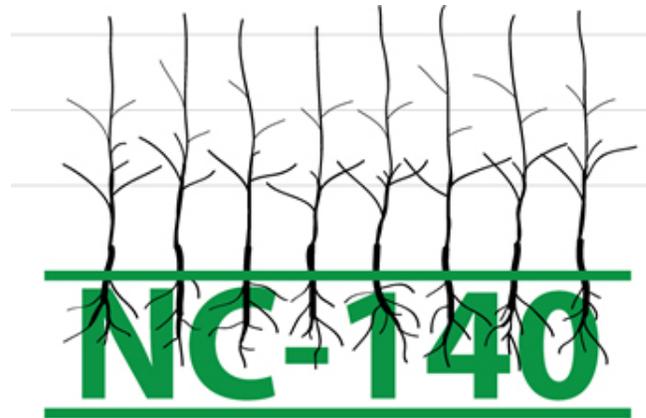




2017 NC-140 Semi-Dwarf Peach Rootstock Trial

*Data Report (2019) and
Collection Protocol (2019-20)*

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Summary

This was the third year of the 2017 NC-140 Semi-Dwarf Peach Rootstock Trial. This trial is evaluating 8 rootstocks across 9 sites in United states and Canada (**Table 1**). The scion cultivar is ‘Cresthaven’. Data collection have occurred at planting (spring 2017) and during summer and fall of 2017 and 2018 (stock trunk diameter, tree survival, suckers count and trunk circumference) and during summer and fall of 2019 (date of bloom and harvest, tree survival, suckers count and trunk circumference, yield, fruit count). Data reports of the 2018 growing season were collected and analyzed during spring of 2019 and reported herein. Data reports of the 2019 growing season will be collected by mid-February and be analyzed during spring of 2020 and reported in Fall 2020.

In fall of the 2018 (second leaf) AL had the largest trees followed by NY, NC and SC. CO remains the site with the lowest vigor.

Table 1. Rootstocks and locations involved in the 2017 NC-140 Semi-Dwarfing Peach Rootstock Trial. Cresthaven trees are spaced 1.5 or 1.8 x 4.5 or 5.5 m and trained to the Perpendicular-V. Each side includes 4 or 5 replications in randomized complete-block design with 2 data trees of each rootstocks treatment per replication

Rootstock	Code	Site
Controller™ 6	1	AL
Controller™ 7	2	CO
Controller™ 8	3	GA*
MP-29	4	MI
Rootpac® 20	5	NC
Rootpac® 40	6	NY
Guardian®	7	ONT
Lovell	8	PA
		SC
		UT

*2018 Data report was not submitted.

Survival was high (>91%) in all sites except of NY were a survival rate of 51% was recorded and NC that had 85. NY site lost 49% of the trees with the majority of the losses coming from Controller trees, Lovell and Rootpac® 40. Suckering was relatively low with AL, CO, MI and SC producing the most suckers across all sites (**Table 3**). Best performance in terms of survival observed in trees with Guardian® followed by Lovell, Rootpac® 20 and Controller™ 7, 8 and 6 and MP-29. Worst survival rates observed across all sites on trees with Rootpac® 40. This might have been associated with the relatively low growth of these trees in the nursery. Guardian® were the largest trees followed by Lovell, Rootpac® 20, Controller™ 6. Smallest trees came from Rootpac®40 followed by MP-29 and Controller™ 7 (**Table 4**). In fall 2018 (Second season) Guardian® was the most vigorous rootstock providing trees of 126% the size of Lovell across all sites. Rootpac® 20 clustered as moderate vigor with trees of 84% the size of Lovell and the rest of the rootstocks clustered together at the semi-dwarf category producing trees of 49-66% of the size of Lovell (**Table 4**). In Table 4 the relative tree size comparisons with Guardian across all rootstocks is provided as well. Suckering was low across most rootstocks tested with the Rootpac® 20 producing the most suckers followed by the more vigorous rootstocks Guardian® and Lovell (**Table 4**).

In **Tables 5, 6, 7 and 8** rootstock performance data in terms of survival, tree size in fall 2017 and fall 2018 as well as number of root suckers within each site are presented.

Trial details

Sites: AL, CO, GA, MI, NC, NY, ONT, PA, SC, UT

Coordinator: Ioannis Minas (Colorado State University), CO

- **Collaborators:** Elina Coneva (AL), Ioannis Minas (CO), Dario Chavez (GA), Terence Robinson (NY), Mike Parker (NC), Brent Black (UT), John Cline (ONT), Gregory Lang (MI), Jim Schupp (PA), Greg Reighard (SC)
- **Scion Cultivar:** 'Cresthaven'
- **Training system:** Perpendicular-V
- **Spacing:** 6 x 15 feet (1.8 x 4.5 m)
- **Trees/acre:** 484
- **Rootstocks:** Controller™ 6, 7 and 8 (UC Davis); MP-29 (USDA-Georgia); Rootpac® 20 (Densipac) and Rootpac® 40 (Nanopac) (Agromillora Iberia); Controls: Guardian® (Clemson/USDA) and Lovell



Table 2. Rootstock background details and genetic origin information for the 2017 NC140 Peach Semi-Dwarf Rootstock Evaluation Trial.

Rootstock	Breeder, Country	Genetic origin
Controller™ 6	UC Davis, USA	peach x peach hybrid (<i>Prunus persica</i> x <i>P. persica</i>)
Controller™ 7	UC Davis, USA	peach x peach hybrid (<i>P. persica</i> x <i>P. persica</i>)
Controller™ 8	UC Davis, USA	peach x peach hybrid (<i>P. persica</i> x <i>P. persica</i>)
MP-29	USDA-Georgia, USA	plum x peach interspecific hyb. (<i>P. umbellata</i> x <i>P. persica</i>)
Rootpac® 40	Agromillora Iberia, Spain	almond x peach interspecific hyb. [(<i>P. dulcis</i> x <i>P. persica</i>) x (<i>P. dulcis</i> x <i>P. persica</i>)]
Rootpac® 20	Agromillora Iberia, Spain	plum x peach interspecific hybrid (<i>P. besseyi</i> x <i>P. persica</i>)
Guardian®	Clemson/USDA, USA	peach seedling (<i>P. persica</i>)
Lovell	G.W. Thissell, USA	peach seedling (<i>P. persica</i>)

Data Tables

Table 3. Site performance in terms of 'Cresthaven' peach tree survival, trunk cross-sectional area (TCSA) in fall 2017 and 2018 and number of root suckers across all sites reported data for the 2017 NC140 Peach Semi-Dwarf Rootstock Evaluation Trial.

Rootstock	Survival (%)	TCSA (cm ²) 2017	TCSA (cm ²) 2018	Suckers
AL	94 ^{ab}	13.1 ^a	25.8 ^a	2.1 ^a
CO	98 ^{ab}	2.2 ^e	8.2 ^g	1.0 ^{ab}
MI	99 ^a	4.4 ^{cd}	13.8 ^{ef}	0.8 ^b
NC	85 ^b	6.9 ^b	19.0 ^{bc}	0.4 ^b
NY*	51 ^c	4.5 ^{cd}	21.6 ^{ab}	0.5 ^b
ONT	91 ^{ab}	3.1 ^{de}	11.1 ^{fg}	0.0 ^b
SC	100 ^a	4.2 ^{cd}	18.4 ^{bcd}	0.8 ^{ab}
PA	96 ^{ab}	5.6 ^{bc}	16.2 ^{cde}	n/a
UT	96 ^{ab}	5.4 ^{bc}	14.4 ^{def}	0.1 ^b
Estimated HSD	13.6*	2.2	4.5	1.2

*Mean separation in columns by Tuckey's HSD ($P=0.05$). HSD was calculated based on the number of observations per mean. Mean values in columns followed by the different letters are statistically different according to HSD at ($P=0.05$).

Table 4. Cresthaven' peach rootstock performance in terms of tree survival, trunk cross-sectional area (TCSA) in fall 2017 and 2018 and number of root suckers across all sites reported data for the 2017 NC140 Peach Semi-Dwarf Rootstock Evaluation Trial.

Rootstock	Survival (%)	TCSA (cm ²) 2017	TCSA (cm ²) 2018	% of Lovell	% of Guardian	Suckers
Controller™ 6	90 ^{ab}	4.2 ^c	14.1 ^{cd}	67.5	53.4	0.0 ^{bc}
Controller™ 7	91 ^{ab}	4.0 ^c	11.4 ^d	54.5	43.2	0.6 ^{bc}
Controller™ 8	90 ^{ab}	4.4 ^c	13.8 ^{cd}	66.0	52.3	0.0 ^{bc}
MP-29	90 ^{ab}	5.3 ^c	11.2 ^d	53.6	42.4	0.2 ^{bc}
Rootpac® 20	91 ^{ab}	5.4 ^{bc}	17.5 ^{bc}	83.7	66.3	2.2 ^a
Rootpac® 40	78 ^b	3.8 ^c	10.2 ^d	48.8	38.6	0.2 ^{bc}
Guardian®	98 ^a	8.6 ^a	26.4 ^a	126.3	100	1.3 ^{ab}
Lovell	93 ^a	7.2 ^{ab}	20.9 ^b	100.0	79.2	1.2 ^{abc}
Estimated HSD	15.2	1.9	5.5			1.3

**Mean separation in columns by Tuckey's HSD (P=0.05). HSD was calculated based on the number of observations per mean. Mean values in columns followed by the different letters are statistically different according to HSD at (P=0.05).*

Table 5. ‘Cresthaven’ peach rootstock survival in all sites reported data for the second season after establishment (2018) for the 2017 NC140 Peach Semi-Dwarf Rootstock Evaluation Trial.

Rootstock	AL	CO	MI	NC	NY	ONT	SC	PA	UT
Controller™ 6	100	100	100	80	33 ^{ab}	100	100	90	100 ^a
Controller™ 7	100	100	100	70	50 ^{ab}	100	100	100	100 ^a
Controller™ 8	90	100	100	100	50 ^{ab}	70	100	100	100 ^a
MP-29	70	100	100	67	75 ^a	n/a	100	100	100 ^a
Rootpac® 20	100	100	90	60	70 ^a	100	100	100	100 ^a
Rootpac® 40	100	80	100	100	0 ^b	70	100	75	63 ^b
Guardian®	100	100	100	100	80 ^a	100	100	100	100 ^a
Lovell	100	100	100	100	40 ^{ab}	100	100	100	100 ^a
Estimated HSD	ns	ns	ns	ns	70	ns	ns	ns	37

**Mean separation in columns by Tuckey’s HSD (P=0.05). HSD was calculated based on the number of observations per mean. Mean values in columns followed by the different letters are statistically different according to HSD at (P=0.05).*

Table 6. ‘Cresthaven’ peach rootstock trunk cross sectional area (TCSA, cm²) at fall 2017 (first season) in all sites reported data for the 2017 NC140 Peach Semi-Dwarf Rootstock Evaluation Trial.

Rootstock	AL	CO	MI	NC	NY	ONT	SC	PA	UT
Controller™ 6	11.2 ^{bc}	1.4 ^c	4.1 ^{cde}	5.3 ^d	3.3 ^b	2.5 ^{bcd}	2.5 ^c	5.0 ^b	4.2 ^b
Controller™ 7	13.3 ^{bc}	1.2 ^c	1.5 ^f	1.2 ^f	3.6 ^b	2.9 ^{bc}	3.0 ^{bc}	4.7 ^b	4.7 ^{ab}
Controller™ 8	11.8 ^{bc}	1.8 ^{bc}	1.8 ^{ef}	2.6 ^{ef}	4.7 ^b	3.1 ^{bc}	2.9 ^{bc}	4.6 ^b	6.3 ^{ab}
MP-29	8.2 ^c	3.7 ^a	5.5 ^{bc}	9.0 ^{bc}	1.7 ^b	n/a	4.9 ^{ab}	4.1 ^b	5.2 ^{ab}
Rootpac® 20	14.3 ^{abc}	2.9 ^{ab}	4.2 ^{cd}	8.2 ^c	3.6 ^b	2.1 ^{cd}	5.1 ^{ab}	3.9 ^b	3.7 ^b
Rootpac® 40	10.5 ^{bc}	1.6 ^c	2.5 ^{def}	5.0 ^{de}	1.4 ^b	1.3 ^d	2.3 ^c	4.0 ^b	4.6 ^{ab}
Guardian®	17.3 ^{ab}	3.2 ^a	7.9 ^a	12.6 ^a	9.8 ^a	5.2 ^a	6.2 ^a	8.3 ^a	6.5 ^{ab}
Lovell	21.8 ^a	1.9 ^{bc}	7.7 ^{ab}	11.6 ^{ab}	3.9 ^b	3.7 ^b	5.8 ^a	8.5 ^a	7.2 ^a
Estimated HSD	5.1*	1.0	2.4	2.7	5.1	1.6	2.4	3.3	2.8

*Mean separation in columns by Tuckey’s HSD (P=0.05). HSD was calculated based on the number of observations per mean. Mean values in columns followed by the different letters are statistically different according to HSD at (P=0.05).

Table 7. ‘Cresthaven’ peach rootstock trunk cross sectional area (TCSA, cm²) at fall 2018 (second season) in all sites reported data for the 2017 NC140 Peach Semi-Dwarf Rootstock Evaluation Trial.

Rootstock	AL	CO	MI	NC	NY	ONT	SC	PA	UT
Controller™ 6	24.5 ^{bcd}	7.9 ^{bc}	14.5 ^{bc}	16.4 ^{cd}	18.3 ^b	9.7 ^{bc}	13.5 ^c	15.4 ^b	12.5 ^{bc}
Controller™ 7	20.9 ^{cd}	2.6 ^d	7.5 ^{cd}	3.0 ^e	20.9 ^{ab}	11.7 ^b	9.5 ^c	15.5 ^b	12.9 ^{bc}
Controller™ 8	26.3 ^{bc}	10.2 ^{ab}	8.7 ^{bcd}	8.9 ^{de}	22.7 ^{ab}	12.3 ^{ab}	10.5 ^c	15.2 ^b	14.4 ^{abc}
MP-29	16.5 ^{cd}	4.8 ^{cd}	10.0 ^{bcd}	19.7 ^c	4.4 ^c	n/a	17.7 ^{bc}	7.6 ^c	11.0 ^c
Rootpac® 20	32.2 ^{ab}	10.7 ^{ab}	14.9 ^b	20.9 ^{bc}	25.5 ^{ab}	6.5 ^c	24.5 ^{ab}	12.9 ^b	11.8 ^{bc}
Rootpac® 40	14.4 ^d	6.8 ^{bcd}	6.8 ^d	15.4 ^{cd}	n/a	6.4 ^c	8.7 ^c	11.5 ^{bc}	13.0 ^{bc}
Guardian®	39.0 ^a	13.5 ^a	24.3 ^a	34.2 ^a	32.5 ^a	16.9 ^a	33.7 ^a	24.1 ^a	20.2 ^a
Lovell	39.1 ^a	8.5 ^{abc}	23.3 ^a	28.5 ^{ab}	20.4 ^{ab}	13.1 ^{ab}	25.6 ^{ab}	21.8 ^a	18.2 ^{ab}
Estimated HSD	11.3*	5.3	7.3	7.5	14.1	5.2	11.1	6.3	6.4

*Mean separation in columns by Tuckey’s HSD ($P=0.05$). HSD was calculated based on the number of observations per mean. Mean values in columns followed by the different letters are statistically different according to HSD at ($P=0.05$).

Table 8. ‘Cresthaven’ peach rootstock number of suckers in the summer 2018 (second season) in all sites reported data for the 2017 NC140 Peach Semi-Dwarf Rootstock Evaluation Trial.

Rootstock	AL	CO	MI	NC	NY	ONT	SC	PA	UT
Controller™ 6	0.0	0.0 ^b	0.0 ^b	0.0	0.0	0.0	0.0 ^b	n/a	0.1
Controller™ 7	3.6	0.4 ^b	0.0 ^b	0.0	0.0	0.0	0.0 ^b	n/a	0.0
Controller™ 8	0.0	0.0 ^b	0.0 ^b	0.0	0.0	0.0	0.0 ^b	n/a	0.1
MP-29	0.4	0.0 ^b	0.1 ^b	0.0	0.0	n/a	0.4 ^{ab}	n/a	0.5
Rootpac® 20	5.6	3.3 ^a	1.9 ^{ab}	3.0	0.4	0.0	2.7 ^a	n/a	0.0
Rootpac® 40	0.6	0.4 ^b	0.0 ^b	0.0	n/a	0.0	0.0 ^b	n/a	0.0
Guardian®	2.5	0.5 ^b	3.6 ^a	0.1	1.8	0.0	1.8 ^{ab}	n/a	0.0
Lovell	4.3	3.5 ^a	0.3 ^b	0.9	0.8	0.0	1.3 ^{ab}	n/a	0.2
Estimated HSD	ns	2.8*	3.3	ns	ns	ns	2.7		ns

**Mean separation in columns by Tuckey’s HSD (P=0.05). HSD was calculated based on the number of observations per mean. Mean values in columns followed by the different letters are statistically different according to HSD at (P=0.05).*

Data collection and tree management protocol

Spring 2019

1. Julian date (i.e., calendar days) for ~90% full bloom.
2. Thin trees to a crop density (cd) of 2 fruit/cm² of TCSA
3. Manage pests, nutrients, and water per local conditions and recommendations.

Summer 2019

1. Julian date (i.e., calendar days) for ~10% fruit ripe for each tree (not necessarily date of first harvest).
2. Yield: total count of all commercial-sized fruit per tree and weigh them (to nearest 0.1 kg). No fruit less than 2.25 inches should be picked or counted in the yield data.
3. Mean fruit weight (g) should be calculated by dividing total commercial-sized fruit weight by the total commercial-sized fruit count per tree.
4. Firmness and % soluble solids (Brix) measurements on a 10-fruit sample per data tree (optional).
5. Number of root suckers: count and remove, July-August. If more than 20, then **20 is the max number to record**.
6. Manage pests, nutrients, and water per local recommendations.
7. Summer pruning is REQUIRED.

Fall 2019

1. Tree Survival; record either as dead (0) or alive (1), September (only data trees).
2. Tree size: Trunk circumference in cm (to nearest 0.1 cm) at 15 cm above graft union, October (only data trees).

Spring 2020

1. Julian date (i.e., calendar days) for ~90% full bloom.
2. Thin trees to a crop density (cd) of 2 fruit/cm² of TCSA
3. Manage pests, nutrients, and water per local conditions and recommendations.

Summer 2020

1. Julian date (i.e., calendar days) for ~10% fruit ripe for each tree (not necessarily date of first harvest).
2. Yield: total count of all commercial-sized fruit per tree and weigh them (to nearest 0.1 kg). No fruit less than 2.25 inches should be picked or counted in the yield data.
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4. Firmness and % soluble solids (Brix) measurements on a 10-fruit sample per data tree (optional).
5. Number of root suckers: count and remove, July-August. If more than 20, then **20 is the max number to record**.
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7. Summer pruning is REQUIRED.

Fall 2020

1. Tree Survival; record either as dead (0) or alive (1), September (only data trees).
2. Tree size: Trunk circumference in cm (to nearest 0.1 cm) at 15 cm above graft union, October (only data trees).

2019 Data Submission Instructions

For submission of 2019 data, **everyone is encouraged to review their data and make sure that all measurements have been reported with the requested unit. Further, include only those data requested in the protocol, with the same columns in the spreadsheet, and in the same order.** All data should be submitted in the format and units requested and by the submission deadline.

The 2019 data to be submitted and the format of the data submission are presented in the Data Report Excel spreadsheet sample provided, using the rootstock codes described in the current protocol, by **November 22th, 2020**.

Important Notes:

- For data submission please follow the format of the data report spreadsheet provided (by email).
- Enter a period (.) for any data not recorded or considered missing.
- All future data for a dead tree (survival=0) should be represented as missing (enter a period).
- DO NOT include data for replants or additional trees. Use a period in the data cells.

- Please include all data (from all years) on a single spreadsheet. Add data columns to the previous years' file and send the appended spreadsheet under the same file name every year. This guarantees consistency to the arrangement of data from year to year and greatly reduces errors. Name the data report spreadsheet file based on the provided spreadsheet sample.
- **Your data columns for your 2019 data report spreadsheet should be in the following order: tree survival (Dead (0) or Live (1) in September 2019), root sucker count (summer, and trunk circumference (cm) (at ~15 cm above graft union in October 2019).**
- **In the spreadsheet use the following rootstock codes and order:**
 1. Controller™ 6
 2. Controller™ 7
 3. Controller™ 8
 4. MP-29
 5. Rootpac® 20
 6. Rootpac® 40
 7. Guardian®
 8. Lovell

Deadline for 2019 data submission to coordinator (ioannis.minas@colostate.edu) is November 22th, 2019

Publications

Good Fruit Grower, February 2018. Peach rootstock trial tests options for size control: Researchers start with the roots to shrink trees. <http://flashsrv.com/goodfruit/20420/#p=22>
<https://www.goodfruit.com/peach-rootstock-trial-tests-options-for-size-control/>