WALNUT ROOTSTOCK SELECTION FOR RESISTANCE TO *PHYTOPHTHORA* SPP.

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The Crops Pathology and Genetics Unit, USDA-ARS, Davis, with the UC Walnut Improvement Program cooperating, is pursuing improved genetic resistance to *Phytophthora* spp. in walnut rootstocks. *Phytophthora* spp. are among the most serious soilborne pathogens among many horticultural crops in California, including walnuts. Fumigation with methyl bromide plays an important sanitizing role for preplant reduction of *Phytophthora* populations at commercial nursery and orchard sites. The need for genetic and cultural Phytophthora disease control strategies will intensify as nursery and production field sanitation with methyl bromide is banned. Although alternative chemicals to methyl bromide appear necessary at nursery sites to maintain adequate sanitation, genetic and cultural approaches offer the most effective and economical means to control of many diseases caused by *Phytophthora*.

Paradox hybrid seedling rootstock (*J. hindsii* x *J. regia*) presently represents the available industry standard for maximum vigor, general tolerance to lesion nematodes, and resistance to most *Phytophthora* spp. Unfortunately, at least some sources of paradox succumb to attack by *P. citricola* and *P. cinnamomi*, which are known to infest many orchard sites in California. Evidence suggests that paradox seed families are genetically diverse, but work is needed to determine families or clones of paradox with superior resistance to *Phytophthora* spp. Previous research revealed that at least some sources of Chinese wingnut (*Pterocarya stenoptera*) are highly resistant to all *Phytophthora* spp. that commonly affect walnuts, including *P. citricola* and *P. cinnamomi*, but more resistance screens and graft compatibility determinations among diverse wingnut sources are needed to assess the practical value of wingnut as a walnut rootstock.

In 1997, we conducted greenhouse screens of resistance to *P. citricola* among seedlings from 31 commercial and experimental seed families of paradox hybrid, 23 seed families of black walnut species (*J. hindsii, J. major, J. microcarpa,* and *J. nigra*), and 2 seed families of English walnut (*J. regia*). In 1996 and 1997, we tested 10 and 8 wingnut seed families, respectively, for resistance to *P. citricola* and *P. cinnamomi*. The walnut and wingnut seedlings were transplanted into pots with noninfested soil or soil artificially infested with isolates of *P. citricola* or *P. cinnamomi* and subjected to biweekly 48-hr flooding episodes to favor disease development. Mortality due to Phytophthora crown rot among paradox seedlings grown in soil infested with *P. citricola* ranged from 0 to 100%, depending on seed family (mean 55%). In two of the seed families, all paradox seedlings survived. Black and English seed families were relatively more susceptible than paradox to *P. citricola* (mortality 60-100%, mean 92%). Overall mortality in noninfested soil among seed families of paradox, black, and English was 0-33% (mean 2%). All wingnut

wingnut seed families were highly resistant to *P. citricola* and *P. cinnamomi* (mortality 0%).

Our results provide evidence of valuable genetic resistance to *P. citricola* among a limited number of paradox seed families and indicate uniform and very high resistance to *P. cinnamomi* and *P. citricola* among diverse Chinese wingnut seed families. Repeat experiments are needed for confirmation of the findings. Screens will be repeated in 1998. Clonal propagation and rescreening will be needed to confirm resistance to *P. citricola* in individual paradox seedlings that survived the 1997 evaluations.

In 1997, final evaluations of an 11-yr graft compatibility experiment were made with a single seed family of Chinese wingnut. Northern California black served as the standard graft-compatible control rootstock. Results indicated that the wingnut seed family was graft compatible with walnut cultivars Franquette, Hartley, Tehama, and Vina; but the wingnut source was partially or completely incompatible with Ashley, Chandler, Chico, Eureka, Payne, Serr, and Sunland. Another experiment was established in 1997 to determine graft compatibility between 6 diverse seed families of wingnut rootstock and 6 English cultivars, including the "new" varieties of Tulare and Howard. Preliminary compatibility evaluations from the 1997 experiment will be available in 1998.