

2009 Peach Trial Report – 2012

Cooperative Regional Project NC-140 “Improving Economic and Environmental Sustainability in Tree-Fruit Production through Changes in Rootstock Use”

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2009 NC-140 Peach Rootstock Trial - All Locations

A. Progress of Work and Principal Accomplishments

A test planting of 18 *Prunus* rootstock cultivars and selections budded with ‘Redhaven’ peach was planted at 16 locations in North America in 2009. Third-year (2011) performance of 12 rootstocks from 14 locations is summarized (Table 1). Overall, every rootstock in Table 1 except BH-5 and Krymsk®1 (both 81%) had >87% survival after 3 years. Tree TCSA on Viking and BH-5 were significantly larger than Lovell while TCSA of trees on KV010123, KV010127, HBOK 10, HBOK 32 and Krymsk®1 were significantly smaller than on Lovell.

Third-year performance of all 18 rootstocks at 14 locations is summarized in Tables 2-5. Tree growth varied largely across locations (Table 2). Growth was best in CA followed by NY (Geneva), MO, SC, and AL. In contrast, growth was very limited at sites in NC, CO, UT and MX with NC on a deep, infertile sand and the latter 3 having calcareous soil conditions.

Survival was excellent in AL, CA, CO, MA, NC, NY (Geneva), PA, SC and UT and fair to very good at the other sites (Table 3). Mirobac, Krymsk®1 and Guardian® tended to sucker slightly more than the other rootstocks but *Prunus americana* was by far the worst for suckering after 3 years (data not shown).

Yield data varied widely among sites in 2011 (Table 4). CA had by far the best yields followed by NY (Geneva) and then MA and SC. MO and NC were slightly less while the other sites had non-commercial yields. AL over-thinned with a growth regulator and UT (South Shore) had a freeze, so no fruit were harvested. The highest yielding rootstocks were the peach and peach x almond hybrids (also the most vigorous) as well as Krymsk®86. The rootstocks that had the highest yield efficiency were HBOK 10, HBOK 32 and Krymsk®1 (Table 1).

Average fruit weight varied significantly among locations and rootstocks (Table 5). SC, UT, and CA had the largest mean fruit size followed by MO, MA and NC. NY (Geneva) had the smallest fruit. Trees on *P. americana* and KV010123 had fruit in the largest size category statistically at most sites.

| Table 1. Third-year performance of Redhaven on 12 rootstocks at 14 locations as part of Cooperative Regional Project NC-140. ^z | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----|--------------------|----|-------------|-----|-------------|------|------------|------|-----------------------|----|
| | Survival ^z | | TCSA | | No. of | | Total Yield | | Mean Fruit | | Yield Efficiency | |
| | (%) | | (cm ²) | | Rootsuckers | | (kg) | | Weight (g) | | (kg/cm ²) | |
| Rootstock cultivar | Fall 2011 | | Fall 2011 | | Fall 2011 | | 2011 | | 2011 | | 2011 | |
| Viking | 87 | bcd | 58.1 | a | 0.02 | d | 17.5 | a | 171 | bcde | 0.24 | bc |
| Atlas | 88 | bcd | 56.7 | ab | 0.09 | cd | 16.8 | ab | 170 | bcde | 0.19 | d |
| BH-5 | 81 | d | 59.9 | a | 0.42 | cd | 16.8 | ab | 173 | bcd | 0.19 | d |
| Mirobac | 97 | ab | 54.7 | ab | 1.95 | b | 14.1 | cde | 162 | de | 0.21 | dc |
| Guardian® | 96 | ab | 56.8 | ab | 1.08 | bcd | 14.4 | bcd | 169 | bcde | 0.19 | d |
| Lovell | 97 | ab | 54.1 | b | 0.64 | cd | 14.6 | bcd | 166 | cbde | 0.19 | d |
| KV010123 | 95 | ab | 44.1 | cd | 0.54 | cd | 15.9 | abc | 177 | b | 0.25 | bc |
| KV010127 | 93 | abc | 46.6 | c | 0.62 | cd | 13.3 | def | 169 | bcde | 0.21 | dc |
| Krymsk®86 (Kuban 86) | 92 | abc | 53.7 | b | 0.24 | cd | 14.1 | cde | 165 | cde | 0.19 | d |
| HBOK 10 | 94 | ab | 37.6 | e | 0.01 | d | 13.5 | cdef | 169 | bcde | 0.29 | a |
| HBOK 32 | 92 | abc | 40.2 | de | 0.18 | cd | 12.9 | def | 160 | e | 0.28 | ab |
| Krymsk®1 (VVA-1) | 81 | d | 25.6 | f | 1.37 | bc | 11.7 | efg | 175 | bc | 0.32 | a |

^z Mean separation within columns by Duncan's multiple range test ($P= 0.05$)

Table 2. Trunk cross-sectional area (cm²) by location of Redhaven on 18 rootstocks after 3 growing seasons in the 2009 NC-140 Peach Rootstock Trial.^Z

| | | Alabama | California | Colorado | Illinois | Kentucky | Massachusetts | Missouri | | | | | | | |
|---------------------------|--|---------|------------|----------|----------|----------|---------------|----------|-----|------|------|------|-----|-------|------|
| Rootstock cultivar | | | | | | | | | | | | | | | |
| Viking | | 82.3 | bc | 131.2 | ab | 25.5 | abc | 49.1 | abc | 47.3 | abc | 66.4 | bcd | 98.6 | a |
| Atlas | | 74.9 | bcd | 133.3 | ab | 30.9 | a | 36.3 | cde | 46.0 | abc | 75.3 | ab | 54.7 | d |
| BH-5 | | 80.1 | bc | 147.7 | a | 28.5 | ab | 51.7 | ab | 51.2 | abc | 66.6 | bcd | 80.1 | abcd |
| Mirobac | | 96.2 | ab | 73.3 | cd | 17.1 | de | 57.5 | a | 53.9 | a | 56.9 | d | 100.4 | a |
| Guardian® | | 107.5 | a | 134.7 | ab | 26.0 | abc | 37.4 | bcd | 47.9 | abc | 83.0 | a | 83.7 | abc |
| Lovell | | 66.7 | cde | 136.2 | ab | 20.6 | cd | 59.1 | a | 44.8 | abcd | 74.1 | ab | 79.2 | abcd |
| KV010123 | | 57.0 | cdef | 128.6 | ab | 12.3 | ef | 34.9 | cde | 40.8 | cd | 57.4 | d | 91.5 | ab |
| KV010127 | | 58.7 | cdef | 113.3 | b | 18.1 | de | 51.3 | ab | 42.4 | bcd | 66.3 | bcd | 86.5 | abc |
| Krymsk®86 (Kuban 86) | | 61.3 | cdef | 126.8 | ab | 22.5 | bcd | 41.6 | bcd | 52.4 | ab | 64.7 | bcd | 100.1 | a |
| Empyrean®2 (Penta) | | 66.4 | cde | 81.8 | c | 21.3 | cd | -- | -- | -- | -- | 69.1 | bc | 84.8 | abc |
| Empyrean®3 (Tetra) | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Imperial California | | -- | -- | -- | 20.8 | cd | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| HBOK 10 | | 23.7 | g | 78.4 | c | 17.1 | de | 41.7 | bcd | 30.2 | e | 60.0 | cd | 61.9 | cd |
| HBOK 32 | | 36.2 | fg | 76.4 | c | 17.5 | de | 42.4 | bcd | 35.4 | de | 60.3 | cd | 65.5 | bcd |
| <i>Prunus americana</i> | | -- | -- | 39.4 | e | 13.2 | ef | 33.6 | de | 27.8 | ef | 42.3 | e | -- | -- |
| Fortuna | | -- | -- | -- | 20.4 | cd | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Krymsk®1 (VVA-1) | | 48.9 | defg | 46.8 | e | 10.7 | f | 22.9 | ef | 18.3 | f | 36.5 | e | 31.3 | e |
| Controller 5 (K146-43) | | 42.8 | efg | 50.9 | de | 9.0 | f | 15.7 | f | 30.0 | e | 17.6 | f | 60.8 | cd |

Table 2. Trunk cross-sectional area (cm²) by location of Redhaven on 18 rootstocks after 3 growing seasons in the 2009 NC-140 Peach Rootstock Trial (continued).^z

| | | | | | New York | | | | | | Utah | | Utah | |
|-------------------------|--------|----|----------------|------|----------|------|--------------|------|----------------|-----|-------------|-------|---------------|----|
| | Mexico | | North Carolina | | (Geneva) | | Pennsylvania | | South Carolina | | (Kaysville) | | (South Shore) | |
| Rootstock cultivar | | | | | | | | | | | | | | |
| Viking | -- | | 31.1 | cde | 92.1 | abcd | 56.8 | ab | 83.4 | ab | 49.8 | ab | 26.3 | bc |
| Atlas | -- | | 31.9 | cde | 103.3 | ab | 61.5 | a | 83.8 | ab | 44.7 | abc | 28.1 | ab |
| BH-5 | 63.3 | a | 38.8 | ab | 97.3 | abc | 57.7 | ab | 87.3 | ab | 51.7 | a | 34.7 | a |
| Mirobac | -- | | 41.8 | a | 92.5 | abcd | 55.7 | abc | 92.3 | a | 33.9 | de | 28.2 | ab |
| Guardian® | 38.2 | b | 25.9 | cdef | 94.3 | abc | 55.4 | abc | 82.9 | abc | 41.3 | bcde | 17.3 | de |
| Lovell | 36.4 | b | 32.6 | bc | 103.7 | a | 51.5 | bcde | 80.2 | bcd | 41.1 | bcde | 14.3 | de |
| KV010123 | 26.8 | b | 23.4 | ef | 56.8 | ef | 45.2 | def | 72.1 | d | 38.9 | cde | 10.2 | ef |
| KV010127 | 35.6 | b | 24.1 | def | 74.3 | cde | 49.3 | bcde | 73.9 | cd | 37.4 | cde | 14.0 | de |
| Krymsk®86 (Kuban 86) | 34.5 | b | 26.3 | cdef | 91.3 | abcd | 54.8 | abcd | 78.9 | bcd | 41.9 | abcde | 21.0 | cd |
| Empyrean®2 (Penta) | 33.2 | b | 24.4 | def | 76.3 | bcde | 46.7 | cdef | 55.3 | e | 32.9 | de | 19.6 | cd |
| Empyrean®3 (Tetra) | -- | | 14.1 | gh | -- | | -- | | 47.8 | ef | -- | | -- | |
| Imperial California | -- | | 14.1 | gh | 66.7 | def | 38.3 | g | 47.2 | ef | 42.3 | abcd | -- | |
| HBOK 10 | 27.6 | b | 12.0 | h | 88.5 | abcd | 43.6 | ef | 52.3 | e | 36.6 | cde | 11.1 | ef |
| HBOK 32 | 38.9 | b | 11.5 | h | 93.8 | abc | 46.7 | cdef | 42.4 | fg | 31.6 | e | 10.5 | ef |
| <i>Prunus americana</i> | -- | | 15.6 | gh | 76.3 | bcde | 38.4 | fg | 37.4 | gh | 21.7 | f | 14.7 | de |
| Fortuna | -- | | 15.5 | gh | 94.3 | abc | 46.1 | cdef | 47.3 | ef | -- | | -- | |
| Krymsk®1 (VVA-1) | 20.1 | bc | 12.0 | h | 46.5 | fg | 24.5 | h | 32.2 | h | 21.7 | f | 14.9 | de |
| Controller 5 (K146-43) | 6.2 | c | 20.9 | fg | 30.7 | g | 33.6 | g | 46.3 | efg | 13.9 | f | 6.8 | f |

^z Mean separation within columns by Duncan's multiple range test ($P=0.05$)

Table 3. Tree survival (%) by location of Redhaven on 18 rootstocks after 3 growing seasons as part of the 2009 NC-140 Peach Rootstock Trial.^Z

| | Alabama | | California | | Colorado | | Illinois | | Kentucky | | Massachusetts | | Missouri | |
|---------------------------|---------|----|------------|---|----------|----|----------|---|----------|---|---------------|---|----------|----|
| Rootstock cultivar | | | | | | | | | | | | | | |
| Viking | 100 | a | 100 | a | 62.5 | b | 100 | a | 75 | a | 100 | a | 38 | b |
| Atlas | 100 | a | 100 | a | 88 | ab | 63 | a | 100 | a | 100 | a | 38 | b |
| BH-5 | 100 | a | 100 | a | 100 | a | 88 | a | 50 | b | 100 | a | 50 | ab |
| Mirobac | 100 | a | 100 | a | 88 | ab | 75 | a | 100 | a | 100 | a | 100 | a |
| Guardian® | 100 | a | 100 | a | 88 | ab | 88 | a | 100 | a | 100 | a | 88 | ab |
| Lovell | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a | 75 | ab |
| KV010123 | 100 | a | 100 | a | 88 | ab | 88 | a | 88 | a | 100 | a | 88 | ab |
| KV010127 | 100 | a | 100 | a | 100 | a | 88 | a | 100 | a | 100 | a | 75 | ab |
| Krymsk®86 (Kuban 86) | 100 | a | 100 | a | 88 | ab | 63 | a | 100 | a | 100 | a | 88 | ab |
| Empyrean®2 (Penta) | 75 | b | 75 | b | 88 | ab | -- | | -- | | 100 | a | 67 | ab |
| Empyrean®3 (Tetra) | -- | | -- | | -- | | -- | | -- | | -- | | -- | |
| Imperial California | -- | | -- | | 100 | a | -- | | -- | | -- | | -- | |
| HBOK 10 | 100 | a | 100 | a | 100 | a | 88 | a | 100 | a | 100 | a | 63 | ab |
| HBOK 32 | 88 | ab | 100 | a | 100 | a | 88 | a | 88 | a | 100 | a | 63 | ab |
| <i>Prunus americana</i> | -- | | 75 | b | 100 | a | 88 | a | 100 | a | 100 | a | -- | |
| Fortuna | -- | | -- | | 88 | ab | -- | | -- | | -- | | -- | |
| Krymsk®1 (VVA-1) | 88 | ab | 100 | a | 88 | ab | 88 | a | 100 | a | 100 | a | 63 | ab |
| Controller 5 (K146-43) | 100 | a | 100 | a | 100 | a | 88 | a | 100 | a | 100 | a | 88 | ab |

Table 3. Tree survival (%) by location of Redhaven on various rootstocks after 3 growing seasons as part of the 2009 NC-140 Peach Rootstock Trial (continued).^z

| | | | | | New York | | | | | | Utah | | Utah | |
|-------------------------|--------|----|----------------|---|----------|-----|--------------|---|----------------|---|-------------|---|---------------|----|
| | Mexico | | North Carolina | | (Geneva) | | Pennsylvania | | South Carolina | | (Kaysville) | | (South Shore) | |
| Rootstock cultivar | | | | | | | | | | | | | | |
| Viking | -- | | 100 | a | 100 | a | 88 | a | 100 | a | 88 | a | 88 | ab |
| Atlas | -- | | 100 | a | 100 | a | 88 | a | 100 | a | 88 | a | 88 | ab |
| BH-5 | 13 | c | 75 | a | 75 | abc | 100 | a | 100 | a | 88 | a | 100 | a |
| Mirobac | -- | | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a |
| Guardian® | 75 | ab | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a |
| Lovell | 100 | a | 88 | a | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a |
| KV010123 | 100 | a | 100 | a | 88 | ab | 100 | a | 100 | a | 100 | a | 100 | a |
| KV010127 | 75 | a | 100 | a | 63 | bcd | 100 | a | 100 | a | 100 | a | 100 | a |
| Krymsk®86 (Kuban 86) | 50 | bc | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a |
| Empyrean®2 (Penta) | 50 | bc | 100 | a | 88 | ab | 100 | a | 100 | a | 100 | a | 100 | a |
| Empyrean®3 (Tetra) | -- | | -- | | -- | | -- | | 100 | a | -- | | -- | |
| Imperial California | -- | | 100 | a | 50 | cd | 38 | b | 100 | a | 88 | a | -- | |
| HBOK 10 | 63 | ab | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a |
| HBOK 32 | 75 | ab | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a | 88 | ab |
| <i>Prunus americana</i> | -- | | 75 | a | 100 | a | 100 | a | 100 | a | 100 | a | 100 | a |
| Fortuna | -- | | 100 | a | 38 | d | 100 | a | 88 | b | -- | | -- | |
| Krymsk®1 (VVA-1) | 13 | c | 50 | b | 88 | ab | 75 | | 100 | a | 88 | a | 100 | a |
| Controller 5 (K146-43) | 63 | ab | 88 | a | 100 | a | 100 | | 100 | a | 100 | a | 75 | b |

^z Mean separation within columns by Duncan's multiple range test ($P=0.05$)

Table 4. Total yield (kg) by location of Redhaven on 18 rootstocks in 2011 as part of the 2009 NC-140 Peach Rootstock Trial (continued).^z

| | | | | | New York | | | | | | Utah | | Utah |
|---------------------------|--------|-----|----------------|-------|----------|-------|--------------|----|----------------|-----|-------------|-----|---------------|
| | Mexico | | North Carolina | | (Geneva) | | Pennsylvania | | South Carolina | | (Kaysville) | | (South Shore) |
| Rootstock cultivar | | | | | | | | | | | | | |
| Viking | -- | | 15.7 | ab | 24.6 | ab | 2.3 | cd | 16.4 | ab | 6.5 | a | -- |
| Atlas | -- | | 7.9 | cdefg | 24.1 | abc | 2.2 | cd | 16.5 | ab | 6.8 | a | -- |
| BH-5 | 4.3 | a | 16.3 | a | 22.6 | abcd | 2.2 | cd | 16.5 | ab | 4.3 | abc | -- |
| Mirobac | -- | | 7.4 | defgh | 27.0 | a | 2.8 | cd | 18.7 | a | 6.7 | a | -- |
| Guardian® | 4.1 | ab | 11.0 | abcd | 24.3 | ab | 2.2 | cd | 18.3 | a | 5.3 | ab | -- |
| Lovell | 2.9 | abc | 13.9 | abc | 24.7 | ab | 2.3 | cd | 13.5 | bcd | 4.8 | ab | -- |
| KV010123 | 3.2 | abc | 10.2 | bcd | 17.2 | cdef | 7.5 | a | 18.4 | a | 6.4 | a | -- |
| KV010127 | 3.8 | ab | 9.7 | bcdef | 14.7 | ef | 2.2 | cd | 15.5 | bcd | 7.3 | a | -- |
| Krymsk®86 (Kuban 86) | 4.1 | ab | 8.4 | cdefg | 19.1 | cdef | 2.3 | cd | 13.4 | bcd | 4.9 | ab | -- |
| Empyrean®2 (Penta) | 4.4 | a | 4.0 | efghi | 21.4 | abcde | 3.1 | cd | 13.4 | bcd | 1.4 | c | -- |
| Empyrean®3 (Tetra) | -- | | -- | | -- | | -- | | 12.4 | bcd | -- | | -- |
| Imperial California | -- | | 1.1 | i | 11.1 | f | 0.8 | d | 13.2 | bcd | 1.2 | c | -- |
| HBOK 10 | 1.8 | abc | 10.4 | bcd | 25.9 | ab | 3.8 | bc | 13.3 | bcd | 4.4 | abc | -- |
| HBOK 32 | 3.2 | abc | 10.0 | bcde | 23.9 | abc | 2.7 | cd | 13.2 | bcd | 4.8 | ab | -- |
| <i>Prunus americana</i> | -- | | 8.6 | cdefg | 18.6 | bcde | 5.9 | ab | 9.5 | d | 6.0 | a | -- |
| Fortuna | -- | | 2.0 | hi | 11.2 | f | 2.0 | cd | 3.2 | e | -- | | -- |
| Krymsk®1 (VVA-1) | 1.7 | bc | 3.0 | ghi | 22.6 | abcd | 2.3 | cd | 10.8 | dc | 3.9 | abc | -- |
| Controller 5 (K146-43) | 0.9 | c | 3.7 | fghi | 16.1 | def | 3.0 | cd | 13.5 | bcd | 2.4 | bc | -- |

^z Mean separation within columns by Duncan's multiple range test ($P=0.05$)

Table 5. Mean fruit weight (g) by location of Redhaven on 18 rootstocks in 2011 as part of the 2009 NC-140 Peach Rootstock Trial (continued).^z

| | | | | | New York | | | | | | Utah | | Utah |
|---------------------------|--------|---|----------------|------|----------|------|--------------|-----|----------------|-----|-------------|-----|---------------|
| | Mexico | | North Carolina | | (Geneva) | | Pennsylvania | | South Carolina | | (Kaysville) | | (South Shore) |
| Rootstock cultivar | | | | | | | | | | | | | |
| Viking | -- | | 185 | a | 109 | e | 145 | bcd | 214 | ab | 220 | ab | -- |
| Atlas | -- | | 169 | abc | 117 | cde | 151 | ab | 218 | ab | 212 | bc | -- |
| BH-5 | 159 | a | 168 | abc | 124 | bcde | 148 | bcd | 212 | ab | 221 | ab | -- |
| Mirobac | -- | | 157 | abcd | 120 | bcde | 148 | bcd | 198 | abc | 193 | cd | -- |
| Guardian® | 167 | a | 177 | abc | 120 | bcde | 150 | bcd | 196 | abc | 210 | bc | -- |
| Lovell | 177 | a | 165 | abc | 119 | bcde | 145 | bcd | 207 | ab | 206 | bc | -- |
| KV010123 | 167 | a | 166 | abc | 134 | bc | 159 | a | 210 | a | 239 | a | -- |
| KV010127 | 148 | a | 167 | abc | 123 | bcde | 148 | bcd | 202 | ab | 199 | bcd | -- |
| Krymsk®86 (Kuban 86) | 167 | a | 177 | abc | 123 | bcde | 147 | bcd | 188 | bc | 198 | bcd | -- |
| Empyrean®2 (Penta) | 151 | a | 169 | abc | 130 | bcd | 147 | bcd | 208 | ab | 181 | d | -- |
| Empyrean®3 (Tetra) | -- | | -- | | -- | | -- | | 208 | ab | -- | | -- |
| Imperial California | -- | | 125 | d | 122 | bcde | 140 | cd | 198 | abc | 205 | bcd | -- |
| HBOK 10 | 176 | a | 147 | abcd | 127 | bcd | 151 | ab | 224 | a | 209 | bc | -- |
| HBOK 32 | 169 | a | 143 | bcd | 116 | de | 145 | bcd | 195 | abc | 200 | bcd | -- |
| <i>Prunus americana</i> | -- | | 165 | abc | 137 | b | 151 | ab | 221 | a | 212 | bc | -- |
| Fortuna | -- | | 182 | ab | 155 | a | 139 | d | 169 | c | -- | | -- |
| Krymsk®1 (VVA-1) | 150 | a | 167 | abc | 137 | b | 146 | bcd | 198 | abc | 222 | ab | -- |
| Controller 5 (K146-43) | -- | | 140 | dc | 127 | bcd | 151 | ab | 210 | ab | 189 | cd | -- |

^z Mean separation within columns by Duncan's multiple range test ($P=0.05$)