WALNUT ORCHARD MANAGEMENT: PILOT PROJECTS, FIELD TESTING, ADAPTIVE RESEARCH AND PROBLEM SOLVING BY C.E. FARM ADVISORS AND SPECIALISTS - 2007

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ABSTRACT

New walnut cultivars and advanced selections are being field evaluated at two sites with cooperating farm advisors. A large scale replicated variety trial and adjoining selection block for initial testing of promising new material from the breeding program have been established in a 22 acre site at California State University, Chico. Walnut rootstocks (*Juglans* species, Paradox hybrid and English walnut seed sources and clones) are being tested in four cooperative field trials. Field testing of putatively disease and nematode resistant rootstocks is also being conducted.

Two studies comparing own-rooted Chandler to nursery grafted Chandler on seedling Paradox rootstock were planted in Sutter and San Joaquin Counties in 2002. Additionally, own-rooted Vina is being compared to Paradox rooted Vina in Sutter County. Several projects related to walnut tree decline due to irrigation management problems are being conducted as part of this project. One is on a Chandler orchard near Wheatland that was declining due to excessive soil moisture at some times during the season. A Chandler orchard near Meridian is being studied where a water table is present throughout much of the growing season at depths of three to five feet. Another project is looking at growth and productivity responses of young Howard walnuts to a pruned versus unpruned treatment as well as to fruit removal treatments. Yet another project is looking at water management on hillside orchards in Lake County.

OBJECTIVE

The general objective of this project is to support applied and site-specific adaptive research conducted by C.E. Farm Advisors and specialists, including field testing of cultivars and rootstocks. Much of this research activity, by its very nature, is long term. As such, this overall report is largely a compilation of progress/status reports of many field trials located throughout the walnut growing areas of the state. Where sufficient data is available a separate, specific research report is included with detailed procedures and results for the past year.

PROCEDURES

The following is a list of specific research activities supported in 2007 as part of this overall project:

Farm Advisor/Specialist	Location	Project Description
Caprile, Janet	Contra Costa	Field testing of putatively Blackline tolerant Paradox rootstocks from the Paradox Diversity Study
Coates, Bill	San Benito	Evaluation of walnut varieties in San Benito County- 2006
Coates, Bill	San Benito	Field testing of putatively CLRV-hypersensitive cultivars and CLRV-tolerant rootstocks from the Paradox Diversity Study
Coates, Bill	San Benito	Walnut Husk Fly Biology and Varietal Susceptibility
Elkins, Rachel	Lake	Assessing irrigation related problems in hillside walnut orchards in Lake County
Elkins, Rachel	Lake	Using a pressure chamber to aid in irrigation scheduling for a drip irrigated hillside walnut orchard
Grant, Joe	San Joaquin	Performance of Chandler on English (*Juglans regia*) seedling rootstocks
Grant, Joe, Gale McGranahan, Chuck Leslie, Bruce Lampinen, Samuel Metcalf	San Joaquin	Field testing of putatively *Phytophthora* resistant Paradox rootstocks from the Paradox Diversity Study
Grant, Joe Gale McGranahan, Chuck Leslie, Bruce Lampinen, Samuel Metcalf	San Joaquin	Field testing of putatively Blackline tolerant Paradox rootstocks from the Paradox Diversity Study
Hasey, Janine, Joe Grant and Bruce Lampinen	Sutter/Yuba and San Joaquin	Growth and performance of own-rooted Chandler and Vina compared to Paradox rooted trees
Hasey, Janine and Bruce Lampinen Cooperator: Joe Conant	Sutter/Yuba	Comparison of different propagation methods of Chandler on Paradox rootstock and own-rooted trees.

Farm Advisor/Specialist	Location	Project Description
Hasey, Janine, Bruce Lampinen and Samuel Metcalf	Sutter/Yuba	Field testing of putatively *Phytophthora* resistant rootstocks from the Paradox Diversity Study
Hasey, Janine, Bruce Lampinen and Dan Kluepfel	Statewide	Crown gall survey of own-rooted versus Paradox rooted walnut
Holtz, Brent	Madera	Wood chipping walnut brush and its effect on the walnut rhizosphere
Kelley, Kathy, Bruce Lampinen and Sam Metcalf	Stanislaus	Evaluation of walnut rootstocks at Modesto Junior College
Lampinen, Bruce, John Edstrom, Sam Metcalf, Claudia Negron and Stan Cutter	Colusa	Comparison of pruned and unpruned Howard walnut trees as impacted by crop load
Lampinen, Bruce, Sam Metcalf and Claudia Negron	Solano	Field testing of putatively *Phytophthora* resistant rootstocks from the Paradox Diversity Study
Joe Connell, Bill Olson, Gale McGranahan and Jed Walton	Butte	Walnut rootstock trial

RESULTS AND CONCLUSIONS

Field evaluations of walnut cultivars and promising selections are being conducted at two sites. In addition, a Regional Walnut Variety Trial was established in 1996 at the CSU, Chico farm to compare 'Chandler', 'Tulare' and selection 76-80, and walnut selection plots were established the same year at CSU, Chico. Walnut rootstocks (Northern California Black, *Juglans* species, Paradox, English walnut seed sources and clones) are being tested in four cooperative field trials (Table 2). New walnut cultivars and advanced selections are being field evaluated at two sites with cooperating farm advisors. A large scale replicated variety trial and adjoining selection block for initial testing of promising new material from the breeding program have been established in a 22 acre site at California State University, Chico. Walnut rootstocks (*Juglans* species, Paradox hybrid and English walnut seed sources and clones) are being tested in four cooperative field trials. Field testing of putatively disease and nematode resistant rootstocks is also being conducted. Two studies comparing own-rooted Chandler to nursery grafted Chandler on seedling Paradox

rootstock were planted in Sutter and San Joaquin Counties in 2002. Additionally, own-rooted Vina is being compared to Paradox rooted Vina in Sutter County. Several projects related to walnut tree decline due to irrigation management problems are being conducted as part of this project. One is on a Chandler orchard near Wheatland that was declining due to excessive soil moisture at some times during the season. Another Chandler orchard near Meridian is being studied where a water table is present throughout much of the growing season at depths of three to five feet. Two trials in Lake County are looking into how best to manage water on hillside walnut orchards that have historically had irrigation problems. Data collected from these trials have been used to describe new cultivars for release ('Tulare') or potential release ('76-80') and to provide useful information for statewide walnut educational programs and for individual growers to make better informed decisions in replanting or establishing and managing new walnut orchards.

TABLE 1. WALNUT CULTIVAR AND SELECTION FIELD STUDIES

1. Cultivar and Selection Performance in a Standard Configuration - Hollister, CA

   Principal Investigator: William Coates Cooperator: A. Bonturi
   Established: 1983
   Design: 16 cultivars and selections ('Ashley', 'Chandler', 'Chico', 'Cisco', 'Hartley', 'Howard', 'Nuggett', 'Payne', 'Pedro', '"Red Leaf" Serr', 'Serr', 'Scharsch Franquette', 'Sunland', 'Tehama', 'Vina', and UC 64-57) were established in a standard planting.

2. Cultivar and Selection Performance in a Standard Configuration - Hollister, CA

   Principal Investigator: William Coates Cooperator: N. Zanella
   Established: 1981-82
   Design: 5 cultivars and 1 selection ('Chandler', 'Hartley', 'Howard', 'Payne', 'Serr', and UC 64-57) were established in a standard planting.

3. Cultivar and Selection Performance in a Standard Configuration - Hollister, CA

   Principal Investigator: William Coates Cooperator: N. Zanella
   Established: 1990
   Design: 2 cultivars and 5 selections ('Cisco', 'Tulare', UC 67-13, UC 76-80, UC 77-12, UC 78-10, and UC 78-189) were established on Paradox rootstock in a standard planting.

4. Regional Variety Trial - Chico, CA

   Principal Investigator: William Olson Cooperator: California State University, Chico Farm
   Established: 1996
   Design: 2 Cultivars and 1 selection ('Chandler', 'Tulare' and UC 76-80) each were replicated five times with approximately 12 trees per replicate. Other items will be added as new cultivars and promising selections become available. Pollenizers planted were 'Cisco', 'Franquette' and 'McFeeley'.

TABLE 2. WALNUT ROOTSTOCK FIELD STUDIES

1. Walnut Hedgerow Planting on Marginal Soil: Soil Modification and Rootstock Performance - Nickel's Soils Laboratory, Arbuckle, CA

   Principal Investigators: John Edstrom, William Krueger, and Wilbur Reil Cooperator: Nickel's Soil Laboratory
   Established: 1986
   Design: 2 rootstocks (*J. hindsii* Rawlins and Rawlins Paradox) grafted with either 'Chandler' or 'Howard' were planted 18' x 12' in 5 tree plots replicated 6 times in a randomized complete block design. Additionally, the ground for one-half of the plots was "slip plowed".

2. Growth and performance of own-rooted 'Chandler' and 'Vina' compared to Paradox rooted trees

   Principal Investigator: Janine Hasey, Joe Grant and Bruce Lampinen
   Established: 2002
   Design- Sutter/Yuba: 'Chandler' and 'Vina' on own root and 'Chandler' and 'Vina' on Paradox were planted 25' x 25' with 6 replications with 6 trees per replication in a randomized complete block.
   Design- San Joaquin County- Own-rooted 'Chandler' compared to nursery grafted 'Chandler' on seedling Paradox rootstock were planted in an 11' x 25' hedgerow with five 8-tree replications of each rootstock in a randomized complete block design.

3. Own Rooted 'Chandler' vs. 'Chandler' on Paradox - Rio Oso, CA

   Principal Investigator: Janine Hasey Cooperator: J. Conant
   Established: 1991
   Design: 'Chandler' on own root and 'Chandler' on Paradox were planted 25' x 25' with 20 single tree replicates per treatment in a randomized complete block.

4. J. regia Rootstock Performance - Linden, CA

   Principal Investigator: Joseph Grant Cooperator: J. Ferrari
   Established: 1989
   Design: 5 rootstocks (*J. regia* Manregian seedlings, *J. regia* 'Eureka' seedlings,. *J .regia* Spain seedlings, *J. regia* Ronde de Montignac seedlings, and *J. regia* Corne seedlings) grafted with 'Chandler' scions were planted in 5 tree plots replicated 3 times. The experiment was organized in a randomized complete block design. The trees were established in a hedgerow configuration (22' x 11').

5. J. regia Rootstock Performance - Linden, CA

   Principal Investigator: Joseph Grant Cooperator: J. Ferrari
   Established: in 1994

Design: 7 rootstocks (*J. regia* Carpathian [Lawyer 6#L-5961], *J. regia* Russian seedlings [Schildgen], *J. regia* 'Eureka' seedlings [Stuke], *J. regia* 'Waterloo' seedlings [Driver], *J. regia* 'Sunland' seedlings [Driver], *J. regia* 'Chandler' seedlings [Driver], and Paradox seedlings [Driver] were grafted with 'Chandler' scions and established in a 22' x 11' hedgerow.

7. Walnut Rootstock Trial - Chico, CA

Principal Investigator: Joe Connell and William Olson Cooperators: California State University at Chico Farm and Gale McGranahan
Established: 1999
Design: 6 treatments (1. own-rooted 'Chandler' via tissue culture', 2. Own-rooted 'Chandler' via tissue culture grafted to 'Chandler', 3. English ['Waterloo'] rootstock grafted to 'Chandler', 4. Common Paradox rootstock grafted to 'Chandler', 5. 'Trinta' Paradox rootstock grafted to 'Chandler' and 6. Clonal Paradox [PX1] grafted to 'Chandler') are being compared. Each treatment consists of 2 trees and is replicated 6 times.