ORCHARD PERFORMANCE OF SELECTED CLONAL PARADOX ROOTSTOCKS

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ABSTRACT

Early results show significant differences in survival among clonal paradox rootstocks.

OBJECTIVES

Evaluate survival and growth of selected UC clonal paradox rootstocks.

PROCEDURES

Three trials comparing survival and growth of selected Paradox clonal rootstocks have been established at commercial orchard sites in Calaveras and San Joaquin Counties: one in 2004 and two in 2005 (Table 1). Included in these trials are clones that have been identified as having some resistance to *Phytophthora*: VX211, AZ2, NZ1, JX2 and RX1. VX211 has also been found to maintain vigor in the presence of lesion nematodes. WIP3 was selected for tolerance to blackline caused by the cherry leafroll virus. Vlach is a commercially available clonal Paradox rootstock. The remaining clones were considered susceptible to Phytophthora or are still under evaluation. Seedling Paradox were also included at all three sites and wingnut seedlings at two sites.

The Jenny Lind trial was planted in 2004 and is located in western Calaveras County. Soil at the site is gravelly loam with indurated hardpan at depths from 1 to 5 feet. Drainage is poor, and the soil is subject to prolonged periods of saturated conditions during the winter and spring. The trial is located in a portion of a sprinkler irrigated 16' X 24' Chandler orchard where trees had previously died and several attempts at re-establishing trees on Paradox seedling rootstocks had failed. Several species of *Phytophthora*, including *P. cinammomi* were previously isolated from the soil and roots of dead trees in the orchard. We established this trial as a "worst case" test of the UC selections to assess their survival and growth under conditions very favorable to Phytophthora root and crown rot. Some of the test trees had been propagated by hardwood cuttings and were transplanted from plastic pots into the trial site. Others were supplied and planted as nursery-grown bare root trees. Trees were limited and variable in availability, so the number of trees of planted of the selections was small and variable. Trees were not top-worked to a scion variety.

The Linden trial site is located in a commercial 24' X 24'Eureka/Hartley walnut orchard in eastern San Joaquin County on Milton Road. Rootstocks were planted as bare root trees in March 2005 and grafted to Tulare in April. Soil at the site is Archerdale clay loam and the orchard is sprinkler irrigated. The soil is well drained but soil is subject to saturated conditions during late winter/early spring and during the summer if the orchard is over-irrigated. Test trees were planted as replants in trees sites where original trees had died, in a portion of the orchard with a history of repeated Paradox-rooted tree losses to Phytophthora.

The Stockton test site was planted in April 2005 in a 24' X 24' Paradox-rooted orchard on Jack Tone Road in central San Joaquin County. Soil at the site is Cogna loam and is well drained but subject to periodic saturated conditions as at the Linden site. Test trees were planted as bare root trees in replant sites where original trees had died, presumably from Phytophthora (The Linden and Stockton sites have not previously been tested for the presence of the pathogen. Attribution of tree death to Phytophthora was based on visual symptoms, including root and crown necrosis.).

Visual ratings of tree growth, condition and survival were performed at the Jenny Lind site in July 2004 and again in July and October 2005. Tree survival was evaluated in October 2005 at Jenny Lind and November 2005 at the other sites. Tree growth, as measured by annual trunk circumference measurements, will be monitored beginning in 2006 at the Linden and Stockton sites.

RESULTS AND DISCUSSION

Jenny Lind. Test rootstocks may be divided into three groups based on tree mortality and visual assessments of tree growth and condition. Wingnut seedlings, RX1, Vlach, VX211and JX2 had the best survival and growth as assessed by visual evaluations (Figures 1 and 2). Poor performing selections included AX1, AX2, AX3, AZ2, PX1 and WIP3. Other rootstocks were intermediate, but generally grew poorly or had unacceptably high mortality in this test. These results are similar to those from previous artificial inoculation experiments with *Phytophthora citricola* (with the exception of AZ2).

Linden. Six trees died at the Linden site in 2005. Mortality was higher in 2006, especially for AZ2.

Stockton. There was no tree mortality at the Stockton site in 2005. Care given trees in and general growing conditions in this trial have been poor. Several attempts at fall budding and whip grafting trees to Vina have had a very low success rate. Given these conditions, evaluations were not made in 2006. This test site has been terminated.

ACKNOWLEDGEMENTS

We are grateful to grower cooperators Del Gotelli, Richard Dondero, and David Taylor for their assistance and cooperation and to Burchell Nursery, Inc.and Bonilla Nursery for providing trees for the trials.

Table 1. Selected descriptive information for clonal Paradox trials, San Joaquin County.

Site	Soil	Irrigation	Tree spacing	Trial design	Rootstocks
Jenny Lind	Gravelly clay with hardpan	Sprinkler	16' X 24'	Randomized complete block, 6 rows x 21 trees	From pots:* AX1, AZ2, GZ1, GZ2, NZ1, PX1, RX1, VX211, WIP3 Bare root:* AX2, AX3, GZ3, JX2, Paradox seedling, UX2, Vlach, wingnut seedling, 84-121
Linden	Clay loam	Sprinkler	24' X 24'	RCBD, test trees planted in replant sites	AZ2, JX2, NZ1, RX1, VX211, Paradox seedling (from pots)**
Stockton	Clay loam	Sprinkler	24' X 24'	RCBD, test trees planted in replant sites	AZ2, JX2, NZ1, RX1, VX211, Paradox seedling (from pots), wingnut seedling**

*Seven trees of all rootstocks planted March 2004except WIP3 (n=5), GZ2 (n=4) and wingnut (n=11)
**Twenty trees of each rootstock planted March (Linden) or April (Stockton) 2005

Figure 1. Average visual rating of tree growth and condition of clonal and seedling test trees at Jenny Lind site (0 = dead, 1 = little growth, small, yellow leaves), 2 = moderate growth, leaves green but often small), 3= excellent growth and leaf color).

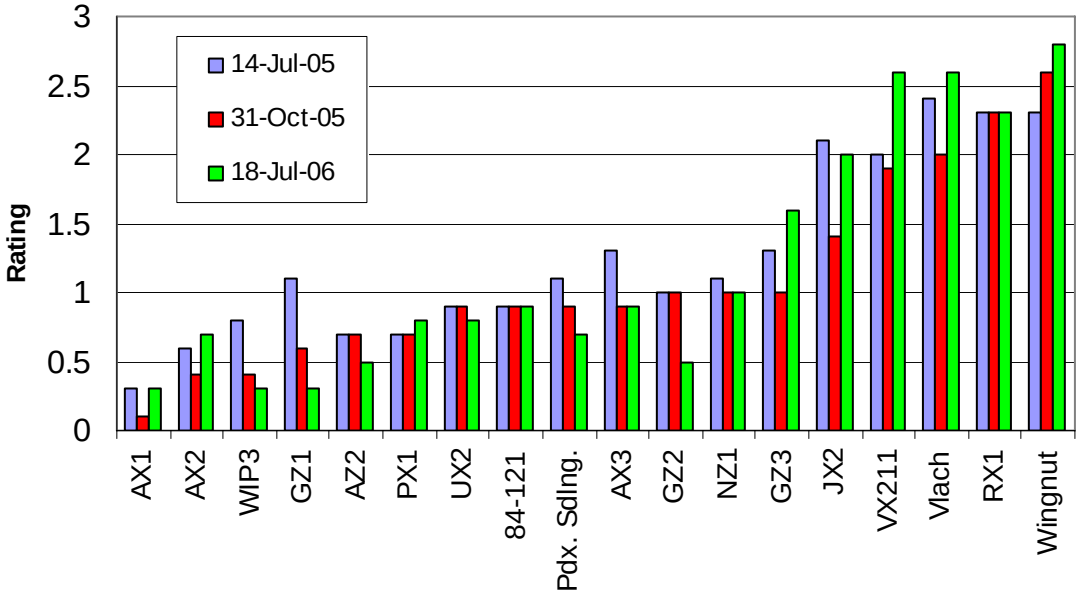

Figure 2. Average tree mortality for UC clonal selections and other rootstocks at Jenny Lind site, 2004 through 2006.

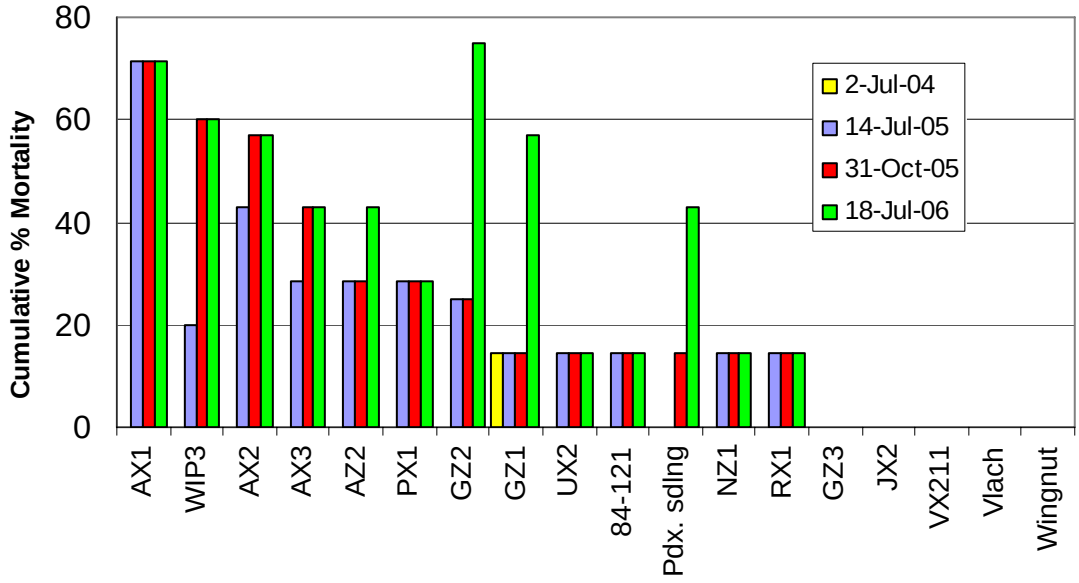

Figure 3. Average tree mortality for UC clonal selections at Linden, 2005 and 2006.