

**California Cling Peach Advisory Board
Annual Report 2011**

Project Title: **IMPROVED ROOTSTOCKS FOR PEACH AND NECTARINE**

Project Leader: **Ted DeJong**, Professor, University of California, Davis.

Cooperators: **Scott Johnson**, Cooperative Extension Specialist, Kearney Ag. Center.
 Kevin Day, Cooperative Extension Farm Advisor, Tulare County.
 Rebecca Phene, Staff Research Associate, Kearney Ag. Center

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. Thirty-nine rootstocks were planted with ‘O’Henry scions, in replicated trials, at the Kearney Agricultural Center (KAC) in 2003, through 2005. Thirteen more rootstock selections with ‘O’Henry’ scions were planted in the KAC trials in winter 2007 and 2008. The three final new selections identified at Davis in 2007 were planted in the KAC plot this past winter (2009). All of the rootstocks that were developed at Davis are root-knot nematode resistant and have the potential for tree size control.

The five rootstock selections previously identified as having size-controlling characteristics (HBOK 10, 27, 28, 32 and 50) performed well through 2010 with tree size ranging between 60 – 95 % of trees on Nemaguard (depending on the rootstock) and acceptable crop loads and fruit size (see previous reports). In 2011 these rootstocks continued to perform well but we did not take any quantitative data on their productivity in the O’Henry blocks because of the loss of funding when the California Tree Fruit Agreement was voted out.

Replicated plots of Loadel, Ross and Riegels clingstone peach scions on each of the two most promising size-controlling rootstocks at the time the planting was put in (HBOK 10 and 32) and Nemared were planted at KAC at a tree spacing of 7 x 18 ft in December 2007. The trees were trained to a KAC-V system and have grown well but the trees on HBOK 32 and HBOK 10 are clearly less vigorous than trees on Nemared (Table 1). These trees produced their first significant crop in 2010. In 2011 we took yield data on these trees and determined the number and yield of fruit on each tree in the plot and separated the fruit in two size categories (above and below minimum size). The yield data indicates that trees on both HBOK 32 performed as well as or better (Ross) than trees on Nemared even though the trees were smaller (Table 2) (For reference, 50 kg/tree ~ 19 tons/acre at the spacing of this planting). Yields of Riegels trees on HBOK 10 were significantly less than trees on Nemared but not significantly different than trees on Nemared with the other two cultivars.

In addition to the yield analyses, mid-June leaf samples of O’Henry trees from the previous CTFA funded project and the Loadel, Ross and Riegels trees on each of the rootstocks from the 2007 cling peach planting were taken and analyzed for nitrogen, phosphorus, potassium, sulfur, boron, calcium, magnesium, zinc, manganese, iron and copper content (Tables 3 and 4). None of the leaf nutrient concentrations of trees on the experimental rootstocks were substantially different from trees on Nemaguard or Nemared.

The results of this project continue to be promising and four of the rootstocks (HBOK 27, HBOK 32, HBOK10, and HBOK 50) have been submitted for patent and are being made commercially available as Controller™ 6 (HBOK 27) Controller™ 7 (HBOK 32), Controller™ 8 (HBOK 10) and Controller™ 9.5 (HBOK 50). These new rootstocks are completely compatible with peach, have root-knot nematode resistance and have a range of tree size-controlling characteristics.

Based on the results of this trial HBOK 32 (Controller™ 7) appears to be the best available rootstock of this series that has substantial size-controlling potential size reduction (20 – 40 %) (compared to trees on Nemaguard or Nemared) that has been tested with clingstone peach scions. HBOK 27 (Controller™ 6) offers even greater size control potential and has consistently performed well with O’Henry peach but has not been tested with cling peaches.

Table 1. Mean trunk cross-sectional area of three cling peach cultivars on the three rootstocks in the KAC trial.

Scion Cultivar	Rootstock	Mean TSA	SE
Loadel	Nemared	65.94	2.10
	HBOK 32	53.08	1.72
	HBOK 10	46.83	3.21
Ross	Nemared	106.3	2.36
	HBOK 32	60.86	2.20
	HBOK 10	51.69	2.40
Riegels	Nemared	92.30	6.39
	HBOK 32	46.00	3.17
	HBOK 10	46.63	3.12

Table 2. Mean fruit yield, fruit number and fruit weight of acceptable sized fruit and undersize fruit per tree of three cultivars and rootstocks in 2011.

Cultivar	Rootstock	Acceptable Size Fruit						Undersize Fruit					
		Weight per tree kg/tree	SE	Fruit per Tree	SE	Mean Fruit Weight (g/fruit)	SE	Weight per tree kg/tree	SE	Fruit per Tree	SE	Mean Fruit Weight (g/fruit)	SE
Loadel	Nemared	38.8	2.86	170	11.04	171.0	1.18	1.28	0.20	4	1.37	90.9	2.95
Loadel	HBOK 10	35.1	2.80	135	18.61	159.5	3.42	2.34	0.48	18	5.20	89.3	4.27
Loadel	HBOK 32	40.6	1.24	173	8.89	160.8	2.30	1.7	0.34	4	1.45	89.5	1.94
Ross	Nemared	46.3	1.69	274	14.19	201.8	2.50	1.13	0.20	13	4.17	97.9	2.34
Ross	HBOK 10	46.0	1.73	253	11.72	188.0	4.30	1.97	0.49	11	2.39	97.2	1.81
Ross	HBOK 32	53.3	2.17	341	13.86	177.5	3.30	1.7	0.29	22	0.66	94.0	2.17
Rigels	Nemared	42.6	2.15	240	9.60	174.1	5.84	0.39	0.11	4	1.22	79.2	5.99
Rigels	HBOK 10	32.8	2.53	197	12.70	161.4	7.04	1.08	0.37	11	3.75	79.3	5.71
Rigels	HBOK 32	38.4	2.77	238	16.38	158.6	3.90	1.1	0.28	11	2.84	88.6	5.80

Table 3. Results of June leaf nutrient analyses of O’Henry trees growing on six different rootstocks.

		O’Henry		O’Henry		O’Henry		O’Henry		O’Henry		O’Henry	
		Nemaguard		HBOK 1		HBOK 50		HBOK 10		HBOK 32		HBOK 27	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
N	%	3.076	0.048	3.033	0.103	3.087	0.038	2.697	0.080	2.790	0.050	3.020	0.020
P	%	0.198	0.003	0.235	0.005	0.234	0.010	0.238	0.011	0.226	0.016	0.214	0.003
K	%	1.940	0.038	1.903	0.120	2.157	0.079	1.950	0.115	1.685	0.265	1.720	0.047
S	ppm	1423.8	26.5	1390.0	62.4	1410.0	20.0	1293.3	44.8	1245.0	5.0	1397.5	14.4
B	ppm	32.21	0.53	30.70	0.60	30.87	0.90	30.40	0.85	27.60	2.90	28.83	0.54
Ca	%	3.031	0.053	2.873	0.148	2.877	0.047	3.210	0.040	3.210	0.030	3.330	0.051
Mg	%	0.688	0.009	0.706	0.041	0.686	0.028	0.781	0.019	0.771	0.063	0.795	0.013
Zn	ppm	13.100	0.305	11.900	0.346	11.933	0.133	12.967	0.561	12.500	0.800	12.650	0.222
Mn	ppm	44.563	2.821	48.800	0.551	55.900	1.893	44.100	4.479	49.850	0.250	32.200	1.346
Fe	ppm	115.16	5.65	125.13	5.87	135.20	5.52	122.23	2.25	139.95	4.45	97.90	1.64
Cu	ppm	6.388	0.058	6.567	0.186	6.167	0.033	6.433	0.067	5.950	0.150	6.825	0.063

Table 4. Results of June leaf nutrient analyses of three cling peach cultivars growing on three different rootstocks.

		Loadel		Loadel		Loadel		Ross		Ross		Ross		Riegels		Riegels		Riegels	
		Nemared		HBOK 32		HBOK 10		Nemared		HBOK 32		HBOK 10		Nemared		HBOK 10		HBOK 32	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
N	%	3.08	0.05	2.95	0.05	2.90	0.04	3.09	0.05	2.89	0.06	2.86	0.04	3.06	0.03	2.84	0.08	2.73	0.08
P	%	0.22	0.00	0.23	0.00	0.23	0.00	0.21	0.00	0.23	0.00	0.23	0.00	0.21	0.01	0.25	0.01	0.26	0.01
K	%	2.81	0.07	2.56	0.10	2.64	0.12	2.77	0.09	2.62	0.06	2.56	0.07	2.61	0.17	2.53	0.16	2.48	0.11
S	ppm	1452	18	1374	27	1348	15	1464	37	1354	36	1368	25	1397	35	1300	36	1243	43
B	ppm	38.36	0.86	33.90	0.89	34.80	1.22	43.16	1.03	37.60	0.60	38.04	1.24	39.67	1.92	36.38	0.88	36.70	0.81
Ca	%	2.85	0.06	2.98	0.07	3.09	0.05	3.12	0.13	3.07	0.06	3.26	0.14	2.99	0.23	2.93	0.13	2.75	0.06
Mg	%	0.52	0.01	0.65	0.02	0.66	0.02	0.59	0.01	0.64	0.01	0.68	0.03	0.57	0.02	0.63	0.02	0.59	0.02
Zn	ppm	18.82	0.40	14.80	0.19	15.22	0.49	17.64	0.40	15.26	0.42	17.00	0.37	17.20	1.60	15.28	0.39	14.48	0.19
Mn	ppm	42.56	0.81	42.92	1.01	44.86	4.24	47.22	1.06	42.32	1.06	46.42	2.21	50.60	2.66	47.40	1.68	39.90	0.30
Fe	ppm	90.50	2.77	97.88	5.25	93.78	2.99	107.34	5.21	97.80	1.43	100.58	3.76	111.90	0.96	109.25	6.23	101.85	4.48
Cu	ppm	7.22	0.09	6.32	0.15	6.58	0.17	6.84	0.24	6.00	0.21	6.60	0.13	6.70	0.17	7.00	0.39	6.25	0.26