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A Perspective on New England's Compact Apple Tree Industry

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New Englanders have been producing apples for the past 348 years. Today, our six-state-region accounts for just under 5% of the nation's apple supply, the product of some 669 commercial orchards encompassing a little more than 27,000 acres (1). Virtually all the fruit is produced and sold for fresh market consumption.

Within New England, 'McIntosh' is king representing 61% of all apples grown. 'Red Delicious' is second accounting for 17% of the crop followed in order by 'Cortland,' 'Golden Delicious' and 'Macoun.' These five cultivars represent 87% of the total production for the six-state-region. The trend toward 'McIntosh,' "McIntosh-types" (Paulared,' 'Empire,' etc.) and solid blush cultivars should continue because of the advantages due to climate, fruit quality and increasing consumer acceptance.

A revolution is in progress in the New England apple industry. To promote management efficiency, low density orchards of large old trees are being rapidly replaced by smaller trees at closer spacings. This dramatic shift has shown that during the past decade the numbers of standard trees have decreased 12%, and that trees on size-controlling rootstocks have increased 296% (2). Today, dwarf and semi-dwarf trees represent 41% of the total trees of all ages in New England, whereas in 1965, they totalled only 15%. For every ten trees planted today, nine are on size-controlling rootstocks. Averages show it takes about three semi-dwarf trees to replace the yield from one standard tree. Considering the decrease in the number of standard trees and recognizing the great increases in compact tree numbers, New England's apple industry should still maintain its present level of production over the next ten years. Therefore, yield is not the motivating factor behind the change-over to compact trees, but rather the following economic necessities:

1. Consistent production of top quality fruit at reduced costs per bushel.
2. Compact orchards are easier and faster to harvest. This means that growers can rely more on domestic pickers rather than be dependent on the highly-skilled foreign pickers whose availability is always uncertain given politics and the like.
3. Smaller trees can be more efficient and inexpensive to maintain.
4. Encroaching suburbia and high taxes which will limit the availability of new and old orchard sites in the future.

The health of New England's apple industry depends upon maximizing yields of quality fruit and economizing the management of our apple cultivars.

The two rootstocks that are "getting the job done" in New England, to some degree of satisfaction, are 'M.7'

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Table 1. The major clonal rootstocks being utilized in compact apple plantings in New England.

	McIntosh	Delicious	All others
M.7	50%	26%	42%
MM.106	25	27	26
M.26	9	19	11
Total	84%	72%	79%

and 'MM.106.' The 1976 data (Table 1) shows that 75% of the 'McIntosh' in New England are on 'M.7' (50%) and 'MM.106' (25%) (3). 'Red Delicious' are evenly spread with 26% on 'M.7' and 27% on 'MM.106,' for a total of 53% for the two stocks. All other apple cultivars share 68% of these two rootstocks, with 42% on 'M.7' and 26% on 'MM.106.' Other popular rootstocks which have been planted heavily within the last five years are 'M.26,' 'M.9,' 'MM.111' and interstem combinations. There has been such a drastic movement away from seedling and vigorous stocks like 'Robusta 5' that in 1976, 93% of all apple trees planted were on dwarf and semi-dwarf rootstocks. The so-called "vigourous stocks" are mostly being utilized as a last resort on difficult terrain and with spur-type cultivars.

Spanning the last 20 years and at least for the immediate future, New England growers will have to rate 'M.7' as their "bread winner" among the size-controlling rootstocks.

The current trend, showing a number of orchardists investing future crops on 'M.26' and interstem stocks, certainly reflects a lack of fear by our growers. Unfortunately, only time will tell if they ventured successfully.

Despite the overwhelming trend towards compact tree orchards, some New England growers still are lagging in removing old deteriorated orchards and blocks which have become liabilities. Meanwhile, their presence has created more expense than profit potential. We have found five basic reasons prompting this kind of rationale:

Table 2. Projected costs to remove an existing orchard, replant and manage for the first four growing seasons.[1, 2]

	Planting and growing years		
Trees/A	1977-80	1978-81	1979-82
100	$2174	$2326	$2488
200	2826	3024	3236
300	3705	3965	4242
400	4472	4784	5118
500	4884	5226	5591

[1]Assuming annual inflation of 7%.
[2]Excludes only cost of land and interest on investment in land.

1. The lingering hope of harvesting one or more profitable crops.
2. Some growers are too set in their ways to change.
3. There is no "next" generation to carry on the orchard.
4. Lack of sufficient finances to change over.
5. Some growers are not convinced that the change to compact trees is the way to go.

Perhaps the two most important problems and challenges facing growers and professionals in the transition to compact plantings are the following:

First, the "uncertain air" surrounding present day rootstocks, primarily the English stocks which have not proven to be totally ideal nor efficient for New England conditions. Simply stated, most of tomorrow's crop is being developed on rootstocks with known deficiencies. The classic example of uncertainty today, is that virtually every size-controlling rootstock planted in New England could be susceptable to a number of problems including brown line decline, fire blight, collar rot, winter injury, anchorage, soil and suckering problems, wooly aphids, etc.

The second problem is cost as it effects the change-over process. High costs are a significant limitation on the expansion of our industry. Figures show (Table 2) that costs would range from about $2,800 to $3,200 per

acre to remove an existing orchard from 1977 through 1980, and to establish a planting with 200 trees per acre and manage it for four years (4). Frequently, New England growers simply don't have sufficient capital, nor can they anticipate any major increase in profit levels, to afford changing-over without financial assistance. Can these high establishment and maintenance costs be justified? It is the feeling New England growers will have an increasing local market advantage, due to rising labor and transportation costs incurred by other apple regions shipping to eastern markets.

As New England's apple industry welcomes participation in the search for "ideal" rootstocks and their proper management, we are optimistic about the future. If during the next century we can realize and capitalize on advancements in dwarf rootstocks, planting systems, culture, storage, and marketing practices, New England's apple industry will remain competitive and successful. However, failure to cope with our problems, essentially the development of "ideal" apple rootstocks, will drive many individuals and businesses out of the industry.

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Segregation for Resistance to Black Rot in Selfed Grape Seedlings[1]

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Susceptibility to black rot (*Guignardia bidwellii* (Ell.) Viala and Ravaz) has been reported in *Vitis* species at levels varying from highly susceptible *V. vinifera* L. cultivars to highly resistant clones of *V. cinerea* Engelm., *V. rupestris* Scheele, and *V. rotundifolia* Michx. (2, 3, 4, 5). Immunity to black rot has been found in selections of *V. cinerea* and *V. rupestris*, and is being incorporated into horticulturally desirable cultivars (6). Artificially inoculated (1) young seedlings from crosses between resistant and susceptible cultivars demonstrated a quantitative inheritance pattern, with some seedlings exceeding either parent in susceptibility or resistance (3). The purpose of this paper is to report a clearcut segregation that occurred for black rot resistance on the fruit of mature S_1 seedlings of 'Blue Lake' grape.

Materials and Methods

Flower clusters of 'Blue Lake' bunch grape (7) were bagged with Kraft paper bags prior to opening in order to obtain selfed seeds in 1961. Seeds were vernalized, planted, and grown in the nursery in 1962, and transplanted to 2.5 x 7 ft (0.8 x 2.1 m) vineyard spacing in 1963. There were 58 plants in each of three replications. On the vines that fruited (1965 to 1967), individual vine records on black rot of the fruit were made. The segregation was subjected to Chi-square analysis for goodness-of-fit to genetic ratios.

Results and Discussion

A distinct segregation occurred between plants with little or no black rot on the fruit and those with numerous black rot lesions and mummied berries. There were no intermediate levels of resistance observed in the progenies.

'Blue Lake' is a resistant selection from the F_1 generation of a cross between Fla 43-47 (resistant) and 'Caco'

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