IMPROVED ROOTSTOCKS FOR PEACH AND NECTARINE

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SUMMARY

The objective of this project is to develop genetically improved rootstocks for peach and nectarine that combine tree size control and resistance to important diseases and pests including nematodes. Fifty rootstocks were planted, in replicated trials, at the Kearney Agricultural Center (KAC) in 2003 through 2007. All of these rootstocks are root-knot nematode resistant and have the potential for tree size control.

Data from a previous replicated trial at (KAC) identified three rootstocks from crosses of Harrow Blood peach x Okinawa peach, made by our program, that had significant size-controlling potential (selections HBOK32, HBOK10 and HBOK50, in descending order of apparent size-controlling effect). These rootstocks were also shown to be resistant to root knot nematode. Selections HBOK32 and HBOK10 were re-replicated at KAC in spring 2003 with O'Henry peach and the early nectarine Mayfire. They were also grafted with Springcrest peach and Summer Fire nectarine and planted in a replicated trial at KAC in February 2004. Selection HBOK50 was re-replicated at KAC with O'Henry peach only in spring 2003.

Data from the 2003 planting indicated that the fifth-leaf O'Henry trees on the HBOK 32 and HBOK10 rootstocks had significantly less height, dormant and summer pruning weights and suckers than Nemaguard and any other tested rootstock. HBOK32 had significantly higher crop efficiency than Nemaguard. Yield efficiency (crop divided by TCA) takes the size of the tree into account. When the early nectarine Mayfire was used as the top, trees on both HBOK32 and HBOK10 had significantly less height, dormant and summer pruning weights and suckers, and higher crop efficiency values than trees on Nemaguard. Similar results were obtained when the early peach Springcrest was used as the scion.

Replicated trials of different rootstocks from our program and others, grafted with O'Henry, and planted at KAC in 2003 and 2004, showed that the majority of the trees on the tested rootstocks had significantly less height, dormant and summer pruning weights and suckers than trees on the control, Nemaguard. Yield efficiency values of the majority of trees on the tested rootstocks, planted in 2003 and 2004, were significantly higher than trees on the control, Nemaguard.

Among the rootstocks tested with O'Henry in the 2004 trial is HBOK28. Trees on this rootstock had significantly less height, dormant and summer pruning weights, and higher cropping

efficiency and larger fruits than trees on Nemaguard and the majority of the other tested rootstocks.

PROBLEM AND ITS SIGNIFICANCE

Many high quality scion varieties of peach and nectarine are available to producers, but relatively few rootstocks have been developed for the changing demands of the industry. In recent years there has been increasing interest in the development of size-reducing rootstocks for peaches and nectarines to reduce the labor costs involved in management and harvest of orchards. Also as the future availability of soil fumigants becomes increasingly uncertain, there is increased need for rootstocks with resistance/tolerance to soil-borne pests and diseases. To develop improved rootstocks that combine several elite traits, hybridization followed by selection is required. Within segregating seedling populations, it is possible to identify individuals that can be clonally propagated, thus developing considerable flexibility in rootstock options for growers.

The control of tree growth of peach and nectarine is usually accomplished by judicious use of management practices, i.e., planting density and pruning. However, even with the best management practices, the resultant large trees usually require large amounts of hand labor for tree care and the use of ladders for pruning, fruit thinning and harvest. An attractive alternative would be the management of tree growth by size-controlling rootstocks, such as are available for apple. This would allow trees to be managed from ground level without resultant loss of yield per acre or reduction in fruit quality while using current scion cultivars.

Several peach varieties and inter-specific hybrids have been reported to have growth controlling ability (e.g., Layne and Jui, 1994), but the inheritance of this trait is unknown. Some peach cultivars, including Harrow Blood, Siberian C, and Rubira, have shown growth controlling ability but these rootstocks are either not well adapted to California or are nematode susceptible. Concomitant with growth control in improved rootstocks is the need for resistance to nematodes and important diseases since the diminished availability of approved chemical control agents is likely to continue. New rootstocks should have nematode resistance similar to the levels found in current rootstocks, i.e., Nemaguard and Nemared. Additionally, resistance to bacterial canker and crown gall would be desirable. None of the rootstocks currently in wide use has these combined attributes.

For each of the desired traits, there are several available sources of genetic materials that are potentially valuable for rootstock improvement. Resistance to root knot nematode is well defined and materials such as Okinawa, Nemared, Nemaguard, Flordaguard, etc. can be used as parents for hybridization (Sharpe, 1957; Sherman et al., 1991). However, genetic variability for growth control, crown gall and bacterial canker resistance is less well defined. Therefore, systematic screening is needed to identify the most useful materials. We have done an extensive screening of *Prunus* germplasm and have identified candidate genotypes to be used as sources of resistance to crown gall disease (Bliss et al, 1999). We also have screened a large number of *Prunus* genotypes for their resistance/susceptibility to the bacterial canker disease and root knot nematode.

GOAL AND OBJECTIVES

The goal of this project is to develop new rootstocks with pest resistance and tree size controlling ability that can be propagated economically by commercial nurseries for use with a wide range of California peach and nectarine varieties.

The specific objectives of this project were to:

1) Screen *Prunus* populations for:

i) compatibility and growth controlling potential with peach and nectarine,

ii) nematode resistance, initially root knot nematode race 1,

iii) crown gall resistance and iv) bacterial canker resistance,

2) Develop elite individual plants that can be used for clonal rootstocks; and

3) Assess the potential of the best materials for commercial peach and nectarine production in California.

PROGRESS DURING 2007

- ***New plantings:***

  Eleven new rootstocks, produced by our program, were planted in 2007. These rootstocks are resistant to root-knot nematode and have tree vigor control potential (Table 1). Thirty nine other rootstocks, having vigor control and resistance to root-knot nematode, were planted in 2005, 2004, and 2003 are listed in tables 2, 3 and 4, respectively.

- ***Data from the 2003 replicated trial:***

  1. Rootstocks grafted with **O'Henry** peach:

  A. Vegetative Data (Tables 5)

  Height: Trees on HBOK50, HBOK1, Barrier, HBOK2 and Cadaman were similar to the control (Nemaguard). Trees on the rest of the tested rootstocks were shorter than the control.

  Dormant Pruning Weight: Pruning weights of trees on HBOK50 and Barrier rootstocks were similar to that of the trees on the control. Trees on the rest of the tested rootstocks had significantly lower dormant pruning weights than trees on the control (ranging from 15% to 86%).

  Summer Pruning Weight: Pruning weights of trees on HBOK10, HBOK1, HBOK 32, HBOK2, HBOK18, Ishtara, Sapalta-OP-3, Adesoto and Sapalta-OP-24 were all significantly less (ranging between 5% to 68%) than trees on the control Nemaguard.

  Number of Suckers **(Table 6)**: Trees on Adesoto, Cadaman and Nemaguard rootstocks produced the greatest number of suckers (6.2, 4.1, and 4.1, respectively). The rest of the rootstocks had fewer suckers than the control. HBOK 32 had no suckers. It is worth-while mentioning that Adesoto had suckers arising from the roots. Suckering may indicate possible incompatibility with other varieties of peach and nectarine, especially since one or more of the parents of some of the rootstocks are of plum origin (Table 6 – see parents column).

B. Fruit production characteristics (Table 7):
Crop : Trees on HBOK1, HBOK2, , Barrier, Cadaman and HBOK50 rootstocks were similar to that of the control.
Weight (size) of fruit: .Trees on the rootstock Barrier were similar to that of the control.
Cropping efficiency: HBOK32, HBOK2 and Ishtara had the highest efficiency values. Trees on HBOK10, HBOK18, HBOK50, Cadaman, Sapalta-OP-24 and Barrier were similar to Nemaguard.

2. Rootstocks grafted with the early nectarine, **Mayfire**:

A. Vegetative Data (Table 8):
Trees on HBOK 32 and HBOK 10 rootstocks were significantly shorter, had fewer suckers and had smaller dormant and summer pruning weights than trees on the control, Nemaguard.

B. Fruit production characteristics (Table 9):
Trees on the HBOK 32 and HBOK 10 rootstocks had higher yield efficiency values than trees on Nemaguard.

- ***Data from the 2004 replicated trial:***

1. Rootstocks grafted with **O'Henry** peach

A. Vegetative Data (Table 10):
Values of the height of HBOK138, HBOK123 and HBOK144 and the dormant pruning weights of HBOK123 and HBOK144 were similar to that of the control Nemaguard. Trees on Nemaguard had summer pruning weights significantly higher than the rest of the tested rootstocks.

B. Fruit production characteristics (Table 11):
Crop: Trees on HBOK36, HBOK160, HBOK121, KV84068 and HBOK138 had similar crop weight as trees on Nemaguard.
Weight per Fruit (size): Trees on the rootstocks, HBOK28, KV84068, HBOK122, HBOK160, HBOK123, HBOK144, HBOK9 and HBOK138 had fruit weight (size) similar to that of the control.
Crop Efficiency: Trees on all of the tested rootstocks, except for HBOK144, HBOK29 and HBOK123, had higher crop efficiency than that of Nemaguard.

2. Rootstocks grafted with the early peach, **Springcrest**

A. Vegetative Data (Table 12):

Similar to the results obtained from the trial with the early Mayfire nectarine (Table 8), trees on the HBOK 32 and HBOK 10 rootstocks were significantly shorter, and had smaller dormant and summer pruning weights, and numbers of suckers values than trees on the control, Nemaguard.

B. Fruit production characteristics (Table 13):

Crop efficiency (similar to Mayfire results- Table 9) was significantly higher for the two rootstocks than the control Nemaguard.

REFERENCES

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Table 1. List of eleven rootstocks that have size-controlling potential being tested in a replicated trial. The trees were grafted with O'Henry peach and planted, at Kearney Ag. Center, in January and September, **2007**.

Rootstock	**Parents**	**Date Planted**	**Description***
95-153-141	Harrow Blood x Okinawa-141	Jan07	Size controlling; RKN resist.
94 94 17	Harrow Blood x Okinawa-17	Jan07	Size controlling; RKN resist.
KV-1	KV84068(3-6) selfed	Sept07	Size controlling; RKN resist.
(FL X KV)-1	Flordaguard (R16,T22) x KV84068(CBR3,T4)-19-44	Sept07	Size controlling; RKN resist.
KV-2	KV77015(3-3) selfed(15-4)	Sept07	Size controlling; RKN resist.
KV-3	KV84068(3-12) selfed	Sept07	Size controlling; RKN resist.
FL X Weep	FlordagxWeep. p.(31-19)	Sept07	Size controlling; RKN resist.
(FL X KV)-2	Flordaguard (R16,T20) x KV84068(CBR3,T4)-15-32	Sept07	Size controlling; RKN resist.
KV-4	KV77015(3-3) selfed(17-76)	Sept07	Size controlling; RKN resist.
KV-5	KV77015(3-3) selfed(5-1)	Sept07	Size controlling; RKN resist.
KV-6	KV84068(3-4) selfed	Sept07	Size controlling; RKN resist.
Nemaguard	control	Jan07 & Sept07	Vigorous; resistant to RKN l

**RKN = Root Knot Nematode.

Table 2. List of eight rootstocks that have size-controlling potential being tested in a replicated trial. The trees were grafted with O'Henry and planted, at Kearney Ag. Center, in **2005**.

Rootstock	**Description***
Harrow Blood x Okinawa-155	Size controlling; resistant to RKN.
Harrow Blood x Okinawa-162	Size controlling; resistant to RKN.
Bl 19,T110	Size controlling; resistant to RKN.
Bl19,T71	Size controlling; resistant to RKN.
Flordaguard x KV84068	Size controlling; resistant to RKN.
FlordagxKV77015	Size controlling; resistant to RKN.
Sm weeping	Size controlling; resistant to RKN.
Lg weeping	Size controlling; resistant to RKN.
Nemaguard (control)	Vigorous; resistant to RKN

*RKN = Root Knot Nematode.

Table 3. List of twenty rootstocks that have size-controlling potential being tested in a replicated trial. The trees were grafted with the appropriate scion and planted, at the Kearney Ag. Center, in February **2004**.

Rootstock	Scion	Description*
HBOK5	O'Henry	Size controlling; resistant to RKN.
HBOK9	O'Henry	Size controlling; resistant to RKN.
HBOK10	Summer Fire	Size controlling; resistant to RKN.
HBOK10	Springcrest	Size controlling; resistant to RKN.
HBOK27	O'Henry	Size controlling; resistant to RKN.
HBOK28	O'Henry	Size controlling; resistant to RKN.
HBOK 29	O'Henry	Size controlling; resistant to RKN.
HBOK32	Summer Fire	Size controlling; resistant to RKN.
HBOK32	Springcrest	Size controlling; resistant to RKN.
HBOK36	O'Henry	Size controlling; resistant to RKN.
HBOK121	O'Henry	Size controlling; resistant to RKN.
HBOK122	O'Henry	Size controlling; resistant to RKN.
HBOK123	O'Henry	Size controlling; resistant to RKN.
HBOK138	O'Henry	Size controlling; resistant to RKN.
HBOK144	O'Henry	Size controlling; resistant to RKN.
HBOK160	O'Henry	Size controlling; resistant to RKN.
Hiawatha	O'Henry	Size controlling; resistant to RKN.
K146-43	O'Henry	Size controlling; resistant to RKN.
KV84068-S	O'Henry	Size controlling; resistant to RKN.
Nemaguard (control)	O'Henry	Vigorous; resistant to RKN
Nemaguard (control)	Summer Fire	Vigorous; resistant to RKN
Nemaguard (control)	Springcrest	Vigorous; resistant to RKN
Rubira	O'Henry	Size controlling; resistant to RKN.
Weeping peach 31	O'Henry	Size controlling; resistant to RKN.
Weeping peach 3	O'Henry	Size controlling; resistant to RKN.

*RKN = Root Knot Nematode

Table 4. List of fourteen rootstocks that have size-controlling potential being tested in a replicated trial. The trees were grafted with the appropriate scion and planted, at Kearney Ag. Center, **in 2003.**

Rootstock	Parents	Scion	Description
Adesoto	P. isititia selection	O'Henry	From NAP*; suckers from the roots; 80% of the standard size of peach; early entry in production; productive; induces larger fruit size and earlier ripening in peaches; good adaptation to poor or saline soils.
Barrier	P. persica x P. davidiana	O'Henry	From NAP; adaptive to a wide array of soils, was selected for longevity and performance on replant sites.
Cadaman	(P. persica x P. dulcis) x P. dividiana	O'Henry	From NAP; high becoming less vigorous with age; has a high yield efficiency. Resistant to RKN** and LN***.
HBOK 1	Harrow Blood x Okinawa-1	O'Henry	Size controlling; resistant to RKN.
HBOK 2	Harrow Blood x Okinawa-2	O'Henry	Size controlling; resistant to RKN.
HBOK 8	Harrow Blood x Okinawa-8	O'Henry	Size controlling; resistant to RKN.
HBOK 10	Harrow Blood x Okinawa-10	Mayfire	Size controlling; resistant to RKN.
HBOK 10	Harrow Blood x Okinawa-10	O'Henry	Size controlling; resistant to RKN.
HBOK 18	Harrow Blood x Okinawa-18	O'Henry	Size controlling; resistant to RKN.
HBOK 32	Harrow Blood x Okinawa-32	Mayfire	Size controlling; resistant to RKN.
HBOK 32	Harrow Blood x Okinawa-32	O'Henry	Size controlling; resistant to RKN.
HBOK 50	Harrow Blood x Okinawa-50	O'Henry	Size controlling; resistant to RKN and LN.
Ishtara	Belsiana plum (P. cerasifera x P. salicina) x (natural hybrid of P. ceracifera x P. persica)	O'Henry	From NAP; semi dwarfing to slightly smaller than peach seedling;. Resistant to RKN and LN but susceptible to LN if both RKN and LN are present in the soil.
Pumiselect	P. pumila selection	O'Henry	From NAP; dwarfing to semi-dwarfing (70% of 'Nemaguard'); high resistance to plum pox (sharka) virus; precocious and very cold hardy. Resistant to RKN and moderately susceptible LN.
Spalta 3	Spalta-OP 3 (P. bessyi x P. salicina)	O'Henry	Size controlling; resistant to RKN.
Spalta 24	Spalta-OP 24 (P. bessyi x P. salicina)	O'Henry	Size controlling; resistant to RKN.
Nemaguard	Control	Mayfire	Vigorous; resistant to RKN
Nemaguard	Control	O'Henry	Vigorous; resistant to RKN

*NAP = North American Plant
**RKN = Root Knot Nematode.
LN*** = Lesion nematode.

Table 5. Mean values and % of the control of height and dormant and summer pruning weights of the rootstocks grafted with **O'Henry** for 2007.The trees were planted in a replicated trial, **in 2003.**

Genotype	Height (cm)*	% Control	
Nemaguard	432.0	100	a
HBOK 50	424.0	98	a
HBOK 1	424.0	98	a
Barrier	419.0	97	a
HBOK 2	418.0	97	a
Cadaman	409.0	95	ab
HBOK 10	390.0	90	bc
HBOK 18	377.0	87	dc
HBOK 32	376.0	87	dc
Ishtara	361.0	84	de
Spalta-OP-3	358.0	83	de
Adesoto	351.0	81	e
Spalta-OP-24	306.0	71	f

Genotype	Drormant Pruning (Kg)	% Control	
Nemaguard	10.1	100	a
HBOK 50	9.4	93	ab
Barrier	9.2	91	abc
HBOK 1	8.7	86	bc
Cadaman	8.4	83	bc
HBOK 2	8.3	82	c
HBOK 10	6.7	66	d
HBOK 32	6.0	59	de
HBOK 18	5.6	55	e
Ishtara	4.2	42	f
Spalta-OP-3	4.1	41	f
Adesoto	3.3	33	f
Spalta-OP-24	1.5	15	g

Genotype	Summer Pruning (Kg)	% Control	
HBOK 50	4.0	105	a
Nemaguard	3.8	100	ab
Cadaman	3.8	100	ab
Barrier	3.8	100	ab
HBOK 10	2.6	68	bc
HBOK 1	2.2	58	dc
HBOK 32	1.9	50	dce
HBOK 2	1.8	47	dce
HBOK 18	1.1	29	def
Ishtara	1.0	26	def
Spalta-OP-3	0.9	24	ef
Adesoto	0.8	21	ef
Spalta-OP-24	0.2	5	f

* = numbers followed by the same letter(s) are not significantly different.

Table 6. Mean values and % of the control of the number of root suckers for the rootstocks grafted with **O'Henry** for 2007.The trees were planted, in a replicated trial, **in 2003**.

Genotype	No. Suckers	% Control		Parents	Notes
Adesoto	6.2	151.2	a	P. isititia selection	root suckers
Cadaman	4.1	100.0	ab	(P. persica x P. dulcis) x P. dividiana	
Nemaguard	4.1	100.0	b	P. persica x P. dividiana	
Sapalta-OP-24	1.4	34.1	c	Sapalta-OP 24 (P. bessyi x P. salicina)	
HBOK 8	0.6	14.6	c	Harrow Blood x Okinawa-8	
HBOK 10	0.3	7.3	c	Harrow Blood x Okinawa-8	
HBOK 50	0.1	2.4	c	Harrow Blood x Okinawa-8	
HBOK 1	0.1	2.4	c	Harrow Blood x Okinawa-8	
Barrier	0.0	0.0	c	P. persica x P. davidiana	
HBOK 2	0.0	0.0	c	Harrow Blood x Okinawa-8	
HBOK 32	0.0	0.0	c	Harrow Blood x Okinawa-8	
Ishtara	0.0	0.0	c	Belsiana plum (P. cerasifera x P. salicina) x (natural hybrid of P. ceracifera x P. persica)	
HBOK 18	0.0	0.0	c	Harrow Blood x Okinawa-8	
Sapalta-OP-3	0.0	0.0	c	Sapalta-OP 3 (P. bessyi x P. salicina)	

* = numbers followed by the same letter(s) are not significantly different.

Table 7. Mean values and % of the control of crop weight per tree, weight per fruit (size), and cropping efficiency of the rootstocks grafted with **O'Henry** for 2007. The trees were planted in **2003.**

Genotype	Crop (Kg)	% Control	
HBOK 1	62.8	104.0	a
HBOK 2	61.9	102.5	ab
Cadaman	61.1	101.2	ab
Nemaguard	60.4	100.0	ab
Barrier	59.2	98.0	ab
HBOK 50	58.0	96.0	b
HBOK 32	50.8	84.1	c
Ishtara	47.6	78.8	dc
HBOK 18	46.0	76.2	de
HBOK 10	45.1	74.7	de
Spalta-OP-3	43.7	72.4	de
Adesoto	42.8	70.9	e
Spalta-OP-24	33.2	55.0	f

Genotype	Wt. per fruit (g)	% Control	
Nemaguard	240.5	100.0	a
Barrier	229.0	95.2	ab
Cadaman	220.2	91.6	bc
HBOK 10	208.2	86.6	dc
HBOK 1	206.6	85.9	dc
HBOK 2	206.5	85.9	dc
HBOK 50	199.8	83.1	d
Ishtara	197.4	82.1	d
HBOK 32	194.5	80.9	d
Adesoto	170.6	70.9	e
Spalta-OP-3	170.6	70.9	e
HBOK 18	167.8	69.8	e
Spalta-OP-24	165.7	68.9	e

Genotype	Cropping Efficiency*	% Control	
HBOK 32	0.86	148.3	a
HBOK 2	0.74	127.6	ab
Ishtara	0.74	127.6	ab
Adesoto	0.73	125.9	b
Spalta-OP-3	0.73	125.9	b
HBOK 1	0.72	124.1	b
HBOK 10	0.66	113.8	bc
HBOK 18	0.64	110.3	bc
HBOK 50	0.62	106.9	bc
Cadaman	0.61	105.2	bc
Nemaguard	0.58	100.0	c
Spalta-OP-24	0.54	93.1	c
Barrier	0.53	91.4	c

* = numbers followed by the same letter(s) are not significantly different.

Table 8. Mean values and % of the control of height, dormant pruning weight, summer pruning weight and number of suckers of the rootstocks grafted with the early nectarine **Mayfire** for 2007. The trees were planted in a replicated trial, in **2003.**

Genotype	Height (cm)*	% Control	
Nemaguard	585.6	100.0	a
HBOK 10	533.3	91.1	b
HBOK 32	492.5	84.1	c

Genotype	Dormant Pruning (Kg)*	% Control	
Nemaguard	27.0	100.0	a
HBOK 10	15.3	56.7	b
HBOK 32	13.5	50.0	c

Genotype	Summer Pruning (Kg)*	% Control	
Nemaguard	4.7	100.0	a
HBOK 32	2.5	53.2	b
HBOK 10	2.4	51.1	b

Genotype	No. Suckers*	% Control	
Nemaguard	1.8	100.0	a
HBOK 32	0.0	0.0	b
HBOK 10	0.0	0.0	b

Table 9. Mean values and % of the control of crop, weight per fruit (size), and cropping efficiency of the rootstocks grafted with **Mayfire** for 2007. The trees were planted in **2003**.

Genotype	Crop (Kg)	% Control		Genotype	Wt. per fruit (g)	% Control	
Nemaguard	43.2	100	a	Nemaguard	190	100.0	a
HBOK 10	33.7	78	b	HBOK 32	176	92.5	b
HBOK 32	29.3	68	c	HBOK 10	159	83.9	c

Genotype	Cropping Efficiency (Kg/cm2)*	% Control	
HBOK 32	0.4	100	a
HBOK 10	0.4	97	a
Nemaguard	0.3	69	b

Table 10. Mean values and % of the control of height, dormant pruning weights and summer pruning weights of the rootstocks grafted with **O'Henry** for 2007.The trees were planted in a replicated trial, in **2004**.

Genotype	Height (cm)*	% Control	
HBOK138	459.0	101	a
Nemaguard	453.0	100	a
HBOK123	448.0	99	ab
HBOK144	441.0	97	abc
HBOK160	426.0	94	bcd
HBOK122	425.0	94	bcd
Weeping peach-31	425.0	94	bcd
HBOK121	422.5	93	cd
HBOK36	419.0	92	cd
KV84068-S	417.0	92	cd
Rubira	416.0	92	cd
HBOK9	414.0	91	d
HBOK28	413.0	91	d
HBOK27	392.0	87	e
Weeping peach-3	366.0	81	f
HBOK29	340.0	75	g

Genotype	Drormant Pruning (Kg)	% Control	
Nemaguard	8.2	100	a
HBOK123	8.1	99	a
HBOK144	7.6	93	ab
HBOK122	7.1	87	bc
HBOK121	7.0	86	bcd
HBOK36	6.8	83	cd
HBOK138	6.8	83	cd
HBOK28	6.7	82	cd
HBOK160	6.5	80	cd
HBOK9	6.4	78	d
KV84068-S	5.3	65	e
Rubira	5.3	65	e
HBOK27	4.1	50	f
Weeping peach-31	4.1	50	f
Weeping peach-3	3.4	42	gf
HBOK29	3.3	40	g

Genotype	Summer Pruning (Kg)	% Control	
Nemaguard	4.0	100	a
HBOK36	2.9	72	b
HBOK160	2.4	59	c
KV84068-S	2.3	58	c
HBOK122	2.3	58	c
HBOK144	2.3	57	c
HBOK9	2.3	57	c
HBOK123	2.2	56	cd
HBOK138	2.1	52	cde
Rubira	1.9	48	cdef
HBOK121	1.9	46	def
HBOK28	1.7	43	efg
HBOK27	1.6	40	fgh
Weeping peach-31	1.4	34	gh
Weeping peach-3	1.2	31	hi
HBOK29	1.0	24	i

* = numbers followed by the same letter(s) are not significantly different.

Table 11. Mean values and % of the control of crop, weight per fruit (size), and cropping efficiency of the rootstocks grafted with **O'Henry** for 2007. The trees were planted in **2004.**

Genotype	Crop (Kg)	% Control	
HBOK36	45.9	100.2	a
Nemaguard	45.8	100.0	a
HBOK160	45.4	99.1	a
HBOK121	45	98.3	a
KV84068-S	44.9	98.0	a
HBOK138	43.8	95.6	ab
HBOK122	42.1	91.9	bc
HBOK123	41.9	91.5	bcd
HBOK9	40.6	88.6	cde
HBOK28	39.8	86.9	cdef
HBOK27	39.2	85.6	defg
HBOK144	38.2	83.4	efg
Weeping peach-31	37.7	82.3	fg
Rubira	37	80.8	g
HBOK29	30.4	66.4	h
Weeping peach-3	27.6	60.3	i

Genotype	Wt. per fruit (g)	% Control	
HBOK28	246	106.0	a
KV84068-S	238	102.6	ab
HBOK122	235	101.3	abc
Nemaguard	232	100.0	abcd
HBOK160	226	97.4	bcde
HBOK123	224	96.6	cdef
HBOK144	223	96.1	cdefg
HBOK9	222	95.7	cdefgh
HBOK138	217	93.5	defgh
HBOK36	216	93.1	efgh
HBOK27	215	92.7	efgh
Weeping peach-31	209	90.1	fghi
HBOK29	208	89.7	fghi
HBOK121	207	89.2	ghi
Rubira	207	89.2	hi
Weeping peach-3	200	86.2	i

Genotype	Cropping Efficiency*	% Control	
HBOK27	0.684	145.5	a
HBOK28	0.627	133.4	ab
HBOK9	0.616	131.1	ab
HBOK121	0.605	128.7	ab
HBOK160	0.579	123.2	bc
Weeping peach-3	0.576	122.6	bc
Rubira	0.57	121.3	bc
HBOK138	0.567	120.6	bc
HBOK36	0.557	118.5	bcd
HBOK122	0.556	118.3	bcd
Weeping peach-31	0.455	96.8	bcd
KV84068-S	0.54	114.9	bcd
HBOK144	0.51	108.5	cd
HBOK29	0.5	106.4	cd
HBOK123	0.478	101.7	d
Nemaguard	0.473	100.6	d

* = numbers followed by the same letter(s) are not significantly different.

Table 12. Mean values and % of the control of height, summer pruning weights, dormant pruning weights and number of suckers of the rootstocks grafted with the early **peach Springcrest** for 2007. The trees were planted, in a replicated trial, in **2004**.

Genotype	Height (cm)*	% Control		Genotype	Summer Pruning (Kg)	% Control	
Nemaguard	512.0	100.0	a	Nemaguard	2.8	100.0	a
HBOK10	449.0	87.7	b	HBOK10	1.5	52.5	b
HBOK32	436.0	85.2	b	HBOK32	1.2	41.5	c
Genotype	**Dormant Pruning (Kg)**	**% Control**		**Genotype**	**No. Suckers**	**% Control**	
Nemaguard	11.7	100.0	a	Nemaguard	2.8	100.0	a
HBOK10	8.0	68.5	b	HBOK32	0.3	10.7	b
HBOK32	8.0	68.4	b	HBOk10	0.1	3.6	b

* = numbers followed by the same letter(s) are not significantly different.

Table 13. Mean values and % of the control of crop, weight per fruit (size), and cropping efficiency (crop weight divided by TCA) of the rootstocks grafted with early peach **Springcrest** for 2007. The trees were planted in **2004.**

Genotype	Crop (Kg)	% Control	
Nemaguard	22.8	100.0	a
HBOK10	20.4	89.5	b
HBOK32	20.3	89.0	b

Genotype	Wt. per fruit (g)	% Control	
Nemaguard	112.0	100.0	a
HBOK32	93.0	83.0	b
HBOK10	89.0	79.5	b

Genotype	Cropping Efficiency*	% Control	
HBOK10	0.27	142.1	a
HBOK32	0..22	115.8	b
Nemaguard	0.19	100.0	c

* = numbers followed by the same letter(s) are not significantly different.