Other Attributes

- Cold hardiness
  - Demonstrated in Edmonton planting
- Fireblight resistance
  - Orchard (OHIO) and lab evidence

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Cornell-developed apple rootstocks survive extreme winter
By Aaron Goldweber

GENEVA, NY: Last winter a "perfect freeze" in New York's Champlain Valley destroyed nearly 25,000 apple trees, resulting in losses projected to be as high as $2.5 million. But of this devastation comes the encouraging report that two new Cornell-developed rootstocks show strong resistance to unusually harsh conditions.

"The new rootstocks in our trial tolerated this cold snap and survived extremely well compared to those in growers' orchards on standard rootstocks," said Terence Robinson, associate professor in the department of horticultural sciences at the New York State Agricultural Experiment Station (NYSAES) in Geneva, NY. Among five rootstocks showing the most hardiness were Geneva 30 and Geneva 16, which exhibited 96 and 92 percent survivability, respectively.

In commercial orchards, apple varieties are grafted onto rootstocks that help growers control tree size and productivity, and manage pests, diseases, and environmental stress. During a 20-year period from the mid-1970s through the mid-1990s, two Cornell researchers working at the NYSAES, James Cummins and Herb Aldwinckle, developed the apple rootstocks for tolerance to fire blight, a devastating bacterial disease.

"Their survival this past winter demonstrates another important characteristic--extreme cold-hardiness," said Robinson, who specializes in tree fruit systems. Ian and Kevin Lungerman, extension associate with Cornell Cooperative Extension's Northeast New York Commercial Fruit Program, have a five-acre, 1,200-tree rootstock trial comparing 16 rootstocks at Chazy Orchards in the Champlain Region.

Planted in 2001, trees in the trial were in a unique location to show the effects of the 2003-04 winter, which was one of the harshest of the last 50 years. The stress of bearing the large apple crop of 2003 coupled with mild temperatures in the fall and early winter made the apple trees extremely vulnerable to conditions that followed. A late-December and early-January thaw was followed by rains that saturated the ground and eliminated the snow cover that usually insulates tree roots. In the space of 24 hours, the mercury plunged to extreme sub-zero temperatures and stayed there. The freeze penetrated the soil and damaged root systems, especially those of trees that were three to five years old.

According to a survey taken in June by Lungerman, 24,032 trees were lost coming out of the 2003-04 dormant season. This number is on the rise now that the consequences of summer stress and cropload are showing at harvest. Trees that initially appeared to survive are now seen as lost. The survey showed the freeze killed trees of all ages but not younger and more productive trees planted.

The 25,000 trees lost represent only about five percent of the county's apple trees, but they were predominantly young orchards representing the recent investments by growers and the future production of the area. Growers will have to make considerable new investments to replant the lost orchards.

The economic impact of the loss will not be clear for some time, but Robinson has some numbers that can be used as a starting point. "Each tree that is three- to five-years-old and is killed represents a $50 loss if it was McIntosh and a $100 loss if it was Honeycrisp," he said. "Even working with the assumption that all of the lost trees were McIntosh, the current losses represent $1.23 million. And that doesn't include the cost of replanting." This monetary loss includes the original tree cost and the lost production time while waiting for replacement trees to begin bearing fruit.

To avoid the same level of damage in the future, growers are advised to choose wisely among commercially available rootstocks when replanting.

"Although Geneva 16 and 30 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. These 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."

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- *"Three Canadian rootstocks in the trials also showed strong survival rates. These included Ottawa 3, Vineland 1, and Vineland 3. "*
- *(Cornell University Press Release, Sept 24 2004)*

Summary of the characteristic and availability of the Vineland Apple Rootstocks

	Commercially Available			Under Test			Will not be commercial-ized
Characterisistic	V.1	V.2	V.3	V.5	V.6	V.7	V.4
Tree Vigor	M.26 size	M.26 Size	M.9E size or slightly smaller	M.9E Size or slightly smaller	M.9E Size or slightly smaller	M.7 Size	MM.106-MM.111 Size
Availability	Cameron Nurseries (cameronnursery.com)	Not commercially available	DNA Gardens, Elnora, Alberta (dnagardens.com)	Not commerciall y available	Not commerciall y available	Not commerciall y available	Not available
Yield Performance	Similar or better than M.26	Similar or better than M.26	Similar to M.9E	NA	NA	Excellent, better than M.26E	Similar to M.26
Yield Efficiency	Similar or better than M.26	Similar or better than M.26	Similar to M.9E	NA	NA	Better than M.26	
Features	Cold Hardy, displays fireblight resistant	Cold Hardy, displays fireblight resistant	Cold Hardy, displays fireblight resistant	NA	NA	Cold Hardy, displays fireblight resistant	Cold Hardy, displays fireblight resistant

NA = not available (rootstock has not been tested)

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/)

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

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Impacts and Research Needs Statement

2003 Annual Meeting Minutes / 2003 Annual Report

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

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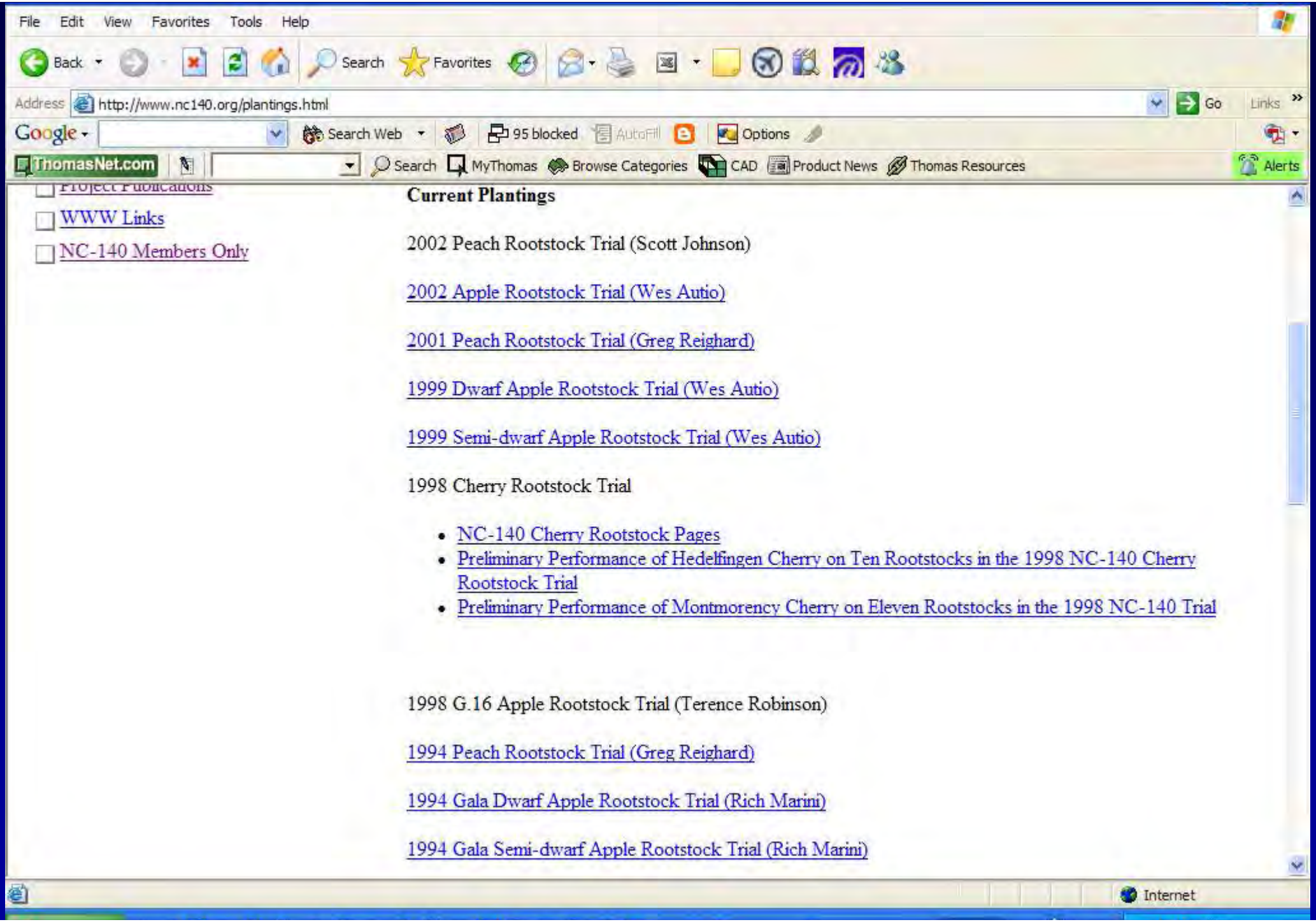
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