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Apple Cultivars— Current Situation and Trends in New York State

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Abstract

The 1985 statewide tree survey indicated a total of 5,052,307 trees in 68,520 acres of orchards. The top ten cultivars were: 'McIntosh,' 'Delicious,' 'Rome,' 'Empire,' 'Idared,' 'Cortland,' 'Golden Delicious,' 'R.I. Greening,' 'Mutsu,' and Paulared.' These ten accounted for 86.2 percent of all trees. Cultivars showing greatest increases in tree numbers include 'Empire,' 'McIntosh,' 'Delicious,' 'Rome,' 'Idared,' and 'Cortland.' Other cultivars that have shown consistent increases in recent plantings include 'Spartan, 'Tydeman Early,' 'Jonamac,' 'Macoun,' 'Jerseymac,' and 'Jonagold.' Cultivars that are decreasing in tree numbers include 'R.I. Greening,' 'Twenty Ounce,' 'Monroe,' 'Baldwin,' 'Wayne,' 'Northern Spy,' 'Wealthy,' and 'Stayman.' Current trends, if continued, suggest that 'McIntosh,' 'Delicious,' 'Empire,' 'Rome,' 'Idared,' 'Cortland,' 'Golden Delicious,' 'Mutsu,' and 'Jonamac' will constitute the top ten cultivars and account for over 85 percent of all trees within the next ten years. Clonally-propagated understocks accounted for 72.6 percent of all trees in 1985.

Introduction

Apple production in New York State is concentrated largely in two distinctly different geographical regions. The Western region, which includes the counties bordering Lake Ontario, accounts for nearly 65 percent of the total crop and historically developed as a production area for processing fruit. The Eastern region includes the Hudson Valley and the Champlain Valley areas, both of which are recognized mainly for fresh fruit production. This difference in market orientation was a significant factor in the selection of cultivars in the past, but is becoming less important as growers in the Western region increase their emphasis on selection of cultivars with greater fresh market potential in new plantings.

Between 1970 and 1985, the total number of commercial orchards (100 trees or more) declined by 19 percent (from 1288 to 1043), while total acreage of orchards declined by only 6 percent (from 72,569 to 68,520 acres). Over this same period, however, the total number of trees increased by 55 percent (from 3,255,888 to 5,052,307). The increase in tree numbers on less acreage is indicative of the adoption of clonally propagated rootstocks and higher-density production systems.

Changes in cultivar preference over this 15 year period are also evident, principally in the decline in rankings of 'R.I. Greening,' 'Twenty Ounce,' 'Northern Spy,' and 'Baldwin;' and the appearance of 'Empire,' 'Mutsu,' and 'Paulared' among the top ten cultivar list. These changes are indicative of a shift in emphasis toward cultivars that have greater fresh market potential.

Current Cultivar Situation and Trends-Statewide

When analyzing data on tree numbers it is critical to note that both rootstocks and tree age distribution can be indicative not only of previous experiences that influenced the present status of a cultivar, but also of how the industry is presently interpreting the future of that cultivar. Therefore, in addition to the information on tree numbers, additional data such as the percentage of trees on clonally-propagated understocks, and the percentage of trees that are less than 12 years of age are included. The data presented for New York State in Table 1 were derived from the 1985 tree survey (2).

Statewide, 'McIntosh' is the leading cultivar, comprising 21.5 percent of total trees. 'Delicious' and 'Rome,' with

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Table 1. Apple cultivars in New York State—1985.

Cultivar	Total No. trees	% of total trees	% of trees on clonal stocks	% of trees < 12 yrs old
1. McIntosh	1,088,752	21.5	68.1	49.0
2. Delicious	836,265	16.6	72.6	50.3
3. Rome	531,265	10.5	63.9	43.7
4. Empire	450,983	8.9	97.8	88.9
5. Idared	445,968	8.8	86.4	52.0
6. Cortland	302,510	6.0	59.0	41.0
7. Golden Delicious	270,837	5.4	67.8	27.1
8. R.I. Greening	239,212	4.7	36.7	15.5
9. Mutsu	103,409	2.0	97.1	71.0
10. Paulared	89,069	1.8	97.1	85.6
11. Twenty Ounce	83,069	1.6	52.8	13.2
12. Spartan	74,572	1.5	90.7	62.1
13. Northern Spy	74,154	1.4	57.7	30.7
14. Tydeman Early	70,378	1.4	94.3	76.5
15. Jonamac	67,527	1.3	97.9	94.9
16. Macoun	49,982	1.0	80.9	63.3
17. Jerseymac	40,982	0.8	98.0	90.5
18. Monroe	34,623	0.7	58.8	6.1
19. Ben Davis	16,164	0.3	47.3	29.3
20. Stayman	15,288	0.3	73.9	45.3
21. Jonagold	13,960	0.3	100.0	75.4
22. Wayne	13,508	0.3	76.8	0.3
23. Baldwin	11,267	0.2	—/a	0.2
24. Jonathan	10,267	0.2	74.6	27.9
25. Wealthy	6,103	—	—/a	0.0
26. Winesap	4,331	—	—/a	2.8
Other cultivars	107,666	2.1	75.1	47.1
All cultivars	5,052,307	100	72.6	50.5

/a. No trees on clonal rootstocks reported for these cultivars.

16.6 and 10.5 percent of total trees, respectively, occupy the second and third positions. 'Empire,' which has been planted extensively during the last 10 years, ranks fourth in tree numbers, followed in order by 'Idared,' 'Cortland,' 'Golden Delicious,' 'R.I. Greening,' 'Mutsu,' and 'Paulared.' These ten cultivars collectively account for 86.3 percent of all trees.

On the statewide basis, the data for trees on clonal understocks and percentages of trees less than 12 years of age indicate the increasing emphasis on fresh market production and decreasing interest in planting of cultivars specifically intended for processing. If one assumes that at least 50 percent of the trees of a specific cultivar less than 12 years of age are required to maintain its current status, the production of 'Empire,' 'Mutsu,' 'Paulared,' 'Tydeman Early,' 'Jonamac,' 'Macoun,' and 'Jerseymac' can be expected to increase as young orchards mature. Conversely, cultivars such as 'Golden Delicious,' 'R.I. Greening,' 'Twenty Ounce,' 'Northern Spy,' 'Monroe,' and 'Ben Davis,' with low percentages of young trees, can be expected to show significant declines in importance.

The percentage of trees of a cultivar that are on clonally-propagated stocks provides a further indication of grower

Table 2. Western New York Region—Top Ten Cultivars, 1985.

Cultivar	Total No. trees	% of total trees	% of trees < 12 yrs old
1. McIntosh	510,559	16.5	51.9
2. Delicious	431,206	14.0	55.7
3. Idared	393,859	12.8	51.9
4. Rome	338,195	11.0	41.2
5. R.I. Greening	234,005	7.6	15.9
6. Empire	224,753	7.3	86.0
7. Cortland	198,535	6.4	45.0
8. Golden Delicious	191,535	6.2	26.1
9. Mutsu	92,451	3.0	69.1
10. Twenty Ounce	82,135	2.7	13.0
Top ten totals	2,697,233	87.4	---
All Cultivars	3,087,829	100	48.0

preference for the cultivar. However, the greater production potential of orchards on the size-controlling stocks, in comparison to those on seedling rootstocks, must also be recognized in estimating the future significance of the cultivars. In order to assess the magnitude of this influence, it is necessary to adjust production data to account for the fact that a high percentage of the trees on clonally propagated stocks have not yet reached maturity. Such adjustment of the 1985 survey data indicates the average yields per acre for trees on seedling stocks and those on size-controlling stocks to be 417 and 796 bushels per acre, respectively. Therefore, those cultivars with high percentages of young trees on the clonal stocks can be expected to show substantial increases in production within the next five to ten years. Unfortunately, the data do not allow comparison of the differences among the various clonally propagated stocks.

Table 3. Eastern New York Region—Top Eleven Cultivars, 1985.

Cultivar	Total No. trees	% of total trees	% of trees < 12 yrs old
1. McIntosh	578,193	29.4	46.5
2. Delicious	405,059	20.6	44.6
3. Empire	226,230	11.5	91.9
4. Rome	193,723	9.8	48.3
5. Cortland	103,723	5.3	33.3
6. Golden Delicious	79,302	4.0	29.5
7. Tydeman Early	61,360	3.1	82.9
8. Paulared	52,721	2.7	86.4
9. Idared	52,109	2.7	52.2
10. Spartan	42,564	2.2	54.5
11. Jonamac	42,347	2.2	94.5
Top eleven totals	1,837,331	93.5	---
All Cultivars	1,964,478	100	54.4

Table 4. Trees planted in four counties of the Hudson Valley, 1975 through 1985.

Cultivar	No. trees	% of all cultivars
1. Empire	178,504	22.1
2. Delicious	157,385	19.5
3. McIntosh	131,791	16.3
4. Rome	85,402	10.8
5. Tydeman Early	46,242	5.7
6. Jonamac	37,976	4.7
7. Paulared	32,308	4.0
8. Cortland	22,880	2.8
9. Idared	19,900	2.5
10. Golden Delicious	15,667	1.9
Top ten totals	728,055	90.1
All Cultivars	808,370	100

Current Situation and Trends By Regions

Although statewide comparisons indicate general trends, these tend to mask the situations existing within the separate regions of the state. Separate analyses of the data for the Western and Eastern areas further emphasize significant factors influencing cultivar selection.

Western Region

Over 61 percent of all trees are located in this region, which has traditionally been known as a processing production area. However, in recent plantings, greater emphasis has been placed on cultivars and strains of these cultivars that have greater potential for the fresh market. The ten cultivars listed in table 2 represent 87.4 percent of all trees in this region. In this region, 'McIntosh,' 'Idared,' 'Rome,' 'Cortland' and 'Golden Delicious' are produced for both the fresh and processing markets. However, the more highly-colored strains of 'McIntosh,' 'Rome,' and 'Cortland' are being selected for new plantings, with the intention of increasing fresh market sales. Such strains are less desirable for the production of some processed products.

Low percentages of trees less than 12 years of age for 'R.I. Greening,' 'Twenty Ounce' and 'Golden Delicious' indicate that these cultivars are likely to show the greatest rate of decline in the near future. In contrast, 'Empire' and 'Mutsu,' with 86 and 69 percent of trees less that 12 years of age, will be increasingly important cultivars in this region.

Eastern New York Region

Approximately 39 percent of all trees are located in the Eastern region. This region has traditionally produced fruit primarily intended for the fresh market. The eleven cultivars listed in table 3 collectively account for 93.5 percent of all trees in this region.

'McIntosh' and 'Delicious,' together, constitute 50 percent of all trees in the Eastern region, but the percentages of young trees of these cultivars indicate that they are not likely to increase significantly above this level, and may begin to decline somewhat in their share of total production. 'Empire' now ranks third in tree numbers, ahead of 'Rome' and 'Cortland,' and represents a major cultivar for the region. Nearly 92 percent of all 'Empire' trees are less that 12 years of age.

Other cultivars that have been planted in appreciable numbers during re-

Table 5. Rootstock and rootstock combinations—eight major scion cultivars, 1985.

Rootstock/ Interstem	NY State	Western NY	Eastern NY
	No. trees	No. trees	No. trees
MM.106	953,823	656,043	330,533
MM.111	581,009	250,476	297,780
M.7	455,149	240,236	214,913
M.9	236,659	214,745	21,914
M.26	226,267	150,575	75,692
M.9/MM.111	217,761	165,097	52,664
M.9/MM.106	197,938	165,705	32,233
Others	95,230	55,965	39,265
Totals	2,963,836	1,898,842	1,064,994

cent years include 'Tydeman Early,' 'Paulared' and 'Jonamac.' Plantings of these cultivars are indicative of a greater emphasis on increasing use of types that mature their fruit before 'McIntosh.' Of these three, the loss of Alar is most likely to influence the rate of future planting of 'Tydeman Early.'

The cultivars that have been decreasing in importance in the newer plantings in this region include 'Golden Delicious' and 'Cortland.' The potential for maintaining or increasing these cultivars is dependent upon the availability of superior strains or selections of similar types, such as 'Smoothee' and 'Redcort,' respectively.

When analyzing the situation in the Eastern region it is important to recognize the differences between the Hudson Valley and the Lake Champlain areas. Climatic differences in these two regions influence cultivar choice to an appreciable extent. Warm weather during the harvest season increases the difficulty of producing highly colored 'McIntosh' in many years in the Hudson Valley. Therefore, orchardists in this area have been deemphasizing this cultivar in new orchards in favor of those that appear to be better suited to the prevailing conditions. In the Lake Champlain area, however, susceptibility of cultivars to low winter temperature injury must be considered, making 'McIntosh' one of the more favored cultivars for planting. In addition, cooler temperature in late summer and fall in the Lake Champlain area promote better color development on 'McIntosh.'

Comparison of cultivars planted in four major counties of the Hudson Valley from 1975 through 1985 indicates the extent of the change in emphasis in this area and suggests one possible trend for future plantings in other areas of the state, Table 4. These data indicate that 'Empire has received the greatest attention in new plantings, followed principally by 'Delicious,' 'McIntosh,' and 'Rome.' These four cultivars include 68.4 percent of all trees in these young plantings. It should also be noted that 'Jonamac,' which was not introduced until 1972, represents the sixth most important cultivar in these plantings.

In contrast, a similar comparison of trees planted from 1975 through 1985 in the Lake Champlain area shows 'McIntosh' to represent 70.6 percent of the total; followed by 'Empire' with 7.2 percent; 'Paulared' with 6.5 percent; 'Delicious' with 5.1 percent; and 'Cortland' with 4.2 percent of the total trees.

General Comments

Particular emphasis is being placed on the selection of improved strains of cultivars when such are available. Several of the more highly colored strains of 'Delicious' and 'Rome' are evident in new plantings throughout the state. The 'Marshall,' 'Red Max' and other more recently available improved strains of 'McIntosh,' and 'Redcort' strain of 'Cortland' are appearing in increasing numbers. Likewise, 'Golden Delicious' types that are less subject to russeting, such as 'Smoothee,' are supplanting less desirable types. Unfortunately, data on tree numbers for the individual strains are not available.

Additional factors must be considered in regard to choices of cultivars for future plantings. Among these are the loss of Alar as a management tool, increasing concern about pesticides, and the appearances of "new" cultivars in the national apple markets. The loss of Alar for use in controlling preharvest drop and regulating maturation of 'McIntosh' can be expected to significantly influence the extent to which this cultivar is included in future plantings. In addition, loss of this tool may also be expected to be a critical factor in the future expansion of cultivars such as 'Jerseymac' and 'Tydeman Early,' and one of the factors limiting new plantings of 'Mutsu.'

Although none of the disease resistant cultivars has received much consideration to date, the pesticide issue may promote their use in future plantings. Those cultivars with multiple disease resistance, such as 'Liberty,' might be expected to be favored, at least in the initial plantings of such cultivars.

There is interest in new cultivars such as 'Jonagold,' 'Gala,' and others, but too little experience to determine their potential under New York conditions. With both of these cultivars, the availability of more highly colored strains would enhance their potential for future planting.

Rootstock and Rootstock/Interstem Combinations

In 1970 (1), trees on the clonally-propagated stocks accounted for only 31.8 percent of all trees in the state. By 1985, trees on these stocks accounted for 72.6 percent of all trees. Comparative numbers of trees of the eight major scion cultivars on the different rootstocks, statewide and in the Eastern and Western regions, are presented in Table 5.

With these eight scion cultivars, 75 percent of all trees were on size-controlling stocks in the Western region and 65 percent in the Eastern region. Trees on MM.106, MM.111, and M.7 accounted for 67 percent of all clonally propagated understocks statewide—60 percent in the Western region, and 79 percent in the Eastern region. Slightly over 90 percent of all trees on M.9, and 80 percent of those on the M.9/MM.111 and M.9/MM.106 combinations were in the Western region. The greater use of M.9 and the interstems in the Western region is attributable directly to the influence of Richard L. Norton in promoting grower adoption of high-density systems during his employment as an Extension Fruit Specialist in this region.

As orchardists continue their efforts toward use of higher-density planting systems, interstems and rootstocks of the more dwarfing classes can be expected to increase in importance. However, limitations of the stocks that are presently available must be recognized in their selection for use in meeting specific site and soil requirements. Cultivars that more nearly meet site-specific requirements can be expected to be planted if and when they become available.

References

1. NY Crop Reporting Service. New York Orchard and Vineyard Survey—1970. AMA Release No. 125. July 1971. 36 pp.
2. NY Agricultural Statistics Service, New York Orchard and Vineyard Survey—1985. November 1986. 90 pp.

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Blossom Season and Peach Seed Germination

A highly significant correlation was observed between time of bloom and the number of days required for resulting selfed seed to reach 80% germination of both local Mexican ($r = 0.71$) and introduced ($r = 0.87$) genotypes. Pollinating peaches with low chilling requirement with high chilling requirement types delayed germination up to 16 days compared to seeds from selfing. Reversing the process and putting pollen from low chilling requirement types on late blossoming types accelerated germination 20 to 24 days.

From: Perez-Gonzales, S. 1990. Relationship between parental blossom season and speed of seed germination in peach. HortScience 25(8):958-960.