

2013 SOLANO COUNTY CLONAL PARADOX ROOTSTOCK TRIAL

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ABSTRACT

The California walnut industry utilizes two seedling rootstocks for commercial production, Northern California Black (*Juglans hindsii*) and Paradox hybrid seedling (*Juglans hindsii* x *Juglans regia*). Both rootstocks are open pollinated resulting in genetic variability. This genetic variation leads to non-uniformity in the field related to size, vigor, compatibility, and disease susceptibility. Due to superior vigor, better adaptability to marginal soils and greater tolerance to *Phytophthora* crown and root rot, Paradox is the preferred rootstock for Northern California. Recent technology has resulted in micropagation and commercial availability of three new clonal walnut rootstocks, RX1, VX211 and Vlach. Clonal rootstocks have several horticultural advantages. First, they can be selected for desirable attributes such as disease resistance, nematode tolerance and vigor giving farmers the opportunity to match rootstock selection with planting sites. Second, they will impart less genetic variability and be more predictable in the orchard. Disadvantages include the loss of genetic diversity in orchard plantings and additional expertise is required to micropropagate, nursery culture and graft to produce a commercially viable product.

A trial was planted in Solano County to evaluate Burbank, RX1, Vlach and VX211. Paradox seedling was also planted as the control. By 2013, there were no significant differences in scion circumference or yield among the clonal rootstocks.

OBJECTIVES

To evaluate the three newly released clonal paradox rootstocks and other test selections, a rootstock trial was planted in Solano County. The plot evaluates five rootstocks includes Burbank, RX1, Vlach and VX211 with Paradox seedling as the control comparison. The trial evaluates growth characteristics, yield potential and possible disease tolerance.

PROCEDURES

The rootstocks were clonal propagated by the UC Walnut Breeding Program and were grown for the first season at a commercial walnut rootstock nursery. The trial contains four clonal rootstocks; Burbank, RX1, Vlach, VX211 and Burbank with Paradox seedling used as the control comparison. Vlach was the only variety that was not grown all in the same nursery and the same clonal propagation. The portion of Vlach that was grown in the same environment as the other is labeled Vlach-1 and the Vlach from the other nursery is labeled Vlach-2. Vlach-2 was grown for two seasons in the nursery while Vlach-1 was only grown one season in the nursery.

The trial was planted on March 31, 2009 in a Solano County orchard with a Yolo silty clay loam soil. Tree spacing was 24 x 18.5 feet in an offset design. The experimental design was a randomized complete block design with 7 replications. Each plot contains 10 trees; two rows wide with 5 trees in each row. Measurements of caliper were taken before planting and trees were randomly mixed for each plot with the same ratio of small and large trees. The trees were budded to Tulare in August 2009 by a professional crew. In 2010, missed buds were rebudded in August. Five trees were replanted on March 18, 2010 to replace trees that died in 2009 (3 RX1, 1 Vlach and 1 VX211).

Overall health of the trees including the age of rootstock and scion was collected in August 2012. Rootstock circumference (cm) at 13 inches above ground was collected on October 15, 2012 and December 16, 2013 (Table 1).

RESULTS

The tree health and age were collected in August 2010. As of August 2010, 58 trees have been re-grafted since the initial graft date in 2009. Of those 58 trees, there are 16 Burbank, 20 RX1, 3 Vlach, 9 VX211 and 10 Paradox seedlings.

By 2012, the Vlach-1 and Vlach-2 were no longer significantly different in rootstock circumference size so they have been reported together. By 2013, the scion circumference was no longer significantly different among the rootstocks (Table 1). Significant differences were found among blocks (data not shown). These differences may be due to the high temperatures at planting with the last blocks going in late in the day, differences between grafter bud survival, or soil difference across the field.

DISCUSSION

The differences in size between the clonal rootstocks seen in the first year after planting decreased over the years and by 2013, there were no significant differences among any of the clones or the seedling Paradox (Table 1). There were also no significant differences in yield for the first harvest in 2013 (Table 2). This suggests that under the good soil conditions in the Solano County trial, there does not appear to be an advantage to the clonal rootstocks over Paradox seedling.

Table 1. Average circumference (cm) for the clonal rootstocks versus Paradox seedling rootstocks in 2011, 2012 and 2013. Scion circumference was measured in 2011 and rootstock circumference in 2012 and 2013. Letters indicates significant difference with Duncan's multiple range test. There were no significant differences in rootstock circumference in 2013.

Rootstock	Nov. 2011 scion circumference (cm)	Nov. 2012 rootstock circumference (cm)	Dec. 2013 rootstock circumference (cm)
VX211	19.5 a	42.3 a	48.3 a
Paradox	19.8 a	39.7 b	46.3 a
Burbank	19.5 a	38.9 b	43.1 a
Vlach	19.5 a	38.7 b	46.4 a
RX1	19.8 a	35.1 c	38.1 a

Table 2. Average photosynthetically active radiation interception for the clonal rootstocks versus Paradox seedling rootstocks in 2011, 2012 and 2013 as well as 2013 yield. There were no significant differences in PAR interception in 2012 but in 2013 there were significant differences. Letters indicate statistical difference using Duncan's multiple range test.

Rootstock	2011 PAR interc (%)	2012 PAR interc (%)	2013 PAR interc (%)	2013 yield (t/ac)
Vlach (B)	9.7 ab	23.4 a	40.4 a	0.90 a
VX211	10 ab	22.4 a	38.5 a	0.78 a
Vlach (S)	10.5 a	23.5 a	36.8 ab	0.85 a
Paradox seedling	8.5 bc	21.2 a	36.4 ab	0.84 a
Burbank	8.9 bc	20.3 a	35.9 ab	0.69 a
RX1	7.4 c	19.2 a	31.7 b	0.71 a