2017 FIELD EVALUATION OF PRUNE ROOTSTOCKS AT WOLFSKILL

Katherine Pope, Richard Buchner, Franz Niederholzer, Ted DeJong, Sarah Castro and Carolyn DeBuse

PROBLEM AND ITS SIGNIFICANCE

The California Prune Industry has historically utilized five rootstocks, Myrobalan seedling, Myro 29C, Marianna 2624, Lovell Peach and some M40. The last statewide organized prune rootstock effort was the "M" series rootstock plots planted in 1987 (Vina Monastery 3/20/87). Since the conclusion of that experiment many more potential rootstocks for prune have been identified.

Three trials were planted in 2011 - two replicated experiments and one non-replicated observation experiment. Maintenance for the replicated trials is paid for by grower trial hosts. The non-replicated trial is at Wolfskill and requires funding for on-going management.

OBJECTIVES

Evaluate promising rootstocks potentially valuable for California Prune production.

PLANS AND PROCEDURES

A satellite experiment of prune rootstocks was planted at the UC Wolfskill experimental orchard in Winters, California. The plot contains 15 experimental rootstocks and 3 standard rootstocks (Marianna 2624, Lovell, and Myro 29C) nursery budded to 'Improved French' (Table 1). This experiment provides an initial evaluation of possible rootstocks that have previously not been tried with prune or have had very little field testing.

The experiment is planted with at least 5 trees of each rootstock and is non-replicated, which limits statistical analysis. The goal was to get a first look at how these rootstocks performed with 'Improved French' scions and identify any defects before commercial planting. 'Improved French' on its own root differs from the others in that trees were grown in the nursery for two years. Own rooted trees do have a graft union because 'Improved French' was budded on top. Trees were planted 17 feet across the row and 14 feet down the row, which would result in approximately 183 trees per acre.

The Wolfskill site was previously planted to peaches, removed in 2008 and the field left fallow for 3 years with annual winter wheat. The Yolo County soil survey describes the soil as Yolo loam. Nematode samples were taken at four locations within the field at approximately an 18 inch depth, and combined for nematode evaluation (8/29/11). One liter of soil contained, 50 Lesion (*Pratylenchus sp.),* 50 Pin (*Pratylenchus sp.),* and 30 Dagger (*Xiphinema americanum*). There were not enough nematodes to identify the species of either Lesion or Pin nematodes.

The majority of the trees were planted on January 19, 2011. Bare-root trees were planted directly after transportation from the nurseries sawdust box. HBOK 32 and HBOK 10 were potted trees planted on April 25, 2011. At the time of planting, trees were headed at 36 inches. Trees that had not reached heading height were left alone and allowed to grow through 2011 then headed at 36 inches in the following dormant season.

Trees were harvested August 22, 2017, when an aggregate sample of fruit from throughout the block indicated pressure was below 4 bars. The weight of the fruit from five adjacent trees (except Puente, n=4) was taken. A 4 lb sample was taken and dried to adjust total field fresh weight to estimated dry weight. This same sample was separated by size class after drying. Twenty fruit were sampled, in addition to the 4 lb sample, for pressure and Brix. Harvest samples were not taken from Krymsk 2 or Krymsk 99 because it was judged by the group at the August prune breeding tasting meeting that these trees were too small and unhealthy looking to merit further tracking.

RESULTS AND DISCUSSION

Because this trial is not replicated, mean separation, also referred to as ANOVA, has not been conducted. Though we cannot say statically how rootstocks differ or rank, we can make initial observations. Averages given are for five trees.

Yield per tree varied widely by rootstock, ranging from 47 to 102 lbs per tree (Table 2, Figure 1). Empyrean 3, HBOK 10, HBOK 27, Imperial California and Speaker 50 all had low per-tree yields, however these were also generally the smallest trees, as measured by trunk circumference in December 2016 (Figure 1), meaning tighter spacing would increase per acre yields, perhaps making them more yield competitive with larger trees in the trial. Controller 9 and WRM 2 are the only trees that out-yielded the standard industry rootstocks (M2624, Lovell & Myro 29C). Empyrean 1, Fortuna and WRM 2 produced the largest trees, as measured by trunk circumference, but of these only WRM 2 out-yielded the standard rootstocks.

Fruit set was not thinned, in order to assess how trees on different rootstocks would respond to the stress of high yields. Among the high and medium yielding trees, Controller 9, Ishtara, Own Rooted and Puente produced a comparable percent of Class A and B fruit when compared with the standards of M2624 and Myro29C.

This high fruit set year was also an opportunity to assess potassium levels given the high demand, as a potential window into how well different rootstocks mine potassium when needed. This is simply a first screening for such behavior. There could be plenty of other confounding factors, such as larger, more vigorous rootstocks producing an overall larger root system that would be able to mine for soil volume for potassium. Controller 9 showed very low leaf potassium levels and three of five trees showed leaf burn. Empyrean 1, HBOK 10, Puente and WRM 2 all showed medium-to-high yields and leaf levels that were comparable to the three standard rootstocks.

CONCLUSION

This is the first year of this trial with a commercial-level fruit set. More years of data will be necessary before judging whether any of the rootstocks being tested should be tested in replicated trials to assess their long-term potential for the industry.

BUDGET SUMMARY

A. Breakdown of expenditures

Salaries & Benefits		$ 0
Supplies & Expenses (Pruning, Supplies, Leaf Analysis)		$1,142.95
Equipment		$ 0
Travel		$ 0
	Total to Date	$1,142.95

B. Remaining funds ($1,457.05) will be spent on rental of Wolfskill land and associated maintenance, and pruning in January.

Table 1. Rootstock name and pedigree.

Rootstock	Species/ Hybrid Pedigree
Controller 9 (P30-135)	P. salicina x P. persica
Empyrean 1 (Barrier)	Peach x Chinese wild peach
Empyrean 3 (Tetra)	P. domestica
Fortuna	P. cerasifera x P. persica
HBOK 10 (Controller 8)	Harrow Blood x Okinawa
HBOK 27	Harrow Blood x Okinawa
HBOK 32 (Controller 7)	Harrow Blood x Okinawa
Imperial California	Plum R/S Italian Origin
Ishtara (Ferciana)	Peach/Plum hybrid
Krymsk 2	P. incanus x P. tomentosa
Krymsk 99	Plum/Peach hybrid
Lovell	Peach seedling
M2624	Marianna 2624
Myro 29C	Myrobalan
Own Rooted French	Own Rooted

Puente (Adara)	P. cerasifera
Speaker (Spicer)	Plum/Peach hybrid
WRM 2	Red leaf myroblan type

Table 2. Yield, fruit quality and size, leaf burn and tree size measurements by rootstock in 2017.

Rootstock	Lbs/ Tree	Pressure	Brix	Class size (% of weight in subsample)					Leaf Burn		Trunk Circum, Inches @ 18". 12/20/16
				A	B	C	D	Under	Leaf K (% DW)	Trees w/ Aug. Leaf Burn	
Controller 9	78	3.6	22.5	2	16	26	27	28	0.96	3/5	16.0
Empyrean 1	69	3.8	20.9	0	14	25	30	31	1.59	0/5	20.9
Empyrean 3	52	4.2	23.4	1	14	39	37	9	1.62	0/5	14.3
Fortuna	65	3.3	22.8	1	8	15	38	38	0.84	3/5	18.7
HBOK 10	55	5.6	23.1	12	7	21	39	21	1.57	0/5	13.2
HBOK 27	49	4	20.3	13	19	25	25	18	0.79	5/5	13.5
HBOK 32	65	4.5	22.5	0	6	12	37	45	1.44	0/5	13.9
Imperial CA	47	3.9	21.6	4	12	18	35	30	1.33	4/5	14.3
Ishtara	64	5.1	21.9	14	23	30	23	10	1.36	1/5	14.1
Lovell	79	4	20.6	3	8	21	32	36	1.42	2/5	15.7
M2624	72	4	21.2	9	21	34	22	14	1.69	0/5	14.6
Myro 29C	71	3.3	23.1	4	19	28	32	16	1.6	3/5	16.9
Own Root	57	4.2	22.8	3	21	11	47	19	1.56	2/5	14.8
Puente	69	4.8	22.3	3	16	16	41	24	1.76	0/5	17.3
Speaker	50	3.9	21.4	9	13	30	33	15	1.12	0/5	13.5
WRM 2	102	3.5	21.1	0	6	21	44	29	1.85	0/5	19.4

Figure 1. Yield and tree trunk circumference by rootstock, 2017.

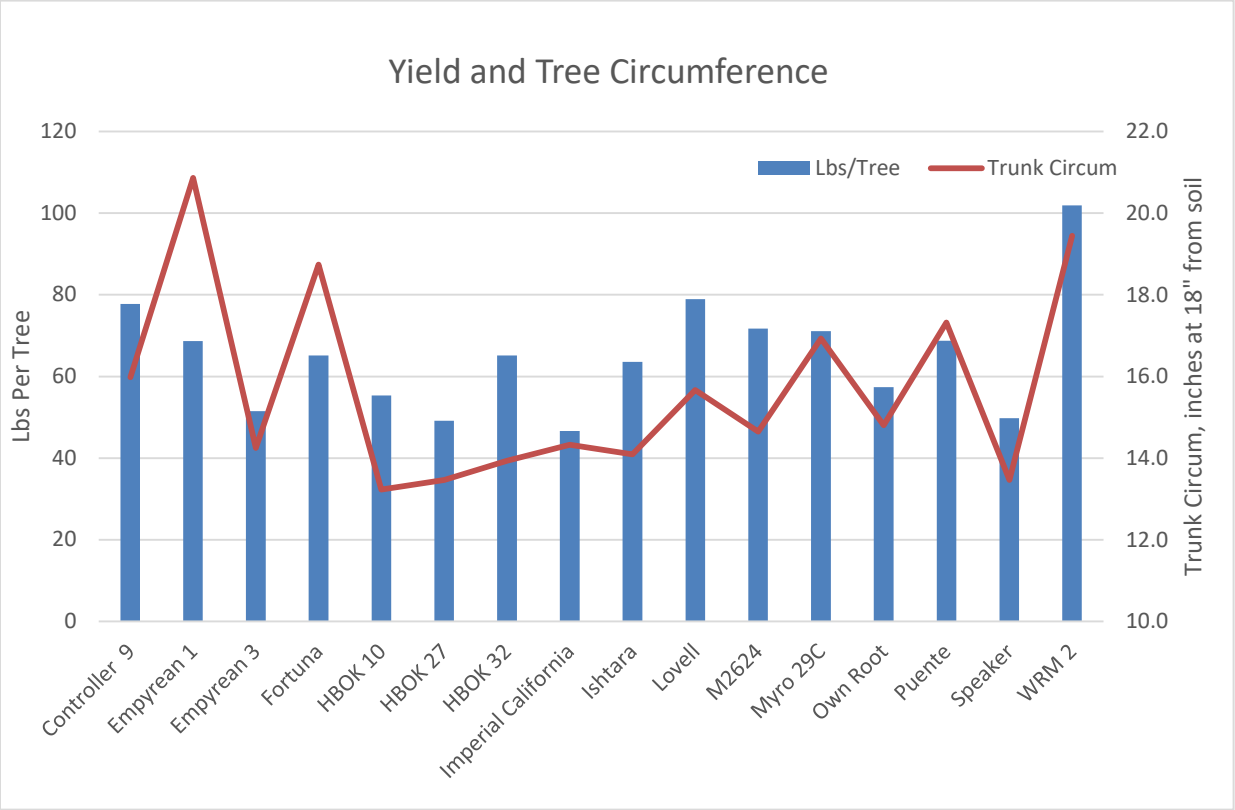

Figure 2. Size Class of Fruit by Rootstock, 2017.

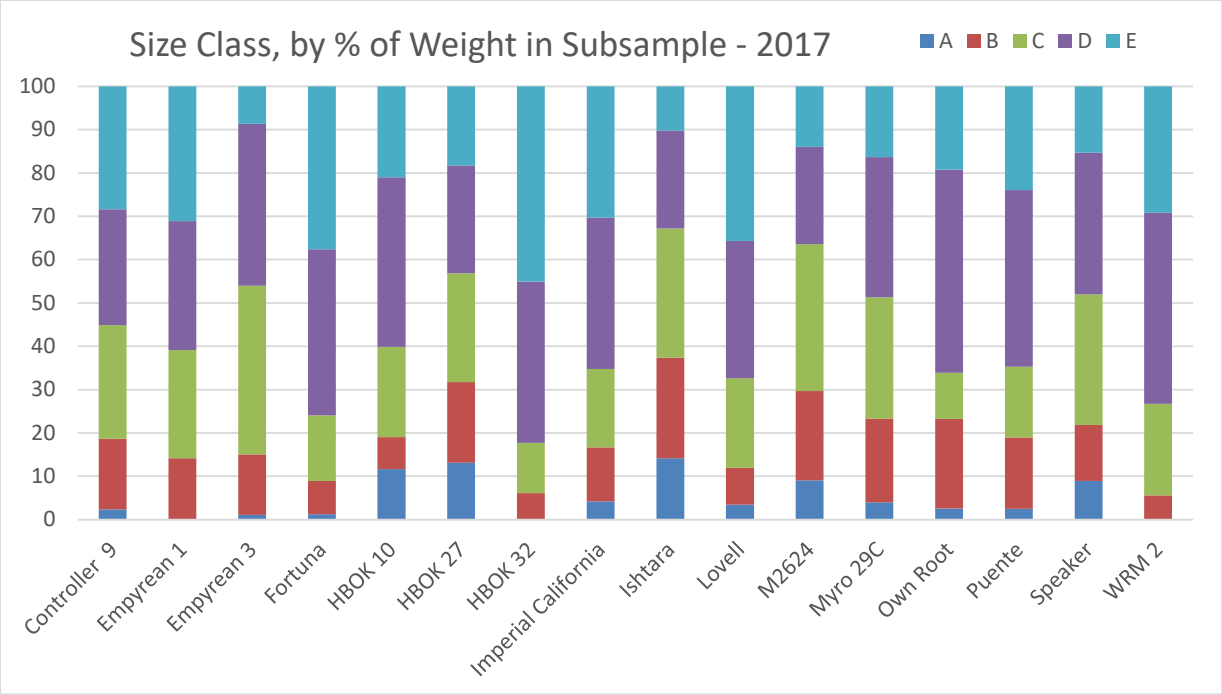

Figure 3. Yield and leaf potassium by rootstock, 2017.