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

<table>
<thead>
<tr>
<th>Almond</th>
<th>Cashew</th>
<th>Chestnut</th>
<th>Hazelnut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macadamia</td>
<td>Pecan</td>
<td>Pistachio</td>
<td>Walnut</td>
</tr>
</tbody>
</table>

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*

<table>
<thead>
<tr>
<th>Pecans</th>
<th>Other nuts</th>
<th>Walnuts</th>
<th>Chestnuts</th>
<th>Hazelnuts</th>
<th>Almonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>394</td>
<td>160</td>
<td>35</td>
<td>34</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

* 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).
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).
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

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).

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

![Chart showing hazelnut acreage in Missouri from 2007 to 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).
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).
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).
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).

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).

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

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.
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*

- **Family and individual**: 84%
- **Institutional, research, reservation and other**: 2%
- **Partnership**: 10%
- **Corporation**: 4%

* 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*

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 pecan acres 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

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**

<table>
<thead>
<tr>
<th></th>
<th>Acres Harvested</th>
<th>Pounds Produced</th>
<th>Dollar Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>515</td>
<td>71,956</td>
<td>$124,527</td>
</tr>
<tr>
<td>2015</td>
<td>1,091</td>
<td>319,948</td>
<td>$503,995</td>
</tr>
</tbody>
</table>

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*

![Age Distribution Chart]

* 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).
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 alternate 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).