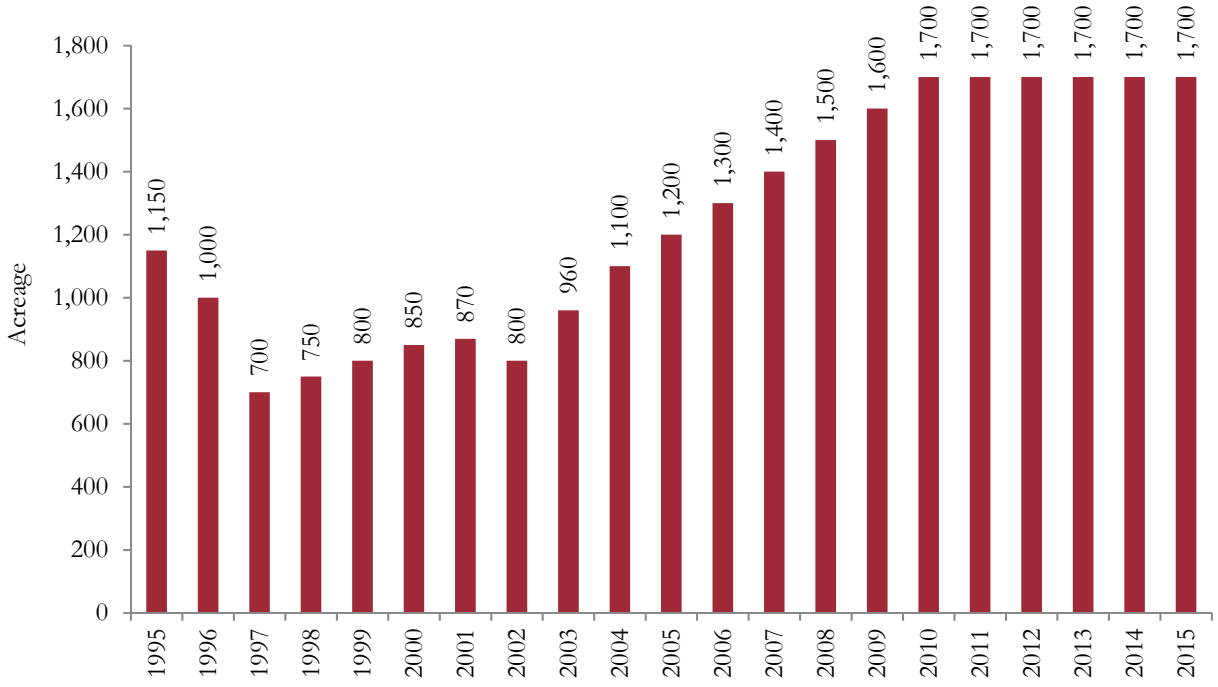
USDA National Agricultural Statistics Service data sets don't articulate gooseberry production or operations by state. However, some Missouri operations have participated in gooseberry production or collection. For example, Persimmon Hill Farm Gourmet Foods has an AgriMissouri listing, and in it, the farm shares that it offers U-pick and pre-picked gooseberries as part of its product offerings (Missouri Department of Agriculture).

Another Missouri operation reportedly offering gooseberries is Kenney Family Farms in Cedar County. The farm with a Stockton, Mo., shares that it sells gooseberries along with blackberries, blueberries and raspberries (Pick Your Own 2017).

1.11 Grapes

In Missouri, grapes bearing acreage increased substantially during the past couple of decades. Exhibit 1.11.1 illustrates the bearing acreage trend from 1995 to 2015. As shown, grape bearing acreage grew quickly from the early 2000s to late 2000s. By 2010, Missouri bearing acreage for grapes had reached 1,700 acres, and it maintained that level through 2015 (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

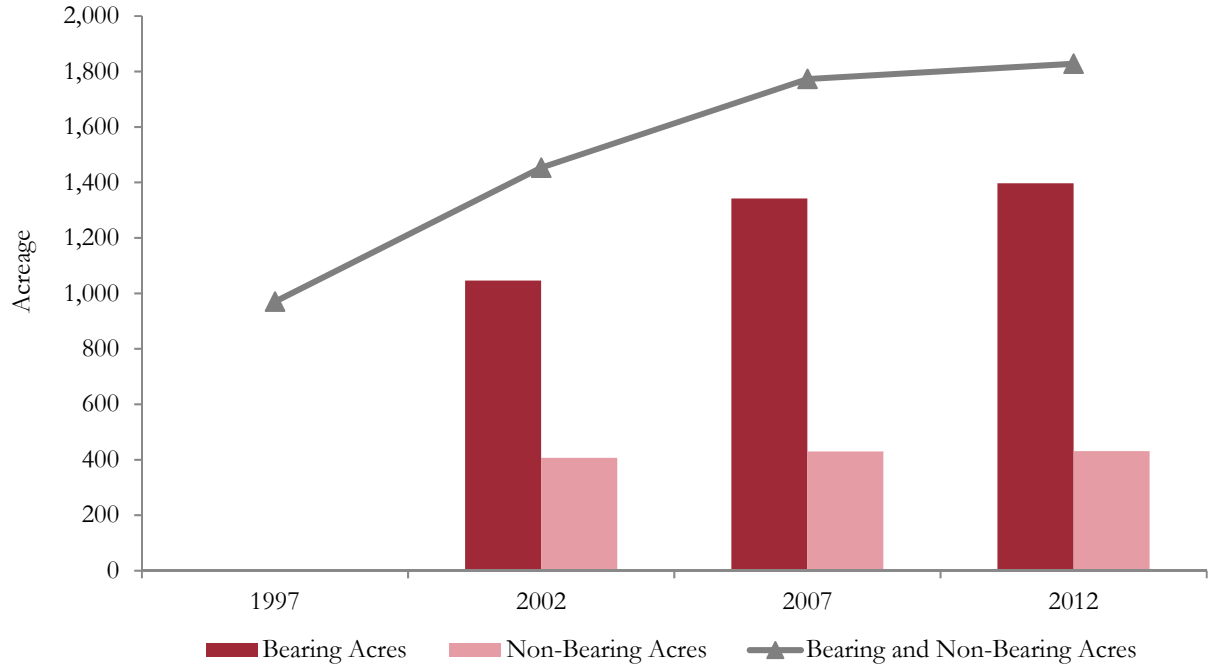
Exhibit 1.11.1 – Missouri Grape Bearing Acreage, 1995 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 1.11.2 breaks down Missouri grape acreage by bearing and non-bearing acreage in U.S. Census of Agriculture years. It shows that total bearing and non-bearing acreage increased from 970 acres in 1997 to 1,828 acres in 2012. Of the 1,828 total grape acres in 2012, 76.4 percent were bearing, and 23.6 percent were non-bearing (USDA National Agricultural Statistics Service 2017b).

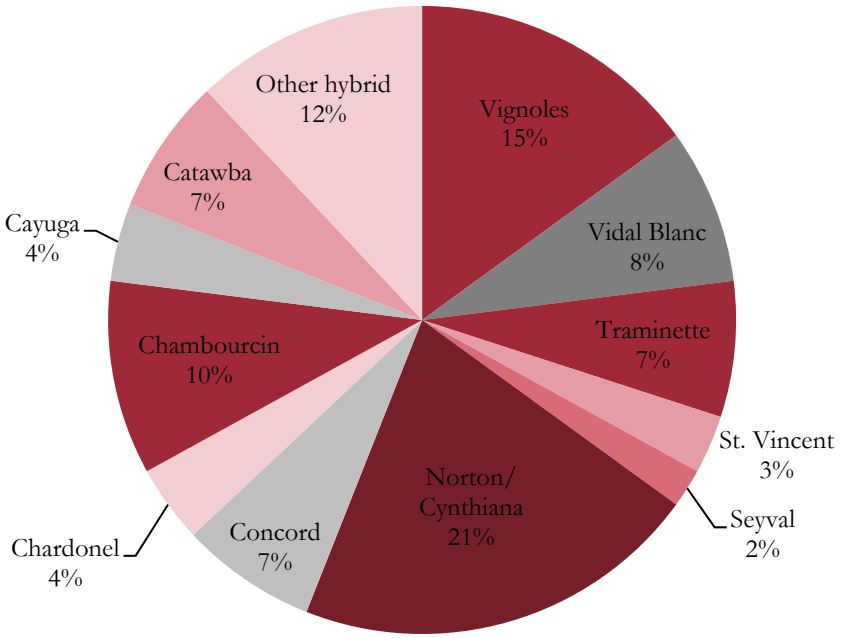
Exhibit 1.11.2 – Missouri Grape Bearing and Non-Bearing Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2015, grape varieties representing the greatest share of Missouri bearing acreage were Norton/Cynthiana and Vignoles. See Exhibit 1.11.3. Collectively, 36 percent of bearing acreage was dedicated to those varieties in 2015. Other top varieties by acreage were Chambourcin, Vidal Blanc, Catawba, Concord, Traminette, Chardonel and Cayuga (Missouri Grape and Wine Board 2016).

Exhibit 1.11.3 – Missouri Grape Bearing Acres by Variety, 2015

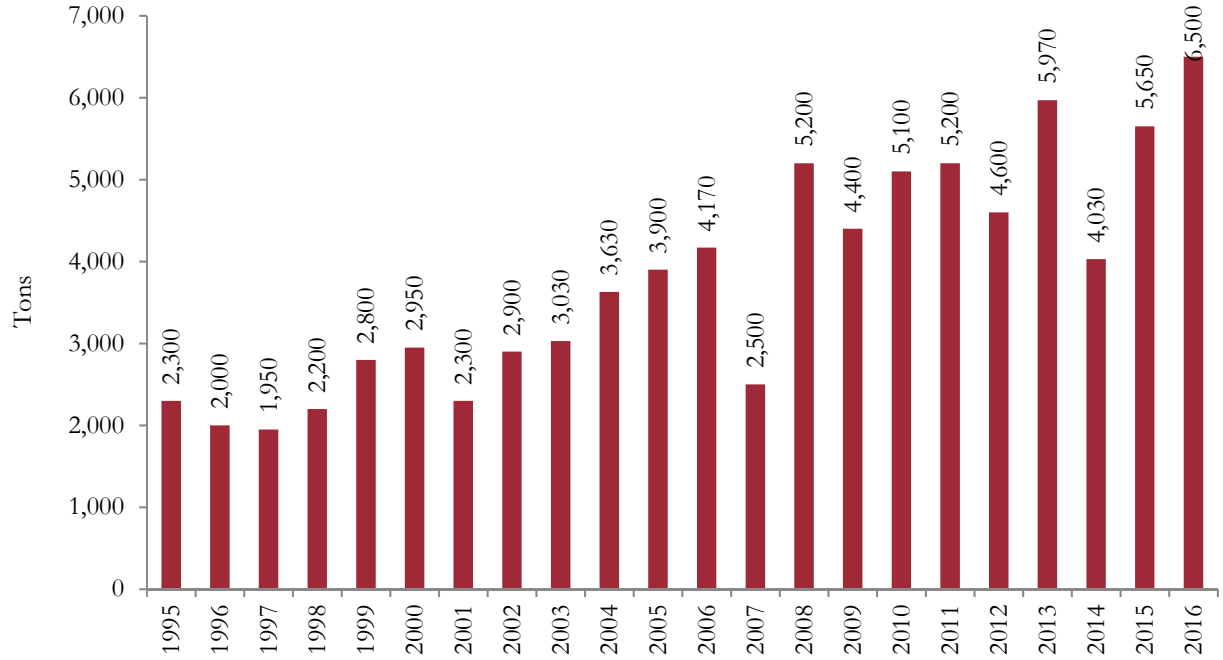


Source: Missouri Wine and Grape Board (2016)

Like the trend of grape bearing acreage, total grape production in Missouri also increased during the past two decades. Exhibit 1.11.4 charts Missouri total grape production from 1995 to 2016. Total production more than doubled between those two years. By 2016, total grape production statewide reached 6,500 tons (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

In 2016, the USDA National Agricultural Statistics Service reported grape production data for 11 states, including Missouri. Relative to the other states, Missouri ranked ninth for total grape tonnage produced. By far, California led the country's grape production in 2016; it produced 6.9 million tons. Washington and New York ranked second and third and produced 480,000 tons and 165,000 tons, respectively (USDA National Agricultural Statistics Service 2017b).

Exhibit 1.11.4 – Missouri Grape Total Production in Pounds, 1995 to 2016

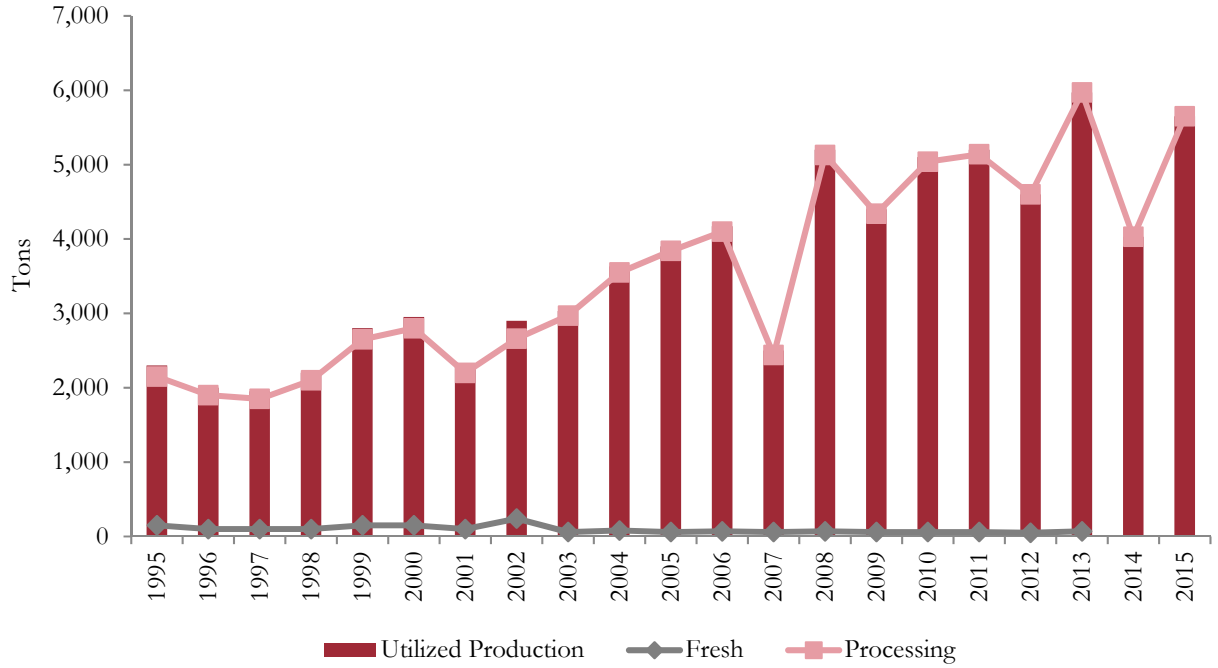


Source: USDA, National Agricultural Statistics Service (2017b)

Most of Missouri's grape production has been used for processing purposes. Exhibit 1.11.5 charts utilized production for fresh and processing uses, and it shares total utilized production. Not only has fresh utilization been a small share of total utilized production, but that share also declined in recent years. Note that fresh market utilization wasn't reported for 2014 or 2015 (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

In Missouri, grapes used for processing are predominantly directed to wine production (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017). The Missouri Grape and Wine Board reports that more than 125 wineries operate in Missouri. Sales of Missouri wine exceed 913,000 gallons. That makes Missouri's wine market share total 7 percent (Missouri Grape and Wine Board).

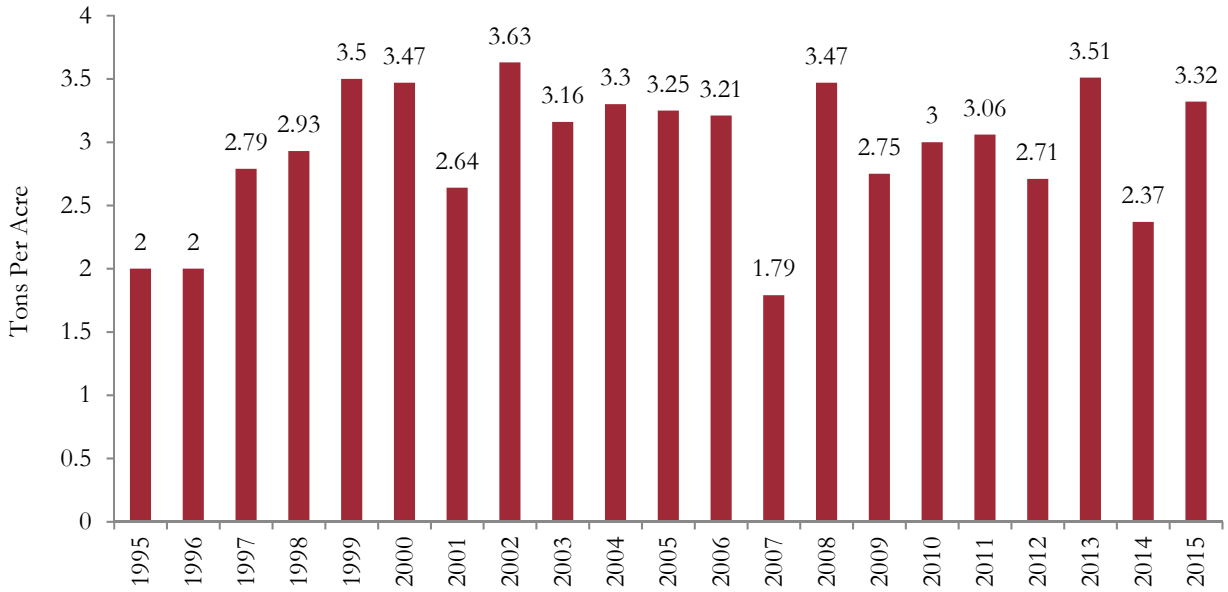
Exhibit 1.11.5 – Missouri Grape Utilized Production in Tons by Use, 1995 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 1.11.6 presents average annual Missouri grape yields from 1995 to 2015. Yields have slightly trended upward, but they've experienced some volatility from year to year. In 2015, Missouri grape yields averaged 3.32 tons per acre (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

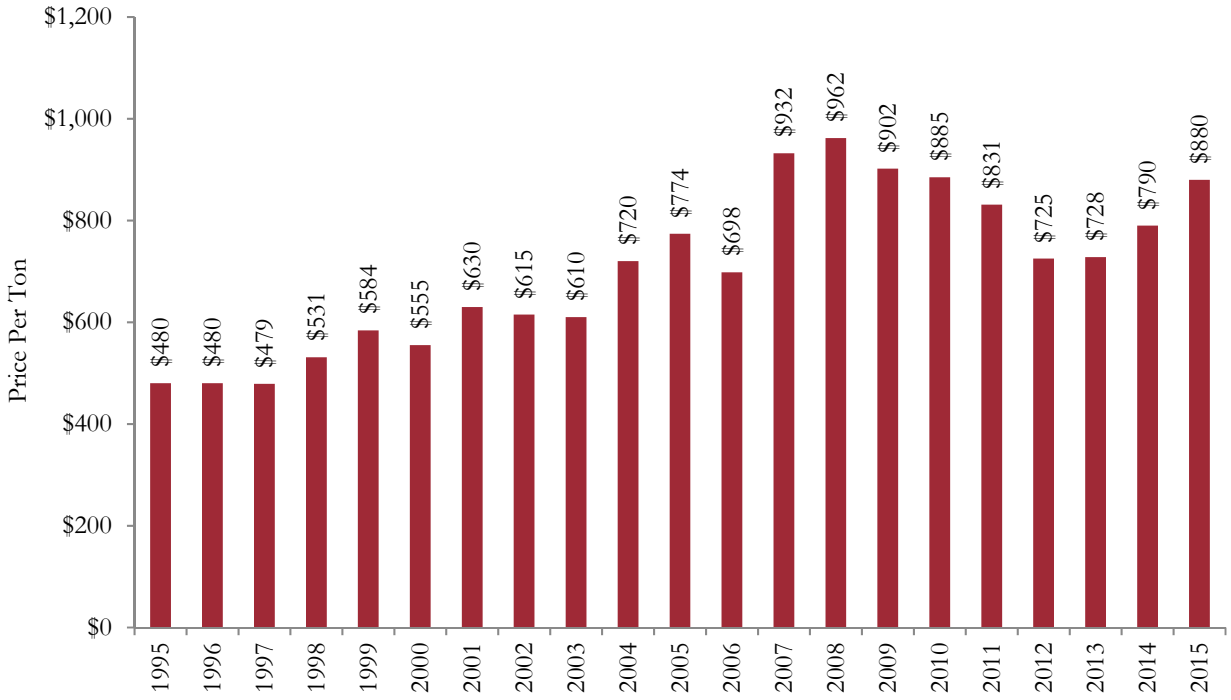
Exhibit 1.11.6 – Missouri Grape Yield in Tons Per Acre, 1995 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

For the most part, Missouri grape prices increased between 1995 and 2015. See Exhibit 1.11.7. In 2015, Missouri grape prices averaged $880 per ton. Often during the observed period, grapes produced for the fresh market commanded premiums relative to grapes produced for processing. From 1995 to 2013, the fresh market premium averaged 5 percent above the processed premium (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

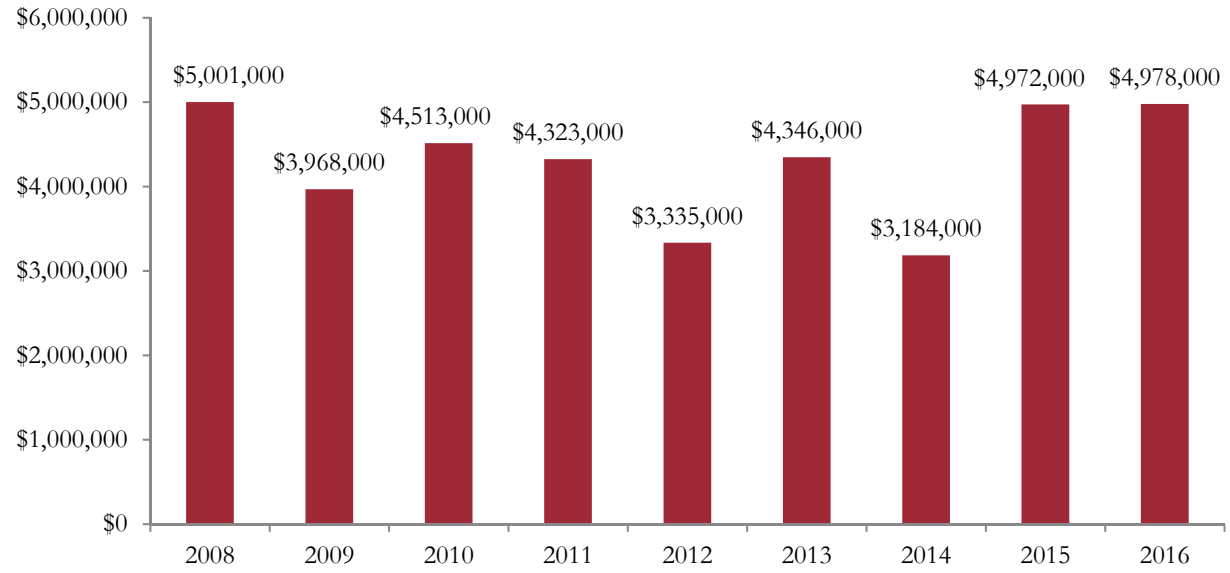
Exhibit 1.11.7 – Average Prices Received for Missouri Grapes, 1995 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

In 2016, Missouri cash receipts for grapes exceeded $4.97 million. As a share of total state cash receipts, grapes contributed 0.1 percent of the total, and they ranked 19th among commodities producing cash receipts in the state. Cash receipts for Missouri-grown grapes were 0.1 percent of total U.S. grape receipts. Exhibit 1.11.8 illustrates the trend in Missouri's grape cash receipts from 2008 to 2016. During the nine-year period, grape cash receipts experienced some changes. Cash receipts in 2016, however, were only slightly less than the total for 2008. Between the two years, grape cash receipts had retreated to an extent (USDA Economic Research Service 2017).

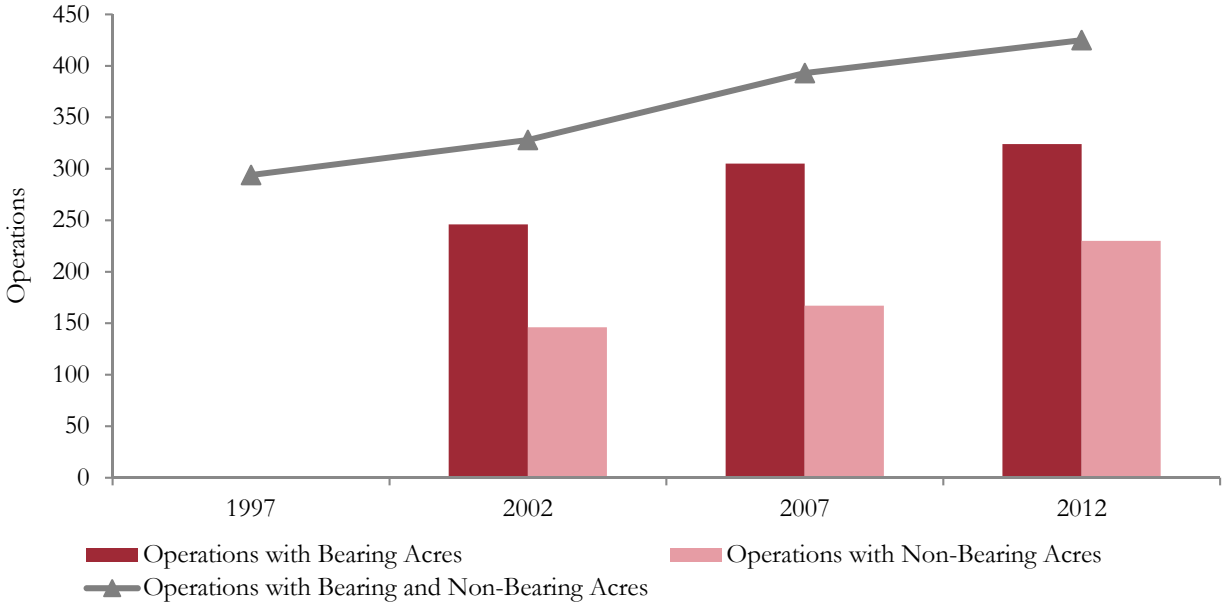
Exhibit 1.11.8 – Missouri Grape Cash Receipts, 2008 to 2016



Source: USDA, Economic Research Service (2017)

As Missouri bearing and non-bearing grape acreage has increased, the number of operations with grape acreage has grown, too. Exhibit 1.11.9 shows the trend in operations with bearing and non-bearing grape acreage. In 1997, Missouri had 294 operations with bearing and non-bearing acreage. The number of operations increased to 425 operations in 2012. During 2012, the count of operations with bearing acreage was 324, and the count with non-bearing acreage was 230 (USDA National Agricultural Statistics Service 2017b).

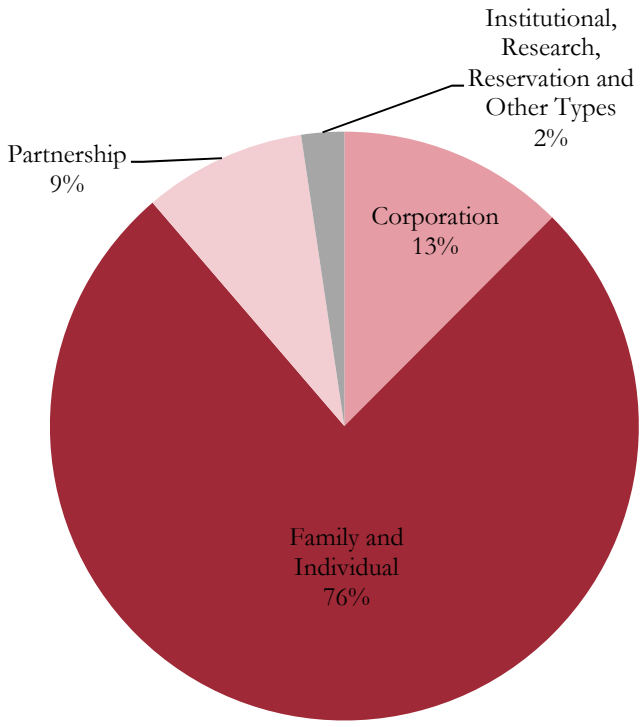
Exhibit 1.11.9 – Missouri Operations with Bearing and Non-Bearing Grape Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, Missouri grape operations with bearing and non-bearing acreage were most commonly structured as family and individual operations. Exhibit 1.11.10 illustrates that three-quarters of Missouri grape operations with bearing and non-bearing acreage were formed as family and individual operations. Corporations represented 13 percent of all Missouri grape operations, and partnerships were 9 percent of all operations. Institutional, research, reservation and other types of operations were minor forms of organizational structures used by Missouri grape operations with bearing and non-bearing acreage (USDA National Agricultural Statistics Service 2017b).

*Exhibit 1.11.10 – Share of Missouri Grape Operations by Organizational Structure, 2012**



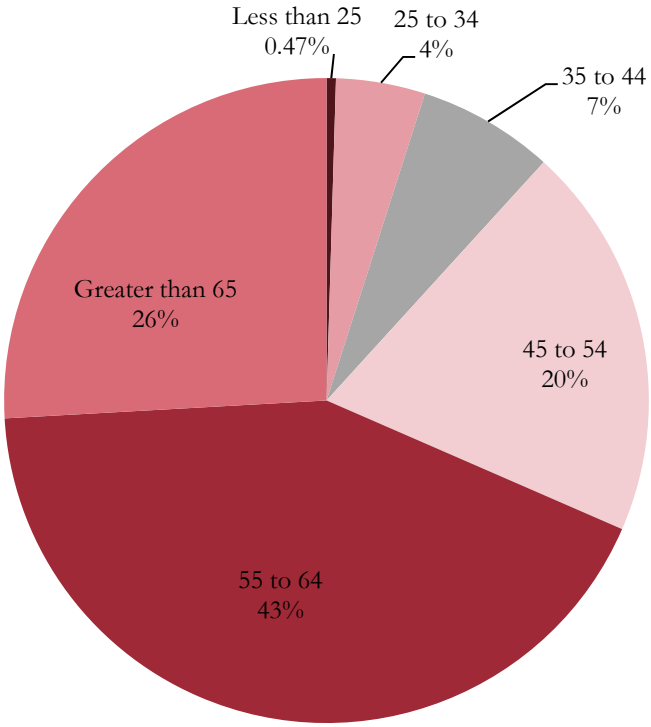
* Operations with bearing and non-bearing grape acreage
Source: USDA, National Agricultural Statistics Service (2017b)

Of all Missouri grape operations with bearing and non-bearing acreage in 2012, 90.1 percent noted having a full-owner, and 7.5 percent shared that they had a part owner. Tenant arrangements were less common. Less than 3 percent of operations reported such a tenant arrangement (USDA National Agricultural Statistics Service 2017b).

A majority of Missouri principal operators — 61.9 percent — of Missouri grape operations with bearing and non-bearing acreage identified an occupation other than farming as their primary occupation in 2012. Roughly 38 percent of the principal operators claimed farming as their primary occupation. More than half of Missouri principal operators — 59.5 percent — of grape operations with bearing and non-bearing acreage noted being on their present operation for 11 years or more. Roughly one-quarter of the principal operators had spent six years to 10 years on their present operations, and 16.2 percent had been on their present operations for less than six years (USDA National Agricultural Statistics Service 2017b).

More than two-thirds of principal operators of Missouri grape operations with bearing and non-bearing acreage were 55 years old or older in 2012. See Exhibit 1.11.11 for a breakdown of operations according to the age of their principal operators. As shown, just 20 percent of the principal operators in 2012 were 45- to 54-year-olds. Roughly 11 percent of principal operators were younger than 45 years old (USDA National Agricultural Statistics Service 2017b).

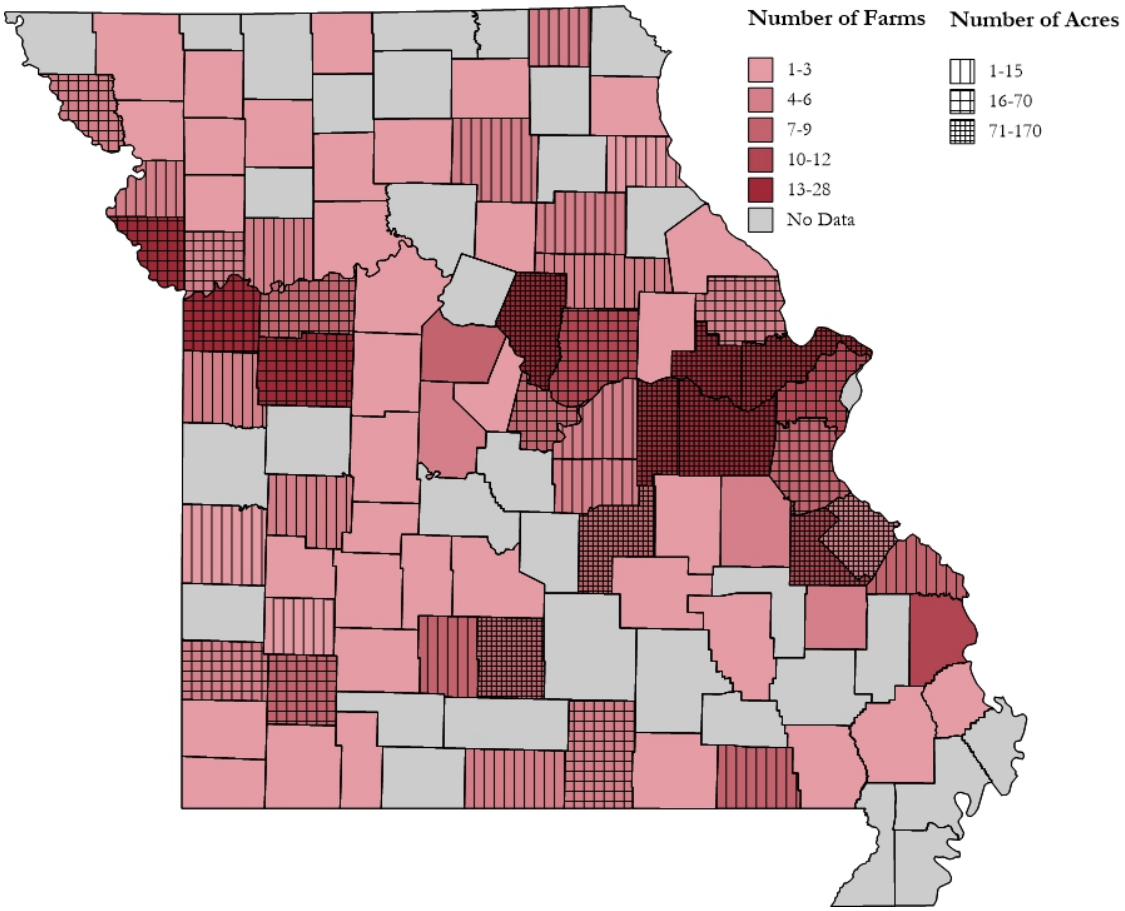
*Exhibit 1.11.11 – Age Distribution of Missouri Grape Operation Principal Operators, 2012**



* Operations with bearing and non-bearing grape acreage
Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, Missouri counties with the greatest number of grape farms were Gasconade County, 28 farms; Franklin County, 26 farms; Boone County, 16 farms; and Jackson County, 16 farms. Exhibit 1.11.12 illustrates the number of grape farms and grape acreage by county. Note that the farm and acreage data account for grapes of bearing and non-bearing age. In terms of acreage, counties with the greatest grape acreage in 2012 were St. Charles County, 170 acres; Franklin County, 142 acres; Wright County, 137 acres; Ste. Genevieve County, 133 acres; and Gasconade County, 124 acres (USDA National Agricultural Statistics Service 2017b). Note that USDA didn't report some data by county, so those counties don't have data described here or in the map.

*Exhibit 1.11.12 – Missouri Grape Farms and Acreage by County, 2012**



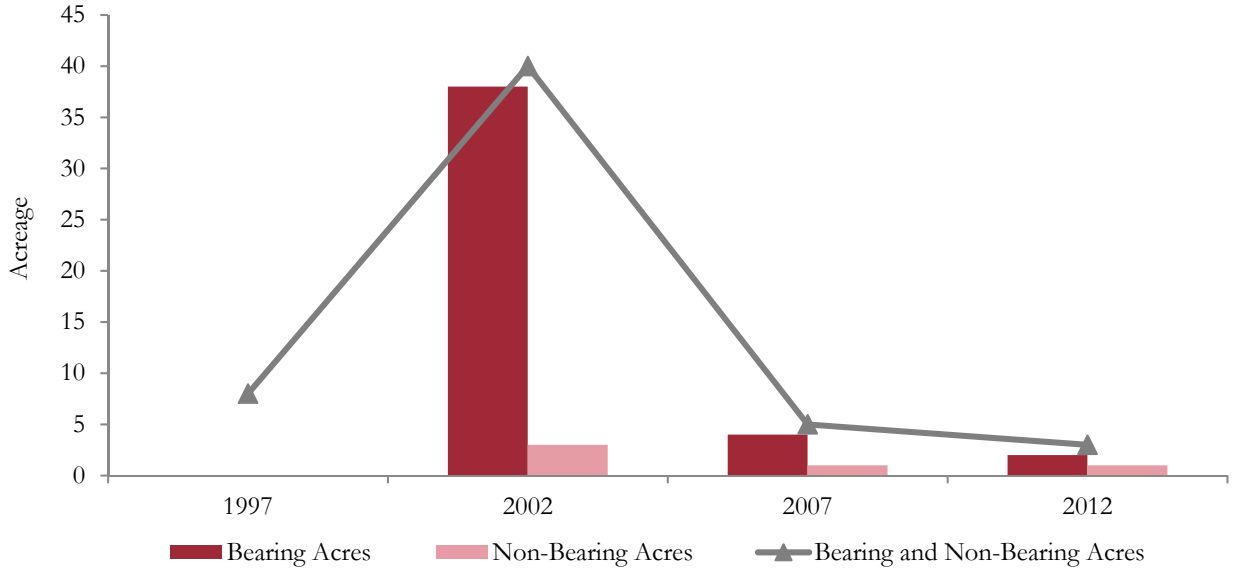
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Relatively few Missouri grape-growing operations have transitioned to organic production. In 2008, USDA reported that four operations harvested organic grape acreage, including certified organic and exempt organic acreage, in the state. Of those, three operations had exempt organic acreage. By 2014, the number of certified and exempt operations had dropped to three farms (USDA National Agricultural Statistics Service 2017b).

1.12 Nectarines

In Missouri, nectarine acreage has been limited. Exhibit 1.12.1 illustrates that total acreage — bearing and non-bearing — spiked from eight acres in 1997 to 40 acres in 2002. Since then, nectarine acreage has been reduced. In 2012, the U.S. Census of Agriculture reported that Missouri had three acres of nectarine production in total. Of those three acres, two were bearing areas, and one was a non-bearing acre (USDA National Agricultural Statistics Service 2017b).

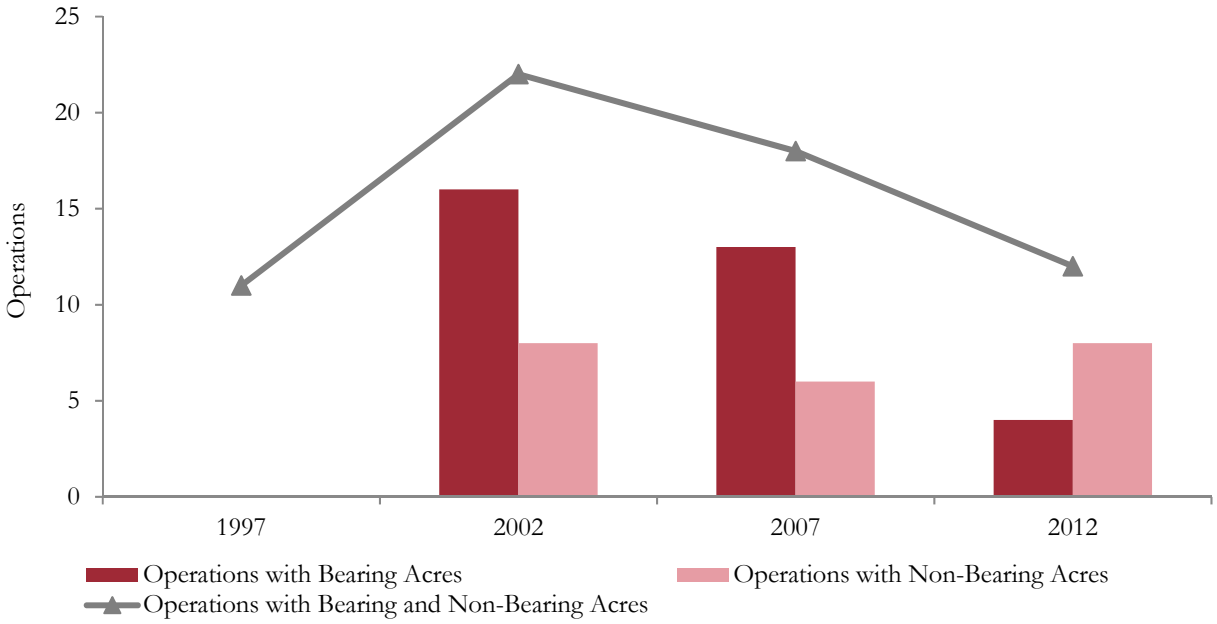
Exhibit 1.12.1 – Missouri Nectarine Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Similarly, the number of operations with nectarine acreage jumped in 2002 and has since declined. Exhibit 1.12.2 presents the number of Missouri nectarine operations based on whether they maintained bearing or non-bearing acreage, and it also shares total nectarine operations. In 2012, 12 operations reported having bearing or non-bearing nectarine acreage. Eight of those maintained non-bearing nectarine acres, and four operations had bearing nectarine acreage (USDA National Agricultural Statistics Service 2017b).

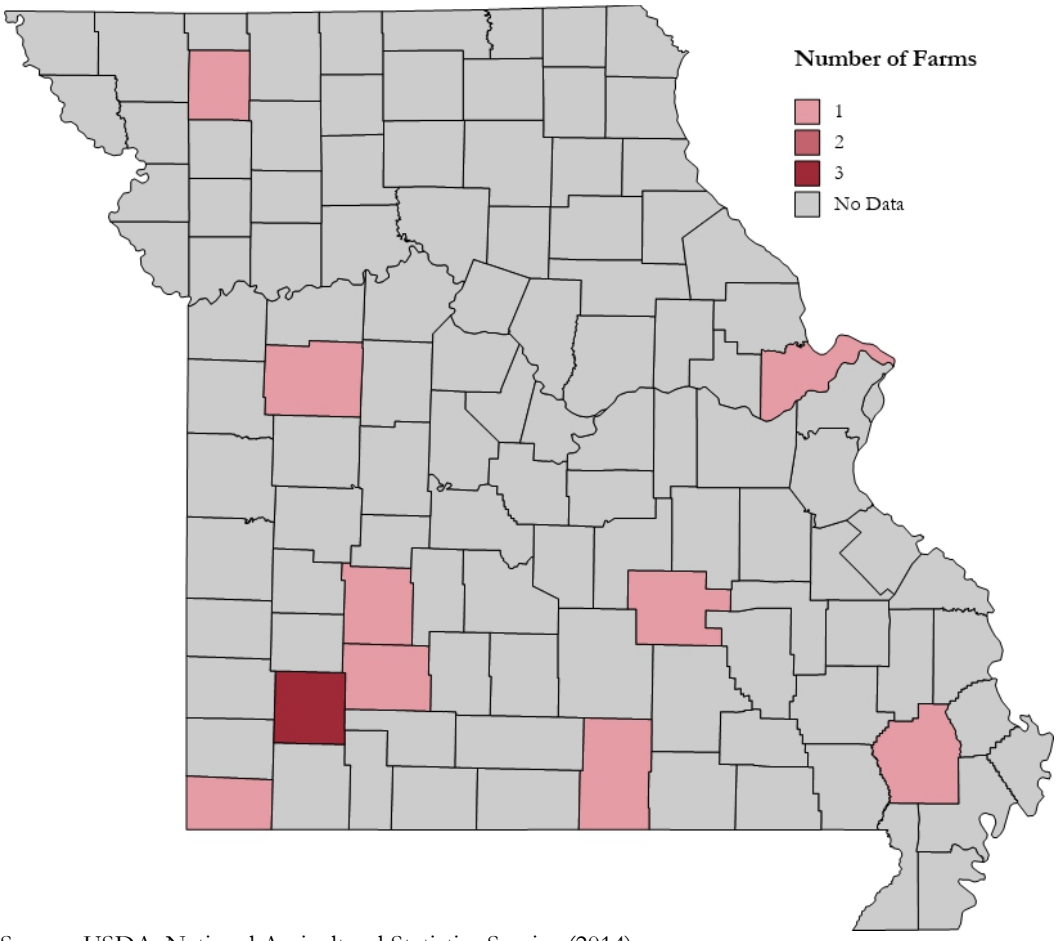
Exhibit 1.12.2 – Missouri Operations with Nectarine Bearing and Non-Bearing Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Data for nectarine acreage by Missouri county were withheld. However, Exhibit 1.12.3 highlights Missouri counties based on their count of nectarine farms in 2012 when data were available. All highlighted counties but one — Lawrence County — reported just one nectarine farm in 2012. Lawrence County had three. Note that the farms data reflect operations with bearing and non-bearing acreage (USDA National Agricultural Statistics Service 2014b).

Exhibit 1.12.3 – Missouri Nectarine Farms by County, 2012

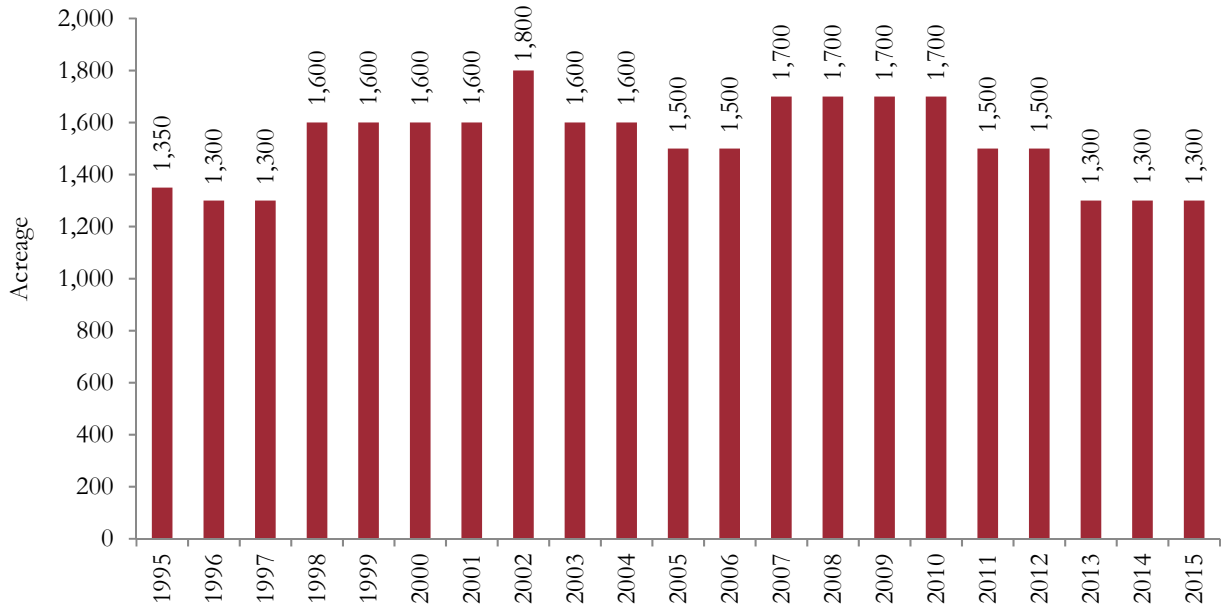


Source: USDA, National Agricultural Statistics Service (2014)

1.13 Peaches

Peaches represent one specialty crop that has historically had a strong presence in Missouri. During the past two decades, Missouri growers have annually maintained at least 1,300 bearing acres of peaches. Exhibit 1.13.1 illustrates the trend in peach bearing acreage from 1995 to 2015. During the observed period, peach bearing acreage peaked at 1,800 acres in 2002. From 2013 to 2015, bearing acreage had remained steady at 1,300 acres, which was similar to bearing acreage totals in the mid-1990s (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

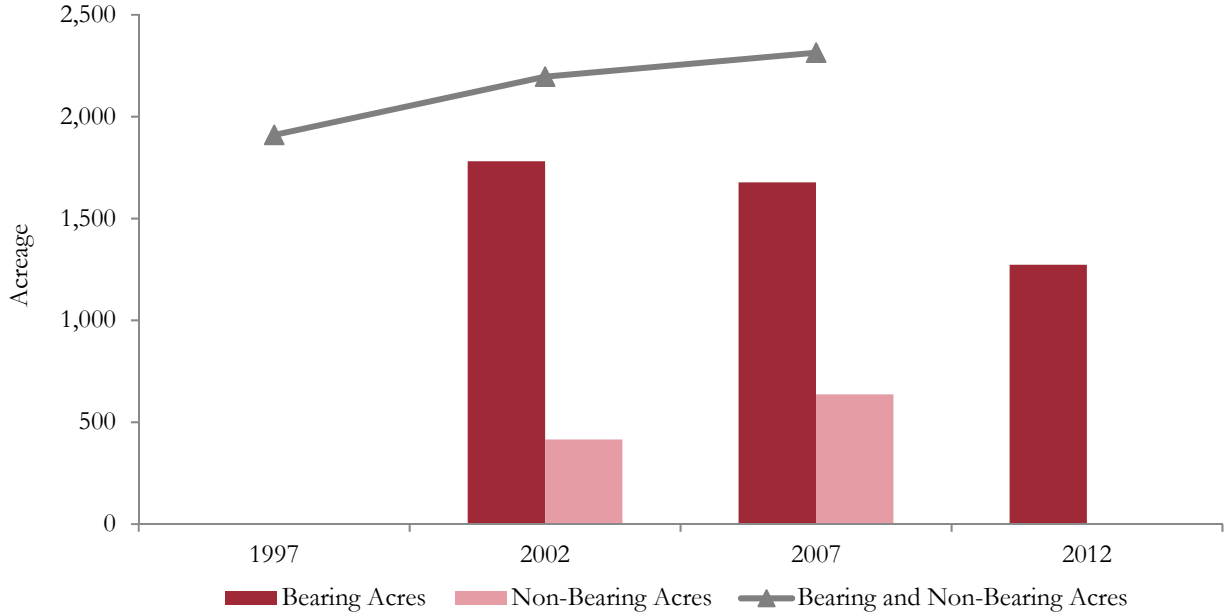
Exhibit 1.13.1 – Missouri Peach Bearing Acreage, 1995 to 2015



Source: USDA, National Agricultural Statistics Service (2016b) and USDA, National Agricultural Statistics Service (2017b)

From 1997 to 2007, total Missouri peach bearing and non-bearing acreage followed an increasing pattern. See Exhibit 1.13.2. Note that combined bearing and non-bearing acreage was withheld for 2012. Data for 2012 were limited to sharing that Missouri had 1,273 bearing peach acres, which was the lowest bearing acreage reported within this data set. On the other hand, note that non-bearing acreage increased between 2002 and 2007 (USDA National Agricultural Statistics Service 2017b).

Exhibit 1.13.2 – Missouri Peach Bearing and Non-Bearing Acreage, 1997 to 2012



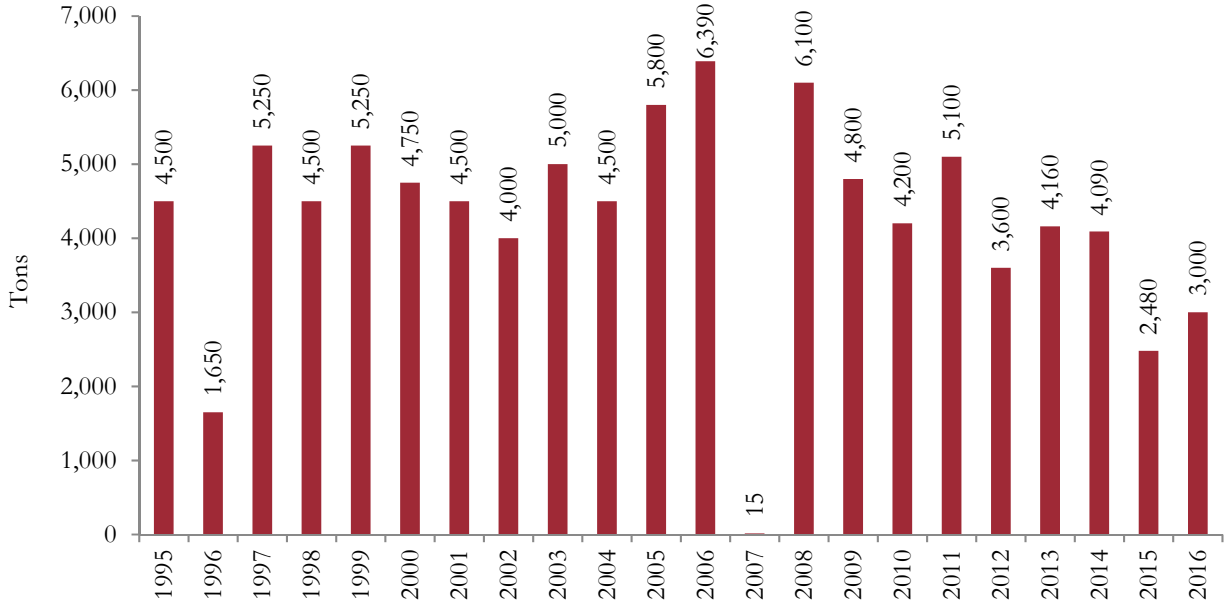
Source: USDA, National Agricultural Statistics Service (2017b)

During the past two decades, Missouri peach production trended downward. Exhibit 1.13.3 illustrates that total production was highest during the mid-2000s. Following 2008, Missouri experienced downward-sloping peach production. In 2016, the state produced 3,000 tons of peaches, which was less than half of the peak production recorded in 2006 (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

Missouri ranked 16th in the country for peach production during 2016. Twenty states had peach production data reported for that year. In 2016, California was the top peach producer. In tons, it produced significantly more peaches than other states. South Carolina and Georgia followed and ranked second and third, respectively, for total peach production (USDA National Agricultural Statistics Service 2017b).

Historically, Missouri-grown peaches have exclusively had application as a fresh-market product. Between 1995 and 2013, all of Missouri-produced peaches were directed to fresh market uses. After 2013, USDA data were withheld for Missouri peach production for fresh or processing applications (USDA National Agricultural Statistics Service 2017b).

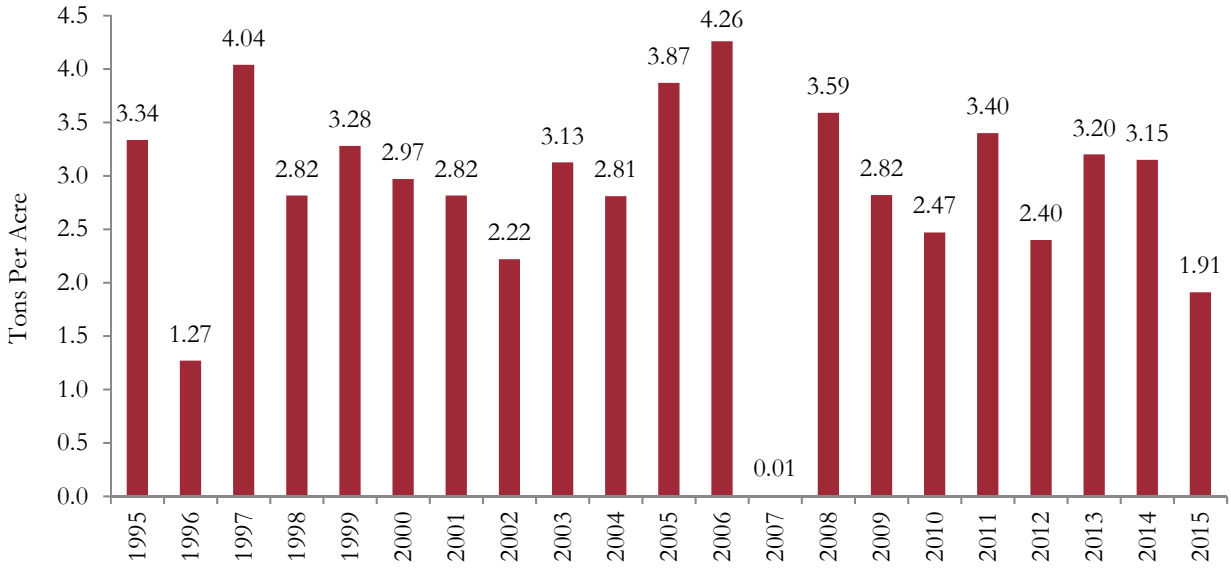
Exhibit 1.13.3 – Missouri Peach Production in Tons, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2016b) and USDA, National Agricultural Statistics Service (2017)

Missouri peach yields experienced some volatility during the past two decades. Overall, the yield trend declined slightly from 1995 to 2005. See Exhibit 1.13.4. Downward sloping yields were most evident during the last roughly eight years of the observed period. In 2015 — the most recent year with data available — peach yields in Missouri averaged 1.91 tons per acre (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

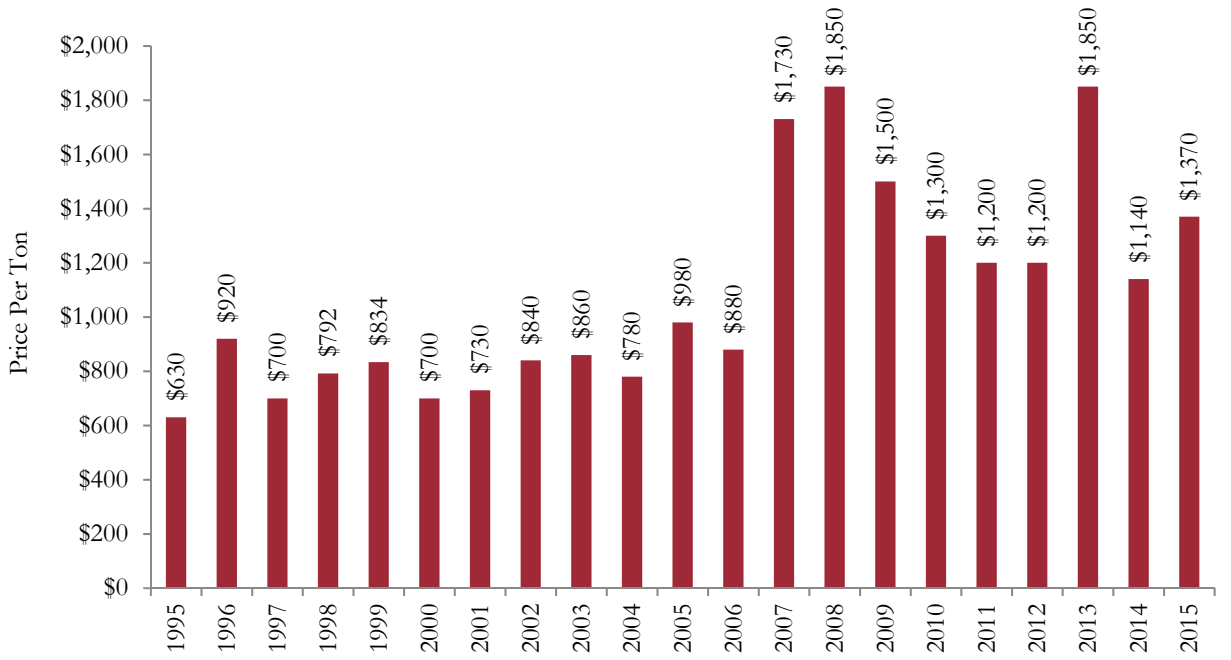
Exhibit 1.13.4 – Missouri Peach Yield in Tons Per Acre, 1995 to 2015



Source: USDA, National Agricultural Statistics Service (2016b) and USDA, National Agricultural Statistics Service (2017b)

With respect to prices, Exhibit 1.13.5 illustrates that peach prices received during the first portion of the previous two decades were starkly different from prices received during the latter portion. From 1995 to 2006, Missouri peach prices ranged from $630 per ton to $980 per ton. From 2007 to 2015, prices ranged from $1,140 per ton to $1,850 per ton (USDA National Agricultural Statistics Service 2016b and USDA National Agricultural Statistics Service 2017).

Exhibit 1.13.5 – Average Prices Received for Missouri Peaches, 1995 to 2015

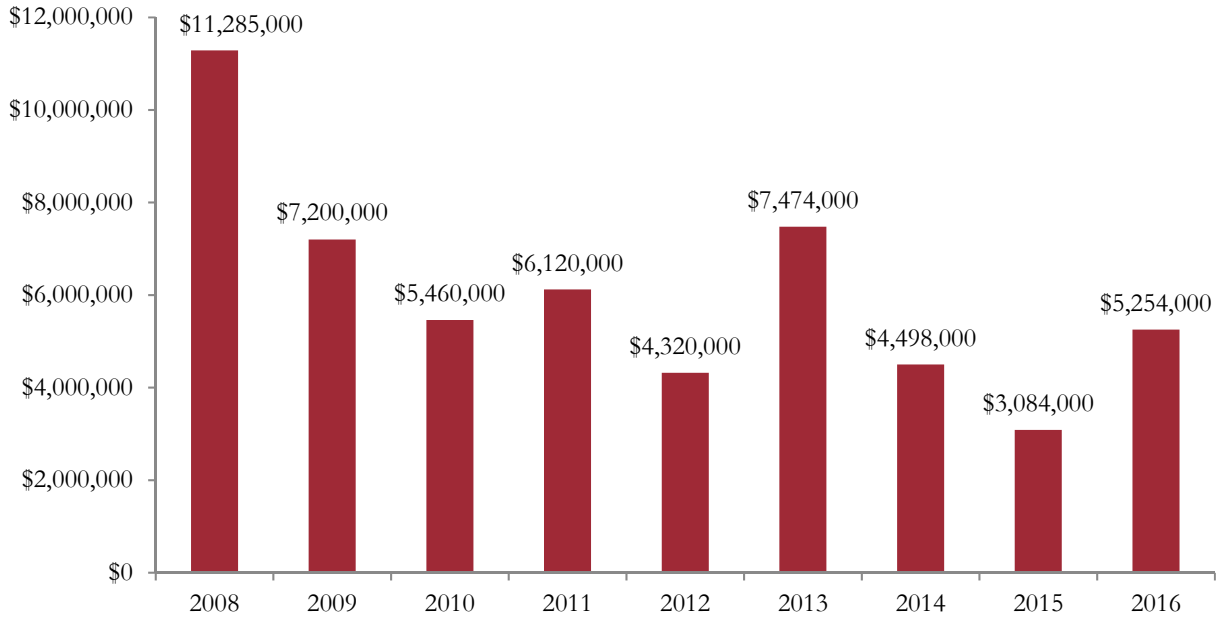


Source: USDA, National Agricultural Statistics Service (2016b) and USDA, National Agricultural Statistics Service (2017b)

In terms of peach cash receipts, those for Missouri dropped from 2008 to 2016. Exhibit 1.13.6 illustrates that the state's peach cash receipts exceeded $11.2 million in 2008. After that year, cash receipts for peaches largely receded. In 2016, Missouri peach cash receipts totaled roughly $5.25 million, which was an increase relative to 2015 (USDA Economic Research Service 2017).

Peach receipts represented a small share — 0.1 percent — of total Missouri commodity receipts in 2016. Comparing the Missouri peach receipts to all U.S. peach receipts, Missouri's receipts were 0.8 percent of the total during 2016 (USDA National Agricultural Statistics Service 2017b).

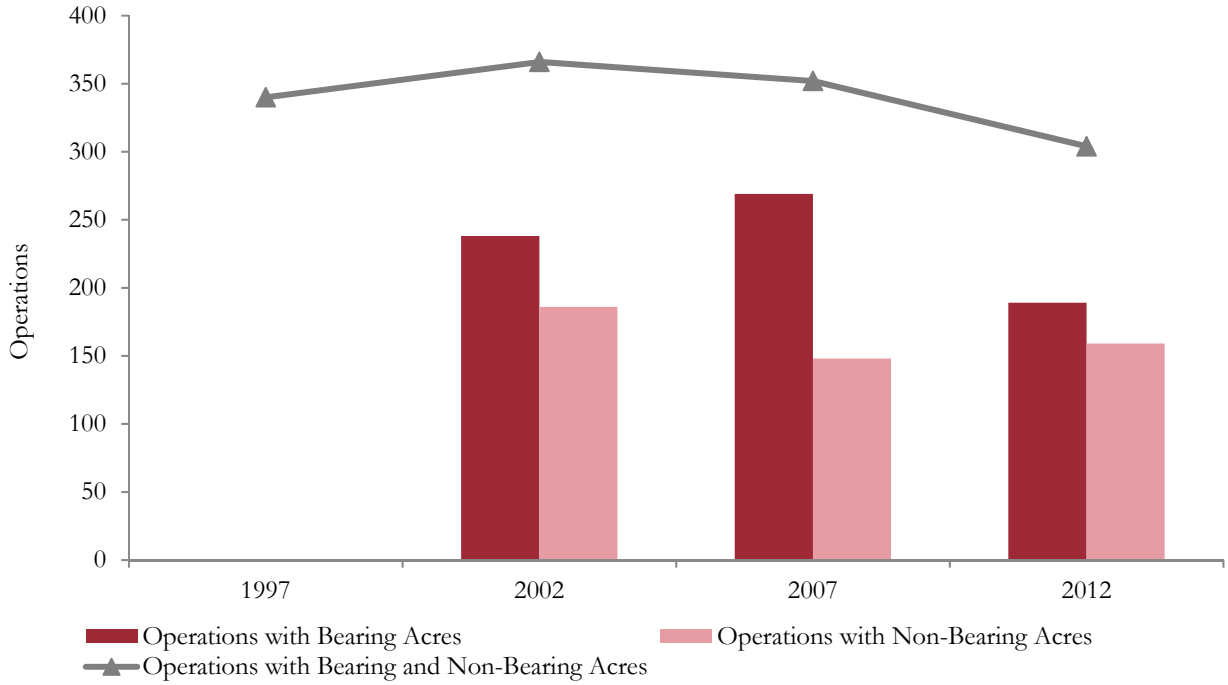
Exhibit 1.13.6 – Missouri Peach Cash Receipts, 2008 to 2016



Source: USDA, Economic Research Service (2017)

In terms of Missouri peach operations, the number of those with bearing and non-bearing peach acreage was relatively steady from 1997 to 2007. In 2012, however, total operations with bearing or non-bearing acreage declined to 304 operations. See Exhibit 1.13.7. Peach operations with bearing acreage in 2012 totaled 189 farms, and those with non-bearing acreage totaled 159 farms (USDA National Agricultural Statistics Service 2017b).

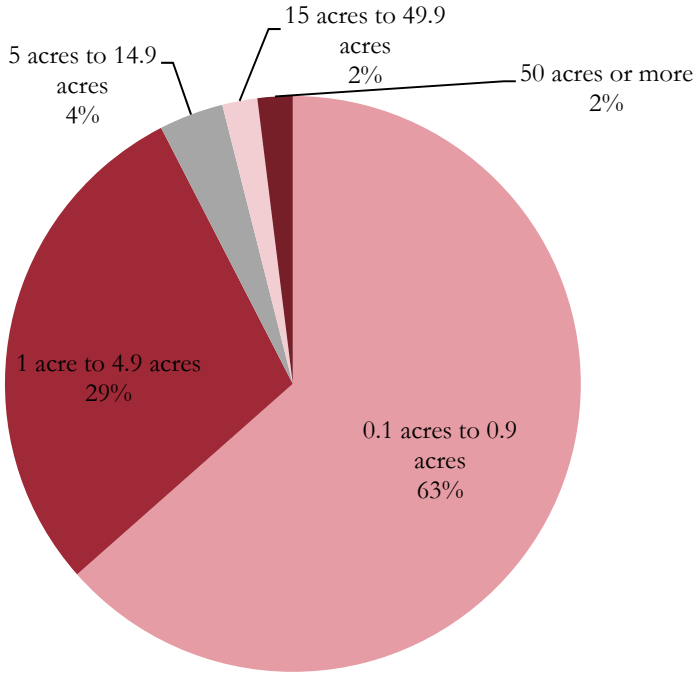
Exhibit 1.13.7 – Missouri Operations with Bearing and Non-Bearing Peach Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, the largest share of Missouri peach farms with bearing and non-bearing acreage reported maintaining less than one acre of total acreage. See Exhibit 1.13.8. Note that 63 percent of Missouri peach operations with bearing and non-bearing acreage had less than one acre of trees in 2012. Twenty-nine percent maintained one acre to 4.9 acres of peaches. Like in apple production, these data suggest the importance of relatively small-scale operations to the state's peach industry. Just 4 percent of peach operations had five acres to 14.9 acres, 2 percent had 15 acres to 49.9 acres, and 2 percent had 50 acres or more (USDA National Agricultural Statistics Service 2017b).

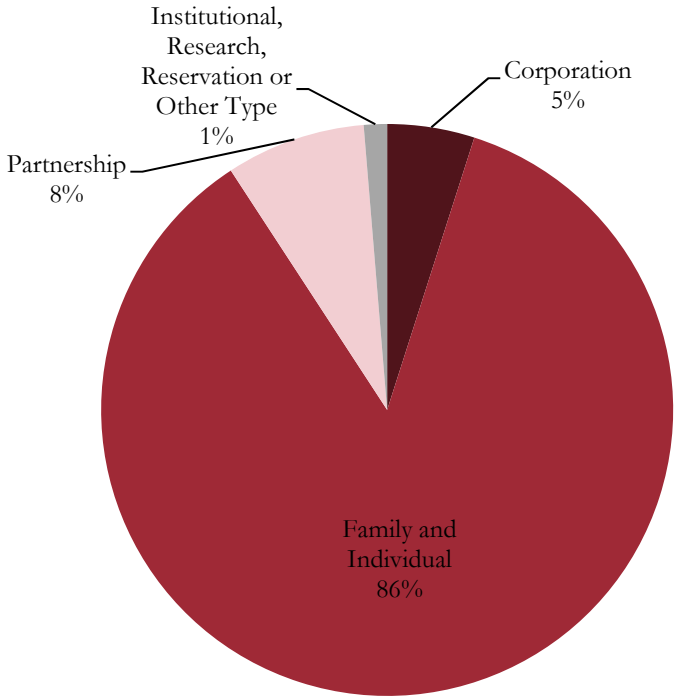
Exhibit 1.13.8 – Share of Missouri Peach Operations with Bearing and Non-Bearing Acreage by Size, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, Missouri peach operations were most commonly organized as family and individual operations relative to corporations; partnerships; or institutional, research, reservation or other types of structures. Exhibit 1.13.9 shares the percentage of total Missouri peach operations with bearing and non-bearing acreage in various organizational structure categories. In 2012, 86 percent of peach operations were structured as family and individual farms. Eight percent of Missouri peach operations were organized as partnerships. Corporations and institutional, research, reservation or other types of structures were less common as forms of peach operational organizational structures (USDA National Agricultural Statistics Service 2017b).

*Exhibit 1.13.9 – Share of Missouri Peach Operations by Organizational Structure, 2012**



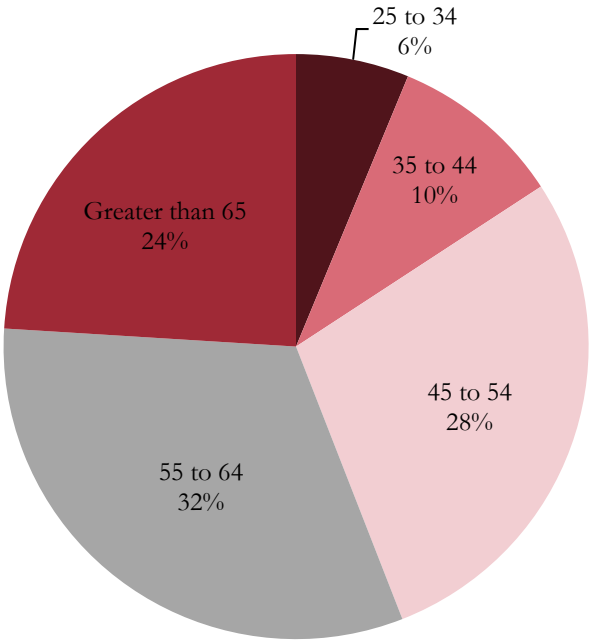
* Operations with bearing and non-bearing peach acreage
Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, slightly more than half — 51 percent — of Missouri principal operators of peach operations with bearing and non-bearing acreage shared that their primary occupation was something other than farming. In contrast, 49 percent of principal operators claimed that farming was their primary occupation. The U.S. Census of Agriculture queries producers' longevity on their current operations. In 2012, 58 percent of Missouri peach operation principal operators who had farms with bearing and non-bearing acreage shared that they had been on their present operations for at least 11 years. Twenty-percent had been on their present operation for six years to 10 years, and another 21 percent had been on their present operation for less than six years (USDA National Agricultural Statistics Service 2017b).

With respect to owner tenure on Missouri peach operations with bearing and non-bearing acreage, 90.1 percent of operations in 2012 had full owners. Slightly more than 8 percent had part owners. Tenant arrangements represented the remaining 1.3 percent of peach operations (USDA National Agricultural Statistics Service 2017b).

Exhibit 1.13.10 shares the age distribution of Missouri peach operation principal operators in 2012; note that these are principal operators of operations with bearing and non-bearing peach acreage. A plurality of principal operators — 32 percent — were 55- to 64-year-olds in 2012. Twenty-eight percent were 45- to 54-year-olds, and 24 percent were greater than 65 years old. Just 16 percent of principal operators were younger than 45 (USDA National Agricultural Statistics Service 2017b).

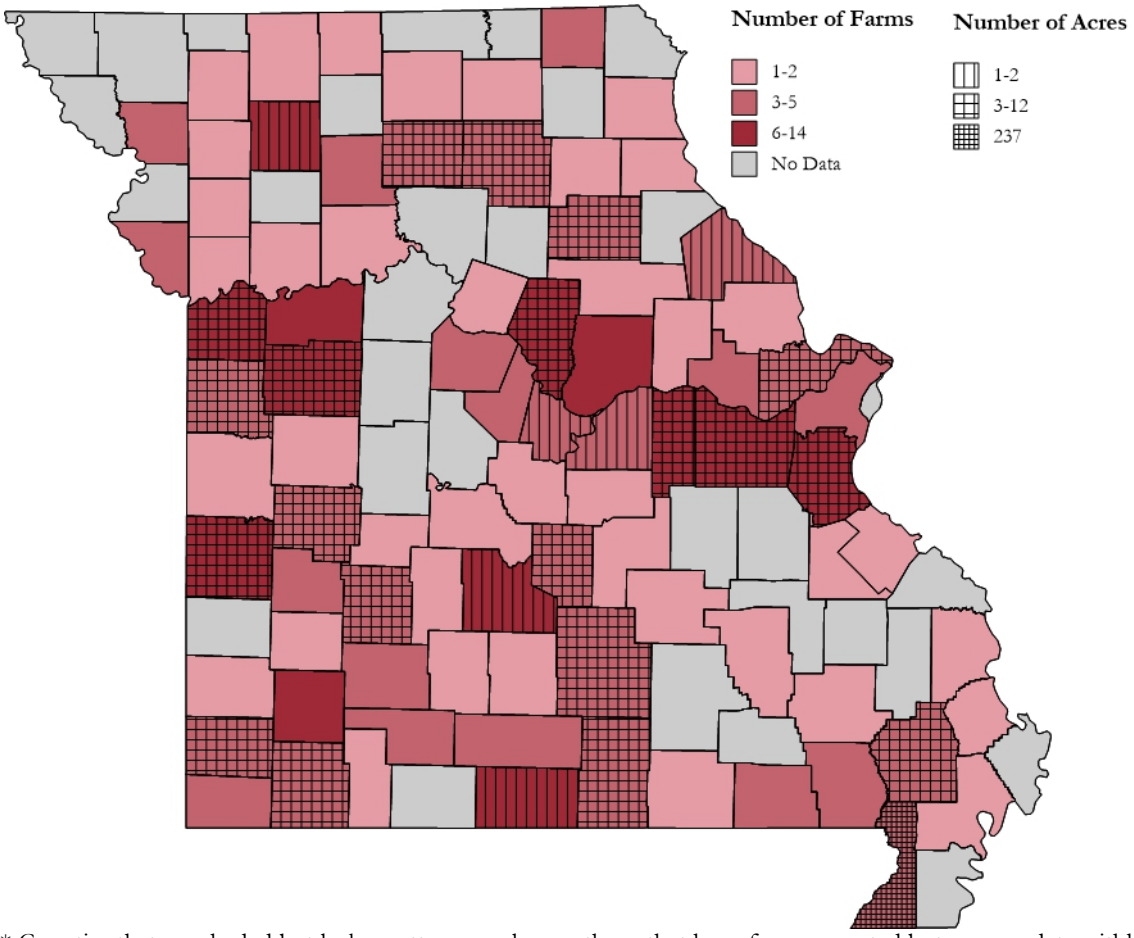
*Exhibit 1.13.10 – Age Distribution of Missouri Peach Operation Principal Operators, 2012**



* Operations with bearing and non-bearing peach acreage
Source: USDA, National Agricultural Statistics Service (2017b)

By county, those with the most peach operations in 2012 were Lafayette County, 14 farms; Boone County, 13 farms; and Jackson County, 13 farms. In terms of peach acreage, Dunklin County was by far the leader. In 2012, it had 237 acres of peaches. Other top counties for peach acreage were St. Charles County, 12 acres, and Stoddard County, 10 acres. Note that the farm count and acreage reflect data for bearing and non-bearing trees. Exhibit 1.13.11 highlights Missouri counties based on their peach acreage and number of peach farms in 2012. Again, the mapped values are totals that include bearing and non-bearing trees (USDA National Agricultural Statistics Service 2014b). Note that data were withheld for some counties, so those counties aren't described here or in the map.

Exhibit 1.13.11 – Missouri Peach Farms and Total Acreage by Missouri County, 2012



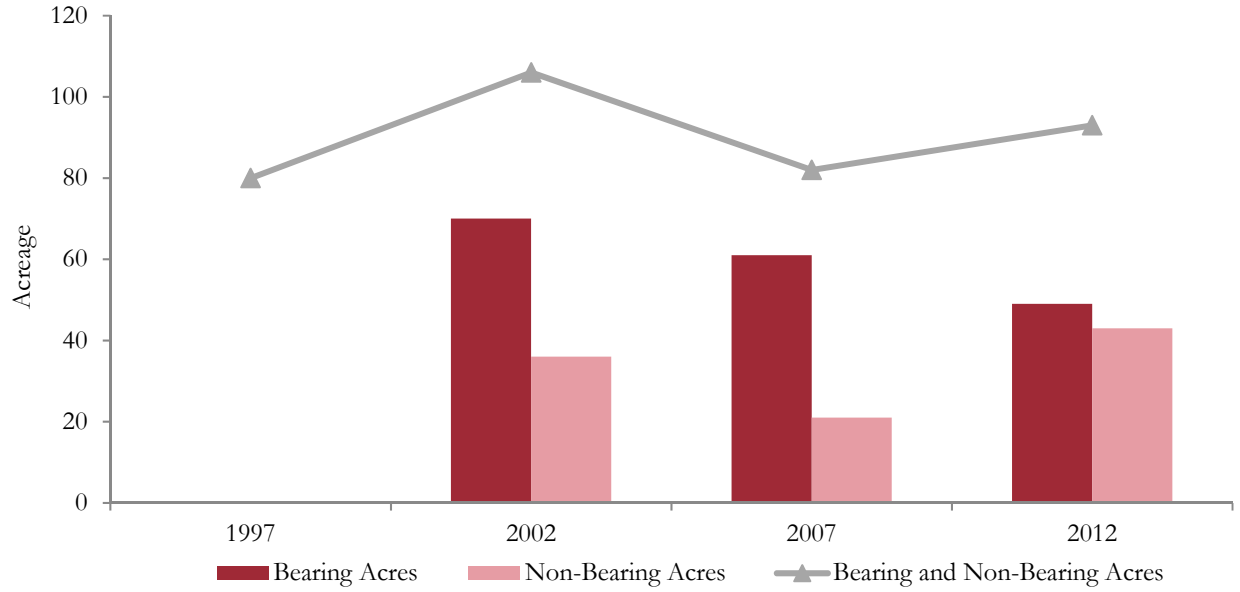
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Organic peach production has been relatively limited. Only data for 2008 were recently reported. In 2008, one acre of organic peaches were harvested in Missouri. During that year, four operations were reported to have harvested peach acreage. Dollar sales for those organic peaches totaled $468 (USDA National Agricultural Statistics Service 2007).

1.14 Pears

From 1997 to 2012, Missouri total pear acreage — bearing and non-bearing — fluctuated between 80 acres and 106 acres. Exhibit 1.14.1 shows the trend. For selected years, the exhibit also breaks down pear acreage into bearing and non-bearing categories. In 2012, Missouri had 93 total bearing and non-bearing pear acres. Of those, 49 acres were bearing, and 43 acres were non-bearing. Between 2002 and 2012, note that bearing pear acreage declined year over year. Non-bearing acreage decreased from 2002 to 2007; however, it grew rather substantially from 2007 to 2012. It roughly doubled during that five-year period (USDA National Agricultural Statistics Service 2017b).

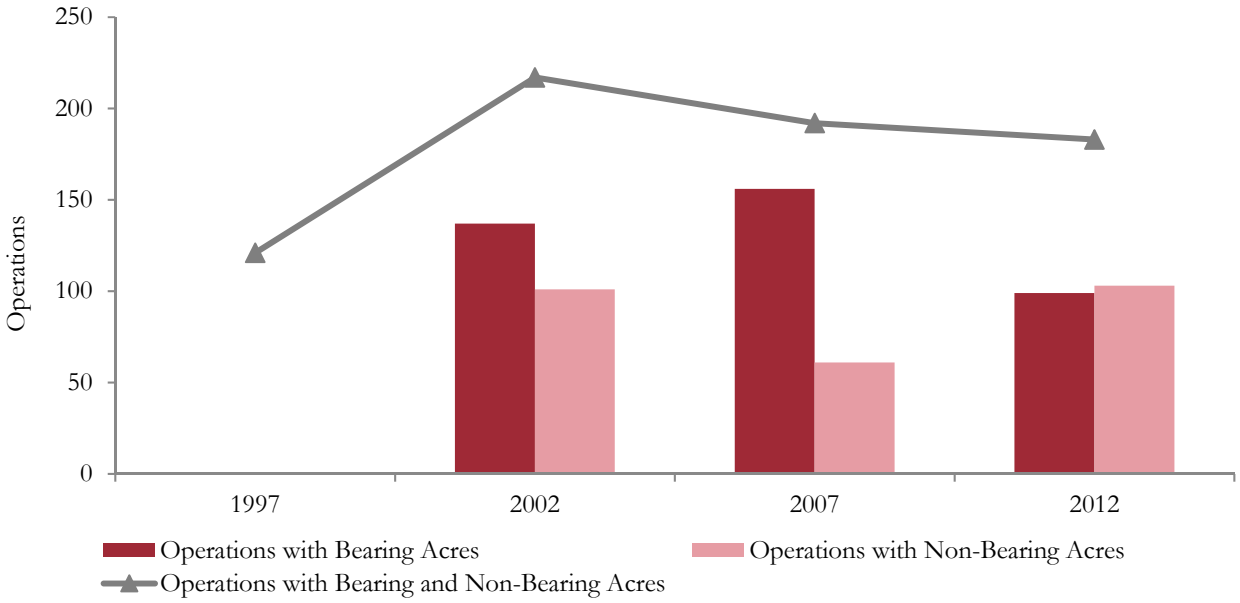
Exhibit 1.14.1 – Missouri Pear Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In terms of operations with pear trees, Exhibit 1.14.2 illustrates the trend from 1997 to 2012. Total operations with pear acreage peaked at 217 operations in 2002. In 2012, 183 operations reported having pear acreage, including bearing and non-bearing acreage. Ninety-nine operations had bearing acres, and 103 had non-bearing acres. Although the number of pear operations with bearing acreage dropped rather substantially from 2007 to 2012, the count of operations with non-bearing acreage increased during that time (USDA National Agricultural Statistics Service 2017b).

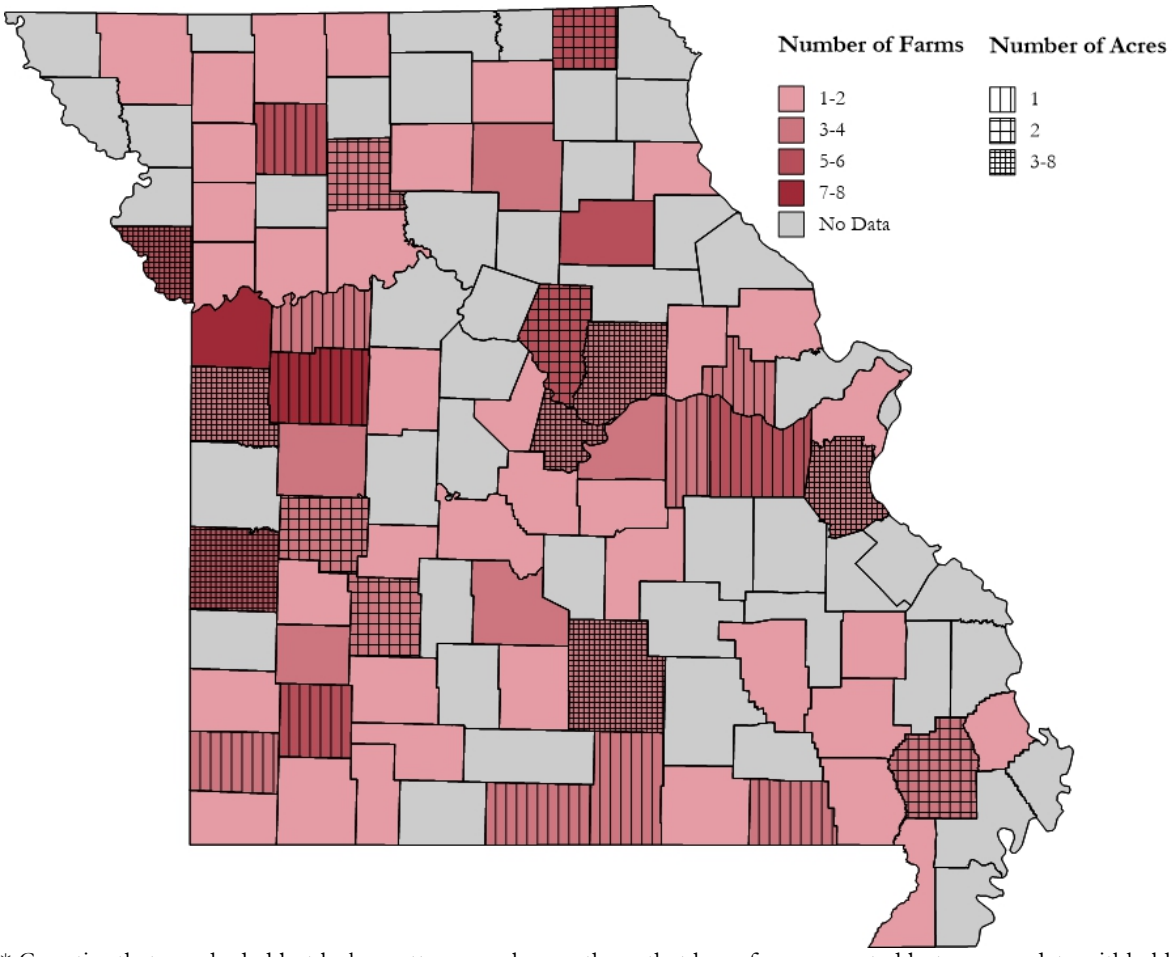
Exhibit 1.14.2 – Missouri Operations with Pear Bearing and Non-Bearing Acreage



Source: USDA, National Agricultural Statistics Service (2017b)

By Missouri county, those with the greatest count of pear farms in 2012 were Johnson County, eight farms; Jackson County, seven farms; Daviess County, six farms; Franklin County, six farms; Vernon County, six farms; Boone County, five farms; Monroe County, five farms; and Platte County, five farms. In terms of acreage, counties recording the most pear acreage in 2012 were Jefferson County, eight acres; Callaway County, seven acres; Cole County, four acres; and Texas County, four acres. By county, Exhibit 1.14.3 shares pear farm and acreage data from 2012 when data were available. Note that the farms and acreage data reflect totals that account for pear bearing and non-bearing area (USDA National Agricultural Statistics Service 2014b).

*Exhibit 1.14.3 – Missouri Pear Farms and Total Acreage by County, 2012**



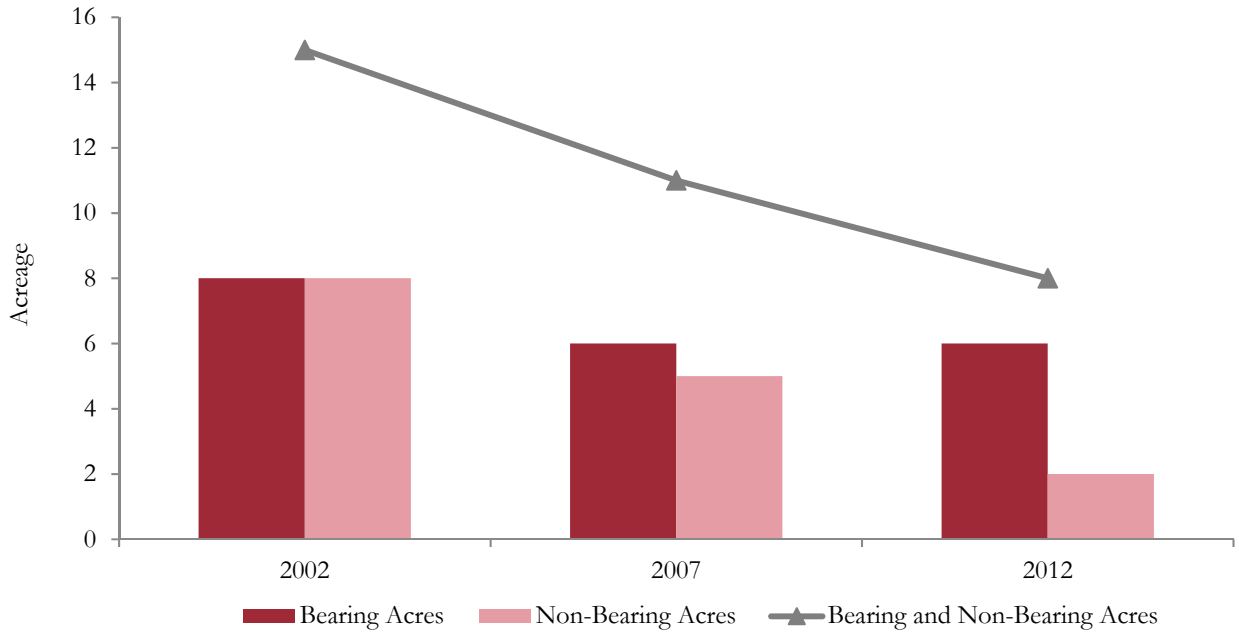
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

To a small degree, Missouri has had a presence in organic pear production. The number of USDA-certified farms that harvested organic pears increased from two operations in 2011 to three operations in 2015. Missouri operations produced and sold one ton of USDA-certified organic pears in 2015. During 2008 and 2011, exempt organic pear operations were noted in Missouri (USDA National Agricultural Statistics Service 2017b).

1.15 Persimmons

Geographically, persimmons are best suited to southern Missouri because they tend to lack the winter hardiness to fit well with the climate elsewhere (Quinn 2000). The crop has had limited adoption in Missouri. Exhibit 1.15.1 reports persimmon acreage for Missouri. It shows that total acreage declined between 2002 and 2012. In total, bearing and non-bearing acreage in 2012 was nearly half of that in 2002. In 2012, Missouri had eight total persimmon acres. Of those, six acres were bearing, and two acres were non-bearing. Non-bearing acreage consistently declined during the observed period. Bearing acreage dropped from 2002 to 2007, but it moderated through 2012 (USDA National Agricultural Statistics Service 2017b). In Missouri, note that growers produce American persimmons. As another type of persimmon, the Asian persimmon is not produced commercially in the state.

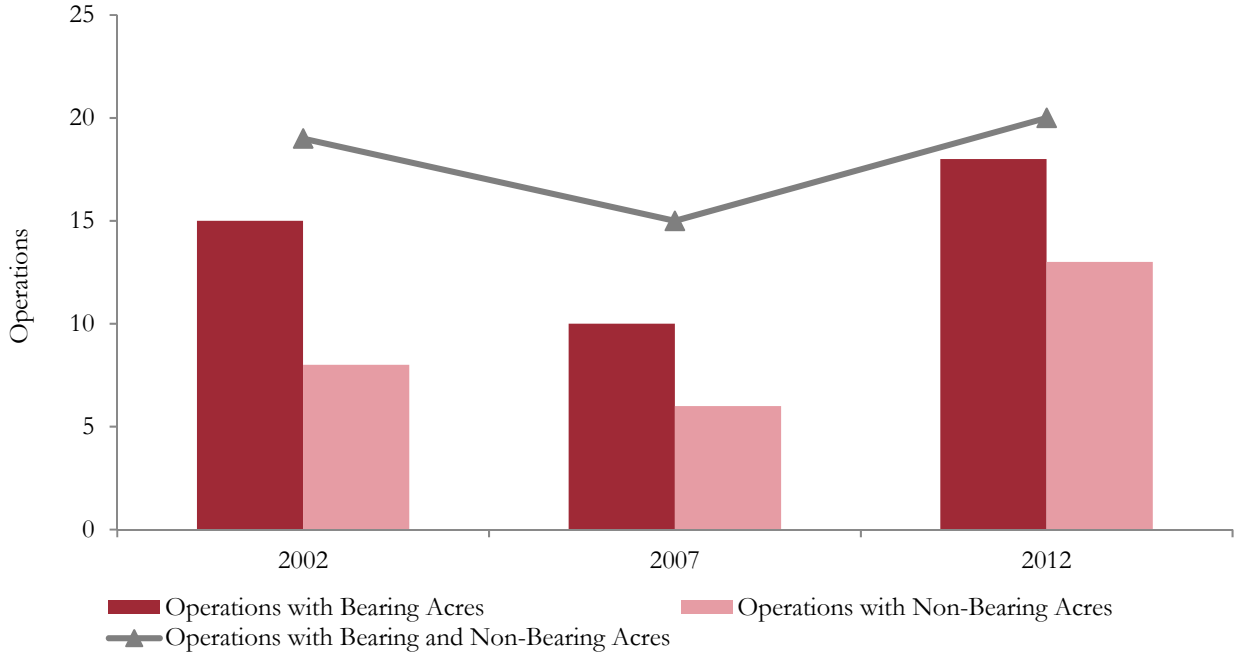
Exhibit 1.15.1 – Missouri Persimmon Acreage, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Despite persimmon acreage declining, more Missouri farms have engaged in persimmon production recently. Again, note that Missouri growers produce American persimmons. Asians persimmon are not produced commercially in the state. Exhibit 1.15.2 shares the number of Missouri operations with bearing and non-bearing persimmon acreage from 2002 to 2012. Of the three observed years, the number of operations with bearing or non-bearing persimmon acreage was highest in 2012. At the time, 20 operations raised persimmons. In 2012, 18 operations had bearing persimmon acreage, and 13 operations reported having non-bearing acreage. Note that more Missouri operations had non-bearing persimmon acreage in 2012 than any other year during the observed period. The same was true for the count of operation with bearing acreage (USDA National Agricultural Statistics Service 2017b).

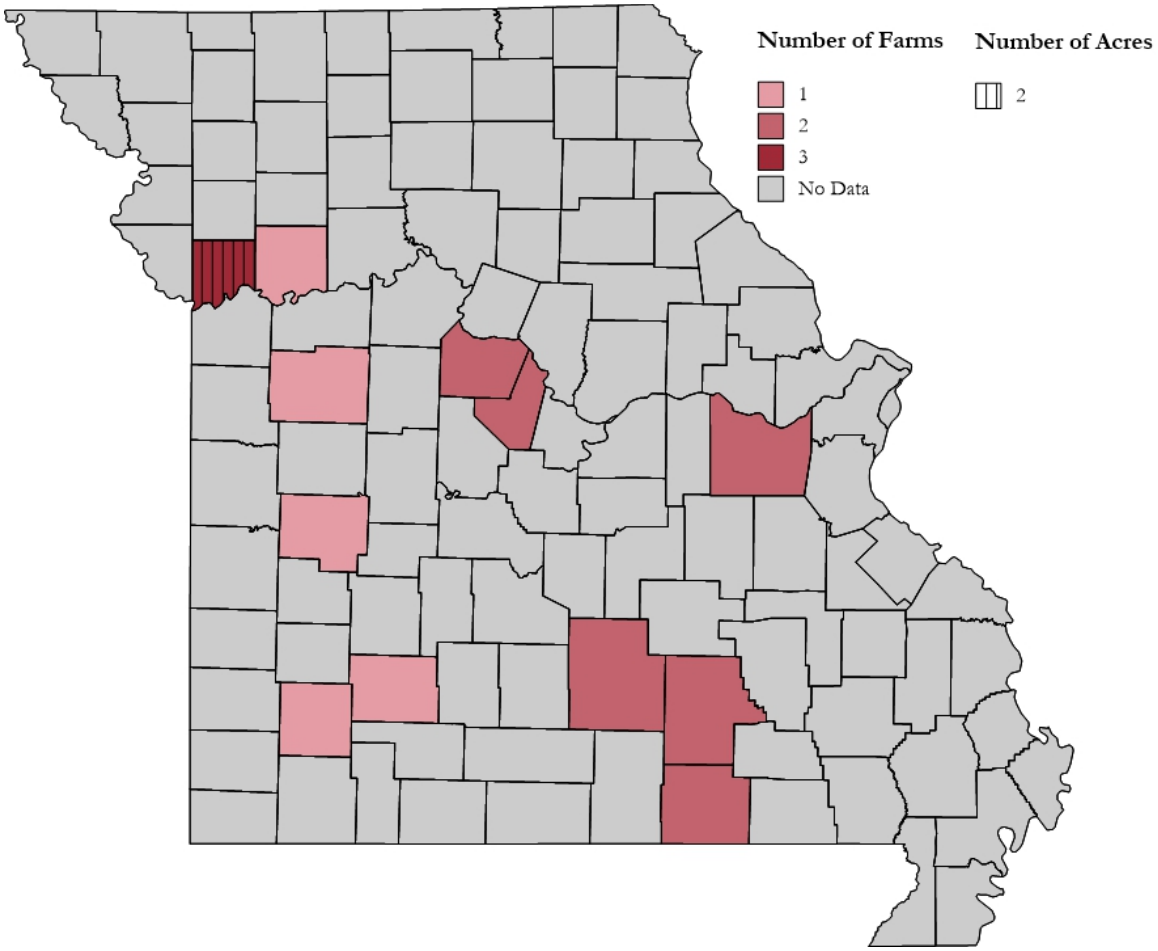
Exhibit 1.15.2 – Missouri Operations with Persimmon Bearing and Non-Bearing Acreage, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Of all Missouri counties, Clay County reported having the most persimmon farms in 2012. At the time, Clay County reported having three persimmon farms. Exhibit 1.15.3 highlights Missouri counties according to their count of persimmon farms. Because persimmons had a relatively small data set, the available data didn't report persimmon acreage for many Missouri counties. Just Clay County data were reported; it had two persimmon acres. Note that the farm and acreage data series count bearing and non-bearing area (USDA National Agricultural Statistics Service 2014b).

*Exhibit 1.15.3 – Missouri Persimmon Farms and Total Acreage by County, 2012**

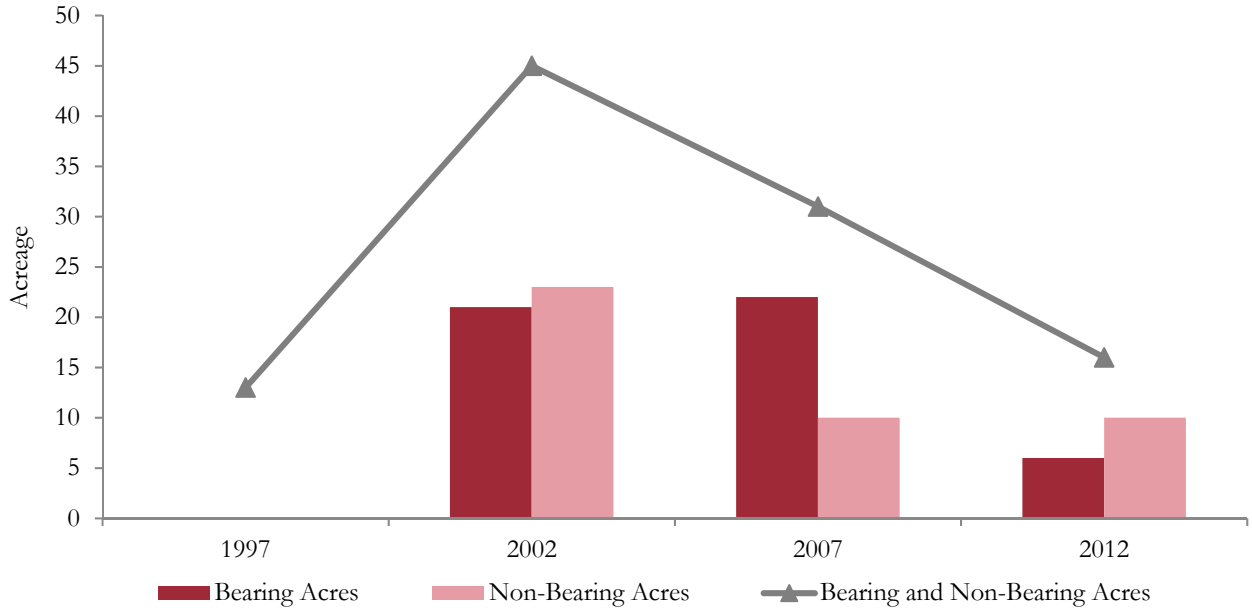


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

1.16 Plums and Prunes

In recent years, plums and prunes have declined in their prominence in Missouri. Exhibit 1.16.1 shows that Missouri total bearing and non-bearing plum and prune acreage jumped from 1997 to 2002 but receded sharply in following years. In 2012, Missouri recorded 16 acres of bearing and non-bearing plums and prunes. Of those, six acres were bearing acres, and 10 acres were non-bearing acres. Bearing acreage was lower in 2012 than 2002 and 2007, and non-bearing acreage was level between 2007 and 2012 (USDA National Agricultural Statistics Service 2017b).

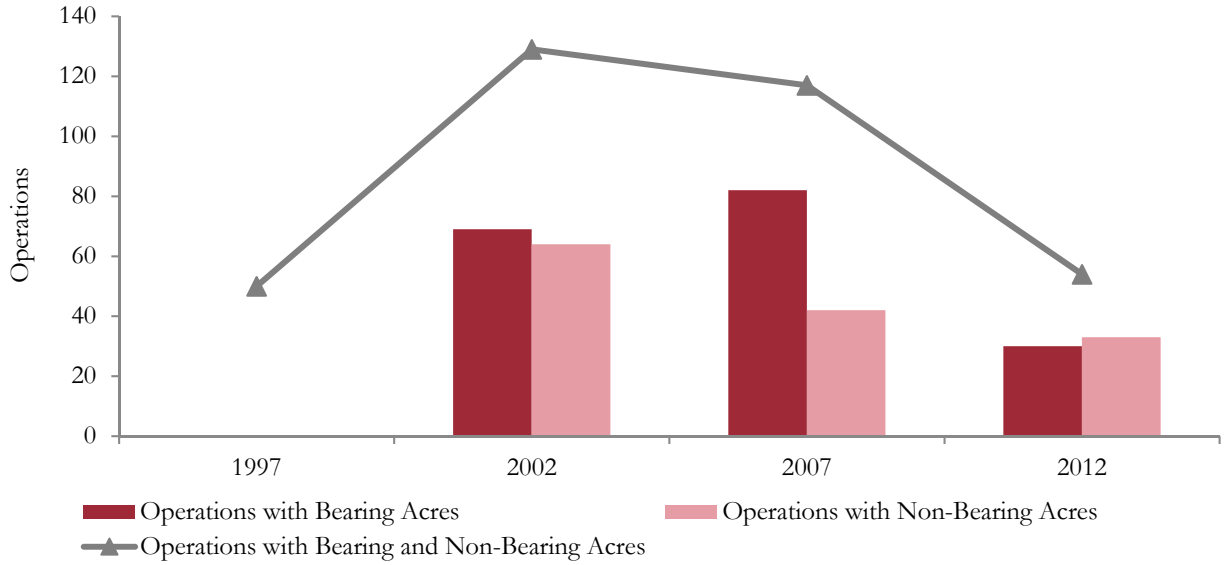
Exhibit 1.16.1 – Missouri Plum and Prune Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, 54 operations in Missouri reported having bearing and non-bearing plums and prunes. Exhibit 1.16.2 illustrates the change in operation count from 1997 to 2012. The trend in total operation count was similar to the trend in total acreage. Operations with bearing acreage totaled 30 farms in 2012. Those with non-bearing acreage totaled 33 farms. Although the count of operations with bearing acreage and operations with non-bearing acreage both declined between 2007 and 2012, the number of operations with bearing acreage dropped more significantly (USDA National Agricultural Statistics Service 2017b).

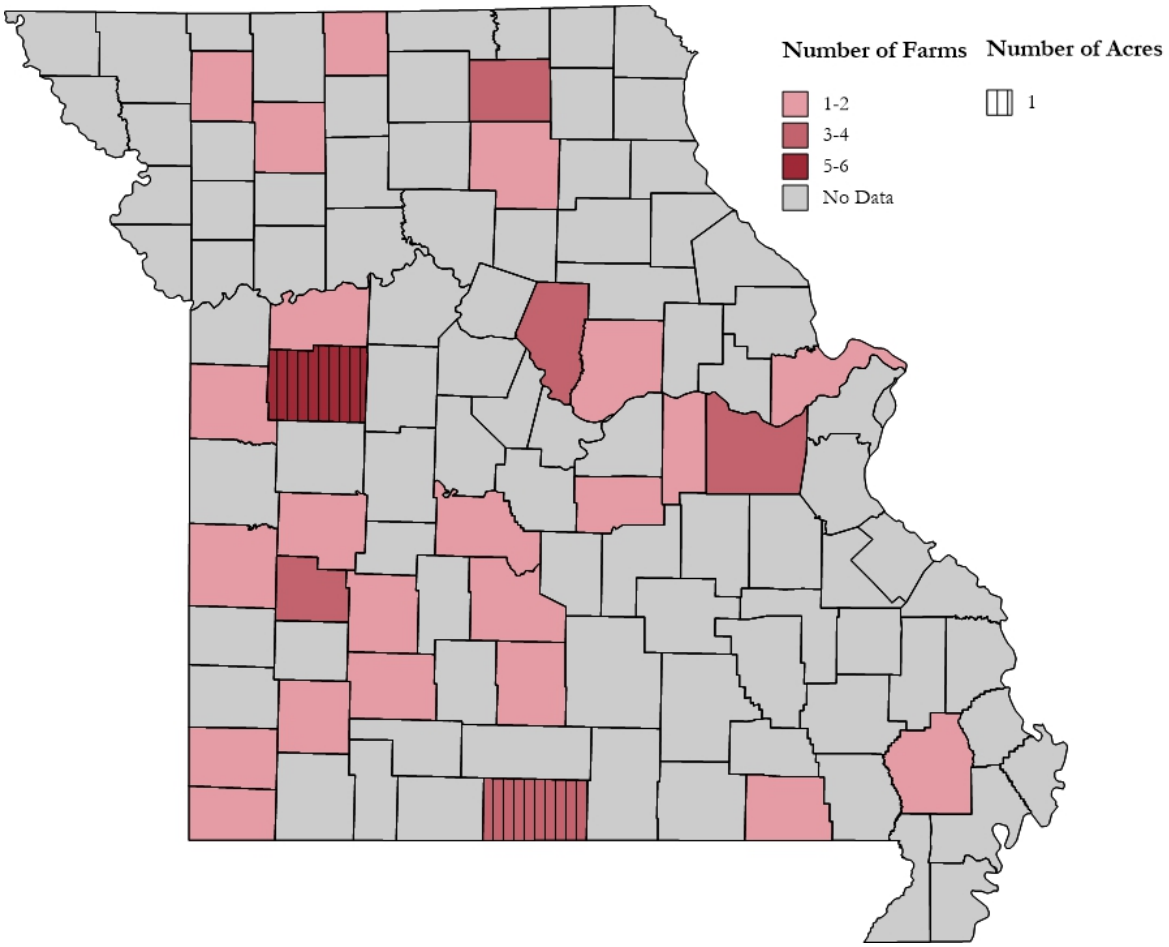
Exhibit 1.16.2 – Missouri Operations with Plum and Prune Bearing and Non-Bearing Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Counties with the greatest number of plum and prune farms in 2012 were Johnson County, six farms; Boone County, four farms; Franklin County, four farms; and Ozark County, four farms. Just two counties had plum and prune acreage reported for 2012. Both Johnson County and Ozark County were reported to raise one acre of plums or prunes. Exhibit 1.16.3 maps plum and prune acreage and farms data for 2012 (USDA National Agricultural Statistics Service 2014b). Note that USDA withheld data for some counties, so those counties aren't well-described here or in the map. Additionally, these data are totals that reflect values for bearing and non-bearing plums and prunes.

*Exhibit 1.16.3 – Missouri Plum and Prune Farms and Total Acreage by County, 2012**

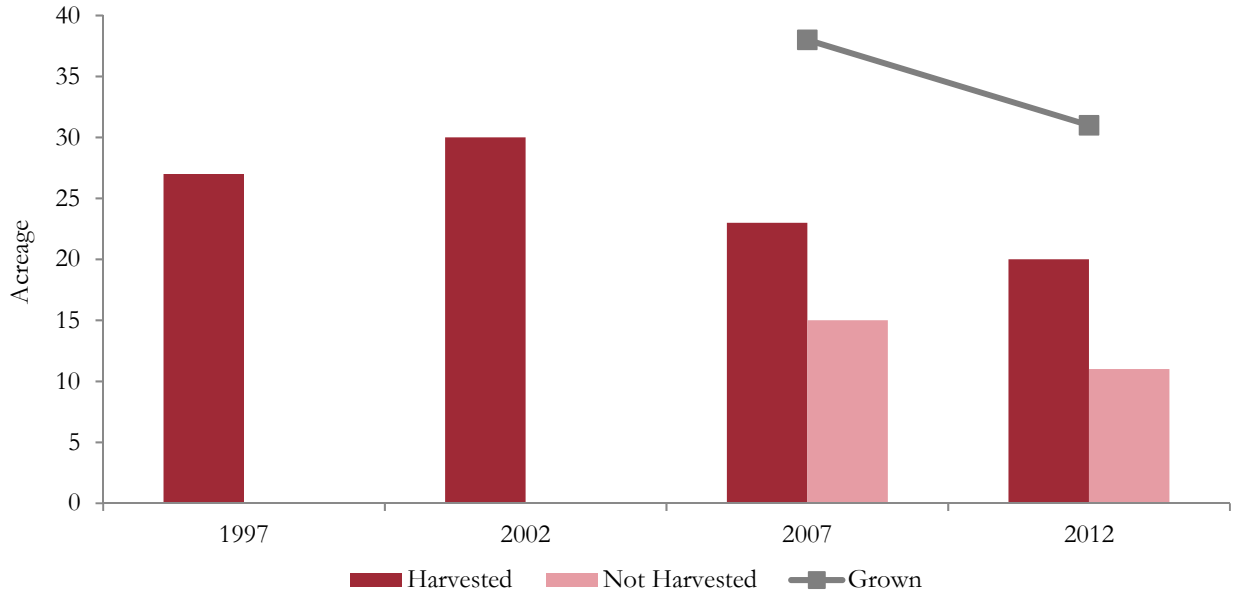


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

1.17 Raspberries

Missouri raspberry acreage grown during 2012 totaled 31 acres. Exhibit 1.17.1 presents raspberry acres grown, harvested and not harvested in recent Census of Agriculture years. Acreage grown in 2012 had dropped from 38 acres in 2007. Before 2007, USDA only reported raspberry harvested acreage. From 1997 to 2012, harvested acreage was lowest in 2012, and between 2007 and 2012, acreage not harvested was lowest in 2012. The 2012 totals were 20 acres of harvested raspberries and 11 acres of raspberries not harvested (USDA National Agricultural Statistics Service 2017b).

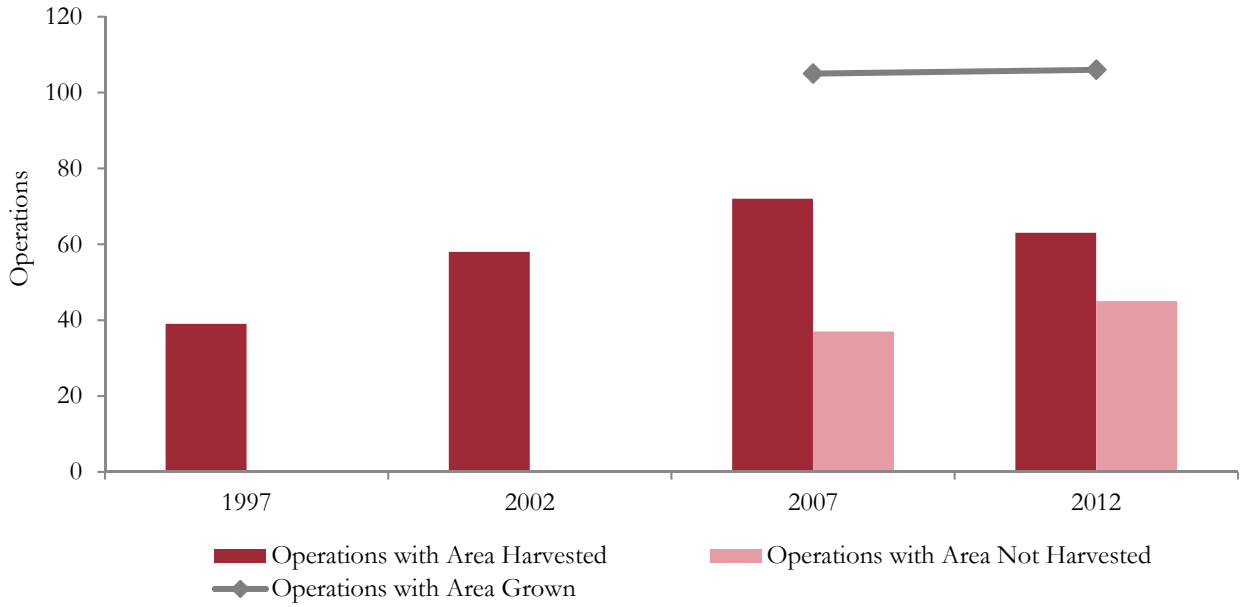
Exhibit 1.17.1 – Missouri Raspberry Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The number of operations growing raspberries in Missouri totaled 106 operations during 2012. With respect to total Missouri operations growing raspberries, the data indicate relatively no change between 2007 and 2012. See Exhibit 1.17.2. In 2012, 63 operations reported harvesting raspberries, and 45 operations shared that didn't harvest raspberry acreage. The number of operations harvesting raspberries peaked in 2007 at 72 operations. Operations with raspberry acreage not harvest increased from 37 farms in 2007 to 45 farms in 2012 (USDA National Agricultural Statistics Service 2017b).

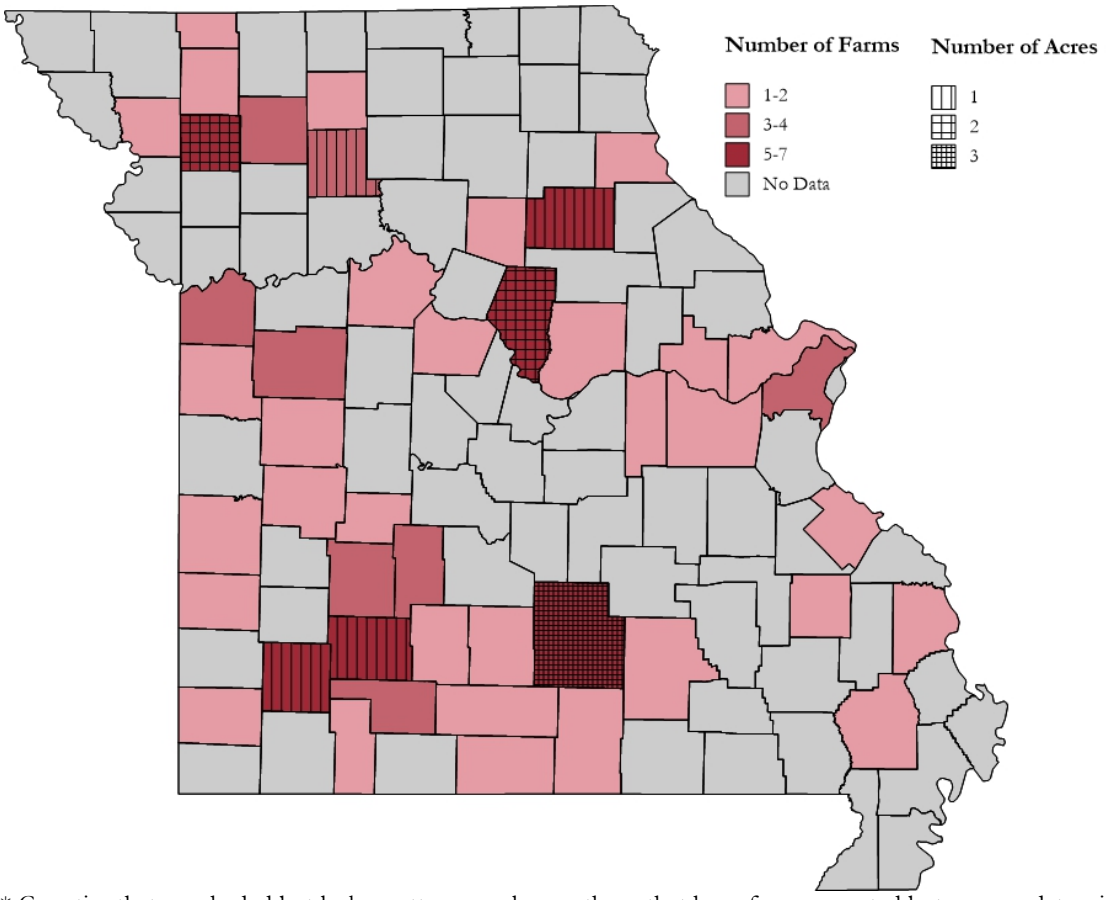
Exhibit 1.17.2 – Missouri Operations with Raspberry Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, Missouri counties with the most raspberry farms were Greene County, seven farms; Boone County, six farms; Lawrence County, six farms; Texas County, six farms; and Monroe County, five farms. Counties with the most raspberry acres in 2012 were Texas County, three acres; Boone County, two acres; and DeKalb County, two acres. Note that both the farms and acreage data count raspberry acreage that was harvested and not harvested (USDA National Agricultural Statistics Service 2014b). Note that USDA withheld data for some counties. In those cases, Exhibit 1.17.3 doesn't describe raspberry activity in those counties.

*Exhibit 1.17.3 – Missouri Raspberry Farms and Total Acreage by County, 2012**



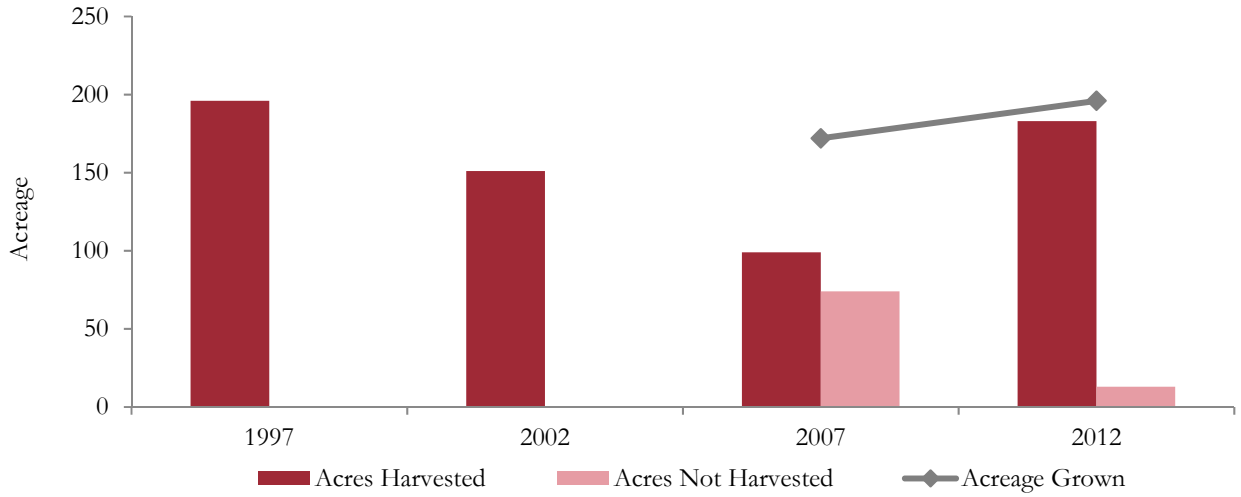
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

One Missouri operation reported harvesting organic raspberry acreage in 2015. Earlier organic censuses found that four operations had harvested organic raspberries — including both USDA certified organic and exempt organic berries — in 2008, and one had harvested organic raspberry acreage in 2014. Statewide organic raspberry production in 2008 totaled 980 pounds, and organic raspberry sales were valued at $2,650 (USDA National Agricultural Statistics Service 2017b).

1.18 Strawberries

Between 2007 and 2012, Missouri increased its total acreage of strawberries grown from 172 acres to 196 acres. Exhibit 1.18.1 shares a snapshot of statewide strawberry acreage data. With respect to harvested strawberry acreage, it declined from 1997 to 2007. However, it rebounded sharply in 2012 to total 183 acres. Between 2007 and 2012, strawberry acreage not harvested declined significantly to total just 13 acres in 2012 (USDA National Agricultural Statistics Service 2017b).

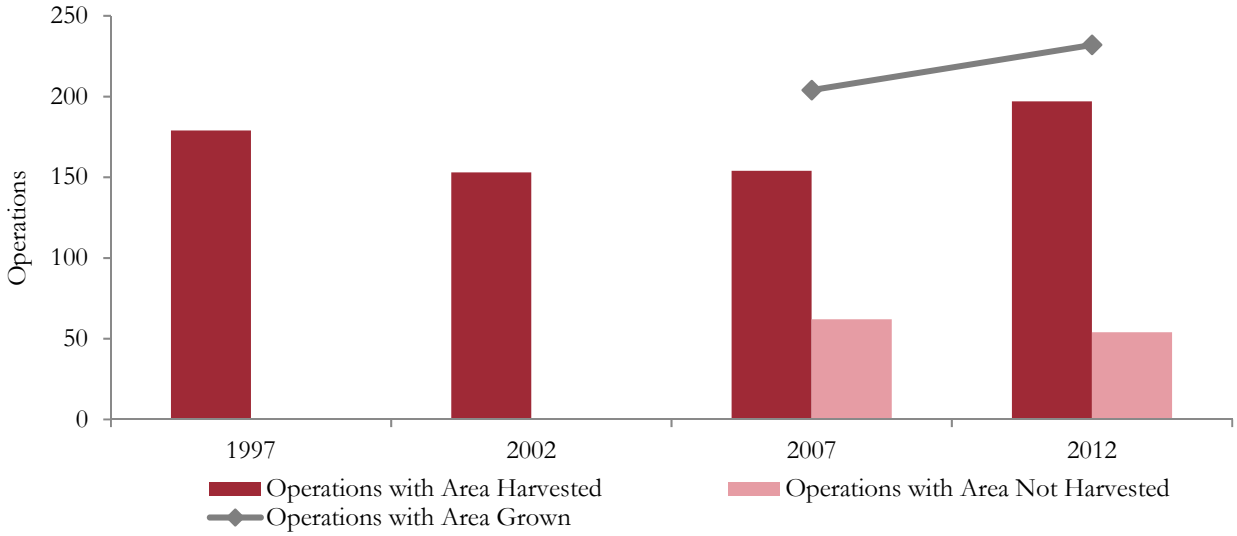
Exhibit 1.18.1 – Missouri Strawberry Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The number of Missouri operations growing strawberries also increased between 2007 and 2012. Exhibit 1.18.2 illustrates that 204 operations had grown strawberries in 2007, and the operation count increased to 232 operations in 2012. For years available, the exhibit also shares operations with area harvested and operations with area not harvested. Operations with harvested strawberry acreage declined slightly from 1997 to 2002 and remained relatively steady through 2007. In 2012, operations with harvested strawberry acreage jumped to 197 farms. Fewer operations had strawberry area not harvested in 2012 relative to 2007 (USDA National Agricultural Statistics Service 2017b).

Exhibit 1.18.2 – Missouri Operations with Strawberry Acreage, 1997 to 2012

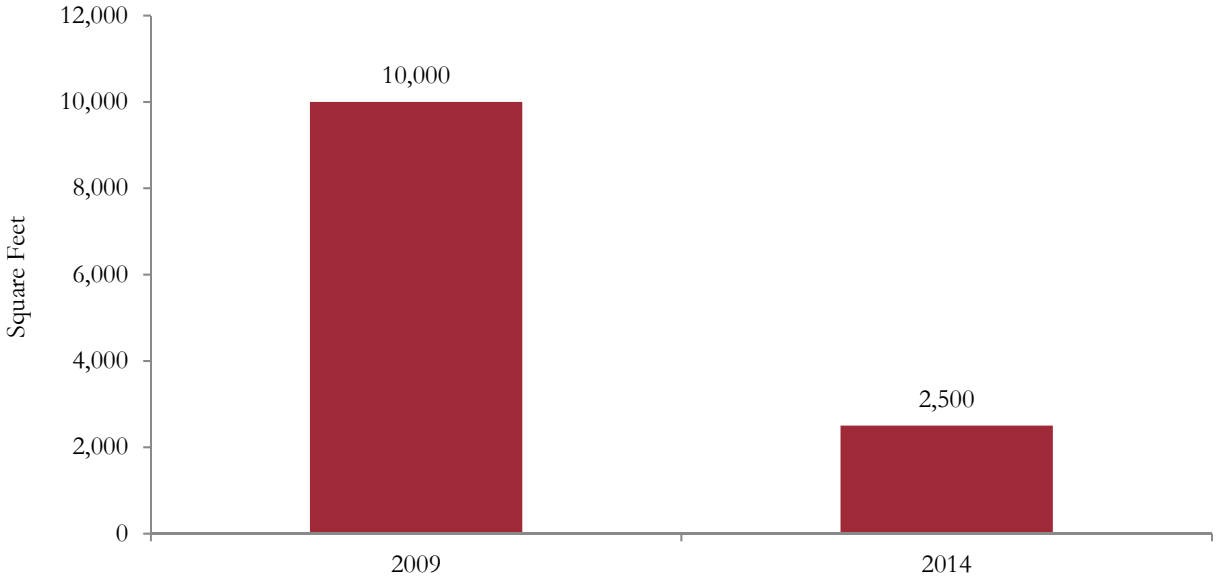


Source: USDA, National Agricultural Statistics Service (2017b)

On a relatively limited basis, Missouri has produced strawberries under protection. Exhibit 1.18.3 shares that square footage of strawberry production area under protection declined steeply between 2009 and 2014. Production area under protection totaled 10,000 square feet in 2009 but only 2,500 square feet in 2014 (USDA National Agricultural Statistics Service 2017b).

The decline in area under protection used to produce strawberries led to reduced strawberry production recorded from areas under protection. In 2009, 160 hundredweight of strawberries were produced under protection. The production level dropped to 5 hundredweight in 2014. Fewer operations also produced strawberries under protection in 2014 relative to 2009 — four operations in 2009 versus three operations in 2014 (USDA National Agricultural Statistics Service 2017b).

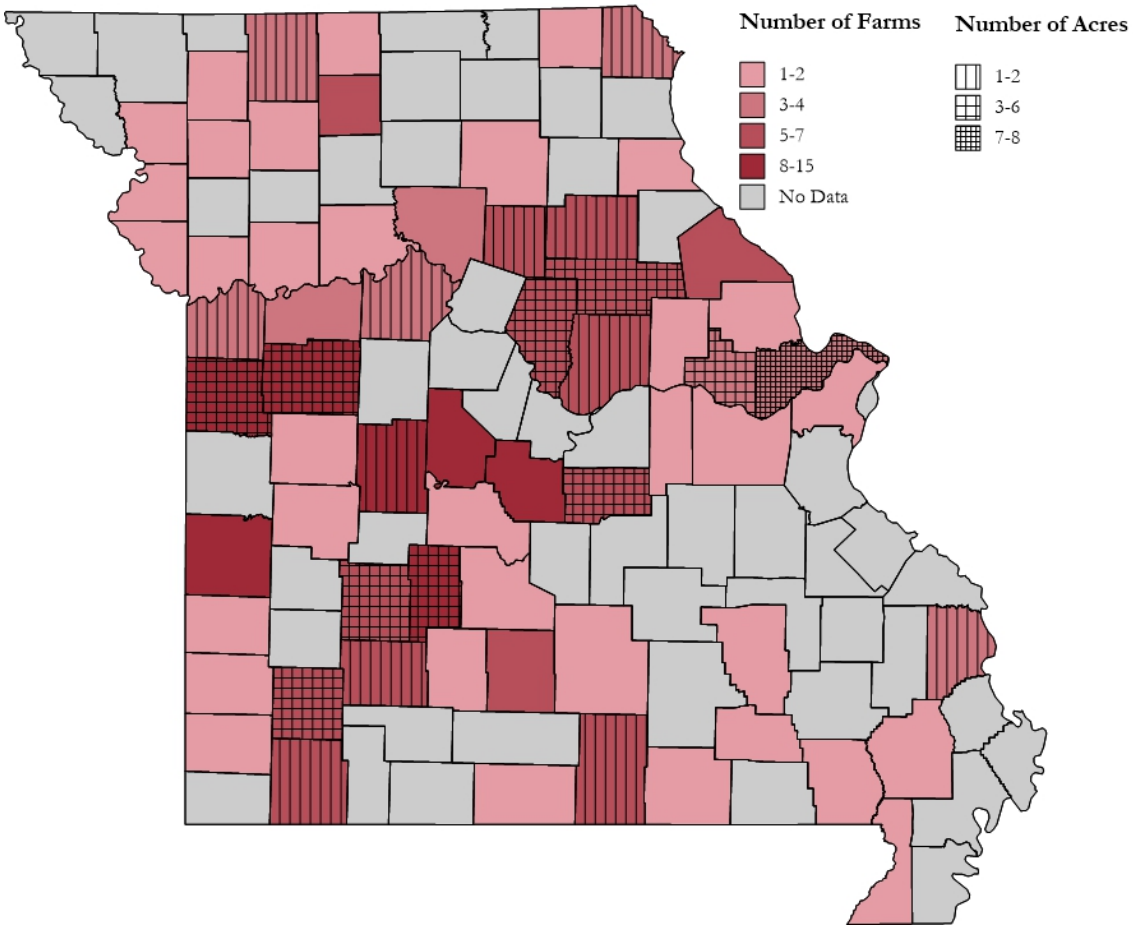
Exhibit 1.18.3 – Missouri Area Under Protection Used to Produce Strawberries, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri counties with the most strawberry farms reported in 2012 were Dade County, 15 farms; Johnson County, 13 farms; and Benton County, nine farms. See Exhibit 1.18.4. In 2012, strawberry acreage was highest in St. Charles County, eight acres; Johnson County, five acres; and Cass County, five acres (USDA National Agricultural Statistics Service 2014b). Note that USDA withheld data for some counties, so those counties lacking public data reports aren't well-described here or in the map.

*Exhibit 1.18.4 – Missouri Strawberry Farms and Acreage by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Strawberries have been more accepted as an organic crop in Missouri than some other specialty crops. USDA reported that nine operations harvested organic strawberries in 2008, and four operations harvested organic strawberries in 2014. Note that these operation counts include those with certified and exempt production. In 2015, USDA note that three Missouri operations harvested USDA certified organic strawberries; the 2015 survey only measured certified organic production (USDA National Agricultural Statistics Service 2017b).

In terms of organic strawberry production, 900 pounds were harvested in 2008, and 1,400 pounds were harvested in 2014. These totals include USDA certified organic and exempt organic production. Organic strawberry sales for that production totaled $992 in 2008 and $7,866 in 2014. For 2015, only production data were reported. Certified organic strawberry production totaled 1,100 pounds in 2015 (USDA National Agricultural Statistics Service 2017b).

2. Tree Nuts

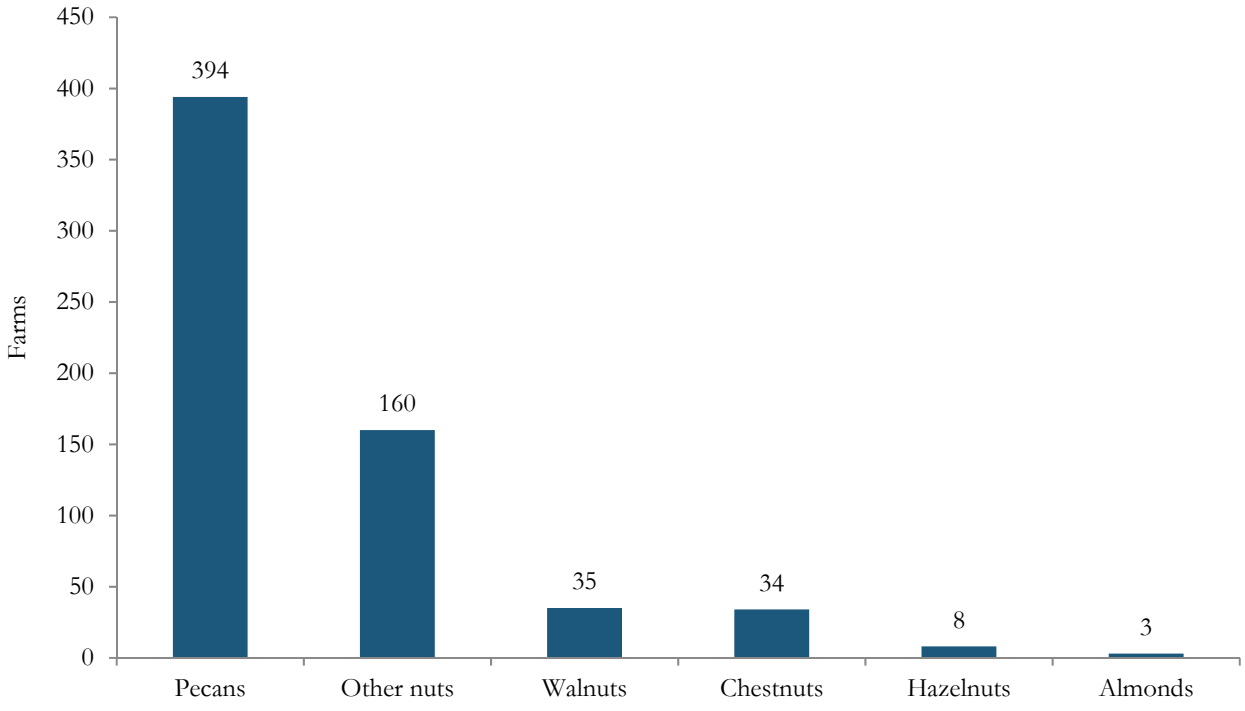
The specialty crop definition from the USDA Agricultural Marketing Service names eight tree nuts that are considered specialty crops. Exhibit 2.1 lists these tree nut species. Of these tree nuts, those that have been grown in Missouri — noted in bold — are almonds, chestnuts, hazelnuts, pecans and walnuts. The following sections describe these tree nuts in more detail.

Exhibit 2.1 – Tree Nuts Included in Specialty Crop Definition

Almond	Cashew	**Chestnut**	**Hazelnut**
Macadamia	**Pecan**	Pistachio	**Walnut**

To summarize Missouri tree nut production, Exhibit 2.2 shares the number of farms growing certain tree nuts in 2012. It includes operations with bearing and non-bearing tree nut acreage. As illustrated, Missouri farms were more likely to raise pecans than any other tree nut. Nearly 400 farms in the state grew pecans in 2012. Eastern black walnuts and chestnuts were grown on 35 farms and 34 farms, respectively. Operations raising "other nuts" totaled 160 farms (USDA National Agricultural Statistics Service 2014b). Other nuts are described as any nut crop that wasn't specifically mentioned on the survey form (USDA National Agricultural Statistics Service 2014a).

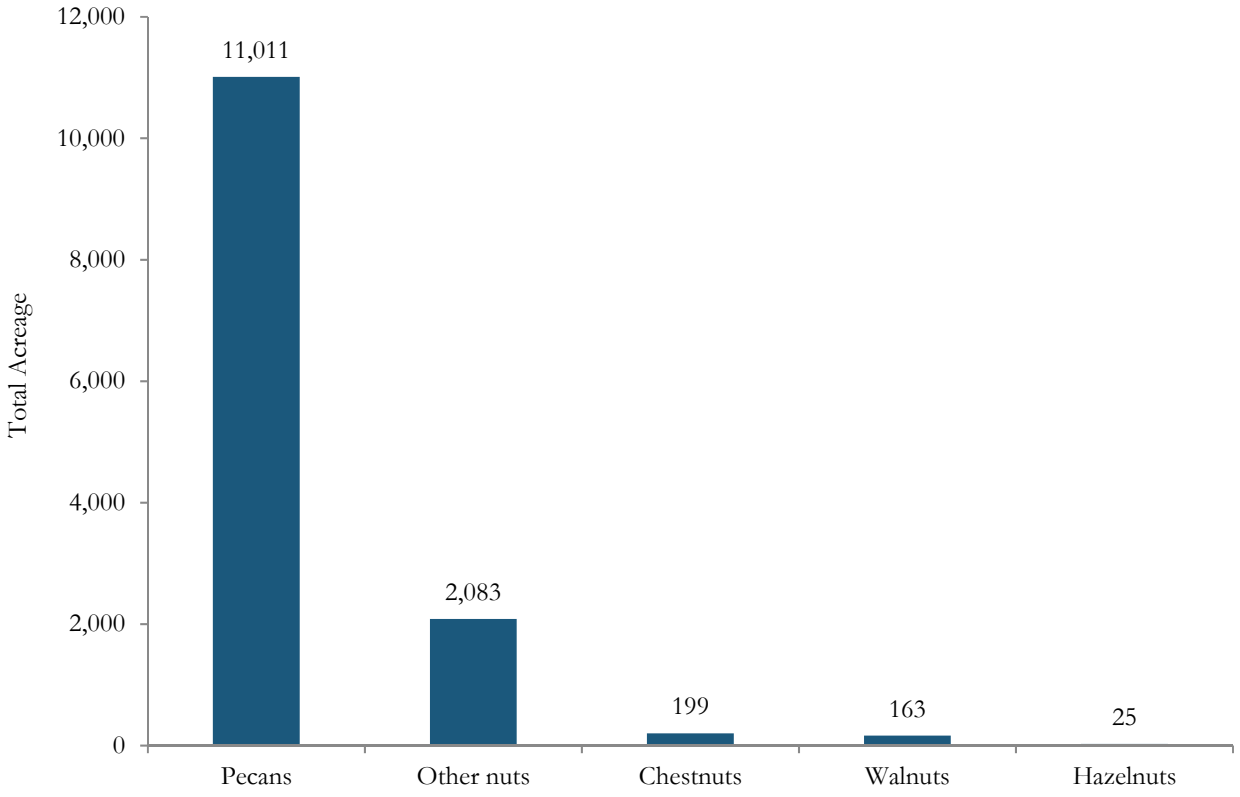
*Exhibit 2.2 – Missouri Farms with Total Bearing and Non-Bearing Tree Nut Acreage, 2012**



* For walnuts, USDA reports that Missouri data reflect production of English walnuts; however, Dr. Michael Gold with the Center for Agroforestry at the University of Missouri, and Dr. Mark Coggeshall, black walnut breeder, note that Missouri's walnut industry grows eastern black walnuts. As a result, this report overrides USDA's description of walnut production and indicates that the state instead produces eastern black walnuts.
Source: USDA, National Agricultural Statistics Service (2014)

Of all tree nuts grown in Missouri, pecans had the highest acreage in 2012. Total Missouri pecan acreage — aggregate bearing and non-bearing acreage — exceeded 11,000 acres during 2012. Exhibit 2.3 shares total Missouri acreage for chestnuts, hazelnuts, pecans, eastern black walnuts and other nuts. Note that data for almond acreage were withheld. More than 2,000 operations maintained "other nut" acreage in 2012. Nearly 200 operations shared that they had chestnut acreage, and 163 operations reported eastern black walnut acreage. In comparison, relatively few acres were dedicated to hazelnut production (USDA National Agricultural Statistics Service 2014b).

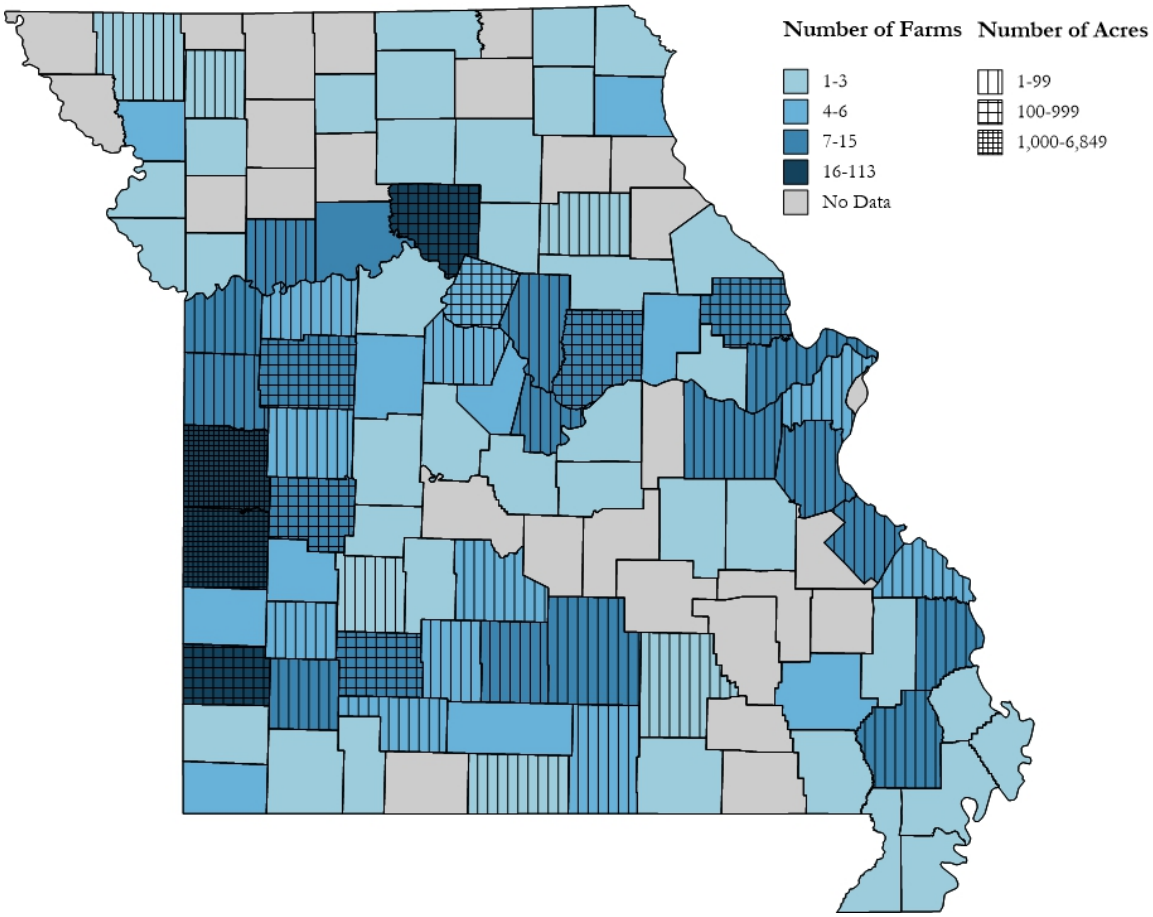
*Exhibit 2.3 – Missouri Total Tree Nut Bearing and Non-Bearing Acreage by Crop, 2012**



* Almond acreage data were withheld in 2012; "total" acreage refers to area combined bearing and non-bearing acreage; and Missouri walnut data are for eastern black walnuts.
Source: USDA, National Agricultural Statistics Service (2014)

Exhibit 2.4 maps total tree nut farms and acreage in 2012 by Missouri county. Note that totals include bearing and non-bearing acreage. As shown, tree nut farms and acreage concentrated in Vernon County, Bates County and Chariton County. Of these three, Vernon County was clearly the leader. During 2012, it had 113 nut farms and 6,849 acres of nuts. In contrast, the nut farm count totaled 28 operations in Chariton County and 27 operations in Bates County. Of these counties, Bates County had the greater nut acreage in 2012. Its acreage totaled 1,098 acres relative to the 966 acres recorded in Chariton County (USDA National Agricultural Statistics Service 2014b).

*Exhibit 2.4 – Missouri Tree Nut Farms and Total Acreage by County, 2012**



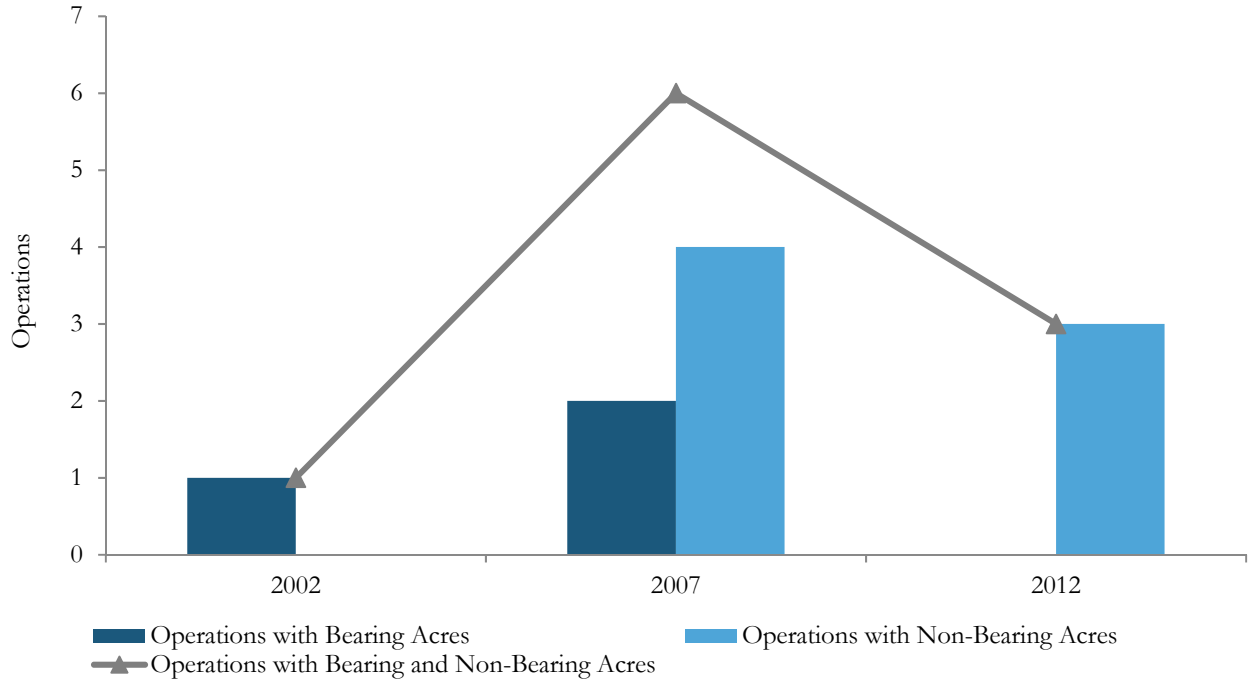
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

2.1 Almonds

In Missouri, almond production has occurred on a relatively small scale. Little data have been reported about the state's almond acreage. The Census of Agriculture in 2007 reported that Missouri had one acre of bearing and non-bearing almonds. Note that USDA didn't disclose almond acreage in 2012 (USDA National Agricultural Statistics Service 2017b).

The number of operations engaged in Missouri's almond industry has fluctuated somewhat during the past few years. Exhibit 2.1.1 illustrates that the number of operations with bearing and non-bearing almond acreage totaled six farms in 2007; this was the highest almond operation count of the observed period. Of the six operations, four had non-bearing acreage, and two had bearing acreage. In 2012, three operations reported having almond acreage, and all had non-bearing acreage (USDA National Agricultural Statistics Service 2017b).

Exhibit 2.1.1 – Missouri Operations with Almond Acreage, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

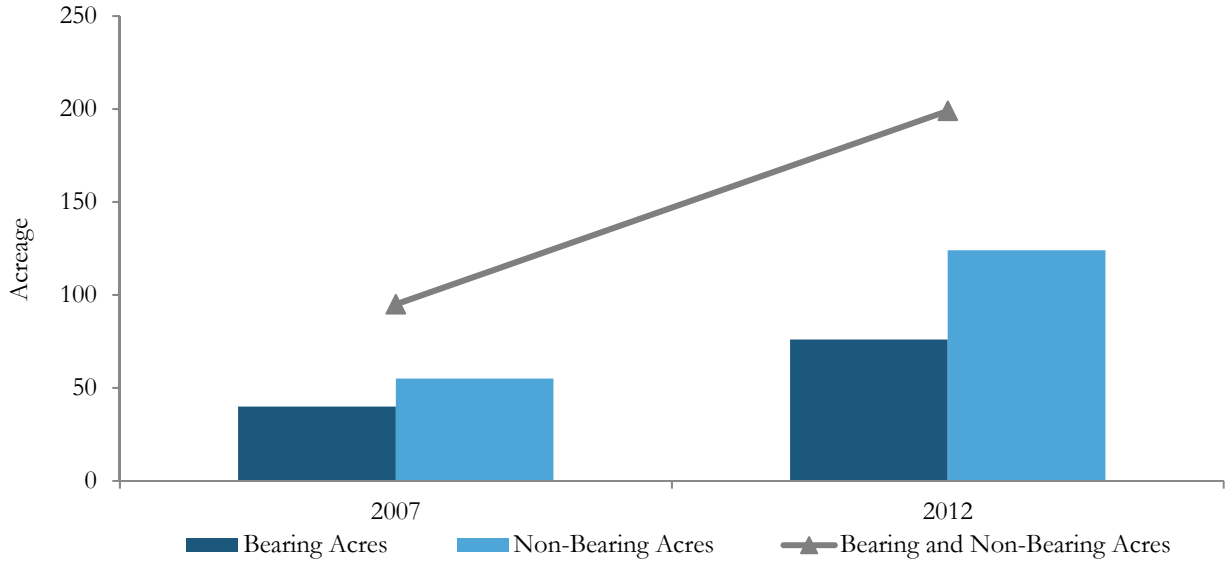
In 2012, almond data by county were only available for number of operations. Two operations were located in Cedar County, and Monroe County had one almond operation. Both counties were reported to have nonbearing almond acreage (USDA National Agricultural Statistics Service 2014b).

2.2 Chestnuts

Chestnuts have been considered an experimental crop for Missouri producers. Their winter hardiness and resistance to chestnut blight make them suitable for Missouri production when grown in well-drained, fertile soils (Quinn 2000 and Hunt et al. 2012). The Center for Agroforestry at the University of Missouri has the nation's leading chestnut testing program with a repository of 60 chestnut cultivars and species hybrids at the University of Missouri Horticulture and Agroforestry Research Center in New Franklin, Mo. Through 20 years of research on cultivar performance, several cultivars ideally suited to commercial production in Missouri have been identified. At maturity, yields in excess of 2,000 pounds per acre are readily achieved (Godsey 2012).

In recent years, the Missouri chestnut industry has grown substantially. Exhibit 2.2.1 illustrates chestnut bearing and non-bearing acreage for 2007 and 2012. Total bearing and non-bearing acreage more than doubled between those two years; it increased from 95 acres in 2007 to 199 acres in 2012. Of the 199 acres in Missouri allocated to chestnuts in 2012, 124 acres were non-bearing, and 76 acres were bearing. Note that both bearing acreage and non-bearing acreage increased between 2007 and 2012. The growth in non-bearing acreage was particularly strong; nearly 70 more non-bearing acres were reported in 2012 than in 2007 (USDA National Agricultural Statistics Service 2017b).

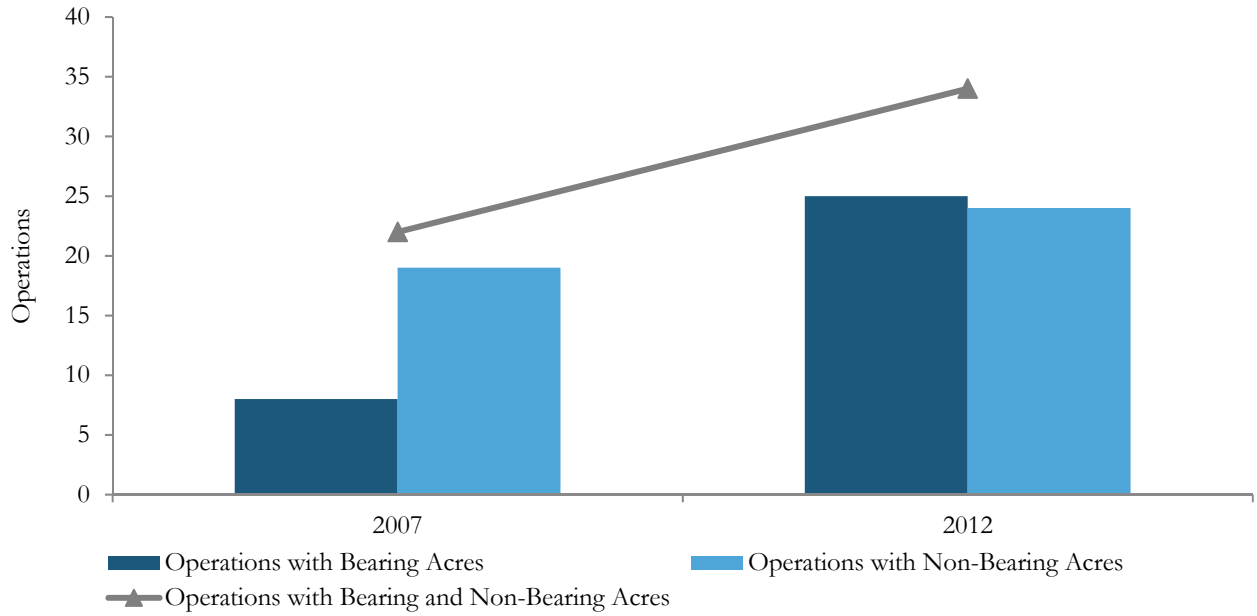
Exhibit 2.2.1 – Missouri Chestnut Bearing and Non-Bearing Acreage, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

As Missouri chestnut acreage grew from 2007 to 2012, the number of chestnut operations also increased. Thirty-four operations in 2012 had bearing or non-bearing chestnut acreage compared with 22 operations in 2007. See Exhibit 2.2.2. Of the operations that reported chestnut acreage in 2012, 25 had bearing acreage, and 24 had non-bearing acreage. Between 2007 and 2012, Missouri added to its total count of operations with bearing acres and operations with non-bearing acreage. The growth was most drastic for operations with bearing chestnut acres (USDA National Agricultural Statistics Service 2017b).

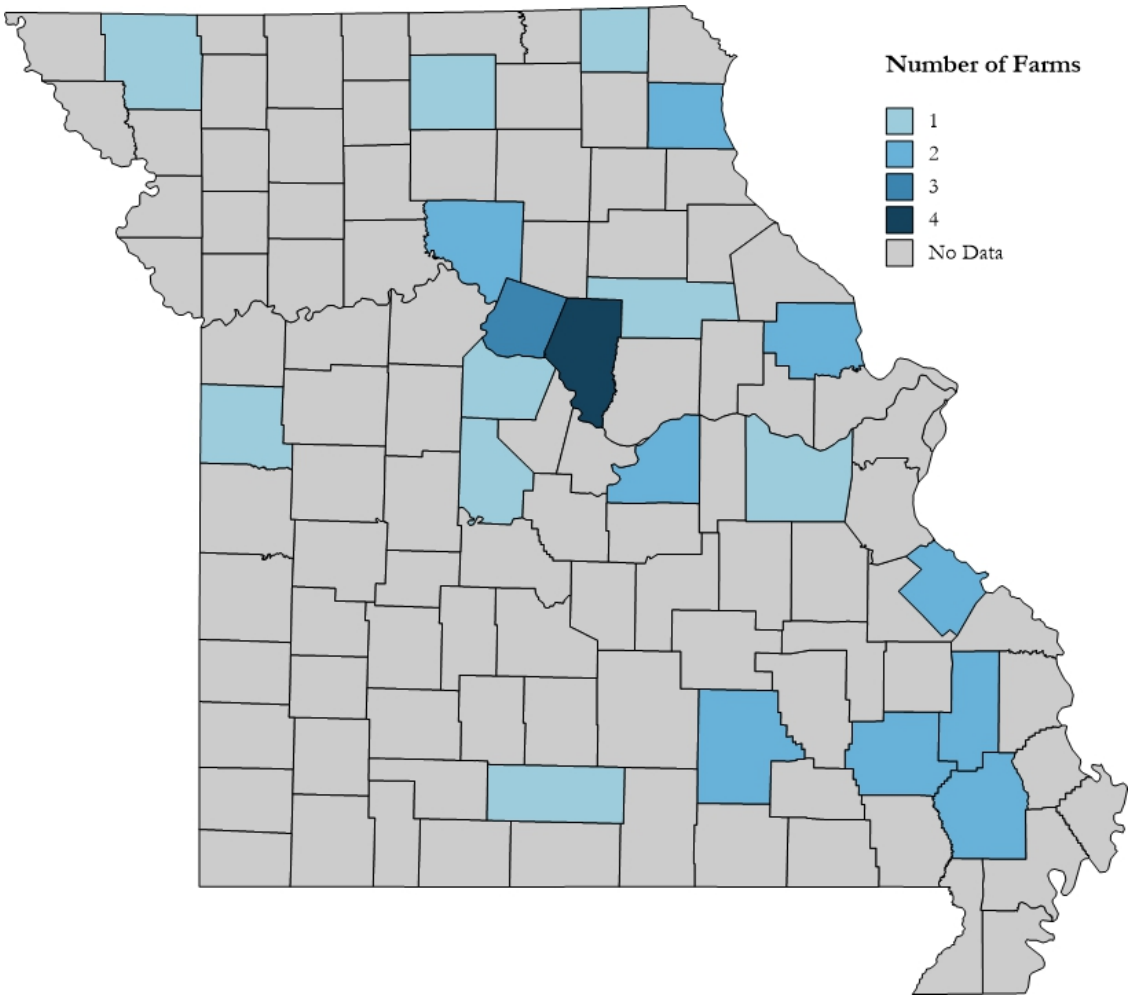
Exhibit 2.2.2 – Missouri Operations with Bearing and Non-Bearing Chestnut Acreage, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri counties with the most chestnut operations in 2012 were Boone County, four farms, and Howard County, three farms. Exhibit 2.2.3 reports the number of Missouri chestnut farms per county. In most cases, USDA hasn't disclosed chestnut acreage by county, so acreage data were limited. Boone County was the exception. Operations in Boone County maintained 17 acres of chestnuts in 2012. Note that the operation count and chestnut acreage include data for both bearing and nonbearing chestnuts (USDA National Agricultural Statistics Service 2017b).

*Exhibit 2.2.3 – Missouri Chestnut Operations by County, 2012**



Source: USDA, National Agricultural Statistics Service (2014)

Missouri consumers' familiarity with chestnuts has increased during the past decade, based on more than 10 years of surveys conducted at the Annual Chestnut Roast Festival held in New Franklin, Mo. The festival was established in 2003, in part, to improve consumer awareness of chestnuts. Missouri consumers have reported a strong preference for Missouri-produced chestnuts compared with those grown elsewhere. Organic and pesticide-free chestnuts also show stronger consumer preferences compared with chestnuts produced using conventional methods (Aguilar et al. 2009).

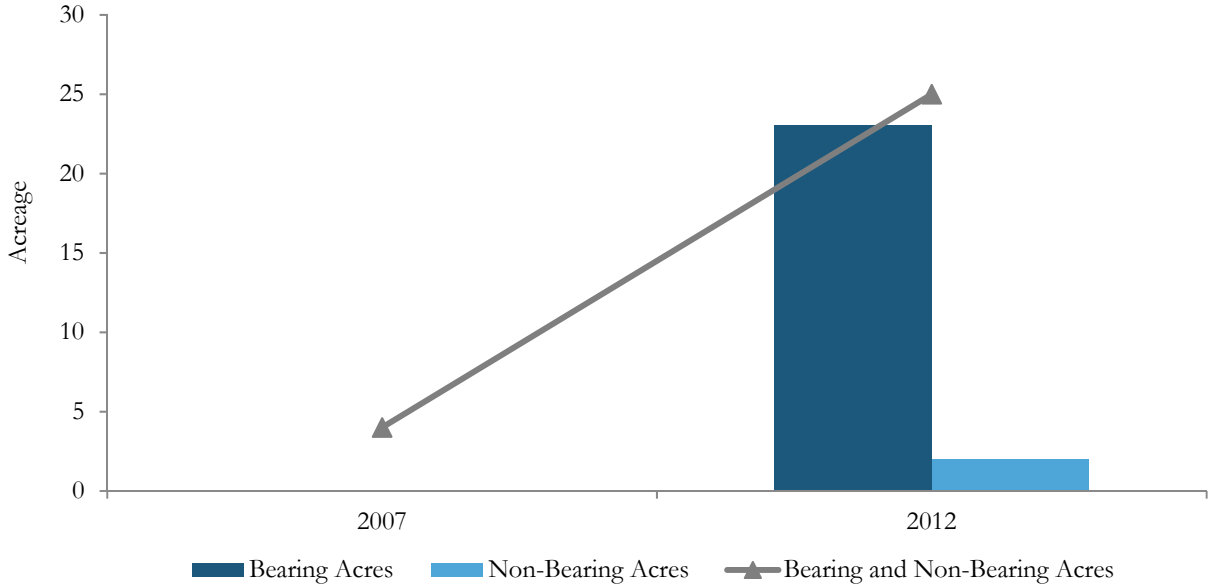
According to a national chestnut market survey, the current chestnut market has low levels of competition, and chestnut demand exceeds supply (Gold et al. 2006). A high proportion of growers

(45 percent) planned to expand their chestnut orchards and grow more chestnut trees, according to a 2017 grower survey (Cai and Gold 2017). However, challenges preventing chestnut growers from succeeding in the chestnut business include lack of market information, the time lag (six years to 10 years) to get a return and pest and disease control (Gold et al. 2006). Market cooperatives play an increasingly important role in marketing chestnuts for small-scale growers.

2.3 Hazelnuts

To avoid disclosing data about individual farms, USDA has not released many datasets that share hazelnut acreage in Missouri. Exhibit 2.3.1 summarizes the available data from recent Census of Agriculture reports. It shows that total bearing and non-bearing hazelnut acreage increased sharply from four acres in 2007 to 25 acres in 2012. Of the total hazelnut acreage in 2012, 23 acres were bearing, and two acres were non-bearing (USDA National Agricultural Statistics Service 2017b).

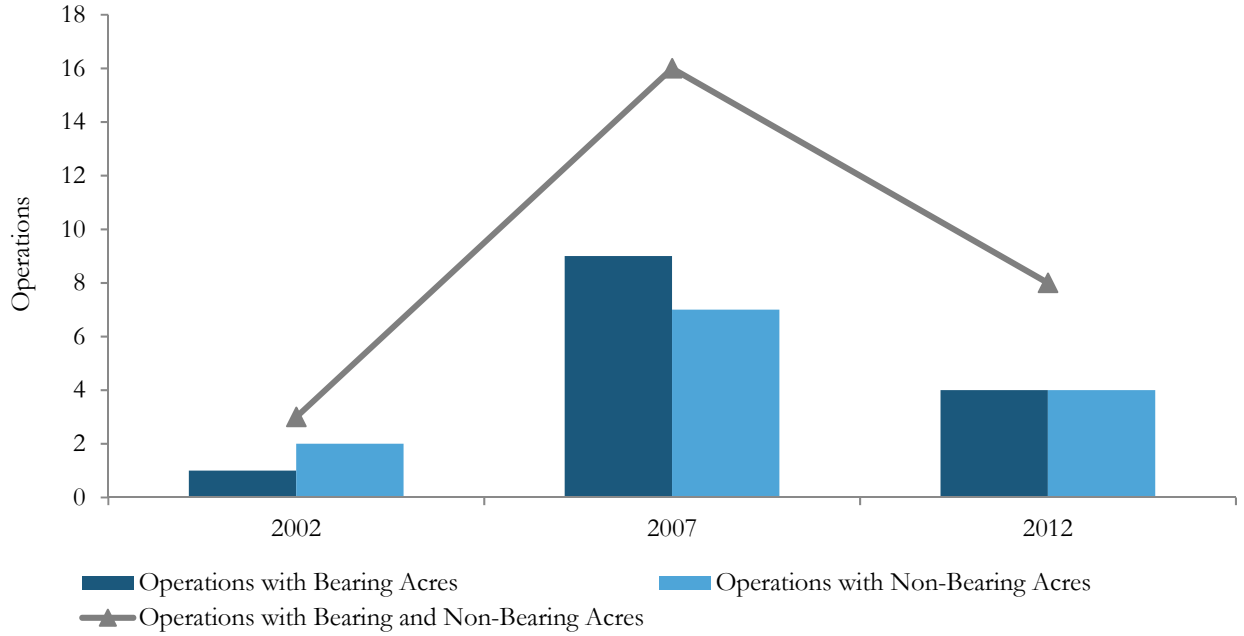
Exhibit 2.3.1 – Missouri Hazelnut Bearing and Non-Bearing Acreage, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The number of operations engaged in Missouri hazelnut production changed somewhat dramatically from 2002 to 2012. See Exhibit 2.3.2. Total operations with bearing and non-bearing acreage increased from three operations in 2002 to 16 operations in 2007. In 2012, eight Missouri operations had bearing and non-bearing hazelnut acreage. Of those operations, half had bearing acreage, and half had non-bearing acreage (USDA National Agricultural Statistics Service 2017b).

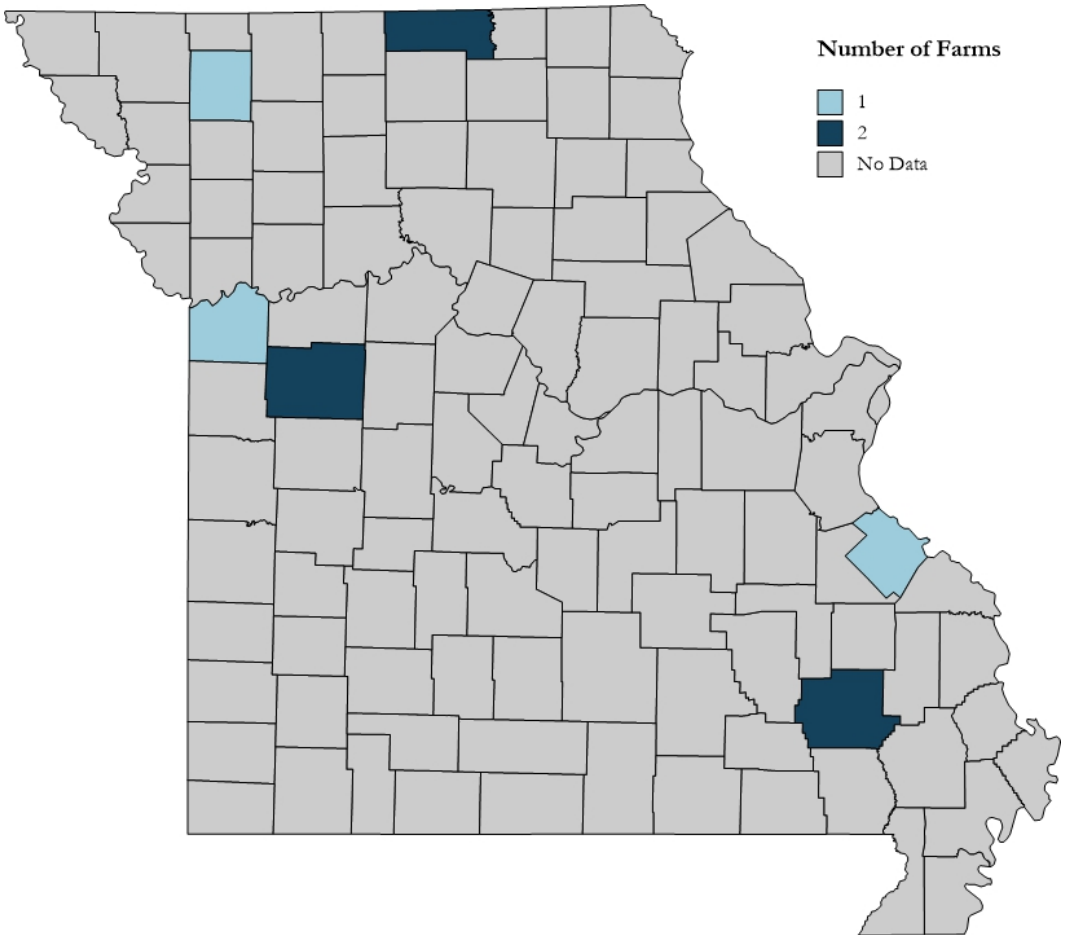
Exhibit 2.3.2 – Missouri Hazelnut Operations, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

By Missouri county, those with the greatest concentration of hazelnut operations in 2012 were Johnson County, two farms; Putnam County, two farms; and Wayne County, two farms. Exhibit 2.3.3 charts the number of hazelnut farms by Missouri county. Note that hazelnut acreage by county was withheld in order to protect information about individual operations, so the map doesn't reflect acreage data. The map does include operations with bearing and non-bearing hazelnut acreage (USDA Economic Research Service 2014).

Exhibit 2.3.3 – Missouri Hazelnut Operations by County, 2012



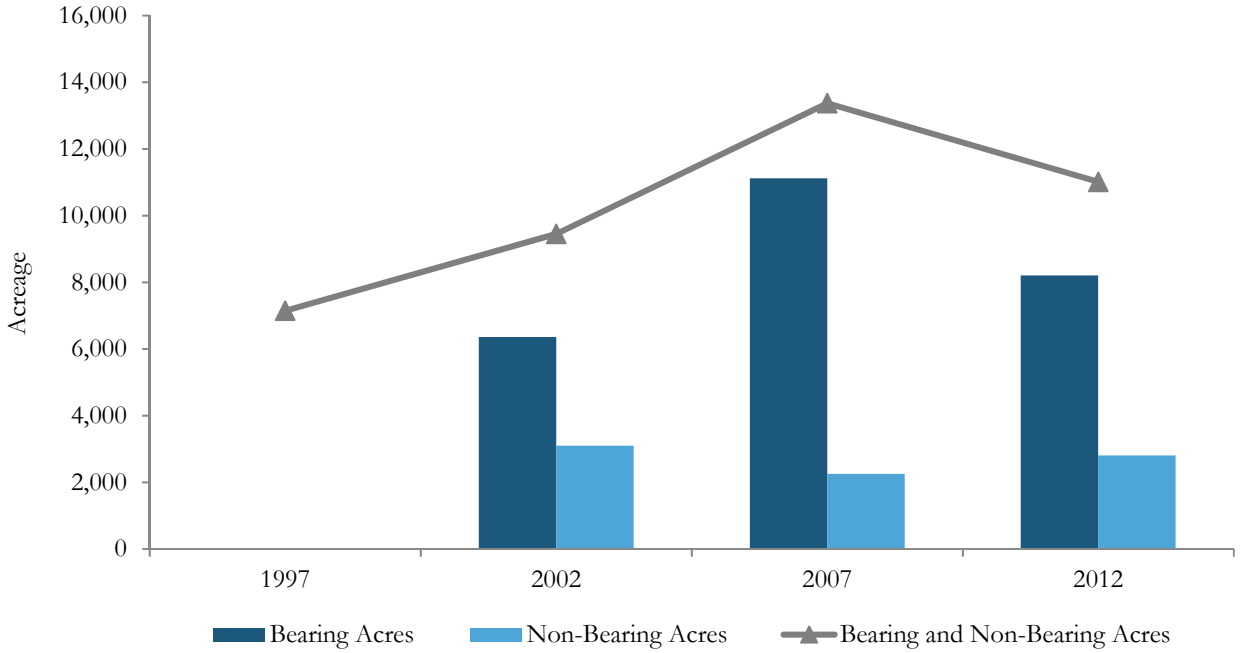
Source: USDA, National Agricultural Statistics Service (2014)

2.4 Pecans

In recent years, Missouri has had significant specialty crop activity dedicated to pecan production. Exhibit 2.4.1 illustrates bearing and non-bearing pecan acreage recorded during recent Census of Agriculture years. Total bearing and non-bearing acreage in Missouri increased from 1997 to 2007. Acreage had totaled 7,145 acres in 1997. Between 2007 and 2012, total acreage declined from 13,369 acres to 11,011 acres. Of the total bearing and non-bearing pecan acreage in 2012, three-quarters were bearing acres, and one-quarter was non-bearing acreage. The chart shows that bearing acreage declined from 2007 to 2012, but non-bearing acreage experienced a slight uptick during that time (USDA National Statistics Service 2017).

In 2012, Missouri ranked 10th in the country for its total pecan bearing and non-bearing acreage. States that led in combined bearing and non-bearing pecan acreage were Texas, Georgia and Oklahoma. All three of those states reported more than 100,000 acres in total bearing and non-bearing pecan acreage (USDA National Agricultural Statistics Service 2017b).

Exhibit 2.4.1 – Missouri Pecan Bearing and Non-Bearing Acreage, 1997 to 2012

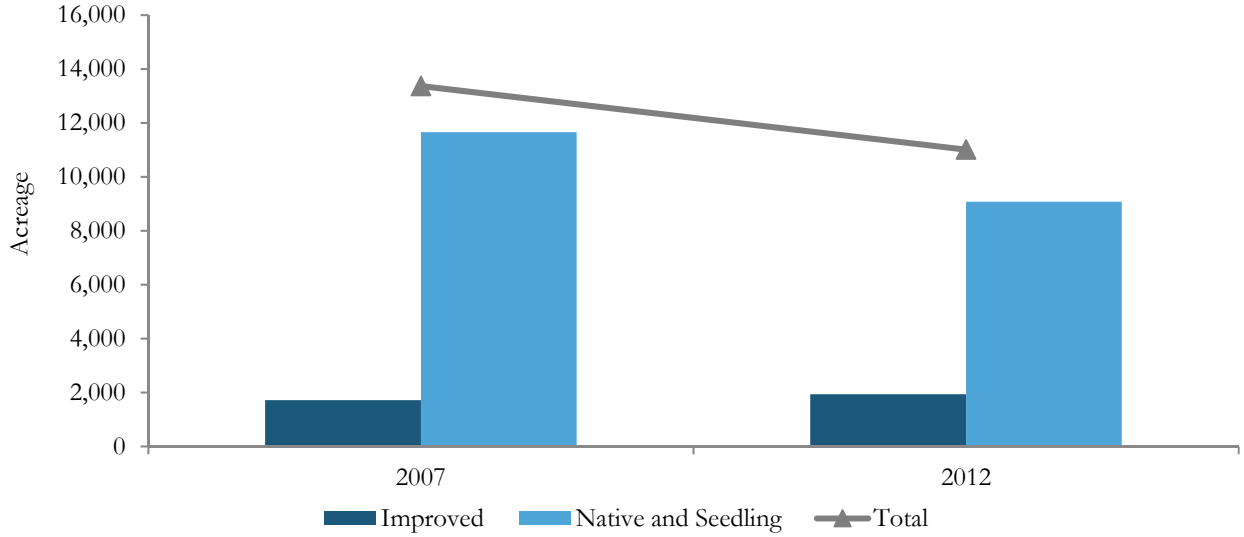


Source: USDA, National Agricultural Statistics Service (2017b)

Native and seedling pecan trees have represented most of Missouri total pecan bearing and non-bearing acreage. USDA considers native pecans to originate from a natural development process, and seedlings originate from seeds, not budding or grafting processes. See Exhibit 2.4.2. In 2012, native and seedling trees were 82.4 percent of the state's total bearing and non-bearing pecan acreage (USDA National Agricultural Statistics Service 2017b).

Improved varieties represented the other 17.6 percent of acreage. USDA describes that some sort of breeding or grafting yields improved varieties. With improved varieties, the goal is to produce trees that yield more nuts or nuts with more "meat." Although native and seedling trees have been most prominent in Missouri, their share of total pecan acreage declined slightly from 2007 to 2012. In 2007, native and seedling trees were 87.2 percent of Missouri pecan bearing and non-bearing acreage, and improved variety trees represented the remainder of 2007 total acreage (USDA National Agricultural Statistics Service 2017b).

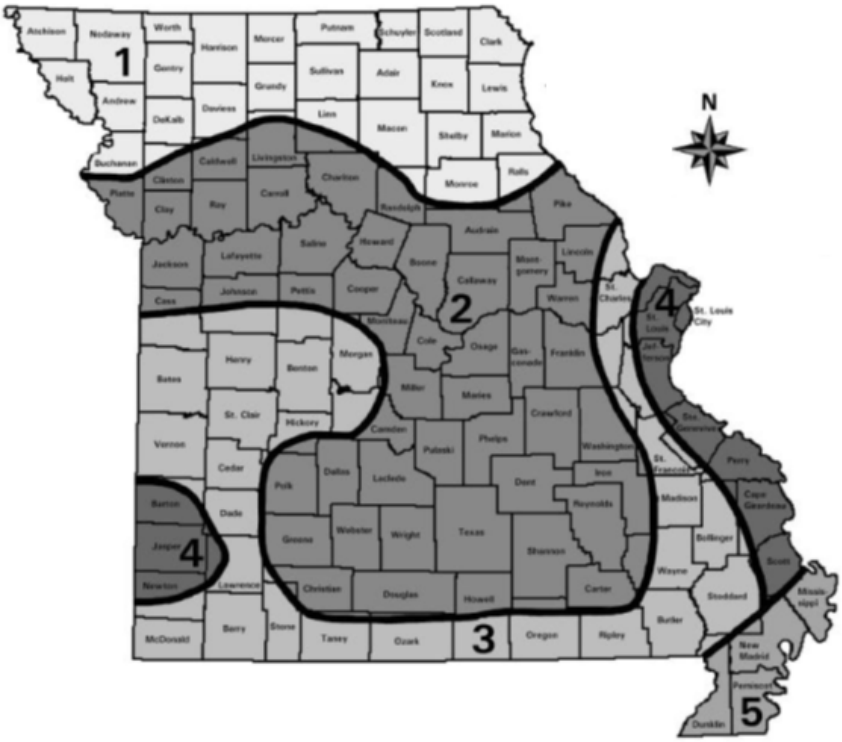
Exhibit 2.4.2 – Missouri Total Bearing and Non-Bearing Pecan Acreage by Type, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The Center for Agroforestry at the University of Missouri maintains the country's largest collection of northern pecan cultivars. Research findings suggest that Missouri can be divided into five zones based on pecan cultivar adaptation. See Exhibit 2.4.3 for an outline of those zones. Pecan cultivars that are suitable for commercial nut production have been recommended for each zone (Reid 2010).

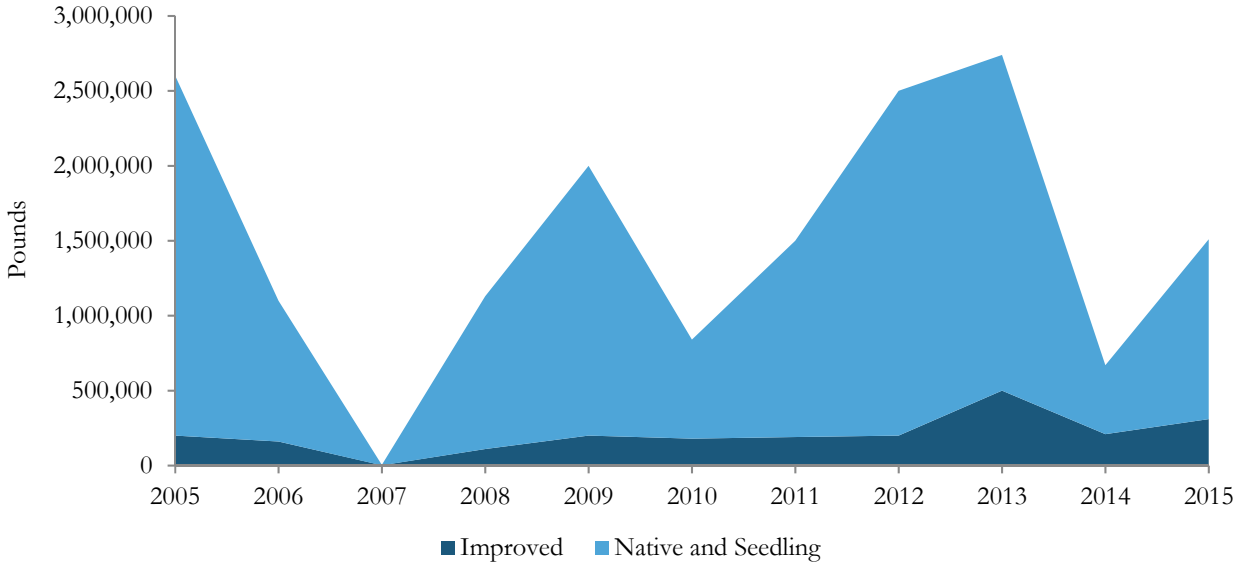
Exhibit 2.4.3 – Five Pecan Cultivar Adaptation Zones in Missouri



Source: Reid (2010)

Because native and seedling pecan trees have represented the bulk of Missouri bearing and non-bearing pecan acreage, in-shell pecan utilized production for native and seedling pecans has bested in-shell utilized production for improved variety pecans. See Exhibit 2.4.4. Total in-shell pecan utilized production experienced some volatility between 2005 and 2015. The exhibit illustrates that low production years occurred in 2007, 2010 and 2014. Total in-shell utilized production reached its peak at 2.74 million pounds in 2013. In 2015 — the most recent year with data reported — in-shell pecan utilized production totaled 1.51 million pounds. Of that total, 79.5 percent was attributed to native and seedling pecans, and improved varieties were 20.5 percent of the total (USDA National Agricultural Statistics Service 2016b and USDA Economic Research Service 2017).

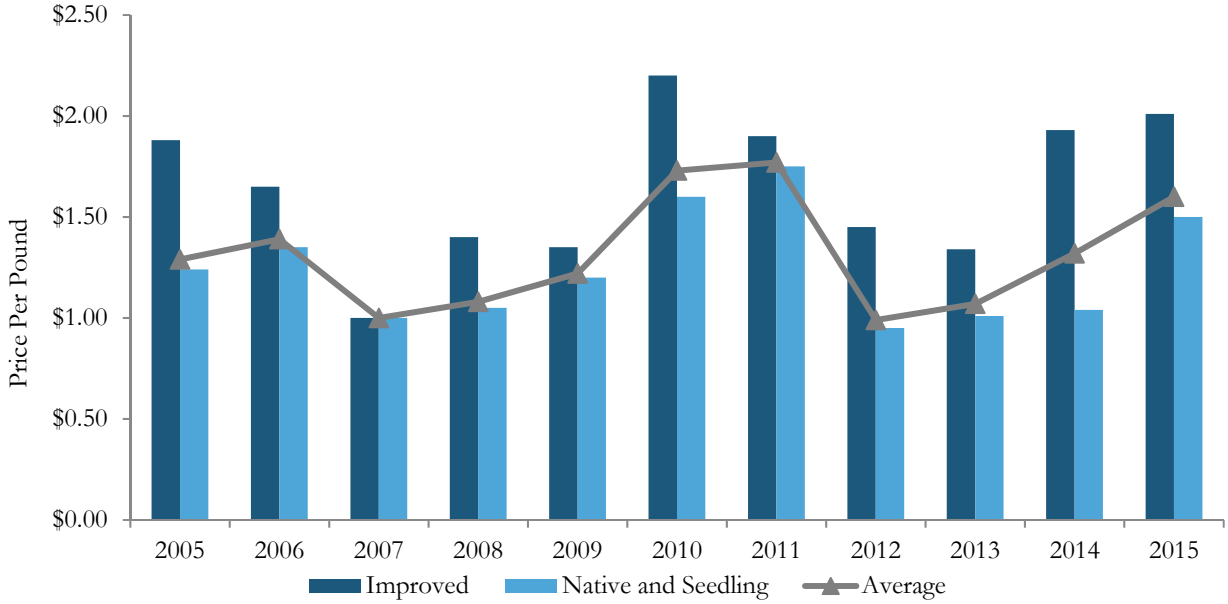
Exhibit 2.4.4 – In-Shell Missouri Pecan Utilized Production by Variety, 2005 to 2015



Source: USDA, National Agricultural Statistics Service (2016b) and USDA, National Agricultural Statistics Service (2017)

Relative to native and seedling pecans, improved variety pecans tend to command a premium. Exhibit 2.4.5 illustrates prices for Missouri improved variety and native and seedling pecans from 2005 to 2015. It also presents the average price received for Missouri pecans. During the observed period, improved pecan prices averaged a 33.7 percent premium relative to native and seedling pecans. In 2015, prices for improved variety pecans averaged $2.01 per pound, and prices for native and seedling pecans averaged $1.50 per pound. Missouri pecan prices averaged $1.60 per pound (USDA National Agricultural Statistics Service 2016b and USDA Economic Research Service 2017).

Exhibit 2.4.5 – Price Received for Missouri Pecans by Type and Average, 2005 to 2015

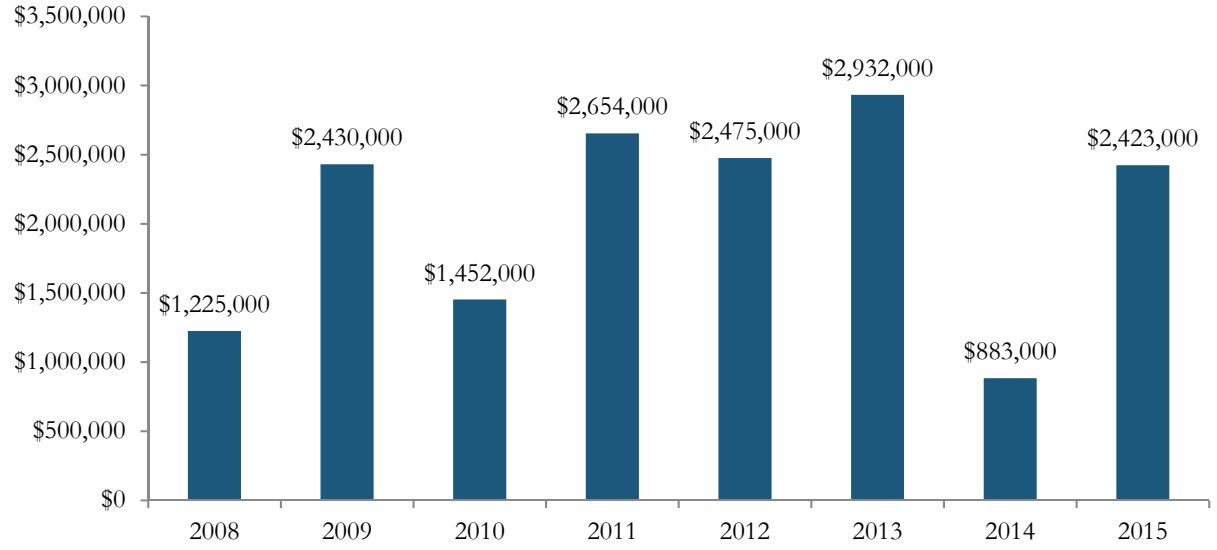


Source: USDA, National Agricultural Statistics Service (2016b) and USDA, National Agricultural Statistics Service (2017)

Exhibit 2.4.6 reports cash receipts for Missouri pecans. It illustrates that pecan cash receipt values experienced some volatility between 2008 and 2015. However, prices overall followed an upward trend. In 2015, the state's cash receipts for pecans totaled slightly more than $2.4 million. During the observed period, cash receipts reached their peak in 2013 at more than $2.9 million. Cash receipts dropped to their lowest level of the observed period — $883,000 — in just the following year, 2014 (USDA Economic Research Service 2017).

Of all U.S. pecan cash receipts recorded in 2015, Missouri contributed 0.4 percent to that total. Missouri pecan cash receipts were less than 1 percent of total commodity cash receipts recorded in the state during 2015. Pecans ranked 24th for their contribution to the state's total commodity cash receipts (USDA Economic Research Service 2017).

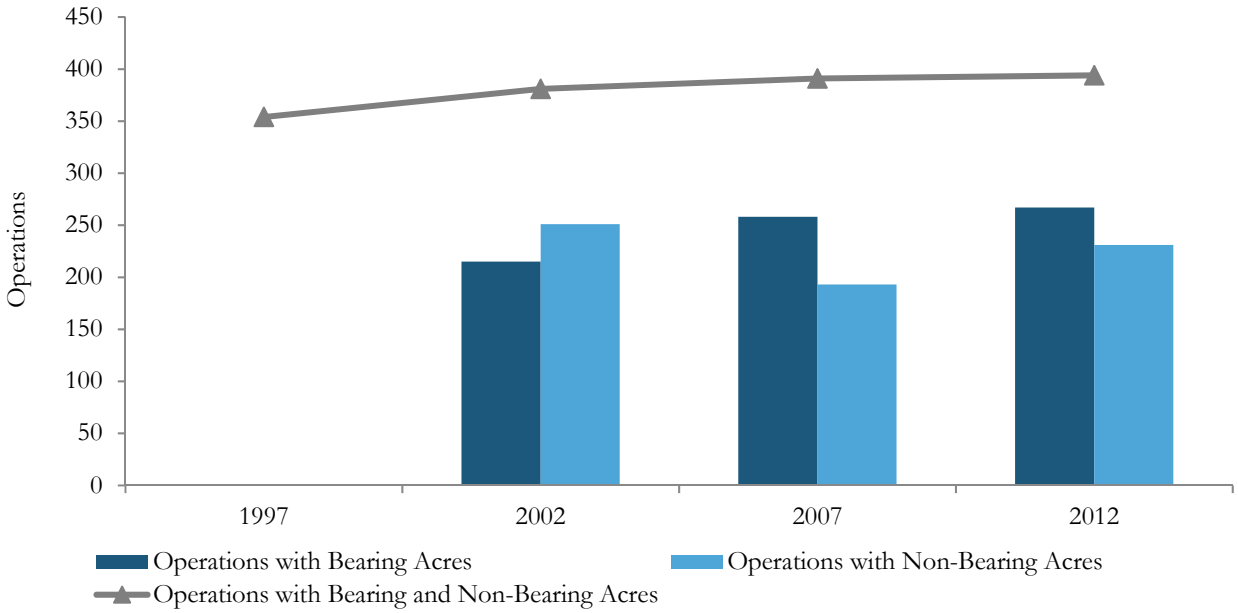
Exhibit 2.4.6 – Missouri Pecan Cash Receipts, 2008 to 2015



Source: USDA, Economic Research Service (2017)

In 2012, 394 pecan operations in Missouri reported having bearing or non-bearing pecan acreage. The number of operations with bearing and non-bearing pecan acreage increased slowly yet steadily from 1997 to 2012. See Exhibit 2.4.7. In 1997, 354 operations reported bearing or non-bearing pecan acreage. During 2012, the exhibit illustrates that 267 operations reported having bearing pecan acreage, and 231 operations reported having non-bearing pecan acreage. The count of operations reporting bearing acreage increased from 2002 to 2012. The count of operations with non-bearing acreage didn't follow a consistent pattern (USDA Economic Research Service 2017).

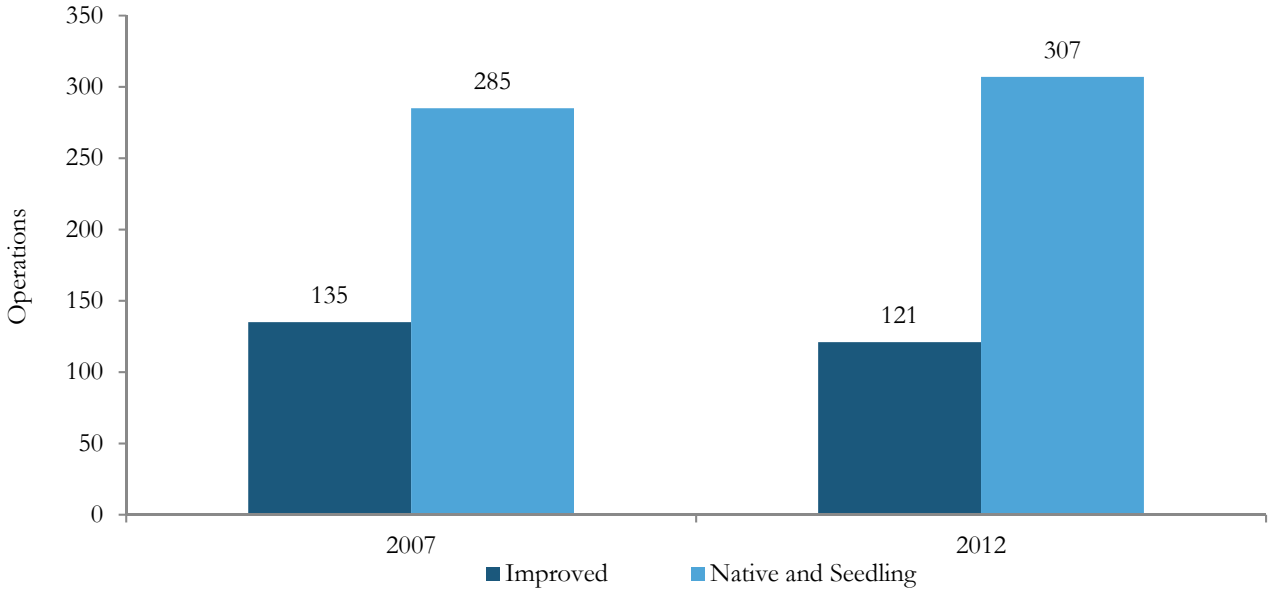
Exhibit 2.4.7 – Missouri Operations with Bearing and Non-Bearing Pecan Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 2.4.8 provides an alternative view of Missouri pecan operations data. It highlights the total number of pecan operations with improved pecan variety acreage and native and seedling variety acreage. Missouri pecan operations have been more likely to grow native and seedling pecans than improved varieties. In 2012, 121 pecan farms grew improved variety pecans, and 307 raised native and seedling pecans. The count of operations with native and seedling pecan acreage increased from 2007 to 2012. On the other hand, fewer Missouri operations had improved pecan acreage in 2012 than in 2007 (USDA Economic Research Service 2017).

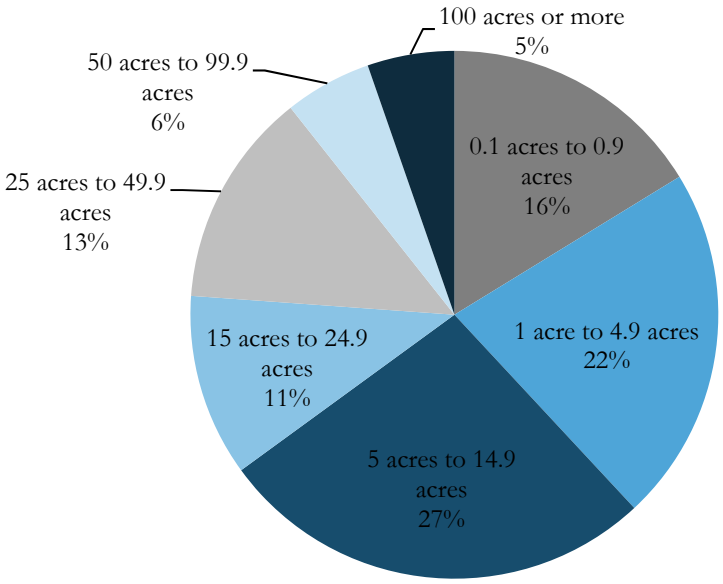
Exhibit 2.4.8 – Missouri Pecan Operations with Bearing and Non-Bearing Pecan Acreage Reporting Improved Variety and Native and Seedling Acreage, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri pecan operations have been varied in size. Exhibit 2.4.9 presents the share of operations in 2012 based on their pecan acreage. Thirty-eight percent of Missouri pecan operations maintained less than five acres of pecans, and 38 percent had between five acres and 24.9 acres. Twenty-four percent of Missouri pecan operations had at least 25 acres of pecans (USDA Economic Research Service 2017). These data suggest that both small- and large-scale operations contribute to Missouri's pecan industry. For other crops — namely, the specialty fruit crops described earlier — operations were less likely to have operated large-scale farms of a particular specialty crop.

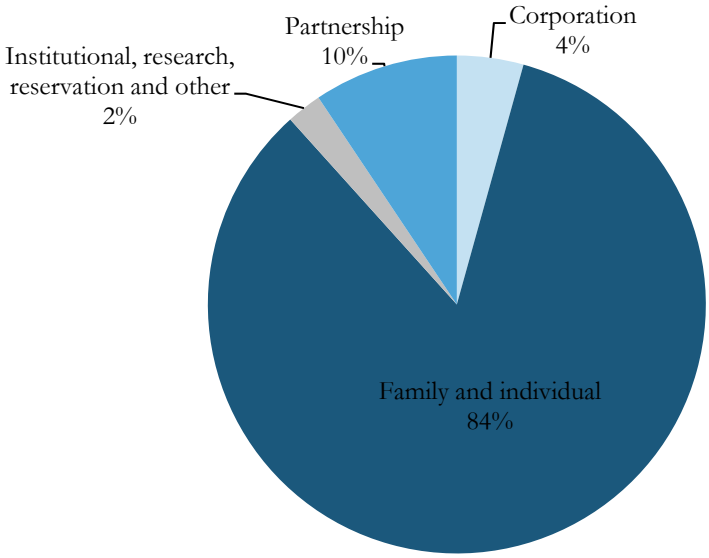
Exhibit 2.4.9 – Share of Missouri Pecan Operations by Acreage, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

To further drill into details about Missouri pecan operations, Exhibit 2.4.10 shares the percentage of operations with bearing and non-bearing acreage that are organized as several different types of business structures for tax purposes. Note that these data are from 2012. Predominantly, Missouri pecan operations were organized as family and individual farms at the time. Ten percent of operations were organized as partnerships, and 4 percent were structured as corporations. A smaller share were institutional, research, reservation or other types of organizations (USDA National Agricultural Statistics Service 2017b).

*Exhibit 2.4.10 – Share of Missouri Pecan Operations by Organizational Structure, 2012**



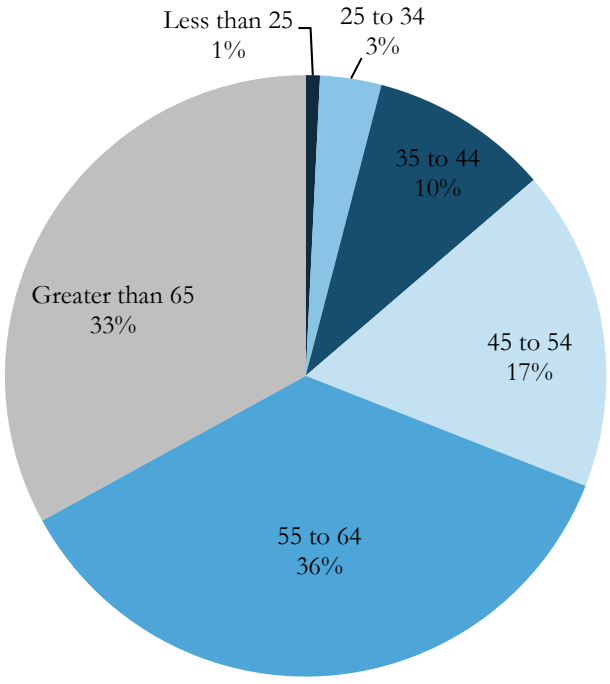
* Operations with bearing and non-bearing pecan acreage
Source: USDA, National Agricultural Statistics Service (2017b)

From a principal operator perspective, 52.5 percent of Missouri pecan operations with bearing and non-bearing acreage shared that their principal operators' primary occupation was something other than farming in 2012. As a result, farming was the primary occupation for 47.5 percent of principal operators (USDA National Agricultural Statistics Service 2017b).

Most principal operators also indicated that they had many years of experience on their present operations. Slightly more than three-fourths of principal operators indicated that they had been on their present operation for 11 years or more. Fifteen percent noted having been on their present operation for 6 years to 10 years. Just 8 percent had been on their operations for six years or less. With respect to Missouri pecan operation owner tenure, a majority of operations with bearing and non-bearing acreage in 2012 reported that they had full owners. Note that this applies to operations with bearing and non-bearing acreage. Sixteen percent indicated that they had part owners, and just 2 percent reported having a tenant operator (USDA National Agricultural Statistics Service 2017b).

For the most part, operating a pecan farm has been more common for older people than younger people. In 2012, a majority — 69 percent — of principal operators of Missouri pecan operations with bearing and non-bearing acreage were at least 55 years old. Exhibit 2.4.11 shares the age distribution of pecan farm principal operators. Slightly less than one-third indicated that they were younger than 54 years old (USDA National Agricultural Statistics Service 2017b).

*Exhibit 2.4.11 – Age Distribution of Missouri Pecan Operation Principal Operators, 2012**

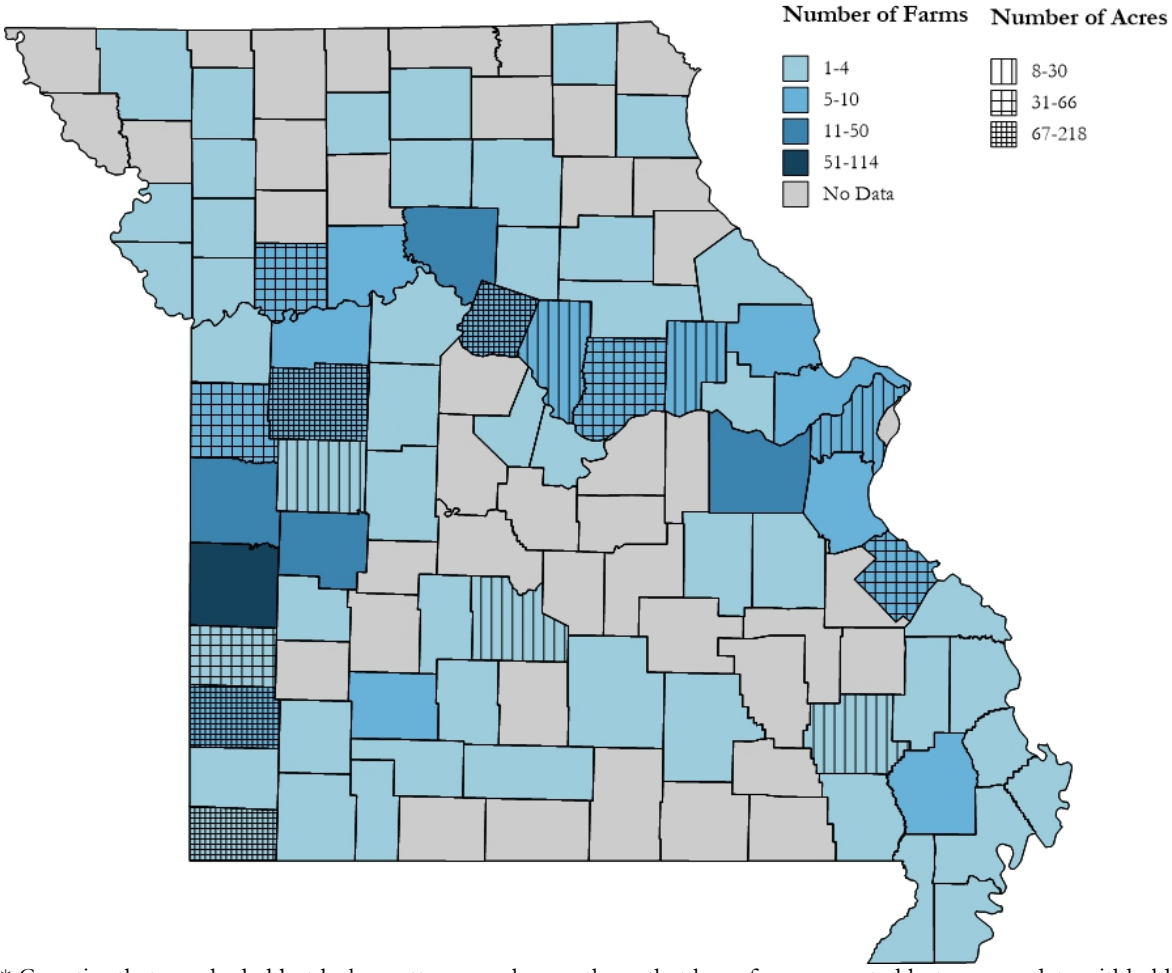


* Operations with bearing and non-bearing pecan acreage
Source: USDA, National Agricultural Statistics Service (2017b)

By Missouri county, those with the greatest number of pecan operations in 2012 were Vernon County, 114 farms; Bates County, 26 farms; and Chariton County, 25 farms. Exhibit 2.4.12 shows the number of pecan farms and pecan acreage by Missouri county. In many cases, USDA withheld

acreage data by county to protect data confidentiality for individual operations. The data reflect counts for bearing and non-bearing pecans and improved and native and seedling pecans. Among the counties with published pecan acreage data, those with the most acreage in 2012 were Howard County, 218 acres, and Jasper County, 170 acres (USDA Economic Research Service 2017).

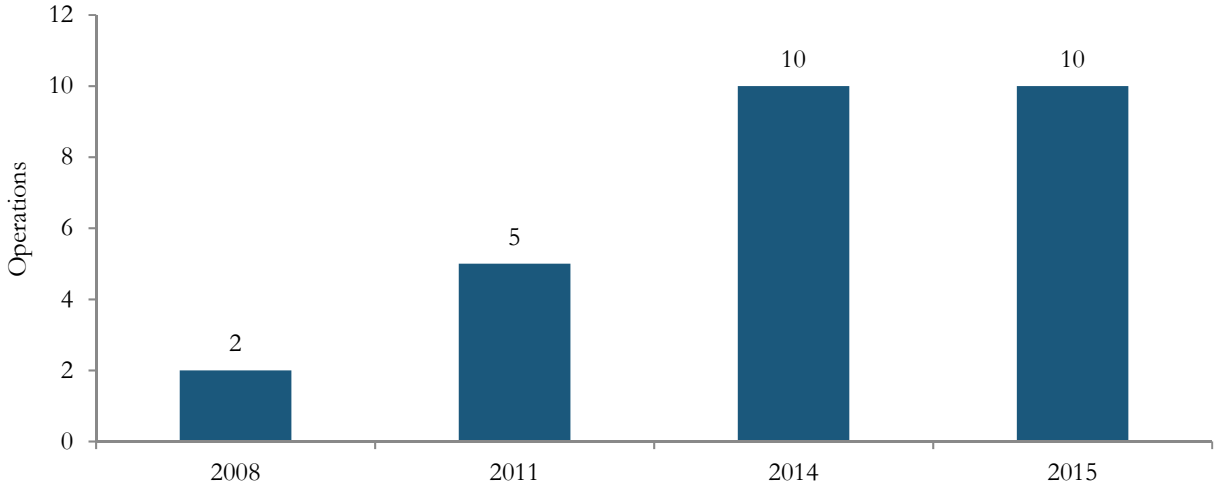
*Exhibit 2.4.12 – Missouri Pecan Operations and Total Acreage by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Missouri has cultivated a presence in organic pecan production. Exhibit 2.4.13 charts the number of Missouri pecan operations that harvested USDA certified organic pecan acreage in select years. It illustrates that two Missouri operations harvested USDA certified organic pecans in 2008, but that number of pecan operations increased to 10 farms in 2014. Ten operations also harvested USDA certified organic pecans in 2015. When accounting for exempt and certified organic production, Missouri had 11 organic pecan operations in 2014. The 10 operations harvested certified organic pecans, and one harvested exempt organic pecans (USDA Economic Research Service 2017). For a definition of exempt and certified organic, see the Methodology section.

Exhibit 2.4.13 – Missouri Pecan Operations Harvesting Certified Organic Acreage, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 2.4.14 highlights other details about Missouri's USDA certified organic pecan industry. Acres harvested of USDA certified organic pecans roughly doubled between 2011 and 2015. Organic pecan production in pounds increased by more than a factor of four from 2011 to 2015. In 2015, Missouri produced nearly 320,000 pounds of certified organic pecans. Certified organic pecan dollar sales topped $0.5 million in 2015 (USDA National Agricultural Statistics Service 2017b).

When accounting for certified and exempt organic production, Missouri's organic pecan activity swells, based on data from 2014. The state's exempt and certified organic pecan acreage harvested totaled more than 6,650 acres in 2014. After combining certified organic and exempt organic data, production in 2014 exceeded 0.5 million pounds, and the value of sales in that year topped $904,000 (USDA National Agricultural Statistics Service 2017b).

Exhibit 2.4.14 – Summary of Missouri Certified Organic Pecan Industry, 2011 and 2015

	Acres Harvested	Pounds Produced	Dollar Sales
2011	515	71,956	$124,527
2015	1,091	319,948	$503,995

Source: USDA, National Agricultural Statistics Service (2017b)

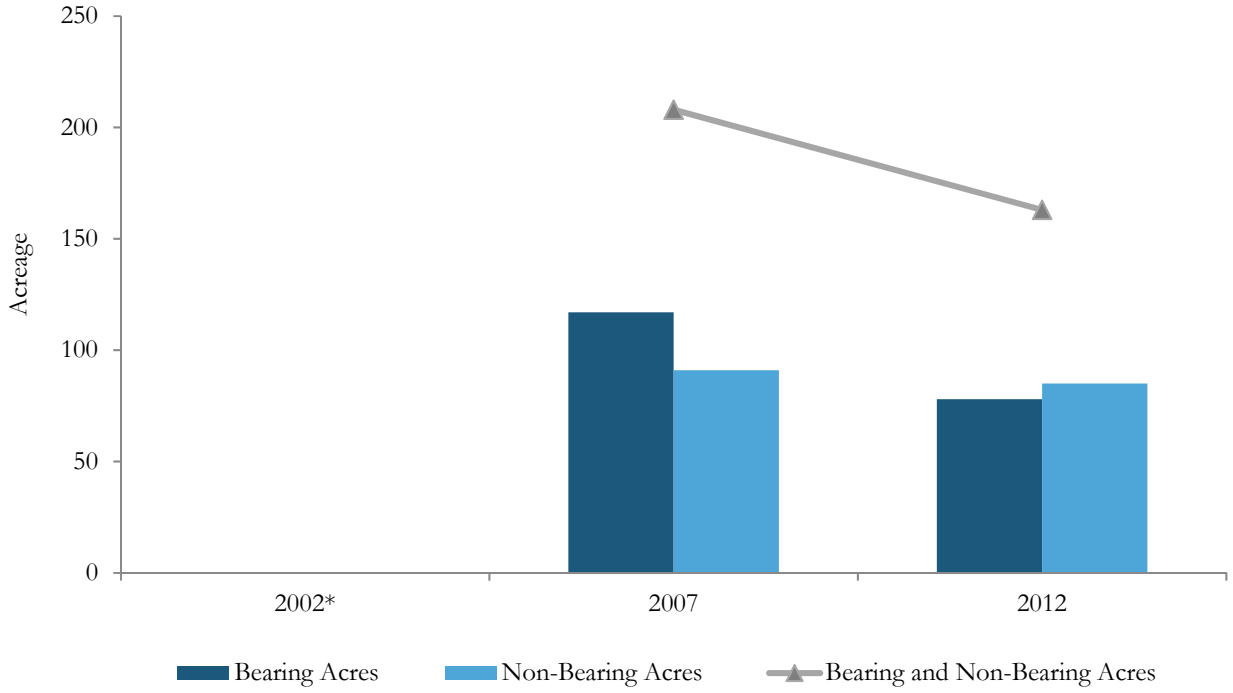
2.5 Walnuts

In the Census of Agriculture, USDA has published Missouri acreage and operations data for English walnuts. However, for this report, those English walnut data are reported as eastern black walnut data. According to Dr. Michael Gold with the Center for Agroforestry at the University of Missouri, and Dr. Mark Coggeshall, black walnut breeder, Missouri's walnut industry grows eastern black walnuts, not English walnuts. As a result, this report overrides USDA's description of walnut production and indicates that the state instead produces eastern black walnuts.

Exhibit 2.5.1 shares statewide walnut bearing and non-bearing acreage for 2007 and 2012. Note that data for 2002 were withheld to protect individual farm information. Total bearing and non-bearing

acreage declined from 208 acres in 2007 to 163 acres in 2012. Of the total acreage in 2012, 47.9 percent of acreage was bearing, and 52.1 percent was non-bearing (USDA National Agricultural Statistics Service 2017b).

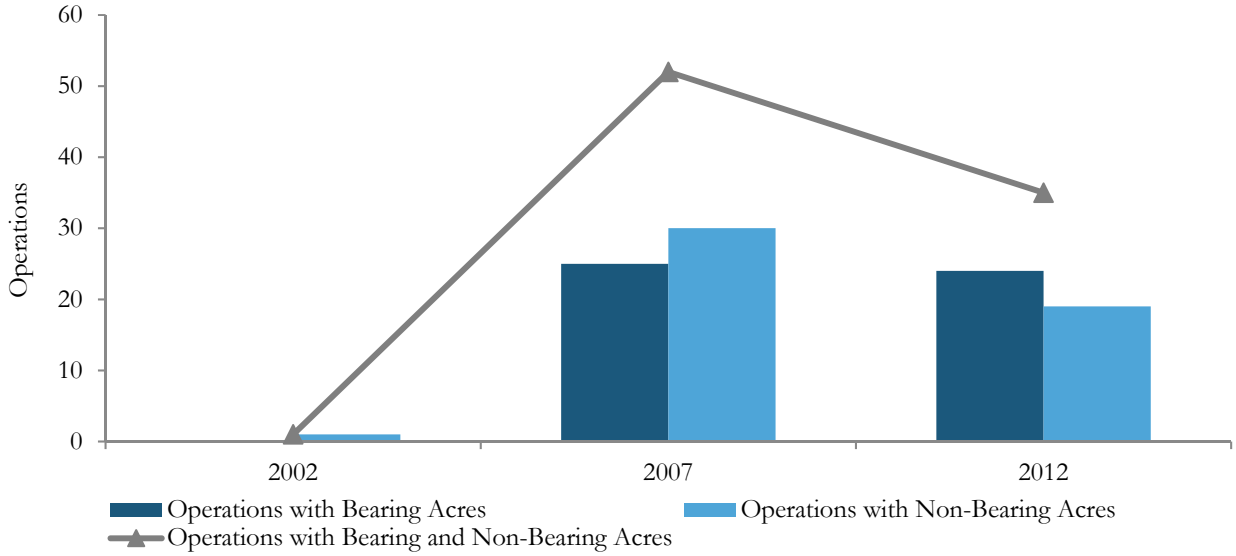
Exhibit 2.5.1 – Missouri Eastern Black Walnut Bearing and Non-Bearing Acreage, 2002 to 2012



* Data for 2002 were withheld to protect information for individual operations.
Note: For walnuts, USDA reports that Missouri data reflect production of English walnuts; however, Dr. Michael Gold with the Center for Agroforestry at the University of Missouri, and Dr. Mark Coggeshall, black walnut breeder, note that Missouri's walnut industry grows eastern black walnuts. As a result, this report overrides USDA's description of walnut production and indicates that the state instead produces eastern black walnuts.
Source: USDA, National Agricultural Statistics Service (2017b)

To give perspective about Missouri operations engaged in the eastern black walnut industry, see Exhibit 2.5.2. It shows that just one operation raised walnut trees in 2002, and it had non-bearing acreage. In 2007, the number of total operations jumped to 52 operations. Then, the operation count dropped to 35 operations in 2012. At the time, 24 operations had bearing acreage, and 19 operations had non-bearing acreage (USDA National Agricultural Statistics Service 2017b).

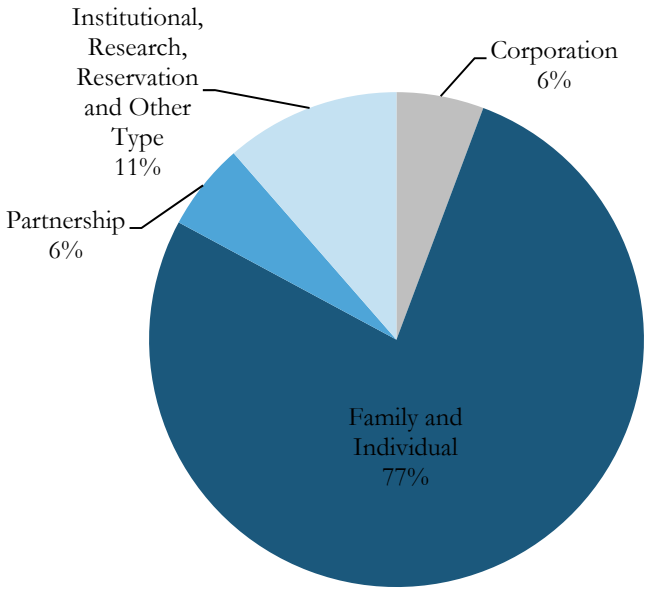
Exhibit 2.5.2 – Missouri Operations with Eastern Black Walnut Bearing and Non-Bearing Acreage, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, Missouri eastern black walnut operations with bearing and non-bearing acreage were most likely to be organized as family and individual operations. More than three-quarters of operations were family or individual operations. Exhibit 2.5.3 presents the share of operations with bearing and non-bearing acreage by organizational structure. Eleven percent of operations were institutional, research, reservation or other form of operation. Corporations and partnerships each represented 6 percent of total operations (USDA National Agricultural Statistics Service 2017b).

*Exhibit 2.5.3 – Share of Missouri Eastern Black Walnut Operations by Organizational Structure, 2012**

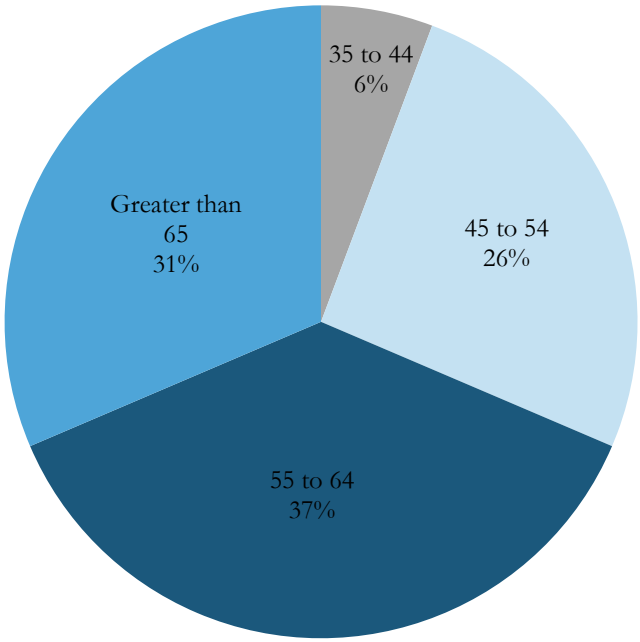


* Operations with bearing and non-bearing acreage
Source: USDA, National Agricultural Statistics Service (2017b)

Farming was the primary occupation for 45.7 percent of eastern black walnut operation principal operators during 2012. More than half of principal operators — 54.3 percent — considered their primary occupation to be something other than farming. Despite many eastern black walnut principal operators claiming a primary occupation other than farming, a majority reported being on their present operation for at least 11 years; 82.9 percent shared that they had been on their present operation for 11 years or longer. A smaller share — 14.3 percent — reported that they had been on their present operation for six years to 10 years, and one principal operator — the equivalent of 2.9 percent — had been on his or her present operation for less than six years (USDA National Agricultural Statistics Service 2017b).

With respect to age, principal operators of eastern black walnut farms with bearing and non-bearing acreage tend to skew older rather than younger. Exhibit 2.5.4 presents the share of principal operators in 2012 by age category. More than two-thirds of principal operators were at least 55 years old. In contrast, just 6 percent of principal operators indicated that they were 35- to 44-year-olds, and 26 percent were 45- to 54-year-olds (USDA National Agricultural Statistics Service 2017b).

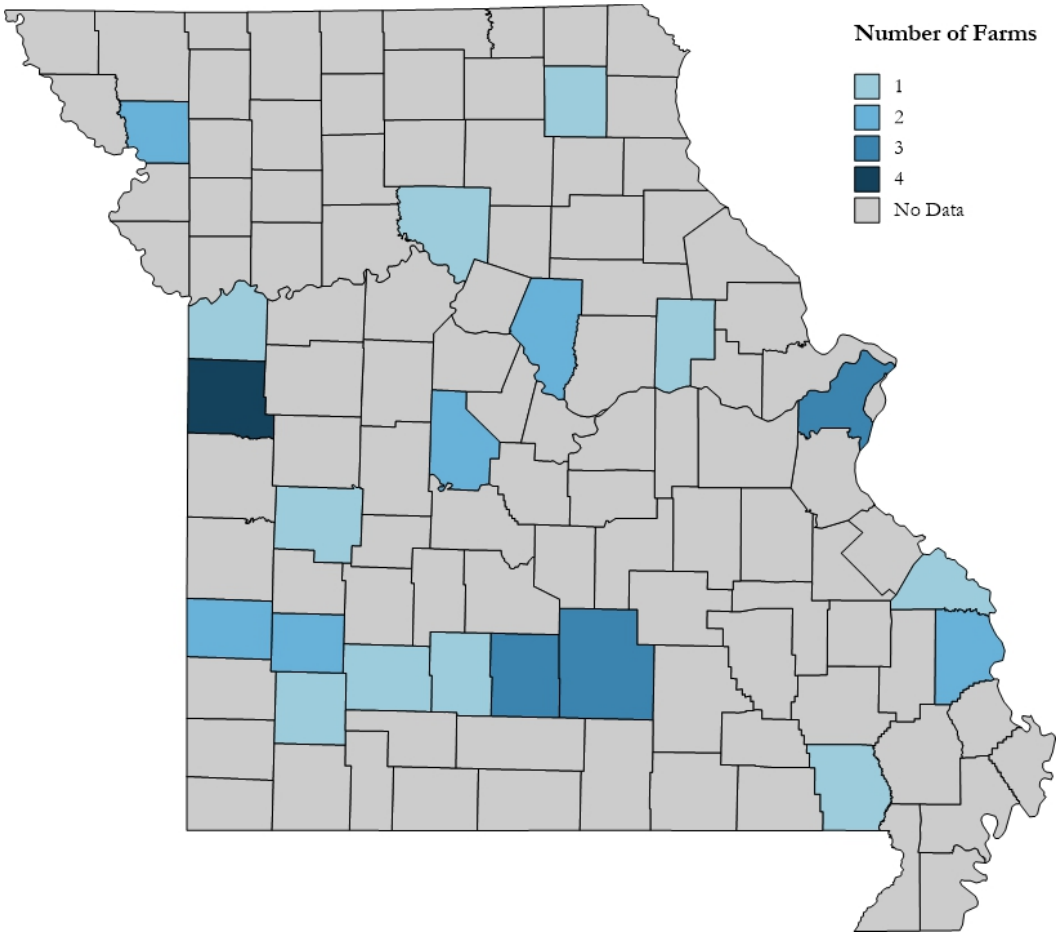
*Exhibit 2.5.4 – Age Distribution of Missouri Eastern Black Walnut Operation Principal Operators, 2012**



* Operations with bearing and non-bearing acreage
Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, counties with the greatest number of eastern black walnut operations were Cass County, four farms; St. Louis County, three farms; Texas County, three farms; and Wright County, three farms. Exhibit 2.5.5 maps Missouri counties by their number of total eastern black walnut operations. In most cases, USDA hasn't disclosed acreage data for Missouri counties. The exception was St. Louis County, which had three in 2012. Note that these data points include bearing and nonbearing area (USDA National Agricultural Statistics Service 2014b).

Exhibit 2.5.5 – Missouri Eastern Black Walnut Operations by County, 2012



Source: USDA, National Agricultural Statistics Service (2014)

Missouri produces more black walnuts than any other state. On a wider scale, Missouri has been said to lead black walnut production worldwide. Most of the state's black walnut trees grow wild. However, some efforts to develop black walnut orchards are underway (Herrold 2016). Trees of "improved varieties" are being tested (Coggeshall 2011a and Wendholt Silva 2016). The Center for Agroforestry at the University of Missouri has invested 20 years into breeding improved black walnut cultivars for commercial black walnut production in Missouri. In the late 1990s, approximately 70 black walnut cultivars were planted at the University of Missouri Horticulture and Agroforestry Research Center in New Franklin, Mo. Fifteen black walnut cultivars have been recommended for commercial production in Missouri based on leafing date, nut weight and percent kernel, disease resistance and bearing tendency (Coggeshall and Walter 2009). Based on results from a 20-year breeding program to improve black walnut overall quality and yield, new experimental cultivars are being tested at multiple Missouri locations. These experimental cultivars will bear at earlier ages, yield better, produce an increased percentage of nut meat (up to 40 percent) relative to shell, resist anthracnose and be less prone to alternative bearing (Coggeshall 2011b).

Wild black walnuts are collected by hand (Freeman 2016). On the other hand, black walnut orchards are machine-harvested. A consumer preferences study revealed that more than 85 percent of Missouri consumers consume black walnuts at least once a year. Taste, quality and nutrition-diet-

health are key factors affecting consumer purchases (Gold et al. 2004). Black walnuts are typically used for baking, not snacking. Other uses include ice cream and craft beer (Wendholt Silva 2016). In addition, black walnuts may be used to produce black walnut oil or animal feed. The shells have multiple applications including use as an abrasive cleaner or filtration material (Freeman 2016) or as fillers or extenders, or they may be used in oil drilling and cosmetics.

Hammons Products Company, based in Stockton, Mo., operates as a large black walnut commercial buyer (Missouri Nut Growers Association 2017). In an average year, Hammons Products processes roughly 23 million to 25 million pounds of wild black walnuts (Herrold 2016). Note that those nuts yield an average of 1.5 million pounds of nutmeats.

Generally, about two-thirds of the Hammons company's throughput originates from Missouri (Herrold 2016). Hammons Products purchases walnuts from more than 200 buying stations located in 11 different states (Freeman 2016).

3. Vegetables

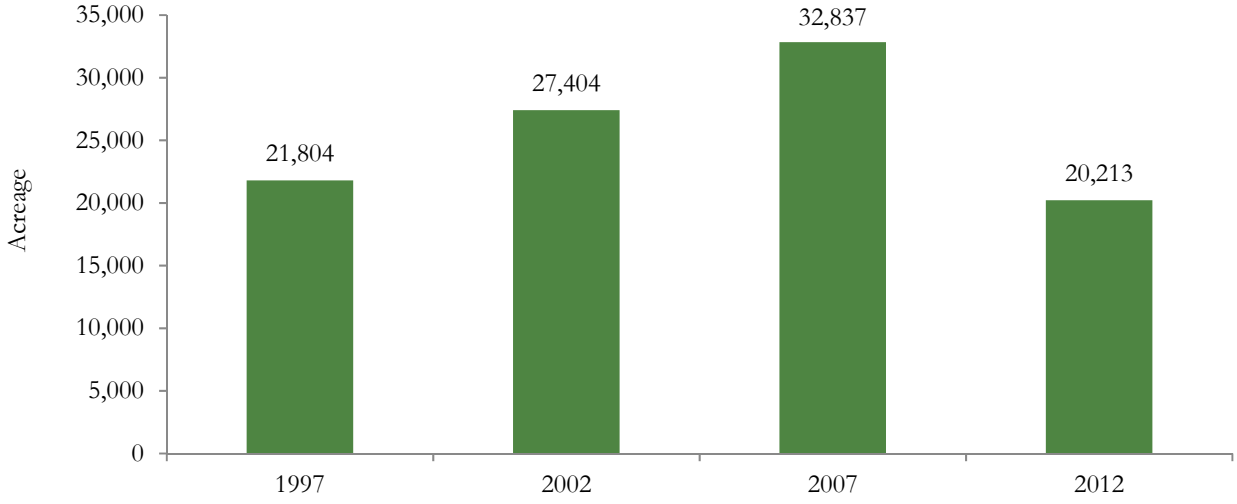
Specialty crops include multiple types of vegetables. Exhibit 3.1 lists the vegetables named by USDA as specialty crops. Those in bold type are produced in Missouri and have information or data available. The following sections describes the extent of vegetable production in the state.

Exhibit 3.1 – Vegetables Included in Specialty Crop Definition

Artichoke	**Asparagus**	Dry edible bean	**Green lima bean**
Snap bean	**Beet**	**Broccoli**	**Brussels sprouts**
Cabbage	**Carrot**	**Cauliflower**	Celeriac
Celery	Chickpeas	**Chive**	**Collards**
Cucumber	**Edamame**	**Eggplant**	**Endive**
Garlic	**Horseradish**	**Kohlrabi**	**Leek**
Lentils	**Lettuce**	**Melon**	**Mushroom**
Mustard and greens	**Okra**	**Onion**	Opuntia
Parsley	**Parsnip**	**Pea**	**Pepper**
Potato	**Pumpkin**	**Radish**	**Rhubarb**
Rutabaga	Salsify	**Spinach**	**Squash**
Sweet corn	**Sweet potato**	Swiss chard	Taro
Tomato	**Turnip**	**Watermelon**	

In 2012, Missouri growers allocated more than 20,000 acres to growing vegetables that they would harvest for selling. Exhibit 3.2 illustrates that total vegetable acreage harvested for selling in 2012 was lower than the totals in 1997, 2002 and 2007. Acreage used to grow vegetables meant for harvesting and selling was highest in 2007. At the time, more than 32,800 acres were harvested (USDA National Agricultural Statistics Service 2004, USDA National Agricultural Statistics Service 2009 and USDA National Agricultural Statistics Service 2014).

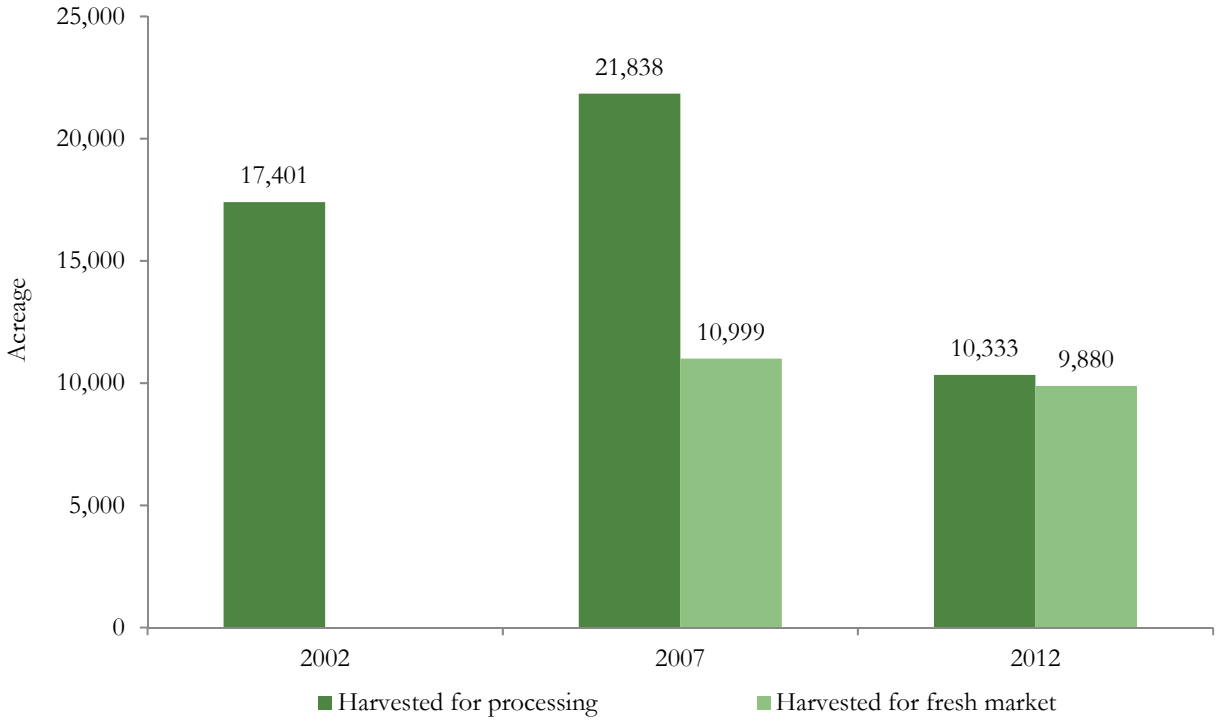
Exhibit 3.2 – Missouri Acreage Used to Harvest Vegetables for Sale, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2004); USDA, National Agricultural Statistics Service (2009); USDA, National Agricultural Statistics Service (2014)

Missouri vegetable acreage has been harvested to serve fresh and processing markets. For years with data available, Exhibit 3.3 breaks down the vegetable acreage total into that harvested for processing and fresh uses. Data for both processing and fresh uses were reported in 2007 and 2012. In those years, Missouri had more acreage harvested for the processing market than the fresh market. However, note the steep drop in acreage harvested for processing between 2007 and 2012. That decline led to acreage harvested for processing just slightly edging out acreage harvested for the fresh market in 2012 — a difference of less than 500 acres (USDA National Agricultural Statistics Service 2004, USDA National Agricultural Statistics Service 2009 and USDA National Agricultural Statistics Service 2014). Contributing to this drop in processing acreage between 2007 and 2012 was losses in the state's snap bean and cucumber acreage. Note that USDA considers processing uses to include freezing, canning, pickling and dehydrating. Crops in this report that are described as being processed may undergo processing methods such as these.

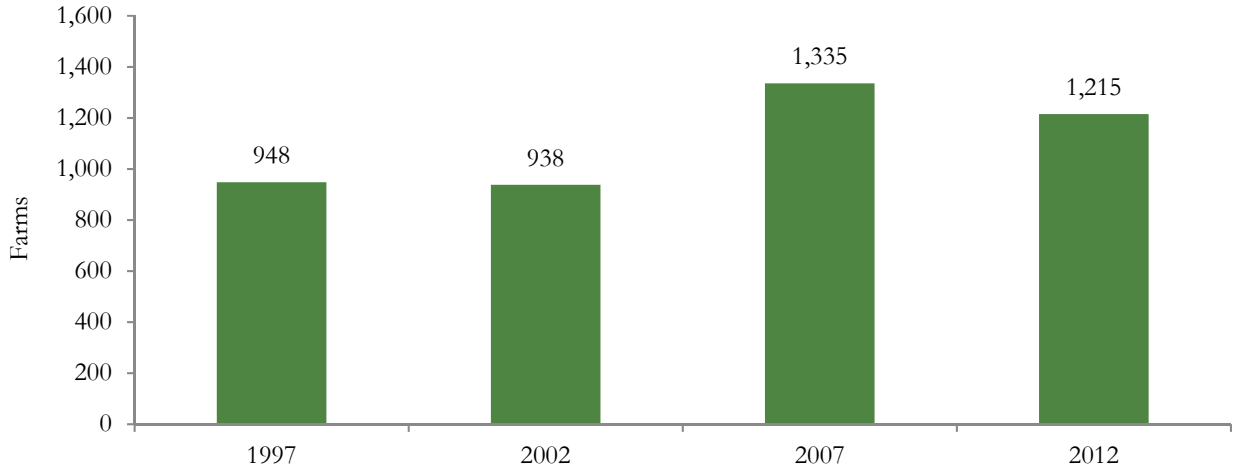
*Exhibit 3.3 – Missouri Acreage Used to Harvest Vegetables for Sale, 2002 to 2012**



* Fresh data weren't disclosed in 2002.
Source: USDA, National Agricultural Statistics Service (2004); USDA, National Agricultural Statistics Service (2009); USDA, National Agricultural Statistics Service (2014)

With respect to the number of farms harvesting vegetables for sale, Exhibit 3.4 presents totals from 1997 to 2012. The farm count was similar in 1997 and 2002. It jumped to 1,335 farms in 2007. By 2012, however, the number of farms harvesting vegetables for sale had declined slightly relative to the total recorded in 2007. Slightly more than 1,200 Missouri farms were reported to harvest vegetables for sale in 2012 (USDA National Agricultural Statistics Service 2004, USDA National Agricultural Statistics Service 2009 and USDA National Agricultural Statistics Service 2014).

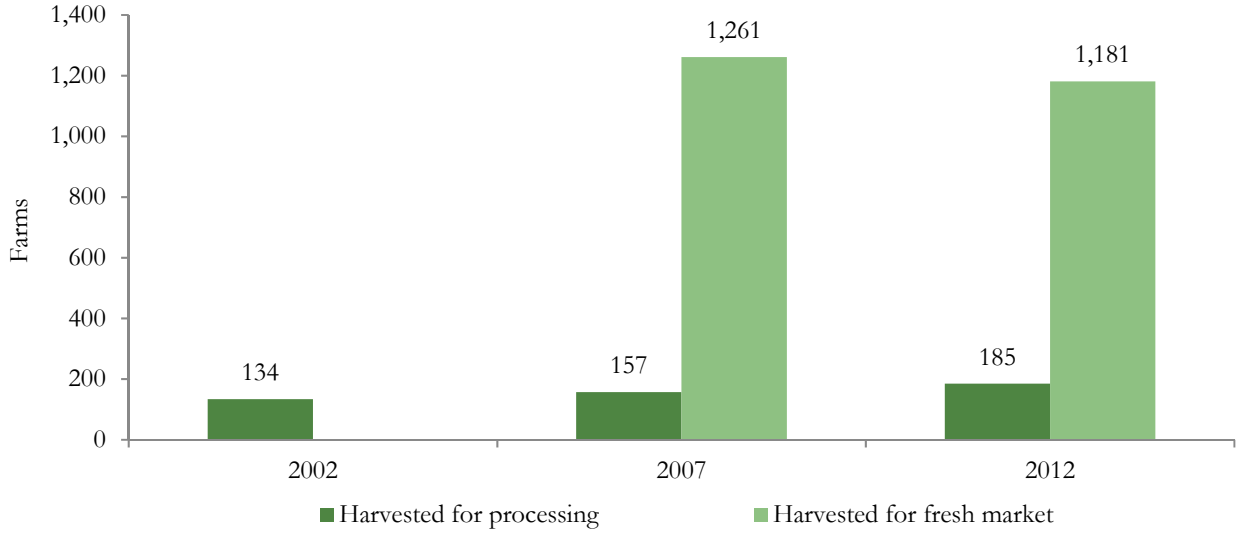
Exhibit 3.4 – Missouri Farms Harvesting Vegetables for Sale, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2004); USDA, National Agricultural Statistics Service (2009); USDA, National Agricultural Statistics Service (2014)

Despite vegetable acreage harvested for processing having been higher in recent years than acreage harvested for the fresh market, Exhibit 3.5 illustrates that Missouri vegetable farms have more commonly harvested product for the fresh market than the processing market. In 2012, for instance, 185 farms indicated that they had harvested vegetables for processing, but 1,181 farms harvested vegetables for the fresh market. From 2002 to 2012, note that the count of farms harvesting vegetables for processing increased during each observed year. Growth in the "processing" farm count even occurred between 2007 and 2012 when vegetable acreage harvested for processing decreased substantially (USDA National Agricultural Statistics Service 2004, USDA National Agricultural Statistics Service 2009 and USDA National Agricultural Statistics Service 2014).

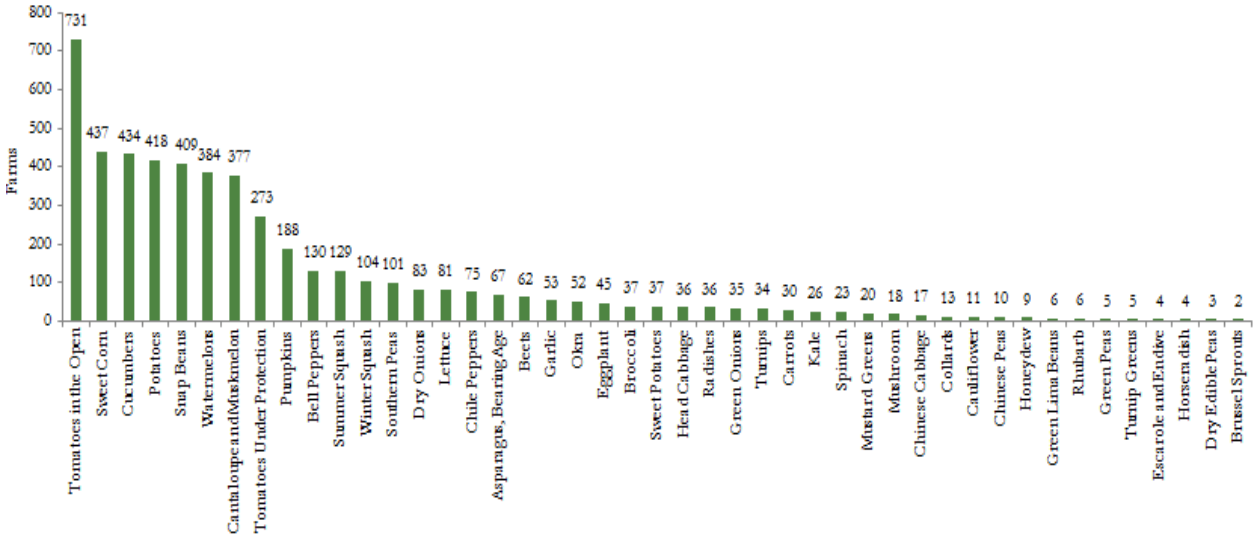
Exhibit 3.5 – Missouri Farms Harvesting Vegetables for Sale in Processing and Fresh Markets, 2002 to 2012



* Fresh data weren't disclosed in 2002.
Source: USDA, National Agricultural Statistics Service (2004); USDA, National Agricultural Statistics Service (2009); USDA, National Agricultural Statistics Service (2014)

To compare Missouri farm count by vegetable crop, see Exhibit 3.6. It reports farms with harvested acreage of various vegetables. As illustrated, tomatoes grown in the open was the vegetable crop that accumulated the greatest number of Missouri farms harvesting it in 2012. More than 730 farms in the state reported harvesting tomatoes grown in the open. Other vegetable crops with a significant number of operations harvesting them were sweet corn, 437 farms; cucumbers, 434 farms; potatoes, 418 farms; and snap beans, 409 farms (USDA National Agricultural Statistics Service 2014b).

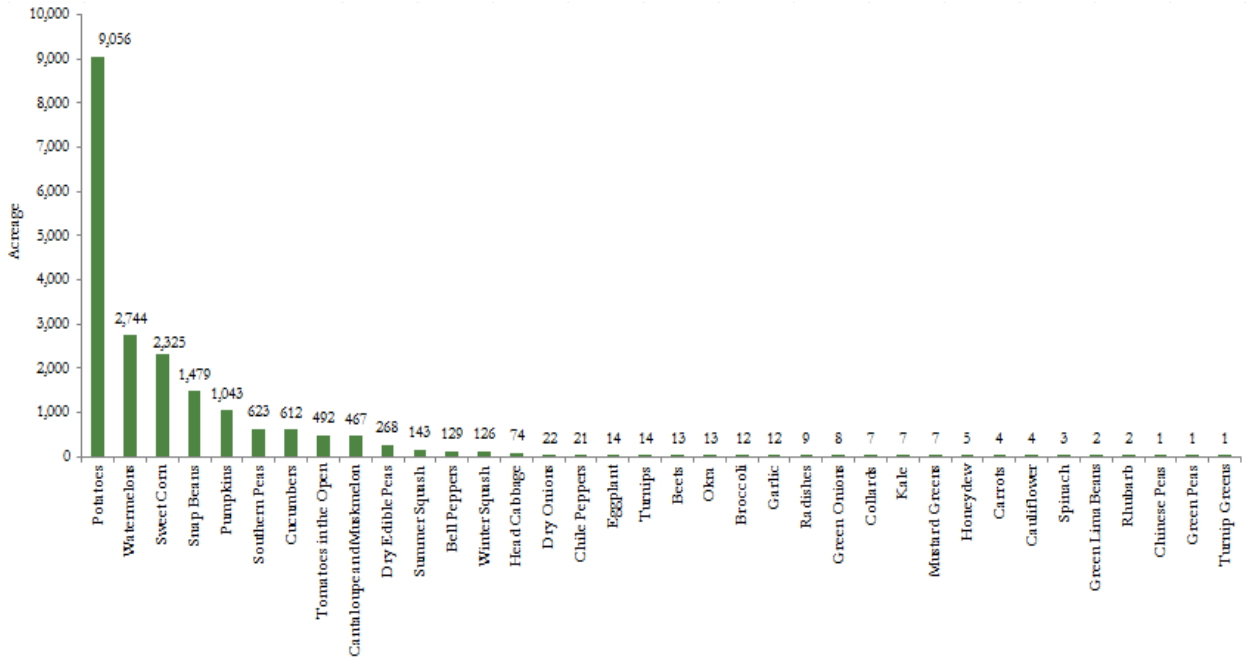
Exhibit 3.6 – Missouri Farms Harvesting Vegetables by Crop, 2012



Source: USDA, National Agricultural Statistics Service (2014)

For an alternative look at Missouri vegetable production by crop, Exhibit 3.7 displays harvested acreage totals from 2012. Based on these harvested acreage totals from the USDA National Agricultural Statistics Service, potatoes were the dominant vegetable crop harvested in 2012. In that year, Missouri operations harvested more than 9,000 acres of potatoes. Other top vegetable crops according to harvested acreage were watermelon, 2,744 acres; sweet corn, 2,325 acres; snap beans, 1,479 acres; and pumpkins, 1,043 acres (USDA National Agricultural Statistics Service 2014b).

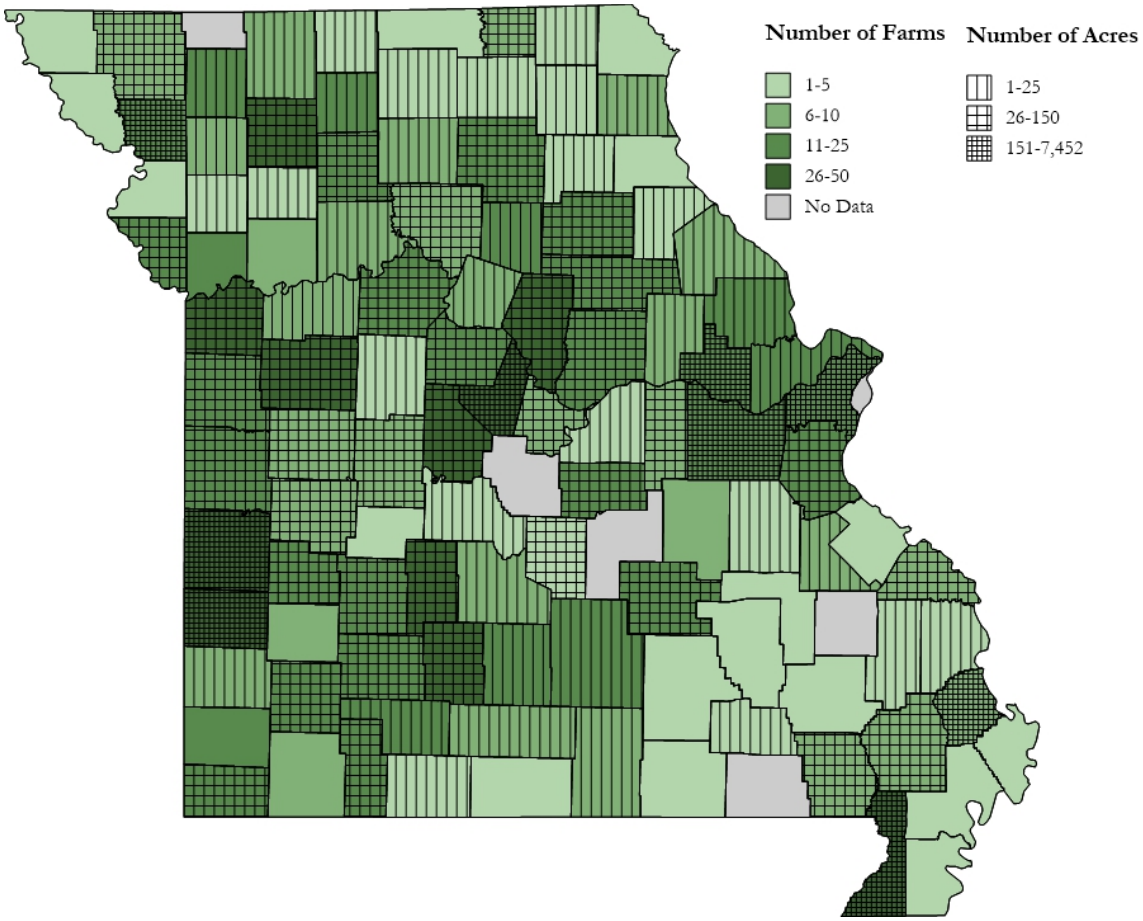
*Exhibit 3.7 – Missouri Harvested Acreage by Vegetable Crop, 2012**



* Data weren't published for escarole and endive, horseradish, lettuce and sweet potatoes. Data for mushrooms and tomatoes under protection were reported, but their production area is measured in square footage. Square footage under production totaled 1,339,178 square feet for tomatoes under protection and 30,586 square feet for mushrooms.
Source: USDA, National Agricultural Statistics Service (2014)

On a county-by-county basis, Exhibit 3.8 shares acres of vegetables harvested for selling and the count of farms harvesting vegetables for selling. Note that these data are for 2012. Counties with the greatest number of farms harvesting vegetables for sale were Vernon County, 50 farms; Moniteau County, 45 farms; Boone County, 42 farms; and Dallas County, 40 farms. With respect to acreage, data were withheld for some counties. Of those with data disclosed, however, the harvested acreage totals were highest in Dunklin County, 7,452 acres; Scott County, 1,775 acres; Vernon County, 879 acres; and Barton County, 659 acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.8 – Missouri Acreage and Farms Harvesting Vegetables for Sale by County, 2012**

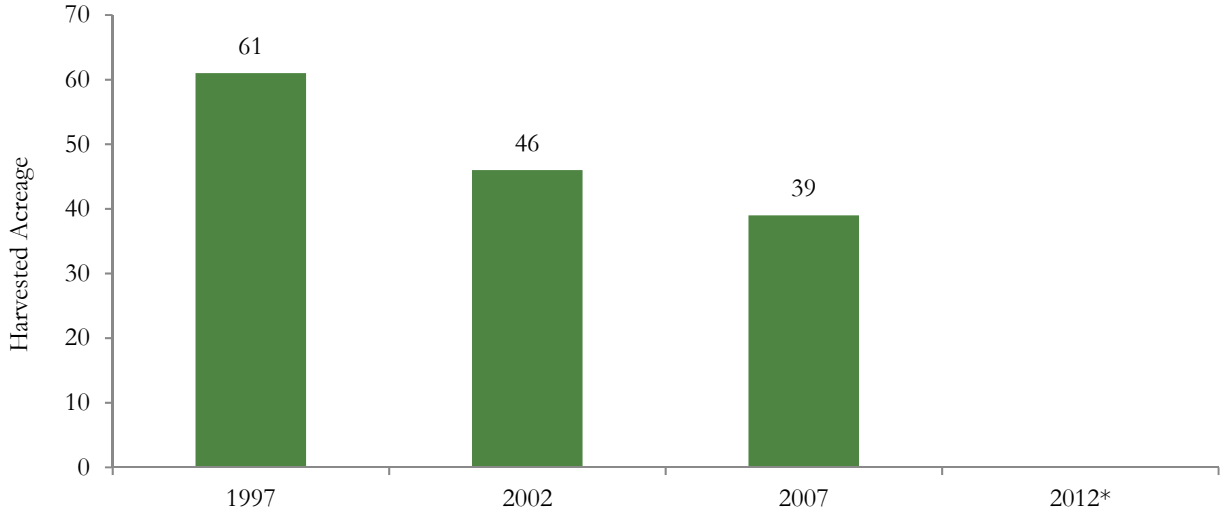


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.1 Asparagus

In Missouri, harvested asparagus acreage declined from 1997 to 2007. Exhibit 3.1.1 illustrates that Missouri producers harvested 61 asparagus acres in 1997. By 2007, asparagus harvested acreage had decreased to 39 acres. Note that 2012 harvested acreage wasn't reported in order to protect data for individual operations. However, fresh market acreage harvested was shared for 2012. Thirty-one acres of Missouri asparagus were harvested for fresh-market uses in 2012 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.1.1 – Missouri Asparagus Acreage Harvested, 1997 to 2012

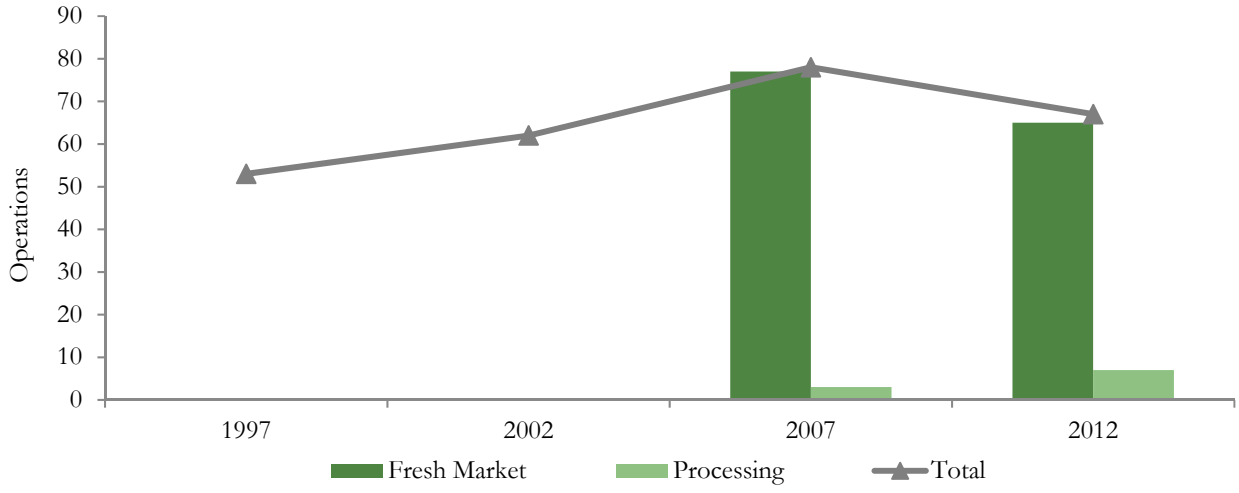


* Harvested acreage data were withheld in 2012.
Source: USDA, National Agricultural Statistics Service (2017b)

The number of Missouri operations engaged in harvesting asparagus increased from 53 operations in 1997 to 78 operations in 2007. However, Missouri had a reduction in operations with asparagus acreage harvested from 2007 to 2012. Sixty-seven operations harvested asparagus in 2012. See Exhibit 3.1.2 (USDA National Agricultural Statistics Service 2017b).

Missouri asparagus operations have been more likely to harvest product for fresh market sales than processing uses. In 2012, 65 operations harvested asparagus acreage for fresh uses, and seven operations harvested acreage for processing uses. Note that the number of operations harvesting asparagus for processing increased from three operations in 2007 to seven operations in 2012. The number of fresh market asparagus operations declined from 77 operations in 2007 to the 65 operations in 2012 (USDA National Agricultural Statistics Service 2017b).

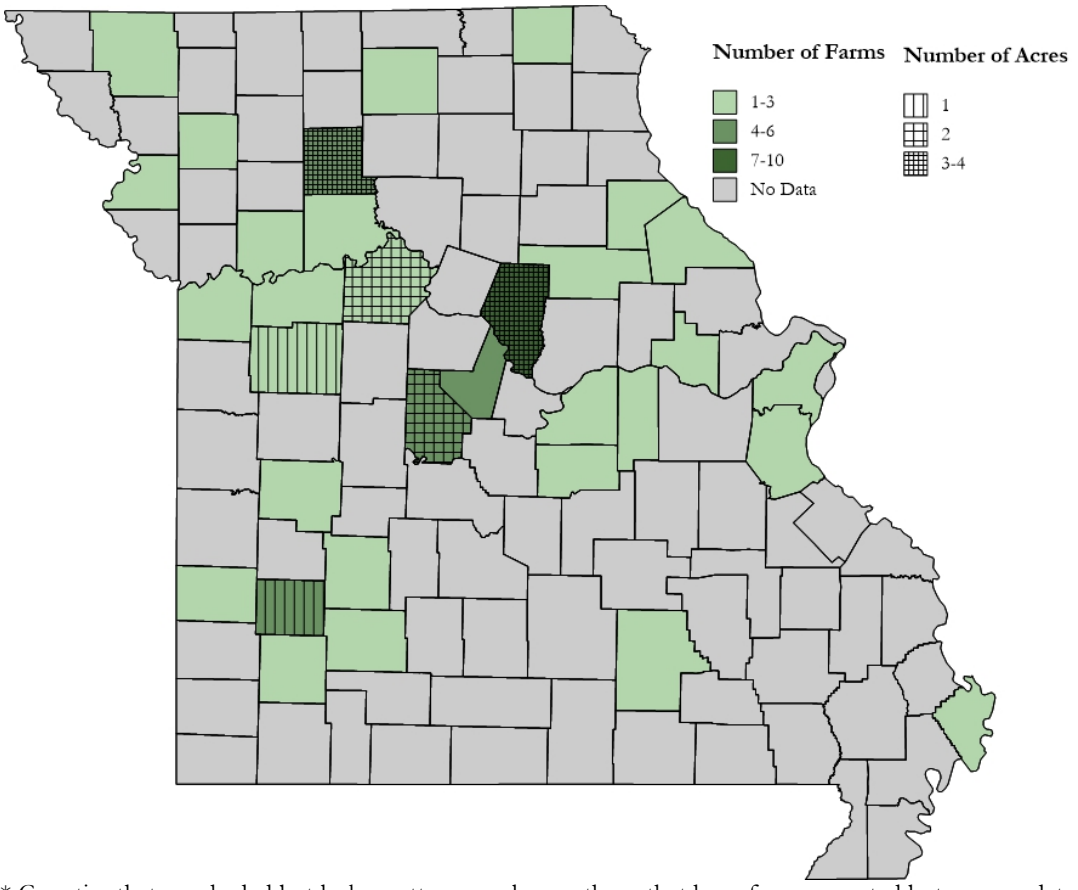
Exhibit 3.1.2 – Missouri Operations with Asparagus Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, counties with the most operations recording bearing-age asparagus acreage harvested were Boone County, 10 farms; Livingston County, five farms; Moniteau County, five farms; and Morgan County, five farms. Exhibit 3.1.3 maps Missouri counties by their number of asparagus operations and acreage. Note that this is acreage harvested and operations with acreage harvested. In some cases, note that USDA didn't report data to avoid disclosing information for particular operations. Counties with the most harvested bearing-age asparagus acreage reported were Boone County, four acres; Livingston County, three acres; Morgan County, two acres; and Saline County, two acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.1.3 – Missouri Harvested Asparagus Bearing-Age Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

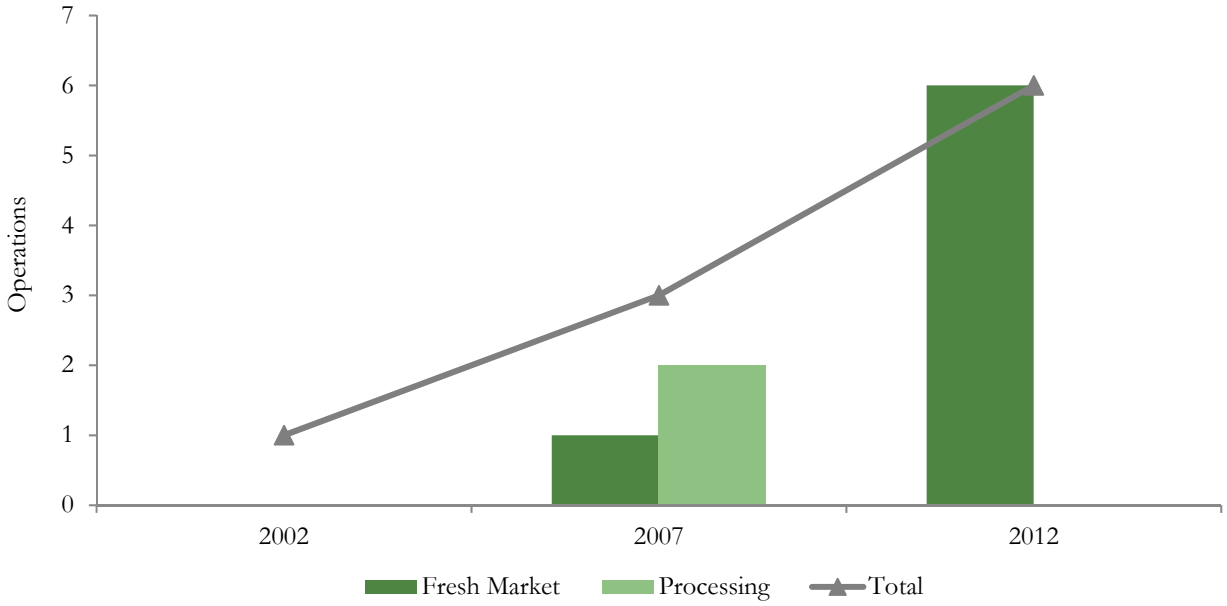
3.2 Green Lima Beans

Limited data have tracked green lima bean acreage in Missouri. In 2012, Missouri operations harvested two acres of green lima beans. Both acres were harvested for fresh market uses (USDA National Agricultural Statistics Service 2017b).

From an operations perspective, more Missouri operations have begun harvesting green lima beans in recent years. Exhibit 3.2.1 presents the number of Missouri operations reporting harvested green

lima bean acreage from 2002 to 2012. Just one Missouri operation harvested green lima beans in 2002, but six operations harvested acreage in 2012. For years with data available, the exhibit also highlights the number of operations harvesting green lima beans for fresh and processing uses. In 2012, all six green lima bean operations harvested product for the fresh market. In 2007, two operations had harvested green lima beans for processing markets, and one operation served the fresh market (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.2.1 – Missouri Operations with Green Lima Bean Acreage Harvested, 2002 to 2012



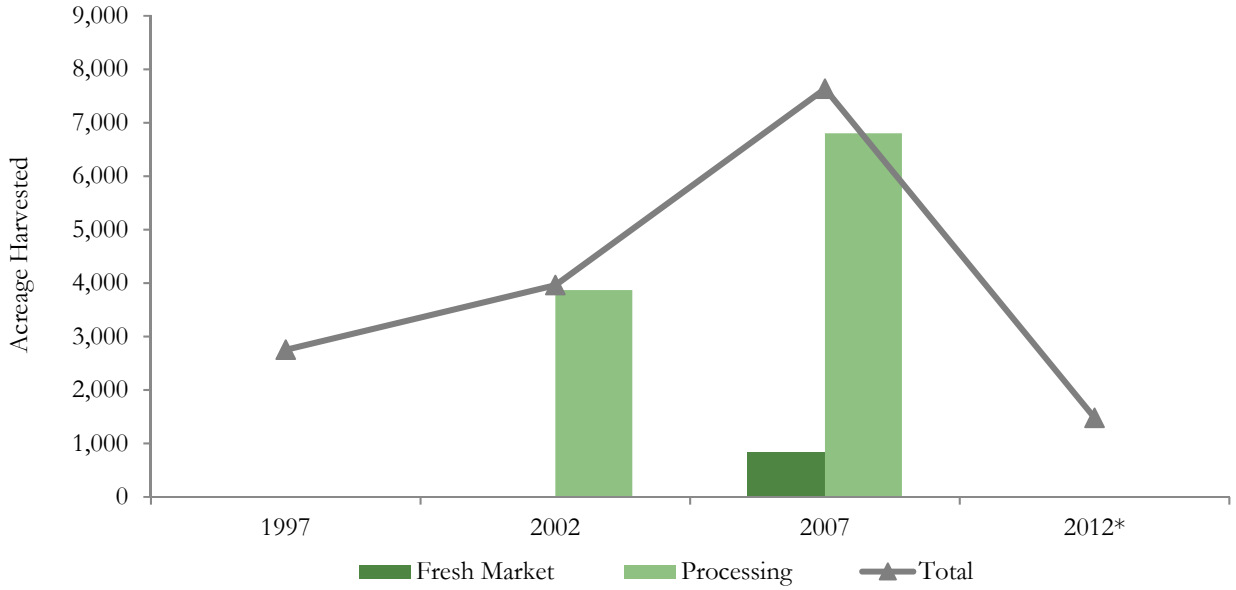
Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, green lima bean operations were distributed among three Missouri counties. McDonald, Moniteau and Scotland counties all had two green lima bean operations. Note that green lima bean acreage data by county were withheld (USDA National Agricultural Statistics Service 2014b).

3.3 Snap Beans

Historically, snap beans were a significant specialty crop in Missouri. Exhibit 3.3.1 illustrates that total Missouri snap bean harvested acreage increased from 1997 to 2007. However, it sharply declined from more than 7,600 acres in 2007 to slightly less than 1,500 acres in 2012. During the observed period, only in 2007 did USDA report acres harvested for both fresh market and processing uses. At the time, snap bean acreage overwhelmingly was harvested to serve processing markets. Processing's share of total acreage was 97.6 percent in 2002 and 89.1 percent in 2007 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.3.1 – Missouri Snap Bean Acreage Harvested, 1997 to 2012

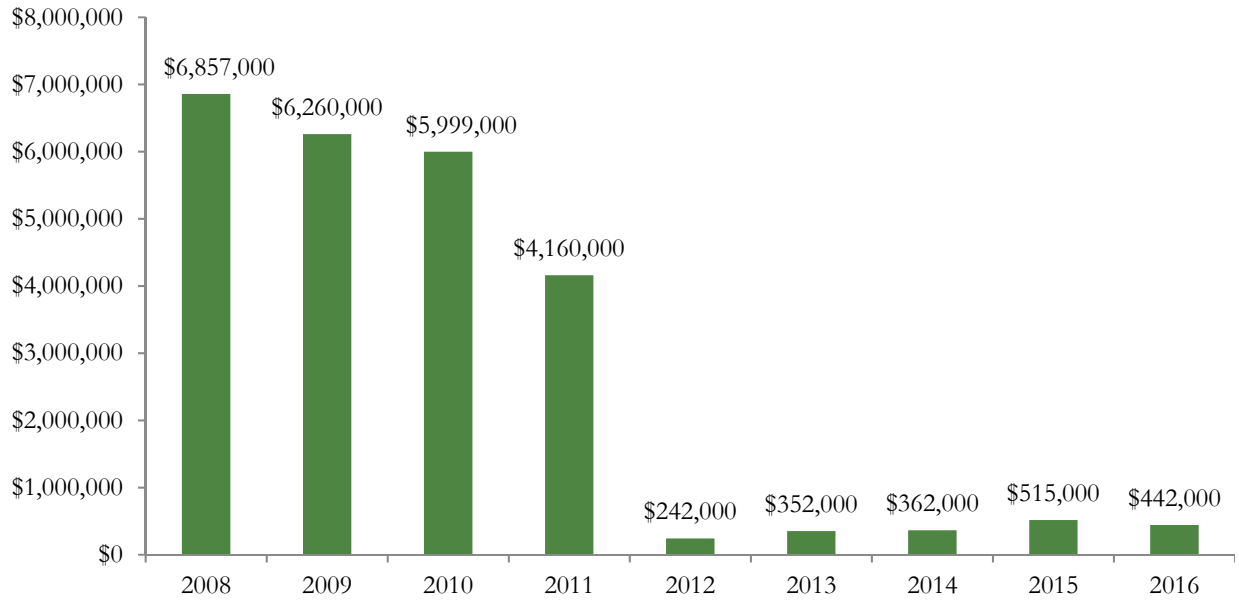


* Data for fresh market and processing acreage harvested were withheld in 2012.
Source: USDA, National Agricultural Statistics Service (2017b)

For snap beans, Missouri cash receipts constricted significantly between 2008 and 2016. Exhibit 3.3.2 illustrates the trend. In 2008, snap bean cash receipts exceeded $6.8 million. Despite total cash receipts declining between 2008 and 2011, they still maintained relatively high levels — more than $4 million annually. A significant drop in Missouri snap bean cash receipts occurred between 2011 and 2012. Later, between 2012 and 2016, cash receipts remained low. By 2016, the cash receipts value totaled just $442,000 (USDA Economic Research Service 2017).

Relative to all Missouri commodity cash receipts generated in 2016, snap beans represented just a sliver of that total. Missouri snap bean receipts in 2016 were 0.1 percent of the U.S. total (USDA Economic Research Service 2017).

Exhibit 3.3.2 – Missouri Snap Bean Cash Receipts, 2008 to 2016

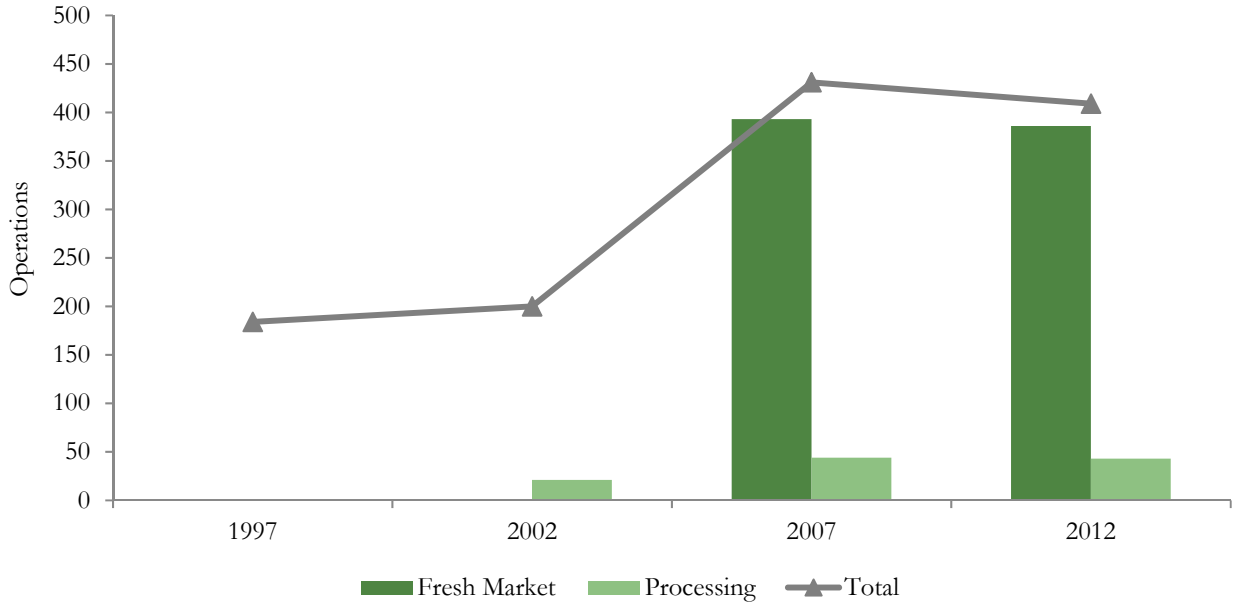


Source: USDA, Economic Research Service (2017)

Total operations engaged in Missouri snap bean production didn't drop from 2007 to 2012 to the extent that snap bean acres harvested declined. Exhibit 3.3.3 illustrates that total operations harvesting snap beans increased significantly from 2002 to 2007 but declined only slightly between 2007 and 2012. Number of snap bean operations totaled 431 farms in 2007 and 409 farms in 2012. This suggests that the operations recently ceasing snap bean harvesting were large farms (USDA National Agricultural Statistics Service 2017b).

Of the operations harvesting snap beans in 2012, 386 farms harvested snap beans for fresh market sales, and 43 farms harvested snap beans for processing uses. Note from earlier that acreage harvested for processing purposes has been more significant than acreage harvested for fresh market purposes. Thus, operations raising snap beans for processing had been larger than operations raising snap beans for fresh uses (USDA National Agricultural Statistics Service 2017b).

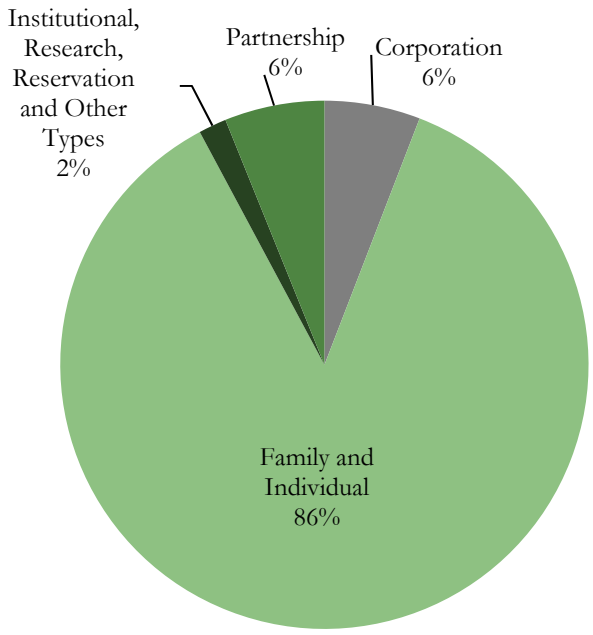
Exhibit 3.3.3 – Missouri Operations with Snap Bean Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

To give further insight into the Missouri operations that harvest snap beans, Exhibit 3.3.4 illustrates that 86 percent of operations in 2012 were structured as family and individual farms for tax purposes. Six percent of total snap bean operations were organized as partnerships, and another six percent were organized as corporations (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.3.4 – Share of Missouri Snap Bean Operations by Organizational Structure, 2012

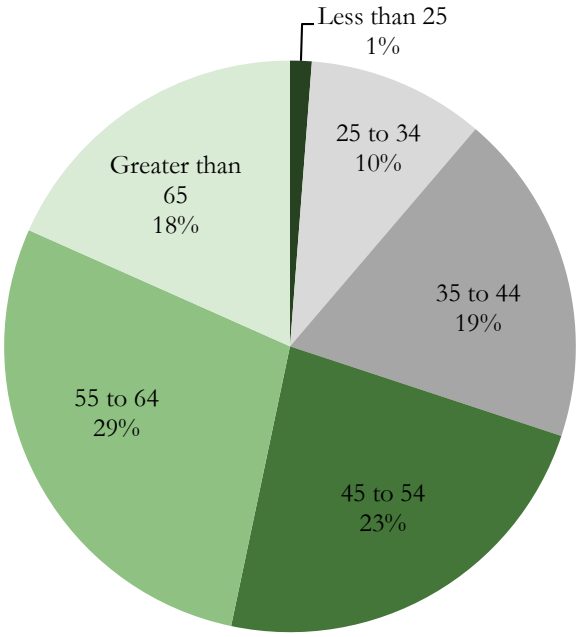


Source: USDA, National Agricultural Statistics Service (2017b)

A majority — 61.4 percent — of Missouri snap bean farm principal operators in 2012 named farming as their primary occupation. For 38.6 percent of operators, they considered something other than farming as their primary occupation. A majority of the principal operators also shared that they had many years of experience on their present operations. More than 57 percent of the snap bean operation principal operators reported that they had been on their present operations for 11 years or more. In comparison, roughly one-quarter had spent less than six years on their present operations (USDA National Agricultural Statistics Service 2017b).

From an age perspective, Missouri snap bean principal operators have had relatively varied ages. Exhibit 3.3.5 shares that 47 percent of principal operators in 2012 were at least 55 years old. Twenty-three percent of principal operators reported ages between 45 years old and 54 years old. Thirty percent of the snap bean principal operators were younger than 45 (USDA National Agricultural Statistics Service 2017b).

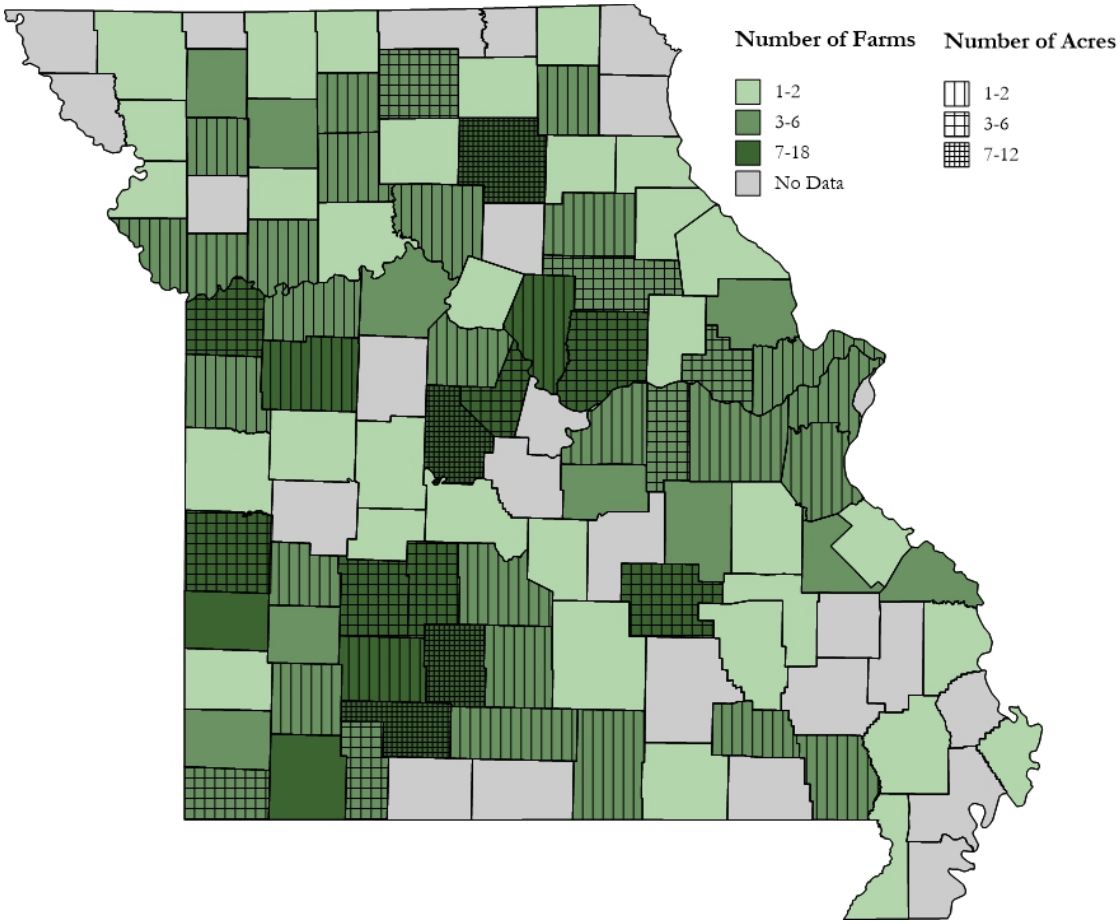
Exhibit 3.3.5 – Age Distribution of Missouri Snap Bean Operation Principal Operators, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, Missouri counties with the greatest number of snap bean operations were Moniteau County, 18 farms; Webster County, 17 farms; Dallas County, 16 farms; and Boone County, 15 farms. Here, note that snap bean operations and acreage include those for bush and pole beans. They also reflect data for harvested snap beans. In other words, acreage data are acreage harvested, and operations data are operations with harvested area. Exhibit 3.3.6 summarizes Missouri snap bean operations and acreage by county in 2012. Counties with the highest snap bean harvested acreage were Morgan County, 12 acres; Christian County, nine acres; Webster County, eight acres; Macon County, seven acres; and Callaway County, six acres. For select counties, note that data were withheld in order to protect information for specific operations (USDA National Agricultural Statistics Service 2014b).

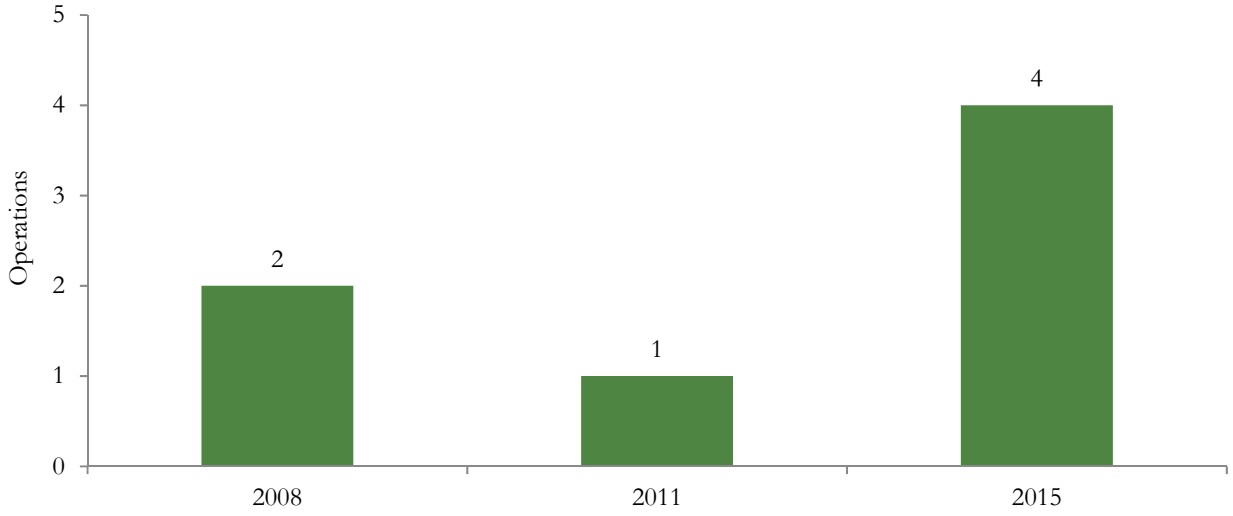
*Exhibit 3.3.6 – Missouri Harvested Snap Bean Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

From an organic snap bean production perspective, Missouri operations have adopted organic production to an extent. Exhibit 3.3.7 illustrates the number of operations that harvested USDA certified organic snap beans in 2008, 2011 and 2015. Note that the number of operations doubled from two operations in 2008 to four operations in 2015. When accounting for organic operations other than those exclusively with USDA organic certification, USDA reported that 14 certified and exempt operations harvested organic snap beans in 2008 (USDA National Agricultural Statistics Service 2017b). For a definition of exempt and certified organic, see the Methodology section.

Exhibit 3.3.7 – Missouri Operations Harvesting Organic Snap Bean Acreage, 2008 to 2015



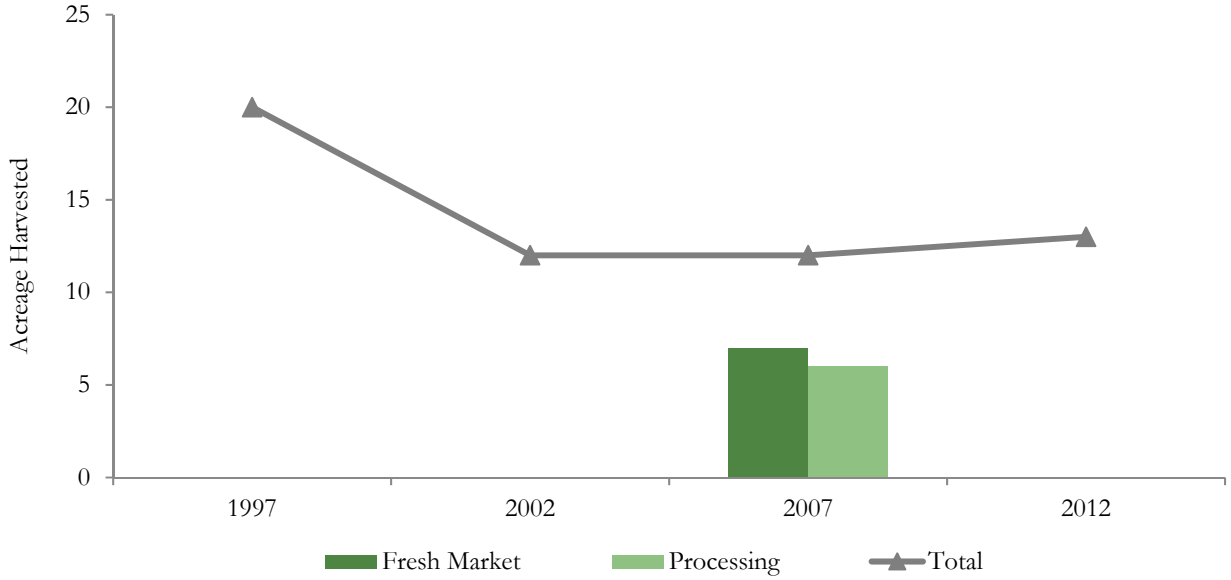
Source: USDA, National Agricultural Statistics Service (2017b)

In 2015, sales of Missouri snap beans with certified organic status totaled $6,800. All sales were derived from selling organic snap beans into fresh markets. At the time, fresh market organic snap bean production totaled 18 hundredweight (USDA National Agricultural Statistics Service 2017b).

3.4 Beets

In U.S. Census of Agriculture years from 1997 to 2012, Missouri harvested between 12 acres and 20 acres of beets annually. Exhibit 3.4.1 illustrates that harvested acreage was at its highest in 1997. Then, total harvested acreage dropped in 2002 and roughly maintained that level through 2012. Only in 2007 did USDA disclose acreage harvested for fresh and processing purposes. Total harvested acreage was roughly half dedicated for fresh market production and half dedicated to production for processing uses (USDA National Agricultural Statistics Service 2017b).

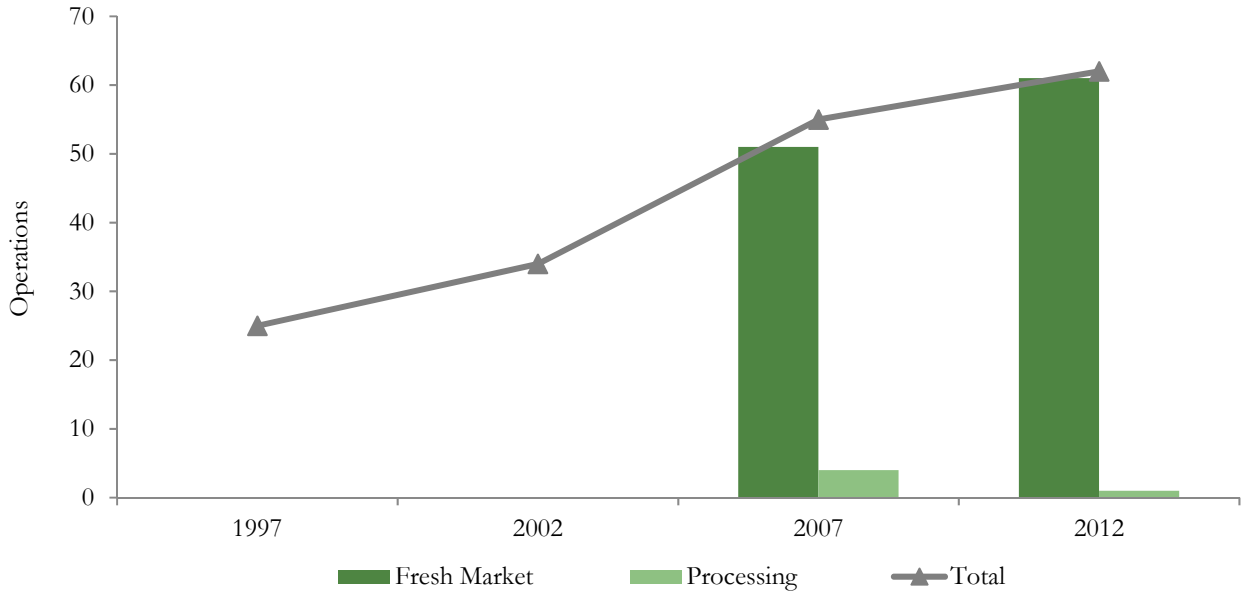
*Exhibit 3.4.1 – Missouri Beet Acreage Harvested, 1997 to 2012**



* 2012 data were withheld for fresh and processing markets; those data also weren't released in 1997 and 2002.
Source: USDA, National Agricultural Statistics Service (2017b)

Despite harvested beet acreage declining from 1997 to 2012, the number of Missouri operations engaged in harvesting beet acreage increased. Total operations harvesting beet acreage in Missouri more than doubled between 1997 and 2012. Exhibit 3.4.2 illustrates that the number of operations that harvested beet acreage increased from 25 operations in 1997 to 62 operations in 2012. Of the operations harvesting beet acreage in 2012, most grew beets for selling into the fresh market. Just one harvested beets for processing purposes (USDA National Agricultural Statistics Service 2017b).

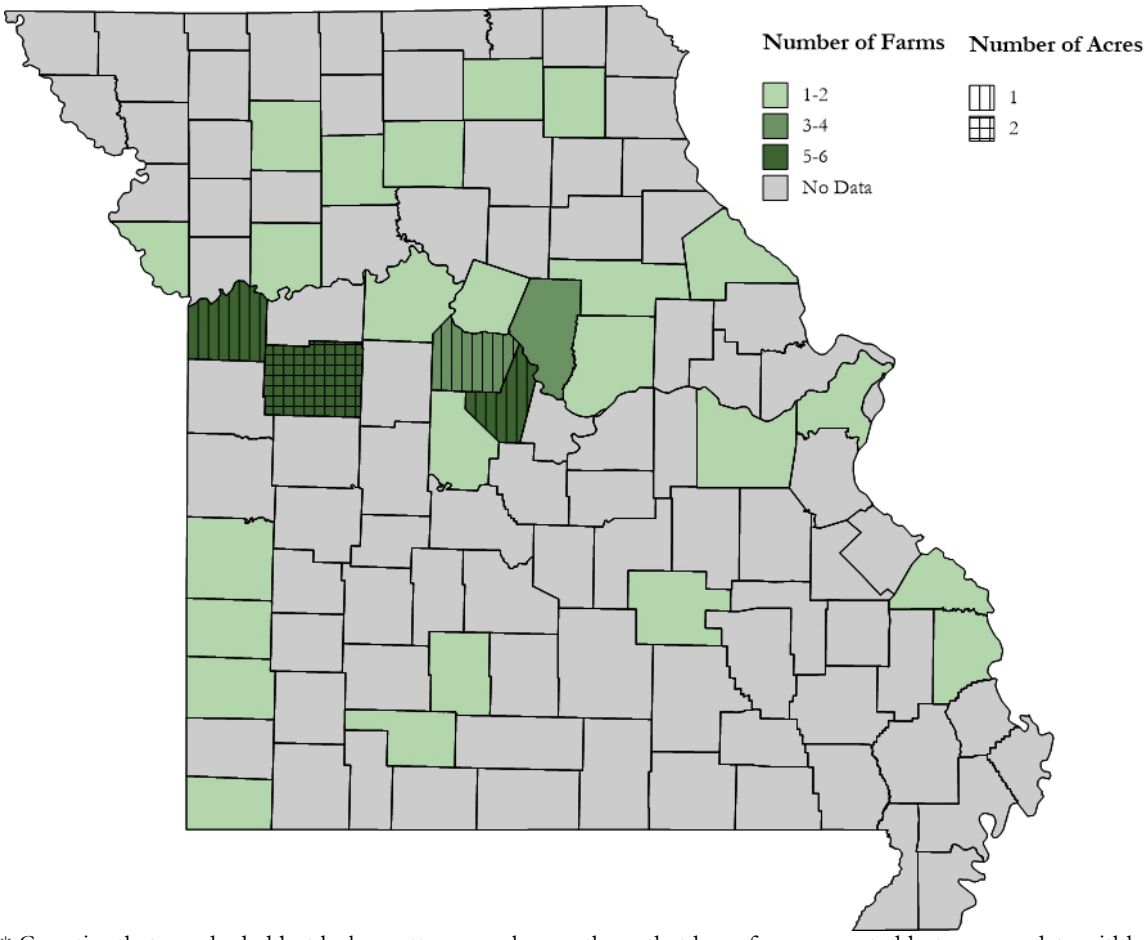
Exhibit 3.4.2 – Missouri Operations with Beet Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri beet farms in 2012 concentrated in a few counties: Jackson County, six farms; Johnson County, six farms; Moniteau County, five farms; and Boone County, four farms. In most cases, USDA withheld beet acreage by Missouri county. Counties with beet acreage reported were Johnson County, two acres; Cooper County, one acre; Jackson County, one acre; and Moniteau County, one acre. Exhibit 3.4.3 summarizes 2012 beet farms and acreage for counties with data available. Note that these are harvested (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.4.3 – Missouri Harvested Beet Acreage and Operations by County, 2012**

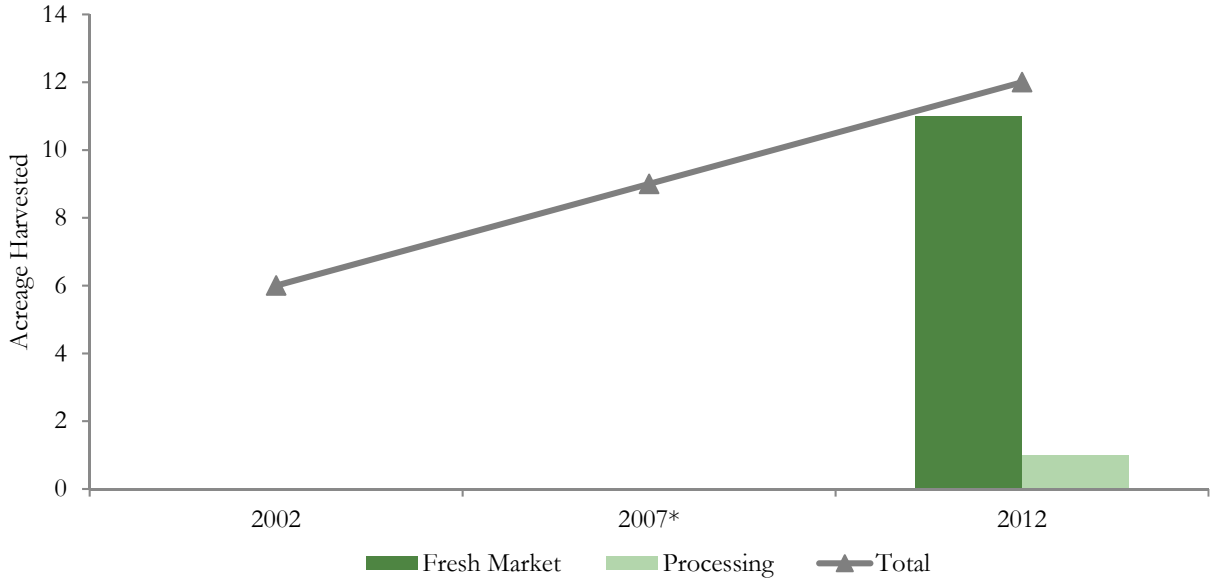


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.5 Broccoli

Broccoli recently has evolved into a more significant specialty crop for Missouri. Acreage harvested doubled from six acres in 2002 to 12 acres in 2012. Exhibit 3.5.1 charts the trend in Missouri broccoli acreage harvested during that time. Predominantly, Missouri broccoli has been produced for the fresh market instead of processing, based on 2012 data. Of the 12 acres harvested in 2012, 11 acres were harvested for fresh uses, and one harvested acre was dedicated to processing applications (USDA National Agricultural Statistics Service 2017b).

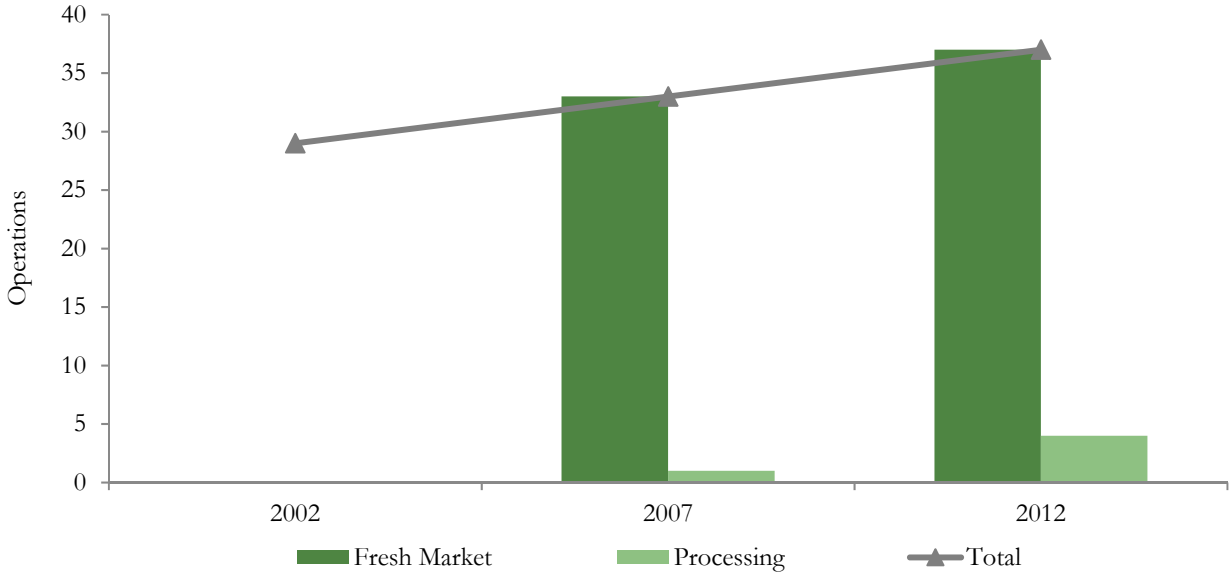
Exhibit 3.5.1 – Missouri Broccoli Acreage Harvested, 2002 to 2012



* 2007 data were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

As Missouri broccoli acreage has increased, more operations have engaged in broccoli production. Exhibit 3.5.2 charts the number of broccoli operations in Missouri harvesting product from 2002 to 2012. Twenty-nine operations harvested broccoli in 2002, and by 2012, 37 farms harvested broccoli. During 2007 and 2012, all Missouri operations reported harvesting broccoli for the fresh market. Some of those farms also harvested product for processing uses: one operation in 2007 and four operations in 2012 (USDA National Agricultural Statistics Service 2017b).

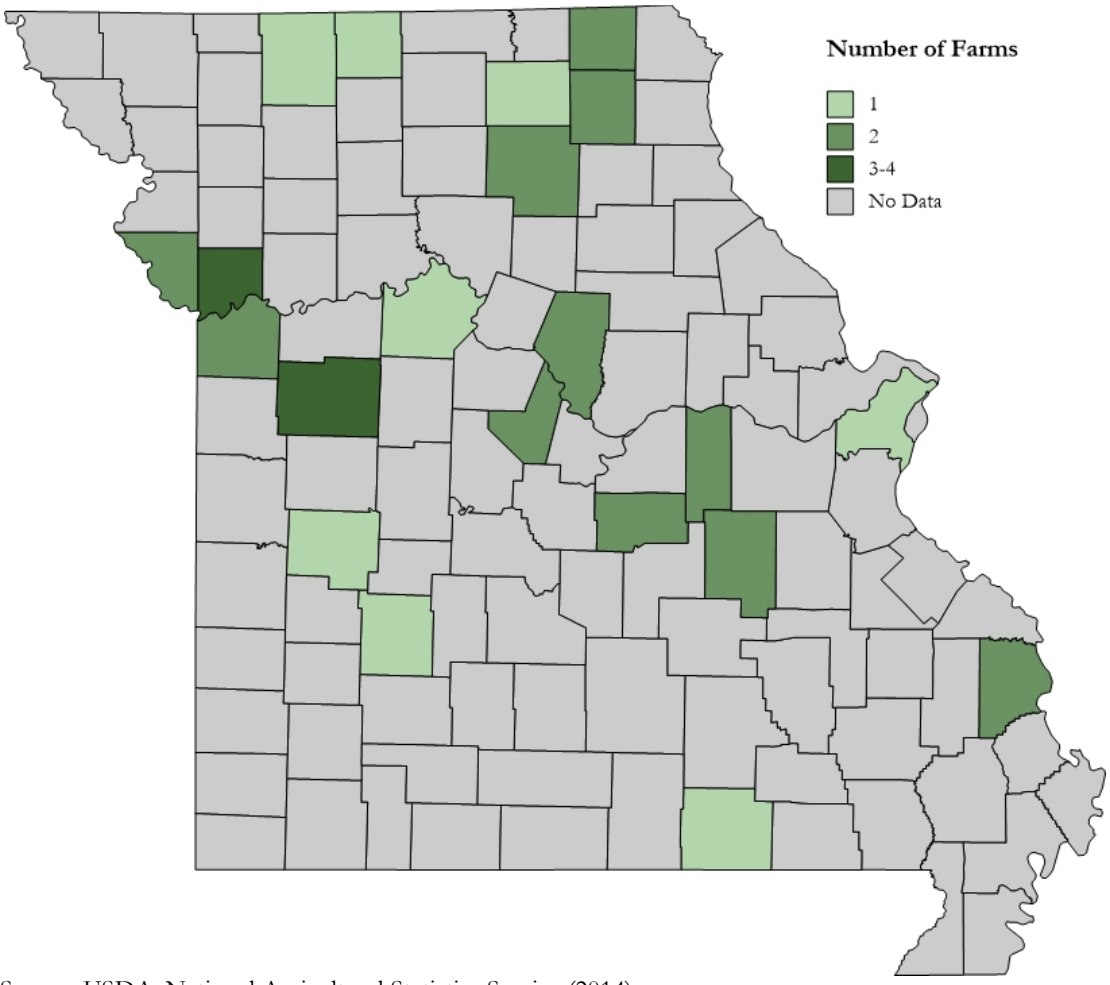
Exhibit 3.5.2 – Missouri Operations with Broccoli Acreage Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Clay and Johnson counties recorded having the most broccoli farms with harvested acreage in 2012. They had four farms and three farms, respectively. Exhibit 3.5.3 shades Missouri counties by their number of broccoli farms with harvested acreage. Note that acreage data aren't included in the map because USDA withheld acreage data for specific Missouri counties (USDA National Agricultural Statistics Service 2014b).

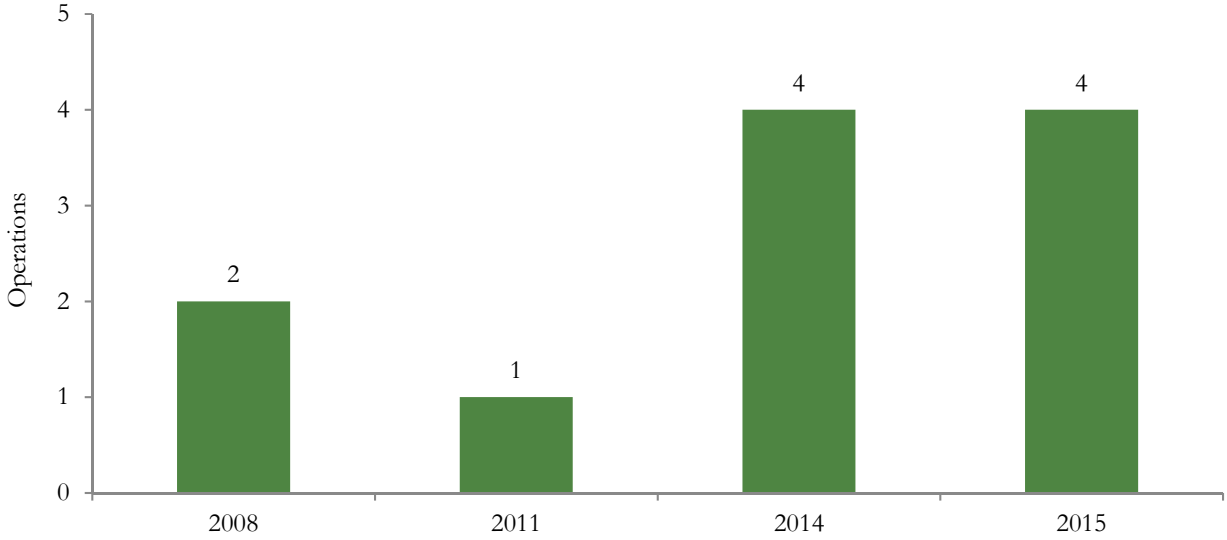
Exhibit 3.5.3 – Missouri Broccoli Operations with Harvested Area by County, 2012



Source: USDA, National Agricultural Statistics Service (2014)

Limited Missouri broccoli production has transitioned to organic. USDA certified organic broccoli acreage totaled two acres in 2014 and one acre in 2015. Exhibit 3.5.4 illustrates the number of USDA certified operations in Missouri that harvested organic broccoli from 2008 to 2015. In 2015, four operations harvested USDA certified organic broccoli. Those operations produced 112 hundredweight of USDA certified organic broccoli. Sales totaled $21,720 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.5.4 – Missouri Certified Organic Broccoli Operations with Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

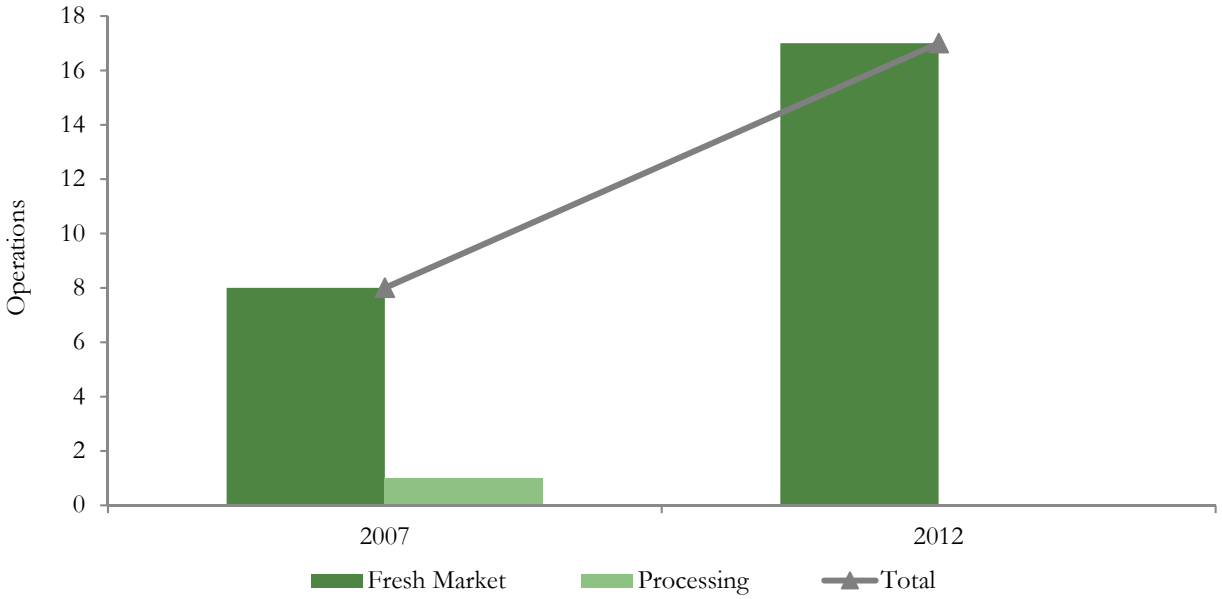
3.6 Brussels Sprouts

Little data are available to describe the state's Brussels sprouts production. In the most recent Census of Agriculture, USDA published that two operations in Missouri harvested Brussels sprouts in 2012. Both operations harvested product for the fresh market. Additionally, both of those farms were located in Cape Girardeau County (USDA National Agricultural Statistics Service 2017b).

3.7 Cabbage

Missouri grows both Chinese cabbage and head cabbage. Chinese cabbage acreage hasn't been reported in order to protect information for individual farms. However, Exhibit 3.7.1 illustrates the change in Missouri operations harvesting Chinese cabbage from 2007 to 2012. Between those two years, the number of Missouri operations harvesting Chinese cabbage more than doubled from eight farms in 2007 to 17 farms in 2012. All Missouri operations harvested Chinese cabbage to sell into fresh markets during both 2007 and 2012. In 2007, one operation also harvested product for processing use (USDA National Agricultural Statistics Service 2017b).

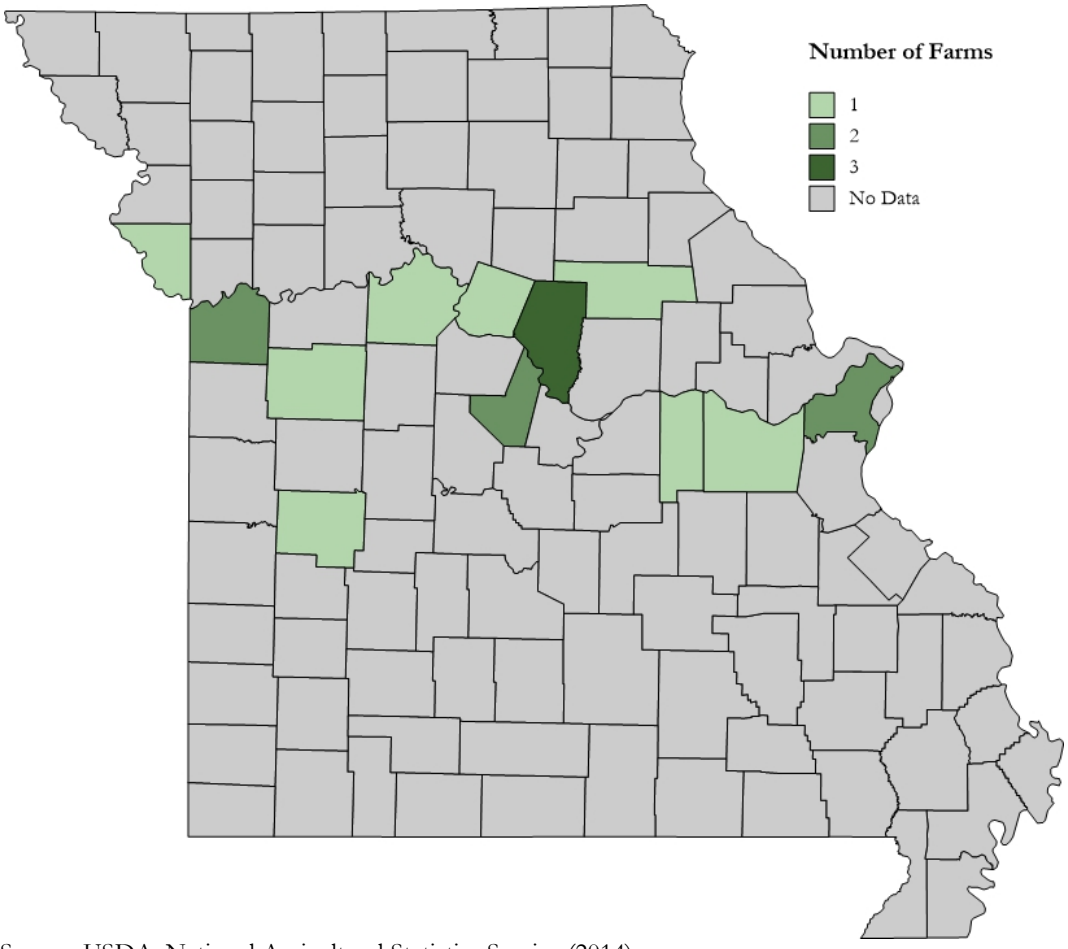
Exhibit 3.7.1 – Missouri Operations with Chinese Cabbage Acreage Harvested, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Counties with the most operations harvesting Chinese cabbage in 2012 were Boone County, three farms; Jackson County, two farms; Moniteau County, two farms; and St. Louis County, two farms. Exhibit 3.7.2 shades Missouri counties to indicate the number of Chinese cabbage farms that harvested acreage. Note that harvested acreage data by county weren't disclosed (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.7.2 – Missouri Chinese Cabbage Operations with Harvested Area by County, 2012

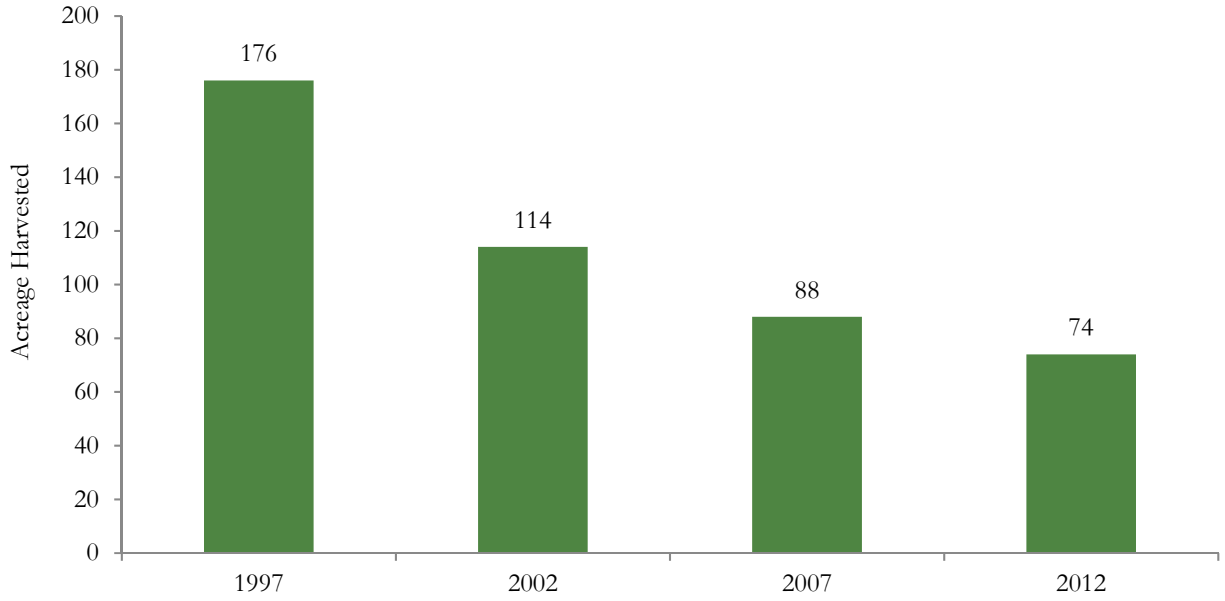


Source: USDA, National Agricultural Statistics Service (2014)

Missouri's head cabbage acreage declined in recent years. Exhibit 3.7.3 charts the change in head cabbage acreage harvested from 1997 to 2012. During that time, acreage harvested dropped from 176 acres in 1997 to 74 acres in 2012 (USDA National Agricultural Statistics Service 2017b).

In most cases, USDA hasn't released data about head cabbage harvested for the fresh market versus processing uses in order to protect data for individual operations. The exception was 2007. In that year, all 88 acres of Missouri head cabbage acres harvested were used to serve the fresh market (USDA National Agricultural Statistics Service 2017b).

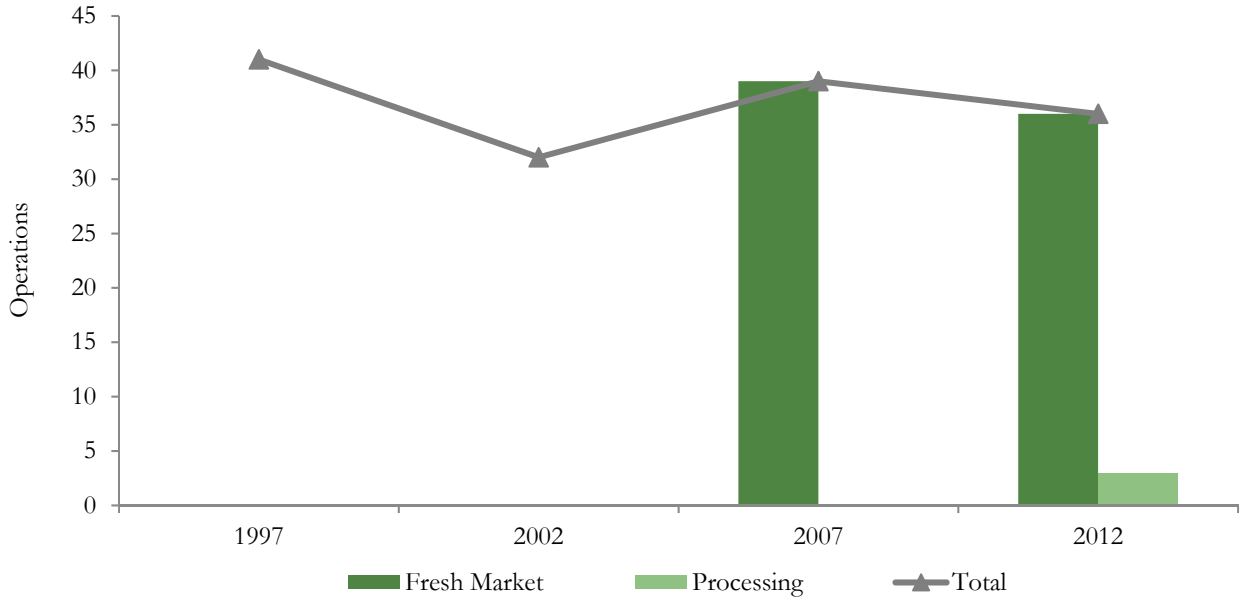
Exhibit 3.7.3 – Missouri Head Cabbage Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.7.4 tracks the number of Missouri operations that harvested head cabbage acreage from 1997 to 2012. As illustrated, the number of operations fluctuated somewhat during the observed period. In 2012, 36 operations in Missouri were reported to have harvested head cabbage acreage. Forty-one operations had harvested head cabbage in 1997. In 2007 and 2012, all operations reported that they harvested head cabbage acreage for the fresh market. In 2012, three farms indicated that they also harvested product for processing (USDA National Agricultural Statistics Service 2017b).

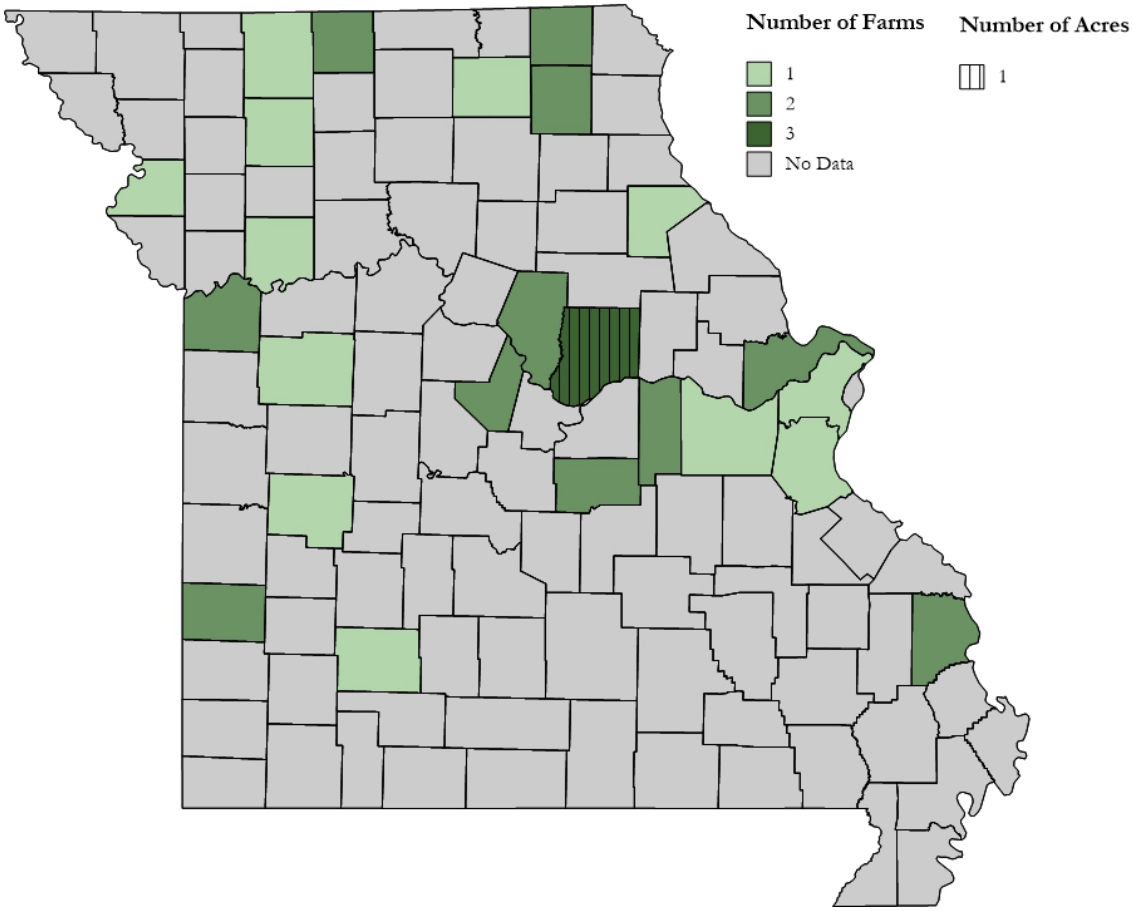
Exhibit 3.7.4 – Missouri Operations with Head Cabbage Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Callaway County was home to the most head cabbage operations — three farms — harvesting acreage in 2012. Counties with two head cabbage farms with harvested acreage in 2012 were Barton County, Boone County, Cape Girardeau County, Gasconade County, Jackson County, Knox County, Maries County, Mercer County, Moniteau County, St. Charles County and Scotland County. Exhibit 3.7.5 shares Missouri head cabbage operations and acreage by county; the data reflect operations with area harvested and harvested acreage. Note that acreage data were only reported for one county. Callaway County was reported to have harvested one acre of head cabbage in 2012 (USDA National Agricultural Statistics Service 2014b).

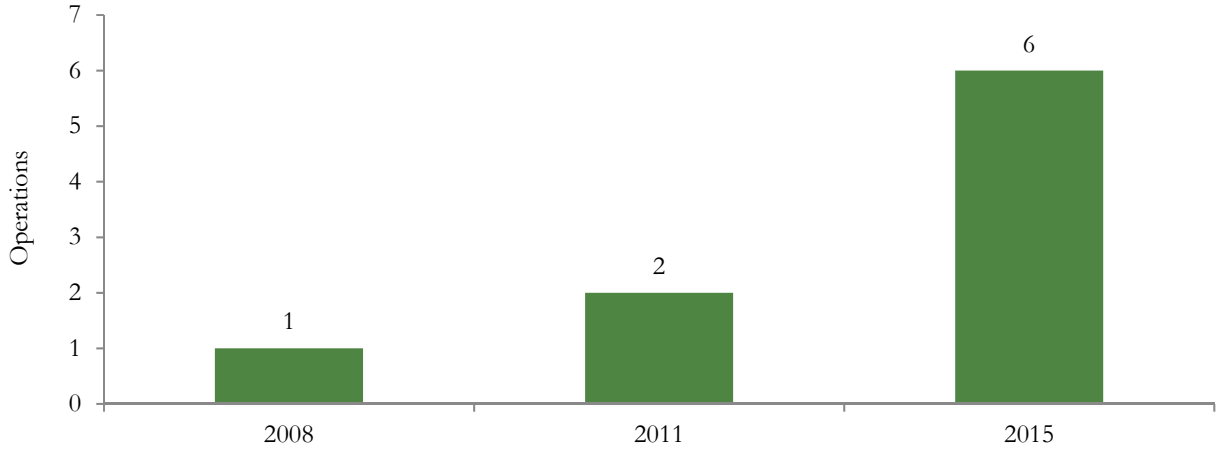
*Exhibit 3.7.5 – Missouri Harvested Head Cabbage Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Between 2008 and 2015, the number of Missouri operations harvesting USDA certified organic cabbage increased. Exhibit 3.7.6 charts the trend. Just one Missouri operation had harvested USDA certified organic cabbage acreage in 2008. By 2015, six operations harvested certified organic cabbage. Note that in 2008, eight operations in total had harvested USDA certified organic and exempt organic cabbage acreage (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.7.6 – Missouri Certified Organic Cabbage Operations with Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.7.7 summarizes other details that describe Missouri's certified organic cabbage production in 2015. Just two acres were harvested. That acreage produced 136 hundredweight of USDA certified organic cabbage, and the output generated dollar sales that topped $26,000 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.7.7 – Summary of Missouri Certified Organic Cabbage Industry, 2015

	Acres Harvested	Cwt. Produced	Dollar Sales
2015	2	136	$26,050

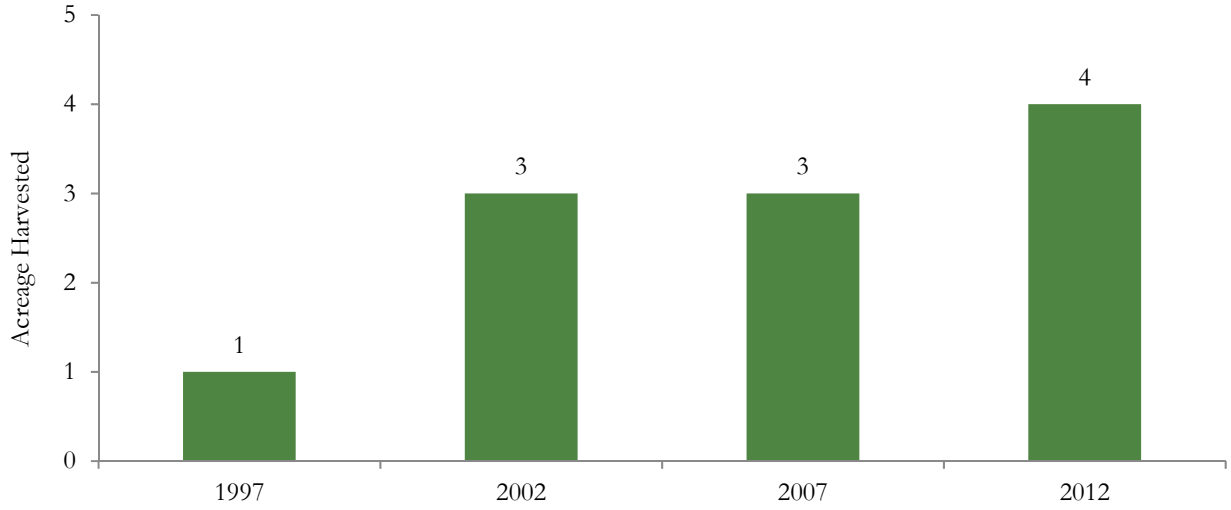
Source: USDA, National Agricultural Statistics Service (2017b)

USDA certified organic head cabbage production can be classified by color: red, green and excluding red and green. In 2015, one farm harvested certified organic red head cabbage, and one harvested certified organic head cabbage other than red and green varieties. Green head certified organic cabbage was most popular to produce. Six operations in Missouri harvested USDA certified organic green head cabbage in 2015 (USDA National Agricultural Statistics Service 2017b).

3.8 Carrots

Between 1997 and 2012, Missouri gradually increased its carrot harvested acreage. Exhibit 3.8.1 illustrates that harvested acreage increased from one acre in 1997 to four acres in 2012. In 2007 and 2012, USDA disclosed that all Missouri carrot harvested acreage was directed to fresh market uses (USDA National Agricultural Statistics Service 2017b).

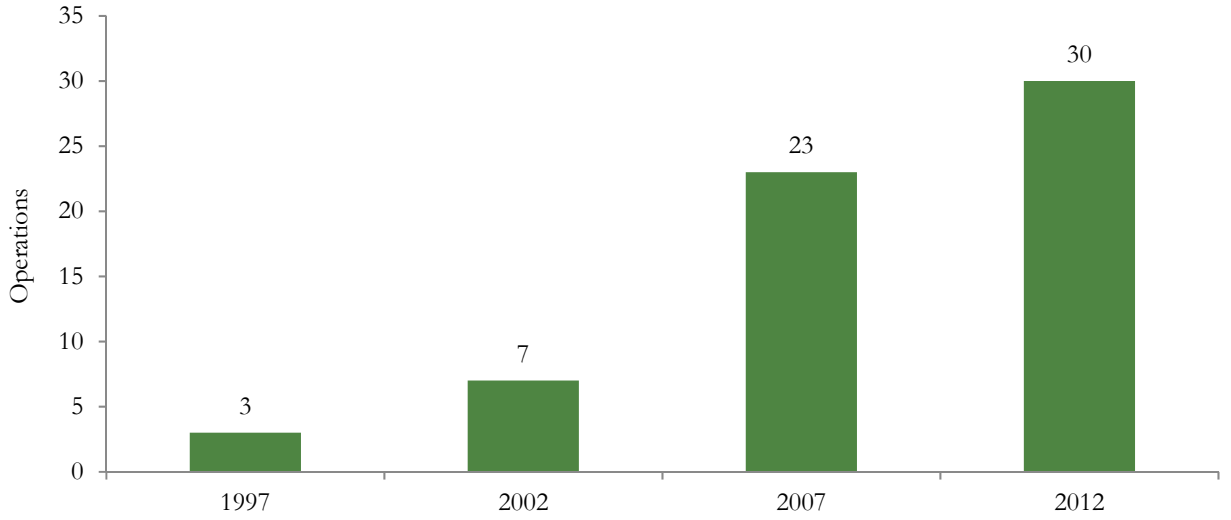
Exhibit 3.8.1 – Missouri Carrot Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

As carrot harvested acreage increased, the count of Missouri operations harvesting carrot acreage also grew. Exhibit 3.8.2 shares that three operations harvested carrots in 1997. In 2012, operations harvesting carrot acreage totaled 30 farms. All farms recording harvested carrot acreage in 2007 and 2012 raised carrots for fresh market uses (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.8.2 – Missouri Operations with Carrot Acreage Harvested, 1997 to 2012

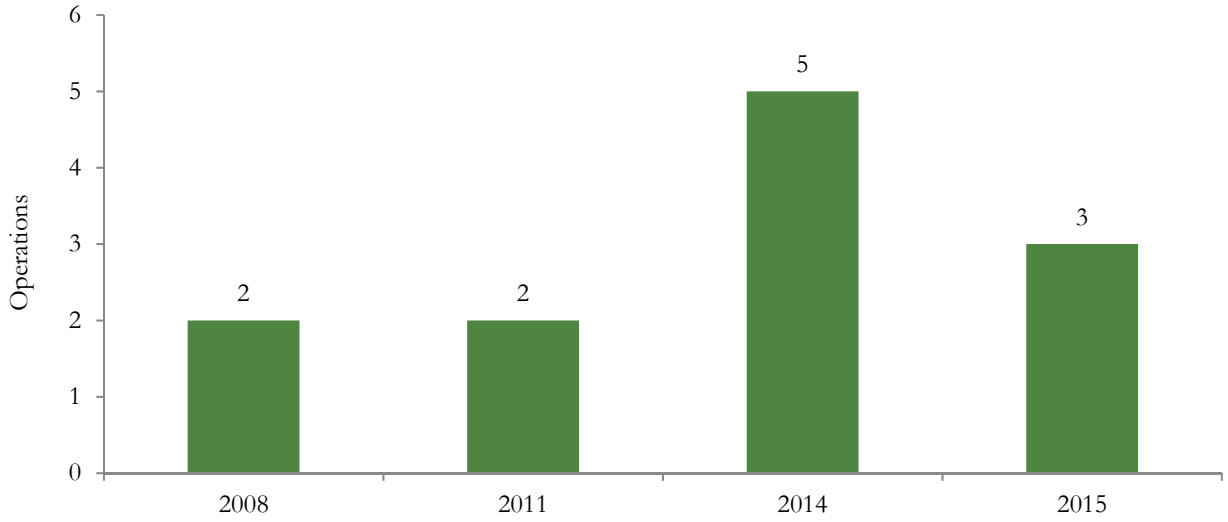


Source: USDA, National Agricultural Statistics Service (2017b)

The number of operations harvesting USDA certified organic carrot acreage hasn't followed quite the same trajectory. Exhibit 3.8.3 illustrates that operations raising USDA certified organic acreage peaked in 2014 at five farms. In 2015, three Missouri operations reported that they harvested USDA certified organic carrots. Those operations in 2015 collectively harvested 8 hundredweight of USDA certified organic carrots. Dollar sales for the certified organic carrots totaled $2,500 (USDA National Agricultural Statistics Service 2017b).

Note that historically, not all Missouri organic carrot producers have had USDA certification. For example, of the seven total operations harvesting organic carrots in 2014, five farms were USDA certified, and two were exempt. Collectively, certified organic and exempt organic carrot production totaled 87 hundredweight in 2014 (USDA National Agricultural Statistics Service 2017b).

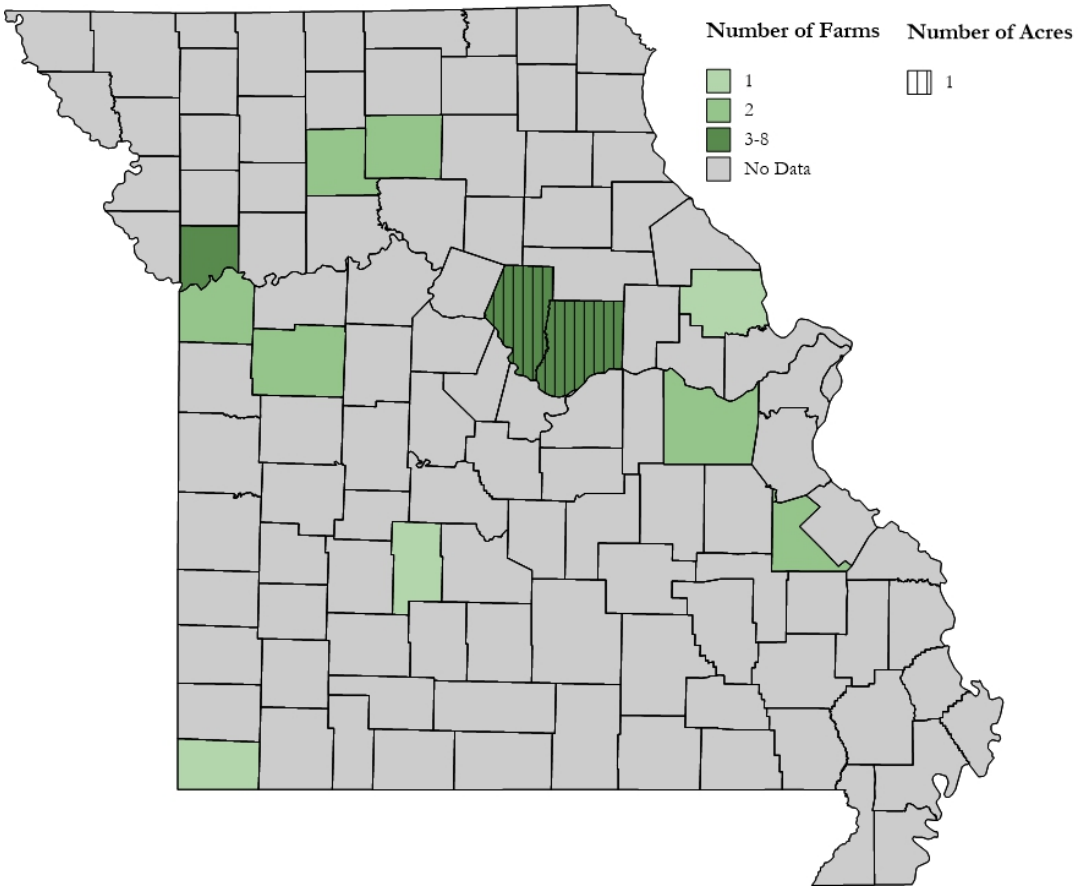
Exhibit 3.8.3 – Missouri Certified Organic Carrot Operations with Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

In Missouri, counties with the most operations harvesting carrots during 2012 were Boone County, eight farms; Clay County, four farms; and Callaway County, three farms. Exhibit 3.8.4 highlights Missouri counties by their count of carrot farms and carrot acreage. These data are acreage harvested and operations with area harvested. Harvested acreage data were only published for Boone and Callaway counties; both reported harvesting one acre of carrots in 2012 (USDA National Agricultural Statistics Service 2014b).

Exhibit 3.8.4 – Missouri Harvested Carrot Acreage and Operations by County, 2012

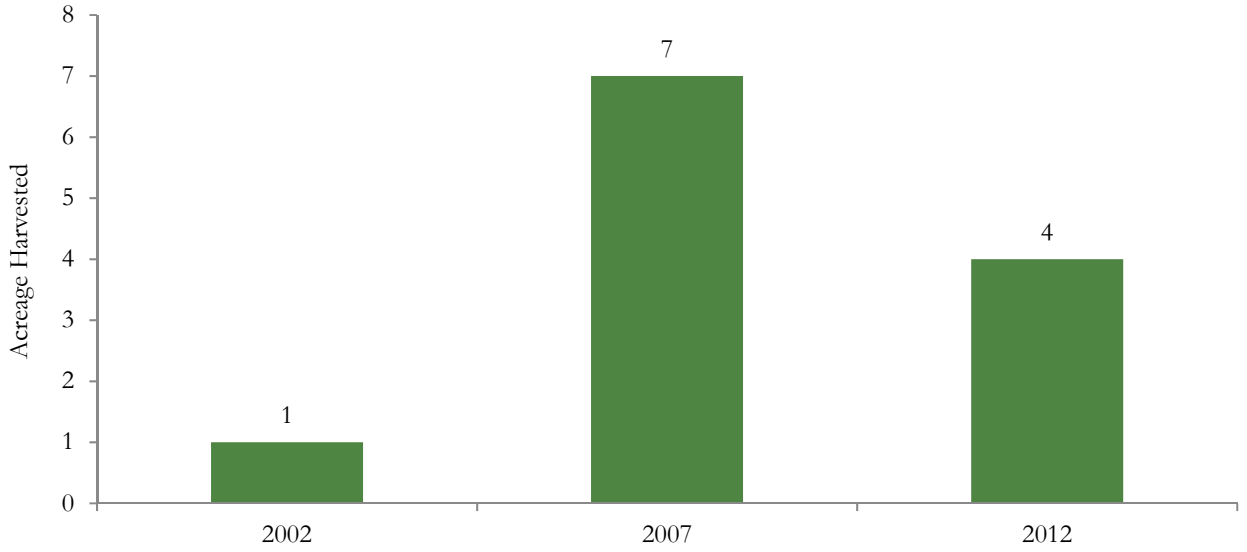


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.9 Cauliflower

Of the past three U.S. Census of Agriculture report years, cauliflower acreage in Missouri was greatest in 2007. See Exhibit 3.9.1. At the time, Missouri producers harvested seven acres of cauliflower. In both 2007 and 2012, the census data stipulated the market to which harvested product was directed. During both years, all Missouri cauliflower acreage harvested was used to serve the fresh market (USDA National Agricultural Statistics Service 2017b).

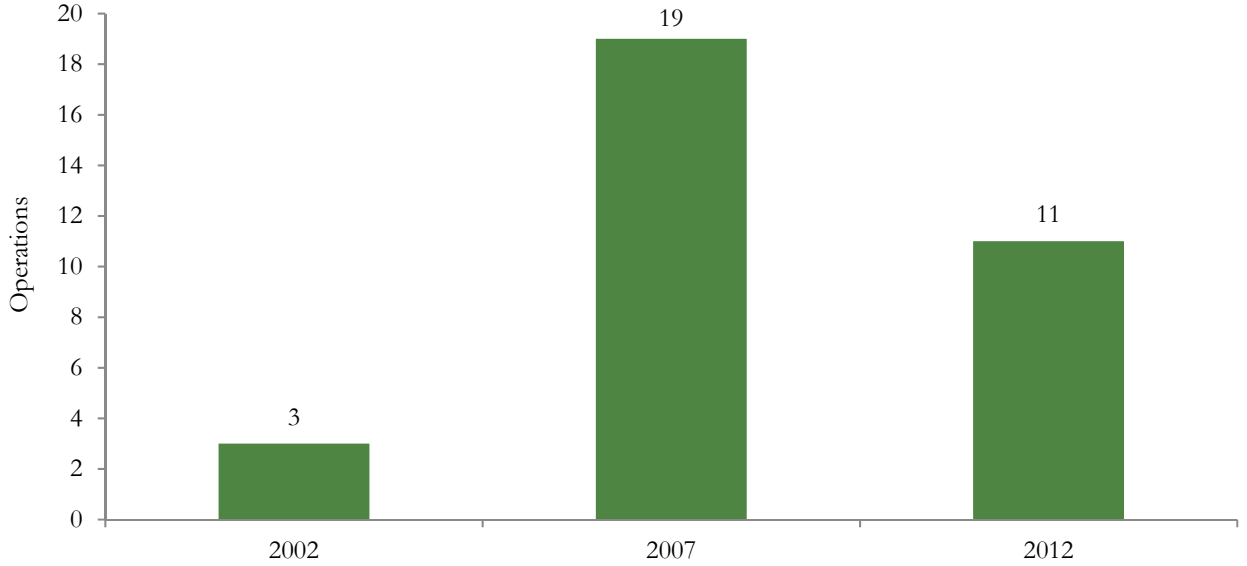
Exhibit 3.9.1 – Missouri Cauliflower Acreage Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Compared with 2002, cauliflower production was more common among Missouri farms in 2007 and 2012. Exhibit 3.9.2 reports the number of Missouri operations harvesting cauliflower from 2002 to 2012. It illustrates that 19 operations harvested cauliflower in 2007, and 11 farms harvested cauliflower in 2012. All farms in 2007 and 2012 served the fresh market (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.9.2 – Missouri Operations with Cauliflower Acreage Harvested, 2002 to 2012

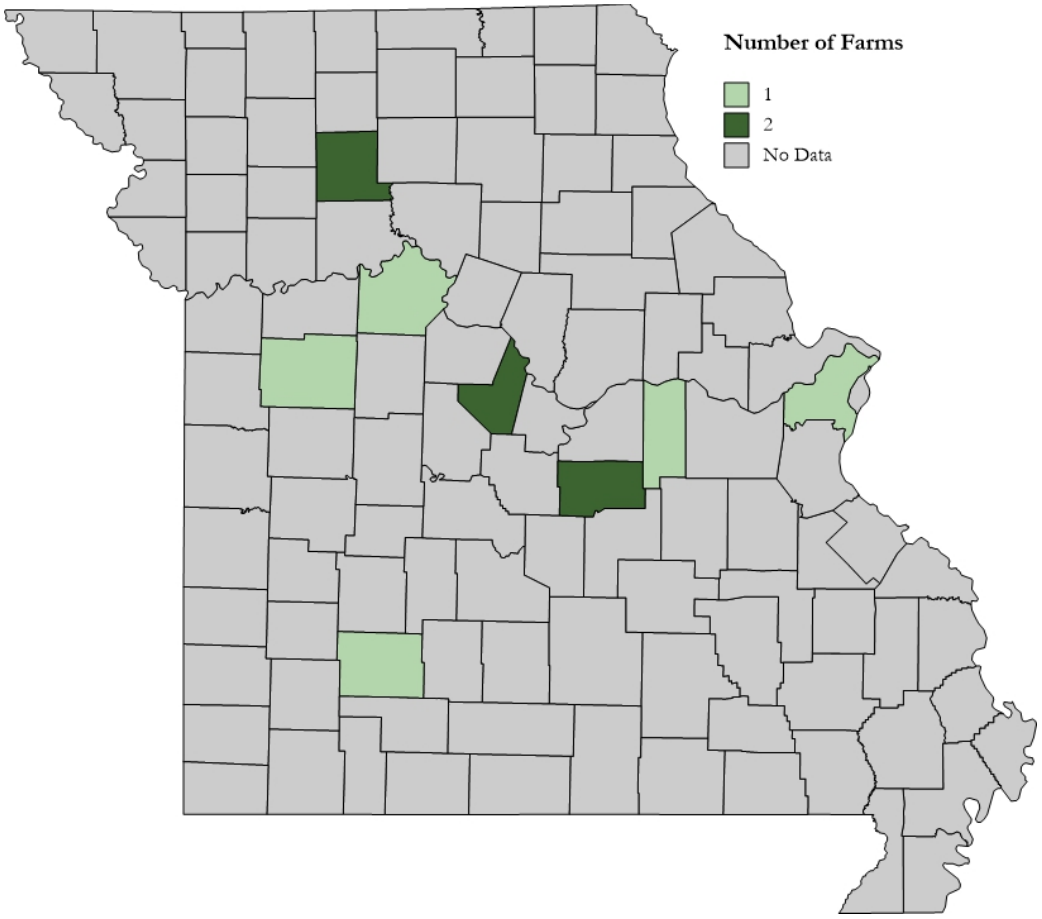


Source: USDA, National Agricultural Statistics Service (2017b)

The count of operations harvesting cauliflower by county was highest in Livingston County, two farms; Maries County, two farms; and Moniteau County, two farms during 2012. See Exhibit 3.9.3 for a map of cauliflower farms with harvested acreage by county. To protect information about

individual operations, note that USDA didn't disclose Missouri cauliflower harvested acreage on a county-by-county basis (USDA National Agricultural Statistics Service 2014b).

Exhibit 3.9.3 – Missouri Cauliflower Operations with Area Harvested by County, 2012



Source: USDA, National Agricultural Statistics Service (2014)

Organic cauliflower production in Missouri has had little activity. In 2008, 2011 and 2015, Missouri had just one operation indicating that it had harvested USDA certified organic cauliflower acreage. During 2008, one operation reported that it harvested exempt organic cauliflower acreage (USDA National Agricultural Statistics Service 2017b).

3.10 Chive

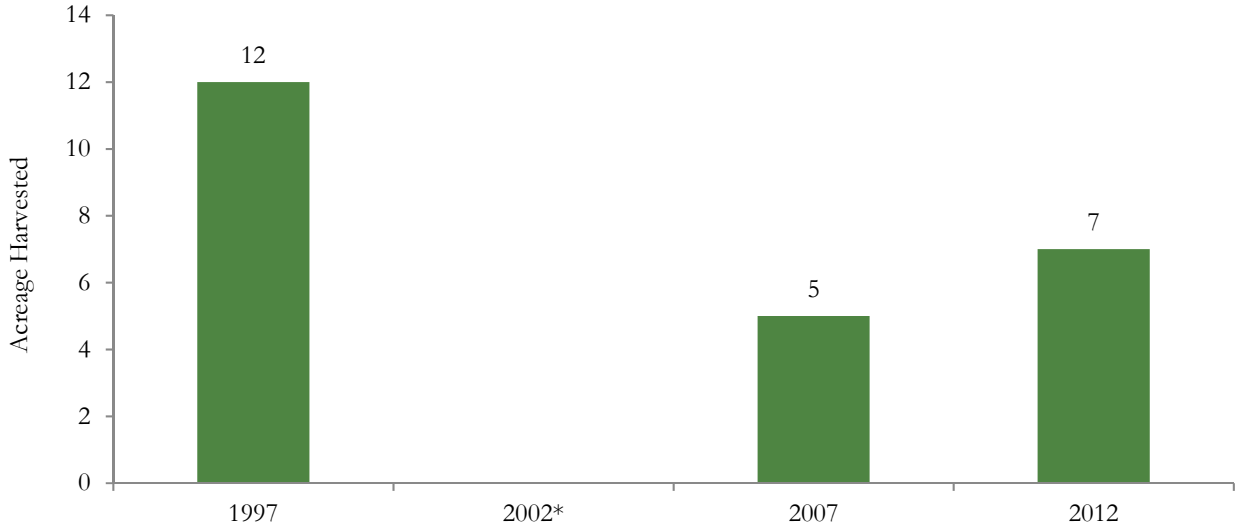
Although no data specifically describe Missouri chive production, production has occurred to an extent. As an example, Just Natural Farms in Belton, Mo., sells chives through its consumer-supported agriculture model. The business uses two distribution strategies for its boxed products. The first involves dropping off product at certain market locations. The second enables consumers to have product delivered directly to their homes. Note that the home delivery option is limited to a subset of communities within the Kansas City metropolitan area (Just Natural Farms 2015).

The Columbia Area Career Center also grows chives. The center often starts its herbs during the summer. Moving those herbs to a greenhouse later extends the growing season through at least a portion of the winter. Chives, sage and rosemary have been products grown in the center's greenhouse. In 2016, one report described that the Columbia Area Career Center had three greenhouses available. It also had one high tunnel available to use (DeSmit 2016).

3.11 Collards

In the USDA specialty crop definition, collards is a comprehensive category that includes kale. Here, collards and kale are described independently as USDA reports data for both collards and kale separately. Exhibit 3.11.1 tracks Missouri collards acreage harvested from 1997 to 2012. Note that data weren't published in 2002 in order to protect information for individual operations. The chart illustrates that collards acreage was more extensive in 1997 than in 2012. Between those two years, collards acreage harvested dropped from 12 acres in 1997 to seven acres in 2012. Data for acreage used to serve certain markets were reported in 2007 and 2012. All collards acreage in those two years were harvested for the fresh market (USDA National Agricultural Statistics Service 2017b).

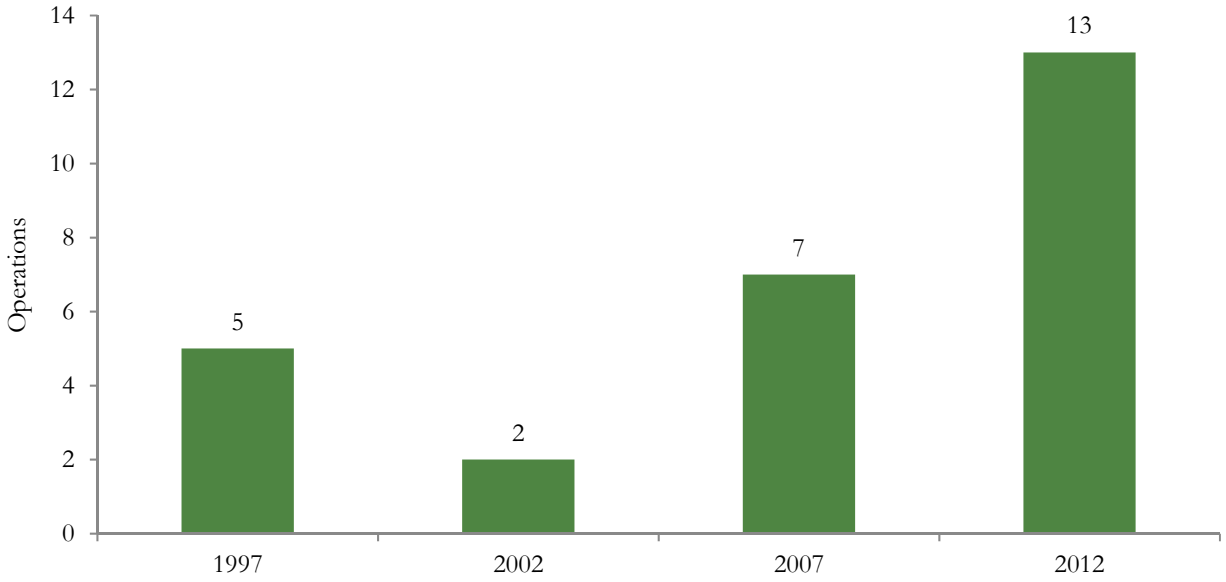
Exhibit 3.11.1 – Missouri Collard Greens Acreage Harvested, 1997 to 2012



* For 2002, data were withheld in order to protect information for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

Despite collards harvested acreage declining between 1997 and 2012, the number of operations harvesting collards acreage increased during that time. Exhibit 3.11.2 reports the number of operations that harvested collards acreage by year. In 1997, five operations in Missouri harvested collard greens acreage. By 2012, 13 operations harvested collard greens. All of the operations that harvested collard greens in 2007 and 2012 served the fresh market (USDA National Agricultural Statistics Service 2017b).

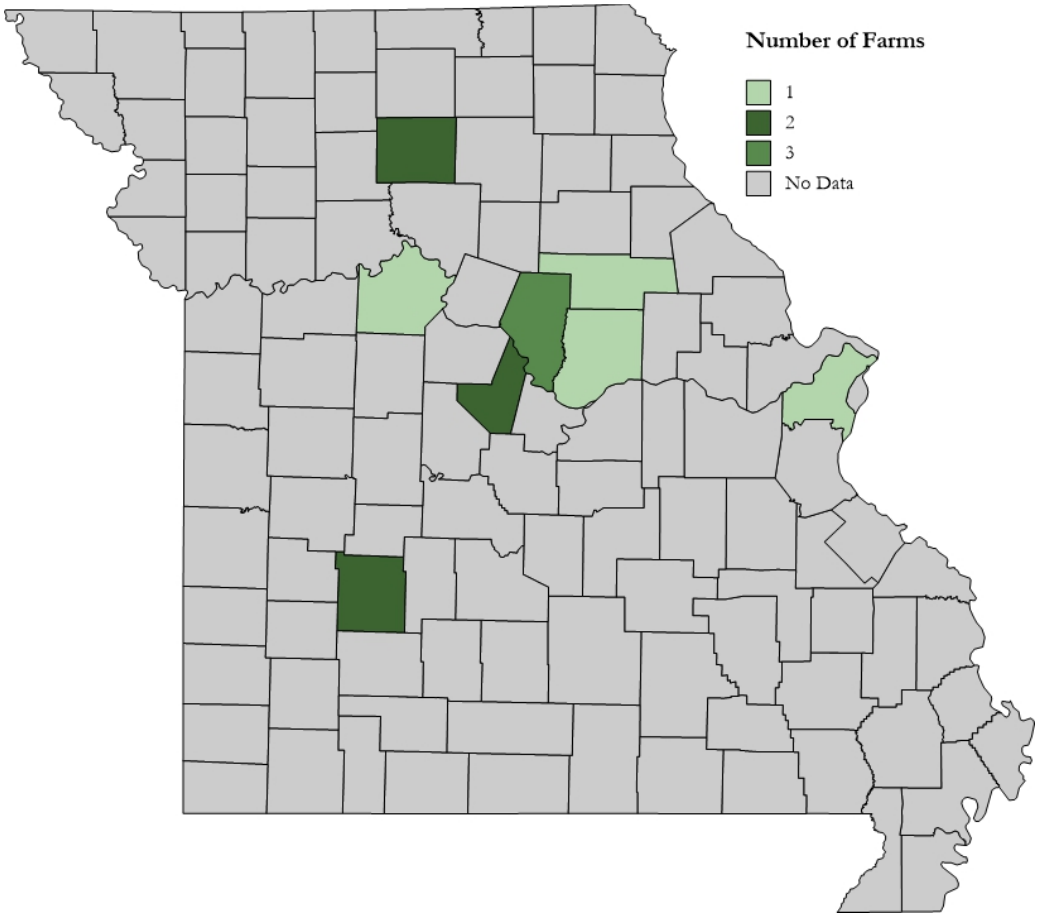
Exhibit 3.11.2 – Missouri Operations with Collard Greens Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Counties with the most collard greens operations with harvested acreage in 2012 were Boone County, three farms; Linn County, two farms; Moniteau County, two farms; and Polk County, two farms. See Exhibit 3.11.3. USDA withheld data about collard greens harvested acreage by Missouri county (USDA National Agricultural Statistics Service 2014b).

Exhibit 3.11.3 – Missouri Collard Greens Operations with Area Harvested by County, 2012

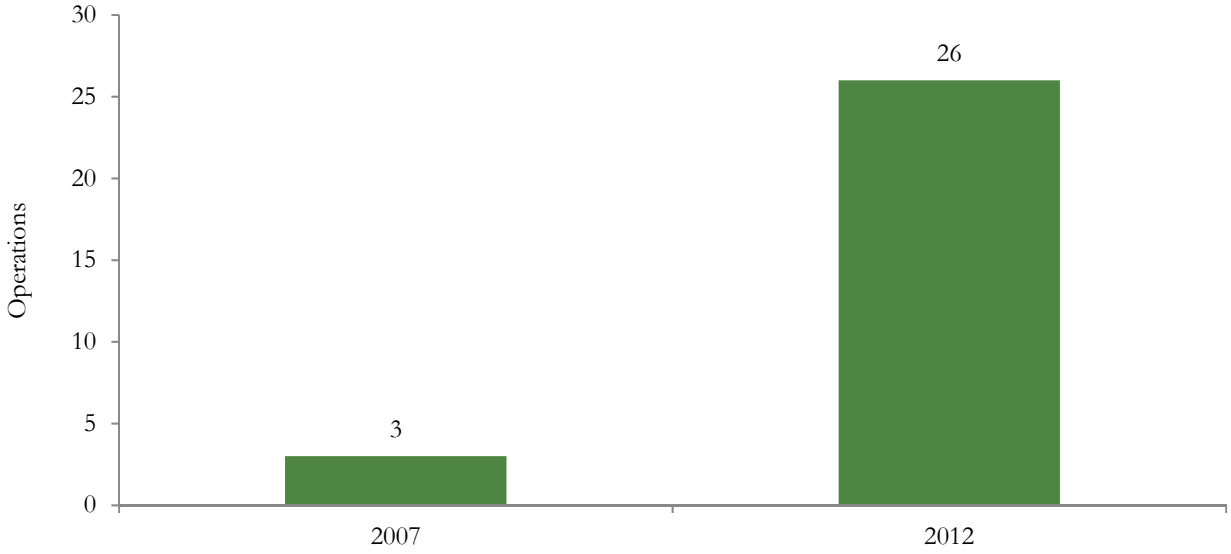


Source: USDA, National Agricultural Statistics Service (2014)

Like for collard greens, kale acreage harvested in Missouri also totaled seven acres during 2012. Specific harvested acreage data weren't released in 2007 (USDA National Agricultural Statistics Service 2017b).

The number of Missouri operations harvesting kale increased dramatically between 2007 and 2012. Exhibit 3.11.4 charts the number of Missouri operations harvesting kale in those years. The count of operations increased from three operations in 2007 to 26 operations in 2012 (USDA National Agricultural Statistics Service 2017b).

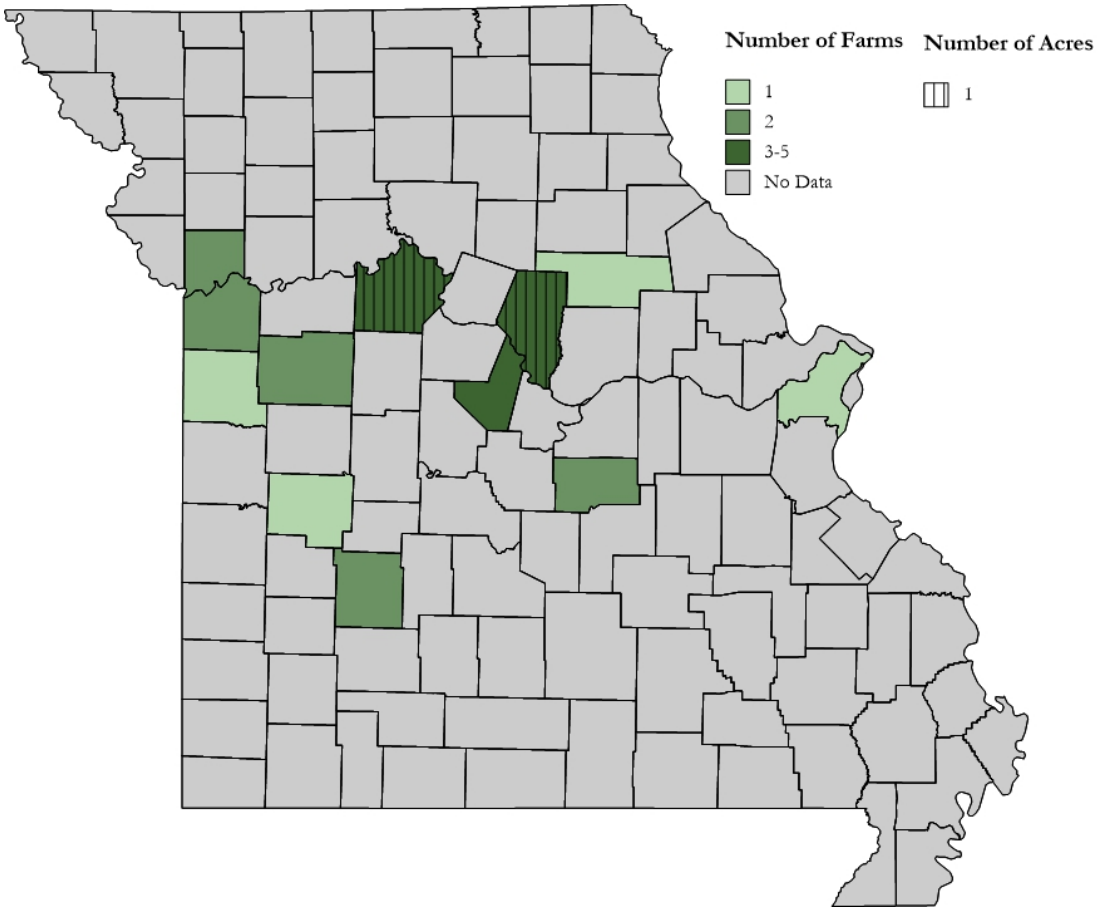
Exhibit 3.11.4 – Missouri Operations with Kale Acreage Harvested, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, kale farms with acreage harvested were most common in Boone County, five farms; Moniteau County, four farms; and Saline County, three farms. Exhibit 3.11.5 shades Missouri counties by their count of kale operations with area harvested and kale harvested acreage in 2012. Like for other specialty crops, kale harvested acreage data by county weren't consistently reported. Data were limited to one acre in Boone County and one acre in Saline County (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.11.5 – Missouri Harvested Kale Acreage and Operations by County, 2012**



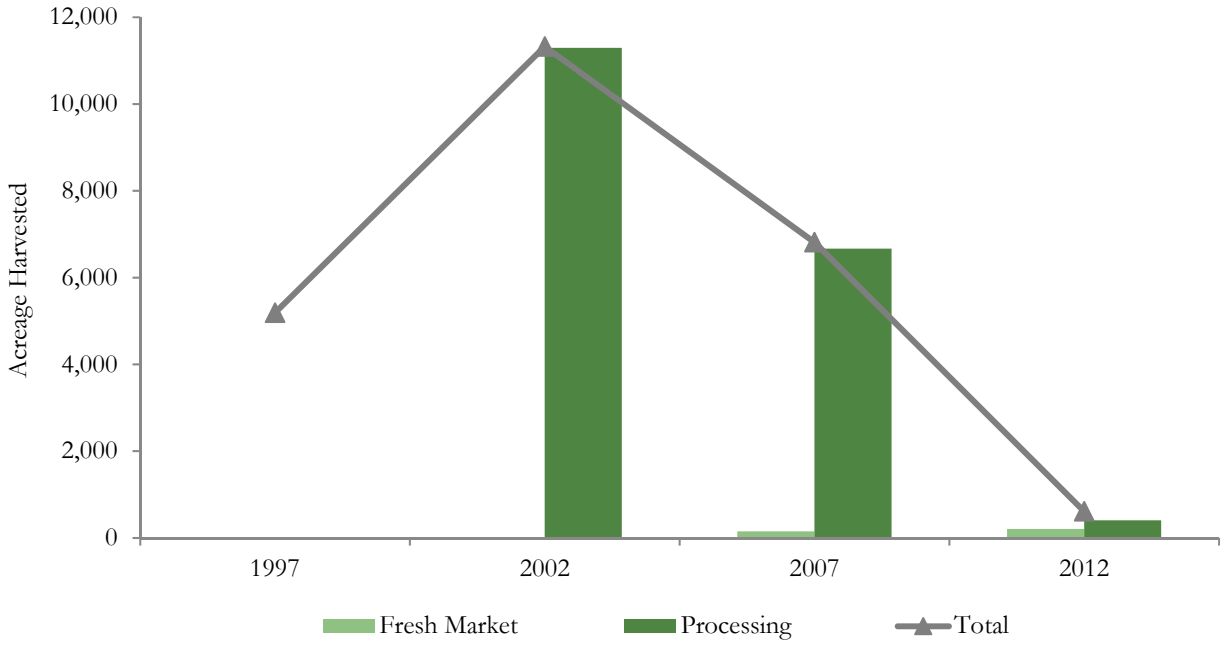
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.12 Cucumber

Historically, cucumbers were a significant specialty crop in Missouri. In recent years, however, Missouri's cucumber industry has constricted. Exhibit 3.12.1 illustrates the recent trend in statewide cucumber harvested acreage. During the observed period, cucumber harvested acreage peaked at more than 11,300 acres in 2002. By 2012, harvested acreage had receded to 612 acres (USDA National Agricultural Statistics Service 2017b).

When data were available, USDA reported harvested acreage by intended crop use: fresh market or processing market. During 2002 and 2007, nearly all Missouri cucumber acreage raised product that would be processed into pickles. As acreage used for processing cucumber production declined, total cucumber production area decreased. Consequently, area used to produce fresh-market cucumbers has recently occupied a greater share of total cucumber production area. In 2012, roughly one-third of Missouri harvested cucumber acreage was used to serve the fresh market. Acreage used to raise cucumbers for processing represented the other two-thirds of 2012 harvested acreage (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.12.1 – Missouri Cucumber Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In recent years, USDA has captured some data to describe Missouri cucumber production that occurs under protection. See Exhibit 3.12.2 for a summary. In 2009, five Missouri operations produced cucumbers under protection, and that operation count increased to 19 farms in 2012. Square footage under protection used to produce cucumbers increased more than five times from 2009 and 2014. It totaled nearly 40,000 square feet in 2014. Note that production data were only disclosed in 2014 when 1,331 hundredweight of cucumbers were produced. That production generated nearly $91,000 in sales, which was three times more than the sales recorded in 2009 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.12.2 – Missouri Cucumber Production Under Protection, 2009 and 2014

	2009	2014
Operations with area in production	5	19
Square foot in production	7,450	39,816
Production in cwt.*	(D)	1,331
Dollar sales	$27,976	$90,872

* Production data were withheld in 2009 to protect data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

For cucumbers, Missouri cash receipts data are only available for 2008 to 2011. Exhibit 3.12.3 illustrates the trend. During this period, cucumber cash receipts followed a slight upward trend; however, the rise in cash receipts wasn't consistent year over year. In 2008, the cash receipts value totaled $476,000. By 2011, it had increased to $595,000 (USDA Economic Research Service 2017).

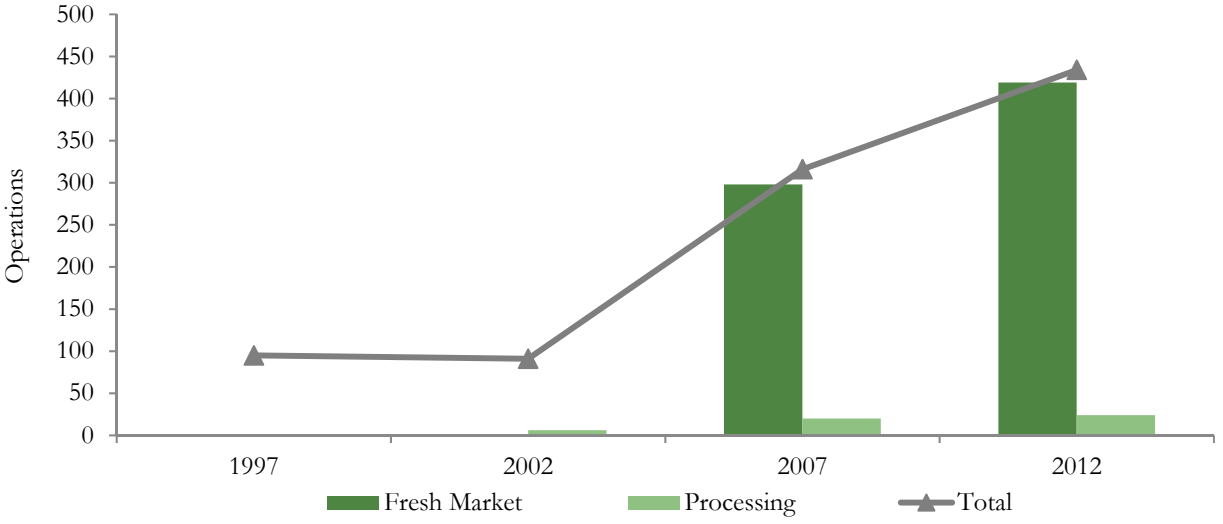
Exhibit 3.12.3 – Missouri Cucumber Cash Receipts, 2008 to 2011

Source: USDA, Economic Research Service (2017)

Despite total Missouri cucumber harvested acreage declining from 1997 to 2012, the number of operations engaged in cucumber production increased during that period. Exhibit 3.12.4 shares the count of Missouri operations harvesting cucumber acreage. In 1997, 95 operations in Missouri harvested cucumber acreage. More than 430 operations harvested cucumber acreage in 2012 (USDA National Agricultural Statistics Service 2017b).

In recent years, a majority of Missouri operations harvested cucumber acreage to serve the fresh market. During 2002, 2007 and 2012, fewer than 25 operations harvested cucumbers for processing in a given year. However, the number of operations engaged in harvesting cucumber acreage for processing purposes increased from year to year. In total, 24 operations harvested cucumbers for processing during 2012, and 419 operations harvested cucumber acreage for serving the fresh market (USDA National Agricultural Statistics Service 2017b).

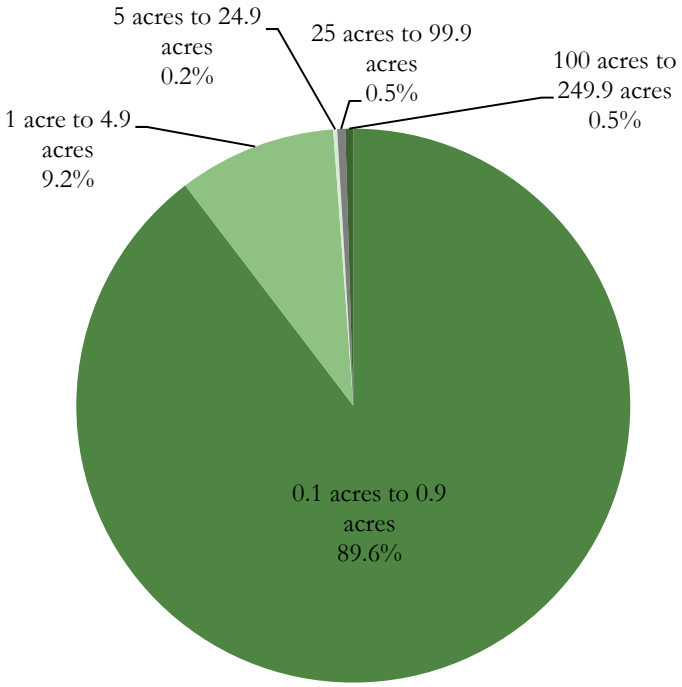
Exhibit 3.12.4 – Missouri Operations with Cucumber Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The bulk of Missouri cucumber operations have tended to dedicate relatively small tracts to cucumber production. In 2012, roughly 90 percent of Missouri operations harvesting cucumber acreage maintained between 0.1 acres and 0.9 acres of cucumbers. See Exhibit 3.12.5. Nine percent of farms harvested 1 acre to 4.9 acres of cucumbers, and roughly 1 percent harvested at least 5 acres of cucumbers (USDA National Agricultural Statistics Service 2017b).

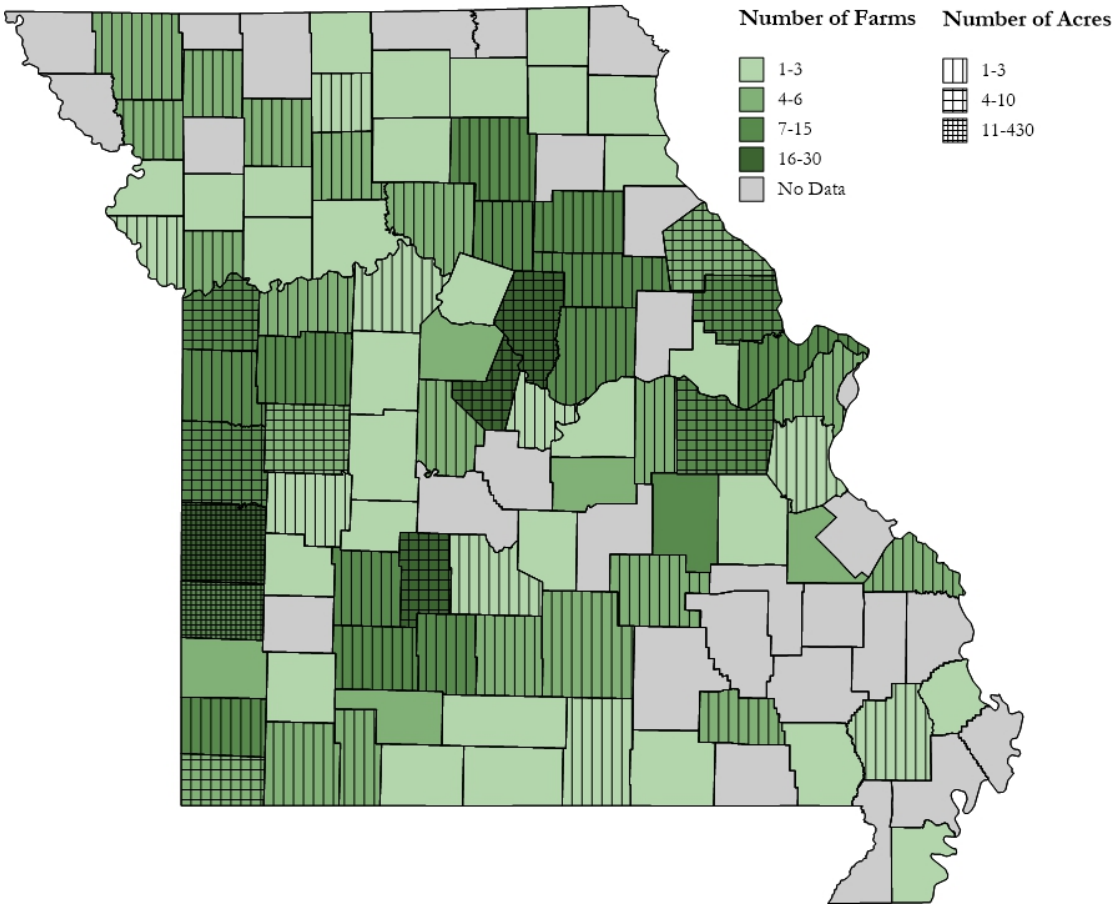
Exhibit 3.12.5 – Share of Missouri Cucumber Operations by Acreage, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Cucumber operations were most prevalent in Vernon County, 30 farms; Boone County, 19 farms; Dallas County, 16 farms; and Moniteau County, 16 farms during 2012. Note that these were operations with harvested acreage. Exhibit 3.12.6 highlights Missouri counties by their count of cucumber farms with area harvested. It also shares cucumber harvested acreage by county when data were available. By far, Barton County had the most harvested acreage in 2012 — 430 acres. Other counties leading in cucumber harvested acreage were Vernon County, 24 acres; Franklin County, nine acres; and Moniteau County, nine acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.12.6 – Missouri Harvested Cucumber Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

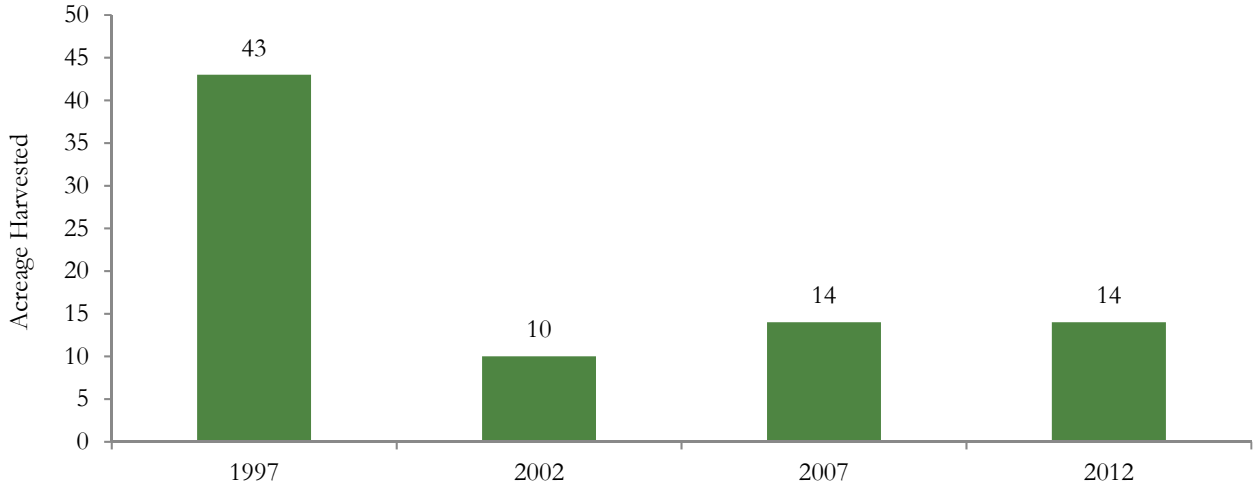
3.13 Edamame

To an extent, Missouri growers have adopted edamame production. Echigo Farm is one Missouri operation that has produced edamame. Located near Seymour, Mo., the farm shares on its website that it raises edamame and tens of other Japanese and Asian vegetables. In a typical year, the farm grows edamame as a vegetable crop on one to two acres. On that acreage, the farm may raise as many as 18 Japanese edamame varieties (Echigo Farm).

3.14 Eggplant

In the last three U.S. Census of Agriculture iterations, Missouri eggplant acreage harvested has been relatively consistent. However, it dropped from 43 acres in 1997 to 10 acres in 2002. Harvested acreage later stabilized to 14 acres in 2007 and 2012. Exhibit 3.14.1 illustrates the trend. During 2007 and 2012, all eggplant acreage harvested had product directed to the fresh market (USDA National Agricultural Statistics Service 2017b).

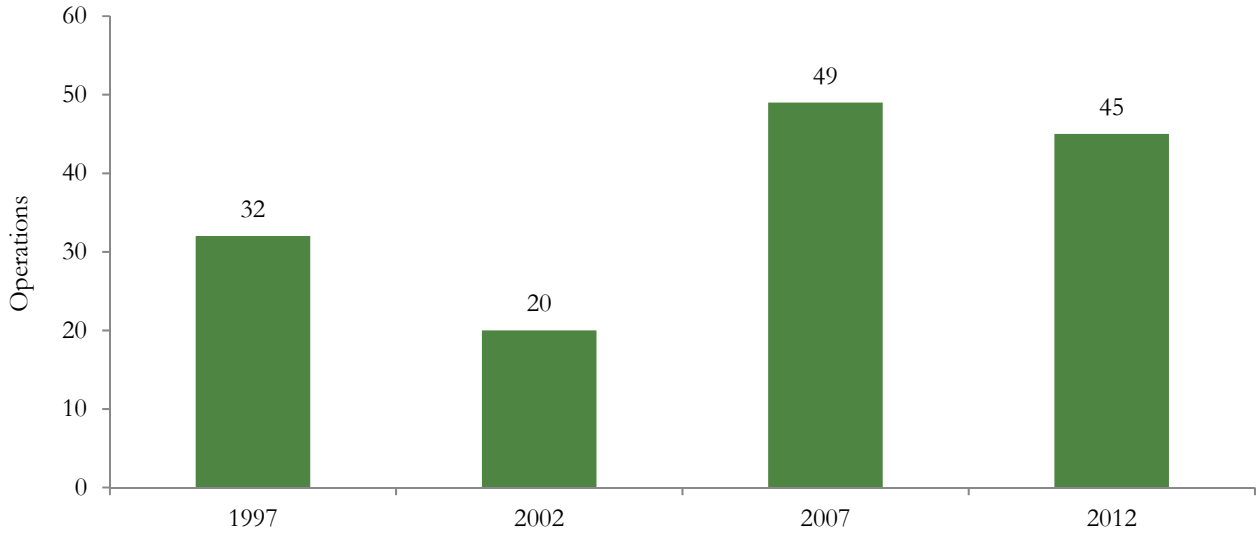
Exhibit 3.14.1 – Missouri Eggplant Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations harvesting eggplant acreage in 2012 totaled 45 farms. Exhibit 3.14.2 shows the trend in Missouri eggplant operations from 1997 to 2012. In later years, more operations harvested eggplant acreage than in earlier years. For comparison purposes, the operation count totaled 32 farms in 1997 and 20 farms in 2002 (USDA National Agricultural Statistics Service 2017b).

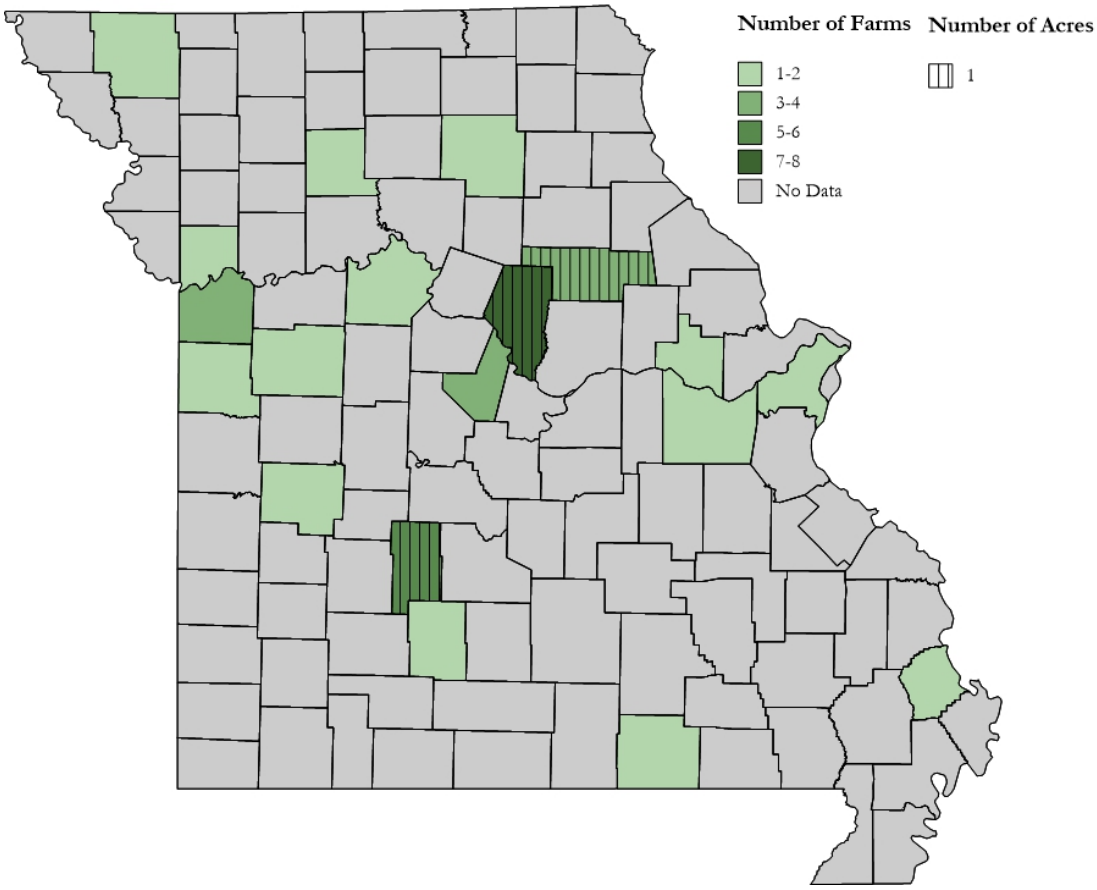
Exhibit 3.14.2 – Missouri Operations with Eggplant Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Boone County led in 2012 for number of eggplant farms. At the time, eight operations harvested eggplant in the county. Exhibit 3.14.3 shades Missouri counties by their count of eggplant operations with area harvested and eggplant harvested acreage. Other counties home to the most eggplant operations with area harvested were Dallas County, five farms; Jackson County, four farms; and Moniteau County, four farms. Limited eggplant harvested acreage data were reported in 2012. However, one acre was recorded for Audrain County, Boone County and Dallas County (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.14.3 – Missouri Harvested Eggplant Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

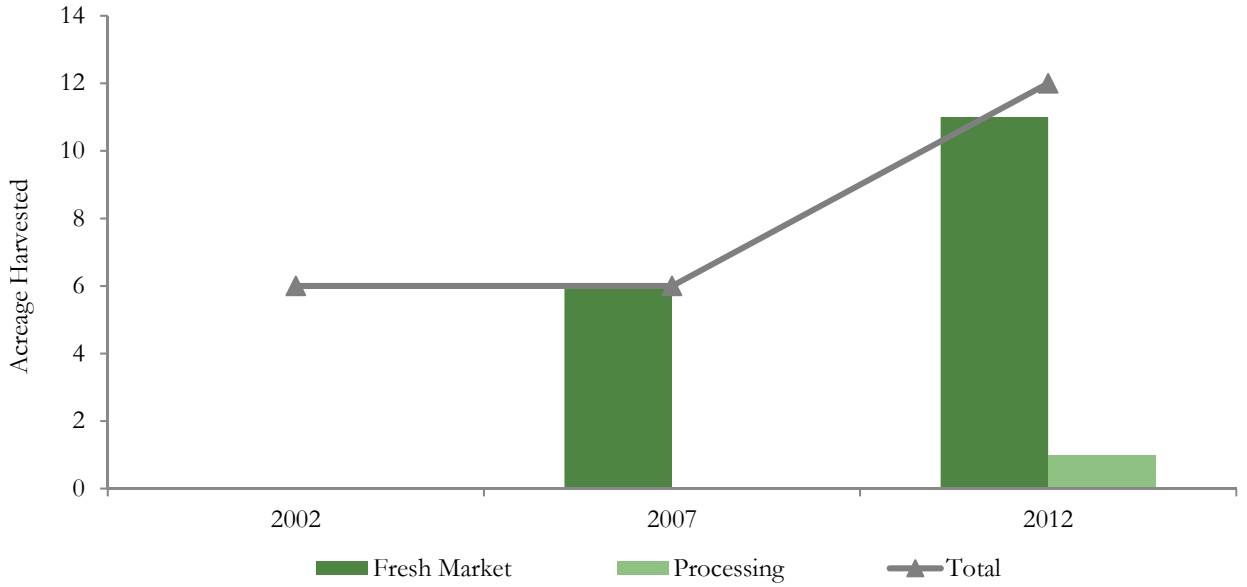
3.15 Escarole and Endive

Escarole and endive have been relatively minor specialty crops in Missouri. Acreage was harvested in 2012, but the value was too small for disclosure. During that year, escarole and endive production was distributed across four Missouri operations. Two farms were located in Boone County, and two were reported in Moniteau County (USDA National Agricultural Statistics Service 2017b).

3.16 Garlic

Missouri garlic acreage harvested doubled between 2007 and 2012. Exhibit 3.16.1 illustrates the trend. Six acres were harvested in both 2002 and 2007. Of the 12 acres harvested in 2012, USDA reports that 11 acres were destined for fresh market uses. One acre was harvested for processing purposes. In 2007, all six harvested acres of garlic had application as a fresh market crop. These data suggest that growing garlic for processing is relatively new in Missouri (USDA National Agricultural Statistics Service 2017b).

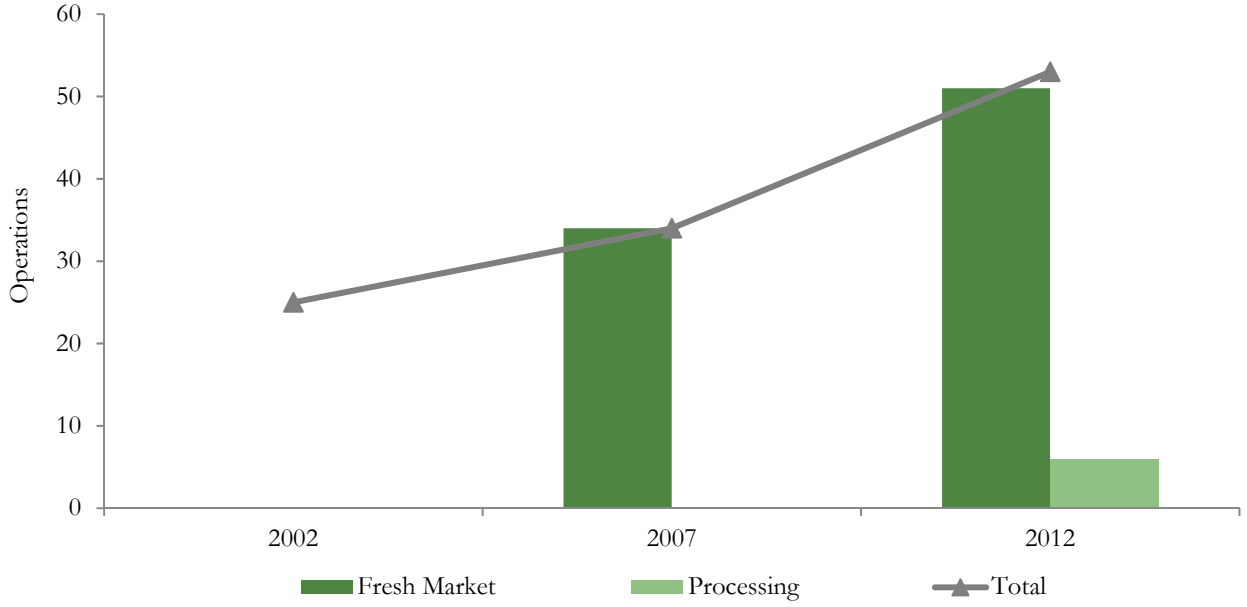
Exhibit 3.16.1 – Missouri Garlic Acreage Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Between 2002 and 2012, Missouri farms gradually added garlic as a specialty crop for their operations. Exhibit 3.16.2 shares that total operations harvesting garlic acreage increased from 25 farms in 2002 to 53 farms in 2012. Most Missouri garlic operations tend to serve the fresh market — 51 operations harvested fresh-market garlic in 2012 — but some have reached processing markets or sell garlic for both fresh and processing uses. The chart shows that six operations harvested garlic for processing purposes during 2012 (USDA National Agricultural Statistics Service 2012).

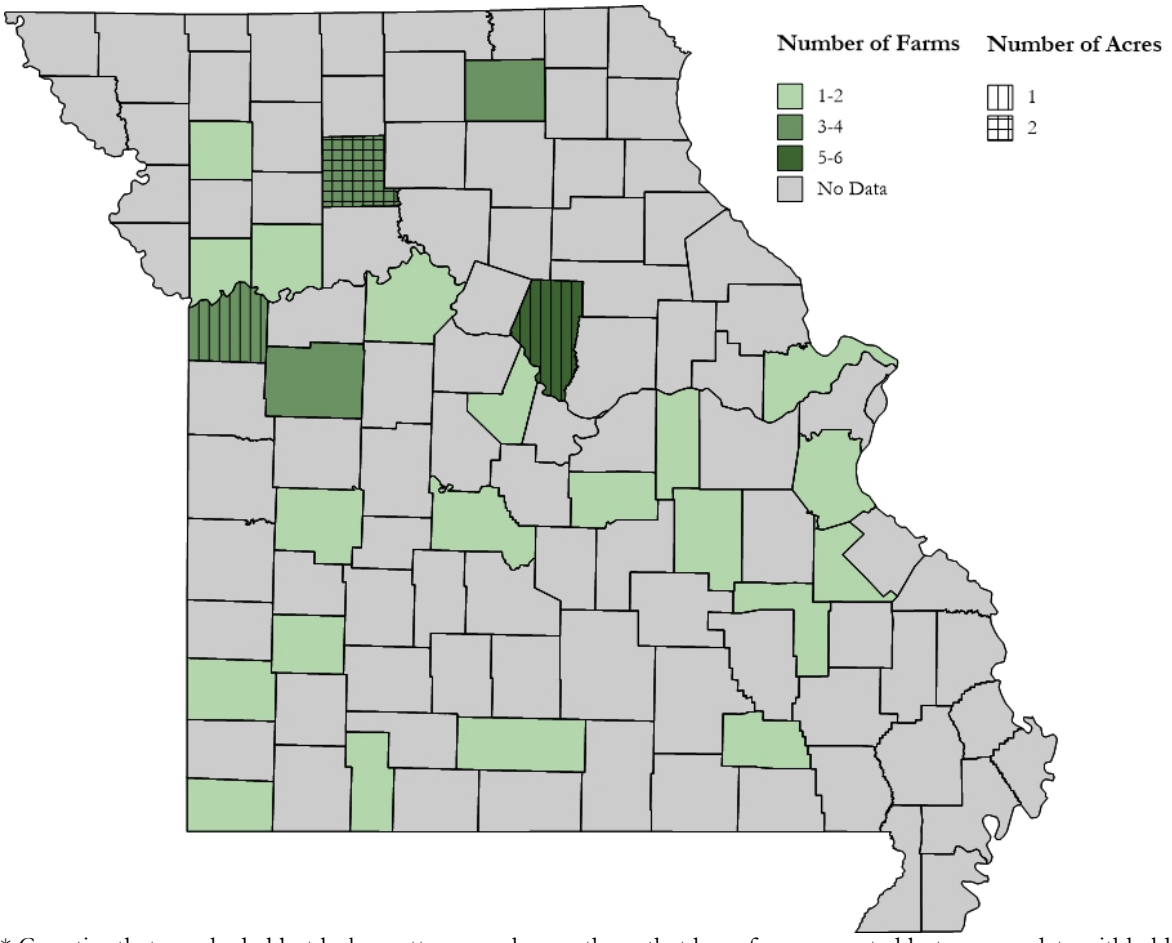
Exhibit 3.16.2 – Missouri Operations with Garlic Acreage Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Counties in Missouri with the most farms harvesting garlic in 2012 were Boone County, six farms; Jackson County, four farms; and Johnson County, four farms. Garlic harvested acreage data by county frequently were withheld. Counties with harvested acreage reported were Livingston County, two acres; Boone County, one acre; and Jackson County, one acre. Exhibit 3.16.3 summarizes the garlic farm and acreage data by county (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.16.3 – Missouri Harvested Garlic Acreage and Operations by County, 2012**

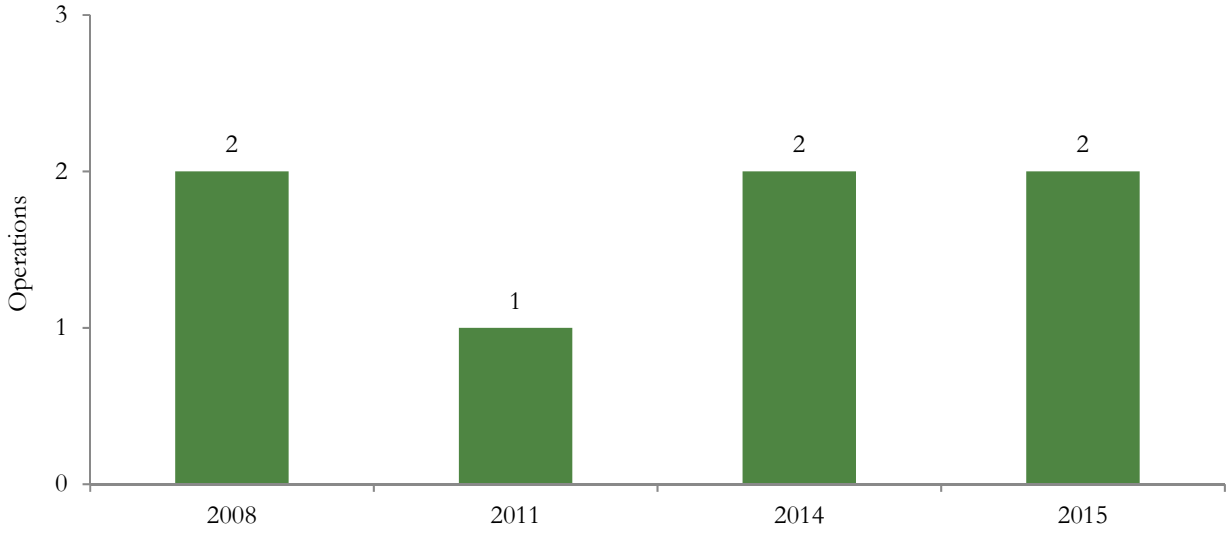


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

For the past decade or so, Missouri has had one or two operations harvesting USDA certified organic garlic each year. Exhibit 3.16.4 presents the number of operations harvesting garlic that was certified organic from 2008 to 2015. Two operations harvested certified organic garlic in 2015. In some years, note that exempt farms also contributed to Missouri organic garlic production. For example, in 2014, two operations harvested certified organic garlic, and four operations harvested exempt organic garlic (USDA National Agricultural Statistics Service 2017b).

2008 is the most recent year with organic acreage harvested, production and sales data reported. At the time, two acres of exempt organic garlic were harvested. For USDA certified organic and exempt organic garlic, production totaled 22 hundredweight in 2008, and dollar sales exceeded $8,500 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.16.4 – Missouri Certified Organic Garlic Operations with Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

3.17 Horseradish

Limited data are available to describe Missouri horseradish production. During 2012, horseradish acreage in the state was small enough that the exact acreage wasn't released. Four operations harvested horseradish acreage in 2012, and all of those operations harvested product for the fresh market. Counties with operations that harvested horseradish in 2012 were Jackson County, two farms, and Johnson County, two farms (USDA National Agricultural Statistics Service 2017b).

Note that the USDA National Agricultural Statistics Service didn't report a Scott County horseradish operation count for 2012 (USDA National Agricultural Statistics Service 2014b). However, other data indicate that Scott County horseradish acreage has been significant. The county's USDA Farm Service Agency office reports that 2016 irrigated acreage totaled 287 acres, and the non-irrigated acreage totaled 99 acres.

3.18 Kohlrabi

Although USDA data don't describe kohlrabi production in Missouri, some production activity has occurred. As an example, Buckeye Acres is a family farm in Warrensburg, Mo. The operation sells fresh produce, including kohlrabi, and meat products, such as beef, pork and chicken. Buckeye Acres operates an on-farm store, and it sells goods at the Warrensburg Farmer's Market. Also, it has a community-supported agriculture program available to customers (Buckeye Acres).

Located in Rushville, Mo., L&R Farms also grows and sells kohlrabi as one of several seasonal fruit and vegetables that the farm offers. The farm sells its products at four farmers markets. One of those markets is the Parkville Farmer's Market near Kansas City, Mo. (Parkville Farmer's Market).

In mid-Missouri, Nolte Hills Nursery is one kohlrabi grower. The operation had maintained a flower nursery for a couple of decades, and within the past decade, it added vegetable production. Today, growing vegetables is a main interest for the farm, which is based in Gasconade County. On about one acre, the farm has 10 greenhouses and one high tunnel (Columbia Farmers Market 2016).

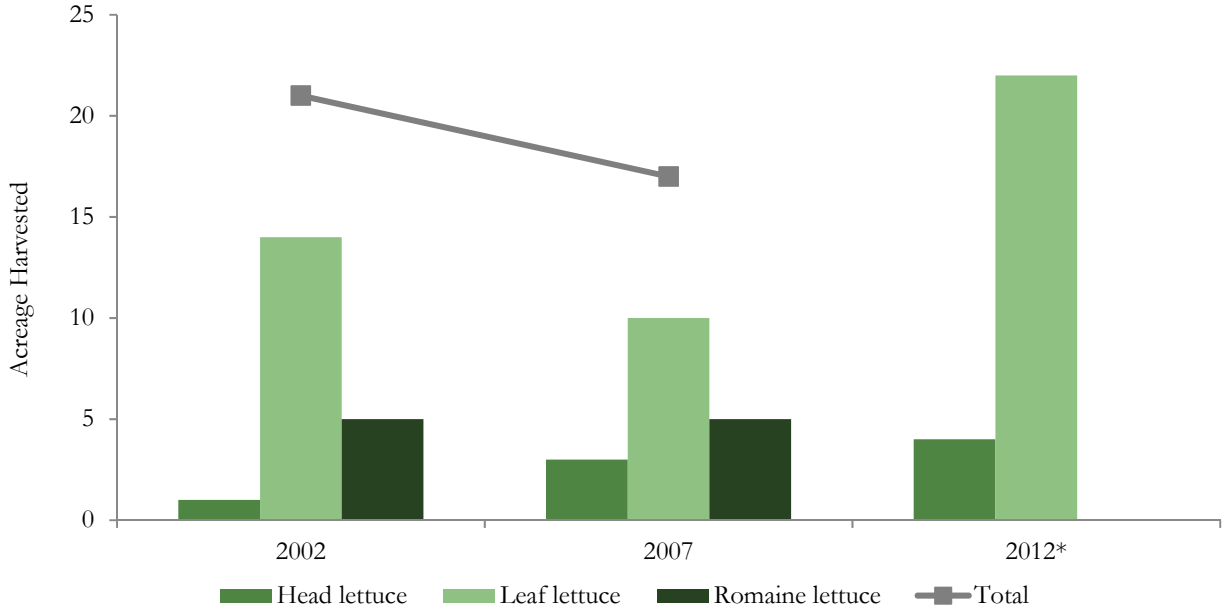
3.19 Leek

With respect to leeks, the crop has been adopted by at least one Missouri farm. Located in Brixey, Mo., Elixir Farm raises certified organic and biodynamic produce. In particular, its specialties are leeks, lettuce and garlic. However, it has a few other crops, depending on the time of year (Elixir Farm). During the 2017 Ozark Area Community Congress event, the farm is scheduled to present about advancements that will enable it to raise leeks year round (Ozark Area Community Congress 2017). The farm also produces grass-fed beef from its Dexter-Galloway cross cattle (Elixir Farm).

3.20 Lettuce

Types of lettuce include head lettuce, leaf lettuce and romaine lettuce. Exhibit 3.20.1 presents harvested acreage data for all three lettuces — head, leaf and romaine — and it tracks total lettuce acreage in years with available data. Total harvested lettuce acreage declined from 2002 to 2007. Note that 2012 data weren't reported. Of the three types of lettuce, Missouri has tended to harvest more leaf lettuce acreage than acreage for head lettuce or romaine lettuce. In 2012, Missouri farms harvested four acres of head lettuce and 22 acres of leaf lettuce. Note that data for romaine lettuce harvested acreage weren't reported in 2012 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.20.1 – Missouri Lettuce Acreage Harvested, 2002 to 2012



* Total lettuce and romaine lettuce acreage harvested data weren't disclosed in 2012.
Source: USDA, National Agricultural Statistics Service (2017b)

Some Missouri lettuce growers have elected to produce their lettuce crops under protection. The number of operations with lettuce production area under protection increased from four operations in 2009 to seven operations in 2014. Exhibit 3.20.2 shares additional details about Missouri lettuce production under protection. Despite the operation count increasing, lettuce production under protection declined from 182 hundredweight in 2009 to 105 hundredweight. in 2014. Dollar sales also dropped from 2009 to 2014. Square footage under protection was exclusively published in 2014. At the time, Missouri growers dedicated more than 16,000 square feet to lettuce production under protection (USDA National Agricultural Statistics Service 2017b).

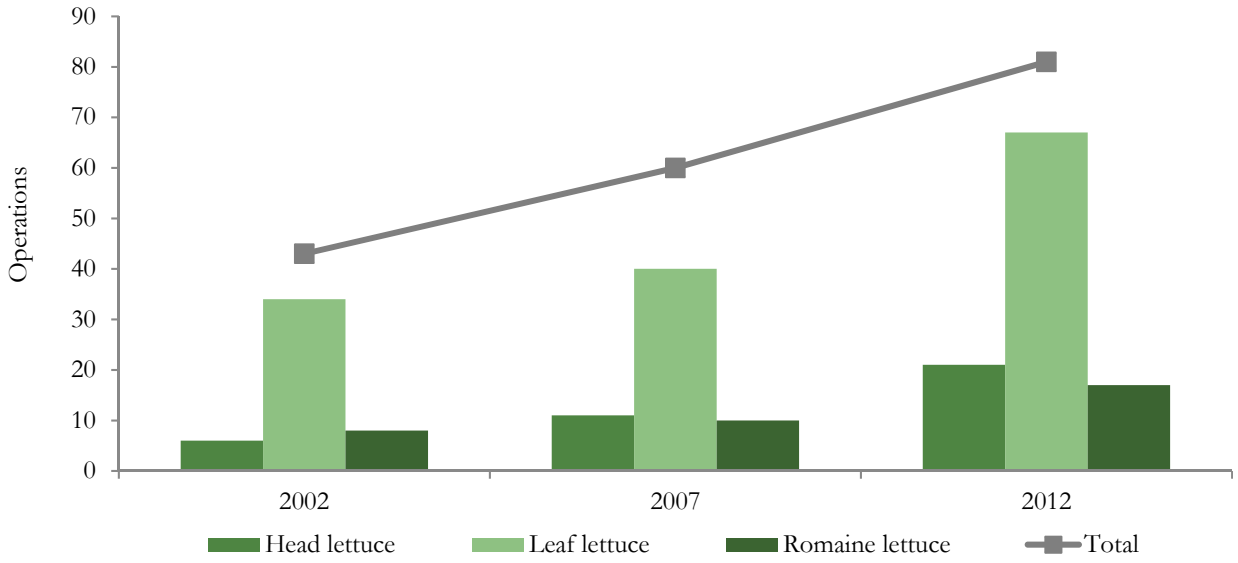
Exhibit 3.20.2 – Missouri Lettuce Production Under Protection, 2009 and 2014

	2009	2014
Operations with area in production	4	7
Square foot in production*	(D)	16,300
Production in cwt.	182	105
Dollar sales	$35,184	$25,070

* Square footage under protection was withheld in 2009 to protect data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

Steadily, more operations in Missouri have harvested lettuce acreage. The number of total lettuce operations harvesting acreage nearly doubled from 43 farms in 2002 to 81 farms in 2012. Exhibit 3.20.3 tracks the number of Missouri operations harvesting lettuce acreage from 2002 to 2012. Missouri farms have been more likely to grow and harvest leaf lettuce than head lettuce or romaine lettuce. For all three types, however, Missouri gained operations with harvested acreage between 2002 and 2012 (USDA National Agricultural Statistics Service).

Exhibit 3.20.3 – Missouri Operations with Lettuce Acreage Harvested, 2002 to 2012

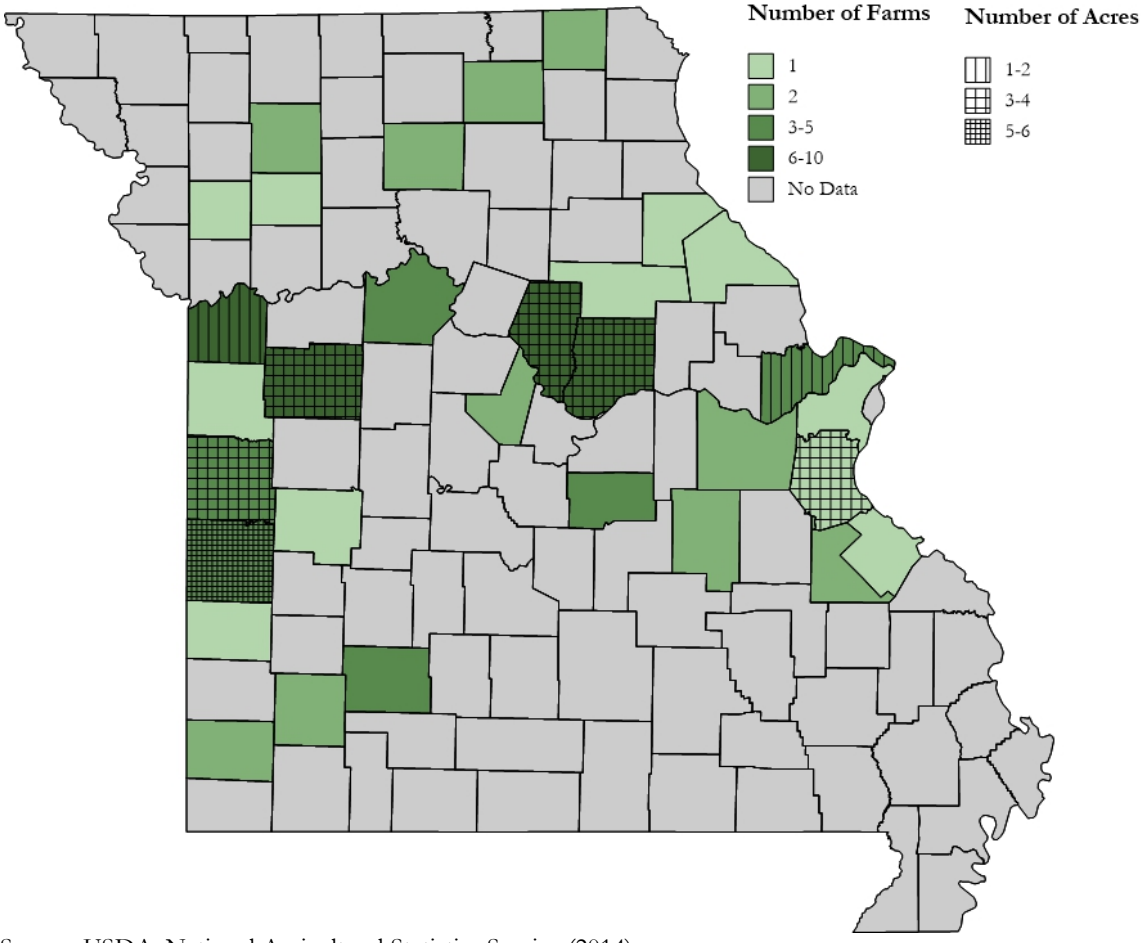


Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.20.4 highlights Missouri counties according to their total lettuce operations with harvested area and harvested lettuce acreage. Note that the totals include all three lettuce types: head lettuce,

leaf lettuce and romaine lettuce. In 2012, counties leading in number of lettuce farms were Boone County, eight farms; Johnson County, seven farms; Callaway County, six farms; and Jackson County, six farms. Total lettuce harvested acreage was highest in Vernon County at six acres. Tying for second in lettuce acreage were Bates, Boone, Callaway, Jefferson and Johnson counties. They all reported three harvested lettuce acres in 2012 (USDA National Agricultural Statistics Service 2017b).

*Exhibit 3.20.4 – Missouri Harvested Lettuce Acreage and Operations by County, 2012**



Source: USDA, National Agricultural Statistics Service (2014)

In 2015, five Missouri operations harvested USDA certified organic lettuce acreage. Exhibit 3.20.5 tracks the number of USDA certified organic lettuce operations from 2008 to 2015. Operation count for certified organic lettuce farms was highest in 2008 and 2011 at six operations (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.20.5 – Missouri Certified Organic Lettuce Operations with Acreage Harvested, 2008 to 2015

Source: USDA, National Agricultural Statistics Service (2017b)

For select years with data available, Exhibit 3.20.6 further summarizes USDA certified organic lettuce activity in Missouri. Harvested acreage may have slightly declined from 2008 to 2015, but production and dollar sales both increased. In 2015, Missouri operations harvested one acre of certified organic lettuce. Production totaled 69 hundredweight, and dollar sales reached nearly $25,000. Note that harvested acreage, production and dollar sales data were withheld in 2014 (USDA National Agricultural Statistics Service 2017b).

Organic lettuce production in the state has included exempt production in addition to certified production. In 2014, for example, four operations were reported to produce exempt or certified organic lettuce. Combined, exempt and certified production totaled 30 hundredweight, and dollar sales were $5,510 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.20.6 – Missouri Certified Organic Lettuce Industry Summary, 2008 to 2015

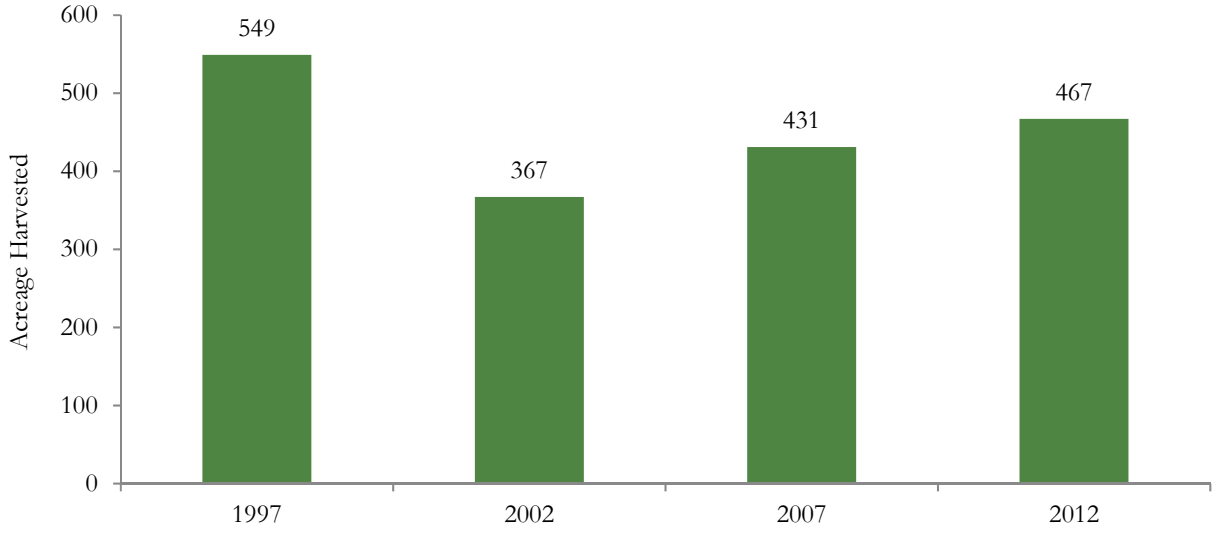
	2008	2011	2014	2015
Acreage harvested*	2	2	(D)	1
Production in cwt.*	6	41	(D)	69
Dollar sales	$2,370	$9,010	(D)	$24,254

* Data for acreage harvested, production and sales were withheld in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

3.21 Melons

Cantaloupe and honeydew are two melons grown in Missouri. During recent years, Missouri cantaloupe harvested acreage didn't show a consistent year-over-year change. Exhibit 3.21.1 shares harvested acreage for cantaloupe from 1997 to 2012. Harvested acreage totaled nearly 550 acres in 1997 and fell to nearly 470 acres in 2012. All harvested cantaloupe acreage in 2007 was directed to fresh market uses. Processing and fresh markets captured Missouri harvested cantaloupe acreage in 2012, but acreage used to serve these markets wasn't disclosed in order to protect data for individual operations (USDA National Agricultural Statistics Service 2017b).

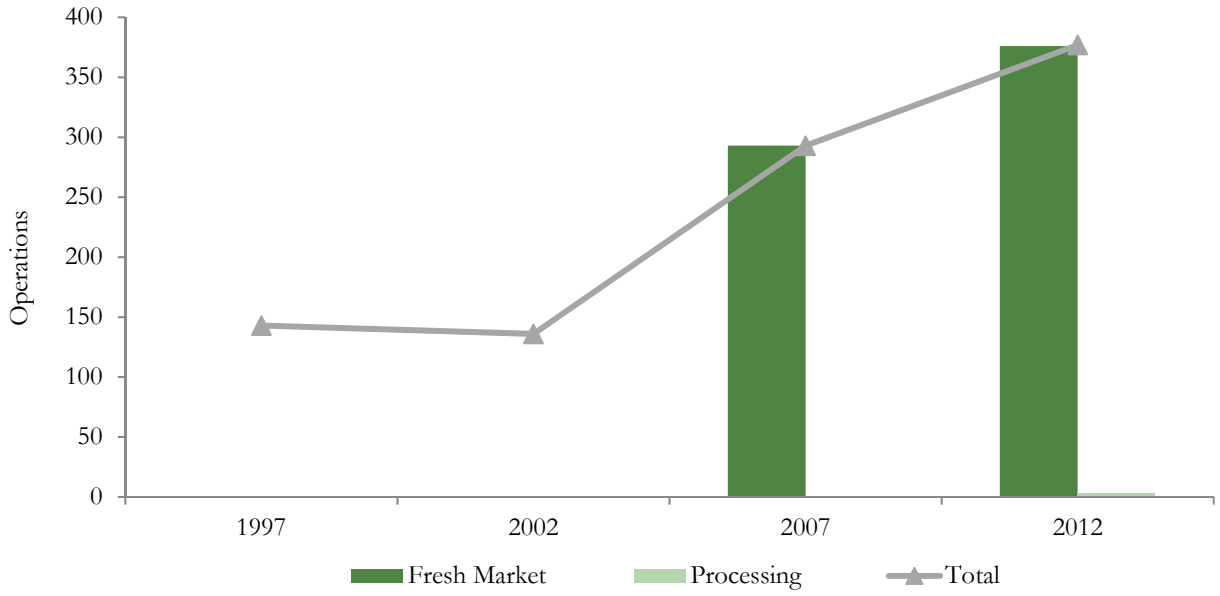
Exhibit 3.21.1 – Missouri Cantaloupe Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In recent years, more Missouri operations have begun growing and harvesting cantaloupe. Exhibit 3.21.2 presents the number of total operations harvesting cantaloupe acreage, and it articulates whether operations harvested the melons for fresh or processing purposes. Operations harvesting cantaloupe totaled 143 operations in 1997, but the count increased to 377 operations in 2012. In 2007, all Missouri cantaloupe-harvesting operations indicated that they harvested melons for fresh uses. Of the 377 total operations harvesting cantaloupe in 2012, 376 farms reported that they served the fresh market, and three operations harvested cantaloupe for use in processing (USDA National Agricultural Statistics Service 2017b).

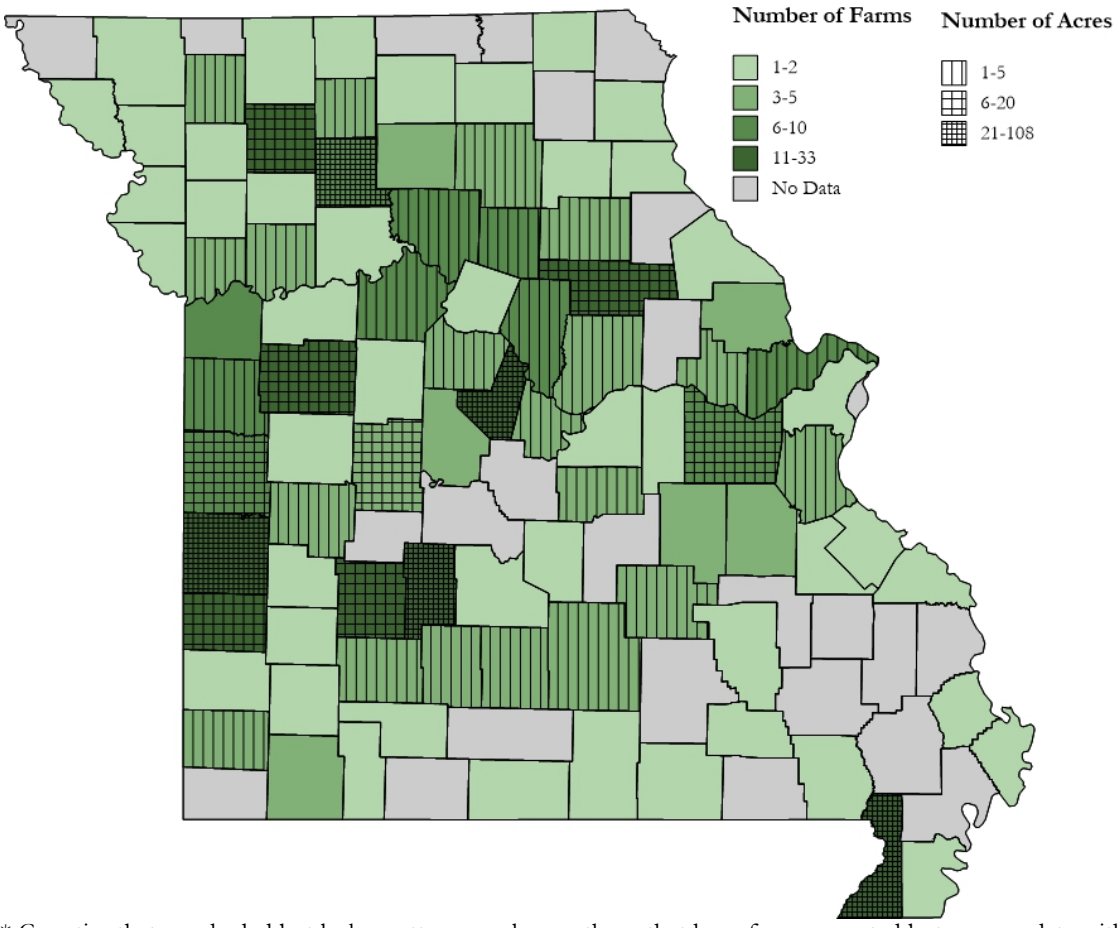
Exhibit 3.21.2 – Missouri Operations with Cantaloupe Harvested Acreage, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri counties that led in number of cantaloupe farms with harvested area during 2012 were Vernon County, 33 farms; Dallas County, 18 farms; and Barton County, 16 farms. Exhibit 3.21.3 displays the number of Missouri cantaloupe operations with area harvested and cantaloupe harvested acreage by county. Cantaloupe harvested acreage was most significant in Dunklin County, 108 acres; Vernon County, 83 acres; and Moniteau County, 26 acres (USDA National Agricultural Statistics Service 2017b).

*Exhibit 3.21.3 – Missouri Harvested Cantaloupe Acreage and Operations by County, 2012**

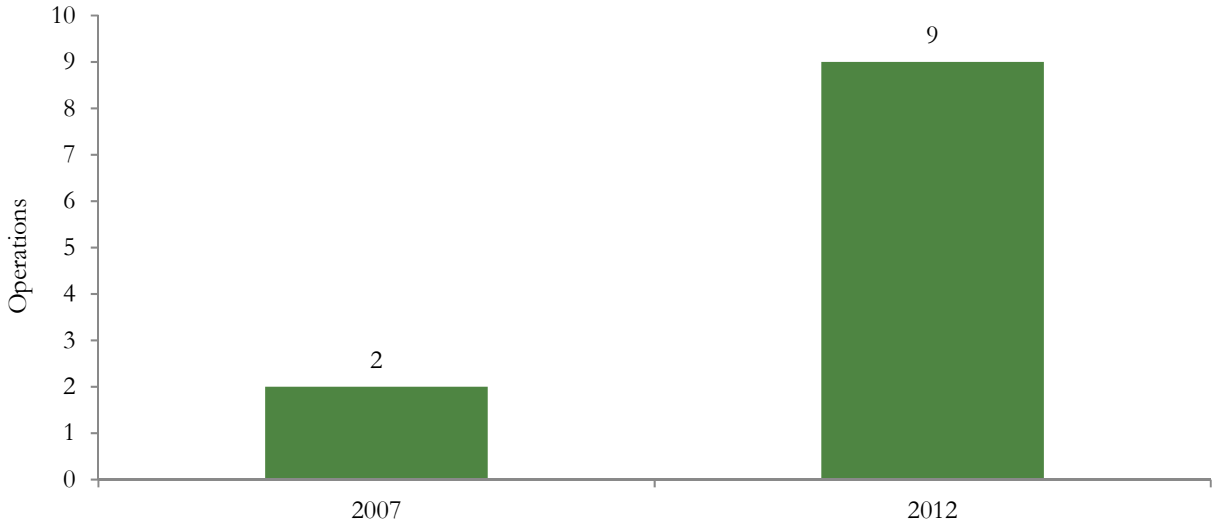


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Cantaloupe production in Missouri has trumped the state's honeydew melon production. In 2012, Missouri operations harvested five acres of honeydew melons, and all harvested melons were used for fresh purposes. Note that harvested acreage wasn't disclosed for 2007 in order to protect data for individual operations (USDA National Agricultural Statistics Service 2017b).

The number of Missouri honeydew operations harvesting acreage increased between 2007 and 2012. Exhibit 3.21.4 illustrates that two farms harvested honeydew acreage in 2007, but nine operations harvested acreage in 2012. During both years, all operations harvested honeydew melons for fresh purposes (USDA National Agricultural Statistics Service 2017b).

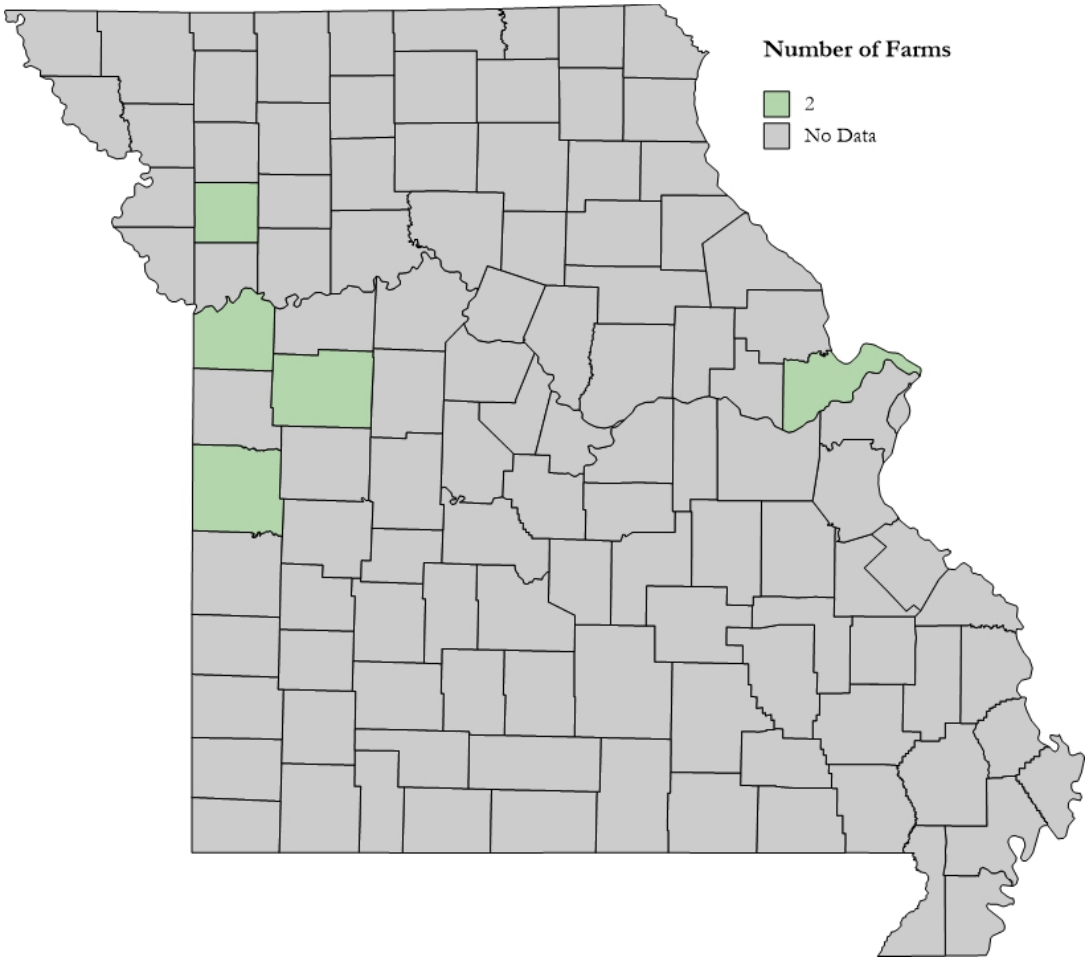
Exhibit 3.21.4 – Missouri Operations with Honeydew Harvested Acreage, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Honeydew operations were distributed across just a few Missouri counties in 2012. Those reporting honeydew melon operations with area harvested were Bates County, two farms; Clinton County, two farms; Jackson County, two farms; Johnson County, two farms; and St. Charles County, two farms. See Exhibit 3.21.5. No honeydew melon harvested acreage data were reported by county in 2012 (USDA National Agricultural Statistics Service 2014b).

Exhibit 3.21.5 – Missouri Honeydew Operations with Area Harvested by County, 2012



Source: USDA, National Agricultural Statistics Service (2014)

Organic melon production in Missouri has occurred on a small scale. Three operations reported harvesting USDA certified organic cantaloupe acreage in 2015. Just one operation had harvested USDA certified organic cantaloupe in 2014. In recent years, harvested acreage wasn't reported to protect data from individual operations. However, total production was published. In hundredweight, USDA certified organic cantaloupe production totaled 38 hundredweight during 2012 (USDA National Agricultural Statistics Service 2017b).

Note that some growers have raised organic cantaloupe that's considered exempt organic, not certified organic. For example, five operations in total operated organic cantaloupe farms in 2014. Of the total, four were exempt organic, and one had USDA certification (National Agricultural Statistics Service 2017).

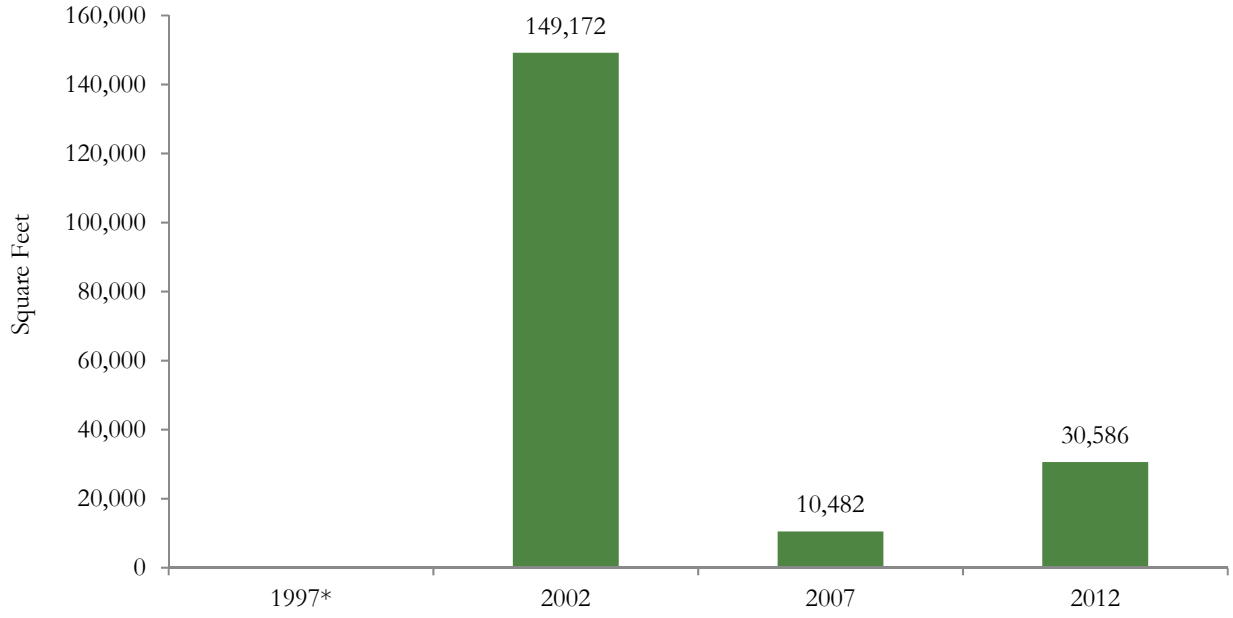
3.22 Mushroom

Compared with area used to raise mushrooms in 2002, the area declined markedly in 2007 and 2012, according to USDA data reports. Exhibit 3.22.1 quantifies production area in square feet. In 2002,

mushroom production area totaled nearly 150,000 square feet. It dropped substantially in 2007 and then improved slightly. In 2012, Missouri producers used slightly more than 30,000 square feet to raise mushrooms. Data from 1997 were withheld from being reported (USDA National Agricultural Statistics Service 2017b).

Mushroom production area data does not completely reflect the mushroom industry's activity in the state. For example, when producing log-grown shiitake mushrooms, production area has little bearing on total production. In Missouri, Ozark Forest Mushrooms is a large log-grown shiitake mushroom producer; its mushrooms are primarily grown under the shade of a tree canopy. Ozark Forest Mushrooms maintains a 20,000-log operation, and it produces mushrooms year-round.

Exhibit 3.22.1 – Missouri Mushroom Area in Production, 1997 to 2012

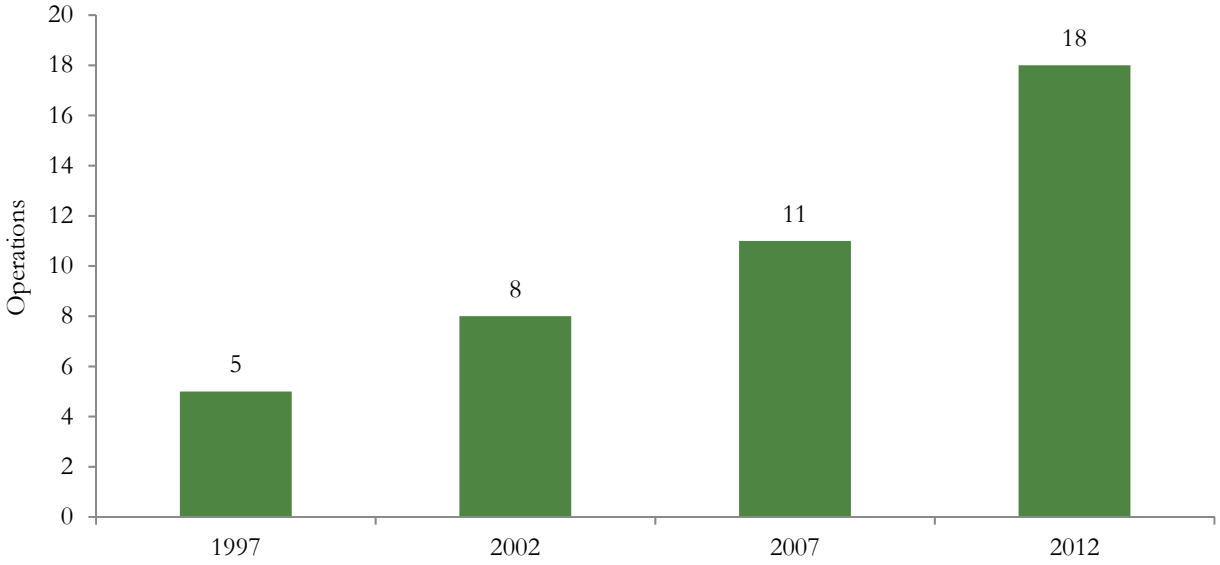


* 1997 data were withheld from being reported.
Source: USDA, National Agricultural Statistics Service (2017b)

Although the USDA data indicate that mushroom production area shrunk in recent years, more Missouri operations have gradually added mushroom production to their farms. Exhibit 3.22.2 tracks the number of Missouri operations with mushroom production area from 1997 to 2012. As illustrated, mushroom production concentrated on five operations during 1997. More than three times as many Missouri operations — 18 in total — maintained mushroom production area in 2012. During 2007 and 2012, all 11 operations and 18 operations, respectively, that reported having mushroom production area also recorded making mushroom sales (USDA National Agricultural Statistics Service 2017b).

In addition to mushroom production, Missouri has a small presence in mushroom spawn sales. Spawn refers to the seed-like material needed to raise mushrooms. One Missouri operation made mushroom spawn sales in 2012 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.22.2 – Missouri Operations with Mushroom Production Area, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Mushroom cash receipts have escalated in recent years. Exhibit 3.22.3 illustrates that cash receipts totaled just $199,000 in 2008. Cash receipts increased 1.67 times to reached $331,000 by 2016. Cash receipts peaked slightly higher at $332,000 in 2015. These data indicate the growing importance of mushrooms to Missouri specialty crop cash receipts (USDA Economic Research Service 2017).

Exhibit 3.22.3 – Missouri Mushroom Cash Receipts, 2008 to 2016

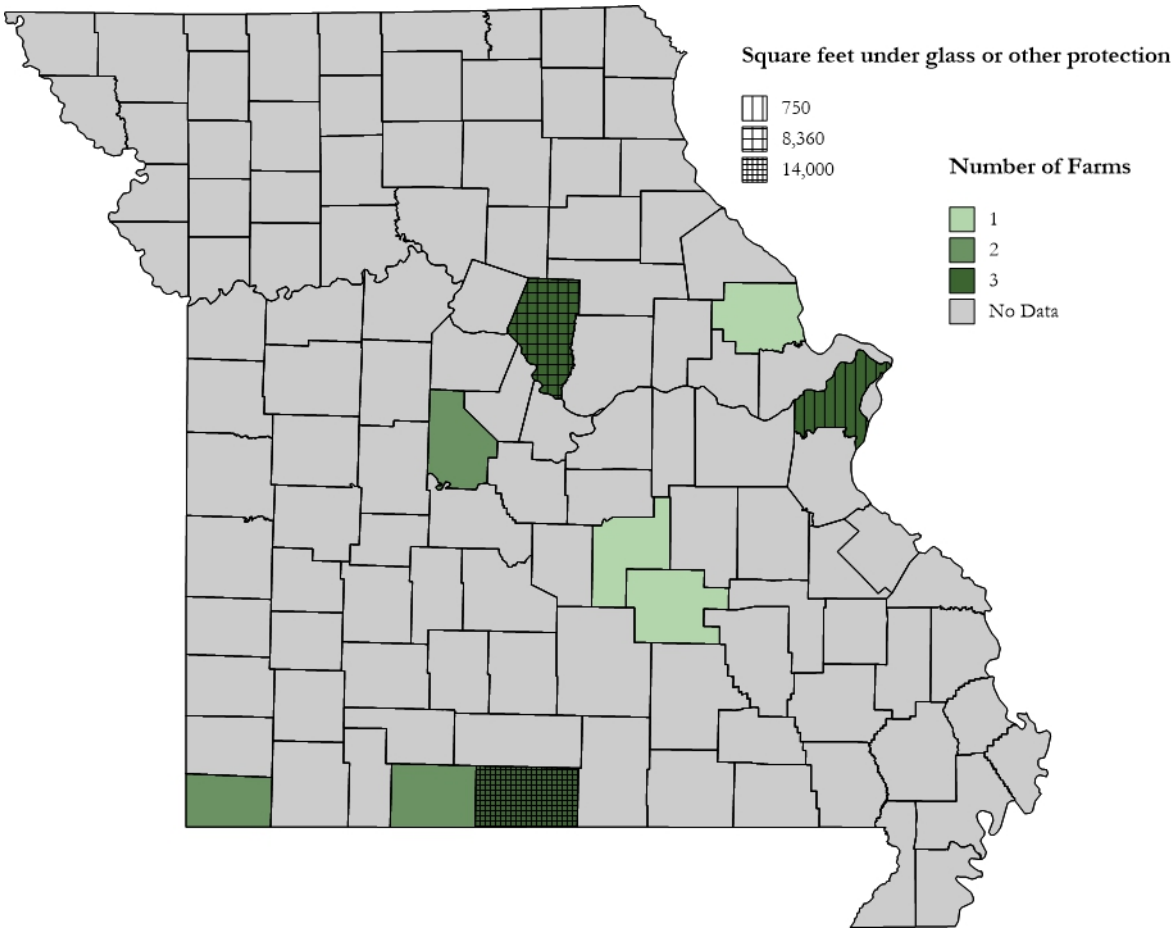
Source: USDA, Economic Research Service (2017)

By county, those with the greatest number of mushroom operations with area in production in 2012 were Boone County, three farms; Ozark County, three farms; and St. Louis County, three farms. In

terms of production area used to raise mushrooms, most counties don't have this data point released. The exceptions in 2012 were Ozark County, 14,000 square feet; Boone County, 8,360 square feet; and St. Louis County, 750 square feet. See Exhibit 3.22.4 (USDA National Agricultural Statistics Service 2014b).

Monterey Mushrooms operates a processing facility in Bonne Terre, Mo., which is located in St. Francois County. In 2005, the facility had a throughput that totaled 11.8 million pounds (Ressel 2005). Monterey Mushrooms reports that it grows its mushrooms in several states: California, Texas, Illinois, Tennessee, Florida and Pennsylvania. Plus, it has a production location in Mexico (Monterey Mushrooms 2017). Because the mushrooms aren't produced in Missouri, they aren't included in the state's production counts.

*Exhibit 3.22.4 – Missouri Mushroom Operations and Production Area by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but area data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

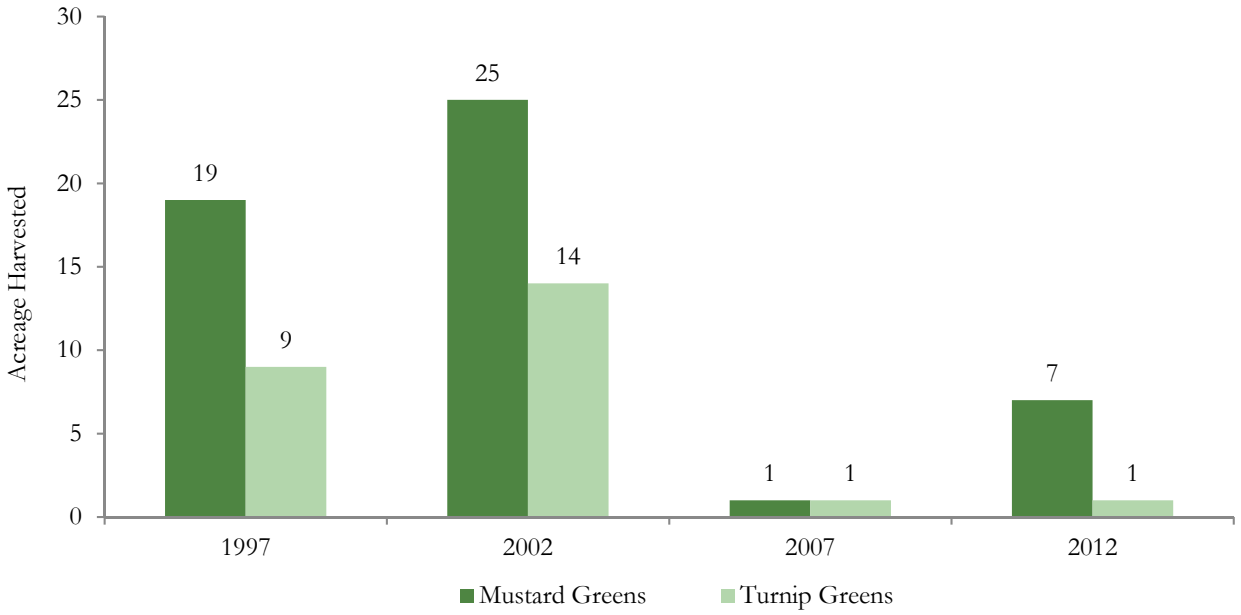
To an extent, Missouri mushroom operations have adopted organic production. During both 2014 and 2015, two Missouri operations indicated that they produced and sold USDA certified organic mushrooms. During 2014, another Missouri grower produced and sold exempt organic mushrooms (USDA National Agricultural Statistics Service 2017b).

The Center for Agroforestry at the University of Missouri has conducted research to develop technology for mushroom cultivation and identify the best-suited types of mushrooms in Missouri. Log-grown shiitake mushrooms grow well in Missouri, especially under shade on white oak and sugar maple logs (Bruhn and Hall 2008). Consumers have growing interest in log-grown shiitake mushrooms. A national market research survey evaluated resources that are critical for the success of a shiitake mushroom business. Production information and skills, market knowledge, tools and equipment, business skills, labor availability and financial resources are the top six factors that determine the success of a mushroom business in the U.S. (Gold et al. 2008).

3.23 Mustard and Other Greens

Greens produced in Missouri include mustard greens and turnip greens. Harvested acreage for these crops from 1997 to 2012 is reported in Exhibit 3.23.1. In most years, mustard greens harvested acreage surpassed turnip greens harvested acreage. The exception was 2007 when acreage harvested totaled just one acre for both mustard greens and turnip greens. In 2012, mustard greens harvested acreage totaled seven acres, and turnip greens acreage harvested totaled one acre. For both mustard and turnip greens, all Missouri acreage harvested in 2007 and 2012 was directed to the fresh market (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.23.1 – Missouri Mustard Greens and Turnip Greens Acreage Harvested, 1997 to 2012

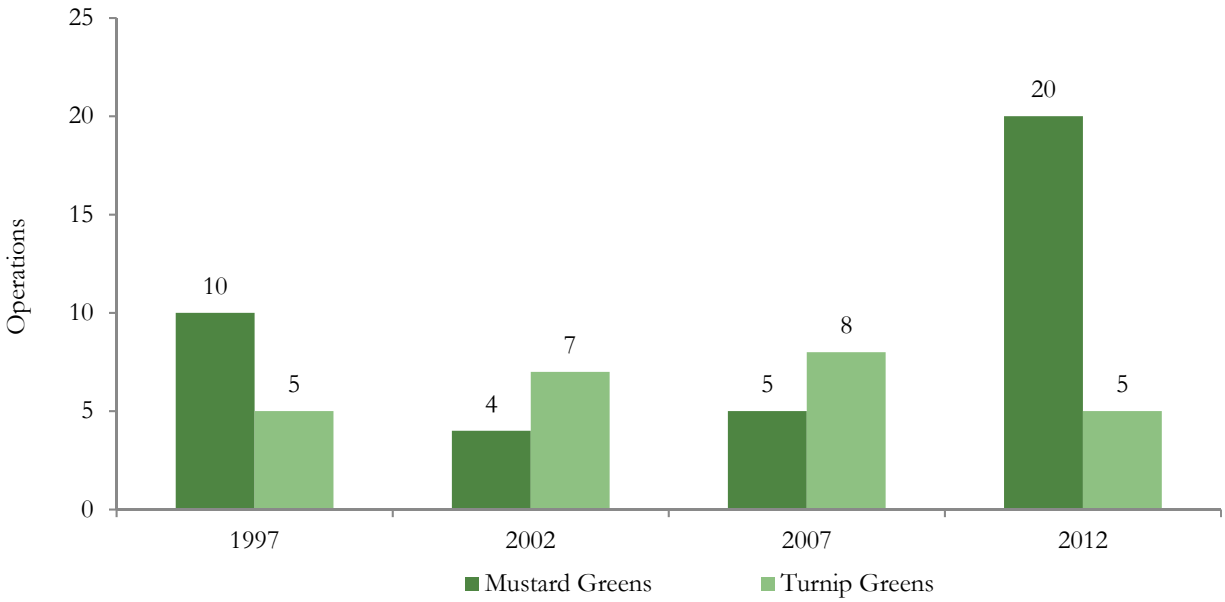


Source: USDA, National Agricultural Statistics Service (2017b)

Somewhat counter intuitively, the number of Missouri operations harvesting mustard greens was higher later in the observed period than earlier in the observed period. This is despite acreage declining. Exhibit 3.23.2 shares that 10 operations harvested mustard greens acreage in 1997 and that the operation count had doubled to 20 farms in 2012. Note that all operations harvesting mustard greens in 2007 and 2012 indicated that they harvested mustard greens for the fresh market (USDA National Agricultural Statistics Service 2017b).

Missouri added operations harvesting turnip greens from 1997 to 2007. However, operations engaged in turnip greens harvesting dropped in 2012. At the time, five operations indicated that they harvested turnip greens. During both 2007 and 2012, all Missouri turnip greens operations harvested acreage to serve the fresh market (USDA National Agricultural Statistics Service 2017b).

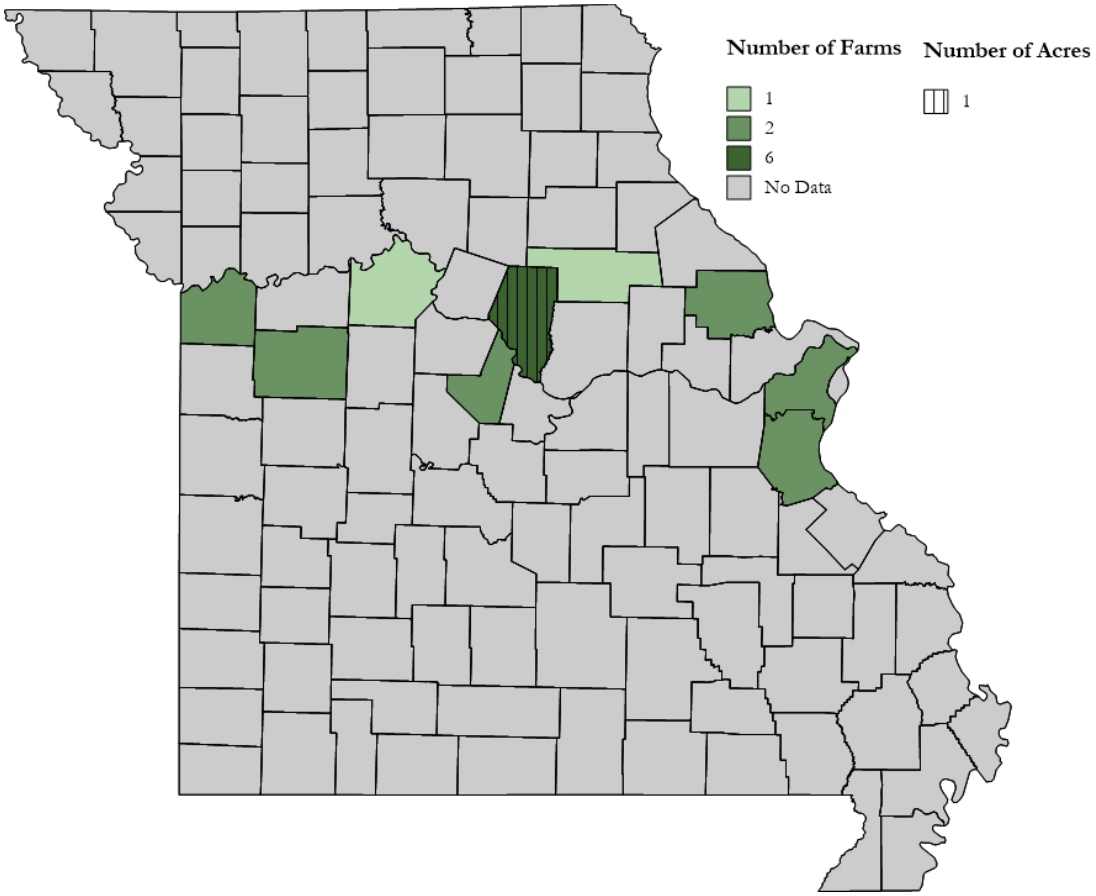
Exhibit 3.23.2 – Missouri Operations with Mustard and Turnip Greens Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The county registering the most mustard greens operations with area harvested in 2012 was Boone County. It had six operations with harvested acreage. Tied for second were Jackson, Jefferson, Johnson, Lincoln, Moniteau and St. Louis counties. Each had two operations. Exhibit 3.23.3 maps Missouri counties according to their mustard green farms with area harvested and the harvested acreage. Just one county — Boone County — had published mustard greens harvested acreage. It had one acre. Harvested acreage totals for the other counties were withheld (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.23.3 – Missouri Harvested Mustard Greens Acreage and Operations by County, 2012**



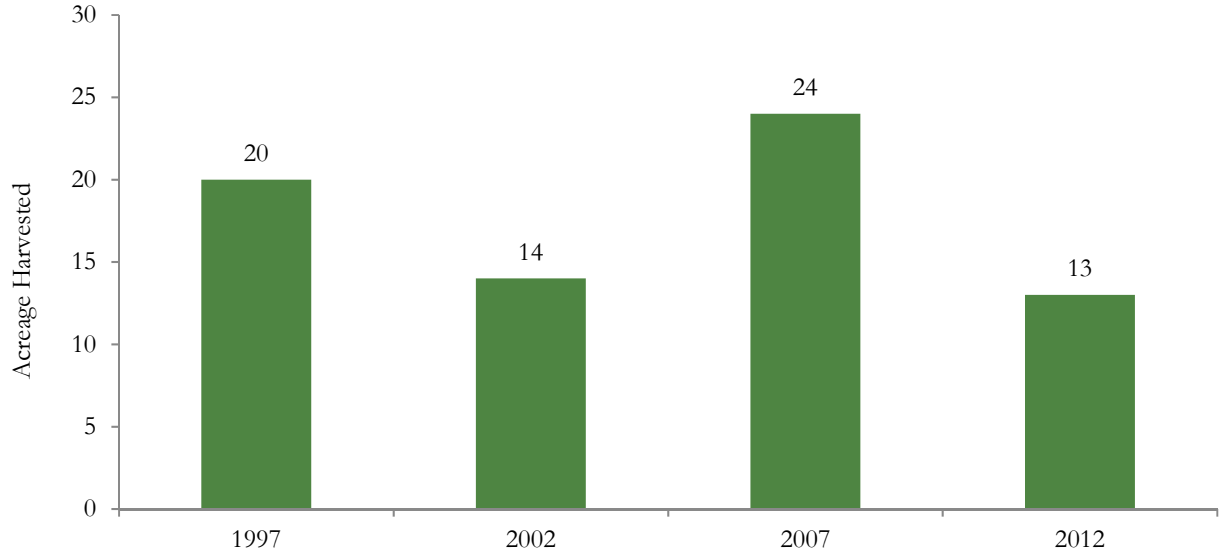
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

With respect to turnip greens production by county, Jackson County and Johnson County each had two turnip greens operations in 2012, and one operation in St. Louis County harvested turnip greens. Note that data for turnip greens harvested acreage by county were withheld (USDA National Agricultural Statistics Service 2014).

3.24 Okra

Year by year, okra harvested acreage in Missouri experienced some variability between 1997 and 2012. During this period, the harvested acreage total was lowest in 2012 at 13 acres and the highest in 2007 at 24 acres. Exhibit 3.24.1 illustrates the harvested acreage trend for okra. Regarding markets pursued for harvested okra acreage, all acreage in 2007 was harvested for the fresh market. In 2012, okra harvested acreage was directed to both the fresh and processing markets. However, precise harvested acreage totals dedicated to each market weren't disclosed in order to protect data for individual farms (USDA National Agricultural Statistics Service 2017b).

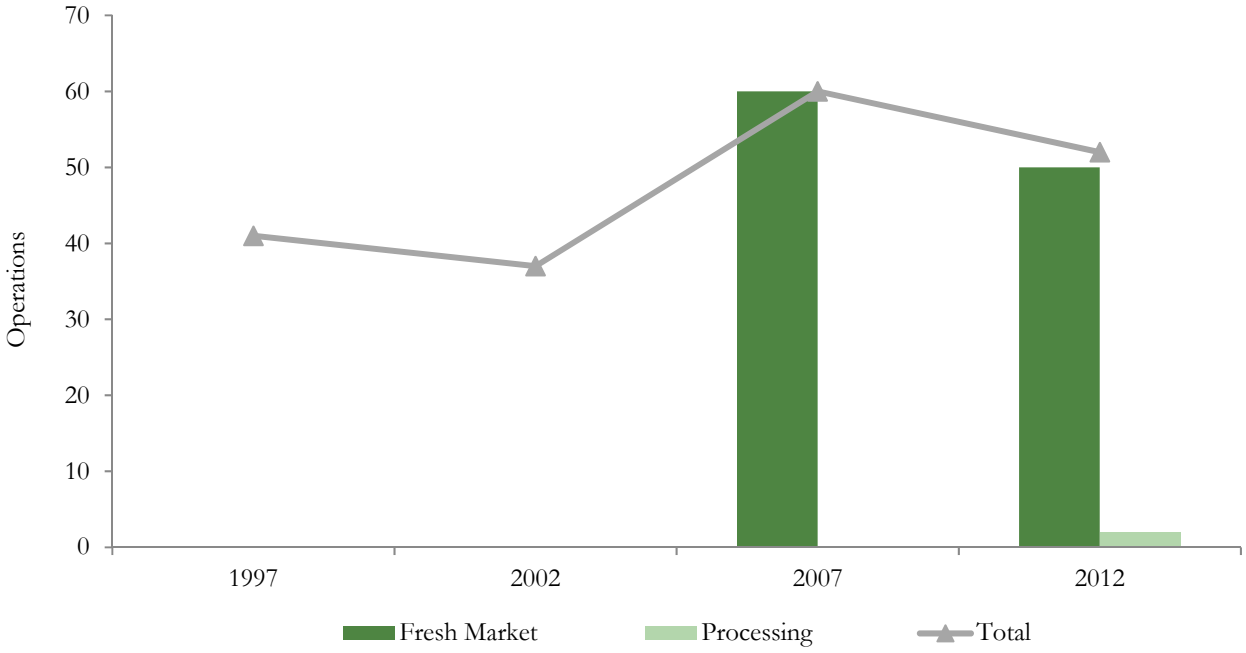
Exhibit 3.24.1 – Missouri Okra Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

For operations harvesting okra acreage, Exhibit 3.24.2 shares the total count of operations and total of those harvesting okra for fresh and processing purposes. The number of operations harvesting okra acreage jumped to 60 farms in 2007 and then receded to 52 farms in 2012. As the acreage data suggested, all okra harvested in 2007 was intended for the fresh market. In 2012, two operations directed okra to processing uses. Fifty operations of 52 operations reported harvesting okra for the fresh market (USDA National Agricultural Statistics Service 2017b).

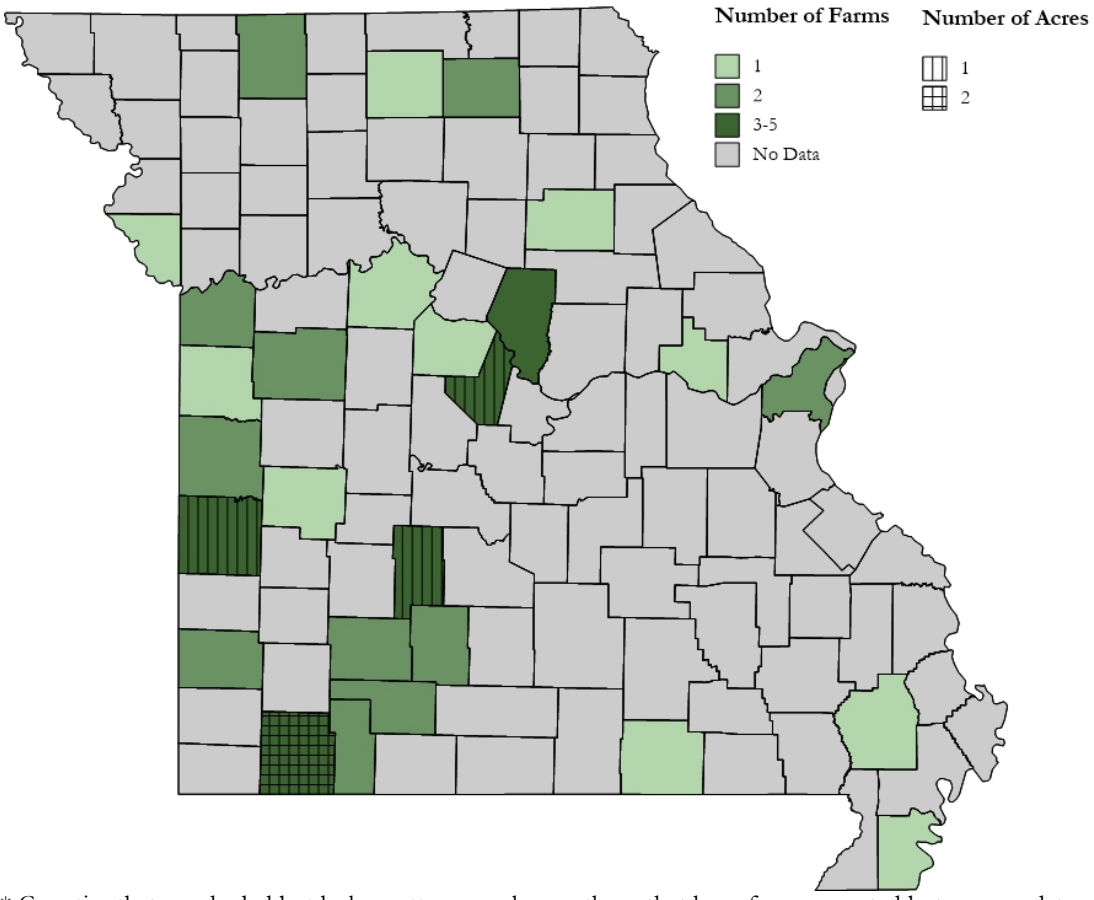
Exhibit 3.24.2 – Missouri Operations with Okra Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

To display the geographic distribution of Missouri okra harvested acreage and operations with harvested area during 2012, Exhibit 3.24.3 shades Missouri counties accordingly. Moniteau County led in the count of okra operations with harvested area; five farms harvested acreage in 2012. Other top counties for okra operations were Vernon County, four farms; Barry County, three farms; Boone County, three farms; and Dallas County, three farms. Harvested acreage data weren't released for all counties. Counties with disclosed harvested acreage data were Barry County, two acres; Dallas County, one acre; Moniteau County, one acre; and Vernon County, one acre (USDA National Agricultural Statistics Service 2017b).

*Exhibit 3.24.3 – Missouri Harvested Okra Acreage and Operations by County, 2012**

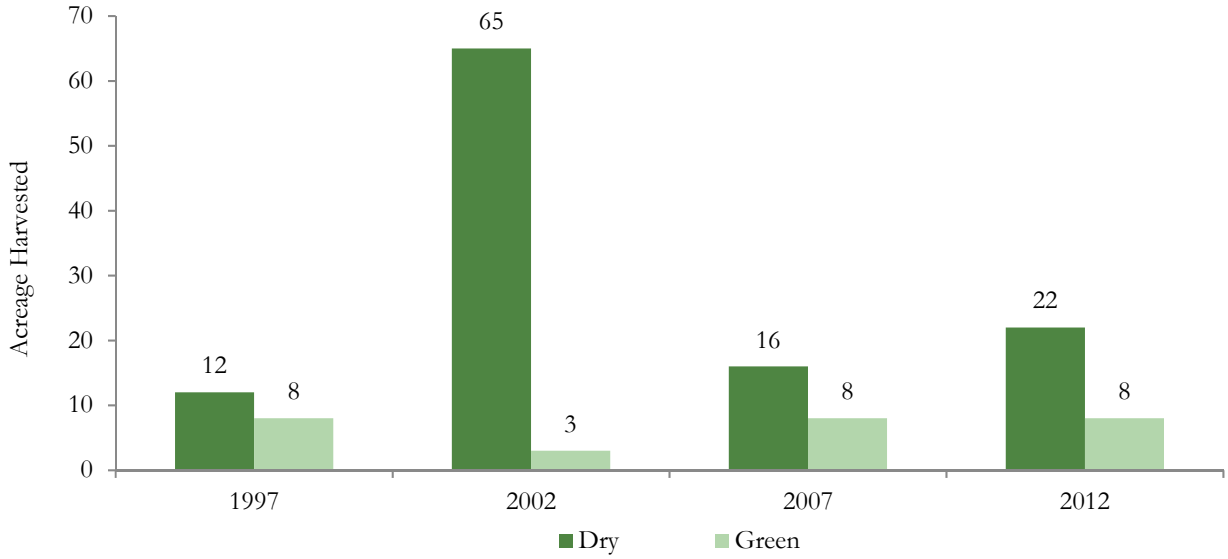


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.25 Onion

Onion production in Missouri has included dry onions and green onions. In past years, operations have harvested more dry onion than green onion acreage. Exhibit 3.25.1 shares harvested acreage for both from 1997 to 2012. Dry onion acreage was substantially higher in 2002 — 65 acres — than in other years during the observed period. During that same year, green onion harvested acreage dipped to levels lower than in other years. In 2012, Missouri growers harvested 22 acres of dry onions and eight acres of green onions (USDA National Agricultural Statistics Service 2017b).

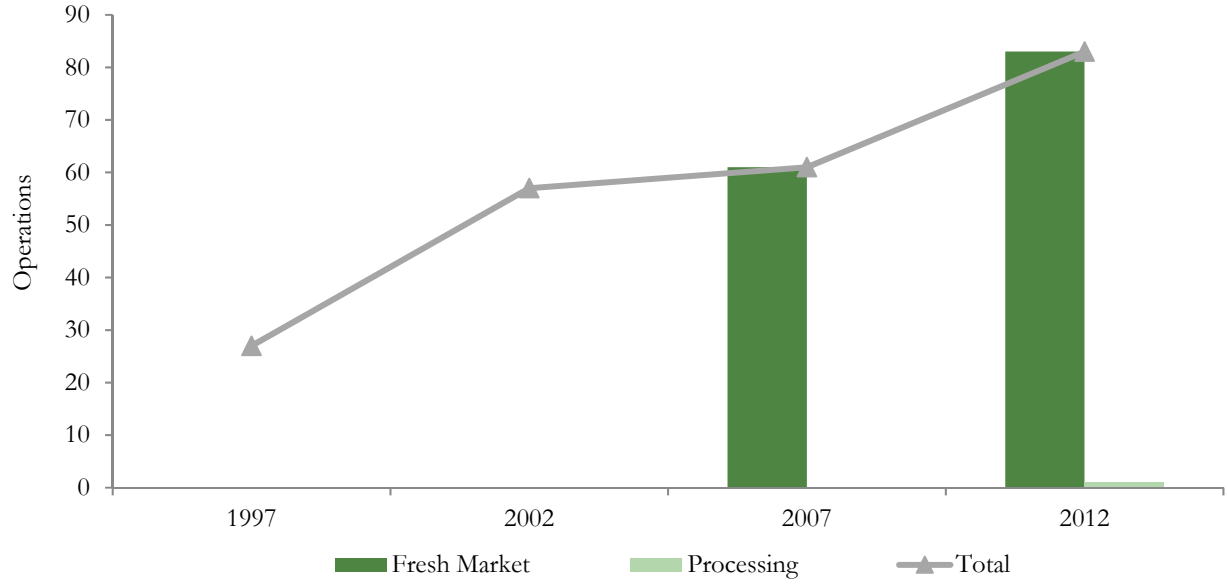
Exhibit 3.25.1 – Missouri Dry and Green Onion Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri farms have increasingly added dry onions to their operations. Exhibit 3.25.2 illustrates that just 27 operations harvested dry onion acreage in 1997. By 2012, the count of operations harvesting dry onion acreage had increased to 83 operations. The number of operations harvesting acreage for the fresh market or processing purposes was reported in 2007 and 2012. All operations harvesting dry onions in 2007 served the fresh market. In 2012, all operations harvested acreage for selling into the fresh market, and one operation noted that it harvested dry onions for processing uses (USDA National Agricultural Statistics Service 2017b).

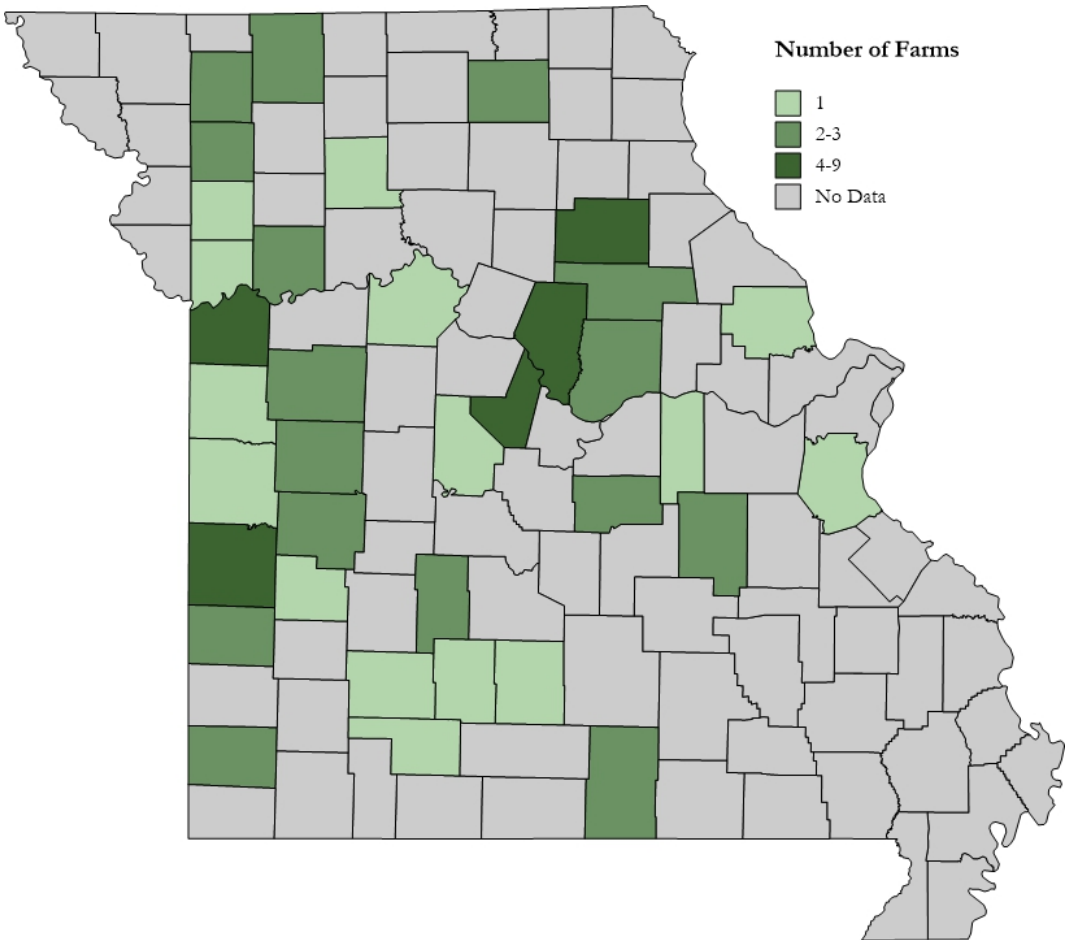
Exhibit 3.25.2 – Missouri Operations with Dry Onion Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Counties with the greatest number of dry onion farms harvesting acreage during 2012 were Boone County, nine farms; Moniteau County, seven farms; and Vernon County, six farms. Many counties didn't have dry onion harvested acreage disclosed. Of those counties with harvested acreage data available, however, counties leading in acreage were Henry County, three acres; Boone County, two acres; Moniteau County, two acres; and Vernon County, two acres. Exhibit 3.25.3 displays dry onion operations with area harvested (USDA National Agricultural Statistics Service 2014b).

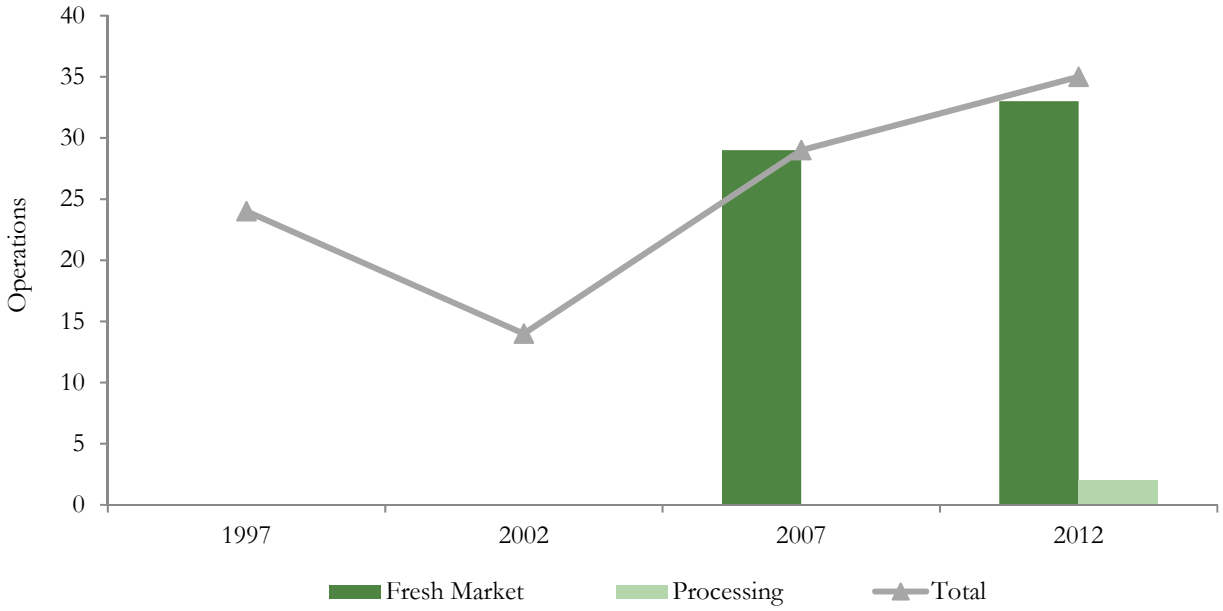
*Exhibit 3.25.3 – Missouri Dry Onion Operations with Harvested Area by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

After declining from 1997 to 2002, the number of operations harvesting green onion acreage increased in later years. Exhibit 3.25.4 presents the trend. In 1997, 24 operations indicated that they harvested green onions. The count increased to 35 operations in 2012. Note that most Missouri operations harvest green onions for the fresh market. Of the 35 operations harvesting acreage in 2012, 94.3 percent harvested green onions for fresh uses, and 5.7 percent harvested green onions for processing purposes (USDA National Agricultural Statistics Service 2017b).

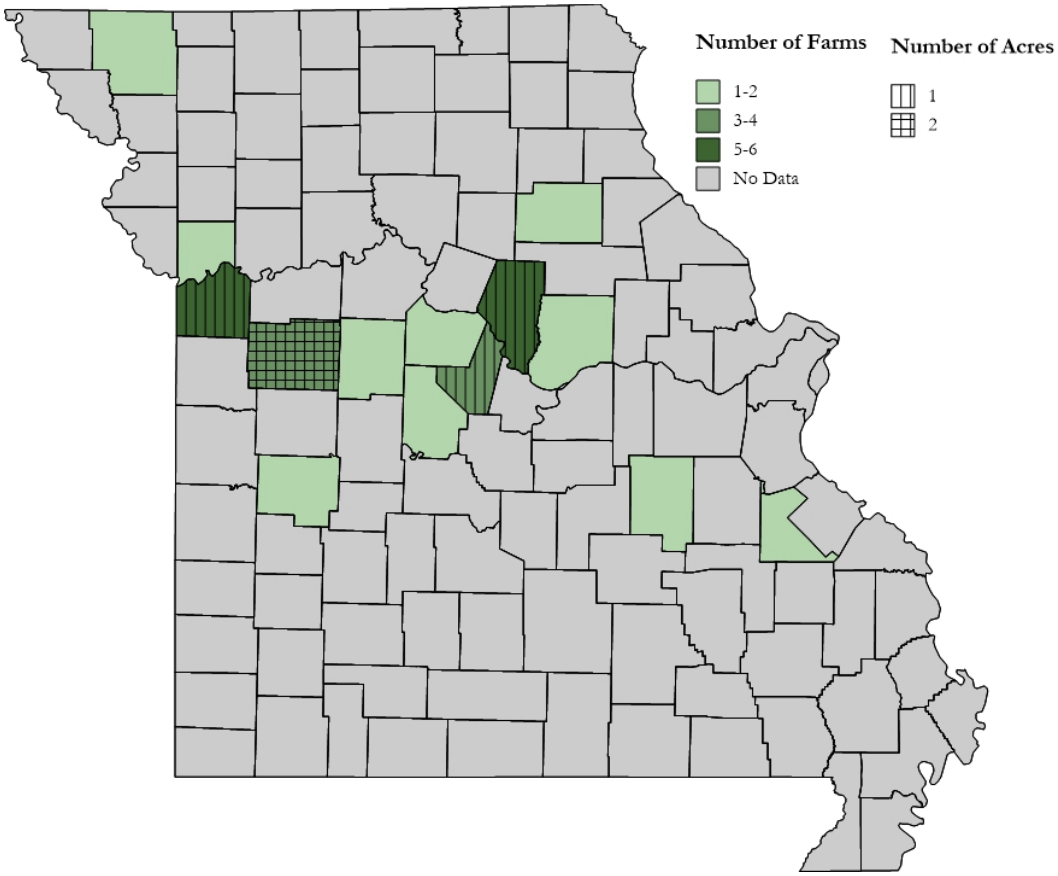
Exhibit 3.25.4 – Missouri Operations with Green Onion Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, green onion operations harvesting acreage were most common in Boone County, six farms; Jackson County, six farms; Johnson County, four farms; and Moniteau County, three farms. Like for dry onions, green onion harvested acreage data frequently were withheld. Counties with released harvested acreage data were Johnson County, two acres; Boone County, one acre; Jackson County, one acre; and Moniteau County, one acre. See Exhibit 3.25.5 for available green onion harvested acreage and operation count by county (USDA National Agricultural Statistics Service 2017b).

*Exhibit 3.25.5 – Missouri Harvested Green Onion Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

To summarize Missouri's certified organic dry onion industry, Exhibit 3.25.6 highlights key data points from 2014 and 2015. Note that the 2014 data points were designated as those for organic dry onions, but those from 2015 were listed as describing organic dry onions for the fresh market. In both years, one acre of certified organic dry onions were harvested. The operation count declined slightly from six farms in 2014 to four farms in 2015. However, production increased from 68 hundredweight in 2014 to 111 hundredweight in 2015. As production increased, sales did, too. Like production, sales more than doubled from 2014 to 2015. Certified organic dry onion sales reached $24,800 in 2015 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.25.6 – Summary of Missouri Certified Organic Dry Onion Industry, 2014 and 2015

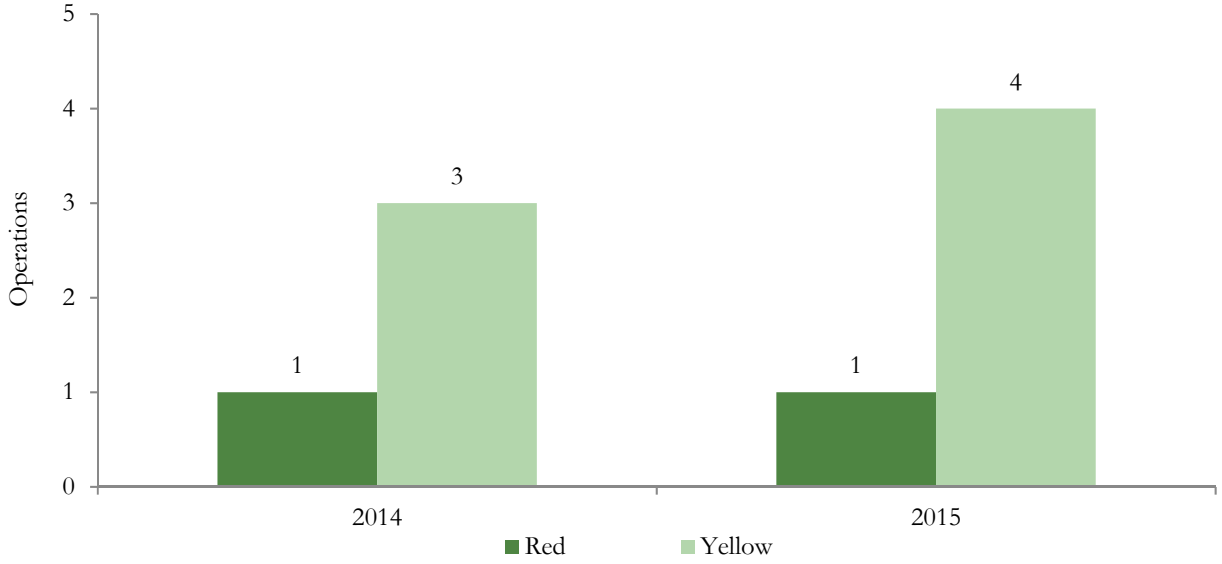
	Acres Harvested	Operations	Cwt. Produced	Dollar Sales
2014	1	6	68	$10,250
2015*	1	4	111	$24,800

* 2015 data were designated as "fresh market" data.
Source: USDA, National Agricultural Statistics Service (2017b)

Missouri has produced both certified organic red dry onions and certified organic yellow dry onions. Exhibit 3.25.7 communicates the number of operations harvesting USDA certified organic dry

onions of both colors in 2014 and 2015. One operation harvested certified organic dry red onions during 2014 and 2015. In 2014, note that two operations reported harvesting exempt organic dry red onion acreage. The number of farms harvesting certified organic dry yellow onions increased by one between 2014 and 2015. Four operations in total harvested certified organic dry yellow onions in 2015 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.25.7 – Missouri Operations with Certified Organic Red and Yellow Dry Onion Acreage Harvested, 2014 and 2015



Source: USDA, National Agricultural Statistics Service (2017b)

3.26 Parsley

For Missouri, parsley data are limited to data points from 2012. At the time, eight operations collectively harvested one acre of parsley. In 2012, Missouri parsley acreage and operations only served the fresh market (USDA National Agricultural Statistics Service 2017b).

Counties in Missouri reporting the most parsley operations with area harvested during 2012 were Boone County, two farms; Jackson County, two farms; and Johnson County, two farms. Christian County and Saline County each had one operation that harvested parsley acreage in 2012. To avoid disclosing data for individual farms, the data series withheld reporting parsley acreage by county (USDA National Agricultural Statistics Service 2014b).

3.27 Parsnip

USDA data don't describe parsnip production for Missouri. However, a certified organic farm, Red Ridge Farms grows fruits and vegetables that it distributes through multiple points, including farmers markets; a community-supported agriculture program; and its own store in Holden, Mo. The farm has offered parsnips in addition to other vegetables such as heirloom tomatoes, spinach, peppers and microgreens (Kansas City Food Circle 2017).

3.28 Pea

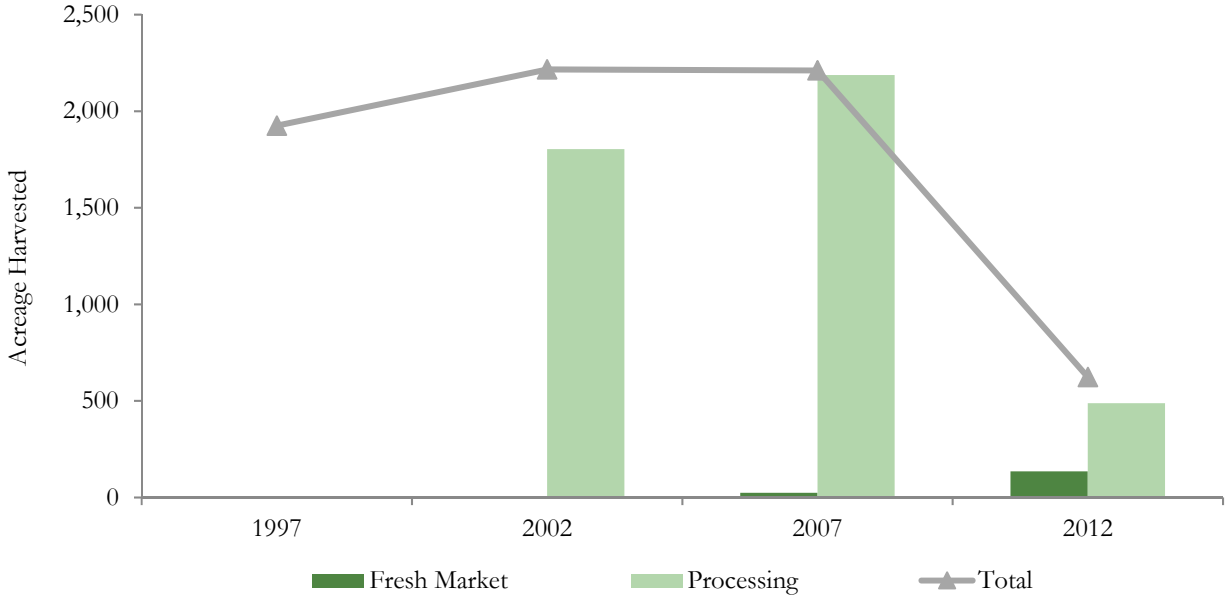
Missouri produces multiple types of peas: Chinese peas including sugar and snow peas; green peas excluding southern peas; green southern peas, which are also known as cowpeas or blackeyed peas; and dry edible peas. Chinese pea production statewide has been relatively limited. In 2012, Missouri growers harvested one acre of Chinese peas for fresh market uses (USDA National Agricultural Statistics Service 2017b).

Several years ago, the state's green pea production, excluding southern peas, was sizable. Green pea harvested acreage totaled roughly 1,200 acres in 1997. Shortly thereafter, harvested acreage slid to three acres in 2002 and one acre in 2012. Data in 2007 were withheld to protect individual operations (USDA National Agricultural Statistics Service 2017b).

Compared with Chinese and green peas, southern pea production in Missouri has been more significant and consistent. However, acreage shrunk during the most recent U.S. Census of Agriculture year. Exhibit 3.28.1 tracks statewide southern pea harvested acreage from 1997 to 2012, and it reports acreage intended for the fresh market or processing uses. Total southern pea acreage harvested grew to exceed 2,200 acres in 2002 and 2007. By 2012, area harvested had declined to 623 acres (USDA National Agricultural Statistics Service 2017b).

Historically, the processing market captured the lion's share of Missouri southern pea harvested acreage. In 2012, however, the fresh market emerged as a relatively more significant buyer. At the time, 21.7 percent of Missouri southern pea acreage harvested was directed to processing, and the fresh market represented the other 78.3 percent of utilization. During 2007, just 1.1 percent of southern pea harvested acreage had found application in the fresh market (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.28.1 – Missouri Southern Pea Acreage Harvested, 1997 to 2012

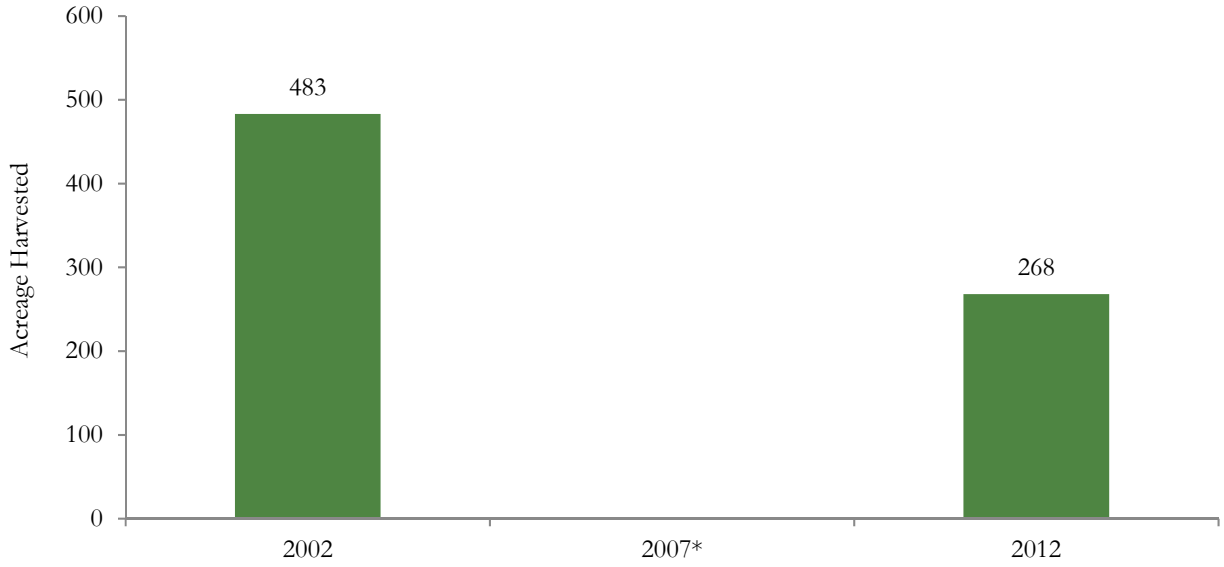


Source: USDA, National Agricultural Statistics Service (2017b)

With respect to dry edible peas, Missouri harvested acreage shifted down in 2012 relative to acreage harvested in 2002. Exhibit 3.28.2 shares that harvested acreage exceeded 480 acres in 2002; however, it dropped to slightly less than 270 acres in 2012. Data for 2007 were withheld to avoid disclosing information for individual operations (USDA National Agricultural Statistics Service 2017b).

Production totals were also reported for Missouri-grown dry edible peas. In 2002, Missouri operations produced roughly 5,900 hundredweight of dry edible peas. As acreage declined, the state's dry edible pea production also decreased. The Missouri production total in 2012 was slightly less than 1,840 hundredweight (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.28.2 – Missouri Dry Edible Pea Acreage Harvested, 2002 to 2012

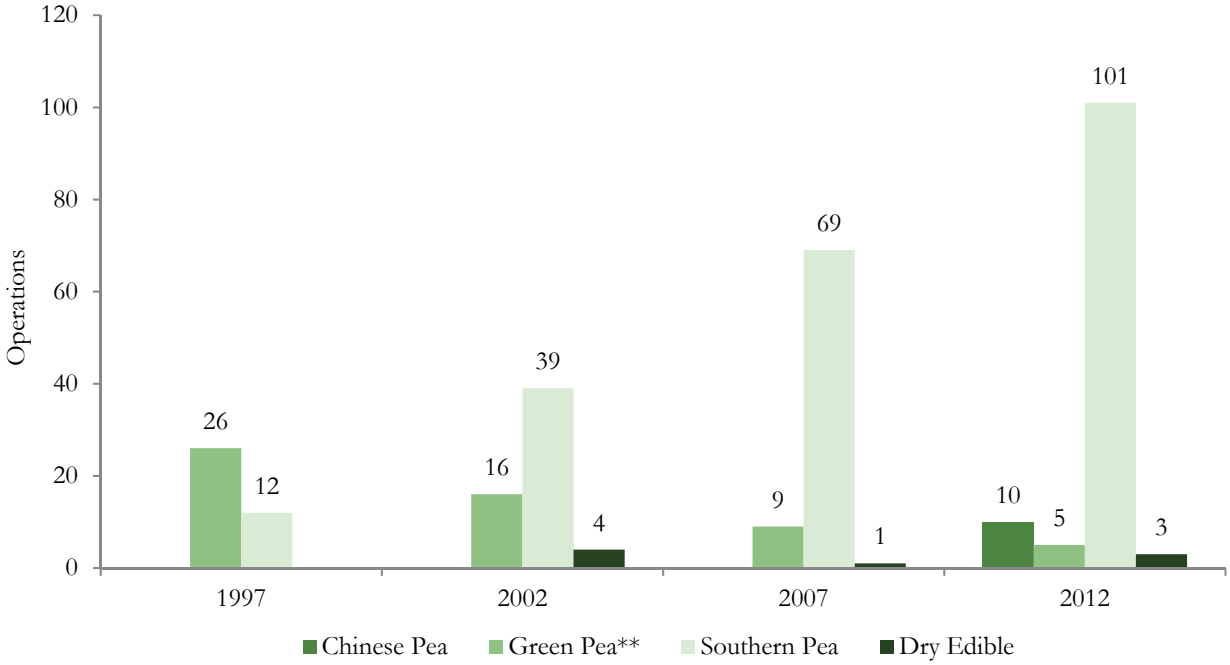


* Data from 2007 were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

From an operations perspective, Exhibit 3.28.3 compares the number of Missouri operations harvesting four types of peas — Chinese, green, southern and dry edible — from 1997 to 2012. It illustrates that fewer operations were harvesting green pea acreage year after year during the observation period. Twenty-six operations harvested green peas in 1997, but by 2012, only five operations harvested green peas. The inverse relationship was true for southern peas as the operation count increased during the observed period. Farms harvesting southern pea acreage grew from 12 farms in 1997 to 101 farms in 2012 (USDA National Agricultural Statistics Service 2017b).

For Chinese peas and dry edible peas, Missouri operations reported starting to produce those types of peas during the observation period. Chinese peas emerged as a Missouri specialty crop in 2012. At the time, 10 operations reported harvesting Chinese pea acreage. Dry edible peas were a crop harvested by four operations in 2002. The operation count dropped to one farm in 2007 and increased to three farms in 2012 (USDA National Agricultural Statistics Service 2017b).

*Exhibit 3.28.3 – Missouri Operations with Pea Acreage Harvested, 1997 to 2012**

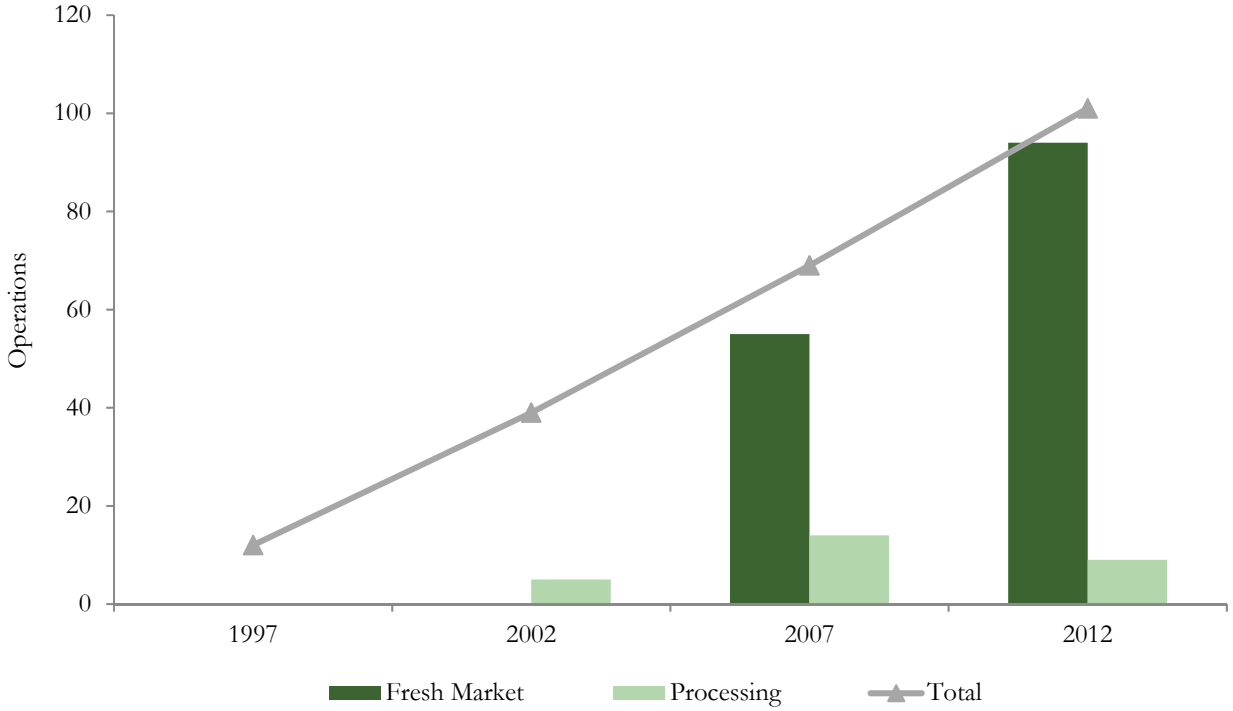


* Chinese pea data were only reported in 2012. Dry edible pea data weren't reported in 1997.
** Green peas exclude southern peas, which are recorded in a dedicated category.
Source: USDA, National Agricultural Statistics Service (2017b)

Regarding markets served by pea operations, all Chinese pea operations that harvested acreage in 2012 served the fresh market. All green pea operations reporting harvested acreage in 2007 and 2012 harvested product for fresh uses (USDA National Agricultural Statistics Service 2017b).

Market opportunities for Missouri-harvested southern peas have differed in that processing has been a market option for some operations. Exhibit 3.28.4 illustrates the total number of operations harvesting southern peas and the number of operations serving the fresh and processing markets from 1997 to 2012. As mentioned earlier, the count of operations engaged in harvesting southern peas increased consistently during the observed period. Most operations have served the fresh market. However, several have also sold southern peas for processing purposes. Of the 101 operations harvesting southern peas in 2012, 94 farms pursued the fresh market, and nine farms served the processing market (USDA National Agricultural Statistics Service 2017b).

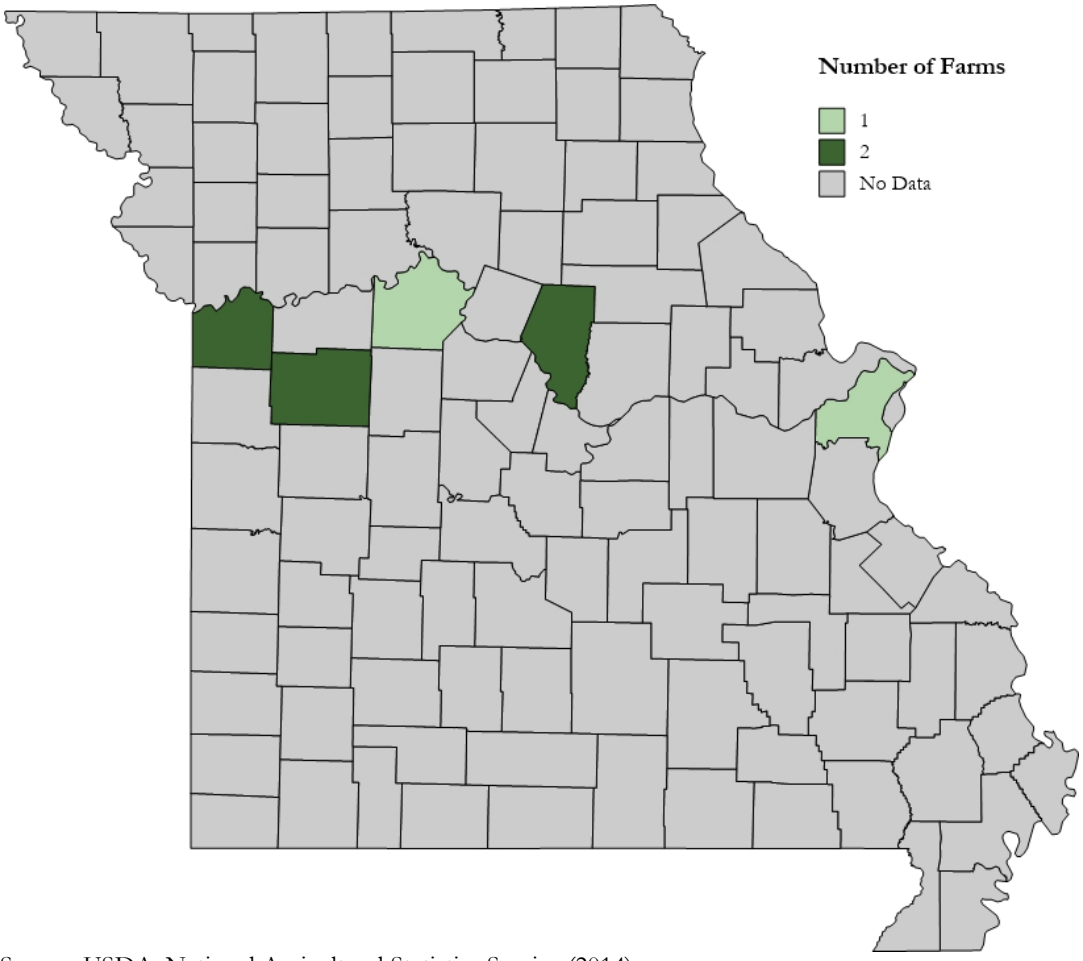
Exhibit 3.28.4 – Missouri Operations with Southern Pea Acreage Harvested by Market Served, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Counties leading in their count of Chinese pea operations with area harvested in 2012 were Boone County, two farms; Jackson County, two farms; and Johnson County, two farms. See Exhibit 3.28.5. Note that harvested acreage data for Chinese peas were withheld for counties in 2012 (USDA National Agricultural Statistics Service 2014b).

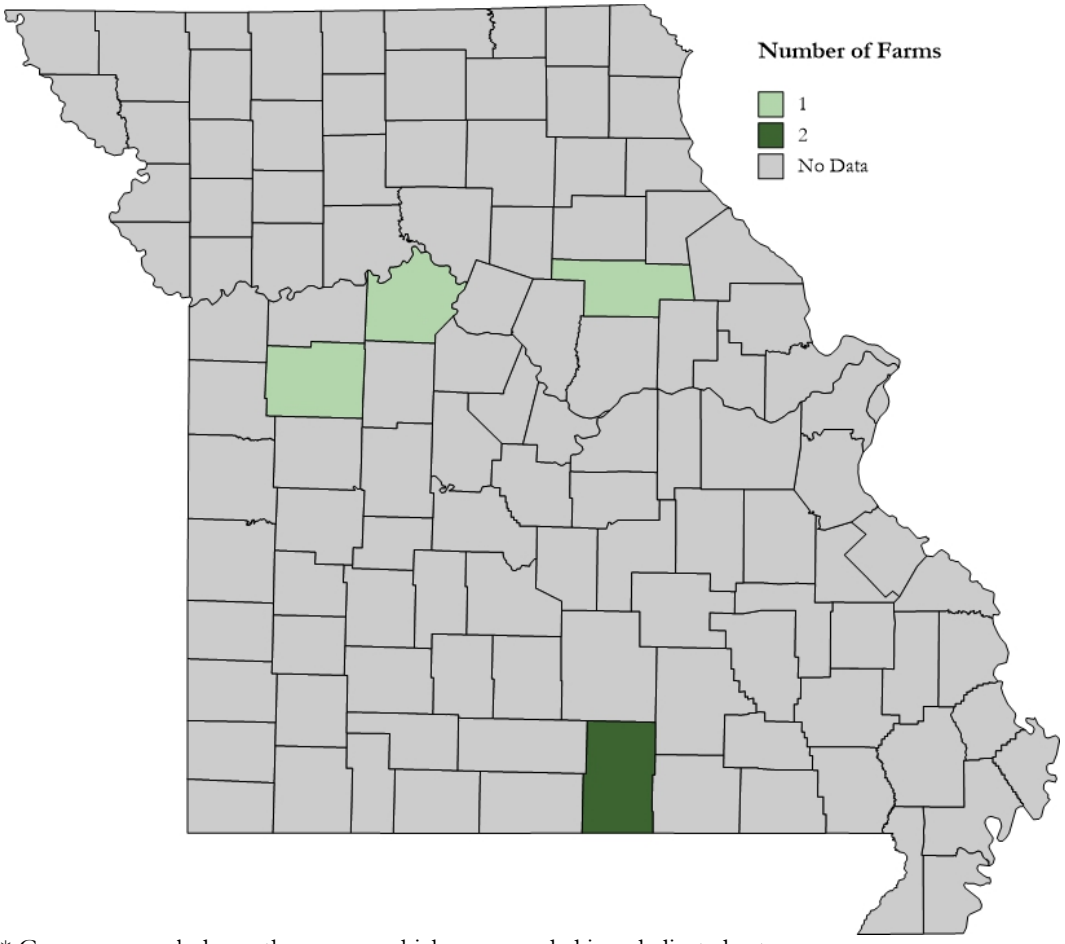
Exhibit 3.28.5 – Missouri Chinese Pea Operations with Harvested Area by County, 2012



Source: USDA, National Agricultural Statistics Service (2014)

In terms of green pea operations with harvested acreage by county, Howell County led with two operations in 2012. Exhibit 3.28.6 highlights Missouri counties to indicate their count of green pea operations with harvested area. Like for Chinese peas, green pea harvested acreage by county was withheld (USDA National Agricultural Statistics Service 2014b).

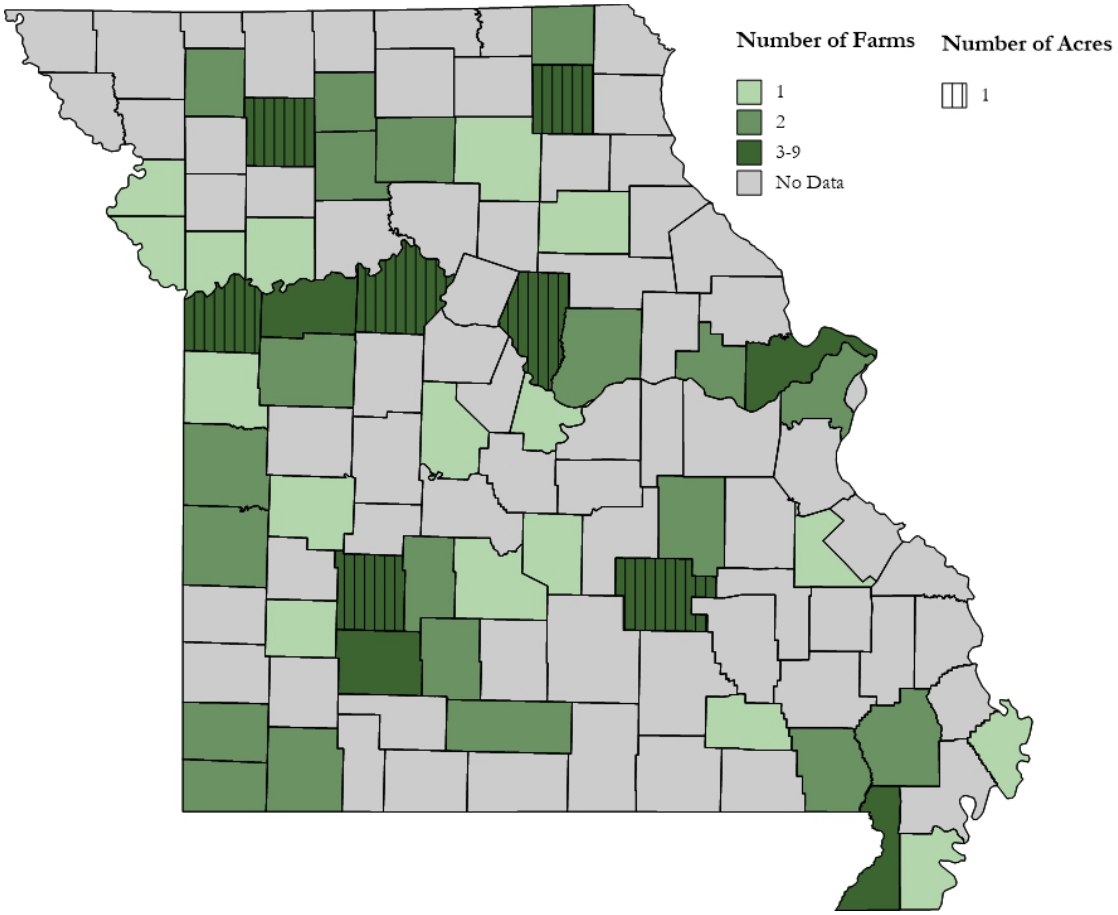
*Exhibit 3.28.6 – Missouri Green Pea Operations with Harvested Area by County, 2012**



* Green peas exclude southern peas, which are recorded in a dedicated category.
Source: USDA, National Agricultural Statistics Service (2014)

Counties reporting the greatest number of southern pea operations with harvested area in 2012 were Boone County, seven farms, and Dunklin County, five farms. Exhibit 3.28.7 shades Missouri counties according to their southern pea operation count and harvested acreage. Harvested acreage data were published for relatively few counties. Counties with one acre of harvested southern peas were Boone, Daviess, Dent, Jackson, Knox, Polk and Saline counties (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.28.7 – Missouri Harvested Southern Pea Acreage and Operations by County, 2012**



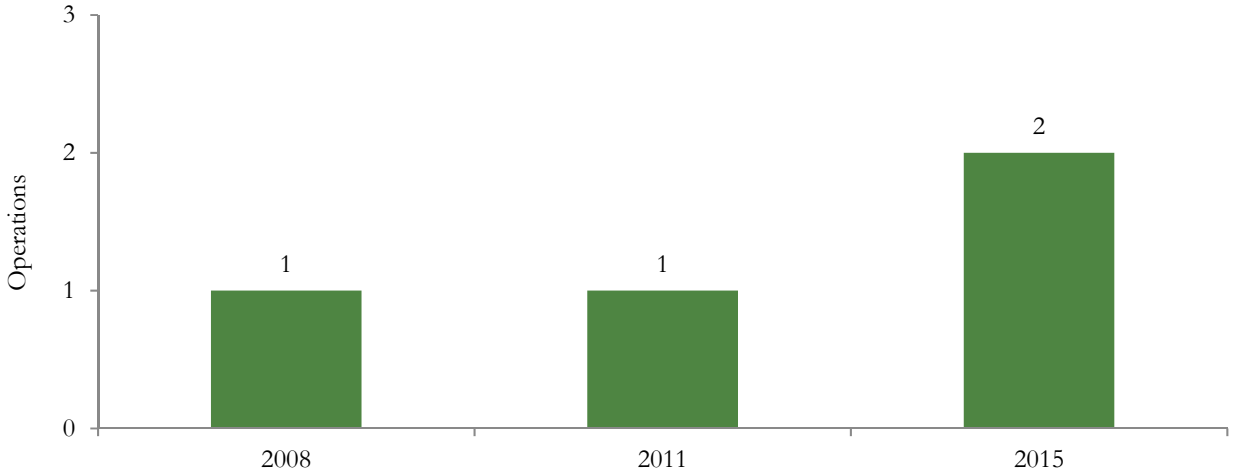
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Dry edible pea production has been limited to the southern portion of Missouri. Dunklin County had two dry edible pea operations with area harvested, and Texas County had one. Harvested acreage totals for these counties were withheld from being reported (USDA National Agricultural Statistics Service 2014b).

With respect to organic pea production, acreage hasn't been reported because of limited data and protecting data for individual operations. Exhibit 3.28.8 illustrates the number of operations harvesting USDA certified organic green peas in various years. As shown, just two operations reported harvesting USDA certified organic green pea acreage in 2015. One operation harvested certified organic green peas in 2008 and 2011(USDA National Agricultural Statistics Service 2017b).

In addition to USDA certified organic production, a few operations have produced exempt organic green peas. For example, in 2014, four operations in total produced exempt organic peas. Their organic green pea sales totaled $250 (USDA National Agricultural Statistics Service 2017b).

*Exhibit 3.28.8 – Missouri Certified Organic Green Pea Operations with Acreage Harvested, 2008 to 2015**

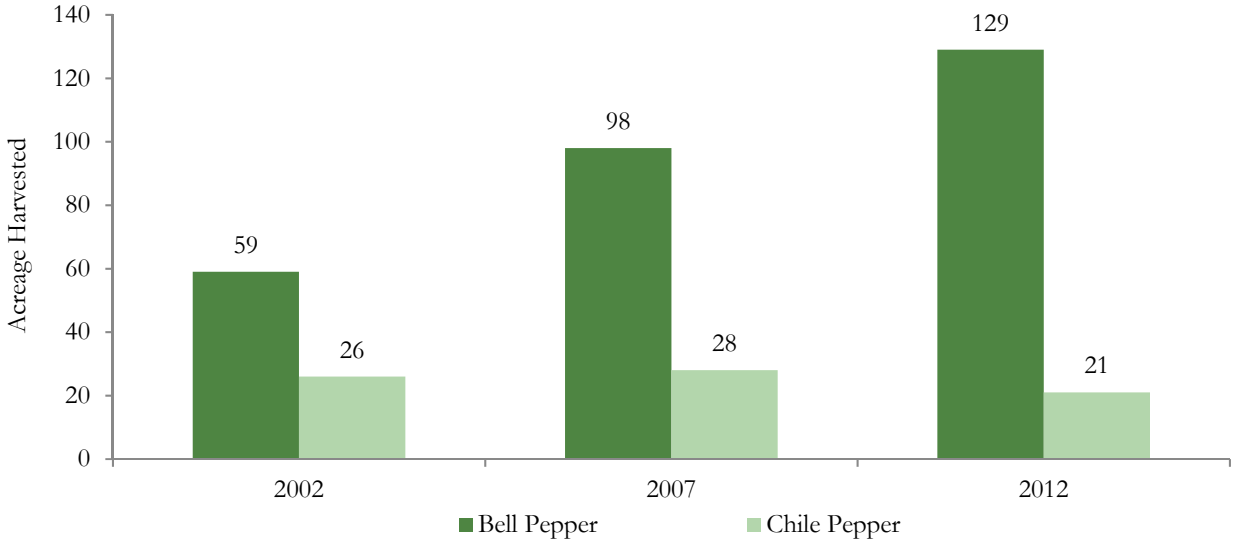


* No operations were reported in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

3.29 Pepper

In Missouri, pepper production has included both bell peppers and other peppers, including chile peppers. Of these two types, acreage has been more significant for bell peppers than other peppers including chile peppers. Exhibit 3.29.1 shares acreage harvested for both types from 2002 to 2012. Chile and other pepper harvested acreage was relatively consistent during the observed years — between 20 acres and 30 acres. Bell pepper harvested acreage, however, consistently increased year after year. Bell pepper acreage harvested totaled 59 acres in 2002 and grew to 129 acres in 2012 (USDA National Agricultural Statistics Service 2017b).

*Exhibit 3.29.1 – Missouri Pepper Acreage Harvested, 2002 to 2012**



* "Chile peppers" include other forms of peppers.
Source: USDA, National Agricultural Statistics Service (2017b)

Some Missouri pepper production has occurred under protected areas. Exhibit 3.29.2 summarizes Missouri pepper production under protection in 2009 and 2014. Square footage was roughly 22,000 square feet to 23,000 square feet in both years. Production area under protection in 2009 was slightly more significant than the production area under protection in 2014. However, note that both the number of operations with area in production and dollar sales increased during the observed period. In 2009, eight operations produced peppers under protection, but the operation count increased to 12 operations in 2014. Dollar sales grew from more than $14,400 in 2009 to more than $27,800 in 2014 (USDA National Agricultural Statistics Service 2017b).

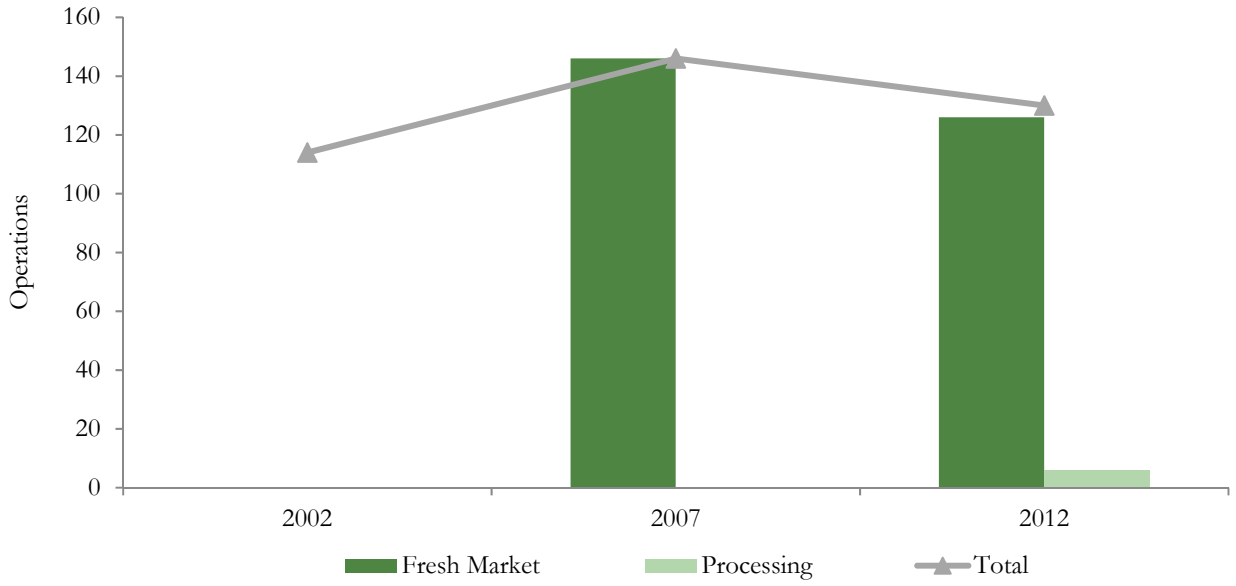
Exhibit 3.29.2 – Missouri Pepper Production Under Protection, 2009 and 2014

	2009	2014
Operations with area in production	8	12
Square foot in production	23,072	22,020
Production in cwt.*	(D)	317
Dollar sales	$14,452	$27,861

* Production data were withheld from being reported in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

For bell peppers, the operation count hasn't increased quite like harvested acreage has increased. Exhibit 3.29.3 presents the number of Missouri bell pepper operations harvesting acreage in 2002, 2007 and 2012. Between 2002 and 2012, 110 farms to 150 farms harvested bell pepper acreage. Operations with harvested acreage totaled 130 farms in 2012. All Missouri bell pepper operations grew product for the fresh market in 2007. In 2012, some operations had entered into bell pepper production for processing. Six operations noted raising bell peppers for processing purposes in 2012. During that year, 126 operations harvested bell pepper acreage to serve fresh markets (USDA National Agricultural Statistics Service 2017b).

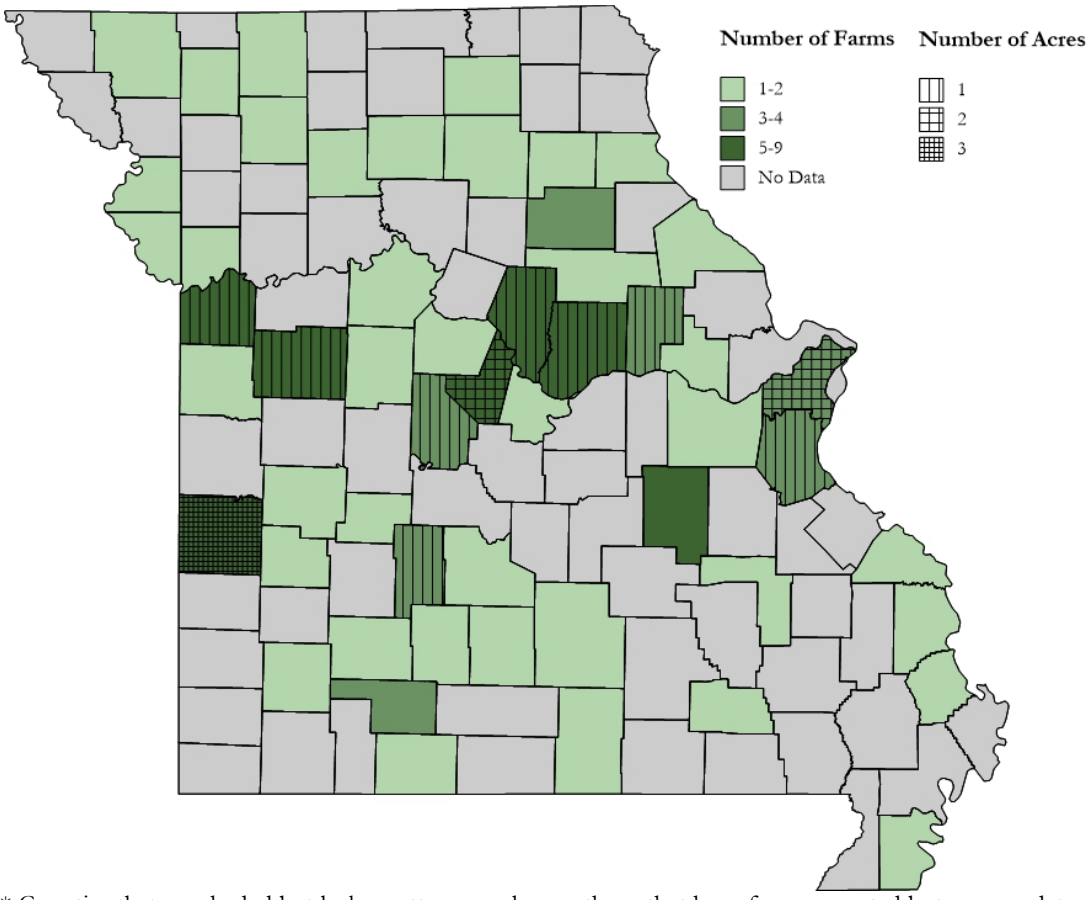
Exhibit 3.29.3 – Missouri Operations with Bell Pepper Acreage Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

On a county-by-county basis, those reporting the most bell pepper operations with area harvested in 2012 were Vernon County, nine farms; Boone County, eight farms; Jackson County, eight farms; Moniteau County, eight farms; and Crawford County, seven farms. For many counties, bell pepper harvested acreage wasn't disclosed. Of the counties with published harvested acreage data, however, those with the most acreage were Vernon County, three acres; Moniteau County, two acres; and St. Louis County, two acres. By county, Exhibit 3.29.4 summarizes data for bell pepper operations with area harvested and harvested acreage (USDA National Agricultural Statistics Service 2017b).

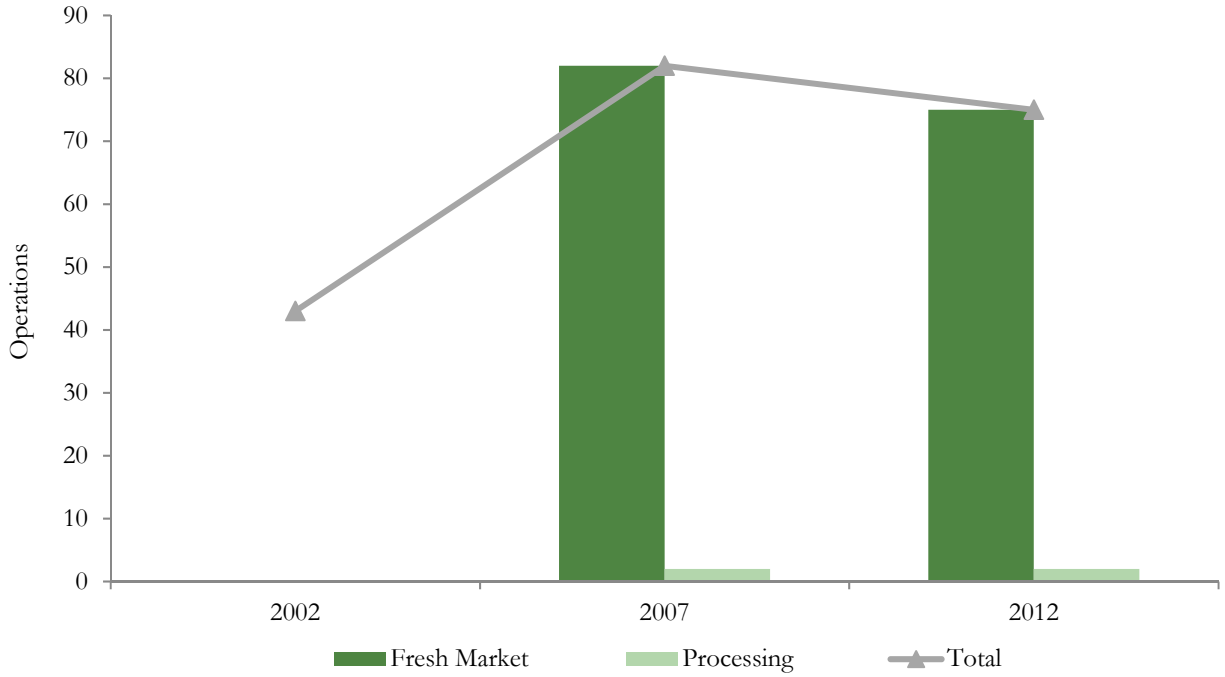
*Exhibit 3.29.4 – Missouri Harvested Bell Pepper Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Trends in chile and other pepper and bell pepper operation counts were similar from 2002 to 2012. Exhibit 3.29.5 illustrates the number of Missouri operations harvesting chile pepper acreage in total and for fresh and processing purposes. The total operation count increased from 43 farms in 2002 to 82 farms in 2007. Later, the chile and other pepper farm count declined to 75 operations in 2012. During both 2007 and 2012, all Missouri chile and other pepper operations harvested acreage for the fresh market. Additionally, two operations in both years harvested chile and other peppers for processing purposes (USDA National Agricultural Statistics Service 2017b).

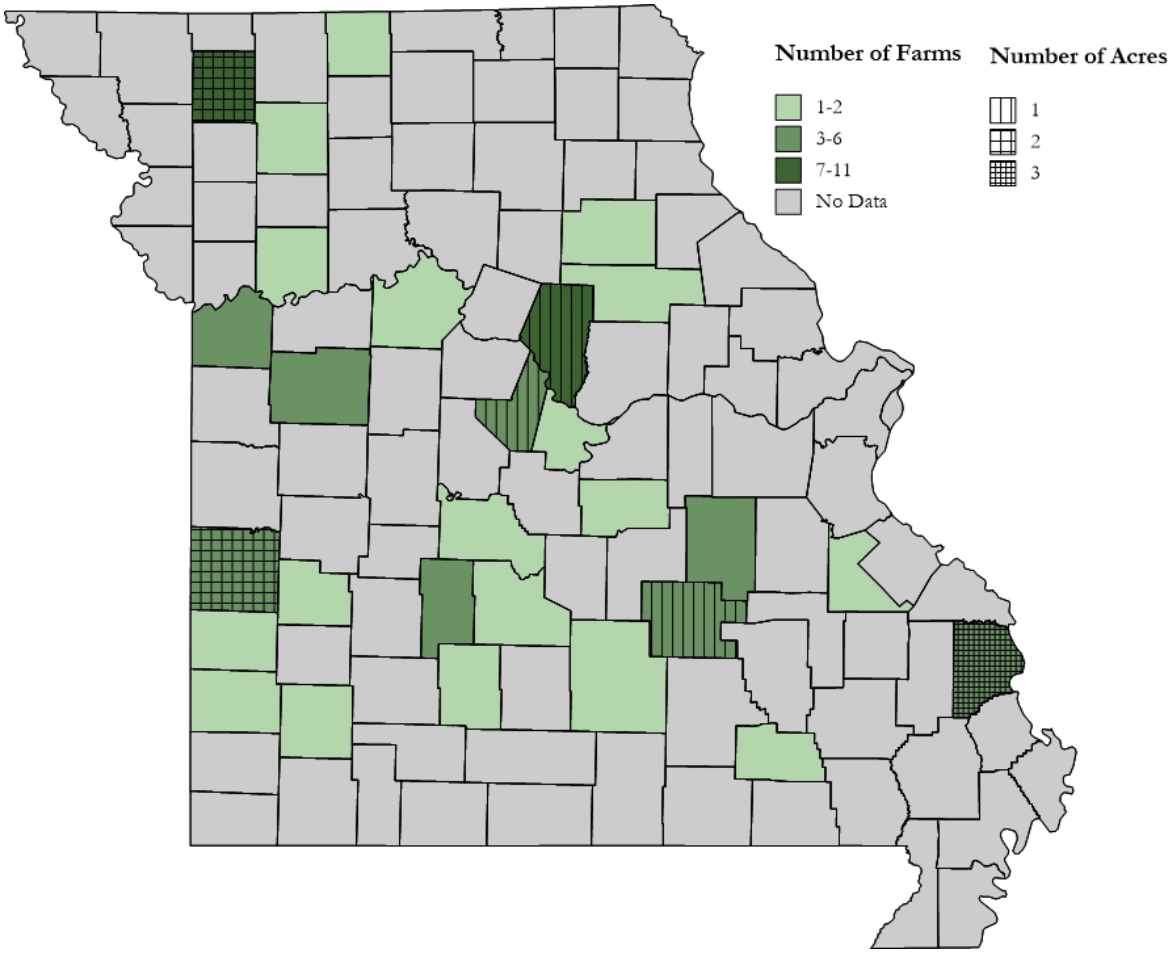
Exhibit 3.29.5 – Missouri Operations with Chile and Other Pepper Acreage Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Operations and acreage data from 2012 for peppers other than bell peppers, including chile peppers, are shared in Exhibit 3.29.6. These are data for operations with harvested area and harvested acreage. Boone County had the most operations with harvested area. Eleven operations were shown to harvest peppers other than bell peppers. Following Boone County in rank by operation count were Gentry County, eight farms, and Moniteau County, six farms. For counties with harvested acreage data reported, the acreage totals were highest in Cape Girardeau County, three acres; Gentry County, two acres; and Vernon County, two acres. Note, however, that not all counties had harvested acreage data disclosed (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.29.6 – Missouri Harvested Pepper Other Than Bell Pepper Acreage and Operations by County, 2012**

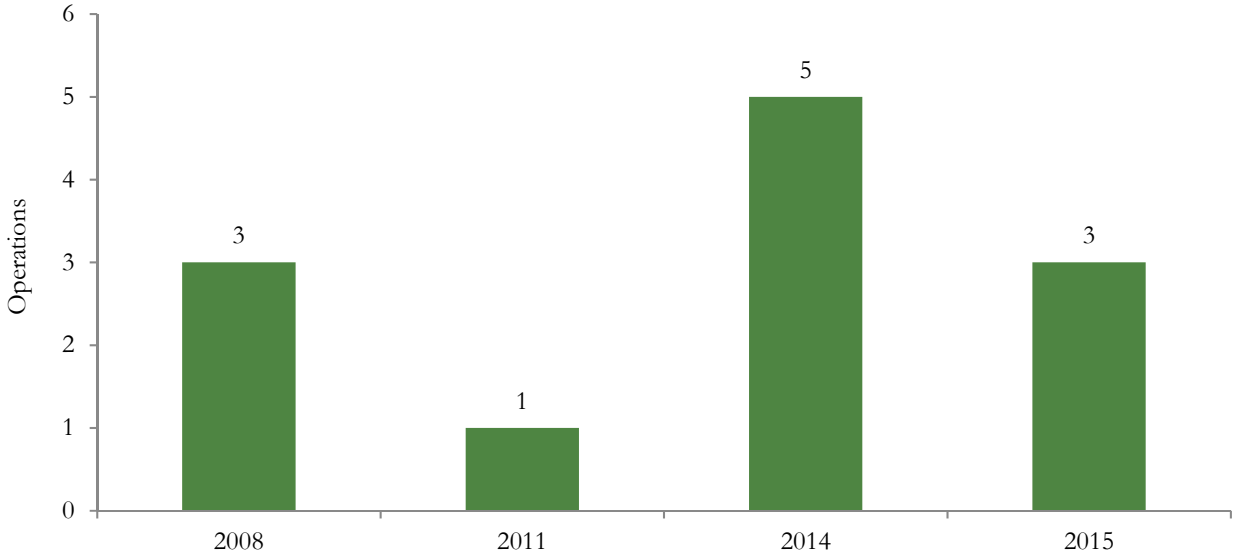


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

A handful of Missouri bell pepper operations have produced organic product. In 2015, three operations reported harvesting USDA certified organic bell pepper acreage. Exhibit 3.29.7 illustrates the trend in operation count for farms harvesting organic bell pepper area. 2014 had the greatest number of operations — five farms — indicating that they had harvested organic bell pepper acreage. Note that just one operation reported harvesting organic bell pepper area in 2011 (USDA National Agricultural Statistics Service 2017b).

In addition to Missouri operations harvesting USDA certified organic bell peppers, some operations have produced exempt organic bell peppers. 2014 provides an example. In total, 11 operations reported harvesting certified and exempt organic bell peppers. Of those, five operations harvested certified organic product, and six operations harvested exempt organic peppers (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.29.7 – Missouri Certified Organic Bell Pepper Operations with Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Despite the variability in the organic bell pepper operation count, data suggest that production and sales have increased rather consistently. Exhibit 3.29.8 summarizes production and sales data from 2008 to 2015; note, however, that 2011 data were withheld from being reported. Production increased from 7 cwt. in 2008 to 40 cwt. in 2015. With respect to dollar sales, they increased from $1,033 in 2008 to $13,950 in 2015 (USDA National Agricultural Statistics Service 2017b).

As suggested earlier, some Missouri operations have raised exempt organic bell peppers. Exempt bell pepper production totaled 76 cwt. in 2014, and sales of exempt organic bell peppers totaled $1,220 during that year (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.29.8 – Missouri Certified Organic Pepper Activity, 2008 to 2015

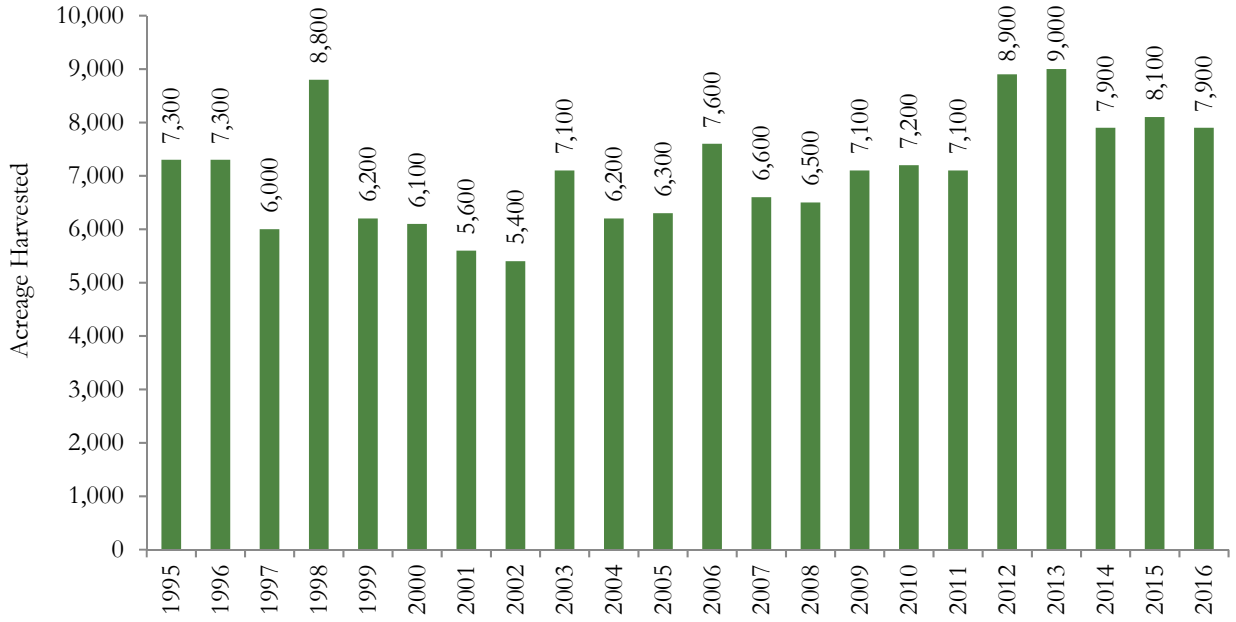
	2008	2011	2014	2015
Production in cwt.	7	(D)	30	40
Dollar sales	$1,033	(D)	$8,240	$13,950

* Data were withheld from being reported in 2011.
Source: USDA, National Agricultural Statistics Service (2017b)

3.30 Potato

Potatoes have been grown on a relatively large scale in Missouri. Between 1995 and 2016, Missouri potato harvested acreage trended upward. Exhibit 3.30.1 illustrates the trend. Harvested acreage dipped to its lowest levels in the early 2000s but then recovered. Harvested area reached its highest level of the observed period — 9,000 acres — in 2013. The chart illustrates that Missouri harvested potato acreage totaled 7,900 acres in 2016. All potatoes summarized in this section have been summer potatoes (USDA National Agricultural Statistics Service 2017b).

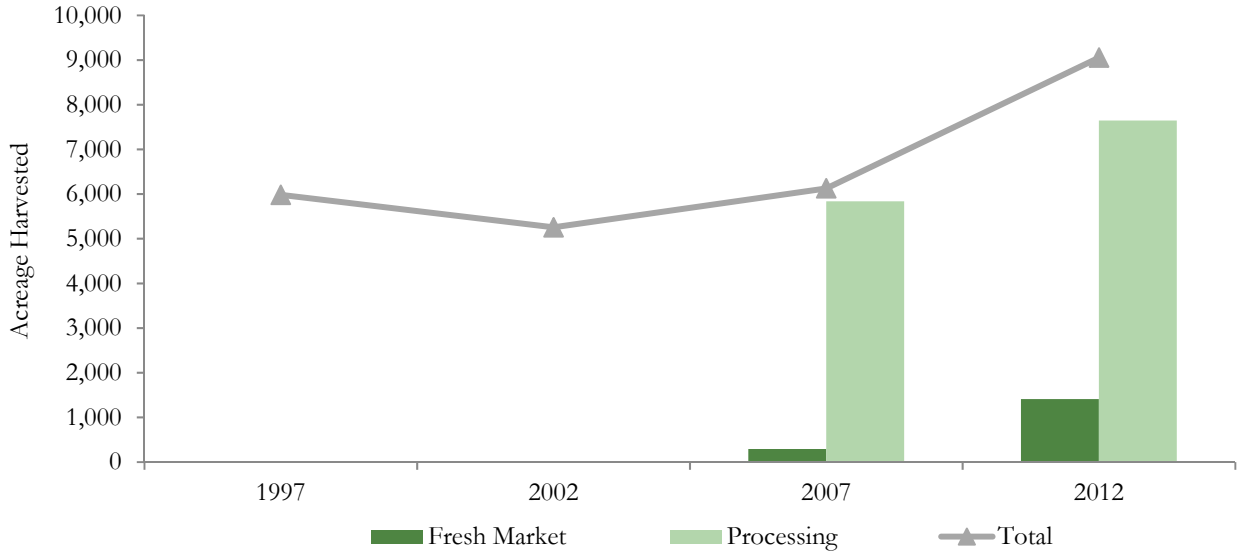
Exhibit 3.30.1 – Missouri Potato Acreage Harvested, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.30.2 offers an alternative view of Missouri potato harvested acreage. Note that these data, collected for the U.S. Census of Agriculture, drill down into potatoes harvested for certain uses: fresh market or processing. Total acreage harvested increased during this observed period. The chart also shows that the bulk of Missouri potato harvested acreage has been directed to processing purposes in recent years. In 2012, processing absorbed 84.4 percent of Missouri potato harvested acreage. Fresh consumption absorbed 15.6 percent of the acreage harvested (USDA National Agricultural Statistics Service 2017b).

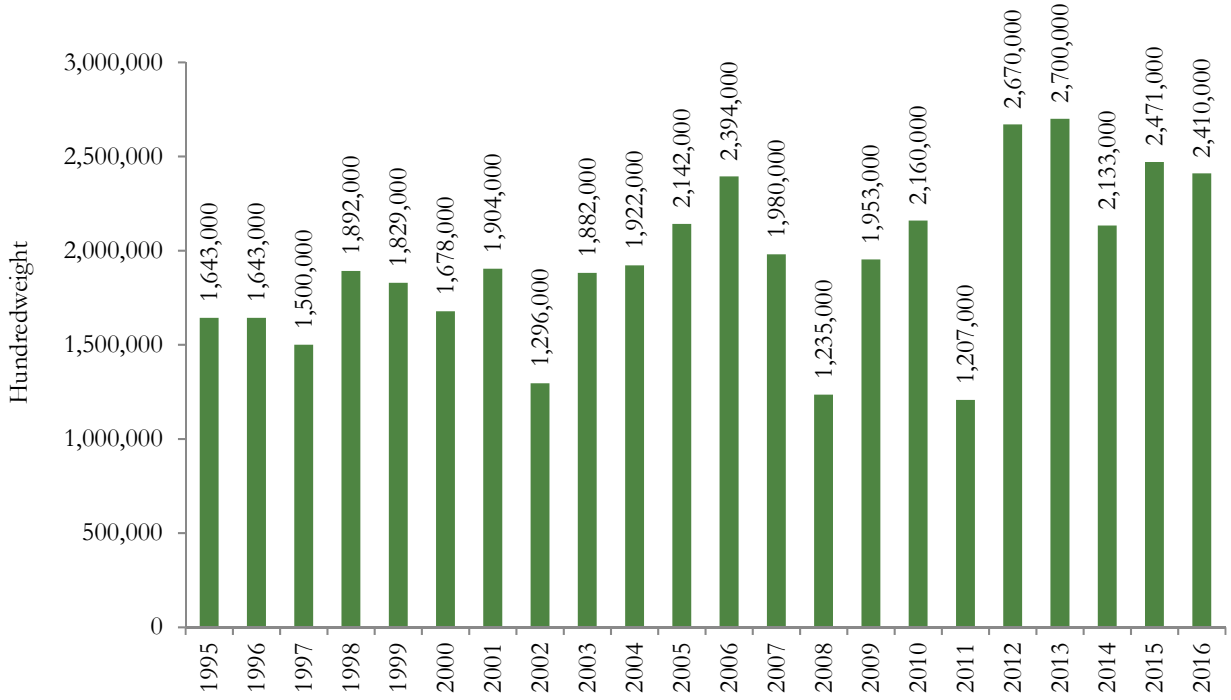
Exhibit 3.30.2 – Missouri Potato Acreage Harvested by Market, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

As Missouri potato harvested acreage has followed an upward trend, production has increased, too. The state maintained upward-sloping production despite Missouri experiencing a few low-production years in 2002, 2008 and 2011. Exhibit 3.30.3 presents Missouri potato production from 1995 to 2016. In the last five years of data, production exceeded 2 million hundredweight. It totaled 2.41 million hundredweight in 2016 (USDA National Agricultural Statistics Service 2017b). Note, years with lower potato production may be those that experienced weather challenges. For example, in 2008 and 2011, flooding concerns were common in potato-growing areas.

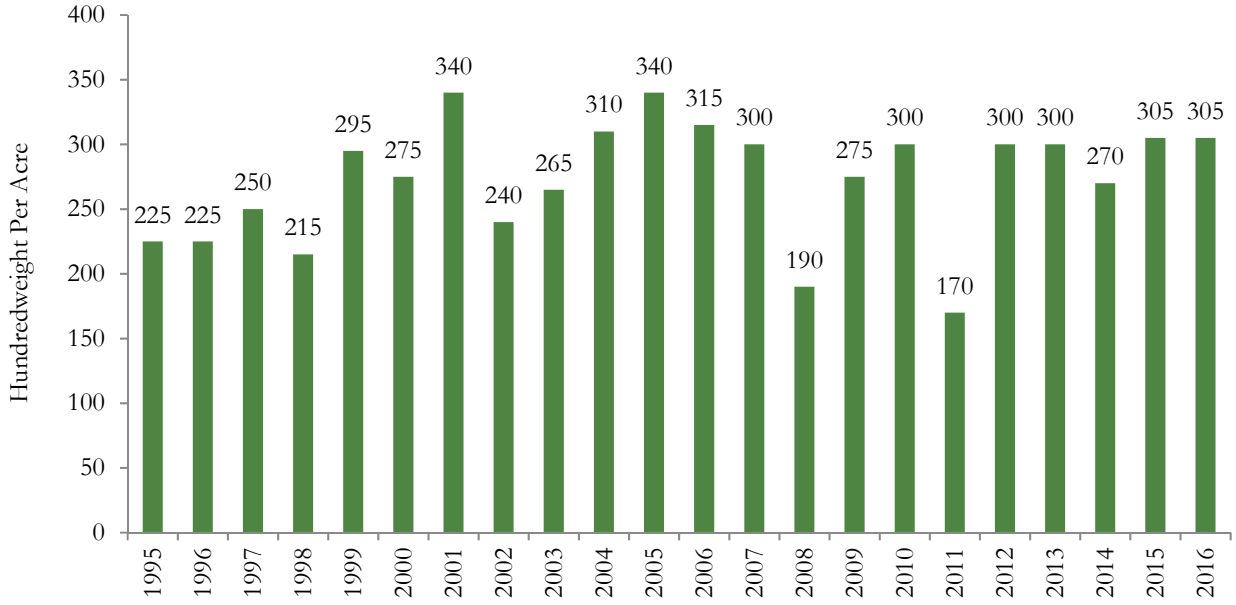
Exhibit 3.30.3 – Missouri Potato Production, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri potato yields have largely improved during the past two decades. Exhibit 3.30.4 tracks potato yields in hundredweight per acre. During the observed period, yields exceeded 300 hundredweight per acre for the first time in 2001. In several years that followed, yields surpassed the mark of 300 hundredweight per acre. During both 2015 and 2016, Missouri potato yields averaged 305 hundredweight per acre (USDA National Agricultural Statistics Service 2017b).

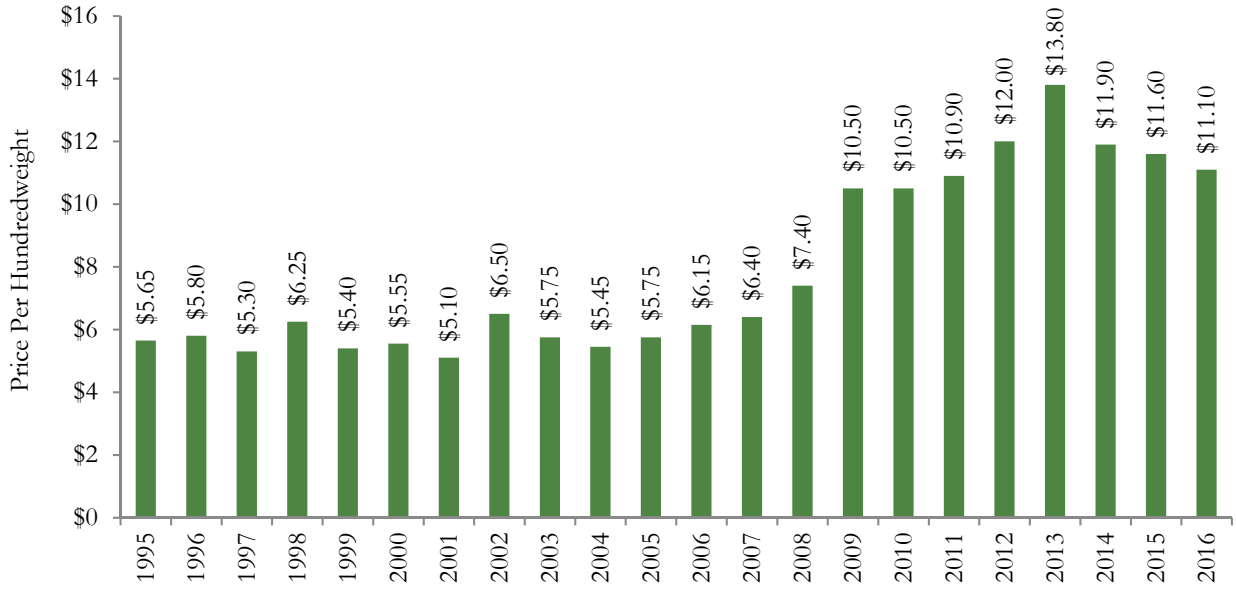
Exhibit 3.30.4 – Missouri Potato Yield, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2017b)

Prices received for Missouri potatoes experienced marked growth between 1995 and 2016. Potato prices, which are reported as annual averages in Exhibit 3.30.5, jumped significantly from 2008 to 2009. Prior to that point, annual prices were relatively consistent between $5 and $7 per hundredweight. Between the late 2000s and 2013, prices continued to rise. They've since leveled somewhat. Prices averaged $11.10 per hundredweight in 2016, which is nearly twice as much as the average price reported in 1995 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.30.5 – Prices Received for Missouri Potatoes, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2017b)

Cash receipts for Missouri potatoes are reported in Exhibit 3.30.6. Of the years included in the observed period, cash receipts peaked in 2013 at nearly $35.35 million. In 2016, cash receipts exceeded $27.7 million. During 2016, Missouri potato cash receipts were 0.3 percent of the state's total commodity cash receipts. Relative to total U.S. potato cash receipts, Missouri's share was 0.8 percent in 2016 (USDA National Agricultural Statistics Service 2017b).

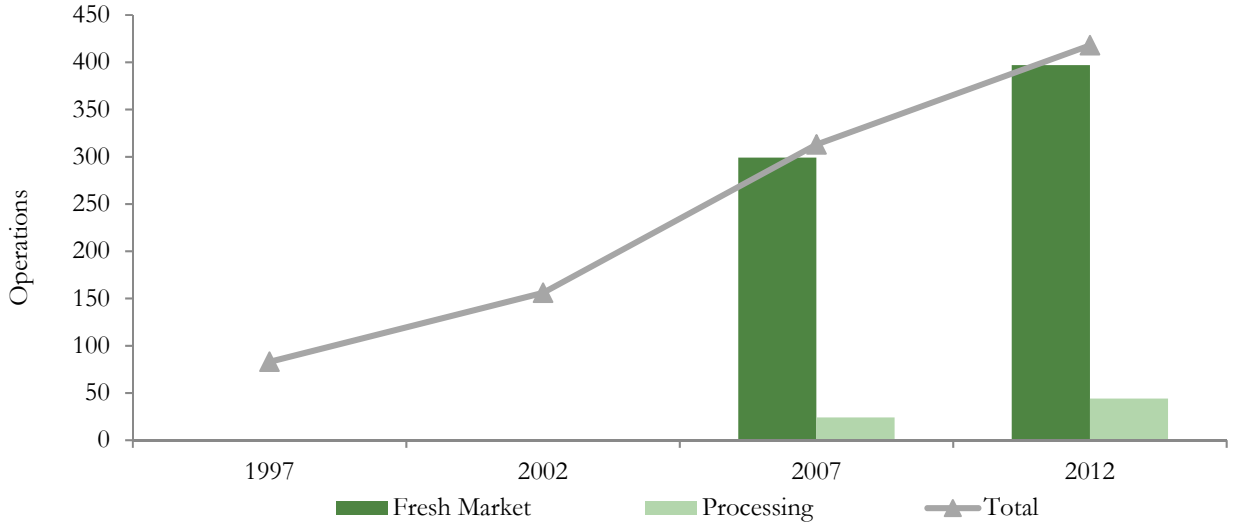
Exhibit 3.30.6 – Missouri Potato Cash Receipts, 2008 to 2016

Source: USDA, Economic Research Service (2017)

The count of Missouri operations harvesting potatoes escalated during the past two decades. In 1997, 83 operations in Missouri reported that they harvested potato acreage. By 2012, operations engaged in harvesting potato acreage increased to 418 farms. Growth in number of operations harvesting potatoes was strongest from 2002 to 2007. Exhibit 3.30.7 illustrates the trend. It also reports number of operations harvesting potatoes for the fresh market and processing purposes. Missouri potato operations have been more likely to raise potatoes for the fresh market than for processing purposes. In 2012, 397 operations harvested potatoes for fresh use, and 44 harvested potatoes for processing purposes (USDA National Agricultural Statistics Service 2017b).

Recall from earlier that 84.4 percent of Missouri potato acreage harvested was dedicated to processing uses in 2012. This insight combined with the operation count data indicate that most operations raising processing potatoes tend to be quite large compared with operations that raise potatoes for the fresh market (USDA National Agricultural Statistics Service 2017b).

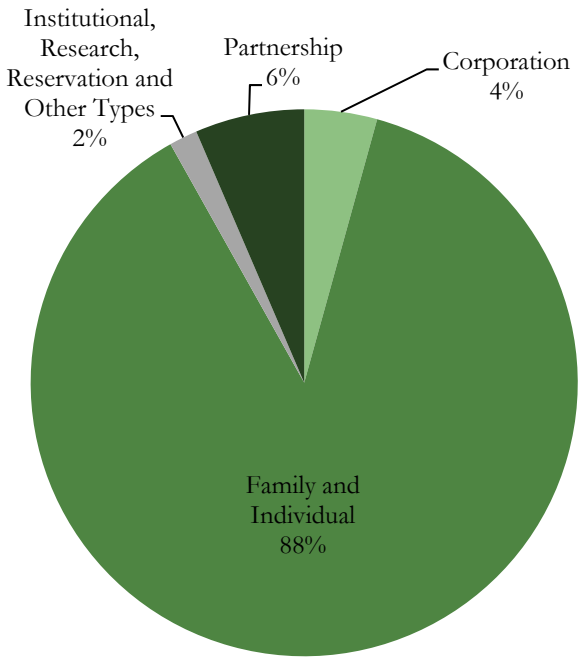
Exhibit 3.30.7 – Missouri Operations with Potato Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

A majority of the Missouri potato operations in 2012 were structured as family or individual farms. Exhibit 3.30.8 breaks down Missouri potato operations according to their organizational structures for tax purposes. Eighty-eight percent of operations were classified as family and individual farms. Six percent of Missouri operations were partnerships, and 4 percent were corporations. The remainder were structured as institutional, research, reservation and other types of structures (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.30.8 – Share of Missouri Potato Operations by Organizational Structure, 2012

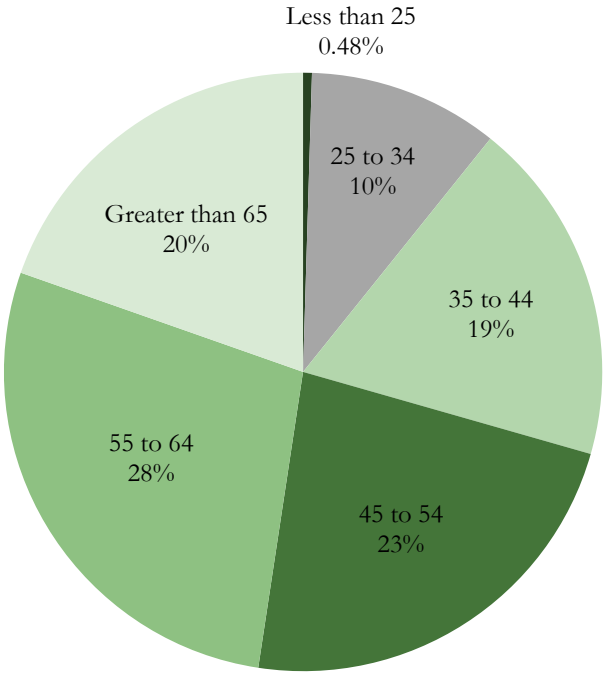


Source: USDA, National Agricultural Statistics Service (2017b)

Principal operators of Missouri potato operations were more likely to name farming as their primary occupation than an alternative career as their primary occupation. In 2012, 65.1 percent of Missouri potato operations had principal operators that claimed farming as their primary occupation. The other 34.9 percent of principal operators shared that something other than farming was their primary occupation. With respect to experience on their current operations, 55 percent of potato farm principal operators in 2012 had been on their present operations for at least 11 years. One-quarter had been on their present operations for less than six years, and 19.4 percent had spent six years to 10 years on their present operations (USDA National Agricultural Statistics Service 2017b).

Missouri potato operations in 2012 had principal operators of varied ages. Exhibit 3.30.9 shares the percentage of principal operators in various age categories. Forty-eight percent of principal operators were 55 years old or older, and 42 percent were between 35 years old and 54 years old. Fewer than 11 percent of principal operators were 34 years old or younger (USDA National Agricultural Statistics Service 2017b).

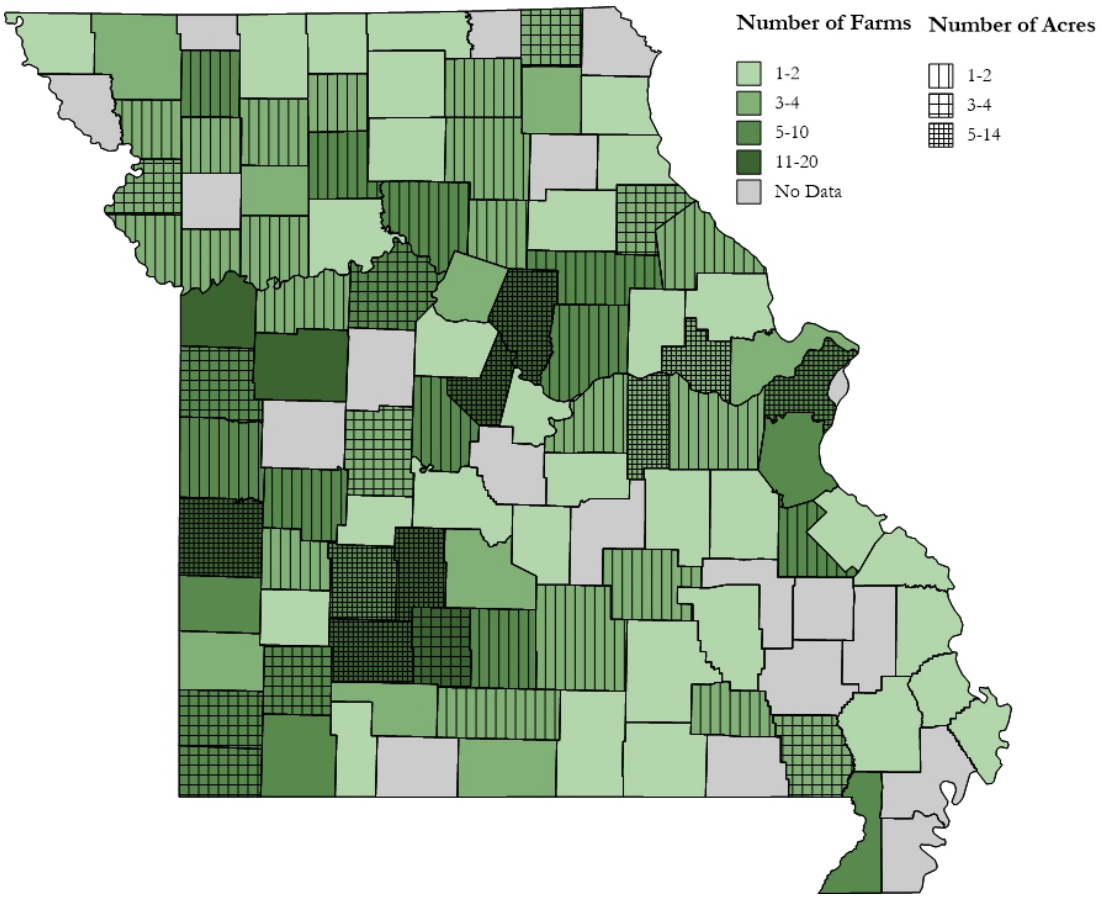
Exhibit 3.30.9 – Age Distribution of Missouri Potato Operation Principal Operators, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

To indicate the geographic dispersion of Missouri's potato industry, Exhibit 3.30.10 highlights Missouri counties based on their harvested potato acreage and number of potato operations with area harvested. Counties reporting the most potato farms with area harvested in 2012 were Boone County, 20 farms; Moniteau County, 17 farms; and Dallas County, 15 farms. Potato harvested acreage was highest in Gasconade County, 14 acres; Vernon County, eight acres; and Moniteau County, seven acres. Note that harvested acreage data weren't published for all counties (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.30.10 – Missouri Harvested Potato Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Scott County was noted for having two potato operations with harvested area in 2012. The USDA National Agricultural Statistics Service withheld acreage data, however (USDA National Agricultural Statistics Service 2014b). Other data sources suggest that Scott County's potato acreage is significant. The USDA Farm Service Agency reports that potato acreage in 2016 totaled 2,376 acres, and all of the acreage was irrigated.

Black Gold Farms is one potato grower with a presence in Missouri. The firm grows potatoes in select states, including Texas, Florida, North Carolina, Louisiana and Indiana. Missouri has two of the company's farm locations: one in Charleston, Mo., and one in Arbyrd, Mo. Both farms raise chip potatoes, and the Arbyrd farm site also produces red potatoes. Black Gold Farms began producing potatoes in Charleston during 1986, and it claims that its Charleston site is Missouri's largest potato producer. Black Gold Farms added the Arbyrd site as a potato farm in 1999. Not only does the Arbyrd site grow potatoes, but it also has a packing facility (Black Gold Farms 2017).

Missouri has had limited certified organic potato industry activity. Exhibit 3.30.11 summarizes data points about USDA certified organic potato production in the state. The operation count peaked at seven farms in 2014 but declined to two operations in 2015. Other data points for 2015 were withheld to avoid disclosing data for individual operations. Note that some exempt organic potato

production has existed in the state, too. However, those data points were also withheld from being reported in recent years (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.30.11 – Summary of Missouri Certified Organic Potato Industry, 2008 to 2015

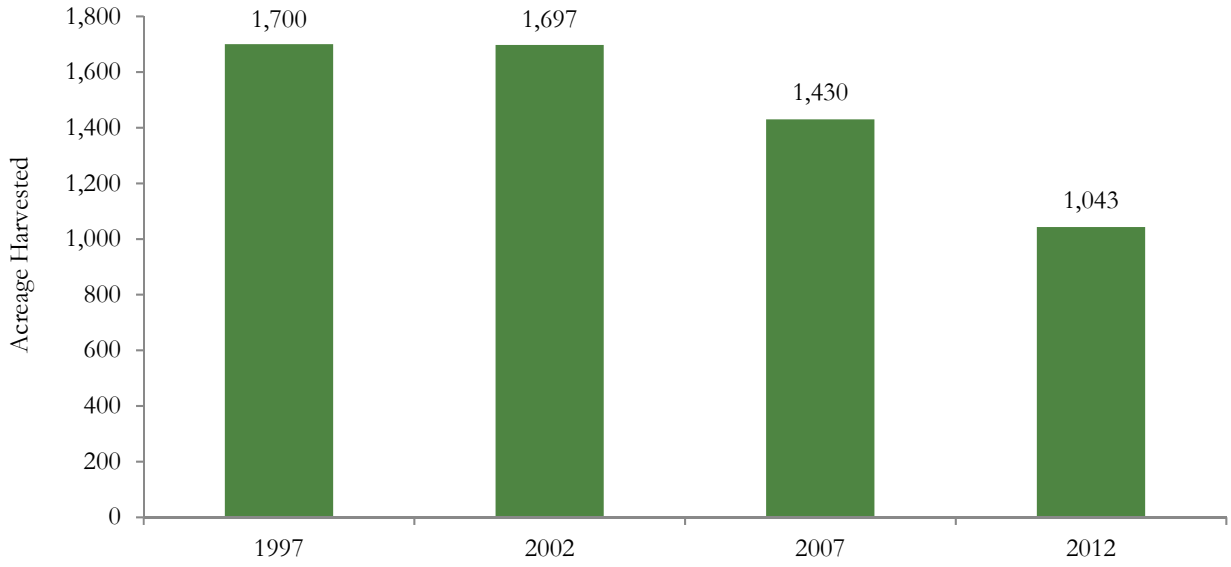
	Acres Harvested	Operations	Cwt. Produced	Dollar Sales
2008	2	5	331	$10,379
2011	3	5	729	$25,657
2014	5	7	(D)	(D)
2015	(D)	2	(D)	(D)

(D) indicates that data were withheld from publication to avoid disclosing data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

3.31 Pumpkin

Total Missouri pumpkin acreage harvested declined between 1997 and 2012; however, even in 2012, pumpkins were grown on a relatively large scale compared with some other specialty crops. For the years observed, Exhibit 3.31.1 illustrates that pumpkin harvested acreage was highest at 1,700 acres during 1997. Harvested acreage dropped by more than 650 acres by 2012 to total 1,043 acres. The USDA data didn't disclose the share of acreage harvested for fresh or processing purposes in order to protect data for individual operations (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.31.1 – Missouri Pumpkin Acreage Harvested, 1997 to 2012

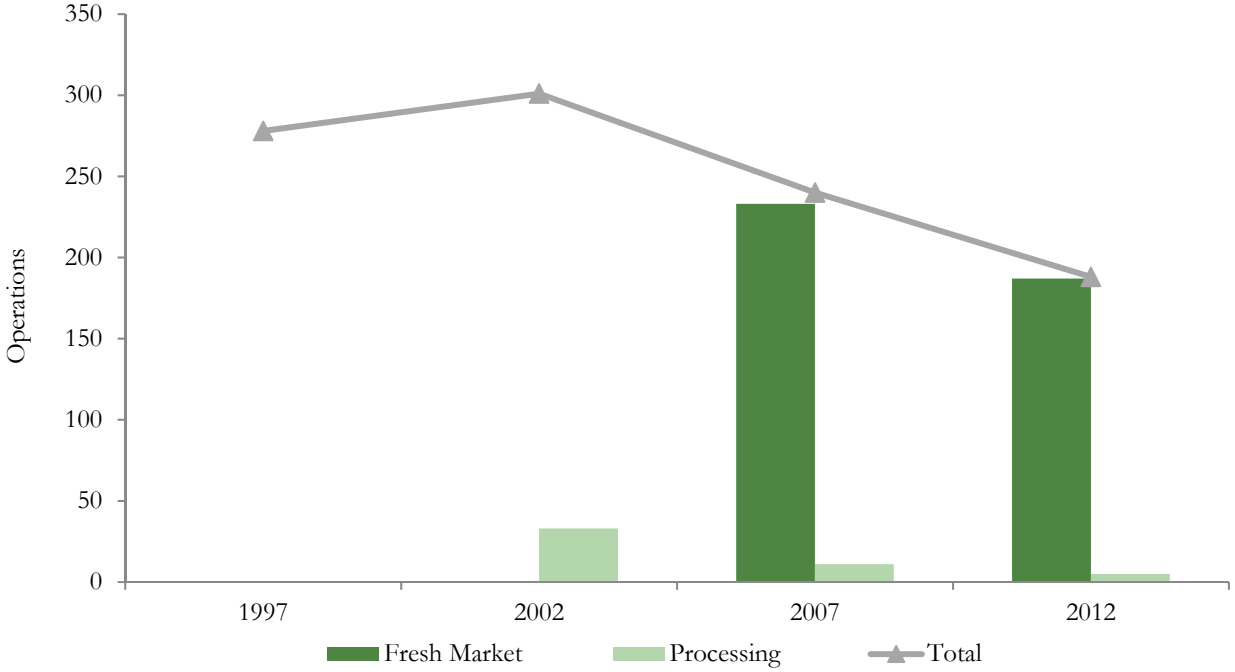


Source: USDA, National Agricultural Statistics Service (2017b)

USDA did report the number of operations harvesting pumpkins for fresh and processing markets in selected years. For the time period that spanned from 1997 to 2012, Exhibit 3.31.2 shares the number of total Missouri pumpkin operations and the count of those raising pumpkins for fresh or processing purposes. Total operations growing pumpkins increased from 1997 to 2002, but the number has since declined. In 2012, 188 Missouri farms harvested pumpkins. During that year, 187

operations harvested pumpkins for the fresh market, and five farms directed production to processing uses (USDA National Agricultural Statistics Service 2017b).

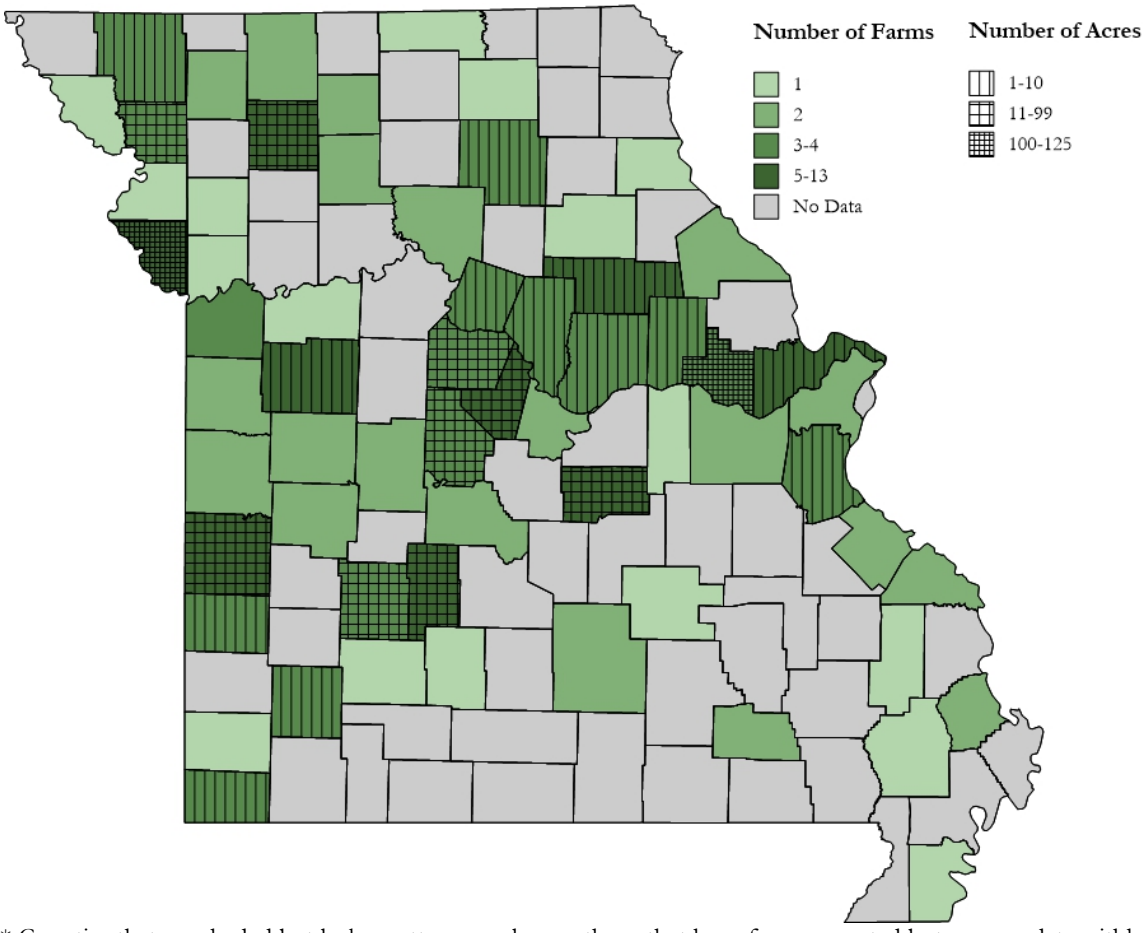
Exhibit 3.31.2 – Missouri Operations with Pumpkin Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri counties registering the most pumpkin operations with harvested area in 2012 were Daviess County, 13 farms; Vernon County, 13 farms; Dallas County, 12 farms; and Moniteau County, 10 farms. Exhibit 3.31.3 highlights counties based on their count of pumpkin operations with area harvested. Like for many specialty crops, harvested acreage data weren't reported for many counties. For counties with harvested acreage reported, however, the map indicates their pumpkin acreage totals. Counties with the most pumpkin harvested acreage in 2012 were Warren County, 125 acres; Platte County, 116 acres; Andrew County, 50 acres; and Daviess County, 46 acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.31.3 – Missouri Harvested Pumpkin Acreage and Operations by County, 2012**

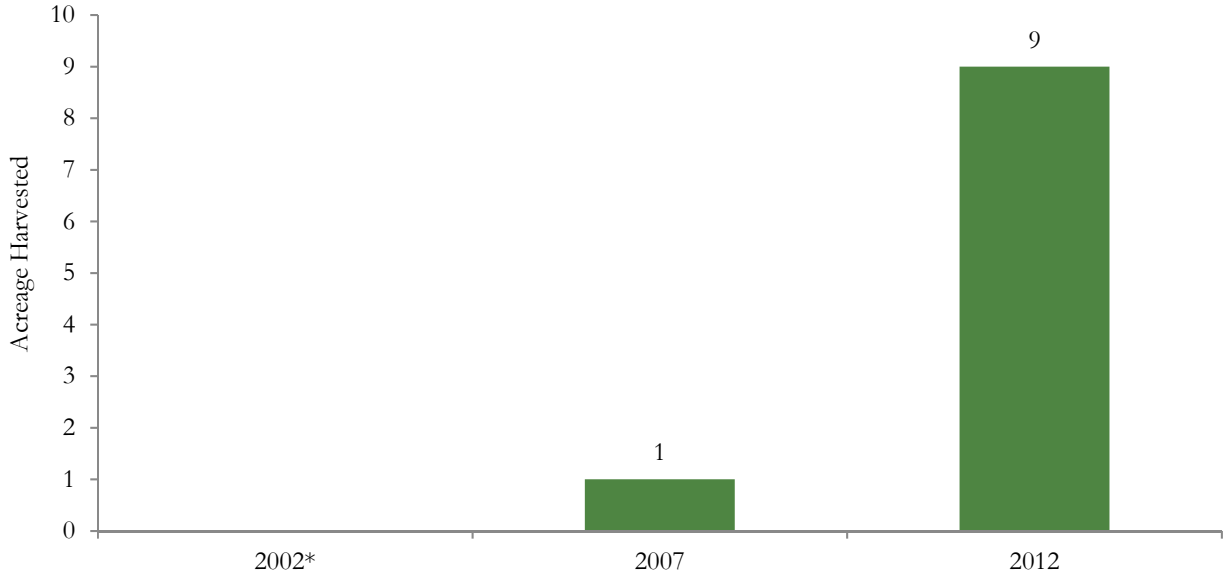


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.32 Radish

Radish acreage harvested in Missouri increased quite a bit during the past few years. See Exhibit 3.32.1. Harvested radish acreage wasn't reported in 2002 in order to protect data for individual operations. In total, Missouri operations dedicated just one acre to radish production in 2007. By 2012, however, radish harvested acreage in the state had grown to nine acres. All harvested acreage in 2007 and 2012 supplied fresh markets (USDA National Agricultural Statistics Service 2017b).

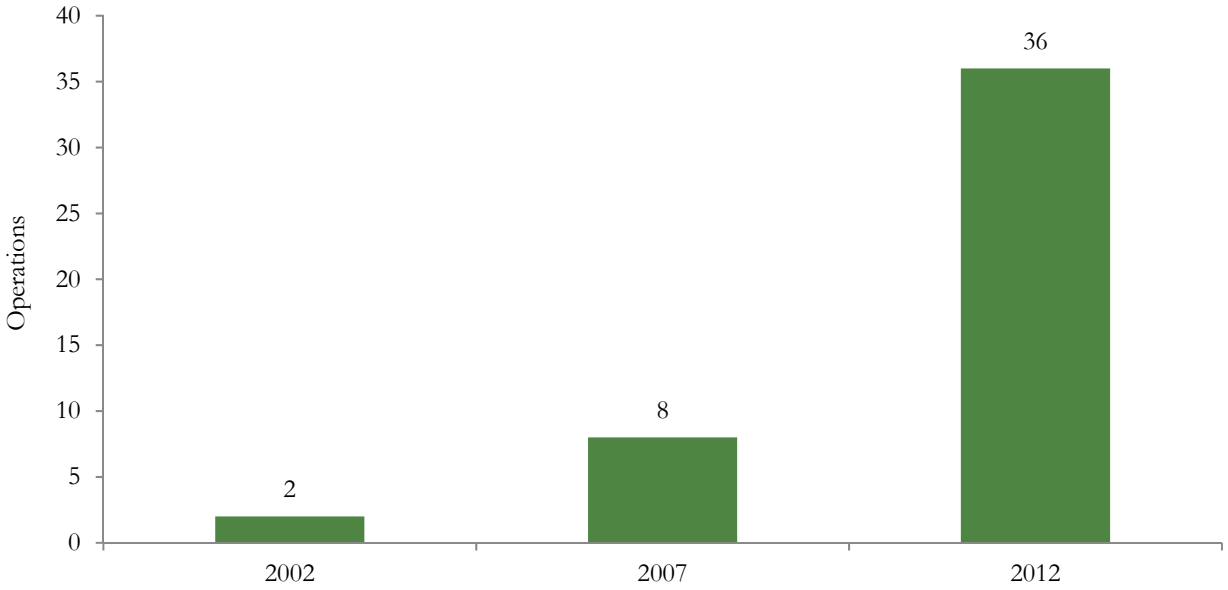
Exhibit 3.32.1 – Missouri Radish Acreage Harvested, 2002 to 2012



* Data for 2002 aren't disclosed in order to protect data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

As radish harvested acreage grew, the number of Missouri operations harvesting radishes increased. Exhibit 3.32.2 illustrates the trend in Missouri operations harvesting radish acreage from 2002 to 2012. Only two Missouri operations harvested radish acreage in 2002. By 2012, however, 36 Missouri operations harvested radish acreage. During both 2007 and 2012, all operations harvesting radish acreage served fresh markets (USDA National Agricultural Statistics Service 2017b).

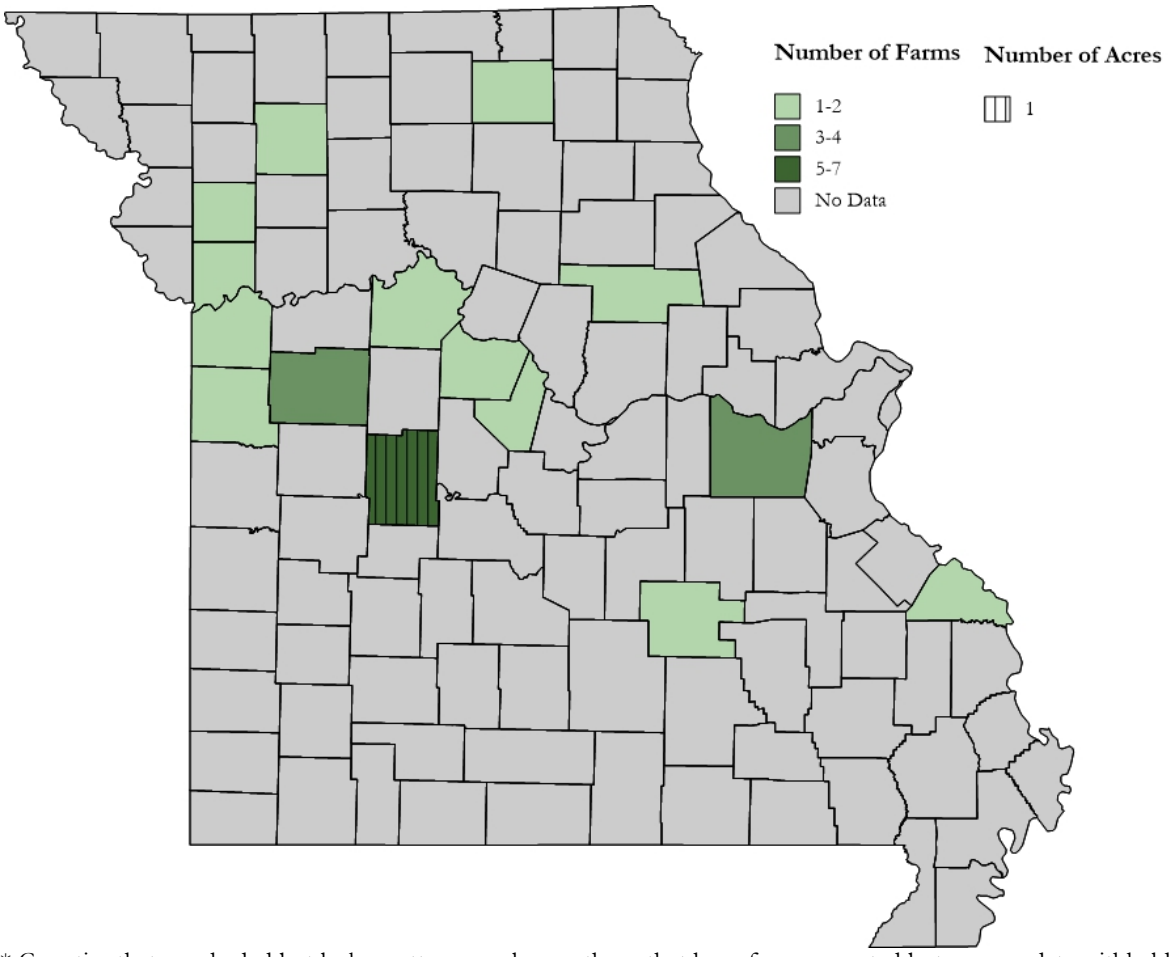
Exhibit 3.32.2 – Missouri Operations with Radish Acreage Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Counties that had the most radish operations with area harvested in 2012 were Benton County, seven farms; Johnson County, four farms; and Franklin County, three farms. Limited data for radish harvested acreage by county were available. The exception was Benton County. Its operations reported harvesting one acre of radishes in 2012. For other counties with radish operations that harvested acreage, the specific acreage by county wasn't disclosed. By county, Exhibit 3.32.3 summarizes radish operations with acreage harvested and harvested acreage data (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.32.3 – Missouri Harvested Radish Acreage and Operations by County, 2012**

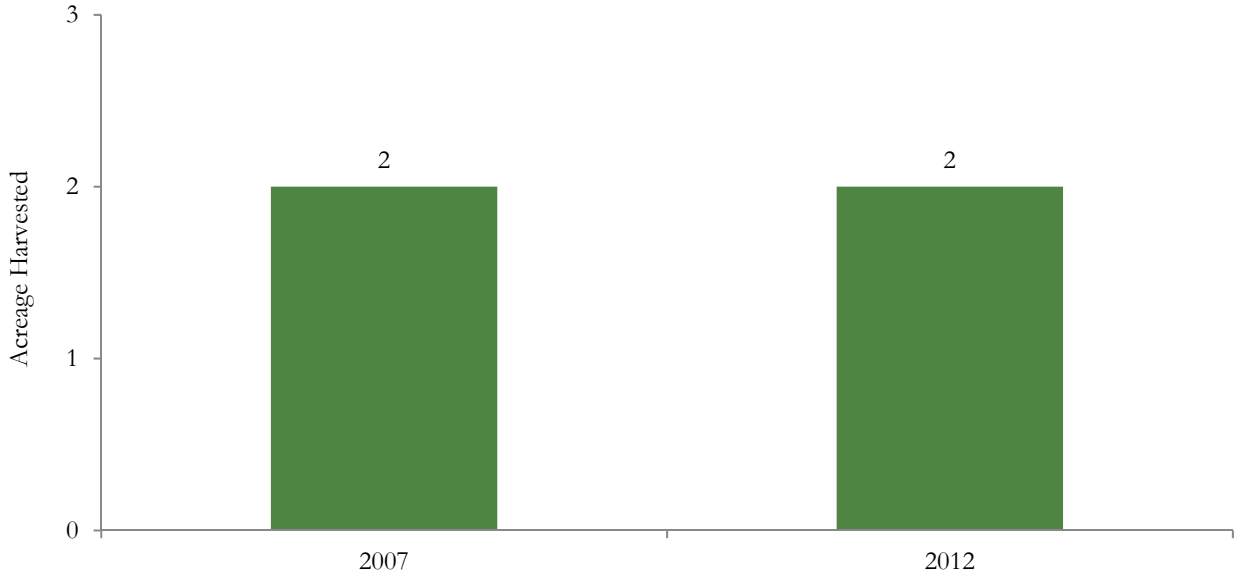


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.33 Rhubarb

Rhubarb has been a minor specialty crop in Missouri. Exhibit 3.33.1 indicates that Missouri had two harvested rhubarb acres in both 2007 and 2012. For both years, note that all rhubarb acreage was harvested for fresh-market purposes (USDA National Agricultural Statistics Service 2017b).

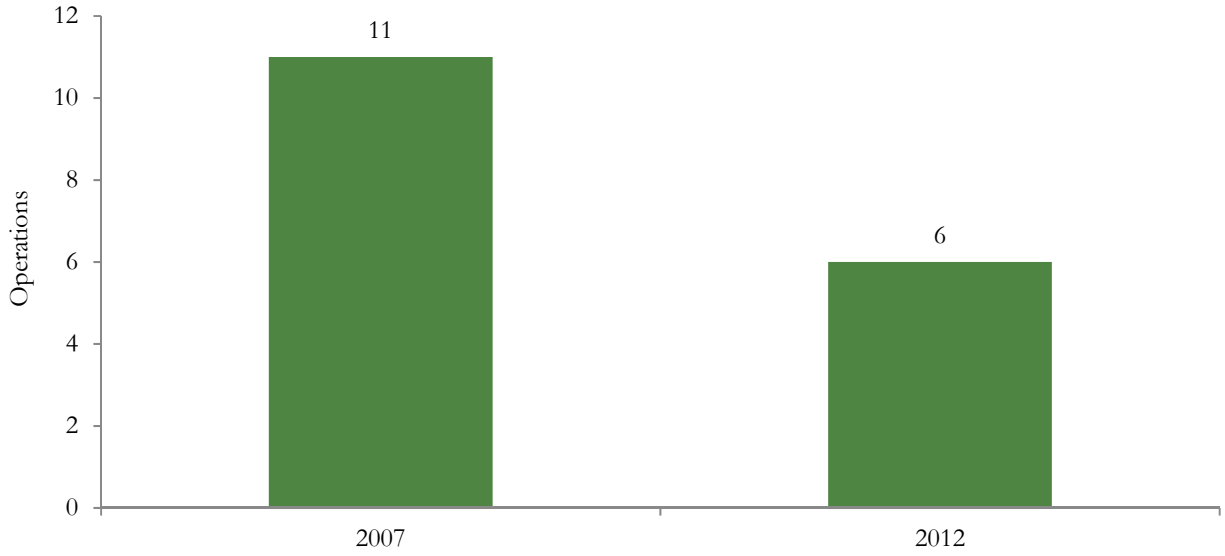
Exhibit 3.33.1 – Missouri Rhubarb Acreage Harvested, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Between 2007 and 2012, the number of Missouri operations harvesting rhubarb acreage decreased markedly. Eleven operations reported harvesting rhubarb acreage in 2007. That count was nearly halved to six operations harvesting rhubarb acreage in 2012. Exhibit 3.33.2 tracks the trend. Note that all operations in both years indicated that they served the fresh market (USDA National Agricultural Statistics Service 2017b). Given that rhubarb harvested acreage was unchanged between 2007 and 2012 but the number of operations declined, the farms that harvested rhubarb in 2012 must have maintained more rhubarb acreage on average.

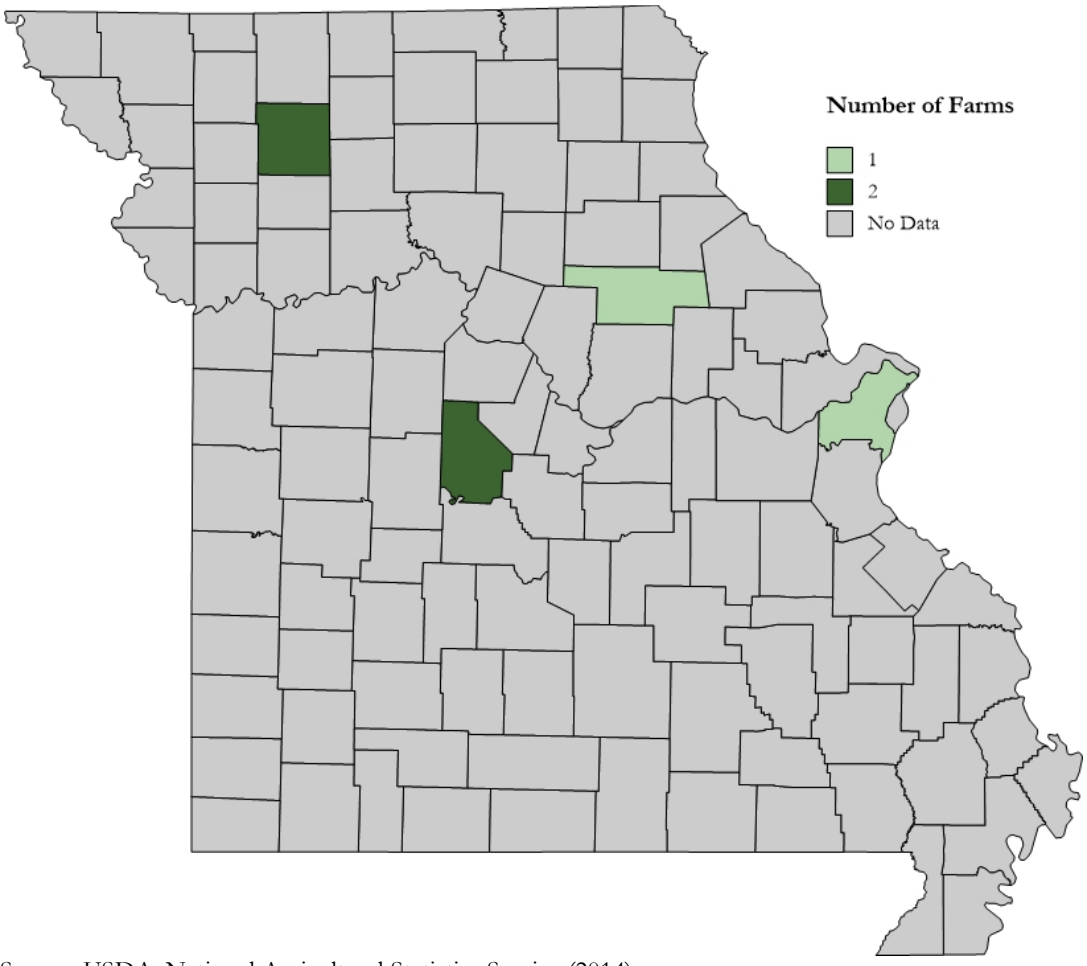
Exhibit 3.33.2 – Missouri Operations with Rhubarb Acreage Harvested, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

By county, Daviess and Morgan counties tied for having the most operations harvesting rhubarb acreage in 2012. Both reported two operations with harvested rhubarb acreage. The map provided as Exhibit 3.33.3 highlights Missouri counties according to their count of rhubarb operations with harvested acreage. Note that the map doesn't highlight rhubarb harvested acreage by county because the data were withheld (USDA National Agricultural Statistics Service 2014b).

Exhibit 3.33.3 – Missouri Rhubarb Operations with Harvested Area by County, 2012

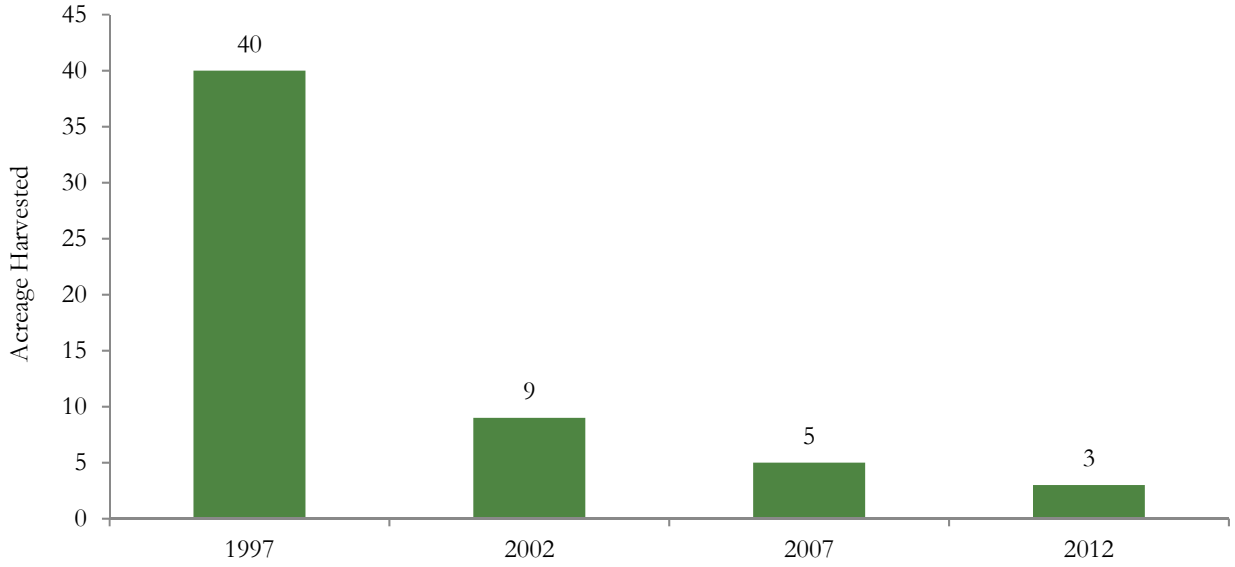


Source: USDA, National Agricultural Statistics Service (2014)

3.34 Spinach

Missouri spinach acreage harvested dropped substantially during the past two decades. Exhibit 3.34.1 tracks harvested acreage from 1997 to 2012. Harvested acreage was highest in 1997. At the time, Missouri operations harvested 40 acres of spinach. By 2012, harvested acreage declined to three acres. Note that all spinach harvested acreage in 2007 and 2012 served the fresh market (USDA National Agricultural Statistics Service 2017b).

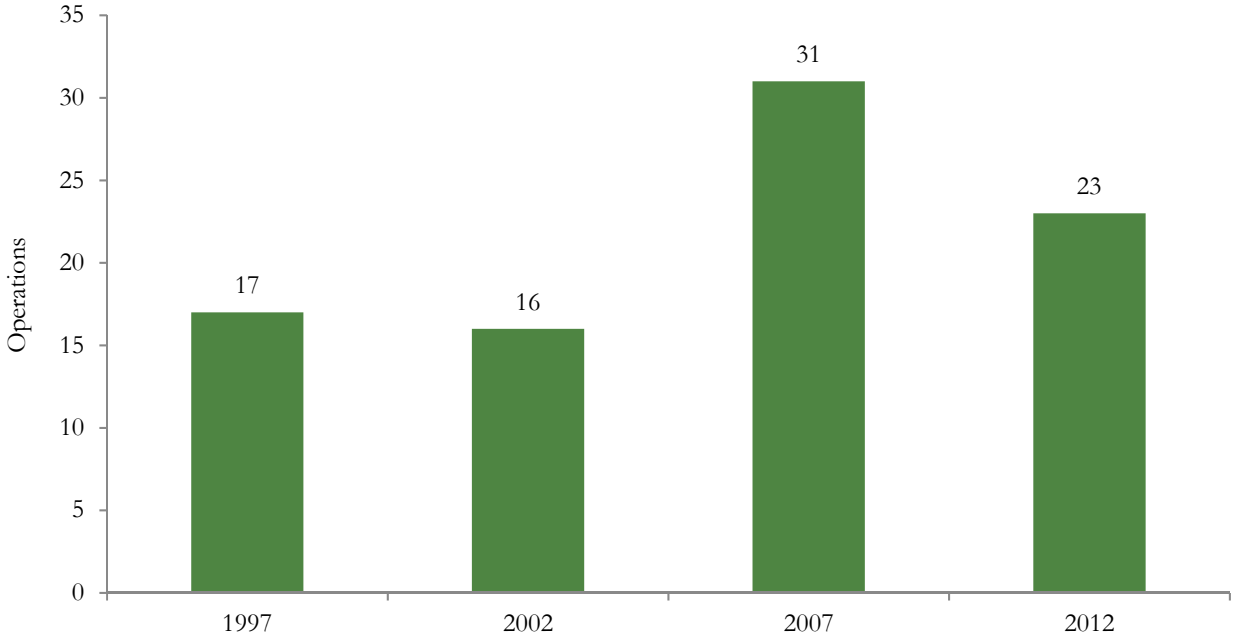
Exhibit 3.34.1 – Missouri Spinach Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Despite harvested spinach acreage declining, the number of Missouri operations harvesting spinach actually was higher in 2012 than in 1997. Exhibit 3.34.2 shows that 23 Missouri operations harvested spinach in 2012; that's six more operations harvesting spinach than in 1997. Of the period observed, the spinach operation count was highest in 2007. At the time, 31 operations in Missouri harvested spinach acreage. Note that all operations harvesting spinach in 2007 and 2012 sold product into the fresh market (USDA National Agricultural Statistics Service 2017b).

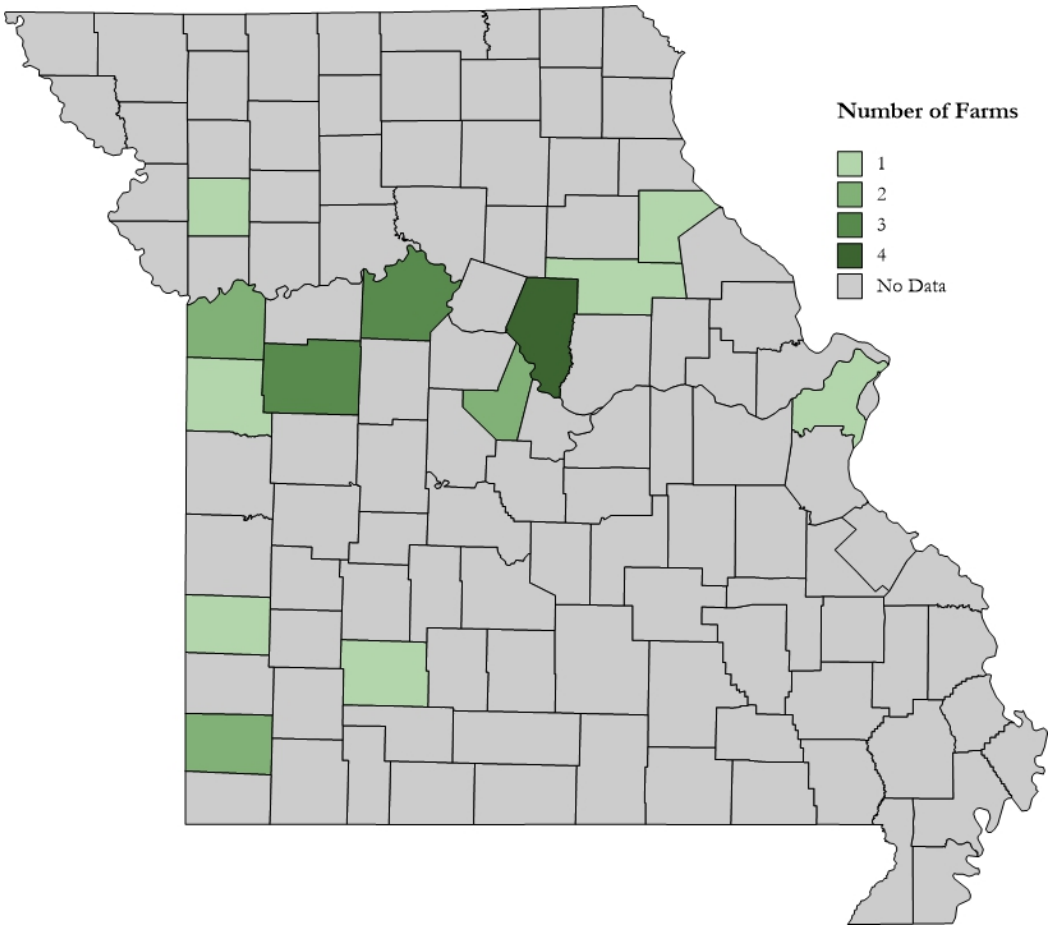
Exhibit 3.34.2 – Missouri Operations with Spinach Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Boone County, four farms; Johnson County, three farms; and Saline County, three farms, led in their count of spinach farms with area harvested during 2012. Exhibit 3.34.3 highlights Missouri counties based on their number of spinach farms with acreage harvested in 2012. Note that harvested acreage data weren't readily available on a county-by-county basis due to those data being withheld (USDA National Agricultural Statistics Service 2014b).

Exhibit 3.34.3 – Missouri Spinach Operations with Area Harvested by County, 2012

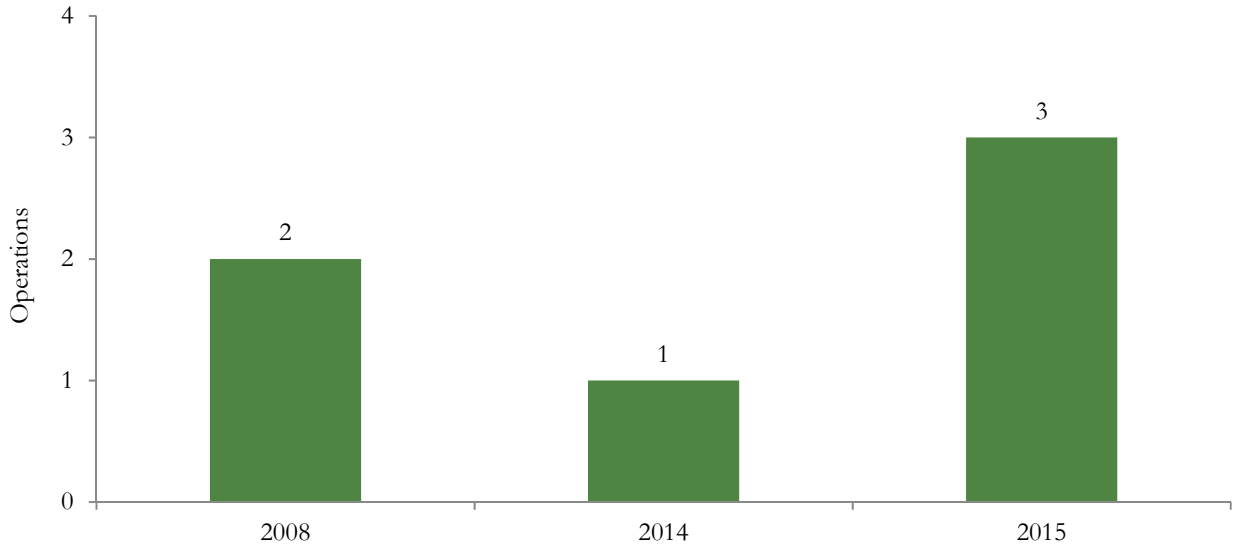


Source: USDA, National Agricultural Statistics Service (2014)

With respect to organic production, three Missouri operations harvested and sold USDA certified organic spinach in 2015. One of those operations in 2015 grew its certified organic spinach under protection. Exhibit 3.34.4 tracks the number of Missouri operations recording USDA certified organic spinach harvest and sales from 2008 to 2015. Two operations engaged in the USDA certified organic spinach business in 2008, and that count decreased to one operation in 2014 (USDA National Agricultural Statistics Service 2017b).

USDA certified organic spinach production and sales data were disclosed for 2015. Measured in hundredweight, USDA certified organic spinach production in Missouri totaled 16 hundredweight during 2015. Dollar sales for that certified organic product totaled $18,400 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.34.4 – Missouri Operations with Certified Organic Spinach Acreage Harvested and Product Sold, 2008 to 2015

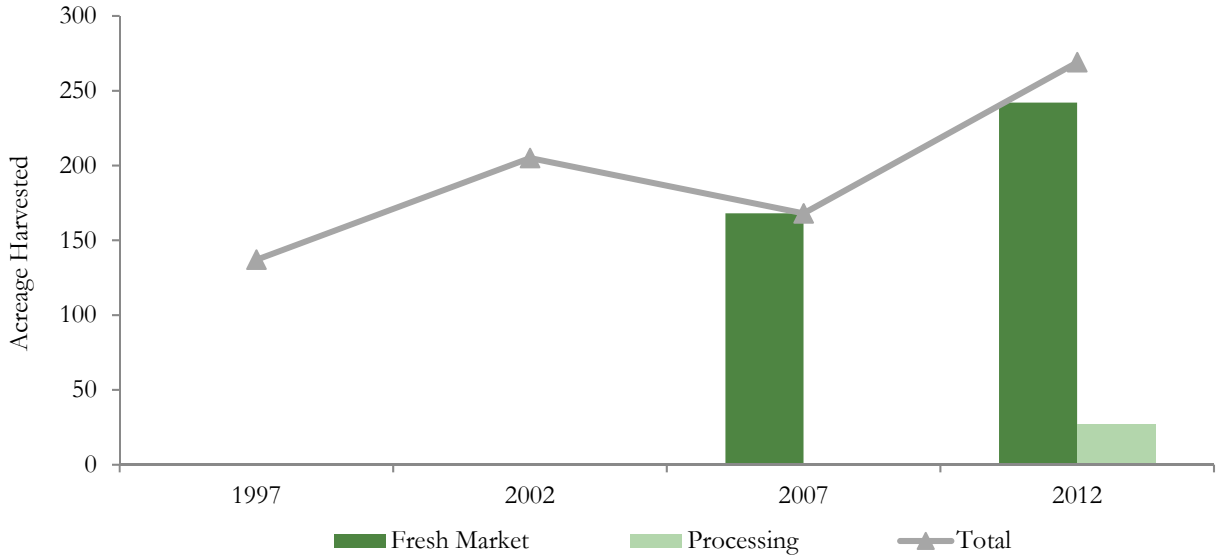


Source: USDA, National Agricultural Statistics Service (2017b)

3.35 Squash

Acreage allocated to Missouri squash production increased in recent years. Exhibit 3.35.1 illustrates that total squash acreage harvested increased from 137 acres in 1997 to 269 acres in 2012. In 2012, the Missouri squash harvest found use in both the fresh and processing markets. Of total squash acreage harvested during 2012, 90 percent was directed to the fresh market, and processing absorbed the other 10 percent (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.35.1 – Missouri Squash Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri growers have raised both summer and winter squash. Exhibit 3.35.2 breaks down harvested acreage from 2007 and 2012 into those two categories. In 2007, winter squash harvested acreage surpassed harvested summer squash acreage. However, an inverse relationship existed in 2012. At the time, growers harvested 143 acres of summer squash and 126 acres of winter squash (USDA National Agricultural Statistics Service 2017b).

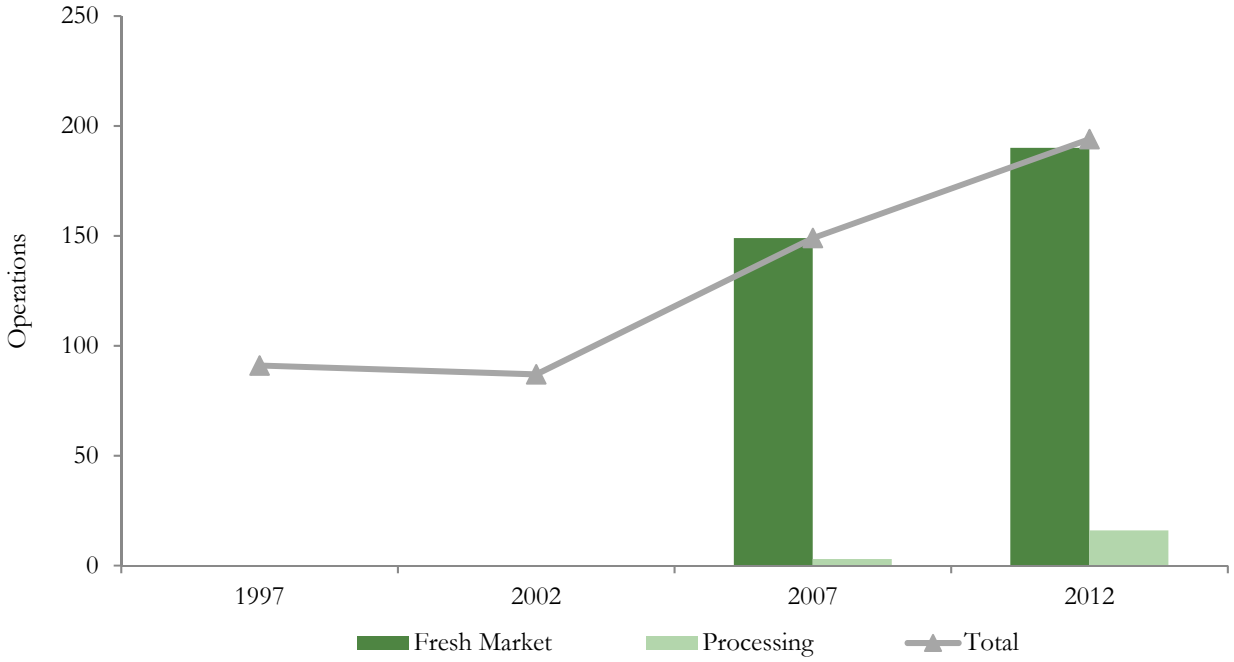
For 2012 harvested acreage, USDA reported the extent to which acreage was harvested for fresh or processing uses. Of the summer squash acreage harvested in 2012, 82.5 percent was used for fresh purposes, and processing captured the other 17.5 percent of the harvested acreage. For winter squash, nearly all — 98.4 percent — of the harvested acreage in 2012 was intended for fresh market use (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.35.2 – Missouri Summer and Winter Squash Acreage Harvested, 2007 and 2012

Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.35.3 summarizes the number of operations harvesting all squash from 1997 to 2012. During this time period, the count of operations harvesting squash more than doubled. In 2012, 194 farms reported that they harvested squash. Operations have more commonly harvested squash for the fresh market than for processing purposes. The count of farms that harvested squash for fresh purposes totaled 190 operations in 2012. Just 16 operations harvested squash for processing uses in that year (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.35.3 – Missouri Operations with Squash Acreage Harvested, 1997 to 2012

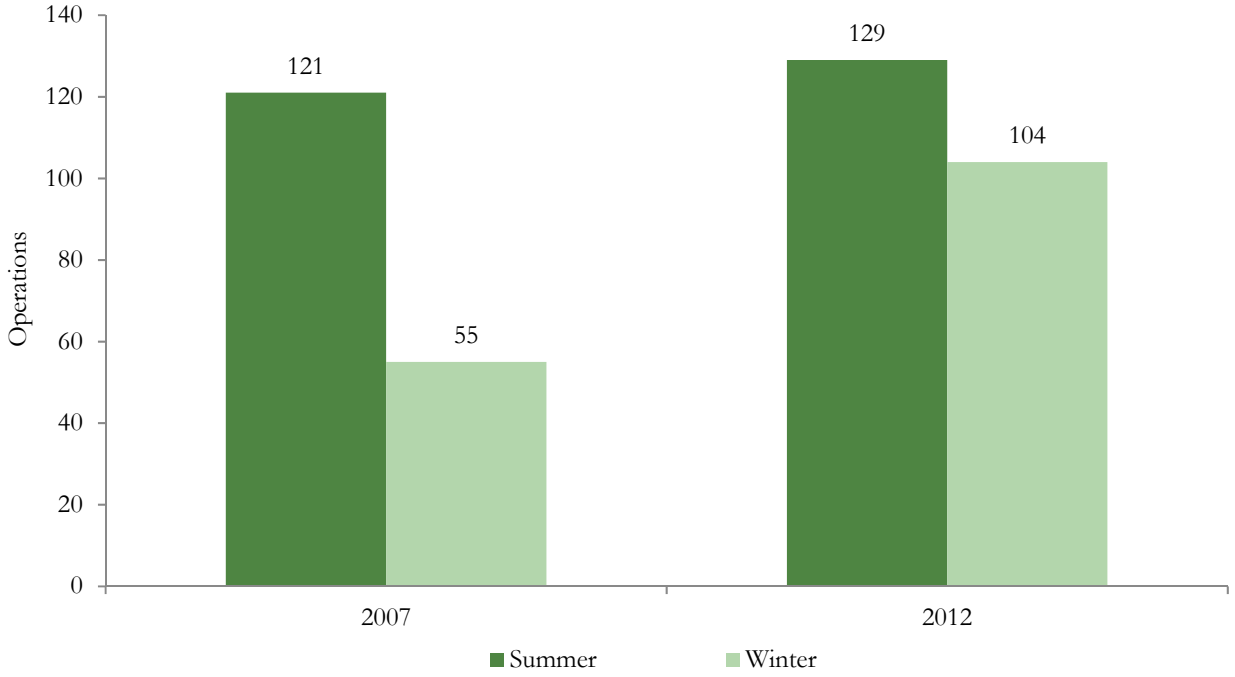


Source: USDA, National Agricultural Statistics Service (2017b)

Squash-growing operations in Missouri have been more likely to choose summer squash than winter squash. Exhibit 3.35.4 reports that more operations harvested summer squash than winter squash in both 2007 and 2012. Note, however, that the number of operations harvesting winter squash increased rather drastically between 2007 and 2012. The number of operations harvesting summer squash increased less significantly. In 2012, 129 operations harvested summer squash, and 104 operations harvested winter squash (USDA National Agricultural Statistics Service 2017b).

Operations harvesting summer squash and winter squash have been more likely to harvest product for the fresh market than the processing market. Of the 129 operations harvesting summer squash in 2012, 127 operations harvested product for the fresh market, and eight operations harvested squash for processing. With respect to winter squash, 104 operations in total reported harvested acreage. Of those, 102 operations harvested product for the fresh market, and nine operations harvested squash for the processing market (USDA National Agricultural Statistics Service 2017b).

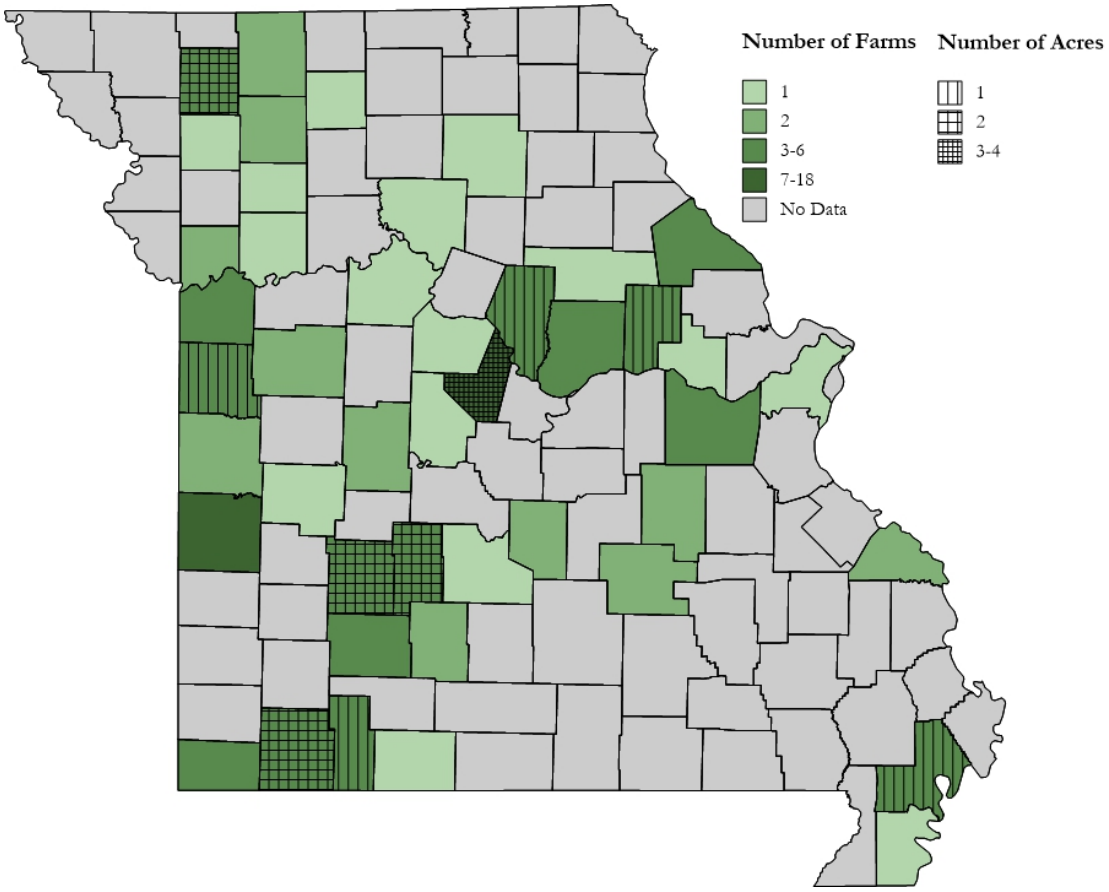
Exhibit 3.35.4 – Missouri Operations with Summer and Winter Squash Acreage Harvested, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.35.5 summarizes the geographic dispersion of Missouri summer squash operations with area harvested and harvested acreage in 2012. Vernon County topped the list of counties based on the number of summer squash operations with harvested area; it had 18 summer squash farms in 2012. Other counties with a significant count of summer squash operations with area harvested were Moniteau County, eight farms; Barry County, six farms; Boone County, six farms; and Dallas County, six farms. Most counties didn't have summer squash harvested acreage disclosed in order to avoid disclosing data for individual operations. Of the counties with published harvested acreage data, however, those leading in acreage were Moniteau County, four acres; Barry County, two acres; Dallas County, two acres; Gentry County, two acres; and Polk County, two acres (USDA National Agricultural Statistics Service 2014b).

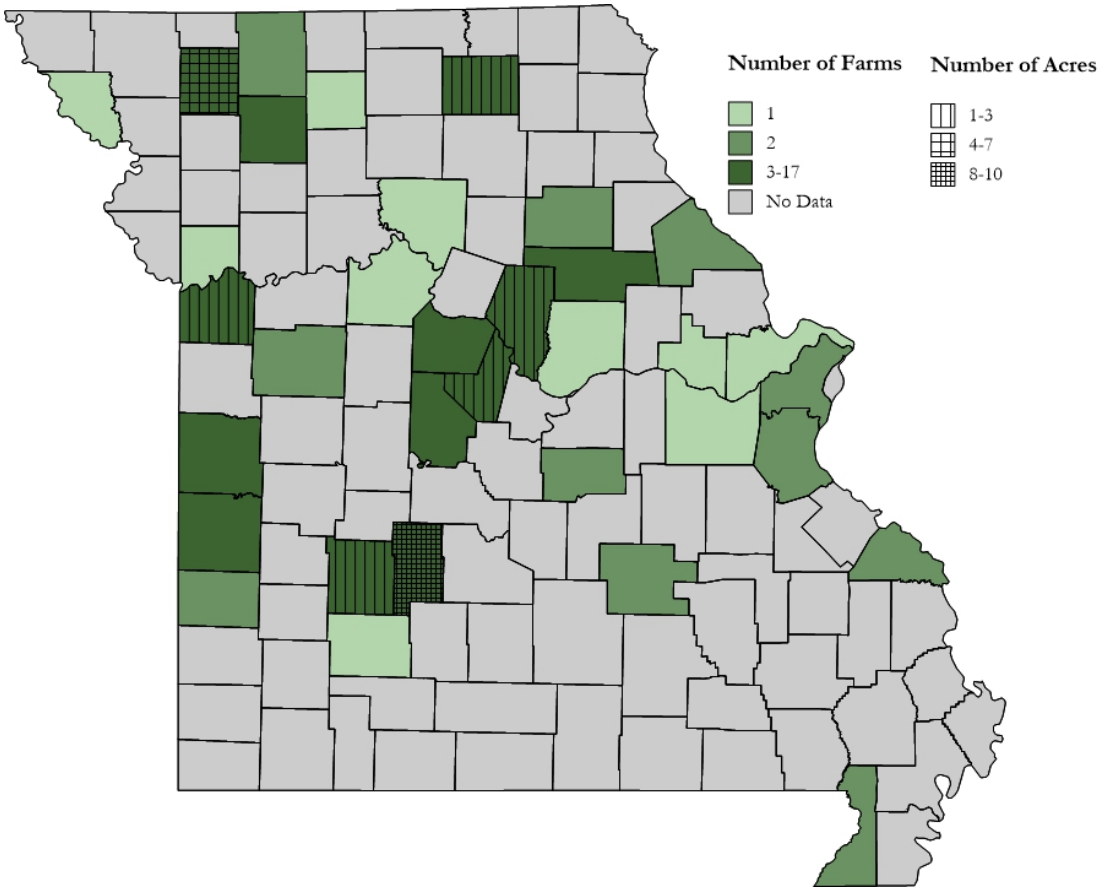
*Exhibit 3.35.5 – Missouri Harvested Summer Squash Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Counties reported to have the most winter squash operations with area harvested in 2012 were Vernon County, 17 farms; Boone County, seven farms; Dallas County, seven farms; Bates County, six farms; and Gentry County, six farms. Like for summer squash, USDA withheld winter squash harvested acreage for many counties. Of counties with harvested acreage reported, Dallas County, 10 acres, and Gentry County, four acres, led in their winter squash harvested acreage totals. See Exhibit 3.35.6 (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.35.6 – Missouri Harvested Winter Squash Acreage and Operations by County, 2012**

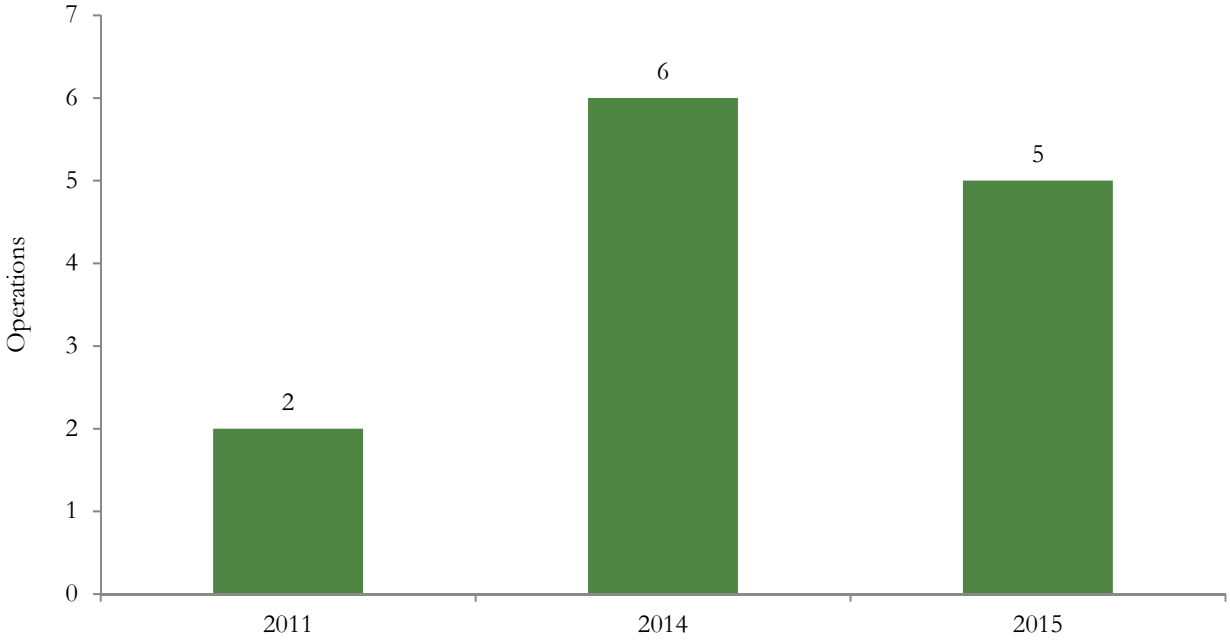


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Relatively few Missouri operations have grown USDA certified organic squash; however, the count of such operations has grown. Exhibit 3.35.7 illustrates the trend in Missouri operations harvesting squash with the USDA organic certification. Just two operations harvested USDA certified organic squash in 2011, but five operations harvested certified organic squash by 2015 (USDA National Agricultural Statistics Service 2017b).

In some years, note that USDA also published counts of operations that harvested exempt organic squash. As an example, in 2014, 12 operations harvested organic squash that was either certified or exempt. Of those, half harvested USDA certified organic squash, and half harvested exempt organic squash (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.35.7 – Missouri Operations with Certified Organic Squash Harvested Acreage, 2011 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.35.8 further summarizes Missouri's USDA certified organic squash industry. On just one acre, the five operations harvesting USDA certified organic squash in 2015 produced 123 hundredweight of product. Sales totaled nearly $25,000. In 2014, the state's certified organic squash industry was larger. Six operations harvested five acres of product and produced 288 hundredweight, which was more than twice the production measured in 2015. Dollar sales were also more significant in 2014 than in 2015 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.35.8 – Summary of Missouri Certified Organic Squash Industry, 2014 and 2015

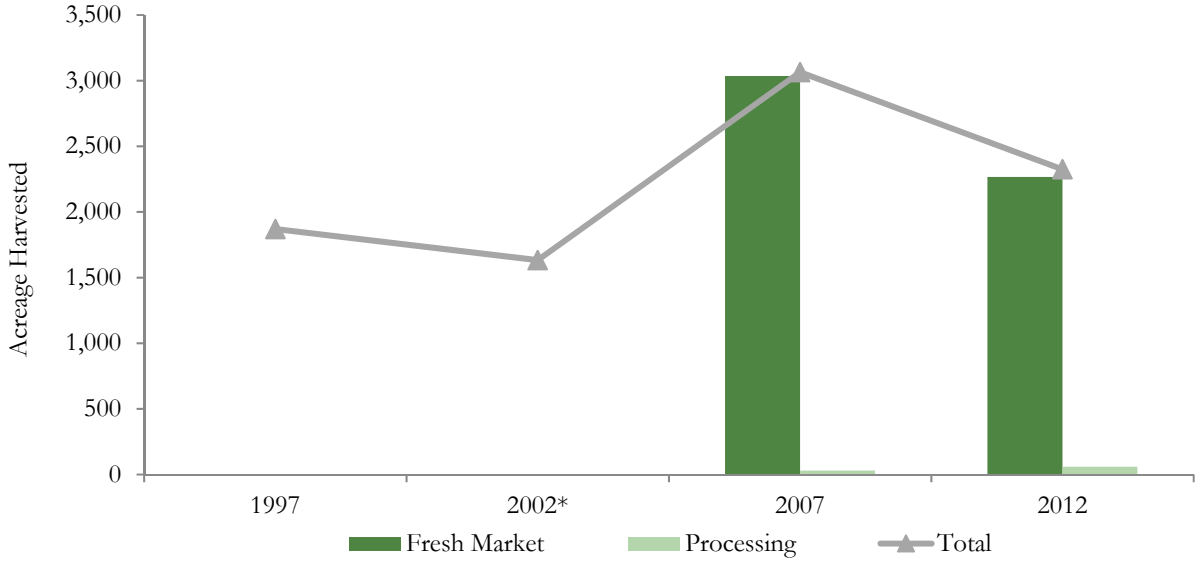
	Acres Harvested	Operations	Cwt. Produced	Dollar Sales
2014	5	6	288	$42,600
2015	1	5	123	$24,780

Source: USDA, National Agricultural Statistics Service (2017b)

3.36 Sweet Corn

In terms of harvested acreage, sweet corn has had a relatively significant presence in Missouri. In 2012, sweet corn harvested acreage surpassed 2,300 acres, which was a drop from 2007 harvested acreage but more than harvested acreage totals in 1997 and 2002. Of the sweet corn acreage harvested in 2012, most was intended to serve the fresh market. See Exhibit 3.36.1. The fresh market consumed 97.5 percent of total harvested acreage. Limited sweet corn — just 2.5 percent of total acreage — served the processing market (USDA National Agricultural Statistics Service 2017b).

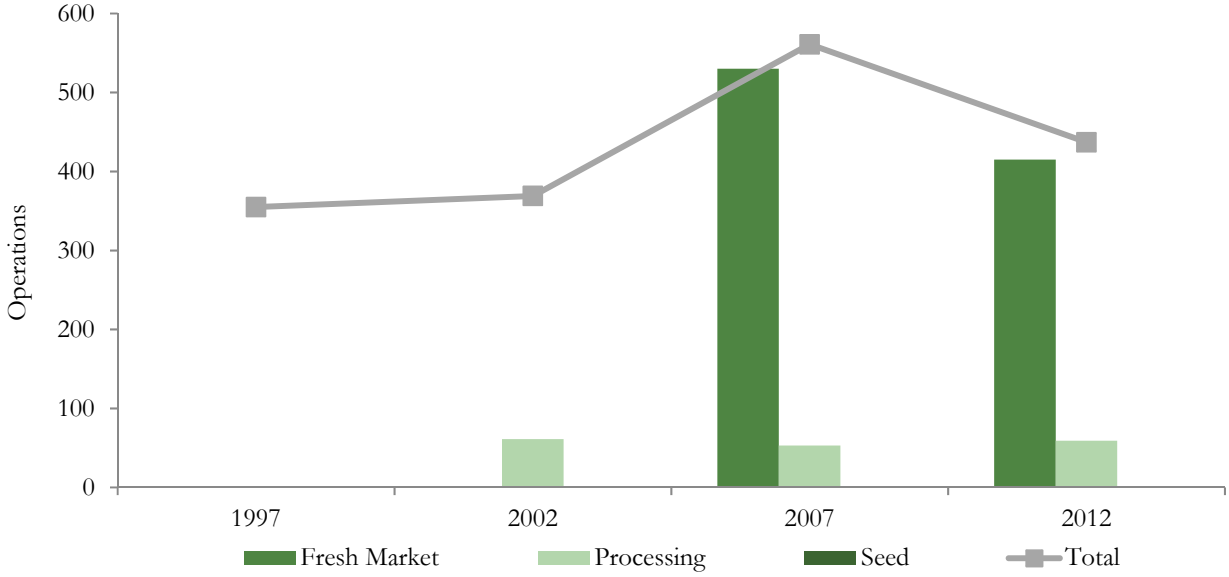
Exhibit 3.36.1 – Missouri Sweet Corn Acreage Harvested, 1997 to 2012



* Processing acreage weren't reported in 2002 to avoid disclosing data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

The trend in Missouri operations harvesting sweet corn acreage has some similarities with the trend in sweet corn acreage harvested. Exhibit 3.36.2 reports the number of operations that harvested sweet corn between 1997 and 2012. In 2012, 437 farms harvested sweet corn. Most operations harvested sweet corn for the fresh market compared with processing purposes. In 2012, 415 farms reported harvesting sweet corn for fresh consumption, whereas 59 operations harvested sweet corn for processing. Note that one operation in 2012 indicated that it harvested sweet corn for seed (USDA National Agricultural Statistics Service 2017b).

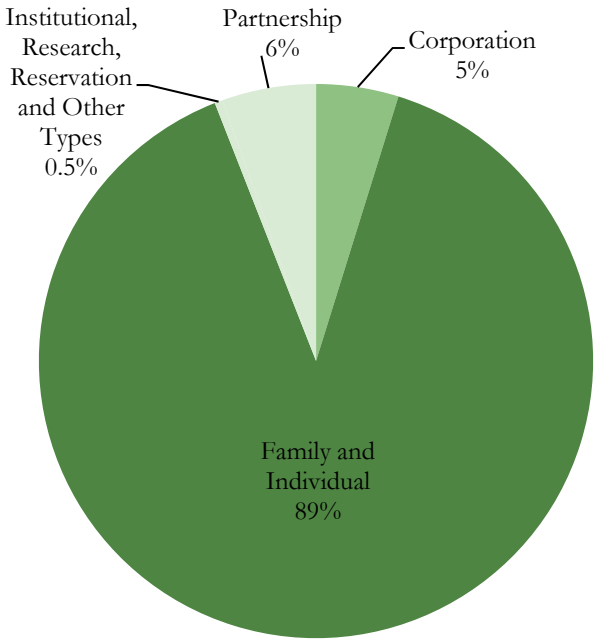
Exhibit 3.36.2 – Missouri Operations with Sweet Corn Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations harvesting sweet corn acreage in 2012 were most commonly structured as family and individual operations. Exhibit 3.36.3 shares the percentage of Missouri sweet corn operations classified as using various organizational structures for tax purposes in 2012. Nearly 90 percent of Missouri sweet corn operations were organized as family and individual farms. Six percent were structured as partnerships, and corporations represented 5 percent of operations. Relatively few operations were institutional, research, reservation and other types of farms (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.36.3 – Share of Missouri Sweet Corn Operations by Organizational Structure, 2012

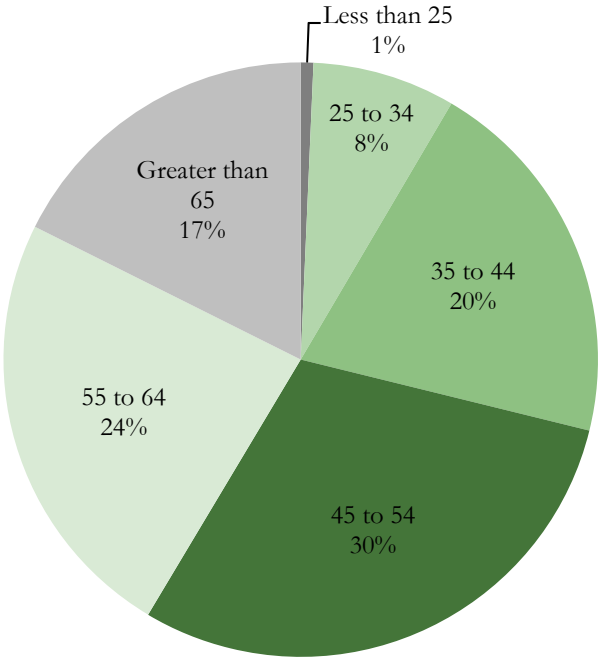


Source: USDA, National Agricultural Statistics Service (2017b)

For nearly 60 percent of Missouri sweet corn farm principal operators in 2012, they named farming as their primary occupation. A career other than farming was the primary occupation for the remaining 40 percent of principal operators. A majority of principal operators have had significant experience on their present operations. In 2012, nearly 61 percent of principal operators had spent at least 11 years on their present operations. Roughly 22 percent had spent less than six years on their present operations (USDA National Agricultural Statistics Service 2017b).

With respect to principal operator age, Exhibit 3.36.4 illustrates the share of Missouri sweet corn farm principal operators by age category in 2012. Half of the principal operators indicated that they were between 35 years old and 54 years old, and 41 percent of principal operators reported being at least 55 years old. Young people — those younger than 35 years old — represented 9 percent of Missouri sweet corn farm principal operators (USDA National Agricultural Statistics Service 2017b).

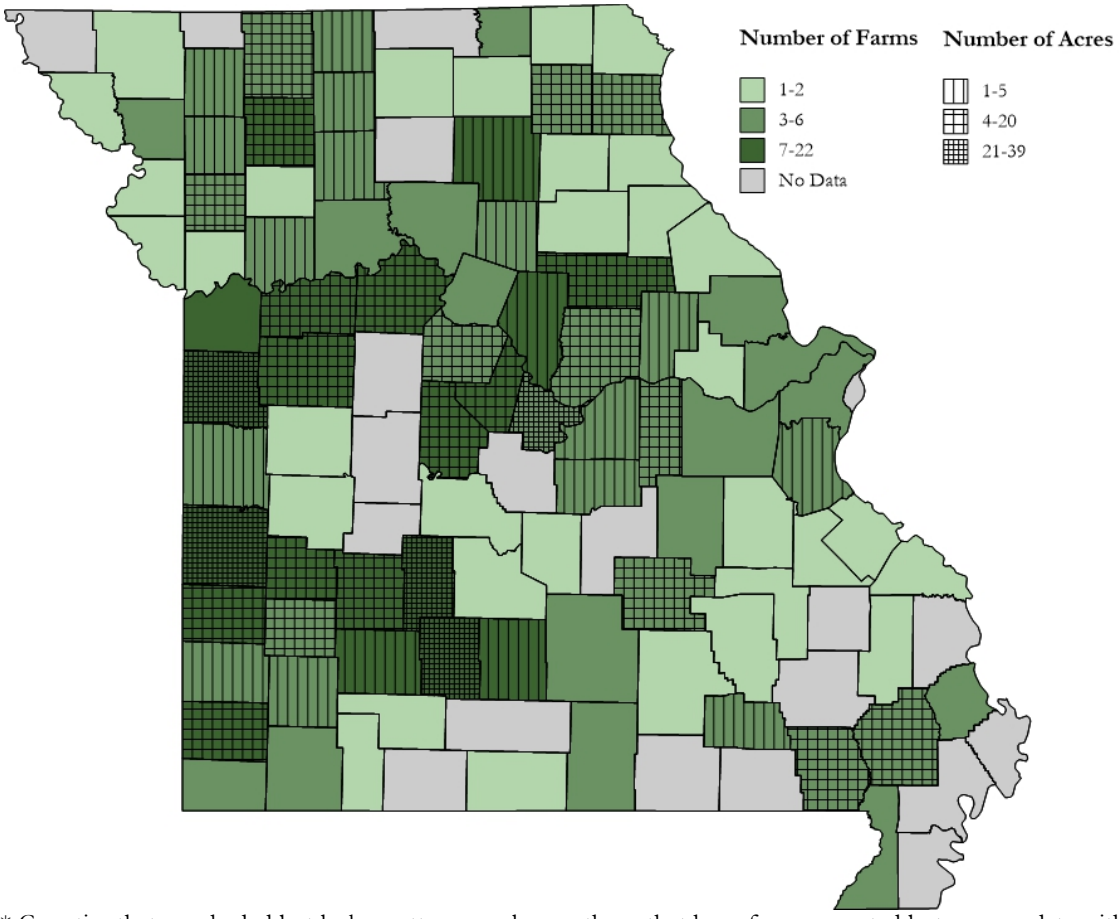
Exhibit 3.36.4 – Age Distribution of Missouri Sweet Corn Operation Principal Operators, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, sweet corn operations with area harvested were most common in Dallas County, 22 farms; Vernon County, 21 farms; Barton County, 14 farms; Webster County, 14 farms; and Polk County, 13 farms. Sweet corn harvested acreage was highest in Vernon County, 39 acres; Webster County, 24 acres; Dallas County, 23 acres; Cass County, 22 acres; and Cole County, 21 acres. Exhibit 3.36.5 communicates sweet corn harvested acreage and operations with area harvested by county (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.36.5 – Missouri Harvested Sweet Corn Acreage and Operations by County, 2012**



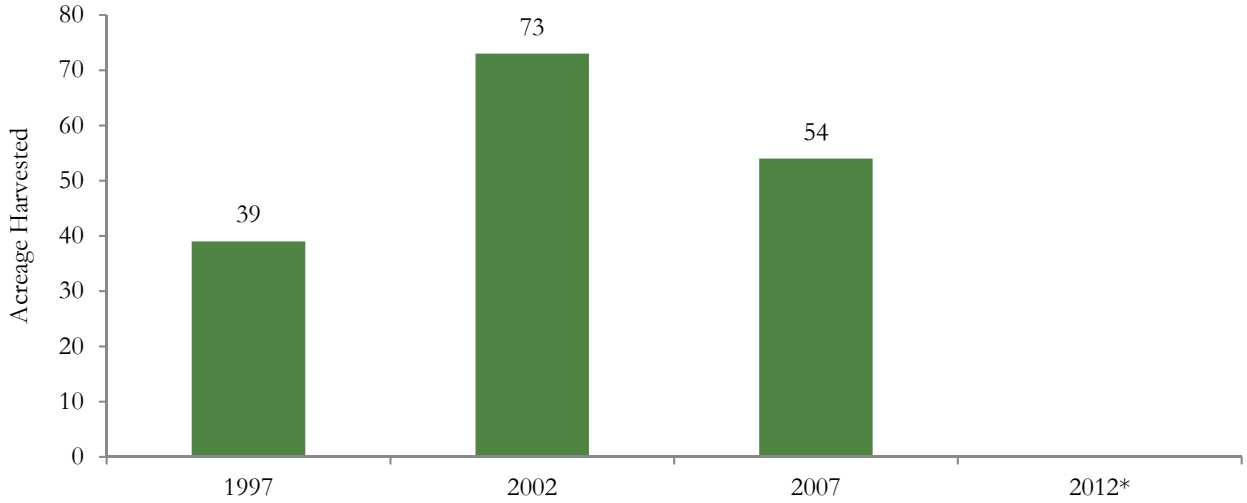
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Organic sweet corn production in Missouri has occurred on a small scale. In 2014, four operations indicated that they harvested organic sweet corn. Of those, half were USDA certified organic, and half were exempt organic. Combined, organic sweet corn production of these operations totaled 204 hundredweight. Note that acreage data weren't published in order to protect data of individual operations (USDA National Agricultural Statistics Service 2017b).

3.37 Sweet Potato

Sweet potato harvested acreage data for Missouri are relatively limited. Exhibit 3.37.1 reports the available data. Harvested acreage increased from 1997 to 2002, and it then decreased from 2002 to 2007. Total acreage harvested was 54 acres in 2007. An acreage total wasn't reported for 2012 to avoid releasing data for individual operations. However, fresh-market harvested acreage was reported to total 15 acres. Acreage harvested for processing purposes wasn't released (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.37.1 – Missouri Sweet Potato Acreage Harvested, 1997 to 2012

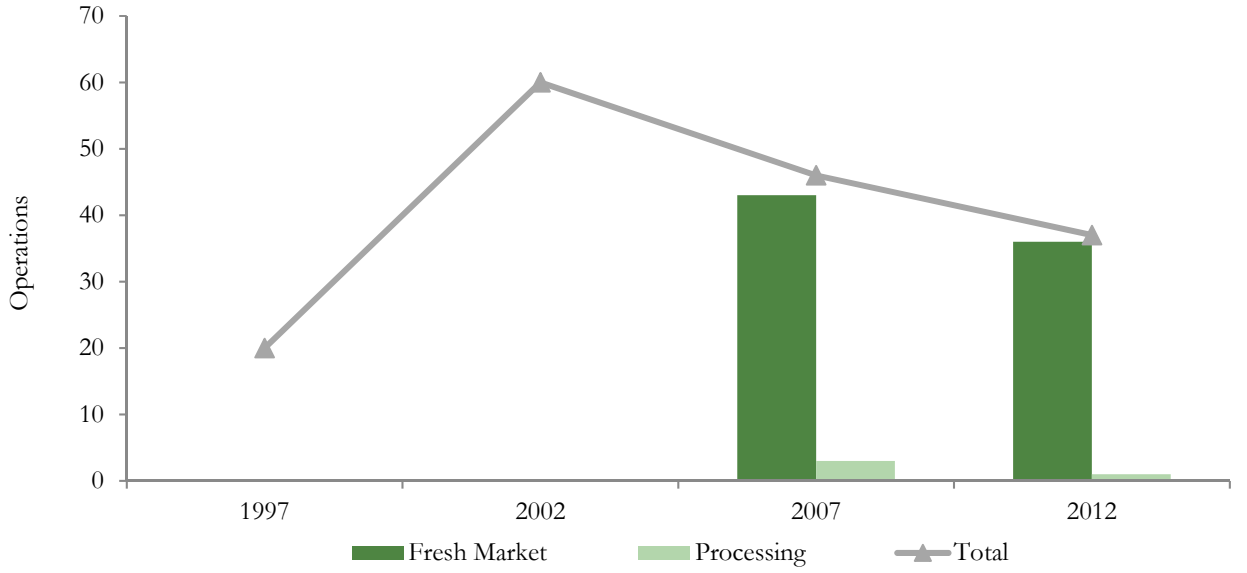


* 2012 data were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

Missouri sweet potato production was reported in 1997 and 2002 but not since then. Production exceeded 2,700 hundredweight in 1997, and it increased to more than 10,700 hundredweight in 2002 (USDA National Agricultural Statistics Service 2017b).

The count of Missouri operations that have harvested sweet potatoes is shared in Exhibit 3.37.2. As illustrated, the number of farms harvesting sweet potatoes peaked in 2002 and then declined. In 2012, 37 operations reported that they harvested sweet potatoes. Of the total, 36 operations indicated that they harvested product for the fresh market, and one operation reported harvesting sweet potatoes for processing purposes (USDA National Agricultural Statistics Service 2017b).

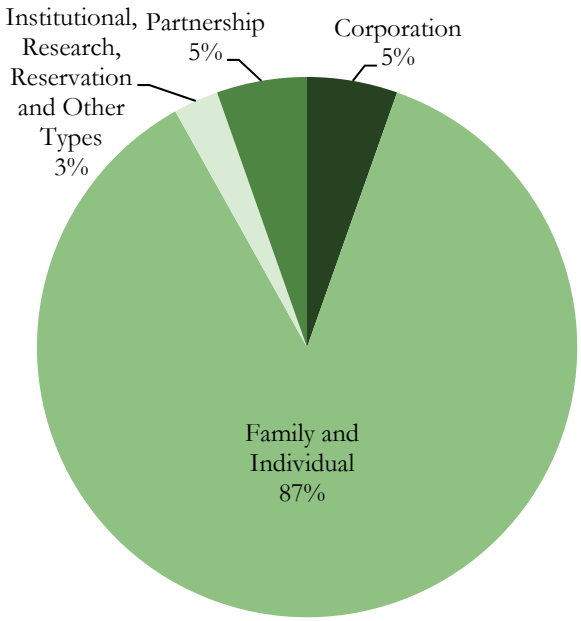
Exhibit 3.37.2 – Missouri Operations with Sweet Potato Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Of the Missouri operations that harvested sweet potato acreage in 2012, most were structured as family and individual operations. Exhibit 3.37.3 illustrates that 87 percent of the sweet potato farms in 2012 were family and individual operations. In comparison, 5 percent were partnerships, and 5 percent were corporations. Just one operation — 3 percent of the total — identified as an institutional, research, reservation or other type of sweet potato operation (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.37.3 – Share of Missouri Sweet Potato Operations by Organizational Structure, 2012

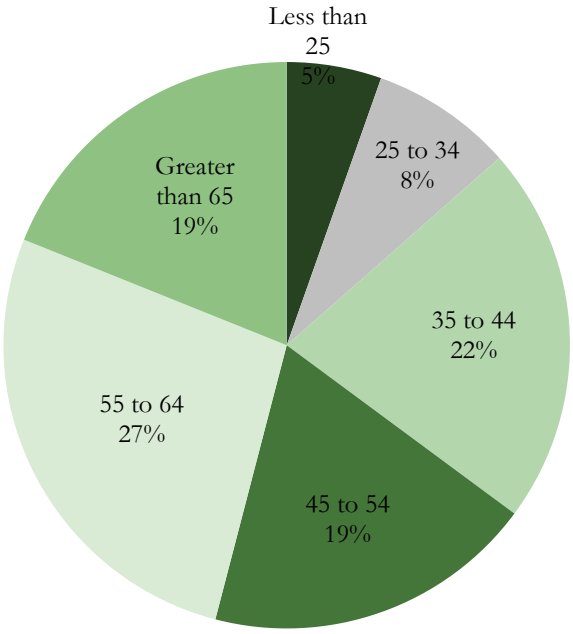


Source: USDA, National Agricultural Statistics Service (2017b)

Frequently, principal operators of Missouri sweet potato operations have named farming as their primary occupation. During 2012, 59.5 percent of the principal operators shared that farming was their primary occupation. In contrast, 40.5 percent identified something other than farming as their primary occupation. The principal operators also have tended to have significant experience on their present operations. In 2012, 62.2 percent of the principal operators shared that they had been on their present operations for at least 11 years, and 27 percent shared that they had been on their present operations for less than six years (USDA National Agricultural Statistics Service 2017b).

In terms of principal operator age, Exhibit 3.37.4 reports the share of Missouri sweet potato farm principal operators according to their age category in 2012. Forty-six percent of the principal operators shared that they were at least 55 years old, and 41 percent indicated that they were 35-year-olds to 54-year-olds. Just 13 percent of the principal operators were 34 years old or younger (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.37.4 – Age Distribution of Missouri Sweet Potato Operation Principal Operators, 2012

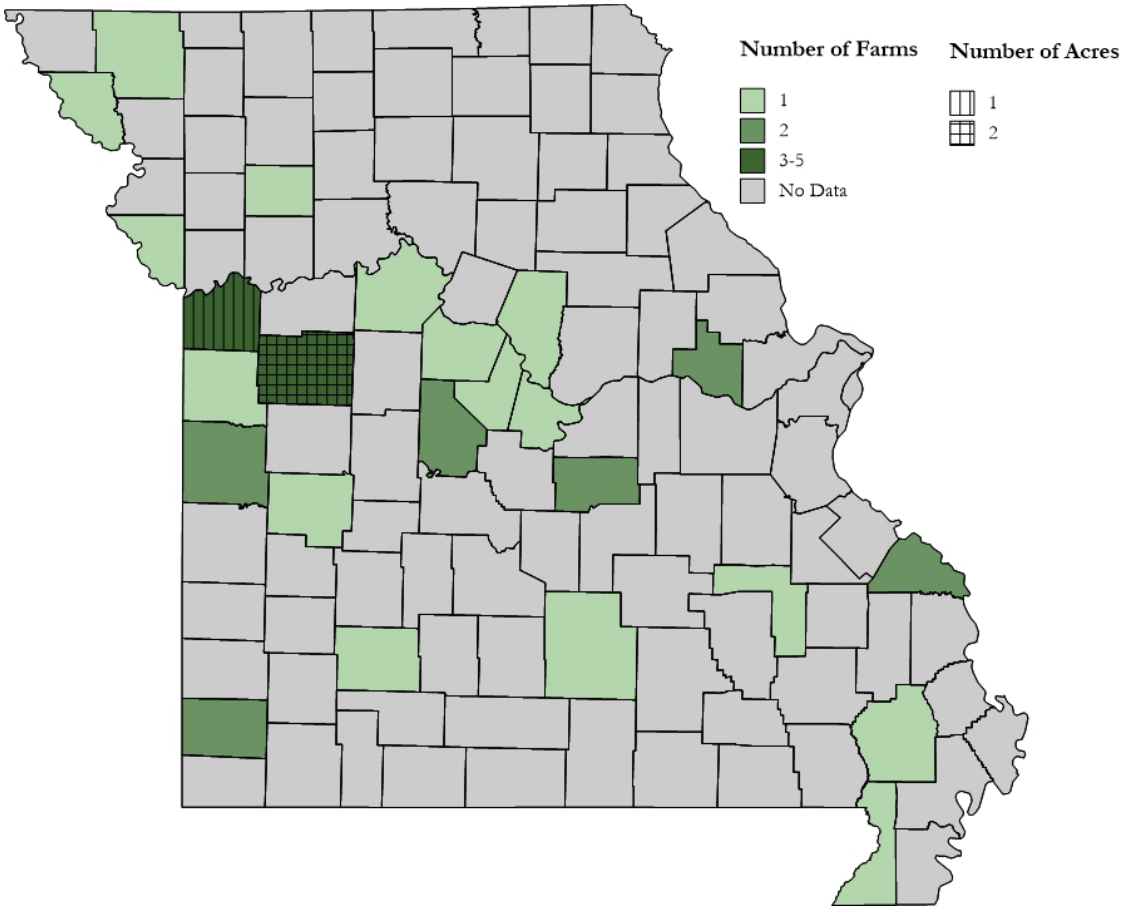


Source: USDA, National Agricultural Statistics Service (2017b)

Two Missouri counties led sweet potato activity in Missouri during 2012. Counties reporting the most sweet potato farms with area harvested were Johnson County, five farms, and Jackson County, four farms. In most cases, USDA has withheld sweet potato harvested acreage data by county. However, the data set indicates that Johnson County had two acres of sweet potatoes harvested and Jackson County had one acre of sweet potatoes harvested in 2012. See Exhibit 3.37.5 (USDA National Agricultural Statistics Service 2014b).

Although Mississippi County is shown as not contributing to Missouri sweet potato production, the county does have a sweet potato operation. Black Gold Farms, which also raises chip potatoes and red potatoes in the Bootheel, has two sweet potato production sites in Missouri. The Charleston, Mo., location would be in Mississippi County. Black Gold Farms also has a sweet potato farm site in Arbyrd, Mo., which is located in Dunklin County. In total, note that Black Gold Farms maintains four sweet potato farm locations, and two of those are the Missouri sites (Black Gold Farms 2017).

*Exhibit 3.37.5 – Missouri Harvested Sweet Potato Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.38 Swiss Chard

Although USDA data don't specifically describe Swiss chard production in Missouri, some production occurs on operations throughout the state. As an example, Overlook Farm in Clarksville, Mo., lists Swiss chard as one of the ingredients that it grows for its farm-to-table operation. To grow its products, the farm uses 26 hoop houses, five greenhouses and 327 acres (Overlook Farm 2014).

As another example, Hart|Beet Farm in Lincoln County grows multiple types of produce, and it sells some goods that are harvested from the wild. Swiss chard is one type of produce grown on the farm. Others include bok choi, collards, lettuce, salad mix, parsnips, turnips and squash. Established in 2015, the farm sells its goods at the Lake Saint Louis Farmers and Artists Market. Additionally, it operates a CSA program (Hart|Beet Farm).

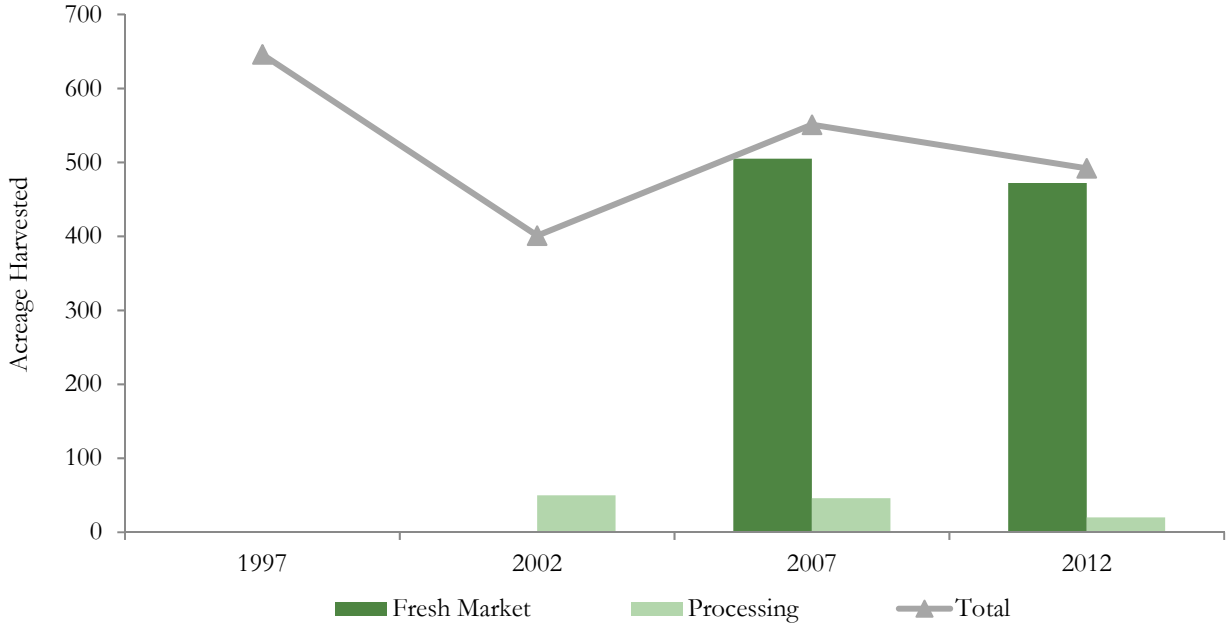
3.39 Taro

USDA data also don't describe the extent to which Missouri has adopted taro as a specialty crop. However, some news reports suggest that it has been grown at least on a small scale. For example, Raytown-based JJ Farms is an urban farm that has grown taro. Both the tuber and the large leaves of a taro plant have potential uses. In the past, restaurants have been produce buyers for JJ Farms (Wendholt Silva 2015).

3.40 Tomato

In 2012, Missouri producers harvested nearly 500 acres of tomatoes grown in the open. Exhibit 3.40.1 presents Missouri in-the-open tomato harvested acreage from 1997 to 2012. The harvested acreage was highest in 1997 at 646 acres and lowest in 2002 at 401 acres. The fresh market has used the most Missouri grown-in-the-open tomatoes. In 2012, 96 percent of total in-the-open tomato acreage was harvested for the fresh market. Operators harvested the remaining acreage for processing purposes (USDA National Agricultural Statistics Service 2017b).

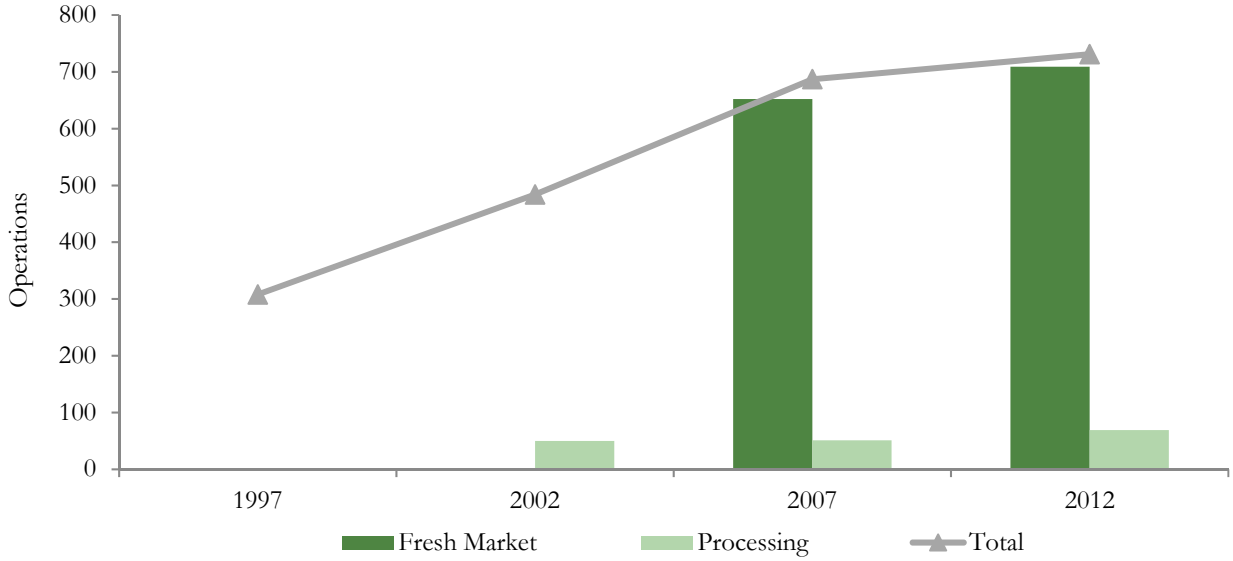
Exhibit 3.40.1 – Missouri In-the-Open Tomato Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations have increasingly added in-the-open tomatoes as a specialty crop that they grow on their farms. Exhibit 3.40.2 tracks the number of Missouri operations harvesting tomatoes raised in the open between 1997 and 2012. During 2012, more than 730 operations reported that they harvested tomatoes. At the time, the bulk of Missouri operations — 709 operations — harvested tomatoes for the fresh market. In 2012, 69 farms indicated that they harvested tomatoes for processing purposes (USDA National Agricultural Statistics Service 2017b).

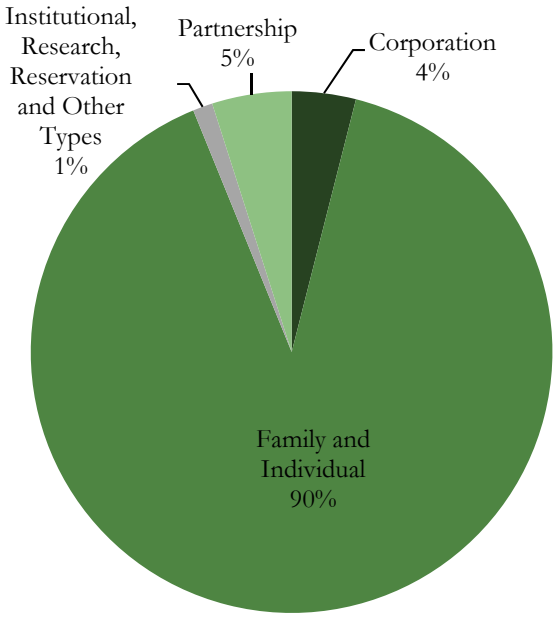
Exhibit 3.40.2 – Missouri Operations with In-the-Open Tomato Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, 90 percent of Missouri operations harvesting tomatoes from in the open were organized as family and individual farms. See Exhibit 3.40.3 for a breakdown of the business structures used by in-the-open tomato operations for tax purposes. Five percent of in-the-open tomato operations with area harvested noted that they were organized as partnerships, and 4 percent were structured as corporations. Relatively few were institutional, research, reservation or other types of farms (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.40.3 – Share of Missouri In-the-Open Tomato Operations by Organizational Structure, 2012

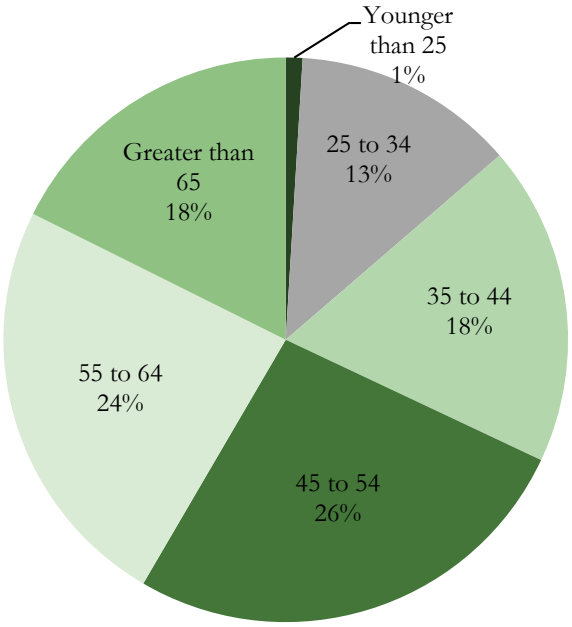


Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, principal operators of Missouri in-the-open tomato operations were more likely to name farming as their primary occupation relative to naming something else. Nearly six in 10 principal operators shared that farming was their primary occupation. Additionally, more than half — 53.5 percent — indicated that they had been on their present operations for 11 years or more. About one in three principal operators had spent less than six years on their present operations (USDA National Agricultural Statistics Service 2017b).

Like for many other specialty crop farm principal operators, principal operators of Missouri in-the-open tomato operations tended to skew older. See Exhibit 3.40.4. Forty-two percent of the principal operators in 2012 were at least 55 years old, and 44 percent were between 35 years old and 54 years old. In contrast, just 14 percent of the principal operators of Missouri in-the-open tomato farms were younger than 35 years old (USDA National Agricultural Statistics Service 2017b).

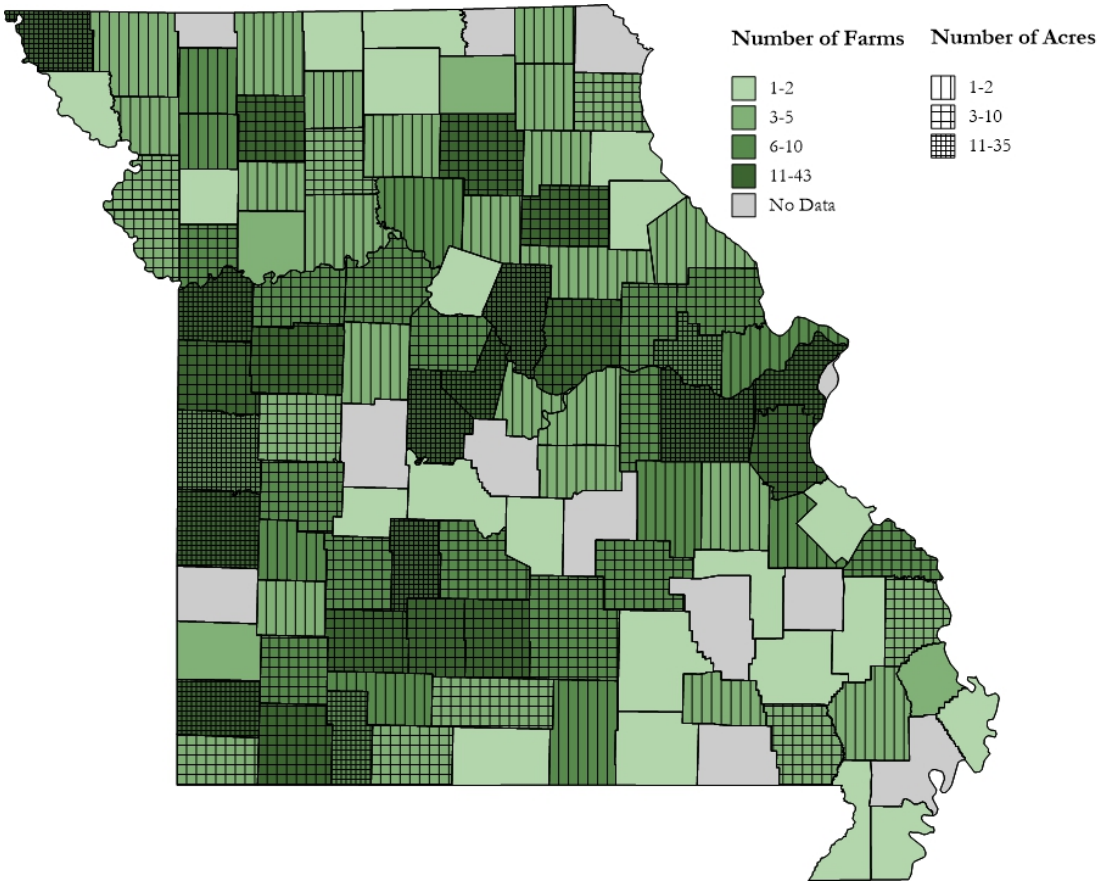
Exhibit 3.40.4 – Age Distribution of Missouri In-the-Open Tomato Operation Principal Operators, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

By count of farms, Missouri's in-the-open tomato industry was most significant in Vernon County, 43 farms; Boone County, 34 farms; Dallas County, 26 farms; Jackson County, 22 farms; and Moniteau County, 21 farms during 2012. Note that these are operations that had harvested tomato acreage. Exhibit 3.40.5 shades Missouri counties based on their number of in-the-open tomato operations with area harvested and in-the-open tomato harvested acreage in 2012. Harvested acreage totals were highest in St. Louis County, 35 acres; Vernon County, 27 acres; Boone County, 17 acres; and Franklin County, 17 acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.40.5 – Missouri Harvested In-the-Open Tomato Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Missouri producers have also raised tomatoes under protection. Exhibit 3.40.6 highlights the change in several metrics related to tomato production under protection between 2007 and 2014. For operations with area in production, square footage in production and dollar sales, values were relatively variable during the observed period. Production wasn't consistently reported to be available for comparison. In 2014, 55 operations in Missouri indicated that they had area in production for raising tomatoes under protection. During that year, the area under protection exceeded 610,000 square feet, production totaled 10,757 hundredweight, and sales surpassed $1.5 million (USDA National Agricultural Statistics Service 2017b).

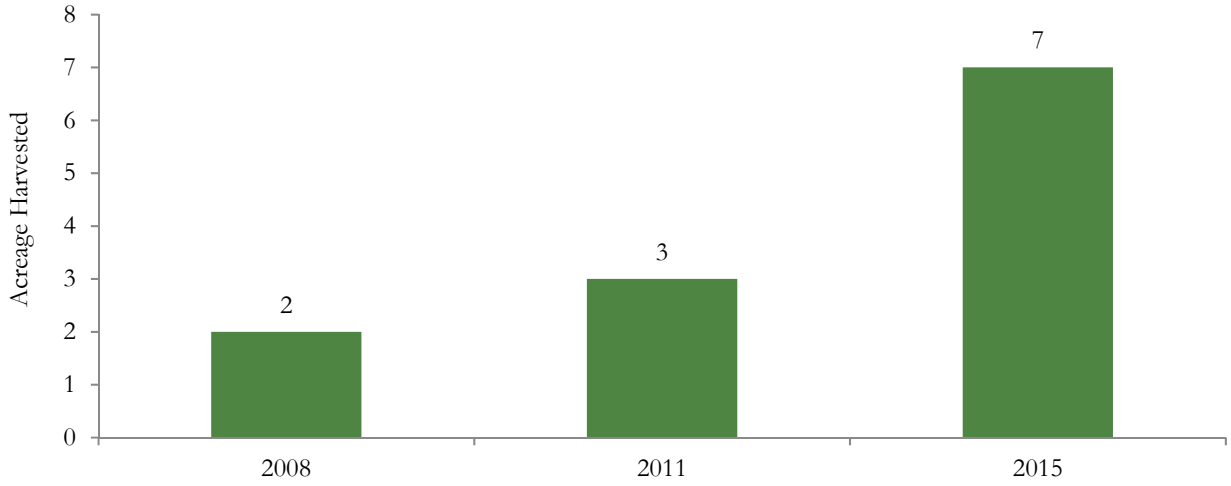
Exhibit 3.40.6 – Missouri Tomato Production Under Protection, 2007 to 2014

	2007	2009	2012	2014
Operations with area in production	126	42	273	55
Square footage in production	402,971	386,529	1,339,178	610,582
Production in cwt.*		(D)		10,757
Dollar sales	$2,769,558	$1,009,635	$5,209,309	$1,517,501

* Production data were withheld in 2009 to protect data for individual operations. Production values weren't released in 2007 and 2012.
Source: USDA, National Agricultural Statistics Service (2017b)

Missouri has produced both USDA certified organic and exempt organic tomatoes. Exhibit 3.40.7 limits the analysis to USDA certified organic acreage harvested for tomatoes grown in the open. Harvested acreage increased from two acres in 2008 to seven acres in 2015. Of the seven acres harvested in 2015, all were harvested for the fresh market. Exempt acreage was reported for just 2008. At the time, seven acres of exempt organic tomatoes were harvested. Thus, three-fourths of Missouri's 2008 harvested organic tomato in-the-open acreage was exempt organic acreage (USDA National Agricultural Statistics Service 2017b).

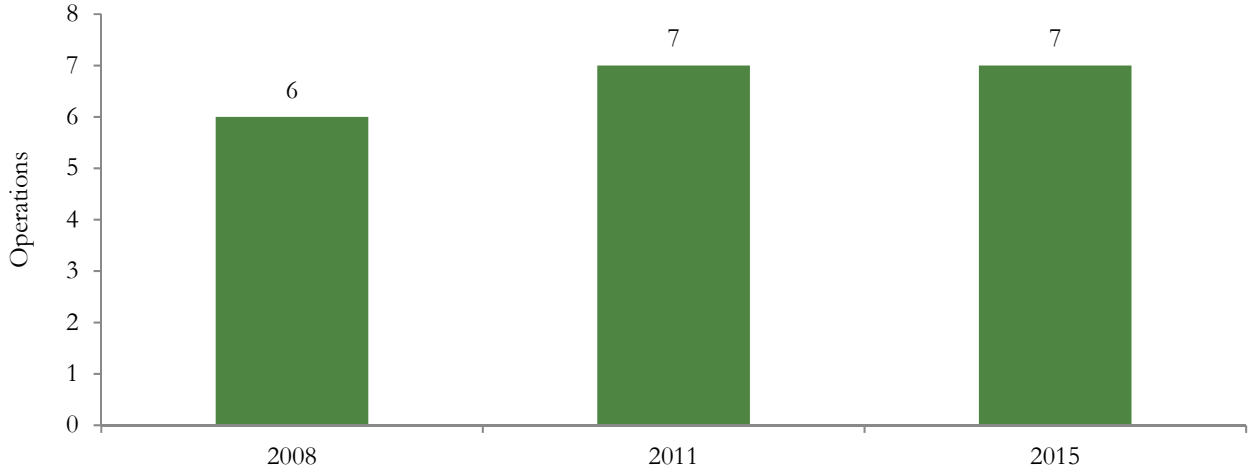
Exhibit 3.40.7 – Missouri In-the-Open, USDA Certified Organic Tomato Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Operations harvesting USDA certified organic tomatoes maintained a steady count in recent years; see Exhibit 3.40.8. Seven operations harvested certified organic tomatoes from in the open during 2015, and all harvested product for the fresh market. Fresh-market certified organic production totaled 310 hundredweight in 2015 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.40.8 – Missouri Operations with Certified Organic, In-the-Open Tomato Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Some Missouri growers have also produced organic tomatoes under protection. Exhibit 3.40.9 summarizes several metrics for Missouri organic tomatoes grown under protection for the fresh market in 2014. Of the 14 operations harvesting organic tomato area under protection in 2014, half harvested certified organic area, and half harvested exempt organic area. A majority of the organic tomato production under protection resulted from exempt organic tomatoes; however, a majority of the sales originated from certified organic tomatoes. This suggests a steep premium for certified organic tomatoes grown under protection. Harvested square footage under protection for organic tomatoes totaled nearly 110,000 square feet (USDA National Agricultural Statistics Service 2017b).

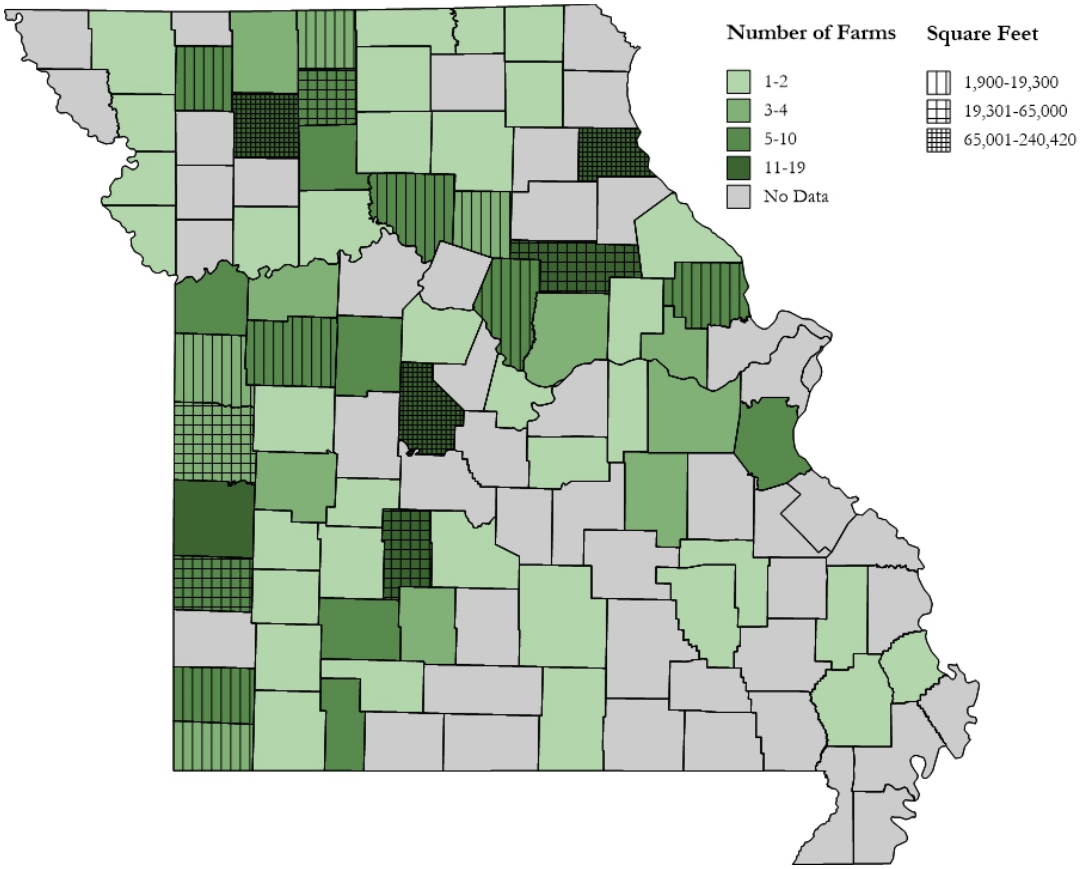
Exhibit 3.40.9 – Summary of Missouri Organic Tomatoes Grown Under Protection for the Fresh Market, 2014

	Square Feet Harvested	Operations with Area Harvested	Cwt. Produced	Dollar Sales
Certified Organic*	(D)	7	171	$50,710
Exempt Organic*	(D)	7	949	$8,000
Total	109,440	14	1,120	$58,710

* Data for certified organic and exempt organic square footage harvested were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

By county, Exhibit 3.40.10 shares the concentration of Missouri tomato operations that reported producing tomatoes grown under protection in 2012. Counties with the greatest number of operations with production area under protection were Vernon County, 19 farms; Daviess County, 18 farms; Morgan County, 15 farms; and Moniteau County, 13 farms. Counties with the most tomato production area under protection were Moniteau County, 240,420 square feet; Daviess County, 121,784 square feet; Morgan County, 80,441 square feet; and Dallas County, 64,764 square feet (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.40.10 – Missouri Tomatoes Grown Under Protection Operations and Production Area by County, 2012

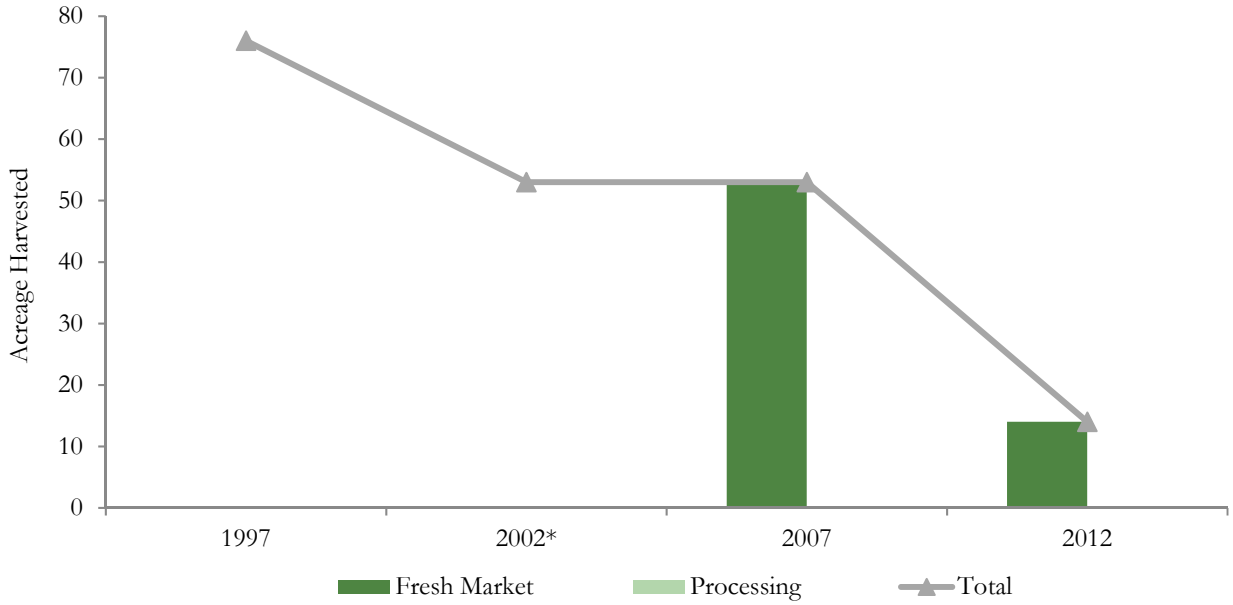


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.41 Turnip

Turnip harvested acreage slid significantly in recent years. Operators harvested just 14 acres in 2012, whereas harvested acreage in 1997 totaled 76 acres. Exhibit 3.41.1 illustrates the change in Missouri turnip harvested acreage from 1997 to 2012. Product from all acreage harvested in 2007 and 2012 was directed to the fresh market. Some turnip acreage was used for processing in 2002; however, the acreage wasn't reported in order to protect data for individual farms (USDA National Agricultural Statistics Service 2017b).

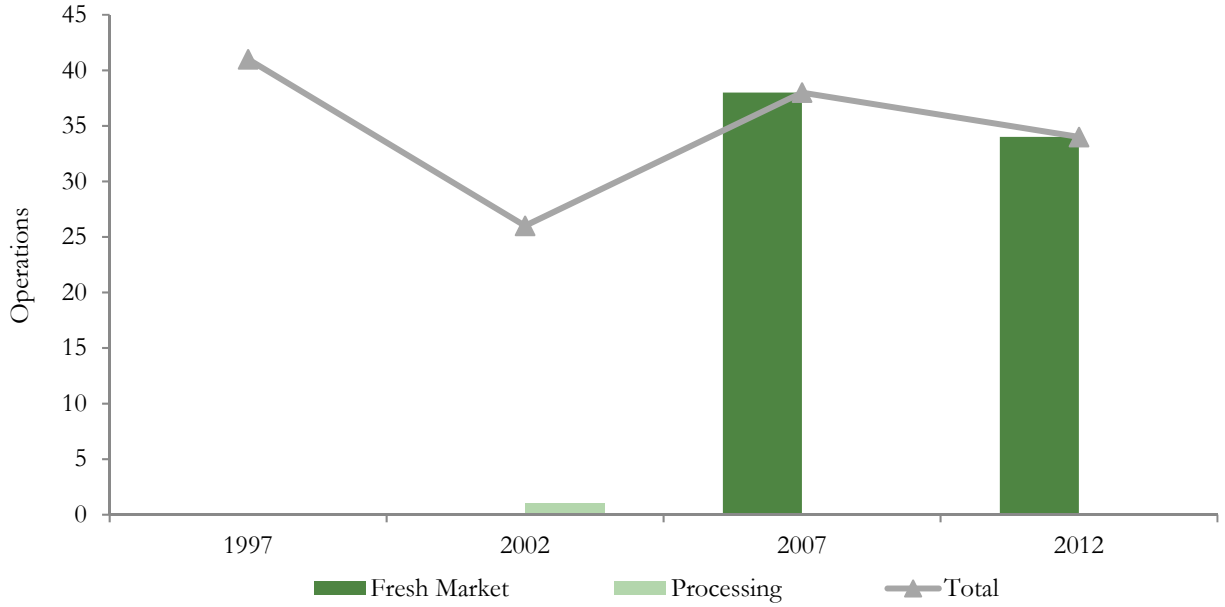
Exhibit 3.41.1 – Missouri Turnip Acreage Harvested, 1997 to 2012



* Processing acreage weren't reported in 2002 to avoid disclosing data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

Although turnip harvested acreage dropped substantially during the observed period, operations engaged in turnip production didn't decline to the same extent. Exhibit 3.41.2 charts the number of Missouri operations harvesting turnips from 1997 to 2012. Forty-one operations harvested turnip acreage in 1997. By 2012, the operation count had dropped to 34 operations, and all harvested product for the fresh market (USDA National Agricultural Statistics Service 2017b).

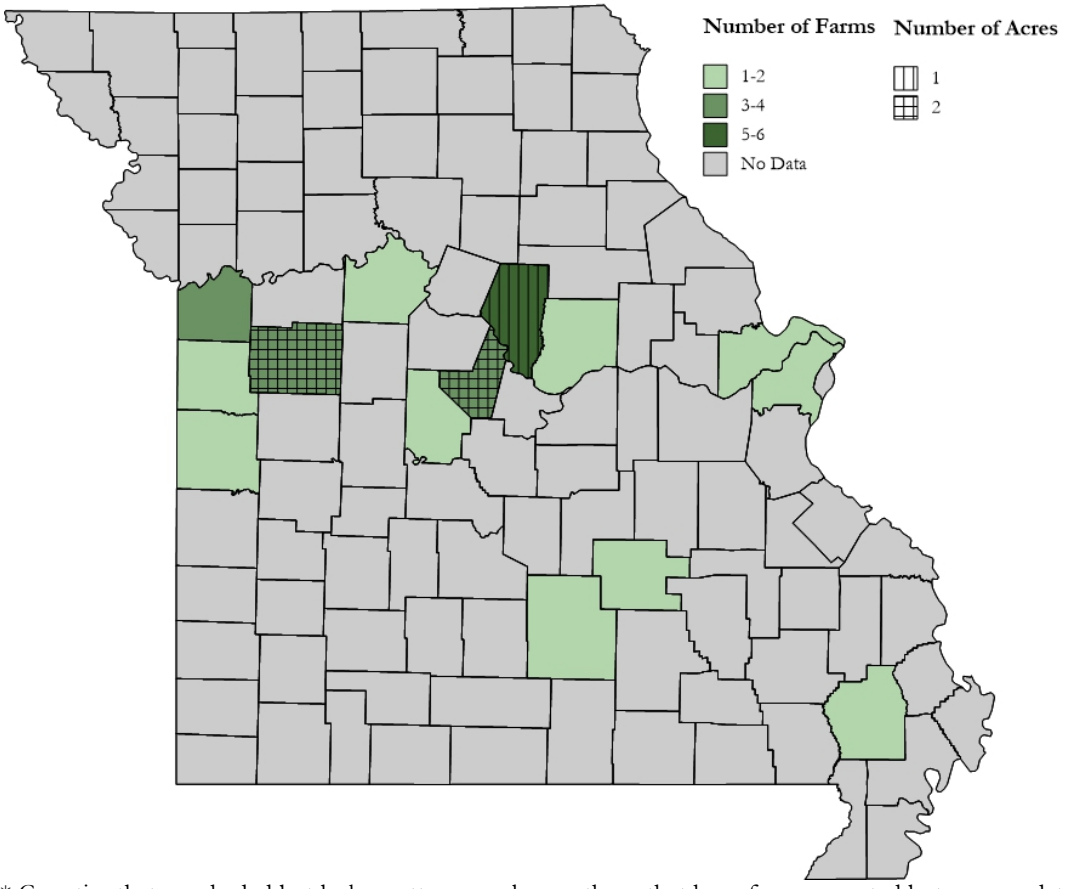
Exhibit 3.41.2 – Missouri Operations with Turnip Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Boone County led in number of turnip operations with harvested area during 2012. Six turnip farms harvested turnip acreage at the time. Other counties that recorded having the most turnip operations with area harvested were Johnson County, four farms, and Moniteau County, four farms. Exhibit 3.41.3 shares the distribution of turnip farms with harvested area and harvested acreage by Missouri county in 2012. For many counties, turnip harvested acreage data weren't reported. Counties with published acreage data were Johnson County, two acres; Moniteau County, two acres; and Boone County, one acre (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.41.3 – Missouri Harvested Turnip Acreage and Operations by County, 2012**



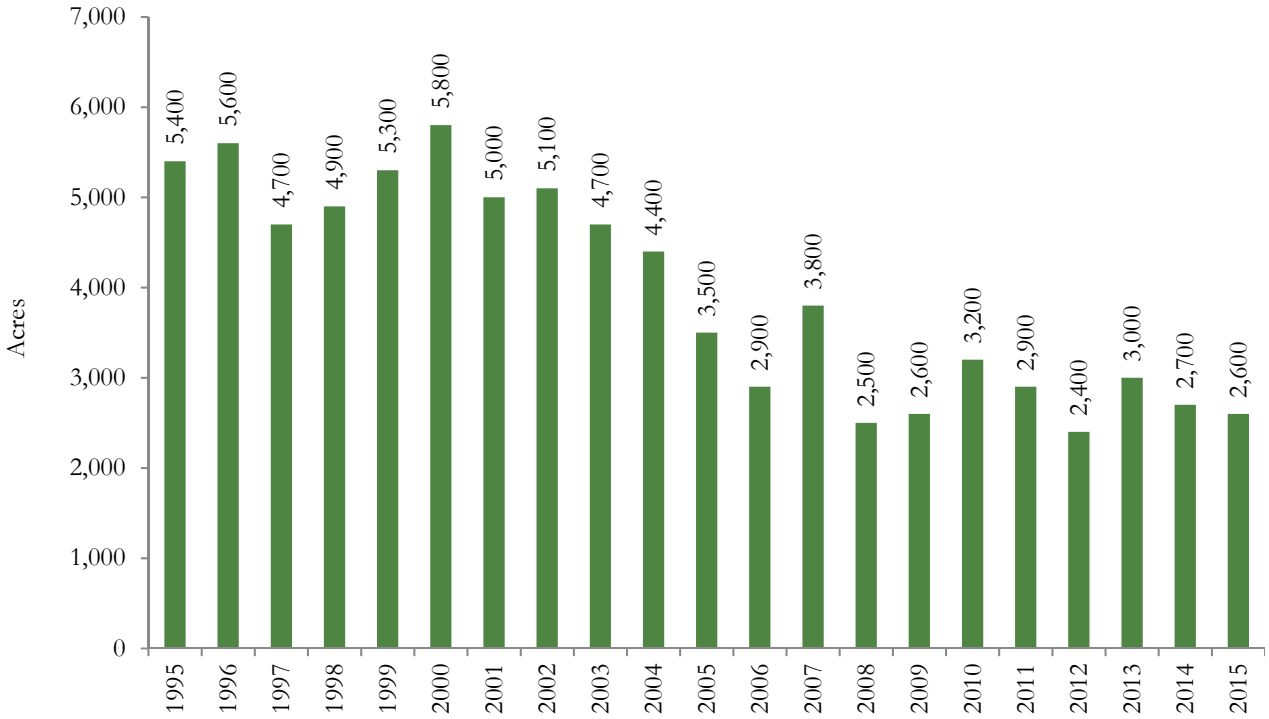
* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

3.42 Watermelon

Watermelon has been a relatively significant portion of Missouri's specialty crop industry. Exhibit 3.42.1 illustrates harvested watermelon acreage in the state from 1995 to 2015. Overall, harvested acreage declined during the past two decades. Between the mid-1990s and early 2000s, acreage harvested experienced volatility, but it frequently totaled at least 5,000 acres. By 2015, harvested watermelon acreage in Missouri had dropped to 2,600 acres. Note that data from 1998 to 2015 reflected data for the fresh market. The data source for 1995 to 1997 harvested acreage didn't

stipulate whether the harvested acreage totals were specific to the fresh market (USDA Economic Research Service 2013 and USDA National Agricultural Statistics Service 2017).

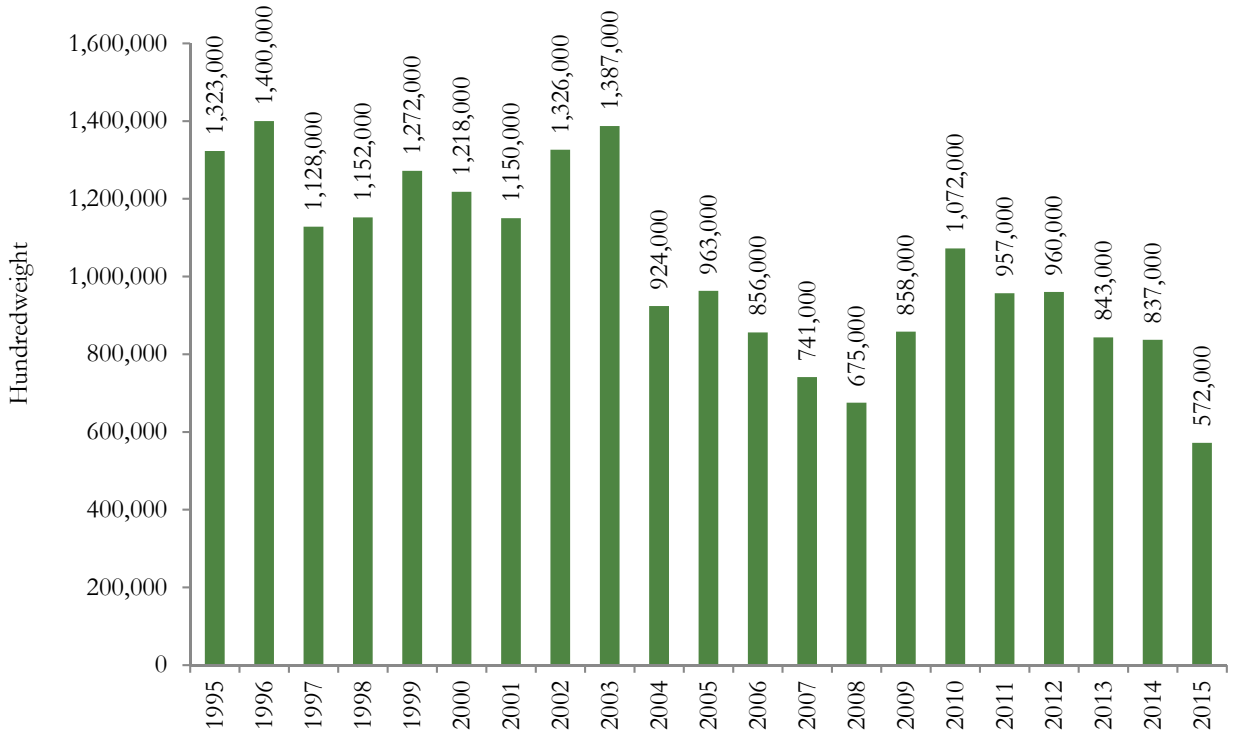
Exhibit 3.42.1 – Missouri Watermelon Acreage Harvested, 1995 to 2015



Source: USDA, Economic Research Service (2013) and USDA, National Agricultural Statistics Service (2017b)

In Missouri, watermelon production has followed a trend similar to the one for watermelon harvested acreage in the state. In 2015, production recorded 572,000 hundredweight. Like for the previous exhibit, data sets used to create the watermelon production visual in Exhibit 3.42.2 were specified as fresh-market data from 2013 to 2015. Other years are thought to summarize the fresh market, but the source was not specific (USDA Economic Research Service 2013 and USDA National Agricultural Statistics Service 2017).

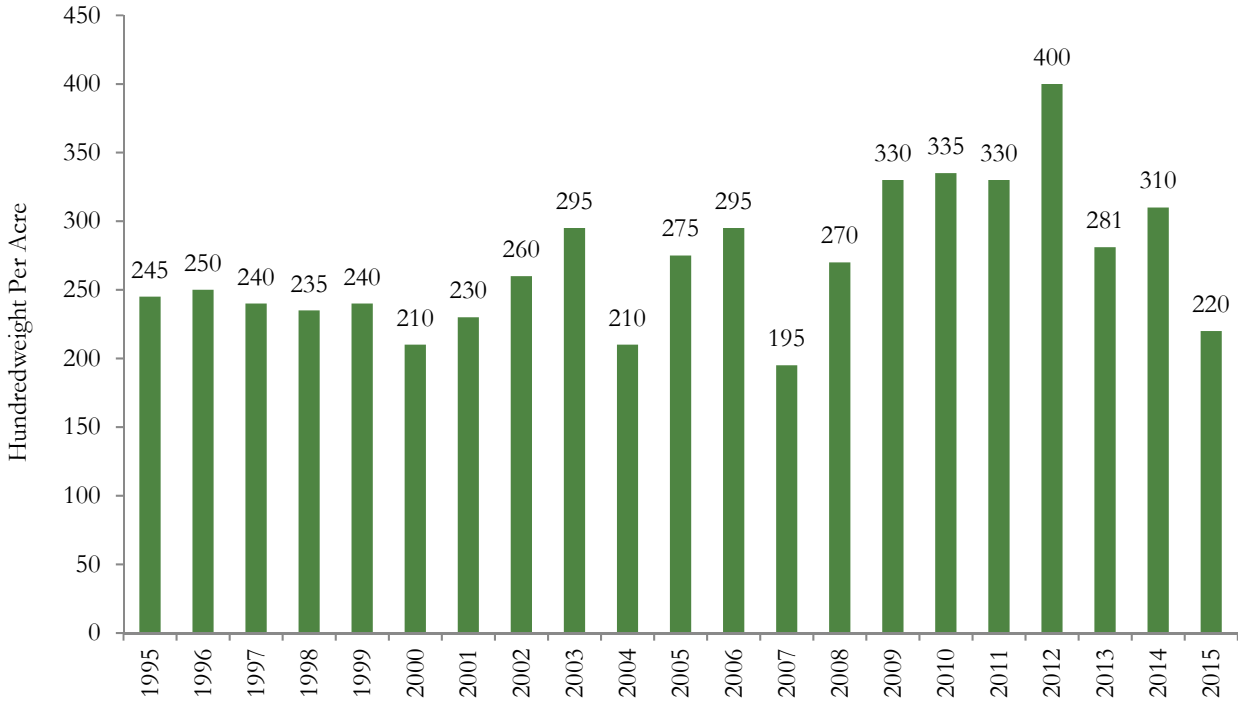
Exhibit 3.42.2 – Missouri Watermelon Production, 1995 to 2015



Source: USDA, Economic Research Service (2013) and USDA, National Agricultural Statistics Service (2017b)

Between 1995 and 2015, Missouri watermelon producers achieved an overall upward trend in yields per acre. Exhibit 3.42.3 illustrates the trend. However, on an annual basis, yields have had some variability. They reached their highest level in 2012. At the time, Missouri watermelon yields reached 400 hundredweight per acre. Yields in 2015 declined to one of the lowest levels in the two-decade observation period. They averaged 220 hundredweight per acre. Sources supplying these data didn't consistently indicate whether yields were for watermelons harvested for the fresh market, but it's assumed that these data are specific to fresh-market watermelon (USDA Economic Research Service 2013 and USDA National Agricultural Statistics Service 2017).

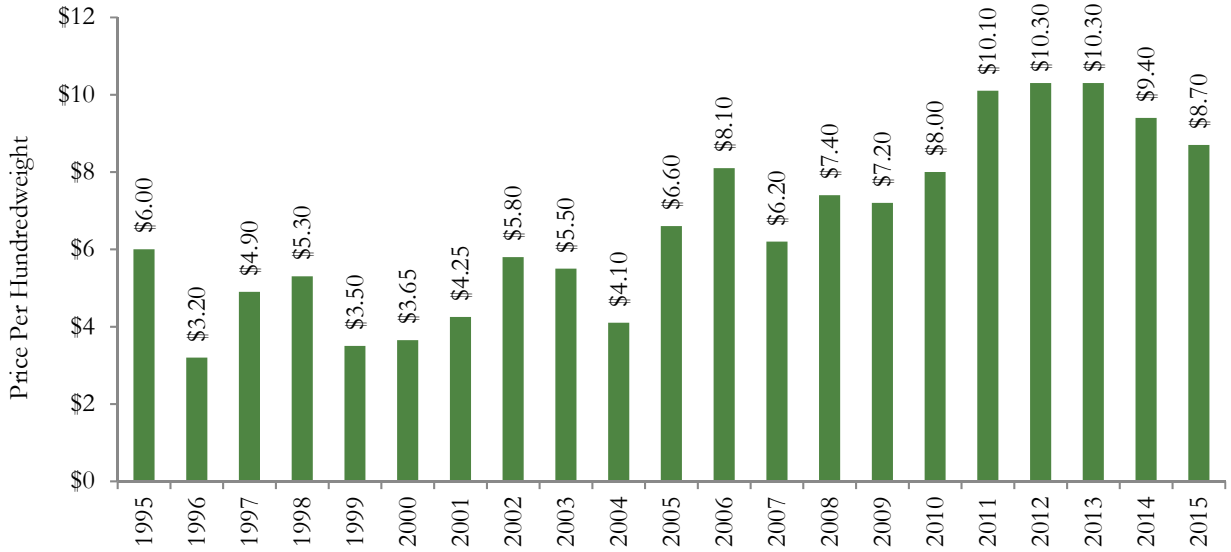
Exhibit 3.42.3 – Missouri Watermelon Yields, 1995 to 2015



Source: USDA, Economic Research Service (2013) and USDA, National Agricultural Statistics Service (2017b)

Prices received on average for Missouri watermelons have escalated in recent years. The growth was particularly strong from the mid-2000s to the early 2010s. See Exhibit 3.42.4 for average Missouri watermelon prices. Since the early 2010s, prices have receded somewhat. They averaged $8.70 per hundredweight in 2015. Note that average watermelon prices are assumed to be those for the fresh market, but some data sources were not specific (USDA Economic Research Service 2013 and USDA National Agricultural Statistics Service 2017)

Exhibit 3.42.4 – Average Prices Received for Missouri Watermelons, 1995 to 2015



Source: USDA, Economic Research Service (2013) and USDA, National Agricultural Statistics Service (2017b)

Between 2008 and 2016, watermelon cash receipts recorded in Missouri followed a bell-shaped pattern. See Exhibit 3.42.5. The cash receipts value peaked at nearly $9.89 million during 2012. In 2016, the state's watermelon cash receipts totaled more than $4.23 million, which was the lowest cash receipts value reported during the observed period (USDA Economic Research Service 2017).

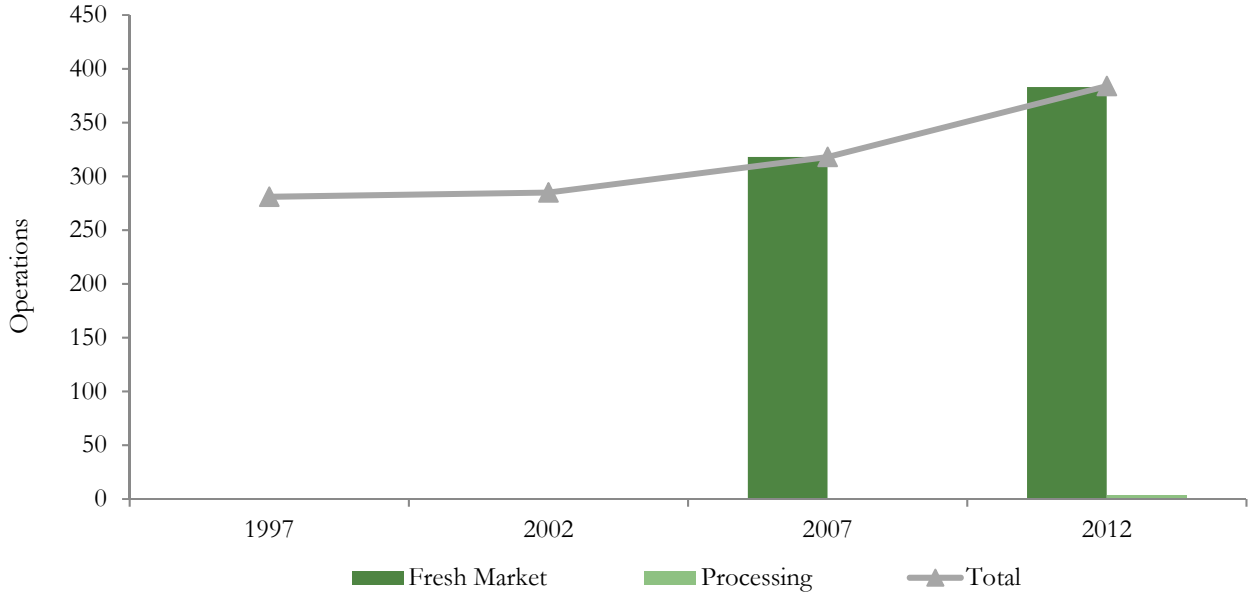
In 2016, watermelon cash receipts represented a small share of all Missouri commodity cash receipts, and Missouri's watermelon output contributed 0.7 percent to all U.S. watermelon cash receipts (USDA Economic Research Service 2017).

Exhibit 3.42.5 – Missouri Watermelon Cash Receipts, 2008 to 2016

Source: USDA, Economic Research Service (2017)

The number of Missouri operations growing watermelons increased somewhat steadily from 1997 to 2012. Exhibit 3.42.6 illustrates the trend. Based on 2012 data, the state had 384 operations harvesting watermelon acreage in that year. Historically, most Missouri watermelon operations have grown product for the fresh market; however, a few have recently begun serving the processing market. In 2012, 383 operations harvested watermelon for fresh use, and three operations harvested acreage meant for processing uses (USDA National Agricultural Statistics Service 2017b).

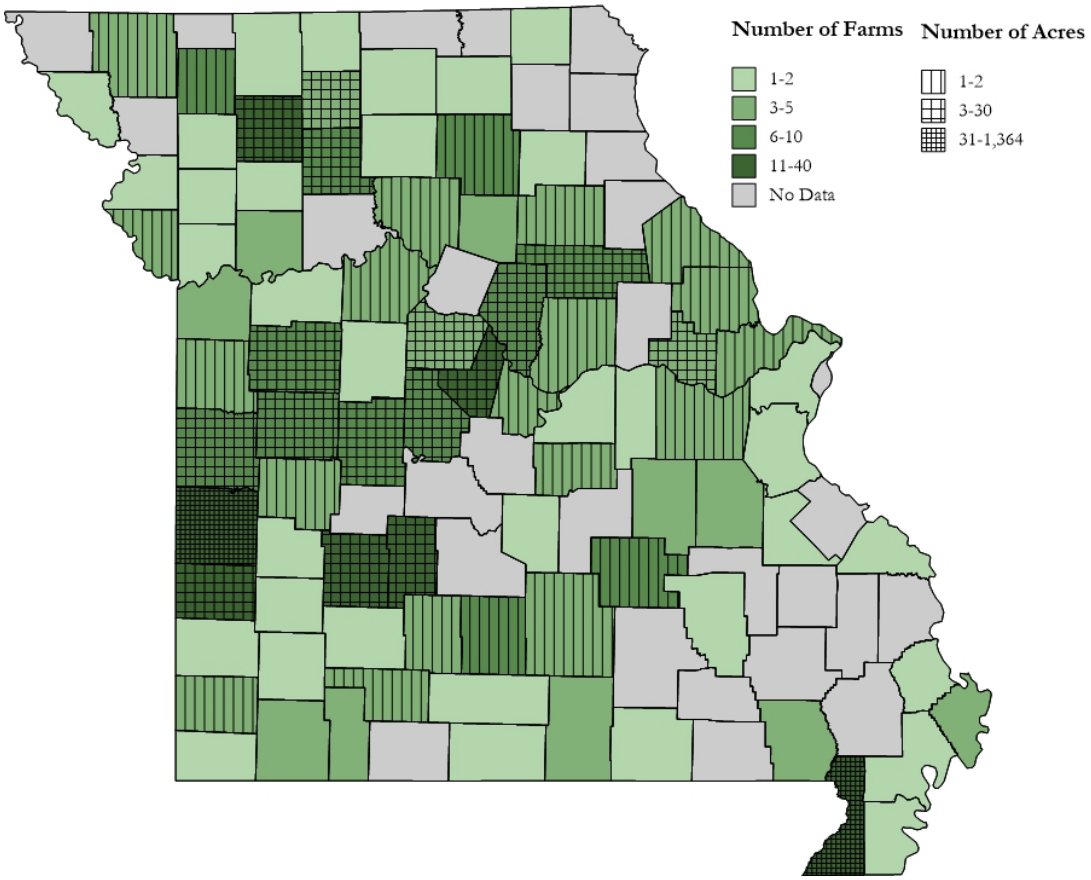
Exhibit 3.42.6 – Missouri Operations with Watermelon Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 3.42.7 highlights Missouri counties according to their total watermelon operations with harvested area and harvested acreage. Counties reporting the most watermelon farms with harvested area in 2012 were Vernon County, 40 farms; Barton County, 14 farms; and Dallas County, 14 farms. By far, watermelon harvested acreage in 2012 was highest in Dunklin County, which had nearly half of the state's watermelon acreage concentrated in it. Other counties with relatively significant harvested watermelon acreage were Vernon County, 613 acres; Henry County, 26 acres; and Moniteau County, 26 acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 3.42.7 – Missouri Harvested Watermelon Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Organic watermelon data for Missouri are limited to 2008 and 2014. Exhibit 3.42.8 reports acreage, operations, production and sales for operations raising USDA certified organic and exempt organic watermelon. The table indicates that organic watermelon activity constricted between 2008 and 2014. Four operations in 2014 produced 57 hundredweight of USDA certified and exempt organic watermelon. The value of that production totaled $420. In contrast, five operations during 2008 harvested 84 hundredweight of certified and exempt organic watermelons, and dollar sales totaled $833 (USDA National Agricultural Statistics Service 2017b).

Exhibit 3.42.8 – Summary of Missouri Certified and Exempt Organic Watermelon Industry, 2008 and 2014

	Acres Harvested	Operations with Area Harvested	Cwt. Produced	Dollar Sales
2008	1	5	84	$833
2014	Not released	4	57	$420

Source: USDA, National Agricultural Statistics Service (2017b)

4. Culinary Herbs and Spices

Culinary herbs and spices included in the specialty crop definition are those in Exhibit 4.1. The following sections share both an overall summary of Missouri's fresh-cut herb production and industry. Additionally, when data are available for specific culinary herbs and spices, data for those products are included. The bold names in the table indicate that a discussion specific to those herbs is included in the report.

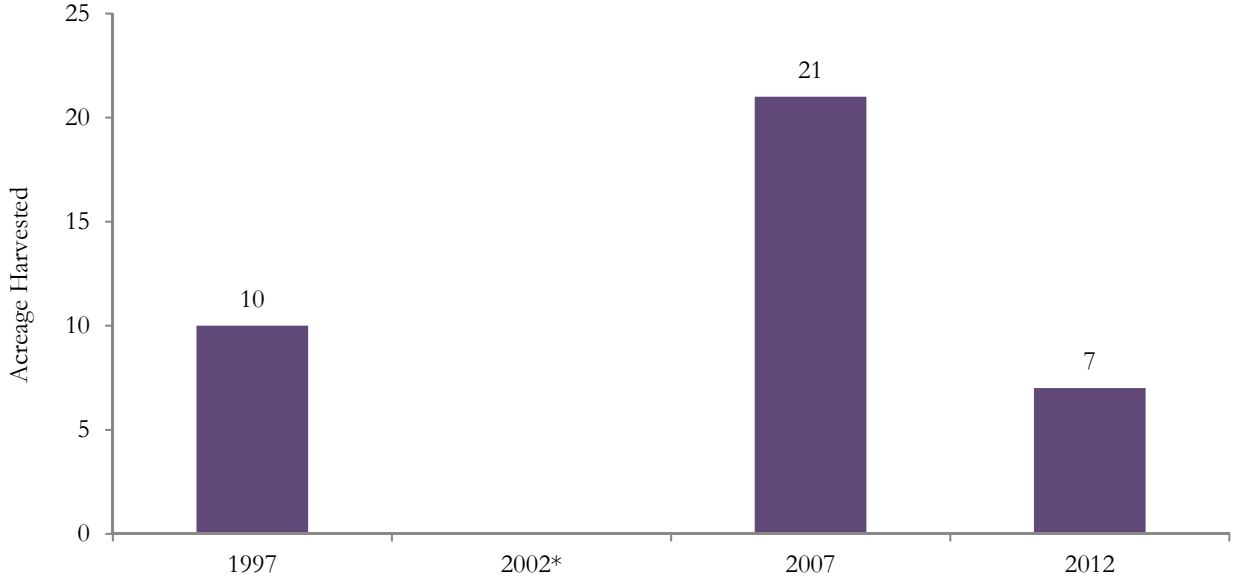
Exhibit 4.1 – Culinary Herbs and Spices Included in Specialty Crop Definition

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**	Pepper	Rocket (arugula)
Rosemary	Rue	Saffron	Sage
Savory	Tarragon	Thyme	Turmeric
Vanilla	Wasabi	**Water cress**	

4.1 Fresh-Cut Herbs

Missouri fresh-cut herb harvested acreage has had volatility during recent years. Exhibit 4.1.1 presents the harvested acreage totals from 1997 to 2012. Note that data were withheld in 2002. Fresh-cut herb harvested acreage peaked at 21 acres in 2007. It later dropped to seven acres in 2012. All fresh-cut herbs harvested in 2007 and 2012 were used for fresh-market purposes (USDA National Agricultural Statistics Service 2017b).

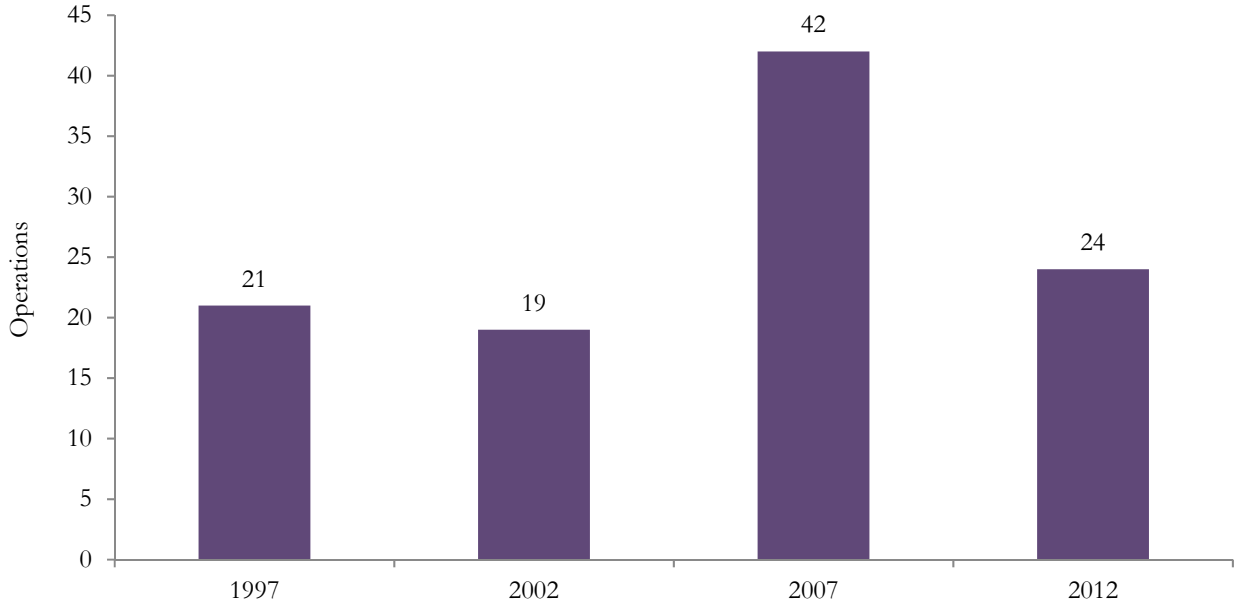
Exhibit 4.1.1 – Missouri Fresh-Cut Herbs Acreage Harvested, 1997 to 2012



* Harvested acreage weren't reported in 2002 to avoid disclosing data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

In 2012, 24 operations in Missouri harvested fresh-cut herb acreage, and all of the operations intended to serve the fresh market. Exhibit 4.1.2 tracks the number of Missouri operations harvesting fresh-cut herb acreage from 1997 to 2012. Note that the operation count was highest during 2007 — 42 operations with area harvested. At the time, all of those operations harvested fresh-cut herbs for the fresh market (USDA National Agricultural Statistics Service 2017b).

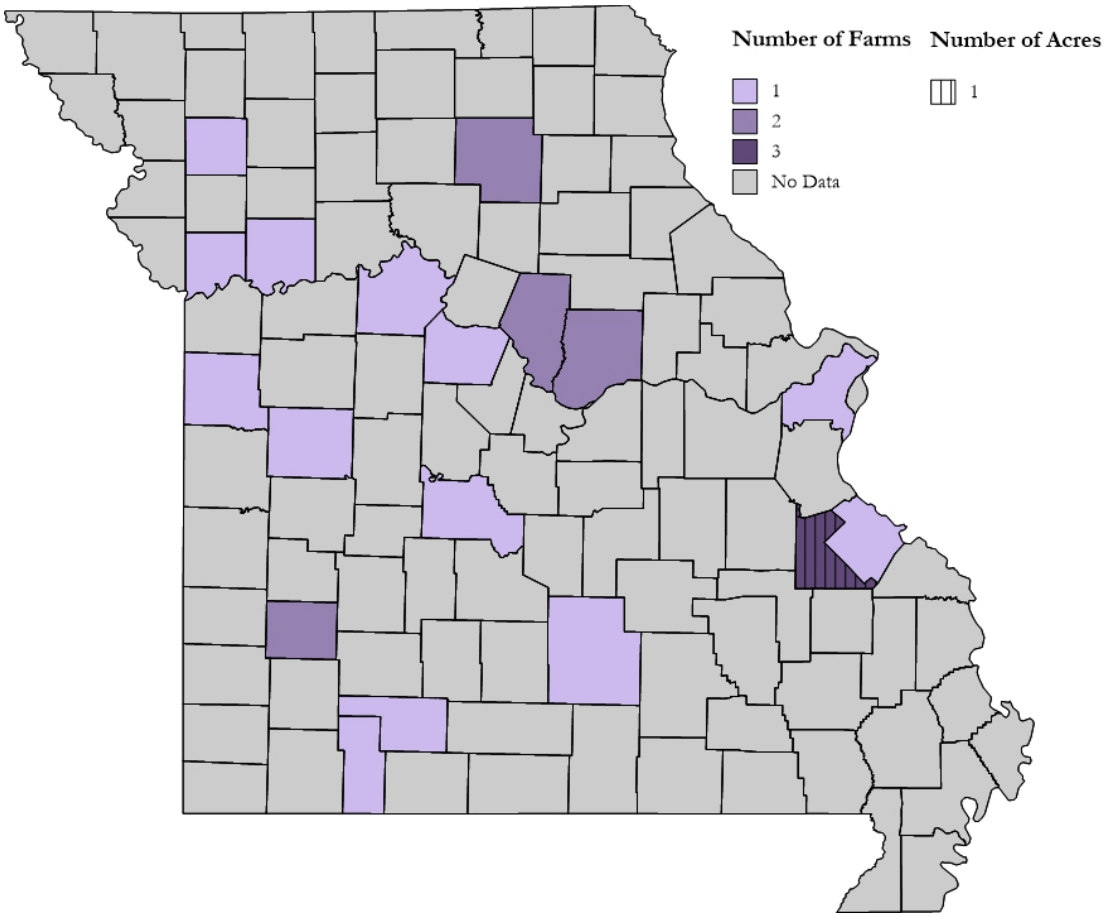
Exhibit 4.1.2 – Missouri Operations with Fresh-Cut Herb Acreage Harvested, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

By operation count, top Missouri counties for harvesting fresh-cut herb area in 2012 were St. Francois County, three farms; Boone County, two farms; Callaway County, two farms; Dade County, two farms; and Macon County, two farms. See Exhibit 4.1.3. With respect to acreage data, only St. Francois County had fresh-cut herb harvested acreage data published for 2012; it harvested one acre. Other counties with fresh-cut herb operations had the harvested acreage data withheld (USDA National Agricultural Statistics Service 2017b).

*Exhibit 4.1.3 – Missouri Harvested Fresh-Cut Herb Acreage and Operations by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

To an extent, Missouri operations have elected to raise fresh-cut herbs under protection. Exhibit 4.1.4 summarizes the state of Missouri's fresh-cut herb production under protection. The number of operations producing fresh-cut herbs under protection increased from two operations in 2009 to 10 operations in 2014. Note that comparisons for the other measures aren't possible because data for them were withheld in 2009. In 2014, however, Missouri operations dedicated 10,940 square feet under protection to fresh-cut herb production, and those operations produced 150 hundredweight of fresh-cut herbs. The dollar value of their sales exceeded $46,000 (USDA National Agricultural Statistics Service 2017b).

Exhibit 4.1.4 – Missouri Fresh-Cut Herb Production Under Protection, 2009 and 2014

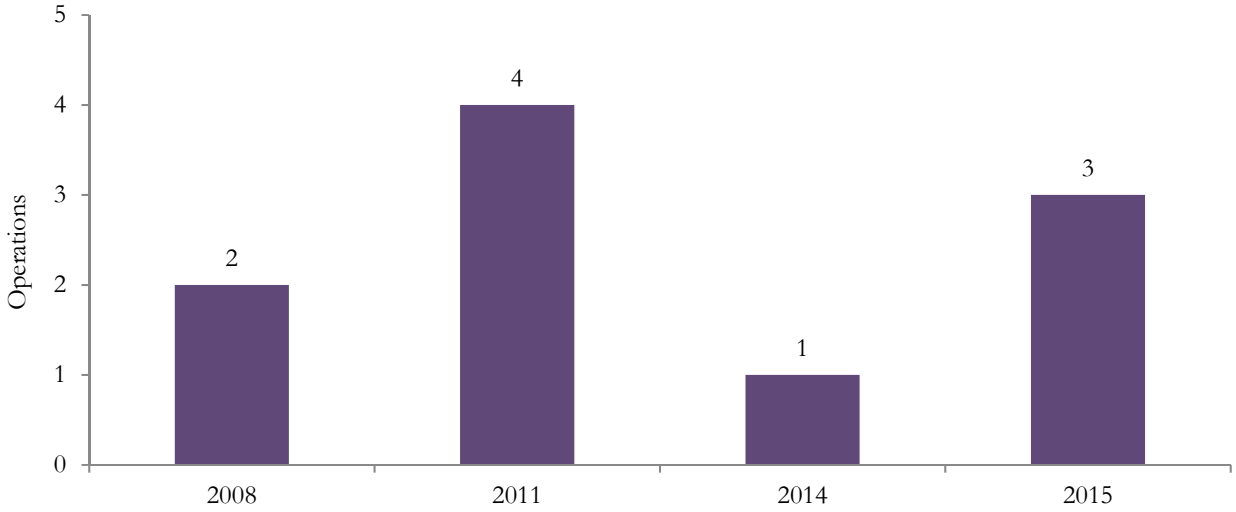
	2009	2014
Operations with area in production	2	10
Square footage in production*	(D)	10,940
Production in cwt.*	(D)	150
Dollar sales*	(D)	$46,343

* In 2009, data for square footage, production and dollar sales were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

A portion of Missouri's fresh-cut herb industry has transitioned to organic production. Note that data for organic fresh-cut herbs were collected in years that were different from the U.S. Census of Agriculture years, and the organic data are reported independently here. Exhibit 4.1.5 shares the number of Missouri operations harvesting USDA certified organic herbs from 2008 to 2015. As illustrated, the operation count fluctuated somewhat during the observed period. The number of operations harvesting USDA certified organic fresh-cut herb acreage was highest at four operations in 2011 and lowest at one operation in 2014. Three operations harvested certified organic fresh-cut herb acreage in 2015 (USDA National Agricultural Statistics Service 2017b).

In addition to certified organic production, some operations have engaged in producing exempt organic fresh-cut herbs. See the Methodology section for a definition of certified and exempt organic. For example, during 2014, three operations in total reported certified organic and exempt organic fresh-cut herb harvested area. Of those, two were exempt organic producers, and one was a certified organic producer. In contrast, 10 operations reported harvesting certified or exempt organic fresh-cut herbs during 2008. Two operations harvested certified organic fresh-cut herbs, and eight harvested exempt organic fresh-cut herbs (USDA National Agricultural Statistics Service 2017b).

Exhibit 4.1.5 – Missouri Operations with Certified Organic Fresh-Cut Herb Acreage Harvested, 2008 to 2015



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 4.1.6 further summarizes the USDA certified organic fresh-cut herb industry in Missouri. It includes data points from both 2011 and 2015. Harvested acreage increased by roughly 200 acres between 2011 and 2015. Total harvested acreage registered 440 acres in 2015. Although harvested

acreage increased between the two years, total production declined by more than half. In pounds, certified organic fresh-cut herb production exceeded 1.44 million pounds in 2011. It dropped to roughly 600,000 pounds in 2015. The reduction may be attributed to the operation count declining from four operations to three operations from 2011 to 2015. As certified organic fresh-cut herb production constricted, the value of sales dropped, too. In 2015, the sales value totaled roughly $1.6 million relative to $5.95 million in 2011 (USDA National Agricultural Statistics Service 2017b).

Exhibit 4.1.6 – Summary of Missouri Certified Organic Fresh-Cut Herb Industry, 2011 and 2015

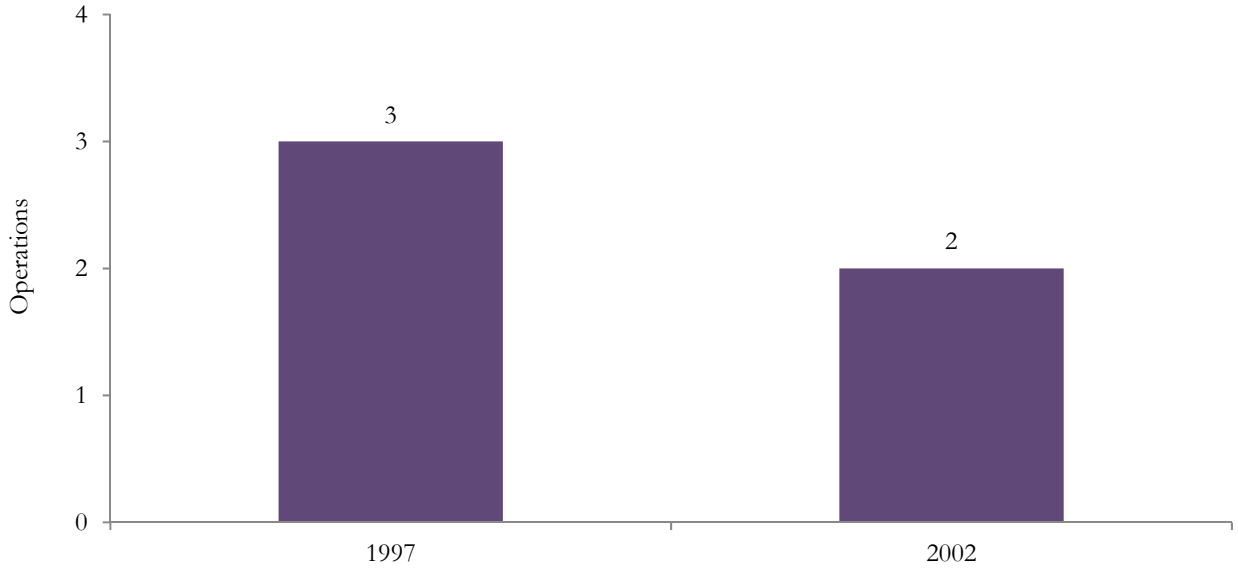
	Acres Harvested	Operations	Pounds Produced	Dollar Sales
2011	238	4	1,444,875	$5,952,179
2015	440	3	600,100	$1,600,300

Source: USDA, National Agricultural Statistics Service (2017b)

4.2 Dry Herbs

Historically, Missouri has had a small presence in dry herb production. Exhibit 4.2.1 illustrates that three Missouri operations reported that they harvested dry herb acreage in 1997, and by 2002, the operation count had dropped to two farms. In more recent years, no farms were reported to harvest dry herb acreage in Missouri (USDA National Agricultural Statistics Service 2017b).

Exhibit 4.2.1 – Missouri Operations with Dry Herb Acreage Harvested, 1997 and 2002



Source: USDA, National Agricultural Statistics Service (2017b)

To a limited extent, Missouri has also had participation in organic dry herb production. In terms of certified organic dry herb production, Missouri had one operation report certified organic acreage harvested in 2011, 2014 and 2015. Other farms have chosen exempt organic production instead of certified organic production. In 2014, two operations in Missouri reported harvesting exempt organic dry herb acreage compared with the one operation that reported harvesting certified organic dry herb acreage (USDA National Agricultural Statistics Service 2017b).

Other data points describing Missouri's organic dry herb industry are relatively scarce. However, production data were released in 2014. At the time, combined certified organic and exempt organic production totaled 21,500 pounds (USDA National Agricultural Statistics Service 2017b).

4.3 Chicory

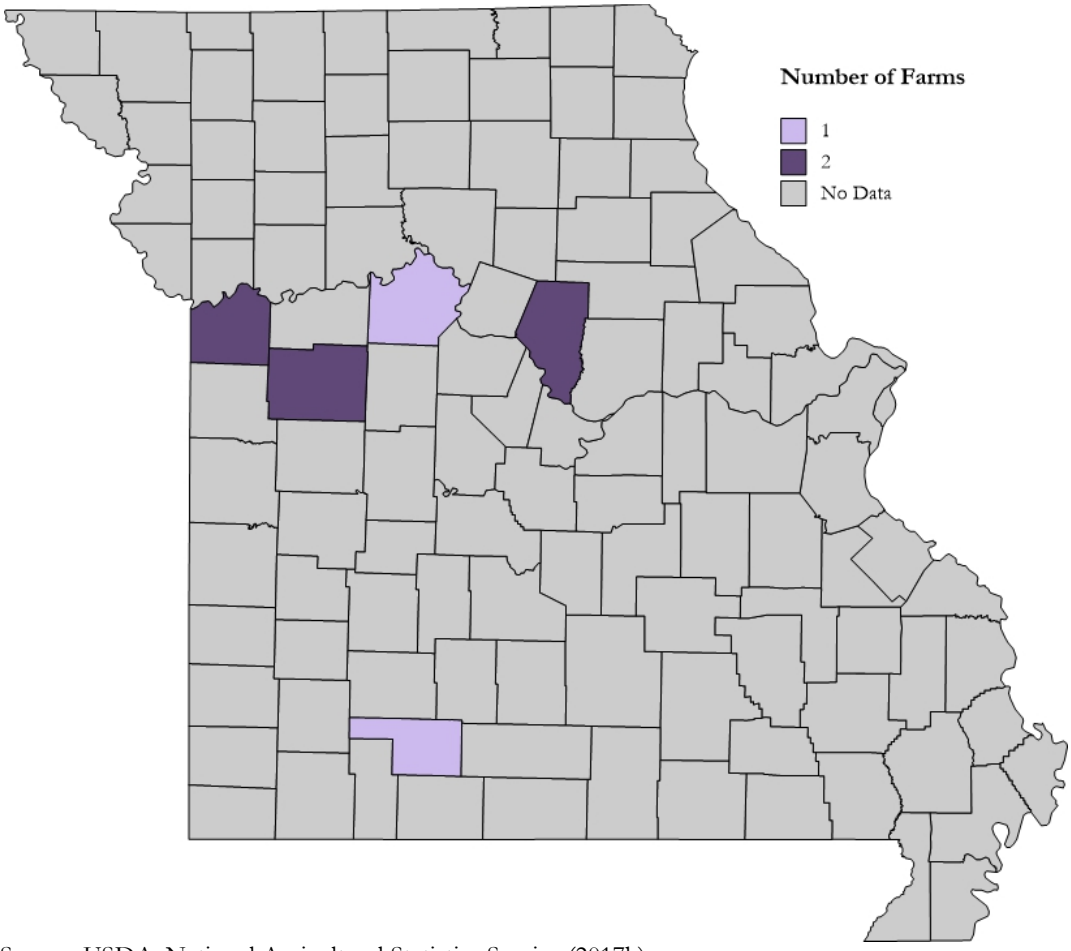
USDA reported that Missouri had a relatively small chicory industry in 2012. At the time, one operation indicated that it had harvested chicory acreage, and that operation harvested product for the fresh market. The operation was located in Iron County, Missouri. Specific acreage data weren't published in order to prevent releasing data for individual operations (USDA National Agricultural Statistics Service 2017b).

4.4 Parsley

Data for Missouri parsley production are limited to 2012. At the time, Missouri was reported to have one acre of harvested parsley, and that acreage intended to serve the fresh market. Eight operations were reported to have harvested parsley acreage, and all eight operations served the fresh market (USDA National Agricultural Statistics Service 2017b).

In 2012, parsley production in Missouri took place in just five counties. Exhibit 4.4.1 illustrates the count of parsley operations with harvested acreage by county. Boone County, two farms; Jackson County, two farms; and Johnson County, two farms, had the greatest number of parsley operations with harvested acreage in 2012 (USDA National Agricultural Statistics Service 2014b).

Exhibit 4.4.1 – Missouri Parsley Operations with Harvested Area by County, 2012



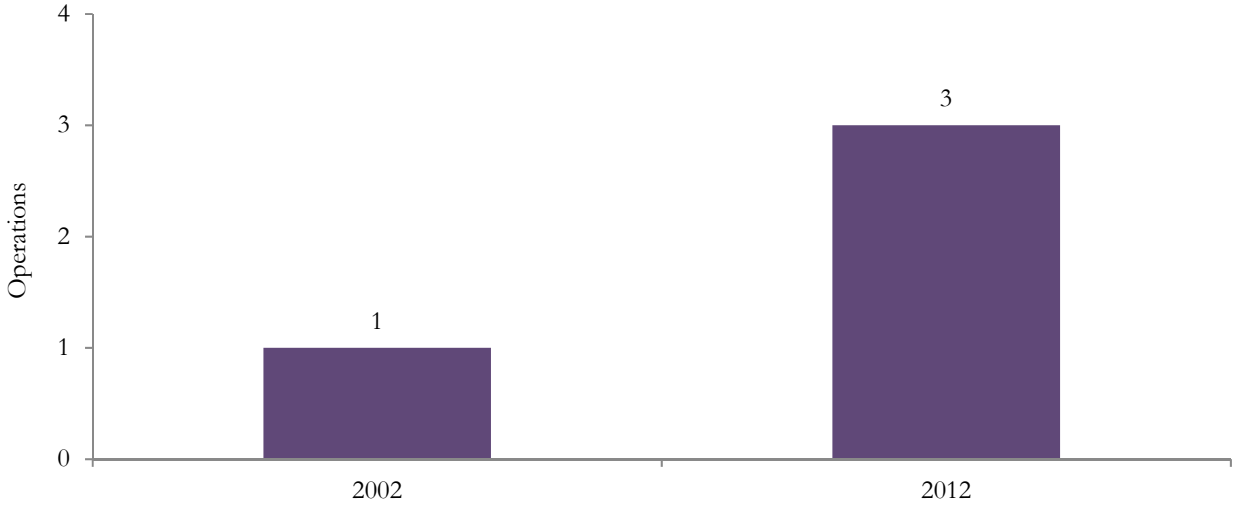
Source: USDA, National Agricultural Statistics Service (2017b)

4.5 Watercress

Like the industries for other herbs, the watercress industry in Missouri has been relatively small. Data for the state were reported in both 2002 and 2012. Harvested watercress area totaled two acres in 2012. The acreage harvested wasn't released in 2002 in order to protect data for individual operations (USDA National Agricultural Statistics Service 2017b).

In terms of operations, Exhibit 4.5.1 illustrates the number of Missouri operations harvesting watercress during 2002 and 2012. The watercress operation count increased from one enterprise in 2002 to three enterprises in 2012 (USDA National Agricultural Statistics Service 2017b).

Exhibit 4.5.1 – Missouri Operations with Watercress Acreage Harvested, 2002 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

From a county-by-county perspective, Moniteau County was reported to have two operations that harvested watercress in 2012. One operation in Clay County reported harvesting watercress acreage in 2012. These were only two counties with reported operations, and note that harvested watercress acreage data by county were withheld (USDA National Agricultural Statistics Service 2014b).

5. Medicinal Herbs

The specialty crop definition includes several crops designated as medicinal herbs. Exhibit 5.1 lists these medicinal herbs. In Missouri, medicinal herb cultivation is relatively rare. The bold type for ginseng indicates that USDA National Agricultural Statistics Service publishes data for only it.

Exhibit 5.1 – Medicinal Herbs Included in Specialty Crop Definition

Artemisia	Arum	Astragalus	Boldo
Cananga	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		

The ginseng data set for Missouri is relatively small. Operations reported harvesting ginseng in 1997 and 2002. Five operations indicated that they harvested ginseng area in 1997. By 2002, just one operation reported harvesting ginseng. To avoid releasing information for the one operation, USDA didn't disclose ginseng harvested acreage or production in 2002. Data were reported for 1997, however. At the time, Missouri was reported to harvest one acre of ginseng, and production totaled 1,035 pounds (USDA National Agricultural Statistics Service 2017b). Because ginseng is collected from the wild, operations that sell ginseng may be less likely to share production data. Sharing such information may ultimately lead to theft if the public uses that information to identify areas where the ginseng grows.

6. Horticultural Goods

Horticultural goods are varied. Those recognized by USDA are listed in Exhibit 6.1. Of these goods, honey, turfgrass, hops and maple syrup have been produced in Missouri; they're denoted in bold text within the table. No known tea leaf production occurs in the state. The following sections describe the horticultural industries with data available for Missouri.

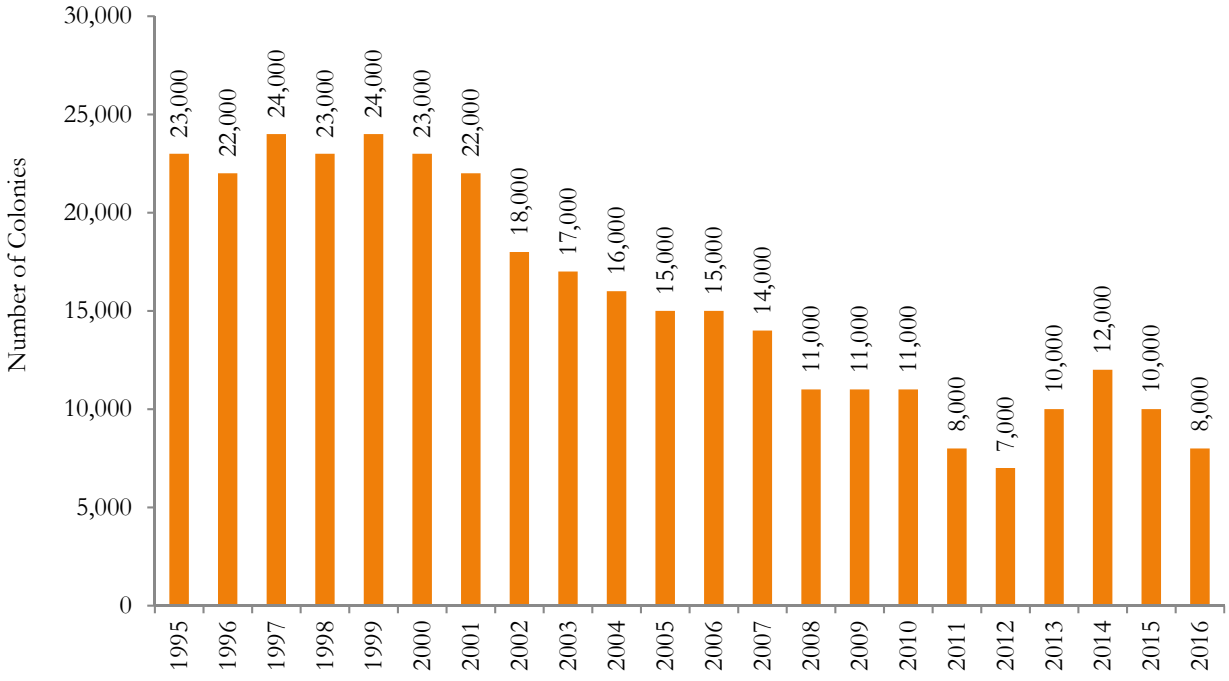
Exhibit 6.1 – Horticultural Goods Included in Specialty Crop Definition

Honey	**Hops**	**Maple syrup**	Tea leaves
Turfgrass			

6.1 Honey

Honey production varies based on the number of colonies maintained in the state. During the past 20 years, colony inventory declined dramatically. Exhibit 6.1.1 illustrates the trend in honey bee colony inventory from 1995 to 2016. During 2016, the state's honey producers had just one-third the colonies that they had in 1995. In total, 8,000 colonies were reported in 2016 relative to the 23,000 colonies existing in 1995 (USDA National Agricultural Statistics Service 2017b).

Exhibit 6.1.1 – Missouri Honey Bee Colony Inventory, 1995 to 2016

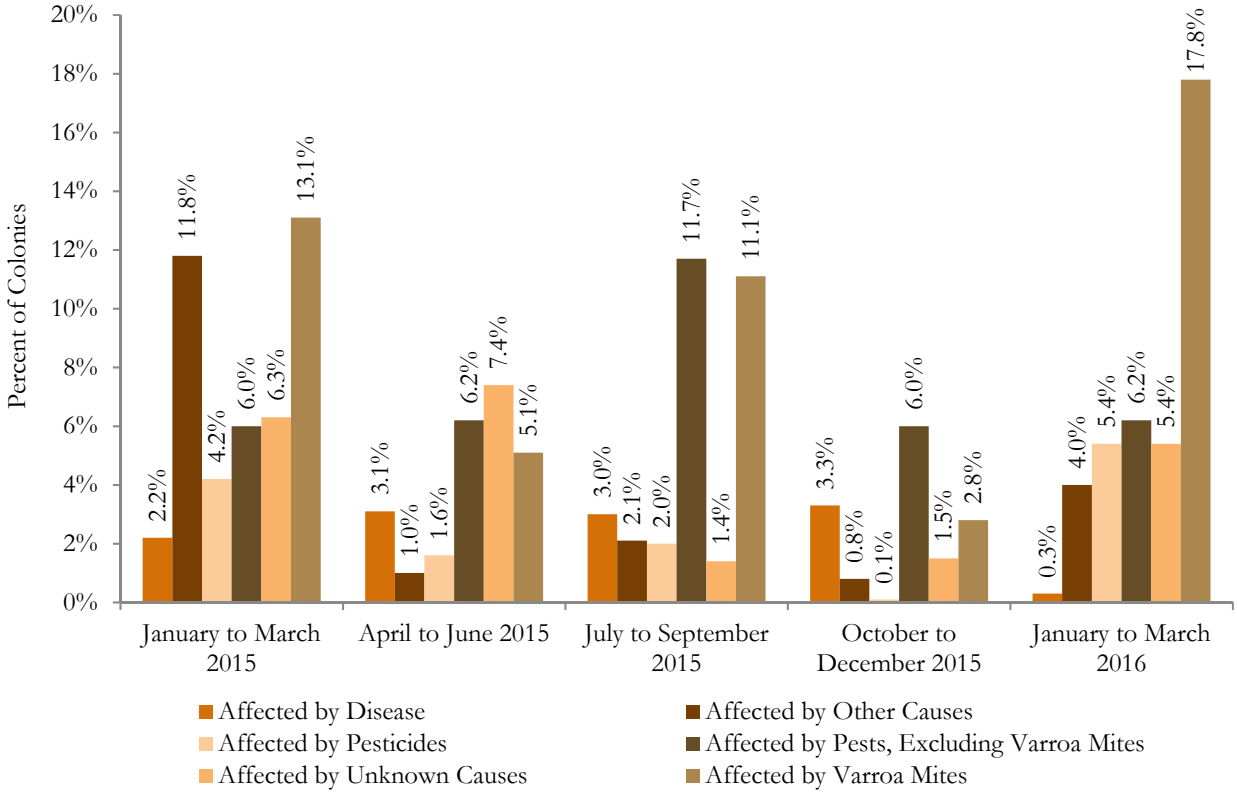


Source: USDA, National Agricultural Statistics Service (2017b)

The reduction in Missouri bee colonies can at least partially be attributed to several challenges: diseases, pesticides, pests and other causes. Exhibit 6.1.2 presents the share of colonies that were affected by such challenges during five recent calendar quarters. As the chart illustrates, Varroa mites

commonly were a problem affecting Missouri bee colonies. Other pests were also often cited as affecting colonies. In the most recent quarter with data reported — January to March 2016 — 17.8 percent of colonies were affected by Varroa mites. Other problems affecting colonies were other pests, 6.2 percent of colonies; pesticides, 5.4 percent of colonies; unknown causes, 5.4 percent of colonies; other causes, 4 percent of colonies; and diseases, 0.3 percent of colonies (USDA National Agricultural Statistics Service 2017b).

Exhibit 6.1.2 – Missouri Bee Colonies Affected by Certain Challenges by Calendar Quarter, 2015 and 2016

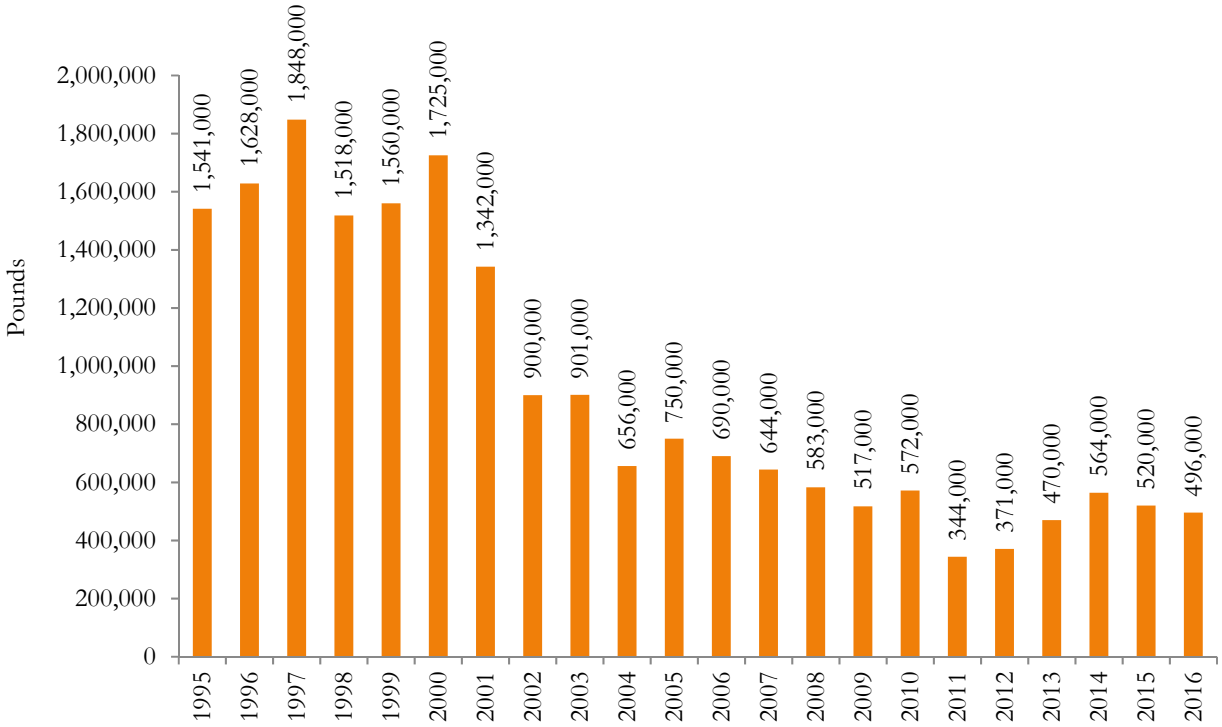


Source: USDA, National Agricultural Statistics Service (2017b)

Note that some producers have renovated their bee colonies. In 2015, USDA reported that 3,380 colony renovations occurred. During the first quarter of 2016 — January to March — Missouri operations renovated 290 colonies, which was fewer than the 910 colonies renovated in the first quarter of 2015 (USDA National Agricultural Statistics Service 2017b).

The overall trend in Missouri honey production somewhat mirrors the honey bee colony inventory trend. Exhibit 6.1.3 charts production from 1995 to 2016. Based on data from that time period, total honey production in the state reached its highest point — nearly 1.85 million pounds — in 1997. 2011 had the lowest production recorded — just 344,000 pounds. Later, the state experienced a slight uptick in honey production. It reached nearly 500,000 pounds in 2016 (USDA National Agricultural Statistics Service 2017b).

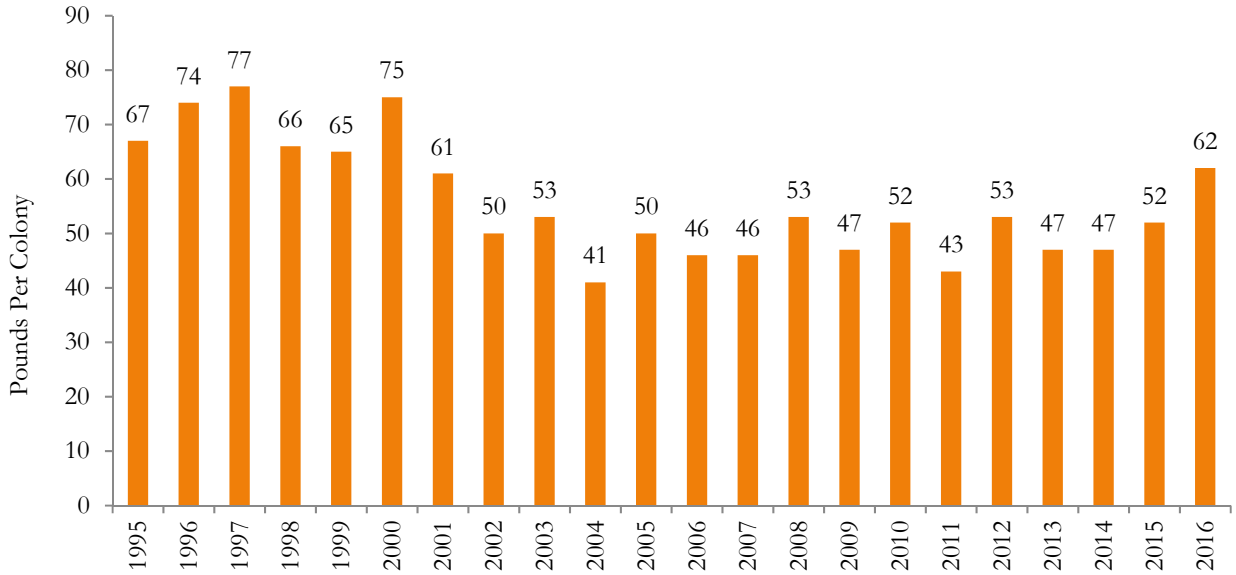
Exhibit 6.1.3 – Missouri Honey Production, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2017b)

For another view of Missouri honey production, Exhibit 6.1.4 presents average annual production in pounds per colony from 1995 to 2016. During the observed period, colonies were most productive in the mid- and late 1990s. By the mid-2000s, production tended to range from 40 pounds per colony to 55 pounds per colony. More recently, colony productivity increased. In 2016, colonies produced 62 pounds of honey on average (USDA National Agricultural Statistics Service 2017b).

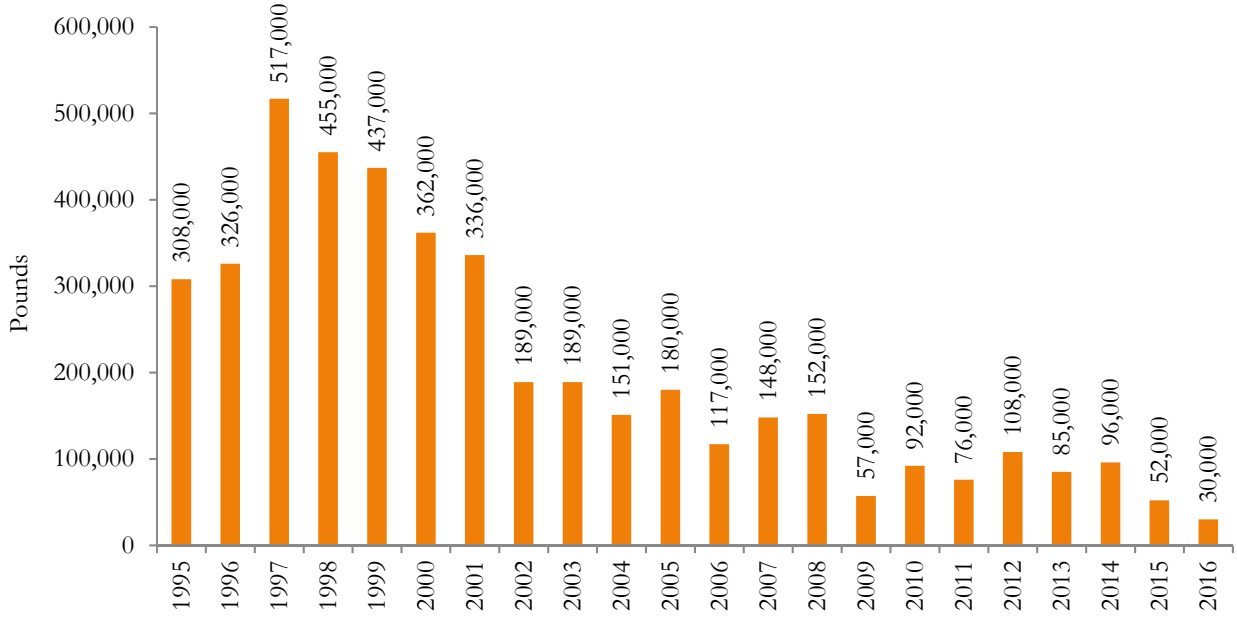
Exhibit 6.1.4 – Missouri Honey Production Per Colony, 1995 to 2016



Source: USDA, National Agricultural Statistics Service (2017b)

From 1995 to 2016, Missouri honey stocks decreased significantly. Exhibit 6.1.5 tracks the trend, according to stock measurements taken in mid-December of each year. Note that USDA considers honey stocks to be stocks held by producers, according to its March 2017 honey report. The decline was most drastic between 1997 and the early and mid-2000s. During the observed period, stocks reached their highest level — 517,000 pounds — in 1997, and they were lowest — 30,000 pounds — in 2016 (USDA National Agricultural Statistics Service 2017b).

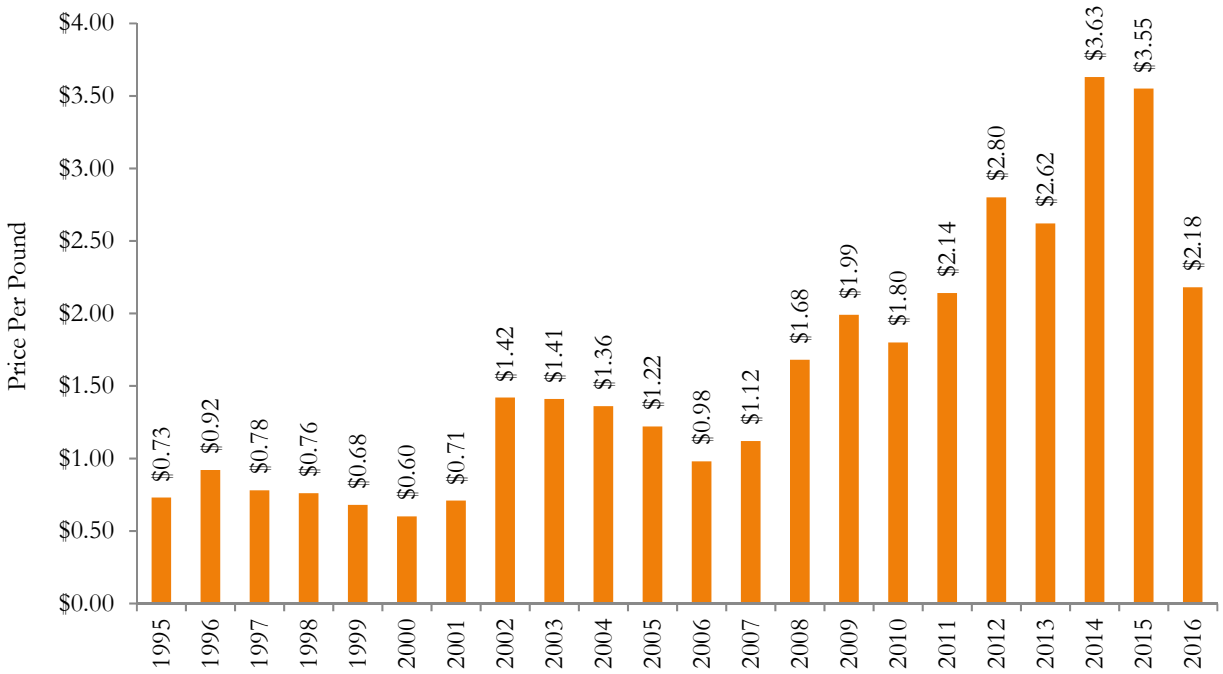
Exhibit 6.1.5 – Missouri Honey Stocks, 1995 to 2016, Mid-December



Source: USDA, National Agricultural Statistics Service (2017b)

As honey production in the state has constricted, prices have strengthened. Exhibit 6.1.6 presents the trend in prices received per pound for Missouri honey. Until the early 2000s, honey prices averaged less than $1 per pound. During the mid-2000s, prices tended to range from $1 per pound to $1.50 per pound. Since then, honey prices have jumped significantly. Prices reached their highest levels — more than $3.50 per pound — in 2014 and 2015. They receded to $2.18 per pound in 2016 (USDA National Agricultural Statistics Service 2017b).

Exhibit 6.1.6 – Prices Received for Missouri Honey, 1995 to 2016

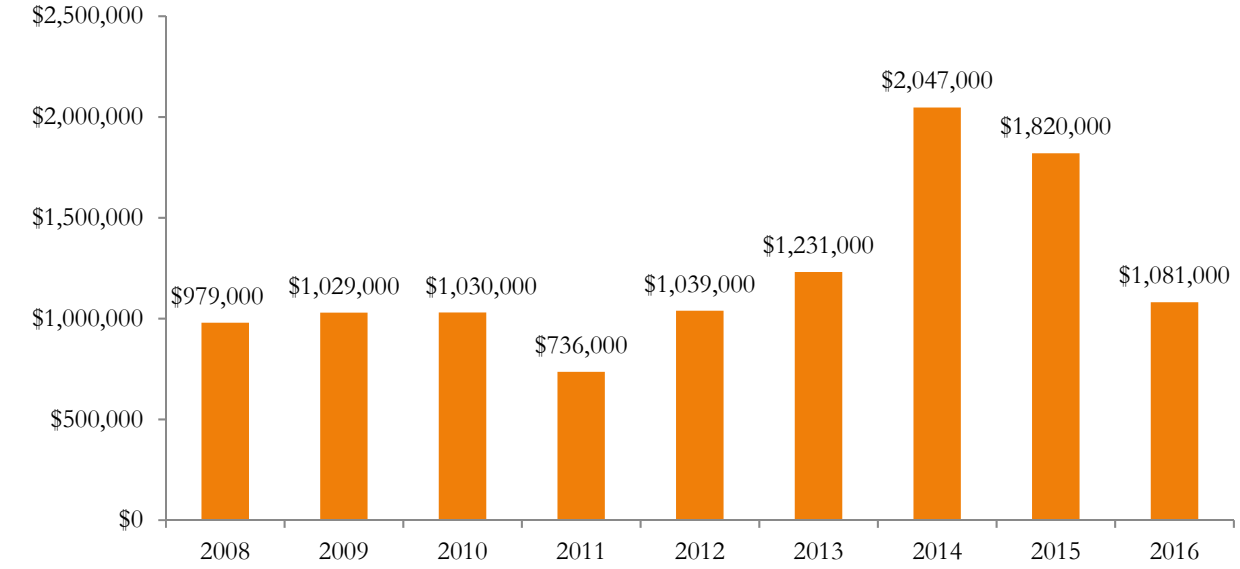


Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 6.1.7 presents Missouri honey cash receipts from 2008 to 2016. During that time period, cash receipts experienced some volatility. They totaled $979,000 in 2008. Significant growth in cash receipts was recorded from 2013 to 2014. Since then, the value has declined. Cash receipts totaled $1.081 million in 2016 (USDA Economic Research Service 2017).

Compared with total Missouri commodity cash receipts, cash receipts for honey were a small share of that total in 2016. U.S. honey cash receipts in 2016 totaled more than $332 million, and Missouri's share of the U.S. total was 0.3 percent (USDA Economic Research Service 2017).

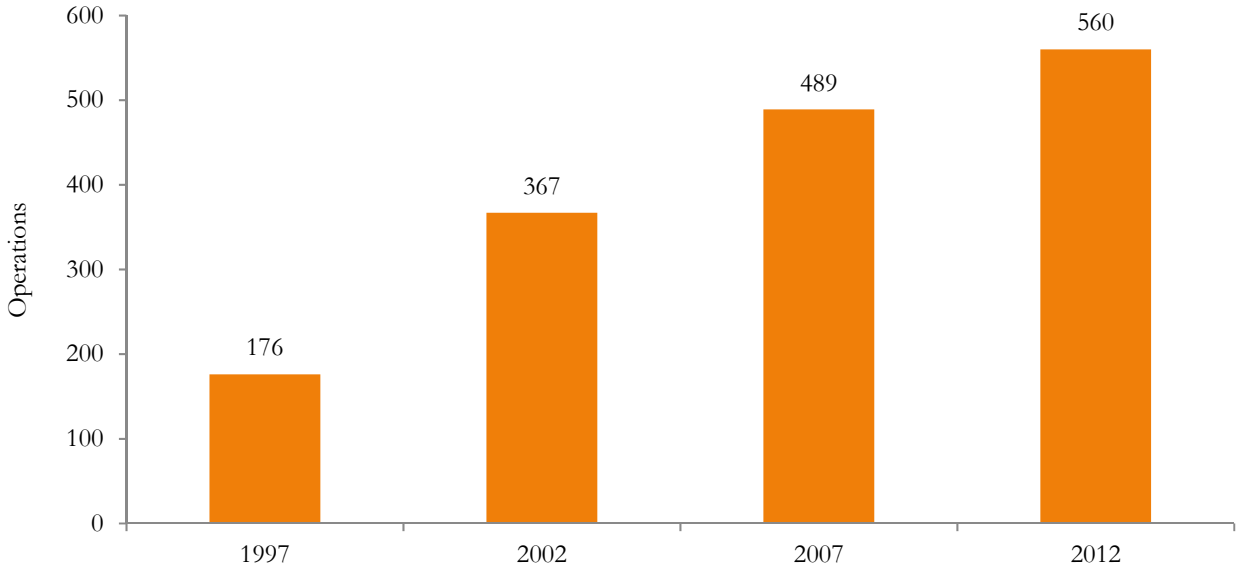
Exhibit 6.1.7 – Missouri Honey Cash Receipts, 2008 to 2016



Source: USDA, Economic Research Service (2017)

In recent years, more Missouri operations have added honey production to their businesses. The increase in operation count has been quite significant, too. Exhibit 6.1.8 illustrates that just 176 operations in Missouri reported that they produced honey during 1997. Steady growth ultimately led to 560 operations producing honey in 2012. Of that total, 372 operations indicated that they made honey sales in 2012 (USDA National Agricultural Statistics Service 2017b).

Exhibit 6.1.8 – Missouri Operations with Honey Production, 1997 to 2012

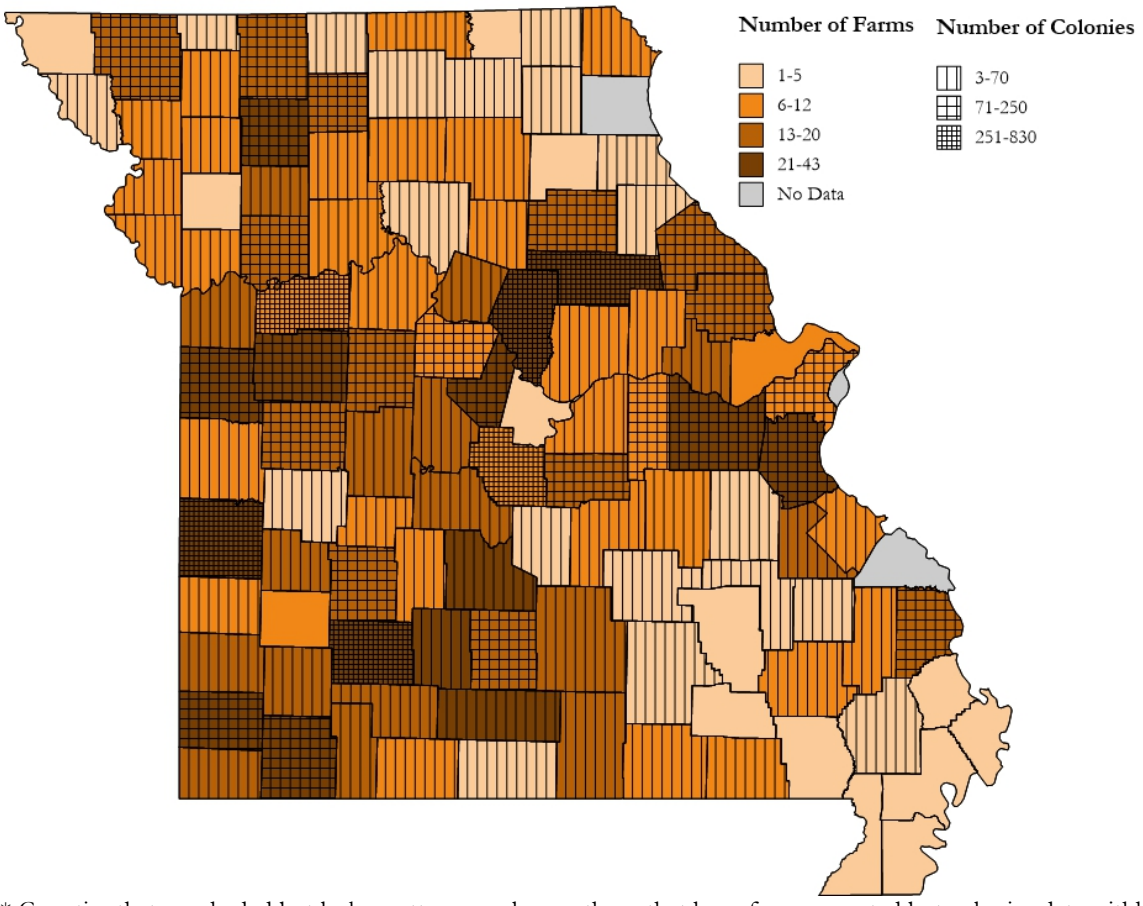


Source: USDA, National Agricultural Statistics Service (2017b)

Honey bee data by county are reported as colony inventory and honey collected. Exhibit 6.1.9 summarizes colony inventory data by county for farms with colonies and number of colonies in

2012. Counties reporting the most farms with honey bee colonies were Vernon County, 43 farms; Franklin County, 33 farms; Cass County, 31 farms; and Newton County, 30 farms. Number of colonies was greatest in Greene County, 830 colonies; Lafayette County, 641 colonies; Boone County, 500 colonies; Vernon County, 489 colonies; and Miller County, 415 colonies (USDA National Agricultural Statistics Service 2014b).

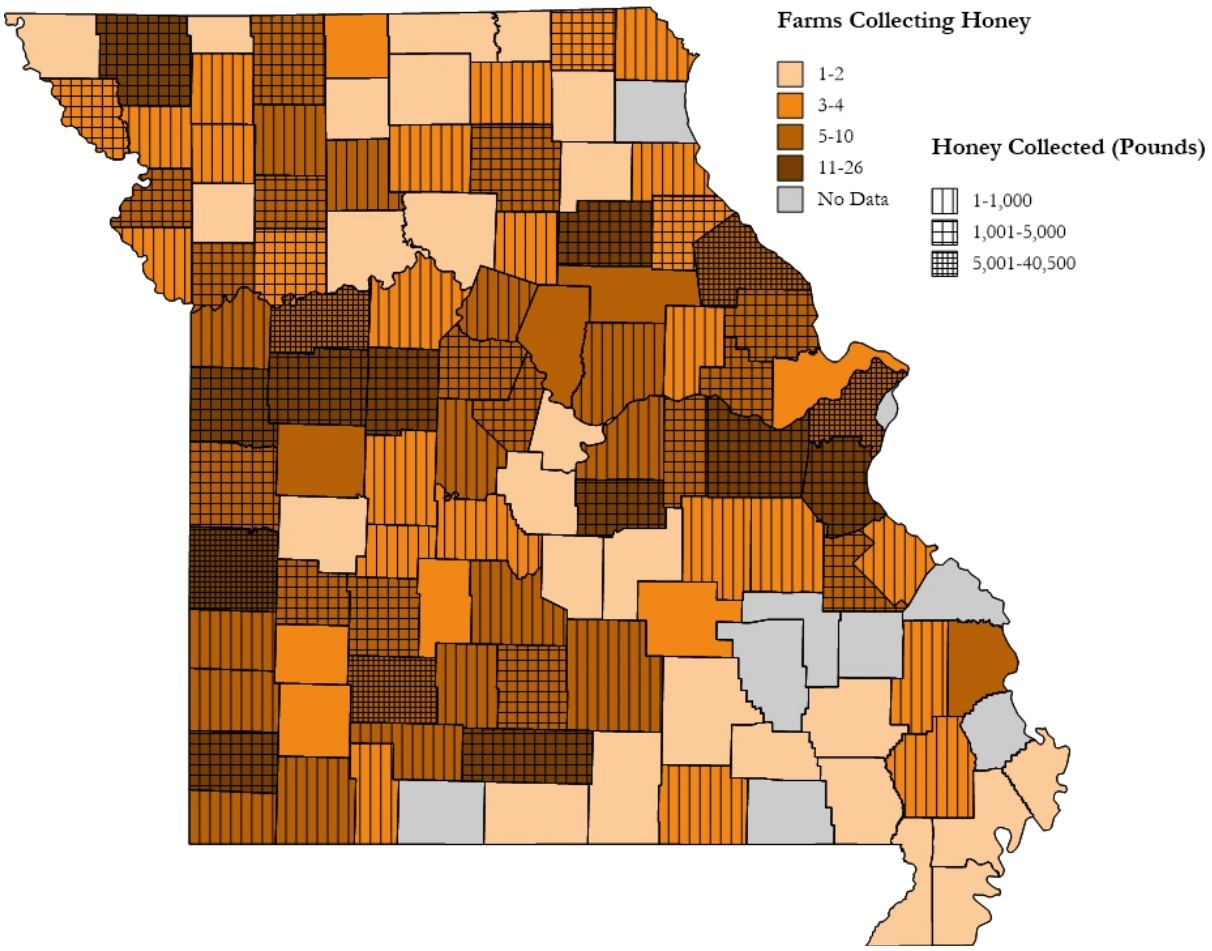
*Exhibit 6.1.9 – Missouri Honey Bee Farms with Colonies and Number of Colonies by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farms reported but colonies data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

By county, Exhibit 6.1.10 summarizes the number of Missouri farms collecting honey and the honey that was collected in 2012. Vernon County had the most farms — 26 operations — collecting honey at the time. Several counties tied for ranking second on this metric and had 14 farms collecting honey: Cass County, Douglas County, Johnson County and Newton County. Honey collection itself was highest in Lafayette County, 40,500 pounds; Vernon County, 20,744 pounds; and St. Louis County, 19,190 pounds (USDA National Agricultural Statistics Service 2014b).

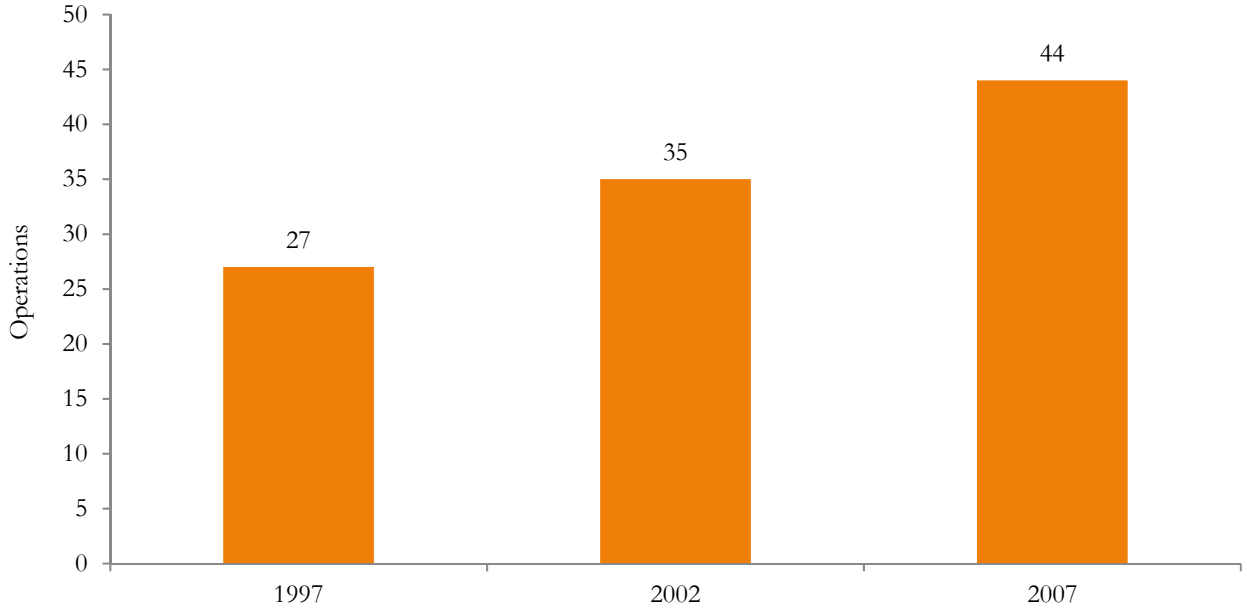
*Exhibit 6.1.10 – Missouri Farms Collecting Honey and Honey Collected by County, 2012**



* Counties that are shaded but lack a pattern overlay are those that have farm count reported but honey collection data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

In addition to producing honey, some honey bee operations also tailor their businesses to include honey bee colony sales. During recent years, the number of operations selling honey bee colonies increased. See Exhibit 6.1.11. Missouri operations selling honey bee colonies totaled 27 operations in 1997. The operation count increased to 44 operations in 2007, which was the most recent year with data available (USDA National Agricultural Statistics Service 2017b).

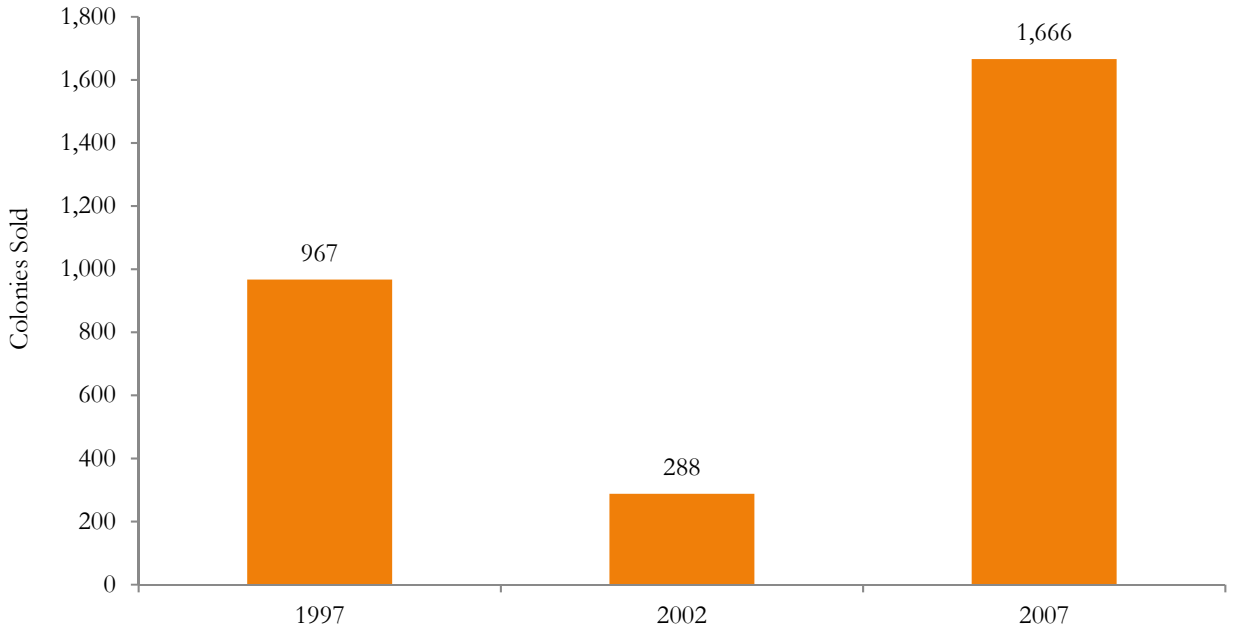
Exhibit 6.1.11 – Missouri Operations Selling Honey Bee Colonies, 1997 to 2007



Source: USDA, National Agricultural Statistics Service (2017b)

For 1997, 2002 and 2007, Exhibit 6.1.12 reports the number of honey bee colonies sold within Missouri. Colony sales were greatest in 1997 and 2007. They totaled 967 colonies and 1,666 colonies, respectively. Sales in 2002 were significantly lower and totaled just 288 colonies (USDA National Agricultural Statistics Service).

Exhibit 6.1.12 – Missouri Honey Bee Colony Sales, 1997 to 2007



Source: USDA, National Agricultural Statistics Service (2017b)

6.2 Hops

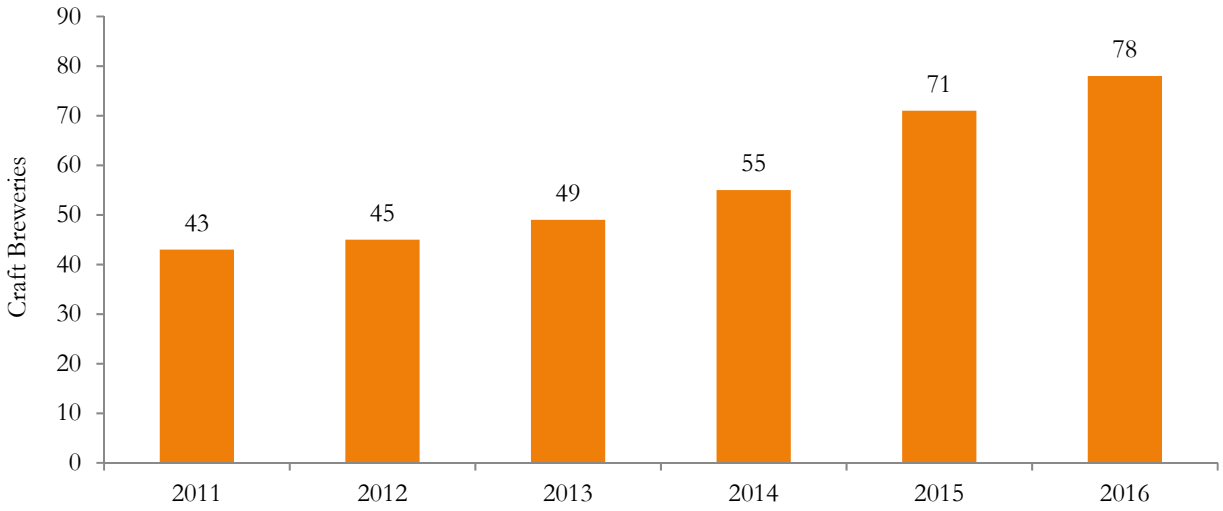
For Missouri, the USDA National Agricultural Statistics Service hasn't reported hops data in previous years (USDA National Agricultural Statistics Service 2017b). The Hop Growers of America releases an annual statistical report that offers estimates in addition to those shared in the USDA National Agricultural Statistics Service reporting. Past statistical reports from the grower group did not include data points for Missouri, however (Hop Growers of America 2017).

Despite the lack of data, some hops industry activity appears to have occurred in previous years. Based near Edgerton, Mo., Royal Hops Company has operated as a "hops yard." On its website, the company shares that it formed to supply regional craft brewers with a local hops supply. The operation is reported to grow 10 hops varieties. In previous years, the company opened its operation to U-pick (Royal Hops Company). During 2016, Royal Hops Co. completed its third harvest. The company harvested three acres that yielded 1,000 pounds. By 2017, the company anticipated that its total production would reach 4,000 pounds (Davis 2016).

In Ste. Genevieve, the Charleville Vineyard and Microbrewery has grown hops. The St. Louis Post-Dispatch reported in 2012 that the Charleville Vineyard and Microbrewery had maintained roughly 75 hop plants at the time. Another grower had established some hops plants near De Soto (Gustin 2012). Other hops growers in Missouri include Hoppiness Farms near Hermann, Mo. On its website, the company describes its business as "growing quality hops for craft beer enthusiasts" (Hoppiness Farms).

Missouri-grown hops would support that state's evolving craft brewery industry. Between 2011 and 2016, Missouri gained 35 craft breweries in the overall brewery count. Exhibit 6.2.1 illustrates the number of Missouri craft breweries by year, according to data reported by the Brewers Association For Small and Independent Craft Brewers. In 2016, the state had 78 craft breweries. It ranked 20th in the country for count of craft breweries. Craft beer production in the state was more than 368,800 barrels (Brewers Association For Small and Independent Craft Brewers 2017).

Exhibit 6.2.1 – Missouri Craft Breweries, 2011 to 2016

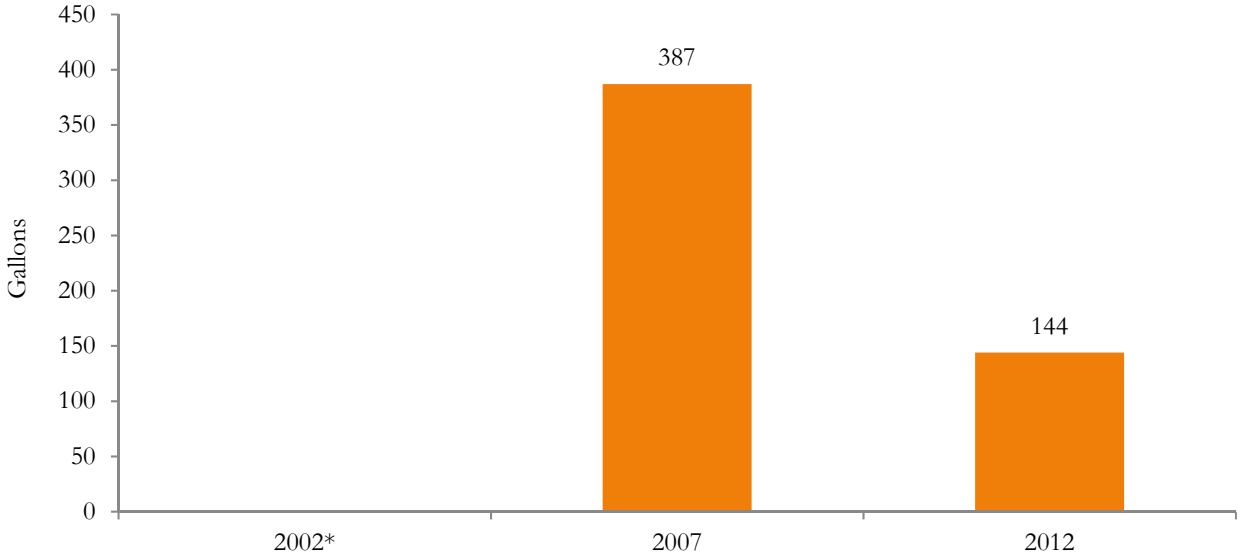


Source: Brewers Association For Small and Independent Craft Brewers (2017)

6.3 Maple Syrup

Missouri maple syrup production data are somewhat limited. USDA released data sets for 2002, 2007 and 2012. Exhibit 6.3.1 summarizes the Missouri production data available. In 2002, USDA withheld releasing a specific value for Missouri maple syrup production. However, 2007 maple syrup production totaled 387 gallons. The production level dropped in 2012 to 144 gallons (USDA National Agricultural Statistics Service 2017b).

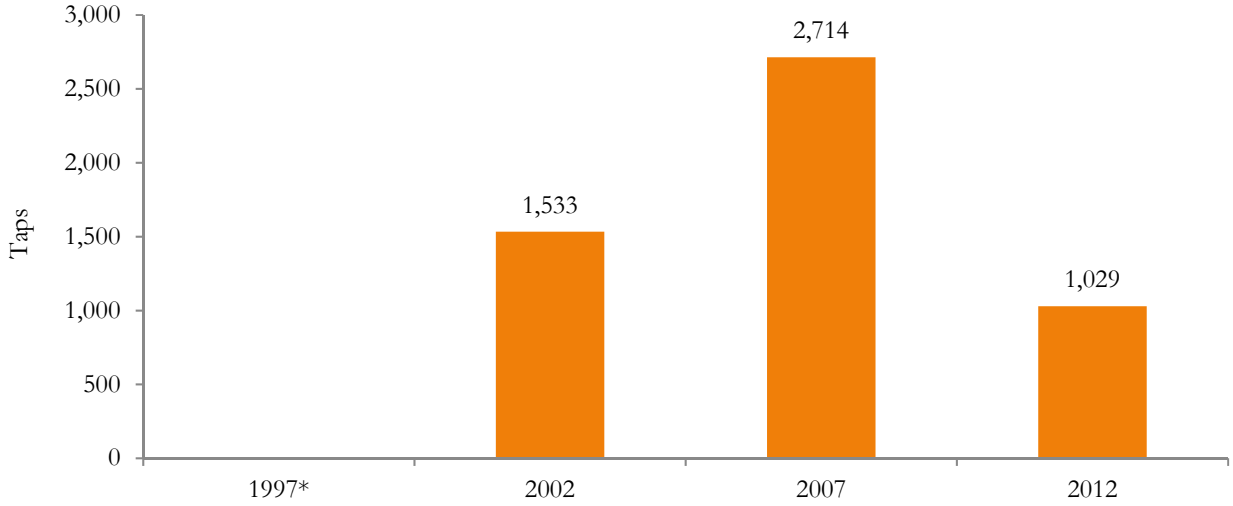
Exhibit 6.3.1 – Missouri Maple Syrup Production, 2002 to 2012



* Production data for 2002 were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

For number of maple syrup taps, Exhibit 6.3.2 shares information from 1997 to 2012. USDA withheld the count of Missouri maple syrup taps for 1997. However, data points were available for 2002, 2007 and 2012. Missouri increased its number of maple syrup taps between 2002 and 2007, but the number receded to its lowest level of the observed period in 2012. Missouri operations reported having 1,029 maple syrup taps in 2012. The state's highest count was 2,714 taps during 2007 (USDA National Agricultural Statistics Service 2017b).

Exhibit 6.3.2 – Missouri Maple Syrup Taps, 1997 to 2012

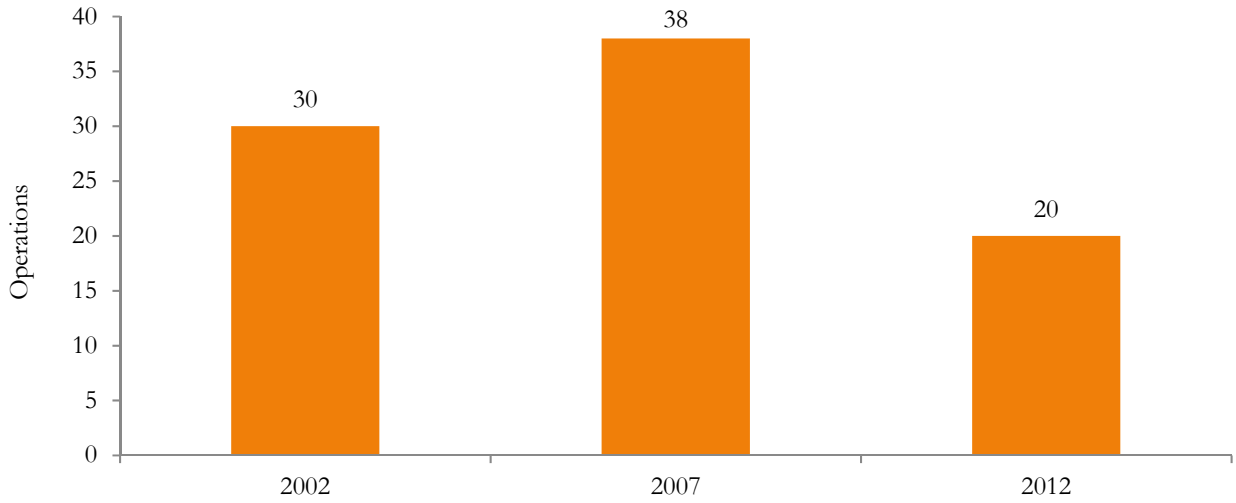


* Data for number of taps were withheld for 1997.
Source: USDA, National Agricultural Statistics Service (2017b)

With respect to maple syrup operations, data were reported for operations with maple syrup production and operations with maple syrup taps. Exhibit 6.3.3 presents data for the former. Of the observed years, number of Missouri operations producing maple syrup peaked at 38 operations in 2007. During 2012 — the most recent year with data reported — Missouri operations producing maple syrup totaled 20 operations (USDA National Agricultural Statistics Service 2017b).

The count of operations with taps nearly mirrors the count of operations with production. The exception was that number of operations with taps was reported in 1997. In that year, one Missouri operation reported having maple syrup taps. Operations with maple syrup production weren't reported in 1997 (USDA National Agricultural Statistics Service 2017b).

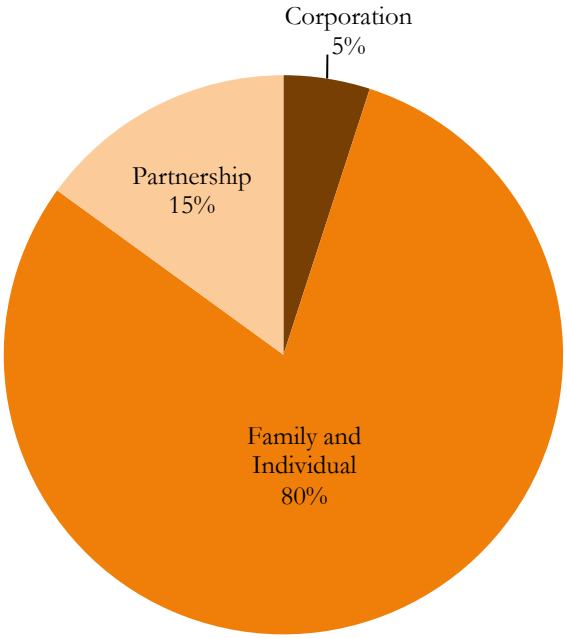
Exhibit 6.3.3 – Missouri Operations with Maple Syrup Production, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

During 2012, all 20 Missouri operations with maple syrup production also recorded maple syrup sales. Operations reporting sales were most frequently organized as family or individual operations for tax purposes. Exhibit 6.3.4 highlights the share of operations with sales according to their selected organizational structure for tax purposes. Eighty percent were structured as family or individual farms. Fifteen percent were organized as partnerships, and 5 percent were organized as corporations (USDA National Agricultural Statistics Service 2017b).

Exhibit 6.3.4 – Share of Missouri Maple Syrup Operations by Organizational Structure, 2012

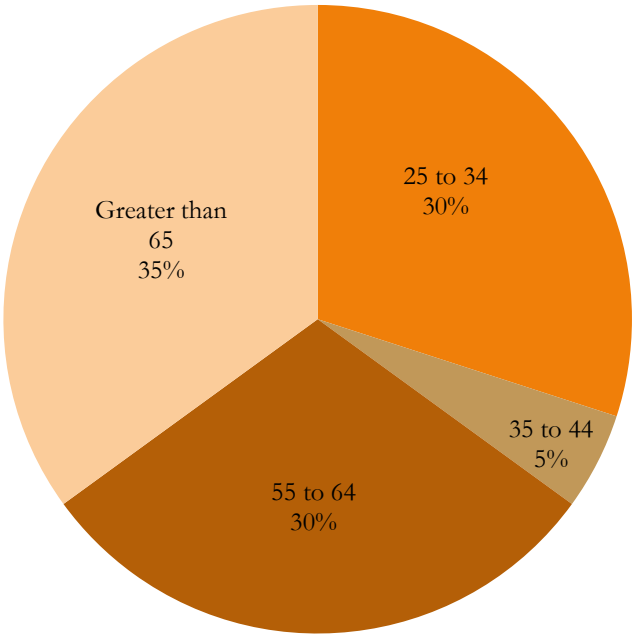


Source: USDA, National Agricultural Statistics Service (2017b)

A strong majority of Missouri maple syrup farm principal operators in 2012 named something other than farming as their primary occupation. Eighty percent of the principal operators indicated that farming wasn't their primary occupation. Just 20 percent reported that farming was their primary occupation. A majority of the principal operators in 2012 also noted that they had significant experience on their current operations. Fifty-five percent shared that they had been on their present operation for 11 years or more. Just 10 percent had spent less than six years on their present operation (USDA National Agricultural Statistics Service 2017b).

In terms of age, principal operators of Missouri maple syrup operations in 2012 tended to skew older. Exhibit 6.3.5 indicates that nearly two-thirds of the principal operators in 2012 were at least 55 years old. Five percent reported being 35- to 44-year-olds, and 30 percent were between 25 years old and 34 years old (USDA National Agricultural Statistics Service 2017b).

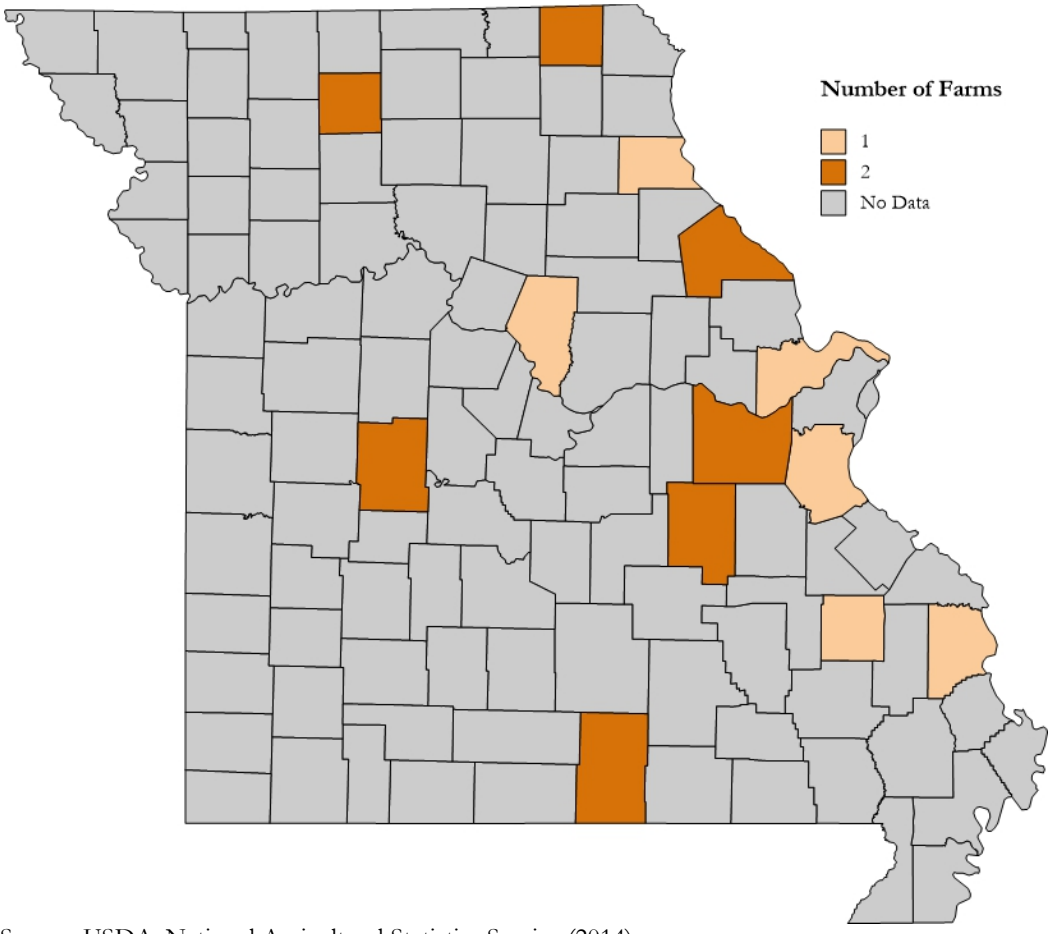
Exhibit 6.3.5 – Age Distribution of Missouri Maple Syrup Operation Principal Operators, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

For a view of Missouri maple syrup activity by county, Exhibit 6.3.6 highlights Missouri counties according to their count of maple syrup operations with taps. Counties reporting the greatest number of maple syrup operations with taps in 2012 were Benton, Crawford, Franklin, Grundy, Howell, Pike and Scotland counties. Two operations in each of these counties were reported to have maple syrup taps. Note that data were withheld for number of taps and syrup production by county (USDA National Agricultural Statistics Service 2014b).

Exhibit 6.3.6 – Missouri Maple Syrup Operations with Taps by County, 2012



Source: USDA, National Agricultural Statistics Service (2014)

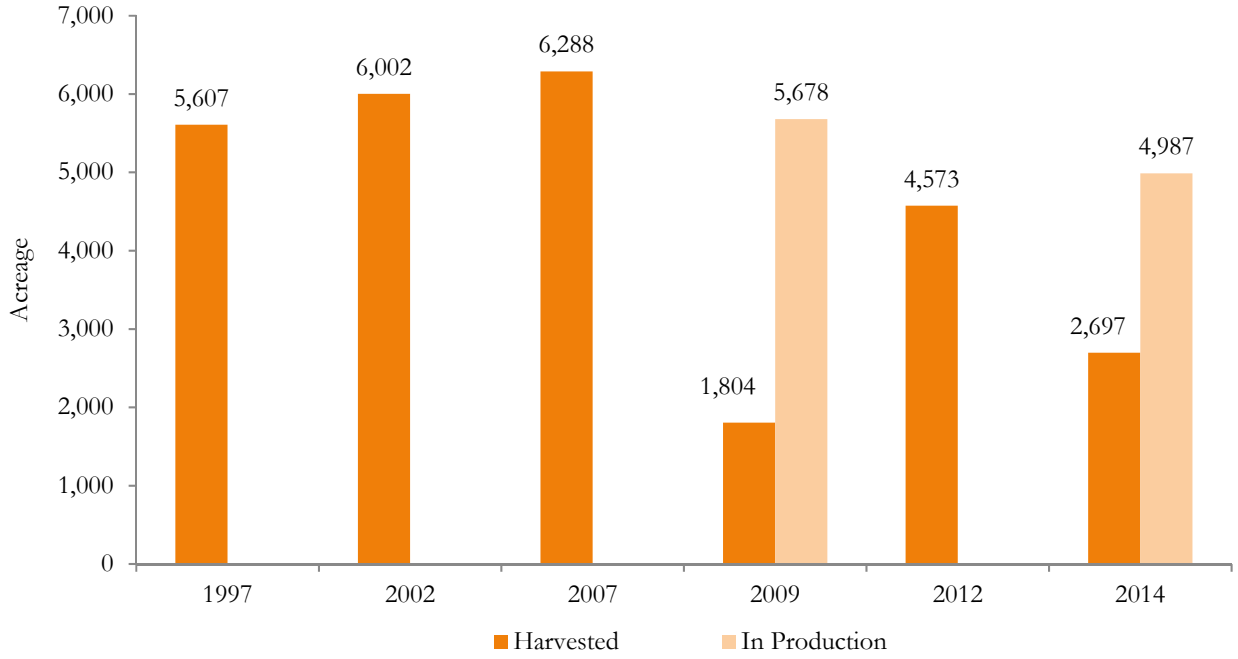
Data for organic maple syrup production in Missouri was limited to 2008. At the time, two operations were reported to have taps for organic maple syrup production. One of those operations was certified organic, and one was exempt organic. Due to the low operation count and not wanting to disclose data for individual operations, no data for organic maple syrup production, sales or number of taps were released (USDA National Agricultural Statistics Service 2017b). For a definition of exempt and certified organic, see the Methodology section.

6.4 Turfgrass

For turfgrass, the USDA National Agricultural Statistics Service reports data for sod that's raised in Missouri. Acreage data have been measured as acreage harvested and acreage in production. Exhibit 6.4.1 illustrates data points for years when data were available. Note that acreage in production was only released in 2009 and 2014. The graph shows that sod acreage harvested increased early in the observation period and then decreased. Of years with data reported, harvested acreage reached its greatest level — 6,288 acres — in 2007. It dropped to its lowest level of 1,804 acres in 2009. Harvested acreage was fairly low at just less than 2,700 acres in 2014 (USDA National Agricultural Statistics Service 2017b).

Note that just a portion of sod in production was harvested during 2009 and 2014. Harvested acreage was just 31.8 percent of acreage in production during 2009. Sod acreage harvested as a share of sod acreage in production was slightly higher in 2014. At the time, harvested sod acreage was 54.1 percent of sod acreage in production (USDA National Agricultural Statistics Service 2017b).

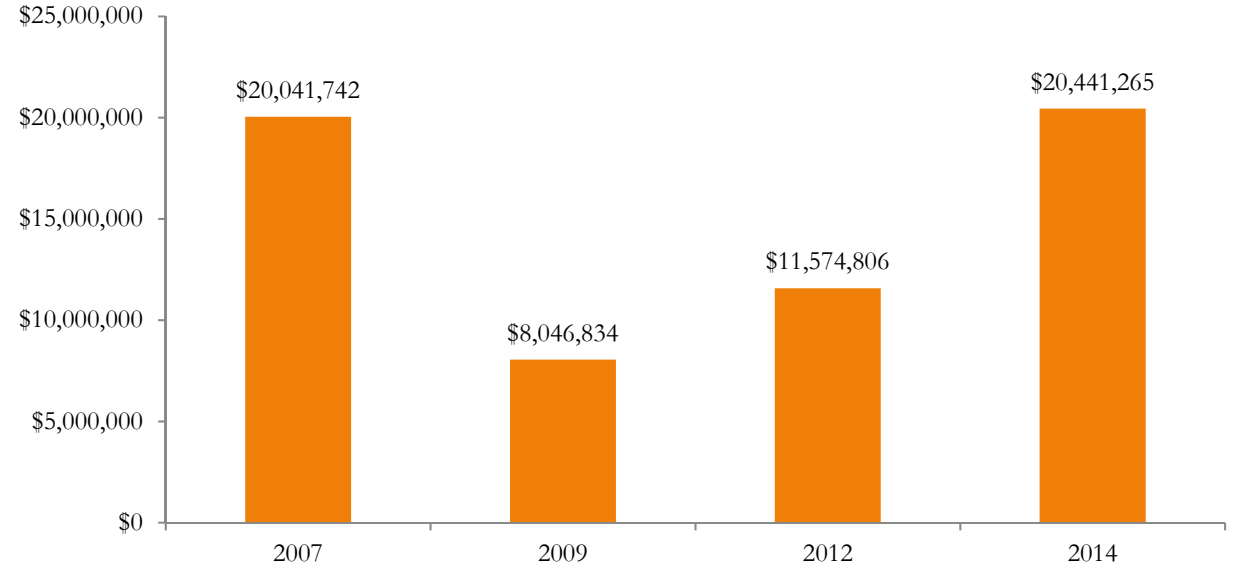
Exhibit 6.4.1 – Missouri Sod Acreage Harvested and Acreage in Production, 1997 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Sod sales in dollars have been reported in U.S. Census of Agriculture years. Exhibit 6.4.2 summarizes sod sales in 2007, 2009, 2012 and 2014. As illustrated, sod sales declined dramatically from 2007 to 2009, but they then increased quite sharply between 2009 and 2014. Sod sales exceeded $20 million in 2014; the 2014 sales value was the highest of those from the observed period (USDA National Agricultural Statistics Service 2017b).

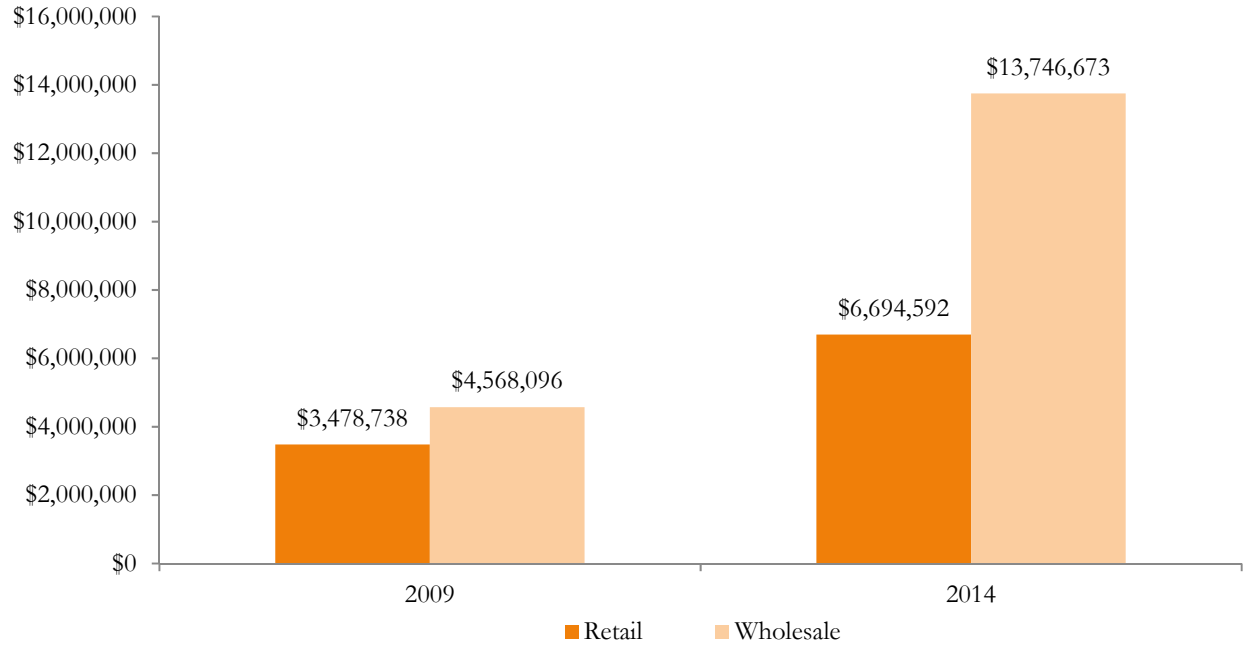
Exhibit 6.4.2 – Missouri Sod Sales, 2007 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

In years past, Missouri sod sales have accumulated to a greater extent in the wholesale channel than the retail channel. Exhibit 6.4.3 charts wholesale and retail sod sales in 2009 and 2014. Note the particular jump in wholesale sod sales from 2009 to 2014. Of all sod sales, 56.8 percent were wholesale transactions in 2009. In 2014, wholesale's share had increased to 67.2 percent (USDA National Agricultural Statistics Service 2017b).

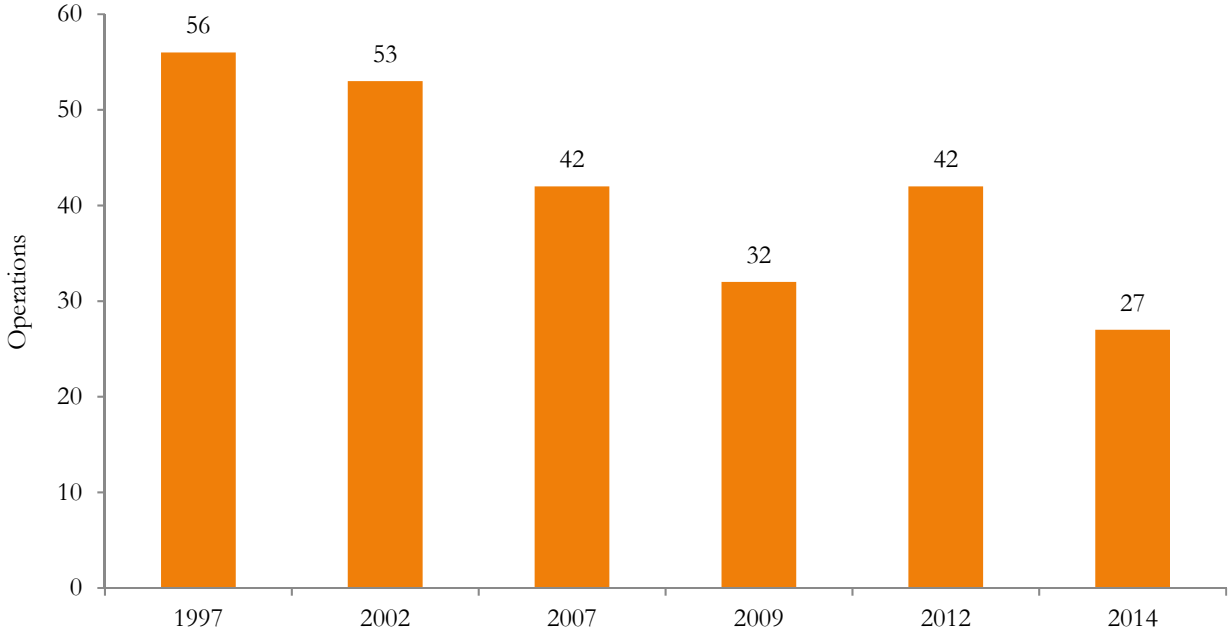
Exhibit 6.4.3 – Missouri Sod Wholesale and Retail Sales, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations have gradually exited the sod business. In 1997, 56 operations reported that they harvested sod acreage. USDA published that just 27 operations harvested sod in 2014. Exhibit 6.4.4 illustrates the trend in number of Missouri operations harvesting sod during selected years from 1997 to 2014 (USDA National Agricultural Statistics Service 2017b).

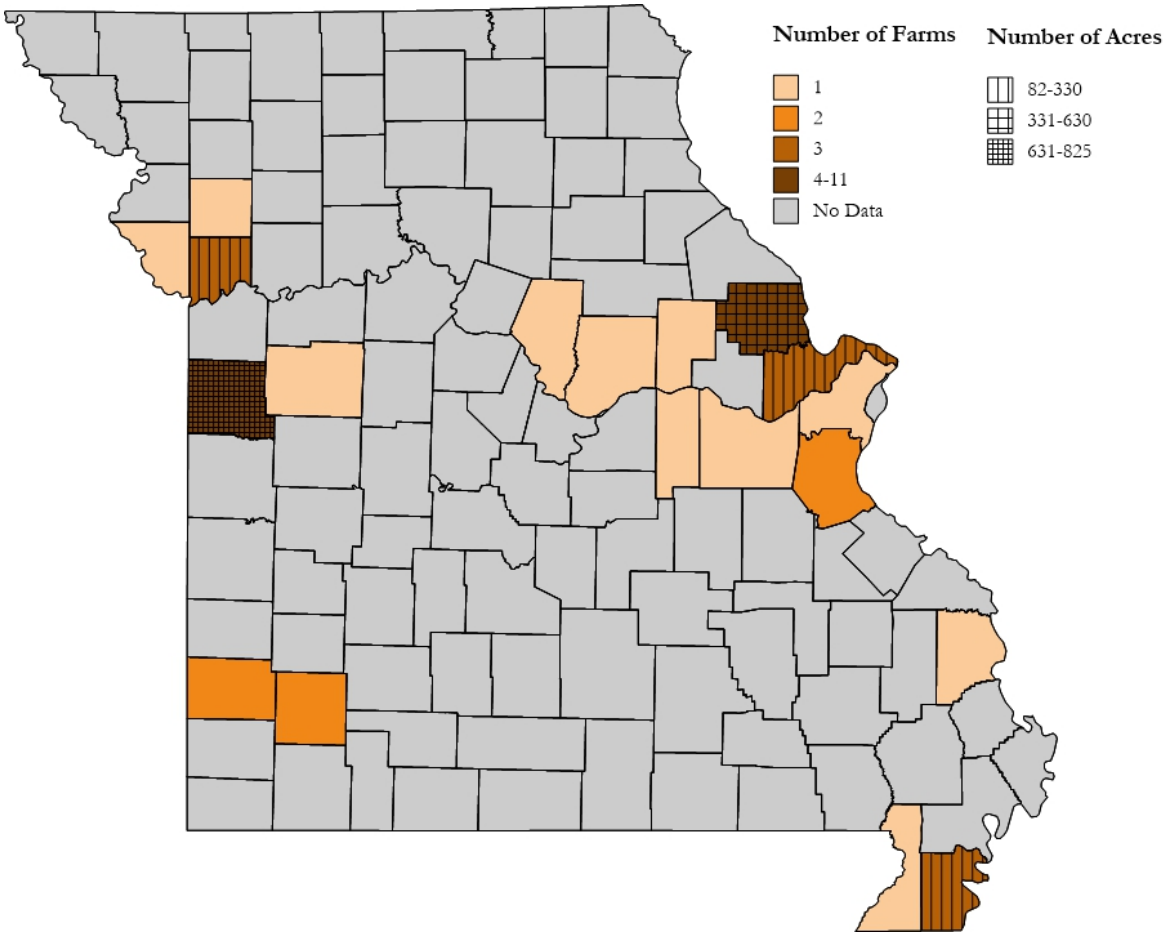
Exhibit 6.4.4 – Missouri Operations with Harvested Sod Area, 1997 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Sod production in Missouri has occurred in several different counties. In 2012, harvested sod acreage was highest in Cass County, 825 acres, and Lincoln County, 628 acres. Exhibit 6.4.5 maps Missouri counties according to their sod acreage harvested and operations with area harvested. The count of operations with sod area harvested was highest in Cass County, 11 operations, and Lincoln County, five operations. For the county-by-county harvested acreage data, note that data for some counties weren't disclosed (USDA National Agricultural Statistics Service 2017b).

*Exhibit 6.4.5 – Missouri Harvested Sod Acreage and Operations by County, 2012**

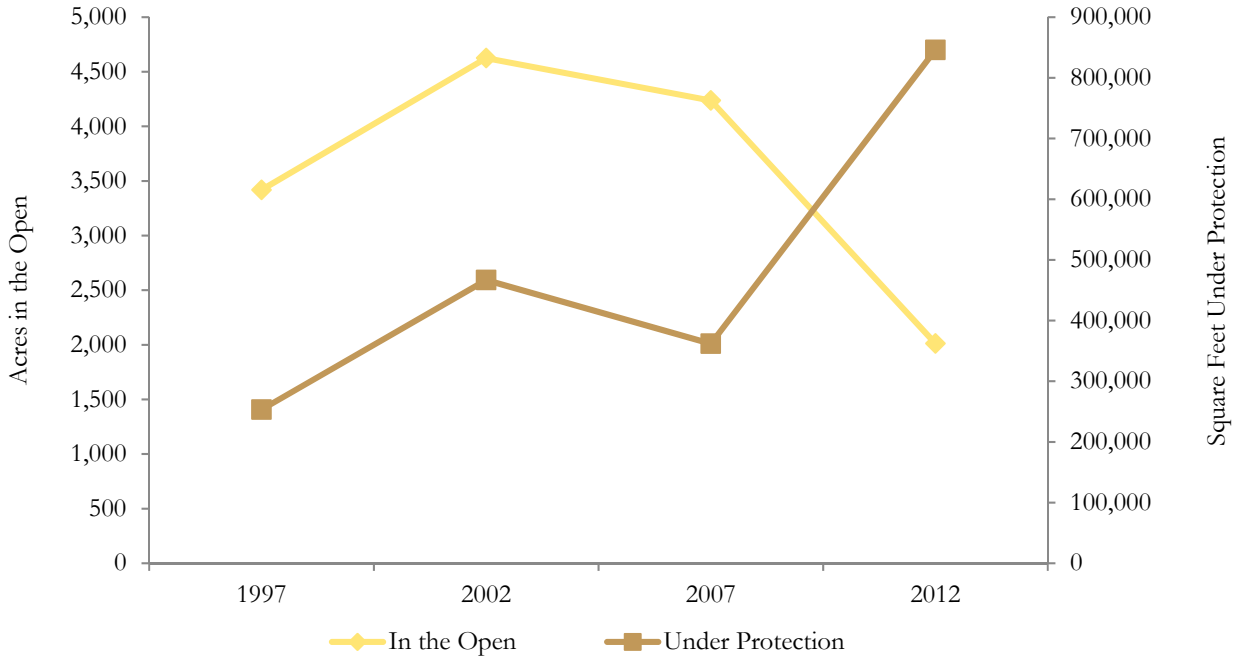


* Counties that are shaded but lack a pattern overlay are those that have farms reported but acreage data withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

7. Nursery and Flowering Plants

Missouri is also home to a nursery and floriculture industry. Industry insiders suspect that some of the large-scale nurseries in Missouri may not be reflected in the data due to USDA disclosure policies or separate out-of-state production. Exhibit 7.1 shares the state's total area dedicated to raising nursery crops in the open or under protection, according to data available from USDA. Between 1997 and 2002 and 2002 and 2007, the two data sets recorded similar patterns. Operations increased nursery production area and then decreased it. An inverse relationship was shown later in the data series, however. Between 2007 and 2012, area under protection used to raise nursery crops grew substantially, and during that same period, acreage in the open used to grow nursery crops declined markedly. In 2012, Missouri operations dedicated more than 2,000 acres in the open to nursery crops, and the square footage under protection used to grow nursery crops exceeded 846,000 square feet (USDA National Agricultural Statistics Service 2017b).

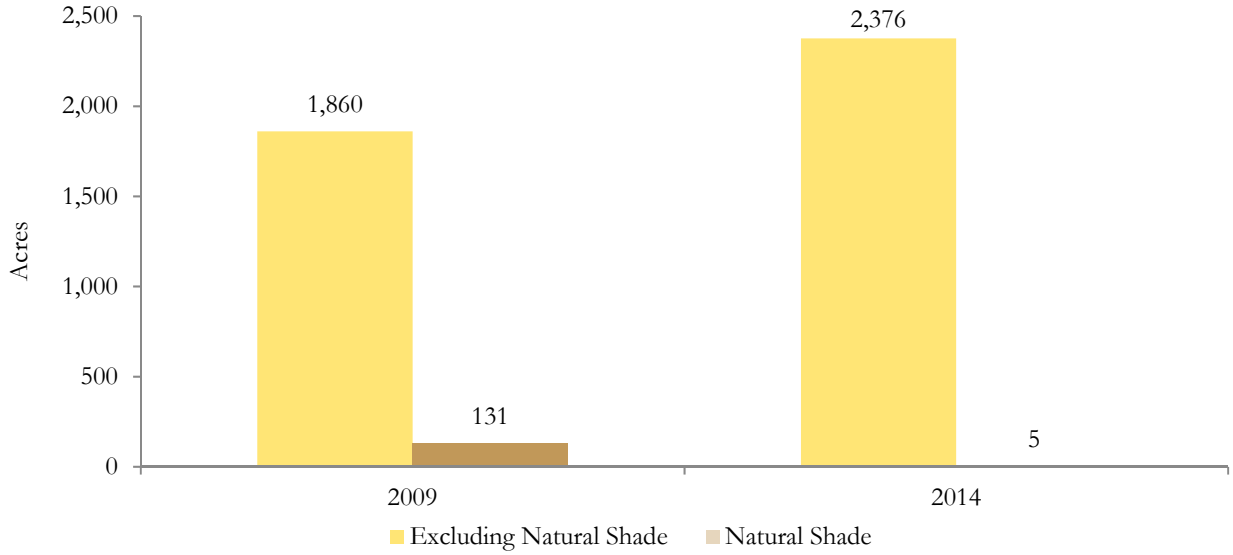
Exhibit 7.1 – Missouri Nursery Crop Acreage In the Open and Under Protection, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Of the nursery production area in the open, most has existed in area that doesn't have natural shade. Acreage in naturally shaded areas has represented just a sliver of total acreage in the open dedicated to nursery crops. Exhibit 7.2 summarizes acreage in the open data from 2009 and 2014. In 2014, five acres in natural shade were used to produce nursery crops in Missouri. In contrast, 2,376 acres in the open excluding natural shade were used to produce nursery crops. Between 2009 and 2014, note that the natural shade area dropped. At the same time, production acreage that's in the open but not in natural shade increased (USDA National Agricultural Statistics Service 2017b).

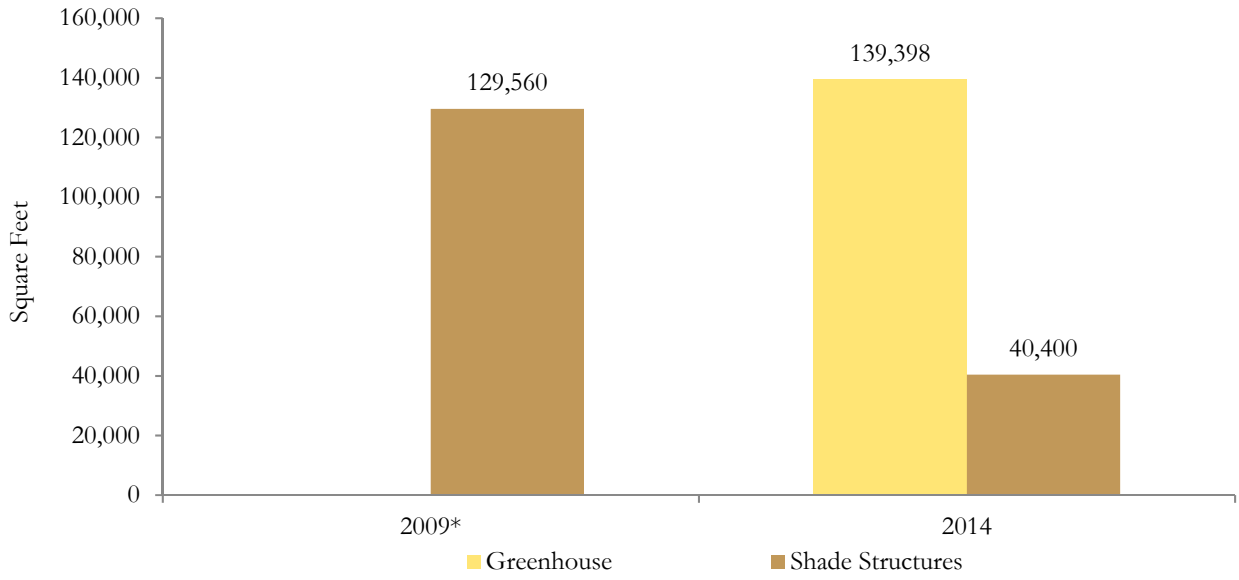
Exhibit 7.2 – Missouri Nursery Acreage In the Open, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Of Missouri's nursery crop production area under protection, a majority in 2014 was located within greenhouses instead of shade structures. Exhibit 7.3 shares area under protection data from 2009 and 2014. The 2014 area data indicate that nearly 140,000 square feet of greenhouse space was used for producing nursery crops, and the square footage within shade structures was nearly 100,000 square feet less. Shade structure area in production totaled 40,400 square feet. The greenhouse data were withheld in 2009. For shade structures, note that their area used for raising nursery crops declined significantly between 2009 and 2014 (USDA National Agricultural Statistics 2017).

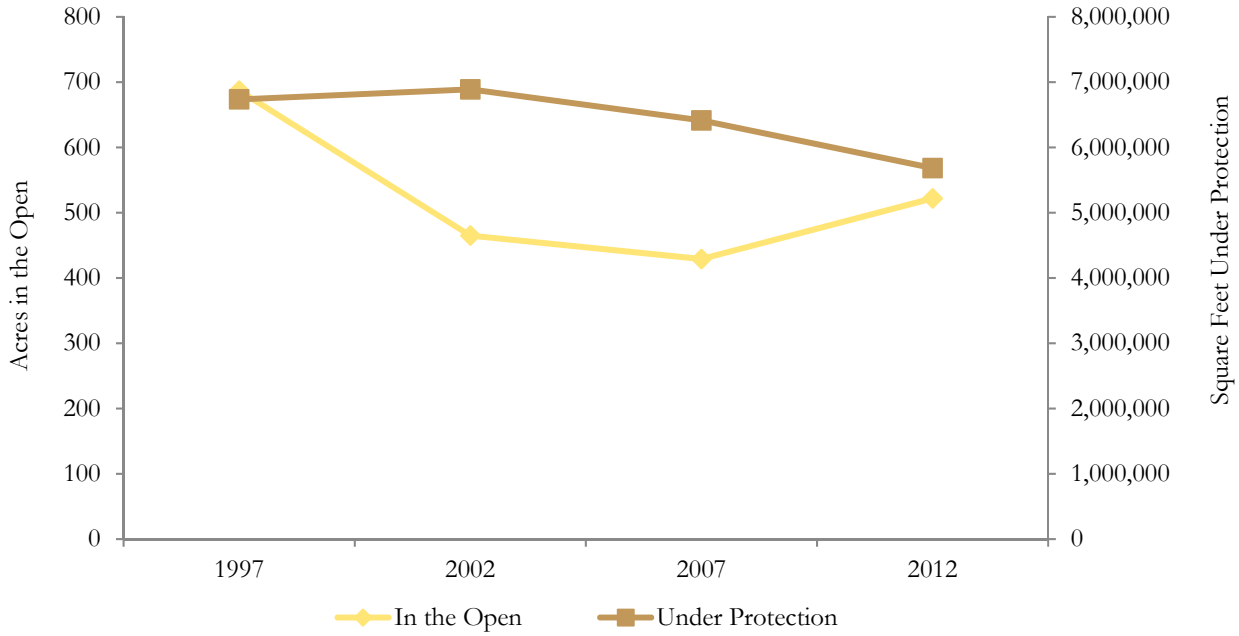
Exhibit 7.3 – Missouri Nursery Acreage Under Protection, 2009 and 2014



*Data were withheld for greenhouse square footage in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

Floriculture represents another facet of Missouri specialty crop production. Exhibit 7.4 summarizes the area dedicated to floriculture production in Missouri. In-the-open acreage declined from 1997 to 2007, but it rebounded slightly in 2012. During 2012, operations in Missouri allocated 522 acres to floriculture production, and area under protection for floriculture production exceeded 5.68 million square feet. Note that square footage under protection increased slightly between 1997 and 2002; however, it later decreased in 2007 and 2012 (USDA National Agricultural Statistics Service 2017b).

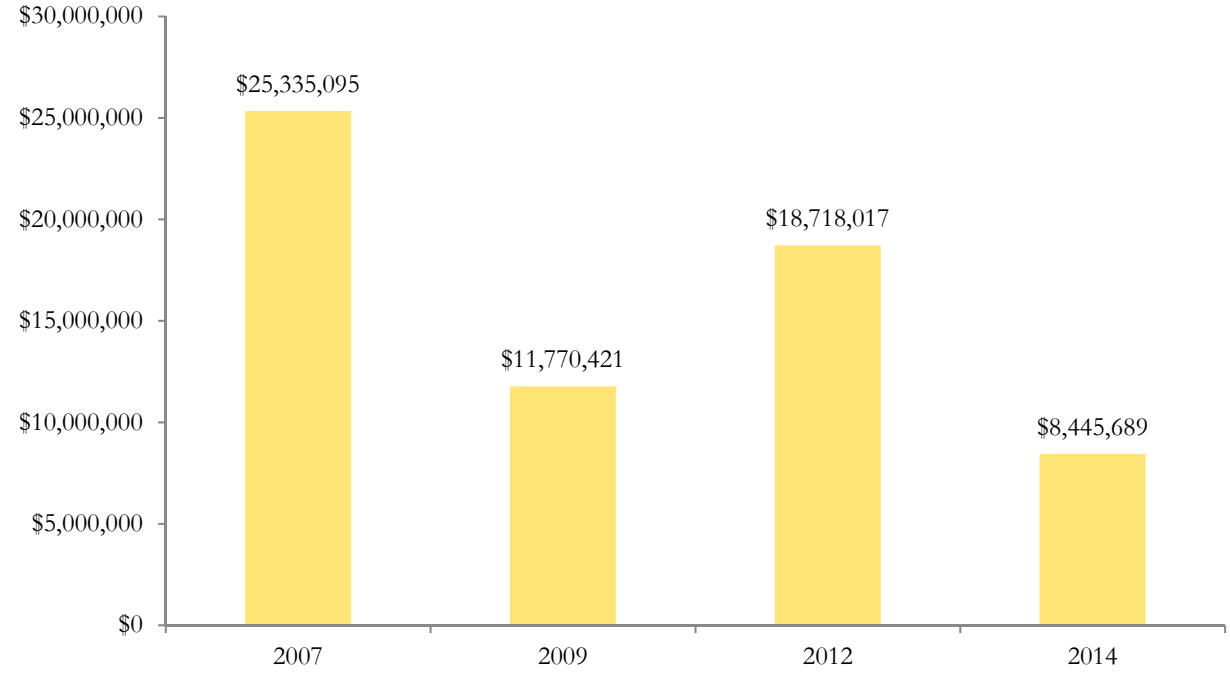
Exhibit 7.4 – Missouri Floriculture Acreage In the Open and Under Protection, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

From a sales perspective, Exhibit 7.5 tracks Missouri nursery sales from 2007 to 2014. During this time, the sales trend was downward-sloping. Sales dropped steeply from 2007 to 2009. Then, they improved in 2012 but later declined in 2014. During 2014, sales totaled more than $8.4 million, or roughly one-third of sales reported in 2007 (USDA National Agricultural Statistics Service 2017b).

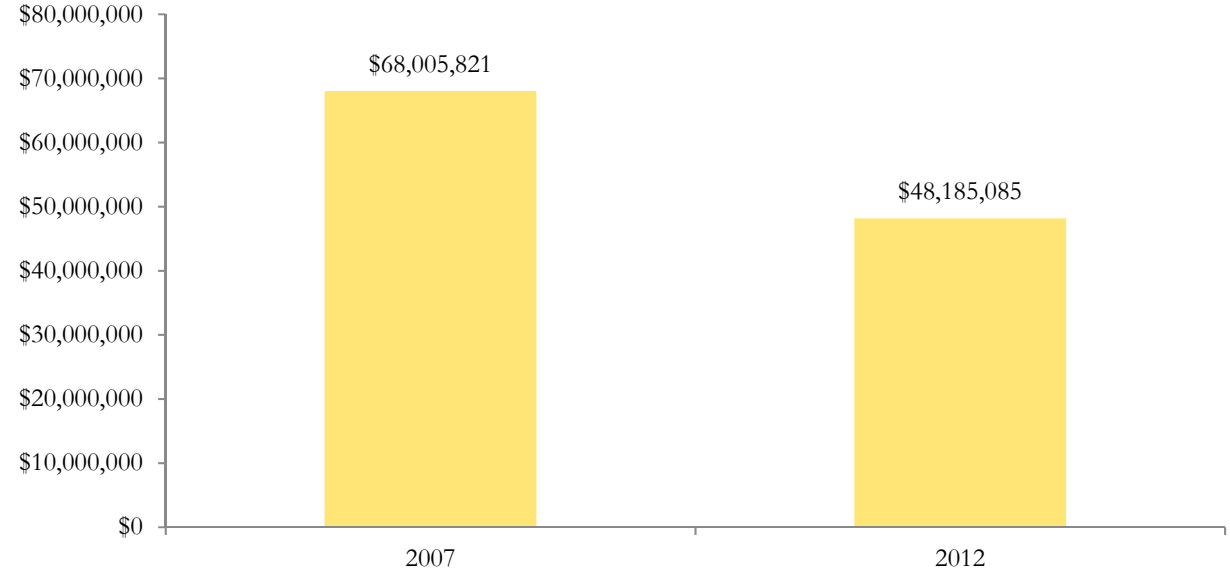
Exhibit 7.5 – Missouri Nursery Sales, 2007 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Floriculture sales data for Missouri were only reported in 2007 and 2012. Exhibit 7.6 indicates that sales declined from 2007 to 2012. In 2007, the state's floriculture sales were roughly $68 million. In contrast, 2012 sales exceeded $48.1 million. Thus, total sales constricted by roughly $20 million during the observed period (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.6 – Missouri Floriculture Sales, 2007 and 2012

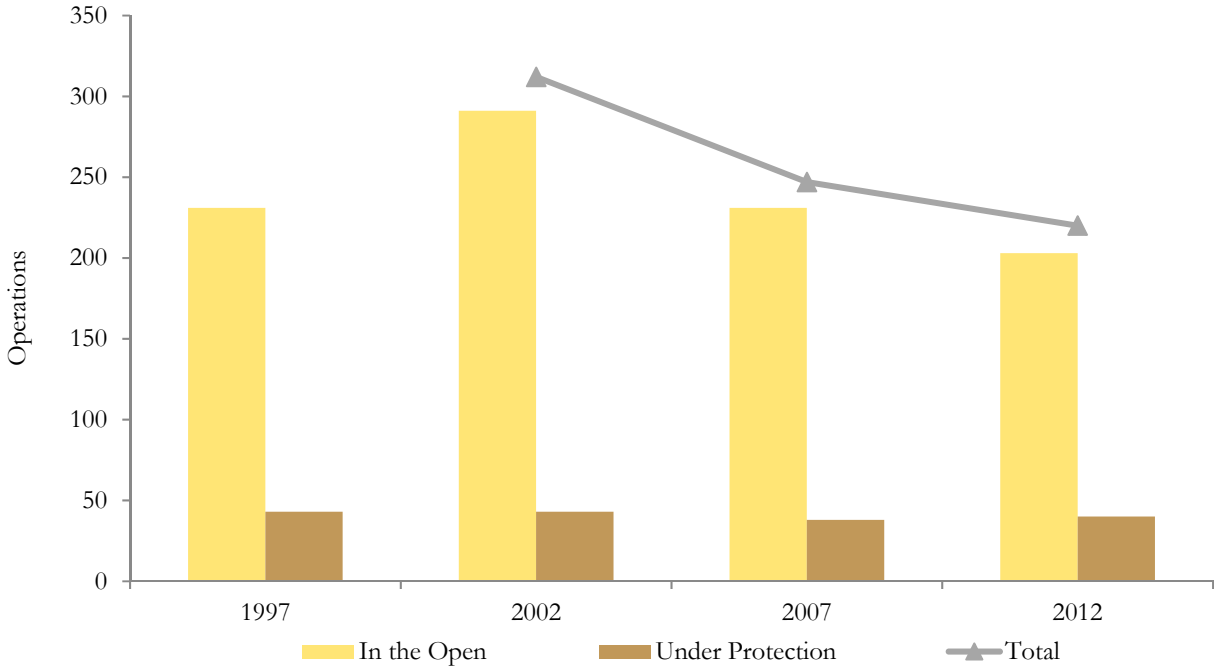


Source: USDA, National Agricultural Statistics Service (2017b)

In terms of nursery crop operations, Exhibit 7.7 summarizes the count that used area in the open and the count that used area under protection to raise nursery crops from 1997 to 2012. It also illustrates the trend in total Missouri nursery operations. During the observed period, fewer Missouri operations used area under protection than area in the open for growing nursery crops, and the total operation count maintained a downward trend. In 2012, 220 operations in Missouri shared that they had nursery area in production. Of the total, 203 operations shared that they used area in the open, and 40 operations grew at least some nursery crops under protection (USDA National Agricultural Statistics Service 2017b).

Organic production has been rare among Missouri nursery operations. In 2008, one nursery operation with area in production shared that it had exempt organic production. By 2014, the count increased to two operations with exempt organic production (USDA National Agricultural Statistics Service 2017b). For a definition of exempt and certified organic, see the Methodology section.

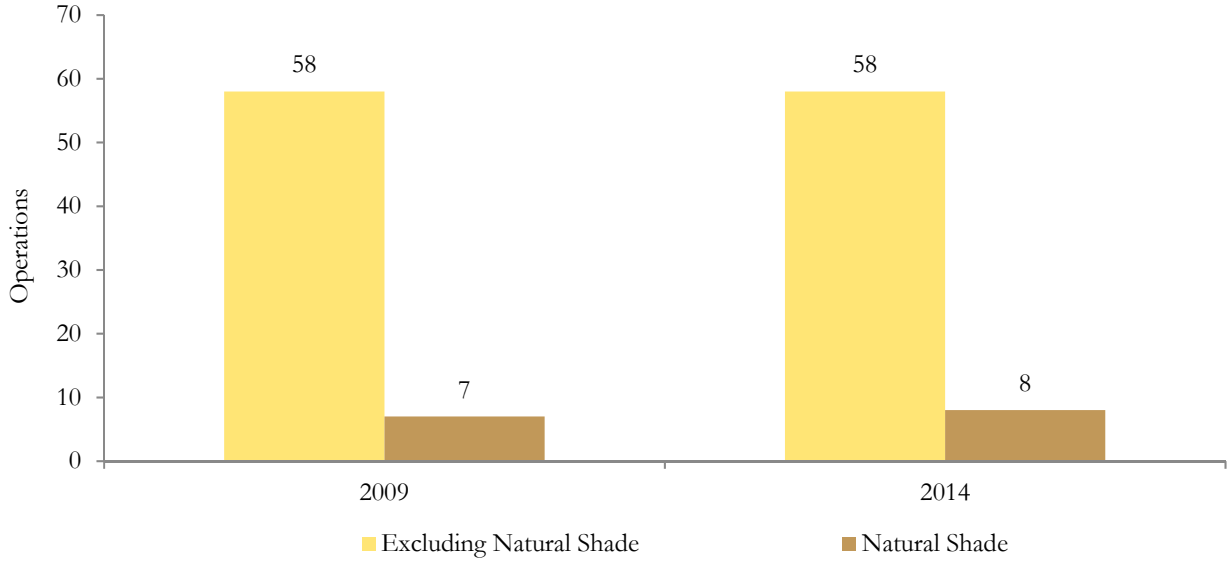
Exhibit 7.7 – Missouri Operations with Nursery Production Area, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The Missouri operations that have used area in the open to produce nursery crops most frequently have chosen open areas without natural shade rather than those with natural shade. Exhibit 7.8 presents the count of Missouri nursery operations with in-the-open production area in 2009 and 2014 according to whether they used natural shade areas or areas without natural shade. During both years, 58 operations reported using areas other than those with natural shade to raise nursery crops. In 2014, just eight operations shared that they used naturally shaded areas. That was an increase from seven operations in 2009 (USDA National Agricultural Statistics Service 2017b).

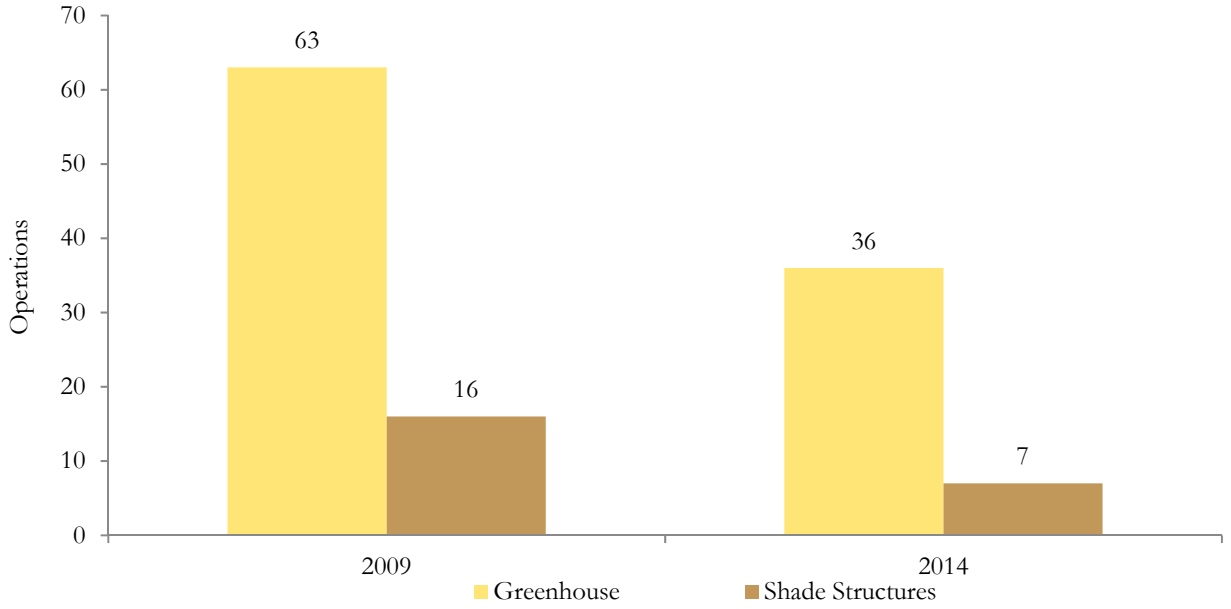
Exhibit 7.8 – Missouri Nursery Operations with In-the-Open Production Area, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Operations that have used area under protection to produce nursery crops more commonly have created those protected areas with greenhouses relative to shade structures. Exhibit 7.9 shares the count of operations with production area under protection according to whether the operations used greenhouses or shade structures in 2009 and 2014. Note that the operation count for both categories decreased between 2009 and 2014. In 2014, Missouri had 36 operations raise nursery crops in greenhouses relative to seven operations that used shade structures (USDA National Agricultural Statistics Service 2017b).

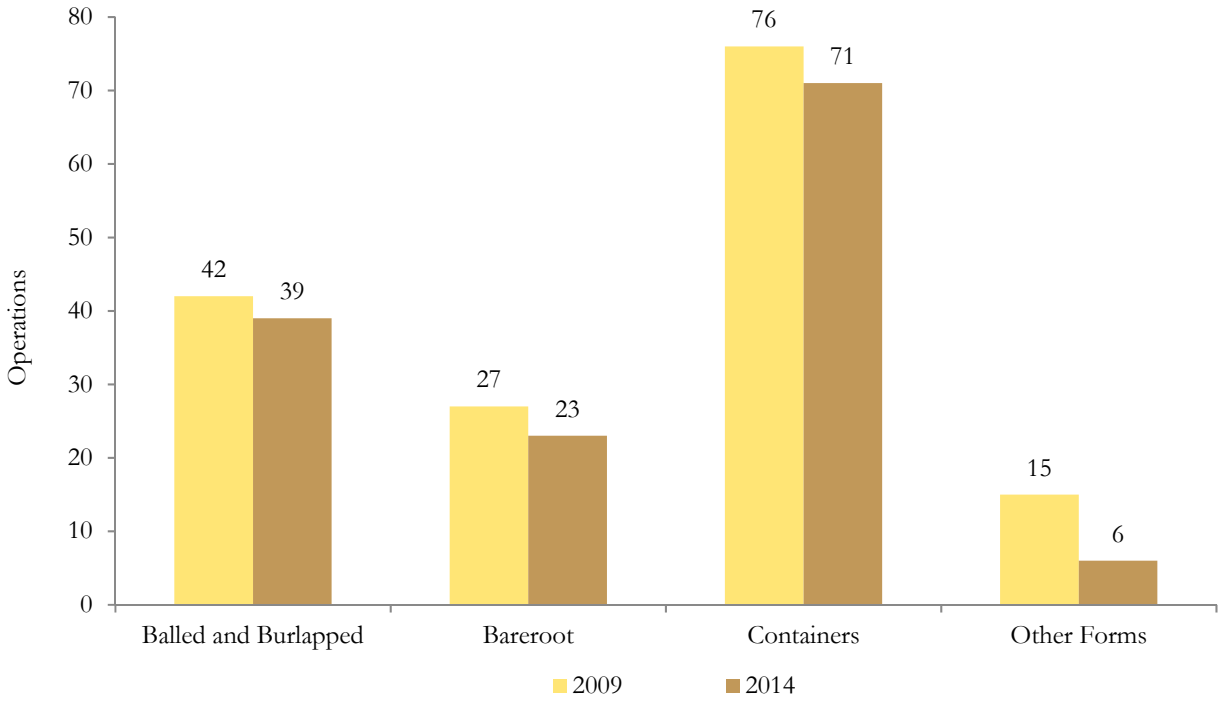
Exhibit 7.9 – Missouri Nursery Operations with Production Area Under Protection, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri nursery operations — and the overall nursery marketplace — also appear to have preferences for the form of nursery products sold. Form refers to whether the nursery crop is sold as a balled and burlapped plant, bareroot plant, container plant or other form of plant. Exhibit 7.10 articulates the count of Missouri operations reporting sales by form in 2009 and 2014. During these observed years, Missouri operations were most likely to sell nursery plants in containers. Balled and burlapped plants and bareroot plants were the second and third most popular among Missouri nursery operations, respectively. Note, however, that each form category experienced a decline in operation count from 2009 to 2014. In 2014, 71 operations sold container plants, 39 operations sold balled and burlapped plants, 23 operations sold bareroot plants, and six operations sold other forms of plants (USDA National Agricultural Statistics Service 2017b).

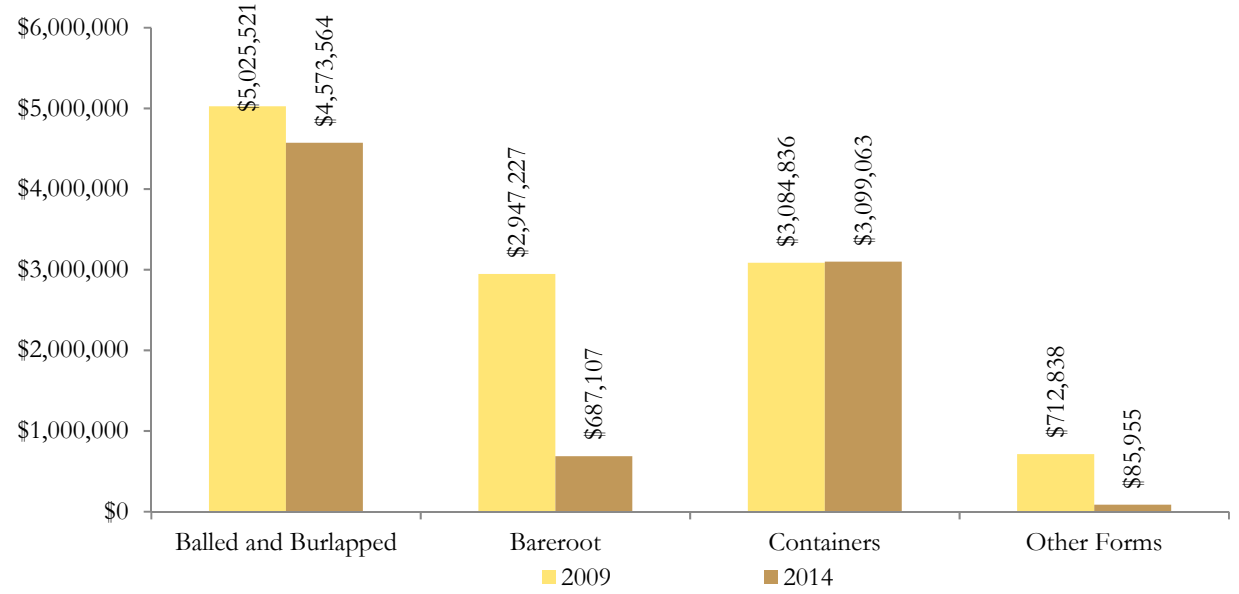
Exhibit 7.10 – Missouri Nursery Operations by Form of Product Sold, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Sales data, on the other hand, illustrate that balled and burlapped plants contributed the most to overall Missouri nursery sales in past years, and container sales followed. Exhibit 7.11 presents Missouri nursery sales in 2009 and 2014 by product form. For most forms — balled and burlapped, bareroot and other — sales declined between 2009 and 2014. The drop was most significant for bareroot plants. Conversely, container sales experienced a slight sales uptick between 2009 and 2014 (USDA National Agricultural Statistics Service 2017b).

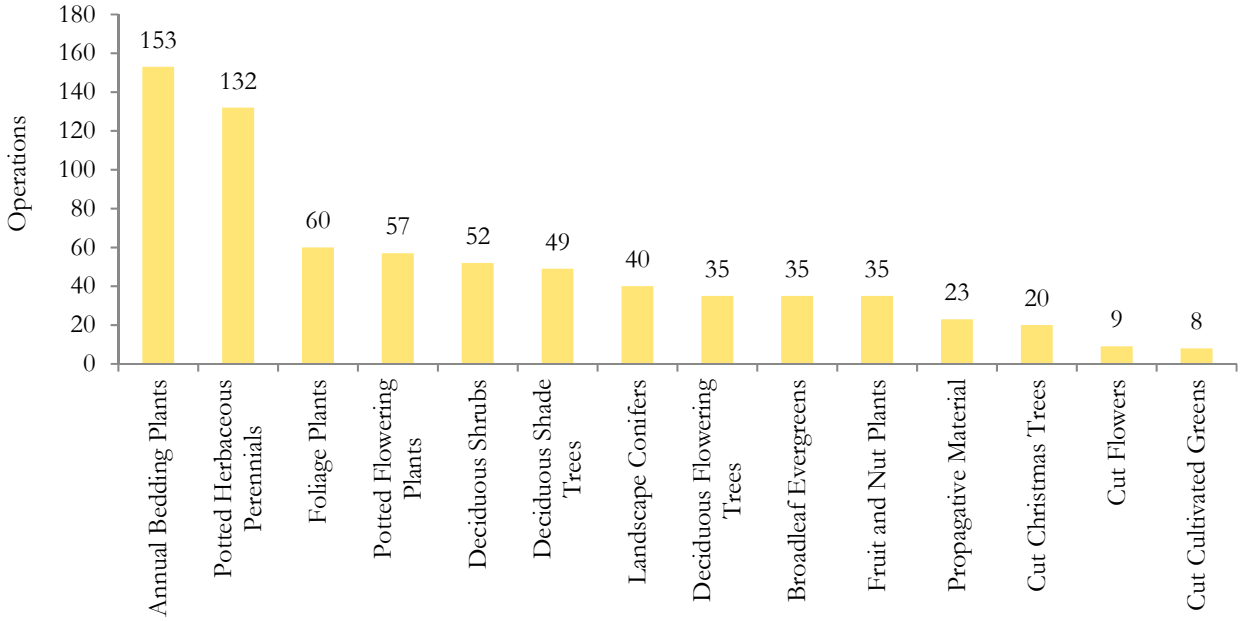
Exhibit 7.11 – Missouri Nursery Sales by Form of Product Sold, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.12 shares the number of Missouri operations reporting sales of the nursery crops named in the specialty crop definition. Annual bedding plants, 153 operations, and potted herbaceous perennials, 132 operations, had the greatest count of operations reporting sales in 2014. Nursery operations also fairly commonly reported selling foliage plants, 60 operations; potted flowering plants, 57 operations; deciduous shrubs, 52 operations; and deciduous shade trees, 49 operations (USDA National Agricultural Statistics Service 2017b).

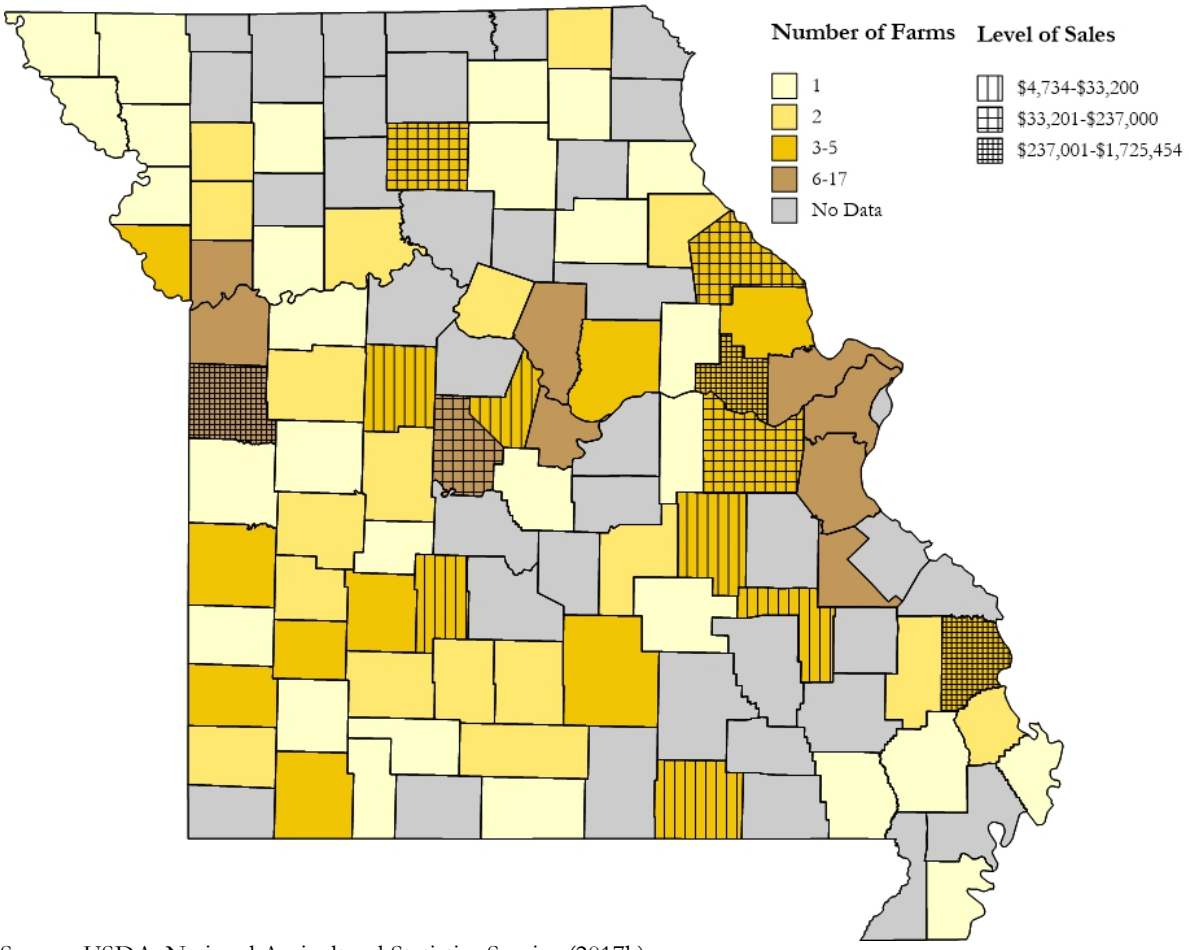
Exhibit 7.12 – Missouri Nursery Operations with Sales by Plant Type, 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Counties with the most nursery operations that had area in production during 2012 were St. Louis County, 17 operations; Jackson County, 10 operations; and Jefferson County, nine operations. Exhibit 7.13 shades Missouri counties according to their count of nursery operations with area in production during 2012. The map also shares nursery operations sales for counties with those data available. Sales values were highest in Warren County, $1,725,454, and Cass County, $1,098,000, during 2012. Note that counties near metropolitan areas tended to support a greater number of nursery operations (USDA National Agricultural Statistics Service 2017b). Industry insiders suspect that some of the large-scale nurseries in Missouri may not be reflected in the data due to USDA disclosure policies or separate out of state production.

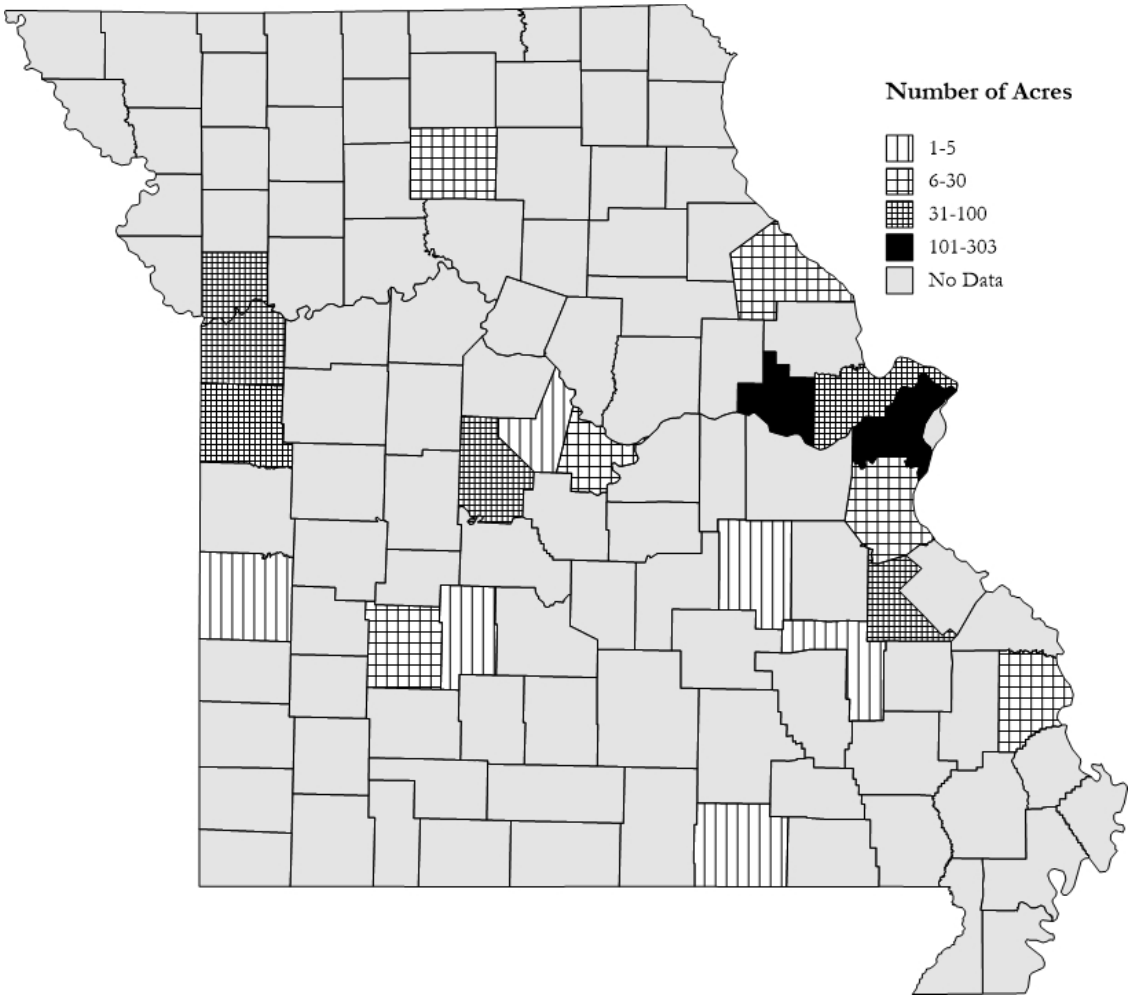
Exhibit 7.13 – Missouri Nursery Operations with Production Area and Sales by County, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

As indicated previously, nursery operations may choose from production area that's in the open and area that's under protection. Exhibit 7.14 shades Missouri counties according to the acreage in the open that they used to produce nursery crops. In 2012, counties that led in their in-the-open acreage dedicated to nursery production were Warren County, 303 acres; St. Louis County, 126 acres; Jackson County, 83 acres; and St. Charles County, 70 acres. USDA withheld acreage data for some counties (USDA National Agricultural Statistics Service 2017b).

*Exhibit 7.14 – Missouri Nursery Operations with Production Area In the Open by County, 2012**



* Data were withheld for Adair, Andrew, Atchison, Barry, Benton, Bollinger, Boone, Buchanan, Butler, Callaway, Carroll, Cedar, Christian, Clinton, Dade, Daviess, DeKalb, Dent, Douglas, Franklin, Gasconade, Greene, Henry, Holt, Howard, Jasper, Johnson, Knox, Lafayette, Lawrence, Lincoln, Macon, Marion, Miller, Mississippi, Monroe, Montgomery, Nodaway, Ozark, Pemiscot, Pettis, Phelps, Platte, Ralls, Ray, Scotland, Scott, St. Clair, Stoddard, Stone, Webster and Wright counties.
Source: USDA, National Agricultural Statistics Service (2017b)

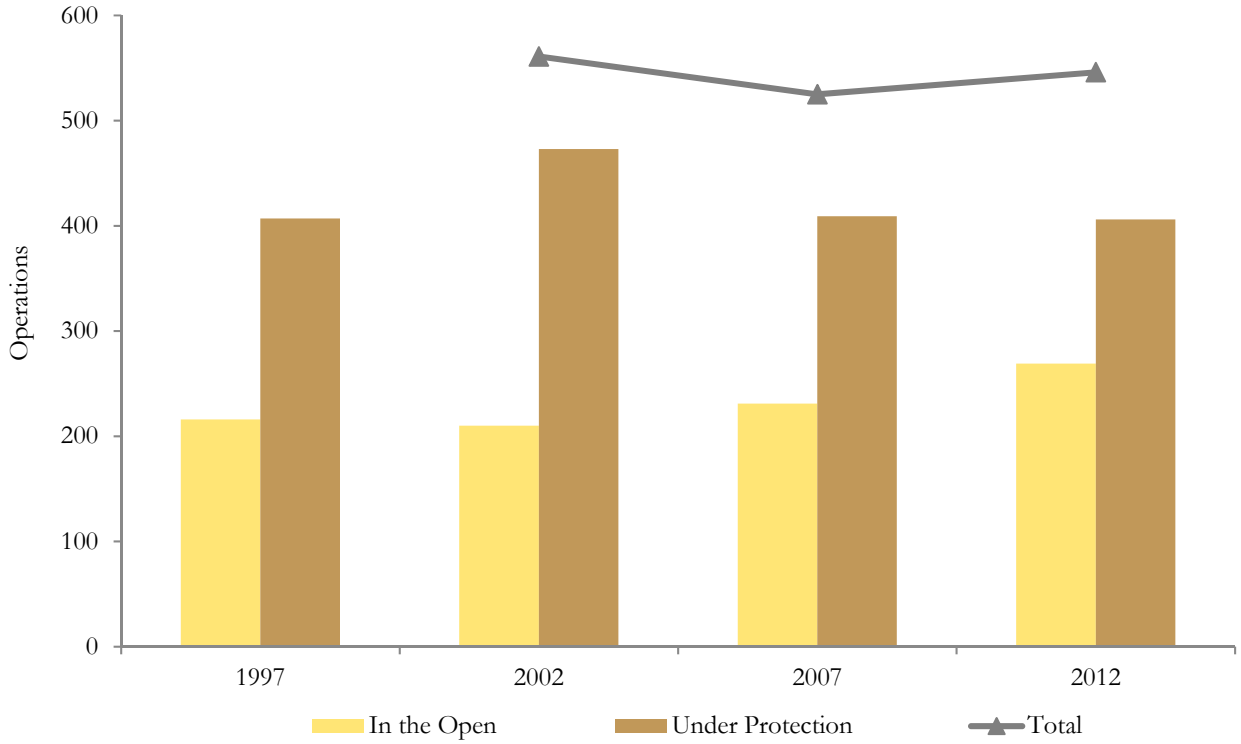
Operations that raise nursery crops under protection measure their production area in square feet. In 2012, square footage in nursery production was released for just two counties. Platte County reported 6,570 square feet in nursery production area under protection, and the area totaled 5,032 square feet for Morgan County. For other counties with nursery production area under protection, the area data were withheld in order to protect information for individual operations (USDA National Agricultural Statistics Service 2017b).

In 2012, Missouri was home to 546 floriculture operations with area in production. See Exhibit 7.15. As illustrated, the total floriculture operation count fluctuated only slightly between 2002 and 2012. The chart also shares the number of operations that have used area in the open and area under protection for floriculture production purposes. More Missouri operations have opted for using area

under protection relative to area in the open, though the count using area in the open did grow during the observed period. During 2012, 406 operations noted using area under protection for raising floriculture products, and 269 operations used area in the open (USDA National Agricultural Statistics Service 2017b).

To an small extent, Missouri floriculture operations have adopted certified organic production. In 2016, three operations indicated that they sold certified organic floriculture products (USDA National Agricultural Statistics Service 2017b).

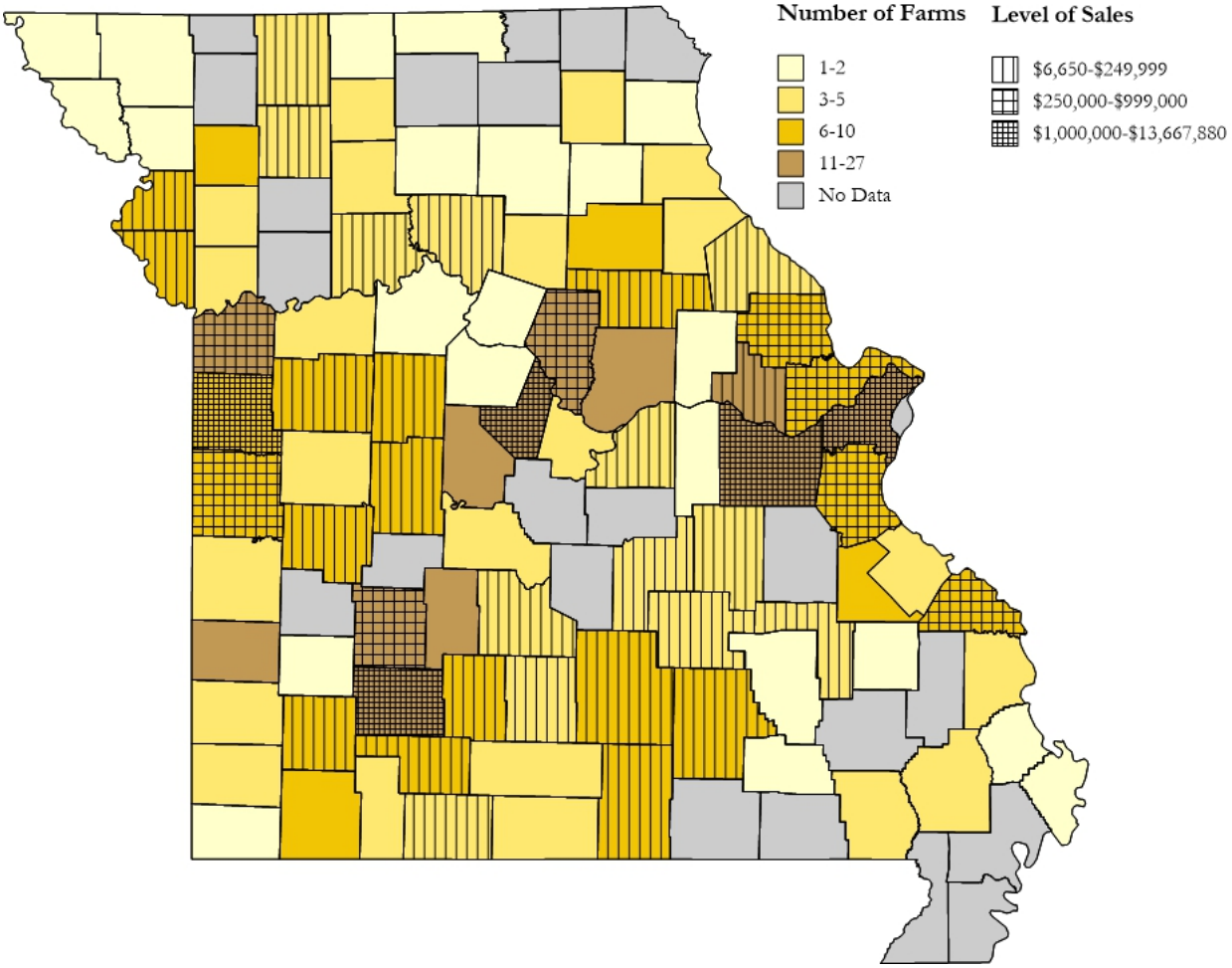
Exhibit 7.15 – Missouri Operations with Floriculture Production Area, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

During 2012, Missouri counties reporting the greatest number of floriculture operations with production area were Moniteau County, 27 operations; Morgan County, 21 operations; and Greene County, 20 operations. Exhibit 7.16 shades counties according to their number of floriculture operations with production area. It also highlights counties according to their floriculture sales. Floriculture sales from 2012 were highest in Cass County, $13,667,880, and St. Louis County, $9,241,700 (USDA National Agricultural Statistics Service 2017b).

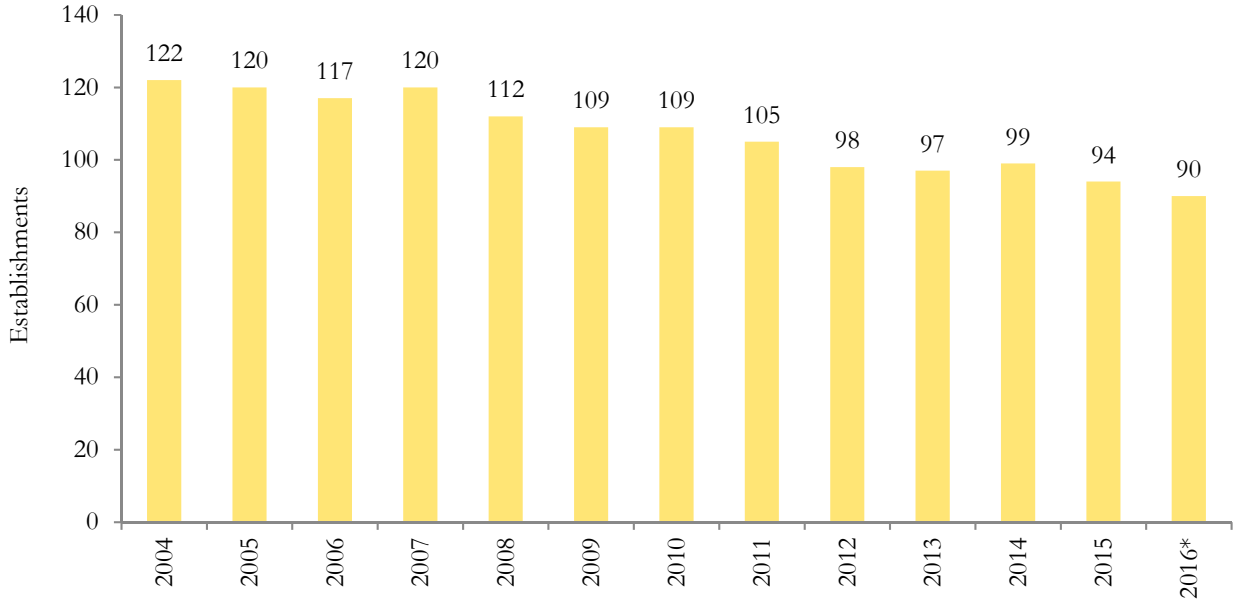
Exhibit 7.16 – Missouri Floriculture Operations with Production Area and Sales by County, 2012



Source: USDA, National Agricultural Statistics Service (2017b)

The Bureau of Labor Statistics reports key data points that describe Missouri's nursery and floriculture industry in terms of employees, wages and number of establishments. Exhibit 7.17 shares the number of Missouri nursery and floriculture establishments from 2004 to 2016. Note that data for 2001 to 2003 weren't disclosed, and the 2016 data point was preliminary. The exhibit indicates that the establishment count steadily declined between 2004 and 2016. In 2004, 122 operations were classified in the Missouri nursery and floriculture industry, which is noted in the NAICS 11142 category. By 2016, 90 establishments were counted in the Missouri nursery and floriculture industry, according to preliminary data (Bureau of Labor Statistics 2017).

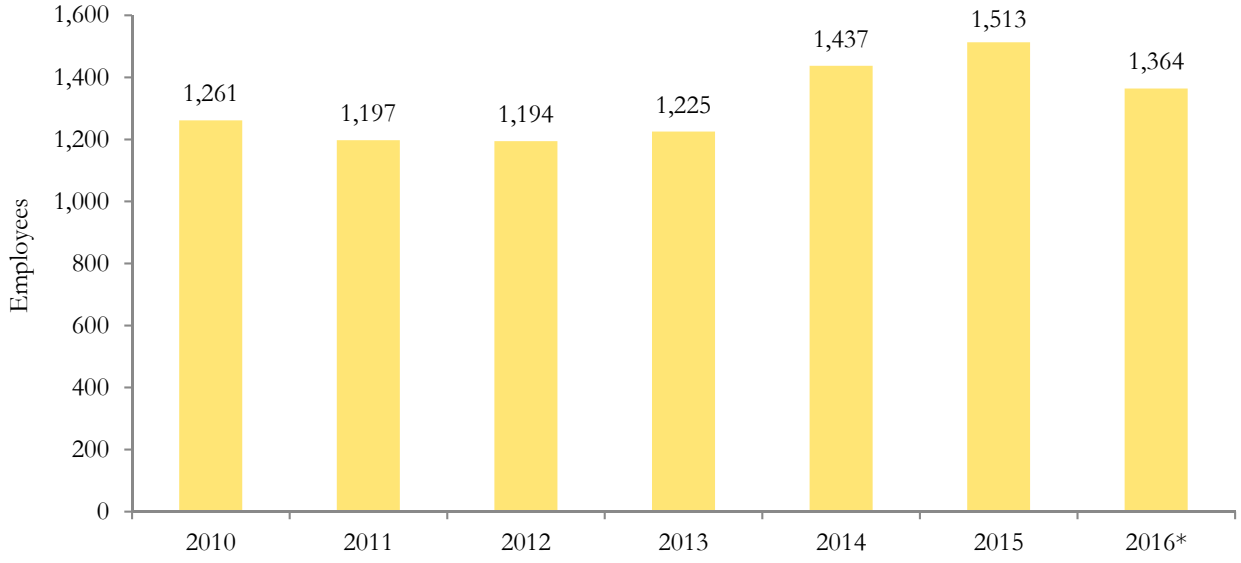
Exhibit 7.17 – Missouri Nursery and Floriculture Establishments, NAICS 11142, 2004 to 2016



* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

Despite the number of Missouri nursery and floriculture establishments declining, employment in the industry trended upward from 2010 to 2016; employment data weren't disclosed for 2001 to 2009. See Exhibit 7.18. In 2016, the Bureau of Labor Statistics reported that the industry employed 1,364 people. Note that the 2016 data were preliminary. In contrast, the state's nursery and floriculture industry employed 1,261 people in 2010 (Bureau of Labor Statistics 2017).

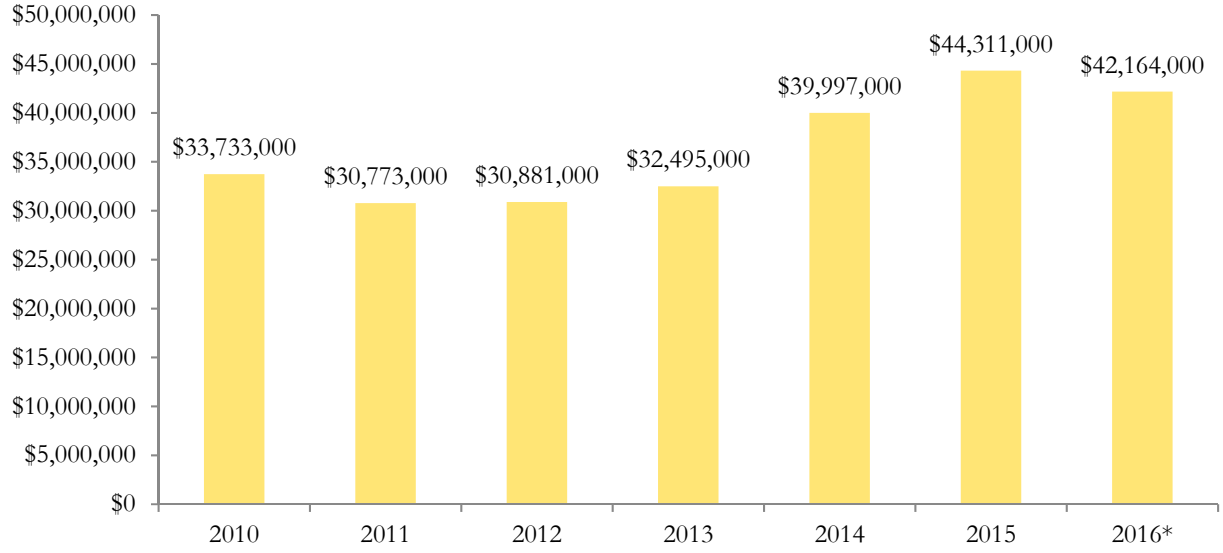
Exhibit 7.18 – Missouri Nursery and Floriculture Employment, NAICS 11142, 2010 to 2016



* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

Corresponding with the growth in Missouri nursery and floriculture industry employment, the industry has increased total wages paid to its workforce. Data from 2010 from 2016 were disclosed by the Bureau of Labor Statistics, and Exhibit 7.19 presents the data points by year. In 2016, total wages paid to Missouri nursery and floriculture industry workers exceeded $42.16 million, according to preliminary data. Of the years with data available, 2015 had the highest wages total, and total wages were at their lowest in 2011 (Bureau of Labor Statistics 2017).

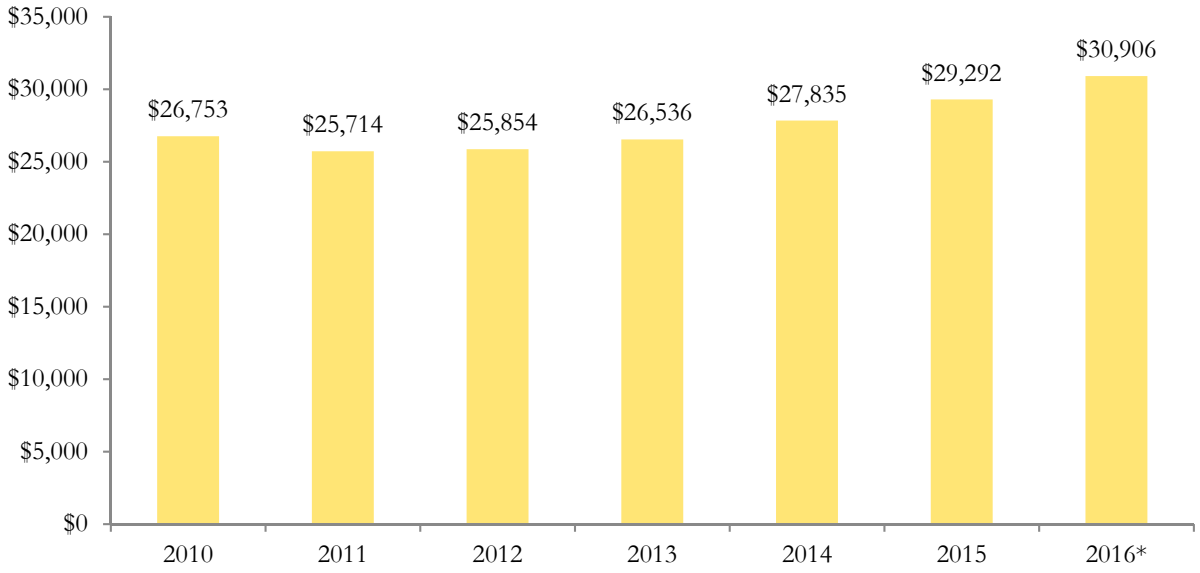
Exhibit 7.19 – Total Wages Paid by Missouri Nursery and Floriculture Establishments, NAICS 11142, 2010 to 2016



* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

On an annual average basis, Missouri nursery and floriculture employees earned $30,906 in 2016. Weekly, employee wages averaged $594 in 2016. Note that these 2016 averages are preliminary estimates released by the Bureau of Labor Statistics. Workers in the state's nursery and floriculture industry largely benefited from wage growth between 2010 and 2016. Exhibit 7.20 shares the trend in average annual pay from 2010 to 2016. Only in 2011 and 2012 did average annual pay dip lower than $26,000. It increased by 15.5 percent between 2010 and 2016 (Bureau of Labor Statistics 2017).

Exhibit 7.20 – Average Annual Pay by Missouri Nursery and Floriculture Establishments, NAICS 11142, 2010 to 2016



* Preliminary
Source: Department of Labor, Bureau of Labor Statistics (2017)

The following subsections describe Missouri's involvement in raising several types of nursery or floriculture products that are named in the USDA Agricultural Marketing Service specialty crop definition: 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.

7.1 Annual Bedding Plants

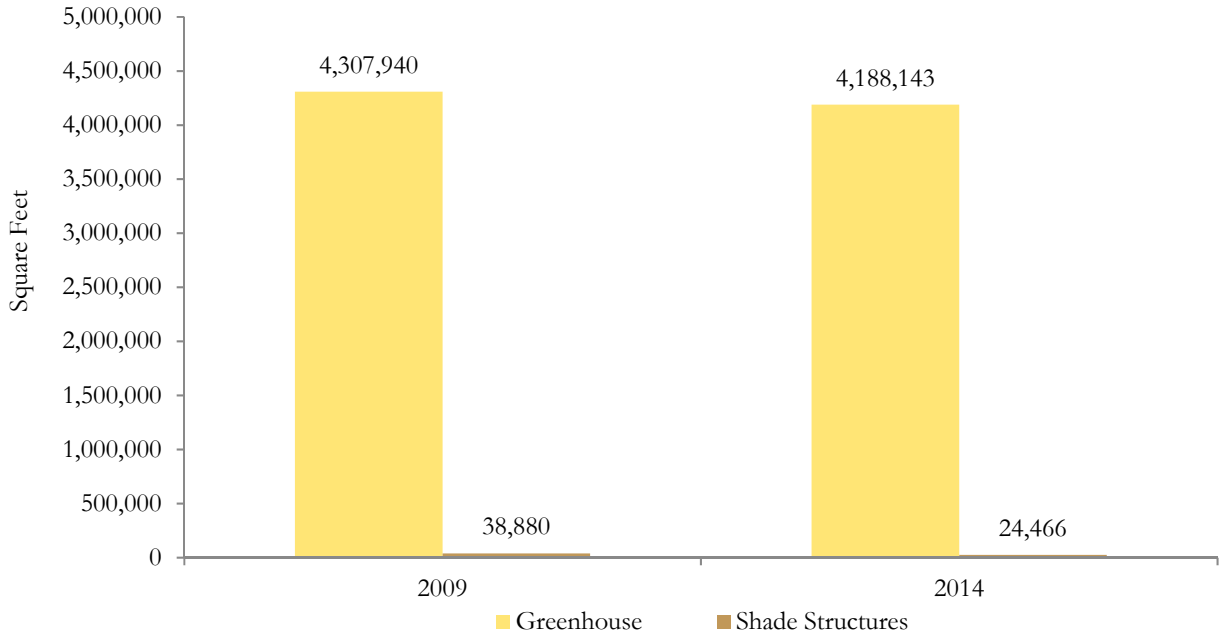
Raising annual bedding plants is one example of nursery or floriculture production in Missouri. The annual bedding plants category includes multiple flowering and foliar plants and vegetable transplants. Exhibit 7.1.1 names the specific plants included in the specialty crop definition. The bold font indicates that USDA has reported data for the particular annual bedding plant. The list mentions plants such as begonias, geraniums, marigolds and snapdragons.

Exhibit 7.1.1 – Annual Bedding Plants Included in Specialty Crop Definition[2]

Begonia	**Coleus**	**Dahlia**	**Geranium**
Impatiens	**Marigold**	**Pansy**	**Petunia**
Snapdragon	**Vegetable transplants**		

When growing annual bedding plants, producers may choose from producing plants under protection or in the open. As described earlier, under protection refers to circumstances when growers use greenhouses or shade structures to raise their plants. Exhibit 7.1.2 shares square footage used to raise annual bedding plants in either greenhouses or shade structures. Of the two, growers have been more likely to dedicate greenhouse square footage to produce annual bedding plants than shade structure area. In 2014, area used to produce annual bedding plants totaled more than 4.18 million square feet. By comparison, shade structures had just less than 24,500 square feet dedicated to producing annual bedding plants. Note that square footage for both declined between 2009 and 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.1.2 – Missouri Area Under Protection Used to Produce Annual Bedding Plants, 2009 and 2014

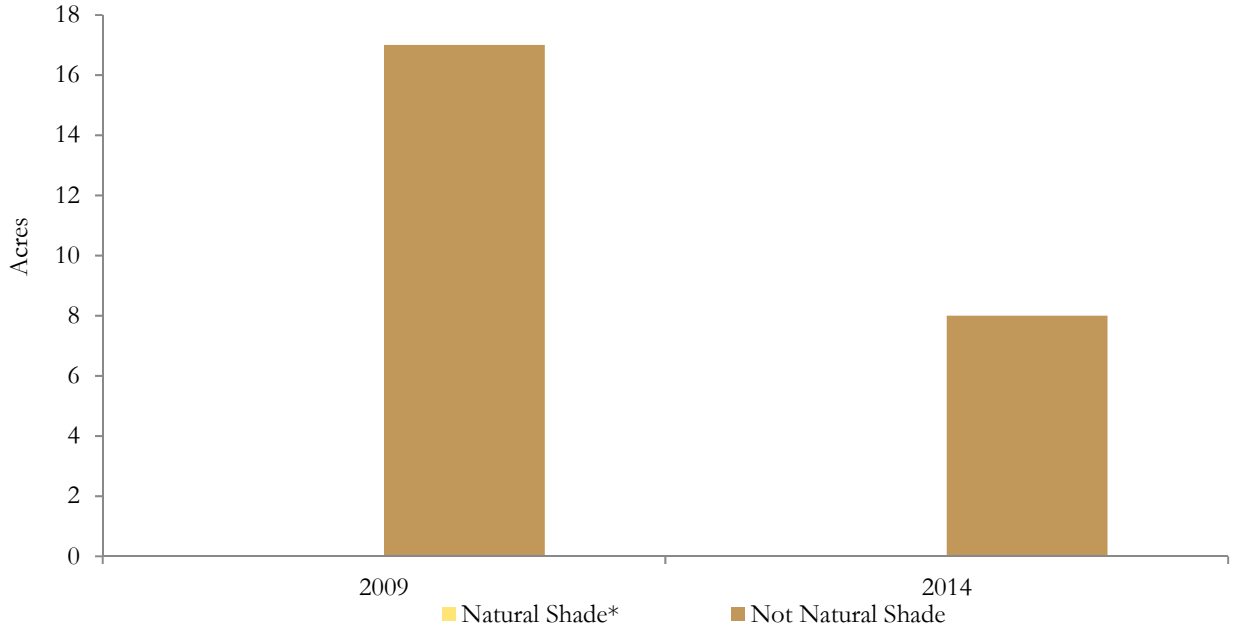


Source: USDA, National Agricultural Statistics Service (2017b)

[2] Note, the USDA Agricultural Marketing Service doesn't name all classes of annual bedding plants in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.1.1. When reporting totals for the annual bedding plant sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are ageratum, sweet alyssum, angelonia, cabbage and kale, caladium, calendula, calibrachoa, canna, celosia, cleome, cosmos, daisy, dianthus, dusty miller, fuchsia, gazania, gomphrena, lisianthus, lobelia, millet, nasturtium, nicotiana, osteospermum, pentas, pepper, poppy, portulaca, ranunculus, rudbeckia, salvia, scaevola, thunbergia, verbena, vinca, zinnia and "other classes" included by the USDA National Agricultural Statistics Service.

To grow annual bedding plants in the open, producers may choose to use natural shade or arrangements other than natural shade. Exhibit 7.1.3 highlights acreage for annual bedding plants grown in the open. As illustrated, acreage used to grow annual bedding plants in the open without natural shade declined between 2009 and 2014. Note that USDA withheld natural shade acreage in both years (USDA National Agricultural Statistics Service 2017b).

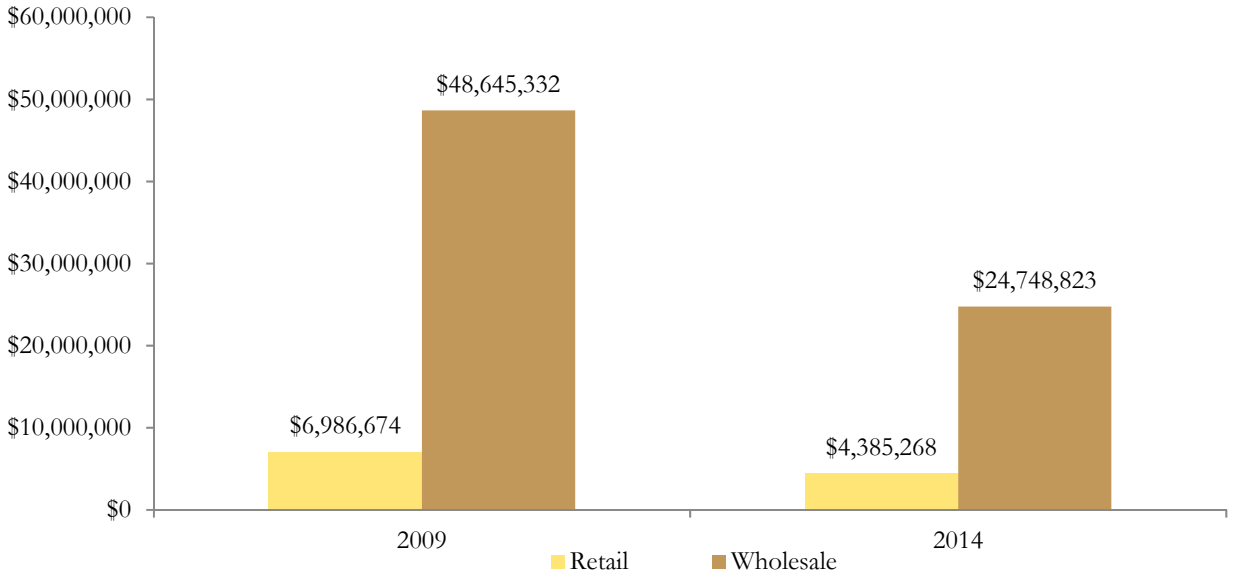
Exhibit 7.1.3 – Missouri Area In the Open Used to Grow Annual Bedding Plants, 2009 and 2014



* Data points for natural shade area in production were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

Sales of Missouri annual bedding plants dropped significantly between 2009 and 2014. The sales value totaled $55.6 million in 2009. By 2014, that sales value declined to $29.1 million. Of total Missouri annual bedding plant sales, most — more than 80 percent — occurred in the wholesale channel during recent years. Exhibit 7.1.4 shows retail and wholesale annual bedding plant sales totals from 2009 and 2014. In 2014, retail sales exceeded $4.38 million, and wholesale sales exceeded $24.74 million. Sales in both categories declined between 2009 and 2014. The drop was steeper for wholesale sales than retail sales (USDA National Agricultural Statistics Service 2017b).

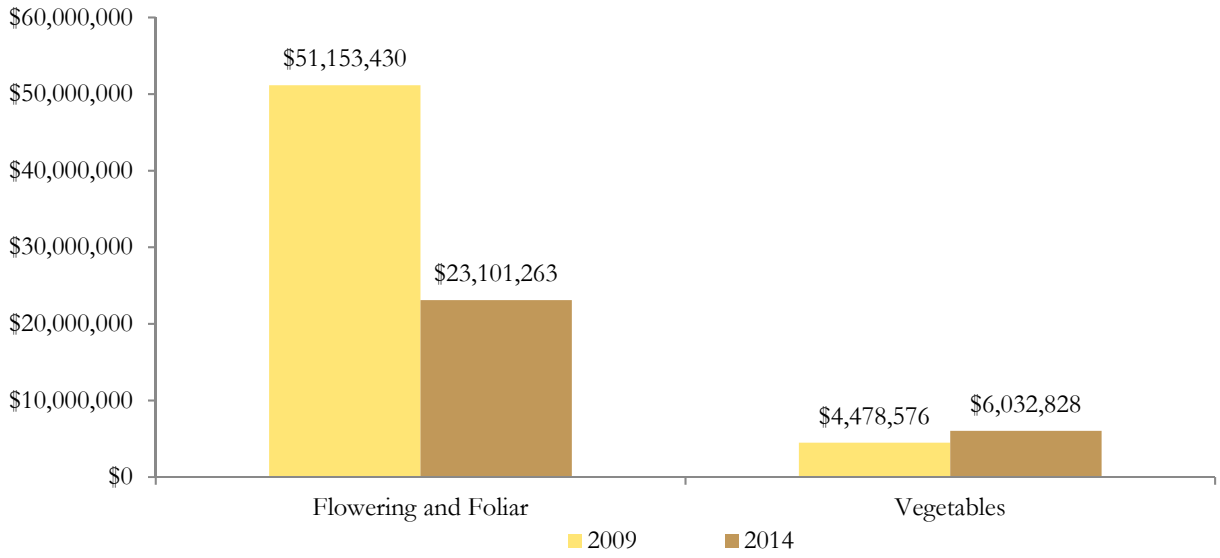
Exhibit 7.1.4 – Missouri Annual Bedding Plant Sales in Retail and Wholesale Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Annual bedding plants include both flowering and foliar plants and vegetable plants. Sales of flowering and foliar plants have trumped sales of vegetable plants in recent years. Exhibit 7.1.5 shares data from 2009 and 2014. Note that flowering and foliar plant sales decreased rather significantly from 2009 to 2014; however, vegetable plant sales increased. In 2014, flowering and foliar plant sales totaled $23.1 million relative to $51.1 million in 2009. Vegetable plant sales exceeded $6 million in 2014 but were roughly $4.48 million in 2009 (USDA National Agricultural Statistics Service 2017b).

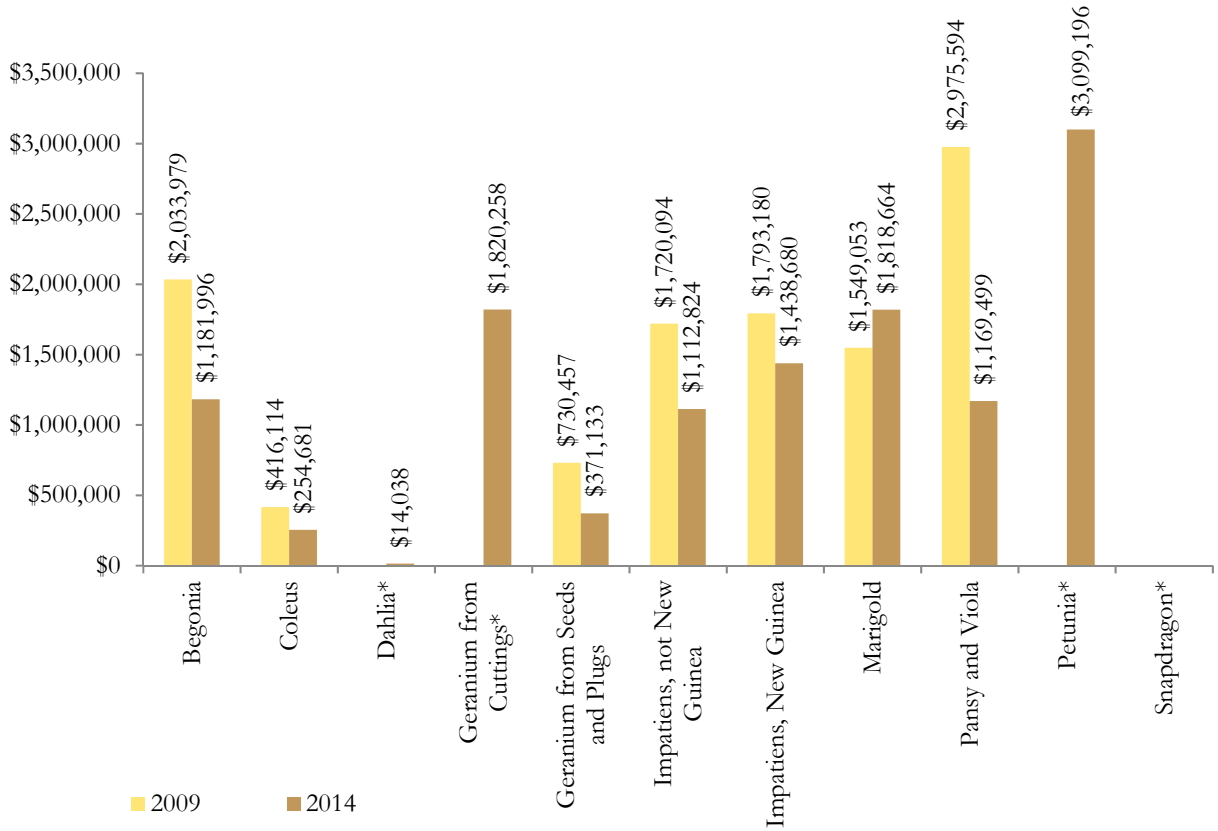
Exhibit 7.1.5 – Missouri Annual Bedding Plant Sales for Flowering and Foliar and Vegetable Plants, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

To further explore annual flowering and foliage bedding plant dollar sales, Exhibit 7.1.6 breaks down their sales by plant class. Petunias ranked first for total sales in 2014. Sales of geraniums from cuttings and marigolds ranked second and third, respectively. Of the plant classes with data reported in both years, marigolds were the only class noting a sales increase between 2009 and 2014. During this period, sales declines — measured as a percentage — were steepest for pansies and violas. Reductions were also fairly strong for geraniums from seeds and plugs and begonias. For some plant classes, sales data weren't reported in order to avoid disclosing data for individual operations. Those classes are marked with asterisks (USDA National Agricultural Statistics Service 2017b).

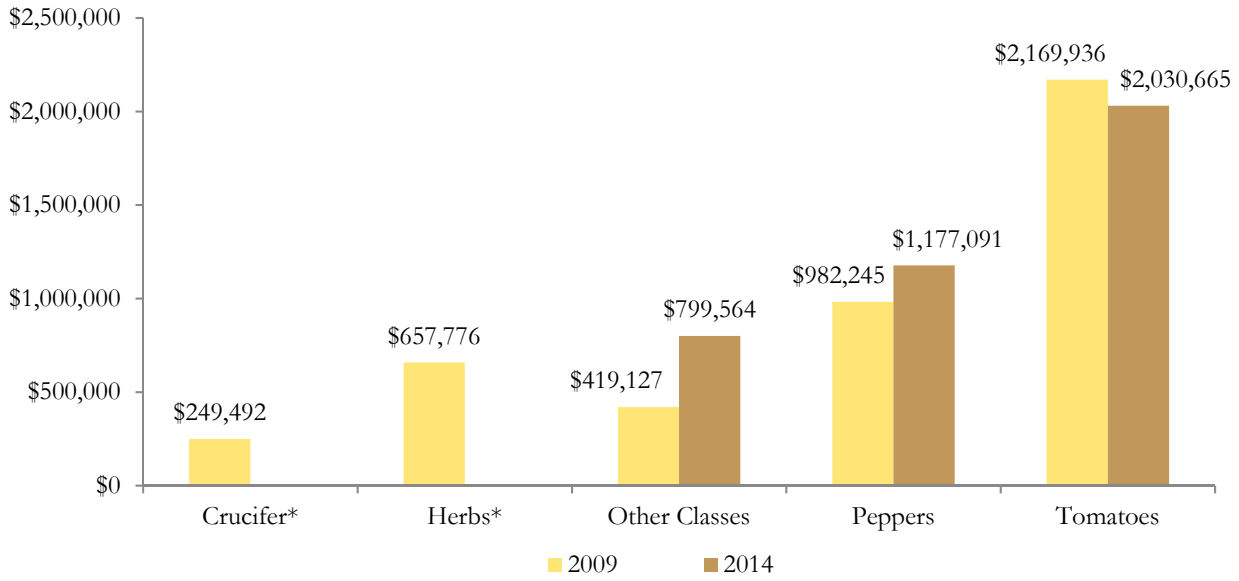
Exhibit 7.1.6 – Sales of Missouri Annual Flowering and Foliar Bedding Plants by Class, 2009 and 2014



* Data for dahlias, geraniums from cuttings and petunias were withheld in 2009. Snapdragon data were withheld in both 2009 and 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Vegetable plants can be further classified as crucifers, herbs, peppers, tomatoes and other. Exhibit 7.1.7 shows sales data for these classes in 2009 and 2014. By far, sales have been highest for tomato plants; however, tomato plant sales declined slightly from 2009 to 2014. Still, sales exceeded $2 million in 2014. Pepper plants ranked second in terms of dollar sales. For both pepper plants and other classes of vegetable plants, the sales value increased between 2009 and 2014. Note that crucifer plant and herb plant sales data weren't published in 2014 to avoid disclosing data for individual operations (USDA National Agricultural Statistics Service 2017b).

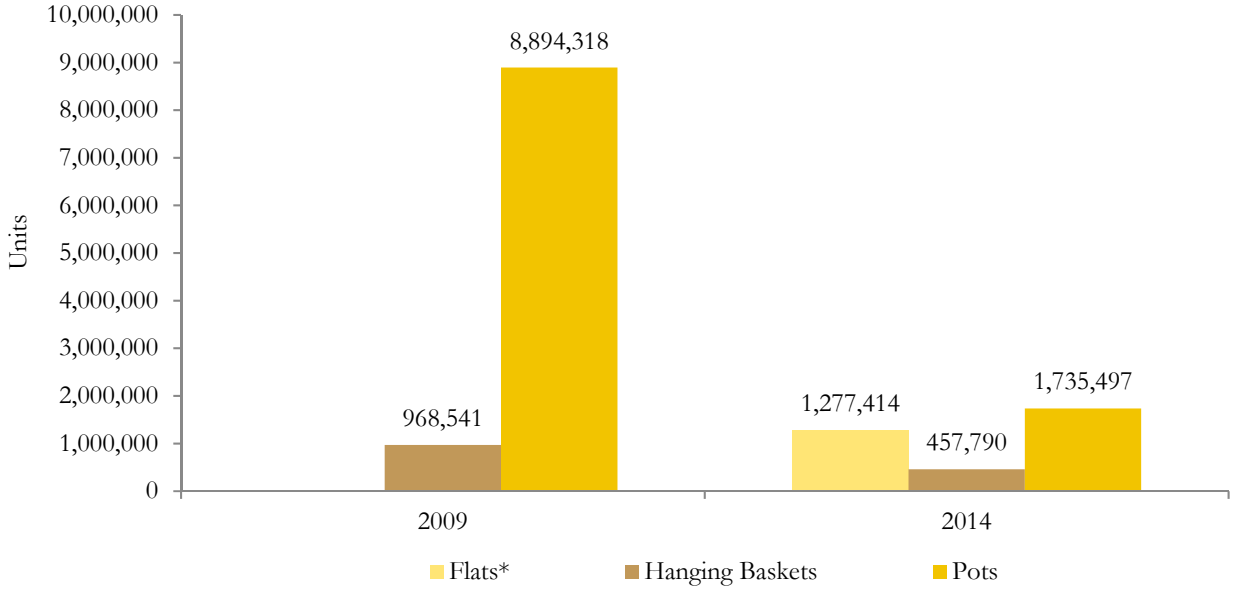
Exhibit 7.1.7 – Sales of Missouri Annual Vegetable Plants, 2009 and 2014



* Data for crucifers and herbs were withheld in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Producers may sell annual bedding plants in flats, hanging baskets or pots. Exhibit 7.1.8 presents the number of units sold of each type during 2009 and 2014. Units sold as hanging baskets and pots declined from 2009 to 2014; note that data for flats were withheld in 2009. In 2014, unit sales of pots exceeded sales of flats and hanging baskets. Sales totaled nearly 1.74 million pots, 1.28 million flats and 458,000 hanging baskets (USDA National Agricultural Statistics Service 2017b).

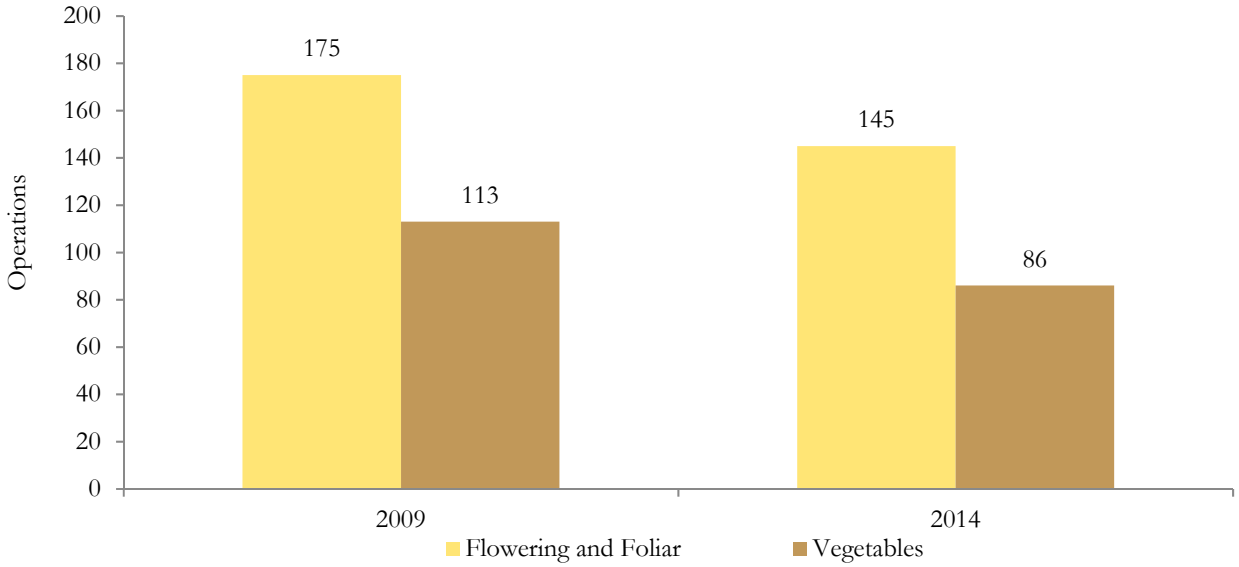
Exhibit 7.1.8 – Missouri Annual Bedding Plants Sales in Units, 2009 and 2014



* Data for flats were withheld in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

From an operations perspective, 153 farms in Missouri sold annual bedding plants in 2014. That count was a reduction from the 184 operations that sold annual bedding plants in 2009. To further articulate the state of Missouri's annual bedding plants industry, operations data take multiple forms. Exhibit 7.1.9 illustrates the change in operations selling flowering and foliar plants and vegetable plants from 2009 to 2014. For both categories, the number of operations making sales declined during the observed period. As a percentage, the operation count reduction was largest for operations selling vegetable plants. The chart shows that 145 operations sold flowering and foliar plants in 2014. Fewer operations — 86 in total — sold annual vegetable plants in 2014 (USDA National Agricultural Statistics Service 2017b).

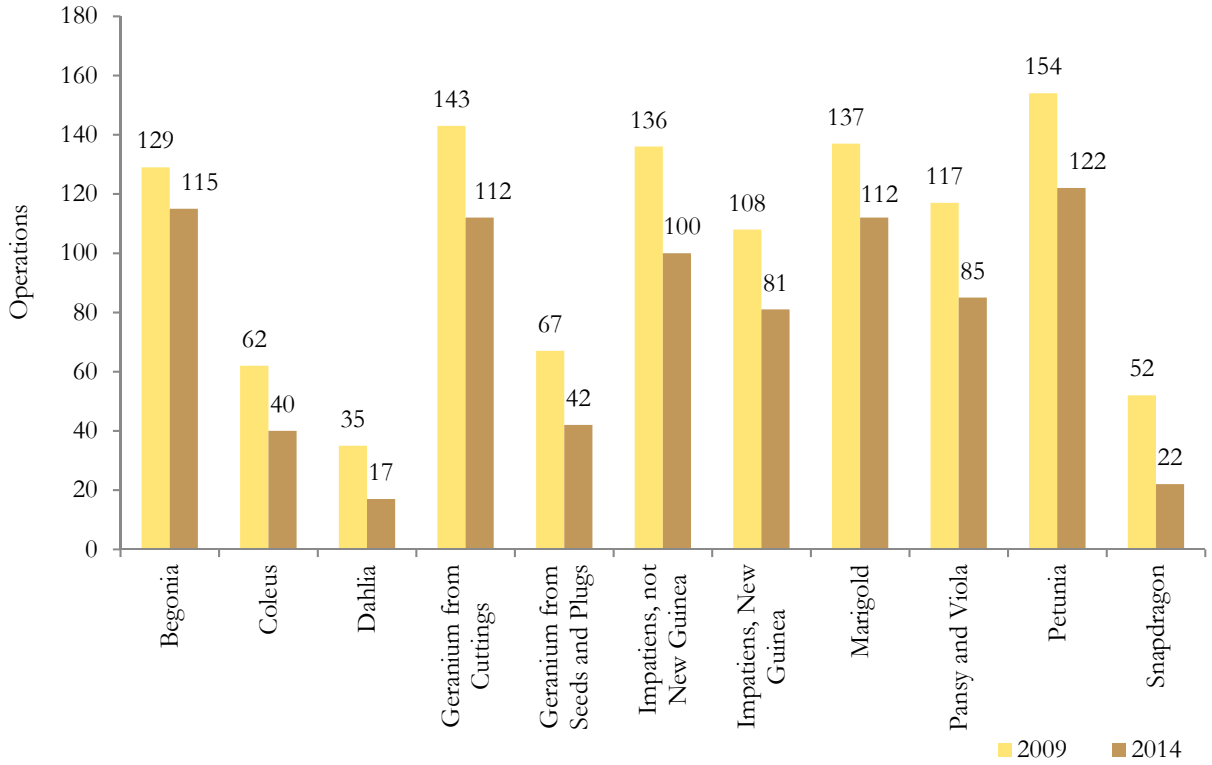
Exhibit 7.1.9 – Missouri Operations Selling Annual Flowering and Foliar Plants and Vegetable Plants, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

To specifically articulate operations growing various types of annual bedding plants, Exhibit 7.1.10 shares the count of operations selling flowering and foliar plants by plant class. Of the plant classes listed, operation counts were highest in 2014 for petunias, 122 operations; begonias, 115 operations; geraniums from cuttings, 112 operations; and marigolds, 112 operations. For all plant classes listed, the total number of operations selling plants in each respective class declined between 2009 and 2014 (USDA National Agricultural Statistics Service 2017b).

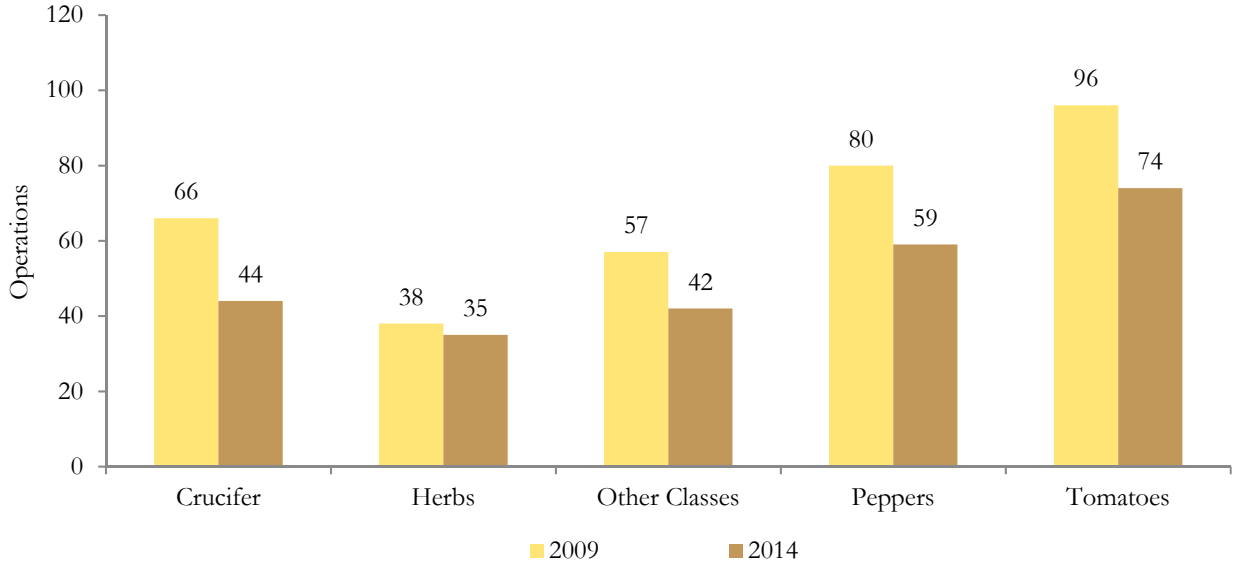
Exhibit 7.1.10 – Missouri Operations Selling Annual Flowering and Foliar Plants by Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Regarding operations selling vegetable plants, Exhibit 7.1.11 presents the number of operations reporting sales in 2009 and 2014 by vegetable plant class. During both 2009 and 2014, Missouri operations were most likely to sell tomato plants and pepper plants. Note the number of operations selling all classes of vegetable plants declined between 2009 and 2014 (USDA National Agricultural Statistics Service 2017b).

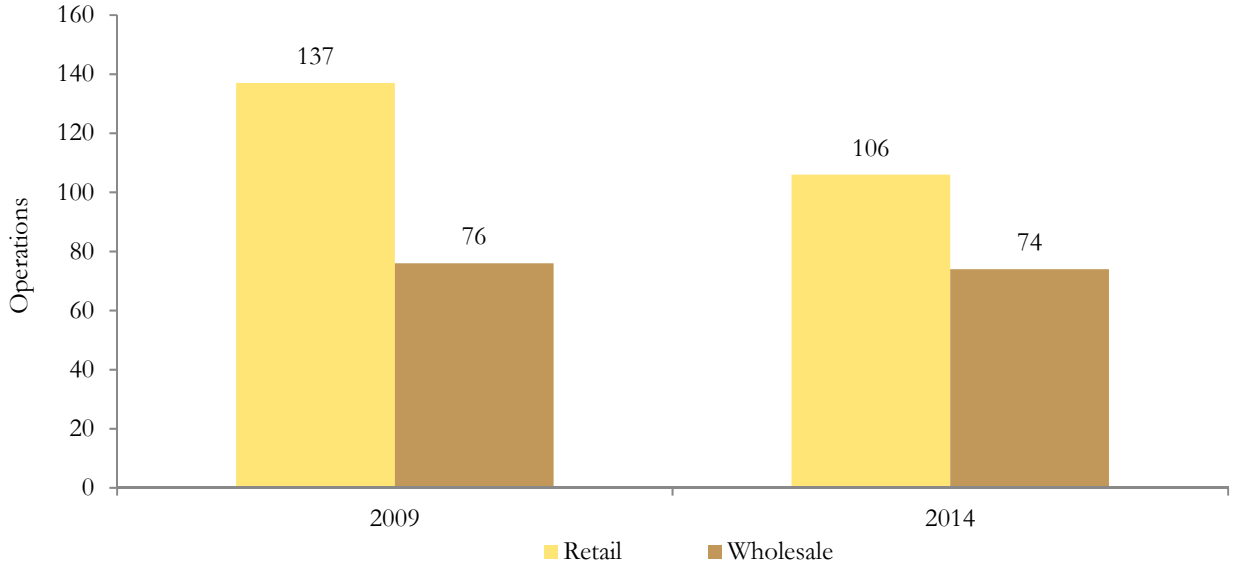
Exhibit 7.1.11 – Missouri Operations Selling Annual Vegetable Plants by Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Operations may also choose to sell annual bedding plants in wholesale or retail channels. Historically, more retail operations have existed than wholesale operations. Exhibit 7.1.12 charts the count of both retail and wholesale annual bedding plant operations in 2009 and 2014. It illustrates that 106 operations sold annual bedding plants at retail in 2014, and 74 operations sold annual bedding plants at wholesale. For comparison purposes, the number of operations selling annual bedding plants totaled 137 retail operations and 76 wholesale operations in 2009 (USDA National Agricultural Statistics Service 2017b).

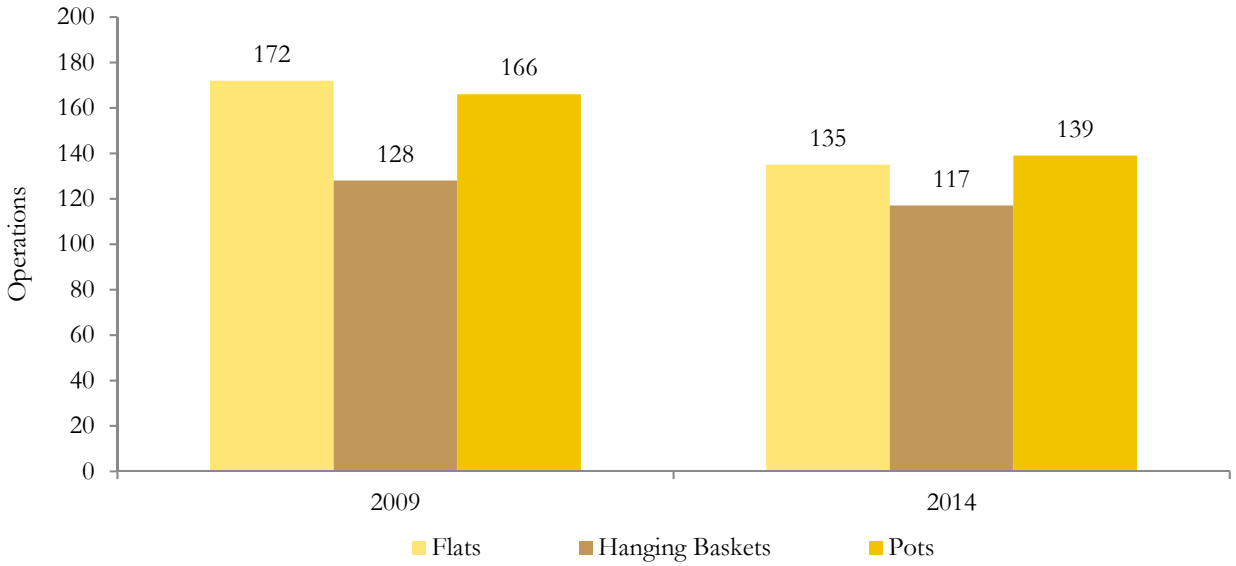
Exhibit 7.1.12 – Missouri Operations Selling Annual Bedding Plants in Retail and Wholesale Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Another data set quantifies the number of Missouri operations based on whether they sell annual bedding plants in flats, hanging baskets or pots. See Exhibit 7.1.13 for a visual summary of Missouri operation counts from 2009 and 2014. During 2014, 139 operations reported that they sold annual bedding plants in pots. The number selling flats of annual bedding plants totaled 135 operations. Slightly fewer operations — 117 enterprises — sold annual bedding plants in hanging baskets. In contrast to 2014, Missouri annual bedding plant operations in 2009 were slightly more likely to sell flats than pots; the operation counts totaled 172 operations and 166 operations, respectively (USDA National Agricultural Statistics Service 2017b).

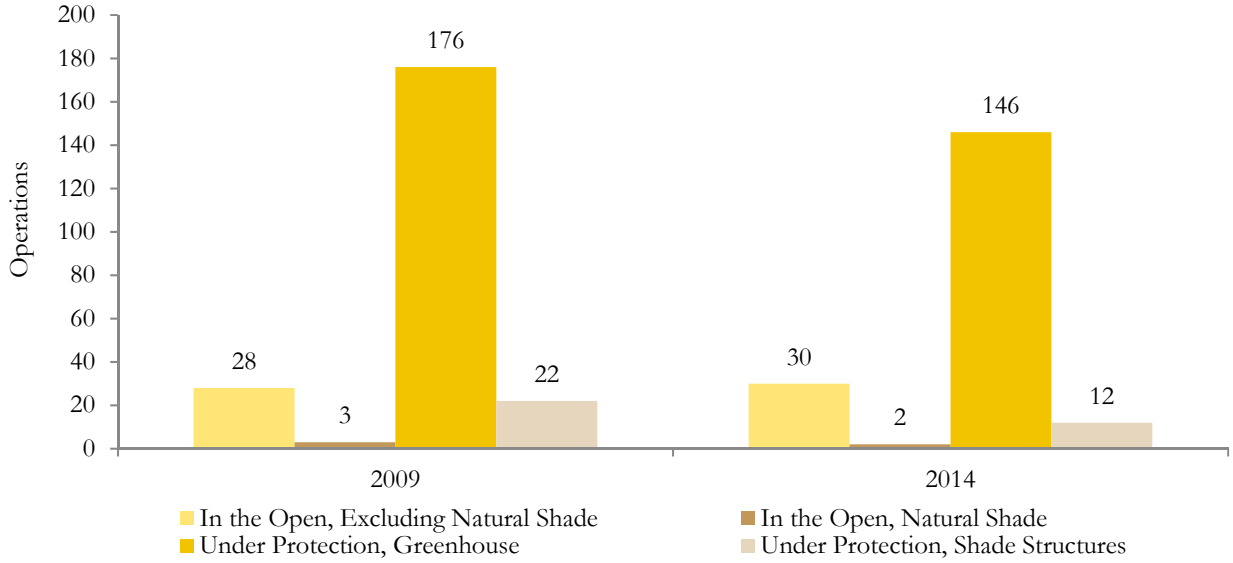
Exhibit 7.1.13 – Missouri Operations Selling Annual Flowering and Foliar Plants and Vegetable Plants, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Most commonly, Missouri annual bedding plant operations have produced their plants under protection using greenhouses. Exhibit 7.1.14 illustrates that 146 operations in Missouri grew annual bedding plants under protection with greenhouses in 2014. In the open, excluding natural shade followed in popularity; 30 operations reported producing annual bedding plants in the open without natural shade. Twelve operations grew annual bedding plants under shade structures, and two operations used natural shade in the open. Between 2009 and 2014, note that the number of operations increased only for those growing annual bedding plants in the open, excluding natural shade (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.1.14 – Production Type Used by Missouri Annual Bedding Plant Operations, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

7.2 Potted Flowering Plants

Potted flowering plants refer to those named in Exhibit 7.2.1. These plants include African violets, flowering bulbs, hydrangeas, poinsettias and roses. The bold type indicates that USDA has released data for each type of potted flowering plant listed in the table. The following discussion shares more about Missouri's role in producing and selling potted flowering plants.

Exhibit 7.2.1 – Potted Flowering Plants Included in Specialty Crop Definition[3]

African violet	**Azalea**	**Florist chrysanthemum**	**Flowering bulbs**
Hydrangea	**Lily**	**Orchid**	**Poinsettia**
Rose			

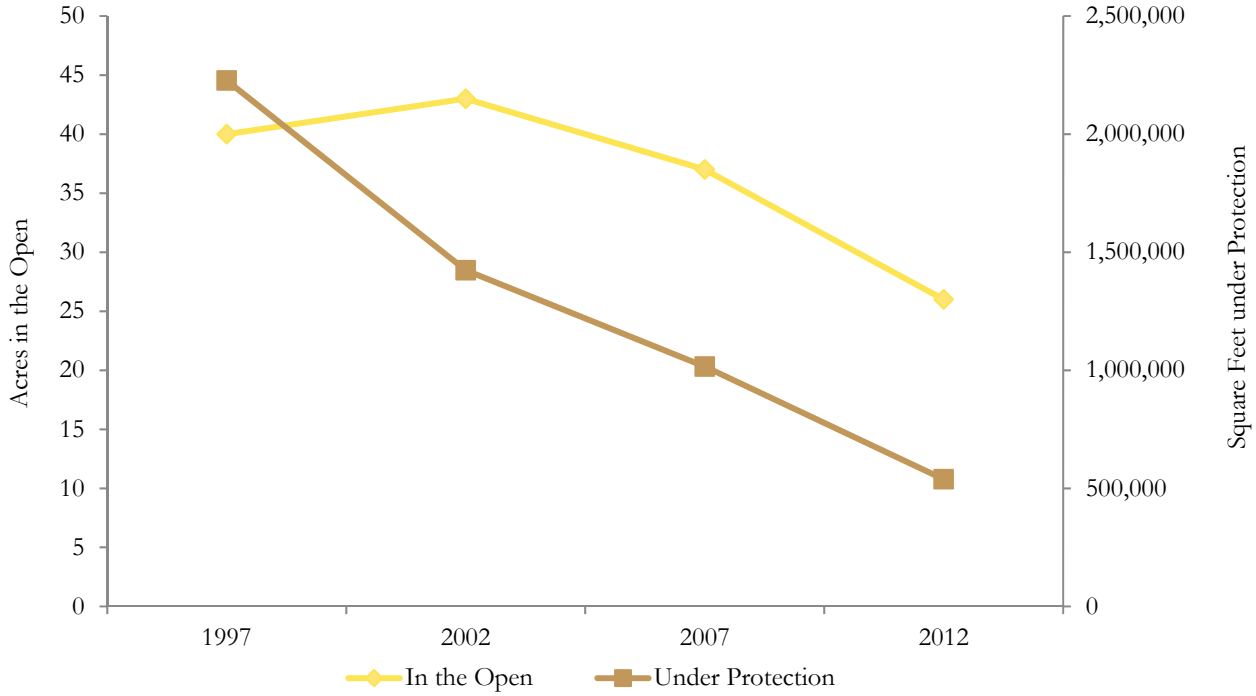
In terms of production area, Missouri potted flowering plant operations have grown such plants in the open and under protection. Again, under protection refers to both greenhouses and shade structures, and growing potted flowering plants in the open can take place in natural shade or in open areas other than those with natural shade. Exhibit 7.2.2 summarizes production area for Missouri potted flowering plants grown under protection and in the open. Note that area under

[3] Note, the USDA Agricultural Marketing Service doesn't name all classes of potted flowering plants in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.2.1. When reporting totals for the potted flowering plant sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are alstromeria, anthurium, begonia, bromeliad, cape primrose, cineraria, cyclamen, gerbera daisy, exacum, gardenia, gloxinia, hibiscus, kalanchoe, primula, regal pelargonium, sunflower, zygocactus and "other classes" included by the USDA National Agricultural Statistics Service.

protection is measured in square feet. Conversely, area in the open is measured in acres. Production area for both declined in recent years. In 2012, area under protection used to raise potted flowering plants surpassed 538,000 square feet. Area in the open totaled 26 acres (USDA National Agricultural Statistics Service 2017b).

Of the area under protection used to produce potted flowering plants in 2014, roughly 950,000 square feet was covered by a greenhouse. Data for area covered by a shade structure was withheld. Of the acreage in the open used to raise potted flowering plants, three acres in 2014 were in the open, excluding natural shade. Data for potted flowering plant production area in natural shade wasn't available (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.2.2 – Missouri Potted Flowering Plant Production Area, 1997 to 2012

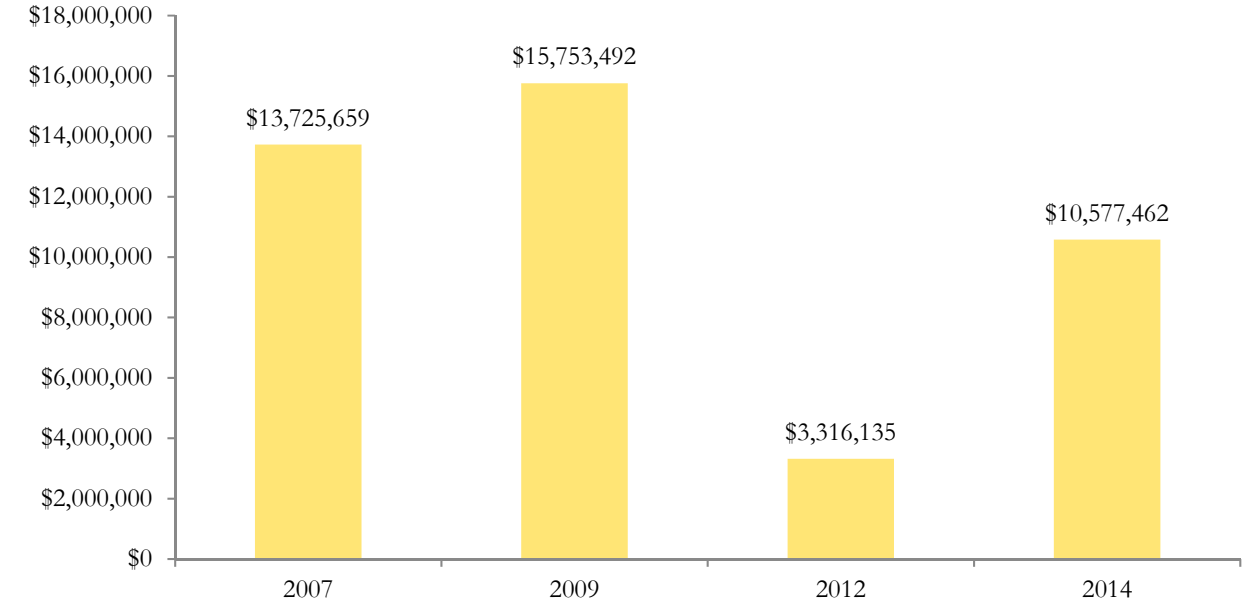


Source: USDA, National Agricultural Statistics Service (2017b)

With respect to potted flowering plant sales data, Exhibit 7.2.3 presents dollar sales for Missouri potted flowering plants. Of the four years reported, 2009 had the highest sales; they exceeded $15.7 million. Sales dipped significantly in 2012 and later recovered. In 2014, potted flowering plant sales surpassed $10.5 million (USDA National Agricultural Statistics Service 2017b).

Sales volume data for Missouri potted flowering plants have also been reported. Measured in pots, unit sales exceeded 3.8 million pots in 2009. Sales declined to roughly 2.6 million pots in 2014 (USDA National Agricultural Statistics Service 2017b).

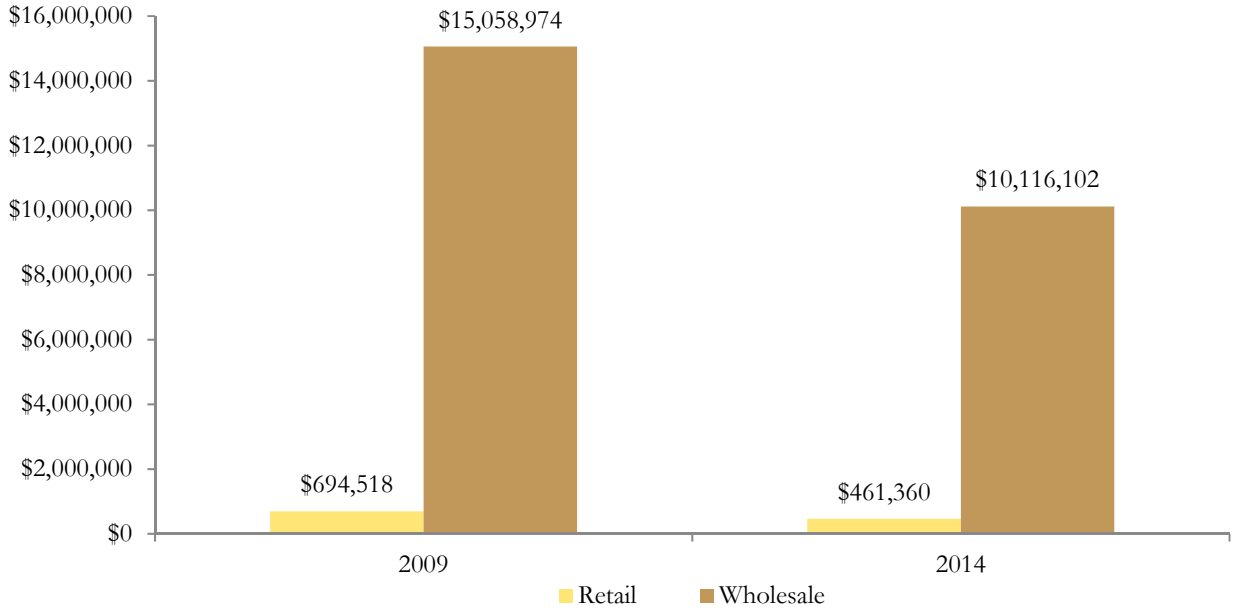
Exhibit 7.2.3 – Missouri Potted Flowering Plant Sales, 2007 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Potted flowering plant sales have occurred in both retail and wholesale channels. Exhibit 7.2.4 summarizes dollar sales by channel for 2009 and 2014. Wholesale sales have been more significant than retail sales. In 2014, 95.6 percent of total potted flowering plant sales originated from wholesale transactions. Retail sales represented 4.4 percent of total sales. Note that both retail and wholesale sales declined from 2009 to 2014 (USDA National Agricultural Statistics Service 2017b).

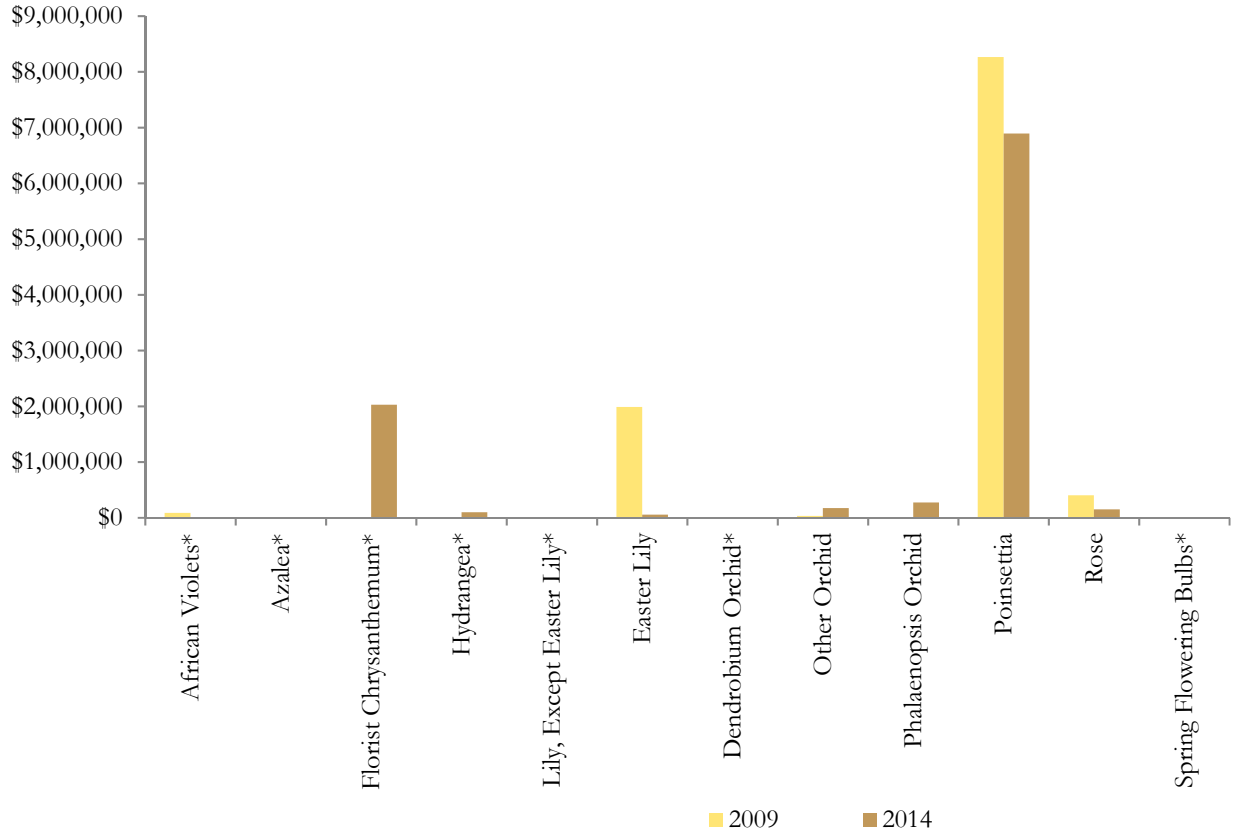
Exhibit 7.2.4 – Missouri Potted Flowering Plant Dollar Sales in Retail and Wholesale Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

For an alternative view of potted flowering plant dollar sales, Exhibit 7.2.5 breaks down sales by plant class. Several plant classes didn't have data published in one or both years in order to protect data for individual operations. An asterisk marks those instances. Of the potted flowering plant classes with data released for 2014, sales were greatest for poinsettias, which had sales total nearly $6.9 million. Florist chrysanthemum sales ranked second and totaled slightly more than $2 million. Several plant classes had data released for both years. Among those classes, sales only increased during the 2009-to-2014 period for Phalaenopsis orchids and orchids included in the "other" category (USDA National Agricultural Statistics Service 2017b).

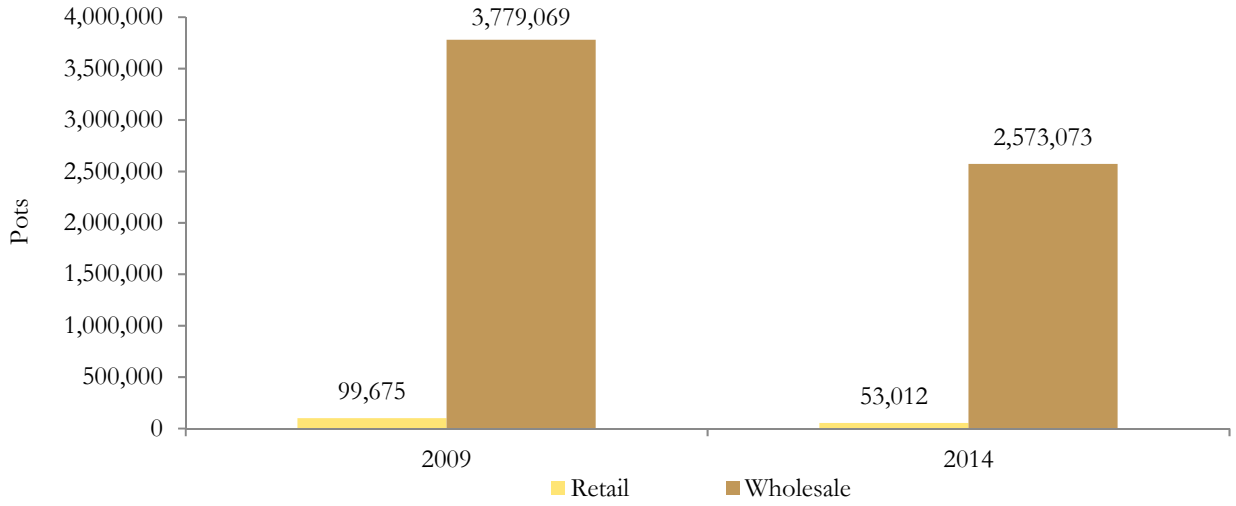
Exhibit 7.2.5 – Missouri Potted Flowering Plant Dollar Sales by Plant Class, 2009 and 2014



* Data for 2009 were withheld for florist chrysanthemums, hydrangeas and Dendrobium orchids. Data for African violets were withheld in 2014. Data for both 2009 and 2014 were withheld for azaleas, lilies other than Easter lilies and spring flowering bulbs. No data were reported for Dendrobium orchids in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

The trend in dollar sales of Missouri retail and wholesale potted flowering plants has been similar to the trend in retail and wholesale unit sales. Exhibit 7.2.6 presents retail and wholesale unit sales for 2009 and 2014. Units are measured in pots. In 2014, pots sold at retail totaled roughly 53,000 units. Units sold in the wholesale channel exceeded 2.5 million pots. Sales in both retail and wholesale channels declined from 2009 to 2014 (USDA National Agricultural Statistics Service 2017b).

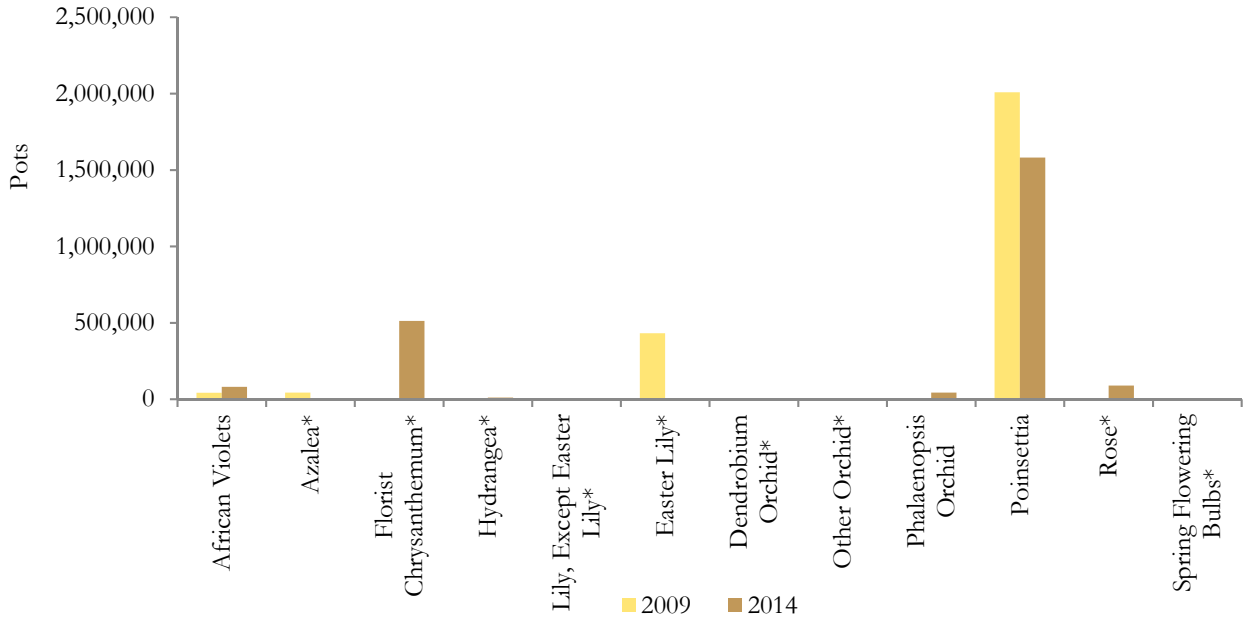
Exhibit 7.2.6 – Missouri Potted Flowering Plant Unit Sales by Retail and Wholesale Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri unit sales for potted flowering plants by plant class are shared in Exhibit 7.2.7. The chart marks plant classes with asterisks if data were withheld in either or both 2009 and 2014. In 2014, unit sales were highest for poinsettias, more than 1.58 million pots, and florist chrysanthemums, more than 512,000 pots. Several plant classes had unit sales recorded in both 2009 and 2014. Among them, unit sales increased for African violets and Phalaenopsis orchids, but they declined for poinsettias (USDA National Agricultural Statistics Service 2017b).

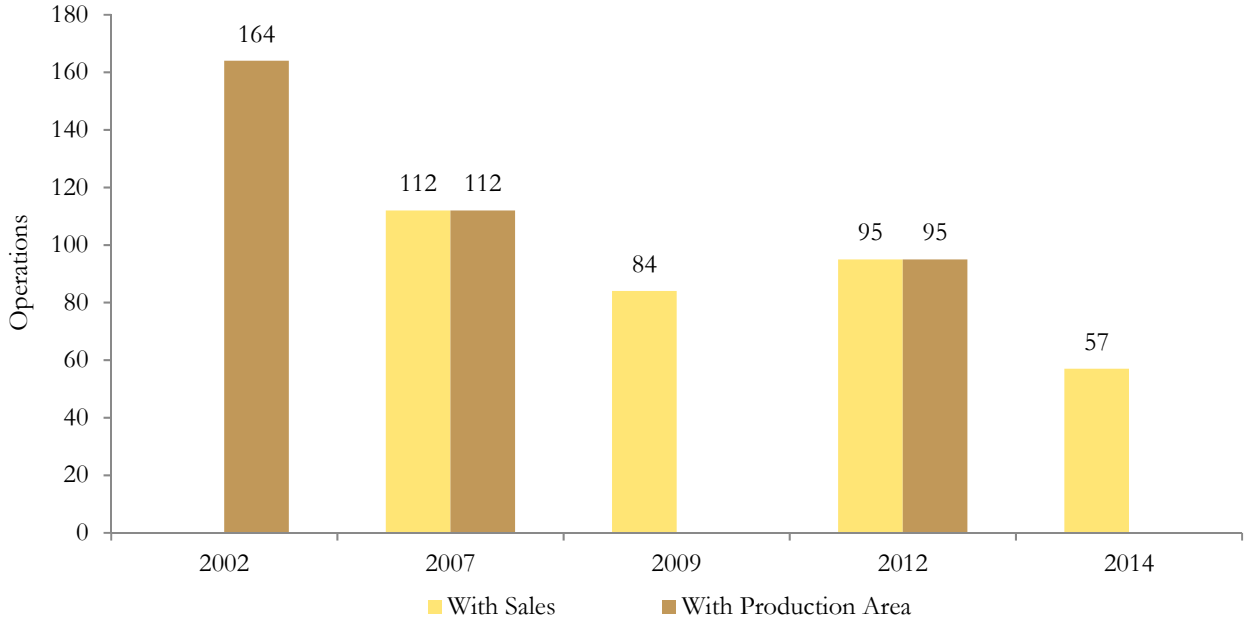
Exhibit 7.2.7 – Missouri Potted Flowering Plant Unit Sales by Plant Class, 2009 and 2014



* Data for 2009 were withheld for florist chrysanthemums, hydrangeas, Dendrobium orchids and roses. Data were withheld for azaleas and Easter lilies in 2014. Data were withheld in both 2009 and 2014 for lilies other than Easter lilies and spring flowering bulbs.
Source: USDA, National Agricultural Statistics Service (2017b)

Potted flowering plant operation data have been reported in several forms. Exhibit 7.2.8 highlights the number of Missouri operations selling potted flowering plants or reporting potted flowering plant production area in multiple years. In 2014, 57 operations sold potted flowering plants. Nearly twice as many operations reported sales in 2007. In 2002, 164 operations indicated that they had potted flowering plant production area. By 2012, operations selling potted flowering plants had dropped to 95 operations (USDA National Statistics Service 2017).

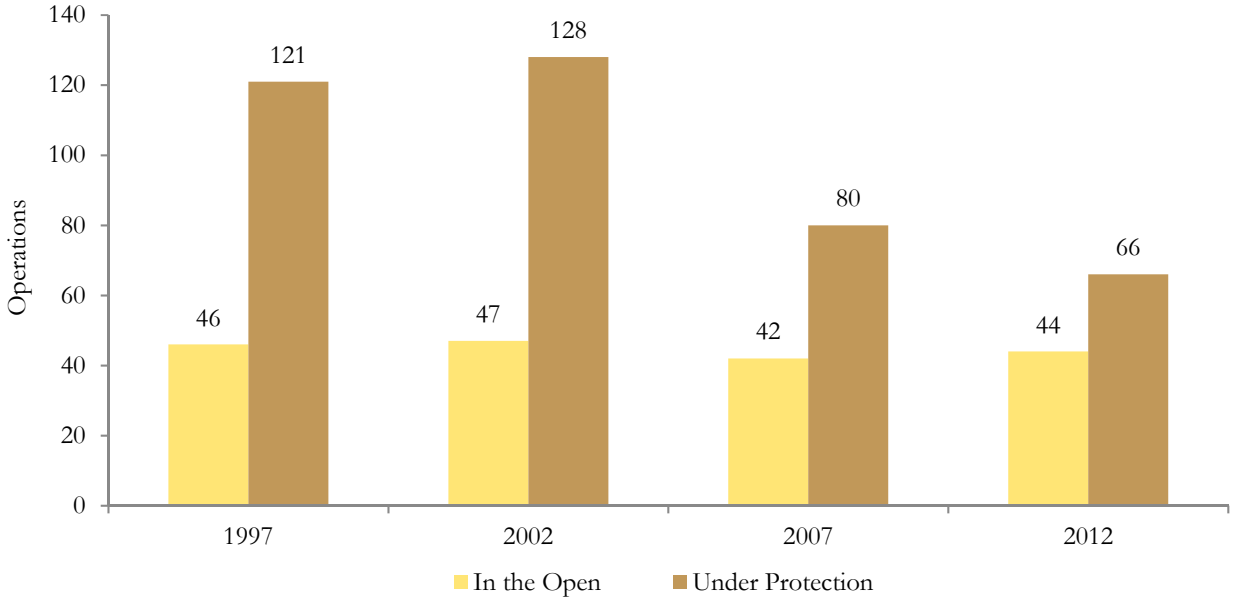
Exhibit 7.2.8 – Missouri Operations Selling or Reporting Production Area for Potted Flowering Plants, 2002 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

To grow potted flowering plants in Missouri, operations have more frequently used structures that provide protection than raise plants in the open. In 2012, 66 operations indicated that they had potted flowering plant production area under protection. In contrast, 44 operations shared that they raised potted flowering plants in the open. See Exhibit 7.2.9. The number of operations producing potted flowering plants in the open was relatively static from 1997 to 2012. On the other hand, the number of operations using structures that offer protection declined dramatically between 1997 and 2012. During both 1997 and 2002, more than 120 operations indicated that they raised potted flowering plants under protection. That operation count was roughly halved by 2012 (USDA National Agricultural Statistics Service 2017b).

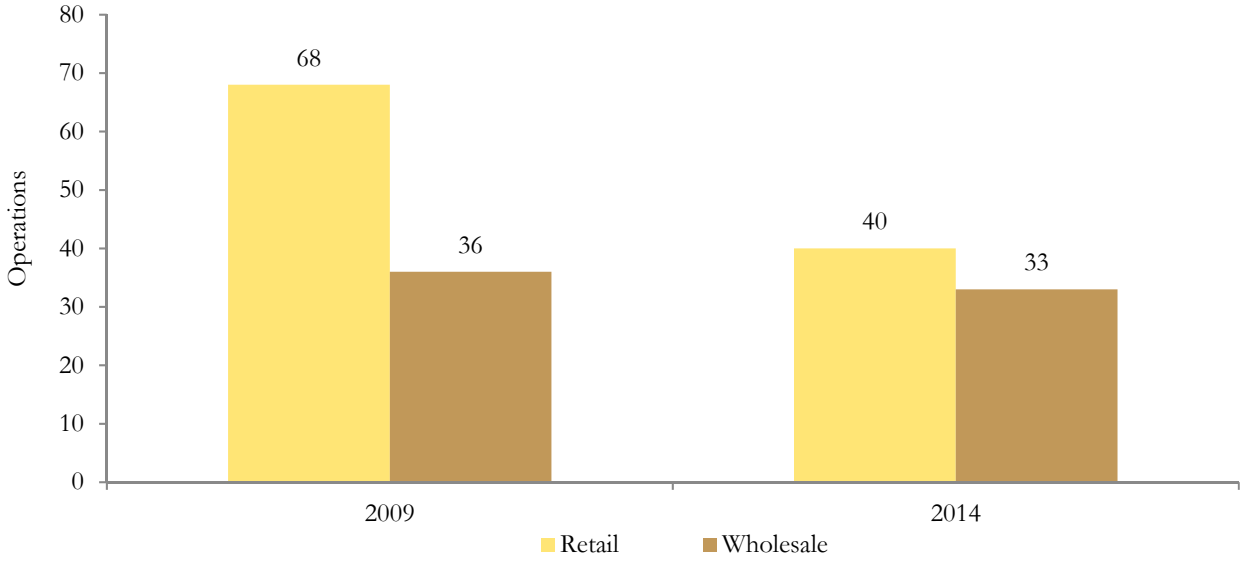
Exhibit 7.2.9 – Missouri Operations Producing Potted Flowering Plants Under Protection or In the Open, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Operations may choose to sell potted flowering plants in retail or wholesale channels. In 2009, more Missouri operations sold such plants at retail than at wholesale. The difference in operation count narrowed, however, in 2014. Exhibit 7.2.10 presents the number of operations selling potted flowering plants at retail and wholesale during both 2009 and 2014. During 2014, 40 operations reported retail sales, and 33 operations indicated that they made wholesale sales (USDA National Agricultural Statistics Service 2017b).

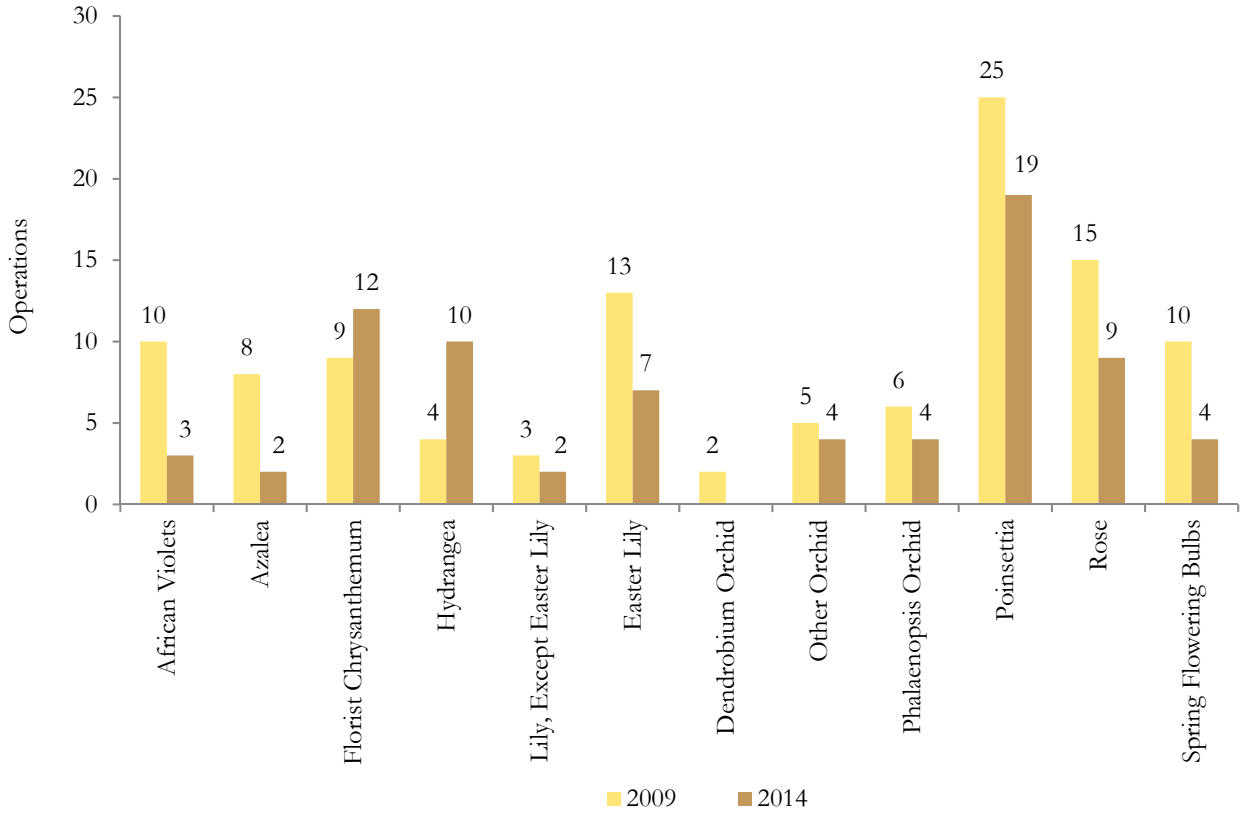
Exhibit 7.2.10 – Missouri Operations Selling Potted Flowering Plants at Retail and Wholesale, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.2.11 presents the number of Missouri operations selling various classes of potted flowering plants during 2009 and 2014. In 2014, the greatest count of operations reported selling poinsettias, florist chrysanthemums and hydrangeas. In most cases, the number of operations growing a given class of potted flowering plants declined between 2009 and 2014. The exceptions were hydrangeas and florist chrysanthemums, which both had more operations selling them in 2014 than in 2009 (USDA National Agricultural Statistics Service 2017b).

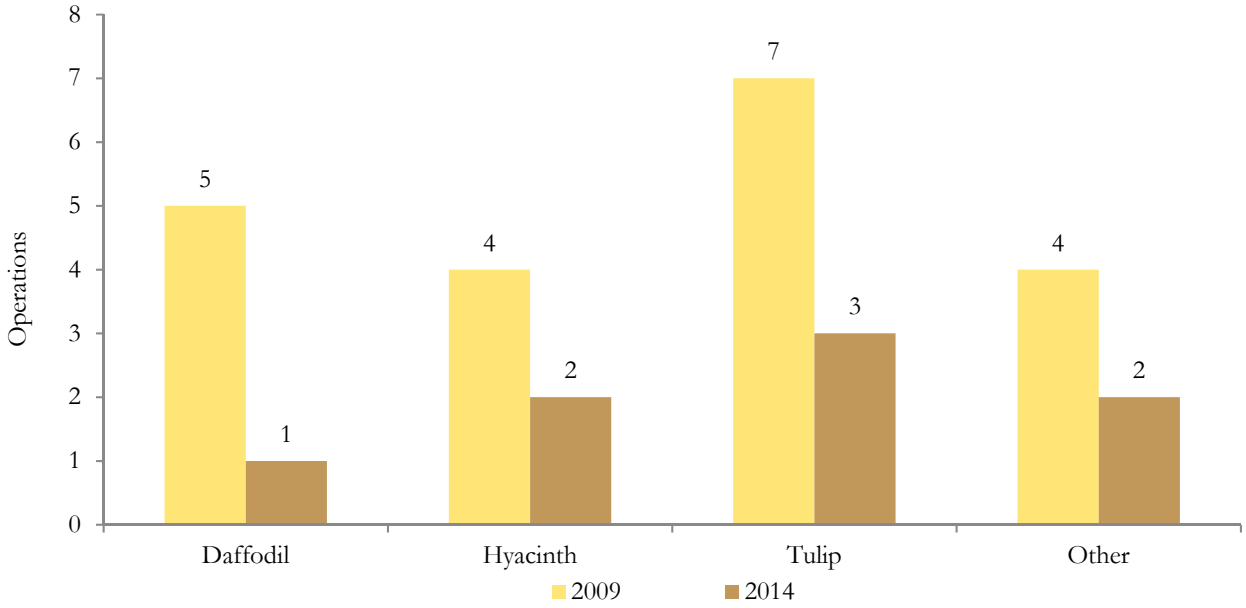
Exhibit 7.2.11 – Missouri Operations Selling Potted Flowering Plants by Plant Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

For spring flowering bulbs, note that USDA further subdivided operations data into bulb categories: daffodils, hyacinths, tulips and other. These data are specific to potted spring flowering bulbs. In all cases, fewer Missouri operations sold each class of potted bulb in 2014 than in 2009. See Exhibit 7.2.12. During 2014, three operations sold potted tulips. Two operations sold potted hyacinths, two operations sold other classes of potted spring flowering bulbs, and just one operation reported that it sold potted daffodils (USDA National Agricultural Statistics Service 2017b).

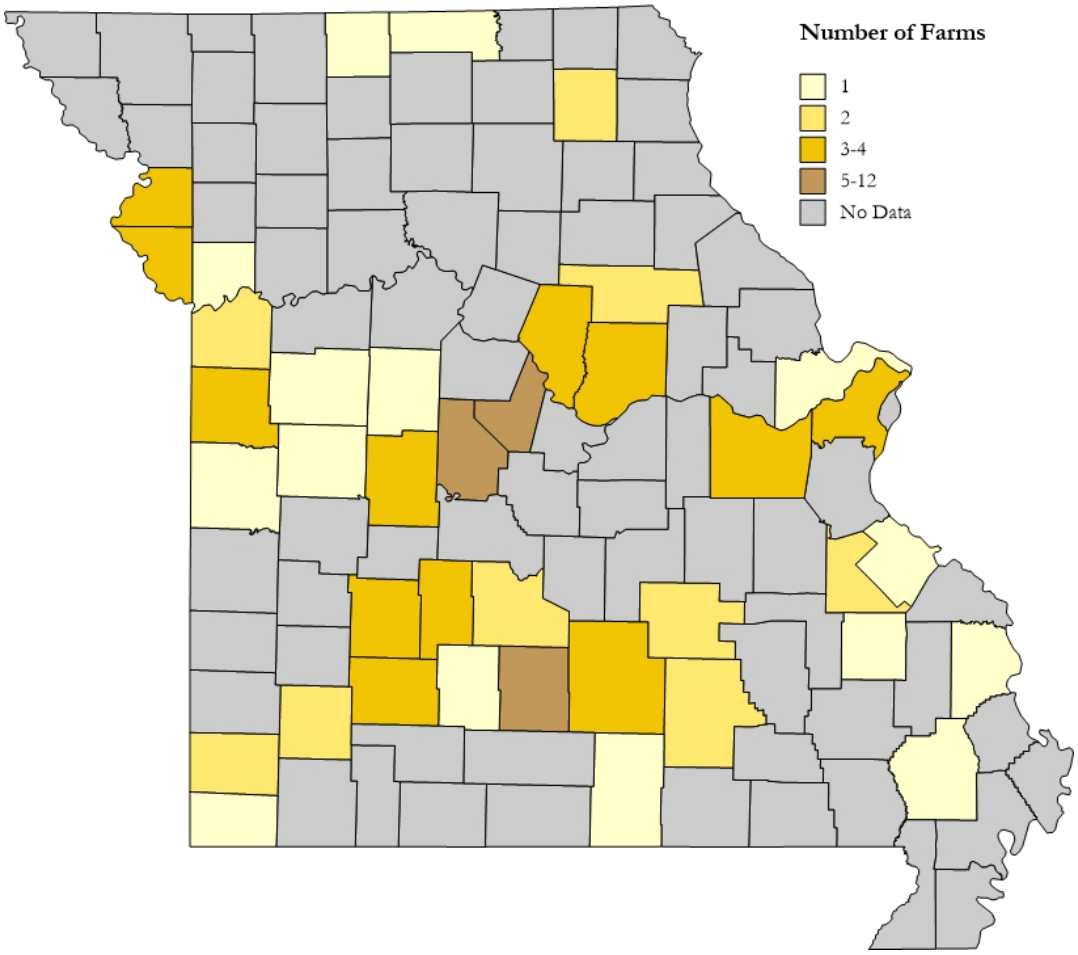
Exhibit 7.2.12 – Missouri Operations Selling Potted Flowering Spring Bulbs by Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.2.13 provides an alternative view of Missouri potted flowering plant operations data. The map shades Missouri counties according to their number of potted flowering plant operations with production area. In 2012, counties with the most operations were Moniteau County, 12 operations; Morgan County, seven operations; and Wright County, five operations. To protect information for individual operations, USDA predominantly withheld production area data. However, there were two exceptions. Buchanan County was reported to have one in-the-open acre in production, and Morgan County was reported to have roughly 6,000 square feet under protection that were in production for potted flowering plants (USDA National Agricultural Statistics Service 2017b).

*Exhibit 7.2.13 – Missouri Potted Flowering Plant Operations with Production Area by County, 2012**



* Operations used in-the-open acreage but the data were withheld for Bates, Benton, Boone, Callaway, Cass, Clay, Dallas, Dent, Greene, Madison, McDonald, Moniteau, Morgan, Newton, Pettis, Platte, Polk, St. Francois, Stoddard, Texas, Webster and Wright counties. Operations used area under protection but the data were withheld for Audrain, Bates, Benton, Boone, Callaway, Cape Girardeau, Cass, Clay, Dallas, Dent, Franklin, Greene, Henry, Howell, Jackson, Johnson, Knox, Laclede, Lawrence, McDonald, Mercer, Moniteau, Morgan, Newton, Platte, Polk, Putnam, Shannon, St. Charles, St. Francois, St. Louis. Ste. Genevieve, Stoddard and Wright counties.
Source: USDA, National Agricultural Statistics Service (2017b)

7.3 Potted Herbaceous Perennials

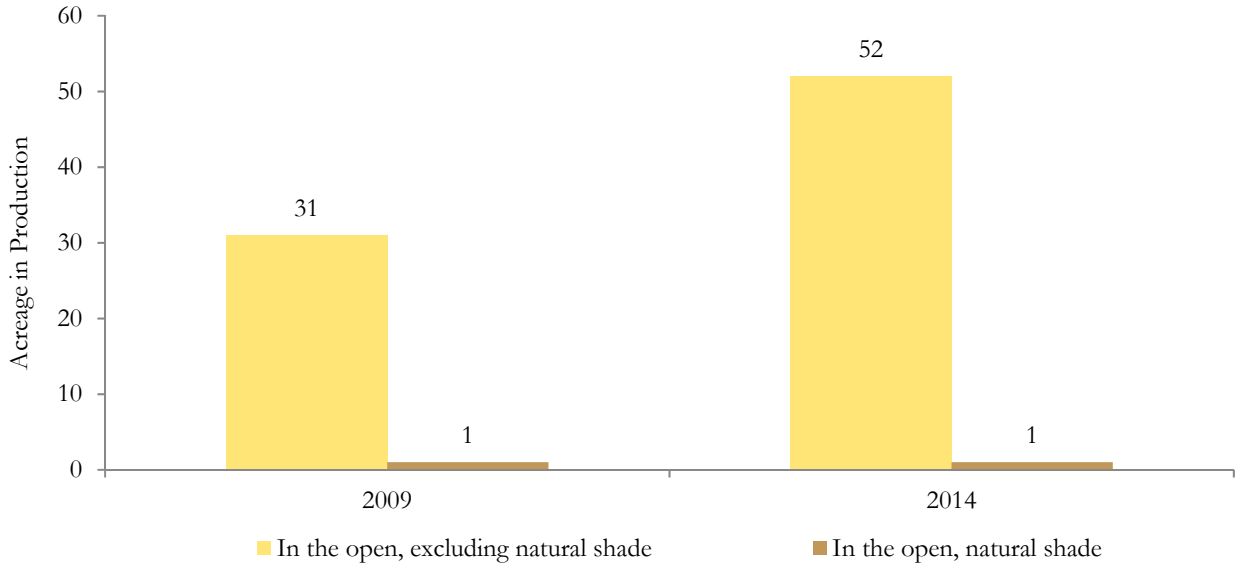
The potted herbaceous perennials included in USDA's specialty crop definition are listed in Exhibit 7.3.1. They range from columbine to coreopsis and peony to phlox. The following discussion highlights more details about Missouri's role in producing and selling potted herbaceous perennials. Note that USDA published data for most but not all of these herbaceous perennials. The plants listed in bold text are those with specific data reported about them. In other cases, data were reported for perennials not listed in the table but that were included in releases from the USDA National Agricultural Statistics Service.

Exhibit 7.3.1 – Potted Herbaceous Perennials Included in Specialty Crop Definition[4]

Astilbe	**Columbine**	**Coreopsis**	**Daylily**
Delphinium	**Dianthus**	**Garden chrysanthemum**	**Heuchera**
Hosta	Ivy	**Ornamental grasses**	**Peony**
Phlox	**Rudbeckia**	**Salvia**	Vinca

Potted herbaceous perennial growers may choose to raise their plants in the open or under protection. In the open refers to using natural shade or choosing an in-the-open growing environment other than natural shade. Missouri in-the-open production area for potted herbaceous perennials is measured in acres and presented in Exhibit 7.3.2 for 2009 and 2014. Growers who produce potted herbaceous perennials in the open generally haven't allocated much space to naturally shaded areas. One acre of natural shade production area was reported in both 2009 and 2014. Production acreage in the open, excluding natural shade, increased between 2009 and 2014. It grew from 31 acres to 52 acres (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.3.2 – Production Area for Potted Herbaceous Perennials Grown In the Open, 2009 and 2014



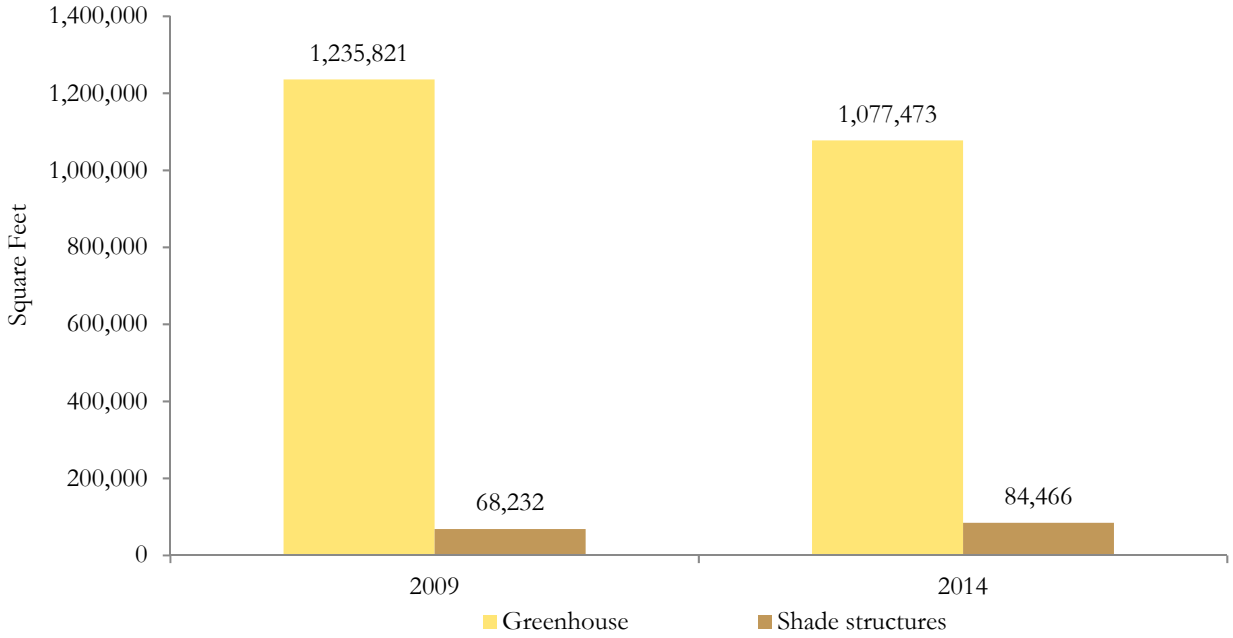
Source: USDA, National Agricultural Statistics Service (2017b)

If growing herbaceous perennials under protection, then growers may choose from using greenhouses or shade structures. Production area for these structures that provide protection is

[4] Note, the USDA Agricultural Marketing Service doesn't name all classes of potted herbaceous perennials in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.3.1. When reporting totals for the potted herbaceous perennial sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are achillea, asclepias, bleeding heart, campanula, clematis, shasta daisy, purple coneflower, echinacea other than purple coneflower, fern, gaillardia, hibiscus, iris, lavender, lobelia, lupine, poppy, penstemon, perovskia, physostegia, platycodon, scabiosa, sedum, verbascum and veronica. Additionally, ornamental grasses are reported separately, so totals is section may not reflect data for those ornamental grasses.

measured in square feet. Exhibit 7.3.3 articulates production area in 2009 and 2014 for potted herbaceous perennials grown under protection. Historically, greenhouse square footage has exceeded shade structure square footage. Between 2009 and 2014, however, greenhouse square footage declined, but square footage in shade structures grew. Greenhouse square footage used for potted herbaceous perennial production totaled nearly 1.1 million square feet in 2014. During the same year, Missouri operations used slightly less than 85,000 square feet in shade structures for producing potted herbaceous perennials (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.3.3 – Production Area for Potted Herbaceous Perennials Grown Under Protection, 2009 and 2014

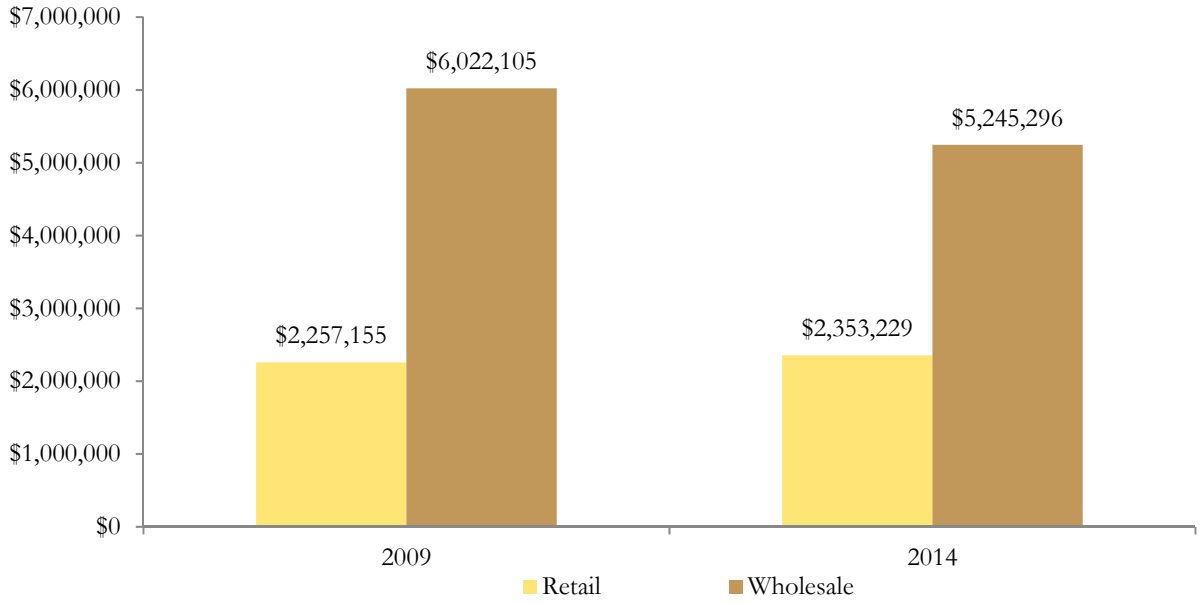


Source: USDA, National Agricultural Statistics Service (2017b)

Total dollar sales for Missouri potted herbaceous perennial plants were nearly $8.3 million in 2009. They declined to just less than $7.6 million in 2014. With respect to unit sales, Missouri growers sold more than 2.4 million pots of herbaceous perennials in 2009. Sales dropped to roughly 1.56 million pots in 2014 (USDA National Agricultural Statistics Service 2017b).

Missouri potted herbaceous perennial plant sales have occurred in both retail and wholesale channels. Exhibit 7.3.4 shares retail and wholesale dollar sales recorded in 2009 and 2014. Wholesale sales have trumped retail sales. In 2014, 69 percent of total potted herbaceous perennial sales were generated by wholesale transactions. Thirty-one percent were generated by retail transactions. Between 2009 and 2014, wholesale sales for Missouri potted herbaceous perennials declined, but retail sales increased slightly. 2014 sales totals were roughly $2.35 million at retail and $5.25 million at wholesale (USDA National Agricultural Statistics Service 2017b).

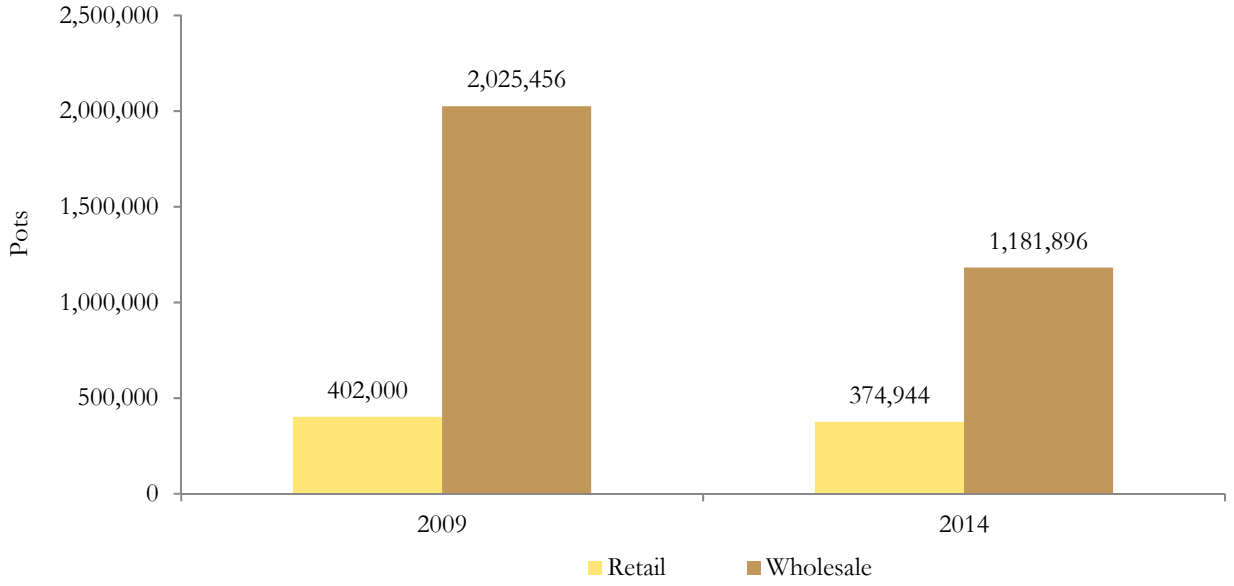
Exhibit 7.3.4 – Missouri Potted Herbaceous Perennial Dollar Sales in Retail and Wholesale Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.3.5 charts retail and wholesale sales data in units, or pots. Wholesale transactions yielded three-quarters of total units sold in 2014. The other 25 percent of units sold were sold in the retail channel. From 2009 to 2014, pots of herbaceous perennials sold declined in both retail and wholesale channels. In 2014, pots sold totaled nearly 375,000 units at retail and 1.18 million units at wholesale (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.3.5 – Missouri Potted Herbaceous Perennial Unit Sales in Retail and Wholesale Channels, 2009 and 2014

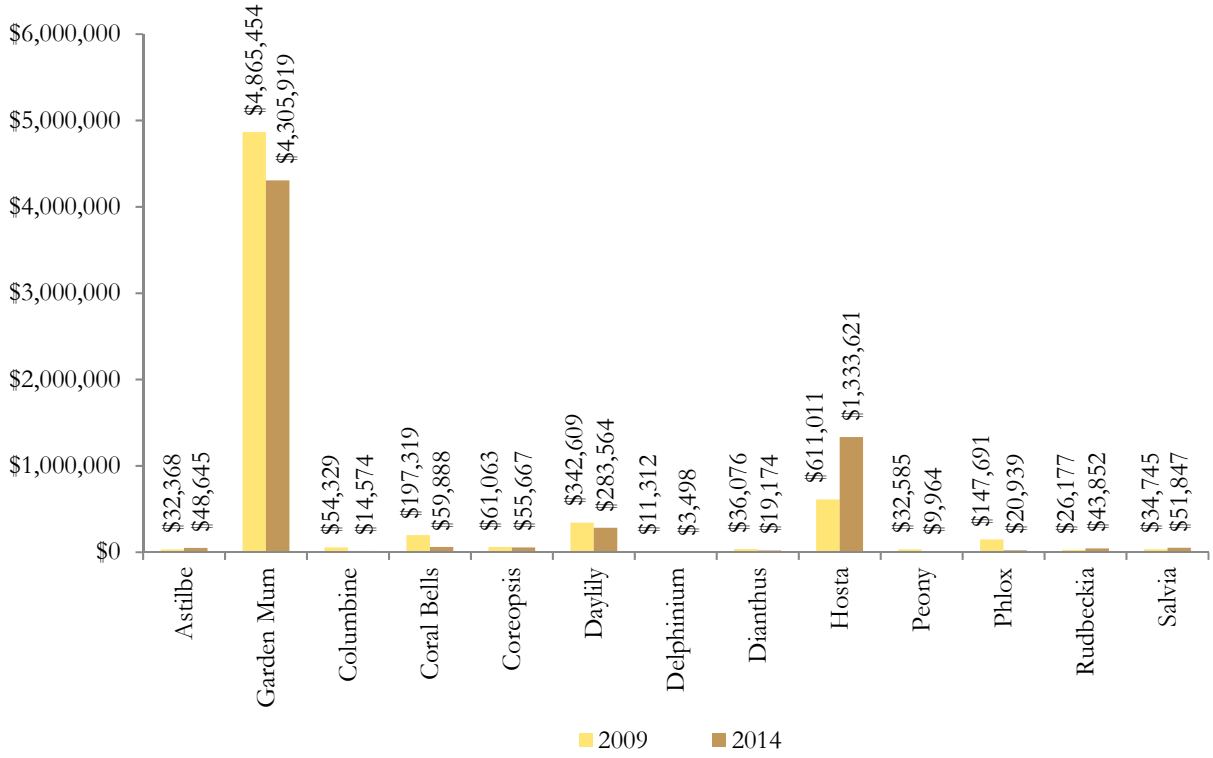


Source: USDA, National Agricultural Statistics Service (2017b)

Like for other nursery crops, potted herbaceous perennials can also be categorized according to plant class. Exhibit 7.3.6 shares potted herbaceous perennial dollar sales from 2009 and 2014 by plant class. Note that data weren't available for ivy and vinca potted herbaceous perennial plants. Ornamental grasses are reported separately from the other potted herbaceous perennials, so they're reported separately here. Note that "heuchera" mentioned in the specialty crop definition listing is alternatively known as coral bells.

In dollars, potted herbaceous perennial sales were greatest for garden chrysanthemums and hostas in 2014. Garden mum sales exceeded $4.3 million. Hostas followed with $1.33 million in sales. Between 2009 and 2014, dollar sales increased for four potted herbaceous perennial classes: hosta, astilbe, rudbeckia and salvia. Hosta sales in 2014 were more than double those recorded in 2009. During the same period, sales declined for the other classes of potted herbaceous perennials that are named specialty crops. Sales reductions were most significant for phlox, 85.8 percent decline, and columbine, 73.2 percent drop (USDA National Agricultural Statistics Service 2017b).

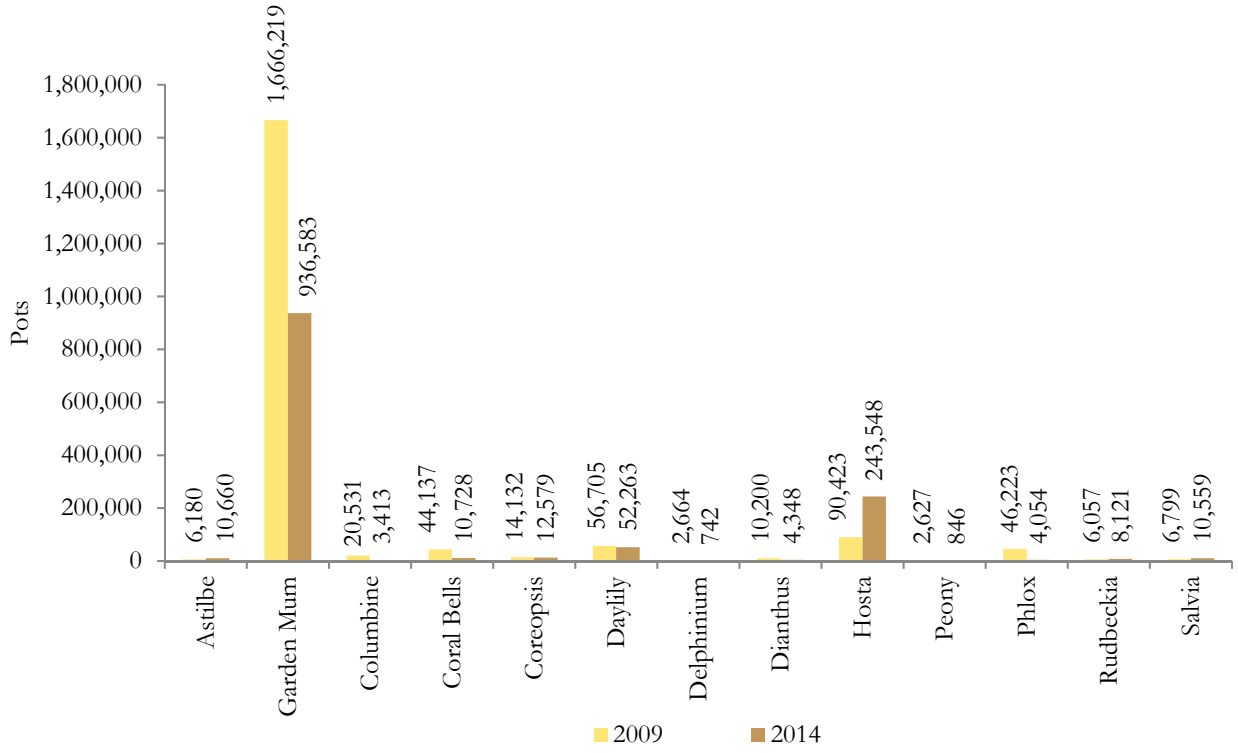
Exhibit 7.3.6 – Missouri Potted Herbaceous Perennial Dollar Sales By Plant Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

In terms of unit sales, Missouri sold more garden mums and hostas during 2014 than other classes of potted herbaceous perennials. Pots sold exceeded 936,500 units for garden mums and 243,500 units for hostas. Note, however, that garden mum unit sales declined from 2009 to 2014, but hosta unit sales increased. Other classes that experienced unit sales gains were astilbe, salvia and rudbeckia. Mirroring the dollar sales data, unit sales reductions were most significant for phlox and columbine. By plant class, Exhibit 7.3.7 shares unit sales data from 2009 and 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.3.7 – Missouri Potted Herbaceous Perennial Unit Sales By Plant Class, 2009 and 2014



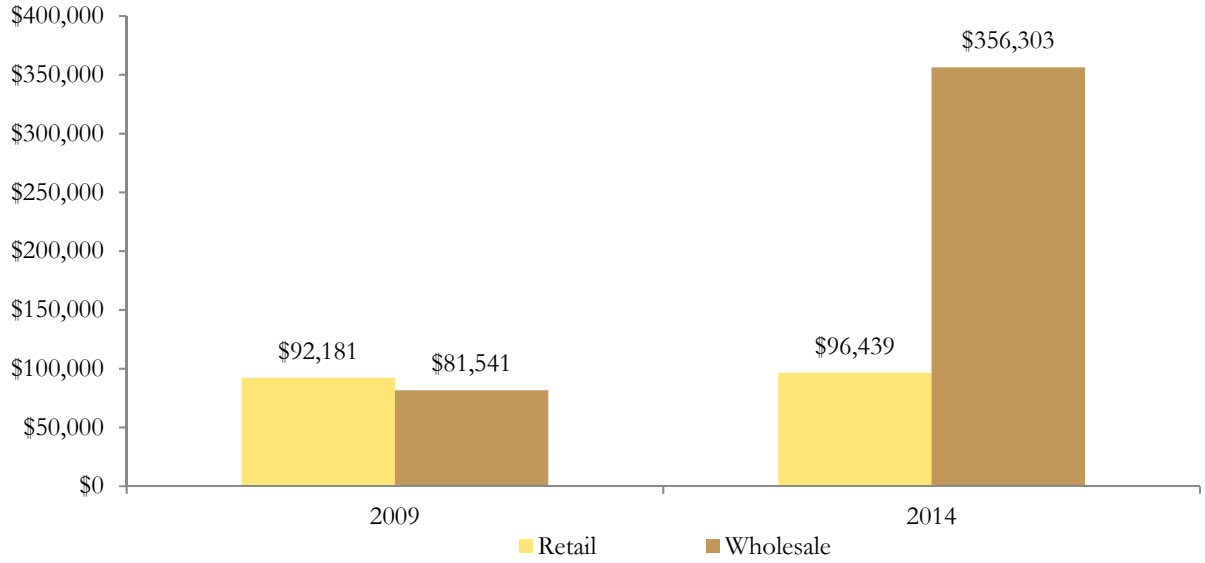
Source: USDA, National Agricultural Statistics Service (2017b)

As mentioned previously, USDA reported sales of ornamental grasses as a data series independent of the potted herbaceous perennials data. Ornamental grasses sales increased rather substantially from 2009 to 2014. Dollar sales grew by 160.6 percent during that time. In terms of sales volume, Missouri operations sold more than 2.7 times more ornamental grass plants in 2014 than they did in 2009 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.3.8 highlights ornamental grasses sales recorded in retail and wholesale channels. In 2014, retail sales tallied more than $96,000, and wholesale sales surpassed $356,000. Although both retail and wholesale ornamental grasses sales increased between 2009 and 2014, note that the growth in wholesale dollar sales were most dramatic. The wholesale sales total was more than four times higher in 2014 than in 2009 (USDA National Agricultural Statistics Service 2017b).

Regarding Missouri ornamental grasses unit sales, data were published for 2009; however, to protect data for individual operations, 2014 data were withheld from being disclosed. In 2009, unit sales, measured in plants, totaled more than 12,800 units in the retail channel and more than 20,000 units in the wholesale channel (USDA National Agricultural Statistics Service 2017b).

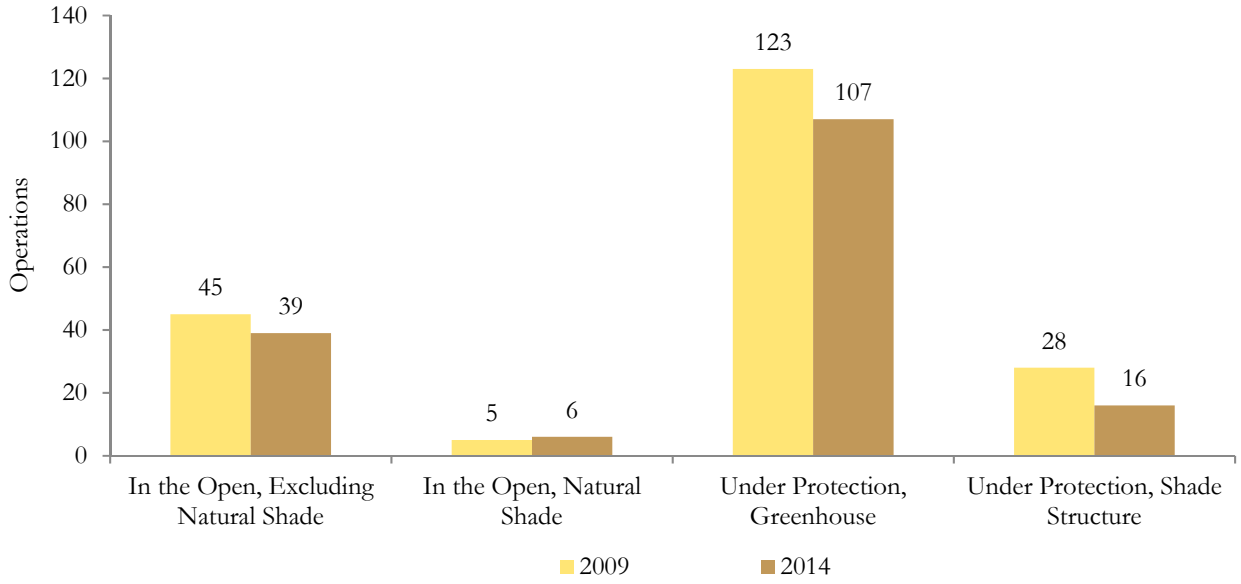
Exhibit 7.3.8 – Missouri Ornamental Grasses Dollar Sales in Wholesale and Retail Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

With respect to operations data, 132 operations in Missouri reported potted herbaceous perennial sales in 2014. That count was a reduction from the 157 operations that reported sales in 2009. To raise potted herbaceous perennials, Missouri operations most commonly have used greenhouses. In 2014, 107 of the 132 total operations shared that they produced potted herbaceous perennials under the protection of greenhouses. Other production area options include raising potted herbaceous perennials in the open without natural shade, in the open with natural shade and under protection of a shade structure. See Exhibit 7.3.9. Between 2009 and 2014, the number of operations in each category declined with one exception. Operations raising potted herbaceous perennials in the open with natural shade increased from five firms in 2009 to six firms in 2014 (USDA National Agricultural Statistics Service 2017b).

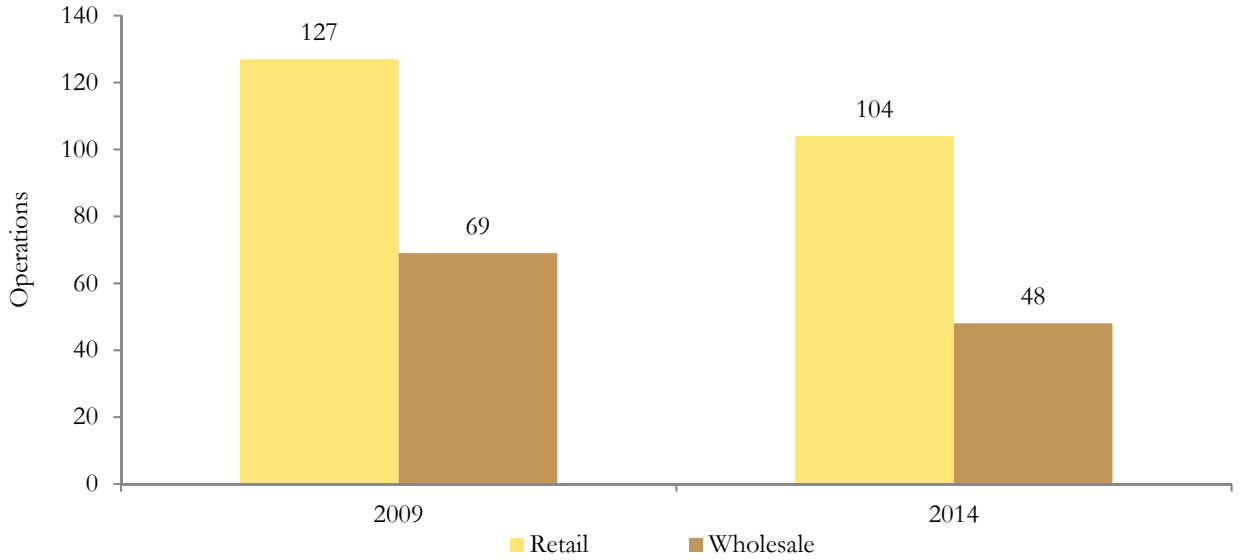
Exhibit 7.3.9 – Missouri Potted Herbaceous Perennial Operations by Type of Production Area, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Operations may choose to sell potted herbaceous perennial plants in retail or wholesale channels. Exhibit 7.3.10 quantifies the number of operations selling plants in both channels during 2009 and 2014. The data show that more Missouri operations have sold potted herbaceous perennials in retail than wholesale. In 2014, 104 operations shared that they sold potted herbaceous perennials through retail channels, and 48 operations indicated that they made wholesale sales of potted herbaceous perennials. The count of both types of operations — retail and wholesale — declined from 2009 to 2014 (USDA National Agricultural Statistics Service 2017b).

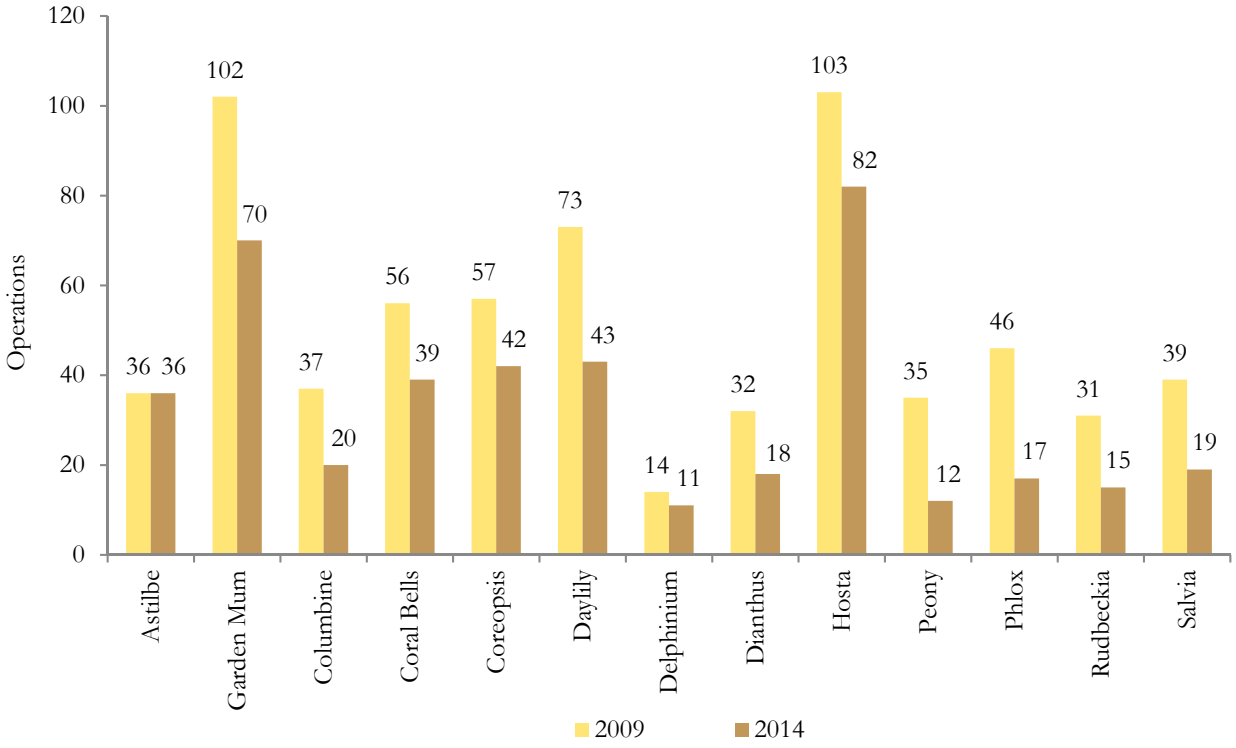
Exhibit 7.3.10 – Missouri Operations Selling Potted Herbaceous Perennials in Retail and Wholesale Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Of the potted herbaceous perennials included in the specialty crop definition, Missouri operations in 2014 were most likely to sell hostas, 82 operations, and garden mums, 70 operations. Exhibit 7.3.11 details the number of operations selling potted herbaceous perennials by class in 2009 and 2014. For each plant class, fewer operations in 2014 reported making sales than in 2009, or the same number made sales in 2009 and 2014. In percentage terms, operation count declines were steepest for peonies and phlox (USDA National Agricultural Statistics Service 2017b).

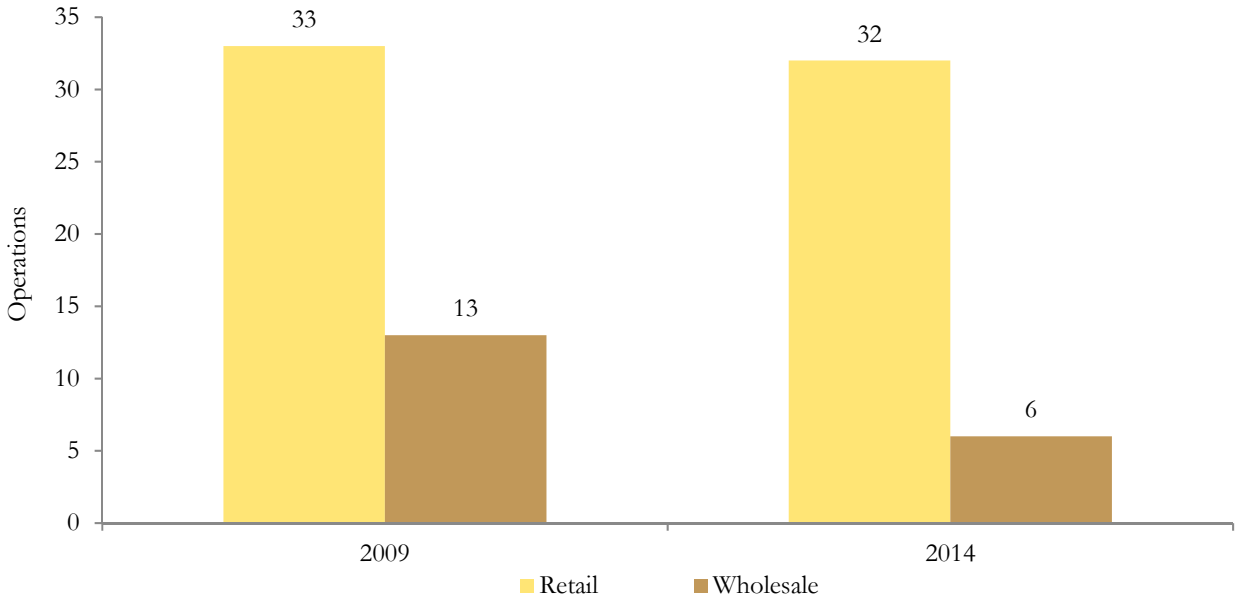
Exhibit 7.3.11 – Missouri Operations Selling Potted Herbaceous Perennials by Plant Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

The number of Missouri operations selling ornamental grasses also declined between 2009 and 2014. The total operation count decreased from 45 operations in 2009 to 38 operations in 2014. Of those operations, more have historically sold product through the retail channel than the wholesale channel. See Exhibit 7.3.12. In 2014, 32 operations shared that they sold ornamental grasses at retail, and six operations sold product at wholesale. Although counts of both retail and wholesale operations declined between 2009 and 2014, the reduction was more significant for wholesale operations than retail operations (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.3.12 – Missouri Operations Selling Ornamental Grasses in Retail and Wholesale Channels, 2009 and 2014

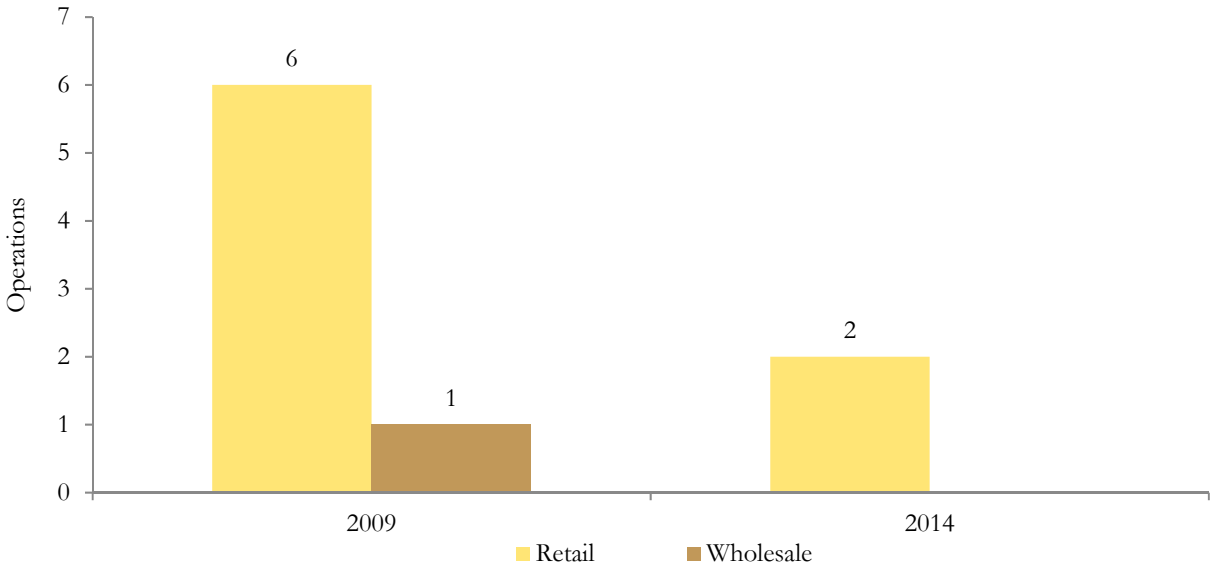


Source: USDA, National Agricultural Statistics Service (2017b)

As a note, Missouri not only grows and sells potted herbaceous perennials, but it also has produced bareroot herbaceous perennials. Dollar sales for bareroot herbaceous perennials totaled $266,150 in 2009, and at the time, unit sales totaled 80,150 plants. Note that sales data for dollars and units were withheld in 2014 (USDA National Agricultural Statistics Service 2017b).

Total operations selling bareroot herbaceous perennials declined between 2009 and 2014. Seven operations reported sales in 2009, but the count recording sales was reduced to two operations in 2014. Exhibit 7.3.13 communicates the number of Missouri operations selling bareroot herbaceous perennials at retail and wholesale during both years. One operation reported selling bareroot herbaceous perennials at wholesale in 2009, but the count was no wholesalers in 2014. The number of retailers selling bareroot herbaceous perennial plants shrunk from six operations in 2009 to two operations in 2014 (USDA National Agricultural Statistics Service 2017b).

*Exhibit 7.3.13 – Missouri Operations Selling Bareroot Herbaceous Perennials in Retail and Wholesale Channels, 2009 and 2014**



* No wholesaler data were reported in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

7.4 Cut Flowers

Cut flowers included in the specialty crop definition are those listed in Exhibit 7.4.1; the names in bold are those with specific USDA data reported about them as cut flowers. They include carnations, chrysanthemums, lilies and snapdragons. This section details Missouri's cut flower industry, including its sales and operations.

Exhibit 7.4.1 – Cut Flowers Included in Specialty Crop Definition[5]

Carnation	Chrysanthemum	**Delphinium**	**Gladiolus**
Iris	**Lily**	**Orchid**	**Snapdragon**
Rose	**Tulip**		

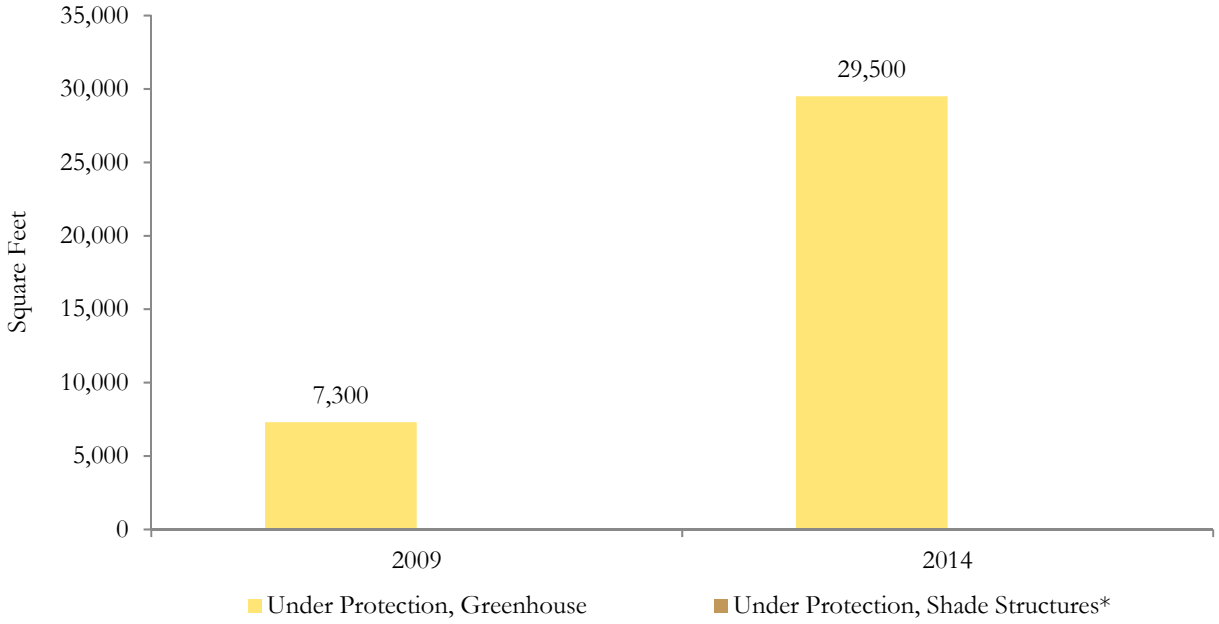
Like for many other horticultural specialty crops, Missouri growers can choose to grow cut flowers in the open or under protection. Area in the open used to raise cut flowers can either use natural

[5] Note, the USDA Agricultural Marketing Service doesn't name all classes of cut flowers in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.4.1. When reporting totals for the cut flowers sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are alstromeria, anemone, anthurium, aster, bird of paradise, cabbage and kale, calla lily, campanula, celosia, cosmos, daffodil, dahlia, marguerite daisy, dianthus, freesia, ginger and heliconia, godetia, gypsophila, heather, heliconia, hydrangea, ilex, pikake, plumeria, tuberose, leptospermum, liatris, limonium, lisianthus, matricaria, peony, protea, solidago, statice, stephanotis, stock, sunflower, trachelium, waxflower and zinnia.

shade or something other than natural shade. Under protection refers to instances when a greenhouse or shade structure provides cover to the flowers being raised for cutting.

In Missouri, cut flower producers have predominantly relied on growing their flowers under the protection of a greenhouse or in the open without natural shade. Exhibit 7.4.2 presents area in production data for cut flowers grown under protection during 2009 and 2014. Greenhouse square footage used to raise cut flowers increased significantly — by more than four times — between those two years. It totaled 29,500 square feet in 2014. For shade structures, note that the data indicate that some square footage was allocated to cut flower production in 2014. However, the specific square footage was withheld in order to protect data for individual operations (USDA National Agricultural Statistics Service 2017b).

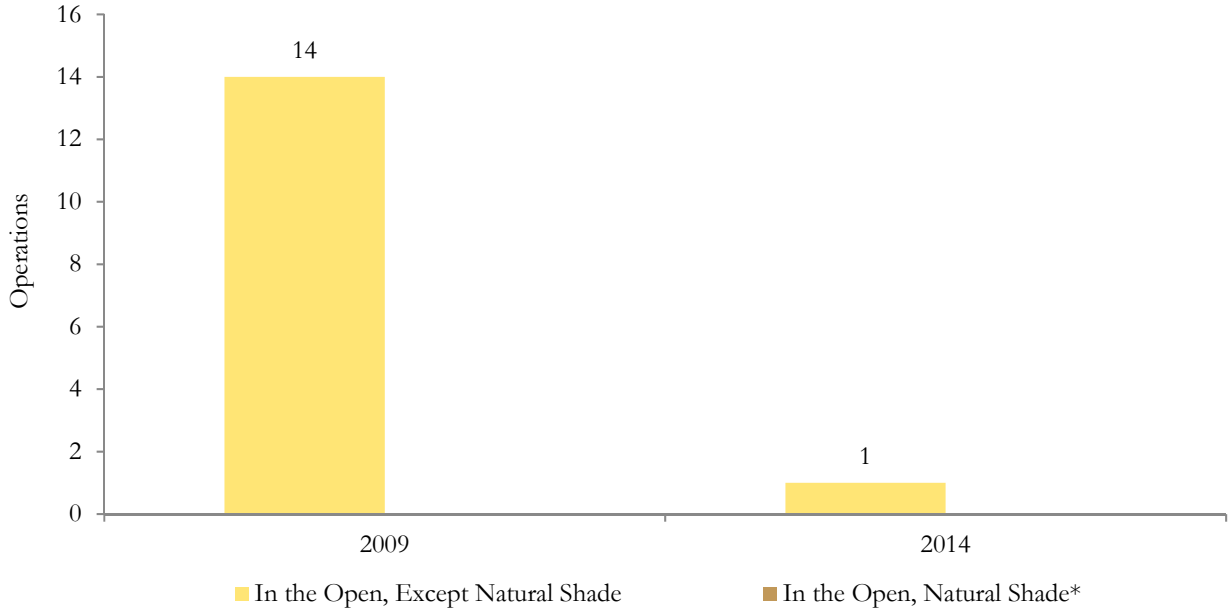
Exhibit 7.4.2 – Missouri Cut Flower Production Area Under Protection, 2009 and 2014



* No shade structure production area in 2009; 2014 shade structure area was withheld from being reported.
Source: USDA, National Agricultural Statistics Service (2017b)

In recent years, cut flower production in open areas has become more rare. Exhibit 7.4.3 reports production acres in the open from 2009 to 2014. Acreage in the open without natural shade declined from 14 acres in 2009 to one acre in 2014. The data set indicates that some open area with natural shade was used in 2009 to product cut flowers, but specific data were withheld in order to protect information for individual operations (USDA National Agricultural Statistics Service 2017b).

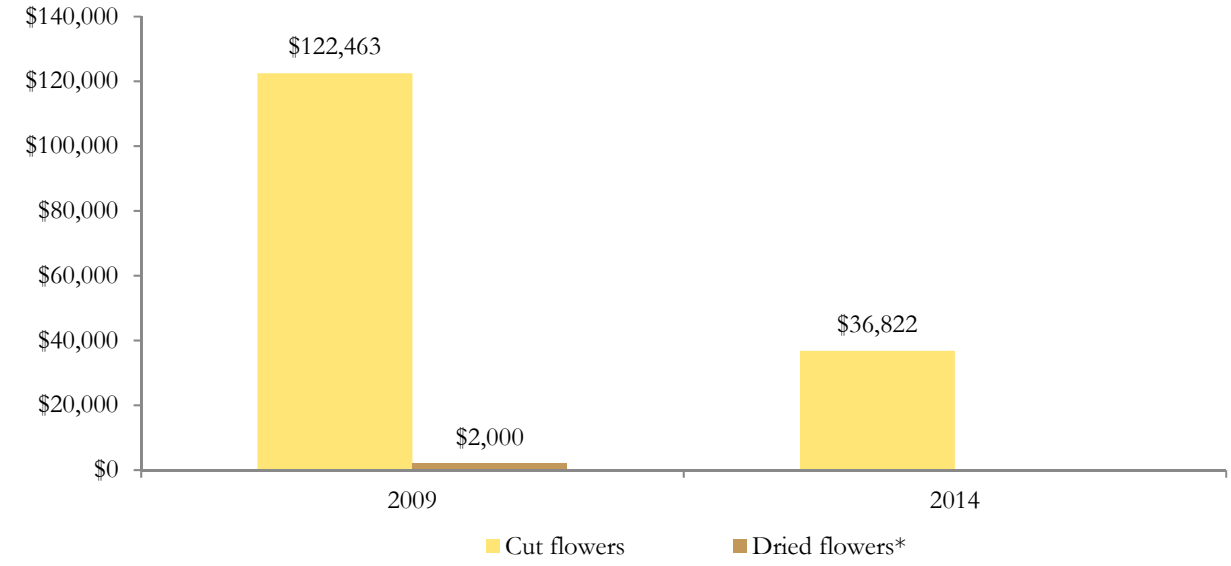
Exhibit 7.4.3 – Missouri Cut Flower Production Area In the Open, 2009 and 2014



* No production area in 2014; 2009 area was withheld to avoid reporting information for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

Between 2009 and 2014, Missouri cut flower sales declined markedly. The more than $122,000 in sales recorded during 2009 declined to slightly less than $37,000 in 2014. See Exhibit 7.4.4. Missouri operations have also raised and sold dried cut flowers. The exhibit shares that dried cut flower sales totaled $2,000 in 2009. Data for 2014 were withheld in order to protect information for individual operations (USDA National Agricultural Statistics Service 2017b).

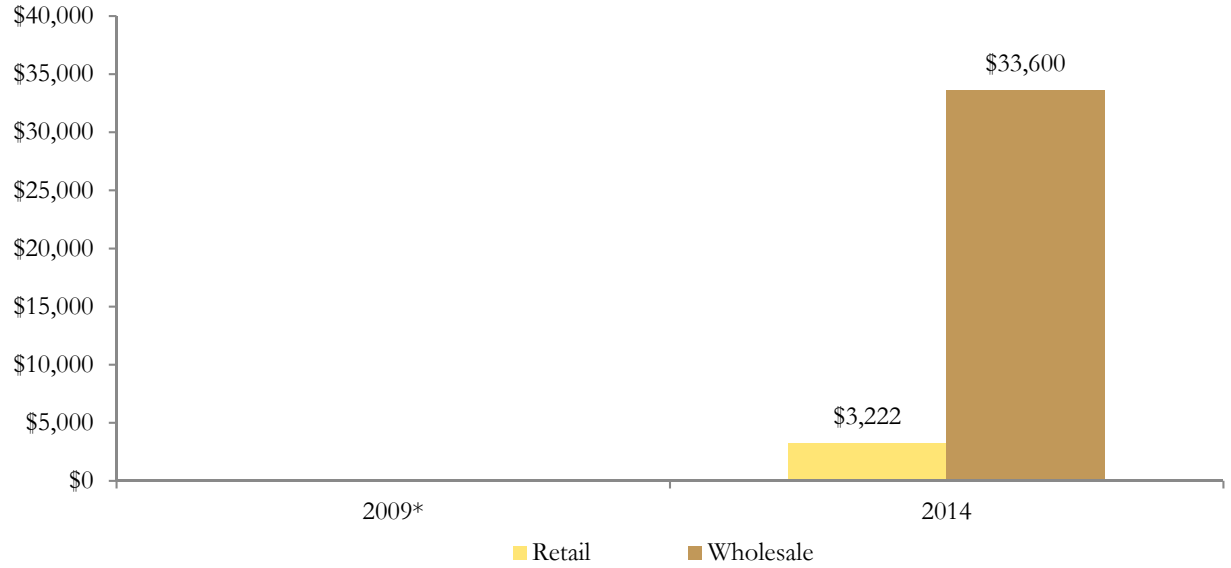
Exhibit 7.4.4 – Missouri Cut and Dried Flower Sales, 2009 and 2014



* In 2014, dried cut flower sales were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

Operations have sold cut flowers through retail and wholesale channels. Sales in those channels were withheld for 2009 in order to protect data for individual operations. In 2014, a majority of the state's cut flower sales originated from wholesale transactions. See Exhibit 7.4.5. Wholesale transactions produced more than 90 percent of Missouri cut flower sales from growers in 2014. Retail represented nearly 9 percent of sales (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.4.5 – Missouri Cut Flower Sales in Retail and Wholesale Channels, 2009 and 2014

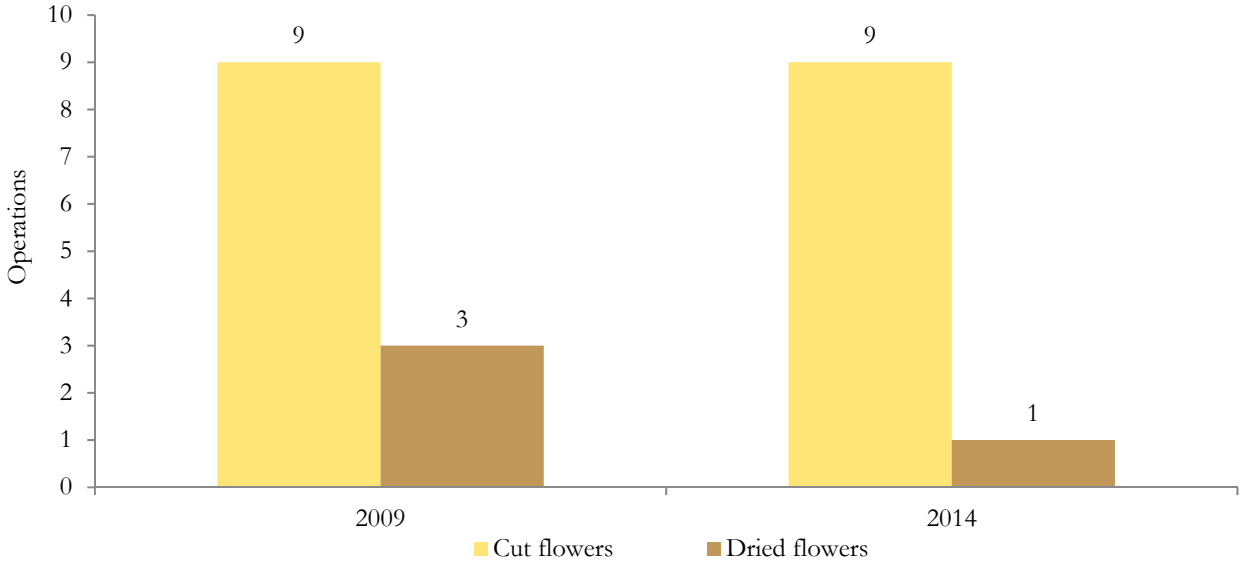


* In 2009, retail and wholesale sales were withheld to protect data for individual operations.
Source: USDA, National Agricultural Statistics Service (2017b)

Note that little sales data are available to explain Missouri cut flower sales by plant class. In 2014, sales volume or value data were only reported for iris and tulip. Missouri operations reported selling 1,000 iris stems in 2014. Tulip sales totaled 5,200 stems, which generated $10,200 in sales (USDA National Agricultural Statistics Service 2017b).

During both 2009 and 2014, nine operations in Missouri reported that they sold cut flowers. See Exhibit 7.4.6. Missouri's dried cut flower industry has had less consistency in terms of operation count. Three operations in the state indicated that they sold dried cut flowers in 2009. By 2014, the dried cut flower operation count declined to one enterprise. During both years, Missouri dried flower operations exclusively served the wholesale market; none sold dried flowers at retail. For the distribution of Missouri operations selling cut flowers at retail and wholesale, continue to Exhibit 7.4.8 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.4.6 – Missouri Cut and Dried Flower Operations, 2009 and 2014

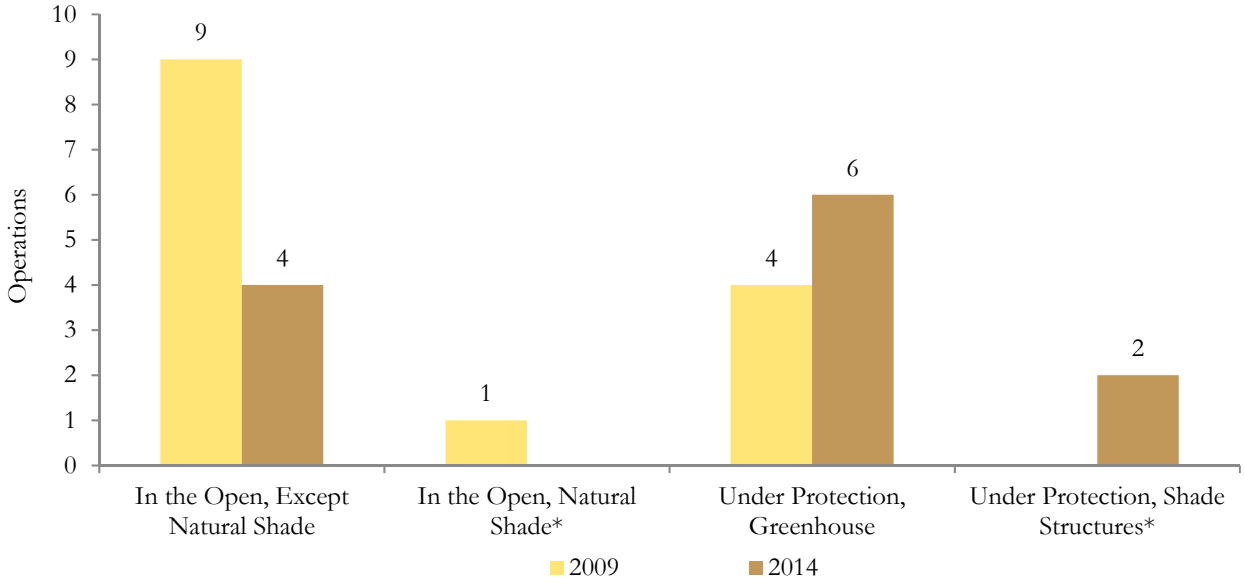


Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.4.7 shares the extent to which the state's cut flower operations produced those flowers in various environments — in the open or under protection — during 2009 and 2014. In 2009, operations were most likely to grow cut flowers in the open without natural shade. Several — four — operations grew cut flowers under a greenhouse, and one raised flowers in the open with natural shade (USDA National Agricultural Statistics Service 2017b).

In 2014, fewer operations indicated that they raised flowers in the open without natural shade, and none reported using open spaces with natural shade. Between 2009 and 2014, operations increased their likelihood to use structures that provide protection when producing cut flowers. None had used shade structures in 2009, but two operations reported growing flowers with shade structures in 2014. The number of operations growing cut flowers under greenhouses increased from four operations in 2009 to six operations in 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.4.7 – Missouri Cut Flower Operations by Production Environment, 2009 and 2014



* No operations in 2009 produced cut flowers under shade structures; no operations in 2014 raised cut flowers in the open with natural shade.
Source: USDA, National Agricultural Statistics Service (2017b)

More Missouri cut flower operations have sold their flowers via the wholesale channel than the retail channel. Exhibit 7.4.8 presents the count of Missouri operations selling retail and wholesale cut flowers in 2009 and 2014. In both years, six operations indicated that they sold cut flowers at wholesale. The number of operations selling cut flowers at retail increased from three enterprises in 2009 to four enterprises in 2014 (USDA National Agricultural Statistics Service 2017b).

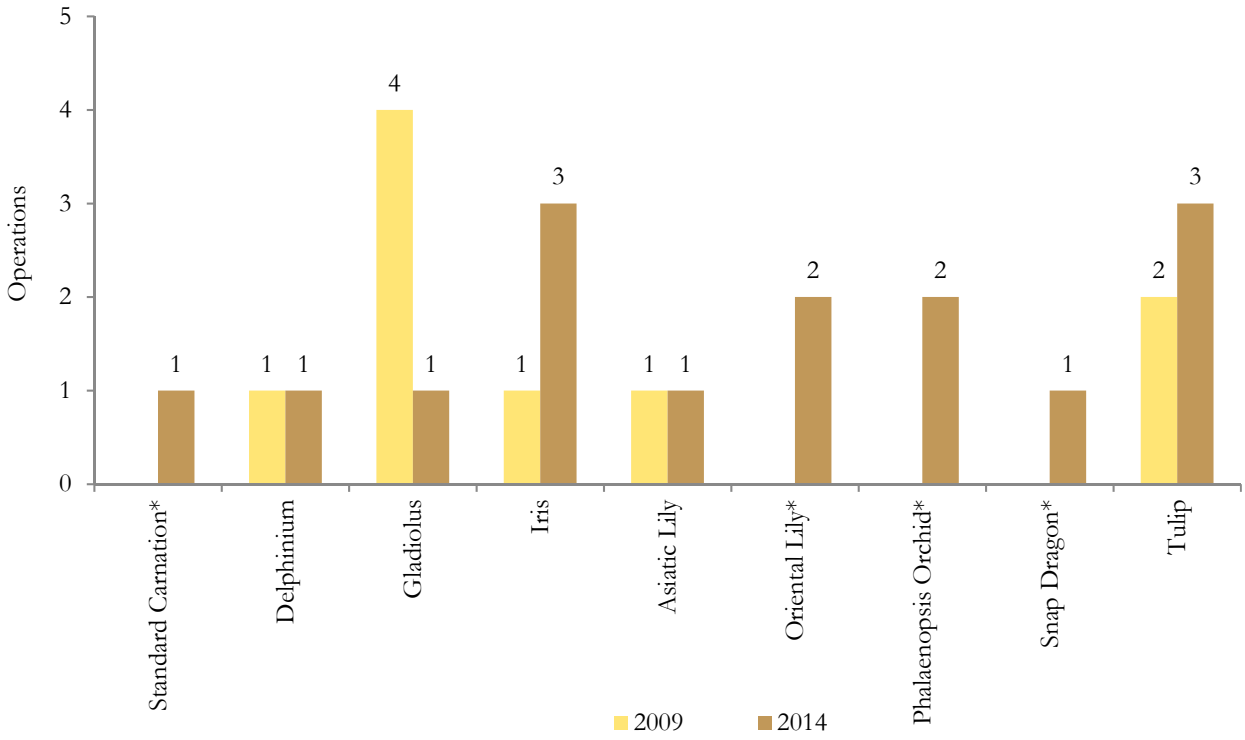
Exhibit 7.4.8 – Missouri Cut Flower Operations Selling in Retail and Wholesale Channels, 2009 and 2014

Source: USDA, National Agricultural Statistics Service (2017b)

In Missouri, cut flower operations have grown several types of flowers that USDA includes in its specialty crop definition. Exhibit 7.4.9 shares the number of operations that reported selling various classes of cut flowers in 2009 and 2014. Note that no operations reported selling standard carnations, oriental lilies, Phalaenopsis orchids and snap dragons in 2009. In 2014, Missouri operations most commonly sold iris and tulips as cut flowers. Three operations reported selling cut iris, and three sold cut tulips (USDA National Agricultural Statistics Service 2017b).

For several cut flower species, the count of operations selling them increased from 2009 to 2014. The number of operations selling iris, oriental lilies and Phalaenopsis orchids each grew by two enterprises. In contrast, three fewer Missouri cut flower operations reported selling gladiolus in 2014 relative to 2009. Gladiolus was the only cut flower class to experience a reduction in operation count with sales from 2009 to 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.4.9 – Missouri Cut Flower Operations Selling Flowers by Plant Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

7.5 Cut Cultivated Greens

The specialty crop definition names six plant classes as cut cultivated greens. Those classes are shared in Exhibit 7.5.1. They range from asparagus ferns to holly. Specific data are available for the cut cultivated greens formatted in bold text. For more details about Missouri's role in producing and selling cut cultivated greens, see the following discussion.

Exhibit 7.5.1 – Cut Cultivated Greens Included in Specialty Crop Definition[6]

Asparagus fern	**Coniferous evergreens**	Eucalyptus	Holly
Leatherleaf fern	Pittosporum		

Missouri cut cultivated greens producers have raised their crops in the open and under protection. "In the open" includes spaces with natural shade and without natural shade, and space under protection encompasses space under greenhouses and shade structures. Exhibit 7.5.2 summarizes cut cultivated greens production area data for 2009 and 2014. To prevent releasing production area data for individual operations, note USDA has withheld several data points. The "(D)" designates instances when data were withheld (USDA National Agricultural Statistics Service 2017b).

The data indicate that Missouri significantly increased its greenhouse area dedicated to cut cultivated greens production between 2009 and 2014. Operations reported just 800 square feet of cut cultivated greens production area in 2009 but 16,000 square feet in 2014. Additionally, between 2009 and 2014, Missouri growers added natural shade in the open and shade structures to support cut cultivated greens production (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.5.2 – Missouri Cut Cultivated Greens Area in Production, 2009 and 2014

	2009	2014
Acres In the Open		
Excluding natural shade	(D)	12
Natural shade	--	(D)
Square Feet Under Protection		
Greenhouse	800	16,000
Shade structures	--	(D)

Source: USDA, National Agricultural Statistics Service (2017b)

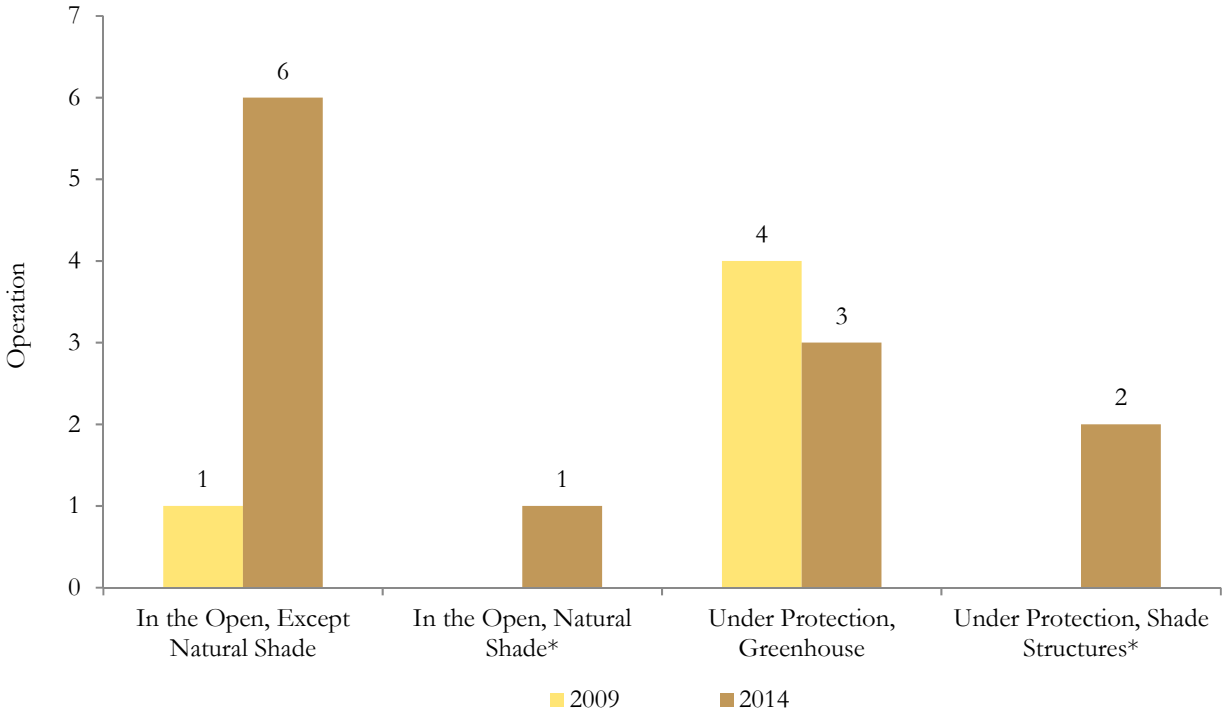
Data articulating cut cultivated greens sales are relatively limited. In 2009, Missouri sales of cut cultivated greens tallied $1,700. Total sales were withheld in 2014 to prevent disclosing data for individual operations (USDA National Agricultural Statistics Service 2017b).

The count of Missouri operations selling cut cultivated greens increased from 2009 to 2014. Five operations in the state sold cut cultivated greens in 2009, and the number selling cut cultivated greens increased to eight operations in 2014. Exhibit 7.5.3 categorizes Missouri cut cultivated greens operations according to the type of production area that they use: natural shade in the open, in the open except natural shade, under protection in a greenhouse and under protection in a shade structure. In 2014, cut cultivated greens operations were most likely to grow their product in the open without natural shade. Between 2009 and 2014, Missouri operations added production area

[6] Note, the USDA Agricultural Marketing Service doesn't name all classes of cut cultivated greens in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit.7.5.1. When reporting totals for the cut cultivated greens sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are aspidistra, berzelia, boxwood, curly willow, ivy, leucadendron, lily grass, lily turf, melaleuca, myrtle, pittosporum, podocarpus, ruscus, ti and other classes reflected by the USDA National Agricultural Statistics Service reporting.

within shade structures and in open spaces with natural shade. During that same time, the number of operations producing cut cultivated greens in a greenhouse declined from four operations to three operations (USDA National Agricultural Statistics Service 2017b).

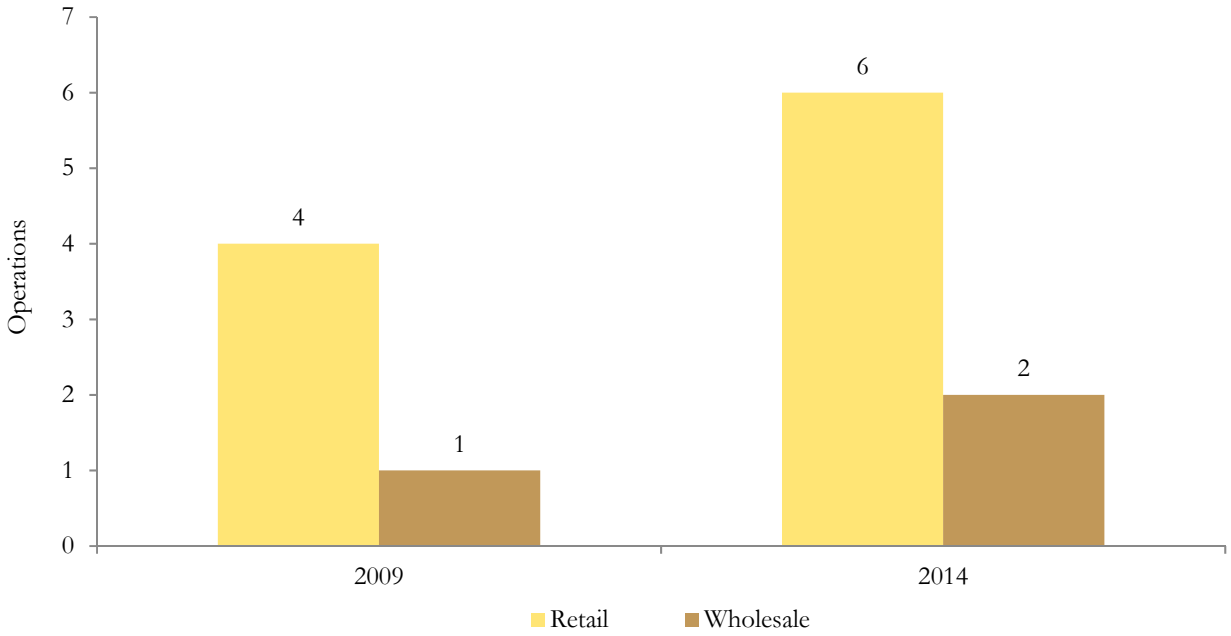
Exhibit 7.5.3 – Missouri Cut Cultivated Greens Operations by Production Arrangement, 2009 and 2014



* In 2009, USDA had no data for areas in the open with natural shade and areas under protection in shade structures.
Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations selling cut cultivated greens have been more likely to sell product at retail than wholesale. Exhibit 7.5.4 illustrates that six operations sold cut cultivated greens at retail in 2014. By comparison, two operations indicated that they had sold cut cultivated greens through wholesale transactions in 2014. The number of operations selling wholesale cut cultivated greens increased from one in 2009 to two in 2014. The count selling product at retail increased from four operations in 2009 to six operations in 2014 (USDA National Agricultural Statistics Service 2014b).

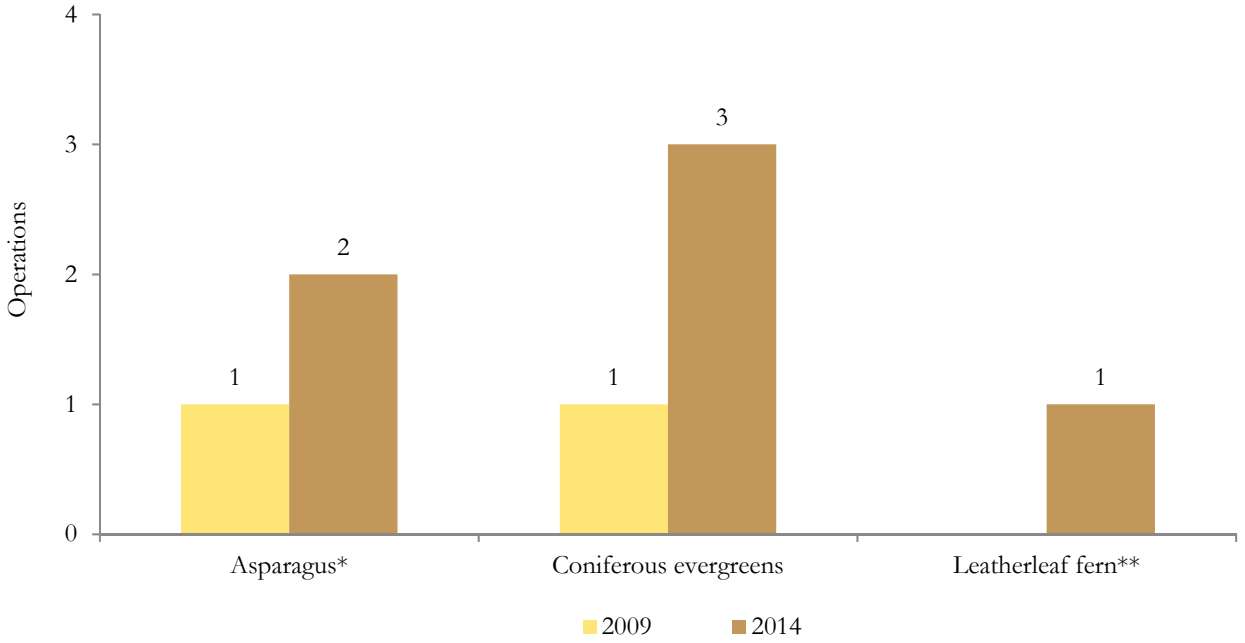
Exhibit 7.5.4 – Missouri Operations Selling Cut Cultivated Greens in Retail and Wholesale Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations reported selling asparagus ferns, coniferous evergreens and leatherleaf ferns as cut cultivated greens in recent years. Exhibit 7.5.5 reports the count of operations selling each class of cut cultivated greens in 2009 and 2014. During 2014, coniferous evergreens were the most common cut cultivated green sold by Missouri operations. Three operations in Missouri reported selling coniferous evergreens in 2014, and two operations shared that they sold asparagus fern as a cut cultivated green. Plus, leatherleaf fern was a cut cultivated green added to Missouri's industry in 2014. No operations were reported in 2009, but one was indicated to make sales in 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.5.5 – Missouri Operations Selling Cut Cultivated Greens by Plant Class, 2009 and 2014



* Asparagus data are specific to "other asparagus." Missouri didn't have data available for plumosus asparagus or tree fern asparagus.
** No operations data were available for leatherleaf ferns in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

7.6 Foliage Plants

Several foliage plants are included in the specialty crop definition. See Exhibit 7.6.1 for a complete inventory of those foliage plants, which are grown for indoor use. All plant names are in bold because USDA collected data specifically for those plants. The extent to which Missouri participates in foliage plant production is described below.

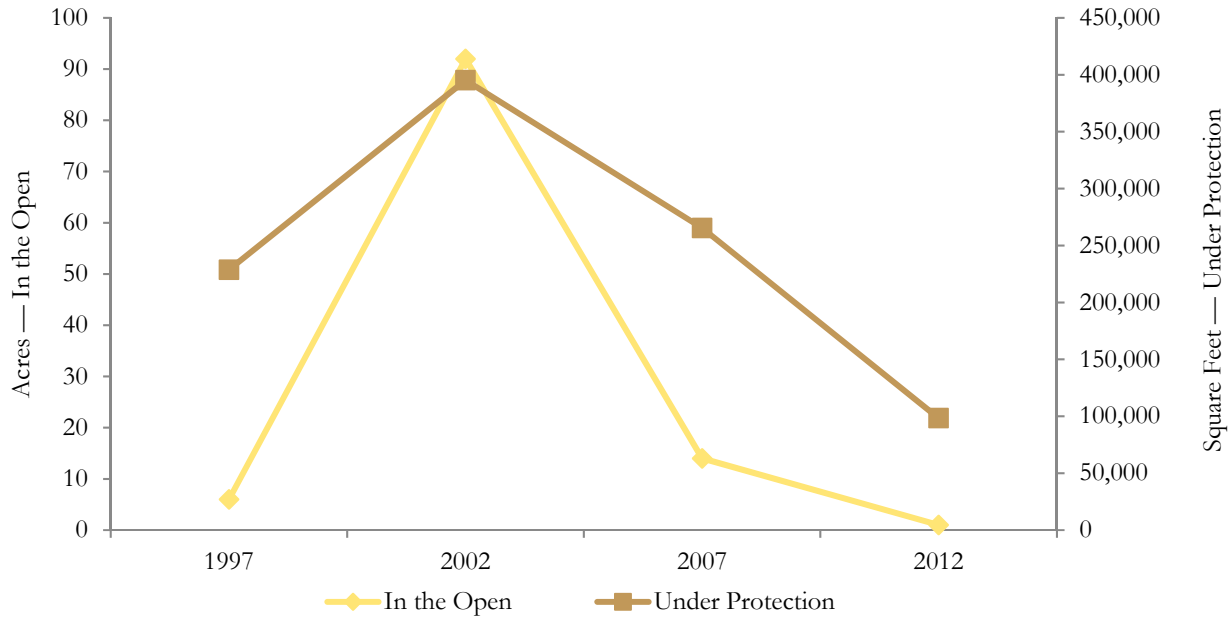
Exhibit 7.6.1 – Foliage Plants Included in Specialty Crop Definition[7]

Anthurium	**Bromeliad**	**Cacti**	**Dieffenbachia**
Dracaena	**Fern**	**Ficus**	**Ivy**
Palm	**Philodendron**	**Spathipyllum**	

[7] Note, the USDA Agricultural Marketing Service doesn't name all classes of foliage plants in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.6.1. When reporting totals for the foliage plants sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are aglaonema, croton, epipremnum, maranta, schefflera, syngonium and other classes reflected by the USDA National Agricultural Statistics Service reporting.

When growing foliage plants, growers may elect to use space in the open or under protection. Area in the open is measured in acres, and area under protection is measured in square feet. Exhibit 7.6.2 reports totals for both categories. Acreage in the open shifted significantly from 1997 to 2012. It increased markedly from six acres in 1997 to 92 acres in 2002. Later, production area in the open declined and ultimately totaled just one acre in 2012. Square footage under protection used to produce foliage plants followed a similar trend. At its highest point, square footage exceeded 395,000 square feet in 2002. It dropped to its lowest level — slightly more than 98,000 square feet — in 2012 (USDA National Agricultural Statistics Service 2017b).

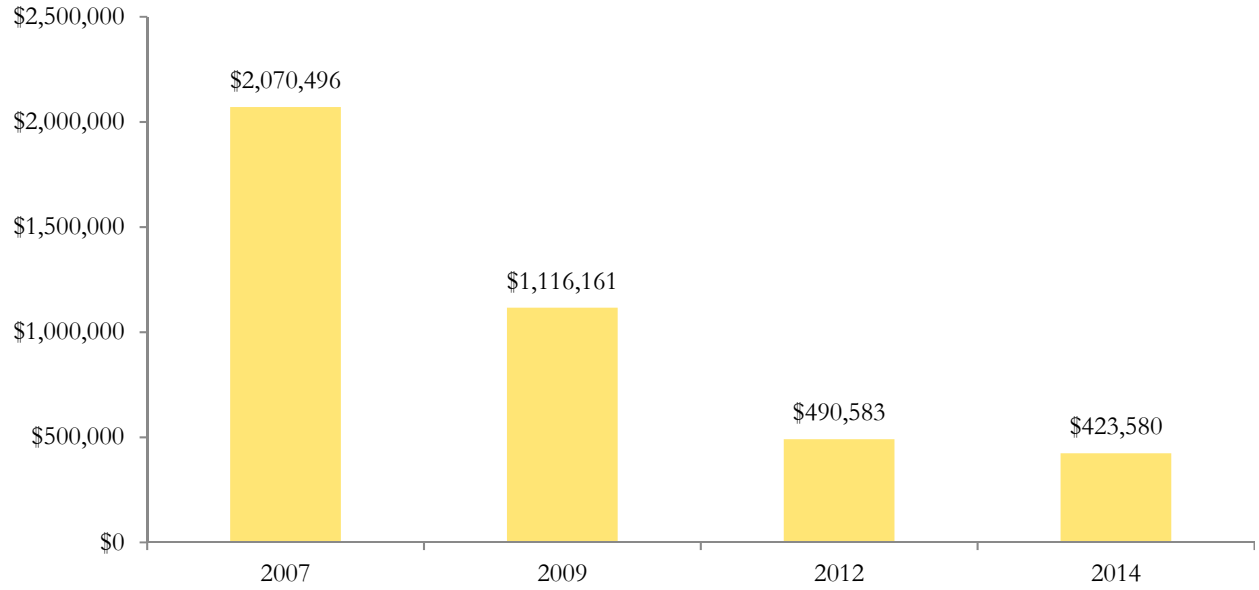
Exhibit 7.6.2 – Missouri Foliage Plant Production Area In the Open and Under Protection, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

From 2007 to 2014, foliage plant sales declined from Missouri operations. Exhibit 7.6.3 illustrates that the state's foliage plant sales exceeded $2 million in 2007. Sales reductions in the years that followed were significant. By 2014, Missouri foliage plant sales totaled just more than $423,500 (USDA National Agricultural Statistics Service 2017b).

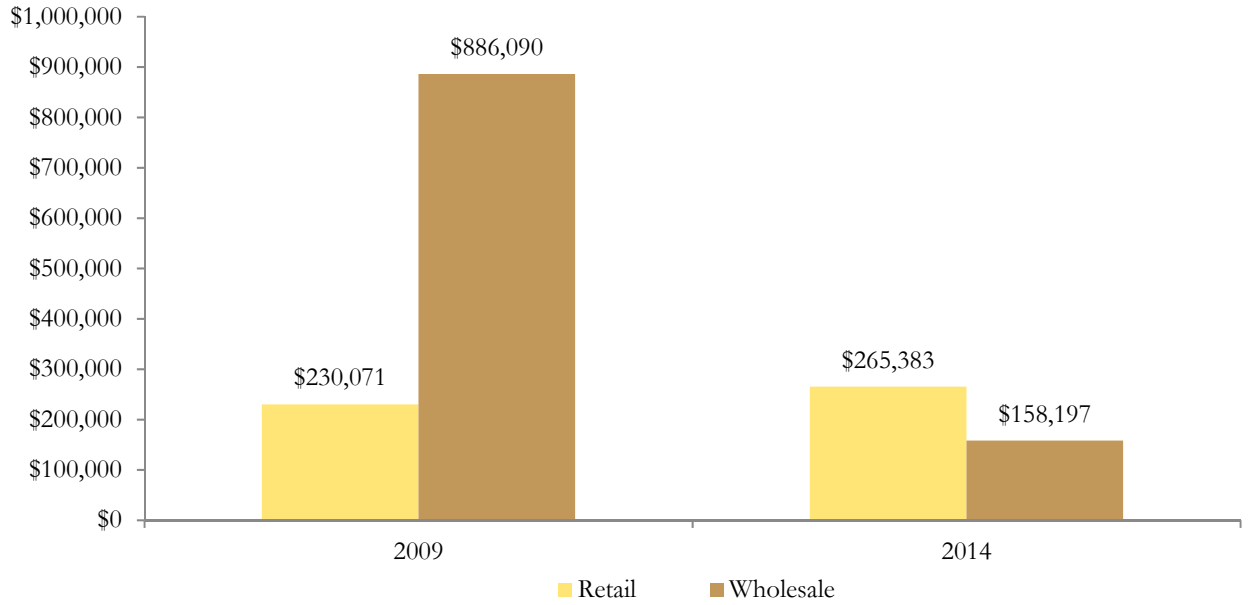
Exhibit 7.6.3 – Missouri Foliage Plant Sales, 2007 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Retail and wholesale foliage plant sales from Missouri operations have experienced varying changes in recent years. Retail sales experienced growth between 2009 and 2014. Exhibit 7.6.4 illustrates that movement in sales; they increased from roughly $230,000 in 2009 to more than $265,000 in 2014. Note that the trend in wholesale foliage plant sales was a stark contrast; sales decreased significantly from 2009 to 2014. They shrunk from roughly $886,000 in 2009 to slightly more than $158,000 in 2014 (USDA National Agricultural Statistics Service 2017b).

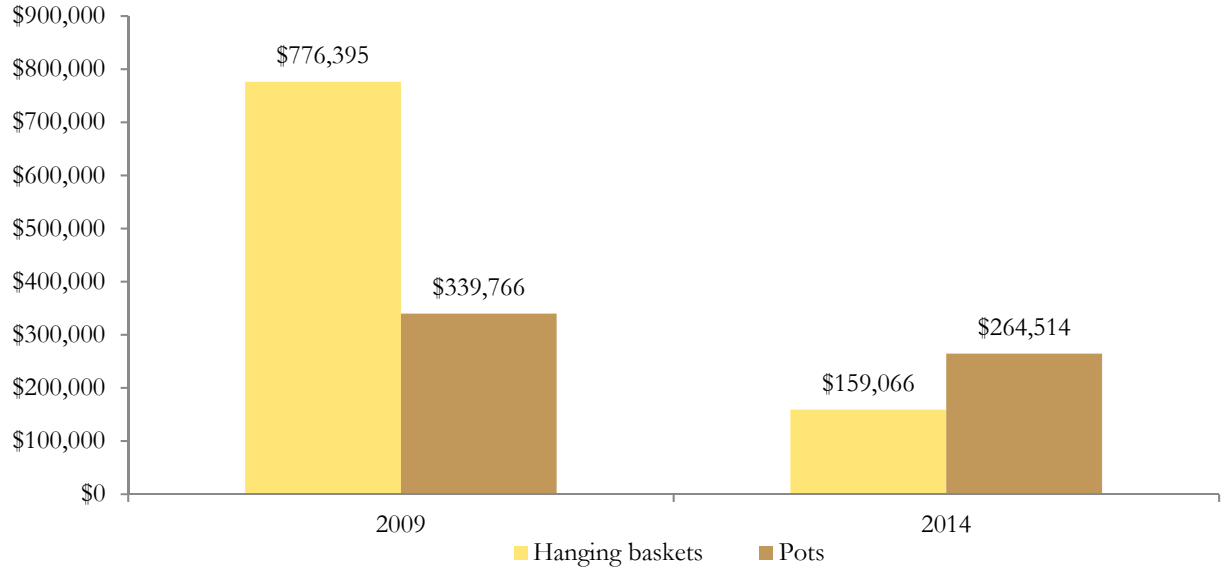
Exhibit 7.6.4 – Missouri Foliage Plant Sales in Retail and Wholesale Channels, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Operations in Missouri have sold foliage plants in hanging baskets and pots. Depending on the year, the extent of sales in each group has varied. In 2009, hanging basket sales generated 69.6 percent of total Missouri foliage plant dollar sales. By 2014, sales activity had shifted. At the time, 62.4 percent of foliage plant dollar sales in the state originated from pots of foliage plants. Exhibit 7.6.5 charts the value of Missouri foliage plant sales for hanging baskets and pots in 2009 and 2014. The data have one consistent thread — dollar sales of both hanging baskets and pots declined during the observed period (USDA National Agricultural Statistics Service 2017b).

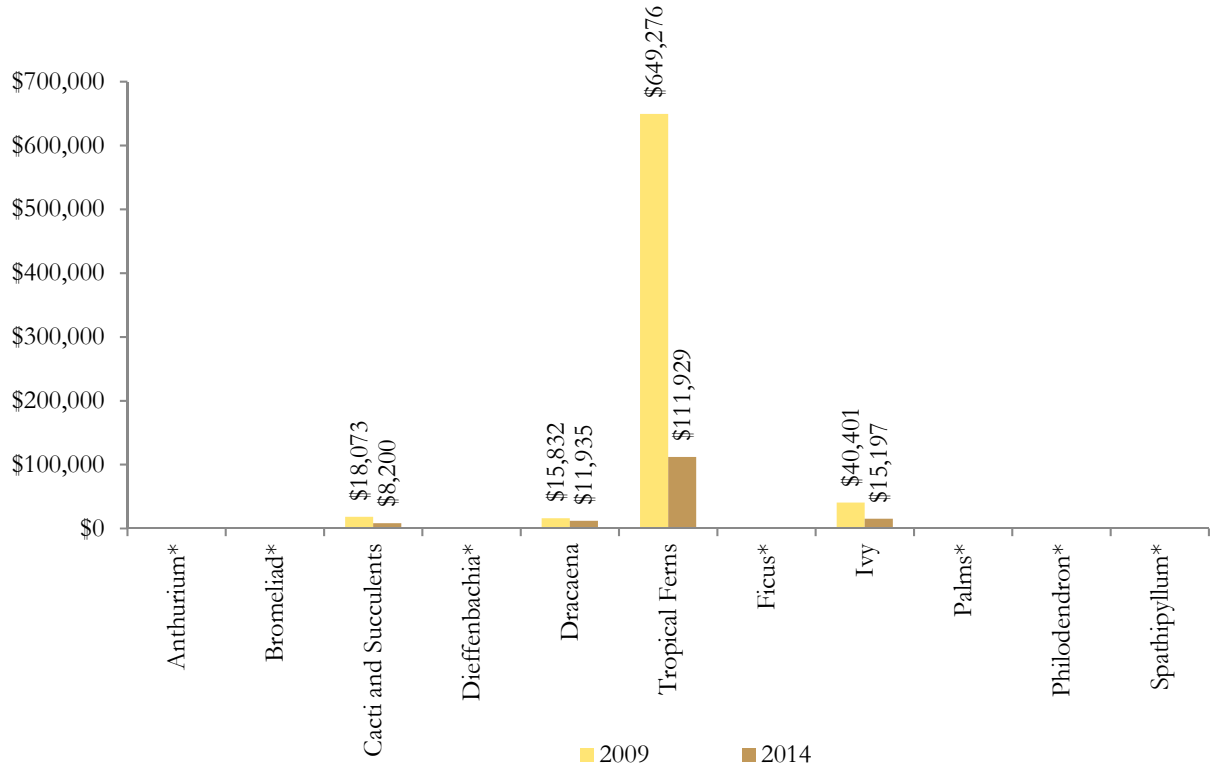
Exhibit 7.6.5 – Missouri Foliage Plant Sales of Hanging Baskets and Pots, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

For the foliage plant classes listed as specialty crops, Exhibit 7.6.6 shares sales in dollars for those grown in Missouri. Note that some crops don't have data listed. In those cases, the state didn't record sales of them, or the data were withheld to avoid releasing data for individual operations. The exhibit's note explains further. Of the foliage plants with data available, sales were greatest for tropical ferns during both 2009 and 2014; however, the sales value declined significantly between 2009 and 2014. Tropical fern dollar sales in 2009 surpassed $649,000, but they shrunk to slightly less than $112,000 in 2014. Ivy ranked second in dollar sales during both 2009 and 2014, but the ivy sales value also declined between those two years. Of the plant classes with data reported in both years, none experienced dollar sales growth (USDA National Agricultural Statistics Service 2017b).

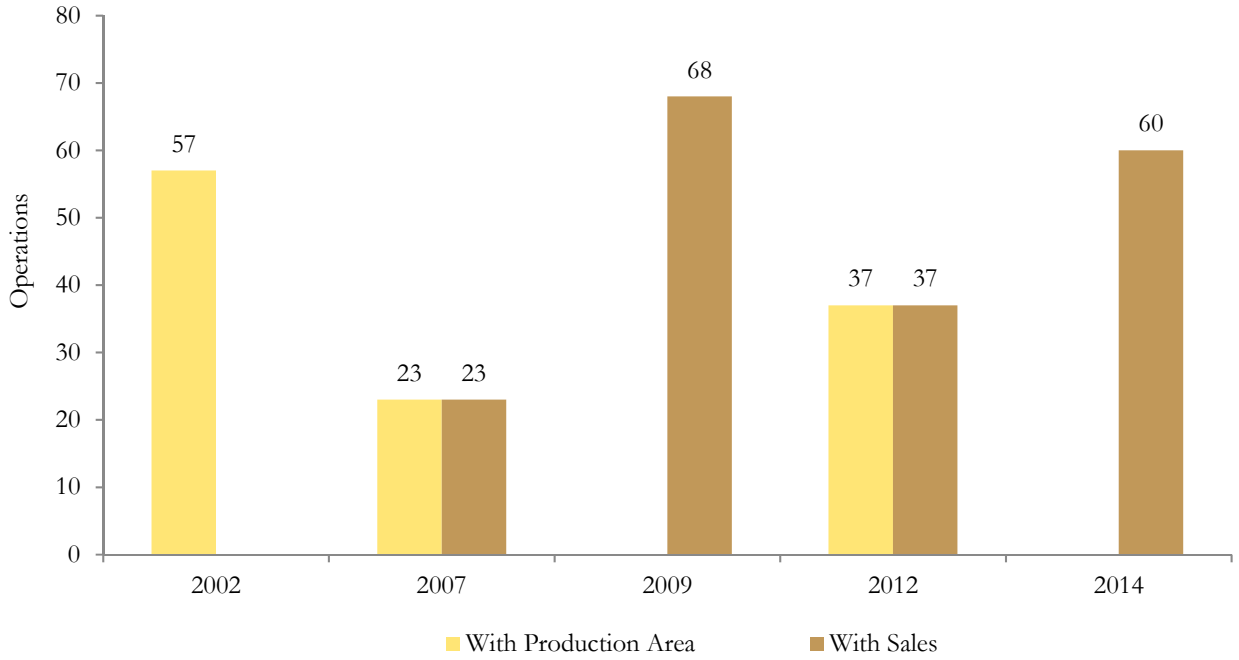
Exhibit 7.6.6 – Missouri Foliage Plant Sales by Plant Class, 2009 and 2014



* Anthurium data were withheld in 2014; none were reported in 2009. Dieffenbachia, ficus, palm, philodendron and spathipyllum data were withheld in 2009. Bromeliad data were withheld in both 2009 and 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

The number of Missouri operations producing and selling foliage plants has changed somewhat erratically in recent years. Exhibit 7.6.7 presents the count of operations that reported foliage plant production area and sales from 2002 to 2014. For both data sets, the count bounced upward and downward from one observed year to another. In 2014, 60 operations in Missouri reported that they sold foliage plants. Two years earlier, 37 operations indicated that they produced and sold foliage plants (USDA National Agricultural Statistics Service 2017b).

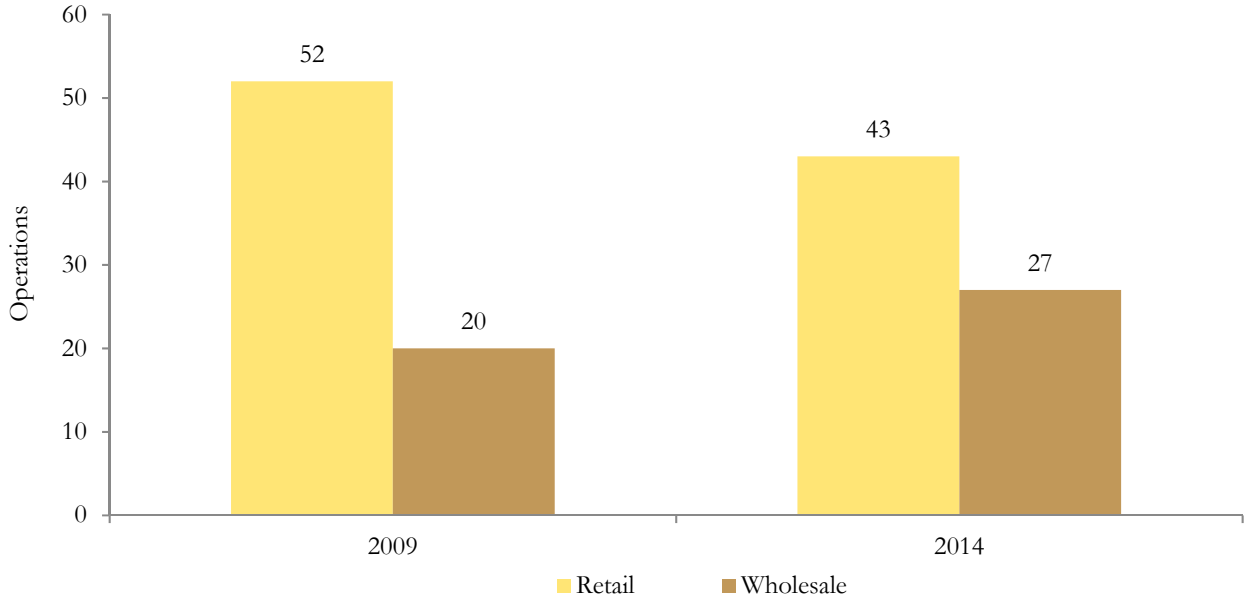
Exhibit 7.6.7 – Missouri Operations Producing and Selling Foliage Plants, 2002 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

In 2009 and 2014, Missouri foliage plant operations were more likely to sell product at retail than at wholesale. See Exhibit 7.6.8. In 2014, Missouri operations selling at retail dropped to 43 operations from the 52 that operated in 2009. Wholesale operations in 2014 totaled 27 operations, which was an increase from the 20 that operated in 2009 (USDA National Agricultural Statistics Service 2017b).

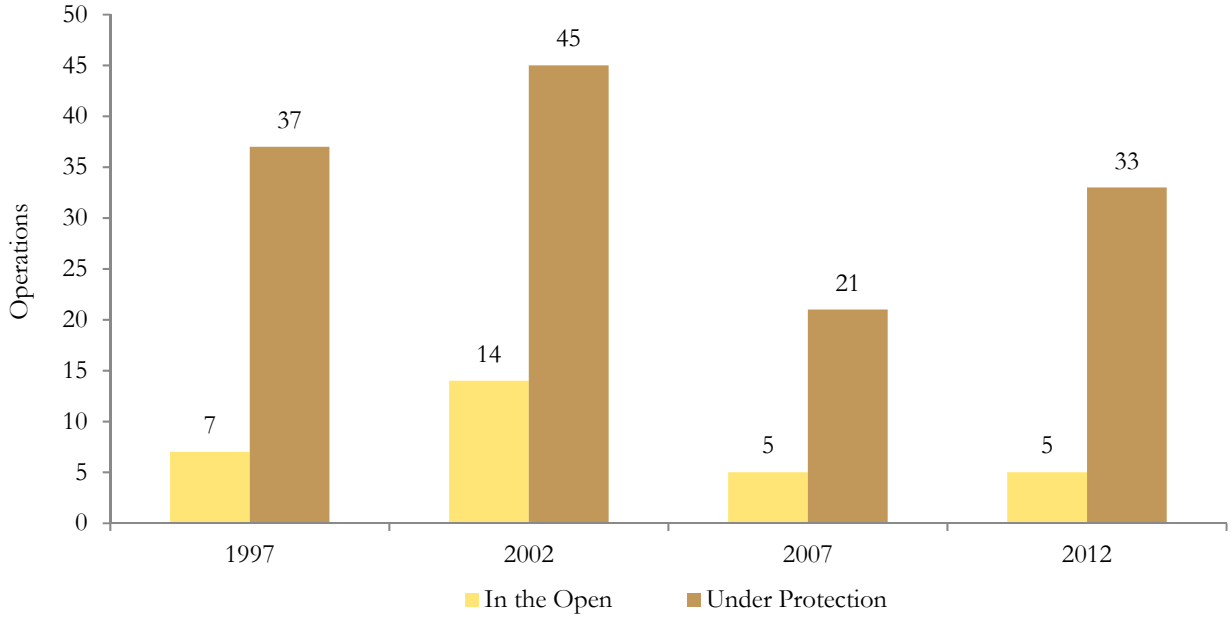
Exhibit 7.6.8 – Missouri Operations Selling Foliage Plants at Retail and Wholesale, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.6.9 provides an alternative view of Missouri foliage plant operations data. It shares the number of operations that maintained foliage plant production in open areas and areas under protection from 1997 to 2012. As the chart illustrates, more Missouri operations have had production area under protection than in the open. In 2012, five Missouri foliage plant operations reported that they grew foliage plants in the open. In contrast, 33 operations indicated that they grew foliage plants under protection (USDA National Agricultural Statistics Service 2017b).

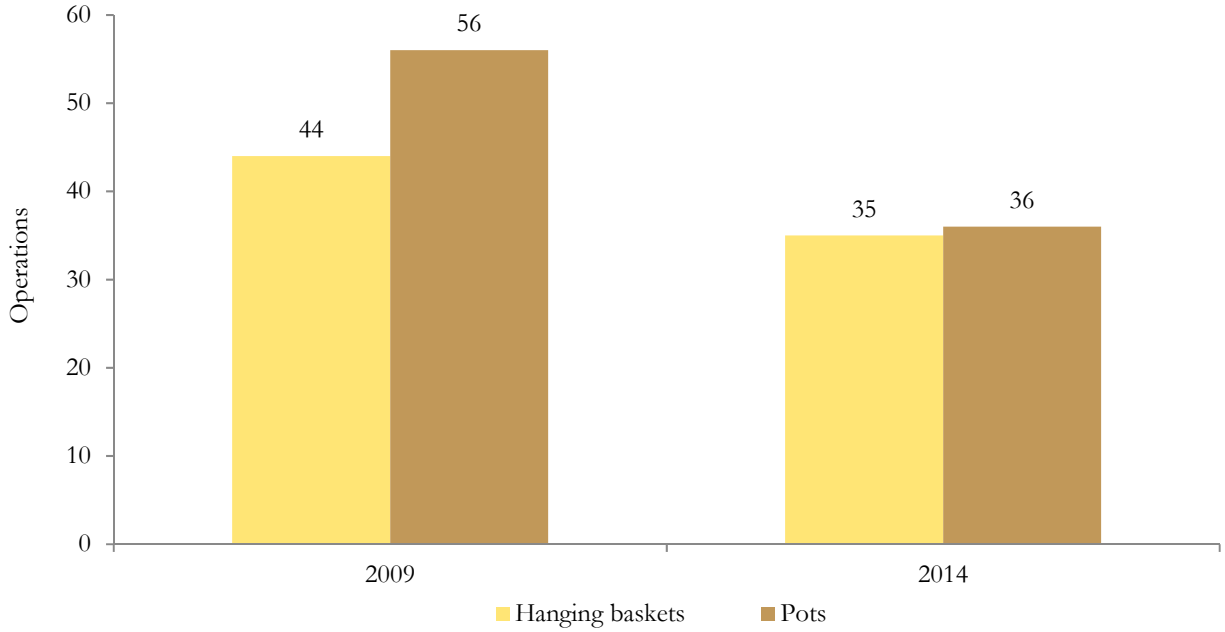
Exhibit 7.6.9 – Missouri Operations with Foliage Plant Production Area In the Open and Under Protection, 1997 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

During 2009 and 2014, the number of Missouri operations selling foliage plants in pots exceeded the number of those selling them in hanging baskets. However, Exhibit 7.6.10 illustrates that the gap between count of operations selling hanging baskets and those selling pots closed between the two years. By 2014, the count of operations selling pots was just one higher than the number selling hanging baskets. In total, 36 operations sold potted foliage plants during 2014, and 35 operations sold foliage plants in hanging baskets (USDA National Agricultural Statistics Service 2017b).

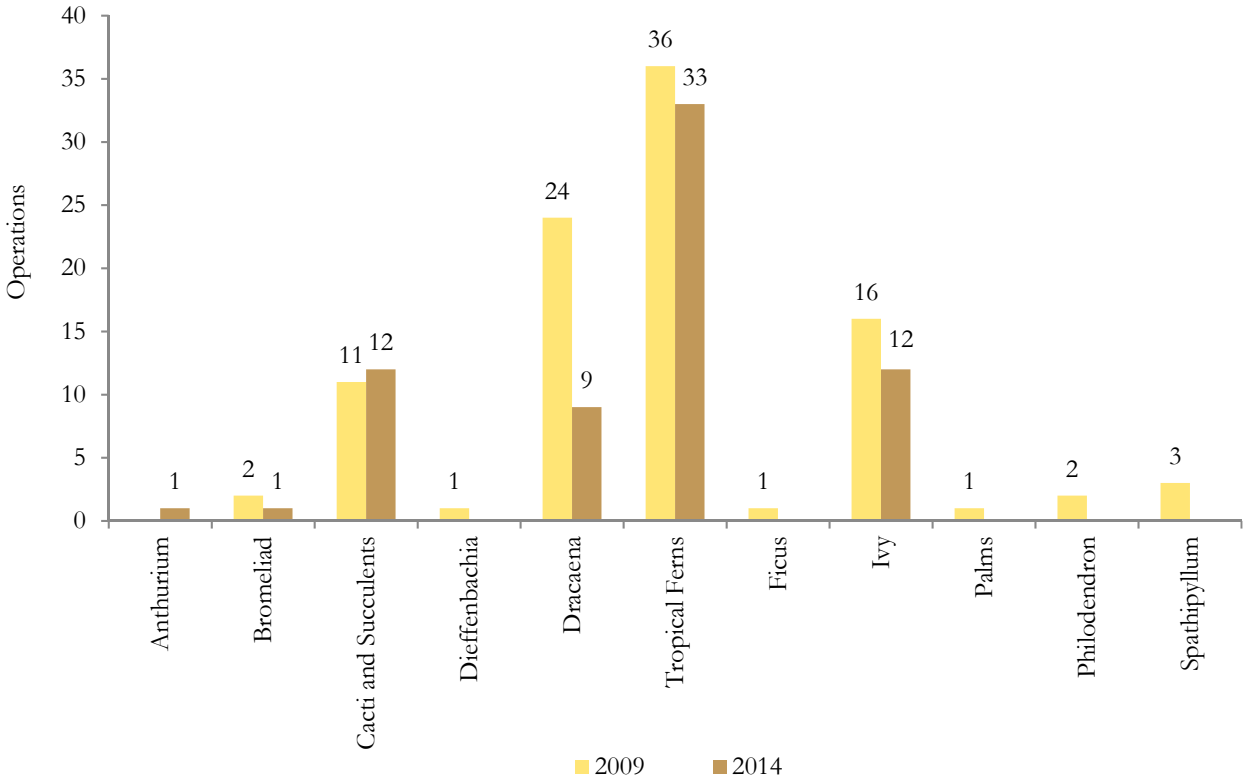
Exhibit 7.6.10 – Missouri Operations Selling Foliage Plant Hanging Baskets and Pots, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

To further assess Missouri foliage plant operations, Exhibit 7.6.11 presents the count of those selling such plants by plant class in 2009 and 2014. Missouri operations have been most likely to raise tropical ferns. In 2014, 33 operations shared that they sold tropical ferns. That count was a reduction from the 36 operations that sold tropical ferns in 2009. During 2014, 12 operations reported that they sold cacti and succulents, and 12 indicated that they sold ivy. Note that cacti and succulents and anthurium were the two plant classes that had an increase in operations selling those foliage plants between 2009 and 2014. Cacti and succulent operations increased from 11 in 2009 to 12 in 2014. One operation reported selling anthurium in 2014, but none were reported to have sales in 2009 (USDA National Agricultural Statistics Service 2017b).

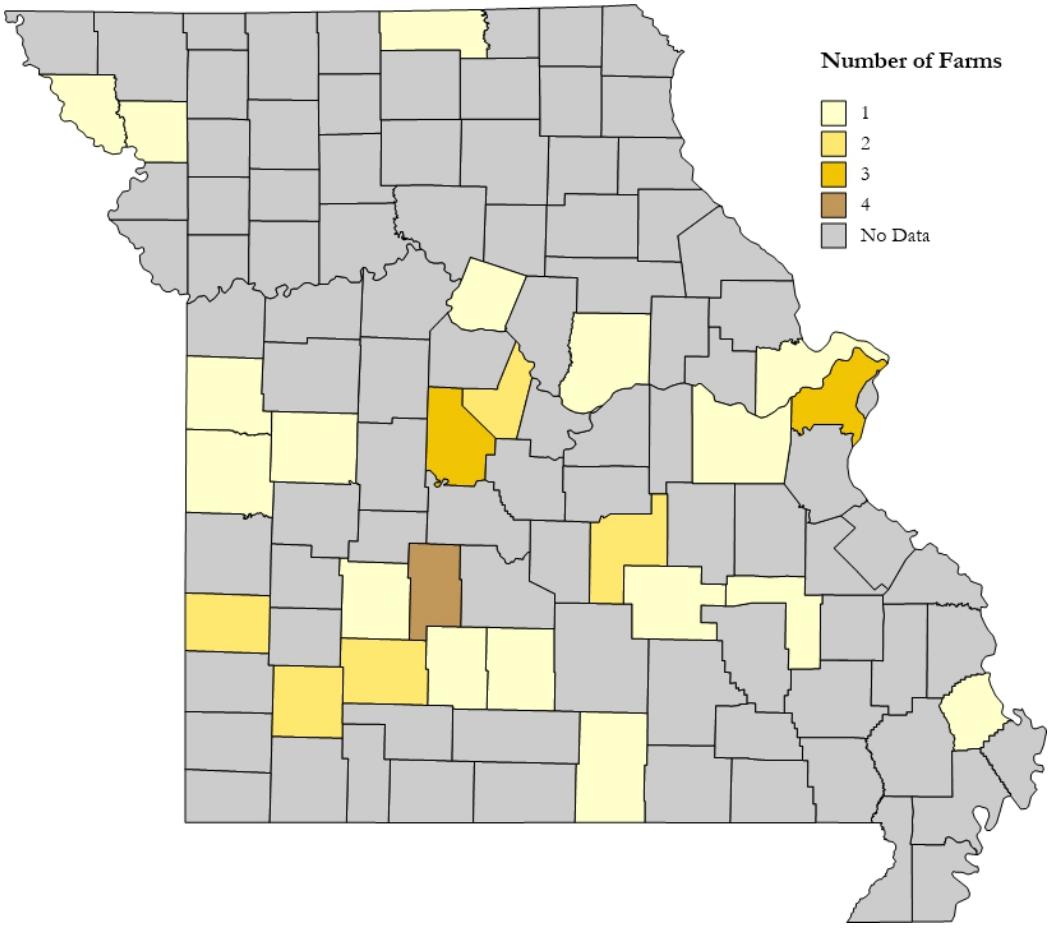
Exhibit 7.6.11 – Missouri Operations Selling Foliage Plants by Plant Class, 2009 and 2014



* No data for anthirium were reported in 2009; no 2014 data were reported for dieffenbachia, ficus, palms, philodendron and spathipyllum.
Source: USDA, National Agricultural Statistics Service (2017b)

To see the number of Missouri foliage plant operations by county, refer to Exhibit 7.6.12. The map illustrates that the number of operations with area in production was greatest in Dallas County, four operations; Morgan County, three operations; and St. Louis County, three operations. To protect data for individual operations, most production area data were withheld. Only Dallas County had published production area data. In 2012, more than 11,200 square feet of area under protection was used to produce foliage plants (USDA National Agricultural Statistics Service 2017b).

*Exhibit 7.6.12 – Missouri Foliage Plant Operations by County, 2012**



* Operations used in-the-open acreage but the data were withheld for Callaway, Dent, Iron and Phelps counties. Operations used area under protection but the data were withheld for Andrew, Barton, Bates, Cass, Dent, Franklin, Greene, Henry, Holt, Howard, Howell, Lawrence, Moniteau, Morgan, Polk, Putnam, Scott, St. Charles, St. Louis, Webster and Wright counties.
Source: USDA, National Agricultural Statistics Service (2017b)

7.7 Christmas Trees

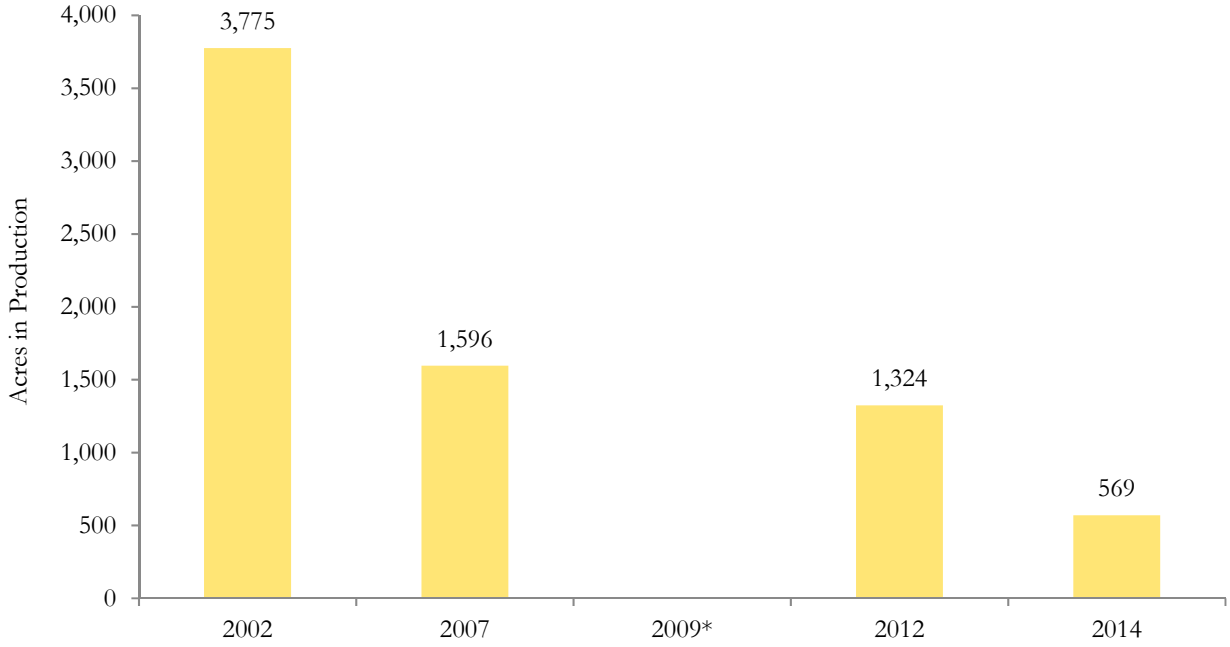
Christmas trees also qualify as a specialty crop, and the Christmas tree category includes multiple classes of trees. Exhibit 7.7.1 lists the various Christmas tree classes named in the USDA Agricultural Marketing Service's specialty crop definition. The tree types listed in bold are those with USDA National Agricultural Statistics Service data available for Missouri.

Exhibit 7.7.1 – Christmas Trees Included in Specialty Crop Definition[8]

Balsam fir	Blue spruce	**Douglas fir**	**Fraser fir**
Living Christmas tree	Noble fir	**Scotch pine**	**White pine**

Area in Missouri used to raise cut Christmas trees declined dramatically between 2002 and 2014. The steepest drop occurred between 2002 and 2007. Exhibit 7.7.2 illustrates that Missouri operations allocated more than 3,700 acres to producing Christmas trees for cutting in 2002. The acreage total declined to 569 acres in 2014. Note that data for 2009 were withheld, so that information isn't reflected in the exhibit (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.7.2 – Missouri Cut Christmas Tree Production Area, 2002 to 2014

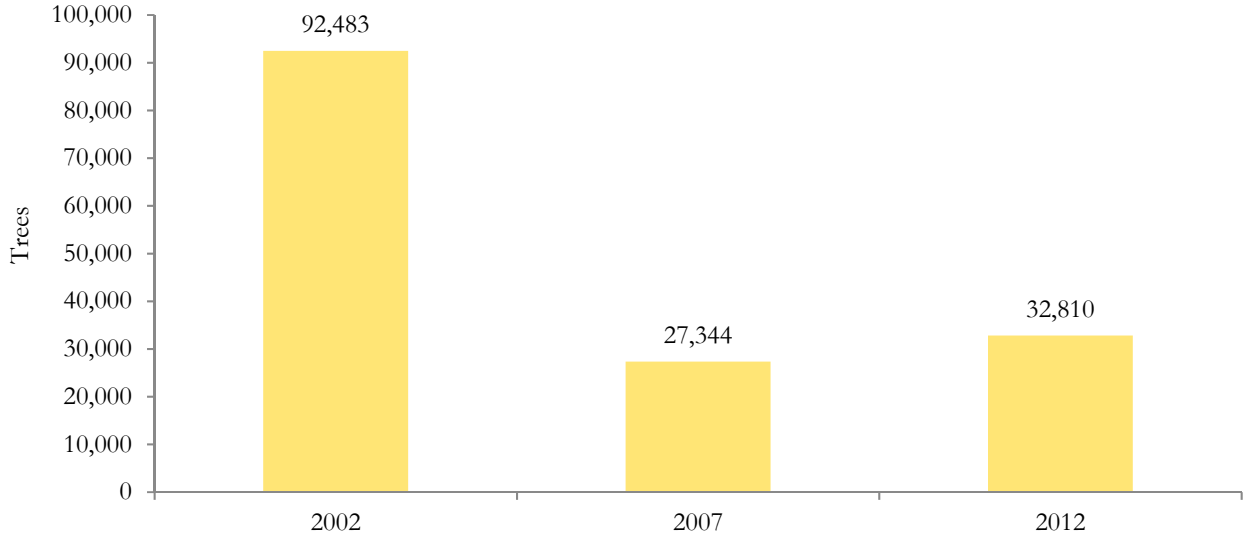


* Data withheld for 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

Cut Christmas trees harvested per year is provided Exhibit 7.7.3. As illustrated, Missouri's industry yielded more than 92,400 cut Christmas trees during 2002. The harvest declined dramatically in 2007, but it increased somewhat more recently. In 2012, Missouri operations harvested more than 32,800 cut Christmas trees (USDA National Agricultural Statistics Service 2017b).

[8] Note, the USDA Agricultural Marketing Service doesn't name all classes of Christmas trees in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.7.1. When reporting totals for the Christmas tree sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are Leyland cypress, grand fir, white spruce and other classes reflected by the USDA National Agricultural Statistics Service reporting.

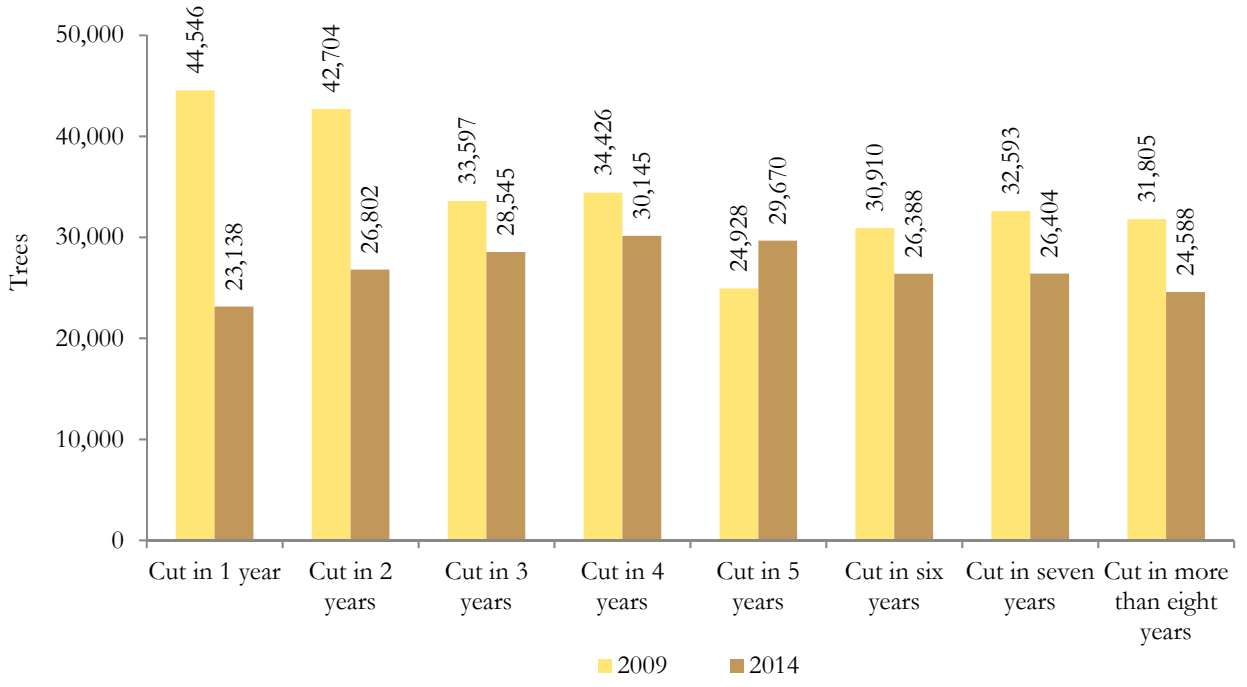
Exhibit 7.7.3 – Missouri Cut Christmas Trees Harvested, 2002 to 2012



Source: USDA, National Agricultural Statistics Service (2017b)

Christmas tree inventory is a measure of the potential size of tree harvests in future years. Exhibit 7.7.4 breaks down Missouri cut Christmas tree inventory by intended harvest year for 2009 and 2014. These data indicate that the industry has the potential to constrict further. When comparing the 2009 and 2014 data sets, note that tree inventory in 2009 exceeded tree inventory in 2014 for all but one category: trees to cut in five years (USDA National Agricultural Statistics Service 2017b).

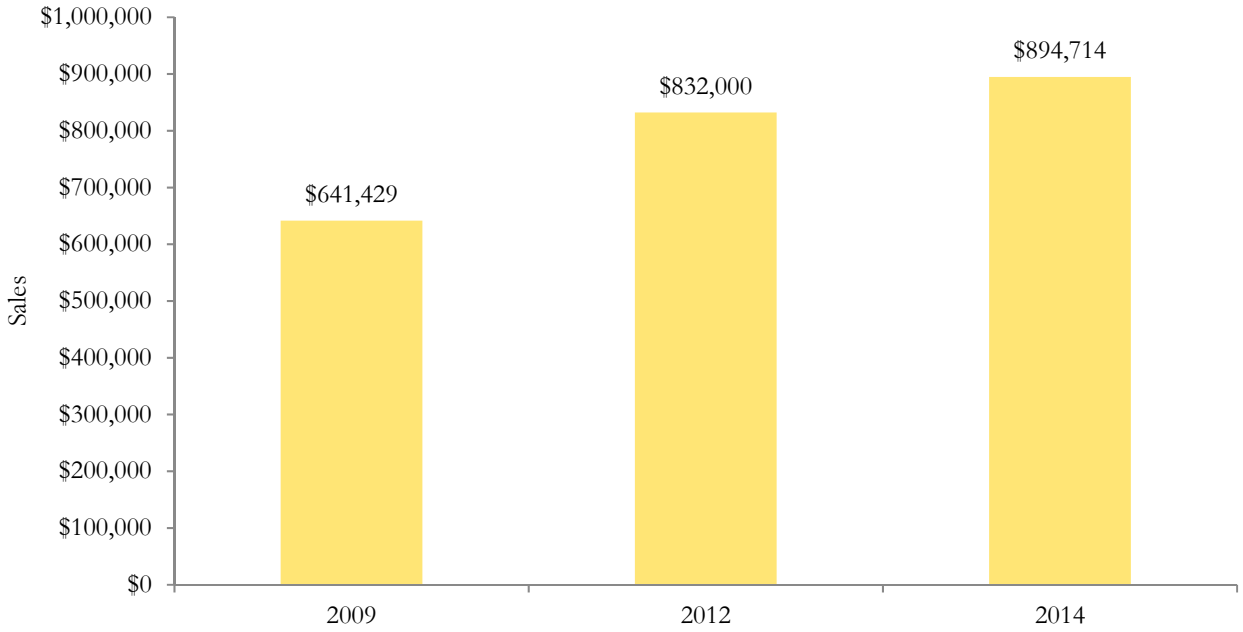
Exhibit 7.7.4 – Missouri Cut Christmas Tree Inventory, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Despite Missouri cut Christmas tree acreage and the count of harvested trees declining, dollar sales of cut Christmas trees have increased in recent years. As Exhibit 7.7.5 shares, cut Christmas tree sales totaled slightly more than $641,000 in 2009. They grew to $832,000 in 2012 and more than $894,000 in 2014 (USDA National Agricultural Statistics Service 2017b).

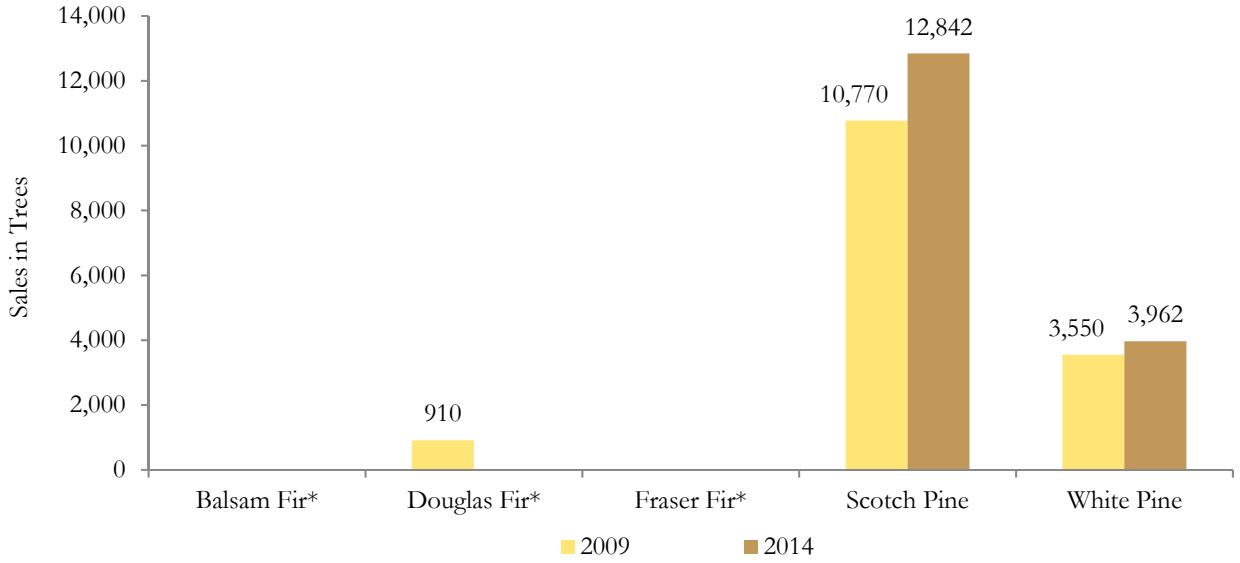
Exhibit 7.7.5 – Missouri Cut Christmas Tree Dollar Sales, 2009 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Scotch pine and white pine have been two classes of Christmas trees popular with Missouri producers. Exhibit 7.7.6 illustrates Missouri cut Christmas tree sales volume by several different classes of trees. Note that data have been withheld for several classes; the exhibit's note shares more details. Data were reported for Scotch pine and white pine in both years. For those two classes of cut Christmas tree, their sales volume actually increased between 2009 and 2014, which is counter to the overall decline in cut Christmas tree acreage and number of trees harvested within the state. Missouri operations sold more than 12,800 Scotch pine trees in 2014, and white pine sales totaled nearly 4,000 trees (USDA National Agricultural Statistics Service 2017b).

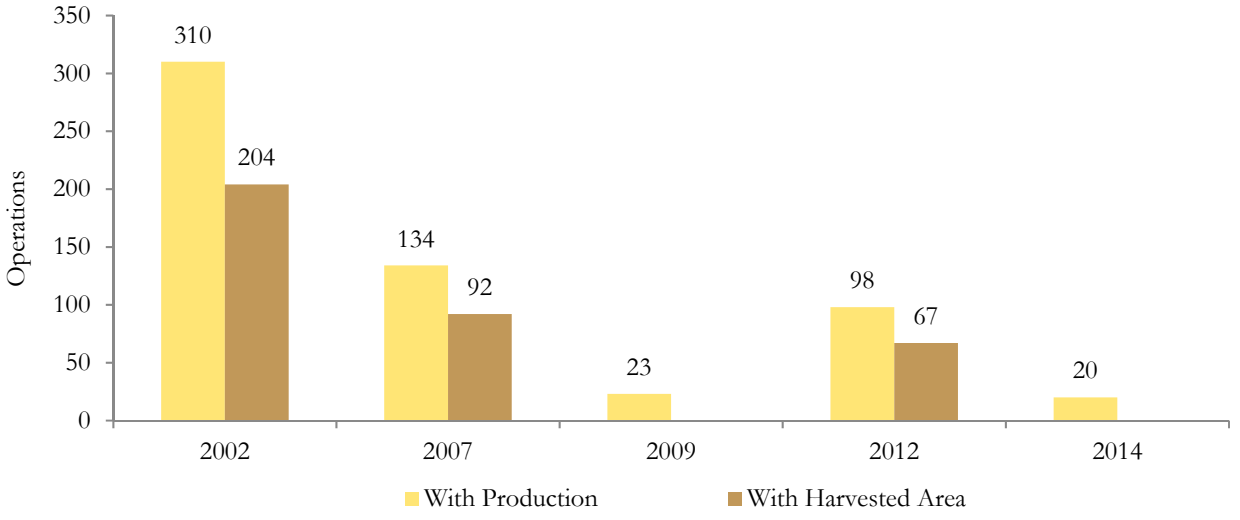
Exhibit 7.7.6 – Missouri Cut Christmas Tree Unit Sales by Tree Class, 2009 and 2014



* Data in 2009 were withheld for balsam fir. Data in 2014 were withheld for balsam fir, Douglas fir and Fraser fir. No data were reported for Fraser fir in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

In terms of cut Christmas tree operations, Exhibit 7.7.7 shares the number of those producing trees and harvesting trees from 2002 to 2014. The data indicate some volatility; however, the overall trend suggests that fewer Missouri operations have engaged in cut Christmas tree production in more recent years. In 2002, 310 operations noted that they had cut Christmas tree area in production. At the same time, those harvesting trees totaled 204 operations. During 2012 — the most recent year that reported both operations with production area and operations with harvested area — 98 operations shared that they had cut Christmas tree acreage in production, and 67 had area harvested for trees (USDA National Agricultural Statistics Service 2017b).

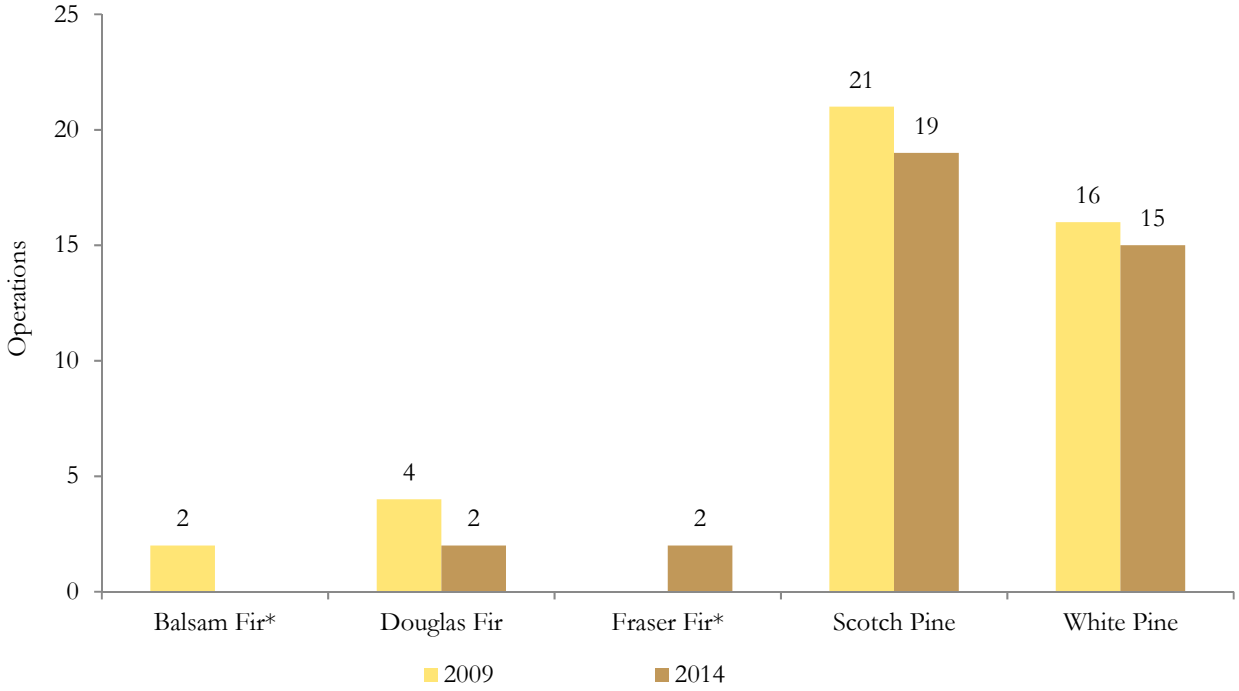
Exhibit 7.7.7 – Missouri Operations with Production and Harvested Cut Christmas Tree Area, 2002 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

As the sales volume data from earlier indicated, Scotch pine and white pine have been popular classes of cut Christmas trees produced in Missouri. Exhibit 7.7.8 presents the number of Missouri cut Christmas tree operations producing trees from various classes. Nineteen operations produced Scotch pines in 2014, and 15 produced white pine trees. For nearly all classes of trees, the operation count declined between 2009 and 2014. The exception was Fraser fir. No Missouri operations were indicated in 2009, but two reported Fraser fir production area in 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.7.8 – Missouri Operations Producing Cut Christmas Trees by Tree Class, 2009 and 2014



* No data were reported for Balsam fir in 2014; no data were reported for Fraser fir in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

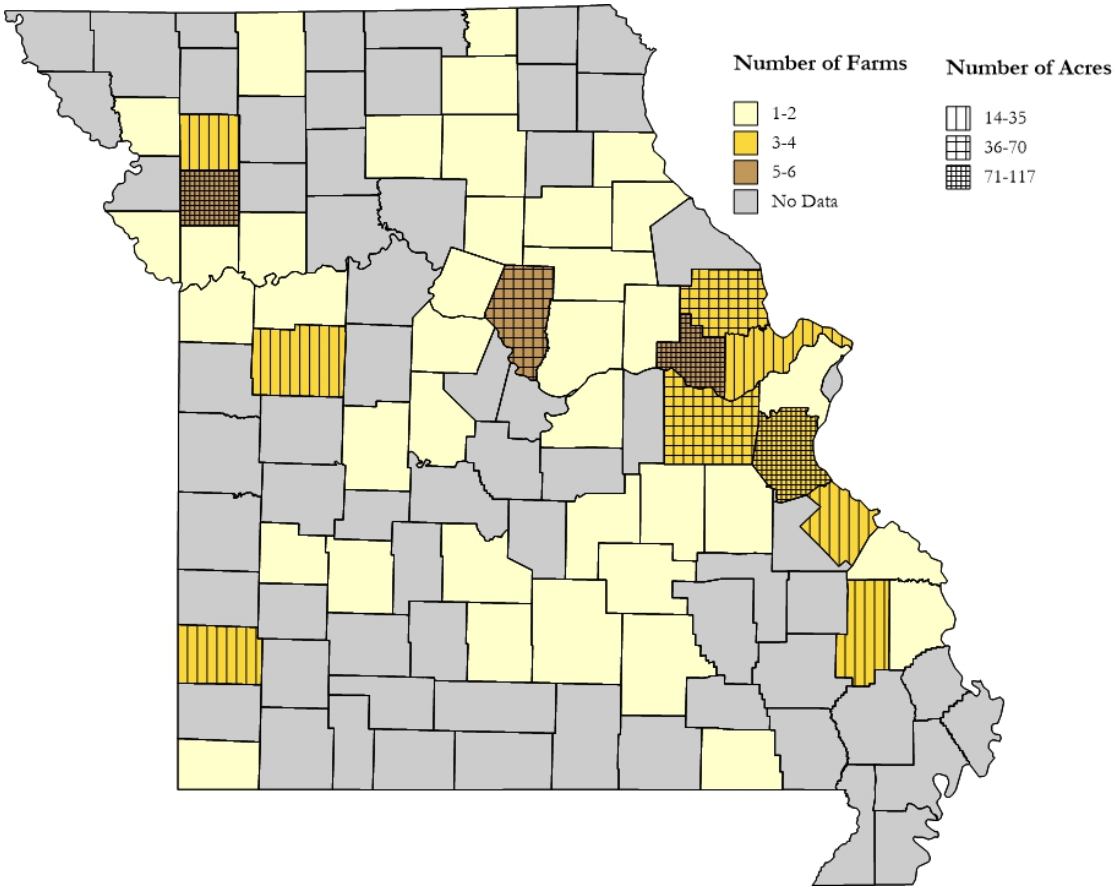
Cut Christmas tree operations have predominantly sold their trees at retail. In 2009, no operations were reported to sell their trees through the wholesale channel. Five operations shared that they sold wholesale trees in 2014, however. See Exhibit 7.7.9. Although Missouri operations have predominantly sold cut Christmas tree at retail, fewer operations sold trees at retail in 2014 than in 2009. In 2014, 19 operations reported that they sold trees in the retail channel compared with 23 operations in 2009 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.7.9 – Missouri Operations Selling Cut Christmas Trees at Retail and Wholesale, 2009 and 2014

Source: USDA, National Agricultural Statistics Service (2017b)

By county, the count of Missouri cut Christmas tree operations with area in production in 2012 was highest in Boone County, six farms; Clinton County, six farms; and Warren County, five farms. Exhibit 7.7.10 shades counties by their number of cut Christmas tree farms with area in production and acreage in production. Acreage in production during 2012 was highest in Clinton County, 117 acres; Jefferson County, 112 acres; and Warren County, 110 acres (USDA National Agricultural Statistics Service 2014b).

*Exhibit 7.7.10 – Missouri Cut Christmas Tree Farms and Acreage in Production by County, 2012**

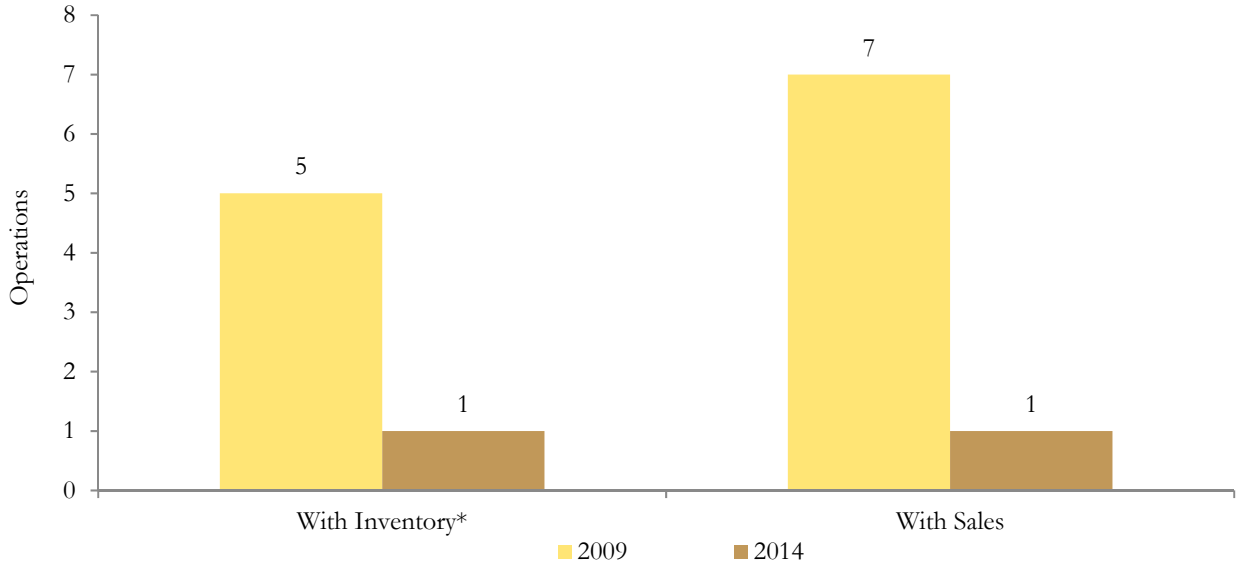


* Counties that are shaded but lack a pattern overlay are those that have farms with area in production reported but production area data withheld.
Source: USDA, National Agricultural Statistics Service (2014)

Some Missouri operations raise and sell live Christmas trees rather than those that are cut, and data for live trees are reported independently of the data for cut trees. The live Christmas tree data are nested within the "coniferous evergreen" category of USDA National Agricultural Statistics Service reporting. Compared with the cut tree sector, the live tree sector has been smaller. As a result, data for live trees are more limited. Exhibit 7.7.11 provides the count of operations reporting live tree inventory and sales in 2009 and 2014. Note that the number of operations with inventory were counted effective Dec. 31 of the respective year. Operations with sales are annual data. In 2009, five operations reported having live Christmas trees in inventory, and seven made sales. By 2014, just one Missouri operation indicated that it had live Christmas tree inventory and sales (USDA National Agricultural Statistics Service 2017b).

The one live Christmas tree operation selling trees in 2014 sold product into the wholesale channel. It wasn't counted as a retail operation with sales. In 2009, seven of the state's live Christmas tree operations made sales at retail, and one shared that it sold live trees in the wholesale channel (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.7.11 – Missouri Live Christmas Tree Operations, 2009 and 2014



* Operations with inventory were counted at the end of December in a respective year.
Source: USDA, National Agricultural Statistics Service (2017b)

7.8 Deciduous Flowering Trees

Included in the specialty crop definition are several classes of deciduous flowering trees. Exhibit 7.8.1 lists the deciduous flowering trees provided in the definition; the bold formatting indicates that USDA data are available for all of these deciduous flowering trees in Missouri. They include dogwood, hawthorn and redbud. For more context about Missouri's role in producing and selling these deciduous flowering trees, refer to the following discussion.

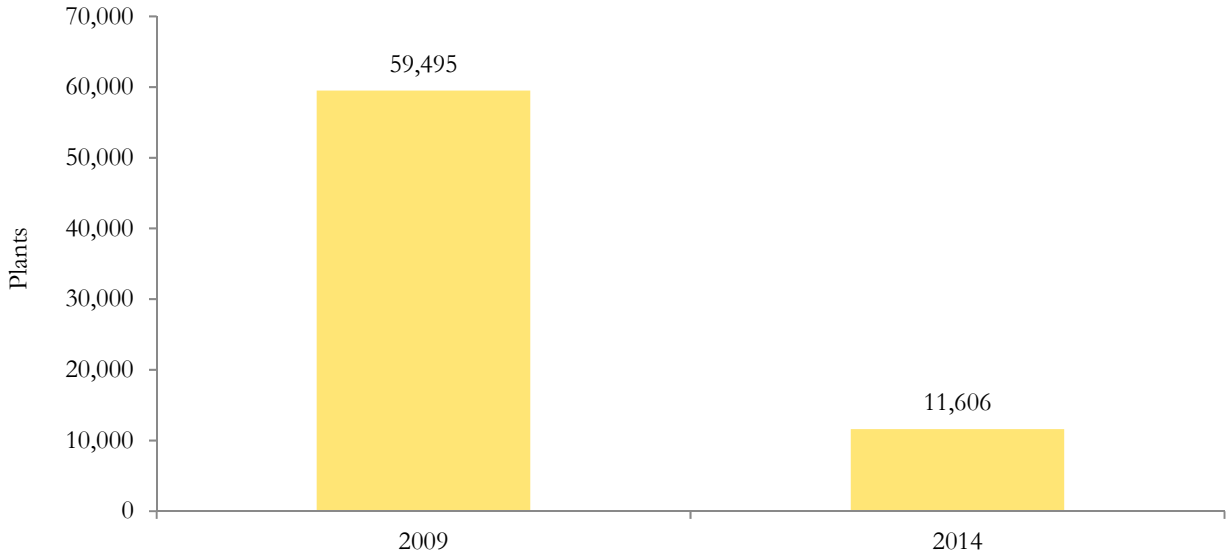
Exhibit 7.8.1 – Deciduous Flowering Trees Included in Specialty Crop Definition[9]

Crabapple	**Crepemyrtle**	**Dogwood**	**Flowering cherry**
Flowering pear	**Flowering plum**	**Hawthorn**	**Magnolia**
Redbud	**Serviceberry**		

Data for Missouri's deciduous flowering tree inventory suggest a decline in this specialty crop industry sector in recent years. Exhibit 7.8.2 presents deciduous flowering tree inventory, measured in plants, for 2009 and 2014. During 2009, Missouri producers maintained nearly 59,500 deciduous flowering trees in their inventory. The inventory level dropped to just more 11,600 plants in 2014 (USDA National Agricultural Statistics Service 2017b).

[9] Note, the USDA Agricultural Marketing Service doesn't name all classes of deciduous flowering trees in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.8.1. When reporting totals for the deciduous flowering tree sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are golden rain and other classes reflected by the USDA National Agricultural Statistics Service reporting.

Exhibit 7.8.2 – Missouri Deciduous Flowering Tree Inventory, 2009 and 2014

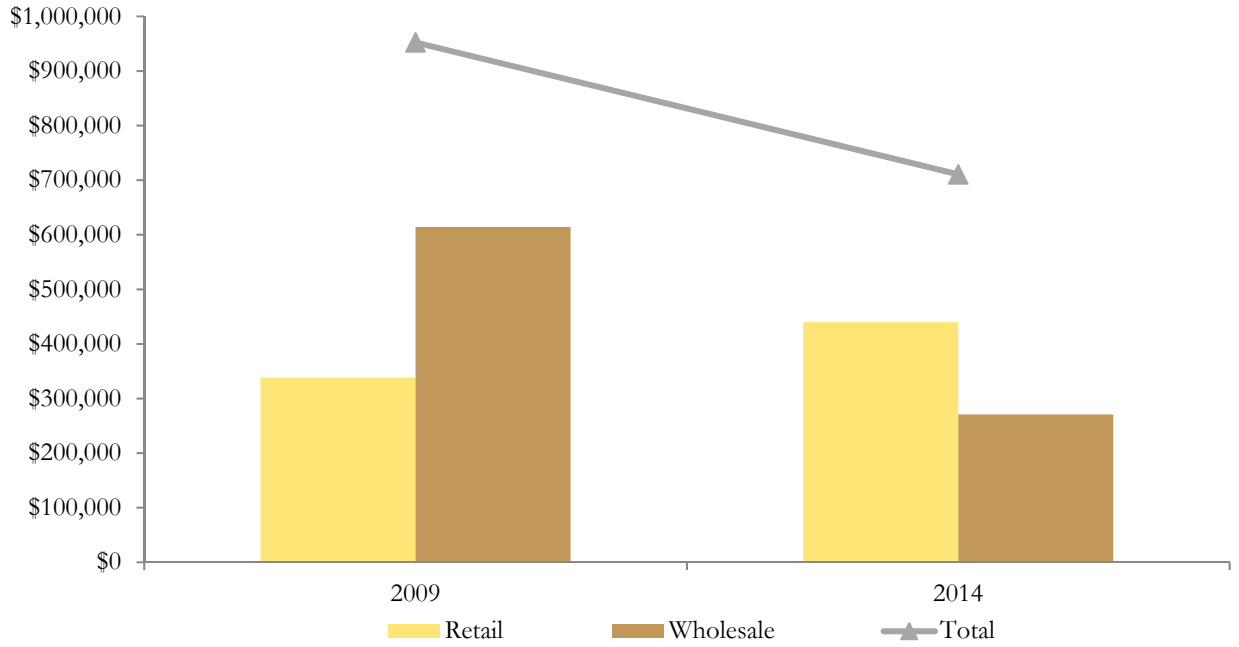


Source: USDA, National Agricultural Statistics Service (2017b)

Perhaps corresponding to the drop in tree inventory, Missouri dollar sales of deciduous flowering trees declined in recent years. Sales exceeded $950,000 in 2009. See Exhibit 7.8.3. Note that total sales fell to slightly more than $710,000 in 2014. At that time, Missouri operations sold more than 9,000 deciduous flowering trees (USDA National Agricultural Statistics Service 2017b).

The relationship between retail and wholesale deciduous flowering tree sales shifted between 2009 and 2014. In 2009, nearly two-thirds of the state's deciduous flowering tree sales in dollars originated from wholesale transactions. In 2014, more than 60 percent of the total sales value was attributed to retail channel sales (USDA National Agricultural Statistics Service 2017b).

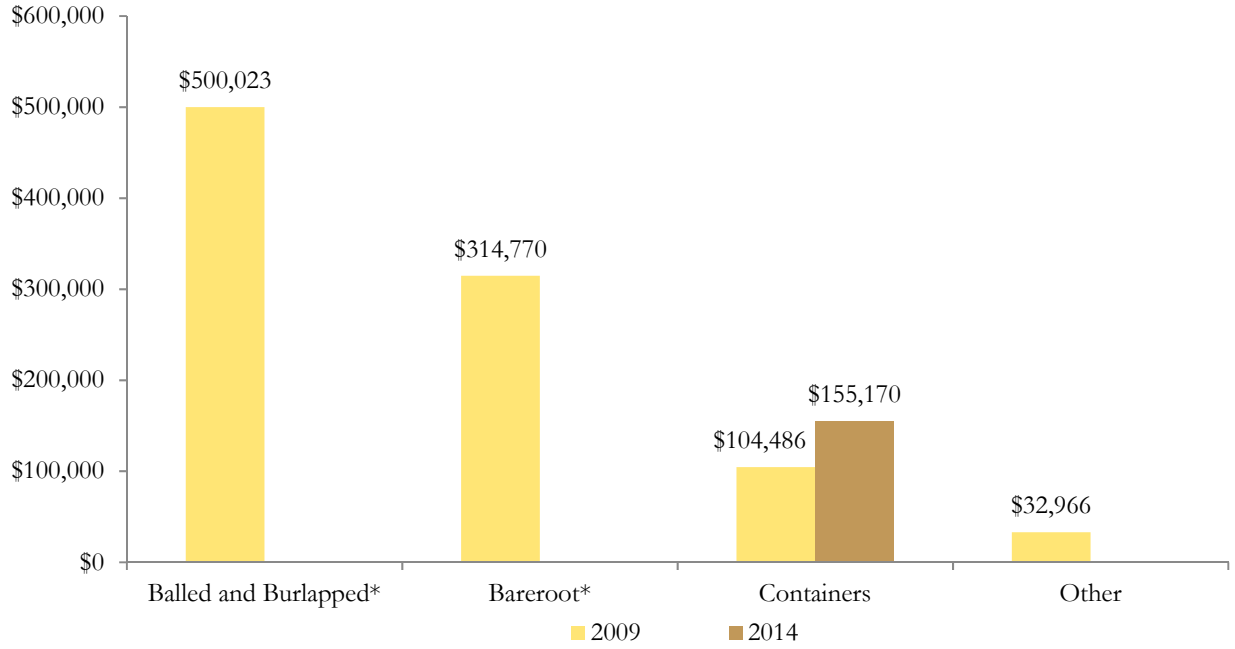
Exhibit 7.8.3 – Missouri Deciduous Flowering Trees Dollar Sales by Total and Sales Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Operations may sell deciduous flowering trees as balled and burlapped trees, as bareroot trees, in containers or in other forms. Slightly more than half of Missouri deciduous flowering tree dollar sales in 2009 originated from balled and burlapped tree sales, and during 2009, one-third of deciduous flowering tree sales were attributed to sales of bareroot trees. See Exhibit 7.8.4. Container sales produced 11 percent of total dollar sales, and 3.5 percent of dollar sales originated from other forms of trees. Data for 2014 were limited. To avoid disclosing data for individual operations, sales data for balled and burlapped trees and bareroot trees were withheld in 2014. Container sales totaled slightly more than $155,000, which was a 48.5 percent increase relative to the total container dollar sales recorded in 2009 (USDA National Agricultural Statistics Service 2017b).

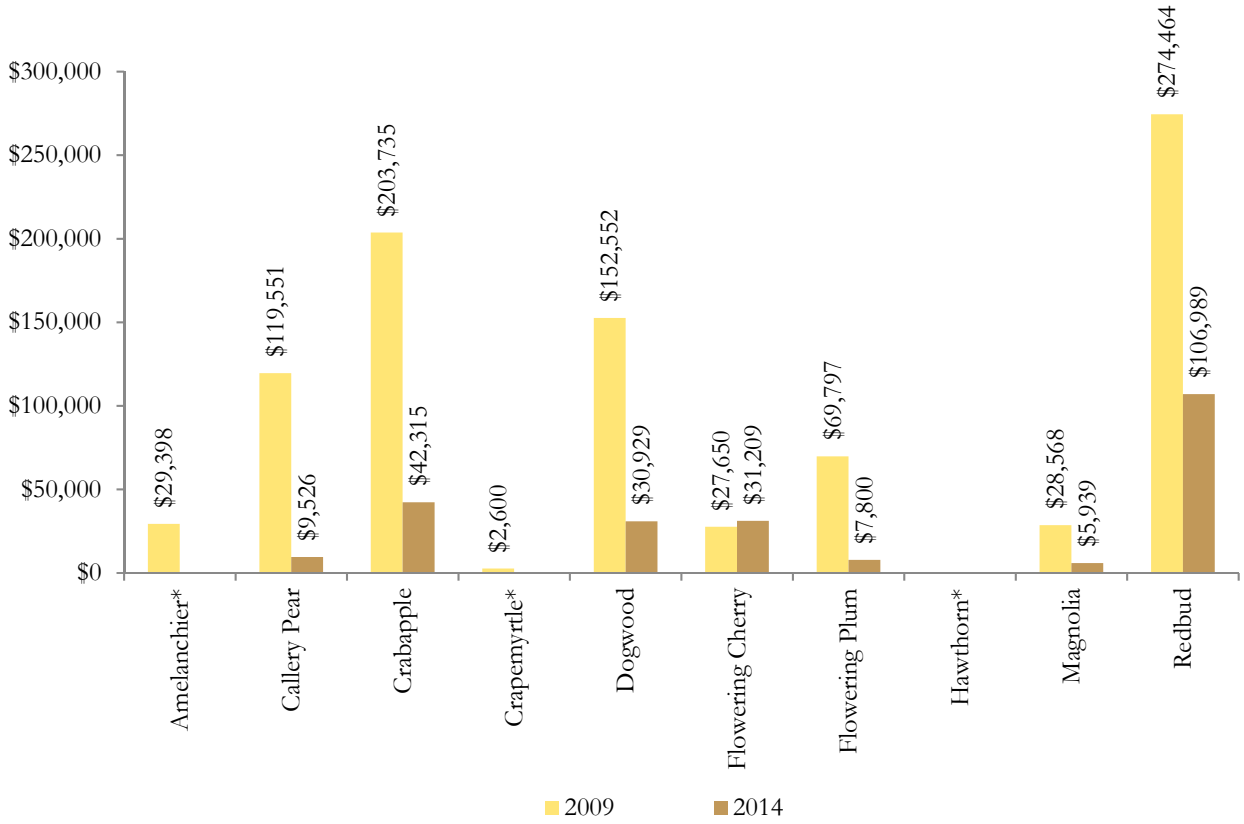
Exhibit 7.8.4 – Missouri Deciduous Flowering Trees Dollar Sales by Plant Form, 2009 and 2014



* Data for balled and burlapped and bareroot plants were withheld in 2014. No other forms were sold in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

To further describe Missouri deciduous flowering tree sales, dollar sales can be assessed by class of deciduous flowering tree. Exhibit 7.8.5 shares the values of sales for the 10 classes of trees included in the specialty crop definition for deciduous flowering trees. Note that the amelanchier category communicates serviceberry sales, and Callery pear is otherwise known as Bradford pear. During both 2009 and 2014, redbud and crabapple sales were higher than sales for the other tree classes. Sales of most deciduous flowering tree classes declined between 2009 and 2014. The flowering cherry was the exception. For it, sales increased slightly from $27,650 in 2009 to just more than $31,200 in 2014 (USDA National Agricultural Statistics Service 2017b).

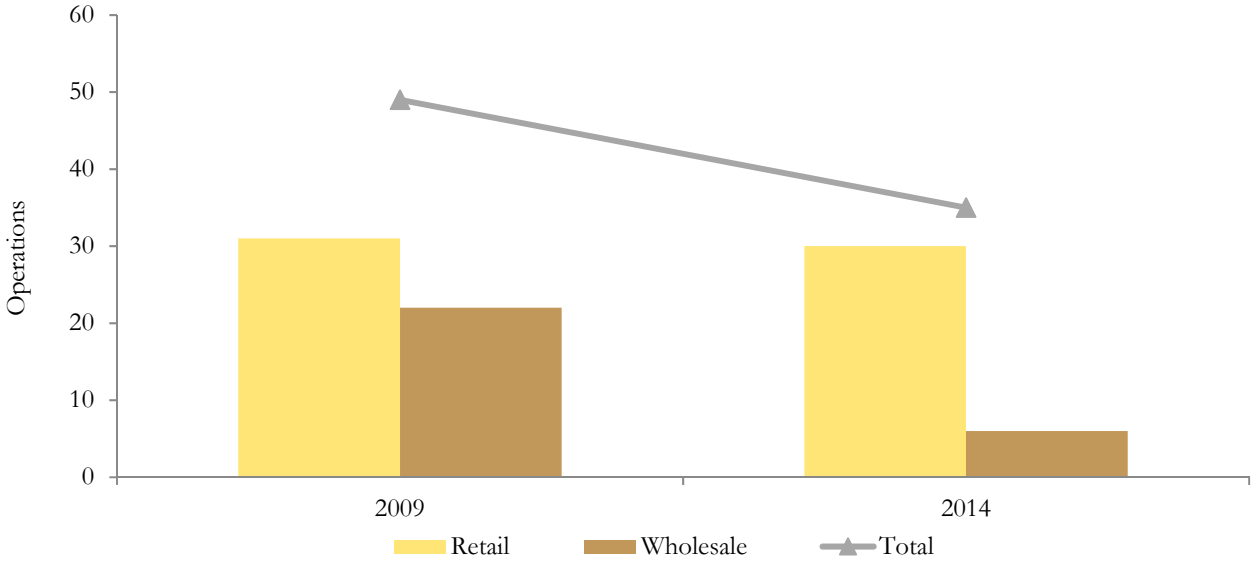
Exhibit 7.8.5 – Missouri Deciduous Flowering Trees Dollar Sales by Tree Class, 2009 and 2014



* Amelanchier and crapemyrtle sales were withheld in 2014. Hawthorn sales were withheld in 2009 and not reported in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

From an operations perspective, the total count of those selling deciduous flowering trees declined from 49 operations in 2009 to 35 operations in 2014. See Exhibit 7.8.6. It also describes the number of operations selling deciduous flowering trees in retail and wholesale channels. Between the two observation years — 2009 and 2014 — the drop in operations selling trees at retail was small relative to the decline in those selling trees at wholesale. In 2014, Missouri had 30 operations selling deciduous flowering trees at retail. Six operations reported selling deciduous flowering trees in the wholesale market at the time (USDA National Agricultural Statistics Service 2017b).

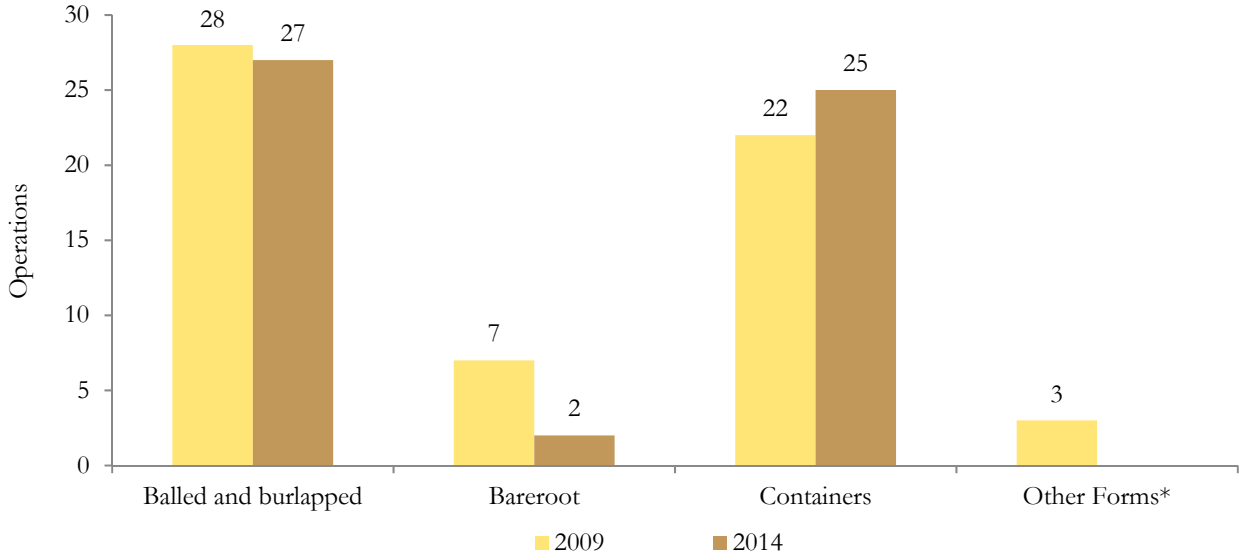
Exhibit 7.8.6 – Missouri Deciduous Flowering Tree Operations with Sales, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations have been most likely to sell deciduous flowering trees as balled and burlapped trees or in containers. In 2014, 27 operations indicated that they sold balled and burlapped deciduous flowering trees, and 25 operations reported selling deciduous flowering trees in containers. Only two operations shared that they sold bareroot deciduous flowering trees. In addition to sharing operation count totals for 2014, Exhibit 7.8.7 shows the change in operation count from 2009 to 2014. The number of operations selling trees in containers increased during that period. However, the count of those selling trees in other forms, as balled and burlapped trees and as bareroot trees declined (USDA National Agricultural Statistics Service 2017b).

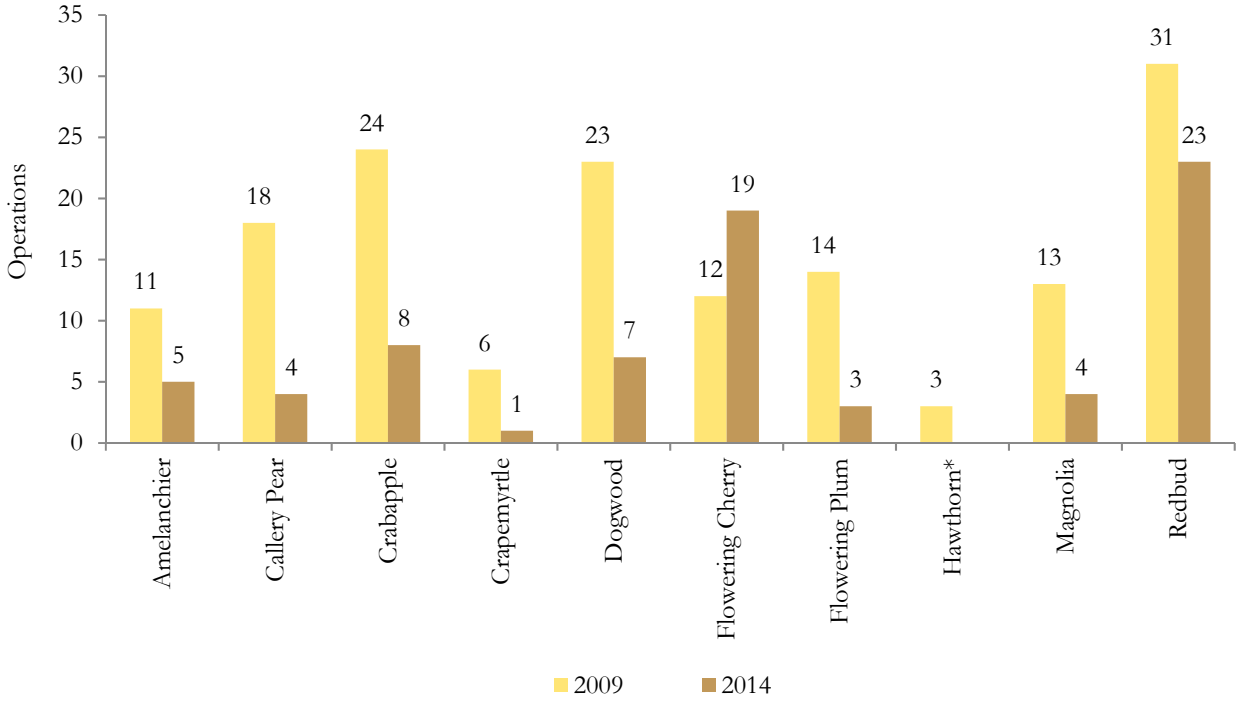
Exhibit 7.8.7 – Missouri Deciduous Flowering Tree Operations with Sales, 2009 and 2014



* Data for "other forms" in 2014 weren't reported.
Source: USDA, National Agricultural Statistics Service (2017b)

In 2014, Missouri operations were most likely to sell redbud and flowering cherry trees. See Exhibit 7.8.8. Note that the number of operations selling flowering cherry trees increased from 12 operations in 2009 to 19 operations in 2014. It was the only class of deciduous flowering tree that experienced an increase in count of operations with sales during the two observed years (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.8.8 – Missouri Deciduous Flowering Tree Operations Selling Trees by Class, 2009 and 2014



* No hawthorn operations were reported in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

7.9 Broadleaf Evergreens

The broadleaf evergreens category includes several plants commonly used in landscapes. Exhibit 7.9.1 articulates the broadleaf evergreens listed in the specialty crop definition; the bold text indicates that all have Missouri data reported. They range from azalea to boxwood and rhodeodendron.

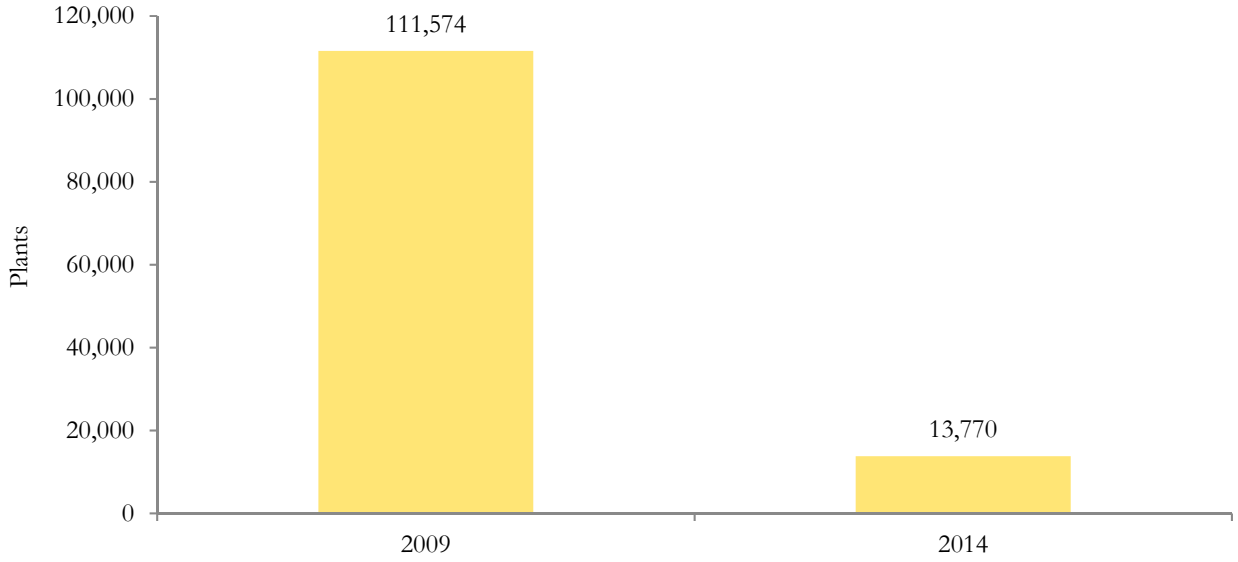
Exhibit 7.9.1 – Broadleaf Evergreens Included in Specialty Crop Definition[10]

Azalea	**Boxwood**	**Cotoneaster**	**Euonymus**
Holly	**Pieris**	**Rhododendron**	**Viburnum**

[10] Note, the USDA Agricultural Marketing Service doesn't name all classes of broadleaf evergreens in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.9.1. When reporting totals for the broadleaf evergreens sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are magnolia, pittosporum, privet and other classes reflected by the USDA National Agricultural Statistics Service reporting.

Broadleaf evergreen inventory data suggest that the Missouri industry has constricted in recent years. Exhibit 7.9.2 charts broadleaf evergreen inventory, measured in plants, during 2009 and 2014. The broadleaf evergreen inventory totaled more than 111,500 plants at the end of December 2009, but by the end of December 2014, the inventory level had dropped to 13,770 plants (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.9.2 – Broadleaf Evergreen Inventory of Missouri Operations, 2009 and 2014

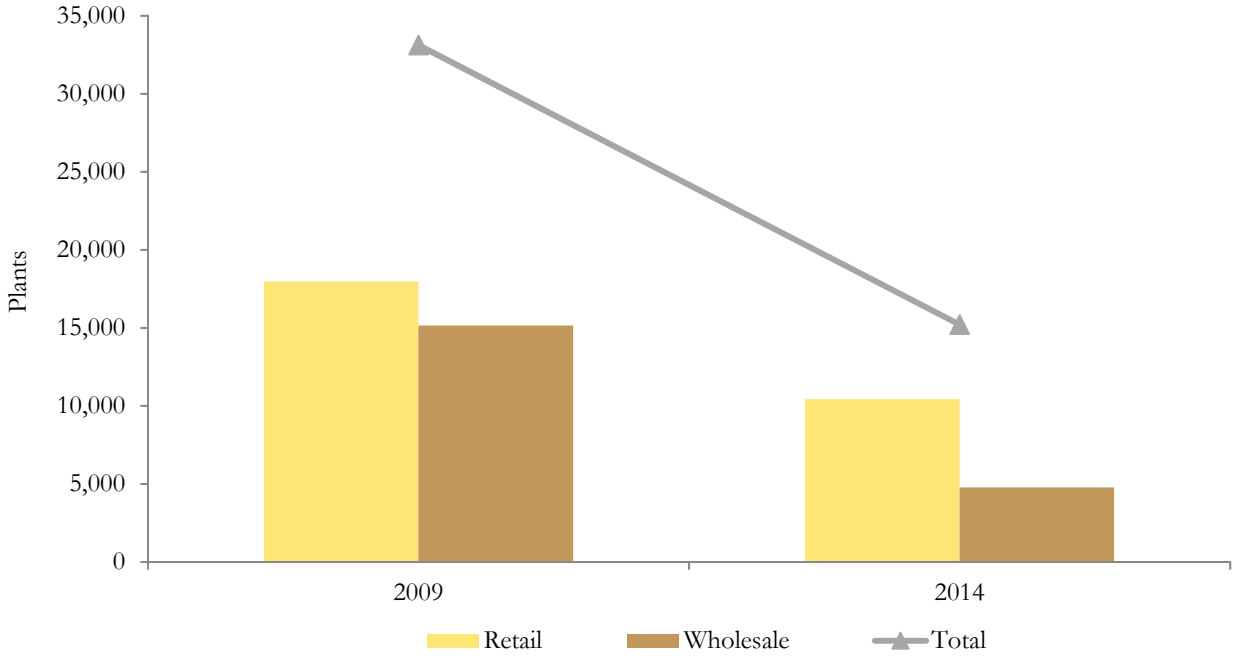


Source: USDA, National Agricultural Statistics Service (2017b)

As Missouri broadleaf evergreen inventory dropped, the sales volume for broadleaf evergreens also declined dramatically between 2009 and 2014. Exhibit 7.9.3 shows that Missouri broadleaf evergreen sales, measured in plants, were roughly halved during the observed period. In 2014, Missouri sold more than 15,000 broadleaf evergreen plants, but it had sold more than 33,000 plants in 2009 (USDA National Agricultural Statistics Service 2017b).

The exhibit also designates the volume of sales made in retail and wholesale channels. In 2009, retail had the slight edge as a distribution channel as it represented 54.3 percent of total sales volume. The retail share of broadleaf evergreen volume sales increased from 2009 to 2014. In 2014, 68.6 percent of the broadleaf evergreens from Missouri operations were sold at retail (USDA National Agricultural Statistics Service 2017b).

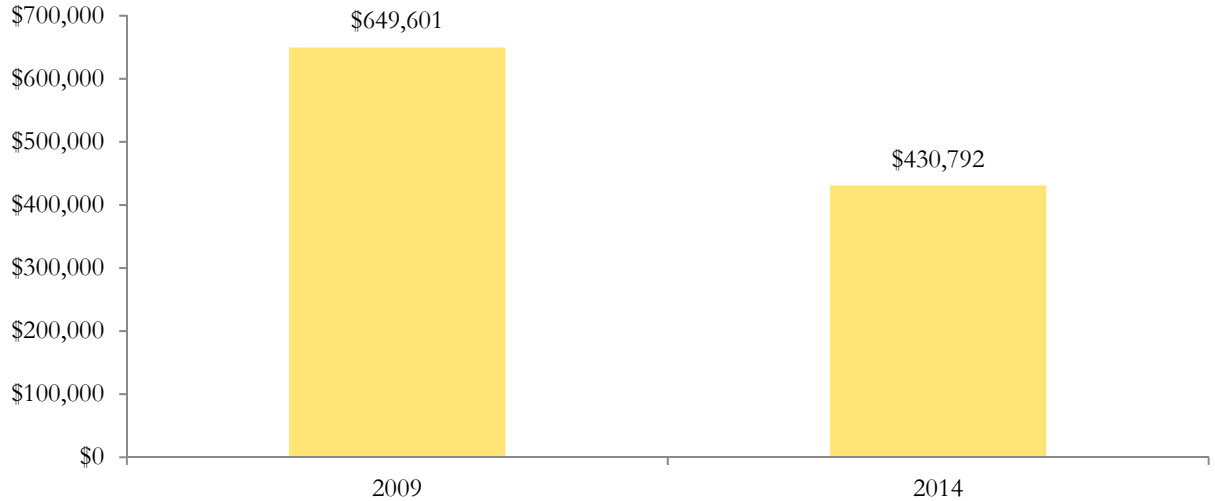
Exhibit 7.9.3 – Missouri Broadleaf Evergreen Sales Volume by Total and Retail and Wholesale Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

As broadleaf evergreen sales volume has declined, the value of sales has also dropped. Missouri sales totaled nearly $650,000 in 2009. The reduced number of plants sold resulted in sales decreasing to slightly more than $430,000 in 2014. See Exhibit 7.9.4. With respect to sales made in retail and wholesale channels, data from 2009 were released, but data from 2014 were withheld. In 2009, 64.8 percent of Missouri broadleaf evergreen dollar sales were recorded via retail transactions (USDA National Agricultural Statistics Service 2017b).

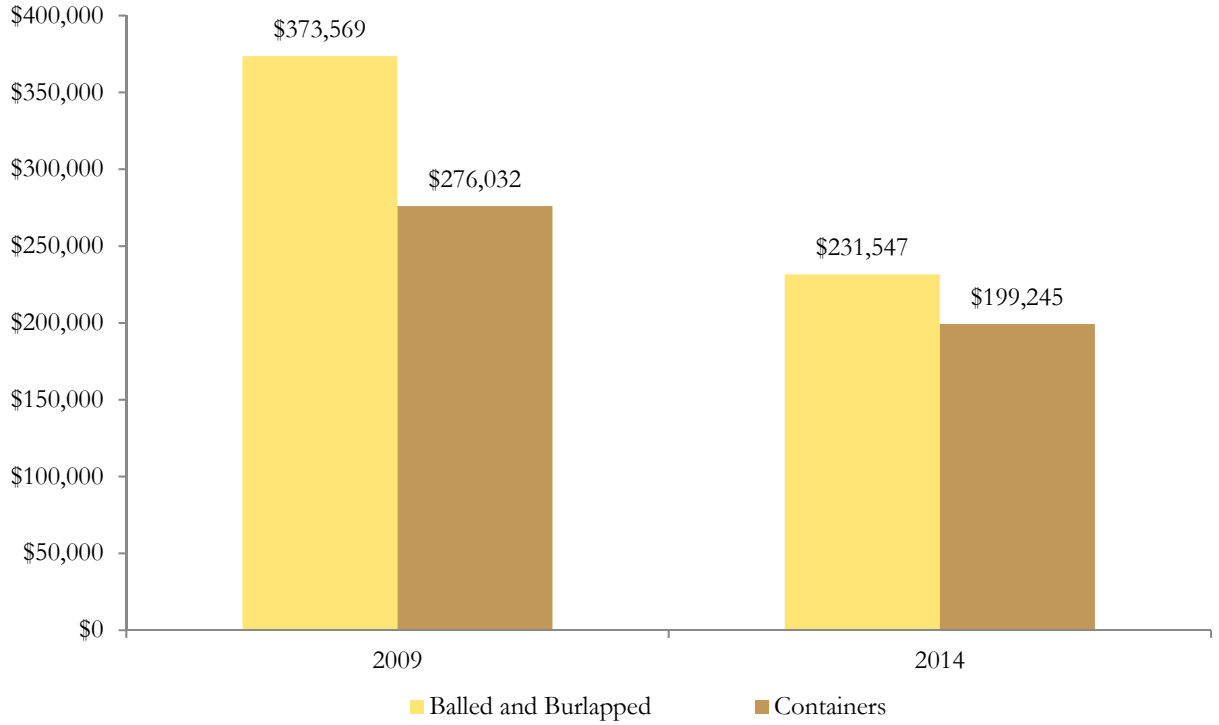
Exhibit 7.9.4 – Missouri Broadleaf Evergreen Sales in Dollars, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

In recent years, Missouri operations have sold broadleaf evergreens as balled and burlapped plants or plants growing in containers. During 2009 and 2014, dollar sales of balled and burlapped plants exceeded the sales of broadleaf evergreens sold in containers. Exhibit 7.9.5 illustrates that 2014 sales totaled more than $231,000 for balled and burlapped evergreens and nearly $200,000 for evergreens in containers. Both were reductions compared with 2009 values (USDA National Agricultural Statistics Service 2017b).

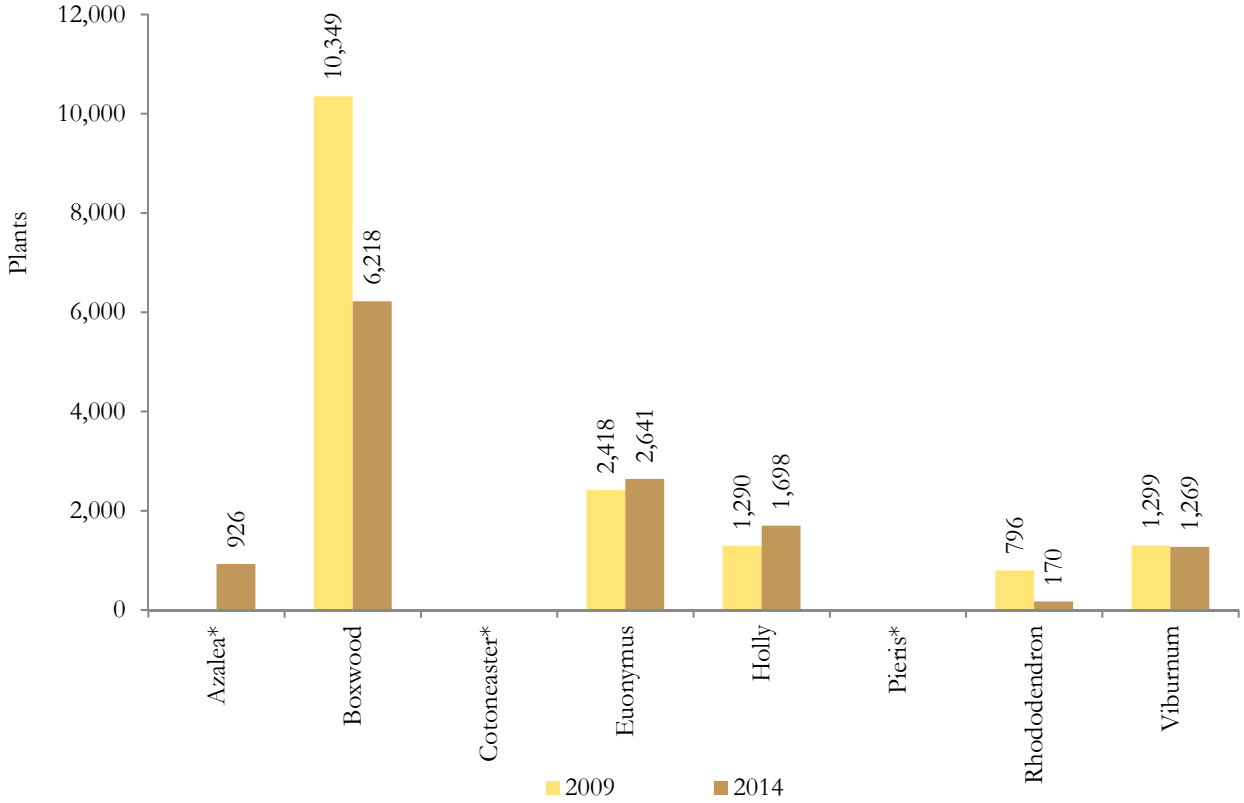
Exhibit 7.9.5 – Missouri Broadleaf Evergreen Dollar Sales by Form Sold, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Unit sales of broadleaf evergreens by plant class are provided in Exhibit 7.9.6. Missouri operations in 2014 sold more boxwood plants than plants of any other class of broadleaf evergreen. Euonymus, also known as spindle, ranked second in unit sales. Some classes didn't have data available for both years. The exhibit note further details the data availability by class. Of the classes with 2009 and 2014 data reported, two experienced unit sales growth. Missouri operations sold more euonymus and holly plants in 2014 than in 2009. Sales volume declined between 2009 and 2014 for the other classes with data reported in both years (USDA National Agricultural Statistics Service 2017b).

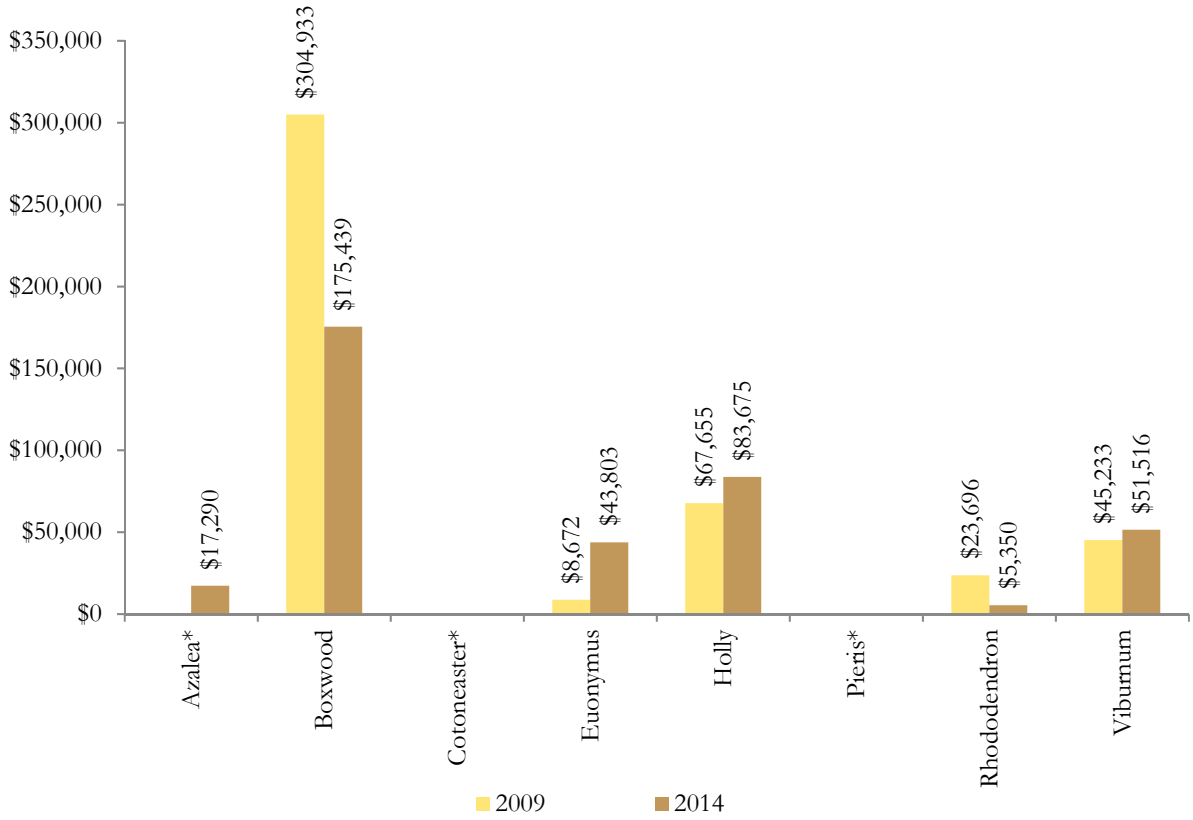
Exhibit 7.9.6 – Missouri Broadleaf Evergreen Dollar Unit Sales by Plant Class, 2009 and 2014



* Azalea, cotoneaster and pieris data in 2009 were withheld. For cotoneaster and pieris, no data were reported for 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Trends in dollar sales by broadleaf evergreen plant class were similar to those for unit sales. See Exhibit 7.9.7. Boxwood and holly plants generated the most sales in 2009 and 2014. Dollar sales increased for euonymus, holly and viburnum between 2009 and 2014. Viburnum unit sales had decreased slightly during the observed period, so acceleration in the unit price likely contributed to the plant class' dollar sales growth (USDA National Agricultural Statistics Service 2017b).

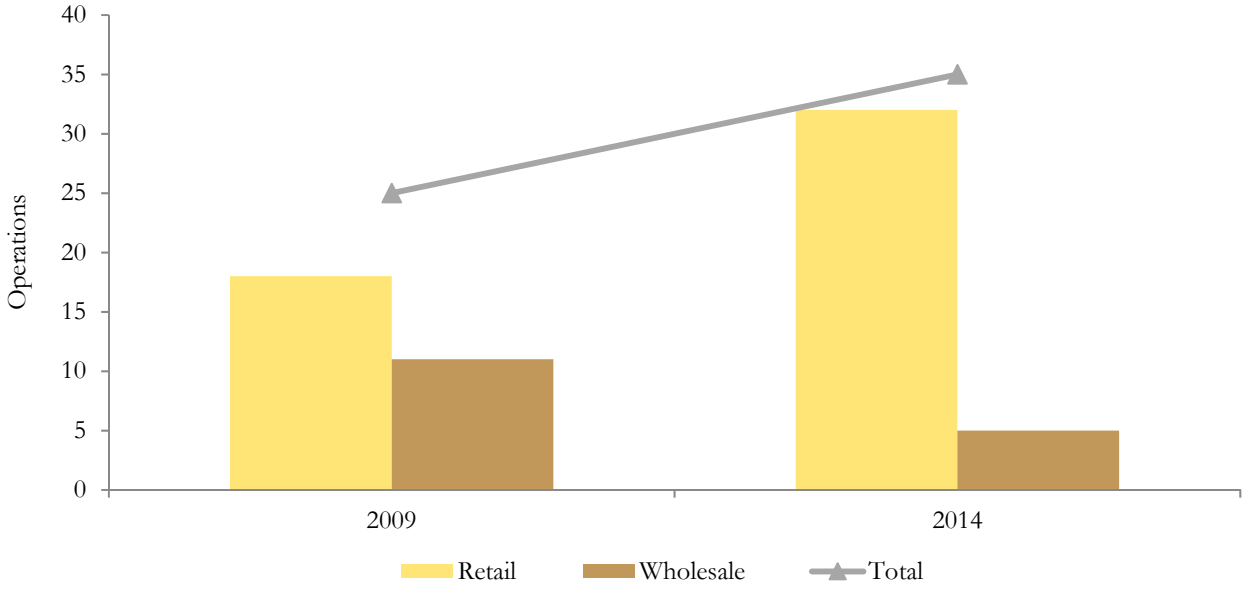
Exhibit 7.9.7 – Missouri Broadleaf Evergreen Dollar Sales by Plant Class, 2009 and 2014



* Data for azalea, cotoneaster and pieris were withheld in 2009. No 2014 data were reported for cotoneaster and pieris.
Source: USDA, National Agricultural Statistics Service (2017b)

The total count of Missouri operations engaged in selling broadleaf evergreens increased between 2009 and 2014. Twenty-five operations indicated that they sold broadleaf evergreens in 2009 relative to the 35 operations in 2014. See Exhibit 7.9.8. The exhibit also highlights the number of operations that recorded retail and wholesale sales during the two observation years. In both years, more operations sold broadleaf evergreens at retail than at wholesale. Between 2009 and 2014, the count of operations selling broadleaf evergreens in the retail channel increased substantially. Conversely, the number of wholesale operations declined. In total, 32 operations noted selling broadleaf evergreens at retail in 2014. Five operations sold broadleaf evergreens in the wholesale market (USDA National Agricultural Statistics Service 2017b).

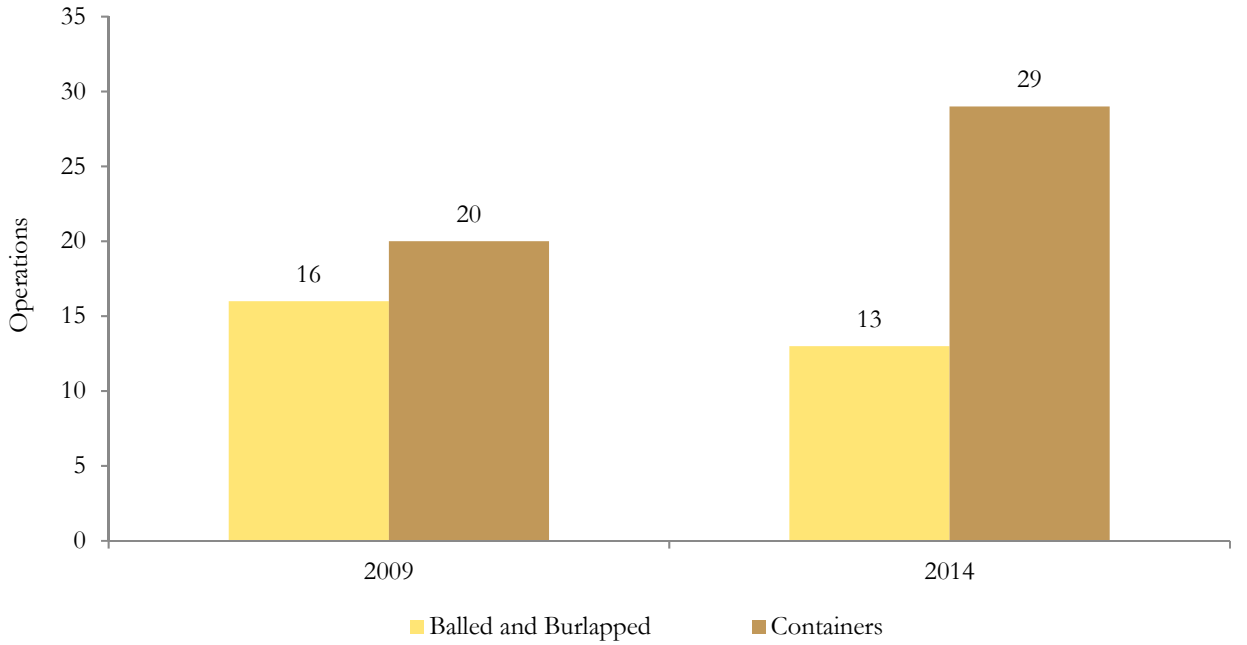
Exhibit 7.9.8 – Missouri Broadleaf Evergreen Operations with Sales, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

During both 2009 and 2014, more Missouri broadleaf evergreen operations sold product in containers than in a balled and burlapped form. See Exhibit 7.9.9. The number of operations selling container broadleaf evergreens increased from 20 operations in 2009 to 29 operations in 2014. Operations selling balled and burlapped broadleaf evergreens reduced their count from 16 operations in 2009 to 13 operations in 2014 (USDA National Agricultural Statistics Service 2017b).

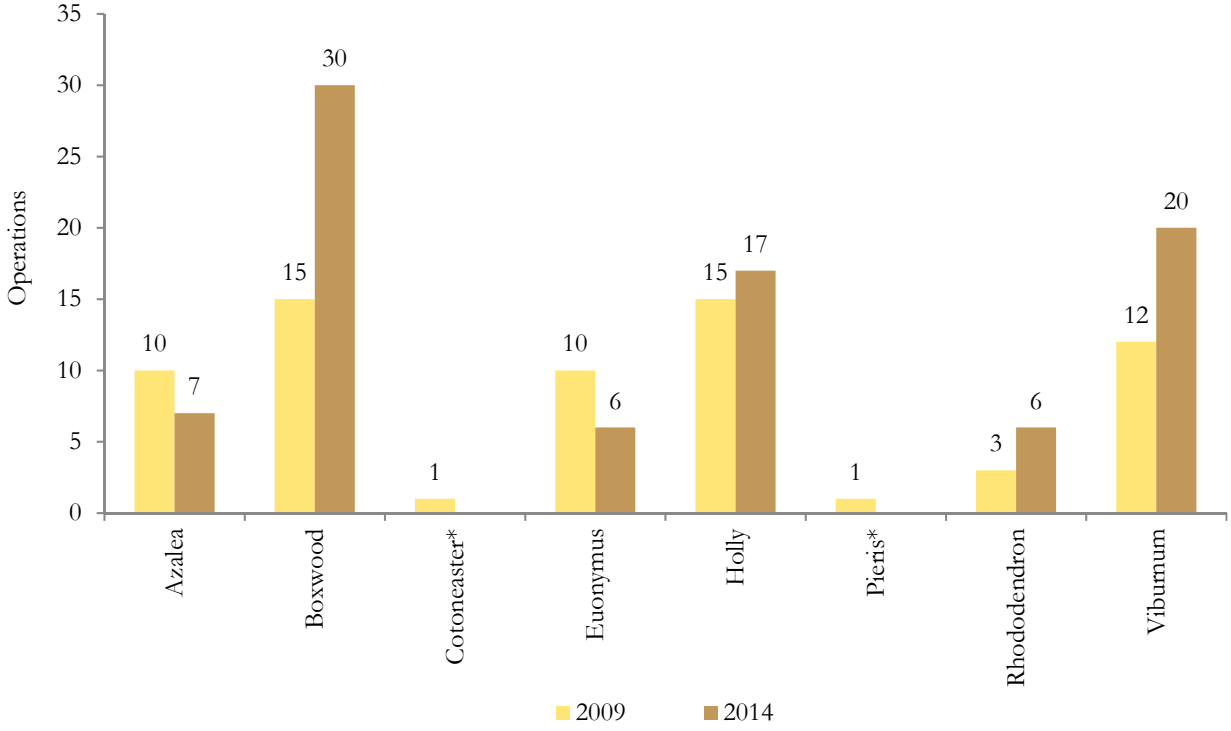
Exhibit 7.9.9 – Missouri Operations Selling Broadleaf Evergreens by Form, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

In 2014, the greatest number of Missouri broadleaf evergreen operations chose to sell boxwood, viburnum and holly. See Exhibit 7.9.10. Thirty operations reported selling boxwood. The 30 operations is double the 15 operations that sold boxwood in 2009. The number of operations selling viburnum nearly doubled. Twenty operations reported sales in 2014 relative to 12 operations selling viburnum in 2009. The count of holly-selling operations increased from 15 in 2009 to 17 in 2014, and the number of operations selling rhododendron grew from three operations in 2009 to six operations in 2014. Fewer operations sold azalea, cotoneaster, euonymus and pieris in 2014 than in 2009 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.9.10 – Missouri Operations Selling Broadleaf Evergreens by Plant Class, 2009 and 2014



* No operations data were reported for cotoneaster and pieris in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

7.10 Deciduous Shade Trees

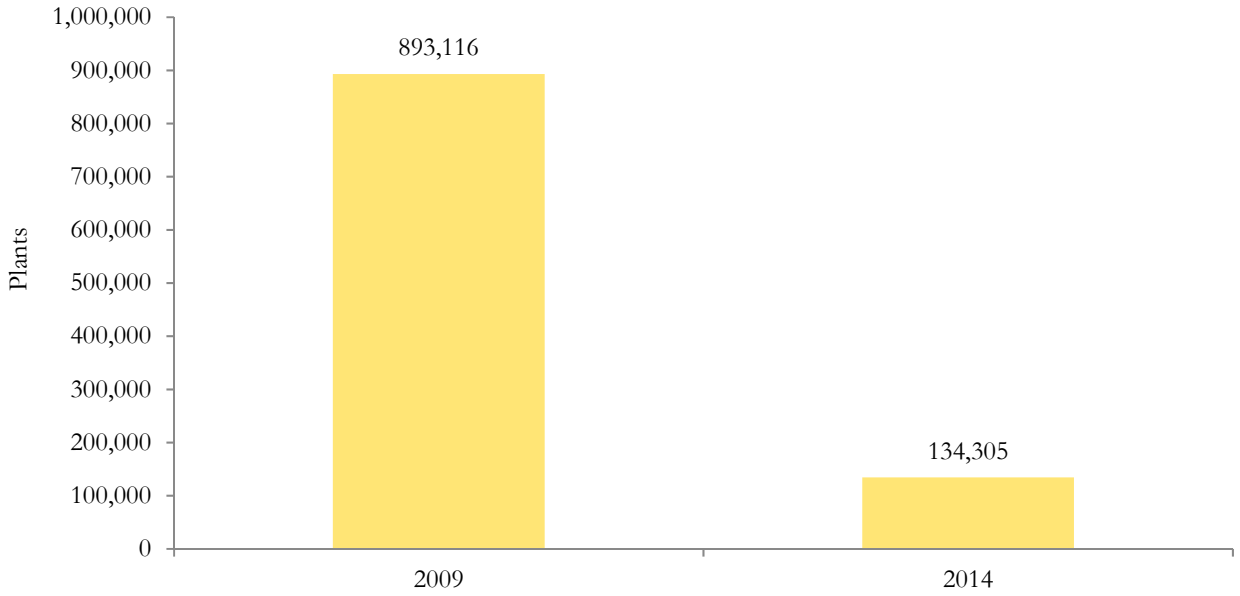
Ash, maple and oak are three classes of trees named in the deciduous shade tree specialty crop definition. Exhibit 7.10.1 lists all nine classes of deciduous shade trees recognized in the definition; those in bold have data shared for them specifically. The following discussion shares about Missouri's deciduous shade tree production.

Exhibit 7.10.1 – Deciduous Shade Trees Included in Specialty Crop Definition[11]

Ash	Elm	**Honey locust**	**Linden**
Maple	**Oak**	**Poplar**	**Sweetgum**
Sycamore			

Deciduous shade tree inventory, measured on the last day of December in a respective year, is provided in Exhibit 7.10.2. Note that the inventory level dropped significantly from 2009 to 2014. The tree inventory exceeded 893,100 trees in 2009. It declined to slightly more than 134,300 trees in 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.10.2 – Missouri Deciduous Shade Tree Inventory, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri deciduous shade tree dollar sales constricted in recent years. Exhibit 7.10.3 illustrates that total dollar sales declined from roughly $3.92 million in 2009 to nearly $3.39 million in 2014. Wholesale sales were greater than retail sales in both years; however, the gap between the two narrowed in 2014. During 2009, 72.6 percent of deciduous shade tree dollar sales were generated through transactions in the wholesale market. Wholesale sales represented a smaller 52.5 percent of total sales in 2014 (USDA National Agricultural Statistics Service 2017b).

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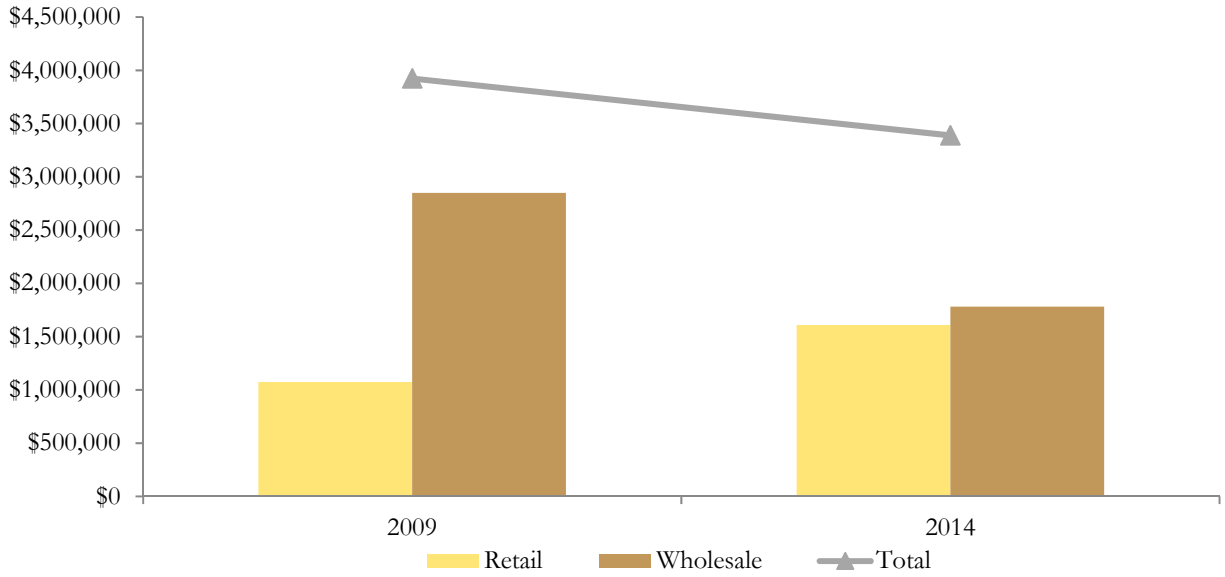
[11] Note, the USDA Agricultural Marketing Service doesn't name all classes of deciduous shade trees in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.10.1. When reporting totals for the deciduous shade tree sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are birch, linden, willow and other classes reflected by the USDA National Agricultural Statistics Service reporting. USDA National Agricultural Statistics Service data sets don't include data for elm and sycamore, which are both deciduous shade trees named in the specialty crop definition. Those classes are, thus, excluded from this analysis.

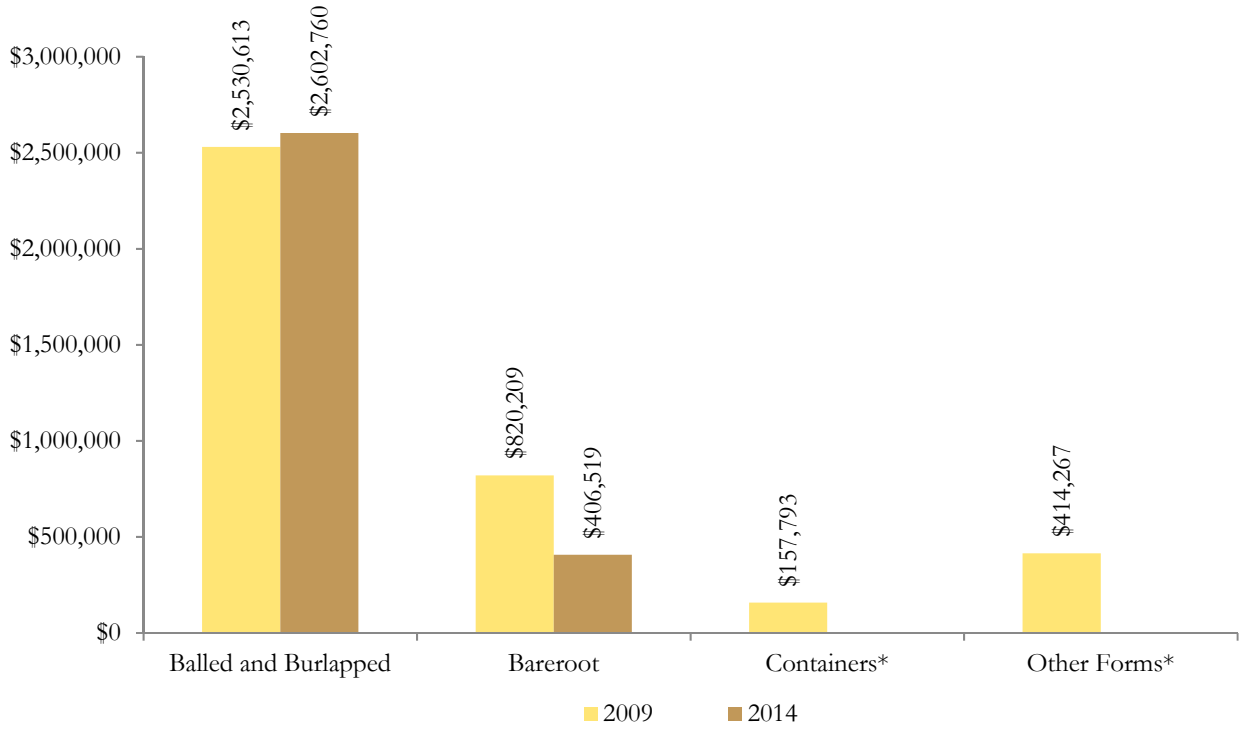
Exhibit 7.10.3 – Missouri Deciduous Shade Tree Dollar Sales by Total and Retail and Wholesale Market, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

To gauge the form of deciduous shade trees sold by Missouri operations, data are reported for dollar sales by plant form: balled and burlapped, bareroot, containers or other forms. During 2009 and 2014, balled and burlapped sales represented the greatest share of total deciduous shade tree sales. Additionally, dollar sales of balled and burlapped trees increased slightly between the two years. Exhibit 7.10.4 shares that $2.6 million in deciduous shade tree sales stemmed from selling balled and burlapped trees during 2014. Selling deciduous shade trees as bareroot trees has also been fairly popular, but bareroot tree sales declined between 2009 and 2014. Bareroot deciduous shade tree sales exceeded $406,500 in 2014. Note that data were withheld for container trees and trees sold in other forms during 2014 (USDA National Agricultural Statistics Service 2017b).

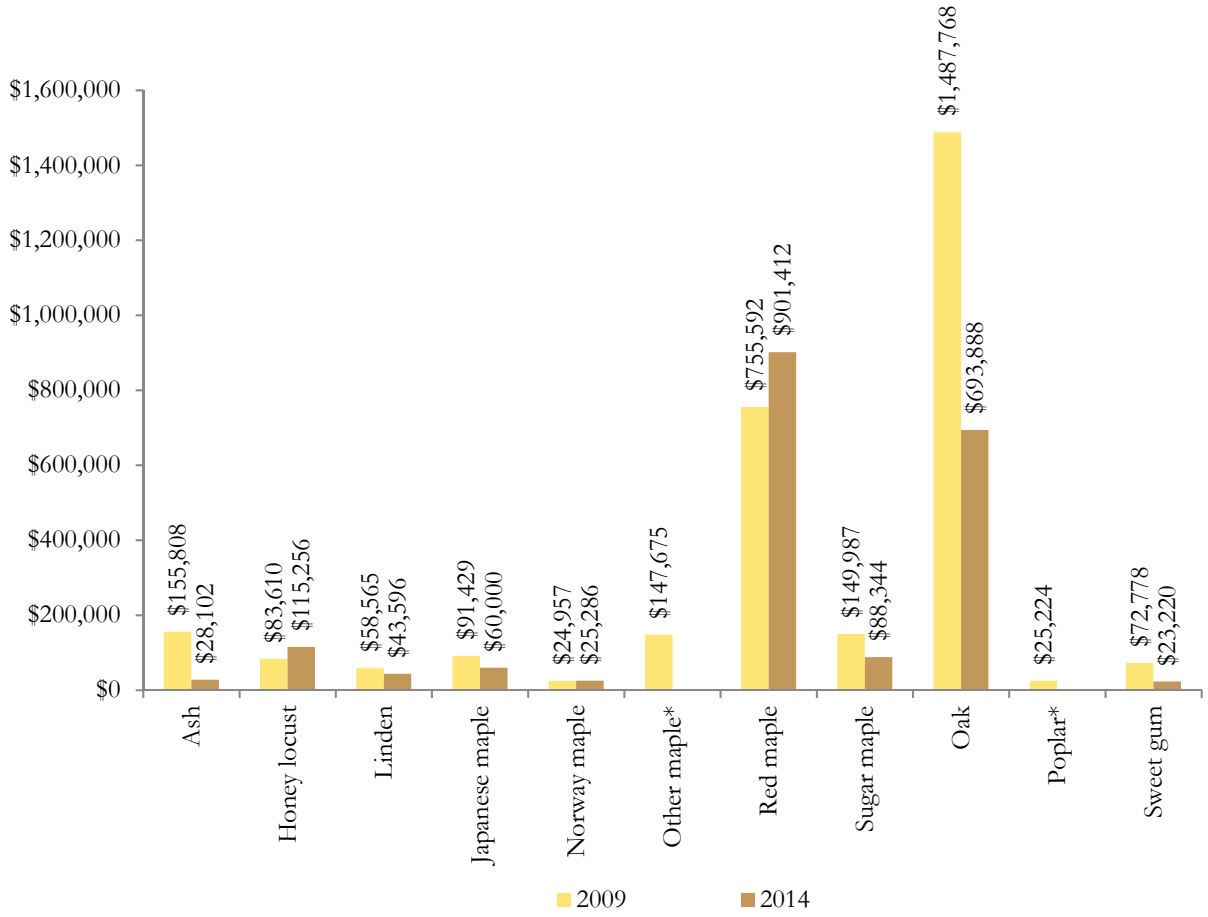
Exhibit 7.10.4 – Missouri Deciduous Shade Tree Dollar Sales by Plant Form, 2009 and 2014



* Data were withheld for trees sold in containers and other forms during 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Missouri dollar sales data for various classes of deciduous shade trees clearly point to oak and red maple as the predominant trees sold in 2009 and 2014. Oak sales exceeded red maple sales in 2009, and the inverse relationship was true for 2014. See Exhibit 7.10.5. Sales in 2014 totaled more than $901,000 for red maple trees and slightly less than $694,000 for oak trees. During 2014, honey locust ranked third in terms of dollar sales reported. Between 2009 and 2014, dollar sales only increased for three classes of deciduous shade trees: red maple, Norway maple and honey locust. Sales for the other classes of trees declined from 2009 to 2014, or in the case of "other maples," data weren't reported in both years, so arriving at a conclusion about growth or decline in sales isn't feasible (USDA National Agricultural Statistics Service 2017b).

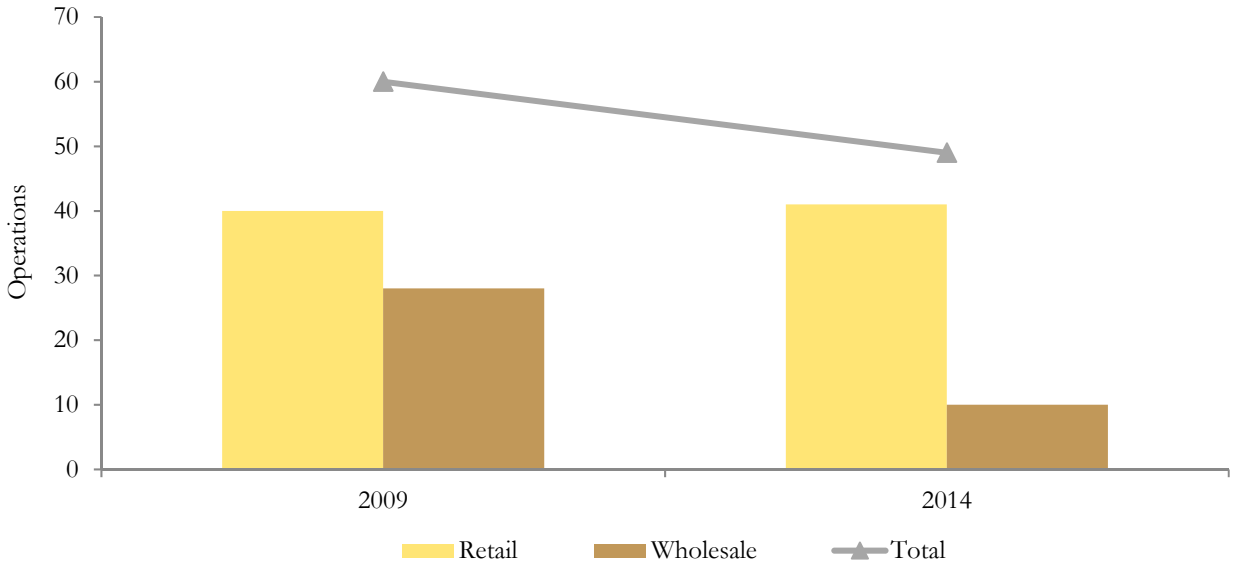
Exhibit 7.10.5 – Missouri Deciduous Shade Tree Dollar Sales by Tree Class, 2009 and 2014



* Data were withheld for other maple trees in 2014. No data were reported for poplar trees in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

To provide a view of Missouri operations selling deciduous shade trees, Exhibit 7.10.6 indicates the count that sold trees in total and the number that reported making retail and wholesale transactions. Fewer Missouri operations sold deciduous shade trees in 2014 than in 2009. Sixty operations in Missouri sold deciduous shade trees in 2009. By 2014, 49 operations reported selling deciduous shade trees. During 2009 and 2014, more operations shared that they sold deciduous shade trees at retail than at wholesale. The count of operations selling trees in the retail channel increased by one from 2009 to 2014. It totaled 41 operations in 2014. The count of Missouri operations selling trees in the wholesale channel declined between 2009 and 2014. Ten operations sold deciduous shade trees in the wholesale market during 2014 relative to the 28 operations that sold deciduous shade trees in the wholesale channel during 2009 (USDA National Agricultural Statistics Service 2017b).

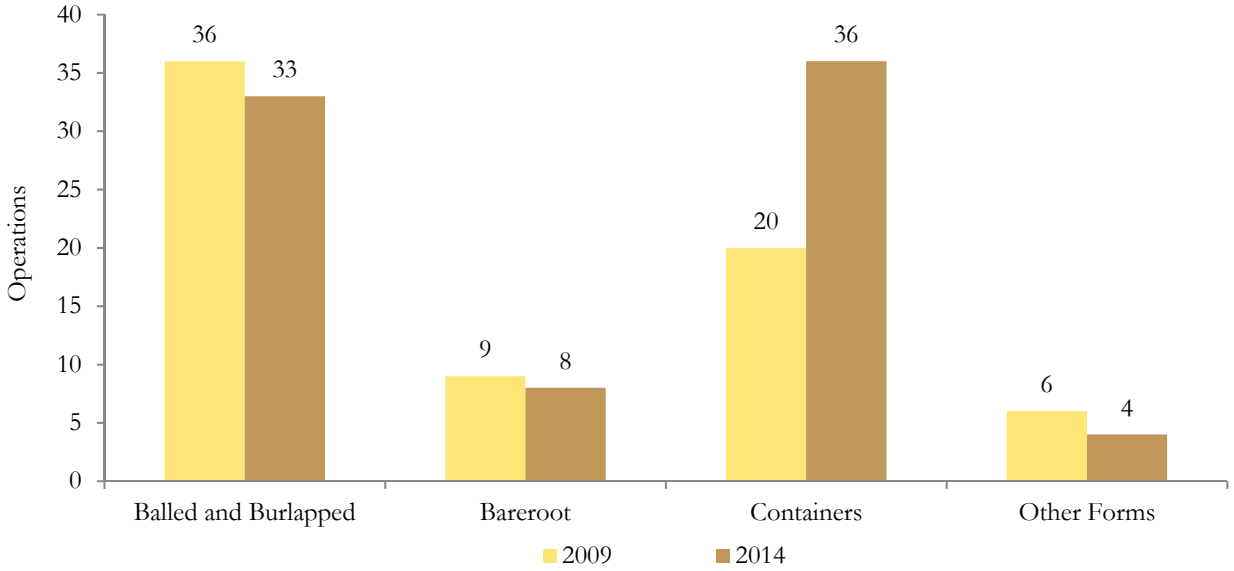
Exhibit 7.10.6 – Missouri Operations Selling Deciduous Shade Trees in Total and at Retail and Wholesale, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations have most frequently sold deciduous shade trees in balled and burlapped form or containers. The count selling trees in balled and burlapped form decreased from 36 operations in 2009 to 33 operations in 2014. See Exhibit 7.10.7. Between 2009 and 2014, multiple Missouri operations were added to the count of operations selling deciduous shade trees in containers. Twenty operations shared that they sold container deciduous shade trees in 2009. The number increased to 36 operations in 2014. Fewer operations have sold deciduous shade trees as bareroot trees or trees in other forms (USDA National Agricultural Statistics Service 2017b).

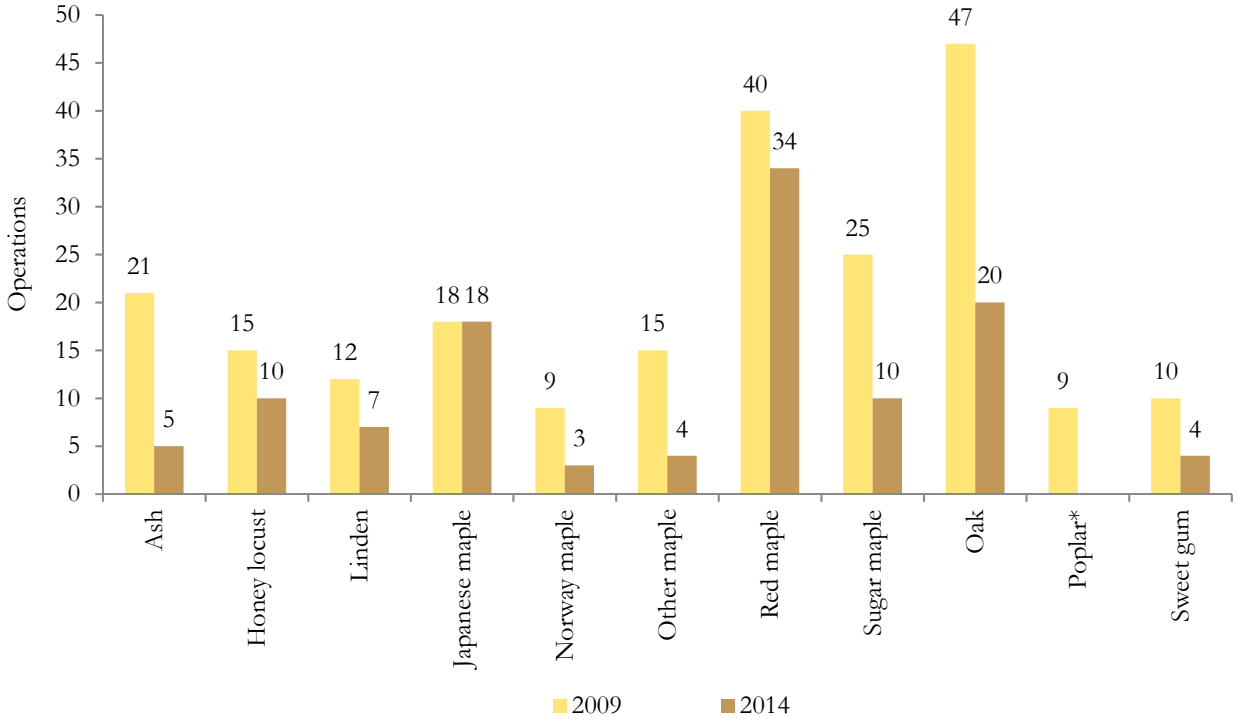
Exhibit 7.10.7 – Missouri Operations Selling Deciduous Shade Trees by Plant Form, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

In 2014, Missouri operations most commonly sold three classes of deciduous shade trees: red maple, 34 operations; oak, 20 operations; and Japanese maple, 18 operations. Exhibit 7.10.8 presents the number of Missouri operations recording sales of various classes of deciduous shade trees. Between 2009 and 2014, all but two classes of deciduous shade trees experienced a reduction in the number of operations selling them — 18 operations sold Japanese maple trees in both years, and the poplar tree operation count dropped from nine operations in 2009 to no operations reported in 2014. Classes of trees that experienced the steepest drop in operation count between 2009 and 2014 were oak, ash and sugar maple (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.10.8 – Missouri Operations Selling Deciduous Shade Trees by Tree Class, 2009 and 2014



*No data were reported for poplar trees in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

7.11 Landscape Conifers

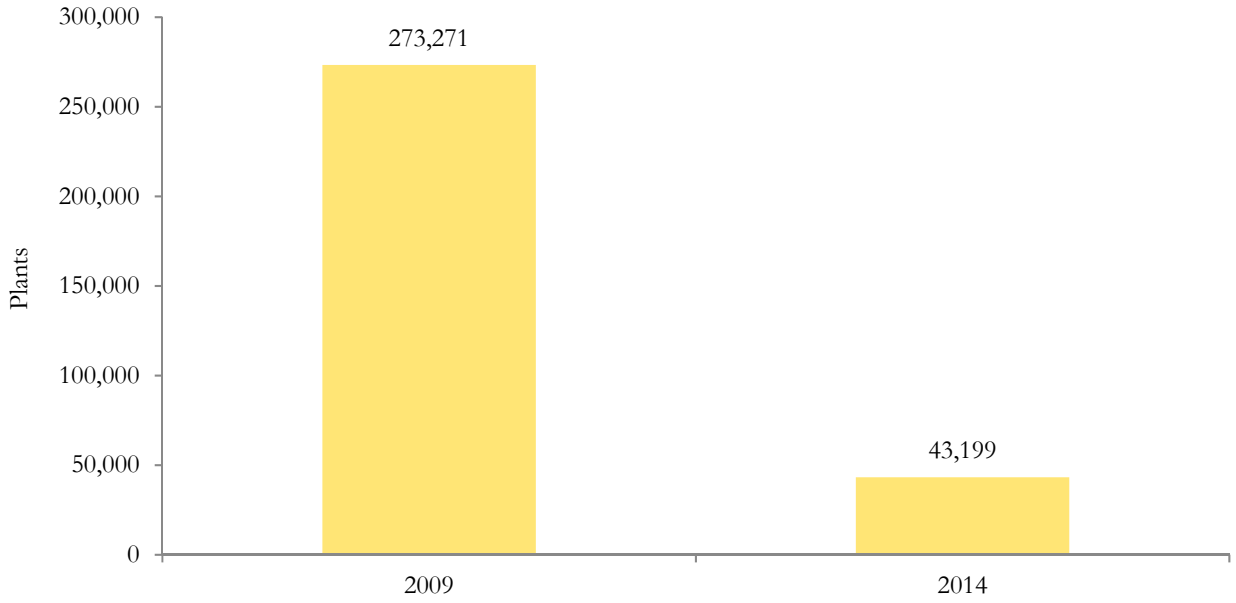
The specialty crop definition named eight classes of plants as landscape conifers. Exhibit 7.11.1 lists these eight conifers. They range from firs and hemlocks to spruces and yews. The bold text indicates that USDA data are specifically reported for each class of these landscape conifers. The following section shares more details about these landscape conifers in relation to Missouri's industry. Note that Chamaecyparis is also known as cypress.

Exhibit 7.11.1 – Landscape Conifers Included in Specialty Crop Definition[12]

Arborvitae	**Chamaecyparis**	**Fir**	**Hemlock**
Juniper	**Pine**	**Spruce**	**Yew**

The landscape conifer inventory from Missouri operations sharply declined between 2009 and 2014. Exhibit 7.11.2 shares the trend. The inventory level exceeded 273,000 plants at the end of December 2009. It fell to nearly 43,200 plants by the end of December 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.11.2 – Missouri Landscape Conifer Inventory, 2009 and 2014

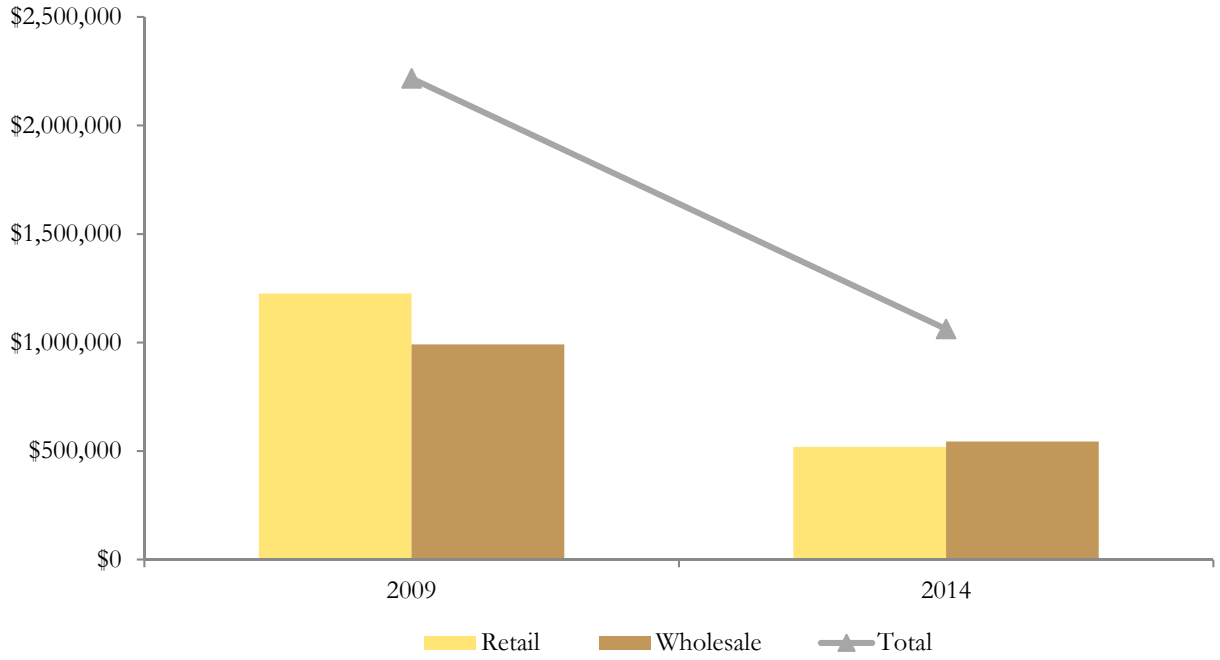


Source: USDA, National Agricultural Statistics Service (2017b)

Landscape conifer dollar sales from Missouri operations dropped significantly between 2009 and 2014. Sales in 2014 — they totaled slightly more than $1.06 million — were roughly half the total that they registered in 2009; the 2009 sales totaled nearly $2.22 million. Exhibit 7.11.3 presents total landscape conifer sales, and it further explores sales made in retail and wholesale channels. In 2009, retail sales exceeded wholesale sales, and the relationship flipped in 2014. Wholesale transactions produced more than $543,000 in landscape conifer sales during 2014, and retail sales for landscape conifers totaled $518,500 at the time (USDA National Agricultural Statistics Service 2017b).

[12] Note, the USDA Agricultural Marketing Service doesn't name all classes of landscape conifers in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.11.1. When reporting totals for the landscape conifer sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are cedar and other classes reflected by the USDA National Agricultural Statistics Service reporting. Note that these data were included in the "coniferous evergreen" category of USDA National Agricultural Statistics Service reporting. Totals for this category include those for live Christmas trees, though the live Christmas tree data were shared more completely in section 7.7, which is dedicated to Christmas tree reporting.

Exhibit 7.11.3 – Missouri Landscape Conifer Dollar Sales in Total and by Retail and Wholesale Channel, 2009 and 2014



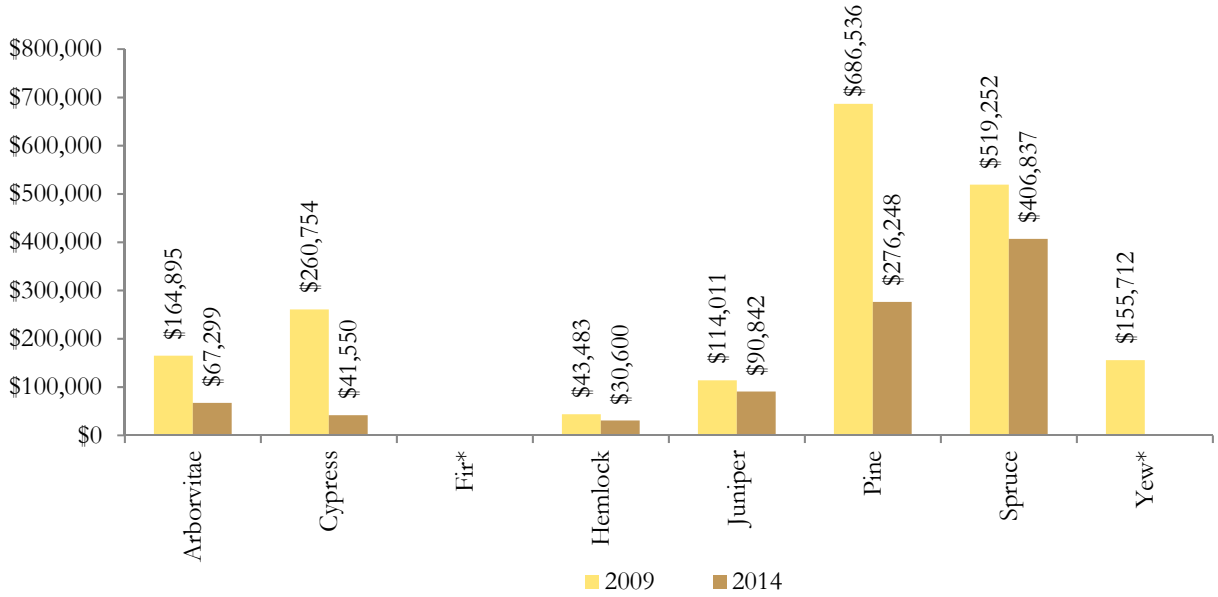
Source: USDA, National Agricultural Statistics Service (2017b)

Sales volume data were limited to 2014 as data were predominantly withheld in 2009. The 2014 data indicate that Missouri operations sold more than 16,500 conifers in that year. The number of plants sold in retail and wholesale channels was similar. The retail sales volume was just slightly higher than the wholesale sales volume. Fifty-two percent of landscape conifer plants sold in 2014 were transactions originating from the retail channel compared with the 48 percent that resulted from wholesale market sales (USDA National Agricultural Statistics Service 2017b).

Missouri operations have sold landscape conifers as balled and burlapped plants, as bareroot plants, in containers and in other forms. To avoid disclosing data for individual operations, data sets have largely withheld landscape conifer sales data by form. Balled and burlapped sales have been the exception. In 2014, balled and burlapped landscape conifers produced sales that totaled $885,800. That was a reduction from the more than $1.56 million in balled and burlapped sales reported during 2009. In 2014, roughly 83 percent of coniferous evergreen dollar sales originated from plants sold in a balled and burlapped form (USDA National Agricultural Statistics Service 2017b).

Sales data for landscape conifers by class have been more readily reported. Exhibit 7.11.4 illustrates the trend in Missouri landscape conifer dollar sales by plant class. Pine and spruce sales were highest in 2009 and 2014. The two swapped for ranking first and second in those years. In 2014, spruces generated the most sales value — nearly $407,000. Pine ranked second and produced sales that exceeded $276,000. All classes of landscape conifers experienced a drop in sales between 2009 and 2014. In percentage terms, the declines were most significant for cypress and pine and least significant for juniper and spruce (USDA National Agricultural Statistics Service 2017b).

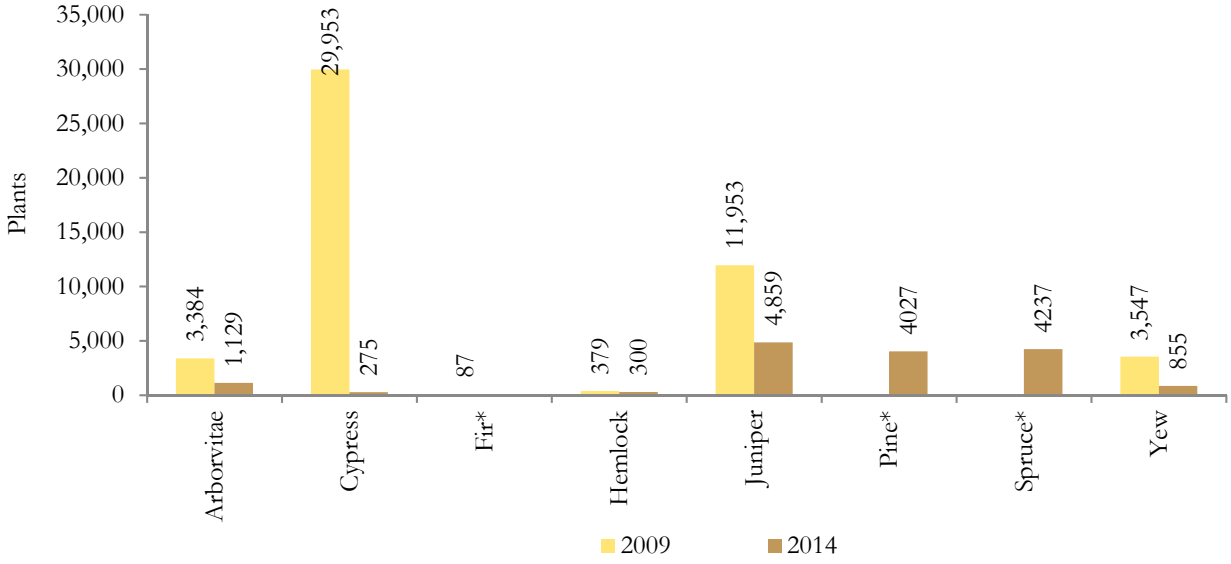
Exhibit 7.11.4 – Missouri Landscape Conifer Dollar Sales by Plant Class, 2009 and 2014



* Data for fir were withheld in 2009 and 2014. Data for yew were withheld in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

To show Missouri landscape conifer sales by class in a different form, Exhibit 7.11.5 presents the number of landscape conifer plants sold in 2009 and 2014. In 2014, Missouri operations sold more juniper, spruce and pine plants than plants of the other landscape conifer classes. Of the classes with data reported in both years, sales volume decreased for all classes. In percentage terms, the drop was most significant for cypress and yew (USDA National Agricultural Statistics Service 2017b).

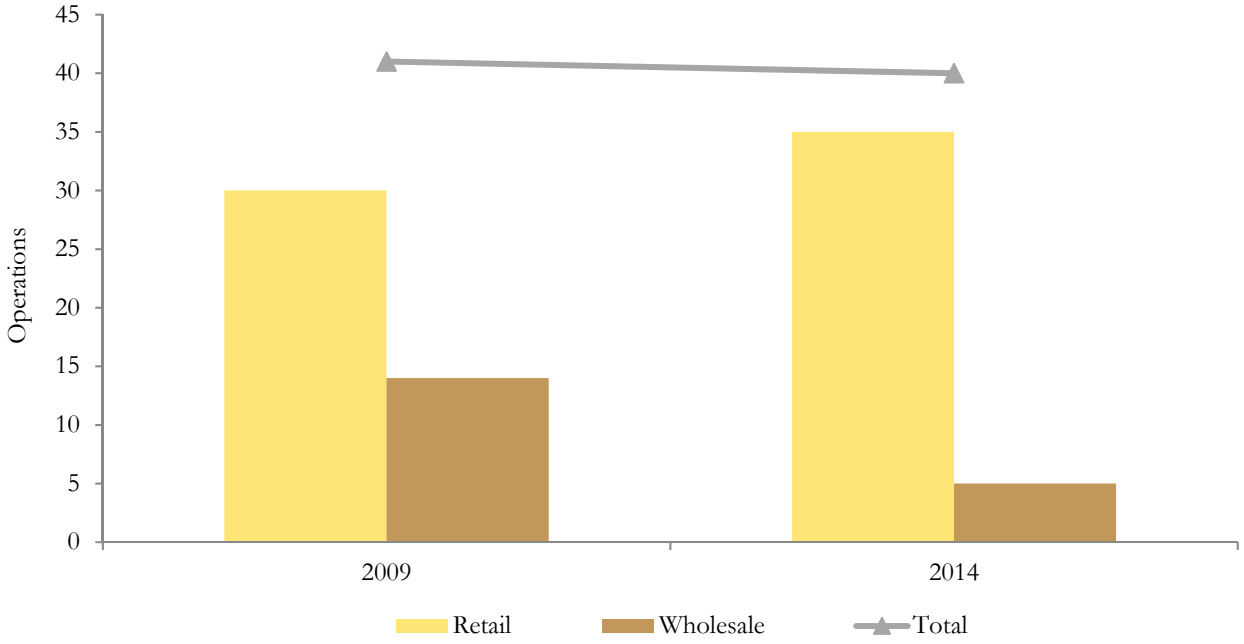
Exhibit 7.11.5 – Missouri Landscape Conifer Unit Sales by Plant Class, 2009 and 2014



* Data for fir were withheld in 2014. Data for pine and spruce were withheld in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

The count of Missouri operations selling landscape conifers barely declined between 2009 and 2014. See Exhibit 7.11.6. Forty-one operations reported sales in 2009, and 40 operations shared that they sold landscape conifers in 2014. The chart also provides the number of operations selling landscape conifers in retail and wholesale channels. During both 2009 and 2014, a majority of Missouri operations selling landscape conifers sold product at retail. Operations selling landscape conifers at retail increased from 30 operations in 2009 to 35 operations in 2014. During the same time period, the count of landscape conifer wholesalers in the state declined from 14 operations to five operations (USDA National Agricultural Statistics Service 2017b).

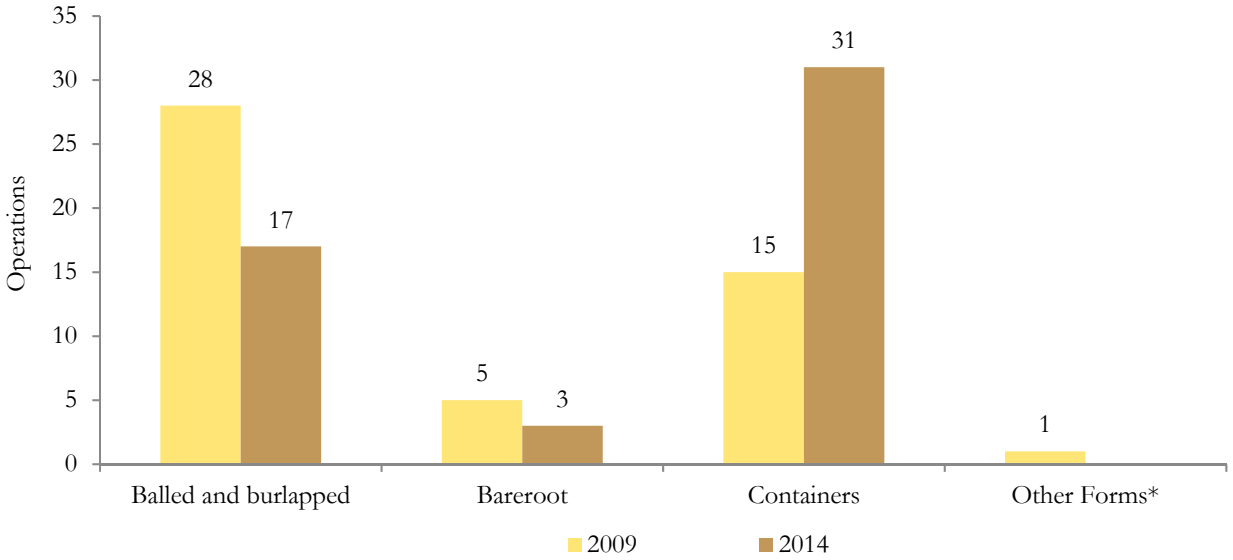
Exhibit 7.11.6 – Missouri Operations Selling Landscape Conifers in Total and by Retail and Wholesale Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Although limited data have been reported to communicate Missouri landscape conifer sales by form — balled and burlapped, bareroot, containers and other forms — the count of operations selling each form of landscape conifer can serve as a proxy. In 2014, container sales were the most popular among Missouri landscape conifer operations. See Exhibit 7.11.7. At the time, 31 operations reported that they sold landscape conifers in containers. Balled and burlapped ranked second; 17 operations reported that they sold landscape conifers as balled and burlapped plants in 2014. Five years earlier, the highest number of operations reported selling landscape conifers as balled and burlapped plants (USDA National Agricultural Statistics Service 2017b).

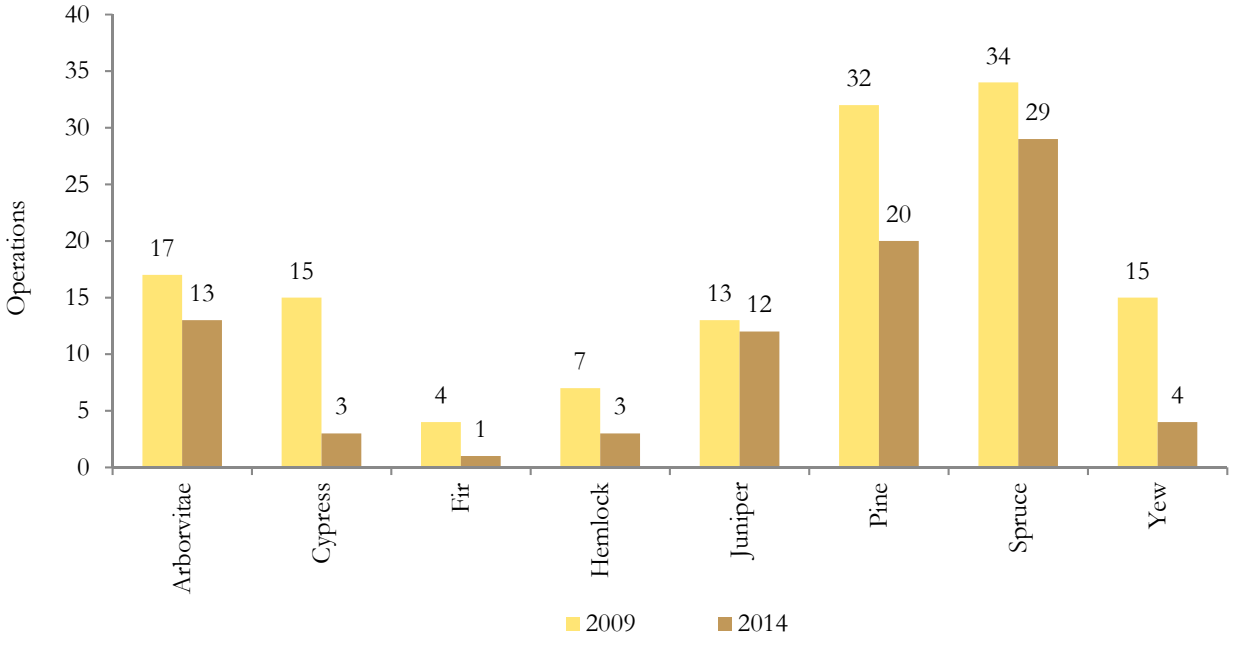
Exhibit 7.11.7 – Missouri Operations Selling Landscape Conifers by Form, 2009 and 2014



* No operations sold landscape conifers in other forms during 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Fewer Missouri operations reported selling each class of landscape conifer in 2014 relative to 2009. In number terms, the reductions were most significant for cypress, pine and yew operations. See Exhibit 7.11.8. The chart also illustrates that Missouri landscape conifer operations were most likely to sell spruce and pine landscape conifers in 2014. These same conifers also had the highest operation counts in 2009 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.11.8 – Missouri Operations Selling Landscape Conifers by Plant Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

7.12 Deciduous Shrubs

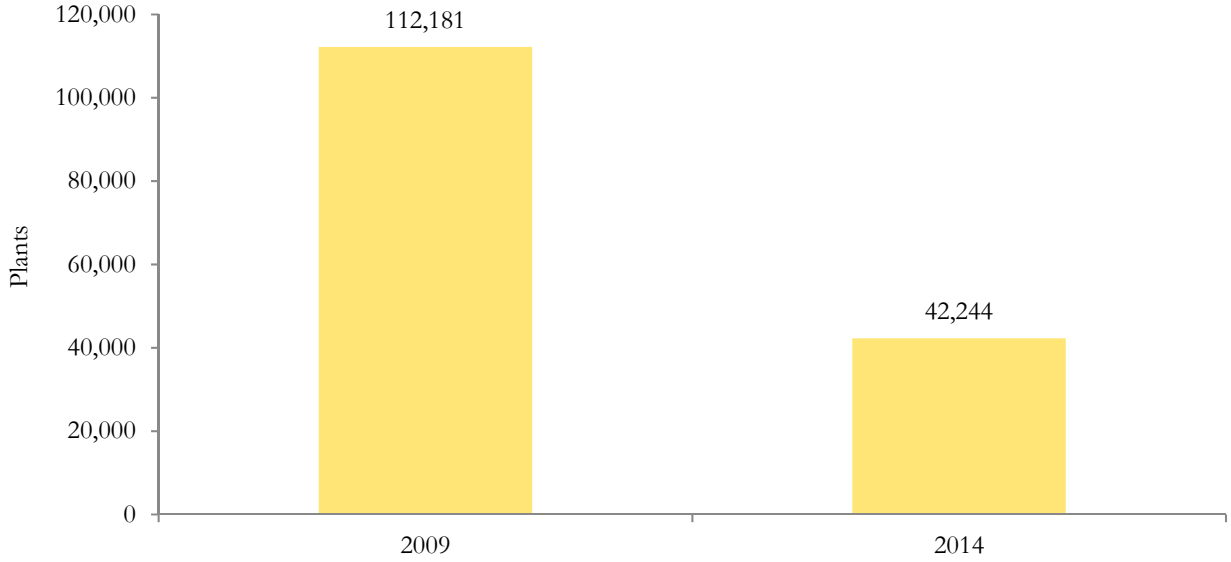
Eight classes of deciduous shrubs were included in the specialty crop definition. They include hibiscus, hydrangea and rose. For the full list, see Exhibit 7.12.1. The bold text indicates that USDA has reported data specifically for each of these deciduous shrub classes. This section describes Missouri's involvement in producing and selling deciduous shrubs.

Exhibit 7.12.1 – Deciduous Shrubs Included in Specialty Crop Definition[13]

Barberry	**Bubbleia**	**Hibiscus**	**Hydrangea**
Rose	**Spirea**	**Viburnum**	**Weigela**

In terms of inventory, Exhibit 7.12.2 shares Missouri deciduous shrub inventory data from 2009 and 2014. As illustrated, the inventory level at the end of December 2014 was roughly 37 percent of the inventory level recorded at the end of December 2009. The 2014 inventory level ended at slightly more than 42,200 plants (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.12.2 – Missouri Deciduous Shrub Inventory, 2009 and 2014



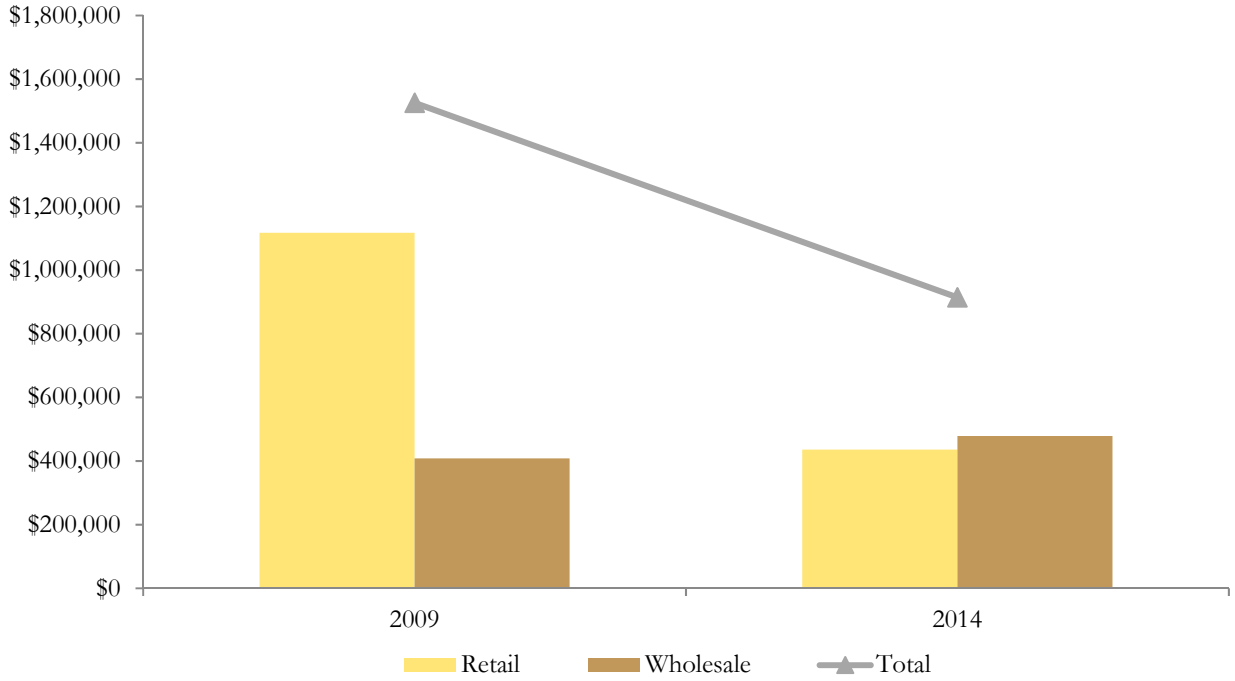
Source: USDA, National Agricultural Statistics Service (2017b)

Dollar sales of Missouri deciduous shrubs decreased from 2009 to 2014. Missouri recorded sales that exceeded $1.52 million in 2009. The 2014 sales value registered slightly more than $914,000. Exhibit 7.12.3 illustrates this trend. Note that the chart also presents the change in retail and wholesale dollar sales for Missouri deciduous shrub operations. Retail sales value declined substantially between 2009

[13] Note, the USDA Agricultural Marketing Service doesn't name all classes of deciduous shrubs in its specialty crop definition. This analysis limits the class-by-class discussion to the specific classes named in the definition; these are the plants listed in Exhibit 7.12.1. When reporting totals for the deciduous shrub sector, however, plant classes not specifically named in the specialty crop definition may be included if Missouri was involved with their production. Those classes that may be included in totals but not named in the specialty crop definition are lilac and other classes reflected by the USDA National Agricultural Statistics Service reporting.

and 2014. However, sales made at wholesale grew. Ultimately, wholesale sales exceeded retail sales in 2014. The wholesale market generated more than $478,000 in sales during 2014. Retail sales totaled nearly $436,000 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.12.3 – Missouri Deciduous Shrub Dollar Sales in Total and by Retail and Wholesale Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

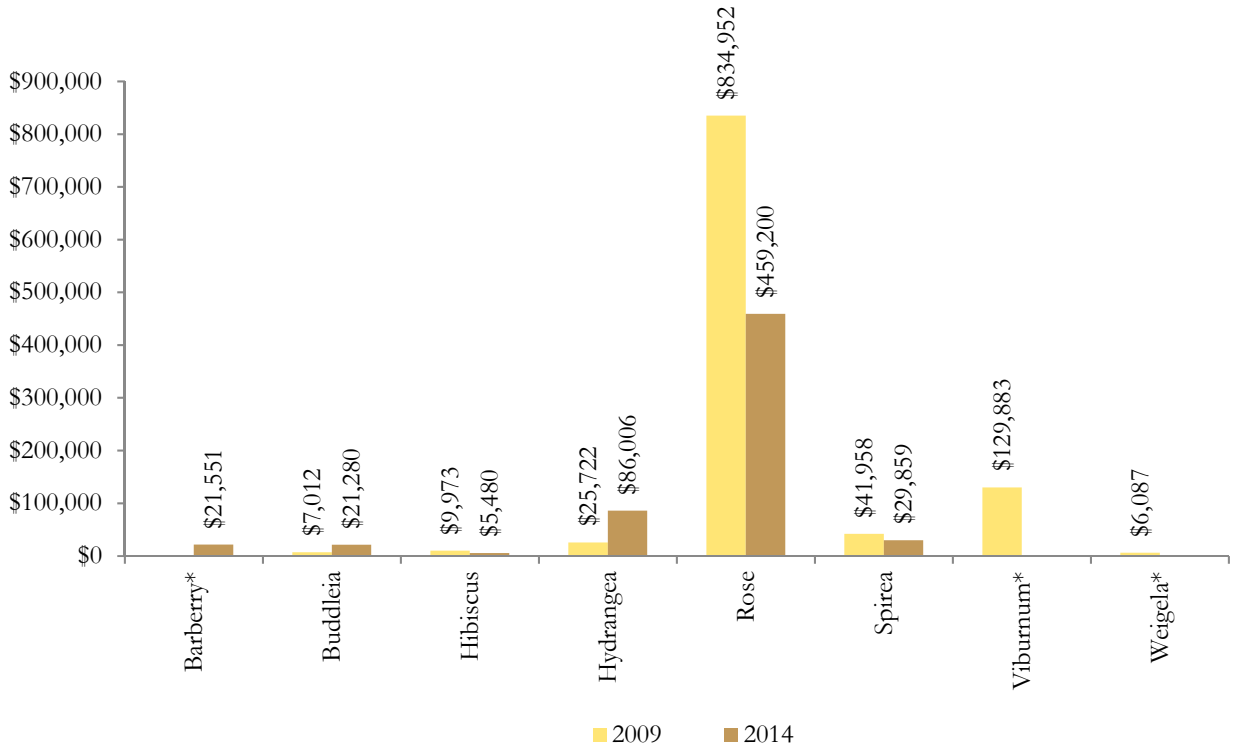
Limited sales volume data from Missouri operations have been reported for deciduous shrubs. Data were withheld in 2009 in order to protect information for individual operations. In 2014, however, sales volume data were reported. More than 93,600 plants of deciduous shrubs were sold in Missouri during 2014. Of those, a majority — 63.9 percent — were sold through wholesale market transactions. Retail transactions generated 36.1 percent of Missouri deciduous shrubs sold in that year (USDA National Agricultural Statistics Service 2017b).

Sales data also haven't regularly been reported for the form of deciduous shrub being sold. Missouri operations have sold deciduous shrubs as balled and burlapped plants, as bareroot plants, in containers and in other forms. In 2009, the value of sales were only released for containers; dollar sales surpassed $1.08 million. Thus, containers were 71 percent of all deciduous shrub sales. Data for the other forms were withheld. In 2014, container sales declined to just nearly $645,000. Still, the container sales were roughly 71 percent of all deciduous shrub sales. Additionally, balled and burlapped dollar sales totaled more than $146,000 in 2014. For bareroot plants and plants sold in other forms, data for 2014 were withheld (USDA National Agricultural Statistics Service 2017b).

For the various classes of deciduous shrubs, sales data have been more routinely reported. To view dollar sales of Missouri deciduous shrubs in 2009 and 2014, see Exhibit 7.12.4. During both years,

the value of rose sales totaled more than the sales value for other deciduous shrub classes. Note, however, that rose sales slid markedly between the two years. The value of rose sales in 2014 exceeded $459,000, but sales had totaled nearly $835,000 in 2009. Hydrangea ranked second in 2014 for sales value as sales totaled roughly $86,000. Just five years prior, hydrangea sales had totaled just more than $25,700 (USDA National Agricultural Statistics Service 2017b).

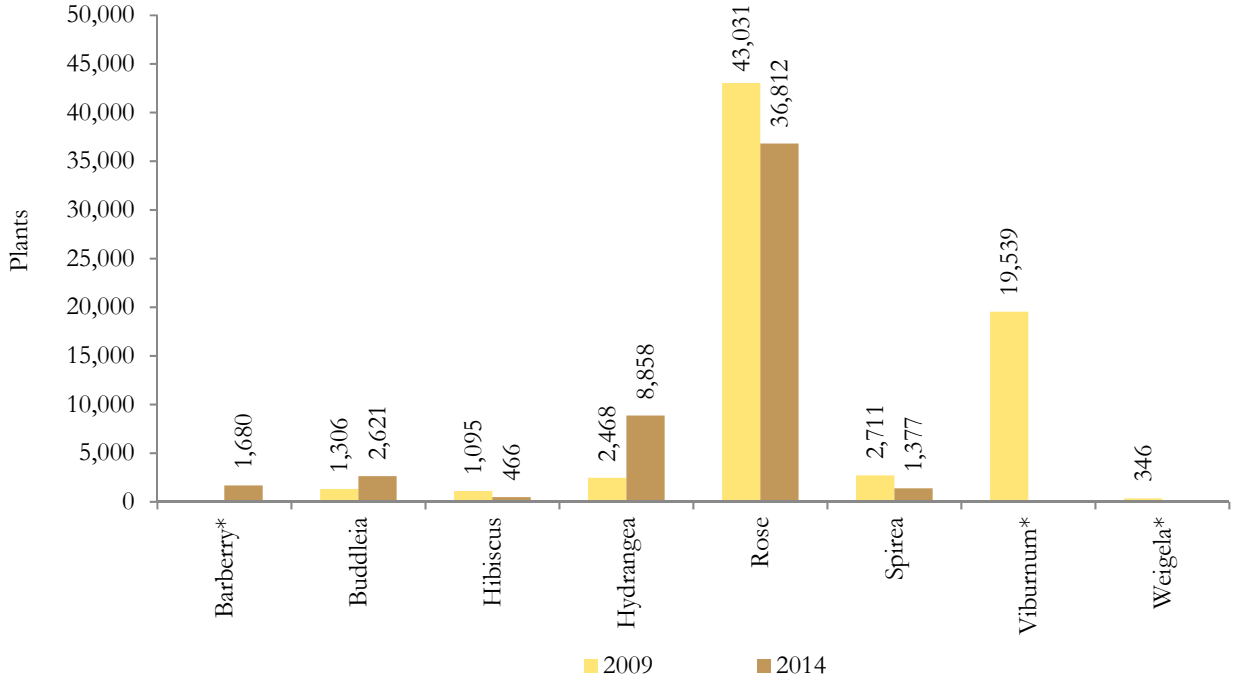
Exhibit 7.12.4 – Missouri Deciduous Shrub Dollar Sales by Plant Class, 2009 and 2014



* Data for barberry were withheld in 2009. Data for viburnum and weigela were withheld in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Missouri deciduous shrub unit sales data were also provided. As the dollar sales data would suggest, Missouri sold more rose plants and hydrangea plants in 2014 than other deciduous shrubs. Rose plant unit sales declined between 2009 and 2014 by more than 6,200 plants. Hydrangea, on the other hand, experienced an uptick in sales volume. Exhibit 7.12.5 charts unit sales for Missouri deciduous shrubs in 2009 and 2014. Missouri operations sold nearly 6,400 more hydrangea plants in 2014 than in 2009. Buddleia was the only other deciduous shrub class that had a reported increase in unit sales between 2009 and 2014, based on data that were available and reported for deciduous shrubs in both 2009 and 2014 (USDA National Agricultural Statistics Service 2017b).

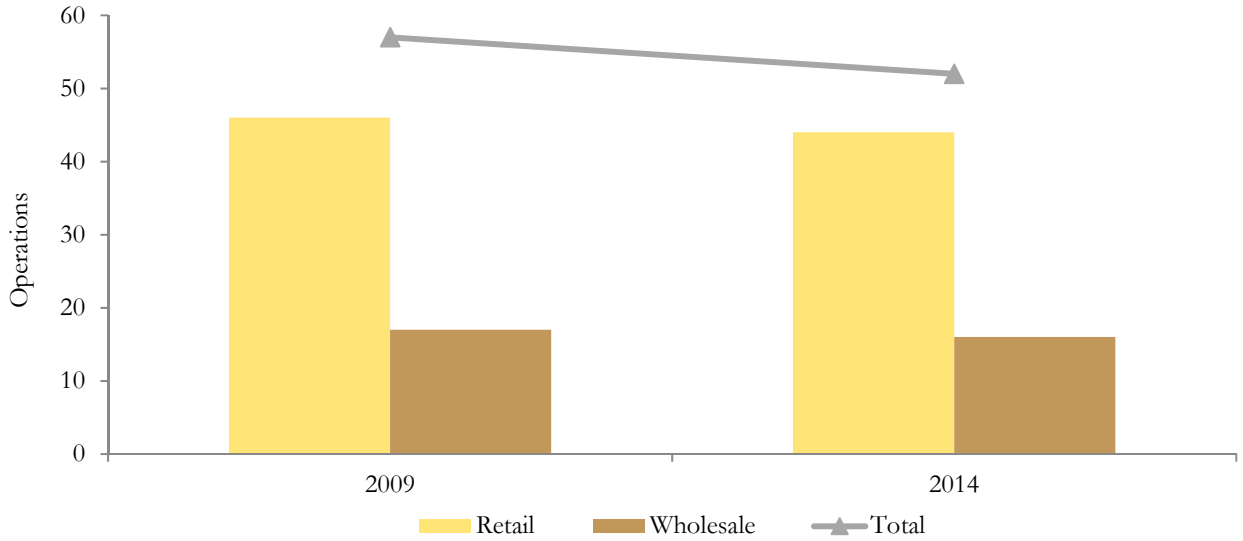
Exhibit 7.12.5 – Missouri Deciduous Shrub Unit Sales by Plant Class, 2009 and 2014



* Data for barberry were withheld in 2009. Data for viburnum and weigela were withheld in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

In terms of Missouri operations selling deciduous shrubs, the total count declined from 57 in 2009 to 52 in 2014. From a wholesale and retail perspective, Exhibit 7.12.6 illustrates that 44 operations in Missouri sold deciduous shrubs at retail in 2014, and those reporting wholesale sales totaled 16 operations (USDA National Agricultural Research Service 2017).

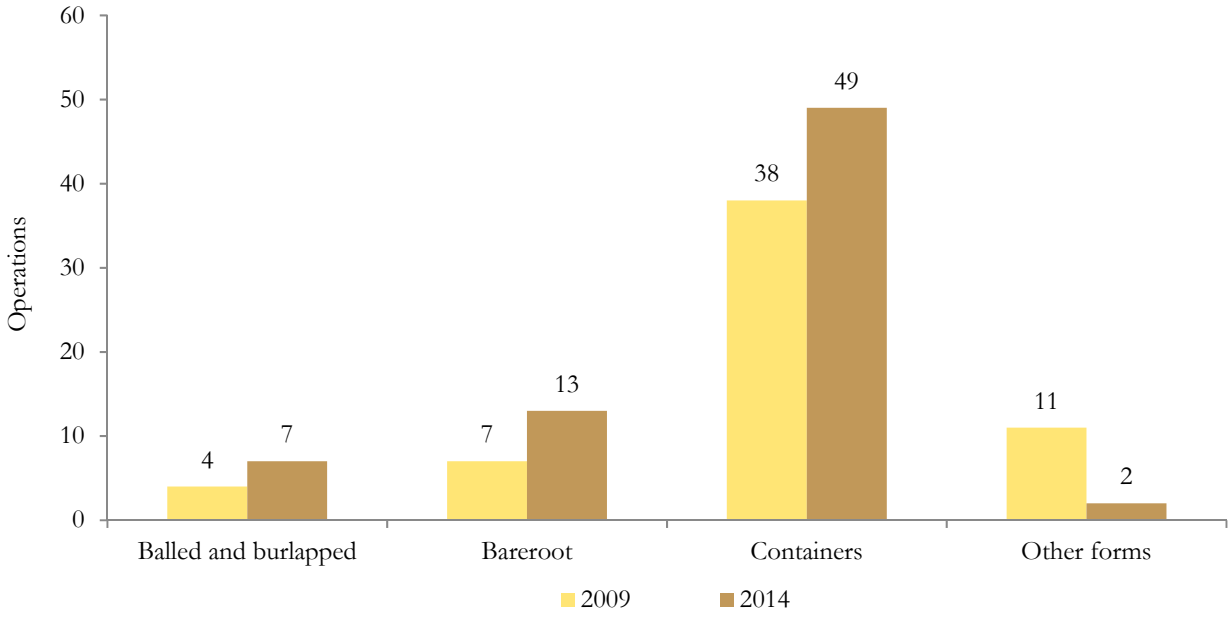
Exhibit 7.12.6 – Missouri Operations Selling Deciduous Shrubs in Total and by Retail and Wholesale Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Despite the overall reduction in Missouri operations selling deciduous shrubs between 2009 and 2014, the count of operations selling shrubs in several different forms increased during that same time. Exhibit 7.12.7 illustrates that more Missouri operations sold deciduous shrubs as balled and burlapped plants, as bareroot plants and in containers during 2014 than during 2009. The number of operations selling deciduous shrubs in containers increased most — 38 operations in 2009 but 49 operations in 2014. Operations with bareroot deciduous shrub sales ranked second in terms of total operations reporting sales. Note that the count of Missouri operations selling deciduous shrubs in forms other than balled and burlapped, bareroot and containers declined to just two operations in 2014. Eleven operations had sold deciduous shrubs in other forms during 2009 (USDA National Agricultural Statistics Service 2017b).

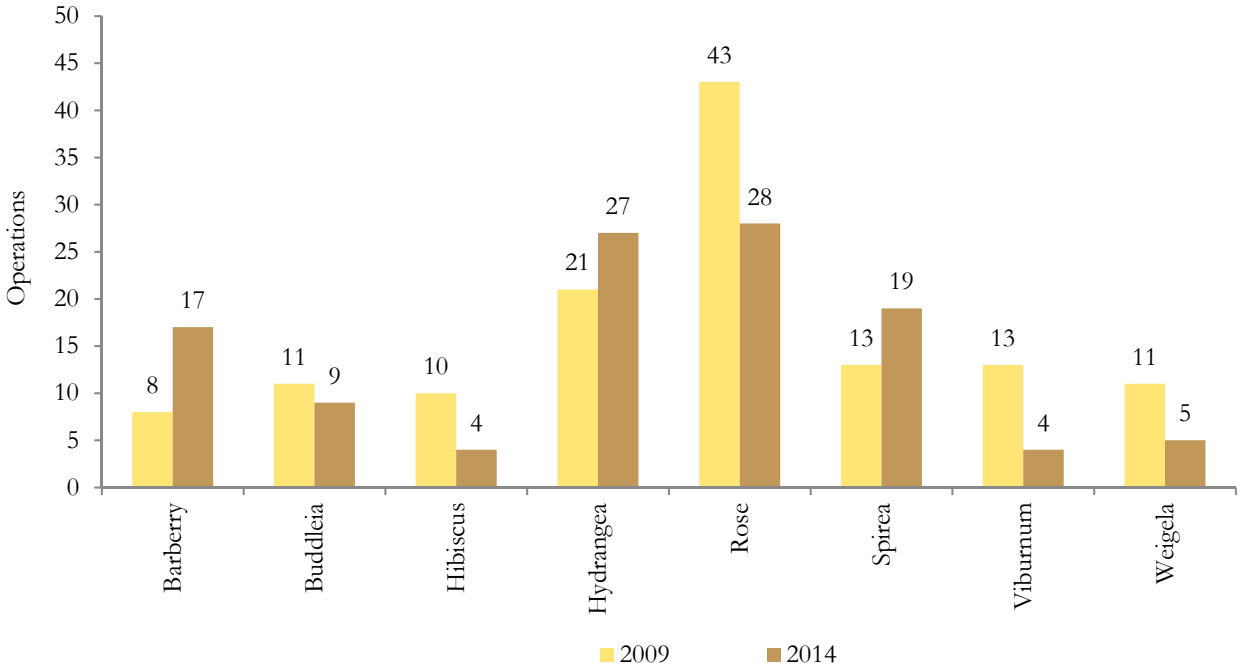
Exhibit 7.12.7 – Missouri Operations Selling Deciduous Shrubs by Form, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

To share Missouri deciduous shrub operations data in an alternative form, Exhibit 7.12.8 presents the number of operations reporting sales of various deciduous shrub classes. During 2009 and 2014, more Missouri operations sold roses than any other deciduous shrub. However, the number of hydrangea operations with sales was a close second. The gap between operations selling roses and those selling hydrangeas largely had closed by 2014. At the time, 28 operations sold rose plants, and 27 operations sold hydrangea plants. The operation count for spirea — 19 operations — ranked third, and 17 operations indicated that they sold barberry. Between 2009 and 2014, Missouri experienced an increase in the number of operations selling barberry, hydrangea and spirea. Roses lost the most operations reporting sales between 2009 and 2014. Fifteen fewer operations reported rose sales in 2014 relative to 2009 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.12.8 – Missouri Operations Selling Deciduous Shrubs by Plant Class, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

7.13 Fruit and Nut Plants

Fruit and nut plants are also considered to be nursery crops. Exhibit 7.13.1 shows that the USDA specialty crop definition includes four categories of fruit and nut plants: berry plants, citrus trees, deciduous fruit and nut trees and grapevines. USDA has reported Missouri data for segments of all of these categories. This section shares more about Missouri's role in raising fruit and nut plants.

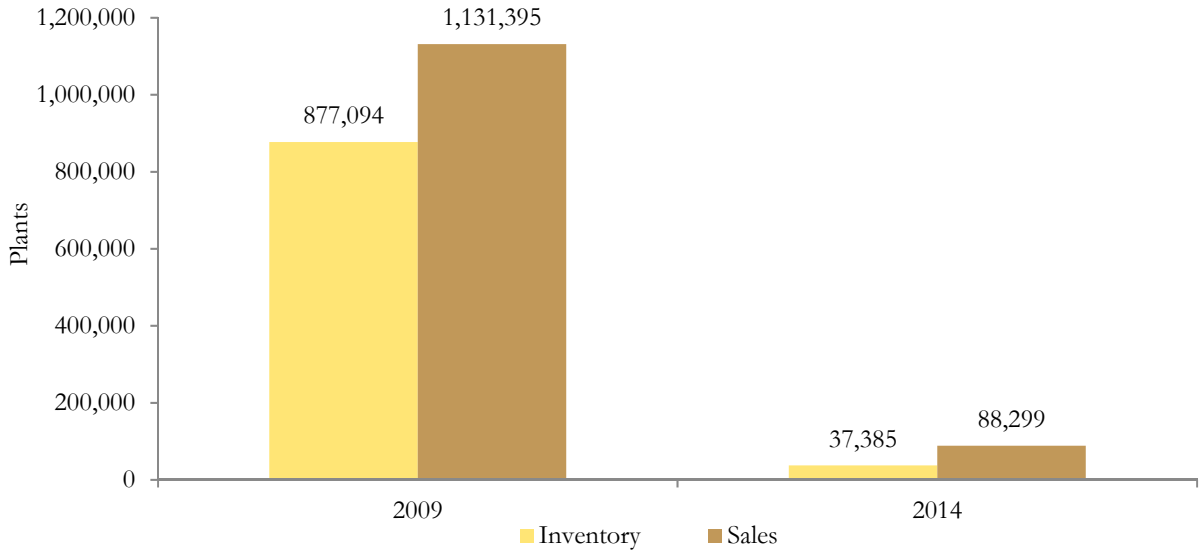
Exhibit 7.13.1 – Fruit and Nut Plants Included in Specialty Crop Definition[14]

Berry plants	Citrus trees	Deciduous fruit and nut trees	Grapevines

Between 2009 and 2014, Missouri fruit and nut plant inventory and sales both declined. With respect to inventory, it decreased from more than 877,000 plants in 2009 to more than 37,300 plants in 2014. See Exhibit 7.13.2. The drop in fruit and nut plant sales was also significant. Missouri operations sold more than 1.13 million fruit and nut plants in 2009. By 2014, the unit sales level had receded to nearly 88,300 plants (USDA National Agricultural Statistics Service 2017b).

[14] Note, the USDA Agricultural Marketing Service doesn't name all classes of deciduous shrubs in its specialty crop definition. The USDA National Agricultural Statistics Service also reports data for other small plants and other trees. Data for those "other" categories aren't described as categories in this report, but they may be included in totals reported for fruit and nut plants.

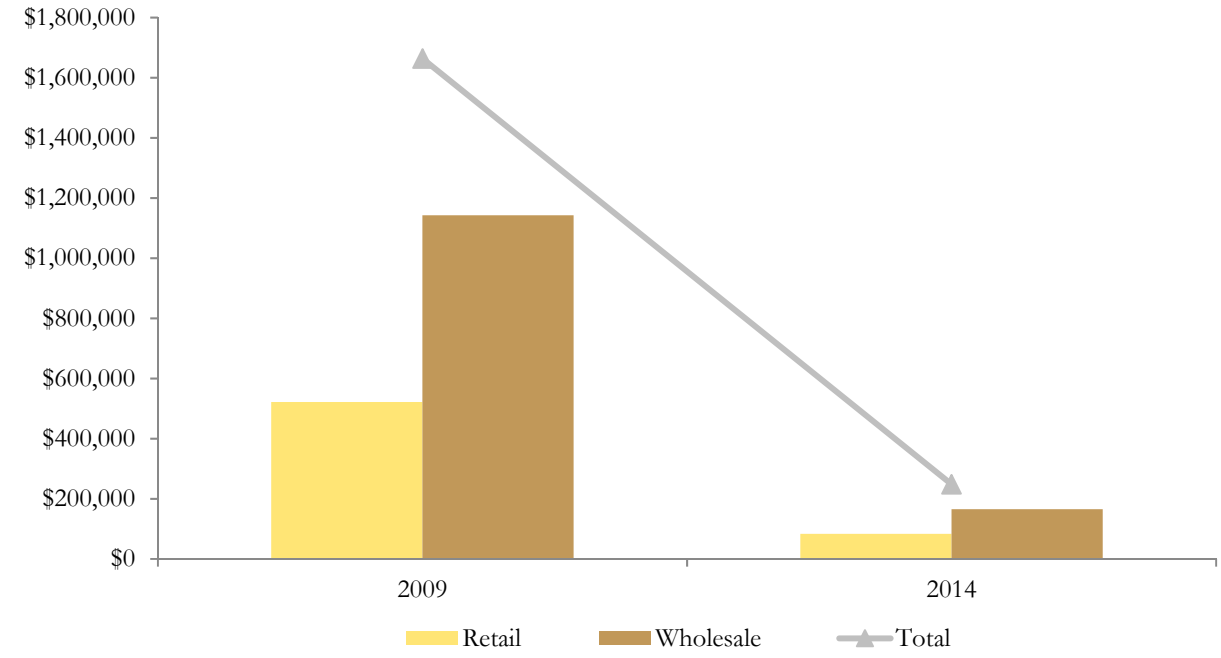
Exhibit 7.13.2 – Missouri Fruit and Nut Plant Inventory and Sales, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Dollar sales data for Missouri fruit and nut plants are provided in Exhibit 7.13.3. Total sales declined from roughly $1.66 million in 2009 to slightly more than $248,000 in 2014. Of the total sales generated in 2014, two-thirds were wholesale sales, and one-third was retail sales (USDA National Agricultural Statistics Service 2017b).

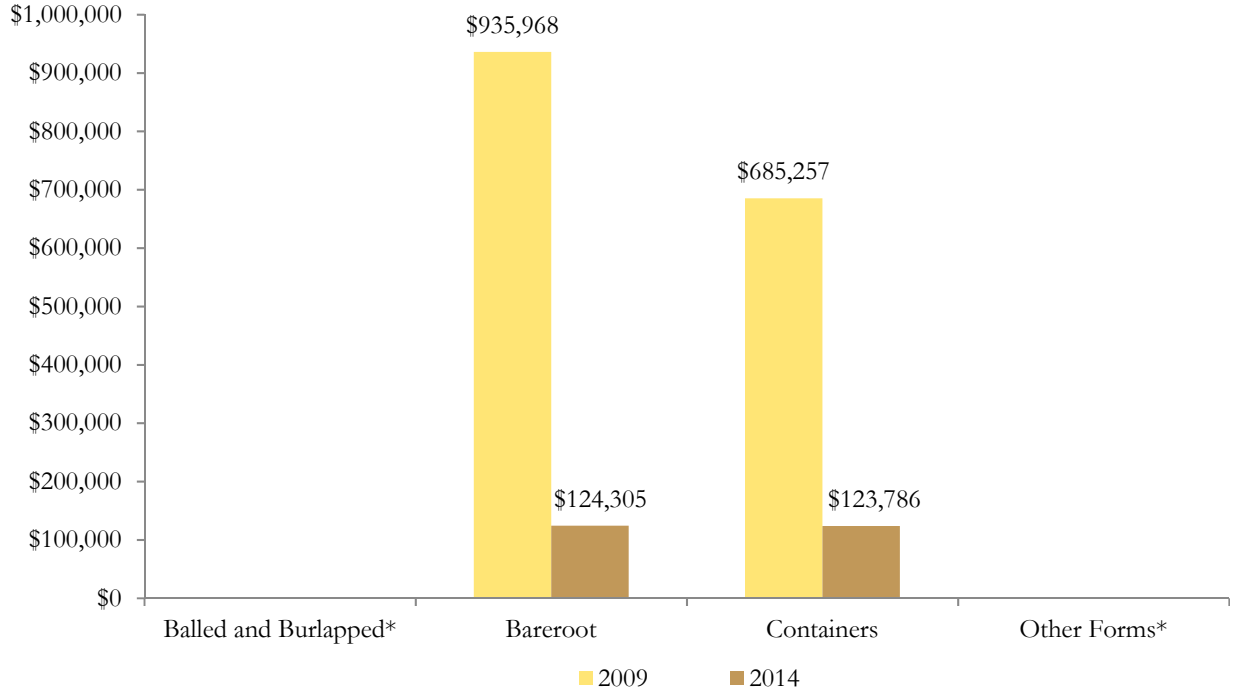
Exhibit 7.13.3 – Missouri Fruit and Nut Plants Dollar Sales in Total and by Retail and Wholesale Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri operations have sold fruit and nut plants as balled and burlapped, bareroot and container plants. Plus, they've used select other forms. Bareroot fruit and nut plants and plants in containers have been most common. Exhibit 7.13.4 shares dollar sales data for fruit and nut plants by form. In 2009, Missouri operations made sales in all four categories; at the time, data were withheld for balled and burlapped plants and plants in other forms. In 2014, Missouri operations exclusively sold fruit and nut plants as bareroot and container plants; their sales declined significantly between 2009 and 2014. In 2014, bareroot and container sales were relatively equivalent: $124,305 and $123,786, respectively (USDA National Agricultural Statistics Service 2017b).

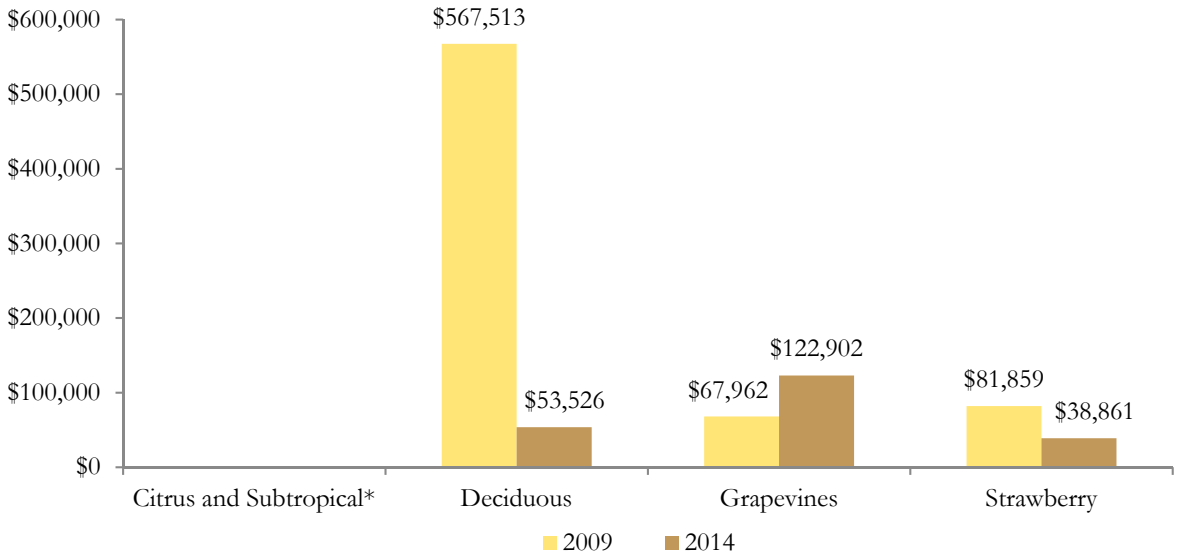
Exhibit 7.13.4 – Missouri Fruit and Nut Plant Dollar Sales by Plant Form, 2009 and 2014



* Balled and burlapped and other forms data were withheld in 2009; no data were reported for these forms in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.13.5 breaks down fruit and nut plant dollar sales by plant type. Note, however, that citrus data were withheld in both observed years. The chart indicates that sales for deciduous fruit and nut plants and strawberry plants declined between 2009 and 2014. The drop was most significant for deciduous fruit and nut plants. Growth in grapevine sales, on the other hand, was significant between 2009 and 2014. Grapevine sales in 2014 were nearly 181 percent of the sales recorded in 2009. These changes between 2009 and 2014 led to grapevine sales trumping sales of deciduous fruit and nut plants and strawberry plants by a wide margin during 2014 (USDA National Agricultural Statistics Service 2017b).

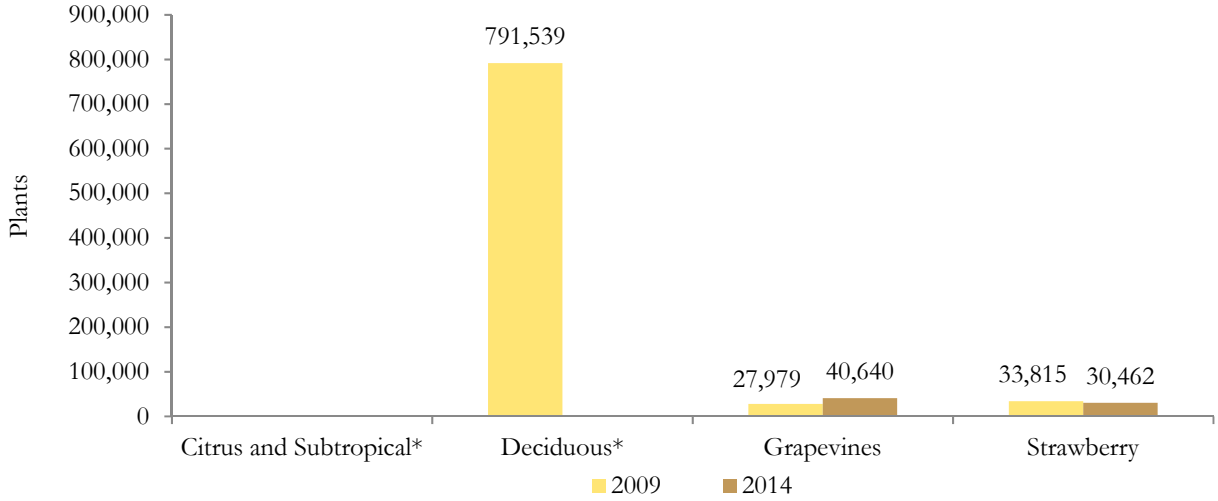
Exhibit 7.13.5 – Missouri Fruit and Nut Plant Dollar Sales by Plant Type, 2009 and 2014



* Citrus and subtropical data were withheld for both 2009 and 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

To provide a different view of fruit and nut plant sales by plant type, Exhibit 7.13.6 shows unit sales data for 2009 and 2014. Unit sales for citrus and subtropical plants were withheld in 2009 and 2014; deciduous fruit and nut plant data were also withheld for 2014. As the dollar sales data suggested, strawberry plant unit sales declined between 2009 and 2014; however, the unit sales reduction wasn't as drastic as the dollar sales drop. Grapevine unit sales grew between 2009 and 2014. In total, Missouri operations sold more than 30,000 strawberry plants and more than 40,000 grapevines in 2014 (USDA National Agricultural Statistics Service 2017b).

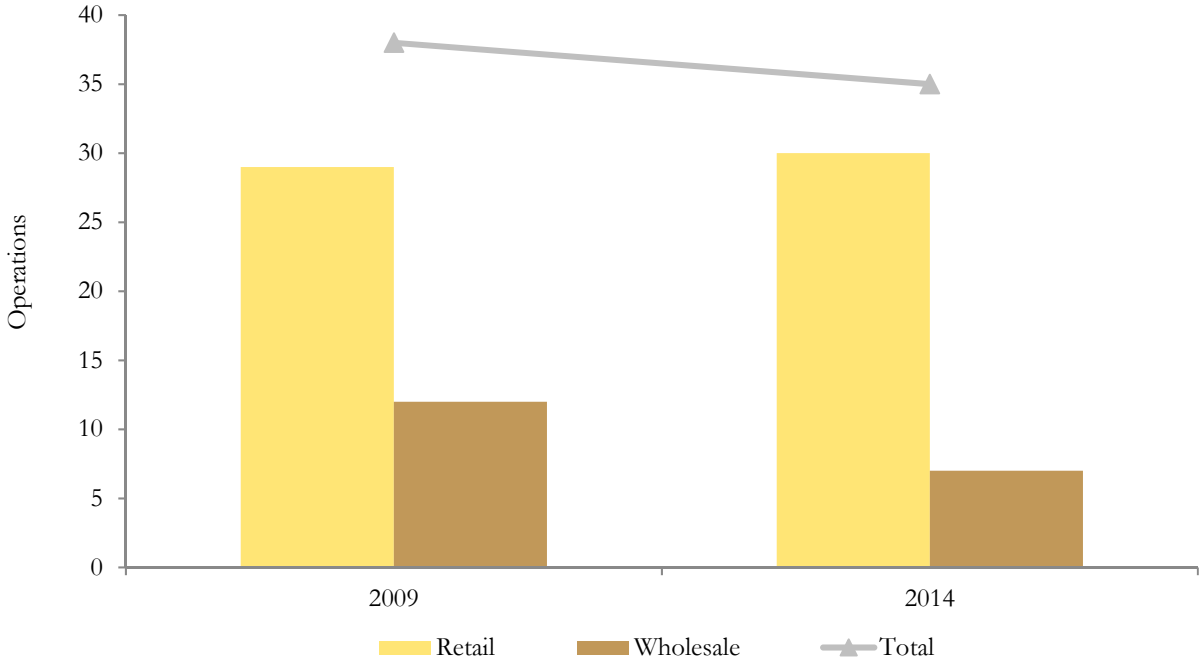
Exhibit 7.13.6 – Missouri Fruit and Nut Plant Unit Sales by Plant Type, 2009 and 2014



* Data were withheld for citrus and subtropical plants in 2009 and 2014, and they were withheld for deciduous fruit and nut plants in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

In 2014, 35 operations in Missouri sold fruit and nut plants. That number was a drop from the 38 operations that sold fruit and nut plants in 2009. Exhibit 7.13.7 charts this total operation count. Plus, it shares the number of operations reporting retail and wholesale sales. As illustrated, more Missouri operations sold fruit and nut plants at retail than at wholesale. The count of operations selling plants at retail increased by one between 2009 and 2014, and the count of operations selling plants at wholesale declined by five. During 2014, 30 operations sold fruit and nut plants at retail, and seven made wholesale sales (USDA National Agricultural Statistics Service 2017b).

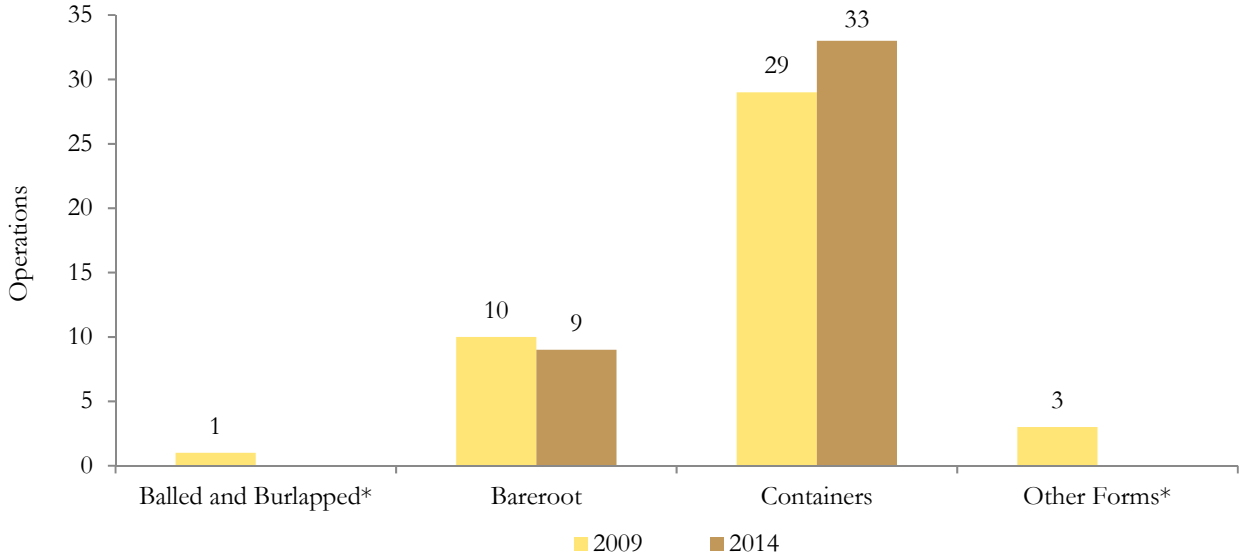
Exhibit 7.13.7 – Missouri Operations Selling Fruit and Nut Plants in Total and by Retail and Wholesale Channel, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Missouri fruit and nut plant operations have most commonly sold bareroot and container plants. Between 2009 and 2014, the count of operations selling bareroot plants declined, but the count selling container fruit and nut plants increased. See Exhibit 7.13.8. During 2014, 33 operations in Missouri indicated that they sold fruit and nut plants in containers, and nine operations sold bareroot plants. No operations sold balled and burlapped and plants of other forms in 2014 (USDA National Agricultural Statistic Service 2017).

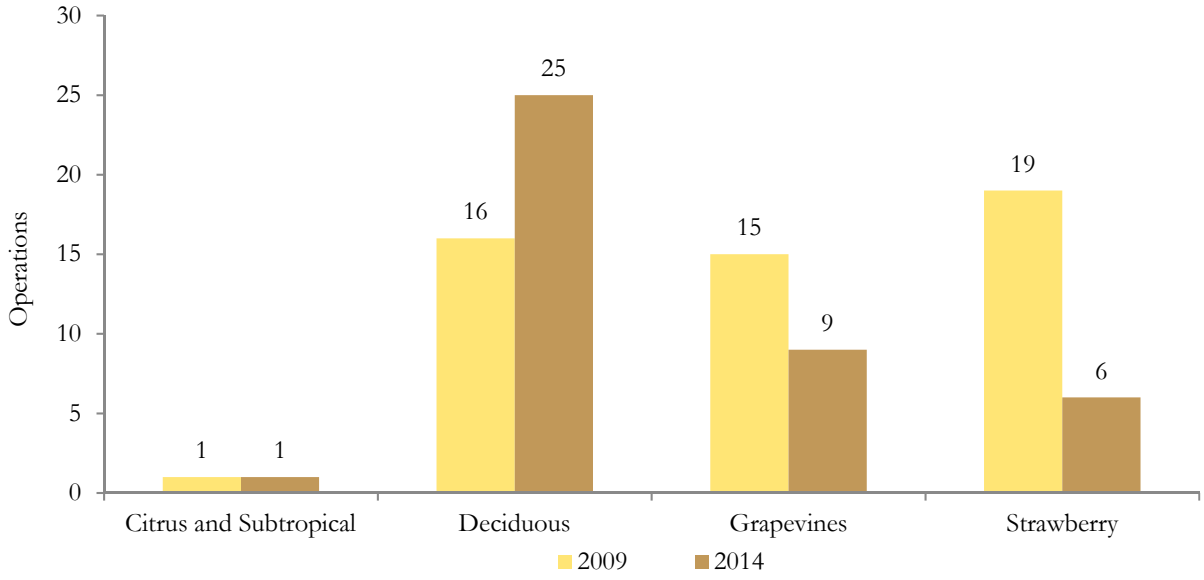
Exhibit 7.13.8 – Missouri Operations Selling Fruit and Nut Plants by Form, 2009 and 2014



* No operations were reported to have sold balled and burlapped plants and other forms of plants in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

Exhibit 7.13.9 shares fruit and nut plant operations data from an alternative perspective. For 2009 and 2014, it shares the number of operations selling citrus and subtropic fruit plants, deciduous fruit and nut plants, grapevines and strawberry plants. During 2014, more operations sold deciduous fruit and nut plants than other types of fruit and nut plants; note that the count increased from 16 operations in 2009 to 25 operations in 2014. Also during 2014, nine operations sold grapevines, six operations sold strawberry plants, and one operation sold citrus and subtropical fruit plants (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.13.9 – Missouri Operations Selling Fruit and Nut Plants by Plant Types, 2009 and 2014



Source: USDA, National Agricultural Statistics Service (2017b)

7.14 Propagative Materials

The USDA specialty crop definition also includes various propagative materials. Those specifically named are listed in Exhibit 7.14.1. The material classes shared in bold type are those for which the USDA National Agricultural Statistics Service has published data for Missouri. The following section shares more about Missouri's role in producing and selling propagative materials.

Exhibit 7.14.1 – Propagative Materials Included in Specialty Crop Definition

Bare-root divisions	**Cuttings**	**Liners**	**Plug seedlings**
Tissue-cultured plantlets	**Prefinished plants**		

Missouri operations have raised propagative materials in the open and under protection. Exhibit 7.14.2 summarizes production area data for 2007 and 2012. As illustrated, production area in the open that's dedicated to propagative materials production increased from 22 acres in 2007 to 47 acres in 2012. Area under protection exceeded 47,000 square feet for raising propagative materials in 2007. The under protection production area data were withheld for 2012 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.14.2 – Missouri Propagative Materials Production Area, 2007 and 2012

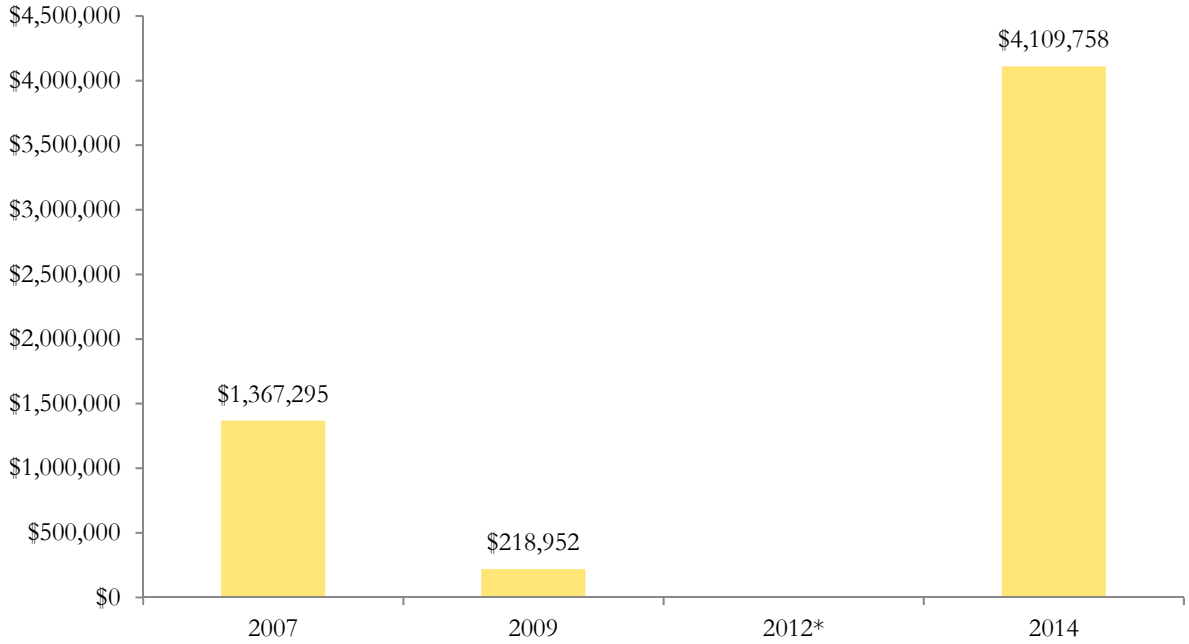
	In the Open (acres)	Under Protection (square feet)
2007	22	47,168
2012	47	(D)

(D) denotes that data were withheld.
Source: USDA, National Agricultural Statistics Service (2017b)

In terms of dollar sales, Exhibit 7.14.3 shares data from 2007 to 2014 for Missouri propagative materials. Dollar sales experienced volatility during the observed period. 2007 sales exceeded $1.36 million in 2007, but sales dropped to nearly $219,000 in 2009. Data were withheld in 2012, but sales escalated to roughly $4.1 million in 2014 (USDA National Agricultural Statistics Service 2017b).

Relatively few dollar sales data points divide these totals into categorical sales. With respect to retail and wholesale sales, data were only published for 2009; the 2014 data were withheld. In 2009, 27.6 percent of propagative material sales were generated by retail transactions. Wholesale transactions represented 72.4 percent of the total (USDA National Agricultural Statistics Service 2017b).

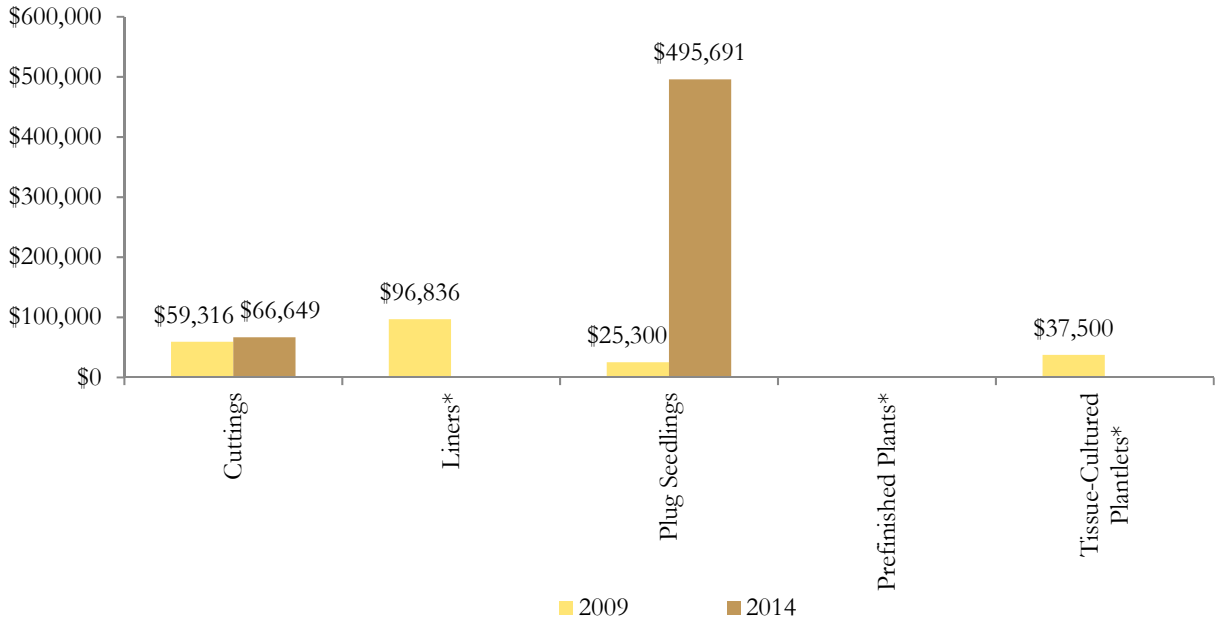
Exhibit 7.14.3 – Missouri Propagative Materials Dollar Sales, 2007 to 2014



* Dollar sales data were withheld for 2012.
Source: USDA, National Agricultural Statistics Service (2017b)

To see a breakdown of propagative materials sales by type, see Exhibit 7.14.4. In some cases, data were withheld. Dollar sales data were published for cuttings and plug seedlings in both 2009 and 2014. The graph shows that plug seedling sales exceeded $495,000 in 2014 relative to just $25,300 in 2009. For cuttings, their sales increased from more than $59,300 in 2009 to more than $66,600 in 2014. Sales for liners and tissue-cultured plantlets were shared in 2009; however, those data points were withheld in 2014. Prefinished plant data were withheld in 2014 and not reported in 2009 (USDA National Agricultural Statistics Service 2017b).

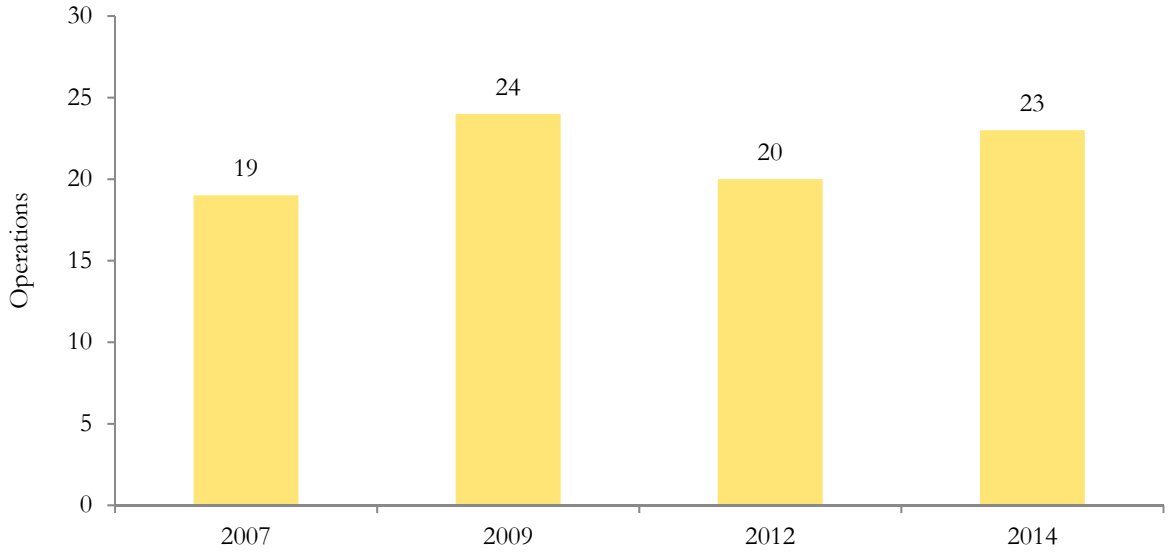
Exhibit 7.14.4 – Missouri Propagative Materials Dollar Sales by Type, 2009 and 2014



* Prefinished plant sales were withheld in 2014 and not reported in 2009. Sales of liners and tissue-cultured plantlets were withheld in 2014.
Source: USDA, National Agricultural Statistics Service (2017b)

The count of Missouri operations selling propagative materials had minor variability from 2007 to 2014. See Exhibit 7.14.5. Nineteen operations sold propagative materials in 2007. The operation count increased to its high of the observed period — 24 operations — in 2009. More recently, the 2014 data indicated that 23 operations in the state sold propagative materials at the time (USDA National Agricultural Statistics Service 2017b).

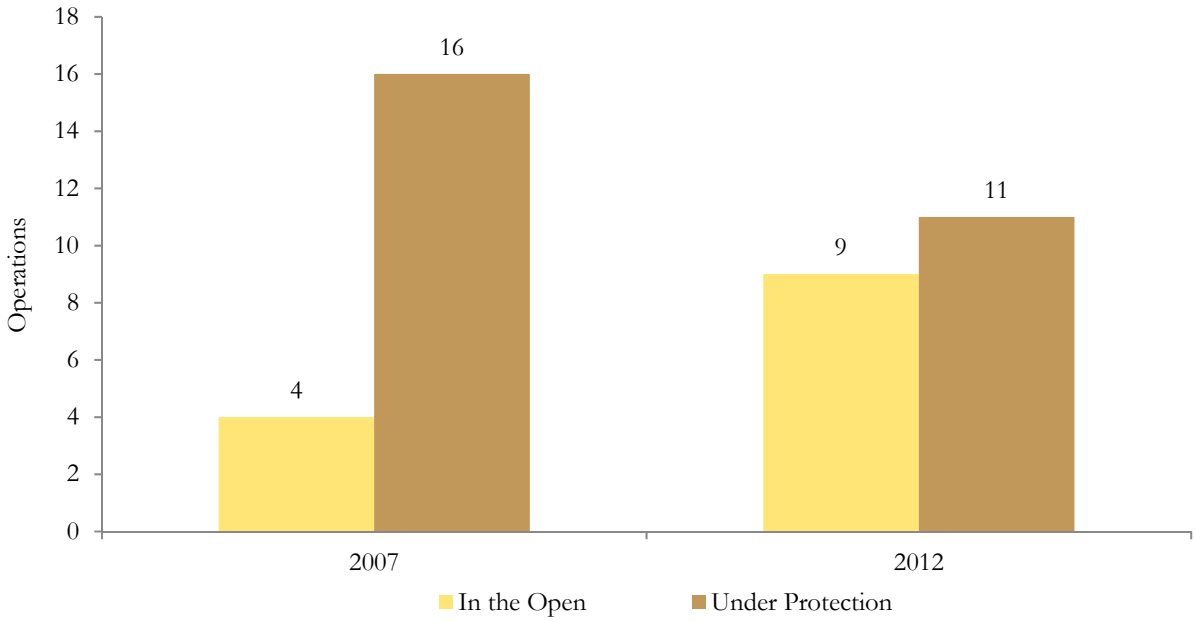
Exhibit 7.14.5 – Missouri Operations Selling Propagative Materials, 2007 to 2014



Source: USDA, National Agricultural Statistics Service (2017b)

Some interesting relationships are presented in the data for Missouri propagative materials operations maintaining production areas in the open or under protection. See Exhibit 7.14.6. During 2007 and 2012, more Missouri operations used area under protection than area in the open for producing propagative materials. However, the count of operations with production area under protection declined from 16 operations in 2007 to 11 operations to 2012. The count of operations using area in the open, however, increased from four operations in 2007 to nine operations in 2012 (USDA National Agricultural Statistics Service 2017b).

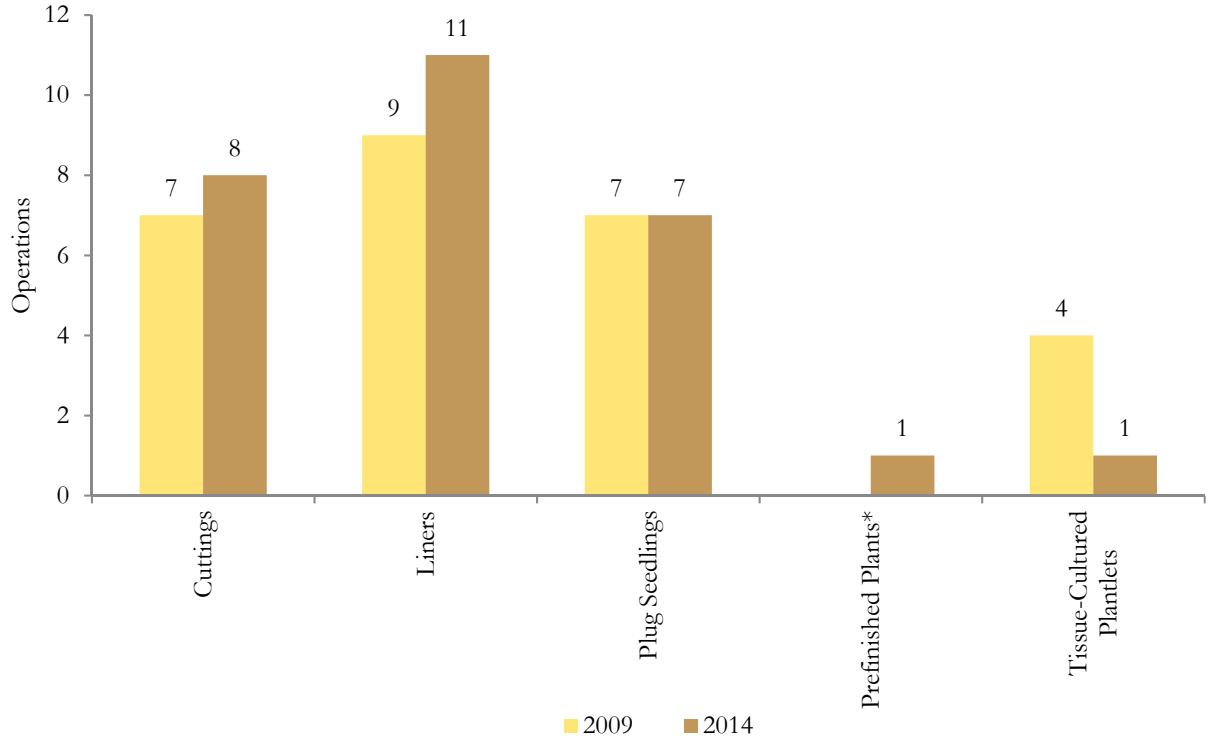
Exhibit 7.14.6 – Missouri Operations With Propagative Materials Production Area, 2007 and 2012



Source: USDA, National Agricultural Statistics Service (2017b)

During 2014, Missouri propagative materials operations with sales most commonly sold liners. See Exhibit 7.14.7. Eleven operations indicated that they sold liners. Eight operations sold cuttings, and seven operations sold plug seedlings. One operation shared that it had prefinished plant sales, and one sold tissue-cultured plantlets. Between 2009 and 2014, the data also show an operations count increase for operations selling cuttings, liners and prefinished plants. Fewer operations sold tissue-cultured plantlets in 2014 than in 2009. The operation count didn't change for plug seedlings between 2009 and 2014 (USDA National Agricultural Statistics Service 2017b).

Exhibit 7.14.7 – Missouri Operations Selling Propagative Materials by Plant Class, 2009 and 2014



* No data were reported for prefinished plants in 2009.
Source: USDA, National Agricultural Statistics Service (2017b)

Methodology

This study organizes specialty crop data according to the crop categories and specific crops or goods listed in the previous table. Data predominantly originate from the USDA National Agricultural Statistics Services. For many crops, data were only available from the U.S. Census of Agriculture; data were reviewed from censuses conducted in 1997, 2002, 2007 and 2012. In 2012, note that a drought significantly affected crop performance in Missouri, As a result, some crops may have had acreage planted that couldn't be harvested. Alternatively, perennial crops may have undergone stress that limited their performance. For some nursery crops, data are limited to census years in 2009 and 2014. Crops produced to a more extensive degree often have had survey data shared on an annual basis. When possible, survey data from the previous 20 years are presented. In some cases, data and information from trade organizations and news publications are referenced to supplement the USDA data and give a more complete view of Missouri's specialty crop activity.

The report shares overall data by specialty crop category, such as fruits, vegetables, tree nuts, annual bedding plants, foliage plants and Christmas trees. When possible, it also reports data for specific crops or goods, such as apples, peaches, begonia, petunia, fern, palm, Fraser fir and white pine. Generally, when analyzing specialty crop categories in smaller classes, this report's discussion centers on the specific goods named in the USDA specialty crop definition and listed in the previous table. For nursery and floriculture crops in particular, the plants listed in the definition aren't exhaustive of crops included in the particular category. For example, the specialty crop definition names nine potted flowering plants, but it doesn't specifically name several other potted flowering plants, such as hibiscus and sunflower. For purposes of this analysis, data for those named crops were used as the focus. The select data points for those named crops provide an overall view of the particular crop category to accompany the category totals.

As an exception to the crops named in the definition, this report adds elderberry as a specialty crop to study. Because elderberry is a crop that has emerged as a specialty crop of interest in Missouri, this presented an opportunity to expand the specialty crop definition based on state-specific conditions. Black walnut was another Missouri specialty crop explored in this report, but it also wasn't specifically named in the USDA definition.

When possible, each crop has data presented about its acreage and farms and operations. Depending on the crop, acreage data may represent a crop's harvested acreage or a crop's bearing and non-bearing acreage. For farms, also referenced as operations, the USDA Economic Research Service identifies a farm as a place that would typically sell at least $1,000 in agricultural products during a given year (USDA Economic Research Service). For a nursery and floriculture operation, the USDA Census of Horticultural Specialties has counted operations as being places that report growing and selling at least $10,000 of horticultural specialty products during a given year (USDA National Agricultural Statistics Service 2017a). The count of nursery and floriculture operations doesn't necessarily include all operations engaged in the state's nursery and floriculture industry. For example, businesses, such as Ace Hardware and Orscheln, that sell nursery plants and goods would function as nursery dealers, not nursery operations included in the scope of this study.

Other data sets, including those for production, prices, cash receipts, operation characteristics and principal operators, are shared as data have been available. For example, crops raised on a wider

scale have farm organizational structure data reported. With respect to organizational structure, farms may be structured as family or individual farms; partnerships; corporations; or institutional, research, reservation or other farms. Note that "family or individual" farms are exclusively those organized as sole proprietorships. If a family farm was structured as a partnership or corporation, then the farm would be classified as a partnership or corporation, respectively. Farms noted as being organized as institutional, research, reservation or other are another category. Within that category, research farms are those that are privately held or those that are publicly owned by universities, colleges or government agencies (USDA National Agricultural Marketing Service 2014a).

Farm operator data were also reported in some instances. Operators are individuals responsible for farm work or decisions. Principal operators are those that predominantly make an operation's day-to-day decisions, and they may include farm managers. Operator tenure was one variable explored for some specialty crops. It describes whether farms are operated by full owners, part owners or tenants. Full owners are those who only operate land of their own. In contrast, part owners may use owned or rented land, and tenant operators exclusively use rented land or work on shares (USDA National Agricultural Marketing Service 2014a).

In some cases, this report shares data for organic production, and data may be specific to certified or exempt products. Certified organic products are those produced in a system that completely adheres to USDA organic standards and raised on an operation that has secured organic certification. Farms and businesses that record gross organic sales being less than $5,000 annually may bypass the certification and call their products organic if they adhere to all USDA organic standards. Without the certification, however, exempt producers may not label their products with the USDA organic seal. Additionally, they may not sell their exempt organic products to a processor and have the processor claim that a processed good is organic. If the exempt producer is processing the product, however, then the "organic" designation may be used (USDA Agricultural Marketing Service A).

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