



FPS FRUIT & NUT TREE NEWS

OCTOBER 2005

UCDAVIS

Foundation Orchard Replacement Efforts Underway

by Mike Cunningham, FPS Fruit and Nut Tree Program Manager



IT IS IMPORTANT THAT THE FRUIT AND NUT TREES in the Foundation Orchard at Davis be maintained in a condition which is conducive to good growth and the production of good quality propagation materials. As the trees age they begin to develop problems such as Eutypa fungal infections, damage from boring insects, and root die-back from various soil fungi. An eight- to twelve-year rotation of the orchard has been considered a good time frame for maintaining healthy, productive trees. The majority of the FPS Brooks Foundation Orchard (BFO) from which distribution of registered budwood currently takes place was planted in 1993 and 1994.

Foundation Plant Services field staff is in the third year of replacement efforts for the Brooks foundation collection. Finding a location on the UC Davis campus that complies with the isolation requirements as dictated by the California Registration and Certification Program was a challenge. The site of the current foundation plantings and contiguous acreage is about all that remains that qualifies with regard to geographic isolation from the various research plantings that exist in the Plant Pathology and Plant Sciences Departments on campus. An appropriate piece of land was eventually assigned to FPS by campus officials. It consists of approximately 20 acres of Yolo sandy loam adjacent to existing FPS orchards and vineyards. Ten acres were fumigated and prepared for planting; the first trees were put into the new Foundation Orchard in February 2004. The old BFO will be replaced in stages over four to five years' time.

continued on page 2

Welcome to New Customer Service Representative

IN JUNE, our long-time customer service representative Ginnie Dixon retired from the University and her position at FPS. We will miss her considerable knowledge and the enormous amount of energy and good will she generated and shared in the business office. We are pleased to welcome onboard a new customer service representative, Tracy Pinkelton, who comes to us from the Center for Human Services at UC Davis Extension, where she worked as an administrative assistant in client services. Tracy brings a high level of computer, organizational and troubleshooting skills, as well as an educational background in the plant sciences and the experience of growing up in a farming family. We trust that you'll enjoy working with her as much as we do. ☺



INSIDE:

- 2 **New Introductions to the Foundation Orchard**
- 3 **How to Order Fruit and Nut Tree Budwood and Seed**
- 3 **The Diameter Dilemma**
- 4 **New UCD Almond Selections**
- 5 **'CONTROLLER 5™ and 'CONTROLLER 9™ Rootstocks**
- 6 **UC Release of 'MUIR BEAUTY™ Dried Plum**
- 7 **Fruit and Nut Tree Sales and Distribution Update**
- 7 **Pistachio Update**
- 8 **UCB#1 Pistachio Rootstock Trials**
- 10 **Progress in DNA Identification of *Prunus***
- 11 **The FPS Foundation Orchard**
- 12 **Q-37 Revision Underway**
- 12 **Proposal for a National Clean Plant Network**
- 13 **CDFA Update**
- 14 **Real-time RT-PCR Assays for Tree Virus Detection**
- 15 **In Memory**

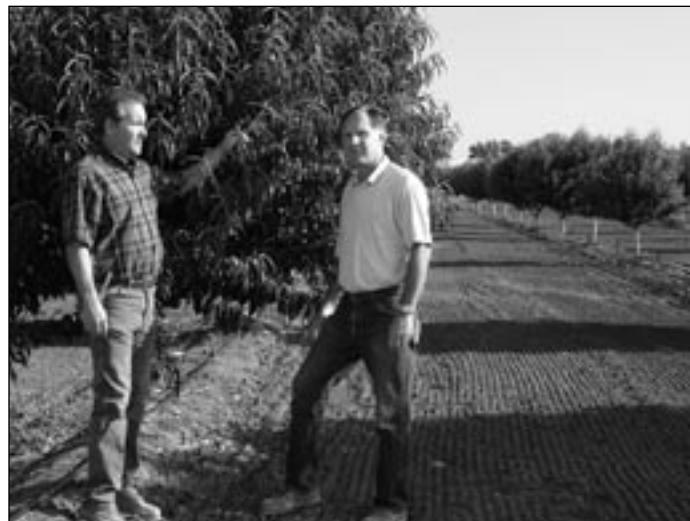
New Introductions to the Foundation Orchard

IN RECENT YEARS FPS has added several new introductions to the Foundation Orchard. The USDA Agricultural Research Service released three new plum varieties that are now in the FPS Foundation Orchard and available for distribution. 'Black Splendor,' an early season plum with red flesh and blue/black skin color, is for the fresh market. 'Owen T,' with black skin color and purple shoulders, provides an early to mid-season plum for the fresh market. 'John W' plum ripens the last week of August to the first week of September. It has an orange flesh and purple-red skin.

Propagation material of 'Galaxy' peach, also from the USDA-ARS program, is now available from FPS. All USDA-ARS releases sent to FPS are indexed for disease at the NRSP5 Virus-Tested Fruit Tree Collection at Washington State University in Prosser, Washington and were found free of known viruses. This material automatically qualifies as California Registered stock. More detailed descriptions are available at Foundation Plant Services.

Two new UC/USDA size-controlling peach-plum hybrid rootstock selections are also available now from Foundation Plant Services. 'CONTROLLER 9™' (formerly P30-135) rootstock is an interspecific hybrid rootstock developed for use as a commercial clonal rootstock for peach and nectarine cultivars. It imparts vigor control to the scion cultivar, allowing for the reduction in height of orchard trees without compromising the quality of the fruit. 'CONTROLLER 9™' eventually produces a tree that is about 90% the size of a tree growing on Nemaguard rootstock, and the trees require less severe pruning and have more open canopies than trees on standard rootstocks. 'CONTROLLER 5™' (formerly K146-43) rootstock is another interspecific hybrid useful primarily as a commercial understock for peach and nectarine cultivars. It imparts a substantial degree of vigor control to the scion cultivar, reducing the height of the individual orchard tree without compromising the quality of the fruit. 'CONTROLLER 5™' produces an orchard tree that is about 50-60% of the size of trees growing on Nemaguard rootstock, depending on pruning practices. This stock has been successfully propagated clonally by hardwood cuttings.

Both 'CONTROLLER 9™' and 'CONTROLLER 5™' are moderately rootknot nematode susceptible and are probably not inherently resistant to numerous soil pathogens. ☀



Field Manager Matt Gallagher (left) and FPS Tree Program Manager Mike Cunningham check the new Goheen Orchard.

Foundation Orchard Replanting...continued from page 1

The first planting included trees used for seed production, namely Nemaguard, Lovell, and Nemared peaches, Mahaleb and Mazzard cherries, and Myrobalan plum. The first harvest of a small amount of seed from the peach trees may occur in fall 2005, but the more significant numbers are expected in the 2006 season and beyond. The 11-year-old Brooks Foundation seed trees will be retained at least until the new trees are in full production. Also planted in the Foundation Orchard in 2004 were the cherry and plum scion source trees. The almond selections were added to the new collection in 2005, to be followed by the apricots, peaches, and nectarines in 2006. The varieties are represented by four trees each.

FPS views each orchard replanting as an opportunity to update the orchard inventory, leaving behind those fruit and nut varieties that are no longer of interest to the industry as indicated by the input received from nursery clients. At the same time, we strive to add new varieties to the collection, as described in other parts of this newsletter. All trees in the older orchard will be used for budwood distribution until the new trees have been identified as being true to variety.

The entire Brooks Foundation area - trees, vines, and roses - is being gradually converted to either drip or microsprinkler irrigation. The Foundation Orchard will be our first foray into the growing of trees using this newer irrigation technology. Though the initial financial outlay is considerable, it is our desire to decrease the amount of tractor work needed to cultivate the orchard and reduce the water cost, thus saving labor and equipment costs in the longer run. ☀

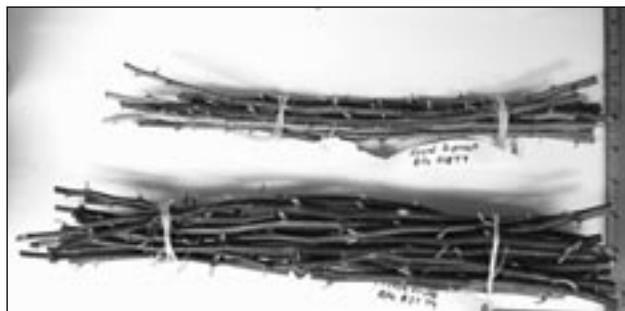
How to Order Fruit and Nut Tree Budwood and Seed

DISEASE-TESTED FRUIT AND NUT TREE propagating material may be purchased from FPS from May through January each year. An order form, price list and list of cultivars maintained in the FPS Foundation Orchard can be obtained by calling the FPS office at (530) 752-3590, by email request to fps@ucdavis.edu or by downloading them from our Web site at <http://fps.ucdavis.edu>.

Available material for each distribution period will be allocated among all who request it by the ordering deadlines listed below. After the initial allocations, any remaining material will be sold on a first-come, first-served basis.

Type of Material	Order deadline	Supplied
June (green) budwood	May 1st	May/June
Pistachio parent tree budwood	June 1st	Late June-September
Fall scion buds	August 1st	August/September
Cherry, peach & plum seed	August 1st	September
Fall rootstock cuttings	October 15th	Early November
Betulaefolia pear seed	November 1st	Late November
Dormant wood	November 15th	December/January
UCB#1 pistachio seed	November 15th	Late Nov./Early December

To place an order, please submit a completed and signed FPS Order Form along with 50% prepayment to the FPS office. To order pistachio seed or budwood, you will need to submit the Pistachio Material Order Form. If you have questions about placing an order, you can contact the customer service office by phone at (530) 752-3590 or by email at fps@ucdavis.edu. For technical or cultural questions about the materials in our tree collection, contact Mike Cunningham, FPS tree program manager, by phone at (530) 752-3888 or by email at macunningham@ucdavis.edu. ☺



FPS tree budwood ready to ship for June budding.

The Diameter Dilemma

As tree nursery production personnel are aware, it is important to match the diameters of the rootstock and scion material as closely as possible to enhance budtake. It is always a challenge for FPS staff to provide useful propagation material without knowing the rootstock situation of our customers. Is the rootstock one year old or two? Has growth been normal for the time of year, or are things slow or ahead of schedule? Are the budders ready to receive the material—especially during spring or June budding season when the green budsticks are fragile and need to be propagated immediately upon receipt? Optimal diameter sizes are also different among the various fruit and nut cultivars in the FPS inventory.

As FPS production manager, Mike Cunningham often contacts customers to consider their individual needs for budwood diameters, establish a delivery time frame, or discuss availability. It is important to limit the number of "surprises" when it comes to budwood quality and quantity. The more information our budwood collectors have as they cut, the more satisfactory the product will be. Here are a few helpful suggestions that may expedite the order process:

- ✓ Indicate on the order form the approximate time frame you expect to receive your material.
- ✓ Indicate preferred budwood diameter range.
- ✓ If your order is large by FPS standards, specify the maximum number of buds/cuttings that you want to receive. FPS maintains an "Increase Block" in the sense that we may have more than the customary four trees of the more recent releases, especially of the varieties developed and released by the University of California. If our staff knows the largest number of buds or cuttings that you would like to receive, we can do our best to reach that amount. "All available" can be a dangerous request in that there may be 25 trees of some new releases and an order may be filled with more material than expected.

In the case where FPS is pushed to distribute a large number of buds or cuttings, as often occurs with initial releases of UC material, wood may be cut that is outside the normal generally-preferred diameter range. In order to get as much material out into the industry as possible, FPS staff may send out material that we know is smaller or larger than optimal; this provides some leeway for customers to propagate as much as their circumstances allow. In such cases, FPS asks the customers to report back on the number of useable buds they obtained from the material, and invoices will reflect these numbers. ☺

UCD Almond Selections Under Consideration for Patenting and Release

by Tom Gradziel, Department of Plant Sciences, UC Davis

Following the release of the 'Nickels' rootstock and 'Winters' almond variety, we anticipate the further release of UCD36-52 (a 'Marcona'-type almond selection) within the next two years. UCD selection 2-19E is also being considered for release to the California industry depending upon results from recently established grower test plots.

UCD36-52 as a Spanish 'Marcona'-type almond combining high quality, productivity and insect resistance

Efforts to develop a California-adapted 'Marcona'-type variety have intensified because of the increasing plantings of the 'Marcona' variety in California due to the high quality of its heart-shaped kernel (Figure 1) and the associated higher market price. Despite its high market price, 'Marcona' does not appear to be well adapted to California conditions owing to a generally greater disease susceptibility, vulnerabilities to noninfectious bud failure, and poor kernel/shell crack-out proportions of approximately 30%.

In its principal areas of production in Spain, 'Marcona' flowers approximately 1 week before 'Nonpareil' and so would not be suitable for cross pollination. UCD selection 36-52 combines the desired heart-shaped kernel of 'Marcona' with its high kernel quality (resulting in part from a higher oleic acid content which confers both an agreeable buttery flavor and improved resistance to kernel rancidity). In addition, selection UCD36-52 has a moderately well sealed paper shell (Figure 2) with crack-out proportions of approximately 60%. Because it flowers approximately 3-6 days after 'Nonpareil', it would be a suitable pollinizer for the late 'Nonpareil' bloom; and since it possesses moderate levels of self-compatibility, it will allow some self seed set if cross-pollination does not occur.

Selection UCD36-52 also demonstrates good post-harvest resistance to navel orangeworm and Indian meal moth which results in greater yield recovery and, equally important, reduced incidence of aflatoxin contamination which is highly correlated with insect damage to the kernel. Insect resistance in UCD36-52 results in part from a good shell seal but also appears to involve various biochemical components of the kernel. The multiple resistance mechanisms provide a more stable, broad-level resistance, but they are difficult to transfer to new varieties because of the complexity of the genetics involved.

Yield, which is the single most important determinant of variety success, will vary by site in almond production areas of the Sacramento and San Joaquin valleys. A small-scale (12 trees in a solid 4x4 block), 12-year old test plot at Arbuckle, California has shown UCD36-52 to be similar to, but slightly lower in production, when compared with nearby 'Nonpareil' trees. Additional grower blocks have been planted in the Sacramento and

Figure 1. The Spanish variety 'Marcona' showing a high quality heart-shaped kernel and thick shell.



Figure 2. Advanced selection UCD 36-52 combining good 'Marcona' characteristics with pest resistance, high crack-out, good 'Nonpareil' bloom overlap and partial self-compatibility.



San Joaquin valleys and are now coming into production. Because of the very high market value of this 'Marcona'-type nut and the subsequent high interest by growers familiar with this marketing niche, we have decided to initiate the paperwork for variety patenting and release for UCD 36-52. While final yield potential—particularly in the San Joaquin Valley—remains unsubstantiated, the generally good productivity of this tree combined with its very high market retail price has led to our decision to release this item at this time as a grower alternative to

the Spanish variety 'Marcona', which our evaluations indicate is less adapted to California conditions.

UCD2-19E, a productive pollinizer for late 'Nonpareil' bloom

UCD2-19E has been one of the highest producing varieties at the Kern RVT plot with an accumulated (1995-2004) yield of 23,030 pounds per acre. It yielded an exceptionally high crop of 4890 pounds per acre in 2003 (Figure 3). As can be seen in Figure 3, however, UCD2-19E shows a strong alternate-bearing habit in which years of high crop yield are followed by low crop years. It is believed that in years of very high crop, insufficient nutrients are available to the already overloaded fruiting spurs to initiate the number of flowers needed to maintain the crop, and in some cases to maintain the very viability of the spur into the next season. An alternate-bearing habit is undesirable for California production, and usually breeding selections showing this behavior would be discarded. However, many Kern County growers have been successful in maximizing year-to-year production in other strongly alternate-bearing varieties such as 'Price,' by closely monitoring current season crop yield and providing increases in both irrigation water and fertilizer nutrients as needed. To evaluate this opportunity to capitalize on its very high cropping potential, and because of its good kernel quality and bloom overlap with later 'Nonpareil' bloom, additional grower plantings have been made in Kern County. Virus-tested foundation plant material is also being provided to interested nurseries under test agreement to facilitate greater grower experimentation with this selection. ☺

Figure 3. Plots of annual yields of UCD selection 2-19E and variety standards at the Kern RVT

Accum. Yield 1996-2004

Price	19610 #/A
Carmel	21805
Nonpareil	22147
2-19E	23030
Padre	28330

CONTROLLER 5™ AND CONTROLLER 9™ ROOTSTOCKS

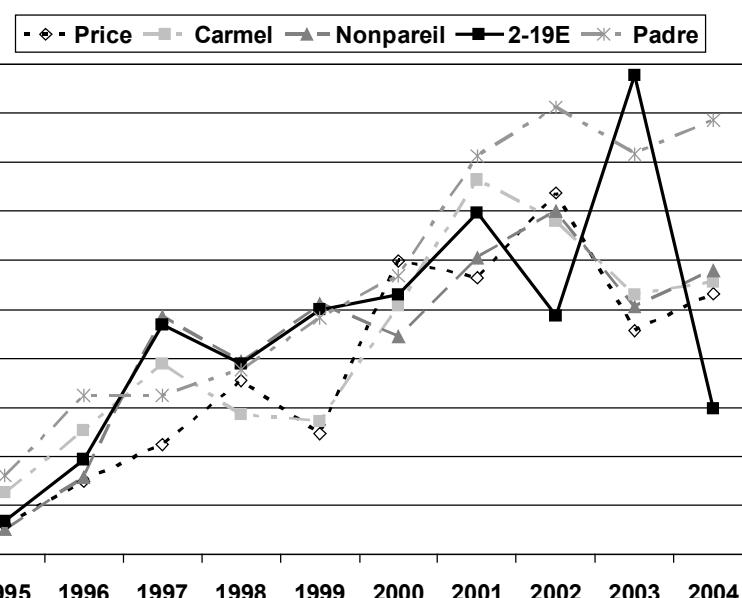
Tired of fighting excessive vegetative growth and tall trees in your peach or nectarine orchards? Consider trying new clonally propagated peach rootstocks released jointly by UC Davis and USDA ARS. 'CONTROLLER 5™' and 'CONTROLLER 9™' rootstocks were released in 2004 and are now available from commercial California fruit tree nurseries.

'CONTROLLER 5™' produces trees that are approximately 50–60% as vigorous as trees grown on standard Nemaguard rootstock and require virtually no summer pruning. The amount of brush removed in the dormant season is less than half that typically removed from trees on standard rootstocks. Although trees on 'CONTROLLER 5™' can grow to a height of 12 feet, they can be productively maintained at 8 feet, and orchard yields can be comparable to more vigorous orchards when tree spacing is adjusted appropriately.

'CONTROLLER 9™' produces trees that can be similar in size to trees on standard Nemaguard rootstock; however, they require very little, if any, summer pruning and substantially less dormant season pruning. Because the canopies of trees on 'CONTROLLER 9™' are naturally more open than trees on Nemaguard, maintenance of fruitwood is easier and trees can be equally productive with good fruit size. If growers wish to grow trees that are a couple of feet shorter than standard, this can be done more easily with 'CONTROLLER 9™' than with standard rootstocks.

Neither 'CONTROLLER 5™' nor 'CONTROLLER 9™' has as much rootknot nematode resistance as Nemaguard, but field level problems with rootknot nematodes have never been observed with these rootstocks. Because trees growing on these rootstocks are inherently less vigorous, tree management practices during establishment (the first year in the orchard) are critical, and it is more important to obtain high quality trees from the nursery than with standard rootstocks.

For more information see the April–June issue of California Agriculture or contact Ted DeJong at tmdejong@ucdavis.edu.



The UC Release of a New Dried Plum 'MUIR BEAUTY'™

by Carolyn DeBuse, Department of Plant Sciences, UC Davis

THE UC DAVIS DRIED PLUM CULTIVAR DEVELOPMENT PROGRAM has released a new dried plum, 'MUIR BEAUTY,'™ in January 2004. Through traditional horticultural breeding methods, the program has enlarged the germplasm and bred new generations of dried plum/prune (*Prunus domestica*) since its inception in 1985. The program is directed by Dr. Ted DeJong, with Carolyn DeBuse managing the breeding and trials. The research is supported by the California Dried Plum Board. The new dried plum 'MUIR BEAUTY'™ (UC # D6N-72) is an excellent dried plum that ripens earlier than both the UCD variety 'Sutter' and the commonly grown variety 'Improved French.'

'MUIR BEAUTY'™ was developed from a controlled pollination of 'Improved French' to 'Tulare Giant' in 1992. It was selected in 1997 from the Davis seedling orchards and propagated in both advanced selection research orchards—Wolfskill and Kearney—the following winter. The fruit of 'MUIR BEAUTY'™ matures in early August about 10 to 15 days before the industry standard 'Improved French' when grown at the same location.

The fruit is large, oval in shape, without a neck. The skin is a purple-rose color with a grayish medium thick waxy bloom. The fresh fruit flesh color ranges from a dark gold to a golden-orange. The fresh fruit soluble solids range from 20.0- 24.0 degrees Brix. The dried fruit is large, shiny black in color with larger but fewer wrinkles than 'Improved French.' The dried flesh retains the golden color of the fresh fruit. The pit of 'MUIR BEAUTY'™ is medium size and varies from semi-free to freestone. Limited pitting tests have resulted in easy pit removal. In taste tests, 'MUIR BEAUTY'™ is described as having a thick, meaty dried fruit texture with a pleasant well-balanced fruity flavor.

The tree characteristics of 'MUIR BEAUTY'™ are similar to both 'Improved French' and 'Sutter.' The tree is a vigorous grower with an upright form, and is a very productive regular bearer. 'MUIR BEAUTY'™ has been grown successfully on plum rootstocks 'Marianna' and 'Myrobalan.' The leaves are moderately large in size, deep green in color and relatively shiny.

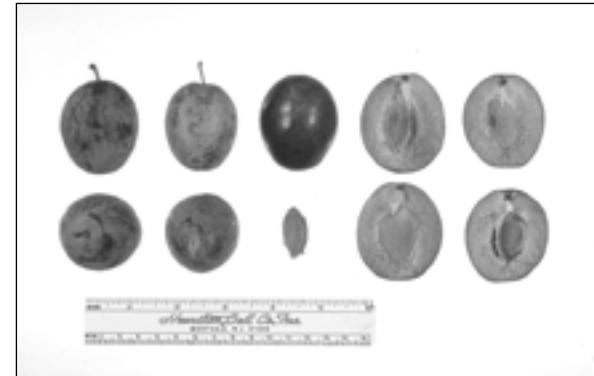
The tree is more precocious than 'Improved French,' flowering and fruiting at an early age. Fruit is borne on one-year-old shoots and older spurs. Full bloom is 7-10 days before 'Improved French.' 'MUIR BEAUTY'™ bloom overlaps with the bloom of 'Tulare Giant' very well. 'MUIR BEAUTY'™ is self-pollinating and is able to set a heavy crop without additional pollination. The fruit hangs well on the tree with no more than normal pre-harvest drop. A small mechanical tree-shaking trial removed all the fruit from the tree with no damage to fruiting spurs or tree structure. ☺



Above- 'MUIR BEAUTY'™ fruit on the branch.



Left- Full view of 'MUIR BEAUTY'™ fruit and branches.



photos courtesy of Carolyn DeBuse

Fruit and Nut Tree Sales & Distribution Update

by Cheryl Covert, FPS Distribution Manager

ANNUAL BUDWOOD SALES have been modest in the last couple of years, ratcheting down from average annual unit totals (buds and cuttings) in the hundred thousands in the late 90's and early 2000's, to totals of 86,547 units in fiscal year 2002-03 and 27,253 units in 2003-04. Distribution of almond material was down significantly in 2003-04 from the previous year, going from a little over 35,000 units to a little under 3,000 units in 2003-04. Distribution of peach/nectarine material was down by half in 2003-04 from the previous year, and total plum/prune units were a third of what they were in 2002-03.

In the same time period, combined distribution of cherry and plum seed tripled from 146 to 483 pounds, and cleaned *Betulaefolia* pear seed doubled from 91 to 186 ounces. Peach seed production remained steady at around 190,000 seeds both years. Demand for certified seed from FPS remains high, and we continue to sell out of all available cherry, peach and plum seed each year. New seed trees have been planted to begin replacing old trees whose production is beginning to decline, which we expect will also help to meet the strong demand for seed. In spite of annual fluctuations in plant material sales, the FPS fruit and nut tree program continues to function from year to year on an even financial footing thanks to the industry's commitment to supporting the program in the form of funding from the Fruit Tree, Nut Tree, and Grapevine Improvement Advisory Board (IAB) assessment.

Over the last two years, FPS has coordinated the release (and in some cases a pre-release distribution) of nine new UC fruit and nut tree cultivars developed by pomology breeders in the UC Davis Department of Plant Sciences. These include: 'MUIR BEAUTY'™ (D6N-72)



dried plum, released in January 2004; 'CONTROLLER 5'™ (K146-43) and 'CONTROLLER 9'™ (P30-135) peach-plum hybrid rootstocks, also released in January 2004; and 'RANDY,'™ 'GOLDEN HILLS'™ and 'LOST HILLS'™ pistachios, released in July 2005. FPS wrote and distributed release notices, coordinated with UCD Technology Transfer Services staff regarding completion of licensing by nurseries, determined allocations of material in short supply, and distributed allocated material to licensed nurseries. Anyone interested in licensing for these new cultivars should contact Clint Neagley at UCD Technology Transfer Services by phone at (530) 757-3471 or by email at chneagley@ucdavis.edu. Descriptions of the new cultivars can be found in this and prior editions of *FPS Fruit & Nut Tree News* or requested by contacting the FPS customer service desk at (530) 752-3590.

Pistachio Update

By Cheryl Covert, FPS Distribution Manager

UC Releases Three New Pistachio Varieties

In July of 2005, the university released under license agreement three new UC pistachio varieties developed by pomology breeders in the UC Davis Department of Plant Sciences. Though these varieties are not part of the FPS collection, FPS was asked to coordinate the initial budwood release and collect and distribute budwood at the field trial site in Kern County. The university has licensed a number of nurseries and growers to propagate these varieties for both self-use and sale to others. Licensing information can be obtained by contacting Clint Neagley at UC Davis Technology Transfer Services by phone at (530) 757-3471 or by email at chneagley@ucdavis.edu. Brief descriptions of the three new varieties follow. Please note that descriptions and features noted below are based on limited field testing, and performance may vary among locations and among management practices.

'RANDY'™ male pistachio—an early flowering male pistachio that may be used as a pollinizer for 'GOLDEN HILLS'™ and 'LOST HILLS'™. It has flowering synchrony with 'GOLDEN HILLS'™ and 'LOST HILLS'™ and may be used to cover the earlier part of the 'Kerman' flowering period during seasons of low chill in which 'Kerman' flowering is extended. 'RANDY,'™ was selected for high

continued on page 9

UCB#1 Pistachio Rootstock Trials

by Louise Ferguson, Extension Pomologist, Department of Plant Sciences, UC Davis

THE PISTACHIO ROOTSTOCK known as UCB#1 was named for the University of California at Berkeley Department of Plant Pathology by its inventor, Dr. Lee Ashworth. It is a hybrid of *Pistacia atlantica* pollinated by *P. integerrima*. The accompanying map and tables summarize UCB#1's characteristics relative to the other commercial rootstocks. In 1989, four 400-tree trials were planted to test UCB#1 against each of its parents, *P. integerrima* (known commercially as Pioneer Gold I or PGI) and *P. atlantica*, and another *atlantica* x *integerrima* hybrid, Pioneer Gold II (PGII). All plots had 100 replications of each rootstock. All data was taken on budded (cold tolerance) or producing trees. Yield was monitored through 2000. Salinity tolerance was monitored through 2002 and *Verticillium* tolerance through 2003. A freeze in December 1990 provided young tree cold tolerance data.

Rootstock Frost Tolerance

In the December 1990 freeze, young trees on *atlantica* rootstocks withstood the freeze best, followed by trees

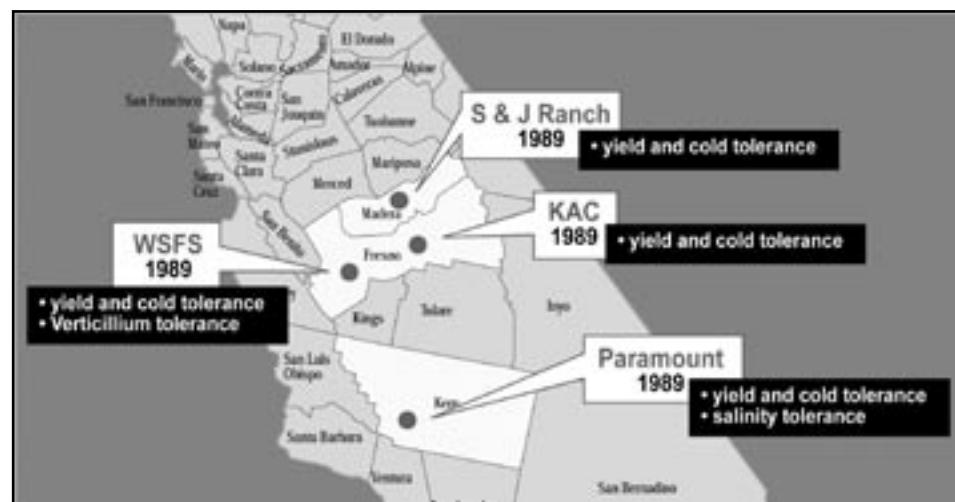
on UCB#1, PGII and PGI. While trees on all rootstocks suffered some frost damage, only trees on PGI rootstocks died.

Effect of Rootstock on Yield

Averaged over three trials, trees on UCB#1 rootstocks produced 15% higher yields than trees on PGII rootstocks, 16% more than trees on PGI rootstocks, and 40% more than trees on *atlantica* rootstocks. This covered only four good bearing years, 1997—2000. It is entirely possible that the mature trees on the *integerrima* parentage rootstocks, UCB#1, PGI and PGII, pruned to an equivalent canopy, could produce equally well.

Effect of Rootstock on Alternate Bearing

Trees on all four rootstocks had an average alternate bearing index of 0.67, even though there were significant differences in average yield. This confirms rootstock has little effect on alternate bearing, and that breeding to decrease alternate bearing should be done in scion breeding programs.



Cold Tolerance: December 1990

- 11 nights@ 4–12° F
- UC Berkeley 1: UCB#1 no death
- Pioneer Gold I: PGI 41% died

Production Recommendation: Salinity Tolerance

Soil water extract: Pistachios on all three rootstocks produce equally well up to:

- 8dS/m ECe
- 6720 ppm TDS
- 8 mmuho/cm

Limiting factors:

- soil saturation
- osmotic pressure
- Cl and Na uptake with *P. integerrima*

Tolerance Ranking of Pistachio Rootstocks in SJV 1989–2002

Rootstock	Limiting Factor (1) best > worst (4)			
	Frost	Yield	Salinity	Vert
<i>P. integerrima</i>	4	2	3	1
<i>P. atlantica</i>	1	4	1	3
PGII	3	3	2	4
UCB#1	2	1	2	2

Rootstock *Verticillium* Tolerance

Trees on PGI and UCB#1 rootstocks suffered no mortality in a field heavily infested with the soil-borne fungus *Verticillium*. However, trees on PGI rootstocks were heavily infested with the fungus. Trees on UCB#1 rootstocks were far less infected with the fungus but, when infected, appeared less vigorous. For this reason PGI rootstock is ranked higher in *Verticillium* tolerance than the UCB#1 rootstock. However, in the trial, even with a percentage of less vigorous trees, trees on UCB#1 rootstocks still produced higher yields than trees on PGI rootstocks. Trees on *atlantica* rootstocks suffered less mortality and obvious infection than trees on PGII rootstocks. Previously, *atlantica* rootstock was the standard for susceptibility to *Verticillium*.

Rootstock Salinity Tolerance

The salinity tolerance of the four pistachio rootstocks in this trial was tested two ways. A greenhouse trial subjected two-year-old budded rootstocks to salinities up to 12 dS/m in a sand tank where the roots could not escape the salinity and soil saturation could be avoided. The major parameter tested was growth. The second trial subjected established five-year-old budded trees to irrigation water salinities up 12 dS/m for seven sequential seasons. In this trial, soil saturation could not be avoided and the roots had the ability to escape the treatment area and obtain fresh water. The major parameter tested was yield.

The salinity tolerance results in the summarizing table are based primarily on the greenhouse trial, as the ability to control experimental conditions was greater. In this trial, trees on *atlantica* rootstocks demonstrated the best tolerance, followed by trees on UCB#1 and PGI. PGII was not in this greenhouse trial. In this trial, trees on PGI transported significantly more sodium and chloride to the scion versus trees on UCB#1, which sequestered these ions in the rootstock.

In the field trial, the major parameter tested was the decrease in scion yield under the highest salinity irrigation level, 12 dS/m, versus the control treatment. Soil water extract salinities averaged as high as 16 dS/m in this treatment. *Atlantica*, PGI and PGII rootstocks suffered less of a loss in yield: 10%, 15%, and 15% respectively versus the 35% decrease in yield of trees on UCB#1 rootstocks.

In both trials trees on all four rootstocks tolerated a soil water extract salinity of 8 dS/m. ☺

Pistachio Update...continued from page 7

pollen viability, pollen durability, and a high level of pollen production (based on visual evaluation). 'RANDY'™ flowers 1 to 3 weeks earlier than 'Peters,' the standard pollinator for 'Kerman.'

'GOLDEN HILLS'™ female pistachio—a female pistachio cultivar with improved performance characteristics compared to the standard female cultivar 'Kerman.' 'GOLDEN HILLS'™ produces a greater yield and higher percentage of split, edible nuts than 'Kerman' while maintaining a similar low percentage of loose shells and kernels. Harvest date is 2 to 4 weeks earlier than 'Kerman,' permitting growers to extend their harvest period and better utilize harvesting equipment and personnel. Earlier harvest may reduce disease in the northern production areas of California by permitting an earlier harvest before fall rains, as well as reducing navel orangeworm infestations

'LOST HILLS'™ female pistachio—a female pistachio cultivar that is being released as a potential replacement for 'Kerman,' the industry standard female cultivar. 'LOST HILLS'™ produced substantially higher percentages of split, edible nuts than 'Kerman' in 2003 when split percentages for 'Kerman' were very low. Nut size for 'LOST HILLS'™ is larger than for 'Kerman.' Harvest date is 2 to 4 weeks earlier than 'Kerman,' permitting growers to extend their harvest period and better utilize harvesting equipment and personnel. Earlier harvest may reduce disease in the northern production areas of California by permitting an earlier harvest before fall rains, as well as reducing navel orangeworm infestations.

UCB#1 Pistachio Rootstock Seed Production and Distribution

As the UCB#1 parent trees at FPS continue to mature and additional female trees have been incorporated into our enclosed pollination structure, production of UCB#1 seed has continued to rise. Since our initial tiny seed crop in 2002, the annual amount of FPS-produced seed rose to 250,500 seeds in 2003 and 509,000 seeds in 2004. Along with the smaller amounts of seed harvested from the original Kearney Agricultural Center tree, a total of 297,000 seeds were distributed in 2003 and 521,822 seeds in 2004. As we make steady progress in increasing our production, demand continues to be strong for UCB#1 seed, and we continue to sell out all available seed each year. Requests for seed from the 2005 UCB#1 crop should be submitted to the FPS office no later than November 15, 2005 for the fall 2005 allocation. ☺

Progress in DNA Identification of *Prunus*

by Bev Ferguson, Media Coordinator, Foundation Plant Services, UC Davis

LOCATED ACROSS THE ROAD from each other on the west side of the UC Davis campus, Foundation Plant Services (FPS) and the USDA-ARS National Clonal Germplasm Repository (NCGR) share some common interests and goals. One of these shared interests is in the characterization of *Prunus* cultivars using DNA "fingerprinting" techniques. The ability to compare plant material at multiple, specific DNA markers is tremendously useful to both organizations.

To Dr. Ed Stover, curator of NCGR, DNA marker analysis is an important tool in understanding the genetic variability of the collection - information that is helpful in determining where to search for new materials to add to the collection. DNA marker analysis may also be used to verify the identity of plant accessions maintained at the NCGR. *Prunus* species, including the cultivated crops almonds, apricots, cherries, peaches/nectarines and plums, as well as related wild species, comprise the second largest number of NCGR accessions.

Dr. Malli Aradhya, an NCGR geneticist, has been testing DNA markers (specific fragments of DNA) for their value in characterizing the wild and cultivated *Prunus*. His primary goal is to elucidate the genetic diversity and genetic structure of the accessions in the NCGR collection, answering questions of how closely related each species is to the others. This knowledge is of value to plant breeders and will enhance the usefulness of the collection. In collaboration with Jerry Dangl, manager of the FPS Plant Identification Lab, he is also working toward selecting a set of markers that will be able to uniquely characterize ("DNA fingerprint") all cultivars from the five *Prunus* crops.

Worldwide, there has been a tremendous amount of work done to map *Prunus* DNA, especially in peaches due to their smaller genome. After scrutinizing volumes



Dr. Malli Aradhya

of scientific research and considering a large number of microsatellite markers, Dr. Aradhya selected 27 markers most likely to meet his requirements. This selection was made, in part, by looking at peach as a standard due to its low genetic variability; if a marker shows a large amount of polymorphism (variation in size or forms) it is more likely to be variable across the genus *Prunus*.

The selected 27 markers were then screened against a panel of 26 *Prunus* species, including all major and minor crops (plum, peach, almond, apricot, sweet and sour cherries). The results enabled Dr. Aradhya to

select a set of 16 markers that worked well across the wide range of accessions tested. This set of 16 markers includes both discriminating (highly variable) and non-discriminating markers, since both types are useful for determining the genetic diversity across the wide genus. The final set of 16 markers are being used to profile two sets of genetic material—the first a diverse set of apricots and related wild species—and a second set comprised of plums and their related wild species. These screenings will be done multiple times to ensure consistent results.

In the coming years, a much larger number of microsatellite markers will be screened to identify a set of highly discriminatory markers that should distinguish the major *Prunus* cultivars grown in California and elsewhere. When final results are available, the set of markers will be further refined, focusing on only the most highly variable of the markers. The goal will be to identify markers that can uniquely fingerprint cultivars of the *Prunus* crops; a goal of great interest to FPS. FPS currently uses DNA fingerprinting technology for its grape and strawberry programs and looks forward to bringing this technology to the *Prunus* crops in the future. ☀

The FPS Foundation Orchard

by Mike Cunningham, FPS Fruit and Nut Tree Program Manager

ALL FRUIT AND NUT TREES planted at Foundation Plant Services must qualify for the California Registration and Certification Program before being planted in the FPS Foundation Orchard. This Foundation status budwood is then used to establish Registered Increase Block trees at private production nurseries throughout California. Registered Increase block source trees are used by the nursery to produce certified nursery trees for sale to the growers. Source documentation, in the form of certification tags, follows the propagation material and is used as proof of the source and testing protocols.

At FPS the foundation trees are either produced from disease indexed sources at the National Research Support Project #5 (NRSP5), or from budwood that is provided by other sources and disease tested at FPS. The testing program at NRSP5 qualifies the material that originates from there to be planted directly into the FPS Foundation Orchard. Cultivars that are from other sources, primarily UC plant breeding programs, are tested initially by ELISA and then on the Shirofugen Cherry bioassay. Upon successful completion of these two tests, the new cultivars are further budded to a panel of indicator trees consisting of six other *Prunus* varieties. A negative reading for this field index qualifies the candidate trees for the foundation planting at FPS.

The FPS Foundation Orchard is planted on a relatively isolated site on the UC Davis campus, as far from untested *Prunus* trees as possible. The current site meets the one-half mile geographical isolation from commercial plantings required by the CDFA R&C Program. The FPS Foundation Orchard undergoes an annual indexing rotation whereby two-thirds of the trees in the orchard are tested for *Prunus* Necrotic Ringspot Virus, Prune Dwarf Virus, and Apple Mosaic Virus by ELISA in the FPS laboratory. The other third is indexed using Shirofugen Cherry. In addition to this testing, a visual inspection is performed each spring and fall. State, county, and university personnel walk each row of trees looking for symptoms associated with virus or fungal problems. Trees with observable symptoms are either retested, if the symptoms are inconclusive, or removed from the orchard.

The final step in qualifying a tree for the California Registration and Certification Program is identification for trueness to variety. Experts with knowledge of the leaf and fruit characteristics expected for each cultivar are asked to look at the trees during budbreak, at flowering, and at fruit ripening times to be sure that the individual trees are good representatives of the variety. FPS is in the early stages of using DNA fingerprinting as a more definitive method of trueness to variety verification. ☈



Dr. Jerry Uyemoto, USDA Plant Pathologist (far left) discusses tree health during a recent inspection of the FPS Foundation Orchard. Clockwise from Dr. Uyemoto are: Susan McCarthy, CDFA Associate Agricultural Biologist; Sean Dayyani, CDFA Associate Agricultural Biologist; Dr. Adib Rowhani, FPS Plant Pathologist; Mike Cunningham, FPS Production Manager; and Patrick Thalken, CDFA Senior Agricultural Biologist.

Q-37 Revision Underway

by Robert Woolley, Owner and General Manager of Production, Dave Wilson Nursery

USDA's ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHIS) has initiated a revision of Quarantine 37, the federal statute that governs the importation of certain propagative plant materials into the United States. On December 10, 2004, APHIS promulgated an Advanced Notice of Proposed Rulemaking (ANPR) under Docket No. 03-069-1 in the Federal Register prompting comments by the California Department of Food and Agriculture, the California Association of Nurseries and Garden Centers and, jointly, the Society of American Florists and the American Nursery and Landscape Association.

As a followup to the ANPR, APHIS conducted a workshop in May, 2005 to evaluate criteria to be used in conjunction with the proposed new plant import category "Plant Taxa Excluded Pending Pest Risk Analysis." Although narrow in scope, the workshop addressed what may become a very important category for the regulation of plant materials. Under international agreements entered into by the United States, such as the International Plant Protection Convention, the World Trade Organization's Agreement on the Application of Sanitary and Phytosanitary Measures and the North American

Free Trade Agreement, countries are prohibited from excluding plant materials without proper justification.

Plant material must be infected with a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being "officially controlled" to justify quarantine controls. Although certification programs that reduce the amount of planting stock infected with many economically important pests such as grapevine leafroll, fanleaf and corky bark exist in the USA, these programs are voluntary and so do not constitute "official control" according to the international agreements. The existing US Federal quarantine regulations that prohibit the release of foreign propagation stock infected with uncontrolled endemic pests do not, therefore, comply with the international agreements and could be called unfair trade practices.

It may be acceptable to exclude plant materials for a period of time, however, until a pest risk analysis is completed. The workshop did not yield a consensus of opinion, and technical issues were raised about the legality (under trade treaties) of some of the measures that were proposed. ☺

Proposal for a National Clean Plant Network

by Robert Woolley, Owner and General Manager of Production, Dave Wilson Nursery

CREATION OF A NATIONAL CLEAN PLANT NETWORK (NCPN) to provide ongoing federal support for clean plant services has been proposed to the Cooperative State Research, Education and Extension Service (CSREES), USDA by the nurseries and growers who are served by clean plant programs for horticultural crops.

Current programs such as FPS and the National Regional Support Project (NRSP5), Washington State University, Prosser, will serve as the foundation for the network. New regional facilities are proposed to serve the Midwest, South and Northeast. Ongoing federal support is needed because the existing programs are not able to address nationwide clean stock needs, the FPS grape program has been running at a loss since the planting boom of the 1990s, and funding of the NRSP-5 is scheduled to be dramatically reduced in the near future. NRSP-5 has been supported by funds earmarked for

research, but now, clean plant programs are considered to be service activities that should not receive research monies.

Efforts are underway to obtain federal funding for CSREES to use to support the clean stock effort. We hope that the existing and new Clean Plant Network programs will be maintained and improved with these funds. Supporters of this effort have developed the following commentary:

Benefits of clean plant programs

Healthy planting stock is key to the cost-effective production of horticultural crops such as fruit trees, nut trees, and grapevines because healthy planting stock is easier to propagate, requires fewer chemical inputs, produces higher crop yields and better crop quality than common planting stock. Healthy planting stock is necessary for

U.S. agriculture to remain internationally competitive and economically viable. The most efficient approach to producing healthy planting stock is through programs which screen valuable plant selections for viruses and other diseases which can be spread by contaminated plant stock. In addition, quarantine services provided by clean stock programs reduce the chance of introduction of exotic pests that can be difficult and costly to control.

Background

Clean planting stock programs use disease detection, pathogen elimination techniques, and isolation strategies to produce, maintain, and propagate healthy planting stock. The technology used to create healthy planting stock is becoming faster, more accurate, and more expensive. U.S. programs must use state-of-the-art technology to stay competitive in the global market. It takes many years to establish healthy live plant collections that are the core of clean stock programs. Program continuity is critical because these collections must be continually protected from infection, monitored for disease, farmed, and documented. It could take decades of work to recover from disruptions in funding for a single year because of the risk to these collections.

Solution

Create a National Clean Plant Network (NCPN). Develop sustained national funding for clean planting stock programs for key horticultural crops. Provide funding to established centers that have the expertise, facilities, and climate necessary to efficiently produce, maintain, and distribute healthy planting stock for fruit trees, nut trees, and grapevines. Form an advisory committee that includes industry representatives and researchers from throughout the country to communicate priorities to the NCPN.

Impact

The NCPN will increase the availability of quality plants for planting for grapevine, fruit tree, and nut tree growers. Access to new varieties, rootstocks, and clones from both domestic and international producers will be improved. The risks associated with the introduction of exotic pests will be reduced. The productivity and competitiveness of these valuable specialty crops will be enhanced. Healthy planting stock helps assure the security of the country's food supply and maintain a supply of high quality, low cost products for consumers. ☐

CDFA Update

2005 is shaping up to be a busy year at the California Department of Food and Agriculture (CDFA). With several people hired or reassigned, the team has been reorganized as it faces the challenges of managing the nursery programs and a planned revision of the Fruit Tree and Grape Registration and Certification (R&C) Program regulations.

William Sandige, formerly the program supervisor of border stations, has been appointed branch chief of the Pest Exclusion Branch, which includes the interior and exterior quarantine programs and the nursery, seed and cotton programs.

In July 2004, David Godfrey became the program supervisor for the Nursery, Seed and Cotton Program. He replaced Umesh Kodira, who was promoted to chief of the Plant Pest Diagnostics Branch. Mr. Godfrey has in-depth experience with the nursery program, having managed the R&C Program from 1986 to 1993. He managed the seed services until his new appointment.

Patrick Thalken has been assigned oversight of the nursery regulatory operations and provides backup to the R&C Program. With the retirement of Donna Cunningham, Susan McCarthy has taken the reins of the R&C Program as well as the nematode control program. Sean Dayyani continues in his role as assistant for the R&C Program.

Mandy Chin, an information system technician, is handling updating the databases for the nursery licensing and seed licensing. Charlotte Vermeulen, the staff service analyst, will manage the Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board (IAB). She has become a familiar face at IAB meetings and at inspections of the grapevines and fruit and nut trees. Linda Taylor, Nicole Gambrell and Alicia Munoz provide office support to the nursery program.

Last year, the IAB voted to establish an ad hoc subcommittee to make recommendations for revising the CDFA regulations for grapevine and deciduous fruit and nut tree registration and certification. The regulations were put into effect in 1984, and need updating to bring them in line with the newer technologies and knowledge about diseases. Mr. Godfrey plans to work with Robert Woolley, IAB chairman, to recruit volunteers for the subcommittee. An initial meeting has been set for October 12, 2005.

Contact information for the CDFA nursery staff can be obtained at <http://www.cdfa.ca.gov/phpps>. ☐

Real-time RT-PCR (TaqMan®) Assays for the Detection of Tree Viruses

by Fatima Osman, Staff Research Associate, Foundation Plant Services, UC Davis

REAL-TIME RT-PCR (TaqMan®) assays were developed for the specific detection of *Prunus Necrotic Ringspot Virus* (PNRSV) and *Prune Dwarf Virus* (PDV). PNRSV and PDV belong to the Ilarvirus group and are known to infect every *Prunus* species. The detection of PNRSV in fruit tree tissues is problematic because the virus appears to be unevenly distributed throughout the plant, and this factor combined with seasonal fluctuations of viral concentrations can cause chronically infected plants to appear healthy. The main diagnostic test for PDV commonly used is a woody index inoculation using several *Prunus* species as indicators. However, the woody index cannot distinguish between PNRSV and PDV. Because reliable detection of PNRSV and PDV is required in phytosanitary certification programs, real-time PCR can be an important diagnostic tool.

The designed real-time PCR assays of PNRSV and PDV were derived from a number of virus isolates from tree varieties with a broad geographical distribution. The assays were validated against a range of different isolates found in the United States. Sample material was homogenized and divided for a comparative test for the detection of PNRSV and PDV by conventional and real-time RT-PCR. For such comparisons, both purified RNA as well as crude extract were used.

TaqMan® assays are based upon the polymerase chain reaction, but also utilize novel fluorescent detection chemistry. TaqMan® PCR utilizes a fluorescence probe, which is cleaved by Taq DNA polymerase during amplification, resulting in an increase in detectable fluorescence. This increase in fluorescence corresponds

to the amount of product amplified and is monitored in real-time during amplification. This gives TaqMan® PCR a number of significant advantages over conventional PCR. As TaqMan® uses closed-tube fluorescent detection, the need for post-amplification manipulation is removed, simultaneously reducing the staff input required and the risk of contamination. Significant improvements are also made to the pre-amplification stages of the method, whereby RNA has been purified by automated extractions.

Results (Table 1) showed that when performing real-time PCR for detection of PNRSV we were able to detect 100% of the samples using purified RNA, and 94% when using crude extract. Similarly, for PDV detection with real-time PCR, we were able to detect the virus in 70% of the samples when using purified RNA, and 58% when using crude extract. TaqMan® PCR was shown to detect the viruses under investigation in more samples than ELISA and conventional PCR.

TaqMan® PCR has the potential for multiplexing through the use of several probes labeled with different fluorescent dyes to detect two or more viruses in the same sample. TaqMan® diagnostic assays are expected to be particularly useful for large-scale applications in which high sensitivity, reliability, speed and quantitative data are required; such as detecting the level of infection when the virus is present in low concentration due to seasonal fluctuation, identification of virus reservoirs, field surveys, screening of germplasm for sources of resistance, and disease forecasting. *

	PNRSV					PDV				
	ELISA	Conventional PCR		Real-time TaqMan PCR		ELISA	Conventional PCR		Real-time TaqMan PCR	
	POS samples	RNA	GES	RNA	GES	36	RNA	GES	RNA	GES
		67	73	54	86		46	30	60	50
Total samples	86	86	86	86	86	86	86	86	86	86
Percentage	78%	85%	63%	100%	94%	42%	53%	35%	70%	58%

Table 1. Diagnostic test results for ELISA, conventional PCR and Real-Time TaqMan® PCR. POS samples are the number of samples that tested positive for the specific tests out of 86 total samples. RNA is the purified RNA extracted from the samples and GES represents the crude extract. Percentage (%) represents the percent positive samples detected by each method.

In Memory



Donna Marzolf

FPS Staff Member Donna Marzolf died at UC Davis Medical Center in Sacramento on Dec. 3, 2003, at age 69, after a lengthy battle with breast cancer.

Born April 24, 1934 on the family farm in Portal, North Dakota, Donna moved to Chico in 1970 and graduated with a degree in public administration from California State University Chico in 1982. In 1986, she moved to Woodland and three years later began working for Foundation Plant Materials Service, now Foundation Plant Services (FPS). She retired in October 1993, but we were fortunate to recall her to work half-time in 1994.

Donna was a favorite of customers and FPS staff alike. She understood the complicated records used to document the disease and identification status for plant materials at FPS and meticulously entered and checked much of the information in the database over the last 14 years.



Jack Wick

Jack Wick, longtime advocate of the California nursery industry, passed away peacefully at home surrounded by loved ones on May 14, 2004, at the age of 75. Loved by many, he was preceded in death by his wife, Marion Shirley Verbisky Wick.

In 1953, Jack went to work for Jack Anderson Landscape Nursery in Sacramento. During this time, he became an active member of the California Association of Nurserymen's (C.A.N.) Superior Chapter, serving on many committees and as President. In hearing the association had an opening, he applied, and on June 1, 1958, Jack became C.A.N.'s new Assistant Executive Secretary. In 1969, he was promoted to Executive Secretary. Upon his retirement in 1988, the membership had increased from 1,000 to 2,100, and the budget from \$80,000 to \$1.3 million. He saw the establishment of CANERS, the association's endowment for research and scholarship, in 1969.

Throughout his life Jack was continuously involved in community affairs. His many associations include the Sacramento Association of Retarded Children, the Sacramento Suburban Kiwanis Club, the Manor Recreation Swimming and Tennis Club in Sacramento, and the Sociedade Caboverdianos Norte De California Club. Upon his semi-retirement, Jack was



Photo courtesy of C.A.N.

made an Honorary Lifetime Member of the California Agricultural Commissioners and Sealers Association.

In 1978, Jack was selected as the Cal Poly, San Luis Obispo Alumnus of the Year for the College of Agriculture for his lifetime achievements. The Jack Wick Endowed Professorship was established in 1988 in his honor with a \$100,000 donation from the industry. Although semi-retired, Jack continued to work at the newly re-named California Association of Nurseries and Garden Centers as their Regulatory Consultant until his death. Jack's career in the nursery industry spanned over 50 years.

— Condensed and reprinted with permission from the *California Nurseriescape* magazine.

Dale Kester

Dale Kester of Davis died Nov. 21, 2003, after a long illness. Born July 28, 1922, on a 160-acre farm north of Ross, Iowa, he was 81 years old.



Kester was the first graduate student in the UCD department of pomology after the war, graduating in July 1951 and becoming a member of the faculty. Later, he was promoted to professor and pomologist, joining with Hudson Hartmann to teach plant propagation until 1987.

Long before that, Kester and Hartmann began writing a textbook for a plant propagation course. In 1959, the book became the first edition of "Plant Propagation: Principles and Practices." The textbook is in its eighth printing and has been translated into Russian, Spanish and Italian.

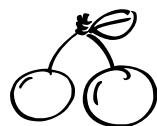
Kester had 120 papers published in journals and conference proceedings and presented six papers to the Western Region of the International Plant Propagators Society, of which he was founder. He received a stack of awards of awards and was a member of many academic organizations. He received the 2003 Research Award from the California Association of Nurseries and Garden Centers at its annual meeting.

Kester received the Curtis J. Alley Award in 1999 for his lifetime service to the International Plant Propagators Society and in 2002 received the society's International Award of Honor. His major research was with almonds and stone fruits. He introduced numerous *Prunus* rootstocks to the nursery industry, participated in many international symposiums and became a fellow of the American Society for Horticultural Science in 1980. In 1998, he was the Spenser Ambrose Beach Lecturer at Iowa State University.

— Condensed and reprinted from the *The Davis Enterprise*, Wednesday, December 3, 2003.



Providing high quality virus-tested, true-to-variety budwood is taken seriously by the staff of Foundation Plant Services. Pictured are (l to r): Field Manager Matt Gallagher, FPS Tree Program Manager Mike Cunningham, and field staff member Isaac Rainwater.



The California Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board (IAB) has been instrumental in funding Foundation Plant Services programs directly, and by providing funds for research to improve the tree program. Their support and active participation by members is invaluable to our success.

Upcoming Meetings

C.A.N.G.C. Deciduous Tree Meeting will be on October 4, 2005 at Sierra Gold Nursery.

Meeting to Discuss Revision of R&C Program

Regulations: October 12, 2005 from 9am-12noon in room 2005 in the Plant and Environmental Sciences Building, UC Davis campus. FPS is hosting this IAB-sponsored event, and CDFA staff will be present. Nurseries are invited to send representatives. Contact the FPS office at (530) 752-3590 for details.

NAPPO Annual Meeting: October 17-21, 2005 in Puerto Vallarta, Jalisco, Mexico. Contact Mario Puente at mpuente@senasica.sagarpa.gob.mx.

IAB Fall Meeting is scheduled for November 8, 2005. Time and place to be decided.

2005 FPS Annual Meeting will be held November 9, 2005 at the Beuhler Alumni and Visitors Center, UC Davis. Contact the FPS office at (530) 752-3590 for information or to register.



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