Matching New Rootstock Traits (Dwarfing, Productivity, Disease Resistance) with ‘Honeycrisp’ Apple for Michigan

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Objectives

To acquire new apple rootstocks (see Table 1) with improved traits and evaluate their effect on growth, fruiting, resistance to insects/diseases, cold hardiness, and mortality, with particular respect to growing ‘Honeycrisp’ in key Michigan apple regions.

Performance of Semi-Vigorous Rootstocks (Traverse City)

In these northern Michigan trials on sandy soils, trees with more vigor than on M.9 have been most yield efficient (productivity per tree “footprint” in the orchard) on a number of new stocks, including CG.6969, CG.5046, CG.5890, CG.5087 and CG.5935 (see red stars below in Fig. 1A). Three of these have now been released commercially as G.969, G.890, and G.935.

- All three, ‘Honeycrisp’ on G.935 has been the closest in vigor to M.7 (Fig. 1B). As apple growers on the Ridge adopt high efficiency training systems like the Tall Spindle, the larger vigor level for suitable new rootstocks is that imparted by M.9. Over 9 years, ‘Honeycrisp’ has been most yield efficient on CG.5935 (Fig. 2A), significantly greater (+18%) than M.9, yet CG.5935 has been only slightly (5%) more vigorous (Fig. 2B). Somewhat less yield efficient, but still higher (+15%) than M.9, has been CG.5179 and CG.4210, which are 4% and 21% less vigorous than trees on M.9. Unfortunately, CG.5935 has not been released commercially, so its performance elsewhere in the U.S. (including at Traverse City) has been similar to that of G.935.

Performance of Vigor-Limiting Rootstocks (Belding)

As apple growers on the Ridge adopt high efficiency training systems like the Tall Spindle, the larger vigor level for suitable new rootstocks is that imparted by M.9. Over 9 years, ‘Honeycrisp’ has been most yield efficient on CG.5935 (Fig. 2A), significantly greater (+32%) than M.9, yet CG.5935 has been only slightly (5%) more vigorous (Fig. 2B). Somewhat less yield efficient, but still higher (+15%) than M.9, has been CG.5179 and CG.4210, which are 4% and 21% less vigorous than trees on M.9. Unfortunately, CG.5935 has not been released commercially, so its performance elsewhere in the U.S. (including at Traverse City) has been similar to that of G.935.

Performance of Vigor-Limiting Rootstocks (Sparta)

‘Honeycrisp’ on a new cohort of Cornell elite and international rootstocks, planted in 2010 near Sparta, is part of an NC140 regional research trial that is coordinated across North America. In terms of vigor, trees on B.7-20-20 already are clearly too vigorous and those on B.71-7-22 are too weak for commercial interest.

Conclusions

- Yields were poor or nil at each trial site due to an extraordinary early bloom and subsequent late April freeze events in 2012.
- Since the 2014 trials began near Belding and Traverse City, the data collected has contributed to the USDA-Cornell decision to release three of the tested rootstocks: CG.5935, CG.5890, and CG.935, all of which are very resistant to fire blight; low suckering; tolerant of Phytophthora and replant disease complex; and the latter two are highly resistant to wooly apple aphid.