Evaluation of Peach Rootstocks: 2009 NC-140 Peach Rootstock Trial through Seven Growing Seasons

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Like all other temperate tree-fruit crops, peach varieties are propagated by grafting. Seedlings have long been the norm for rootstock, with most of the seeds coming from prescribed crosses. Lovell and Bailey are among the most common seedling rootstocks used for peaches in the Northeastern U.S. The NC-140 Multi-State research committee has evaluated peach rootstocks for 30 years. Some of the new rootstocks in the NC-140 trials have been clonally propagated and included genetics of peach and other *Prunus* species. The primary goal of NC-140 evaluations has been to find peach rootstocks with greater longevity, particularly under some of the disease pressures of the significant peach-growing regions of the U.S. Some of these rootstocks, however, are interesting for other reasons, such as vigor control and effects on cropping and fruit size.

As part of the 2009 NC-140 Peach Rootstock Trial, a planting of Redhaven on 15 rootstocks was established in the spring of 2009 at the University of Massachusetts Cold Spring Orchard Research & Education Center in Belchertown. See below for the genetics and origin of these rootstocks. Trees grew well in their first seven seasons. It is important to note that these trees experienced a heavy snowstorm at the end of October 2011. Leaves were still present, and some scaffold breakage

Rootstocks included in the 2009 NC-140 Peach Rootstock Trial planted on May 6, 2009 at the UMass Cold Spring Orchard Research & Education Center.

Rootstock	Genetics	Source	Origin
Lovel	Peach	California (1882 selection drying cultivar)	USA -- CA
Guardian	Peach	USDA/Clemson University	USA -- SC
HBOK 10	Peach	University of California Davis	USA -- CA
HBOK 32	Peach	University of California Davis	USA -- CA
KV010-123	Peach	Ralph Scorza, USDA Kearneysville	USA -- WV
KV010-127	Peach	Ralph Scorza, USDA Kearneysville	USA -- WV
Prunus americana	American Plum	Bailey's Nurseries	USA -- MN
Penta	European Plum	Istituto Sperimentale per la Frutticoltura	Italy
Controller 5	Japanese Plum x Peach	University of California Davis	USA -- CA
Krymsk 86	Myrobolan Plum x Peach	Krymsk Breeding & Research Station	Russia
Krymsk 1	Nanking Cherry x Myrobolan Plum	Krymsk Breeding & Research Station	Russia
Bright's Hybrid #5	Almond x Peach	Bright's Nursery	USA -- CA
Mirobac	Myrobolan Plum x Almond	Agromillora Catalana	Spain
Atlas	Peach x Almond x Flowering Plum	Zaiger's Genetics	USA -- CA
Viking	Peach x Almond x Flowering Plum	Zaiger's Genetics	USA -- CA

Table 1. Trunk size, root suckering, yield, yield efficiency, and fruit size in 2015 of Redhaven peach trees in the 2009 NC-140 Peach Rootstock Trial at the UMass Cold Spring Orchard Research & Education Center, Belchertown, MA. All values are least-squares means, adjusted for missing subclasses and for crop load in the case fruit weight.[z]

Rootstock	Trunk cross-sectional area (cm^2)	Root suckers (no./tree, 2009-15)	Yield per tree (kg)	Yield efficiency (kg/cm^2)	Fruit weight (g)
Atlas	180 abc	0.1 b	17 ab	0.10 bc	170 a
Brights Hybrid 5	159 bc	0.0 b	15 ab	0.09 bc	171 a
Controller 5	58 d	0.0 b	11 b	0.21 a	168 a
Guardian	211 a	0.3 b	17 ab	0.08 c	178 a
HBOK 10	148 c	0.5 b	14 ab	0.10 bc	173 a
HBOK 32	144 c	0.3 b	18 ab	0.13 bc	165 a
KV010-123	151 bc	0.5 b	18 ab	0.12 bc	175 a
KV010-127	171 abc	1.5 b	16 ab	0.10 bc	174 a
Krymsk 1	82 d	3.8 b	12 b	0.16 ab	198 a
Krymsk 86	174 abc	0.0 b	16 ab	0.10 bc	175 a
Lovell	186 ab	0.0 b	20 a	0.11 bc	177 a
Mirobac	151 bc	3.3 b	17 ab	0.12 bc	162 a
Prunus americana	88 d	129.8 a	18 ab	0.22 a	171 a
Penta	160 bc	9.4 b	14 ab	0.09 bc	178 a
Viking	174 abc	0.0 b	16 ab	0.10 bc	198 a

[z] Means were separated within columns by Tukey's HSD (P = 0.05).

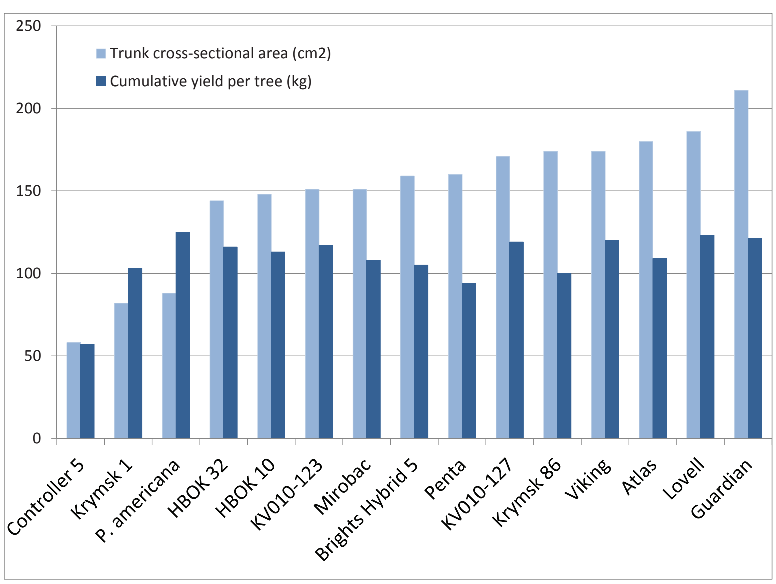

Figure 1. Trunk cross-sectional area (2015) and cumulative yield per tree (2011-15) of Red Haven trees in the Massachusetts planting of the 2009 NC-140 Peach Rootstock Trial.

occurred. Where possible, scaffolds were pulled back and bolted into place. All of these trees have grown and performed normally. The planting includes eight replications in a randomized-complete-block design. Means from 2015 (seventh growing season) are included in Tables 1 and 2 and Figure 1.

At the end of the 2015 season, largest trees were on Guardian, Lovell, Atlas, Viking, Krymsk 86, and KV010-127, and smallest trees were on Controller 5, Krymsk 1, and *Prunus americana* (Table 1, Figure 1). Trees on Penta, Bright's Hybrid 5, KV010-123, Mirobac, HBOK 10, and HBOK 32 were intermediate to

Table 2. Cumulative yield, cumulative yield efficiency, and average fruit size of Redhaven peach trees in the 2009 NC-140 Peach Rootstock Trial at the UMass Cold Spring Orchard Research & Education Center, Belchertown, MA. All values are least-squares means, adjusted for missing subclasses.[z]

Rootstock	Cumulative yield per tree (2011-15, kg)	Cumulative yield efficiency (2011-15, kg/cm^2)	Average fruit weight (2011-15, g)
Atlas	109 a	0.62 d	188 a
Brights Hybrid 5	105 a	0.66 d	181 a
Controller 5	57 b	1.02 bc	172 a
Guardian	121 a	0.59 d	190 a
HBOK 10	113 a	0.83 cd	182 a
HBOK 32	116 a	0.81 cd	179 a
KV010-123	117 a	0.78 cd	181 a
KV010-127	119 a	0.71 cd	184 a
Krymsk 1	103 a	1.32 ab	186 a
Krymsk 86	100 a	0.59 d	180 a
Lovell	123 a	0.67 d	186 a
Mirobac	108 a	0.74 cd	176 a
Prunus americana	125 a	1.50 a	188 a
Penta	94 a	0.60 d	186 a
Viking	120 a	0.72 cd	184 a

[z] Means were separated within columns by Tukey's HSD (P = 0.05).

the two groups (Table 1, Figure 1). Substantially more suckering occurred from trees on *P. americana* than from any other rootstock (Table 1).

Greatest yields in 2015 were harvested from trees on Lovell, and the lowest yields were harvested from those on Controller 5 and Krymsk 1, with all others intermediate in yield (Table 1). On a cumulative basis (2011-15), yield was similar among most trees, except that yield from trees on Controller 5 was significantly lower than all others (Table 2, Figure 1). The most yield efficient trees in 2015 were on *P. americana* and Controller 5, and the least efficient trees were on Guardian (Table 1). Cumulatively (2011-15), yield efficiency was greatest for trees on *P. americana* and lowest for trees on Bright's Hybrid 5, Lovell, Atlas, Krymsk 86, Penta, and Guardian (Table 2). Fruit size in 2015 and on average (2011-15) was not different among rootstocks (Tables 1 and 2).

Under Northeastern conditions in this trial, most peach rootstocks performed similarly. It is interesting, however, to look more closely at the dwarfing rootstocks. In this trial, trees on Controller 5, Krimsk 1, and *P. americana* were all substantially smaller than trees on all other rootstocks. Yield per tree was significantly lower in 2015 for those on Controller 5 and Krymsk 1 than trees on Lovell, but trees on *P. americana* yielded similarly to those on Lovell. Cumulatively (2011-15), trees on Krymsk 1 and *P. americana* yielded similarly to trees on Lovell, but trees on Controller 5 yielded less. Yield efficiency (yield per trunk size) in 2015 and cumulatively was high for all three dwarf peach trees. Overall, Controller 5 results in trees of very low vigor which appear weak in the field. Yield per tree is low, but because of the small size, efficiency is good. Trees on Krymsk 1 and *P. americana*, however, are dwarf but produce a comparable levels per tree to the much more vigorous rootstocks. *P. americana* is a prolific producer of root suckers, which may limit its commercial value.

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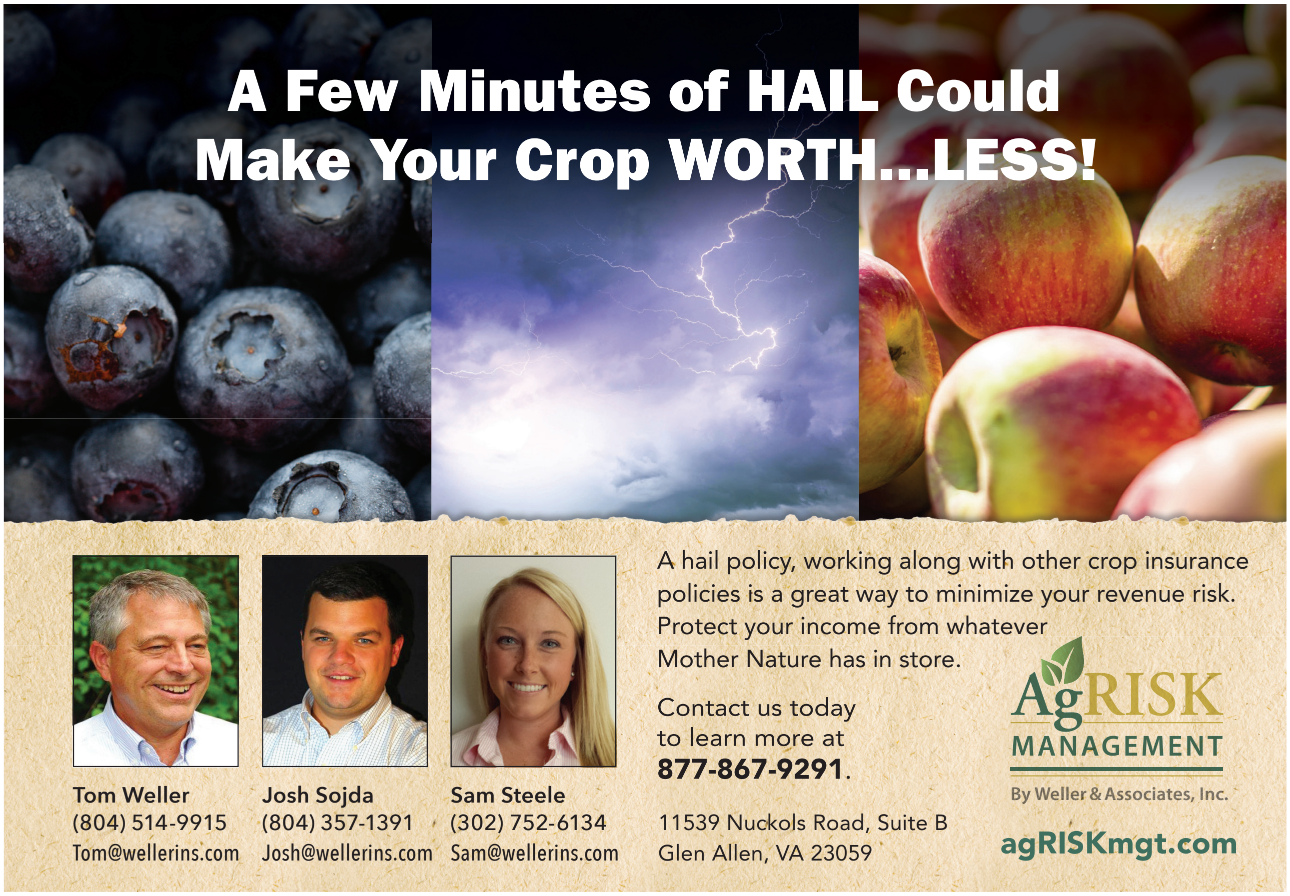
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