

FIELD EVALUATION OF PRUNE ROOTSTOCKS

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PROBLEM AND ITS SIGNIFICANCE

The California Prune Industry has historically utilized four rootstocks, Myrobalan seedling, Myro 29C, Marianna 2624 and Lovell Peach. M40 is being planted, but not in large numbers and is currently not a mainstay rootstock for the industry. 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. HBOK 50, Krymsk1, Krymsk 86, Citation, Rootpac-R, Viking Atlas and others. These are relatively new, need evaluation under California conditions and hopefully we can discover attributes useful for California prune production.

OBJECTIVES

- 1) Evaluate promising rootstocks potentially valuable for California Prune production. All three Plots have been planted and replants are on order to fill in for failed trees. Mortality in both Butte and Sutter was higher than anticipated requiring a second year to complete planting at the two locations.
- 2) Evaluate tree growth and development: trunk circumference, light interception and suckering.

PLANS AND PROCEDURES

Butte County location (Buchner and Connell)

The Butte County location was planted 4/28/11. The wet winter delayed soil preparation and subsequently delayed planting. The plot is a randomized complete design with 15 treatments and 5 replicates. There are 6 trees per plot in the original design. Tree mortality was high during the first season in the ground. Replants have been ordered for replanting in 2012. Depending upon how that goes, we may not have the entire compliment of trees but should have enough to get valuable data. The HBOK 50 rootstock came as potted trees and were delivered 5/4/2011 and planted by 5/10/2011. Instructions were to remove trees from the pots, do not disturb the root ball, cover with 2 inches of soil and irrigate carefully to keep the small root ball moist.

The heavier soil type mapped on the 1925 Butte County soil survey is Farwell clay adobe and the lighter textured soil in the field is mapped as Nord loam. The prune planting followed almonds on Lovell peach rootstock with no soil treatments prior to planting prunes. Lesion nematodes were isolated from soil samples.

Trees were planted into fairly dry cloddy soil conditions. Twenty-four inch planting holes were augured just ahead of planting. Conditions were dry and windy but trees were well covered with

wet blankets and plastic tarps. We were able to place trees into planting holes immediately ahead of the commercial planting crew. Trees were planted quickly resulting in no more than 15 minutes from placement to soil coverage. Planting crews backfilled the holes with loose soil and left a soil ring to hold water. Each soil well was immediately filled with approximately 5 gallons of water per tree. After infiltration, dry soil was placed over wet soil and planting was complete. The entire plot took 4 hours to plant from start to finish. After planting, trees were whitewashed the same day and tree wraps installed. The drip irrigation system was completed about a week following planting making irrigation possible. Tall enough trees were headed at 40 inches on 5/10/2011. The potted HBOK 50 were fairly small bush like trees and were left unpruned and undisturbed to favor establishment. Rootpac- R trees were fairly small in diameter and did not have enough height growth for heading. Consequently terminal buds were left to continue main stem growth.

Measurements taken so far include rootstock circumference measured 6/2/11 just above the soil line and scion circumference measured 12 inches above the graft union. Scions were measured again 12 inches above the graft union on 11/22/11 allowing us to calculate growth rate. Tree survival was evaluated 7/1/11, 8/22/11 and 11/22/11. Each date demonstrated additional tree failure. Prior to 11/22/11 the grower crews evaluated and removed poor growing trees and replant holes were backfilled and fumigated with Chloropicrin on 11/15/11 to prepare those sites for another tree. Myrobalan seedling, Myro 29C, Marianna 2624, Lovell peach, M30, M40, M58, HBOK50, Empyea 2, Citation, Krymsk 1 Krymsk 86, Rootpac-R, Viking, and Atlas are the rootstocks included at the Butte location. All rootstocks are nursery grafted with Improved French using the same budwood source to standardize scions for all locations.

Yuba County Location (Niederholzer)

The Yuba County location was planted 6/3/11. The wet winter delayed soil preparation and subsequently delayed planting. Identical to Butte, the plot is a randomized complete design with 15 treatments and 5 replicates. There are 6 trees per plot in the original design. Rootstocks are the same as the Butte plot. Tree mortality was high during the first season in the ground. Replants have been ordered for replanting in 2012. Depending upon how that goes, we may not have the entire complement of trees but should have enough to get valuable data.

Wolfskill Location (DeBuse)

A non-replicated complement of prune rootstocks was planted at the UC Wolfskill experimental orchard at Winters, California. The experiment contains 16 “new” rootstocks and 3 standards for comparison. All trees were nursery grafted to Improved French. The objective is to look at possible rootstocks that have not previously been tested with prune or rootstocks that we have little experience with. The Wolfskill rootstocks are thought to be more risky and therefore not a good choice to plant in commercial orchards without additional evaluation. The experiment is planted with 5-10 trees of each rootstock non-replicated. Since it is non-replicated, results will be

observational without statistics. The experiment includes the following test rootstocks by their common name: Empyrean 1, Empyrean 3, WRM 2, Fortuna, Speaker, Puente, Krymsk 2, Krymsk 99, Ishtara, Imperial California, Controller 9, HBOK 10, HBOK 27, HBOK 32, Sharpe, and own rooted Improved French. Standard rootstocks planted for comparison include Marianna 2624, Lovell, and Myro 29C. Improved French on its own root differs in that trees were grown in the nursery for two years. Own rooted trees have a graft union because French was grafted on top.

The experimental site was previously planted to peaches which were removed in 2008 and the field was left fallow for 3 years with winter wheat planted each year. Soil type is Yolo Loam. Soil was sampled at four locations within the field, at about 18 inches depth, combining samples into one for nematode evaluation (8/29/11). The results showed that 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 the Lesion or the Pin nematodes.

The majority of the trees were planted on January 19, 2011. Bare-rooted trees were planted directly after transportation from the nursery's sawdust box. Two rootstocks, HBOK 32 and HBOK 10, were potted trees planted April 25, 2011. At the time of planting trees were headed at 36 inches above ground. The ones that had not reached this height will be allowed to grow through 2011 and be headed at 36 inches height in the dormant season of 2011/12.

RESULTS AND DISCUSSION

For the Butte and Yuba county locations data is limited. Relatively high tree mortality in those two experiments has not allowed a complete set of growth measurements. Rootstock and scion circumference have been measured but another year will be required for meaningful results. Replants have been ordered and should be in the ground in 2012.

For the Wolfskill planting, table 1 shows the growth measurements, diameter and height, of each rootstock relative to Marianna 2624 as a standard. Tree size varied at planting and may affect 2011 growth comparisons against Marianna 2624 and the other standards Lovell and Myro 29C. In the future, we may see any growth differences even out over multiple seasons and annual pruning. Empyrean 1, WRM 2, Fortuna, and Speaker were 10% taller than Marianna 2624. Compared to the more vigorous Lovell only two closely compare in height, Empyrean 1 and WRM 2.

The survival rate of the Wolfskill trees was quite good. Of the trees planted the losses are as follows: Sharpe- 5 trees, Imperial California- 1 tree, Krymsk 99 -1 tree, Speaker-1 tree. Mortality was 100% for the Sharpe rootstock probably because trees were small and weak from the nursery and did not have successful grafts on them. Though this is not enough trees to make an accurate conclusion, there is little reason to continue testing this rootstock and it will not be replanted. Several of the dead trees were taken to plant pathology at UC Davis. Fusarium fungus was the common pathogen isolated from root tissue.

Table 1. Number of trees of each rootstock, average diameter (mm) on April 20, 2011, average diameter (mm) on September 20, 2011, percent of increase in the average growth of the diameter over the growing season, average height (cm) on October 18, 2011, and the percent of height and diameter of each rootstock relative to Marianna 2624 rootstock.

Rootstock	Number of trees in trial	Average diameter (mm) April 20, 2011	Average diameter (mm) Sept. 20, 2011	% increase of Diameter (mm)	Average Height (cm) Oct. 18, 2011	% Height Compared to M2624	% Diameter (Sept) Compared to M2624
Lovell	5	13.45	28.02	108%	371	31%	10%
M2624	5	9.66	25.38	163%	283	0%	0%
Myro 29C	5	9.24	27.01	192%	309	9%	6%
Empyrean 1	5	10.03	30.15	200%	381	35%	19%
WRM 2	4	10.05	28.28	182%	365	29%	11%
Fortuna	5	10.71	28.29	164%	323	14%	11%
Speaker	4	11.98	24.17	102%	314	11%	-5%
Puente	6	10.15	23.19	128%	301	6%	-9%
Krymsk 2	6	8.50	21.50	153%	299	6%	-15%
Ishtara	5	8.41	21.21	152%	296	5%	-16%
Krymsk 99	7	10.49	24.27	131%	266	-6%	-4%
HBOK 27	8	5.82	16.15	178%	222	-22%	-36%
Empyrean 3	3	6.43	20.20	214%	203	-28%	-20%
own root	5	7.63	19.31	153%	187	-34%	-24%
HBOK 32	5	na	13.02	na	184	-35%	-49%
Imperial California	6	6.45	15.53	141%	184	-35%	-39%
Controller 9	10	9.31	18.90	103%	181	-36%	-26%
HBOK 10	5	na	10.71	na	122	-57%	-58%