Overview of the Vineland Series

Apple Rootstocks

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Presentation Overview

**Vineland Series Apple Rootstocks**

- Description
- Attributes
- Availability
Rootstock differences can be subtle but significant.

Precocity, productivity, size control, disease resistance, cold hardiness, replant tolerance.
The Orchard System Puzzle

(Barritt, 1992)
APPLE ROOTSTOCKS

S.E. Wilson

(Replaces Fact Sheet “Apple Rootstocks”, Order No. 95-118 and portions of Publication 35a, Rootstocks for Fruit Trees)

High land values and increases in all other farming costs make it imperative that apples be produced economically and an early return on the investment be realized. The use of appropriate apple rootstocks has greatly improved the economics of growing apples.

Apple trees are not grown on their own roots but propagated on rootstocks that control the tree. Dwarfing rootstocks control wood production in the tree, directing its energy into fruit production. By choosing the rootstock for your needs and soil conditions, you can preselect, to a considerable extent, the size of your orchard trees at maturity. This choice, in itself, can save a great deal of labour in grading and picking, and time waiting for your trees to start cropping.

Dwarf trees grow apples where most, if not all, of the fruit can be picked without ladders. To improve efficiency in the picking operation and to increase yield per hectare, dwarf to semi-dwarf trees are planted at close intervals in the rows. This type of high-density planting provides a continuous tree wall of bearing surface to be sprayed and picked, thus reducing waste of time and materials.

High-density relates to maximum light interception by the leaves of the trees rather than specifically to the number of trees per hectare. For maximum light interception to occur, a minimum amount of sunlight is lost on the ground between trees. It has been shown that fruit size and total fruit production increases when light interception and utilization are increased. In general, the roots dwarf the rootstock, the better they load themselves to high density planting, with early economic return.

Most of the rootstocks available for apples were not bred or selected for western conditions in Canada. Consequently, the roots or stems suffer cold injury occasionally in certain locations across Ontario. Avoid excessive cultivation or fertilizing that induces late, immature growth. Flood cover with mulch under the trees provides protection for the roots against extremes of temperature.

Depending on which rootstock is used, apple trees may be broadly classified into 4 categories: dwarf, semi-dwarf, semi-vigorous or semi-vigorous, and vigorous or standard size. These are relative terms. Tree size at any age will vary with the cultivar, the soil, nutrition, pruning techniques, amount of cropping, and climate.

The number of rootstocks available commercially for dwarfing apple trees is steadily increasing. Not all of these rootstocks are suitable for apple production in Ontario. Before selecting a rootstock be sure to research the options available. These are varying opinions on the performance of the different rootstock depending on the environment under which they have been evaluated. The rootstocks listed in this fact sheet are the ones believed to have the most promise for Ontario growing conditions.

DWARF

These rootstocks have the added advantage of being very productive, with high yield efficiency. This allows growers to change cultivars as necessary without extended periods of low production. The traditional concern that an orchard is a lifetime venture must be abandoned considering the economic pressures of today.

Since the fruiting canopy is so close to the ground with dwarf rootstocks, do not plant on sites where accumulation of cold air causes frequent freeze conditions during the spring. Under such circumstances, loss of a crop can lead to excessive regrowth and crowding, which may prove difficult to control. Where heavy snow accumulations occur, limbs of trees on dwarf rootstocks may be damaged or pulled from the mists as the snow melts or settles.

Dwarfing rootstocks have a limited root volume and benefit from supplemental irrigation in dry seasons and in droughty soils. Dwarfing rootstocks also benefit from total tree support for the life of the orchard.
Description

- Developed by Dr. Alec Hutchinson
- ‘Kerr’ applecrab x ‘M.9’ rootstock
- Seven rootstocks in the series (‘V.1’, ‘V.2’-‘V.7’)
- Tested in 1980 (Washington, Ohio)
- Tested in 1994-2003 (NC-140)
- Tested in Simcoe 1997, 2002
- Tested in Manitoba and Edmonton (1997-)

Excluded V.5 and V.6
Tree size and cumulative yield of 10-yr-old Gala on 20 rootstocks

Orchard and Vineyard Show, Traverse City, MI – Jan 21-22, 2009
Mean tree size and cumulative yield for 10-Yr-old trees on various Vineland rootstocks

- **Tree size (Trunk x-sectional area, cm²)**

- **Cumulative yield (kg/tree)**

<table>
<thead>
<tr>
<th>Rootstock</th>
<th>Tree size</th>
<th>Cumulative yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.3</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>O.3</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>M.9</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>M.26</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>V.2</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>V.1</td>
<td>100</td>
<td>120</td>
</tr>
<tr>
<td>V.7</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>V.4</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

Orchard and Vineyard Show, Traverse City, MI – Jan 21-22, 2009
Cumulative Yields

Honeycrisp
- No statistical difference among roostocks

Royal Gala
- V.1 – 190% of M.26
- V.3 – 161% of M.26
- Bud.9 - 118% of M.26
- M.9E – 107% of M.26
- C.G.16 – 190% of M.26

Shizuka (No statistical difference)
- V.1 – 118% of M.26
- V.3 – 78% of M.26
- Bud.9 - 107% of M.26
- M.9E – 101% of M.26

Orchard and Vineyard Show, Traverse City, MI – Jan
TCSA – 7 Years

Tree Growth

- Honeycrisp < Royal Gala < Shizuka

For Honeycrisp

- V.1 – 81% of M.26
- V.3 – 70% of M.26
- Bud.9 - 62% of M.26
- M.9E – 66% of M.26

Orchard and Vineyard Show, Traverse City, MI – Jan 21-22, 2009
TCSA – 7 Years

For Royal Gala
- V.1 – 98% of M.26
- V.3 – 78% of M.26
- M.9 – 66% of M.26
- Bud.9 – 64% of M.26

For Shizuka
- V.1 – 92% of M.26
- V.3 – 60% of M.26
- M.9 E – 60% of M.26
- Bud.9 – 67% of M.26

Orchard and Vineyard Show, Traverse City, MI – Jan
Royal Gala/M.26
Dwarfing Characteristics of the Vineland Series Apple Rootstocks

Vigour as % of Standard

- M.27
- V.3
- V.5
- V.6
- M.9E
- B.9
- M.26
- V.2
- V.1
- M.7
- V.7
- V.4
- MM.106

Orchard and Vineyard Show, Traverse City, MI – Jan 21-22, 2009
Other Attributes

- Cold hardiness
  - Demonstrated in Edmonton planting
- Fireblight resistance
  - Orchard (OHIO) and lab evidence
Three Canadian rootstocks in the trials also showed strong survival rates. These included Ottawa 3, Vineland 1, and Vineland 3.


“Three Canadian rootstocks in the trials also showed strong survival rates. These included Ottawa 3, Vineland 1, and Vineland 3.”

-Geneva 16 and 36 are relatively new, they have been tested in several locations in New York and around the country, so they are ready for use now,” said Robinson. “Growers who plant these stocks will have the benefits of using the most highly productive and disease-resistant rootstocks around and will have some insurance against tree death from this type of winter damage.”

Growers may not be able to replant these new rootstocks immediately because the rootstocks are at the beginning of commercialization and not yet readily available. Three Canadian rootstocks in the trials also showed strong survival rates. These included Ottawa 3, Vineland 1, and Vineland 3.

“Growers may have to leave their plots open while they wait for commercial stock to become available, but that small amount of time will be a big help in the future of the farm,” said Robinson. “This exact type of winter cold snap may not happen for another 50 years, but if another event like 2004 comes, growers will protect themselves from losses by planting the new stocks.”

- Jan 21-22, 2009
# Summary of the characteristic and availability of the Vineland Apple Rootstocks

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Commercially Available</th>
<th>Under Test</th>
<th>Will not be commercialized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tree Vigor</strong></td>
<td>V.1 M.26 size</td>
<td>V.3 M.9E size or slightly smaller</td>
<td>V.4 MM.106-MM.111 Size</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td>Cameron Nurseries (cameronnursery.com)</td>
<td>DNA Gardens, Elnora, Alberta (dnagardens.com)</td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Yield Performance</strong></td>
<td>Similar or better than M.26</td>
<td>Similar to M.9E</td>
<td>Excellent, better than M.26E</td>
</tr>
<tr>
<td><strong>Yield Efficiency</strong></td>
<td>Similar or better than M.26</td>
<td>Similar to M.9E</td>
<td>Better than M.26</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>Cold Hardy, displays fireblight resistant</td>
<td>Cold Hardy, displays fireblight resistant</td>
<td>Cold Hardy, displays fireblight resistant</td>
</tr>
</tbody>
</table>

*NA = not available (rootstock has not been tested)*

Orchard and Vineyard Show, Traverse City, MI – Jan 21-22, 2009
Availability

- Commercial development by the University of Guelph and the Ontario Ministry of Agriculture.
- ‘V.1’, ‘V.2’ and ‘V.3’ have been licensed.
- More information is required to determine the suitability of commercializing ‘V.5’, ‘V.6’, and ‘V.7’.
- ‘V.2’ has been commercially released but has been difficult to propagate in the nursery, therefore it may have limited availability.
- ‘V.4’ will not be commercialized.
Further Information

- Contact the author (John Cline, Univ of Guelph)
- Dr. Stephen Bowley, Business Development Office, University of Guelph
  ([www.uoguelph.ca/research/bdo/](http://www.uoguelph.ca/research/bdo/))
  Tel: (519) 824-4120 Ext 58704
NC-140 Regional Rootstock Research Project

Cooperative State Research Education and Extension Service

North-Central Regional Association of Agricultural Experiment Station Directors (NCRA)

2004 Annual Meeting Information
Impacts and Research Needs Statement

Welcome to the NC-140 Regional Rootstock Research Project. The goal of these pages is to disseminate research information generated by pome fruit rootstock research projects throughout North America that are part of the NC-140 Regional Research Project. Additionally, the site offers NC-140 researcher and
Current Plantings

2002 Peach Rootstock Trial (Scott Johnson)

2002 Apple Rootstock Trial (Wes Autio)

2001 Peach Rootstock Trial (Greg Reighard)

1999 Dwarf Apple Rootstock Trial (Wes Autio)

1999 Semi-dwarf Apple Rootstock Trial (Wes Autio)

1998 Cherry Rootstock Trial
  - NC-140 Cherry Rootstock Pages
  - Preliminary Performance of Hedelfingen Cherry on Ten Rootstocks in the 1998 NC-140 Cherry Rootstock Trial
  - Preliminary Performance of Montmorency Cherry on Eleven Rootstocks in the 1998 NC-140 Trial

1998 G.16 Apple Rootstock Trial (Terence Robinson)

1994 Peach Rootstock Trial (Greg Reighard)

1994 Gala Dwarf Apple Rootstock Trial (Rich Marini)

1994 Gala Semi-dwarf Apple Rootstock Trial (Rich Marini)