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# Apple Variety Trends in Michigan

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## Abstract

Michigan's apple acreage has increased over the past decade and the trend is expected to continue. Tree numbers have increased 24% in recent years reflecting the move to higher density planting systems on size controlling rootstocks. About 98% of all young plantings, 6-years-old or younger, are on size controlling stocks. The average yield of apples per acre has steadily increased in Michigan. Total production for the state may reach 30 million bushels in the early 1990's, a 20% increase above the peak 25 million bushels produced in 1985 and 1987.

'Delicious' is the dominant cultivar grown in Michigan with almost twice as many acres planted as the second leading variety 'Jonathan.' A significant number of new trees being planted are 'Empire' followed by 'Rome' and 'Idared.' Current trends indicate a decrease in the production of 'Jonathan' and 'Winesap,' two cultivars that represent a significant acreage of all trees 22-years-old and older. The prospects for large plantings of the newer cultivars such as 'Fuji,' 'Gala,' and 'Jonagold' are uncertain at this time.

The most recent inventory of Michigan's apple trees was in 1986 by the Michigan Agricultural Statistics Service. (Fedewa and Pscodna, 1987). The number of trees in Michigan in 1986 was 5.8 million, an increase of more than 24 percent since 1982, when the previous survey was taken. The distribution of apple trees by variety in 1986 is shown in Table 1.

Michigan apple acreage increased 4 percent from 59,300 acres in 1982 to 61,700 acres in 1986 (3, 4). Table 2 lists acreages of each variety and indicates bearing and non-bearing acreage for each.

Almost all young plantings in Michigan are on size controlling rootstocks. Such plantings are at greater tree den-

**Table 1. Michigan Apple Trees by Age and Variety.**

| Variety | 1986 1 yr | 1989 2 yr | 1984 3 yr | 1983 4 yr | 1982 5 yr | 1981 6 yr | 1976-80 7-11 yr | 1966-75 12-21 yr | 22+ yr | All ages | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Red Delicious | 63,300 | 45,500 | 93,100 | 93,900 | 146,800 | 182,300 | 268,000 | 349,200 | 474,900 | 1,637,000 | 28.2 |
| Jonathan | 10,000 | 17,100 | 13,500 | 21,500 | 17,100 | 7,700 | 49,000 | 121,300 | 376,800 | 634,000 | 10.9 |
| Golden Delicious | 20,100 | 9,000 | 21,600 | 22,100 | 21,600 | 22,000 | 84,300 | 198,900 | 182,400 | 582,000 | 10.0 |
| Idared | 7,600 | 19,900 | 19,500 | 21,700 | 25,100 | 33,300 | 218,800 | 164,600 | 57,500 | 568,000 | 9.8 |
| Rome | 14,700 | 19,700 | 34,100 | 37,000 | 24,500 | 25,500 | 122,200 | 128,600 | 99,700 | 506,000 | 8.7 |
| McIntosh | 7,500 | 8,500 | 11,500 | 21,700 | 35,700 | 18,700 | 120,400 | 121,000 | 144,000 | 489,000 | 8.5 |
| Northern Spy | 13,000 | 15,000 | 15,000 | 25,900 | 9,100 | 4,000 | 45,700 | 102,300 | 102,000 | 332,000 | 5.7 |
| Empire | 16,700 | 32,600 | 42,600 | 49,500 | 51,000 | 21,500 | 72,600 | 29,000 | 3,500 | 319,000 | 5.5 |
| Paulared | 600 | 2,000 | 2,500 | 2,600 | 8,000 | 4,500 | 42,100 | 109,700 | 11,000 | 183,000 | 3.2 |
| Winesap | 1,000 | 600 | 500 | 600 | 1,100 | 500 | 7,100 | 21,200 | 40,500 | 74,000 | 1.3 |
| R.I. Greening | 1,000 | — | — | 1,500 | 2,000 | 1,500 | 4,400 | 43,800 | 19,800 | 74,000 | 1.3 |
| Mutsu | 7,500 | 5,000 | 4,500 | 4,000 | 1,500 | 2,500 | 11,100 | 25,200 | 4,700 | 66,000 | 1.1 |
| Spartan | 3,500 | 3,000 | 5,000 | 5,500 | 3,000 | 4,500 | 11,200 | 6,300 | 2,000 | 44,000 | 0.8 |
| Cortland | 2,500 | 1,500 | 1,500 | 2,500 | 2,000 | 1,000 | 6,600 | 6,300 | 12,100 | 36,000 | 0.6 |
| Jerseymac | 1,500 | 500 | 2,000 | 3,000 | 500 | 500 | 10,500 | 7,000 | 500 | 26,000 | 0.4 |
| Others | 11,000 | 17,600 | 14,600 | 16,500 | 10,100 | 7,000 | 43,000 | 58,600 | 51,600 | 230,000 | 4.8 |
| | | | | | | | | | | 5,800,000 | |

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**Table 2. Michigan Apple Acres by Variety, 1986.**

| | Acres All Ages | Bearing Acres (7 yrs. +) | Non-bearing Acres (6 yrs. & younger) | Non-bearing as a Percent of Bearing Acres |
|---|---|---|---|---|
| Red Delicious | 16,860 | 12,410 | 4,450 | 36% |
| Jonathan | 8,890 | 8,180 | 710 | 9% |
| Golden Delicious | 5,960 | 5,010 | 950 | 19% |
| McIntosh | 5,700 | 4,580 | 850 | 18% |
| Idared | 5,270 | 4,210 | 1,060 | 25% |
| Rome | 5,110 | 3,830 | 1,280 | 33% |
| Northern Spy | 3,770 | 3,100 | 670 | 22% |
| Empire | 2,600 | 870 | 1,730 | 199% |
| Paulared | 1,550 | 1,390 | 160 | 12% |
| Winesap | 1,040 | 1,000 | 40 | 4% |
| Greening | 890 | 840 | 50 | 6% |
| Mutsu | 570 | 370 | 200 | 54% |
| Cortland | 420 | 330 | 90 | 27% |
| Spartan | 370 | 170 | 200 | 118% |
| Jerseymac | 220 | 150 | 70 | 47% |

sity per acre. Thus, tree numbers increased 24 percent from 1982 to 1986 compared to a 4 percent increase in acreage.

Michigan's calculated total bearing acreage increased slightly from 47,400 acres in 1982 to 48,500 acres in 1986. The major shift was the increase in bearing acreage on size controlled plantings compared to the decline in bearing acreage on standard rootstocks.

In 1986 Michigan had 37,300 acres of apples of all ages on size controlled rootstocks and 24,400 acres on seedling rootstock. This compared to 1982 when standard plantings and size controlled planting were about equal, nearly 29,000 acres each (Table 3).

The shift to size controlling rootstocks has been very dramatic. The older acreage, 22 years and older, had 81 percent on standard rootstocks, but 98 percent of trees 6 years old and younger were size controlled type plantings (Table 4).

Michigan's future production will be influenced by yields per acre. Average yields per bearing acre have been

**Table 3. Michigan Apple Acres on Standard and Size Controlling Rootstocks.**

| | 1978 | 1982 | 1986 | Projected by Early 1990's |
|---|---|---|---|---|
| | acres | | | |
| Bearing Acres | | | | |
| Standards | 33,400 | 29,100 | 24,100 | 15,900 |
| Size Controlled | 9,300 | 18,300 | 24,400 | 36,600 |
| Total | 42,700 | 47,400 | 48,500 | 52,500 |
| Nonbearing Acres | | | | |
| Standards | 1,600 | 700 | 300 | |
| Size Controlled | 7,800 | 11,200 | 12,900 | |
| Total Nonbearing | 9,400 | 11,900 | 13,200 | |
| Total Acres | 52,100 | 59,300 | 61,700 | |

**Table 4. Michigan Apple Acres by Type of Rootstock.**

| | 1978 | 1982 | 1986 | Projected Early 1990's |
|---|---|---|---|---|
| | percent | | | |
| Bearing Acres | | | | |
| Standards | 78 | 61 | 50 | 35 |
| Size Controlled | 22 | 39 | 50 | 65 |
| Nonbearing Acres | | | | |
| Standards | 17 | 6 | 2 | |
| Size Controlled | 83 | 94 | 98 | |

**Table 5. Michigan Average Yields Per Bearing Acre.**

| | State Average Yield |
|---|---|
| | bu. |
| 1972-1975 | 289 |
| 1976-1979 | 354 |
| 1980-1983 | 445 |
| 1984-1987 | 456 |

increasing (Table 5). This reflects increased plantings of closer tree spacings on size controlled rootstocks as well as other cultural practices. From the mid to late 1970's to mid 1980's productivity increased 100 bushel per acre, almost 30 percent. Average yields are expected to continue to increase.

Michigan's future will depend upon its present bearing acreage, new acreage to come into production and any acreage removed by growers. Ricks and Schwallier (5) analyzed these three factors to project bearing acres of each variety in Michigan in the early 1990's (Table 6). The rate of tree removal between 1982 and 1986 was used as a basis for projecting removals during the next few years (Table 7). Grower plantings 1983 to 1986 showed major emphasis on 'Delicious' with

**Table 6. Michigan Apple Varieties, Bearing Acres 1986 and Projections to Early 1990's.**

| | (1) Present Bearing Acres | (2) New Bearing Acres from Present Young Plantings | (3) Projected Acres Removed | (4) Bearing Acres by Early 1990's | (5) Net Change in Bearing Acres | (6) Percent Change |
|---|---|---|---|---|---|---|
| | acres | | | | | |
| Red Delicious | 12,410 | 3,560 | 1,390 | 14,580 | +2,170 | +17 |
| Jonathan | 8,180 | 480 | 850 | 7,810 | -370 | -5 |
| Golden Delicious | 5,010 | 710 | 370 | 5,350 | +340 | +7 |
| McIntosh | 4,850 | 720 | 530 | 5,040 | +190 | +4 |
| Idared | 4,210 | 830 | 170 | 4,870 | +660 | +16 |
| Rome | 3,830 | 1,000 | 230 | 4,600 | +770 | +20 |
| Northern Spy | 3,100 | 440 | 270 | 3,270 | +170 | +5 |
| Paulared | 1,390 | 140 | 20 | 1,510 | +120 | +9 |
| Winesap | 1,000 | 30 | 220 | 810 | -190 | -19 |
| Empire | 870 | 1,330 | 10 | 2,190 | +1,320 | +152 |
| Greening | 840 | 40 | 60 | 820 | -20 | -2 |
| Mutsu | 370 | 100 | — | 470 | +100 | +27 |
| Cortland | 330 | 60 | 40 | 350 | +20 | +6 |
| Spartan | 170 | 150 | — | 320 | +150 | +88 |
| Jerseymac | 150 | 50 | — | 200 | +50 | +33 |

**Table 7. Tree Removal of Major Apple Varieties.**

| | Apparent Removals 1982 to 1986 as a % of Orchards 22 yrs. + | Projected Removals in Next Few Years |
|---|---|---|
| Red Delicious | 21 | Medium |
| Jonathan | 3 | Slow |
| Golden Delicious | 24 | Slow |
| McIntosh | 27 | Medium |
| Idared | 58 | Medium |
| Rome | 15 | Slow |
| Northern Spy | 15 | Slow |
| Paulared | | Slow |
| Winesap | 38 | Medium Fast |
| Empire | — | Slow |
| Greening | 47 | Medium |

strong interest in the relatively new 'Empire' variety (Table 8).

The Michigan apple industry produces a number of important apple varieties. The 1986 Michigan orchard and vineyard survey indicated more acreage planted to 'Delicious' than any other variety. 'Delicious' acreage was almost twice that for 'Jonathan,' the second most widely planted variety in the state (Table 2). The young, non-bearing acreage of 'Delicious' was 36% of the bearing acreage of this variety, suggesting that Michigan's 'Delicious' production will continue to increase.

**Table 8. Michigan Apple Plantings by Variety (1983 to 1986).**

| | New Planted Acres |
|---|---|
| Red Delicious | 2,410 |
| Empire | 1,150 |
| Rome | 860 |
| Golden Delicious | 590 |
| Idared | 570 |
| Northern Spy | 560 |
| Jonathan | 500 |
| McIntosh | 410 |
| Mutsu | 170 |
| Spartan | 140 |
| Cortland | 60 |
| Paulared | 60 |
| Jerseymac | 60 |
| Winesap | 30 |
| Greening | 20 |

'Jonathan' had a high percentage of bearing acres and a high percent of acreage 22 years and older (Table 9). The very low percentage of young 'Jonathan' acreage might indicate the possibility of a significant decrease in future production of this variety. However, between 1982 and 1986 orchardists removed very few 'Jonathan' plantings (Table 8). The estimated acres that may be removed by the early 1990's for each variety are shown in column 3 of Table 6.

Michigan's acreage of 'Golden Delicious,' 'McIntosh,' 'Idared,' and 'Rome' were similar in 1986. The bearing acreage of 'Rome' increased 19 percent from 1982 to 1986, and 'Idared' increased 35 percent (the largest percentage of any variety in Michigan).

'Empire' has been widely planted in Michigan in recent years. Bearing acreage increased from 290 acres in 1982 to 870 acres in 1986. 'Empire' had the second highest number of non-bearing acres in 1986, second only to 'Delicious' (Table 2). Non-bearing acreage was almost twice the bearing acreage indicating a large percentage increase in production of this variety.

'Northern Spy' has been a very important processing variety in Michigan.

**Table 9. Michigan Apple Varieties 22 Years and Older, 1986.**

| | Acres Age 22+ | Old (22+) Acreage as a Percent of Michigan's Total Acreage of That Variety |
|---|---|---|
| Red Delicious | 6,960A | 41% |
| Jonathan | 6,560 | 74 |
| McIntosh | 2,660 | 47 |
| Golden Delicious | 2,440 | 41 |
| Northern Spy | 1,830 | 49 |
| Rome | 1,550 | 30 |
| Idared | 870 | 17 |
| Winesap | 720 | 69 |
| R.I. Greening | 350 | 39 |
| Cortland | 220 | 52 |
| Paulared | 130 | 8 |
| Mutsu | 60 | 11 |
| Empire | 30 | 1 |
| Spartan | 20 | 5 |

**Table 10. Michigan Apple Production with Projections.**

| | Recent Years | Projected by Early 1990's |
|---|---|---|
| | ------million bu.----- | |
| Four-year Average (1985-1988) | 21.7 | 24-25 |
| Large-crop Years (1985 & 1987) | 25.6 | 28-30 |
| Short-crop Years (1984 & 1986) | 17.5 | 18-20 |

The acreage of this variety changed very little between 1982 and 1986. Since growers remove relatively few old 'Northern Spy' plantings, production of this primary processing variety should be maintained.

'Paulared' has been Michigan's important summer variety. Although this variety had a low number of non-bearing acres, it also had a very low percentage of old plantings so that production should be maintained.

'Winesap' acreage decreased 22 percent between 1982 and 1986. This variety had very little non-bearing acreage and nearly 70 percent of its acreage over 22 years suggesting declining production of 'Winesap.'

'Greening' is grown primarily for processing markets. Nearly all the acreage of this variety was bearing age, but old plantings were only 39 percent of its total acreage suggesting rather stable production.

Ricks and Schwallier (5) calculated projected bearing acres of each variety for the early 1990's based upon present bearing acres, new bearing acreage which will result from maturing of current young acreage and the estimated removal of trees. Projections of bearing acres for each variety in Michigan are given in Table 6. 'Delicious' is expected to have the largest increase in bearing acreage.

Based on the 1986 survey data, most Michigan varieties are likely to increase in production. 'Delicious' and 'Empire' will increase more than most varieties. 'Rome' and 'Idared' should also increase substantially.

The acreage removed by orchardists for each variety between 1982 and 1986 in Michigan is represented in Table 7. Growers removed a relatively high percentage (38%) of old plantings of certain varieties such as 'Winesap' but only a small percentage (3%) of 'Jonathan' acreage 22 years and older. Moderate acreage removal occurred for 'Delicious,' 'Golden Delicious' and 'McIntosh.' The substantial removal of 'Idared' was a result of fireblight problems.

Removal of acreage will continue to vary by variety. Ricks and Schwallier (1988a) utilized the rate of removal from 1982 to 1986 as a basis to project future removals. They projected tree removal to be low for newly expanded varieties such as 'Empire,' 'Mutsu' and 'Spartan.'

Bearing acres of 'Empire' will increase considerably. Substantial increases are expected for 'Rome' and 'Idared,' and small increases anticipated for bearing acreages of 'Golden Delicious,' 'McIntosh' and 'Northern Spy.'

The projection of bearing acres indicates that production of 'Delicious,' 'Empire,' 'Rome' and 'Idared' will increase significantly in Michigan during the next several years. Young, high density plantings on size controlling rootstocks should result in high yields per acre for these varieties and production of these varieties will probably increase by more than the indicated percentage increase in acreage.

Because of projected increases in both bearing acres and a continued trend for higher yields per acre, Michigan's apple production is expected to increase significantly. Ricks (3) projects the state's average production to increase to about 25 million bushels by the early 1990's compared to a recent average of 21.7 million bushels (Table 10). In a large crop year, when the state has favorable weather, Michigan apple production could be 28 to

30 million bushels. This can be compared to 25 million bushel in 1987 and 26.2 million bushel in 1985.

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# Mid-Atlantic Apple Cultivars

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## Abstract

The mid-Atlantic region has 6.8 million apple trees, but all states except Virginia have experienced tree losses during the last seven years. The five cultivars accounting for 85% of the production, in descending order of importance, include 'Delicious,' 'Golden Delicious,' 'Rome,' 'York,' and 'Stayman.' 'Stayman' is declining in importance due to fruit cracking problems, but the other four cultivars will remain prominant for the next 15 years. 'Gala' is the only new cultivar likely to be planted in volume in the next five years.


## Introduction

The mid-Atlantic region has been an important apple producing area for more than 200 years. For many years apple cultivars of local origin were grown, but since World War II the number of these important cultivars has declined.

There are two distinct apple industries in the mid-Atlantic region. About 70% of the 4.7 million apple trees grown in Pennsylvania, Virginia, and West Virginia are concentrated within 60 miles of Frederick, Maryland. The orchards in this area tend to be large (mostly > 100 acres) and about 70% of the fruit is processed. Orchards in other parts of the region tend to be smaller (mostly < 100 acres) and produce primarily for the wholesale and retail fresh fruit markets. Differences in fruit utilization influence cultivar selection in each area.

## Discussion

The region has lost about 632,500 trees since 1982 and only Virginia has increased tree numbers (Table 1). Primary reasons for the decline in tree numbers include increasing land values due to urbanization, unavailability of labor (especially orchard managers), and poor prices for processing fruit. Tree density has increased more slowly than in some parts of the country, but has increased from 72 to 76 trees per acre from 1982 to 1987.

'Delicious' is the most important cultivar in the region and varies in importance from 47% of the trees in North Carolina to 28% in Pennsylvania and West Virginia (Table 2). 'Golden Delicious,' 'Rome,' 'York,' and 'Stayman' are the other major cultivars of the

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