

## Apple Rootstocks, an Update from the NC-140 Research Committee

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The NC-140 Multi-state Research Committee began officially in 1977 with a membership of 21 scientists from 20 U.S. states and one Canadian province. Many people have come and gone during its 32 years of its existence. Currently, NC-140 is comprised of 44 scientists from 24 U.S. states, 3 Canadian provinces, and one Mexican state. NC-140's original and continuing mission is to evaluate tree-fruit rootstocks in a wide range environmental conditions for potential adoption in North America. The candidate rootstocks have come from North American, European, and Asian breeding programs. To date, 25 cooperative apple rootstocks trials (as well as several pear, peach, cherry, and plum trials) have been established, averaging 12 North American sites per trial. Over 100 different apple rootstocks have been evaluated in these trials. These rootstocks include 13 of the Budagovsky series from Russia, 37 from Cornell-Geneva in New York, seven JM rootstocks from Japan, 14 East Malling rootstocks (including 8 strains of M.9), four MAC rootstocks from Michigan, six of the P series from Poland, nine Pillnitz rootstocks from Germany, and a number of others. The geographical distribution of NC-140 plantings range from Georgia, Texas, and California to Oregon, Minnesota, and Maine in the U.S., including 32 states.

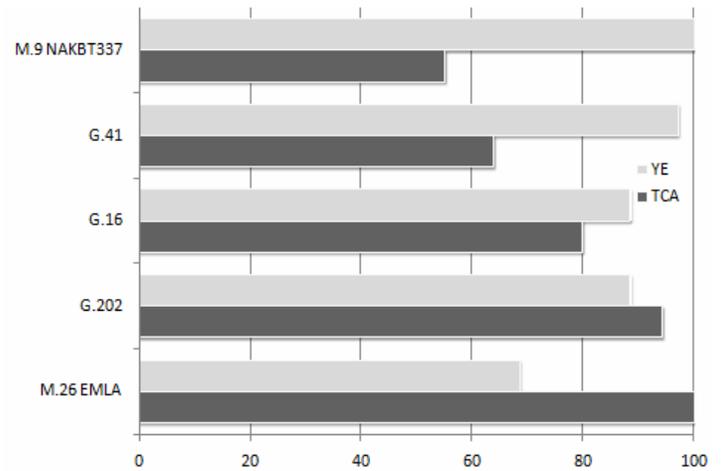


Figure 1. Relative performance of Fuji apple trees on several rootstocks in the 1999 NC-140 Dwarf Apple Rootstock Trials (through 10 growing seasons).

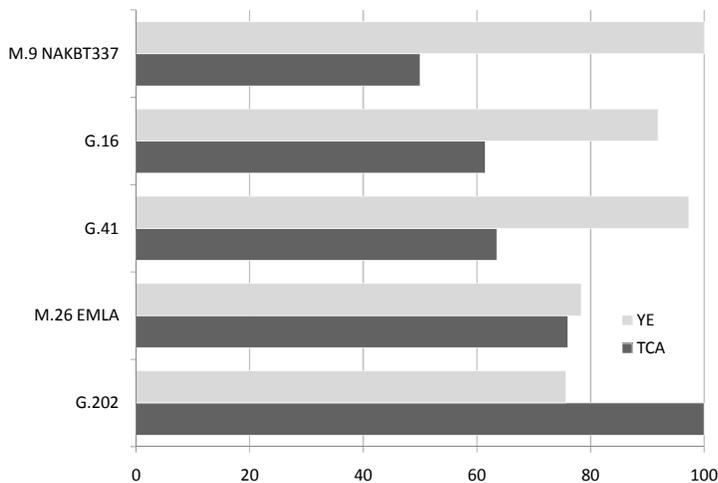


Figure 2. Relative performance of McIntosh apple trees on several rootstocks in the 1999 NC-140 Dwarf Apple Rootstock Trials (through 10 growing seasons).

In Canada, five provinces from British Columbia to Nova Scotia have planted trials. One Mexican and one Australian state have also been the location of NC-140 plantings. This wide distribution of climates and soils has allowed a very thorough evaluation of these rootstocks. These evaluations are the foundation of all North American apple rootstock recommendations.

As you might expect, most of these rootstocks did not perform well, or at least well enough to recommend widespread adoption. Throughout all of these many trials, one of the oldest rootstocks, M.9, has consistently

produced high yield efficiencies with large fruit size. Unfortunately, it has also experienced the greatest tree loss, due mostly to its sensitivity to fireblight. B.9 was first planted in 1984 and has performed well also. It produces a tree similar to the small M.9 strains and has not experienced a great amount of tree death. Tree size and yield efficiency of trees on some of the newer rootstocks in current trials are presented in the following figures. The standout in these trials is G.41 for a moderate M.9-sized tree. G.41 may have somewhat greater yield efficiency than M.9 NAKBT337, but it certainly has better survival (87% of trees on G.41 alive after 10 years in the 1999 NC-140 trials, and only 63% of trees on M.9 NAKBT337 alive).

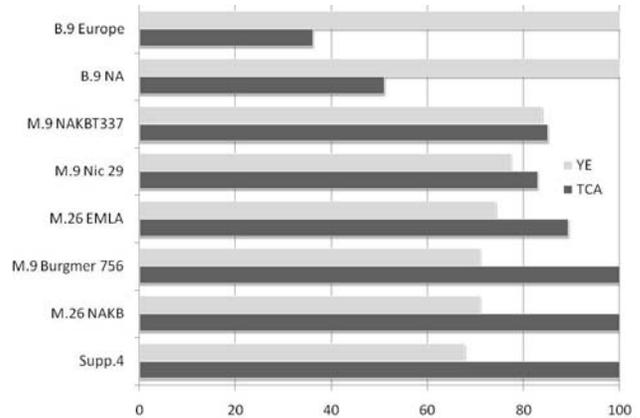


Figure 3. Relative performance of Gala apple trees on several rootstocks in the 2002 NC-140 Apple Rootstock Trials (through 7 growing seasons).

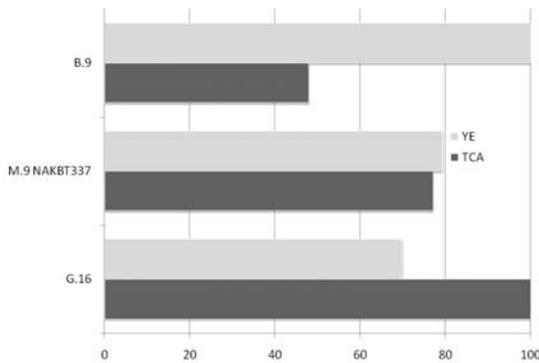


Figure 4. Relative performance of Cameo apple trees on three rootstocks in the 2002 NC-140 Cameo Apple Rootstock Trials (through 8 growing seasons).

Several new releases are imminent. These include one in the M.26 size, G.214. Others soon to be released are closer to semidwarf size: G.890, G.969, G.087, G.874, and G.210. We do not expect to see any of these in the commercial market in the near future.

The NC-140 Research Committee will continue to evaluate new rootstocks. New rootstocks are becoming available from East Malling in Great Britain, but most new rootstocks will be from the very active breeding program in Geneva, New York (a cooperative effort between USDA and Cornell University).

Of the newest rootstocks, the Geneva rootstocks are likely to be the ones of choice. All have some degree of fireblight tolerance or resistance. Some resist collar rot and wooly apple aphid. The fireblight tolerance, however, is the most significant improvement over older rootstocks and those from many other parts of the world. Many Geneva rootstocks are in the pipeline. G.16 and G.30 are generally commercially available. Newer rootstocks which are considered good alternatives to M.9 and B.9 are G.11 and G.41. G.11 has been built up in the nurseries so that it will be widely available in about 2 years. G.41 possibly will be a year behind.

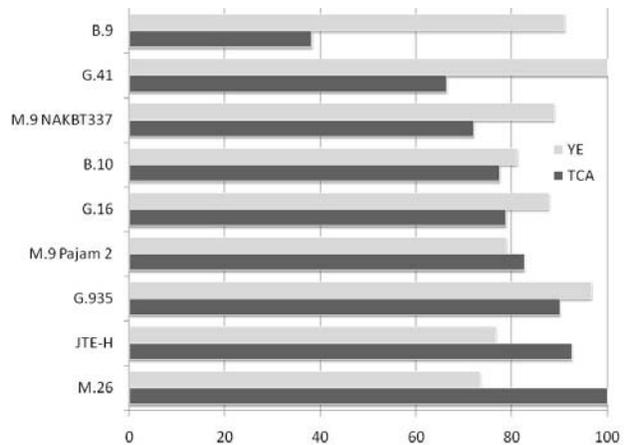


Figure 5. Relative performance of Golden Delicious apple trees on several rootstocks in the 2003 NC-140 Dwarf Apple Rootstock Trials (through 6 growing seasons).