

TREE CROPS

Project: 45 Identify Procedures to Replace Conventional Soil Fumigation

Project Leader: Michael McKenry, Ph.D., Nematologist, Department of Nematology, UC Riverside, Kearney Agricultural Center

Objective: Field evaluate more than a dozen biocidal agents delivered by shank or drench for the nematode control value against root lesion and pin nematode. Document plant growth benefits of various pre-plant soil treatments. Conduct walnut selection studies for resistance to root lesion nematode and root knot nematode.

Project: 054 Aflatoxin Control in Figs: Biocontrol and New Resistant Cultivars

Project Leader: Themis Michailides, Ph.D., Plant Pathologist, Department of Plant Pathology, UC Davis, Kearney Agricultural Center

Objective: Continue studies on the biocontrol of aflatoxin-producing fungi using an atoxigenic *A. flavus*. Evaluate new fig selections for resistance to aflatoxin contamination.

Project: 203 Fungal Diseases of Kerman Pistachios

Project Leader: Themis Michailides, Ph.D., Plant Pathologist, Department of Plant Pathology, UC Davis, Kearney Agricultural Center

Objective: Follow the survival of atoxigenic strains previously applied in a pistachio orchard. Initiate an additional biocontrol experiment using the atoxigenic strain AF36 in another pistachio orchard irrigated by micro-sprinklers. Determine the incidence of the atoxigenic strain AF36 among isolates from commercial pistachio orchards.

Project: 502 Prune Germplasm Evaluation and Development

Project Leader: Ted DeJong, Ph.D., Professor/Specialist, Department of Pomology, UC Davis

Objective: To develop new prune cultivars with the same or better quality characteristics as the "Improved French" cultivars that can be harvested significantly earlier or later than "Improved French".

Project: 554 Research and Demonstration Trees for Citrus IPM

Project Leader: Beth Grafton-Cardwell, Ph.D., CE Specialist and Research Entomologist, Department of Entomology, UC Riverside, Kearney Agricultural Center

Objective: To provide untreated citrus fruit, leaves, and twigs for rearing insects and for various laboratory experiments.

Project: 560 Advanced Walnut Cultivar Selection Evaluation for the Southern San Joaquin Valley

Project Leader: Gale McGranahan, Ph.D., Pomologist, Department of Plant Sciences, UC Davis

Objective: Evaluate advanced walnut cultivars selected by the UCD Pomology Department breeding program under southern San Joaquin Valley conditions

Project: 653 Orchard Odyssey Education Center

Project Leader: R. Scott Johnson, Ph.D., Extension Pomologist, Department of Pomology, UC Davis, Kearney Agricultural Center

Objective: To develop a demonstration orchard and educational pavilion where principles of sustainable orchard management can be displayed. To develop a program for large numbers of students to tour the orchard and pavilion and learn from the displays.

Project: 750 Evaluation of Cultural, Biological and New Chemical Pre and Postharvest Brown Rot on Stonefruit

Project Leader: Themis Michailides, Ph.D., Plant Pathologist, Department of Plant Pathology, UC Davis, Kearney Agricultural Center

Objective: Monitor environmental conditions in stone fruit orchards to predict blossom blight. Predict brown rot at harvest and postharvest based on the incidence of latent infections. Study various alternative strategies of brown rot control by suppressing primary and secondary inoculum sources in the spring and summer, reducing survival of mummified fruit, and use biocontrol agents to reduce brown rot.

Project: 751 Improvement of Peach Rootstocks for California Production

Project Leader: Ted DeJong, Ph.D., Professor/Specialist, Department of Pomology, UC Davis

Objective: Continue to assess the vegetative growth and fruit production characteristics of the rootstock/scion combinations currently in the field. Add additional rootstock selections to the trial from our size-controlling/nematode resistance screening trials at Davis.

Project: 757 Management and epidemiology of Stone Fruit and Almond Diseases in California

Project Leader: James E. Adaskaveg, Ph.D., Associate Professor, Department of Plant Pathology, UC Riverside

Objective: Evaluate bloom and preharvest applications of new compounds (e.g., fungicides) and biological products as compared to registered fungicides for control of brown rot blossom blight and pre- and postharvest brown rot fruit decay. Determine the efficacy of new fungicides and biological products as postharvest treatments. Evaluate new postharvest application methods, including in-line drenching systems, and roller-bed applications. Develop rapid antibody-based assays for determining concentrations of fludioxonil in mixing tanks and on fruit. Incidence of *Geotrichum candidum* on stone fruits with of sour rot-like symptoms. In vitro evaluations of registered and experimental sanitizers and fungicides. Toxicity of sanitizers on handling equipment and efficacy of sanitizers and fungicides for management of sour rot on stone fruits.

Project: 812 Pistachio Rootstock Trial

Project Leader: Robert H. Beede, Farm Advisory, UC Cooperative Extension, Kings County

Objective: Study the effects of regulated deficit irrigation at different stages of pistachio nut development on shell splitting. Obtain more basic biological information on how crop load and rootstock affects the growth and fruitbud retention of pistachio. Evaluate the selected UCB1 seedling under clonal propagation against open pollinated seedlings of the same parents and the industry standard, PG1. Provide a study site for entomology research when possible.

Project: 819 Cling Peach and Almond Evaluation

Project Leader: Tom Gradziel, Ph.D., Professor/Geneticist, Department of Pomology, UC Davis,

Objective: Accelerate regional testing of advanced breeding selections. Collect, summarize, and distribute results from regional trials. Improve the exchange of information, ideas, needs, etc. between the breeding program and Farm Advisors, handlers, processors, fieldsmen, growers, and nurseries

Project: 850 Water Management for Optimum Peach Productivity and fruit Quality

Project Leader: R. Scott Johnson, Ph.D., Extension Pomologist, Department of Pomology, UC Davis, Kearney Agricultural Center

Objective: To determine the water use of young and mature peach trees. To determine the effect of postharvest water stress on peach tree growth, productivity and fruit quality. To determine the effect of subsurface irrigation on peach tree water use, tree growth, productivity and fruit quality. To compare different methods of predicting tree water use and water stress with the lysimeter measurements.

Project: 854 Pistachio Seed Production

Project Leader: Themis Michailides, Ph.D., Plant Pathologist, Department of Plant Pathology, UC Davis, Kearney Agricultural Center

Objective: To maintain these two trees in a healthy state and produce annual crops of rootstock seed.

Project: 952 Apple Rootstock and Variety Trial

Project Leader: R. Scott Johnson, Ph.D., Extension Pomologist, Department of Pomology, UC Davis, Kearney Agricultural Center

Objective: The main objective of this study is to evaluate new apple rootstocks which have the potential for improving apple production in California. Along with that is the objective of comparing the performance of these rootstocks in widely varying environmental conditions so a more complete picture of performance can be obtained. A secondary objective of this block will be to use the border rows to evaluate such things as new Gala strains, compare training systems etc.

Project: 953 Nutrient Deficiency of Peaches and Nectarines

Project Leader: *R. Scott Johnson, Ph.D., Extension Pomologist, Department of Pomology, UC Davis, Kearney Agricultural Center*

Objective: To test the feasibility of measuring boron, zinc and nitrogen (and other nutrients if possible) in stone fruit trees during the dormant season or early spring and relate those nutrient levels to the various components of yield and fruit quality. To develop deficiency threshold values for these nutrients that can be used to guide fertilization decisions early in the season. To test the usefulness of these threshold values in commercial orchards.

Project: **0002 Biological Control of Fire Blight**

Project Leader: *Brent Holtz, Farm Advisor, UC Cooperative Extension, Madera County*

Objective: The testing of models to predict the occurrence of fire blight in apples. Rain events and temperatures were recorded and the infection events were determined. Bactericides were applied as based on the predicted infection events. Efficacy of bactericides. Bactericides were applied based on the infection events. However, fire blight was low in these plots and no significant differences were observed between treated and untreated trees or between the calendar-based and model-predicted sprays.

Project: **1001 Increasing Water and Nitrogen Use Efficiency in Peach Using Size-Controlling Rootstocks**

Project Leader: *R. Scott Johnson, Ph.D., Extension Pomologist, Department of Pomology, UC Davis, Kearney Agricultural Center*

Objective: Determine N requirements of different varieties of peach budded to various size-controlling rootstocks. Assess the ability of the rootstocks to acquire N from soil and limit leaching of nutrients into the ground water, and develop and evaluate fertilization recommendations for using size-controlling rootstocks in commercial peach production.

Project: **1004 Olive Pests and Their Natural Enemies**

Project Leader: *Kent Daane, Ph.D., CE Assistant Specialist, Division of Insect Biology, UC Berkeley, Kearney Agricultural Center*

Objective: Describe the seasonal patterns of OLF egg and larval activity, and apply the information toward selecting optimal times to implement different IPM strategies (e.g., parasitoid release). Investigate the residual levels and efficacy of GF-120 applied against olive fruit fly.

Project: **1005 Peach NC-140 Rootstock Evaluation**

Project Leader: *R. Scott Johnson, Ph.D., Extension Pomologist, Department of Pomology, UC Davis, Kearney Agricultural Center*

Objective: Evaluate new peach rootstocks, that have been collected from around the world, for dwarfism, pest resistance, suckering and productivity. Cooperate with the NC-140 Technical Committee (of which we are members) in this national peach rootstock testing study.

Project: **2001 Epidemiology and Management of Walnut Blight and Varietal Susceptibility to the Disease**

Project Leader: *James E. Adaskaveg, Ph.D., Associate Professor, Department of Plant Pathology, UC Riverside*

Objective: I. Evaluate the toxicity of alternative, non-copper based chemicals to *X. campestris* pv. *juglandis*. Compare, in laboratory, greenhouse, and small-scale field tests, the toxicity and efficacy of protective treatments including commercially available biocidal oxidation agents (OxiDate, Zerotel) and fungicidal-bactericidal treatments (e.g., Arvesta 04-01) for control of walnut blight as compared fixed-copper compounds. II. Develop and evaluate epidemiological aspects of walnut blight including evaluation of XanthoCast as a model for forecasting the incidence of the disease.

Project: **2012 Understanding Genetic Control of Tree Fruit Quality with Emphasis on Fruit Mealiness**

Project Leader: *Carlos H. Crisosto, Ph.D., Pomologist, Department of Pomology, UC Davis, Kearney Agricultural Center*

Objective: The goal of this research is to identify important genes controlling expression of the fruit organoleptic traits (FOTs) that define fruit quality of peach, and to develop molecular tools for enhancing genetic improvement of fruit quality with emphasis on fruit mealiness through molecular and classical breeding. The specific objectives of this proposal are to:
1. Identify and locate i) QTLs controlling fruit mealiness, acidity, soluble solids consisting

of various sugars, fruit firmness and fruit size, and ii) the F (freestone), M (melting), and (soft) loci that distinguish clingstone, non-melting canning peaches from freestone, melting dessert peaches. 2. Quantify the phenotypes resulting from interaction among the genes controlling the F (freestone), M (melting), St (soft) and Y (yellow flesh) loci, and the QTLs that produce the genetic variability for fruit mealiness, acidity, soluble solids, fruit firmness and fruit size, so as to enhance the understanding of how new cultivars with high quality fruit can be bred. 3. Develop molecular marker tags for major loci and QTLs controlling these important FOTs for use in marker-aided selection for enhanced fruit quality of peaches/nectarines.

Project: 0310 Insecticide Evaluation--Peach and Nectarine

Project Leader: *Walter J. Bentley, IPM Entomologist, UC Kearney Agricultural Center*

Objective: To gain pest control efficacy data on three key pests of peaches. These include Oriental fruit moth, peach twig borer, and western flower thrips. In addition to efficacy, I will evaluate these as to increasing spider mite problems. Residual activity of these materials will also be tested.

Project: 0401 Chemical and Cultural Control of Band Canker of Almond Caused by Botryosphaeria dothidea

Project Leader: *Themis Michailides, Ph.D., Plant Pathologist, Department of Plant Pathology, UC Davis, Kearney Agricultural Center*

Objective: 1) Compare various fungicide treatments by injecting them in trees in a) a lath house, B) GREENHOUSE, and C) in the field. 2) Compare ways of irrigation in controlling band canker of almond. 3) Compare tree seals with or without fungicides in controlling band canker.

Project: 0505 California Citrus Incubation Program for the Korean Export Market

Project Leader: *Jim Adaskaveg, Ph.D., Associate Professor, Department of Plant Pathology, UC Riverside*

Objectives: Develop an incubation program for the certification of California oranges to the Korean export market.

Project: 0506 Epidemiology and Management of Gray Mold of Kiwi in California

Project Leader: *James E. Adaskaveg, Ph.D., Associate Professor, Department of Plant Pathology, UC Riverside*

Objective: 1. Preharvest treatments for postharvest decay control- Evaluate new reduced-risk fungicides (e.g., pyrimethanil-Scala, cyprodinil-Vanguard, fenhexamid-Elevate, pyraclostrobin/boscalid - Pristine) and biological controls (Trichoderma spp.- PlantShield, Bio-Trek) as preharvest treatments for postharvest decay management. 2. Postharvest treatments - Evaluate new reduced-risk fungicides (e.g., pyrimethanil-Penbotec, cyprodinil-Vanguard, fenhexamid-Elevate, fludioxonil-Scholar, pyraclostrobin/boscalid - Pristine) and biological controls (Trichoderma spp.- PlantShield, Bio-Trek, Arabesque) as postharvest treatments for decay management. 3. Continue to cooperate with commercial packinghouses on postharvest applications of fungicides pending registration of fenhexamid (Section 3 or Section 18) or fludioxonil (Section 3).

Project: 0511 Molds in Walnut Cultivars and Their Management

Project Leader: *Themis Michailides, Ph.D., Plant Pathologist, Department of Plant Pathology, UC Davis, Kearney Agricultural Center*

Objective: 1) Identify specific characteristics associated with moldy (and aflatoxin)-contaminated walnuts in three cultivars and investigate the role of insect infestation. 2) Determine the period when walnuts of three cultivars become susceptible to infection by molds, including *Aspergillus flavus* or *A. parasiticus* and differences in cultivar susceptibility.

Project: 0515 OEtiology of Black Heart of Pomegranates and Disease Management

Project Leader: *Themis Michailides, Ph.D., Plant Pathologist, Department of Plant Pathology, UC Davis, Kearney Agricultural Center*

Objective: 1) Identify the cause(s) responsible for the black heart disease of pomegranates. 2) Determine the period when infection takes place and design control measures.

Project: 0601 Development and Testing of Pedestrian Orchard Concepts

Project Leader: *Kevin R. Day, Farm Advisor, U.C. Cooperative Extension, Tulare County*

Objective: The primary goals of this project are to 1) evaluate several orchard system/rootstock combinations with the idea of testing the concept of a true pedestrian orchard, and 2) evaluate the potential of those systems for actual grower adoption.

Project: **0707 Impact and Management of the Mediterranean Pine Engraver in Urban Pines of California**

Project Leader: *Steven J. Seybold, Research Entomologist, Chemical Ecology of Forest Insects, USDA Forest Service, Pacific Southwest Research Station*

Objective: 1) Determine the host range of the Mediterranean pine engraver (MPD) in California on native and ornamental pines and related conifers (through observation and collections in Fresno and Tulare Cos.). 2) Identify fungal pathogens vectored by MPE in California (conducted at Iowa State University). 3) Develop an attractive semiochemical bait to optimize early detection of MPE outside currently infested counties and elsewhere in North America (conducted at golf courses in Fresno, Kingsburg, and Visalia). 4) Identify inhibitory semiochemicals (repellents) as a biorational pest management tool (conducted at golf courses in Fresno, Kingsburg, and Visalia).

Project: **0811 Developing the California Fresh Fig Industry**

Project Leader: *Carlos H. Crisosto, Ph.D., Plant Physiologist, Department of Plant Sciences, UC Davis, Kearney Agricultural Center*

Objective: The main goal of this program is to create a relationship with the industry and among UC peers with interests in fresh figs that will help to develop a research and outreach program and develop new technology to develop this fresh fruit industry. We are proposing the following objectives:

- 1) Consolidate domestic and foreign information on figs (first and second year).
- 2) Establish a research plot at the Kearney Agricultural Center (first year).
- 3) Determine chilling and heat unit requirements (first year).
- 4) Evaluate techniques to break apical dominance (first and second year).
- 5) Test cultivar performance under different pruning systems (third and fourth year).
- 6) Introduce European fig varieties to the research and demonstration plot (second year).

Project: **0813 Carbon Sequestration and Stone Fruit Replant Disease**

Project Leader: *Brent A. Holtz, Ph.D., Pomology Farm Advisor, U.C. Cooperative Extension, Madera County*

Objective: To compare wood chipping and grinding up of whole trees with burning as a means of orchard removal. We will examine these treatments with respect to second generation orchard growth and replant disease. We hypothesize that soils amended with woody debris will sequester carbon at a higher rate, have higher levels of soil organic matter, a higher humification rate, increased soil fertility, increased water retention, and reduced soil erosion. Soil organic matter has been shown to reduce the leaching of nutrients and pesticides.

Project: **0814 Management of Pomegranate Diseases in California**

Project Leader: *James E. Adaskaveg, Ph.D., Associate Professor, Department of Plant Pathology, UC Riverside*

Objective: 1) Identify fungal diseases impacting the yield and quality of pomegranates. 2) Identify and develop possible pre- and post harvest applications (fungicides, biological products, sanitizers, timing, and application methods) to minimize the effects of disease on the industry. 3) Develop sustainable programs that are highly effective and provide and postharvest fungicides. 4) Assist in IR-4 residue trials for the registration of new preharvest and postharvest fungicides. 5) Help keep the Korean and other future export markets open for pomegranate growers and processors.

Project: **0901 Testing a Fall Ethrel Application for Flower Removal: A New Thinning Approach**

Project Leader: *Carlos H. Crisosto, Ph.D., Pomologist, Department of Plant Sciences, UC Davis, Kearney Agricultural Center*

Objective: These preliminary results demonstrated that detailed work on the action of ethephon applied in late summer-fall should be pursued. These 2008 fall trials are focusing on developing the optimum ethephon concentration-timing for crop load reduction for 'O'Henry' peach and 'May Glo' nectarine.

Project: 0902 Peach NC-140 Rootstock Evaluation

Project Leader: *R. Scott Johnson, Ph.D., Extension Pomologist, Department of Plant Sciences, UC Davis, Kearney Agricultural Center*

Objective: 1) Evaluate new peach rootstocks, that have been collected from around the world, for dwarfism, pest resistance, suckering and productivity. 2) Cooperate with the NC-140 Technical Committee (of which I am a member) in this national peach rootstock testing study.

Project: 0904 Mechanical Blossom Thinning Using a Darwin String Thinner

Project Leader: *R. Scott Johnson, Ph.D., Extension Pomologist, Department of Plant Sciences, UC Davis, Kearney Agricultural Center*

Objective: 1) To test the Darwin String Thinner on blossoms of Summer Fire nectarine trees in a Kearney "V" training system at the Kearney Ag Center. Rotation speed, travel speed, distance from canopy and other parameters will be tested to see how much the thinning response is affected. 2) If a successful protocol is developed under objective 1, the unit will be tested in a couple of commercial fields trained to Kearney "V" or Quad "V" systems.

Project: 1017 Pomegranate Fertigation Efficiency with Drip Irrigation Systems

Project Leader: *R. Scott Johnson, Ph.D., Extension Pomologist, Department of Plant Sciences, UC Davis, Kearney Agricultural Center*

Objective: The overall objective is to use high frequency drip irrigation to optimize water-nitrogen interactions, to improve FUE of young and maturing pomegranate and to minimize leaching losses of nitrogen.