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Michigan State University Agricultural Experiment Station
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Carleton C. Dennis, Agricultural Economics
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MICHIGAN FRUIT PRODUCTION

Importance and Location

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MICHIGAN STATE UNIVERSITY

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IN RECENT YEARS, the cash income from fruits grown by Michigan farmers have exceeded $60 million, or approximately 9 percent of the cash income from all crops grown in the state, indicating that fruits are an important crop for Michigan farmers. Income from fruits increased at approximately 1 percent every 12 years over the 1941-60 period increasing 6 percent per year.2 Over this same period, fruits accounted for 1 percent of total farm cash receipts.

That Michigan is an important fruit producer is indicated by its ranking among the states in the production of various fruits. Michigan is lower than fourth in the production of apples, sour cherries, sweet cherries, grapes, plums, pears, and peaches. Most of the states produce important quantities of strawberries, peaches, and plums.

Production of nearly all of the major fruits has increased in recent years. The increase in the percentage of the average for 1941-60 production in these periods, and the United States can be divided into districts advancing less than, equal to, or greater than the United States as a whole. If the graph is divided into districts with the average for the United States as a whole.

Figure 1 shows the average percentage of the average for the United States and Michigan in each district. The percentage of the average for 1941-60 is given in the middle column, and the United States can be divided into districts advancing less than, equal to, or greater than the United States as a whole. If the graph is divided into districts with the average for the United States as a whole.

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1 Assistant professor, department of agricultural economics, Michigan State University
2 Actual cash receipts deflated by the implicit GNP price deflator.
IN RECENT YEARS, the cash receipts from fruit sales of Michigan farmers have exceeded $60 million annually. This has represented approximately 9 percent of their total cash receipts from farm marketings, indicating that fruits are an important source of income to Michigan farmers. Income from all fruit sold from Michigan farms over the 1941-60 period increased at the rate of about $465,000 per year. Over this same period, cash receipts from fruit sales as a percent of total farm cash receipts increased at the rate of about 1 percent every 12 years.

That Michigan is an important producer of deciduous fruits is indicated by its ranking among other states. In 1960, it ranked no lower than fourth in the production of apples, peaches, pears, sour cherries, sweet cherries, grapes, plums, and strawberries. Very few states produce important quantities of as large a variety of deciduous fruits.

Production of nearly all of the fruits now important in Michigan has increased in recent years. Comparison of recent production as a percentage of 1941-60 production of major fruits in Michigan and the United States can show whether this state has been advancing less than, equal to, or more than the average of other states.

Figure 1 shows the average production of several fruits in the United States and Michigan in the 4-year period, 1957-60, as a percentage of the average for the 20-year period, 1941-60. Michigan percentages are given on the vertical axis and United States percentages are given on the horizontal axis. If the observation for a given fruit falls above the 45° line, it indicates that, when comparing production in these periods, Michigan has fared better than the United States as a whole. If the observation falls below the line, the United States has fared better than Michigan. The dashed lines

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1 Assistant professor, department of agricultural economics.
2 Actual cash receipts deflated by the index of prices received by farmers (1910-14 = 100).
Fig. 1. 1957-60 average production of certain fruits as percentages of 1941-60 average production, United States and Michigan.

“Mich” and “US” are at the 100 percent level for Michigan and the United States, respectively, separating observations on fruits having increases from those having decreases in production. From this it can be concluded that Michigan has fared relatively well in the production of apples, sweet cherries, sour cherries, grapes, plums and pears, but that the state has not kept pace with the United States in the production of peaches and strawberries. Of these fruits, only peaches have been decreasing in production in Michigan, and only sweet cherries and pears have been decreasing in production in the United States.

A severe freeze in November, 1950 killed or injured more than half of Michigan’s peach trees. Many that were not killed were so severely injured that they were low in production for several years, undoubtedly causing 1957-60 production to be less than it otherwise would have been.

Few, if any fruits are produced as apples. In the United States apples commercially. Only the Dakotas, Wyoming, and Texas, the Dakotas, Wyoming, are not included. Washington, crop, produces more apples to the United States than any other state, with 15 to 17 percent, produce slightly less than 10.

Comparison of the average 1941-60 and 1957-60, shows Michigan more in Michigan than in any of the United States, and at least 2 percent of the U.S. are ranked according to an index. is simply a comparison of pro-

\begin{table}[h]
\centering
\caption{Average annual production (000 bu.) in selected state}
\begin{tabular}{ l l l l }
\hline
State & 1941-60 & 1957-60 \\
\hline
Michigan & 8,296.8 & 11,57 & 1157 \\
West Virginia & 4,113.9 & 5,11 & 511 \\
Pennsylvania & 5,675.8 & 6,68 & 668 \\
New York & 15,943.9 & 18,65 & 1865 \\
New Jersey & 2,622.2 & 2,97 & 297 \\
California & 8,537.7 & 9,59 & 959 \\
Virginia & 9,615.6 & 10,07 & 1007 \\
Massachusetts & 2,486.1 & 2,55 & 255 \\
Washington & 26,681.0 & 26,53 & 2653 \\
Ohio & 3,324.8 & 3,10 & 310 \\
Oregon & 2,578.2 & 2,33 & 233 \\
Illinois & 2,797.8 & 2,26 & 226 \\
\hline
\end{tabular}
\end{table}

(a) All states producing at least 2 percent.
(b) Average annual production, 1957.
Apples

Few, if any fruits are produced commercially over as wide an area as apples. In the United States, 35 states are considered to produce apples commercially. Only the southern states from South Carolina to Texas, the Dakotas, Wyoming, Nevada, Arizona, and Oklahoma are not included. Washington, with 20 to 25 percent of the U.S. apple crop, produces more apples than any other state and New York follows with 15 to 17 percent. Michigan, California and Virginia each produce slightly less than 10 percent of the U.S. crop.

Comparison of the average annual production of two periods, 1941-60 and 1957-60, shows that apple production has increased more in Michigan than in any other state (Table 1). Only New York approaches the Michigan increase. In Table 1, the states producing at least 2 percent of the U.S. apple crop in either of these periods are ranked according to an index of production change. This index is simply a comparison of production in the latter period with that

<table>
<thead>
<tr>
<th>State</th>
<th>Average annual production (000 bu.)</th>
<th>Change in average production (000 bu.)</th>
<th>Percent of U.S. production</th>
<th>Index of production change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan</td>
<td>8,296.8</td>
<td>+3,278.2</td>
<td>7.53</td>
<td>139.5</td>
</tr>
<tr>
<td>West Virginia</td>
<td>4,113.9</td>
<td>+1,036.1</td>
<td>3.7</td>
<td>125.2</td>
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<td>Pennsylvania</td>
<td>5,675.8</td>
<td>+1,206.7</td>
<td>5.15</td>
<td>121.3</td>
</tr>
<tr>
<td>New York</td>
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<td>+2,706.1</td>
<td>14.48</td>
<td>117.0</td>
</tr>
<tr>
<td>New Jersey</td>
<td>2,622.2</td>
<td>+352.8</td>
<td>2.38</td>
<td>113.5</td>
</tr>
<tr>
<td>California</td>
<td>8,537.7</td>
<td>+1,059.8</td>
<td>7.75</td>
<td>112.4</td>
</tr>
<tr>
<td>Virginia</td>
<td>9,615.6</td>
<td>+459.4</td>
<td>8.73</td>
<td>104.8</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>2,486.1</td>
<td>+63.9</td>
<td>2.26</td>
<td>102.6</td>
</tr>
<tr>
<td>Washington</td>
<td>26,081.0</td>
<td>-143.5</td>
<td>22.22</td>
<td>99.5</td>
</tr>
<tr>
<td>Ohio</td>
<td>3,324.8</td>
<td>-224.8</td>
<td>3.02</td>
<td>93.2</td>
</tr>
<tr>
<td>Oregon</td>
<td>2,578.2</td>
<td>-240.7</td>
<td>2.34</td>
<td>90.7</td>
</tr>
<tr>
<td>Illinois</td>
<td>2,797.8</td>
<td>-537.8</td>
<td>2.54</td>
<td>80.8</td>
</tr>
</tbody>
</table>

(a) All states producing at least 2 percent of the U.S. apple crop in either period.
(b) Average annual production, 1957-60 ÷ average annual production, 1941-60.
in the earlier period. The index for the entire United States is 107.9. Only California and those states listed above have exceeded the average of the U.S. in percentage increase in production. Virginia and Massachusetts had small increases but less than the U.S. average, while Washington and states listed below had decreases. Washington, the major apple producing state, has an index of 99.5, indicating that production in that state has changed very little.

Among the states listed in Table 1, Michigan has the largest index of production change. This serves to strengthen the conclusion that Michigan is becoming more important on the national apple scene. The increased production in Michigan has been accomplished despite a decreased number of bearing apple trees. According to the census, in 1939 Michigan had 4.3 million bearing trees but by 1949 this had decreased to 3.5 million and by 1959 to 2.2 million. While these numbers are not completely comparable, due to a census change in reporting of very small operations, the magnitude of the difference does indicate a large decrease in the number of bearing trees.

The number of non-bearing trees also decreased sharply in the first decade, dropping from over 1 million in 1939 to 683,000 in 1949, but increased slightly to about 699,000 in 1959. The ratio of bearing to non-bearing trees was 4.15 in 1939, 4.98 in 1949, and 3.16 in 1959. In other words, in 1959 there was 1 apple tree being brought to productive age for every 3.16 trees then bearing while in 1949 there was only 1 non-bearing tree for every 4.98 bearing trees.

There are several things that will influence the number of future bearing trees, but the bearing to non-bearing tree ratio is important and seems to indicate at least a stabilization of the number of bearing trees. If the increased production in the past from a decreased number of trees is due to an increased production per tree that will continue and if it is also due, at least in part, to the younger trees being inherently more productive, then a stabilization of tree numbers should result in a further increase in total production of apples.

Figure 2 compares Michigan and United States apple production changes during the 20-year period of 1941-60. The figure is plotted on the basis of annual production as a percent of the average annual production for the entire period. Points above the one hundred percent line represent above average production and points below represent below average production. Michigan was definitely below average in the former and above average in the latter.

Within Michigan, apple production in all counties along Lake Michigan and throughout the southern part of the state was definitely below average. Apples are the only fruit produced in importance.

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1 Several very minor apple producing states are not included in this discussion.
2 Two of the minor apple producing states, New Hampshire and North Carolina, have slightly larger indexes of production change than Michigan.
Fig. 2. Annual index of apple production, 1941-60, United States and Michigan.

*1941-60 average production equals 100
1941-60 averages
Michigan—8,364,900 bushels
United States—109,901,900 bushels

sent below average production. The United States production varied above and below with very little trend while Michigan production was definitely below average in the early part of this period and above average in the latter part of the period. 6

Within Michigan, apple production occurs over a wider area than any other fruit (Fig. 3). Apples are produced in important quantities in all counties along Lake Michigan from Cheboygan to Berrien and throughout the southern half of the lower peninsula. This is the only fruit produced in important quantities in a large number of

6 Least squares regressions on the percentages plotted in Fig. 2 give positive slopes (trends) of 0.23 percent for the United States and 3.34 percent for Michigan.
counties that do not border Lake Michigan. Berrien County has more bearing apple trees than any other county, followed by Van Buren, Kent, Oceana, and Allegan. These five counties have 48 percent of the bearing apple trees in Michigan.

Figure 3 also gives the "locational centers" of bearing apple trees for 1939, 1949, and 1959. The "locational center" was quite stable in the 1939-1959 period. Tree uniform manner across the state was located approximately 30 miles westward about 10 years. The non-bearing tree "locational center" was located in the bearing tree center in 1939-1959 period. Tree uniform manner across the state was located approximately 30 miles westward about 10 years. The non-bearing tree "locational center" was located in the bearing tree center in 1939.

The value of sour cherries varied between $8 million and $22 million in the United States, the annual value of $27 million.

In the 1941-60 period, the production of sour cherries was 112,925 tons. Both had increasing annual production in the United States at an annual rate of 3,501 tons. Annual productions are given in the figure by multiplying the per production for the period.

Two additional points are given for the production of sour cherries in the United States and Michigan. The first, is that Michigan produces a high percentage of the total production by the same token, a large amount of sour cherries.

Michigan's annual production changed in much the same manner in 1941 at a somewhat lower production than the United States, over these years in effect, means that Michigan...
the 1939-1959 period. Tree numbers evidently decreased in a fairly uniform manner across the state. In 1939, the bearing tree center was located approximately 3 miles north of Belding. By 1959, it had moved westward about 10 miles and northward about 2 miles. The non-bearing tree "locational center" was several miles southeast of the bearing tree center in both years.

**Sour Cherries**

The value of sour cherries produced annually in Michigan has varied between $8 million and $15 million in the last decade. In the United States, the annual value of this crop has been between $13 million and $27 million.

In the 1941-60 period, the United States average annual production of sour cherries was 112,922 tons. Of this, Michigan produced 59,500 tons. Both had increasing production trends over this period, the United States at an annual rate of 2,732 tons and Michigan at an annual rate of 2,501 tons.\(^8\) In Fig. 4, Michigan and United States annual productions are given as percentages of their 1941-60 averages. Thus, whether the amount produced in any given year was above or below average can be determined by the location of the line in that year. Production for a given year can be obtained from this figure by multiplying the percentage for that year times the average production for the period.

Two additional points are shown in Fig. 4. The first is that annual production of sour cherries fluctuates greatly. This is true of both the United States and Michigan. The second point, somewhat related to the first, is that Michigan and United States productions fluctuate together, i.e., almost without exception increases or decreases occur in both at the same time. This is due to a large extent to the fact that Michigan produces a high percentage of the U.S. sour cherry crop and by the same token, a large percentage of the annual fluctuations.

Michigan's annual percentage of the 1941-60 average production changed in much the same manner as the U.S. percentage, but started in 1941 at a somewhat lower point and gradually improved, relative to the U.S., over these years to a somewhat higher point in 1960. This, in effect, means that Michigan's share of the United States' production

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\(^8\) On a percentage basis, production increased more rapidly in Michigan than in the United States. Least squares regressions on the percentages plotted in Fig. 4 give positive slopes of 2.43 for the United States and 4.20 for Michigan.
has increased in this period. Figure 5 gives Michigan's share of the United States sour cherry market during this period, but the graph has been placed on a 4-year moving average basis to remove the large annual fluctuations. This figure shows the rapid increase in Michigan's production, relative to the entire U.S., from 1940 to 1948, followed by a "leveling off" and decline, with another period of rapid increase from 1954 to 1960.

Approximately 90 percent of the U.S. sour cherry crop is produced in the Great Lakes states of Michigan (60.34 percent), New York (14.58 percent), Pennsylvania (14.04 percent), and Ohio (1.31 percent). The percentages of 1957-60 average Michigan's share of the U.S. market.

There are three sour cherry subtypes, namely the southwestern or Bensalem, the north-western or Traverse City, and the north-eastern or Benzie. Each includes most of the counties of Michigan. Figure 6 indicates by a "location center" in Michigan. Numeral census bearing tree (sour cherry) is not an absolute indicator of the relative importance of various counties.

The "location center" of Michigan is more than 30 miles north and 7 miles west of the state's center. This remained nearly fixed in the
Fig. 5. Michigan's share of the United States sour cherry market: Annual 4-year average of Michigan production as a percent of total United States production, 1941-58.

(14.58 percent), Pennsylvania (8.12 percent), Wisconsin (7.8 percent), and Ohio (1.31 percent). (Figures in parentheses are state percentages of 1957-60 average U.S. production). The six western states of Oregon, Washington, Colorado, Utah, Idaho, and Montana produce important quantities of sour cherries, but minor percentages of the U.S. crop.

There are three sour cherry producing areas in Michigan known as the southwestern or Benton Harbor area, west-central area, and the north-western or Traverse City area. Collectively, these areas include most of the counties along the eastern shore of Lake Michigan. Figure 6 indicates by map the location of sour cherry production in Michigan. Numerals in the counties of this map are 1959 census bearing tree (sour cherry) numbers. While tree numbers are not an absolute indicator of production, they do tend to show the relative importance of various counties in sour cherry production.

The "locational center" of bearing sour cherry trees moved more than 30 miles north and 7 miles west in the 1939-49 decade, but remained nearly fixed in the following 10 years. Non-bearing tree
Numbers in counties indicate numbers of bearing sour cherry trees recorded in 1959 census.

- 378,907 to 664,516 trees
- 125,006 to 211,100 trees
- 10,594 to 86,528 trees

(9), @, indicate sour cherry tree locational centers in these census years.

Fig. 6. Number of bearing sour cherry trees by Michigan county, 1959.

"centers" have made similar moves, but have been several miles south of the bearing tree "centers" in each of these years. It seems logical to expect a future bearing tree center to move toward a present non-bearing tree center. This did not happen in the 1939 to 1949 period but did in the following decade. Evidently, the rate of removal of orchards bearing in 1939 was greater in the southern areas than in the northern areas of the state. Likewise, future loca-

tion of Michigan sour cherry rates, but non-bearing tree rates, of bearing age in the early of bearing age in the early center to the south.

In comparison with sour minor fruit in Michigan. The important in Michigan north to the production.

The United States production from 1941-60. Michigan pounds during this period, while California and Oregon, or nearly 50 percent of the of changing, however, for in this period accounted for only 67 percent, accounted for more than 17 Michigan's 8 percent in the 20-year period.

Figure 7 illustrates Michigan to that of the U.S., which has been used to enable easy comparison. production in a given year, percentages shown by the average increased very rapidly during this period was at a low of tons. While 1945 was an 8 percent in 1944-5, and a production of 14,125 tons in 1957 was not a "flash-in-the-prod

Figure 8 gives Michigan shows how the state's production in comparison to that of the U.S. production. In this form average basis to avoid the average production was at a low of is now surpassed by the West Coast states and will soon surpass Washington.
tion of Michigan sour cherry production will depend upon removal rates, but non-bearing tree numbers in 1960 indicate that trees coming of bearing age in the early 1960's will tend to move the production center to the south.

**Sweet Cherries**

In comparison with sour cherry production, sweet cherries are a minor fruit in Michigan. This does not mean that this fruit is unimportant in Michigan nor that the state is unimportant in its production.

The United States produced an average of 89,862 tons per year from 1941-60. Michigan produced an annual average of only 7,375 tons during this period, while the 3 West Coast states of Washington, California and Oregon accounted for more than 70,000 tons, or nearly 80 percent of the national production. This situation is changing, however, for in the 1957-60 period, the West Coast states accounted for only 67 percent of national production and Michigan accounted for more than 17 percent. This is in contrast with Michigan's 8 percent in the 20-year period.

Figure 7 illustrates Michigan's changing production in contrast to that of the U.S., which has been relatively stable. Percentages are used to enable easy comparison of the two production trends. Actual production in a given year can be obtained by multiplying the percentages shown by the average production. Michigan production increased very rapidly during this period, especially from 1945, when production was at a low of 500 tons, to 1957 when it rose to 15,500 tons. While 1945 was an exceptionally poor year, production in other years from 1941-48 ranged only from 1,600 tons to 4,600 tons. That 1957 was not a "flash-in-the-pan" is indicated by the average annual production of 14,125 tons in the years of 1957 to 1960.

Figure 8 gives Michigan's share of the sweet cherry market and shows how the state's production has changed in relation to total U.S. production. In this figure, production is placed on a 4-year average basis to avoid the extreme annual variations and give a clearer indication of the trend. The 4-year average shows a low of less than 4 percent in 1944-5, and a high of more than 17 percent in 1958-9. Michigan is now producing nearly as many sweet cherries as each of the West Coast states and, unless present indicators are wrong, will soon surpass Washington and perhaps also California and Oregon.
Table 2 is constructed for sweet cherries on the same basis as Table 1 is for apples. States are listed from top to bottom on the basis of the “index of production change”. This index indicates how the average production in the years of 1957-60 compared with the average in the longer period of 1941-60. The Michigan index of 191.5 is the largest of all the states listed. This sizable Michigan increase is especially notable since the other major sweet cherry states—Oregon, California, and Washington have indexes of less than 1.

That Michigan sweet cherry trees given in Table 3.

According to the census, increased about 55 percent, percentage of these trees are removed for many years. trees in the 1959 census were in 1949 and bearing times as many non-bearing as many trees preparing f

*This actually understates the increase.
Fig. 8. Michigan's share of the United States sweet cherry market: Annual 4-year average of Michigan production as a percent of total United States production, 1942-58.

California, and Washington—as well as the United States as a whole, have indexes of less than 100.

That Michigan sweet cherry production probably will continue to increase is indicated by the number of bearing and non-bearing trees given in Table 3.

According to the census, the number of bearing trees in Michigan increased about 55 percent from 1949 to 1959. Therefore, a large percentage of these trees are young and, barring disaster, will not be removed for many years. Furthermore, the number of non-bearing trees in the 1959 census was very high compared with non-bearing trees in 1949 and bearing ones in 1959. There were more than three times as many non-bearing trees in 1959 than in 1949 or three times as many trees preparing for production as there were just 10 years

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9This actually understates the increase since trees of certain minor producers were counted in 1949 but not in 1959.
TABLE 2—Average annual sweet cherry production in selected states \(^{(a)}\), 1941-60 and 1957-60

<table>
<thead>
<tr>
<th>State</th>
<th>Average annual production (tons)</th>
<th>Change in average production (tons)</th>
<th>Percent of U.S. production change</th>
<th>Index of production change ((b))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1941-60</td>
<td>1957-60</td>
<td>1941-60</td>
<td>1957-60</td>
</tr>
<tr>
<td>Michigan</td>
<td>7,357.0</td>
<td>14,125.0</td>
<td>+ 6,750.0</td>
<td>8.21</td>
</tr>
<tr>
<td>Montana</td>
<td>978.5</td>
<td>1,595.0</td>
<td>+ 616.5</td>
<td>1.09</td>
</tr>
<tr>
<td>New York</td>
<td>3,540.0</td>
<td>4,800.0</td>
<td>+ 1,260.0</td>
<td>3.94</td>
</tr>
<tr>
<td>Colorado</td>
<td>498.0</td>
<td>565.0</td>
<td>+ 67.0</td>
<td>0.55</td>
</tr>
<tr>
<td>Oregon</td>
<td>21,135.0</td>
<td>20,500.0</td>
<td>- 635.0</td>
<td>23.52</td>
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<tr>
<td>Utah</td>
<td>3,259.5</td>
<td>3,125.0</td>
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<td>3.63</td>
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<td>Idaho</td>
<td>2,336.5</td>
<td>1,820.0</td>
<td>- 516.5</td>
<td>2.60</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1,165.0</td>
<td>900.0</td>
<td>- 265.0</td>
<td>1.30</td>
</tr>
<tr>
<td>California</td>
<td>27,720.0</td>
<td>20,025.0</td>
<td>- 7,695.0</td>
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</tr>
<tr>
<td>Washington</td>
<td>21,427.5</td>
<td>14,625.0</td>
<td>- 6,802.5</td>
<td>23.84</td>
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<tr>
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<td>427.0</td>
<td>275.0</td>
<td>- 152.0</td>
<td>0.48</td>
</tr>
</tbody>
</table>


\(^{(b)}\) Average annual production 1957-60 \div average annual production, 1941-60. The United States index of production change is 91.6.

Earlier, sweet cherry trees begin producing at about the fifth year. They are in full production at about the 15th year,\(^9\) and usually continue to produce until the 25th year. Combining the fact that most of the bearing trees are young with the census indication that there were 82 percent as many non-bearing as bearing trees in 1959, it appears obvious that the potential production is great.

Sweet cherry production is concentrated in two counties with two, Grand Traverse and Benzie, producing 73 percent of the bearing trees. With young trees bearing, this concentration is expected to increase in the near future.

The location of sweet cherry production has turned northward in recent years, a trend that is expected to continue for many years to come.

TABLE 3—Number of bearing and non-bearing sweet cherry trees in Michigan, 1939, 1949 and 1959\(^{(a)}\).

<table>
<thead>
<tr>
<th>Year</th>
<th>Bearing</th>
<th>Non-bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>168,212</td>
<td>96,508</td>
</tr>
<tr>
<td>1949</td>
<td>245,165</td>
<td>102,707</td>
</tr>
<tr>
<td>1959</td>
<td>379,423</td>
<td>310,812</td>
</tr>
</tbody>
</table>

\(^{(a)}\) As reported in the Census of Agriculture for those years.

obvious that the potential increase in Michigan sweet cherry production is great.

Sweet cherry production has become concentrated in a very few counties with two, Grand Traverse and Leelanau, having over 55 percent of the bearing trees. On the basis of the number of non-bearing trees, this concentration will decrease only slightly in the near future.

The location of sweet cherry production in Michigan has shifted northward in recent years, as shown in Fig. 9. The locational center

![Map of Michigan showing number of bearing sweet cherry trees by county in 1959](image)

Numbers in counties indicate numbers of bearing sweet cherry trees recorded in the 1959 census.

- **64,153 to 145,153 trees**
- **20,602 to 47,318 trees**
- **2,687 to 13,532 trees**

\[\text{Fig. 9. Number of bearing sweet cherry trees by Michigan county, 1959.}\]
of bearing sweet cherry trees is shown to have moved from Newago County in 1939 to Lake County in 1949 and Wexford County in 1959. The locational center of non-bearing sweet cherry trees was slightly north of the bearing tree center in that year. Since most recent plantings tend to be in the northwestern area of the lower peninsula, it is logical to expect sweet cherry production to continue to be largely concentrated in that area.

Peaches

There was little or no trend in United States peach production in the 1941-60 period. Annual production of peaches in the United States and Michigan in terms of percentages of the 1941-60 average production is given in Fig. 10. The figure shows large annual fluctuations in production, but no consistent trend toward increasing or decreasing production.\(^{11}\) The annual changes in the United States probably are due to weather, insects, etc. and productive potential evidently has remained quite stable. The average U.S. peach production in the 1957-60 period was only slightly greater than in the entire 20-year period, 1941-60.

*Agricultural Statistics*\(^{12}\) lists 35 states as being important in the production of peaches. However, one state—California—produces approximately 50 percent of the U.S. peach crop. All others are comparatively minor producers. Michigan, Pennsylvania, South Carolina and Georgia each produce 4 or 5 percent of the U.S. crop. New Jersey, New York, Illinois, Virginia, North Carolina, Arkansas, Colorado and Washington produce slightly smaller quantities. About two-thirds of the California crop is of the Clingstone type while most of the remainder of the U.S. peaches are Freestones. California production has increased in recent years with most of the increase accounted for by Clingstones. Many of the minor peach producing states, including Michigan, have decreased their production both absolutely and percentagewise.

Michigan peach production varies greatly from year to year. Within the 1941-60 period, it varied from less than 20 percent\(^{13}\) to nearly 150 percent of the 20-year average. It is surprising that Michigan peach production has not decreased more of the rather drastic decrease. The 1949 Census of Agriculture in Michigan. By 1959, the number of non-bearing peach trees, was 20 percent less in 1959 than there were a few years the future. It appears that the

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\(^{11}\) Least squares regressions of the percentages plotted in Fig. 10 yield negative slopes (trends) of 0.18 percent for the United States and 1.65 percent for Michigan.


\(^{13}\) The very low production of 1951 is due largely to a freeze in November, 1950 that killed or severely injured more than half of Michigan’s peach trees.
peach production has not decreased much more than it has, in view of the rather drastic decrease in the number of bearing peach trees. The 1949 Census of Agriculture shows over 2.7 million peach trees in Michigan. By 1959, the number had dropped to a little more than 1.6 million—a decrease of more than 40 percent. Furthermore, the number of non-bearing peach trees, according to the Census of Agriculture, was 20 percent less in 1959 than in 1949. A small part of this change is probably due to a change in the census procedure which eliminated recording fruit trees of very minor fruit producers. However, it seems evident that there are now less bearing peach trees in Michigan than there were a few years ago and that there will be even less in the future. It appears that the peach producing potential of Michigan
has decreased considerably and that it will be at least several years before this potential can be restored.

Peach production in Michigan is concentrated in a few counties (Fig. 11). Berrien County alone has more than 40 percent of the state's bearing peach trees and Allegan and Van Buren Counties each have over 10 percent, so more than 60 percent of the bearing peach trees are located in these three southwestern Michigan counties. Only Oceana County with 8½ percent approaches these counties in the number of bearing peach trees. Ten years earlier, Michigan

![Map of Michigan counties with peach tree numbers]

Fig. 11. Number of bearing peach trees in Michigan counties, 1959.
peach production was even more concentrated in the three southwestern counties mentioned previously. In 1949, Berrien had 53 percent of the bearing peach trees and nearly 70 percent were in the three counties of Berrien, Van Buren and Allegan. The Census of Agriculture shows that since then all three counties decreased their number of peach trees and that Berrien decreased its trees more than 50 percent.

The "locational center" of bearing peach trees in Michigan moved from northeastern Van Buren County to central Allegan County between 1939 and 1959. Most of the movement from 1939 to 1949 was westward, but from 1949 to 1959, there was a compensating movement to the east. While some of the central western counties increased their number of bearing peach trees during this period, others decreased. The northward movement is more the result of Berrien's decrease than of increases elsewhere.

**Plums**

Only a small number of states are important producers of plums. In fact, only California and Michigan production is recorded in *Agricultural Statistics*, although Idaho, Washington and Oregon are important in the production of prunes. Of the recorded plum production, California produces more than 90 percent and Michigan less than 10 percent. In the 1941-60 period, Michigan's average production was 6.6 percent of the U.S. average.

Total plum production in the United States has changed very little in the last 20 years. Figure 12 shows that while there are years in which production is more than 20 percent greater or less than the average, there is very little trend toward greater or smaller annual production. On the other hand, Michigan production does seem to have increased since 1945. It seems unlikely that Michigan plum production will increase in the immediate future because the number of bearing trees, while relatively constant over the last 20 years, has decreased more than 9 percent in the last decade. However, the number of non-bearing trees was 25 percent greater in 1959 than in 1949, so production should increase as these trees come to bearing age.

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14 Least squares regressions on the percentages plotted in Fig. 12, give positive slopes (trends) of 0.57 percent for the U.S. and 2.97 percent for Michigan.
Fig. 12. Annual index of plum production, 1941-60, United States and Michigan.

*1941-60 average production equals 100
1941-60 averages
Michigan—5,640 tons
United States—85,690 tons

Plum production in Michigan is concentrated in a few counties (Fig. 13). Over 30 percent of the bearing plum trees in 1959 were in Berrien County and an additional 30 percent were in Oceana, Van Buren and Grand Traverse counties.

The “locational center” of bearing plum trees, unlike most fruits, moved slightly south and nearly 20 miles west from 1939 to 1949. In the following decade, it moved only slightly farther west but 27 miles north. The first movement is primarily due to an increase in the number of trees in Berrien County, while the second movement can be attributed to a decrease in Berrien and increases in Grand Traverse and Leelanau Counties.

Fig. 13. Number of bearing plum trees in the United States in the last two decades. As a percent of the 1941-60 total, 20 percent in 1943 to a high of 30 percent in 1960, with apples, which during the

Numbers in counties indicate numbers of bearing plum trees recorded in the 1959 census.

- 73,382 trees
- 21,233 to 27,330 trees
- 10,160 to 15,151 trees

39, 49, 59 indicate plum tree locational centers in these census years.

Pear production in the United States has fluctuated in the last two decades. As a percent of the 1941-60 production, 20 percent in 1943 to a high of 40 percent in 1960, with apples, which during the
Numbers in counties indicate numbers of bearing plum trees recorded in the 1959 census.

- 73,382 trees
- 21,233 to 27,330 trees
- 10,160 to 15,151 trees

Fig. 13. Number of bearing plum trees in Michigan counties, 1959.

Pears

Pear production in the United States has been relatively stable in the last two decades. As can be seen in Fig. 14, annual production, as a percent of the 1941-60 average, has varied from a low of 81 percent in 1943 to a high of 114 percent in 1947. This is in contrast with apples, which during this period varied between 60 and 115
The production of pears in the United States, has varied. In 1945, production was only 10 percent of the 1958, it reached 158 percent. Annual variation in Michigan, there was an apparent trend.

As is true of much of Michigan is largely concentrated in a few areas, pear trees in nearly every Michigan. Those recorded in the 1959 Count of southwestern counties of Berrien county, Kalamazoo, had bearing pear trees.

The bearing tree location report to 1959 indicate that pear trees are largely concentrated in a few areas, northern counties since 1939, and was caused more by a decrease than by increases elsewhere. Along Lake Michigan have indications of bearing trees.

Annual fluctuations in United States grape production was more than four times the 1949-60 average only four times, 1951, when it was about 17 percent. Only a small number of states, California is by far the most important, more than 90 percent of the 20 percent of the California raisin varieties. Although much of the grapes produced in other states, not actually dried, it is import of the California grape cr 1.1 Least squares regression on the percent of 0.11 percent for the U.S. and a posi...
The production of pears in Michigan, in contrast with the total of the United States, has varied greatly from year to year (Fig. 14). In 1945, production was only 16 percent of the 1941-60 average, while in 1958, it reached 158 percent. Although there was a considerable annual variation in Michigan pear production during this period, there was an apparent trend toward increased production.\textsuperscript{15}

As is true of much of Michigan’s fruit production, pear production is largely concentrated in a few counties. Although there are a few pear trees in nearly every Michigan county (Fig. 15), 66 percent of those recorded in the 1959 Census of Agriculture were in the three southwestern counties of Berrien, Van Buren, and Allegan. A bordering county, Kalamazoo, had an additional 6 percent of Michigan’s bearing pear trees.

The bearing tree "locational center" movements from 1939 to 1949 to 1959 indicate that pear production has increased somewhat in northern counties since 1939, although the 1939 to 1949 movement was caused more by a decrease in Berrien County’s bearing trees than by increases elsewhere. Many of the lower peninsula counties along Lake Michigan have increased pear production since 1939, while southeastern Michigan counties have decreased their number of bearing trees.

Grapes

Annual fluctuations in United States grape production are small compared with most tree fruits. In Fig. 16, it is shown that annual grape production was more than 10 percent above or below the 1949-60 average only four times. The largest difference occurred in 1951, when it was about 17 percent above the average.

Only a small number of states are important in grape production. California is by far the most important grape producing state, having more than 90 percent of the U.S. production. However, only about 20 percent of the California grapes are table varieties, while a little more than 20 percent are wine varieties and nearly 60 percent are raisin varieties. Although much of the raisin variety production is not actually dried, it is important to realize that a very large proportion of the California grape crop is not sold for the same uses as most of the grapes produced in other sections of the country.

\textsuperscript{15} Least squares regressions on the percentages plotted in Fig. 14 give a negative slope (trend) of 0.11 percent for the U.S. and a positive slope of 2.87 for Michigan.
Numbers in counties indicate numbers of bearing pear trees recorded in the 1959 census.

- 126,122 to 193,233 trees
- 35,858 to 49,187 trees
- 10,703 to 24,843 trees

\(39, 49, 39\) indicate pear tree locational center in these census years.

Fig. 15. Number of bearing pear trees in Michigan counties, 1959.

New York produces more grapes than any state except California, having approximately 3 percent of the U.S. crop. Michigan and Washington produce nearly equal quantities of grapes, but each produces only 1 to 2 percent of the U.S. annual crops. Fifteen additional states produce small but locally important quantities.

Michigan grape production, in contrast with the U.S. production, shows considerable annual variation (Fig. 16). In 1951, for instance, production was only 26 percent of the 20-year average, while in 1960 it was 167 percent. While there were large annual variations, there was no apparent production toward an increase in average production per vine.

The number of bearing pear trees in the 1959 Census of Agriculture indicates locational center in these census years.

*1941-60 average production equals 100
United States—2,889,100 tons
Michigan—39,025 tons

A least squares regression of the slope (trend) for the 20-year period states is 0.46 percent.
Fig. 16. Annual index of grape production, 1941-60, United States and Michigan.

was no apparent production trend from 1941 to 1950. However, since 1950 the annual variations have taken place within an apparent trend toward an increase in average annual production. This is especially interesting since the number of bearing vines in Michigan decreased more than 26 percent in the first period and increased only 2½ percent in the latter period. This was due primarily, of course, to increased production per vine.

The number of bearing grape vines in each county, according to the 1959 Census of Agriculture, is shown in Fig. 17. Also shown are

\[ 1941-60 \text{ average production equals 100} \\
1941-60 \text{ averages} \\
Michigan - 39,025 \text{ tons} \\
United States - 2,889,100 \text{ tons} \]
Numbers in counties indicate numbers of bearing grape vines recorded in 1959 census.

- 3,297,403 vines and over
- 512,494 vines
- 81,934 to 92,010 vines
- 11,528 to 20,550 vines

Fig. 17. Number of bearing grape vines in Michigan counties, 1959.

the “locational centers” of bearing grape vines for 1939, 1949, and 1959. The centers have changed little in the last 20 years, moving only 4 miles south and 9 miles west. It is in Van Buren County. The non-bearing vine center (not shown) has moved across Kalamazoo County and it, too, is now in Van Buren County. The indication is that there was at one time a tendency for a more than proportionate number of vines to be started north and east of the largest producing centers, but that at the present time, replacement vines are being developed in major areas in proportion to presently bearing vines. Michigan's production has been centered for several years.

Strawberry production, once centered for several years, has moved to a new area. Michigan now produces more than other areas, primarily Oregon, and Washington, large producers. This change is widespread. Processing technologies, and new freezing for preserving.

While many of the improved varieties have experienced great variation in acreage up or down, Michigan’s production has varied in the last decade. Figure 18 shows that production has varied.

Fig. 18. Annual index of strawberry production in Michigan.

*1941-60 average production equals 100
1941-60 average Michigan—29,863,400 pounds
United States—394,075,000 pounds
presently bearing vines. Michigan grape production will probably be centered for several years pretty much as it is right now.

**Strawberries**

Strawberry production, compared with tree fruits, sometimes shifts location both rapidly and radically. In the last 20 years, certain areas that once were major producers have become minor in importance, while other areas, primarily the West Coast states of California, Oregon, and Washington, have become the major strawberry producers. This change is widely attributed to changing production and processing technologies, among the main ones being new varieties having limited areas of adaptability and an increase in the use of freezing for preserving.

While many of the important strawberry producing states have experienced great variation in production with strong trends either up or down, Michigan's production has been relatively stable, especially in the last decade. Figure 18 shows how Michigan and United States productions have varied relative to their 1941-60 averages. For a

![Graph showing annual index of strawberry production, 1941-60, United States and Michigan.](image)

Fig. 18. Annual index of strawberry production, 1941-60, United States and Michigan.

*1941-60 average production equals 100
  - Michigan—29,863,400 pounds
  - United States—394,675,000 pounds
state that produces only 5 percent of the nation’s strawberries, on a percentage basis Michigan production has followed that of the United States very closely. This is not true, however, of most of the important strawberry producing states.

One of the important points to be observed in Fig. 18 is the drastic decrease in strawberry production during the World War II years (1940-1945). This occurred in most areas of the United States as well as in Michigan. Many of the minor producing areas failed to recover after World War II, while West Coast states developed into dominant producing areas. Michigan has been somewhat unique among non-West Coast states in that production improved very well in the post-war period. However, this improvement has occurred far from uniformly over the state.

Strawberries are produced to some extent in all sections of Michigan, but commercial production is concentrated in a relatively few counties. Figure 19, which gives acreages of strawberries reported for each county in the 1959 census, shows that most of the counties along Lake Michigan from Berrien to Leelanau are important in production. Berrien and Van Buren are by far the most important, having 44 percent of Michigan’s strawberry acreage in 1959. These counties have been leading producers for many years, having 37 percent of the state strawberry acreage in 1939 and 60 percent in 1949. The acreage in Berrien County decreased by about 300 from 1939 to 1949 and an additional 320 acres in the following decade. Van Buren increased 270 acres in the 1939-49 period and an additional 200 from 1949 to 1959. Thus, the combined acreage of the two counties has changed little in the last 20 years.

There has been a definite shift of strawberry production in the rest of the state. Whereas the counties surrounding Detroit produced important quantities in 1939, all of these counties have reduced their acreages and none produce large quantities at present. At the same time, three areas have been producing increasing quantities. Alpena is a recent addition to Michigan’s strawberry producing counties with increases of from 103 acres in 1939 to 178 in 1949 and then to 687 in 1959. Most of the Alpena production is sold on the fresh market. Manistee County has had a similar rapid increase in production, moving from 82 acres in 1949 to 562 in 1959. Much of the Manistee production is for processing.

The third comparatively new strawberry producing area is Houghton County. Its acreage decreased from 155 in 1939 to 89 in 1949, but then increased to 434 in 1959 in the fresh market, where it has a late producing season and competes with other producing areas.

Michigan is becoming more important than it is true both with respect to...
Numbers in counties indicate acreages of strawberries recorded in the 1959 census.

- 1,377 to 2,358 acres
- 434 to 687 acres
- 114 to 193 acres

Fig. 19. Strawberry acreages by Michigan county, 1959.

then increased to 434 in 1959. This area produces primarily for the fresh market, where it has an advantage due to its comparatively late producing season and consequent lessening of competition from other producing areas.

SUMMARY

Michigan is becoming more important as a producer of fruit. This is true both with respect to total United States production of fruits.
important to Michigan producers and with respect to quantities produced in Michigan in the past.

Eight fruits important to Michigan are considered. In 1960, Michigan ranked no lower than fourth among the states in the production of each of these. Average annual production of each fruit in 1957-60 is compared to the average in 1941-60 for Michigan and the United States. During the 1957-60 period, U.S. production of sweet cherries and pears decreased while peach production declined in Michigan, compared with the 1941-60 period. All other fruits increased in both Michigan and the United States. On a percentage basis, the Michigan increase was greater than the United States increase for all fruits considered except peaches and strawberries.

Most of Michigan's fruit production is concentrated in the lower peninsula counties bordering on Lake Michigan. Only apples are produced in important quantities in a large number of other counties.

“Locational centers” of the number of bearing trees, calculated for Michigan for the census years of 1939, 1949, and 1959, show that potential production of some fruits has been stable location-wise, while for others it has shifted significantly. Apple and peach tree “centers” moved very little in the 20-year period, while moderate shifts were made in pear, plum, and sour cherry “centers”. The largest change was made by sweet cherries. All net changes in tree “centers” were to the north, but the grape vine “center” moved a few miles to the southwest.