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Michigan Fruit Production Importance and Location  
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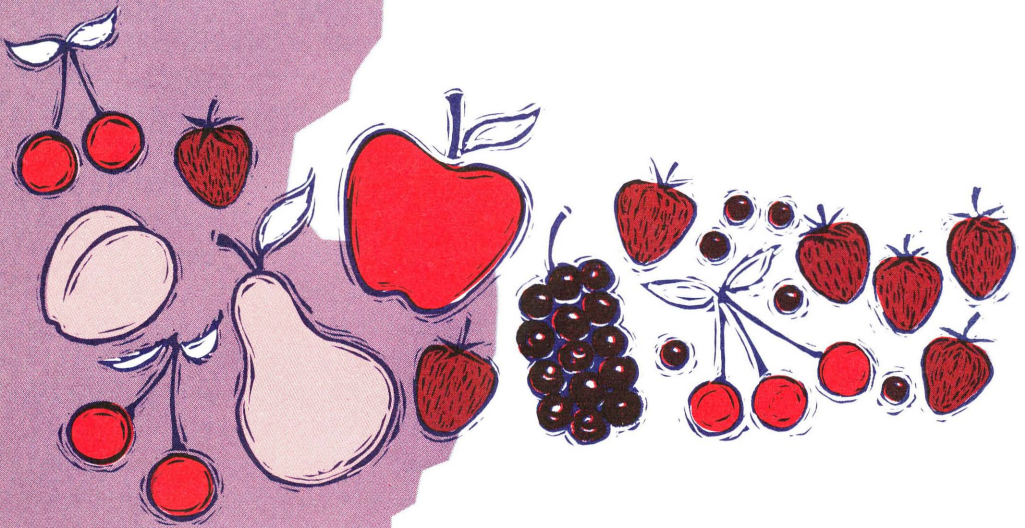
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SPECIAL BULLETIN 441 - 1962

# MICHIGAN FRUIT PRODUCTION

Importance  
and  
Location

BY CARLETON C. DENNIS  
Department of Agricultural Economics



MICHIGAN  
STATE  
UNIVERSITY

*Agricultural Experiment Station, East Lansing*

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# MICHIGAN FRUIT PRODUCTION

## Importance and Location

By CARLETON C. DENNIS<sup>1</sup>

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.<sup>2</sup> 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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<sup>2</sup> Actual cash receipts deflated by the index of prices received by farmers (1910-14 = 100).

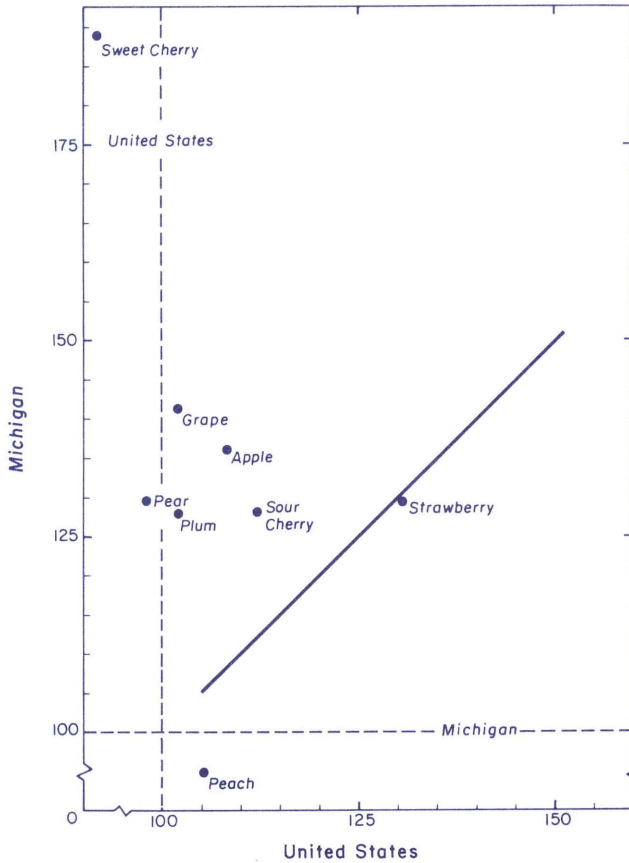


Fig. 1. 1957-60 average production of certain fruits as percentages of 1941-60 average production, United States and Michigan.

“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,<sup>3</sup> and only sweet cherries and pears have been decreasing in production in the United States.

<sup>3</sup> 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.

## 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 1 — Average annual apple production  
in selected states<sup>(a)</sup>, 1941-60 and 1957-60

State	Average annual production (000 bu.)		Change in average production (000 bu.)	Percent of U.S. production		Index of production change (b)
	1941-60	1957-60		1941-60	1957-60	
Michigan	8,296.8	11,575.0	+ 3,278.2	7.53	9.74	139.5
West Virginia	4,113.9	5,150.0	+ 1,036.1	3.7	4.33	125.2
Pennsylvania	5,675.8	6,882.5	+ 1,206.7	5.15	5.79	121.3
New York	15,943.9	18,650.0	+ 2,706.1	14.48	15.69	117.0
New Jersey	2,622.2	2,975.0	+ 352.8	2.38	2.50	113.5
California	8,537.7	9,597.5	+ 1,059.8	7.75	8.07	112.4
Virginia	9,615.6	10,075.0	+ 459.4	8.73	8.48	104.8
Massachusetts	2,486.1	2,550.0	+ 63.9	2.26	2.15	102.6
Washington	26,681.0	26,537.5	— 143.5	24.22	22.33	99.5
Ohio	3,324.8	3,100.0	— 224.8	3.02	2.61	93.2
Oregon	2,578.2	2,337.5	— 240.7	2.34	1.97	90.7
Illinois	2,797.8	2,260.0	— 537.8	2.54	1.90	80.8

(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.<sup>4</sup> 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.<sup>5</sup> 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 repre-

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<sup>4</sup> Several very minor apple producing states are not included in this discussion.

<sup>5</sup> Two of the minor apple producing states, New Hampshire and North Carolina, have slightly larger indexes of production change than Michigan.

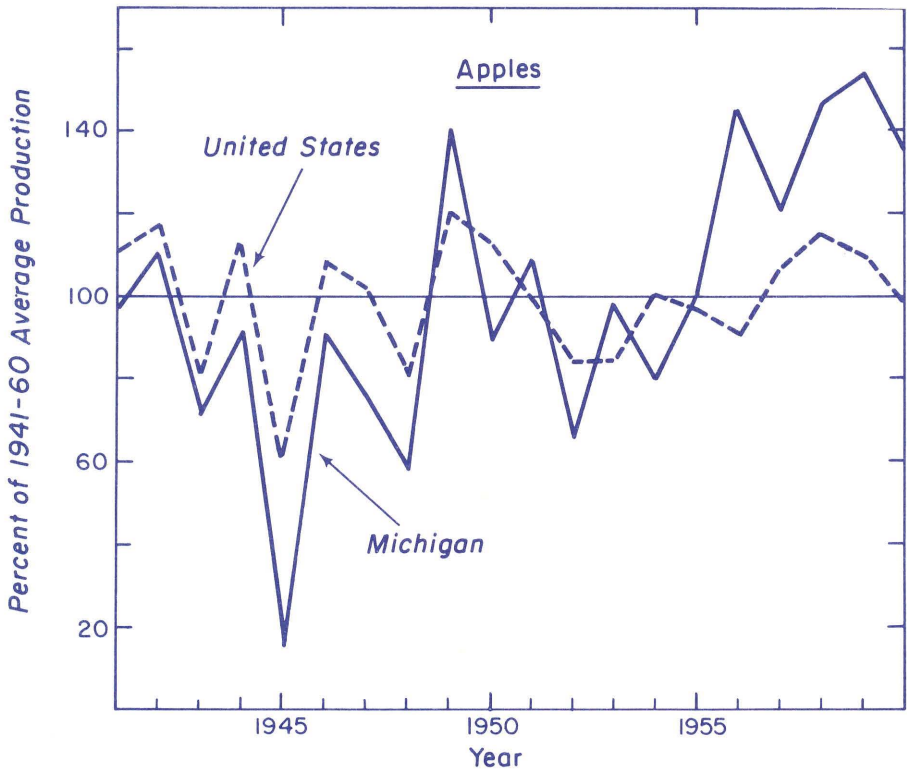


Fig. 2. Annual index of apple production, 1941-60, United States and Michigan.

\*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.<sup>6</sup>

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

<sup>6</sup>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.





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.<sup>8</sup> 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

<sup>8</sup> 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.

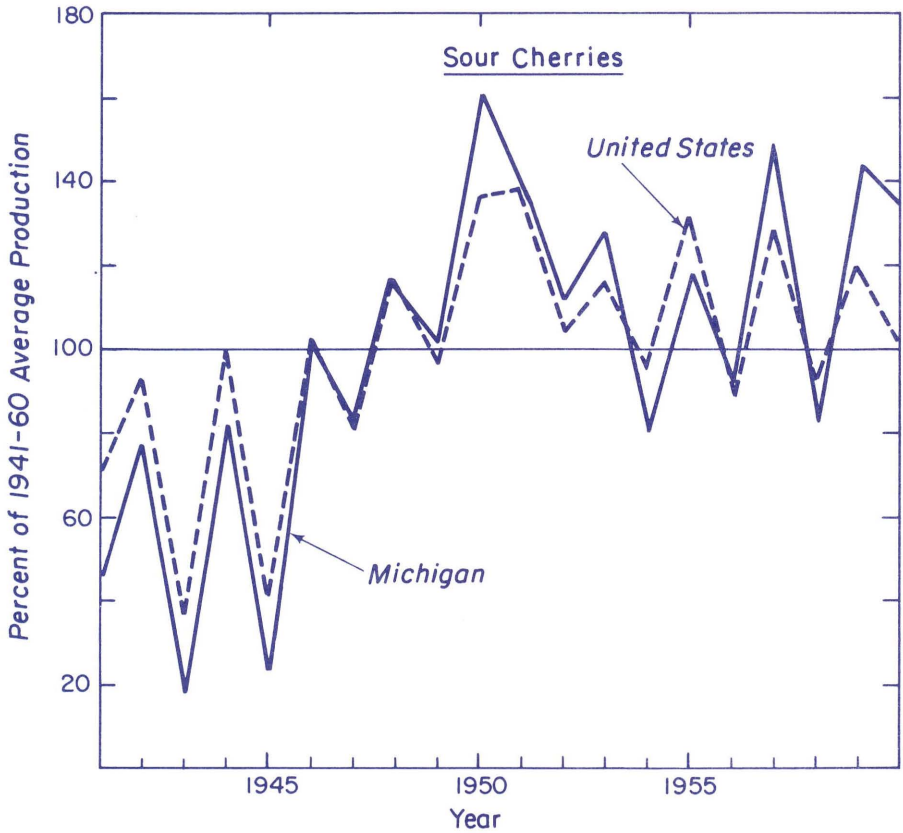


Fig. 4. Annual index of sour cherry production, 1941-60, United States and Michigan.

\*1941-60 average production equals 100  
 1941-60 averages  
 Michigan—59,500 tons  
 United States—112,679 tons

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

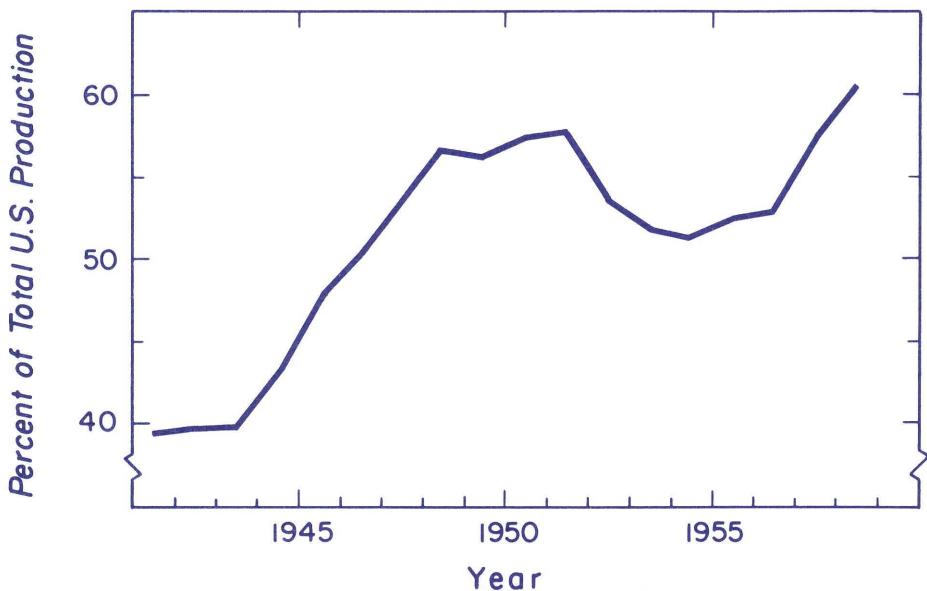


Fig. 5. Michigan's share of the United States sour cherry market: Annual 4-year average of Michigan production as a percent of total United States production, 1941-58.

(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

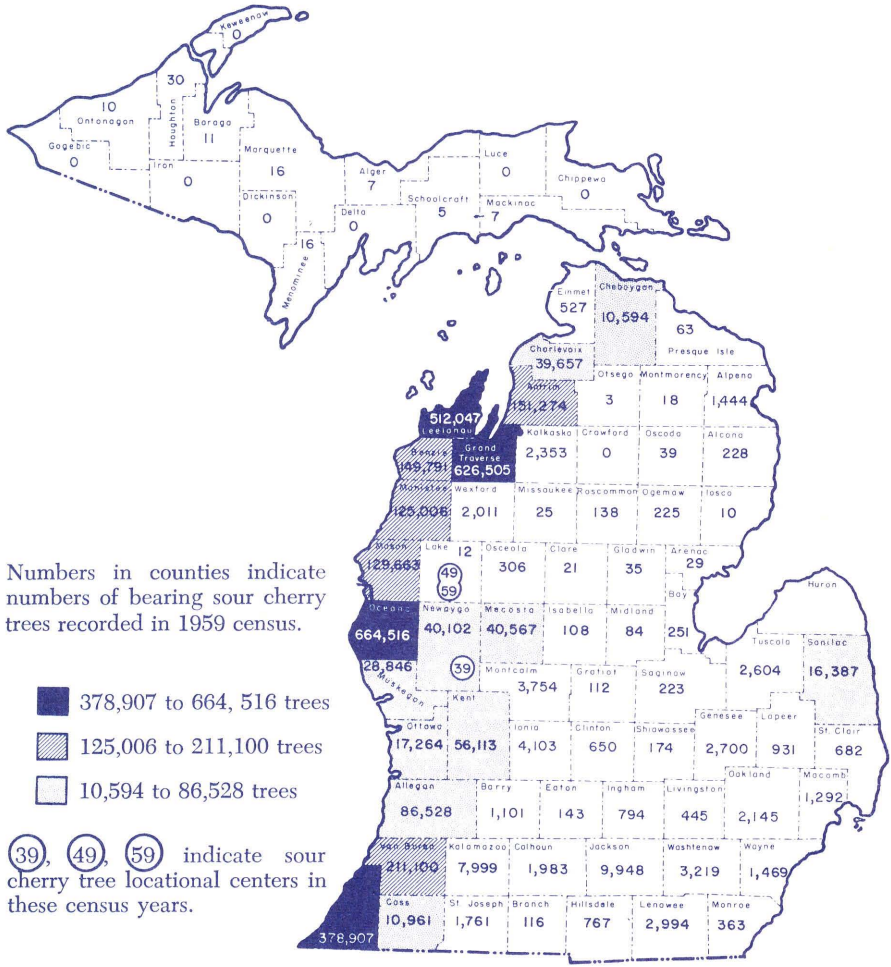


Fig. 6. Number of bearing sour cherry trees by Michigan county, 1959.

"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 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.

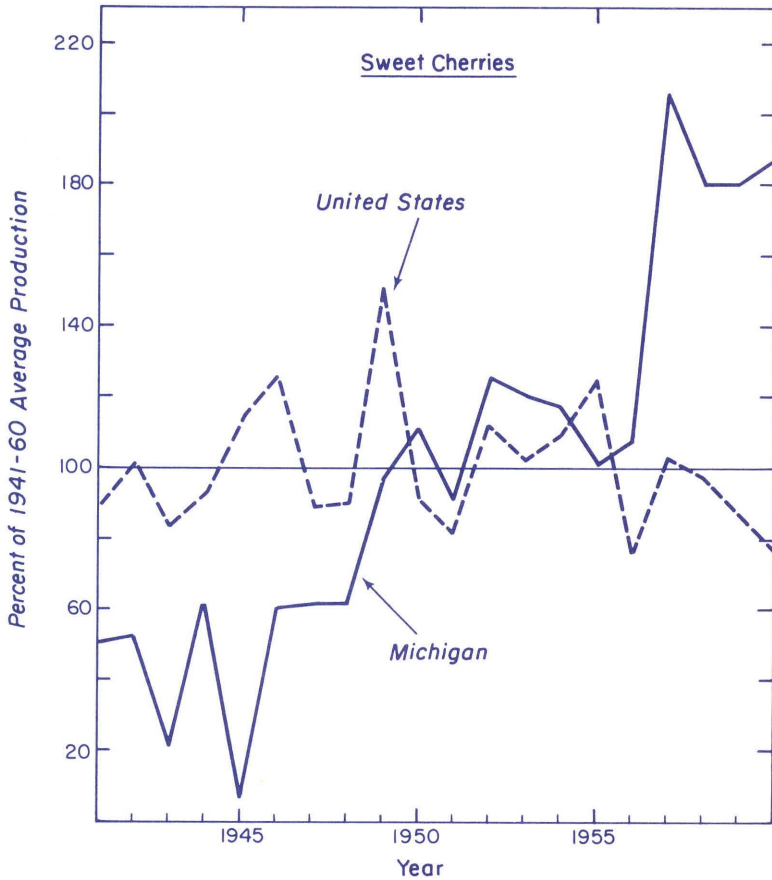


Fig. 7. Annual index of sweet cherry production, 1941-60, United States and Michigan.

\*1941-60 average production equals 100  
 1941-60 averages  
 Michigan—7,480 tons  
 United States—89,882 tons

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,

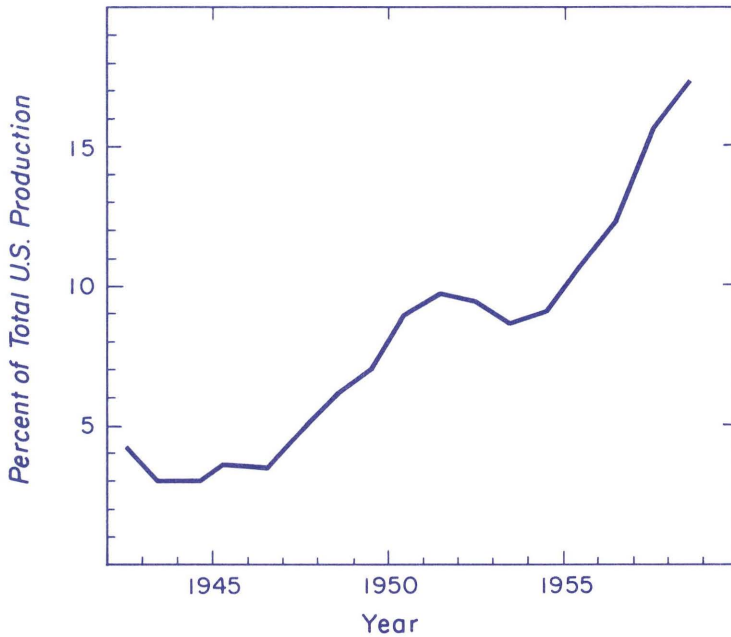


Fig. 8. Michigan's share of the United States sweet cherry market: Annual 4-year average of Michigan production as a percent of total United States production, 1942-58.

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.<sup>9</sup> 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

<sup>9</sup>This 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<sup>(a)</sup>, 1941-60 and 1957-60

State	Average annual production (tons)		Change in average production (tons)	Percent of U.S. production		Index of production change (b)
	1941-60	1957-60		1941-60	1957-60	
Michigan	7,357.0	14,125.0	+ 6,750.0	8.21	17.15	191.5
Montana	978.5	1,595.0	+ 616.5	1.09	1.94	163.0
New York	3,540.0	4,800.0	+ 1,260.0	3.94	5.83	136.5
Colorado	498.0	565.0	+ 67.0	0.55	0.69	113.5
Oregon	21,135.0	20,500.0	— 635.0	23.52	24.89	97.0
Utah	3,259.5	3,125.0	— 134.5	3.63	3.79	95.9
Idaho	2,336.5	1,820.0	— 516.5	2.60	2.21	77.9
Pennsylvania	1,165.0	900.0	— 265.0	1.30	1.09	77.3
California	27,720.0	20,025.0	— 7,695.0	30.85	24.32	72.2
Washington	21,427.5	14,625.0	— 6,802.5	23.84	17.76	68.3
Ohio	427.0	275.0	— 152.0	0.48	0.33	64.4

(a) States listed in U.S.D.A., *Agricultural Statistics*, U.S. Government Printing Office (published annually).

(b) Average annual production 1957-60 ÷ 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,<sup>10</sup> 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

TABLE 3 — Number of bearing and non-bearing sweet cherry trees in Michigan, 1939, 1949 and 1959<sup>(a)</sup>.

Date	Number of trees	
	Bearing	Non-bearing
1939	168,212	96,508
1949	245,185	102,707
1959	379,423	310,812

(a) As reported in the Census of Agriculture for those years.

<sup>10</sup> Ricks D. J., R. P. Larsen and R. G. Wheeler, January 1961. Inputs and relative yields for young orchards, *Fact Sheet for Michigan Agriculture*.

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

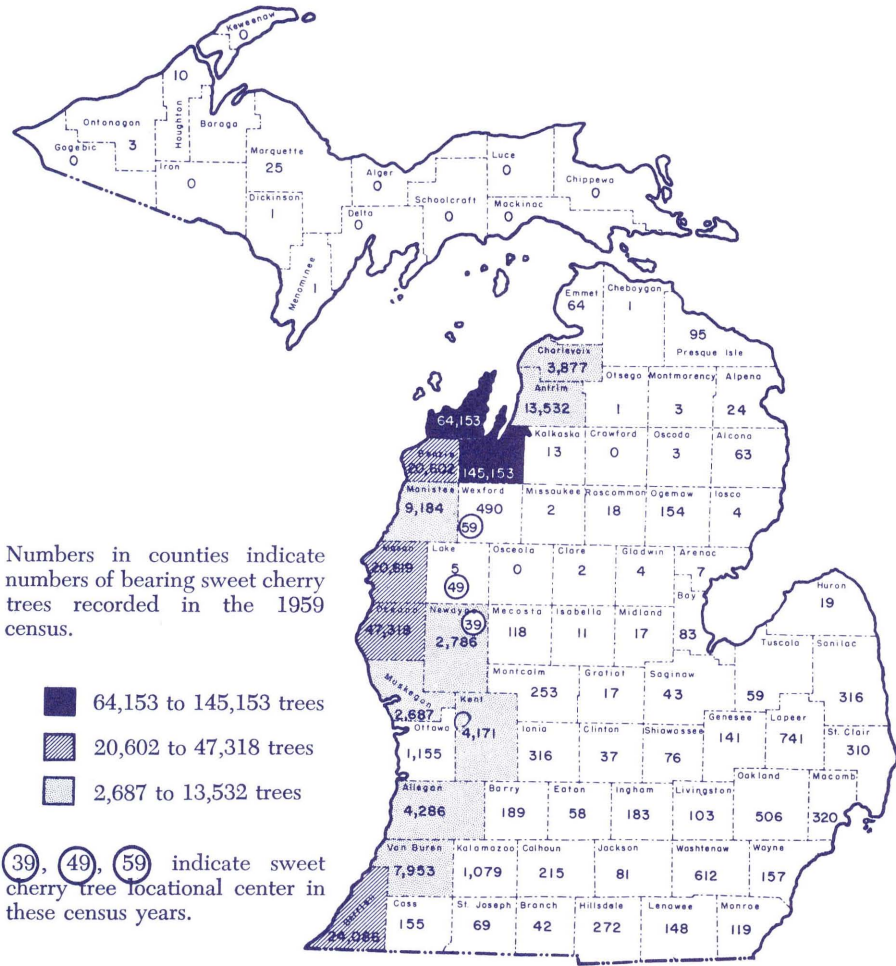


Fig. 9. Number of bearing sweet cherry trees by Michigan county, 1959.

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.<sup>11</sup> 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*<sup>12</sup> 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<sup>13</sup> to nearly 150 percent of the 20-year average. It is surprising that Michigan

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<sup>11</sup> 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.

<sup>12</sup> U.S. Department of Agriculture, *Agricultural Statistics*, U.S. Government Printing Office (published annually).

<sup>13</sup> 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.

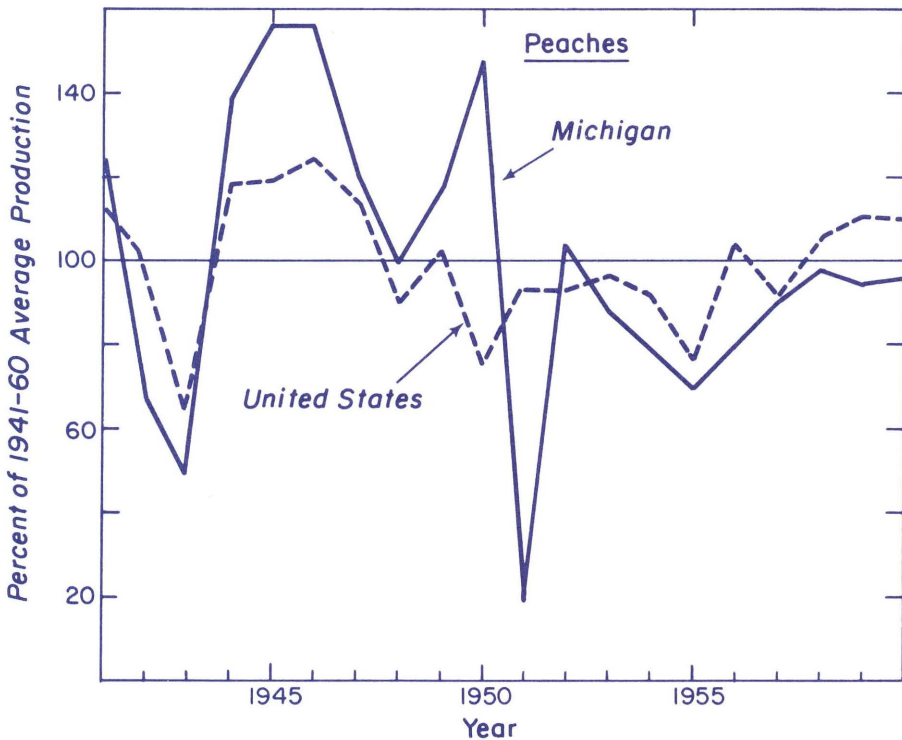


Fig. 10. Annual index of peach production, 1941-60, United States and Michigan.

\*1941-60 average production equals 100  
 1941-60 averages  
 Michigan—3,267,000 bu.  
 United States—66,718,800 bu.

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

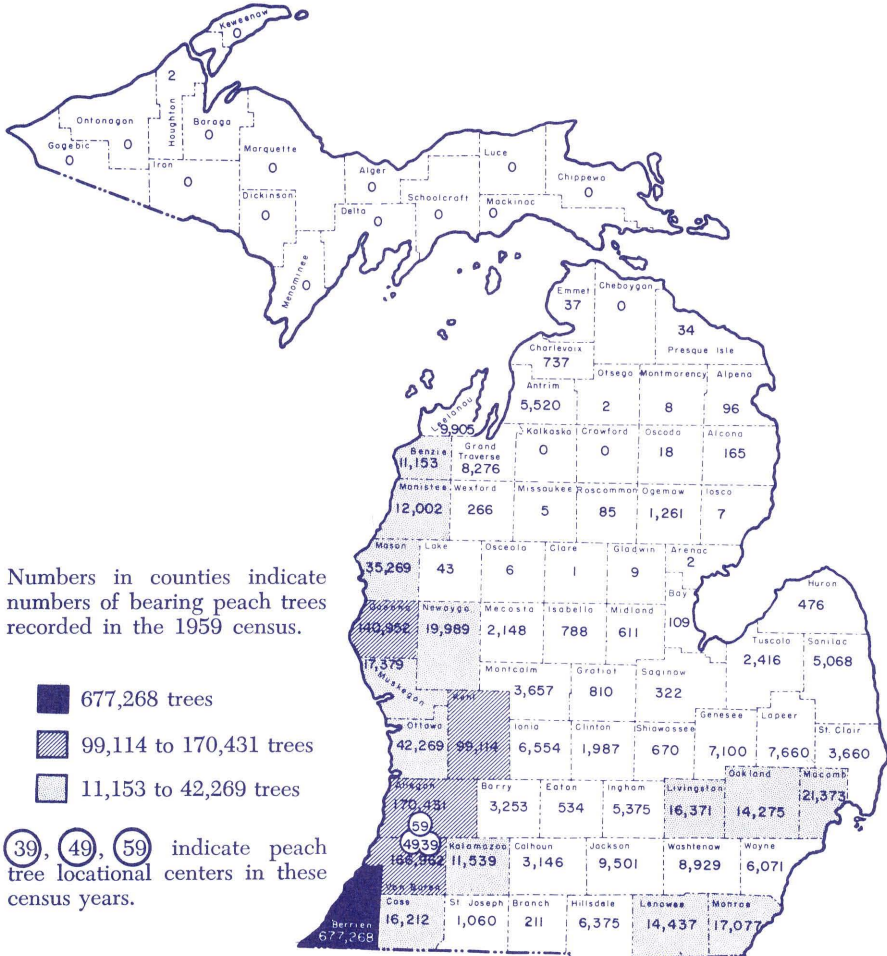


Fig. 11. Number of bearing peach trees in Michigan counties, 1959.

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.<sup>14</sup> 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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<sup>14</sup> 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.

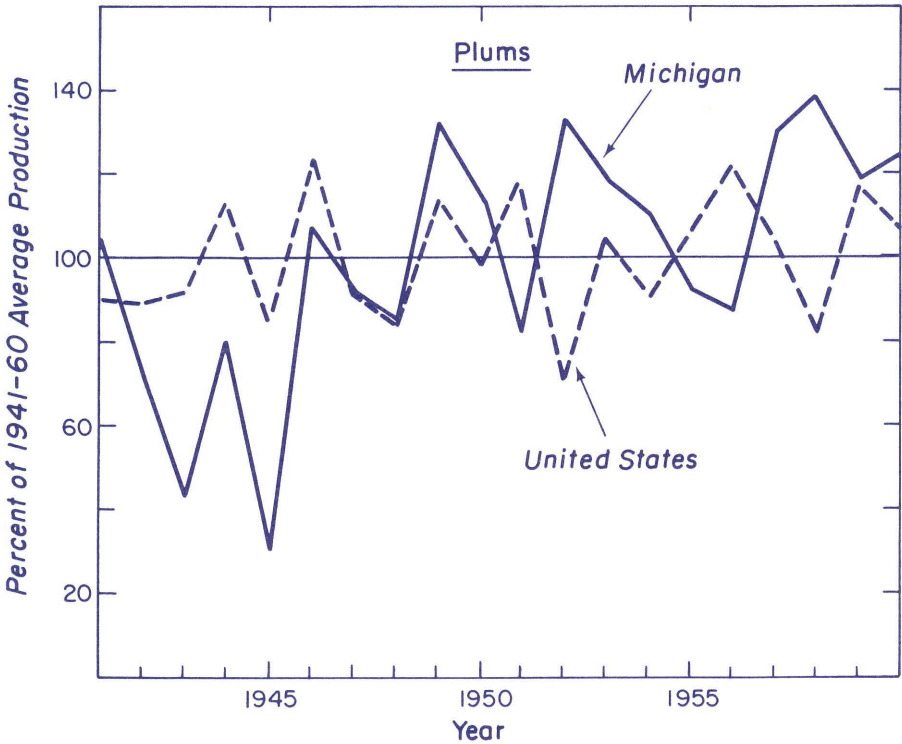


Fig. 12. Annual index of plum production, 1941-60, United States and Michigan.

\*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.





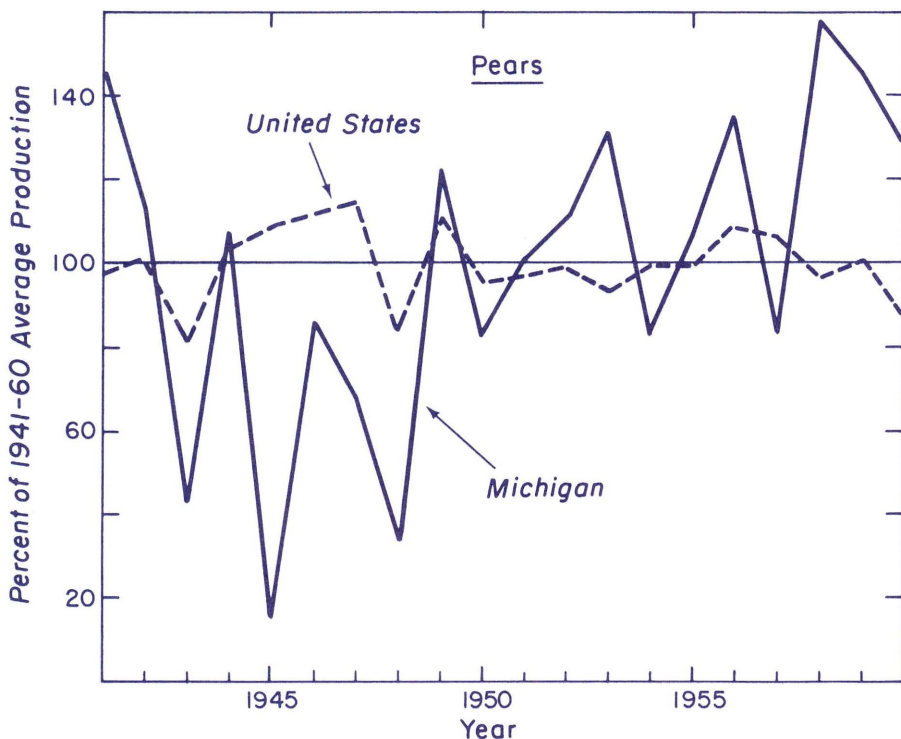


Fig. 14. Annual index of pear production, 1941-60, United States and Michigan.

\*1941-60 average production equals 100  
 1941-60 averages  
 Michigan—887,200 bu.  
 United States—29,787,300 bu.

percent, and sour cherries, which varied between 36 and 139 percent of the two-decade average.

Pears are produced in many states with the production of 25 states being of sufficient importance to be reported in *Agricultural Statistics*. However, only a very few states produce large quantities of this fruit. California has been the major pear producing state, having approximately 45 percent of the national total in recent years. The combined production of three West Coast states (California, Washington, and Oregon) represents about 85 percent of the United States pear production. Michigan produces more pears than any other non-West Coast state but still only about 3 percent of the United States total.

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.<sup>15</sup>

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.

<sup>15</sup> 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.



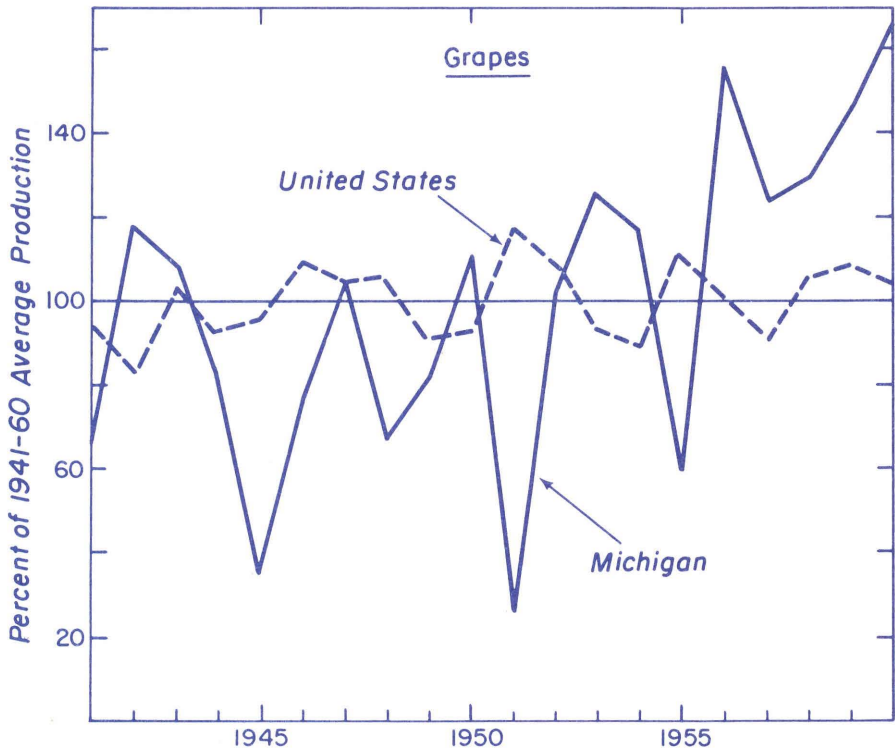


Fig. 16. Annual index of grape production, 1941-60, United States and Michigan.

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

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.<sup>16</sup> 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

<sup>16</sup> A least squares regression of the percentages plotted for Michigan in Fig. 16 give a positive slope (trend) for the 20-year period of 3.54 percent. The comparative figure for the United States is 0.46 percent.

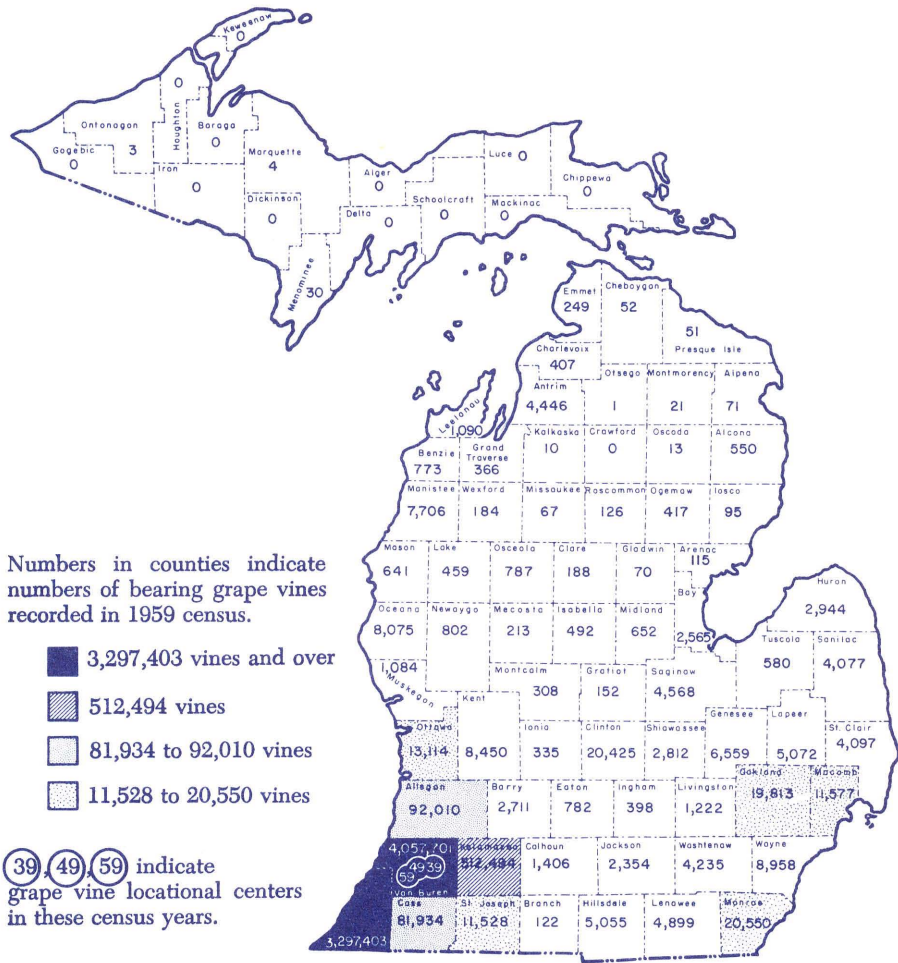


Fig. 17. Number of bearing grape vines in Michigan counties, 1959.

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 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

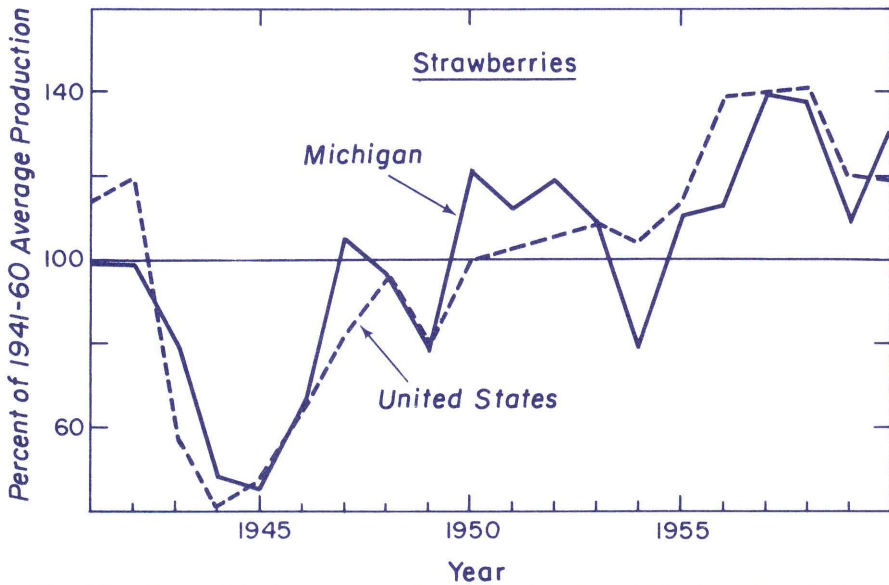


Fig. 18. Annual index of strawberry production, 1941-60, United States and Michigan.

°1941-60 average production equals 100  
 1941-60 averages  
 Michigan—29,863,400 pounds  
 United States—394,075,000 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





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.



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